INVITATION FOR BID

Construction

B23-T102AL

Date issued: August 17, 2023

SOUTH CHEYENNE CANYON BRIDGE REPLACEMENT PROJECT

THE CITY OF COLORADO SPRINGS AND PIKES PEAK RURAL TRANSPORATION AUTHORITY

The City of Colorado Springs hereby solicits Fixed Unit Price (FUP) Bids, as detailed in this Invitation For Bids (IFB), for the South Cheyenne Canyon Bridge Replacement project.

This IFB is posted to BidNet Direct and the City of Colorado Springs' Procurement Services Website. It is available for all vendors free of charge, following free registration, at the BidNet Direct website.

SUBMITTALS FOR THIS PROJECT WILL ONLY BE ACCEPTED ON THE BIDNET DIRECT PLATFORM.

Please login to the following website to register (Free Registration) to submit a bid for this project. All required documents will be uploaded to the BidNet website. The City of Colorado Springs belongs to BidNet's Rocky Mountain e-Purchasing Group within BidNet.

https://www.bidnetdirect.com/

BIDNET Direct Support

800-835-4603

Estimated Project Magnitude: $1,000,000 - $1,500,000

SECTION I – BID INFORMATION

1.0 BID INFORMATION

Section I provides general information to potential Bidders, such as bid submission instructions and other similar administrative elements. This Invitation for Bid (IFB) is available on BidNet (www.bidnetdirect.com). All addenda or amendments shall be issued through BidNet and may not be available through any other source.

1.1 SPECIAL TERMS

Please note the following definitions of terms as used herein:

The term "City" means the City of Colorado Springs.

The term "Contractor" or "Consultant" means the Bidder whose offer is accepted and is awarded the contract to provide the products or services specified in the IFB.

The term "Offer" or "Bid" means a bid submitted in response to this IFB.

The term "Offeror" or "Bidder" means the person, firm, or corporation that submits a formal bid or offer and that may or may not be successful in being awarded the contract.

The term "Project" refers to South Cheyenne Canyon Bridge Replacement Project.

The term "Invitation for Bid" or "IFB" means this solicitation of formal, competitive, sealed bids from prospective bidders in which the intent is to award a contract to the resultant lowest responsible and responsive bidder.

1.2 BID ISSUE DATE

Invitation for Bid (IFB) Number B23-T102AL is being issued and posted on www.bidnetdirect.com on August 17, 2023.

1.3 SUBMISSION OF BIDS

A. Bids are to be submitted electronically on BidNet Direct (www.bidnetdirect.com). Please review the submission requirements **well in advance** of submission date and time, and allow for ample time to upload each required document. It is recommended that Offerors begin the submission process at least one (1) day in advance of the proposal deadline.

   Offerors are solely responsible to ensure all required bid documents are uploaded and submitted correctly, and that a **confirmation number** is obtained upon successful submission. Customer support for BidNet Direct may be reached at (800) 835-4603.

B. Bids shall be received on or before: Thursday, September 7, 2023 no later than 2:00PM MT. A public opening will be held via Microsoft Teams at that time. Web access and dial in information is below:

   Microsoft Teams meeting

   Join on your computer, mobile app or room device: Click here to join the meeting

Meeting ID: 237 563 877 527
Passcode: RodNvx
Download Teams | Join on the web
Or call in (audio only): +1 720-617-3426,,503414832#
Phone Conference ID: 503 414 832#

C. Bid bond is required if total bid exceeds $50,000.00. (Also see 1.22)

D. The cost of Bid preparation is not a reimbursable cost. Bid preparation shall be at the Bidder's sole expense and is the Bidder's total and sole responsibility.

1.4 PRE-BID CONFERENCE

A pre-bid meeting will be held at 12:30PM MT, Wednesday, August 23, 2023. This meeting is highly encouraged but not mandatory. Attendees may participate in person or via Microsoft Teams:

Colorado Springs City Hall
Academy Conference Room
107 N. Nevada Avenue, Suite 121
Colorado Springs, CO 80903

OR

Microsoft Teams meeting

Join on your computer, mobile app or room device: Click here to join the meeting
Meeting ID: 295 781 478 011
Passcode: zaxJZX
Download Teams | Join on the web
Or call in (audio only): +1 720-617-3426,,586853894#
Phone Conference ID: 586 853 894#

1.5 LATE BIDS/LATE MODIFICATIONS OF BIDS

Bids, withdrawals or modifications of Bids received after the time set for opening, as designated in 1.3 above, are considered "late bids", and will not be accepted by the City, except as provided for in the City of Colorado Springs Procurement Rules and Regulations and approved by the Procurement Services Manager. Bidders are solely responsible for insuring their bids arrive on time and to the place specified in this Invitation for Bid.

1.6 MISTAKES IN BIDS - CONFIRMATION OF BID

If it appears from a review of a Bid that a mistake has been made, the Bidder may be requested to confirm its Bid in writing. Situations in which the confirmation may be requested include obvious, apparent errors on the face of a Bid or a Bid unreasonably lower than the other Bids submitted. All mistakes in Bids will be handled in accordance with the City of Colorado Springs Procurement Rules and Regulations**.**

1.7 PROCUREMENT RULES AND REGULATIONS

All formal IFBs advertised by the City of Colorado Springs are solicited in accordance with the City's Procurement Rules and Regulations. The City's Procurement Rules and Regulations can be reviewed and/or downloaded from the City's Procurement Services Division website at www.coloradosprings.gov. Any discrepancies or conflicting statements, decisions regarding bidding irregularities, or clarifications regarding clauses or specifications will be rectified utilizing the City's Procurement Rules and Regulations, when applicable. It is the Bidder's responsibility to advise the Contracts Specialist listed in this IFB of any perceived discrepancies, conflicting statements, or problems with clauses or specifications prior to the Bid opening date and time.

1.8 MINOR INFORMALITIES/IRREGULARITIES IN BIDS

A. A minor informality or irregularity is one that is merely a matter of form and not of substance. It also pertains to some immaterial defect in a Bid or variation of a Bid from the exact requirements of the invitation that can be corrected or waived without being prejudicial to other Bidders. The defect or variation is considered immaterial when the effect on price, quantity, quality, or delivery is negligible when contrasted with the total cost or scope of the goods and/or services being acquired.

B. If the City Procurement Services Division determines that a Bid submitted contains a minor informality or irregularity, then the Procurement Services Manager shall either give the Bidder an opportunity to cure any deficiency resulting from the minor informality or irregularity or waive the deficiency, whichever is to the advantage of the City. In no event will the Bidder be allowed to change the Bid amount. Examples of minor informalities or irregularities include but are not limited to the following:

    1. Bidder fails to sign the Bid, but only if the unsigned Bid is accompanied by other material evidence, which indicates the Bidder's intention to be bound by the unsigned Bid (such as Bid security, or signed cover letter which references the Bid Number and amount of Bid).
    2. Bidder fails to acknowledge an Amendment, although this may be considered a minor informality only if the Amendment, which was not acknowledged, involves only a matter of form or has either no effect or merely a negligible effect on price, quantity, quality, or delivery of the item or services bid upon.

1.9 REJECTION OF BIDS

The Procurement Services Manager has the authority to reject any Bid based on, but not limited to, the following:

A. Any Bid that fails to conform to the essential requirements of the Invitation for Bids shall be rejected.

B. Any Bid that does not conform to the applicable specifications shall be rejected unless the IFB authorizes the submission of alternate bids and the items or services offered as alternates meet the requirements specified in the IFB.

C. A Bid that fails to conform to the specified delivery schedule.

D. A Bid shall be rejected when the Bidder imposes conditions that would modify requirements of the IFB or limit the Bidder's liability to the City, since to allow the Bidder to impose such

conditions would be prejudicial to other Bidders.

For example, Bids shall be rejected in which the Bidder:

1. Protects against future changes in conditions, such as increased costs, if total possible costs to the City cannot be determined. This includes failure to completely fill out required bid schedule.
2. Fails to state a price and indicates that price shall be “price in effect at time delivery”.
3. States a price but qualifies it as being subject to “price in effect at time of delivery”.
4. Takes exceptions to the IFB terms and conditions.
5. Inserts the Bidder’s terms and conditions.
6. Limits the rights of the City under any Contract/Invitation for Bid clause.

E. Any Bid in which the price is considered to be unreasonable or is over budget.

F. Any Bid if the prices are determined to be unbalanced.

G. Bids received from any person or contractor that is suspended, debarred, proposed for debarment, or under investigation for fraud, including failure to pay federal, state, local or city taxes.

H. When a bid guarantee is required and the bidder fails to furnish the guarantee in accordance with the requirements of the IFB.

I. Low Bids received from bidders who are determined to be non-responsible in accordance with the City’s Procurement Rules and Regulations.

J. Any Bid that was prepared and submitted by a vendor who has been determined by the Procurement Services Manager to have an unfair advantage over other Bidders. Examples of an unfair advantage include, but are not limited to, the following:

1. A previous or prior employee who in the last six (6) months was directly involved in the design or specification preparation of the competed procurement.
2. A vendor who was directly involved in design or specification preparation of the competed project either for pay or voluntarily.

1.10 ESTIMATED QUANTITIES

If the Bid Form (Schedule A) herein contains estimated quantities, this provision is applicable. The quantities listed for each of the items in the Bid Form are only estimated quantities. Contractors are required to bid a firm unit price for each item specified. The actual quantities ordered may fluctuate up or down. The unit prices proposed by each Bidder will remain firm and will not be re-negotiated if the estimated quantities are not met or are exceeded. This clause will take precedence over any/all other estimated quantity clauses that conflict with this clause.

For bidding purposes, if there is a conflict between the extended total of an item and the unit price, the unit price shall prevail and be considered as the amount of the Bid. All unit prices shall include all necessary overhead and profit. Items not listed in the Bid Form such as overhead, profit, mobilization, de-mobilization, bonding, etc. shall be distributed throughout the Bidder's Unit Prices for the items listed on the Bid Form.

1.11 NUMBER OF COPIES

Bidders shall submit one electronic copy of each required document on the BidNet Direct Procurement Platform (www.bidnetdirect.com. Upon submission, all Bid documents shall become and remain the property of the City.

1.12 IDENTIFICATION OF BID

Bids must be submitted to the BidNet Direct Procurement Platform (www.bidnetdirect.com). The solicitation number and Offeror name must be clearly marked within the Bid.

Bid No.: B23-T102AL
Due Date and Time: September 7, 2023, 2:

1.13 SALES TAX

The successful Offeror, if awarded a contract, shall apply to the Colorado Department of Revenue for a tax-exempt certificate for this project. The certificate does not apply to City of Colorado Springs Sales and Use Tax which shall be applicable and should be included in all bids and proposals. The tax exempt project number and the exemption certificate only apply to County, PPRTA (Pikes Peak Rural Transportation Authority), and State taxes when purchasing construction and building materials **to be incorporated into this project**.

Furthermore, the exemption **does not** include or apply to the purchase or rental of equipment, supplies or materials that **do not become a part of the completed project or structure**. In these instances, the purchase or rental is subject to full taxation at the current taxation rate.

The Offeror and all subcontractors shall include in their Offer City of Colorado Springs Sales and Use Tax on the work covered by the offer, and all other applicable taxes. Any increase in applicable sales or use tax occurring after the contract has been let shall be borne by the contractor and not passed through to the City.

Forms and instructions can be downloaded at the City of Colorado Springs Website:https://coloradosprings.gov/sales-tax/page/additional-sales-tax-forms?mlid=30771.
Questions can be directed to the City Sales Tax Division at (719) 385-5903 or Construction_SalesTax@ColoradoSprings.gov.

Our Registration Numbers are as follows:
City of Colorado Springs
Federal I.D.: 84-6000573
Federal Excise: A-138557
State Sales Tax: 98-03479

1.14 PREPARATION OF BID OFFER

A. Bidders are expected to examine the drawings, specifications, bid documents, proposed contract forms, terms and conditions, and all other instructions and solicitation documents. Bidders are expected to visit the job-site to determine all requirements and conditions that will affect the work. Failure to do so will not relieve a Bidder from their responsibility to know what is contained in this Invitation for Bid, or site conditions affecting the work.

B. The Bidder certifies that it has checked all of its figures and understands that the City will not be responsible for any errors or omissions on the part of the Bidders in preparing its Bid.

C. All items, (unless the invitation specifically states otherwise) including any additive or deductive alternates on the Bid Form, must be completely filled out or the Bid will be determined non-responsive and ineligible for consideration for award.

D. The Bidder declares that the person or persons signing this Bid is/are authorized to sign on behalf of the firm listed and to fully bind the Bidder to all the requirements of the IFB.

E. The Bidder certifies that no person or firm other than the Bidder or as otherwise indicated has any interest whatsoever in the Bid or the contract that may be entered into as a result of the Bid and that in all respects the Bid is legal and firm, submitted in good faith without collusion or fraud.

F. By submitting a Bid the Bidder certifies that it has complied and will comply with all requirements of local, state, and federal laws, and that no legal requirements have been or will be violated in making or accepting this Bid. Bidders are expected to review the City's Procurement Rules and Regulations, which will be used when determining whether a Bidder is responsive and responsible and awarding contracts in the best interest of the City.

G. If there is a discrepancy between the unit price and the total price, the unit price shall be used to determine the applicable total price. Bidders are responsible for including profit and overhead associated with the project when determining their unit prices.

1.15 BASIS OF AWARD

A. The City of Colorado Springs intends to award a contract to the lowest responsive and responsible Bidder whose Bid meets the requirements and the criteria set forth in the Invitation for Bids and is determined to be in the best interest of the City.

B. The City reserves the right to reject any or all Bids and to waive informalities and/or irregularities in a Bid. Whether or not a contract is awarded as a result of this Invitation for Bid, as stated above, Bid preparation costs are not reimbursable.

C. Total Bid will be evaluated and awarded as follows: It is the City's intent to award this bid based on the TOTAL BASE BID, not on a line item by line-item basis.

1.16 PERIOD OF ACCEPTANCE

The Bidder agrees that its Bid shall remain open for acceptance by the City for a period of sixty (60) calendar days from the date specified in the IFB for receipt of Bids.

1.17 CONTRACT AWARD

The signature of the Bidder indicates that within ten (10) calendar days from acceptance of its Bid, it will execute a contract with the City and, if indicated in this IFB, furnish a project specific Certificate of Insurance naming the City as Additional Insured, furnish Performance, Labor and Materials, Payment and Maintenance Bonds and any other documents required by the Specifications or Contract Documents.

1.18 NOTICE TO PROCEED

Work may not start under any awarded contract until a written notice to proceed is issued by the City. The City may issue the Notice to Proceed any time after the contract is signed and, if required, insurance and bonds have been provided in accordance with 1.22 below.

1.19 AMENDMENTS TO THE SOLICITATION

Amendments are also referred to as addendum or addenda; and these terms shall be considered synonymous. It is the Bidder's responsibility to contact the Contracts Specialist listed in 1.21 below to confirm the number of Amendments which have been issued.

A. If this solicitation is amended, then all specifications, terms and conditions, which are not specifically amended, remain unchanged.

B. Bidders shall acknowledge receipt of any amendment to this solicitation by signing and returning the amendment and by identifying the amendment number and date in the space provided on the form for submitting a Bid.

C. Acknowledged amendments must be received prior to Bid opening. Bidders are encouraged to include signed addenda or initialed acknowledgment with returned Bids.

1.20 EXPLANATIONS TO PROSPECTIVE OFFERORS

Any prospective Bidder desiring an explanation or interpretation of the IFB documents, drawings, specifications, etc., must request it in writing within ten days of the Bid due date to allow enough time for a reply to reach all prospective offerors before the time for submission of offers. Oral explanations or instructions given before the opening of Bids will not be binding. Any information provided to a prospective Bidder during the Bid preparation stage will be promptly furnished to all other prospective Bidders as an amendment to the solicitation, if that information is necessary in submitting Bids or if the lack of it would be prejudicial to other prospective Bidders.

1.21 QUESTIONS AND OTHER REQUESTS FOR INFORMATION

All questions shall be submitted electronically via the BidNet Direct Procurement Platform (www.bidnetdirect.com) to the following Contract Specialist. All questions must be received no later than **3:00 PM MT Friday, August 25, 2023**

Requests for Information, support and questions shall be directed to:

Alyssa Lee
Alyssa.Lee@ColoradoSprings.gov

DO NOT CONTACT ANY OTHER INDIVIDUAL AT THE CITY OF COLORADO SPRINGS REGARDING THIS SOLICITATION.

1.22 SECURITY REQUIREMENTS

A. Bid Security

1. If the total amount of the accumulative Bid is more than $50,000, or a bond is required elsewhere in this IFB, the Bidder is required to furnish with their Bid a bid security in the form of a bank certified check, bank cashier's check or a one-time bid bond underwritten by a company licensed to issue bonds in the State of Colorado and acceptable to the City in an amount equal to at least 5% of the total amount of the Bid payable without condition to the City.
2. The Bid security shall guarantee that the Bid will not be withdrawn or modified for a period of sixty (60) calendar days after the time set for the receipt of Bids, and, if the Bid is accepted within those sixty (60) calendar days, that the person, firm or corporation submitting same shall within ten (10) calendar days after being notified of the acceptance of its Bid, enter into a Contract and furnish the required bonds and all insurance certificates called for under this Invitation for Bid.
3. The Bid bonds of unsuccessful Bidders will not be returned to the respective Bidders unless a self-addressed, stamped envelope is provided along with a written request for bid bond return. However, if a certified check or a cashier's check is submitted as Bid security, it will be returned as soon as possible after the lowest responsive and responsible Bidder is determined and a contract is executed.
4. In the event the Bidder whose Bid is accepted fails to enter into the contract and/or furnish the required contract bonds, its certified check, cashier's check or bid bond will be forfeited in full to the City.

B. Performance, Labor and Materials Payment, and Maintenance Bonds

1. For contracts in excess of $50,000, the Contractor shall furnish to the City each of the following: a Performance Bond, a Labor and Materials Payment Bond, and a Maintenance Bond. Each such bond shall be in the amount of one hundred percent (100%) of the contract price. Bonds shall be submitted within ten (10) calendar days after notification of award of a Contract. The cost of all bonds shall be included in Contractor's Bid.
2. Bonds shall:
   a. Be for the full amount of the Contract price.
   b. Guarantee the Contractor's faithful performance of the work under the Contract, and the prompt and full payment for all labor and materials involved therein.
   c. Guarantee protection to the City against liens of any kind.
   d. Be from a surety company operating lawfully in the state of Colorado and accompanied by an acceptable "Power-of-Attorney" form attached to each bond copy.
   e. Be issued from a surety company that is acceptable to the City.
   f. Be submitted using the forms in the Exhibit section of this IFB or such forms as are approved by the City Attorney's Office.

1.23 SPECIFICATIONS AND DRAWINGS

No Fee solicitations: Specifications and Drawings are normally included in the IFB. If Specifications and Drawings are too large to be included in the IFB, all interested Bidders may obtain one copy of the Project Specifications and a set of the Project Drawings for use in preparing Bids from the City Procurement Services Division office. If the Bidder requires additional sets, it is the Bidder's responsibility to duplicate any additional copies, at its own expense.

1.24 TYPE OF CONTRACT

As a result of this Invitation for Bids, it is the City's intention to award a fixed unit price Contract based on the prices offered by the lowest responsive and responsible bidder. Contract prices shall remain firm and fixed throughout the Contract performance period.

1.25 F.O.B. DESTINATION

Unless otherwise specified in the Invitation for Bid, all goods, materials, supplies, equipment or services covered by this IFB shall be delivered F.O.B. Destination shall be the location indicated in the awarded Contract or Purchase Order.

1.26 BID RESULTS

The City does not mail Bid results or tabulations. However, Bid tabulations are posted and can be downloaded from BidNet. Bidders submitting Bids in response to this solicitation may also request the Bid tabulation for this solicitation via email to the Contracts Specialist indicated as the point of contact for this solicitation.

1.27 APPROPRIATION OF FUNDS

A. In the event funds are not appropriated in whole or in part sufficient for performance of the City's obligations under this IFB, or appropriated funds may not be expended due the City Charter spending limitations, then the City, without compensation to Bidders, may terminate or cancel this IFB or not award any contracts under this IFB.

B. In accordance with the Colorado Constitution and City Charter, performance of the City's obligations under any resultant Contract will be expressly subject to appropriations of funds by the City Council, and, in the event the budget or other means of appropriation for any year of the Contract fails to provide funds in sufficient amounts to discharge such obligations, such failure (i) shall act to terminate the Contract at such time as the then-existing and available appropriations are depleted, and (ii) neither such failure nor termination shall constitute a default or breach of the Contract, including any sub-agreement, attachment, schedule, or exhibit thereto, by the City.

1.28 PERIOD OF PERFORMANCE

The Contractor shall complete all work within **450 Calendar Days** after the Notice to Proceed. The Contractor shall start work promptly after receipt of the Notice to Proceed and Pre-Construction Meeting and continue to work diligently until all work is completed and accepted by the City.

1.29 BID DOCUMENTS

The following comprise this Invitation for Bid.

Schedule A – Bid Form
Schedule B – General Construction Terms and Conditions
Schedule C – Special Contract Terms and Conditions
Schedule D – General Specifications
Schedule E – Special and Technical Specifications
Schedule F – Exhibits

The following listed documents must be included with your Bid in order for your Bid submittal to be considered responsive.

Schedule A – Bid Form
Exhibit 2 – Minimum Insurance Requirements Form
Exhibit 3 – Qualification Statement
Exhibit 4 – Bid Certification and Representations and Certifications
Exhibit 5 – Bid Bond if applicable (see 1.23)
Acknowledged Addenda, if issued

SECTION II – SCHEDULES

Schedule A – Bid Form
Schedule B – General Construction Terms and Conditions
Schedule C – Special Contract Terms and Conditions
Schedule D – General Specifications
Schedule E – Special and Technical Specifications
Schedule F – Exhibits

SCHEDULE A – BID TAB

Offerors must complete and upload the excel document “SCC Schedule A.xlsx”

SCHEDULE B – GENERAL CONSTRUCTION TERMS AND CONDITIONS

Schedule B -- General Construction Terms and Conditions, Version 100316 are hereby incorporated by reference, with the same force and effect as if they were given in full text. Upon request, the City will make their full text available. Also, the full text of a clause may be accessed electronically at this address:

https://www.coloradosprings.gov/finance/page/procurement-regulations-and-documents

The referenced General Construction Terms and Conditions will be incorporated in the resultant Contract.

SCHEDULE C – SPECIAL CONTRACT TERMS AND CONDITIONS/SPECIAL SOLICITATION PROVISIONS

In addition to the special contract terms and conditions listed below, the City's sample contract (see Exhibit 1) contains contract terms and conditions.

ADA STANDARDS

It is a requirement of the City and required by law that any new or renovated facility meet the scoping and technical requirements of the 2010 ADA Standards for newly designed and constructed or altered local government facilities, public accommodations, and facilities. The selected Design Professional shall design the project so it both conforms to the 2010 ADA Standards, as applicable and as amended, and is readily accessible to and usable by individuals with disabilities. The selected Contractor shall build the project so it both conforms to the 2010 ADA Standards, as applicable and as amended, and is readily accessible to and usable by individuals with disabilities. Facilities that are designed, constructed, and/or altered facilities that meet or exceed the IBC 2015/ANSI A117.1 2009, used by Pikes Peak Regional Building Department, will be accepted as meeting or exceeding the 2010 ADA Standards.

PPRTA FUNDED PROJECTS SPECIAL PROVISIONS (Revised August 17, 2016)

PPRTA Funding Special Provision: Joint Contracts – City of Colorado Springs (the "City") and the Pikes Peak Rural Transportation Authority (the "PPRTA").

This Contract is a joint contract between the Contractor/Consultant (hereinafter the "Contractor"), the City, and the PPRTA. The parties therefore agree to the following:

1. Conflicts: This PPRTA Special Provision shall supersede any contrary provision of this Contract.

2. Parties: The Contractor acknowledges and understands that this Contract is funded in whole or in part by the PPRTA and administered by the City. Both the City and the PPRTA are Parties to this Contract.

3. Payments: The Contractor acknowledges and understands that all payments under this Contact shall be made to the Contractor by the PPRTA. PPRTA funding obligations shall be paid by PPRTA warrants. In the event there is joint City / PPRTA funding, then payment to the Contractor shall consist of warrants from the City and warrants from the PPRTA. The Contractor agrees to accept all payments made or proffered by the PPRTA under this Contract.

4. Bonds: All bonds under this Contract shall include the City and the PPRTA as Obligees.

5. Insurance: All insurance policies provided by the Contractor or by any sub-contractor for any work pursuant to contracts with the Contractor pursuant to this Contract shall name both the City and the PPRTA as additional insureds and shall waive all rights of subrogation, in accord with the terms of this Contract, against both the City and the PPRTA.

6. Law: This Contract is subject to and shall be interpreted under the law of the State of Colorado, and the Charter, City Code, Ordinances, Rules and Regulations of the City of

Colorado Springs, Colorado, a Home Rule City; the Resolutions and Rules and Regulations of the PPRTA. Court venue and jurisdiction shall exclusively be in the Colorado District Court for El Paso County, Colorado. The Parties agree that this Contract shall be deemed to have been made in, and the place of performance is deemed to be in, the City of Colorado Springs, El Paso County, State of Colorado. The Contractor shall ensure that the Contractor and the Contractor's employees, agents, officers and subcontractors are familiar with, and comply with, applicable Federal, State, and Local laws and regulations as now written or hereafter amended.

7. Appropriation and availability of funds: In accord with the Colorado Constitution, Article X, Section 20, and the City Charter, performance of the City's obligations under this Contract is expressly subject to appropriation of funds by the City Council for this Contract and the availability of those appropriated funds for expenditure. Further, in the event that funds are not appropriated in whole or in part sufficient for performance of the City's obligations under this Contract, or appropriated funds may not be expended due to Constitutional or City Charter spending limitations, then the City and the PPRTA may terminate this Contract without compensation to the Contractor. Performance of the PPRTA's obligations under this Contract are expressly subject to appropriation of funds by the PPRTA and the availability of those funds for the payment of obligations incurred under this Contract. Further, in the event that PPRTA funds are not appropriated in whole or in part sufficient for performance of the PPRTA's obligations under this Contract, or appropriated funds may not be expended due to legal limitations or non-availability, then the City and the PPRTA may terminate this Contract without compensation to the Contractor.

8. Indemnification: Subject to the provisions of Section 13-50.5-102(8), C.R.S., to the extent applicable to this Contract, the Contractor agrees that the Contractor shall indemnify, defend and hold harmless the PPRTA, its officers, employees and agents, from and against any and all loss, damage, injuries, claims, cause or causes of action, or any liability whatsoever resulting from, or arising out of, or in connection with the Contractor's obligations or actions under this Contract. To the extent the terms of Section 13-50.5-102(8), C.R.S., are applicable to this Contract, the Contractor and the PPRTA hereby agree for the purposes of this Section that: (i) "the degree or percentage of negligence or fault attributable" to the Contractor as used in Section 13-50.5-102(8)(a), C.R.S., shall be conclusively determined by a trial court at the state or federal level and (ii) the term "adjudication" used in Section 13-50.5-102(8)(c), C.R.S., shall mean a trial court order at the state or a federal level.

9. Governmental Immunity: Nothing in this Contract or in any actions taken by the PPRTA pursuant to this Contract shall be construed or interpreted as a waiver, express or implied, of any of the immunities, rights, benefits, protections, or other provisions of the Colorado Governmental Immunity Act, Sections 24-10-101, *et seq*., C.R.S.

10. Warranties: All warranties provided by the Contractor under or pursuant to this Contract to the City shall also apply to the PPRTA.

11. Final Payment: Final payment under this Contract shall be made in accord with the terms of this Contract, except that final payment shall be made by the PPRTA, and the making and acceptance of final payment shall constitute a waiver of all claims by the Contractor against the City and the PPRTA.

12. Termination or default of Contract: In all Contract provisions giving the City the right to terminate, for convenience or otherwise, or giving the City rights in the event of default by the Contractor, the term City shall also apply to the PPRTA.

13. Contract Changes: Any changes to the Contract, including but not limited to additions and/or deletions, which are not insignificant to the scope, design and requirements of the Contract shall be subject to prior approval of the PPRTA.

SCHEDULE D – GENERAL SPECIFICATIONS

The below-listed documents follow this page:

1. Cheyenne Canyon Geo Rpt.pdf
2. SCCB_Final Drainage Report Reduced.pdf
3. SCCB_Final-Plans reduced.pff
4. SCCB_SUE.pdf

South Cheyenne Canon Bridge Replacement Project

Final Drainage Report

Contract R010069 | August 2023

City of Colorado Springs

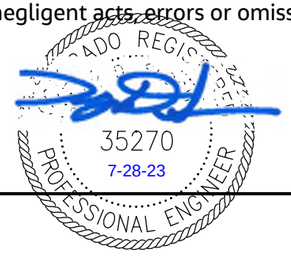
Contents

Appendixes

List of Figures and Tables

Engineers Statement

This report and plan for the drainage design of South Cheyenne Cañon bridge replacement was prepared by me (or under my direct supervision) and is correct to the best of my knowledge and belief. Said report and plan has been prepared in accordance with the City of Colorado Springs Drainage Criteria Manual and is in conformity with the master plan of the drainage basin. I understand that the City of Colorado Springs does not and will not assume liability for drainage facilities designed by others. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.



Signature (affix seal):

Colorado P.E. No. Date

City of Colorado Springs:

Filed in accordance with Section 7.7.906 of the Code of the City of Colorado Springs, 2001, as amended.

For City Engineer Date

City Project Manager's Statement

I hereby certify South Cheyenne Cañon bridge replacement project shall be constructed according to the design presented in this report. I further understand that field changes must be reviewed by the City Review Engineer to ensure conformance with the original design intent. I am employed by and perform engineering services solely for the City of Colorado Springs, and therefore am exempt from Colorado Revised Statute Title 12, Article 25, Part 1 according to § 12-25-103(1), C.R.S.

For City Project Manager Date

I. Introduction and Purpose

The South Cheyenne Cañon Bridge Replacement Project consists of the replacement of the existing structurally deficient bridge (CM02.35W031S) at the intersection of South Cheyenne Canyon Road and Mesa Avenue. The project also realigns the intersection to provide improved traffic flow.

A. Purpose

The purpose of this Drainage Report is to document the methodology, assumptions, and results of the analysis completed of *South Cheyenne Creek* associated with the proposed project. A one-dimensional HEC-RAS computer model has been created to analyze South Cheyenne Creek in the project vicinity. The hydraulic analysis is discussed in further detail in Section III of this report.

B. Project Location

The project is located on South Cheyenne Creek within Township 14 South, Range 67 West, Section 34 west of the 6th Principal Meridian in Colorado Springs, Colorado. Refer to Figure 1 for the location of the proposed project.

The bridge is approximately 2,000 feet southwest of Evans Avenue and the confluence of North and South Cheyenne Creeks.

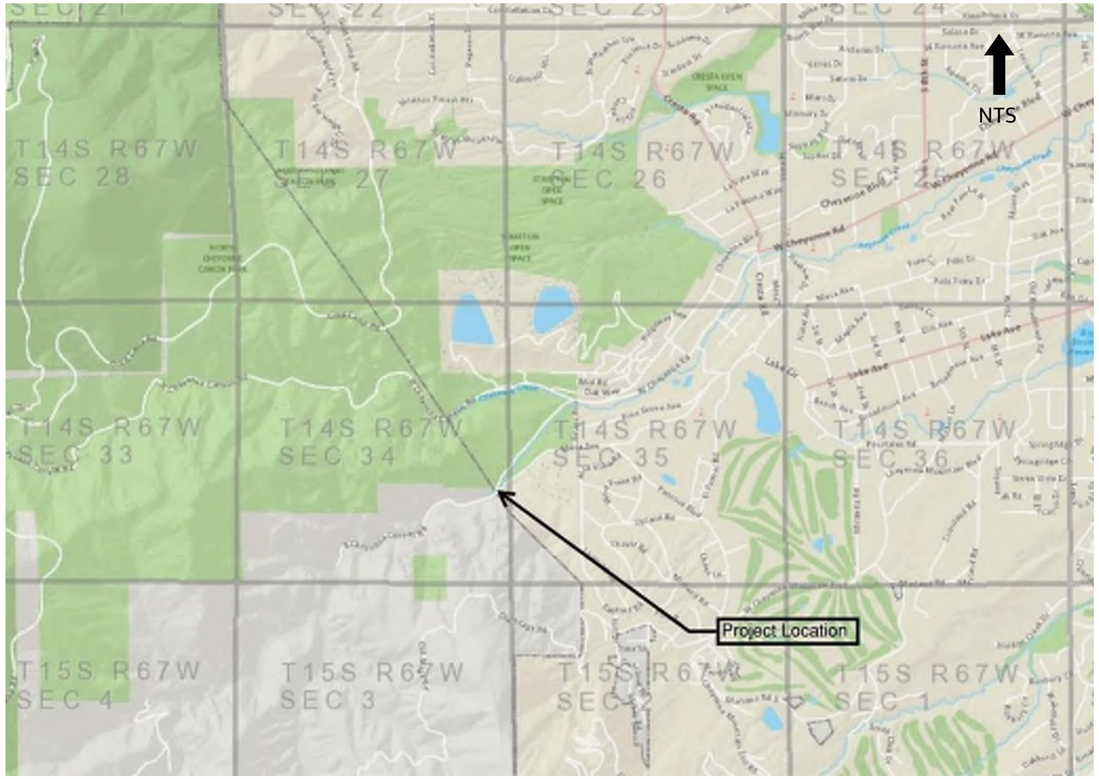


Figure 1: Vicinity Map

II. Previous Reports and Jurisdictional Requirements

A. Previous Reports

The project lies within the Southwest Area Drainage Basin (Upper Cheyenne Creek, Cheyenne Run, and Spring Run) Drainage Basin Planning Study (DBPS). The DBPS was prepared by Lincoln DeVore, Inc. in 1984. Additional drainage reports have been completed within the project limits as seen in Table 1.

Table 1: Previous Project Reports

	Report Name	Published
1	Cheyenne Creek Hydrology Report, Kiowa Engineering Corp.	September 4, 2008
2	Hydrology Report for Cheyenne Creek, El Paso County, Merrick & Company	March 2018
3	Engineering Study of Southwest Area Drainage Basin (Cheyenne Creek, Cheyenne Run, and Spring Run) by Lincoln DeVore, Inc. (DBPS)	February 1984
4	Flood Insurance Study, El Paso County Colorado, and Incorporated Areas by FEMA	December 7, 2018

FEMA – Federal Emergency Management Agency

B. FEMA Regulations

This project is not located within a FEMA regulated floodplain and is identified as an area of minimal flood hazard (unshaded Zone X) in the 2018 Flood Insurance Study. The entire project lies within FEMA Flood Insurance Rate Map (FIRM) 08041C0736G. The FIRM Map can be found in **Appendix A**. A Zone AE Regulatory Floodplain begins at the confluence of North and South Cheyenne Creek at Evans Avenue.

C. Jurisdictional Requirements

South Cheyenne Cañon Creek is assumed to be jurisdictional. Jacobs has prepared a Biological Resources Report and determined that most project impacts are temporary with only 0.03 acres of permanent impacts to the stream bed below the OHWM. Recommendations include a raptor survey within 0.5 mile of the site prior to the start of construction as well as an information consultation with the USFWS to address potential impacts to the Mexican Spotted Owl.

D. Channel Description and Features

The existing South Cheyenne Creek channel features a steep mountainous terrain with thalweg slopes varying from 1 percent to 15 percent. The existing creek features a very rocky channel with large rock outcroppings and dense vegetation on the channel banks. Vegetation ranges from grasses and bushes to large trees. The channel section is not uniform and varies in geometry throughout the studied reach. The typical section generally follows a trapezoidal section with steep side slopes and a small bottom width.

The existing channel, while steep, is in stable condition due to the large stones and gravelly soils. Existing scour is minimal around the existing bridge structures. The Geotechnical Evaluation Report has been added to **Appendix D** and shows the results from borings completed around the bridge structure.

Hydraulic modeling was completed using HEC-RAS 5.0.7, using topography created from ground survey whereby a digital terrain model (dtm) was created. Refer to Section IV of this report for further discussion on hydraulic modeling. The existing bridge was modeled using the geometry shown in the City of Colorado Springs (City) provided structure inspection reports and cross-sectional data derived from the dtm created for this project. These inspection reports are included in **Appendix A**.

The existing bridge was originally constructed in 1957. The existing bridge is structurally deficient and is beginning to show signs of failure. The existing bridge is a combination of a metal and concrete arch. Refer to **Appendix A.3** for photos of the existing bridge.

E. Tributary Watershed

The tributary watershed at Bridge B is 10.0 square miles with a watershed curve number of 75.49 per United States Geological Survey (USGS) Streamstats. The watershed is comprised of mountainous forest with large variations of slopes including many areas of near-vertical rock faces. The watershed is primarily comprised of natural forest with dense vegetation of grass, bushes, and trees. A Geographic Information System (GIS) watershed map has been created using the USGS Streamstats boundary and is included in **Appendix B**. This watershed has been previously studied in previous hydrologic studies, as indicated in Section II.A of this report. A Natural Resources Conservation Service (NRCS) soils report has been created showing mostly Hydrologic Soils Group Type D soils with some Hydrologic Soils Group Type C soils near the bottom of the canyon. This report can be found in **Appendix B**.

F. Proposed Bridge

The project will construct a vehicular bridge as well as a pedestrian bridge to provide trail connections. The proposed bridges will be constructed on drilled caissons featuring a single span. Because of roadway and channel constraints, the elevations will remain similar to the existing roadway condition at either end of the proposed bridge. The vehicular bridge will have reinforced concrete girders and the pedestrian bridge will be a fiberglass bridge matching pedestrian bridges used in other parks in the City.

Upstream Elevation

Downstream Elevation

Figure 2: Bridge Photos

III. Hydrologic Analysis

Several previous studies have analyzed the hydrology of the Cheyenne Creek with large variations of flows between the referenced reports listed in Section II.A. Additionally, there is a USGS stream gage at the confluence of the North and South branches of Cheyenne Creek near Evans Avenue that provides rainfall data back to 1992. The Cheyenne Creek Hydrology Report prepared by Merrick & Company (Merrick) recommends a flowrate at the confluence of the North and South branches of Cheyenne Creek, as shown in Table 1. That study compares the results from previous hydrologic reports including the Drainage Basin Planning Study (DBPS), along with analyzing updated stream gage data, and performed a regional regression analysis. The report indicates the regional regression equations are not recommended to be used in this reach as the results fall outside the 95 percent confidence interval of gage results. It is not in the scope of work for this project to provide an updated hydrologic model, therefore, the most recent hydrologic data will be used as represented from the Merrick report.

Table 2: Cheyenne Canon Hydrology Report Flowrates by Merrick

Drainage Area (SQ. MI.)	Q_{10} (CFS)	Q_{50} (CFS)	Q_{100} (CFS)	Q_{500} (CFS)
21.7	450	1,440	2,260	6,000

The Engineering Study of Southwest Area Drainage Basin (Cheyenne Creek, Cheyenne Run, and Springs Run) Colorado Springs, Colorado (1984) functions DBPS for the area. Flow rates from that study are Q_5 = 2,680 cfs and Q_{100} = 10,119 cfs which are significantly higher than more recent studies for the basin. Both the Merrick report and the DBPS do not differentiate flows from the North and South forks of the Cheyenne Creek but only at the confluence near Evans Avenue. The Cheyenne Creek Hydrology report prepared by Kiowa uses much higher calculated flowrates, it does however, differentiate flows between the two reaches. Jacobs Engineering Group Inc. (Jacobs) performed a split flow analysis using the Kiowa report to develop flows for each branch for use with the Merrick flowrates. This approach is further discussed in Section IV.A.

A. Split Flow Analysis

At the time of the Kiowa report, there was only 15 years of streamflow data with flows ranging from 21 (2000) to 595 (1997) cubic feet per second (cfs). Since that report, a historic rainfall event occurred (2013) producing 1,470 cfs at the confluence. This event produced 9 inches of rainfall within the watershed.

The Merrick report uses an additional 10 years of stream gage data to revise flowrates for Cheyenne Creek that includes the 2013 flood data points.

The Merrick report uses the USACE Statistical Software Package (HEC-SSP) allowing users to perform statistical analyses of hydrologic data. The systematic record includes 25 years of data and is extended to 125 years resulting in a maximum peak flowrate of 3,000 cfs. Refer to the Merrick report for further analysis, confidence levels, and results of this method.

The flowrates from these two reports are summarized in Table 3. Additional data points were extrapolated by graphing the points logarithmically from given flows within these two reports in Microsoft Excel and creating a best fit power trendline, as seen in Figure 2, to determine other design frequency flows.

Table 3: Existing Flow Rate Comparison

Flow at Evans Avenue	2 -Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	500-Yr	Trendline Equations
Kiowa	577	971	1,436	2,426	3,643	5,284	13,345	$y=388.75x^{0.5688}$
Merrick	163	298	450	866	1,440	2,260	6,000	$y=102.81x^{0.6618}$

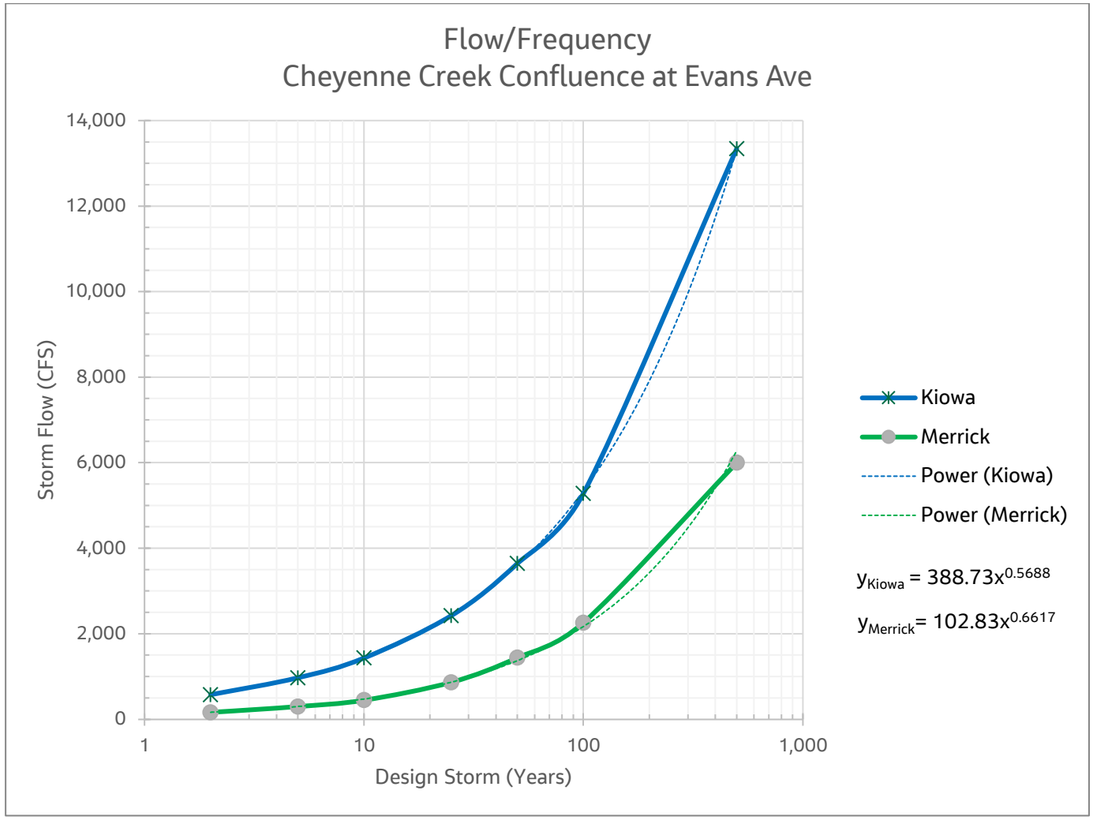


Figure 2: Flow / Frequency Graph

It is important to note that these flowrates are derived at the confluence of the North and South branches of Cheyenne Creek. The South branch encompasses approximately 10 square miles of the 21.7-square-mile watershed. If these flows are split using a percentage of contributing flow areas, it is approximately 53 percent to 47 percent. The Kiowa report modeled both branches in HEC-HMS 3.1.0 but due to differing land use, topography, peak hydrographs, and lag times, flows cannot be distributed among these area percentages. However, using the given flowrates from the Kiowa report, a flow split table can be derived, providing a distribution of peak flows. Table 4 shows peak flow rates with a percentage of contributing flow at the confluence of both streams.

Table 4: Flow Split Distribution from Kiowa Report

Location	Q_{10}	Q_{50}	Q_{100}	Q_{500}	Peak Flow Split Percentage			
Confluence	1,977	5,551	8,339	22,755				
North Branch	1,436	3,643	5,284	13,345	73%	66%	63%	59%
South Branch	545	1,980	3,199	9,963	28%	36%	38%	44%

Using the flow split distribution percentages described previously, then applying them to the revised flowrates in the Merrick report, the flowrates are further revised to be each branch of Cheyenne Creek. Table 5 shows the Merrick report flows distributed to each branch of Cheyenne Creek when the flow split percentages (Table 4) are applied.

Table 5: Flow Split Distribution to the Merrick Report

Location	Q_{10}	Q_{25}	Q_{50}	Q_{100}	Q_{500}
Confluence	450	866	1,440	2,260	6,000
North Branch	327	598	945	1,432	3,519
South Branch	124	274	514	867	2,627

B. Hydrologic Recommendations

In reviewing these reports, the flows presented in the Kiowa report appear to be overly conservative when compared to the documented stream gage data and paleoflood data presented in the Merrick report. It is proposed that the hydraulic design use the split flow analysis performed herein, as depicted in Table 5 as previously used on the North Cheyanne Canyon bridge project.

IV. Hydraulic Analysis

The detailed hydraulic analysis used for this project was completed using the USACE HEC-RAS version 5.0.7 software. The modeled reach begins approximately 500 linear feet above the Bridge and extends approximately 700 linear feet downstream of the bridge. Cross sections were typically cut every 50 feet, at significant changes in channel alignment, bridges, and transitional sections into and out of the bridge. The downstream boundary condition uses critical depth.

Manning's roughness coefficient values, n, were chosen based on aerial photographs, site visits, and the City's Drainage Criteria Manual. The overbanks were chosen to be 0.080, while the main channel was 0.05. For areas where new riprap is being placed, or is a uniform rocky section, a Manning's n of 0.05 was used.

A. Existing Conditions

The existing condition model uses the existing structure and cross-sectional elevation data derived from surveyed dtm. The existing bridge structure reports were referenced to determine geometries while survey shots were taken at the high elevation of the railing and at the low chord.

Using the flowrates described in Section III of this report, the existing bridge will not convey 100-year event without overtopping using the split flow flowrates. Existing bridge hydraulic information can be found in **Appendix C**.

B. Proposed Conditions

The vehicle bridge is proposed to be replaced with single span rectangular bridges similar to those used on North Cheyenne Canyon. The proposed bridge railing was added to the bridge deck geometry as the proposed railing does not provide any hydraulic relief and will be structurally tied to the bridge deck. The proposed railing is 42-inches tall, providing traffic safety. The structure depth of 30 inches was used from the bridge type selection report prepared by Jacobs, making the total structure thickness 72 inches at the headwall location. This was the height modeled in the proposed condition before flow overtops the railing. The extent of improvements are limited by the existing topography and surrounding trails and vegetation. The bridge geometry must match the roadway elevations on either side of the creek which limits significant vertical changes.

A pedestrian bridge will also be constructed to provide a trail crossing separate from the vehicle bridge. The bridge will be a fiberglass pedestrian bridge as directed by Parks, Recreation, and Cultural Services staff to match pedestrian bridges used in other parks. The pedestrian bridge geometry is more flexible than the vehicle bridge and can be slightly elevated to provide better freeboard.

Using the flowrates described in Section III of this report, the proposed vehicle bridge will convey the 100-year event with little freeboard, but without overtopping the adjacent roadway. A comparison of existing and proposed velocities and water surface elevations can be found in Tables 6 and 7.

The channel within the disturbed area will be modified to provide improved capacity and hydraulics in the project limits. A 10' bottom width will be used with 2:1 side slopes to match the existing channel side slopes. The longitudinal slope is not changed and is approximately XXXX%. Channel grading and disturbances have been limited to minimize disturbances to the surrounding trails and vegetation.

Table 6 and Table 7 using the split flow developed in Section III.A of this report. It should be noted that the proposed bridge is slightly downstream from the existing structure with the proposed pedestrian bridge near the existing bridge location. Proposed hydraulic information can be found **Appendix C**. Proposed velocities generally decrease due to the increase in conveyance of the structure, increased channel cross section, and having no flow overtopping.

The channel within the disturbed area will be modified to provide improved capacity and hydraulics in the project limits. A 10' bottom width will be used with 2:1 side slopes to match the existing channel side slopes. The longitudinal slope is not changed and is approximately XXXX%. Channel grading and disturbances have been limited to minimize disturbances to the surrounding trails and vegetation.

Table 6: Velocity Comparison (Merrick Split Flows)

Location	10-Yr		25-Yr		50-Yr		100-Yr		500-Yr	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
Ped Bridge US	NA	4.28	NA	5.45	NA	6.56	NA	7.64	NA	6.56
Ped Bridge DS	NA	6.30	NA	7.61	NA	8.752	NA	9.80	NA	6.63
Roadway Bridge US	4.93	6.06	5.07	7.39	6.56	8.59	7.64	9.22	6.56	5.78
Roadway Bridge DS	6.38	5.34	7.38	7.40	8.41	8.86	10.03	10.08	14.02	11.66

Table 7: Water Surface Elevation Comparison (Merrick Split Flow)

Location	10-Yr		25-Yr		50-Yr		100-Yr		500-Yr	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
Ped Bridge US	NA	6351.84	NA	6352.87	NA	6353.99	NA	6355.16	NA	6351.14
Ped Bridge DS	NA	6351.14	NA	6352.3	NA	5353.03	NA	6351.11	NA	6360.61
Roadway Bridge US	6353.18	6350.28	6355.52	6351.11	6359.36	6352.05	6360.52	6353.22	6363.72	6360.70
Roadway Bridge DS	6351.64	6348.55	6352.63	6349.27	6353.61	6350.21	6354.51	5351.30	6357.89	6355.04

The City of Colorado Spring Drainage Criteria Manual (DCM) Volume 1 summarizes design parameters for natural channels. The design criteria for velocity, Froude number, and shear stress are summarized in Table 8 below.

Table 8: Design Parameters

Location	10-Yr			100-Yr		
	DCM	Existing	Proposed	DCM	Existing	Proposed
Velocity (fps)	5.0	2.5-7.6	2.5-7.5	7.0	4.9-12.5	7.7-11.0

Froude number	0.7	0.7-1.1	0.7-1.1	0.8	0.3-1.1	0.8-1.1
Shear stress (lb/sf)	NA	0.8-1.3	0.7-1.4	1.2	2.7-3.4	1.5-4.5

While the proposed condition design parameters are similar to the existing channel, they exceed the DCM values. The existing channel is comprised of large cobble and appears stable. The proposed design will maintain these characteristics. A variance will be submitted as needed for the design channel design parameters not meeting the DCM requirements.

C. Freeboard and Requested Variances

The existing bridge does not have required freeboard required by the DCM and is overtopped during the 100-year event. While the proposed bridge improves the hydraulic capacity and will provide 0.5' of freeboard, this is less than the City required 2 feet of freeboard. Bridge geometry is constrained due to the existing roadway on either side of the bridge setting the required deck elevation.

Both the existing channel and proposed improvements do not meet the channel design parameters summarized in Table 8. A variance letter will also be submitted for the channel design parameters not meeting the DCM requirements.

The proposed improvements have been designed to limit the disturbance to the creek and the surrounding trails and park land. Additional channel grading to achieve additional freeboard or meet the channel would increase the channel and environmental impacts. A Variance Request Letter will be submitted and will be included in **Appendix E**.

D. Riprap Sizing

Riprap will be placed in the disturbed areas. Riprap sizing has been completed using methods described in Chapter 9 of the USDCM. The calculations while the calculations require a d_{50} riprap size of 9", a d_{50} of 24" has been selected to provide an additional factor of safety and to better match the rock in the existing stream. Riprap calculations can be found in **Appendix D**.

E. Best Management Practices (BMP's)

The proposed channel and roadway improvements for the bridge totals an approximate 0.52 acre required for roadway and bridge improvements. Since the total disturbed area is less than 1-acre, permanent water quality control measures and the 4-Step Process are not required.

Temporary BMPs used during construction include silt fence, aggregate bags, vehicle tracking pads, concrete washouts, and revegetation, including seeding and mulching. Water diversions and other BMPs will be used to limit construction impacts and protect construction debris from entering the stream. The Construction Plans are located in **Appendix F**. The contractor shall also obtain the required discharge permits prior to construction.

Improvements made within the channel include adding riprap to newly graded surfaces, adding riprap in the invert leading into and out of the bridges. There is not a lot of evidence of existing scour, major aggradation, or degradation in the existing channel because of the large stone materials within the channel. Due to the high channel velocities, it is anticipated that during large events, some stones, boulders, and other debris may tumble down the channel before re-stabilizing again.

V. Construction Considerations

A. Engineer's Estimate of Probable Cost

A cost estimate has been developed for the project and the total cost to replace the bridge is estimated to be $2M. This includes demolition and construction of the new structures along with necessary channel improvements proposed within.

B. Construction Phasing

Through discussions with City Engineering Bridge Maintenance staff, it has been determined to close South Cheyenne Canyon Road to public vehicular access during construction to allow for accelerated construction. The construction is anticipated to occur over the winter of 2023 through 2024 with the work being completed during the winter and spring. Cold and inclement weather is to be expected, thus proper construction methods are detailed in the specifications using the Geotechnical Report. Construction is anticipated to go through the spring of 2024.

Emergency access will be coordinated with first responders and will be provided by the roadway remaining open.

The contractor will be responsible for their means and methods of construction phasing and access.

Closing the road will allow for expedited construction activities, reduce construction costs, and minimize impacts to the park as the park receives less visitors during the winter months. Visitors can still access the park through several of the park's trail networks but will have to avoid construction areas during construction. Appropriate trail signage and warning will be provided.

Other Construction Considerations

Bedrock is anticipated to be found during construction. Several borings around the bridge show the existing bedrock to be 14-feet deep. Bedrock will provide excavation difficulties but will also provide support for drilled caissons. If the proposed improvements lie within bedrock (riprap for example) the contractor shall notify and work with the engineer to determine the best course of action to proceed.

Another construction consideration the contractor must make is, how to allow for pedestrian and biked access around the construction site. This can be accommodated using the existing trail network and bridge, but will require coordination in the field and fenced protection to limit access to any excavations and equipment. With the closure of the South Cheyenne Canyon Road, the contractor will need to maintain access using Mesa Ave. The City will work with the contractor during construction for these activities, which may include grading the surface, snow removal, and emergency medical service.

Existing rock may be salvaged and used on proposed railings, headwalls, and wingwalls if it meets the specifications determined by the engineer. If imported materials are needed for this work, efforts will be made so that it resembles existing materials regarding shape and color. This was important input by the Parks and Recreation staff, along with public comments.

VI. Summary

The proposed project is recommending replacement of the structurally deficient bridge along South Cheyenne Canyon Road. The existing bridge will be removed in its entirety and replaced with new single span vehicular and pedestrian bridges on drilled caissons down to bedrock.

The new vehicular bridge will have a larger hydraulic opening, allowing for a higher conveyance than the existing bridge and will convey the 100-year flood event. A variance will be required for freeboard.

Riprap channel lining will be placed on disturbed channel surfaces.

The *Final Drainage Report* will incorporate design changes and comments that are anticipated to be received through the progression of the design.

VII. References

1) Cheyenne Creek Hydrology Report, Kiowa Engineering Corp., September 4, 2008

2) Hydrology Report for Cheyenne Creek, El Paso County, Merrick & Company, March 2018

3) Engineering Study of Southwest Area Drainage Basin (Cheyenne Creek, Cheyenne Run, and Spring Run) by Lincoln DeVore, Inc., February 2014

4) Flood Insurance Study, El Paso County Colorado, and Incorporated Areas by FEMA, December 7, 2018, Number 08041CV001.

5) Flood Insurance Rate Map, El Paso County Colorado, and Incorporated Areas by FEMA, December 7, 2018, Map Numbers 08041C00725G and 08041C0736G.

6) Drainage Criteria Manual, City of Colorado Springs, May 2014.

7) Urban Storm Drainage Criteria Manual, Mile High Flood District (formally Urban Drainage and Flood Control District), January 2016.

8) Sediment Transport Technology, Water and Sediment Dynamics, Water Resources Publications, Daryl B. Simmons and Fuat Senturk,1992.

9) HEC-RAS Version 5.0.7, U.S. Army Corps of Engineers, Hydrologic Engineering Center, March 2019.

Appendix A. Maps and Figures

A.1. Bridge Location Map

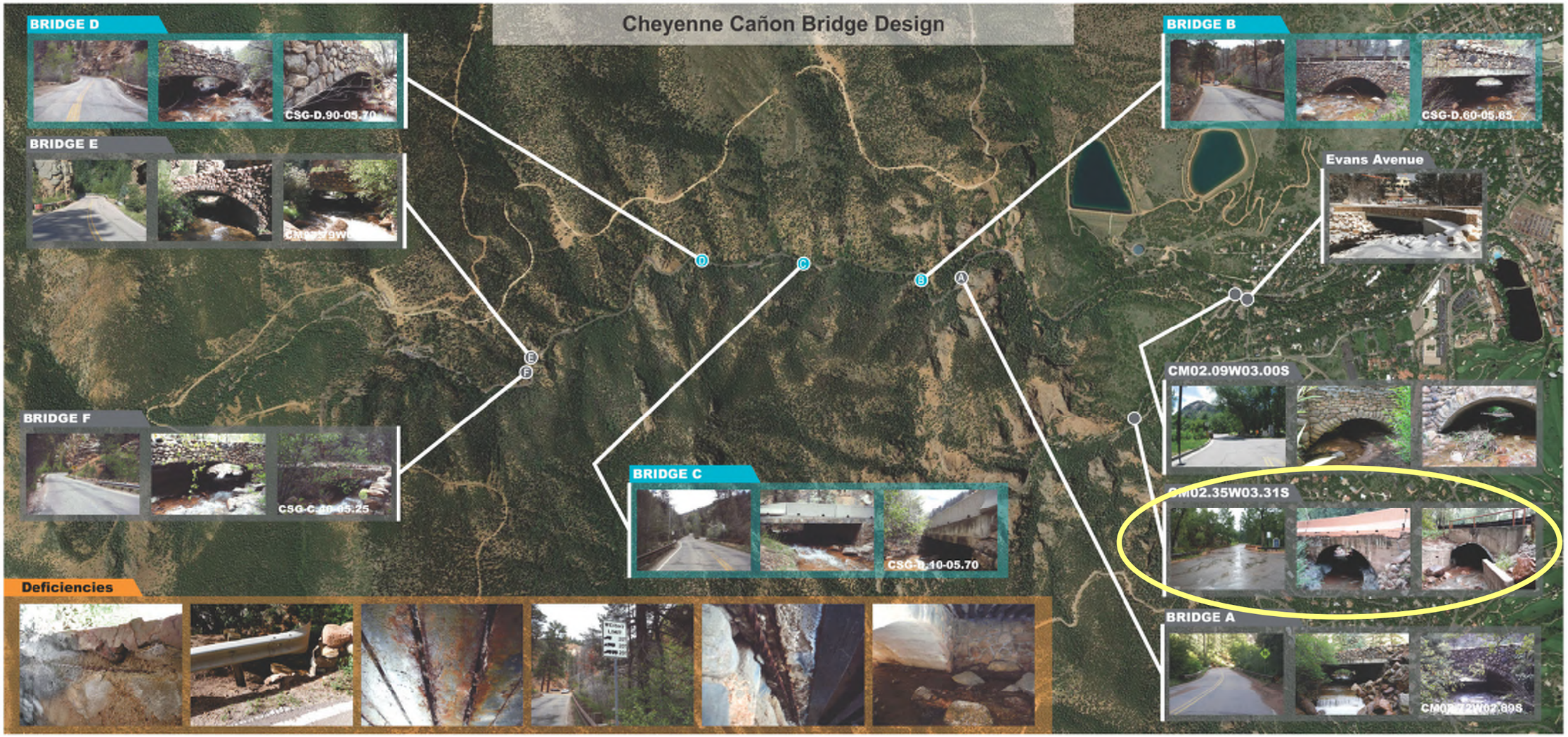


FIGURE A.1 - CHEYENNE CAÑON BRIDGE IMPROVEMENTS

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A.2. FEMA FIRM 08041C0736G

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FEMA

/HJHQG

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- 5HGXFHG)ORRG5LVN'XH72/HYHH =RQH;

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- -XULVGLFWLRQ%RXQGDU\
- &RDVWDO 7UDQVHFW %DVHOLQH
- 3URFHVV%DVHOLQH
- +GURJUDSKLF)HDWXUH

- L'LWDO DWD$YDLODEOH
- R'LWDO DWD$YDLODEOH
- 8QPDSSHG

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SRQW VHOHFWHGE\WKHXVHU DQGGRHV QRW UHSUHV
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UHOHFW FKDQHV RU DPGPQWV VXEVHXHQW WR WKLVGDWH DQG
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HOHQWV GR QRW DSSHDU EDVHPSLDHU\ IORRGRQHODEHOV
OHHG VFDOHEDU PSFUHDWLRQGDWH FRRQLW\LGHQWLILHUV
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XQPSSHGDQGXQRGHUQL}HGDUHDV FDQQRW EHXVHGIRU
UHDOWRU\SUSRVHV

A.3. Bridge Inspection Reports

City of Colorado Springs Non-NBI
Bridge Inspection Report

Structure No.: CM02.35W03.31S **Inspection Date: 08/26/2014** **Sufficiency Rating: 46**

Location Information

1.	State:	08 CO
2E/M.	District:	
2T.	Trans Region:	
3.	County:	El Paso
4.	City Code:	21015
5A.	Route On/Under:	1
5B.	Route Signing Prefix:	5
5C.	Level of Service:	1
5D.	Route Number:	
5E.	Directional Suffix:	
6.	Feature Intersected:	Cheyenne Creek
7.	Facility Carried:	Cheyenne Canyon Rd
8A.	Structure Alias:	2880815
9.	Location:	At Entrance To Seven Falls
11.	Mile Post:	
12.	Base Hwy Net:	
13A.	LRS Inv Rt:	
13B.	LRS Rt No:	
16.	Latitude:	38.786193
17.	Longitude:	-104.869358
18A.	Range:	
18B.	Township:	
18C.	Section:	
19.	Detour Length:	1
20.	Toll Facility:	3
26.	Functional Class:	19
100.	DOD Designator:	
104.	Hwy System:	
105.	Federal Lands Hwy:	
110.	Designated Nat Net:	

Clearance Information

10.	Max Vert Clr:	
47.	Horizontal Clr:	29.40
53.	Min Vert Clr Over:	99.99
54A.	Ref Min Vert Clr Under:	N
54B.	Min Vert Clr Under:	0.0
55A.	Ref Min Lat Clr Under:	N
55B.	Min Lat Clr Under (RT):	0.0
56.	Min Lat Clr Under (LT):	0.0

Structure Information

8P.	Parallel Str No:		
21.	Custodian:	4	
22.	Owner:	4	
27.	Year Built:	1957	
28A/B.	Lanes On/Under:	2	0
31.	Design Load:	0	
32.	Appr Roadway Width:	30.0	
33.	Median:	0	
34.	Skew:	38	
35.	Structure Flared:	0	
36H.	Rail Height:		
37.	Historical Sig:	5	
42A/B.	Service On/Under:	1	5
43A/B.	Main Material/Design Type:	3	19
44A.	Appr Material:		
44B.	Appr Design Type:		
45.	Quantity of Main Spans:	1	
46.	No of Appr Spans:		
48.	Max Span:	10.0	
49.	Structure Length:	15.0	
50A.	Curb Left:	0.0	
50B.	Curb Right:	0.0	
	Deck Area (SF):	N	
51.	Roadway Width:	29.4	
52.	Deck Width:	44.0	
66T.	Asphalt Thickness:		
101.	Parallel Str:		
103.	Temporary Str:		
102.	Direction of Traffic:	2	
107.	Deck Type:	N	
108A.	Wearing Surface:	N	
108B.	Membrane:	N	
108C.	Deck Protection:	N	
111.	Pier Protection:		
112.	NBIS Length:	N	
120A.	Structure Type:	CAC	
120B.	CDOT Constr Type:		
124.	Expansion Device:		
125A.	Bridge Rail Type:		
125B.	Bridge Rail Mod:		

Matrix DESIGN GROUP COLLINS ENGINEERS

City of Colorado Springs Non-NBI
Bridge Inspection Report

Structure No.: CM02.35W03.31S **Inspection Date: 08/26/2014** **Sufficiency Rating: 46**

Appraisal/Condition Information

36A.	Bridge Rail:	1
36B.	Approach Trans:	1
36C.	Approach Rail:	1
36D.	Approach Term:	1
58.	Deck:	N
59.	Superstructure:	N
60.	Substructure:	N
61.	Channel/Channel Prot:	7
62.	Culvert:	5
67.	Structure Condition:	
68.	Deck Geometry:	5
69.	Under Clr Vert & Horiz:	
71.	Waterway Adequacy:	7
72.	Approach Alignment:	6
113.	Scour Critical:	5
113M.	Scour Watch:	0

Inspection Information

90A. Inspection Date:	8/26/2014
90B. Inspection Team:	Matrix
90C. Inspector:	Gary Griffith
91. Frequency:	48
92A. FC Frequency:	
92B. UW Frequency:	
92C. SP Frequency:	
93A. FC Inspection Date:	
93B. UW Inspection Date:	
93C. SP Inspection Date:	
133. SP Equipment:	

Traffic Data Information

29.	Avg Daily Traffic:	1,000
30.	Year of ADT:	2010
109.	Truck ADT:	
114.	Future ADT:	
115.	Year of Future ADT:	

Rating/Posting Information

41.	Posting Status:	A
63.	Operating Rating Mthd:	5
64.	Operating Rating:	0.0
65.	Inventory Rating Mthd:	5
66.	Inventory Rating:	0.0
70.	Posting:	N
129A.	Load Posting/Type 3:	
129B.	Load Posting/Type3-2:	
129C.	Load Posting/Type3S2:	
130.	Rating Date:	11/20/2014

Structure Improvement Information

75A.	Type of Work:
75B.	Work Done By:
76.	Length of Improvement:
94.	Bridge Imp Cost:
95.	Roadway Imp Cost:
96.	Total Imp Cost:
97.	Year of Cost Estimate:
106.	Year Reconstructed:

Inspection Notes

Structure No.: CM02.35W03.31S **Inspection Date: 08/26/2014** **Sufficiency Rating: 46**

Element Condition Comments:

Element Description: ***502-Channel Protection Material and Condition*** Element Category: ***Channel Road Gen***

Total Quantity: *1* Units: *Each (EA)* CS 1: *1* CS 2: CS 3: CS 4: CS 5:

Element Notes: Natural rock and vegetation

Element Description: ***327-Culvert Wingwalls*** Element Category: ***Misc***

Total Quantity: *4* Units: *Each (EA)* CS 1: *3* CS 2: *1* CS 3: CS 4: CS 5:

Element Notes: Concrete walls, flared upstream, extensions of masonry headwall at downstream. Northwest Upstream wingwall is leaning, concrete rundown behind.

Element Description: ***335-Culvert Headwalls*** Element Category: ***Misc***

Total Quantity: *30* Units: *Lineal Feet (LF)* CS 1: *0* CS 2: *30* CS 3: *0* CS 4: *0* CS 5: *0*

Element Notes:

Element Description: ***240-Steel-Culvert*** Element Category: ***Culvert***

Total Quantity: *16* Units: *Lineal Feet (LF)* CS 1: *0* CS 2: *16* CS 3: CS 4: CS 5:

Element Notes: 16-feet of metal plate extension at north. Some separation of seams/joints due to differing corrugation sizes, founded on concrete footers.

Element Description: ***241-Concrete-Culvert*** Element Category: ***Culvert***

Total Quantity: *28* Units: *Lineal Feet (LF)* CS 1: *0* CS 2: *28* CS 3: CS 4: CS 5:

Element Notes: 1/2 Concrete Arch.. Some exposed rebar in arch.

Structure No.: CM02.35W03.31S **Inspection Date: 08/26/2014** **Sufficiency Rating: 46**

Element Description: ***333-Miscellaneous-Bridge Railing (Other)*** Element Category: ***Misc***

Total Quantity: *14* Units: *Lineal Feet (LF)* CS 1: *14* CS 2: CS 3: CS 4: CS 5:

Element Notes: Concrete headwall has 2 1/2-inch diameter painted steel pipe posts and rails.(upstream)

Element Description: ***330-Metal Bridge Railing (Uncoated)*** Element Category: ***Misc***

Total Quantity: *14* Units: *Lineal Feet (LF)* CS 1: *14* CS 2: CS 3: CS 4: CS 5:

Element Notes: Weathering steel w-beam on steel posts embedded in fill in front of headwall extension at north.

Element Description: ***331-Concrete-Bridge Railing*** Element Category: ***Misc***

Total Quantity: *14* Units: *Lineal Feet (LF)* CS 1: *14* CS 2: CS 3: CS 4: CS 5:

Element Notes: Jersey barrier at south side road (downstream).

Element Description: ***361-Scour*** Element Category: ***Misc***

Total Quantity: *1* Units: *Each (EA)* CS 1: *1* CS 2: CS 3: CS 4: CS 5:

Element Notes: Previous scour had undermined concrete arch, but grouted rock rip rap /shotcrete footing rehabilitation project work been done at both abutments. Has reduced scour risk but some undermining still evident. Load posting recommendation has not been removed although scour has been abated.

Element Description: ***501-Channel Condition*** Element Category: ***Channel Road Gen***

Total Quantity: *1* Units: *Each (EA)* CS 1: *1* CS 2: CS 3: CS 4: CS 5:

Element Notes: Mountain stream, gravel and cobbles.

Element Description: ***504-Bank Condition*** Element Category: ***Channel Road Gen***

Total Quantity: *1* Units: *Each (EA)* CS 1: *1* CS 2: CS 3: CS 4: CS 5:

Element Notes: Moderately steep but stable. Concrete rundown placed at northwest and northeast. Northeast is completely undermined behind wingwall.

Structure No.: CM02.35W03.31S **Inspection Date: 08/26/2014** **Sufficiency Rating: 46**

Element Description: ***520-Approach Roadway Alignment*** Element Category: ***Channel Road Gen***

Total Quantity: *1* Units: *Each (EA)* CS 1: *1* CS 2: CS 3: CS 4: CS 5:

Element Notes: Asphalt, intersection with Mesa Ave at west. Approach roadway to east is extremely narrow, eastbound vehicles pinched by jersey barrier and large tree. Cracking and spalling in asphalt above structure, especially westbound lane, exposing top of old headwall. Dip in asphalt at northwest causing ponding water and catches debris.

Element Description: ***530-Approach Guardrail*** Element Category: ***Channel Road Gen***

Total Quantity: *1* Units: *Each (EA)* CS 1: *1* CS 2: CS 3: CS 4: CS 5:

Element Notes: Weathering steel w-beam on treated timber posts, blocked out, approach rail is too short at southwest, northeast, terminations are shielded and breakaway.

Structure No.: CM02.35W03.31S **Inspection Date: 08/26/2014** **Sufficiency Rating: 46**

Maintenance/Repair Recommendations:

Maintenance Repair Element: ***241-Concrete-Culvert***

Maintenance Action: *399.00 - Maintenance requiring engineering.*

Area of Repair: *Structure* Status: *Existing* Timeline: *5 to 10 years*

Category: *Replace* Priority: *Low* Quantity: *50 Lineal Feet (LF)* Est. Cost: *$75,000*

Access Difficulty: Traffic Control: Utility Conflict: Right of Way Conflict: Environmental Conflict:

Notes: Schedule bridge for replacement

Maintenance Repair Element: ***504-Bank Condition***

Maintenance Action: *200.32 - Concrete patching, voids/honeycombing*

Area of Repair: Status: *Existing* Timeline: *1 to 5 years*

Category: *Programmed/Preventative* Priority: *Low* Quantity: *2 Cubic Yards (CY)* Est. Cost: *$1,000*

Access Difficulty: Traffic Control: Utility Conflict: Right of Way Conflict: Environmental Conflict:

Notes: Grout void below concrete rundowns at northeast and northwest behind wingwalls

Maintenance Repair Element: ***505-Debris***

Maintenance Action: *260.01 - Remove weeds/brush/trees encroaching into roadway/rails/growing around bridge*

Area of Repair: *Roadway* Status: *Existing* Timeline: *1 to 5 years*

Category: *Repair* Priority: *Low* Quantity: *1 Cubic Yards (CY)* Est. Cost: *$2,000*

Access Difficulty: Traffic Control: Utility Conflict: Right of Way Conflict: Environmental Conflict:

Notes: Remove vegetation, cut trees encroaching along north railing.

Maintenance Repair Element: ***520-Approach Roadway Alignment***

Maintenance Action: *399.00 - Maintenance requiring engineering.*

Area of Repair: *Roadway* Status: *Existing* Timeline: *1 to 5 years*

Category: *Engineering* Priority: *Moderate* Quantity: *1 Each (EA)* Est. Cost:

Access Difficulty: Traffic Control: Utility Conflict: Right of Way Conflict: Environmental Conflict:

Notes: Traffic and roadway design / analysis is recommended. Improvements to alignment suggested to make intersection more safe and functional to motorists.

City of Colorado Springs Non-NBI
Bridge Inspection Report

Structure No.: CM02.35W03.31S **Inspection Date: 08/26/2014** **Sufficiency Rating: 46**

Maintenance Repair Element: ***520-Approach Roadway Alignment***

Maintenance Action: *154.00 - Patching â€“ Machine/Overlay/Leveling*

Area of Repair: *Roadway* Status: *Existing* Timeline: *Less than 1 year*

Category: *Programmed/Preventative* Priority: *Moderate* Quantity: *2,000 Square Feet (SF)* Est. Cost: *$16,650*

Access Difficulty:	Traffic Control:	Utility Conflict:	Right of Way Conflict:	Environmental Conflict:
	Probable			

Notes: Overlay asphalt roadway of structure and approaches. Grade to provide proper drainage off roadway, especially NW.

Structure No.: CM02.35W03.31S **Inspection Date: 08/26/2014** **Sufficiency Rating: 46**

Photos:

Approach Roadway Looking North

Approach Roadway Looking South

Structure No.: CM02.35W03.31S **Inspection Date: 08/26/2014** **Sufficiency Rating: 46**

Upstream Elevation Looking East

Downstream Elevation Looking West

Structure No.: CM02.35W03.31S **Inspection Date: 08/26/2014** **Sufficiency Rating: 46**

Upstream Channel Looking West

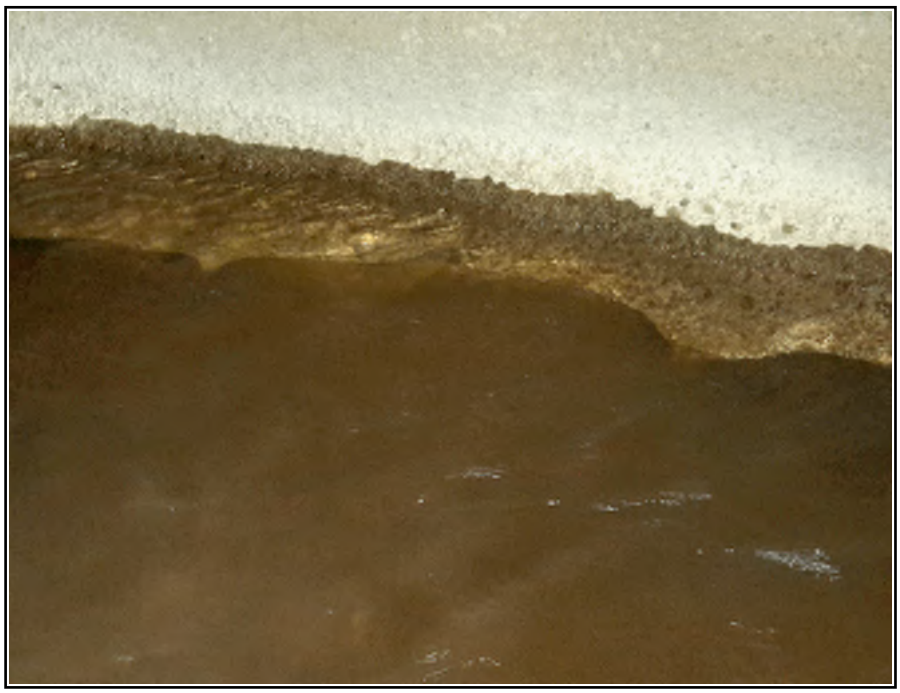
Downstream Channel Looking East

Structure No.: CM02.35W03.31S **Inspection Date: 08/26/2014** **Sufficiency Rating: 46**

Rusting in CMP arch culvert bolt holes

Damage at southeast guardrail

Structure No.: CM02.35W03.31S **Inspection Date: 08/26/2014** **Sufficiency Rating: 46**



Undermining of concrete arch springline at rehab project

Crack in downstream headwall

Structure No.: CM02.35W03.31S **Inspection Date: 08/26/2014** **Sufficiency Rating: 46**

Exposed reinforcing in concrete arch

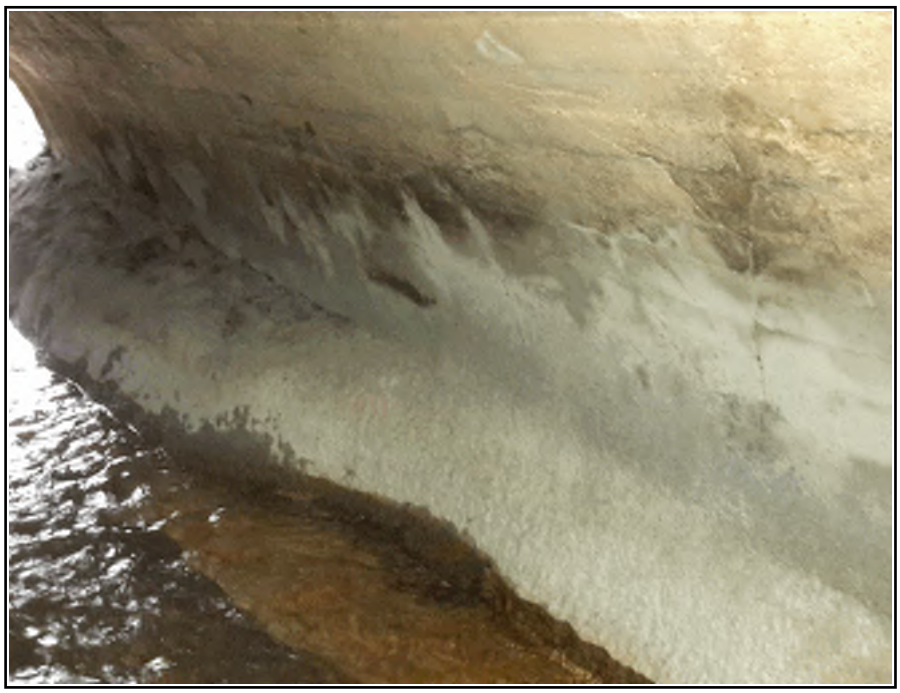
Southwest wingwall displaced, rotated

Structure No.: CM02.35W03.31S **Inspection Date: 08/26/2014** **Sufficiency Rating: 46**

Cracking in downstream headwall has been repaired

Missing bolts top of CMP plate arch. Seam separation of plates.

Structure No.: CM02.35W03.31S **Inspection Date: 08/26/2014** **Sufficiency Rating: 46**

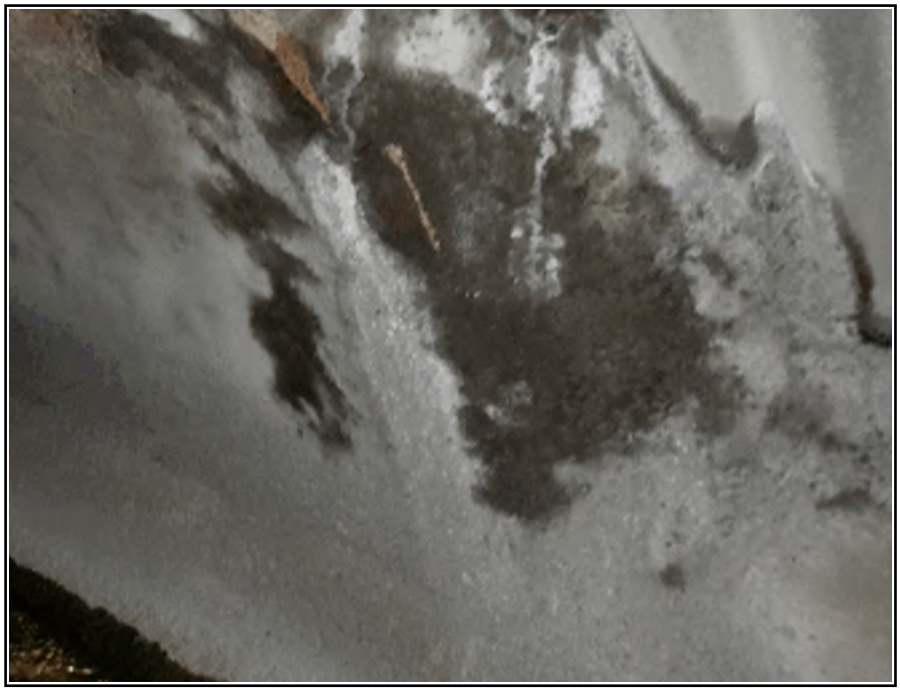


Grouted rock rip rap /shotcrete rehabilitation project at concrete arch.

General View CMP and Concrete Arch

Structure No.: CM02.35W03.31S **Inspection Date: 08/26/2014** **Sufficiency Rating: 46**

Asphalt roadway surfacing deteriorated - requires maintenance



Grouted rock rip rap /shotcrete rehabilitation project at CMP. Channel scouring at base.

CM02.35W03.31S

S CHEY CANY RD1

REV 10/2014

Matrix Design Group, Inc
2435 Research Parkway, Suite 30
Colorado Springs, CO 80920

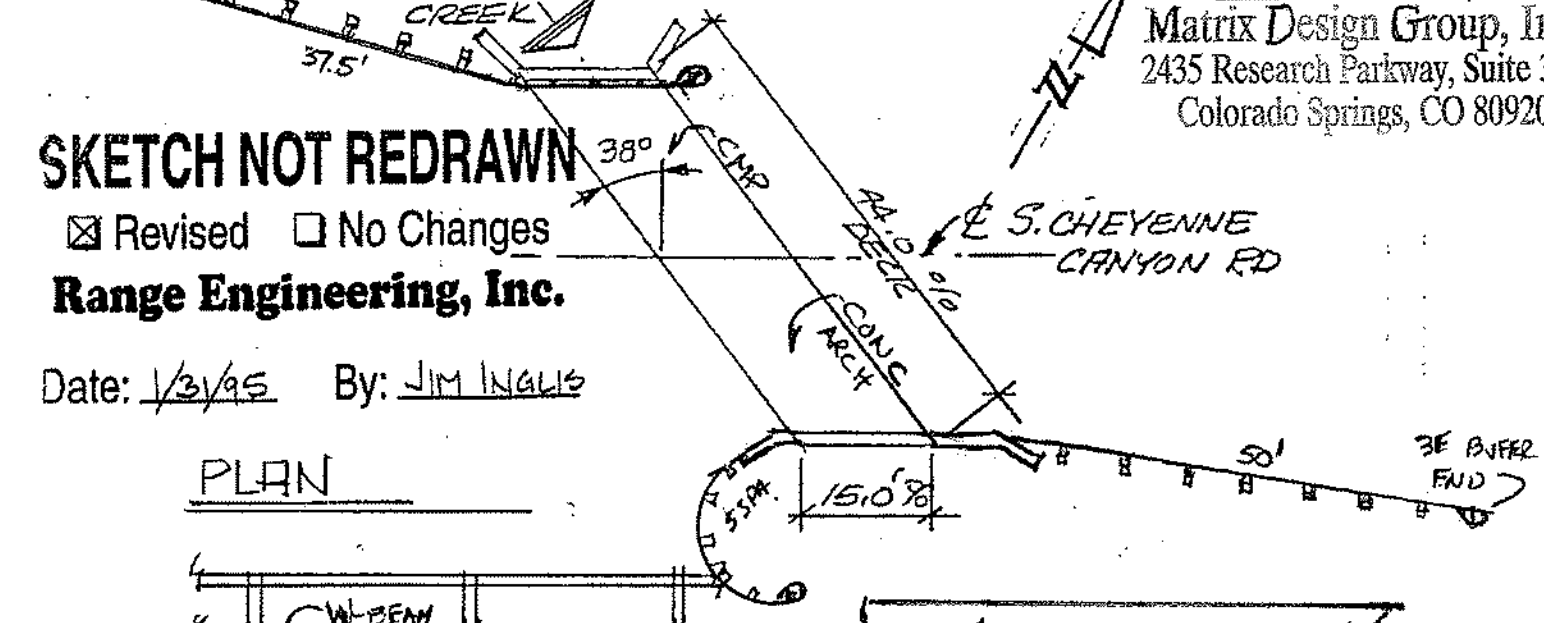
SKETCH NOT REDRAWN

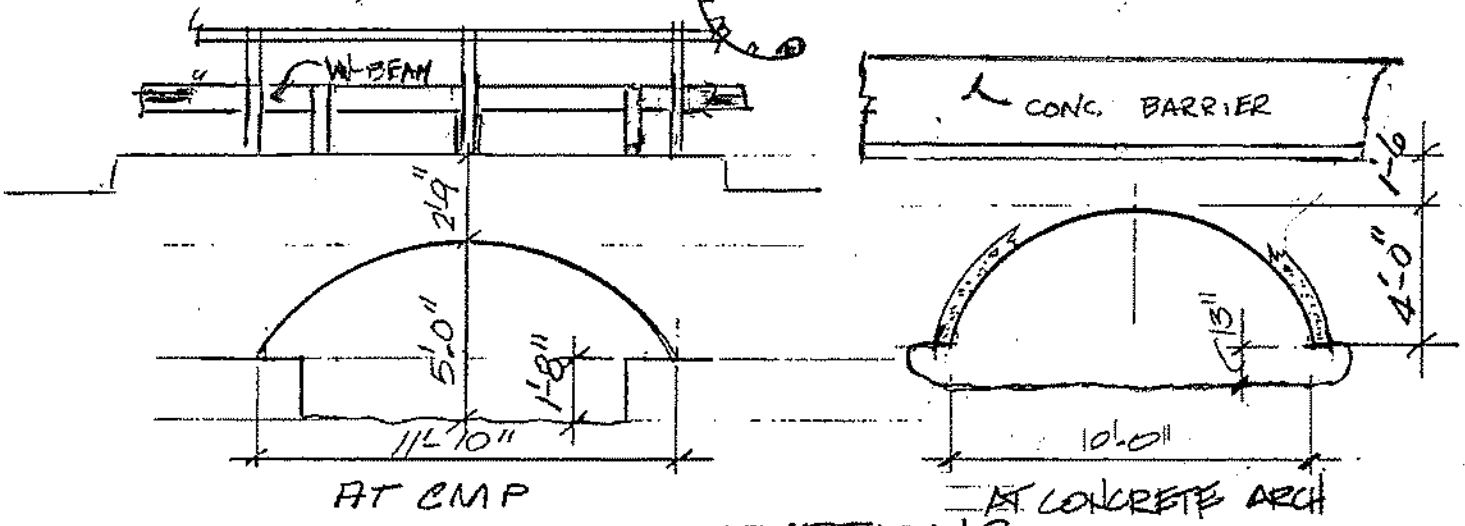
☒ Revised ☐ No Changes

Range Engineering, Inc.

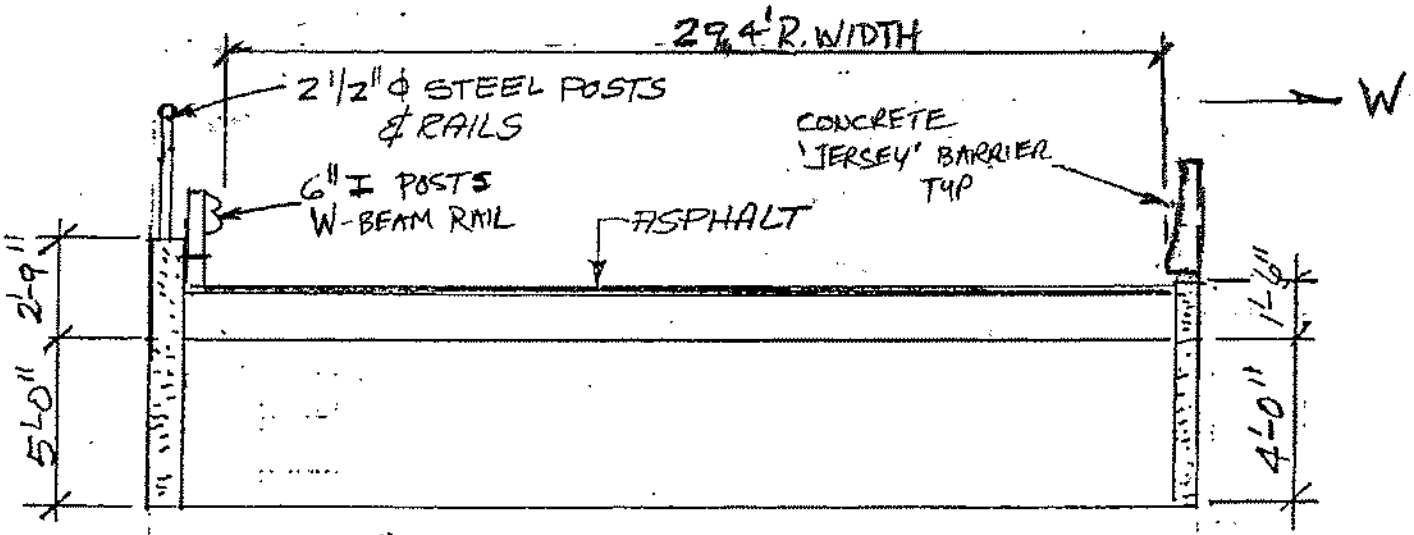
Date: 1/31/95 By: JIM INGLIS

PLAN





ELEVATIONS



SECTION "LOOKING EAST"

2-25-87 RL

STAFF BRIDGE DESIGN
WORK SHEET (01200) 30
REV JULY, 1981

PARALLEL STRUCTURE NUMBER NA

STRUCTURE TYPE CAC

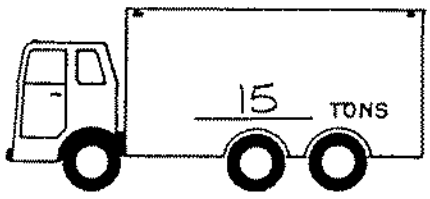
CITY STREET ~~STATE HWY NO.~~ S. CHEYENNE CANYON RD.

STRUCTURE NO. S CHEY CANY RD 1

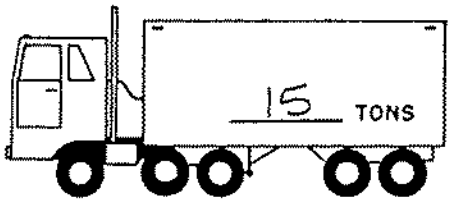
BATCH I.D. _____

COLORADO LEGAL LOADS
RATING SUMMARY (TONS)

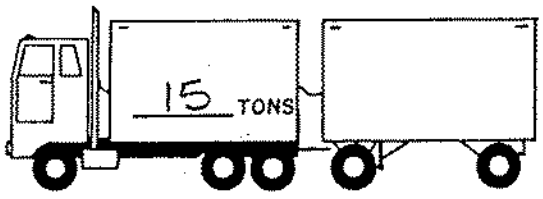
	TRUSS	FLOOR BEAM	CAC ~~STRINGER OR GIRDER~~	SAC ~~STAB~~
HS 20 (36 TONS) INVENTORY			10	27
HS 20 (36 TONS) OPERATING			15	36
TYPE 3 (27 TONS) OPERATING			15	
TYPE 3S2 (42.5 TONS) OPERATING			15	
TYPE 3-2 (42.5 TONS) OPERATING			15	



TYPE 3



TYPE 3S2



TYPE 3-2

COMMENTS;

1'-6" OF FILL ABOVE THE ARCH CROWN.

CAC: THE CONCRETE ARCH CULVERT PORTION OF THE STRUCTURE IS RATED EMPIRICALLY TO REFLECT THE SCOUR AND LOSS OF SUPPORT AT THE BASE OF THE ARCH.

SAC: THE STEEL ARCH CULVERT PORTION OF THE STRUCTURE IS RATED EMPIRICALLY TO REFLECT LOSS OF STRENGTH AT JOINTS BETWEEN PLATES OF DISSIMILAR CORRIGATIONS.

- PLEASE POST AS SHOWN -

DATE: 1/19/95 RATER: JIM INGLIS

City of Colorado Springs - Minor Bridge Inspection - Maintenance Recommendations

Structure №: CM02.35W03.31S Inspection Date: August 1, 2018

Maintenance Repair Element: 241-Concrete-Culvert

Maintenance Action: 399.00 - Maintenance requiring engineering.

Area of Repair: Structure Status: Existing Timeline: 5 to 10 years

Category: Replace Priority: Low Quantity: 1 EA Est. Cost: $75,000

Access Difficulty	Traffic Control	Utility Conflict	ROW Conflict	Environmental Conflict
N/A	N/A	N/A	N/A	N/A

Notes: Schedule bridge for replacement

Maintenance Repair Element: 505-Debris

Maintenance Action: 260.01 - Remove weeds/brush/trees encroaching into roadway/rails/growing around bridge

Area of Repair: Roadway Status: Existing Timeline: 1 to 5 years

Category: Repair Priority: Low Quantity: 1 CY Est. Cost: $500

Access Difficulty	Traffic Control	Utility Conflict	ROW Conflict	Environmental Conflict
N/A	Possible	N/A	N/A	N/A

Notes: Remove vegetation, cut trees encroaching along north railing.

Maintenance Repair Element: 520-Approach Roadway Alignment

Maintenance Action: 399.00 - Maintenance requiring engineering.

Area of Repair: Roadway Status: Existing Timeline: 1 to 5 years

Category: Engineering Priority: Moderate Quantity: 1 EA Est. Cost: $5,000

Access Difficulty	Traffic Control	Utility Conflict	ROW Conflict	Environmental Conflict
N/A	N/A	N/A	N/A	N/A

Notes: Traffic and roadway design / analysis is recommended. Improvements to alignment suggested to make intersection more safe and functional to motorists.

Maintenance Repair Element:

Maintenance Action:

Area of Repair: Status: Timeline:

Category: Priority: Quantity: Est. Cost:

Access Difficulty	Traffic Control	Utility Conflict	ROW Conflict	Environmental Conflict

Notes:

Appendix B. Hydrologic Calculations

B.1. Tributary Watershed Map

StreamStats Report

Region ID: CO
Workspace ID: CO20220510213538012000
Clicked Point (Latitude, Longitude): 38.78632, -104.86927
Time: 2022-05-10 15:36:07 -0600

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BSLDEM10M	Mean basin slope computed from 10 m DEM	49	percent
DRNAREA	Area that drains to a point on a stream	9.98	square miles
I6H100Y	6-hour precipitation that is expected to occur on average once in 100 years	3.73	inches
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	0.6	percent
LC11FOREST	Percentage of forest from NLCD 2011 classes 41-43	91.8	percent
LC11GRASS	Percent of area covered by grassland/herbaceous using 2011 NLCD	5.6	percent
OUTLETELEV	Elevation of the stream outlet in feet above NAVD88	6352	feet
PRECIP	Mean Annual Precipitation	22.57	inches

Parameter Code	Parameter Description	Value	Unit
RCN	Runoff-curve number as defined by NRCS (http://policy.nrcs.usda.gov/OpenNonWebContent.aspx?content=17758.wba)	75.49	dimensionless
STATSCLAY	Percentage of clay soils from STATSGO	17.95	percent

USGS Data Disclaimer: Unless otherwise stated, all data, metadata and related materials are considered to satisfy the quality standards relative to the purpose for which the data were collected. Although these data and associated metadata have been reviewed for accuracy and completeness and approved for release by the U.S. Geological Survey (USGS), no warranty expressed or implied is made regarding the display or utility of the data for other purposes, nor on all computer systems, nor shall the act of distribution constitute any such warranty.

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USGS Product Names Disclaimer: Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Application Version: 4.8.1
StreamStats Services Version: 1.2.22
NSS Services Version: 2.1.2

B.2. NRCS Soils Report

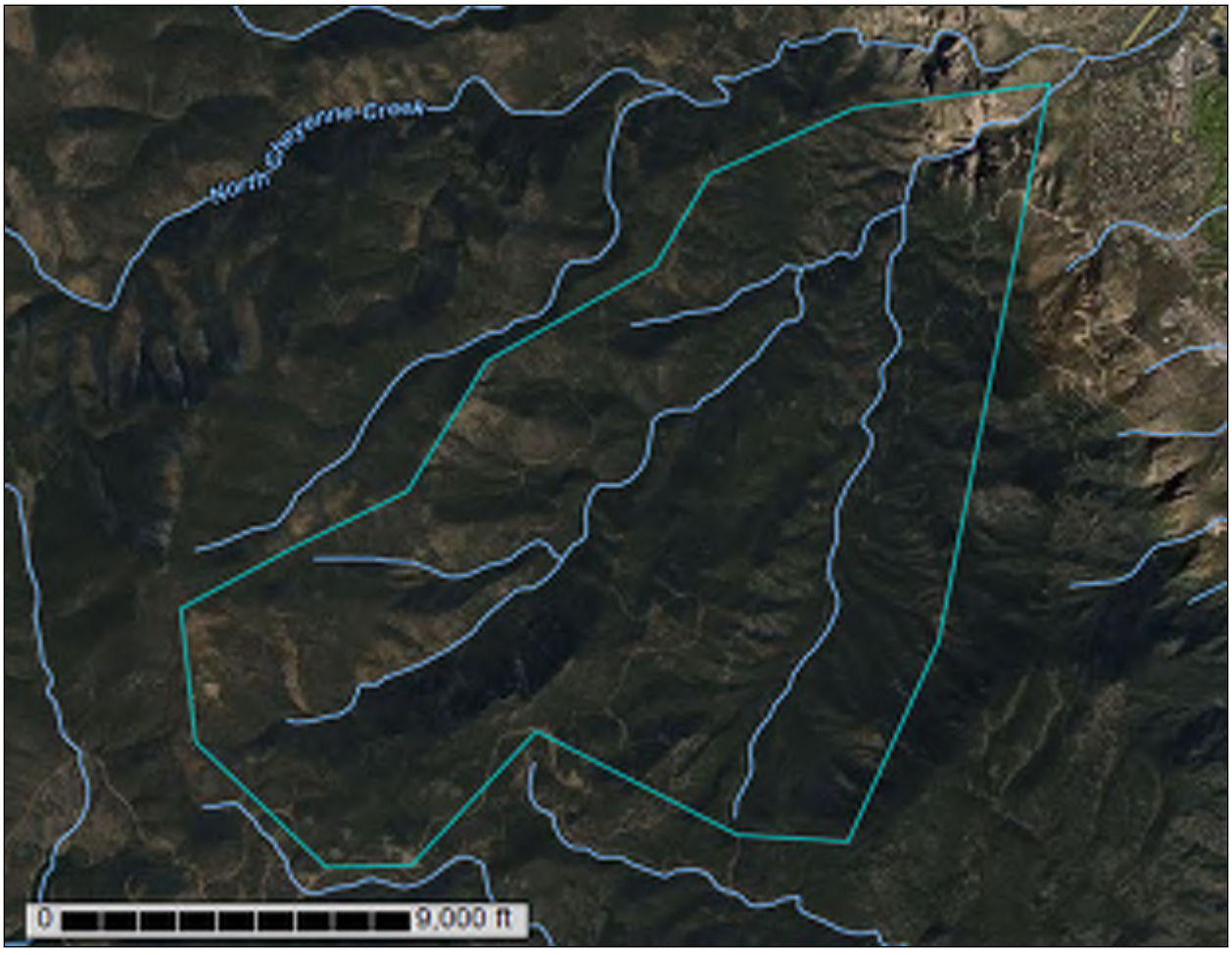
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for El Paso County Area, Colorado; and Pike National Forest, Eastern Part, Colorado, Parts of Douglas, El Paso, Jefferson, and Teller Counties



May 17, 2022

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

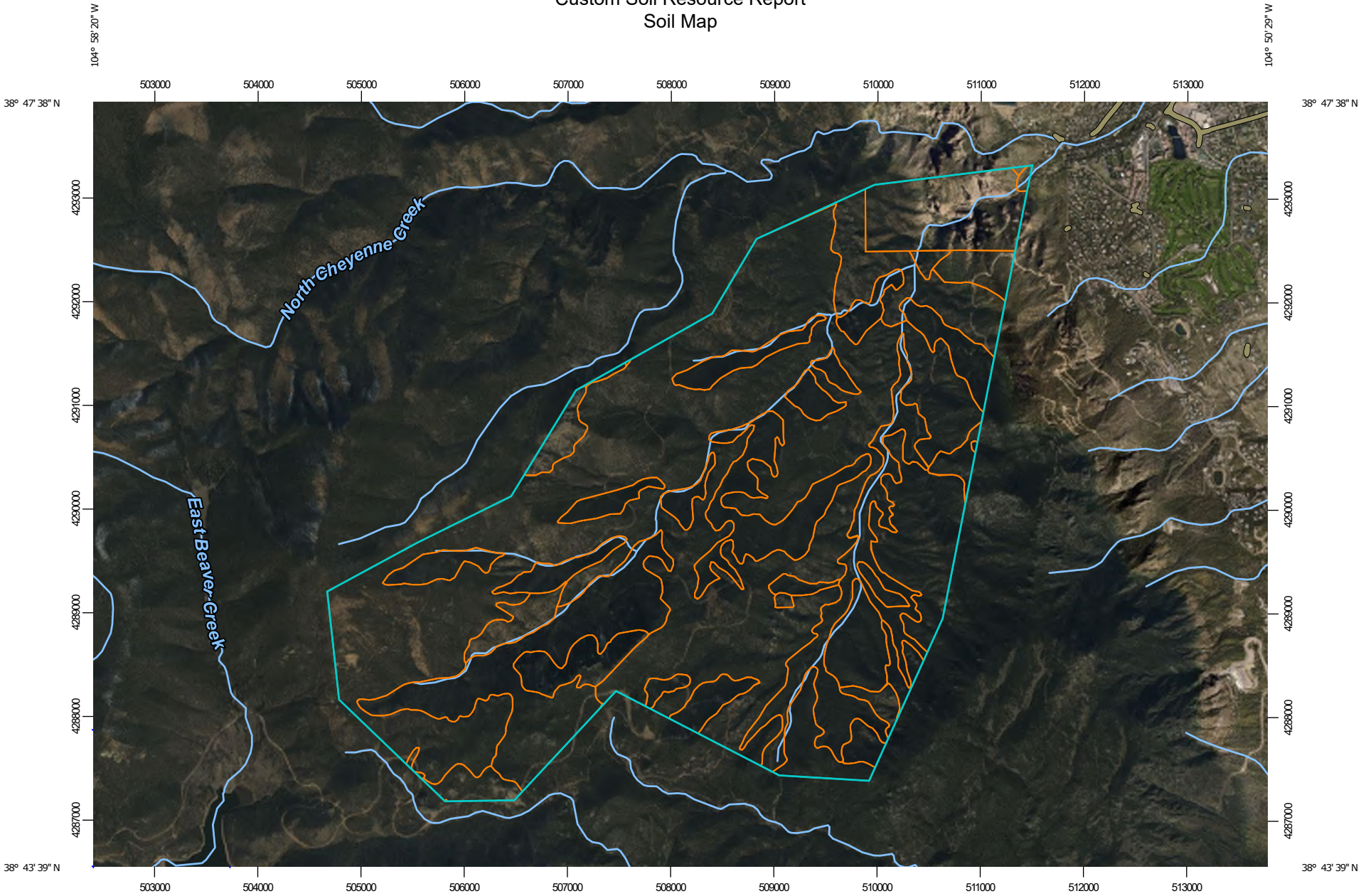
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 19, Aug 31, 2021

Soil Survey Area: Pike National Forest, Eastern Part, Colorado, Parts of Douglas, El Paso, Jefferson, and Teller Counties
Survey Area Data: Version 8, Aug 31, 2021

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 14, 2018—Oct 20, 2018

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
16	Chaseville gravelly sandy loam, 1 to 8 percent slopes	6.0	0.1%
17	Chaseville gravelly sandy loam, 8 to 40 percent slopes	1.6	0.0%
46	Kutler-Broadmoor-Rock outcrop complex, 25 to 90 percent slopes	265.7	4.5%
Subtotals for Soil Survey Area		**273.2**	**4.7%**
Totals for Area of Interest		**5,871.5**	**100.0%**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
2	Aquolls, 1 to 10 percent slopes	3.4	0.1%
14	Garber very gravelly coarse sandy loam, 15 to 40 percent slopes	0.1	0.0%
21	Ivywild-Catamount gravelly sandy loams, 5 to 70 percent slopes, very bouldery	53.9	0.9%
26	Legault-Rock outcrop complex, 15 to 65 percent slopes	1,001.3	17.1%
33	Rock outcrop-Catamount complex, 15 to 70 percent slopes	210.2	3.6%
34	Rock outcrop-Security-Cathedral complex, 15 to 65 percent slopes	140.3	2.4%
35	Rock outcrop-Sphinx complex, 15 to 80 percent slopes	120.8	2.1%
36	Rock outcrop-Sphinx, warm complex, 15 to 80 percent slopes	13.7	0.2%
46	Sphinx-Rock outcrop complex, 15 to 80 percent slopes	3,440.2	58.6%
47	Sphinx, warm-Rock outcrop complex, 15 to 80 percent slopes	228.4	3.9%
48	Tecolote very gravelly sandy loam, 15 to 40 percent slopes, very stony	385.9	6.6%
Subtotals for Soil Survey Area		**5,598.3**	**95.3%**
Totals for Area of Interest		**5,871.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas

shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

El Paso County Area, Colorado

16—Chaseville gravelly sandy loam, 1 to 8 percent slopes

Map Unit Setting

National map unit symbol: 367l
Elevation: 6,100 to 7,000 feet
Mean annual precipitation: 16 to 18 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Chaseville and similar soils: 98 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chaseville

Setting

Landform: Terraces, alluvial fans, hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from arkose

Typical profile

A1 - 0 to 6 inches: gravelly sandy loam
A2 - 6 to 19 inches: very gravelly sandy loam
C1 - 19 to 40 inches: extremely gravelly loamy coarse sand
C2 - 40 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 1 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XY214CO - Gravelly Foothill
Hydric soil rating: No

Minor Components

Pleasant

Percent of map unit: 1 percent
Landform: Depressions

Hydric soil rating: Yes

Other soils

Percent of map unit: 1 percent
Hydric soil rating: No

17—Chaseville gravelly sandy loam, 8 to 40 percent slopes

Map Unit Setting

National map unit symbol: 367m
Elevation: 6,100 to 7,000 feet
Mean annual precipitation: 16 to 18 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Chaseville and similar soils: 99 percent
Minor components: 1 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chaseville

Setting

Landform: Terraces, alluvial fans, hills
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from arkose

Typical profile

A1 - 0 to 6 inches: gravelly sandy loam
A2 - 6 to 19 inches: very gravelly sandy loam
C1 - 19 to 40 inches: extremely gravelly loamy coarse sand
C2 - 40 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 8 to 40 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: A
Ecological site: R049XY214CO - Gravelly Foothill
Hydric soil rating: No

Minor Components

Other soils
Percent of map unit: 1 percent
Hydric soil rating: No

46—Kutler-Broadmoor-Rock outcrop complex, 25 to 90 percent slopes

Map Unit Setting
National map unit symbol: 368n
Elevation: 7,000 to 8,500 feet
Frost-free period: 80 to 100 days
Farmland classification: Not prime farmland

Map Unit Composition
Kutler and similar soils: 35 percent
Broadmoor and similar soils: 30 percent
Rock outcrop: 30 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kutler

Setting
Landform: Mountains
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granite

Typical profile
A - 0 to 6 inches: very gravelly sandy loam
C - 6 to 23 inches: extremely gravelly sandy loam
Cr - 23 to 27 inches: weathered bedrock

Properties and qualities
Slope: 25 to 65 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: R048AY222CO - Loamy Park
Hydric soil rating: No

Description of Broadmoor

Setting

Landform: Mountains
Landform position (three-dimensional): Mountainflank
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from granite

Typical profile

E - 0 to 15 inches: very gravelly sandy loam
Bw - 15 to 28 inches: extremely gravelly sandy loam
Cr - 28 to 32 inches: weathered bedrock

Properties and qualities

Slope: 25 to 70 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: F048AY924CO - Douglas Fir/Gambel Oak
Hydric soil rating: No

Description of Rock Outcrop

Typical profile

R - 0 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 25 to 90 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 4 percent
Hydric soil rating: No

Pleasant

Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

Pike National Forest, Eastern Part, Colorado, Parts of Douglas, El Paso, Jefferson, and Teller Counties

2—Aquolls, 1 to 10 percent slopes

Map Unit Setting

National map unit symbol: jpj0
Elevation: 6,000 to 13,280 feet
Mean annual precipitation: 15 to 25 inches
Mean annual air temperature: 28 to 48 degrees F
Frost-free period: 20 to 100 days
Farmland classification: Not prime farmland

Map Unit Composition

Aquolls and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Aquolls

Setting

Landform: Flood plains, drainageways
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite and/or gneiss and/or schist and/or sandstone

Typical profile

A1 - 0 to 12 inches: fine sandy loam
A2 - 12 to 25 inches: loamy fine sand
2Agb - 25 to 50 inches: very fine sandy loam
3C - 50 to 60 inches: coarse sand

Properties and qualities

Slope: 1 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 6.02 in/hr)
Depth to water table: About 0 to 24 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): 5w
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: A/D
Hydric soil rating: Yes

Minor Components

Garber

Percent of map unit: 10 percent
Landform: Drainageways, mountain slopes
Landform position (three-dimensional): Mountainbase
Down-slope shape: Convex, linear, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

14—Garber very gravelly coarse sandy loam, 15 to 40 percent slopes

Map Unit Setting

National map unit symbol: jpht
Elevation: 6,500 to 9,200 feet
Mean annual precipitation: 15 to 24 inches
Mean annual air temperature: 43 to 48 degrees F
Frost-free period: 70 to 100 days
Farmland classification: Not prime farmland

Map Unit Composition

Garber and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Garber

Setting

Landform: Drainageways, mountain slopes
Landform position (three-dimensional): Mountainbase
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Weathered from granite

Typical profile

A1 - 0 to 6 inches: very gravelly coarse sandy loam
A2 - 6 to 18 inches: very gravelly coarse sandy loam
C - 18 to 42 inches: extremely gravelly coarse sandy loam
Cr - 42 to 60 inches: bedrock

Properties and qualities

Slope: 15 to 40 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: F048AY924CO - Douglas Fir/Gambel Oak
Other vegetative classification: Douglas-fir/Gambel oak (PSME/QUGA) (C1214), Quaking aspen/common juniper (POTR5/JUCO6) (D0508)
Hydric soil rating: No

Minor Components

Sphinx

Percent of map unit: 15 percent
Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Ecological site: R048AY240CO - Shallow Pine
Other vegetative classification: Ponderosa pine/kinnikinnick (PIPO/ARUV) (C1140)
Hydric soil rating: No

21—Ivywild-Catamount gravelly sandy loams, 5 to 70 percent slopes, very bouldery

Map Unit Setting

National map unit symbol: jpj2
Elevation: 6,000 to 13,280 feet
Mean annual precipitation: 15 to 25 inches
Mean annual air temperature: 28 to 46 degrees F
Frost-free period: 20 to 100 days
Farmland classification: Not prime farmland

Map Unit Composition

Ivywild, very bouldery, and similar soils: 50 percent
Catamount, very bouldery, and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ivywild, Very Bouldery

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Colluvium and/or glacial till derived from granite

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material

A - 1 to 2 inches: gravelly sandy loam
E - 2 to 6 inches: very gravelly sandy loam
Bw1 - 6 to 16 inches: very gravelly sandy loam
Bw2 - 16 to 38 inches: extremely gravelly sandy loam
Cr - 38 to 42 inches: bedrock

Properties and qualities

Slope: 5 to 70 percent
Surface area covered with cobbles, stones or boulders: 2.3 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: F048AY924CO - Douglas Fir/Gambel Oak
Other vegetative classification: Douglas-fir/boxleaf myrtle (PSME/PAMY) (C1211)
Hydric soil rating: No

Description of Catamount, Very Bouldery

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Weathered from granite

Typical profile

Oi - 0 to 0 inches: slightly decomposed plant material
A - 0 to 2 inches: gravelly sandy loam
AC - 2 to 9 inches: very gravelly coarse sandy loam
C - 9 to 13 inches: extremely gravelly loamy sand
Cr - 13 to 28 inches: bedrock

Properties and qualities

Slope: 5 to 70 percent
Surface area covered with cobbles, stones or boulders: 2.3 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Excessively drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: F048AY918CO - Spruce-Fir Woodland
Other vegetative classification: Engelmann spruce/moss (PIEN/moss) (C0406)
Hydric soil rating: No

Minor Components

Legault

Percent of map unit: 10 percent
Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Aquolls

Percent of map unit: 5 percent
Landform: Flood plains, drainageways
Down-slope shape: Concave, linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: Yes

26—Legault-Rock outcrop complex, 15 to 65 percent slopes

Map Unit Setting

National map unit symbol: jpj7
Elevation: 6,500 to 12,000 feet
Mean annual precipitation: 17 to 25 inches
Mean annual air temperature: 32 to 46 degrees F
Frost-free period: 20 to 100 days
Farmland classification: Not prime farmland

Map Unit Composition

Legault and similar soils: 50 percent
Rock outcrop: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Legault

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Weathered from granite

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 3 inches: very gravelly coarse sandy loam
E - 3 to 9 inches: very gravelly coarse sandy loam
C - 9 to 18 inches: very gravelly loamy coarse sand
Cr - 18 to 61 inches: bedrock

Properties and qualities

Slope: 15 to 65 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 1.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: F048AY908CO - Mixed Conifer
Other vegetative classification: Douglas-fir/kinnikinnick-common juniper (PSME/ARUV-JUCO6) (C1219)
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear

Typical profile

- 0 to 4 inches: bedrock

Properties and qualities

Slope: 15 to 65 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Tecolote

Percent of map unit: 10 percent

Landform: Mountain slopes
Landform position (three-dimensional): Mountainbase, lower third of mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Other vegetative classification: Douglas-fir/Gambel oak (PSME/QUGA) (C1214)
Hydric soil rating: No

Sphinx

Percent of map unit: 5 percent
Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Other vegetative classification: Ponderosa pine/kinnikinnick (PIPO/ARUV) (C1140)
Hydric soil rating: No

Herbman

Percent of map unit: 5 percent
Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Other vegetative classification: Engelmann spruce/moss (PIEN/moss) (C0406)
Hydric soil rating: No

33—Rock outcrop-Catamount complex, 15 to 70 percent slopes

Map Unit Setting

National map unit symbol: jpjh
Elevation: 6,000 to 13,280 feet
Mean annual precipitation: 15 to 25 inches
Mean annual air temperature: 28 to 46 degrees F
Frost-free period: 20 to 100 days
Farmland classification: Not prime farmland

Map Unit Composition

Rock outcrop: 45 percent
Catamount and similar soils: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Outcrop

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Weathered from granite

Typical profile

- 0 to 60 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 70 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Catamount

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Weathered from granite

Typical profile

Oi - 0 to 0 inches: slightly decomposed plant material
A - 0 to 2 inches: gravelly sandy loam
AC - 2 to 9 inches: very gravelly coarse sandy loam
C - 9 to 13 inches: extremely gravelly loamy sand
Cr - 13 to 28 inches: bedrock

Properties and qualities

Slope: 15 to 70 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: F048AY918CO - Spruce-Fir Woodland
Other vegetative classification: Engelmann spruce/moss (PIEN/moss) (C0406)
Hydric soil rating: No

Minor Components

Legault

Percent of map unit: 5 percent
Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Herbman

Percent of map unit: 5 percent
Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Other vegetative classification: Engelmann spruce/moss (PIEN/moss) (C0406)
Hydric soil rating: No

Aquolls

Percent of map unit: 5 percent
Landform: Flood plains, drainageways
Down-slope shape: Concave, linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: Yes

34—Rock outcrop-Security-Cathedral complex, 15 to 65 percent slopes

Map Unit Setting

National map unit symbol: jpjj
Elevation: 6,000 to 11,000 feet
Mean annual precipitation: 15 to 24 inches
Mean annual air temperature: 37 to 48 degrees F
Frost-free period: 50 to 100 days
Farmland classification: Not prime farmland

Map Unit Composition

Rock outcrop: 40 percent
Security and similar soils: 30 percent
Cathedral and similar soils: 25 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Outcrop

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear

Across-slope shape: Convex, linear
Parent material: Schist and/or weathered from granite and gneiss

Typical profile
R - 0 to 60 inches: unweathered bedrock

Properties and qualities
Slope: 15 to 65 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Security

Setting
Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Weathered from schist and/or gneiss and/or granite

Typical profile
Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 7 inches: very gravelly coarse sandy loam
E - 7 to 15 inches: very gravelly coarse sandy loam
Bt - 15 to 23 inches: very gravelly sandy clay loam
C - 23 to 26 inches: very gravelly sandy loam
Cr - 26 to 30 inches: bedrock

Properties and qualities
Slope: 15 to 65 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 2.3 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F048AY924CO - Douglas Fir/Gambel Oak
Other vegetative classification: Douglas-fir/mountain ninebark (PSME/PHMO4) (C1213)
Hydric soil rating: No

Description of Cathedral

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Weathered from schist and/or gneiss and/or granite

Typical profile

A - 0 to 3 inches: gravelly sandy loam
Bw - 3 to 12 inches: extremely gravelly sandy loam
R - 12 to 60 inches: bedrock

Properties and qualities

Slope: 15 to 65 percent
Surface area covered with cobbles, stones or boulders: 27.0 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 0.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R048AY240CO - Shallow Pine
Other vegetative classification: Douglas-fir/Gambel oak (PSME/QUGA) (C1214), Ponderosa pine/Gambel oak (PIPO/QUGA) (C1121)
Hydric soil rating: No

Minor Components

Legault

Percent of map unit: 5 percent
Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

35—Rock outcrop-Sphinx complex, 15 to 80 percent slopes

Map Unit Setting

National map unit symbol: jpjk
Elevation: 6,000 to 9,200 feet
Mean annual precipitation: 15 to 20 inches
Mean annual air temperature: 43 to 48 degrees F
Frost-free period: 70 to 125 days
Farmland classification: Not prime farmland

Map Unit Composition

Rock outcrop: 45 percent
Sphinx and similar soils: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Outcrop

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Granite

Typical profile

- 0 to 4 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 80 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Sphinx

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear

Across-slope shape: Convex, linear
Parent material: Weathered from granite

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 5 inches: gravelly coarse sandy loam
AC - 5 to 13 inches: very gravelly loamy coarse sand
Cr - 13 to 61 inches: weathered bedrock

Properties and qualities

Slope: 15 to 70 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R048AY240CO - Shallow Pine
Other vegetative classification: Ponderosa pine/kinnikinnick (PIPO/ARUV) (C1140)
Hydric soil rating: No

Minor Components

Sphinx, mollic

Percent of map unit: 10 percent
Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Other vegetative classification: Ponderosa pine/kinnikinnick (PIPO/ARUV) (C1140)
Hydric soil rating: No

Garber

Percent of map unit: 5 percent
Landform: Mountain slopes
Landform position (three-dimensional): Mountainbase
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: No

36—Rock outcrop-Sphinx, warm complex, 15 to 80 percent slopes

Map Unit Setting

National map unit symbol: jpjl
Elevation: 6,000 to 9,200 feet
Mean annual precipitation: 15 to 20 inches
Mean annual air temperature: 43 to 48 degrees F
Frost-free period: 70 to 125 days
Farmland classification: Not prime farmland

Map Unit Composition

Rock outcrop: 45 percent
Sphinx, warm, and similar soils: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Outcrop

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Weathered from granite

Typical profile

R - 0 to 4 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 80 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydrologic Soil Group: D
Hydric soil rating: No

Description of Sphinx, Warm

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear

Parent material: Weathered from granite

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 5 inches: gravelly coarse sandy loam
AC - 5 to 13 inches: very gravelly loamy coarse sand
Cr - 13 to 61 inches: weathered bedrock

Properties and qualities

Slope: 15 to 80 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R048AY240CO - Shallow Pine
Other vegetative classification: Ponderosa pine/kinnikinnick (PIPO/ARUV) (C1140)
Hydric soil rating: No

Minor Components

Sphinx, mollic

Percent of map unit: 10 percent
Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Other vegetative classification: Ponderosa pine/kinnikinnick (PIPO/ARUV) (C1140)
Hydric soil rating: No

Garber

Percent of map unit: 5 percent
Landform: Mountain slopes
Landform position (three-dimensional): Mountainbase
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: No

46—Sphinx-Rock outcrop complex, 15 to 80 percent slopes

Map Unit Setting

National map unit symbol: jpjy
Elevation: 6,500 to 9,200 feet
Mean annual precipitation: 15 to 24 inches
Mean annual air temperature: 43 to 48 degrees F
Frost-free period: 70 to 125 days
Farmland classification: Not prime farmland

Map Unit Composition

Sphinx and similar soils: 60 percent
Rock outcrop: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sphinx

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Weathered from granite

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 5 inches: gravelly coarse sandy loam
AC - 5 to 13 inches: very gravelly loamy coarse sand
Cr - 13 to 61 inches: weathered bedrock

Properties and qualities

Slope: 15 to 70 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R048AY240CO - Shallow Pine

Other vegetative classification: Ponderosa pine/kinnikinnick (PIPO/ARUV) (C1140)
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear

Typical profile

R - 0 to 61 inches: bedrock

Properties and qualities

Slope: 15 to 80 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Sphinx, dark surface

Percent of map unit: 10 percent
Landform: Mountain slopes
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Other vegetative classification: Ponderosa pine/kinnikinnick (PIPO/ARUV) (C1140)
Hydric soil rating: No

Garber

Percent of map unit: 5 percent
Landform: Drainageways, mountain slopes
Landform position (three-dimensional): Mountainbase
Down-slope shape: Convex, linear, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

47—Sphinx, warm-Rock outcrop complex, 15 to 80 percent slopes

Map Unit Setting

National map unit symbol: jpjz
Elevation: 6,500 to 9,200 feet
Mean annual precipitation: 15 to 24 inches
Mean annual air temperature: 43 to 48 degrees F
Frost-free period: 70 to 125 days
Farmland classification: Not prime farmland

Map Unit Composition

Sphinx, warm, and similar soils: 60 percent
Rock outcrop: 25 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sphinx, Warm

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Weathered from granite

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 5 inches: gravelly coarse sandy loam
AC - 5 to 13 inches: very gravelly loamy coarse sand
Cr - 13 to 61 inches: weathered bedrock

Properties and qualities

Slope: 15 to 70 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R048AY240CO - Shallow Pine

Other vegetative classification: Ponderosa pine/kinnikinnick (PIPO/ARUV) (C1140)
Hydric soil rating: No

Description of Rock Outcrop

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountaintop, mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear

Typical profile

R - 0 to 61 inches: bedrock

Properties and qualities

Slope: 15 to 80 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: No

Minor Components

Sphinx, dark surface

Percent of map unit: 10 percent
Landform: Mountain slopes
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Other vegetative classification: Ponderosa pine/kinnikinnick (PIPO/ARUV) (C1140)
Hydric soil rating: No

Garber

Percent of map unit: 5 percent
Landform: Drainageways, mountain slopes
Landform position (three-dimensional): Mountainbase
Down-slope shape: Convex, linear, concave
Across-slope shape: Convex, linear, concave
Hydric soil rating: No

48—Tecolote very gravelly sandy loam, 15 to 40 percent slopes, very stony

Map Unit Setting

National map unit symbol: jpk0
Elevation: 7,500 to 9,000 feet
Mean annual precipitation: 20 to 25 inches
Mean annual air temperature: 43 to 46 degrees F
Frost-free period: 65 to 75 days
Farmland classification: Not prime farmland

Map Unit Composition

Tecolote, very stony, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tecolote, Very Stony

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountainbase, lower third of mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Cobbly or stony colluvium over weathered granite

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 3 inches: very gravelly sandy loam
E - 3 to 21 inches: very cobbly sandy loam
B/E - 21 to 31 inches: very cobbly sandy clay loam
Bt - 31 to 46 inches: very cobbly sandy clay loam
Cr - 46 to 61 inches: bedrock

Properties and qualities

Slope: 15 to 40 percent
Surface area covered with cobbles, stones or boulders: 3.0 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F048AY924CO - Douglas Fir/Gambel Oak
Other vegetative classification: Douglas-fir/Gambel oak (PSME/QUGA) (C1214)
Hydric soil rating: No

Minor Components

Tecolote, mollic

Percent of map unit: 5 percent
Landform: Mountain slopes
Landform position (three-dimensional): Mountainbase, lower third of mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Other vegetative classification: Douglas-fir/Gambel oak (PSME/QUGA) (C1214)
Hydric soil rating: No

Tecolote, very deep

Percent of map unit: 5 percent
Landform: Mountain slopes
Landform position (three-dimensional): Mountainbase, lower third of mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Other vegetative classification: Douglas-fir/Gambel oak (PSME/QUGA) (C1214)
Hydric soil rating: No

Tecolote, non-skeletal

Percent of map unit: 5 percent
Landform: Mountain slopes
Landform position (three-dimensional): Mountainbase, lower third of mountainflank
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Other vegetative classification: Douglas-fir/Gambel oak (PSME/QUGA) (C1214)
Hydric soil rating: No

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Appendix C. Hydraulic Calculations

C.1. Hydraulic Data Tables

HEC-RAS Plan: Exist River: Stream Reach: Reach

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	1337	10-yr	124.00	6368.74	6372.98		6373.18	0.005666	3.57	34.76	11.00	0.35
Reach	1337	25-yr	274.00	6368.74	6374.44		6374.89	0.009583	5.39	50.85	11.11	0.44
Reach	1337	50-yr	514.00	6368.74	6376.43		6377.19	0.011694	6.99	75.26	14.34	0.48
Reach	1337	100-yr	867.00	6368.74	6379.19		6380.00	0.009165	7.57	136.72	30.43	0.44
Reach	1337	500-yr	2627.00	6368.74	6384.13		6385.59	0.011403	11.21	320.55	43.92	0.52
Reach	1328	10-yr	124.00	6369.08	6372.72		6373.09	0.012509	4.90	25.32	9.03	0.52
Reach	1328	25-yr	274.00	6369.08	6373.72		6374.70	0.025963	7.93	34.55	9.29	0.73
Reach	1328	50-yr	514.00	6369.08	6374.57	6374.57	6376.84	0.052167	12.07	42.57	9.52	1.01
Reach	1328	100-yr	867.00	6369.08	6376.47	6376.47	6379.60	0.057602	14.18	61.13	10.03	1.01
Reach	1328	500-yr	2627.00	6369.08	6384.50	6381.49	6385.31	0.008002	8.94	408.66	50.00	0.42
Reach	1309	10-yr	124.00	6369.80	6372.34		6372.81	0.015342	5.63	23.70	14.08	0.72
Reach	1309	25-yr	274.00	6369.80	6373.37	6373.02	6374.29	0.017075	7.90	39.29	16.21	0.81
Reach	1309	50-yr	514.00	6369.80	6374.37	6374.33	6376.04	0.021549	10.78	56.58	18.30	0.96
Reach	1309	100-yr	867.00	6369.80	6375.83	6375.83	6378.11	0.019934	12.79	85.53	21.33	0.97
Reach	1309	500-yr	2627.00	6369.80	6380.87	6380.87	6384.79	0.015878	17.70	218.82	30.00	0.96
Reach	1281	10-yr	124.00	6369.37	6371.98		6372.37	0.014908	5.03	24.64	13.22	0.65
Reach	1281	25-yr	274.00	6369.37	6372.99		6373.77	0.017584	7.11	39.52	16.87	0.75
Reach	1281	50-yr	514.00	6369.37	6373.93	6373.78	6375.37	0.022533	9.76	57.35	21.04	0.89
Reach	1281	100-yr	867.00	6369.37	6375.36	6375.36	6377.18	0.019433	11.25	93.91	30.05	0.87
Reach	1281	500-yr	2627.00	6369.37	6379.42	6379.42	6382.42	0.017424	15.66	238.07	40.00	0.91
Reach	1215	10-yr	124.00	6367.75	6371.91		6372.00	0.001997	2.46	50.68	18.72	0.26
Reach	1215	25-yr	274.00	6367.75	6372.93		6373.17	0.003415	3.95	72.34	24.71	0.36
Reach	1215	50-yr	514.00	6367.75	6373.98		6374.46	0.005112	5.68	99.62	27.28	0.45
Reach	1215	100-yr	867.00	6367.75	6375.06		6375.91	0.007081	7.63	130.49	29.91	0.55
Reach	1215	500-yr	2627.00	6367.75	6377.69	6377.52	6380.85	0.016962	15.07	217.62	36.35	0.91
Reach	1173	10-yr	124.00	6366.76	6370.95	6370.95	6371.71	0.040102	7.63	22.12	17.80	0.66
Reach	1173	25-yr	274.00	6366.76	6371.99	6371.99	6372.77	0.039439	8.80	46.13	25.76	0.68
Reach	1173	50-yr	514.00	6366.76	6372.81	6372.81	6373.91	0.048643	10.78	68.28	28.46	0.78
Reach	1173	100-yr	867.00	6366.76	6373.74	6373.74	6375.21	0.053712	12.47	96.17	31.53	0.84
Reach	1173	500-yr	2627.00	6366.76	6376.92	6376.92	6379.49	0.053392	16.01	211.58	39.00	0.89
Reach	1126	10-yr	124.00	6364.10	6366.15	6366.15	6366.83	0.035020	6.67	18.86	14.52	1.00
Reach	1126	25-yr	274.00	6364.10	6367.12	6367.12	6368.19	0.028671	8.39	34.52	17.69	0.98
Reach	1126	50-yr	514.00	6364.10	6368.27	6368.27	6369.79	0.024205	10.12	57.15	21.46	0.96
Reach	1126	100-yr	867.00	6364.10	6369.66	6369.66	6371.58	0.020381	11.63	90.97	29.05	0.93
Reach	1126	500-yr	2627.00	6364.10	6373.63	6373.63	6376.45	0.016246	15.48	255.63	45.00	0.92
Reach	1055	10-yr	124.00	6360.52	6363.28		6363.57	0.010847	4.29	28.90	16.37	0.57
Reach	1055	25-yr	274.00	6360.52	6364.53		6364.98	0.010243	5.32	51.46	19.68	0.58
Reach	1055	50-yr	514.00	6360.52	6365.64		6366.37	0.012788	6.87	74.79	22.68	0.67
Reach	1055	100-yr	867.00	6360.52	6366.32	6365.92	6367.74	0.020512	9.54	91.28	26.23	0.86
Reach	1055	500-yr	2627.00	6360.52	6369.68	6369.68	6373.02	0.021576	14.87	191.14	30.00	0.98
Reach	1004	10-yr	124.00	6360.02	6361.83	6361.83	6362.56	0.039772	6.88	18.03	12.51	1.01
Reach	1004	25-yr	274.00	6360.02	6362.88	6362.88	6364.01	0.036799	8.50	32.23	14.47	1.00
Reach	1004	50-yr	514.00	6360.02	6364.46	6364.46	6365.48	0.022909	8.37	74.66	47.09	0.81
Reach	1004	100-yr	867.00	6360.02	6365.39	6365.39	6366.55	0.022848	9.43	121.65	52.79	0.84
Reach	1004	500-yr	2627.00	6360.02	6369.92		6370.94	0.008629	9.67	369.77	55.00	0.59
Reach	957	10-yr	124.00	6357.64	6359.69	6359.69	6360.36	0.036897	6.57	18.93	14.71	1.01
Reach	957	25-yr	274.00	6357.64	6360.64	6360.64	6361.69	0.031359	8.23	33.74	16.65	1.00
Reach	957	50-yr	514.00	6357.64	6361.77	6361.77	6363.25	0.028366	9.80	53.84	18.97	1.00
Reach	957	100-yr	867.00	6357.64	6363.21	6363.21	6364.97	0.021735	10.75	88.35	31.90	0.93
Reach	957	500-yr	2627.00	6357.64	6366.96	6366.96	6370.15	0.018695	15.25	216.75	35.00	0.95
Reach	906	10-yr	124.00	6354.83	6356.75	6356.75	6357.37	0.032188	6.32	20.38	19.95	0.97
Reach	906	25-yr	274.00	6354.83	6357.65	6357.65	6358.53	0.024580	7.79	41.17	26.28	0.92
Reach	906	50-yr	514.00	6354.83	6359.28		6360.02	0.010794	7.46	89.80	33.06	0.67
Reach	906	100-yr	867.00	6354.83	6360.45		6361.48	0.011233	9.08	131.20	38.12	0.71
Reach	906	500-yr	2627.00	6354.83	6363.24	6363.24	6365.94	0.018095	15.47	254.10	46.23	0.98
Reach	855	10-yr	124.00	6352.81	6354.70	6354.70	6355.32	0.036270	6.32	19.63	16.02	1.01
Reach	855	25-yr	274.00	6352.81	6355.79	6355.59	6356.54	0.024310	6.95	39.44	20.32	0.88
Reach	855	50-yr	514.00	6352.81	6359.40		6359.63	0.002502	3.90	138.29	33.82	0.32
Reach	855	100-yr	867.00	6352.81	6360.59		6360.95	0.004206	4.89	188.99	50.83	0.42
Reach	855	500-yr	2627.00	6352.81	6363.73		6364.69	0.005558	8.12	371.33	60.00	0.53
Reach	813	10-yr	124.00	6350.80	6353.18	6352.57	6353.56	0.014258	4.93	25.15	11.97	0.60
Reach	813	25-yr	274.00	6350.80	6355.52	6353.64	6355.92	0.007295	5.07	55.58	19.64	0.43
Reach	813	50-yr	514.00	6350.80	6359.36	6355.01	6359.53	0.001725	3.75	205.31	56.93	0.23
Reach	813	100-yr	867.00	6350.80	6360.52	6356.63	6360.78	0.002469	4.91	275.41	63.56	0.28

HEC-RAS Plan: Exist River: Stream Reach: Reach (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	813	500-yr	2627.00	6350.80	6363.72	6360.79	6364.38	0.004878	8.39	499.55	72.00	0.42
Reach	755		Culvert									
Reach	750	10-yr	124.00	6349.74	6351.64	6351.64	6352.27	0.034854	6.38	19.42	14.88	0.99
Reach	750	25-yr	274.00	6349.74	6352.63	6352.63	6353.47	0.031635	7.38	37.13	21.31	0.99
Reach	750	50-yr	514.00	6349.74	6353.61	6353.61	6354.70	0.028860	8.41	61.46	28.48	0.99
Reach	750	100-yr	867.00	6349.74	6354.51	6354.51	6356.07	0.026261	10.03	88.92	32.32	0.99
Reach	750	500-yr	2627.00	6349.74	6357.89	6357.89	6360.81	0.019457	14.02	204.13	59.49	0.97
Reach	704	10-yr	124.00	6348.36	6349.97	6349.97	6350.60	0.036816	6.37	19.45	15.79	1.01
Reach	704	25-yr	274.00	6348.36	6350.88	6350.88	6351.82	0.032420	7.76	35.29	19.04	1.01
Reach	704	50-yr	514.00	6348.36	6351.91	6351.91	6353.18	0.029915	9.05	56.78	22.58	1.01
Reach	704	100-yr	867.00	6348.36	6353.09	6353.09	6354.67	0.027694	10.09	85.90	27.17	1.00
Reach	704	500-yr	2627.00	6348.36	6356.62	6356.62	6359.06	0.021611	12.59	215.90	54.01	0.96
Reach	652	10-yr	124.00	6346.27	6348.55		6348.99	0.024004	5.34	23.23	17.82	0.82
Reach	652	25-yr	274.00	6346.27	6349.27	6349.22	6350.12	0.030288	7.40	37.00	20.45	0.97
Reach	652	50-yr	514.00	6346.27	6350.21	6350.21	6351.44	0.029736	8.86	57.98	23.84	1.00
Reach	652	100-yr	867.00	6346.27	6351.30	6351.30	6352.88	0.028150	10.08	86.04	27.74	1.01
Reach	652	500-yr	2627.00	6346.27	6355.04	6355.04	6357.09	0.017982	11.66	250.75	75.68	0.88
Reach	601	10-yr	124.00	6344.87	6346.91	6346.91	6347.46	0.039166	5.92	20.95	20.07	1.02
Reach	601	25-yr	274.00	6344.87	6347.70	6347.70	6348.48	0.033953	7.08	38.68	25.35	1.01
Reach	601	50-yr	514.00	6344.87	6348.54	6348.54	6349.61	0.030651	8.29	61.98	29.52	1.01
Reach	601	100-yr	867.00	6344.87	6349.49	6349.49	6350.87	0.028132	9.43	91.94	33.61	1.01
Reach	601	500-yr	2627.00	6344.87	6353.73	6352.59	6354.81	0.008313	8.76	367.03	90.65	0.63
Reach	550	10-yr	124.00	6342.52	6344.65	6344.65	6345.32	0.036000	6.57	18.88	14.24	1.01
Reach	550	25-yr	274.00	6342.52	6345.64	6345.64	6346.58	0.032542	7.78	35.22	18.96	1.01
Reach	550	50-yr	514.00	6342.52	6346.70	6346.70	6347.92	0.029468	8.84	58.43	26.57	1.00
Reach	550	100-yr	867.00	6342.52	6347.86	6347.86	6349.29	0.023340	9.73	96.28	40.10	0.94
Reach	550	500-yr	2627.00	6342.52	6349.75	6349.75	6353.73	0.039045	16.96	194.91	58.71	1.30
Reach	499	10-yr	124.00	6340.35	6341.99	6341.99	6342.48	0.039481	5.61	22.09	23.53	1.02
Reach	499	25-yr	274.00	6340.35	6342.68	6342.68	6343.42	0.033804	6.91	39.66	27.33	1.01
Reach	499	50-yr	514.00	6340.35	6343.48	6343.48	6344.51	0.030237	8.13	63.25	31.19	1.01
Reach	499	100-yr	867.00	6340.35	6344.39	6344.39	6345.73	0.027967	9.28	93.38	35.31	1.01
Reach	499	500-yr	2627.00	6340.35	6347.58	6347.58	6349.28	0.017464	10.80	286.64	92.61	0.87
Reach	464	10-yr	124.00	6337.10	6338.96	6338.96	6339.53	0.037729	6.06	20.47	18.42	1.01
Reach	464	25-yr	274.00	6337.10	6339.76	6339.76	6340.65	0.032982	7.56	36.24	20.72	1.01
Reach	464	50-yr	514.00	6337.10	6340.73	6340.73	6341.96	0.030252	8.91	57.71	23.83	1.01
Reach	464	100-yr	867.00	6337.10	6341.81	6341.81	6343.41	0.028470	10.13	85.55	27.48	1.01
Reach	464	500-yr	2627.00	6337.10	6345.22	6345.22	6346.73	0.019829	9.95	291.34	122.86	0.90
Reach	414	10-yr	124.00	6334.16	6336.11	6336.11	6336.62	0.038252	5.75	21.56	21.69	1.01
Reach	414	25-yr	274.00	6334.16	6336.81	6336.81	6337.67	0.031195	7.42	37.51	23.43	1.00
Reach	414	50-yr	514.00	6334.16	6337.71	6337.71	6338.96	0.026382	9.03	59.52	26.06	0.99
Reach	414	100-yr	867.00	6334.16	6338.79	6338.79	6340.46	0.022727	10.56	89.69	29.97	0.97
Reach	414	500-yr	2627.00	6334.16	6342.40	6342.40	6345.50	0.018122	14.88	217.04	38.66	0.97
Reach	359	10-yr	124.00	6332.20	6334.29		6334.62	0.015208	4.65	26.66	17.74	0.67
Reach	359	25-yr	274.00	6332.20	6335.31		6335.80	0.016119	5.62	48.75	25.57	0.72
Reach	359	50-yr	514.00	6332.20	6336.39		6337.06	0.013683	6.57	78.66	29.68	0.70
Reach	359	100-yr	867.00	6332.20	6337.43		6338.40	0.013706	7.91	111.56	33.86	0.73
Reach	359	500-yr	2627.00	6332.20	6340.58	6340.10	6342.79	0.014199	12.22	244.37	50.00	0.83
Reach	309	10-yr	124.00	6331.51	6333.65		6333.92	0.012562	4.16	29.84	20.43	0.61
Reach	309	25-yr	274.00	6331.51	6334.68		6335.09	0.011671	5.14	53.35	24.92	0.62
Reach	309	50-yr	514.00	6331.51	6335.87		6336.41	0.010821	5.86	87.66	31.55	0.62
Reach	309	100-yr	867.00	6331.51	6336.96		6337.72	0.011042	7.01	124.09	36.41	0.65
Reach	309	500-yr	2627.00	6331.51	6340.49		6342.01	0.009402	10.14	290.23	50.00	0.67
Reach	256	10-yr	124.00	6330.68	6332.95		6333.24	0.012966	4.29	28.92	19.46	0.62
Reach	256	25-yr	274.00	6330.68	6333.58		6334.24	0.021897	6.52	42.00	22.22	0.84
Reach	256	50-yr	514.00	6330.68	6334.30	6334.30	6335.47	0.028569	8.67	59.82	27.76	0.99
Reach	256	100-yr	867.00	6330.68	6335.36	6335.36	6336.84	0.022663	9.87	95.73	39.63	0.94
Reach	256	500-yr	2627.00	6330.68	6338.46	6338.46	6341.20	0.019484	14.06	228.42	42.97	0.97
Reach	213	10-yr	124.00	6330.51	6331.96	6331.96	6332.31	0.042416	4.73	26.22	37.94	1.00
Reach	213	25-yr	274.00	6330.51	6332.46	6332.46	6332.95	0.039669	5.62	48.74	51.77	1.02
Reach	213	50-yr	514.00	6330.51	6332.98	6332.98	6333.67	0.034777	6.63	77.49	58.21	1.01
Reach	213	100-yr	867.00	6330.51	6333.57	6333.57	6334.48	0.031129	7.65	113.37	63.81	1.01
Reach	213	500-yr	2627.00	6330.51	6335.53	6335.53	6337.32	0.024506	10.77	248.11	71.61	0.99

HEC-RAS Plan: Exist River: Stream Reach: Reach (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	161	10-yr	124.00	6324.47	6325.89	6325.89	6326.42	0.037886	5.82	21.32	20.77	1.01
Reach	161	25-yr	274.00	6324.47	6326.64	6326.64	6327.43	0.033361	7.11	38.56	25.10	1.01
Reach	161	50-yr	514.00	6324.47	6327.51	6327.51	6328.56	0.029902	8.24	62.38	30.62	1.00
Reach	161	100-yr	867.00	6324.47	6328.41	6328.41	6329.84	0.025344	9.64	92.49	35.29	0.98
Reach	161	500-yr	2627.00	6324.47	6331.55	6331.55	6334.19	0.018982	13.45	224.00	47.36	0.96
Reach	109	10-yr	124.00	6321.75	6324.01	6323.51	6324.29	0.012449	4.27	29.01	18.82	0.61
Reach	109	25-yr	274.00	6321.75	6324.92	6324.37	6325.43	0.014708	5.75	47.62	22.09	0.69
Reach	109	50-yr	514.00	6321.75	6325.86	6325.36	6326.70	0.017587	7.34	70.00	25.47	0.78
Reach	109	100-yr	867.00	6321.75	6326.78	6326.47	6328.08	0.021481	9.12	95.05	28.79	0.89
Reach	109	500-yr	2627.00	6321.75	6330.05	6330.05	6332.61	0.018452	13.06	223.85	51.22	0.91
Reach	49	10-yr	124.00	6320.92	6322.52	6322.52	6323.08	0.036814	6.01	20.62	18.58	1.01
Reach	49	25-yr	274.00	6320.92	6323.34	6323.34	6324.15	0.032718	7.24	37.82	23.46	1.01
Reach	49	50-yr	514.00	6320.92	6324.24	6324.24	6325.33	0.029951	8.38	61.30	28.41	1.01
Reach	49	100-yr	867.00	6320.92	6325.17	6325.17	6326.65	0.026456	9.77	89.59	32.53	1.00
Reach	49	500-yr	2627.00	6320.92	6328.41	6328.41	6331.10	0.018825	13.46	221.17	47.79	0.95

HEC-RAS Plan: ped River: Stream Reach: Reach

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	1337	10-yr	124.00	6368.74	6374.70		6374.79	0.073255	2.30	53.83	11.13	0.18
Reach	1337	25-yr	274.00	6368.74	6376.90		6377.08	0.102122	3.23	82.22	15.39	0.22
Reach	1337	50-yr	514.00	6368.74	6378.74		6379.13	0.086092	3.40	125.49	31.48	0.20
Reach	1337	100-yr	867.00	6368.74	6380.63		6381.17	0.047124	2.86	192.11	39.29	0.15
Reach	1337	500-yr	2627.00	6368.74	6382.89		6385.13	0.090522	4.51	290.18	45.00	0.22
Reach	1328	10-yr	124.00	6369.08	6373.30		6373.55	0.321979	4.05	30.62	9.18	0.39
Reach	1328	25-yr	274.00	6369.08	6374.34		6375.06	0.743865	6.79	40.37	9.46	0.58
Reach	1328	50-yr	514.00	6369.08	6375.21		6376.94	1.591921	10.55	48.71	9.69	0.83
Reach	1328	100-yr	867.00	6369.08	6376.50	6376.50	6379.60	2.481411	14.12	61.40	10.03	1.01
Reach	1328	500-yr	2627.00	6369.08	6382.58	6381.62	6384.34	0.058008	3.30	316.14	51.00	0.17
Reach	1309	10-yr	124.00	6369.80	6372.34		6372.79	0.014411	5.47	25.21	15.83	0.69
Reach	1309	25-yr	274.00	6369.80	6373.43		6374.21	0.014450	7.38	44.40	19.38	0.75
Reach	1309	50-yr	514.00	6369.80	6374.65	6374.22	6375.84	0.014861	9.37	70.33	23.34	0.80
Reach	1309	100-yr	867.00	6369.80	6375.74	6375.63	6377.62	0.017913	11.99	97.83	26.90	0.92
Reach	1309	500-yr	2627.00	6369.80	6379.79	6379.79	6383.56	0.018932	17.97	220.81	31.00	1.03
Reach	1281	10-yr	124.00	6369.37	6371.97		6372.37	0.015160	5.06	24.50	13.21	0.66
Reach	1281	25-yr	274.00	6369.37	6372.98		6373.76	0.018859	7.07	39.47	16.85	0.76
Reach	1281	50-yr	514.00	6369.37	6373.94	6373.79	6375.31	0.024027	9.48	57.69	21.46	0.90
Reach	1281	100-yr	867.00	6369.37	6375.31	6375.31	6377.06	0.020566	10.95	94.32	33.41	0.88
Reach	1281	500-yr	2627.00	6369.37	6378.97	6378.97	6381.64	0.017937	14.89	252.11	46.00	0.90
Reach	1215	10-yr	124.00	6367.75	6371.89		6371.99	0.002023	2.47	50.67	19.31	0.26
Reach	1215	25-yr	274.00	6367.75	6372.91		6373.15	0.003435	3.95	73.33	26.76	0.36
Reach	1215	50-yr	514.00	6367.75	6373.93		6374.41	0.005143	5.66	103.18	31.79	0.45
Reach	1215	100-yr	867.00	6367.75	6374.96		6375.78	0.007085	7.55	138.62	36.88	0.55
Reach	1215	500-yr	2627.00	6367.75	6377.61	6377.31	6380.22	0.015056	14.11	247.30	42.00	0.85
Reach	1173	10-yr	124.00	6366.76	6370.97	6370.97	6371.70	0.038893	7.53	22.59	18.37	0.65
Reach	1173	25-yr	274.00	6366.76	6371.99	6371.99	6372.75	0.039278	8.77	46.79	26.92	0.68
Reach	1173	50-yr	514.00	6366.76	6372.80	6372.80	6373.85	0.047840	10.68	70.31	30.73	0.77
Reach	1173	100-yr	867.00	6366.76	6373.71	6373.71	6375.08	0.052775	12.32	99.99	34.96	0.83
Reach	1173	500-yr	2627.00	6366.76	6376.61	6376.61	6379.09	0.054658	15.87	215.06	41.00	0.90
Reach	1126	10-yr	124.00	6364.10	6366.14	6366.14	6366.84	0.035495	6.70	18.70	14.19	1.00
Reach	1126	25-yr	274.00	6364.10	6367.11	6367.11	6368.21	0.029317	8.47	33.76	16.82	0.99
Reach	1126	50-yr	514.00	6364.10	6368.29	6368.29	6369.85	0.024514	10.21	55.47	20.02	0.97
Reach	1126	100-yr	867.00	6364.10	6369.72	6369.72	6371.72	0.020472	11.75	87.96	27.28	0.94
Reach	1126	500-yr	2627.00	6364.10	6373.79	6373.79	6376.90	0.016800	15.94	242.00	40.00	0.94
Reach	1055	10-yr	124.00	6360.52	6363.28		6363.57	0.010873	4.29	28.87	16.37	0.57
Reach	1055	25-yr	274.00	6360.52	6364.54		6364.98	0.010238	5.32	51.47	19.68	0.58
Reach	1055	50-yr	514.00	6360.52	6365.64		6366.37	0.012788	6.87	74.79	22.68	0.67
Reach	1055	100-yr	867.00	6360.52	6366.32	6365.92	6367.74	0.020517	9.54	91.32	26.28	0.86
Reach	1055	500-yr	2627.00	6360.52	6369.61	6369.61	6373.02	0.022218	15.01	189.24	30.00	0.99
Reach	1004	10-yr	124.00	6360.02	6361.83	6361.83	6362.56	0.039500	6.86	18.07	12.52	1.01
Reach	1004	25-yr	274.00	6360.02	6362.88	6362.88	6364.01	0.036957	8.51	32.18	14.47	1.01
Reach	1004	50-yr	514.00	6360.02	6364.46	6364.46	6365.48	0.022909	8.37	74.66	47.09	0.81

HEC-RAS Plan: ped River: Stream Reach: Reach (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	1004	100-yr	867.00	6360.02	6365.39	6365.39	6366.55	0.022848	9.43	121.65	52.79	0.84
Reach	1004	500-yr	2627.00	6360.02	6369.90		6370.93	0.008702	9.70	368.75	55.00	0.59
Reach	957	10-yr	124.00	6357.64	6359.69	6359.69	6360.37	0.035938	6.59	18.90	14.71	1.01
Reach	957	25-yr	274.00	6357.64	6360.63	6360.63	6361.73	0.028949	8.45	33.67	16.64	0.99
Reach	957	50-yr	514.00	6357.64	6361.79	6361.79	6363.39	0.024751	10.28	54.38	19.02	0.98
Reach	957	100-yr	867.00	6357.64	6363.52	6363.52	6365.27	0.016562	11.03	99.22	36.07	0.86
Reach	957	500-yr	2627.00	6357.64	6367.17	6367.17	6370.18	0.016577	15.77	244.24	40.00	0.94
Reach	906	10-yr	124.00	6354.83	6356.75	6356.75	6357.37	0.032188	6.32	20.38	19.95	0.97
Reach	906	25-yr	274.00	6354.83	6357.64	6357.64	6358.53	0.025044	7.84	40.87	26.20	0.93
Reach	906	50-yr	514.00	6354.83	6358.62	6358.62	6359.82	0.022187	9.43	69.52	32.20	0.93
Reach	906	100-yr	867.00	6354.83	6359.69	6359.69	6361.24	0.020563	11.02	107.71	38.75	0.94
Reach	906	500-yr	2627.00	6354.83	6363.02	6363.02	6365.71	0.018998	15.55	253.89	46.23	1.00
Reach	855	10-yr	124.00	6352.81	6354.69	6354.69	6355.32	0.036780	6.35	19.53	16.00	1.01
Reach	855	25-yr	274.00	6352.81	6355.59	6355.59	6356.52	0.032518	7.73	35.45	19.41	1.01
Reach	855	50-yr	514.00	6352.81	6356.60	6356.60	6357.85	0.029223	8.96	57.69	24.45	1.00
Reach	855	100-yr	867.00	6352.81	6357.71	6357.71	6359.32	0.025682	10.22	87.47	29.24	0.98
Reach	855	500-yr	2627.00	6352.81	6361.24	6361.24	6363.52	0.023553	12.46	228.85	50.05	0.99
Reach	813	10-yr	124.00	6351.00	6352.46	6352.44	6353.02	0.035117	5.99	20.70	18.01	0.99
Reach	813	25-yr	274.00	6351.00	6353.43		6354.14	0.025292	6.73	40.74	23.10	0.89
Reach	813	50-yr	514.00	6351.00	6354.54		6355.39	0.020351	7.39	69.53	28.89	0.84
Reach	813	100-yr	867.00	6351.00	6355.73		6356.74	0.017538	8.04	107.78	35.13	0.81
Reach	813	500-yr	2627.00	6351.00	6360.86		6361.77	0.005714	7.72	350.47	52.70	0.51
Reach	775	10-yr	124.00	6349.80	6351.84	6351.30	6352.12	0.012220	4.29	28.91	18.46	0.60
Reach	775	25-yr	274.00	6349.80	6352.87	6352.21	6353.33	0.012668	5.45	50.27	22.78	0.65
Reach	775	50-yr	514.00	6349.80	6353.98	6353.24	6354.65	0.013251	6.58	78.14	27.42	0.69
Reach	775	100-yr	867.00	6349.80	6355.14	6354.34	6356.06	0.013870	7.68	112.83	32.27	0.72
Reach	775	500-yr	2627.00	6349.80	6360.84	6357.87	6361.51	0.003674	6.88	477.81	97.00	0.43
Reach	760		Bridge									
Reach	755	10-yr	124.00	6349.50	6351.16	6351.16	6351.76	0.034823	6.21	19.98	16.30	0.99
Reach	755	25-yr	274.00	6349.50	6352.05	6352.05	6352.93	0.031585	7.52	36.42	20.47	0.99
Reach	755	50-yr	514.00	6349.50	6353.07	6353.07	6354.22	0.028576	8.61	59.69	25.22	0.99
Reach	755	100-yr	867.00	6349.50	6354.15	6354.15	6355.61	0.026860	9.67	89.70	30.26	0.99
Reach	755	500-yr	2627.00	6349.50	6360.02	6357.54	6360.84	0.005755	7.27	365.49	66.26	0.51
Reach	734	10-yr	124.00	6348.50	6350.00	6350.00	6350.59	0.035968	6.17	20.11	16.75	0.99
Reach	734	25-yr	274.00	6348.50	6350.89	6350.89	6351.75	0.031711	7.43	36.87	20.97	0.99
Reach	734	50-yr	514.00	6348.50	6351.85	6351.85	6353.02	0.030120	8.68	59.21	25.54	1.01
Reach	734	100-yr	867.00	6348.50	6353.37	6352.94	6354.46	0.018659	8.37	103.55	32.77	0.83
Reach	734	500-yr	2627.00	6348.50	6360.13	6356.12	6360.71	0.002935	6.19	475.93	86.96	0.38
Reach	700		Bridge									
Reach	652	10-yr	124.00	6346.27	6348.55	6348.37	6348.99	0.024004	5.34	23.23	17.82	0.82
Reach	652	25-yr	274.00	6346.27	6349.27	6349.24	6350.12	0.030288	7.40	37.00	20.45	0.97

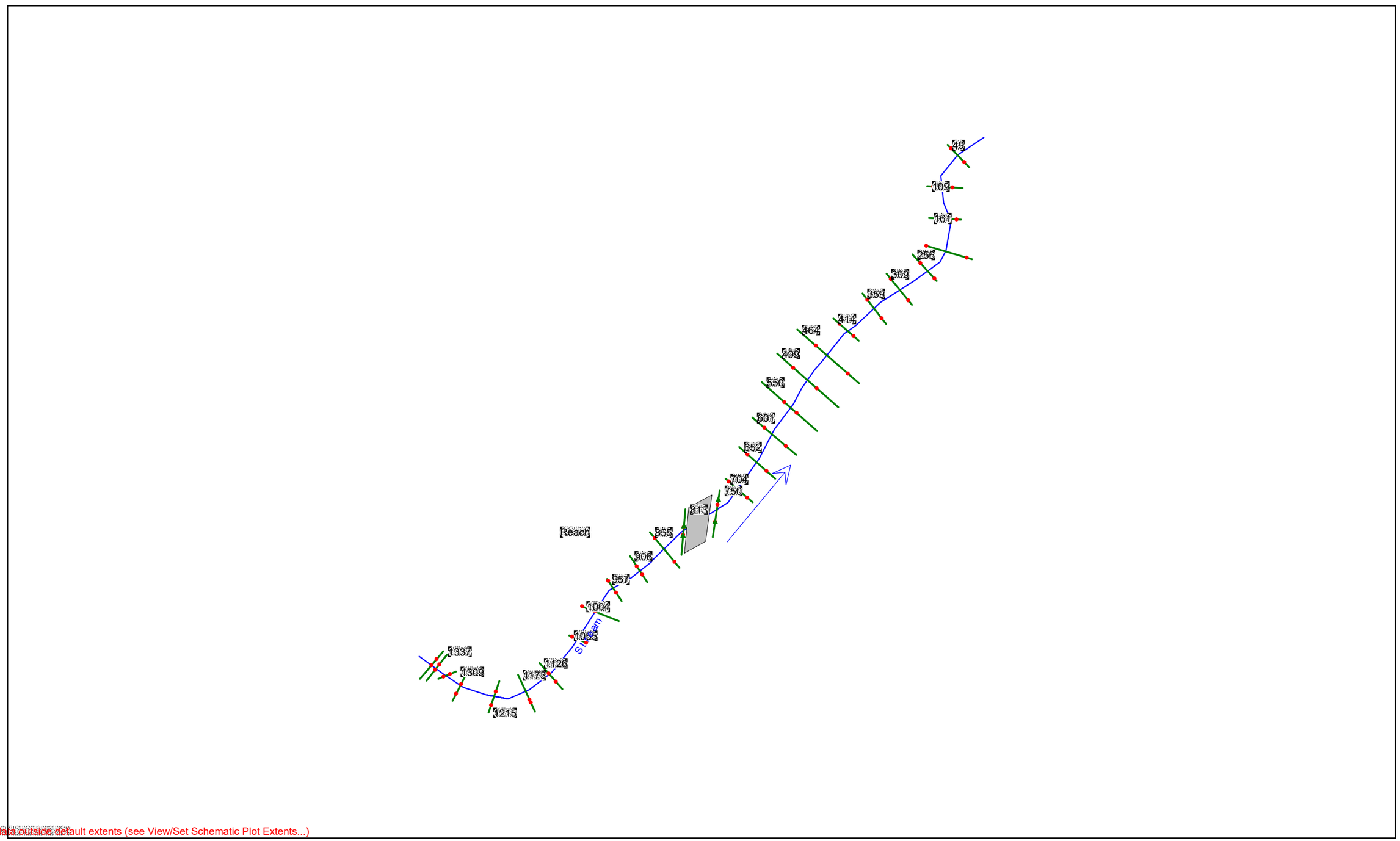
HEC-RAS Plan: ped River: Stream Reach: Reach (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	652	50-yr	514.00	6346.27	6350.23	6350.23	6351.44	0.029090	8.80	58.44	23.91	0.99
Reach	652	100-yr	867.00	6346.27	6351.34	6351.34	6352.88	0.027272	9.96	87.03	27.87	0.99
Reach	652	500-yr	2627.00	6346.27	6355.04	6355.04	6357.09	0.017951	11.66	250.93	75.68	0.88
Reach	601	10-yr	124.00	6344.87	6346.91	6346.91	6347.46	0.039166	5.92	20.95	20.07	1.02
Reach	601	25-yr	274.00	6344.87	6347.70	6347.70	6348.48	0.033953	7.08	38.68	25.35	1.01
Reach	601	50-yr	514.00	6344.87	6348.54	6348.54	6349.61	0.030651	8.29	61.98	29.52	1.01
Reach	601	100-yr	867.00	6344.87	6349.49	6349.49	6350.87	0.028132	9.43	91.94	33.61	1.01
Reach	601	500-yr	2627.00	6344.87	6353.73	6352.59	6354.81	0.008313	8.76	367.03	90.65	0.63
Reach	550	10-yr	124.00	6342.52	6344.65	6344.65	6345.32	0.036000	6.57	18.88	14.24	1.01
Reach	550	25-yr	274.00	6342.52	6345.64	6345.64	6346.58	0.032542	7.78	35.22	18.96	1.01
Reach	550	50-yr	514.00	6342.52	6346.70	6346.70	6347.92	0.029468	8.84	58.43	26.57	1.00
Reach	550	100-yr	867.00	6342.52	6347.86	6347.86	6349.29	0.023340	9.73	96.28	40.10	0.94
Reach	550	500-yr	2627.00	6342.52	6349.75	6349.75	6353.73	0.039045	16.96	194.91	58.71	1.30
Reach	499	10-yr	124.00	6340.35	6341.99	6341.99	6342.48	0.039481	5.61	22.09	23.53	1.02
Reach	499	25-yr	274.00	6340.35	6342.68	6342.68	6343.42	0.033804	6.91	39.66	27.33	1.01
Reach	499	50-yr	514.00	6340.35	6343.48	6343.48	6344.51	0.030237	8.13	63.25	31.19	1.01
Reach	499	100-yr	867.00	6340.35	6344.39	6344.39	6345.73	0.027952	9.28	93.40	35.31	1.01
Reach	499	500-yr	2627.00	6340.35	6347.55	6347.55	6349.36	0.016158	11.11	284.20	92.53	0.85
Reach	464	10-yr	124.00	6337.10	6338.96	6338.96	6339.53	0.037729	6.06	20.47	18.42	1.01
Reach	464	25-yr	274.00	6337.10	6339.76	6339.76	6340.65	0.032982	7.56	36.24	20.72	1.01
Reach	464	50-yr	514.00	6337.10	6340.73	6340.73	6341.96	0.030252	8.91	57.71	23.83	1.01
Reach	464	100-yr	867.00	6337.10	6341.83	6341.83	6343.41	0.028040	10.08	86.03	27.56	1.01
Reach	464	500-yr	2627.00	6337.10	6345.71	6345.71	6347.33	0.011907	11.13	353.21	129.36	0.75
Reach	414	10-yr	124.00	6334.16	6336.11	6336.11	6336.62	0.038252	5.75	21.56	21.69	1.01
Reach	414	25-yr	274.00	6334.16	6336.81	6336.81	6337.67	0.031195	7.42	37.51	23.43	1.00
Reach	414	50-yr	514.00	6334.16	6337.71	6337.71	6338.96	0.026382	9.03	59.52	26.06	0.99
Reach	414	100-yr	867.00	6334.16	6338.79	6338.79	6340.46	0.022727	10.56	89.69	29.97	0.97
Reach	414	500-yr	2627.00	6334.16	6342.40	6342.40	6345.50	0.018122	14.88	217.04	38.66	0.97
Reach	359	10-yr	124.00	6332.20	6334.29		6334.62	0.015208	4.65	26.66	17.74	0.67
Reach	359	25-yr	274.00	6332.20	6335.30		6335.80	0.015912	5.65	48.53	25.53	0.72
Reach	359	50-yr	514.00	6332.20	6336.30		6337.04	0.013916	6.90	76.17	29.38	0.72
Reach	359	100-yr	867.00	6332.20	6337.33		6338.43	0.014024	8.48	108.23	33.35	0.76
Reach	359	500-yr	2627.00	6332.20	6340.51	6340.36	6342.99	0.015349	13.18	240.93	50.00	0.87
Reach	309	10-yr	124.00	6331.51	6333.65		6333.92	0.012562	4.16	29.84	20.43	0.61
Reach	309	25-yr	274.00	6331.51	6334.68		6335.09	0.011701	5.14	53.30	24.91	0.62
Reach	309	50-yr	514.00	6331.51	6335.82		6336.40	0.010115	6.14	85.96	31.36	0.61
Reach	309	100-yr	867.00	6331.51	6336.86		6337.75	0.010685	7.65	120.75	35.87	0.66
Reach	309	500-yr	2627.00	6331.51	6340.33	6339.42	6342.16	0.010640	11.42	282.59	50.00	0.73
Reach	256	10-yr	124.00	6330.68	6332.95		6333.24	0.012966	4.29	28.92	19.46	0.62
Reach	256	25-yr	274.00	6330.68	6333.58		6334.24	0.021828	6.52	42.05	22.23	0.83
Reach	256	50-yr	514.00	6330.68	6334.26	6334.26	6335.50	0.027651	8.97	58.57	27.22	0.99
Reach	256	100-yr	867.00	6330.68	6335.42	6335.42	6336.92	0.021034	10.04	98.01	40.20	0.92
Reach	256	500-yr	2627.00	6330.68	6338.57	6338.57	6341.33	0.019024	14.37	233.16	42.97	0.97

HEC-RAS Plan: ped River: Stream Reach: Reach (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach	213	10-yr	124.00	6330.51	6331.96	6331.96	6332.31	0.042416	4.73	26.22	37.94	1.00
Reach	213	25-yr	274.00	6330.51	6332.46	6332.46	6332.95	0.039794	5.63	48.69	51.75	1.02
Reach	213	50-yr	514.00	6330.51	6332.98	6332.98	6333.67	0.034777	6.63	77.49	58.21	1.01
Reach	213	100-yr	867.00	6330.51	6333.57	6333.57	6334.48	0.031076	7.65	113.42	63.76	1.01
Reach	213	500-yr	2627.00	6330.51	6335.51	6335.51	6337.33	0.025023	10.84	245.74	70.00	1.00
Reach	161	10-yr	124.00	6324.47	6325.89	6325.89	6326.42	0.037886	5.82	21.32	20.77	1.01
Reach	161	25-yr	274.00	6324.47	6326.65	6326.65	6327.43	0.033002	7.08	38.70	25.13	1.01
Reach	161	50-yr	514.00	6324.47	6327.51	6327.51	6328.56	0.029902	8.24	62.38	30.62	1.00
Reach	161	100-yr	867.00	6324.47	6328.41	6328.41	6329.84	0.025344	9.64	92.49	35.29	0.98
Reach	161	500-yr	2627.00	6324.47	6331.55	6331.55	6334.19	0.018982	13.45	224.00	47.36	0.96
Reach	109	10-yr	124.00	6321.75	6324.01	6323.51	6324.29	0.012449	4.27	29.01	18.82	0.61
Reach	109	25-yr	274.00	6321.75	6324.92		6325.43	0.014718	5.75	47.61	22.09	0.69
Reach	109	50-yr	514.00	6321.75	6325.86		6326.70	0.017579	7.34	70.01	25.47	0.78
Reach	109	100-yr	867.00	6321.75	6326.79	6326.47	6328.08	0.021447	9.12	95.11	28.80	0.88
Reach	109	500-yr	2627.00	6321.75	6330.05	6330.05	6332.61	0.018452	13.06	223.85	51.22	0.91
Reach	49	10-yr	124.00	6320.92	6322.52	6322.52	6323.08	0.036814	6.01	20.62	18.58	1.01
Reach	49	25-yr	274.00	6320.92	6323.34	6323.34	6324.15	0.032718	7.24	37.82	23.46	1.01
Reach	49	50-yr	514.00	6320.92	6324.24	6324.24	6325.33	0.029951	8.38	61.30	28.41	1.01
Reach	49	100-yr	867.00	6320.92	6325.17	6325.17	6326.65	0.026456	9.77	89.59	32.53	1.00
Reach	49	500-yr	2627.00	6320.92	6328.41	6328.41	6331.10	0.018825	13.46	221.17	47.79	0.95

C.2. Existing Condition HEC-RAS Analysis



Some schematic data outside default extents (see View/Set Schematic Plot Extents...)

SCC Plan: SCC Existing 6/14/2023

Stream Reach

Legend

- WS 500-yr
- WS 100-yr
- WS 50-yr
- WS 25-yr
- WS 10-yr
- Ground

Elevation (ft)

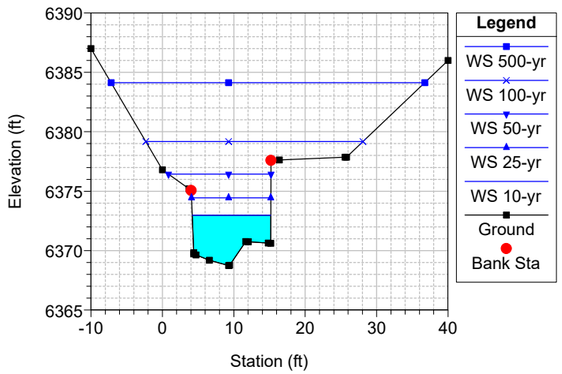
6390
6380
6370
6360
6350
6340
6330
6320

0 200 400 600 800 1000 1200 1400

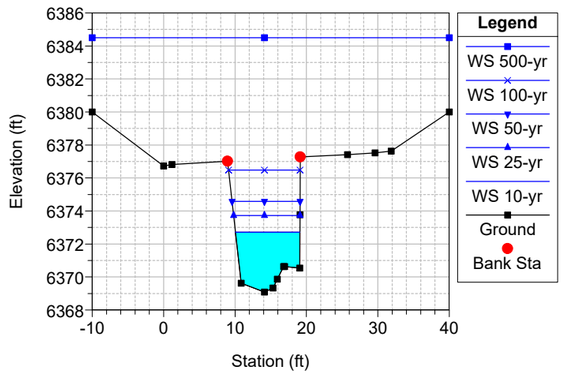
Main Channel Distance (ft)

No Data for Plot

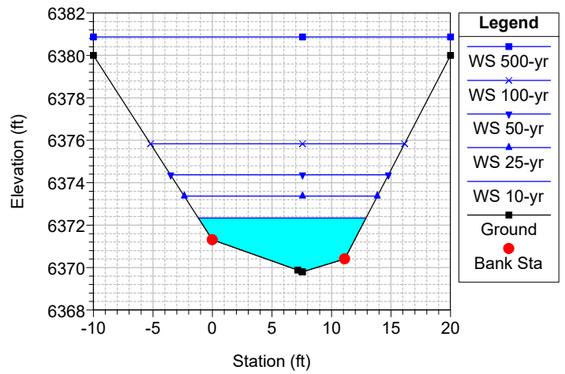
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 1337



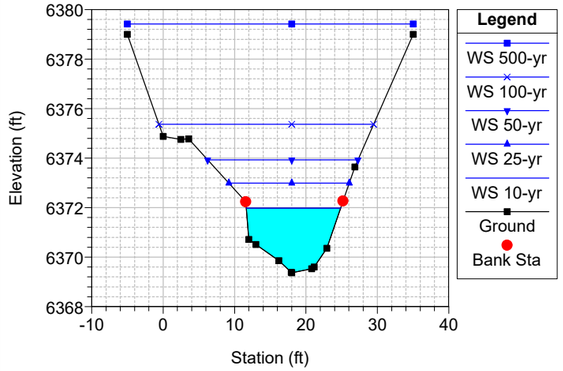
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 1328



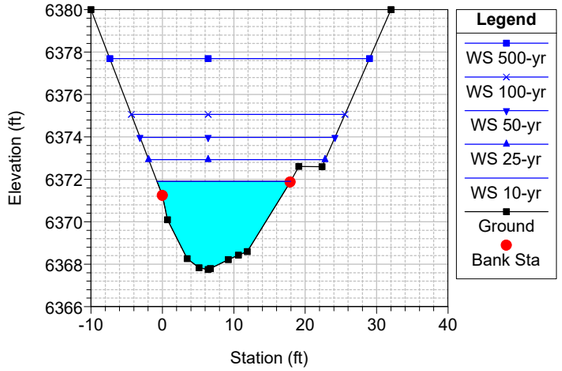
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 1309



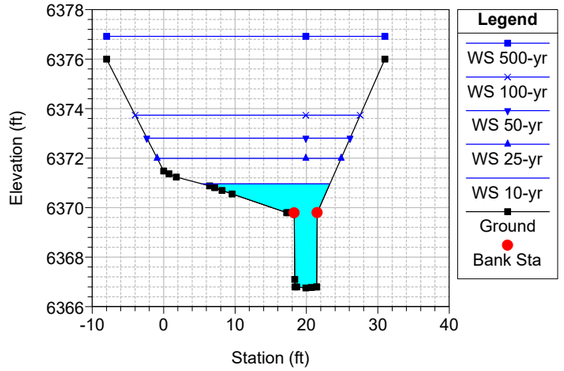
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 1281



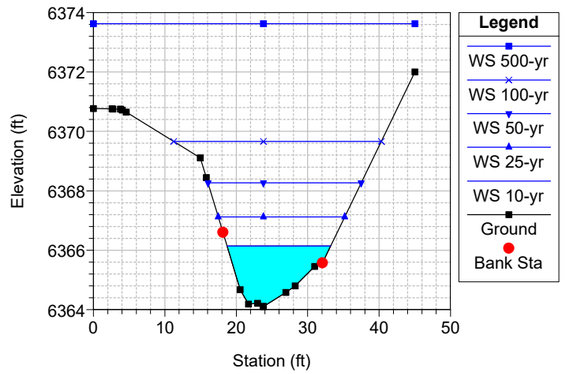
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 1215



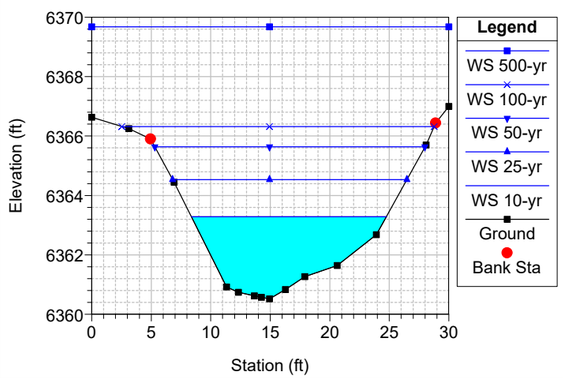
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 1173



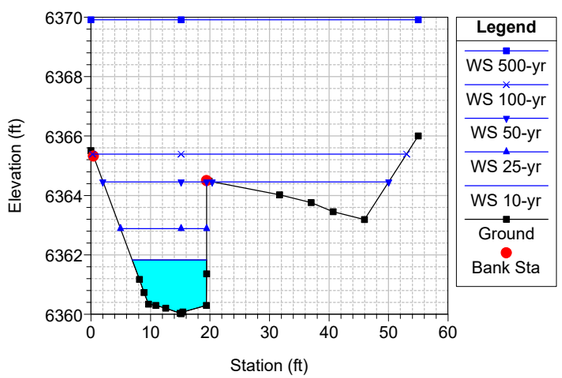
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 1126



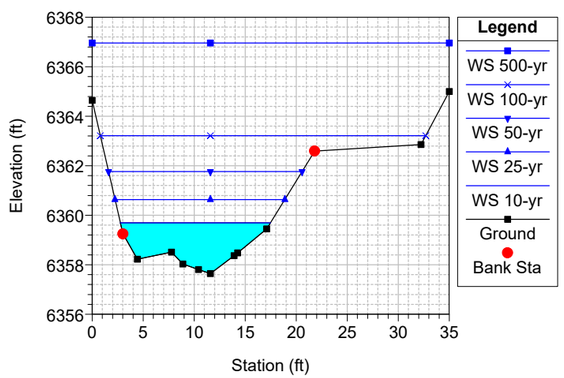
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 1055



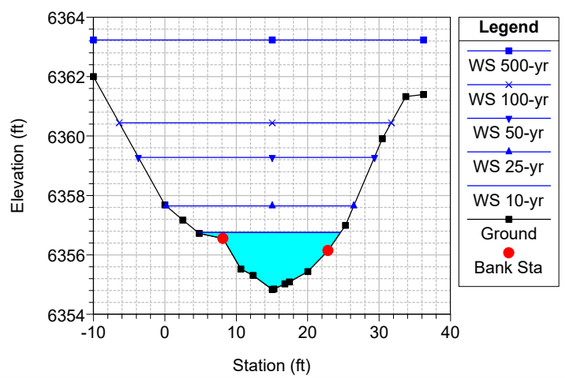
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 1004



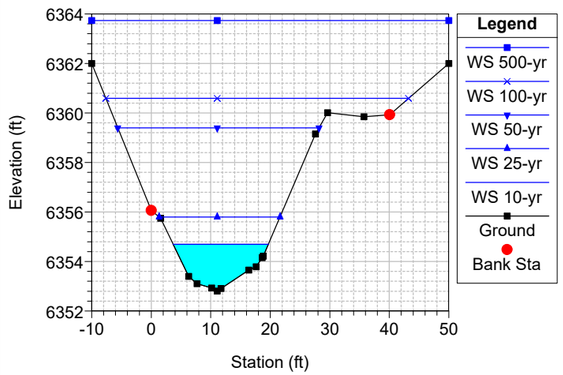
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 957



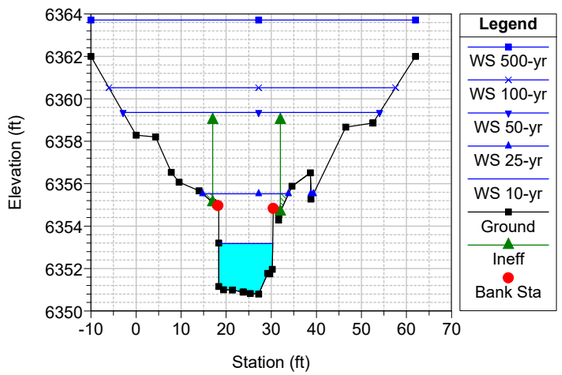
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 906



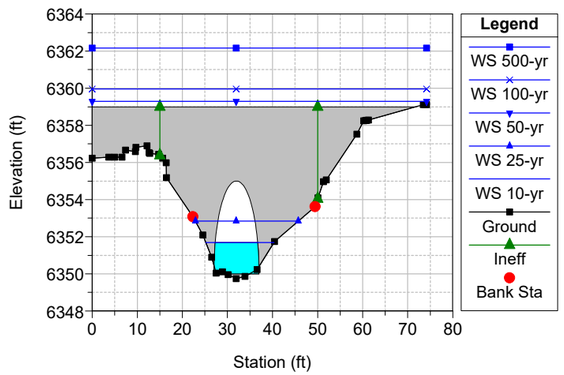
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 855



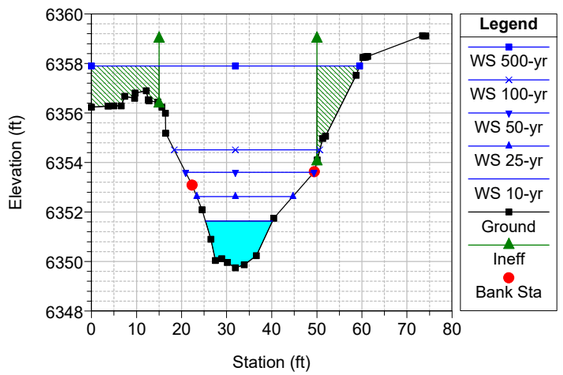
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 813



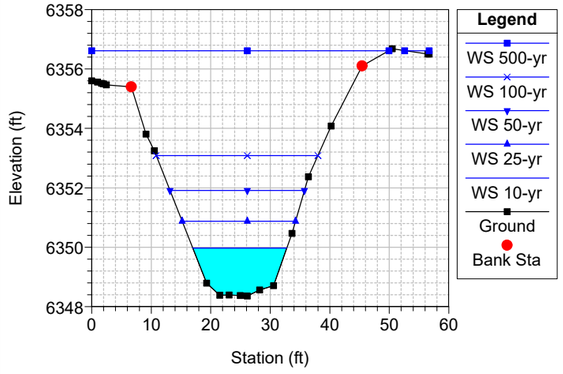
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 755 Culv



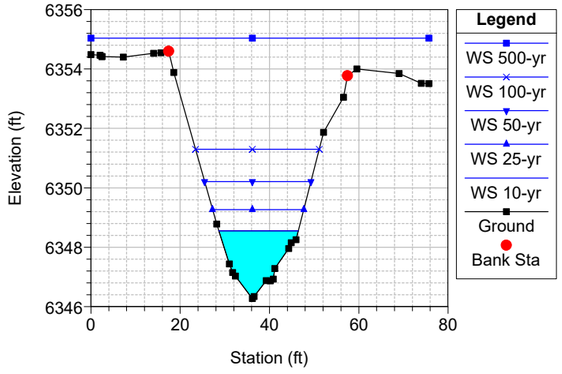
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 750



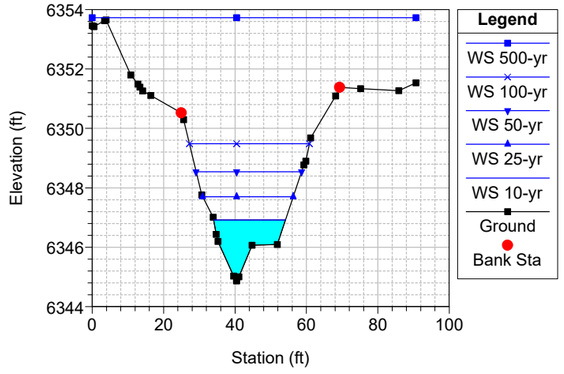
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 704



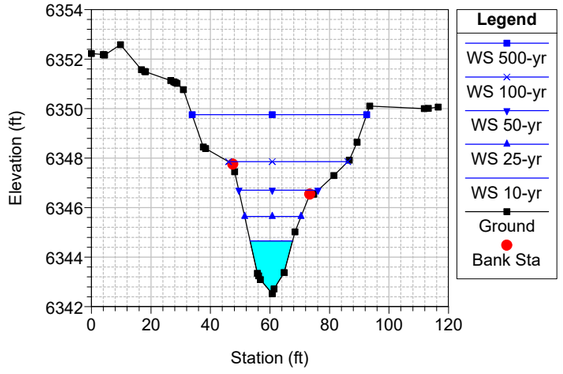
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 652



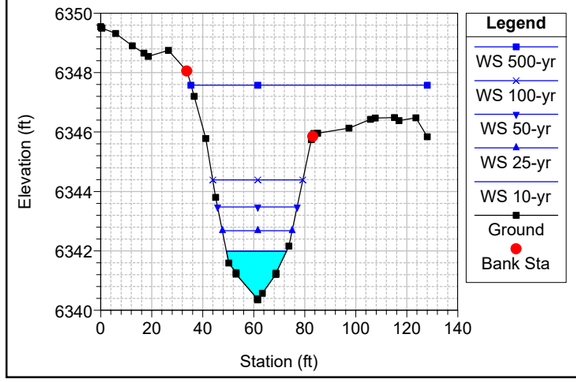
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 601



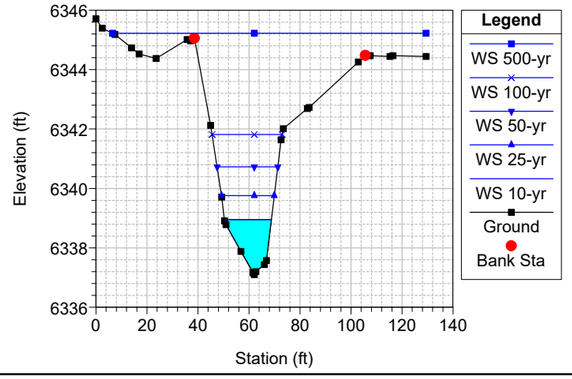
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 550



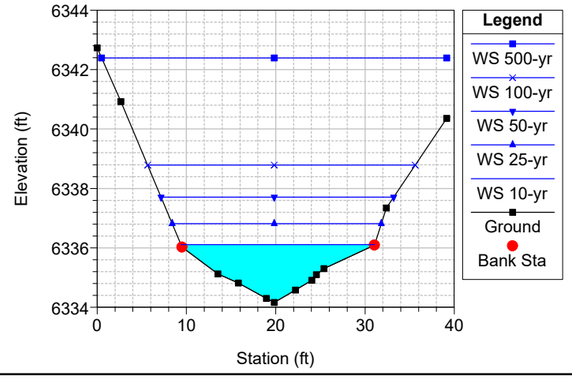
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 499



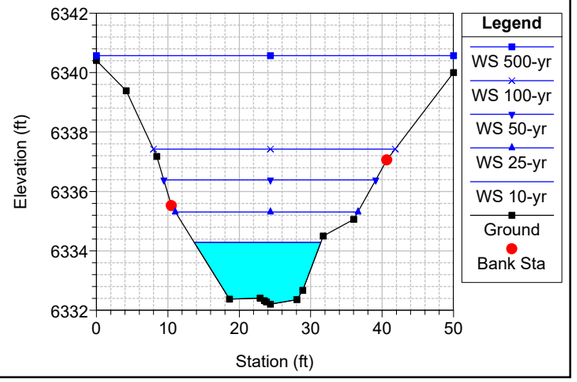
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 464



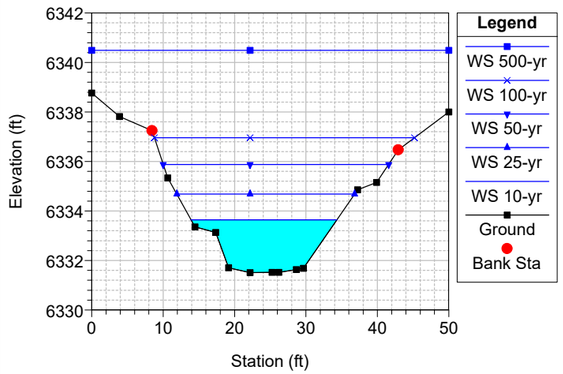
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 414



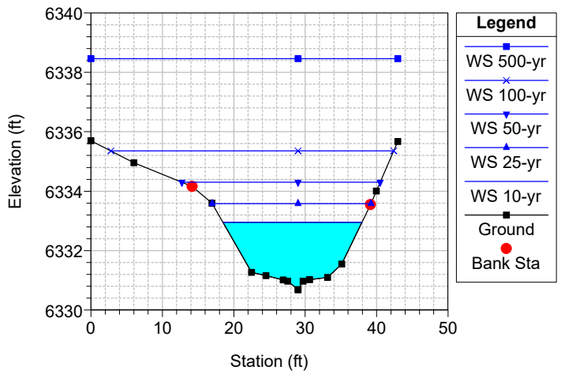
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 359



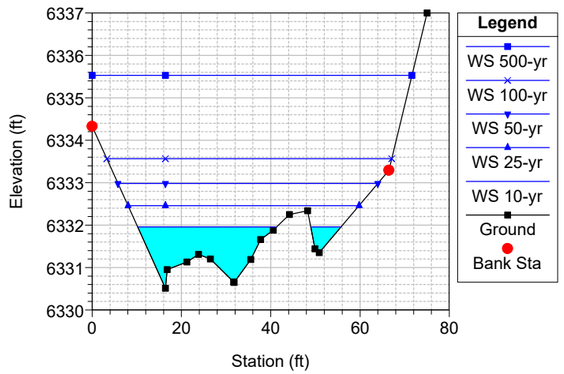
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 309



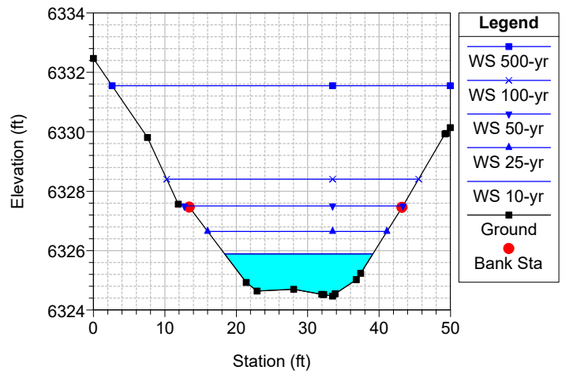
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 256



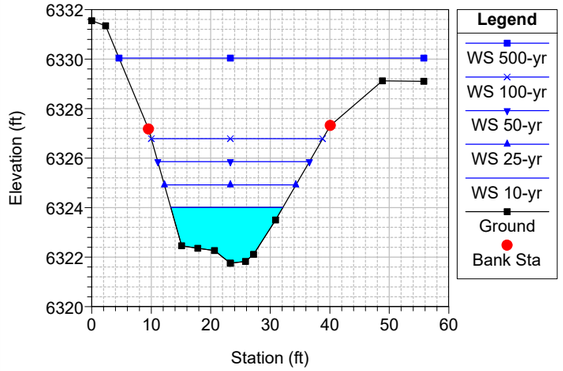
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 213



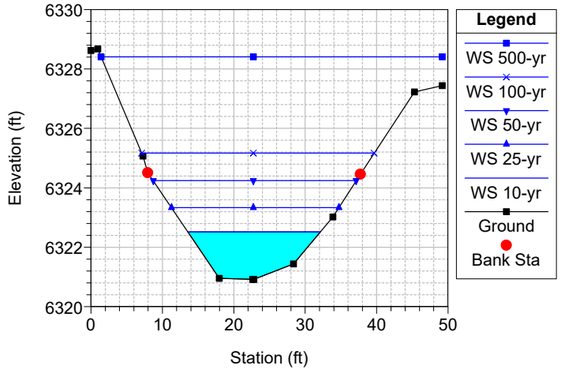
SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 161



SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 109



SCC Plan: SCC Existing 6/14/2023
River = Stream Reach = Reach RS = 49



C.3. Proposed Conditions HEC-RAS Analysis

Some schematic data outside default extents (see View/Set Schematic Plot Extents...)

SCC Plan: Proposed w ped bridge 6/14/2023

Stream Reach

Legend

WS 500-yr
WS 100-yr
WS 50-yr
WS 25-yr
WS 10-yr
Ground

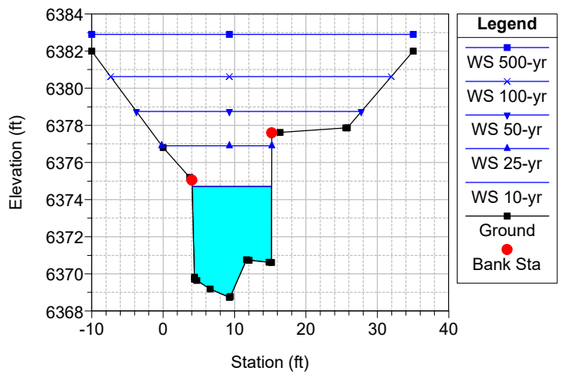
Elevation (ft)

6390
6380
6370
6360
6350
6340
6330
6320

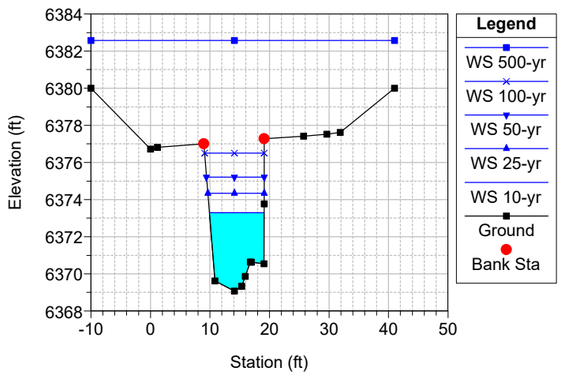
0
200
400
600
800
1000
1200
1400

Main Channel Distance (ft)

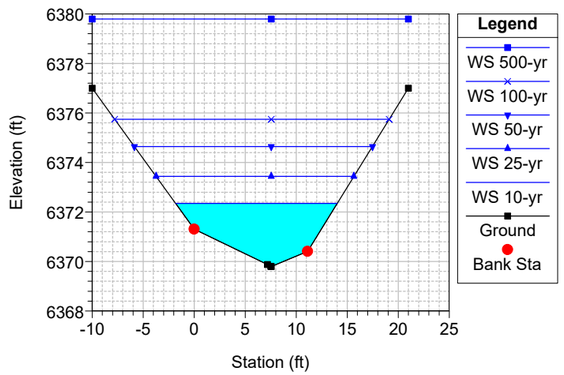
SCC Plan: Proposed w ped bridge 6/14/2023
River = Stream Reach = Reach RS = 1337



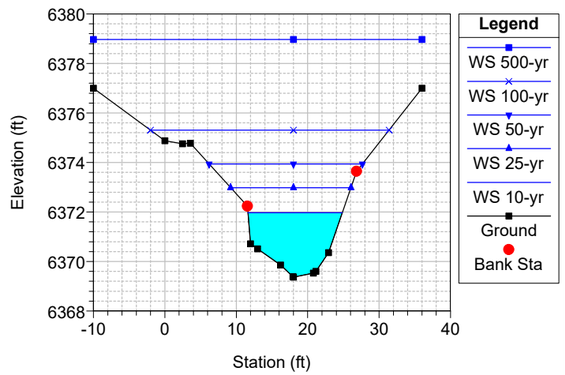
SCC Plan: Proposed w ped bridge 6/14/2023
River = Stream Reach = Reach RS = 1328



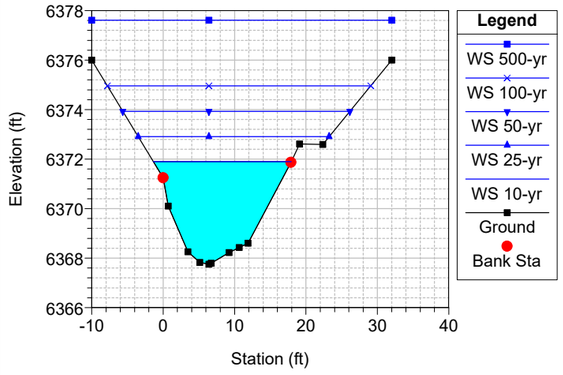
SCC Plan: Proposed w ped bridge 6/14/2023
River = Stream Reach = Reach RS = 1309



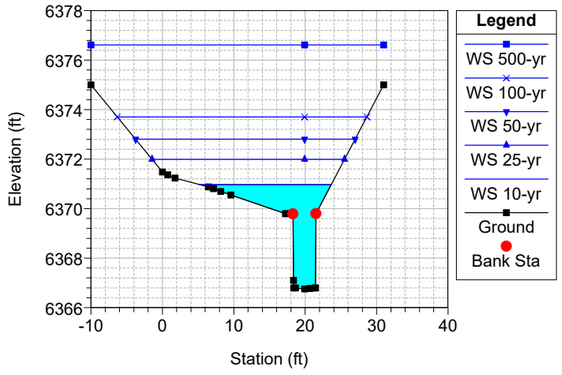
SCC Plan: Proposed w ped bridge 6/14/2023
River = Stream Reach = Reach RS = 1281



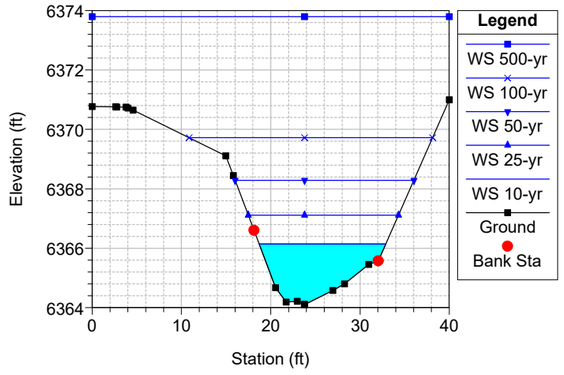
SCC Plan: Proposed w ped bridge 6/14/2023
River = Stream Reach = Reach RS = 1215



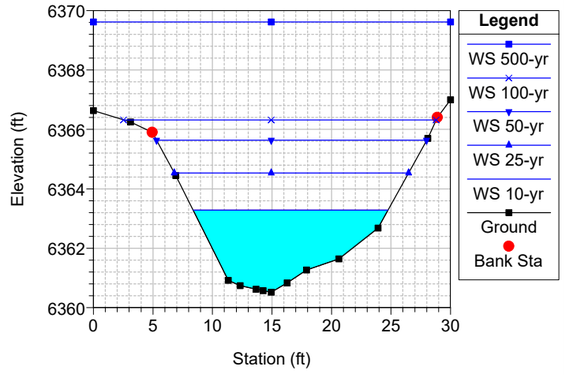
SCC Plan: Proposed w ped bridge 6/14/2023
River = Stream Reach = Reach RS = 1173



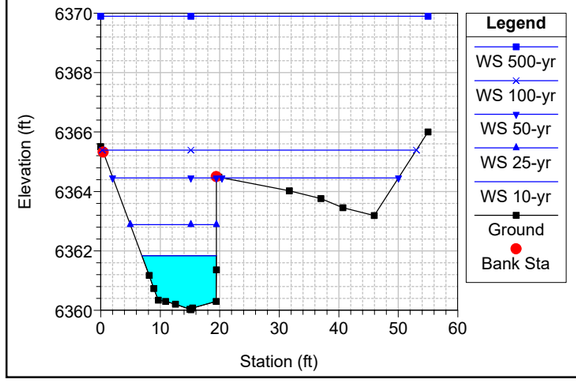
SCC Plan: Proposed w ped bridge 6/14/2023
River = Stream Reach = Reach RS = 1126



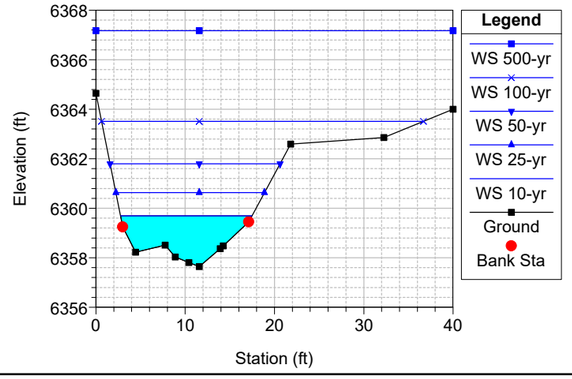
SCC Plan: Proposed w ped bridge 6/14/2023
River = Stream Reach = Reach RS = 1055



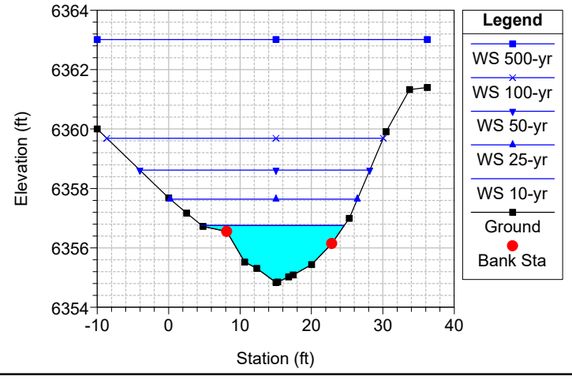
SCC Plan: Proposed w ped bridge 6/14/2023
River = Stream Reach = Reach RS = 1004



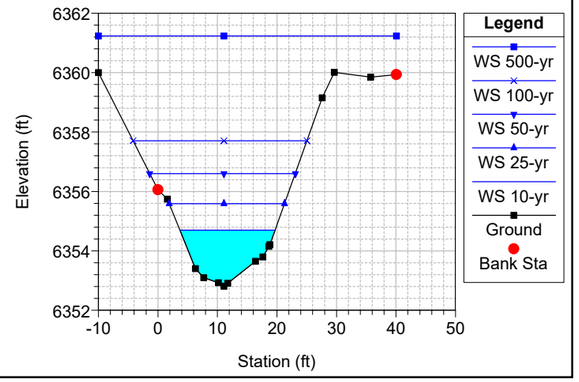
SCC Plan: Proposed w ped bridge 6/14/2023
River = Stream Reach = Reach RS = 957



SCC Plan: Proposed w ped bridge 6/14/2023
River = Stream Reach = Reach RS = 906



SCC Plan: Proposed w ped bridge 6/14/2023
River = Stream Reach = Reach RS = 855



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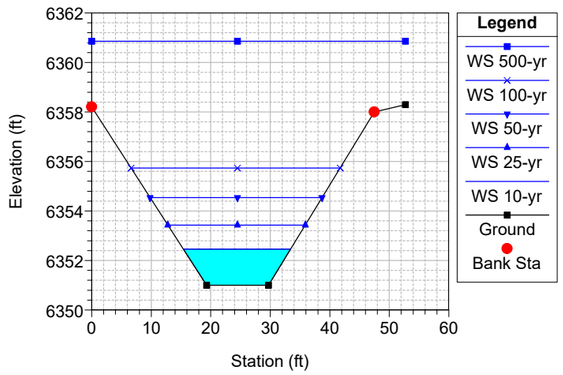

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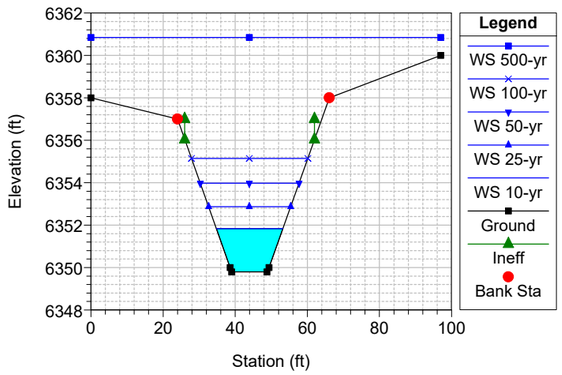

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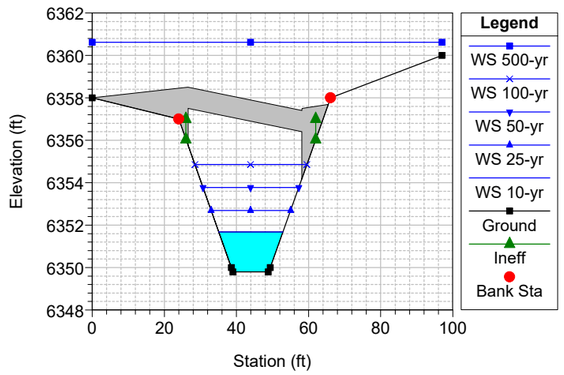

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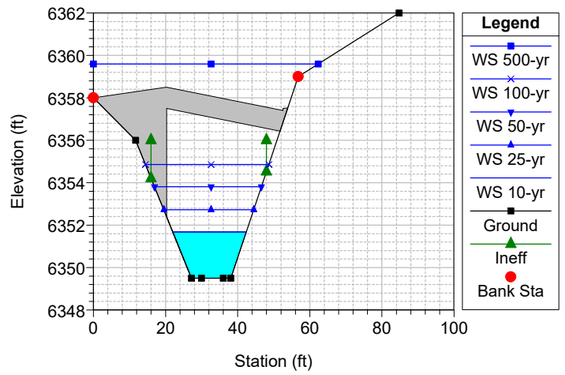

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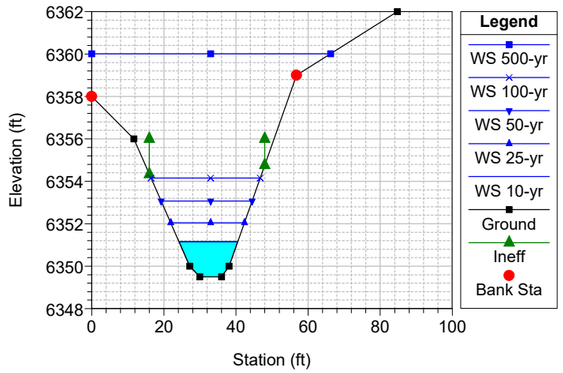

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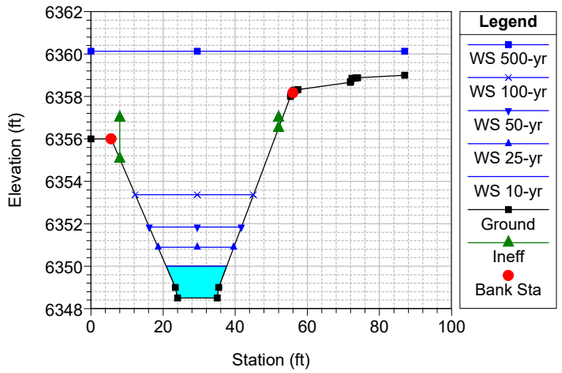

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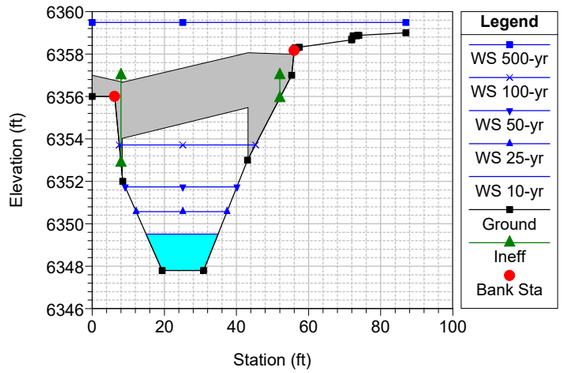

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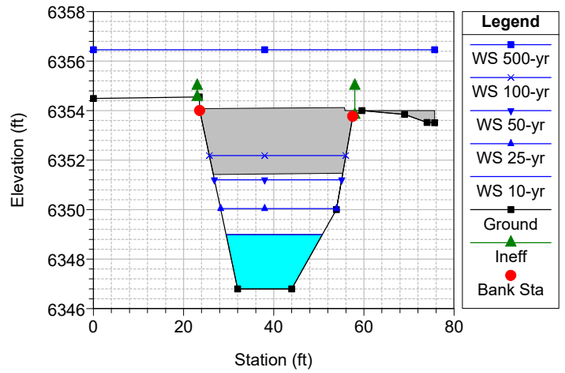
River = Stream Reach = Reach RS = 700 BR



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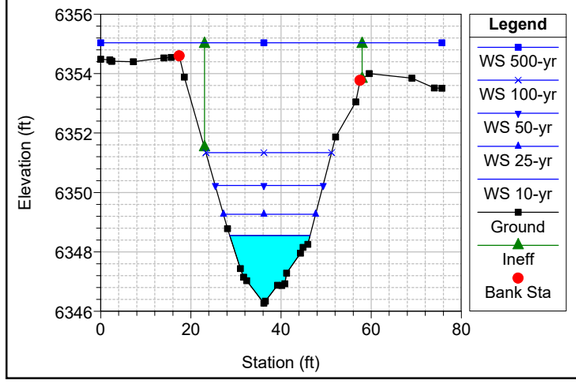

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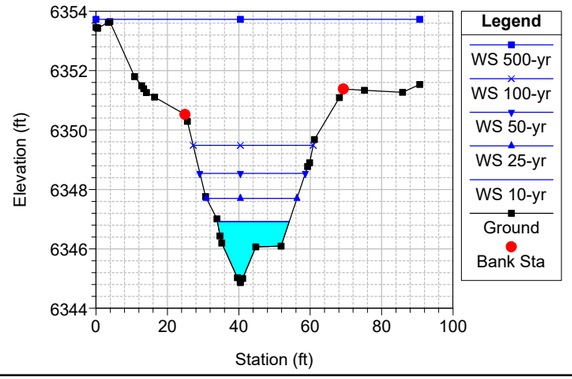

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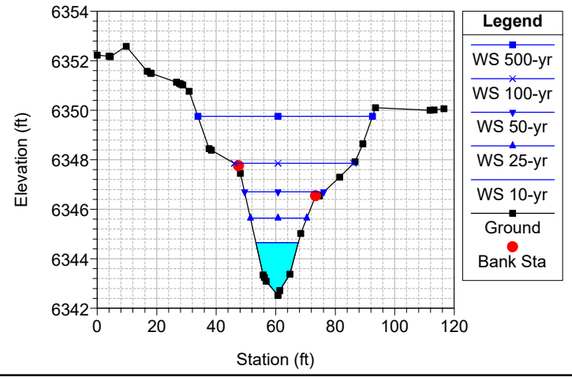

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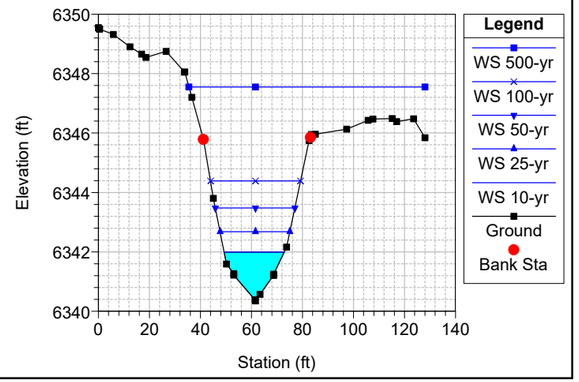

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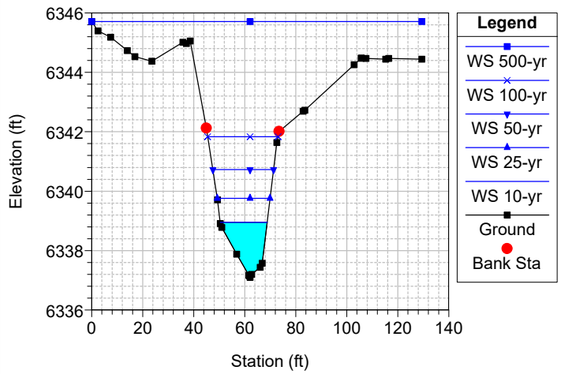

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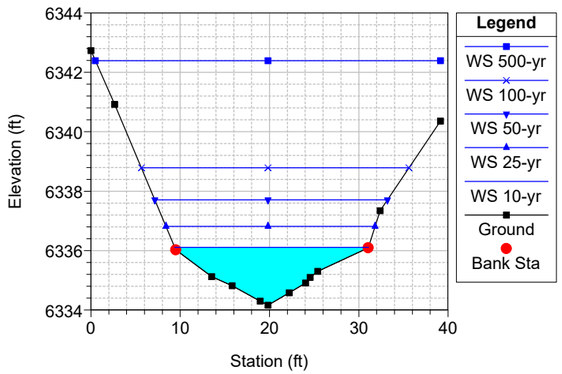

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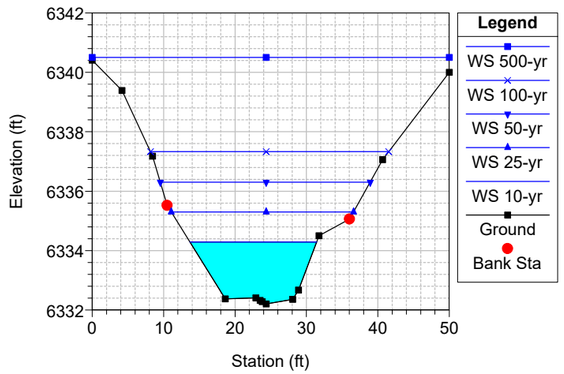

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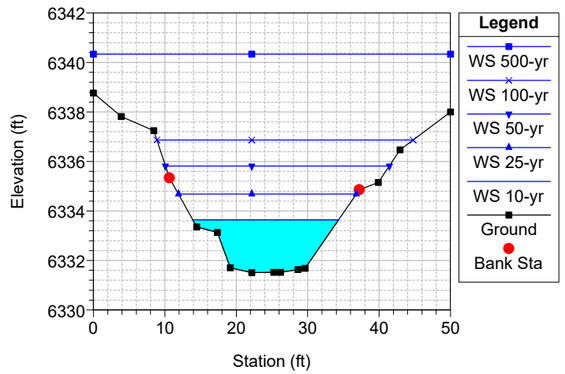

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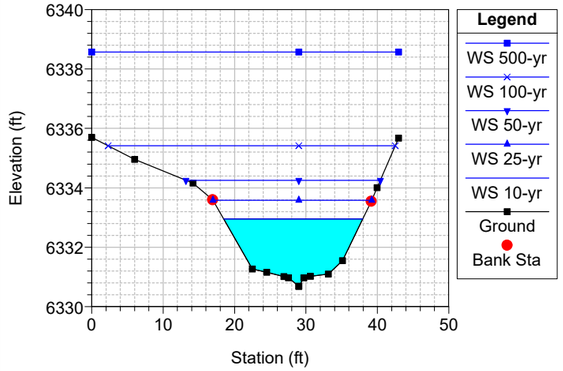

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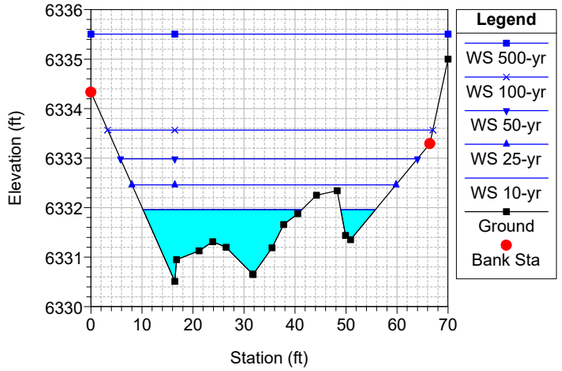

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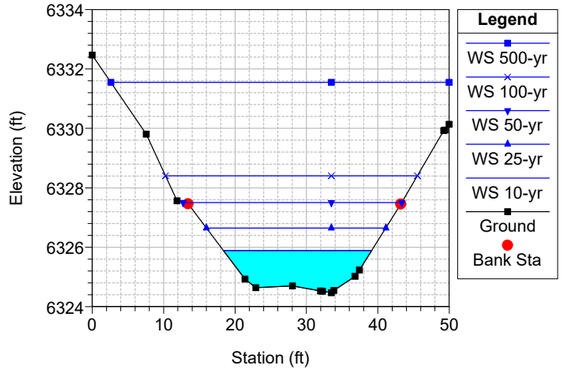

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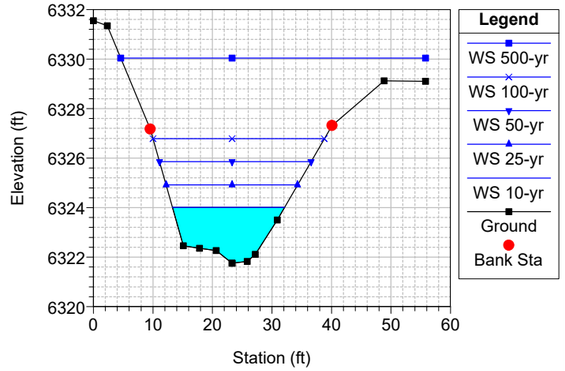

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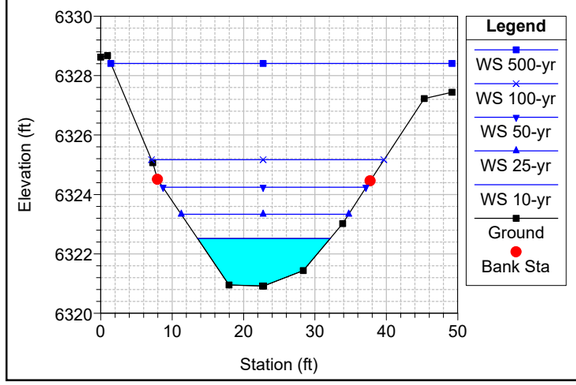


C.4. Riprap Sizing Calculations

South Cheyenne Canon Bridge Replacement
Rip Rap Protection Analysis

Rip Rap Protection Determination - Per USDCM Chapter 9 PN WXXZ6205
The technique presented is suggested for outlet Froude Numbers up to 3. Date 6/12/2023

$Q/WH^{1.5} < 14\ ft^{0.5}/sec$

Culvert Outlet Parameters:

Q, flowrate in culvert =	867	cfs	$Fr = V/(gY_n)^{0.5}$ =	0.79	*Acceptable*
W, culvert width=	12	ft			
H, culvert height =	4.3	ft			
V, Culvert exit velocity =	10.08	fps			

Per the USDCM and HEC-14 if the culvert is less than full or flow is supercritical, use the average height, Ha, instead of H, with $H_a = 0.5*(H+Y_n)$ eqn 9-18. Normal depth calculated in culvet in HEC-RAS

From HEC-RAS - Y_n = 5.03 ft
Therefore, H_a = 4.665 ft From this point, the H_a value will be substituted for H throughout the design.

$Q/WH_a^{1.5} < 14\ ft^{0.5}/sec$ $Q/WH_a^{1.5}$ = 7.2 ∴ *Acceptable*

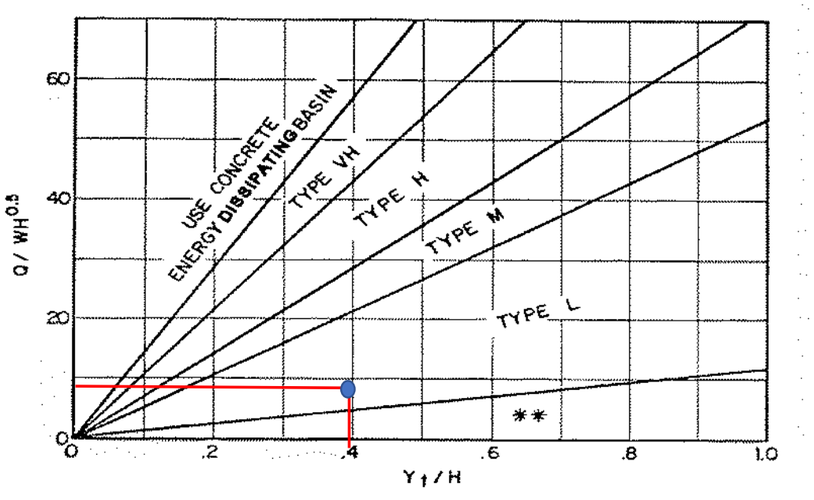
The two parameters for this figure are: $Q/WH^{0.5}$ and Y_t/H or $Q/WH_a^{0.5}$ and Y_t/H

$Q / WH_a^{0.5}$ = 33.5

According to USDCM and HEC-14 in the cases where Y_t is unknown or a hydraulic jump is suspected downstream of the outlet, use $Y_t/H = 0.4$.

therefore, for this analysis it will be assumed that Y_t/H_a = 0.4

Per USDCM *Figure 9-39:*



Use H_a instead of H whenever culvert has supercritical flow in the barrel.
**Use Type L for a distance of 3H downstream

Point lies in the "Type L" area.

Extent of Protection

$L = (1/(2\tan\theta)) * (A_t/Y_t - W)$ Eqn 9-11

L =	Length of Protection, ft	=	24.7
W =	Width of conduit, ft	=	12.0
Y_t =	Tailwater Depth, ft (From RAS)	=	5.03
$1/(2\tan\theta)$	Expansion Factor of culvert	=	1.10
A_t =	Q/V - Required area of flow at Allowable Velocity, sq ft	=	173.4
V =	The allowable Non-Eroding Velocity in the Downstream Channel, fps	=	5.0
Q =	Design Discharge, cfs	=	867.0

Per the USDCM if the Froude Parameter ($Q/WH_a^{1.5}$) is less than or equal to 8.0, the minimum L should be no less than 3H and the maximum L does not need to be greater than 10Ha. If the Froude Parameter is greater than 8.0, the maximum L should be increased by 1/4 H for each whole number that the Froude Parameter is greater than 8.0.

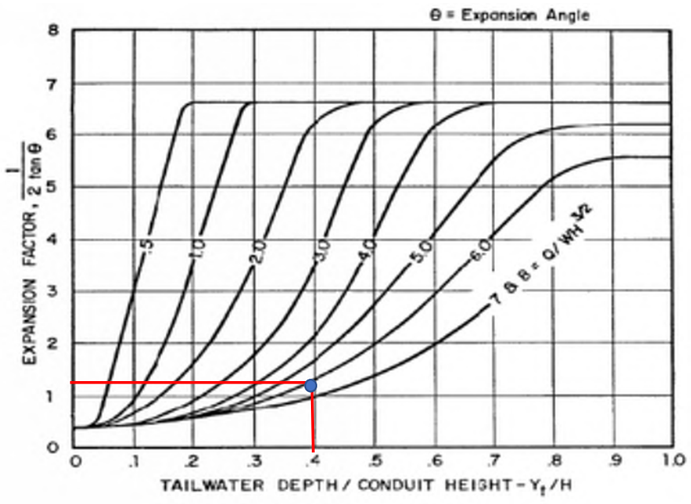


Figure 9-36. Expansion factor for rectangular conduits

For this culvert, the Froude Parameter is equal to -	7.2	
As a result, the calculated length of protection necessary for this culvert is	24.7	ft
3Ha	14.0	ft
10Ha	46.7	ft
Therefore use Calculated L	25.0	ft

Appendix D. Geotechnical Report

SUBMITTED TO:
Jacobs Engineering Group, Inc.
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Dallas, TX 75201

BY:
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Denver, CO 80204

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www.shannonwilson.com

DRAFT

GEOTECHNICAL REPORT

S. Cheyenne Canyon Bridge

COLORADO SPRINGS, COLORADO

Draft

SHANNON & WILSON

May 2023

Shannon & Wilson No: 107347-001

Submitted To: Jacobs Engineering Group, Inc.
1999 Bryan Street, Suite 1200,
Dallas, TX 75201
Attn: Troy Slocum, PE

Subject: DRAFT GEOTECHNICAL REPORT, S. CHEYENNE CANYON BRIDGE, COLORADO SPRINGS, COLORADO

Shannon & Wilson prepared this report and participated in this project as a subconsultant to Jacobs Engineering Group (Jacobs). Our scope of services was specified in our subconsultant agreement with Jacobs dated October 5, 2021 and a subcontract modification dated April 11, 2023. This report presents subsurface explorations, laboratory test results, and geotechnical engineering recommendations for the Project and was prepared by the undersigned.

We appreciate the opportunity to be of service to you on this project. If you have questions concerning this report, or we may be of further service, please contact us.

Sincerely,

SHANNON & WILSON

Draft

David A. Varathungarajan, PE
Vice President

BTM:DAV/jma/ajg

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1 INTRODUCTION

This report summarizes subsurface conditions and provides geotechnical engineering recommendations for the proposed replacement of the S. Cheyenne Canyon Bridge (the Project) located between S. Cheyenne Canyon Road and Mesa Avenue in Colorado Springs, Colorado (see Figure 1). Our services were conducted in general accordance with our subconsultant agreement with Jacobs dated October 5, 2021 and a subcontract modification dated April 11, 2023.

Our scope of services included:

- Coordinating a subsurface exploration program consisting of drilling 4 geotechnical borings.
- Performing geotechnical laboratory testing on samples retrieved from the borings.
- Developing geotechnical recommendations for bridge foundations and associated wing walls.
- Developing pavement design recommendations in accordance with City of Colorado Springs criteria.
- Preparing this geotechnical report.

The scope of our services did not include evaluating the presence of cultural resources or potentially contaminated soils at or around the site. If a service is not specifically indicated in this report, do not assume it was performed.

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2 SITE AND PROJECT DESCRIPTION

The Project involves the design of two new structure crossings over South Cheyenne Creek, connecting S. Cheyenne Canyon Road and Mesa Avenue (see Figures 1 and 2). One structure is a roadway bridge approximately 100 to 200 feet northeast of the existing intersection and the other structure is a pedestrian bridge adjacent to the eastern edge of the existing intersection. We understand the Project team has selected single span bridges supported on deep foundations for these structures.

The intent of the proposed work is to improve roadway geometry at the intersection and to remove an existing, deteriorated culvert carrying South Cheyenne Creek beneath S. Cheyenne Canyon Road.

Roadway improvements will consist of new pavement at the tie-ins to the existing pavement. Based on communications with Jacobs, we understand the proposed pavement for the crossing will match the existing pavement section.

3 FIELD EXPLORATIONS AND LABORATORY TESTING

Shannon & Wilson conducted two field exploration programs to explore subsurface conditions at the Project site. In December 2021, one field exploration program consisted of drilling two borings, designated SW-01 and SW-02, near the proposed roadway bridge abutments. The second field exploration program was performed in April 2023 and consisted of drilling two borings, designated SW-03 and SW-04, near the proposed pedestrian bridge abutments. Boring locations are shown on Figure 2. The borings were drilled in Cheyenne Canyon Road and Mesa Avenue to depths of approximately 26.0 to 41.4 feet below ground surface.

Appendix A describes the procedures used to complete the drilling and sampling of the geotechnical borings and presents the individual exploration logs and an explanation of the symbols and terminology used on the logs.

Shannon & Wilson completed geotechnical laboratory testing to determine properties of selected samples from the borings. The laboratory program included tests for natural water content, Atterberg limits, grain size distribution, percent fines, swell/collapse, and corrosion testing. The laboratory test results are presented in Appendix B along with a brief discussion of the laboratory testing procedures. The natural water contents, Atterberg limits, and percent fines are also indicated on the individual boring logs in Appendix A.

4 REGIONAL GEOLOGY AND SUBSURFACE CONDITIONS

4.1 Regional Geology

The Project is located at the mouth of the South Cheyenne Canyon, north of Cheyenne Mountain. The Ute Pass Fault, a large reverse fault that runs adjacent to the Project site, has juxtaposed Precambrian granitic rocks against younger Cretaceous-age sedimentary rocks. Geologic mapping of the Colorado Springs Quadrangle in El Paso County, Colorado (Carroll and Crawford, 2000) indicates that surficial geology in the Project area consists of Quaternary-age terrace alluvium (described as a stream-deposited, locally bouldery, pebble- and cobble-size gravel in a sandy or silty matrix) overlying Pierre Shale bedrock.

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4.2 Subsurface Conditions

4.2.1 Existing Pavement

Hot mix asphalt (HMA) and aggregate base course (ABC) were encountered in all four borings and thicknesses are shown in Exhibit 4-1.

Exhibit 4-1: Summary of Existing Pavement Sections

Boring No.	Hot Mix Asphalt Thickness (inches)	Aggregate Base Course Thickness (inches)
SW-01	4	2-1/2
SW-02	6	2
SW-03	4	4
SW-04	4-1/2	6

4.2.2 Overburden

We observed subsurface conditions to be generally consistent with regional geologic mapping (see Section 4.1). Overburden soils on the north side of Cheyenne Creek, borings SW-01 and SW-03, generally consisted of loose to very dense, well- to poorly graded sands and gravels with varying amounts of silt, sand, and gravel. Overburden soils on the south side of Cheyenne Creek, borings SW-02 and SW-04, generally consisted of medium dense to very dense, well- to poorly graded sands and gravels with cobbles and boulders. Boring SW-02 initially encountered auger refusal on apparent cobbles and boulders at a depth of 4 feet before completing at an offset location using ODEX methods (see Appendix A).

4.2.3 Bedrock

Pierre Shale Formation bedrock that consisted of extremely weak to weak claystone and shale was encountered below the overburden in each of the four borings. In borings SW-01, SW-02, and SW-04, high-angled bedding was observed in the claystone, dipping approximately 80 degrees. Based on topographic contours of existing ground provided by Jacobs (2022), the approximate elevation of the top of bedrock are indicated in Exhibit 4-2. Boring SW-04 encountered ODEX drilling refusal at 36 feet due to clogging of the downhole hammer with clayey drill cuttings (see Appendix A).

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Exhibit 4-2: Summary of Bedrock Depths

Boring No.	Bedrock Depth (feet)	Bedrock Elevation1 (feet)
SW-01	14.0	6341
SW-02	14.0	6342
SW-03	17.5	6339
SW-04	35.5	6324

NOTES:
1 Based on topographic contours of existing ground provided by Jacobs (2022).

4.2.4 Groundwater

As indicated in Exhibit 4-3, groundwater was measured during or shortly after drilling at depths between 6.5 feet and 9.3 feet. Groundwater measurements were recorded using an electronic water level indicator and are also noted on the boring logs included in Appendix A.

Exhibit 4-3: Summary of Groundwater Depths During Drilling

Boring No.	Groundwater Depth (feet)	Groundwater Elevation1 (feet)	Measurement Date
SW-01	7.8	6347	12/15/2021
SW-02	7.2	6349	12/17/2021
SW-03	6.5	6350	4/10/2023
SW-04	9.3	6350	4/24/2023

NOTES:
1 Based on topographic contours of existing ground provided by Jacobs (2022).

Groundwater fluctuations are possible and will depend on many factors such as seasonal variations, local precipitation, water levels in the South Cheyenne Creek, and runoff.

4.3 Subsurface Variation

Our observations are specific to the locations, depths, and times noted on the logs and may not be applicable to all areas of the site. No amount of explorations or testing can precisely predict the characteristics, quality, or distribution of subsurface and site conditions. Potential variation includes, but is not limited to:

- The conditions between explorations may be different.
- The passage of time or intervening causes (natural and manmade) may result in changes to site and subsurface conditions.

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- Penetration test results in gravelly soils may be unrealistic. Actual soil density may be lower than estimated if the test was performed on a gravel or cobble.
- Near faults, such as the Ute Pass Fault mapped at the site, subsurface conditions may change significantly over relatively short distances and depths.

If conditions that are different from those described herein are encountered during construction, we should review our description of the subsurface conditions and reconsider our conclusions and recommendations.

5 GEOLOGIC HAZARDS

5.1 Corrosion Potential

The clay soil and bedrock materials in the Colorado Front Range area can be corrosive to substructure elements. To assist in estimating the corrosion potential at the site, selected samples (one of granular overburden and two of bedrock) were tested for pH, resistivity, water soluble sulfates, and chlorides. The results are presented in Table B-1 in Appendix B.

The resistivity measured in the samples was 500 and 570 ohm-centimeters in the bedrock and 10,350 ohm-centimeters in the overburden. Based on correlations developed by Roberge (2012) as shown in Exhibit 5-1, these values classify as extremely corrosive for bedrock and mildly corrosive for overburden.

Exhibit 5-1: Corrosivity Ratings Based on Soil Resistivity

Soil Resistivity (ohm-cm)	Corrosivity Rating
>20,000	Essentially Noncorrosive
10,000-20,000	Mildly Corrosive
5,000-10,000	Moderately Corrosive
3,000-5,000	Corrosive
1,000-3,000	Highly Corrosive
<1,000	Extremely Corrosive

The concentration of water-soluble sulfates measured in the samples was 0.13% and 0.18% by weight in the bedrock and 0.02% by weight in the overburden. Based on classifications as defined by CDOT (2022b), as shown in Exhibit 5-2, these test results classified as Class 0 for the overburden and Class 1 for the bedrock. CDOT Standard Specifications (CDOT, 2022b) specify Class 2 sulfate resistance for all concrete structures to protect against potential sulfate attack unless otherwise specified in the plans.

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Exhibit 5-2: Corrosivity Ratings Based on Water Soluble Sulfate Exposure

Water Soluble Sulfate in Soil (Percent by Weight)	Sulfate Exposure Class
<0.10	Class 0
0.11 - 0.20	Class 1
0.21 - 2.00	Class 2
>2.01	Class 3

The test results and the above discussion are provided to assist the designer in the selection of project materials, concrete type, or other features with respect to corrosion. As appropriate, the designer should consider protective measures, such as coatings, upsizing for section loss, or using alternative materials to reduce the corrosion potential.

5.2 Swelling and Collapsible Soils

Expansive and collapsible soils (soils that experience volume change upon wetting) are common along the Front Range region of Colorado. These materials have the potential to damage or cause distress to structures and near-surface features. To assist us in determining the swell and collapse potential at the site, we reviewed a published geologic map of potentially swelling surficial soil and rock along the Front Range urban corridor developed by Hart (1974). The area surrounding the Project is mapped as having moderate to very high swell potential. The granular soils at the site are not considered swell- or collapse-susceptible, but the claystone bedrock can be swell-susceptible.

To further evaluate the potential for swell at the site, we performed a swell/consolidation test on a sample of claystone at a 20-foot depth on SW-02. With an inundation pressure of 500 pounds per square foot (psf), the results showed that the sample collapsed 0.25%.

For soil/rock to swell, the moisture regime at the site must change such that the moisture content of the swell-susceptible material can increase. Given that the claystone underlying the site has been exposed to water flowing in the creek many years, there is a low risk of the moisture regime of the claystone changing. Further, the structures will be supported by deep foundations. As such, the risk of swell to impact the proposed structures is low, in our opinion.

5.3 Seismic Hazards

Based on a geologic map by the United States Geological Survey, the nearest fault to the proposed Project is the Ute Pass Fault, a middle to late Quaternary Age fault (with movement less than 0.2 mm per year) which crosses South Cheyenne Canyon within a few

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hundred feet of the Project site (Widmann and others, 1998). Based on the age and lack of recent movement of the Ute Pass Fault, it is our opinion that the potential for ground surface fault rupture at the Project site is low.

Liquefaction can occur in loose, saturated, cohesionless soils when subjected to earthquake ground shaking. Based on the subsurface conditions and relatively low peak horizontal ground acceleration for the site, it is our opinion that the risk of liquefaction is low.

Seismic compression may occur when loose, granular soils above the groundwater table are rearranged into a tighter packing configuration during seismic shaking, which can cause settlement. Based on the subsurface conditions encountered at the Project site and the relatively low peak horizontal ground acceleration for this area, it is our opinion that the risk of settlement from seismic compression is also low.

6 GEOTECHNICAL RECOMMENDATIONS

6.1 Seismic Ground Motion Design Parameters

Using the AASHTO Load and Resistance Factor Design (LRFD) Bridge Design Specifications (AASHTO, 2020) criteria, and based on subsurface conditions encountered in our borings, the Project site classifies as Site Class C or D, depending on the boring considered. We recommend conservatively assuming Site Class D conditions. If the seismic design is found to significantly affect the design, geophysical testing could be completed at the site to better characterize the seismic site class.

Ground motion parameters were determined for the Project site using the USGS U.S. Seismic Design Map Web Application (USGS, 2023) and procedures recommended by AASHTO (2020). Recommended seismic design ground motion parameters are summarized in Exhibit 6-1.

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Exhibit 6-1: Seismic Design Ground Motion Parameters (Site Class D)

Parameter	Value
Peak Ground Acceleration1 (PGAB)	0.057 g
Short-period Spectral Acceleration, SS	0.123 g
Long-period Spectral Acceleration, S1	0.036 g
Site Factor, Fpga	1.6
Site Factor, Fa	1.6
Site Factor, Fv	2.4
Peak Design Spectral Acceleration, AS	0.091 g
Short-period Design Spectral Acceleration, SDS	0.197 g
Long-period Design Spectral Acceleration, SD1	0.086 g
Short-period Reference Time, T0	0.088 sec
Long-period Reference Time, TS	0.438 sec
Seismic Zone2	1

NOTES:
PGAB = peak ground acceleration for a site underlain by Site Class B material (soft rock).
Seismic Zone from AASHTO (2020) Table 3.10.6-1.
g = gravitational acceleration; PGA = peak ground acceleration, sec = second

6.2 Foundation Recommendations

The following sections provide geotechnical recommendations for the deep foundations supporting the proposed bridges and associated wing walls. As discussed in Section 2.0, we understand the proposed bridges will consist of single-span bridges supported by deep foundations. Due to the presence of shallow cobbles and boulders in the overburden, driven piles are not recommended for the site due to constructability challenges associated with driving piles through these materials. In our opinion, drilled shafts are preferable for the site due to the ability to drill through cobbles and boulders. However, as discussed in Section 7.4, installation of drilled shafts through cobbles and boulders will also present constructability challenges.

6.2.1 Drilled Shafts - Axial Resistance

Drilled shafts can be designed for tip and side resistance in the bedrock. The design criteria presented herein were developed based on recommendations presented in the AASHTO LRFD Bridge Design Specifications (AASHTO, 2020). In addition, a CDOT research report

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(Abu-Hejleh and others, 2003) and the CDOT BDM (CDOT, 2022a) was used to supplement drilled shaft design procedures and develop the axial resistance parameters, which are presented in Table 1.

Consistent with local practice, and because of disturbance from drilling tools and differences in strain compatibility between the soil and bedrock, side resistance from the overburden soils should be ignored. Additionally, the side resistance should be ignored in the top 3 feet of bedrock (due to weathering at the top of the layer and the potential for disturbance from casing). We recommend a minimum drilled shaft penetration of two diameters but no less than 5 feet into the bedrock below this 3-foot zone.

The drilled shaft axial resistance parameters presented in Table 1 are nominal values. A reduction factor of 0.60 for axial side and base resistance should be used in accordance with Section 10.6.2.1 of the CDOT BDM (CDOT, 2022a). The nominal axial resistance parameters do not require reduction due to shaft group action, provided the shafts are spaced a horizontal distance of at least 2 shaft diameters, center-to-center.

Using good installation techniques and equipment based on criteria described in the 2018 FHWA Manual "Drilled Shafts: Construction Procedures and Design Methods" (Brown and others, 2018), the total settlement for a single drilled shaft will be approximately ½-inch or less under service conditions. This settlement value does not include elastic compression of the shaft under the service load. We anticipate that differential settlement between adjacent piers will be about 50% to 75% of the remaining settlement occurring within the first year following construction.

6.2.2 Lateral Resistance

Lateral loads acting on the structure from wind, seismic, and other loadings are typically resisted by the passive earth pressure against the caps, the frictional resistance developed between the sides of the cap and surrounding soils, and the lateral resistance provided by the deep foundation members. The lateral behavior of the shafts is highly dependent on the degree of fixity of the top of the shaft.

In our opinion, frictional sliding resistance at the base of the cap should be ignored because a deep foundation-supported structure may not transmit load directly to the soil beneath the cap. The degree of movement required to initiate passive soil pressure and cap movement will depend on the degree of fixity to the deep foundation element. Passive soil resistance against the cap and frictional resistance along the sides of the cap should be ignored because of the relatively small allowable design deflections, the comparatively large movements required to mobilize the passive soil and frictional resistance, and the potential

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for scour. Therefore, we recommend the lateral resistance be determined based only on the deep foundation elements.

To determine the lateral resistance of an individual drilled shaft, and the deflection, shear, and moment along the shaft or pile, we have provided input parameters for the commercial software LPILE by Ensoft, Inc. (2022) in Table 1. Group action can be analyzed using p-multipliers within LPILE. P-multipliers (i.e. group reduction factors) for loading perpendicular and parallel to a row of piles or shafts should be applied in accordance with AASHTO LRFD Bridge Design Specifications (2020) Table 10.7.2.4-1 and Figure 10.7.2.4-1, which are summarized in Figure 4.

6.3 Wing Walls

We understand the bridges will include concrete abutments and adjacent wing walls and that wing walls be cantilevered from the abutments (which will be supported by deep foundations). The following sections provide additional recommendations related to retaining walls.

6.3.1 Lateral Earth Pressures

We recommend that abutments and wing walls be backfilled in the 1H:1V (horizontal to vertical) zone behind the walls using CDOT Class 1 Structure Backfill. The following earth pressure coefficients and equivalent fluid pressures reflect at-rest (i.e., non-yielding wall) and active (i.e., wall can deflect approximately 0.1% of wall height) conditions; values provided for both cases reflect horizontal backslope conditions. We have not accounted for any water pressure based on the assumption that drainage will be provided as described Section 6.3.2.

Exhibit 6-2: Recommended Lateral Earth Pressure Parameters

	Design Parameter	Recommended Value
CDOT Class 1 Structure Backfill	Total Unit Weight (pcf)	135
	Effective Friction Angle (deg)	34
	Effective Cohesion (psf)	0
	Static At-Rest Earth Pressure Coefficient, Ko	0.44
	At-Rest Equivalent Fluid Pressure (psf/ft)	60
	Static Active Earth Pressure Coefficient, KA	0.28
	Active Equivalent Fluid Pressure (psf/ft)	38

NOTE:
deg = degree; pcf = pounds per cubic foot; psf = pounds per square foot

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Surcharge loads, such as traffic and construction equipment, will induce lateral loads on walls. Lateral loads due to various types of surcharges may be calculated by using the loading diagrams provided in Figure 3 and the earth pressure coefficient indicated above in Exhibit 6-2.

6.3.2 Drainage

Fluctuations of water levels in South Cheyenne Creek could potentially result in differential hydrostatic water pressures in wall backfill (i.e. water levels in the backfill may rise with the water level in the creek and then remain elevated after the creek level decreases, depending on wall drainage measures and the duration of elevated water levels in the creek). The earth pressure parameters provided in Exhibit 6-2 assume that unbalanced hydrostatic pressures do not develop in the retained zone behind walls.

The CDOT Class 1 Structure Backfill may not be free draining at the upper end of the allowable fines content for the material. Therefore, we recommend that either the walls be designed for the additional hydrostatic loads (which were not included in the earth pressure parameters provided above), or that a drainage system be included directly behind the walls. If a drainage system is included, we recommend utilizing a 1-foot-thick layer of Class B or C Filter Material (CDOT, 2022b) against the back face of the walls and including weepholes that are tied to the drainage layer. Alternatively, the specifications for the CDOT Class 1 Structure Backfill could be modified to limit the maximum fines content to 10% and weepholes could be provided.

6.4 Pavement Design

Based on communications with Jacobs, we understand the proposed pavement for the crossing will generally match the existing pavement section and that the roadway is classified as a Minor Residential Collector. Our explorations encountered 4 to 6 inches of HMA over 2 to 6 inches of ABC. The minimum pavement thicknesses specified in City of Colorado Springs Pavement Design Criteria Manual (2010) for a Minor Residential Collector is 4 inches HMA over 6 inches ABC, which appears to be suitable for the site considering the granular subgrade soils present at the site and that areas of new fill will consist of granular wall backfill. We recommend that new pavements follow the minimum sections indicated in the City's specifications.

7 CONSTRUCTION CONSIDERATIONS

The applicability of the design recommendations provided in this report is contingent on good construction practice. Poor construction techniques may alter conditions from those

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on which our recommendations are based, resulting in reduced foundation capacity and increased settlement. The following sections present additional construction and material considerations for this Project. We assume the Project will be constructed in accordance with the City of Colorado Springs General Provisions and Standard Specifications (City of Colorado Springs, 2005) and/or CDOT Standard Specifications for Road and Bridge Construction (2022b).

7.1 Earthwork

7.1.1 Clearing and Stripping

Existing structures and pavements should be removed in accordance with CDOT specifications (2022b). Care should be taken to avoid disturbing subgrade soils and supporting soils that will remain in place, as they can rut and pump under repeated construction traffic. The final subgrade surface should be sloped to promote positive drainage.

7.1.2 Subgrade Preparation

Proper subgrade preparation is required for adequate structure performance. We recommend that wall subgrades be scarified in place to a depth of 8 inches, moisture treated, and recompacted as discussed in Section 7.1.3. The exposed subgrade should then be proof rolled with a fully loaded, tandem-axle, 10-yard dump truck or equivalent before placing any remaining fill. If proof rolling is not feasible due to site constraints, the subgrade could be evaluated by probing. Any areas that are identified as being loose, soft, or yielding during probing should be removed to a maximum depth of two feet and replaced with CDOT Class 1 Structure Backfill.

Care should be taken during subgrade preparation to avoid disturbing subgrade soils and supporting soils that will remain in place, as they can rut and pump under repeated construction traffic. The final subgrade surface should be sloped to promote positive drainage and kept free of water at all times. Leaving the subgrade elevation high until final grading begins is a means to reduce the potential for disturbance to the final subgrade materials. All subgrades should be protected during construction from drying or wetting in excess of the requirements for moisture conditioning.

7.1.3 Fill Placement and Compaction

All fill materials should be placed and compacted in accordance with the CDOT Standard Specifications for Road and Bridge Construction (2022b). CDOT Section 203.07 states:

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- Soil embankment with less than or equal to 30% retained on the 3/4-inch sieve shall be tested for compaction using CP 80. Materials classified as AASHTO A-1, A-2-4, A-2-5, and A-3 soils shall be compacted at plus or minus 2% of Optimum Moisture Content (OMC) and to at least 95% of maximum dry density determined in accordance with AASHTO T 180 as modified by CP 23. All other soil types shall be compacted to 95% of the maximum dry density determined in accordance with AASHTO T 99 as modified by CP 23. Soils with 35% fines or less shall be compacted at plus or minus 2% of OMC. Soils with greater than 35% fines shall be compacted at a moisture content equal to or above OMC to achieve stability of the compacted lift. Stability is defined as the absence of rutting or pumping as observed and documented by the Contractor's Process Control Representative and as approved by the Engineer.

The thickness of loose lifts should not exceed 8 inches for heavy equipment compactors and 4 inches for hand-operated compactors. These maximum values may be less depending on the lift thickness required to obtain the above relative compaction. Compaction of backfill adjacent to walls can result in higher lateral earth pressures against the wall. Heavy equipment should stay behind a line extending upward from the base of the walls at 0.5H:1V, or 3 feet from the wall, whichever is greater. The backfill within this zone should be compacted with hand-operated equipment.

We anticipate that on-site granular overburden material will be suitable for reuse as CDOT Class 1 Structure Backfill. However, the material should be screened to remove particles coarser than the 2-inch sieve size.

7.1.4 Excavation Potential

We anticipate that excavation of overburden can be accomplished with conventional excavating equipment, such as dozers, front-end loaders or scrapers. Boulders in the overburden may need to be reduced in size to facilitate handling. This could be accomplished with a hydraulic rock breaker, expansive grout, or blasting.

7.2 Temporary Slopes and Shoring

The appropriate methodology for excavation and support of excavations depends on many factors, including: (a) the presence and depth of groundwater; (b) the type, density, and shear strength of the subsurface materials; (c) the depth of excavation; (d) the presence of adjacent facilities; (e) surcharge loading adjacent to the excavation (including stockpiled excavated material, existing dead or live loads, and construction equipment); and (f) duration and time of year of construction.

Considering these factors, unshored, temporary excavation slopes may be possible at the crossing. However, constructing excavation slopes below the groundwater level may cause

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slope instability due to the seepage of groundwater into the excavation. Therefore, shoring and/or dewatering may be required (see Section 7.3) depending on the depth of the required excavation.

The Project team may choose to limit where the Contractor can make temporary excavation slopes based on the need to limit impacts to the roadway and adjacent property and or to avoid utilities. If it is possible to slope the excavation, we recommend the temporary slopes be consistent with the Occupational Safety & Health Administration (OSHA) guidelines contained in 29 CFR 1926, Subpart P (1989). For cost estimating and planning purposes only, we recommend assuming temporary excavations above groundwater level are sloped at 1.5H:1V in granular soils, consistent with OSHA Type C soils. If groundwater is actively seeping into the excavation, flatter slopes will be required. The Contractor should continually classify the soils that are encountered as excavation progresses with respect to the OSHA system.

Feasible shoring methods may be restricted by the presence of cobbles and boulders in the subsurface (e.g., sheet piles may not be drivable, or soldier piles may require drilling through boulders to be installed to the required depth). Any temporary walls should include wall drainage measures and should be designed with appropriate surcharge loads. Shoring selection will be the responsibility of the Contractor and will depend on several factors, including the depth of the excavation, adjacent utilities, right-of-way limitations, and sequencing considerations.

Depending on the Contractor's approach to dewatering and stream diversion, a watertight shoring system may be required to control groundwater and surface water in the excavation. A secant pile shoring system embedded in bedrock could be considered as a feasible watertight shoring alternative. The shoring would need to extend around the perimeter of the excavation to create a watertight enclosure around the proposed construction. The stream would then need to be carried in a bypass channel or pipe around the work area.

Consistent with conventional practice, the contract documents should require the Contractor to be responsible for the actual temporary excavation slopes, including methods, sequence, and schedule of construction. The Contractor is able to observe the nature and conditions of the subsurface materials encountered and should evaluate the factors discussed above. If instability is observed, slopes should be flattened or shored. All excavations should be accomplished in accordance with local, state, and federal safety regulations.

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7.3 Dewatering

Based on groundwater levels encountered in our explorations and the stream level at the time of drilling, the proposed excavations for abutments and wing walls might extend below groundwater. The presence of groundwater may cause instability of open-cut excavations and subgrades. Groundwater levels will likely be influenced by the stages and seasonal changes of South Cheyenne Creek. The Contractor should consider these seasonal conditions in planning the work and the groundwater control measures.

We recommend that the groundwater level be kept a minimum of 3 feet below the bottom of excavation elevation or at the top of bedrock, whichever is shallower, to reduce the potential for disturbance to the subgrade. The groundwater level should be drawn down prior to excavating and should be maintained in a dewatered state until the abutments and wing walls are constructed and backfilled.

Consistent with typical practice, the Contractor will be responsible for control of surface water and groundwater during construction, including the design of dewatering and diversion features. In this regard, slope protection, ditching, sumps, dewatering wells, diversions, and other measured should be employed as necessary, to direct water away from excavations, to prevent ponding of water next to the work zone, and to permit completion of the work.

7.4 Drilled Shaft Installation

Specifications and installation methods should be in general accordance with our recommendations and guidelines in the 2018 FHWA Manual, "Drilled Shafts: Construction Procedures and Design Methods" (Brown and others, 2018), and Section 503 of the CDOT Standard Specifications (CDOT, 2022b).

Subsurface conditions at the site will present several significant challenges for the constructability of drilled shafts as discussed below.

7.4.1 Installation Methods and Equipment

7.4.1.1 Cobbles and Boulders

Installation of drilled shafts will require advancing the excavation through cobbles and boulders. Cobbles and boulders can sometimes be excavated by conventional augers, but modified single-helix augers, designed with a taper and sometimes with a calyx bucket mounted on the top of the auger, a.k.a. boulder rooters, are generally more successful at extracting smaller boulders (Brown and others, 2018). However, the extraction of large boulders and rock fragments can cause considerable difficulty and significantly reduce

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drilling production. Boulders that are solidly embedded can likely be cored, while coring through boulders loosely embedded in soil may be ineffective. The removal of loosely embedded boulders may require breaking the boulder in the hole with percussion methods or a rock breaker tool (or other appropriate methods).

7.4.1.2 Bedrock Drilling

Drilled shafts will obtain their capacity within the bedrock. Our experience indicates heavy duty drill rigs using auger drill methods can usually penetrate bedrock similar to that encountered at the site. The specifications should require the drilled shaft contractor to demonstrate experience in similar bedrock, to confirm the suitability of the proposed methods and expected production.

The argillaceous bedrock present at the site is susceptible to degradation in the presence of water or other drilling fluids (slake). Such degradation can result in a smear zone of disturbed material on the sidewall of the drilled shaft, leading to a significant reduction in the side resistance. For shafts constructed using dry methods, if excessive remolding or caking of bedrock sidewalls is detected during drilling, additional roughening should be used to remove the remolded material. If wet methods are required to construct the shafts, the sidewalls of the shaft should be roughened to remove any remolded material prior to concrete placement. Shafts could be roughened using a tooth attached to the outside of a drilling auger or a "backscratcher" tool (see Brown and others, 2018).

7.4.1.3 Excavation Support

Based on the borings drilled for the bridge, overburden at the bridge substructure elements generally consists of sand, gravel, cobbles, and boulders. Groundwater was encountered during the subsurface exploration program at approximately 7 to 9 feet below the ground surface. During drilled shaft installation, we anticipate drilling slurry, temporary casing sealed into the bedrock, or a combination thereof will be required to prevent raveling, caving, and flowing conditions in the overburden.

Where casing is used, it should be pushed, rotated, vibrated, or driven into the bedrock. The inside diameter of the casing should be equal to or larger than the specified drilled shaft dimensions. The use of casings larger than the diameter of the specified casing must have prior approval from the Engineer. Where casing is sealed into the bedrock bearing zone, bedrock penetration to achieve design capacity should begin at the bottom of the casing. If significant penetration (more than 3 feet) of casing into the bedrock is anticipated, we should be notified so we may provide appropriate reduced side resistance parameters. Even with casing, groundwater can infiltrate into drilled shafts from perched water or

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within fractured or more permeable zones within the bedrock. Hence, the Contractor should be prepared for underwater concrete placement techniques (tremie pipes).

Construction of drilled shafts using wet methods (i.e., slurry) is more difficult than constructing shafts using dry methods. Because a wet excavation cannot be visually observed, good construction practices are critical to constructing shafts that perform adequately. Wet installation methods and specifications should be in accordance with the 2018 FHWA Manual, "Drilled Shafts: Construction Procedures and Design Methods" (Brown and others, 2018) and Section 503 of the CDOT Standard Specifications (CDOT, 2022b).

If slurry methods are used to stabilize the excavation, we recommend the use of polymer slurry. Uncontrolled slurries should not be permitted. Additionally, the drilled shaft Contractor should not be permitted to use mineral (e.g., bentonite) slurry in the bedrock or to leave any casing in the portion of the rock socket which will be used for axial resistance after drilling. Mineral slurries may reduce the side resistance in the bedrock below the values provided herein.

7.4.2 Drilled Shaft Inspection and Observation

A geotechnical engineer familiar with the subsurface conditions at the site should observe drilled shaft installation to determine the top of rock elevation and shaft penetration into rock. Because the drilled shafts will develop a significant portion of their axial resistance in end bearing, it will be critical to confirm that the base of the drilled shaft is clean and firm. The hole should be cleaned of loose material and observed by the geotechnical engineer prior to pouring concrete.

7.4.3 Concrete Placement

Even with casing, groundwater can infiltrate into drilled shafts from perched water or within fractured or more permeable zones within the bedrock. Hence, the Contractor should be prepared for underwater concrete placement techniques (tremie pipes). Tremie placement should be used if wet methods are used to construct the shafts or if water cannot be controlled by pumping or bailing such that more than 3 inches of water is present when concrete is placed. The Contractor should be prepared to address these issues. The drilling and concreting process should be relatively continuous with minimal stoppage of work between the completion of drilling, cleaning the hole, and the placement of concrete after setting the rebar cage.

We recommend concrete be designed and placed with a slump of 6 to 9 inches with maximum aggregate size of ⅜ inch consistent with CDOT Class BZ concrete (CDOT, 2022b).

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When tremie placement methods are used, we recommend the higher end of the slump range for Class BZ concrete (minimum slump of 8 inches, and it may also be appropriate to increase the maximum allowable slump to 10 inches, particularly if the rebar cage is relatively congested). When casing and/or tremie concrete placement methods are used, a minimum head of concrete of 5 feet above the bottom of the tremie pipe and/or casing should be maintained at all times.

Defects in drilled shaft are frequently the result of poor workmanship, or inadequate head of concrete, particularly when combined with marginal or low slump concrete. If a truck-mounted pump is used to tremie concrete, pull-out of the pipe can occur if a pressure surge causes upward boom movement. A larger diameter tremie pipe may reduce the risk of surging during concrete placement. Adequate methods should be established to measure and confirm that minimum head requirements are met throughout the concrete placement process.

7.4.4 Non-Destructive Integrity Tests

We recommend that non-destructive tests be completed on drilled shafts for the Project. In our opinion, Cross-Hole Sonic Logging (CSL) will provide the best evaluation of the integrity of the drilled shafts, particularly where temporary casing is used. Section 10.6.3.2 of the CDOT BDM (CDOT, 2022a) recommends CSL should be performed on every drilled shaft used for water-crossing structures.

CSL is a non-destructive testing method that requires steel (preferred for durability and to avoid delaminating from the concrete) or plastic tubes installed in the drilled shaft and tied to the rebar cage. The tubes are attached to the interior of the rebar cage and then the cage is lowered into the hole and the concrete is placed. After the concrete has cured, a sound source and receiver are lowered, maintaining a consistent elevation between source and sensor. A signal generator generates a sonic pulse from the emitter which is recorded by the sensor. Relative energy, waveform, and differential time are recorded and logged. This procedure is repeated at regular intervals throughout the shaft. By comparing the graphs from the various combinations of access tubes, a qualitative idea of the soundness of the concrete throughout the drilled shaft can be interpreted.

For small diameter shafts (less than 3 feet in diameter), CSL testing may not be cost-effective. For these small diameter shafts we recommend using a stress wave method, such as Sonic Echo (SE). The SE method involves generation of low-amplitude stress waves at the top of the shaft. Properties of the shaft concrete then are inferred from measured reflections and travel times of the stress waves. Defects or irregularities in a drilled shaft or any change in the shaft dimensions will change the impedance and result in reflection of wave energy, which allows interpretation of the irregularity or change in diameter.

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Generally, SE methods are less expensive and can be completed on a greater number of shafts than CSL testing. However, CSL test results are generally considered more accurate in identifying defects.

7.5 Paving Materials

7.5.1 HMA Materials

The HMA mix design should be in accordance with the Pikes Peak Region Asphalt Paving Specifications (City of Colorado Springs and others, 2022). Binder selection is based on the anticipated pavement temperatures, traffic patterns, and local availability. The Pikes Peak Region Asphalt Paving Specifications indicate that a performance graded binder of PG 58-28 or PG 64-22 is acceptable for moderate traffic levels (defined in the specification as traffic volumes between 300,000 and 2,500,000 18-kip equivalent single-axle load [ESAL]) and require a design gyratory number of 75. PG 58-28 binder is recommended for low traffic levels (defined as traffic volumes less than 300,000 ESALs). We recommend using a Grade SX (½-inch nominal maximum aggregate size [NMAS]) mix for the upper 1.5 inches of HMA and Grade S (¾-inch NMAS) for the underlying 2.5-inch lift. A tack coat should be placed between subsequent lifts.

7.5.2 ABC Materials

The ABC material should meet gradation requirements and minimum R-value indicated for Colorado Springs Class 5 or Class 6 ABC (refer to Section 302 of City of Colorado Springs General Provisions and Standard Specifications). ABC material should be placed in maximum 6-inch-thick lifts and compacted to a dense and unyielding condition, at least 95% of the maximum Modified Proctor dry density (AASHTO T180) or 100% of the maximum Standard Proctor dry density (AASHTO T99).

8 DOCUMENT REVIEW AND CONSTRUCTION OBSERVATION

We recommend that we be retained to review the geotechnical portions of the plans and specifications to determine if they are consistent with our recommendations. In addition, because geotechnical design recommendations are developed from a limited number of explorations and tests, recommendations may need to be adjusted in the field. To this extent, we recommend that Shannon & Wilson be retained to monitor the geotechnical aspects of construction, particularly the installation of drilled shafts for bridge foundations, subgrade preparation, fill placement, and compaction. This monitoring would allow us to confirm that conditions encountered are consistent with those indicated by the explorations

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and provide expedient recommendations should conditions be revealed during construction that are different from those anticipated.

9 LIMITATIONS

This report was prepared for the exclusive use of Jacobs and the City of Colorado Springs for use in design of the S. Cheyenne Canyon Bridge Project. It should be made available to prospective contractors and/or the Contractor for information on factual data only, and not as a warranty of subsurface conditions.

This report should not be used without our approval if any of the following occurs:

- Conditions change due to natural forces or human activity under, at, or adjacent to the site.
- Assumptions stated in this report have changed.
- Project details change or new information becomes available such that our analyses, conclusions, and recommendations may be affected.
- If the site ownership or land use has changed.
- More than 5 years has passed since the date of this report.

If any of these occur, we should be retained to review the applicability of our analyses, conclusions, and recommendations.

Within the limitations of scope, schedule and budget, the analyses, conclusions and recommendations presented in this report were prepared in accordance with generally accepted professional geotechnical and geological principles and practice in this area at the time this report was prepared. We make no other warranty, either express or implied.

Shannon & Wilson has prepared the attached document, "Important Information about Your Geotechnical Report," to assist you and others in understanding the use and limitations of our reports.

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Table 1 - Deep Foundation Design Parameters

Location and Representative Borings	Approximate Depth Below Ground Surface (feet)		Generalized Soil/Rock Description	Drilled Shaft Axial Resistance [2,3,4,5]			LPILE Parameters [8,9,10]			
				Nominal Side Resistance	Nominal End Bearing	Resistance Factor [6]	p-y Curve	Effective Unit Weight γ [1]	Peak Friction Angle ϕ'	Undrained Cohesion s_u
	Top	Bottom		(ksf)	(ksf)		(%)	(pcf)	(deg)	(psf)
Roadway Bridge North Abutment *(based on SW-01)*	0	5	Loose, well-graded SAND with silt and gravel	--	--		Sand (Reese)	115	30	-NA-
	5	10	Medium dense, well-graded SAND with silt and gravel	--	--		Sand (Reese)	58	34	-NA-
	10	15	Dense, well-graded GRAVEL	--	--		Sand (Reese)	63	40	-NA-
	15	31.5 (BOE)	CLAYSTONE	5.2	64	0.60	Stiff clay w/o free water	130	-NA-	5,000
Roadway Bridge South Abutment *(based on SW-02)*	0	5	Very dense, well-graded GRAVEl to well-graded GRAVEL with sand (cobbles and boulders encountered during drilling)	--	--		Sand (Reese)	130	40	-NA-
	5	15	Very dense, well-graded GRAVEl to well-graded GRAVEL with sand (cobbles and boulders encountered during drilling)	--	--		Sand (Reese)	68	40	-NA-
	15	26 (BOE)	CLAYSTONE	7.0	85	0.60	Stiff clay w/o free water	130	-NA-	6,000
Pedestrian Bridge North Abutment *(based on SW-03)*	0	5	Loose, well-graded SAND with silt and gravel	--	--		Sand (Reese)	115	30	-NA-
	5	12	Medium dense, silty SAND with gravel	--	--		Sand (Reese)	58	34	-NA-
	12	18	Very dense, poorly-graded GRAVEL	--	--		Sand (Reese)	68	40	-NA-
	18	30	Upper CLAYSTONE	2.4	30	0.60	Stiff clay w/o free water	125	-NA-	3,000
	30	41.4 (BOE)	Lower CLAYSTONE	6.0	72	0.60	Stiff clay w/o free water	130	-NA-	5,000
Pedestrian Bridge South Abutment *(based on SW-04 & SW-03)*	0	5	Medium dense, well-graded SAND with silt and gravel (cobbles and boulders encountered during drilling)	--	--		Sand (Reese)	120	33	-NA-
	5	15	Medium dense to very dense, well-graded GRAVEL with silt and sand (cobbles and boulders encountered during drilling)	--	--		Sand (Reese)	63	37	-NA-
	15	36	Very dense, clayey GRAVEL with sand to poorly graded GRAVEL with clay and sand (cobbles and boulders encountered during drilling)	--	--		Sand (Reese)	68	40	-NA-
	36	41	CLAYSTONE	3.0	37	0.60	Stiff clay w/o free water	125	-NA-	3,000

NOTES:

1 Groundwater was encountered between approximately 7 and 9 feet below the ground surface during drilling. A groundwater depth of 5 feet was assumed for design.

2 Calculate the factored drilled shaft tip resistance by multiplying the nominal tip resistance by the end area of the drilled shaft and the specified resistance factor. Calculate the factored drilled shaft side resistance by multiplying the nominal side resistance by the side surface area of the drilled shaft in contact with bedrock whithin each layer and by the specified resistance factor. Total factored axial compressive bearing resistance for the shaft is determined by summing the factored tip resistance and factored side resistance. If the drilled shaft is considered non-redundant, the factored axial resistance should be reduced by an additional 20 percent (AASHTO, 2020).

3 Side resistance has been neglected in the overburden.

4 Side resistance should be ignored in the upper 3 feet of bedrock due to the potential for disturbance from casing for axial capacity of drilled shafts.

5 The drilled shaft nominal tip and side resistance values for bedrock do not require reductions for group effects for center-to-center drilled shaft spacings of 2 diameters or greater.

6 A resistance factor of 0.60 is appropriate for drilled shaft axial resistance (side and tip), assuming load factors are applied in accordance with Section 10.6.2.1 of the CDOT Bridge Design Manual (2022).

7 The LPILE parameters are for a horizontal ground surface on the side of the foundation resisting lateral loading. Sloping ground surface modifications should be included as per Ensoft, Inc.'s recommendations for the LPILE program as necessary.

8 The LPILE parameters do not consider group effects. See Figure 3 for recommended p-multipliers.

9 We recommend utilizing the Ensoft default values for ε_{50} and initial p-y modulus (k) in LPILE. The default values may be utilized by entering "0" in the input field in the program.

10 Adjustments to the design parameters may be required to account for elevation changes due to final grading and for the inclusion of additional materials at the abutments.

ksi = kips per square inch, pcf = pounds per cubic foot, deg = degrees, ft = feet, psf = pounds per square foot, -NA- = not applicable, BOE = Bottom of Explorations, ksf = kips per square foot, pci = pounds per cubic inch

0 2 4

Approximate Scale in Miles

N

S. Cheyenne Canyon Bridge
Colorado Springs, Colorado

VICINITY MAP

May 2023 107347-001

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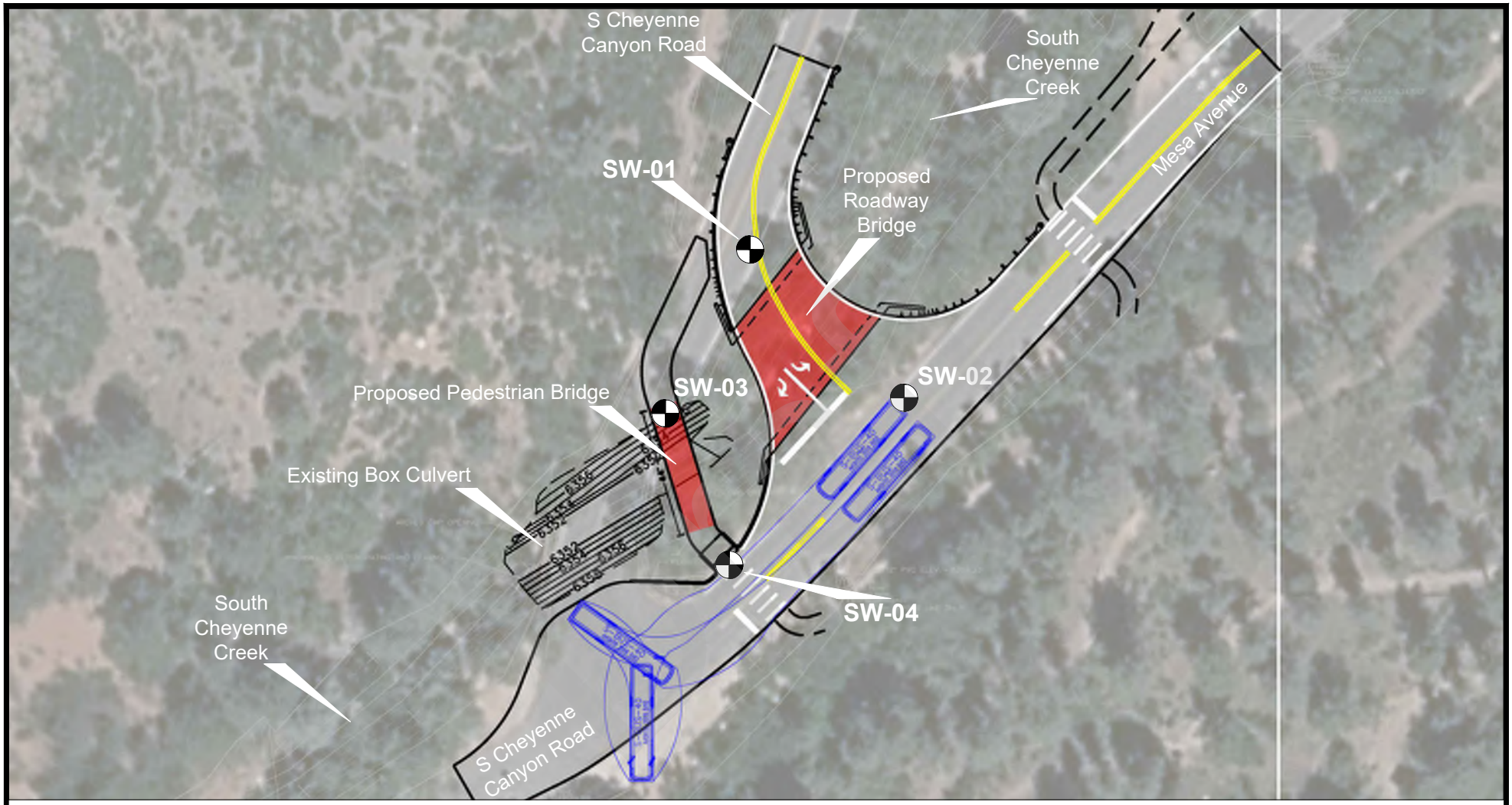
FIG. 1



LEGEND

SW-01 Boring Designation and Approximate Location

0 50 100

Scale in Feet

N

NOTE

Map adapted from "South Cheyenne Canyon 9-23-22 Pedestrian Bridge Concept" map provided by Jacobs Engineering Group Inc.

Boring locations were measured using a recreational grade GPS and should be considered approximate.

FIG. 2

S. Cheyenne Canyon Bridge
Colorado Springs, Colorado

SITE AND EXPLORATION PLAN

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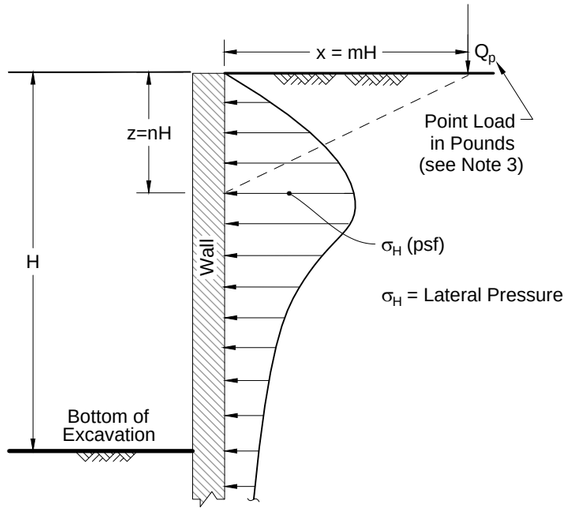
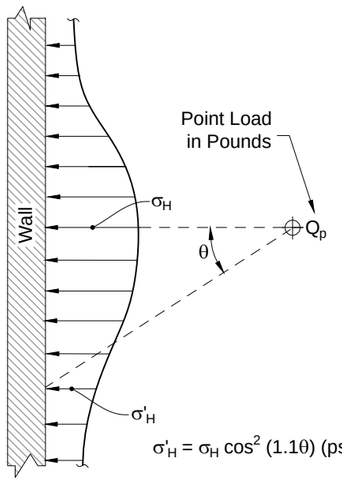
FIG. 2



ELEVATION VIEW

For m Ò0.4: $\sigma_H = 0.28 \frac{Q_p}{H^2} \frac{n^2}{(0.16 + n^2)^3}$ (psf) (see Note 3)

For m > 0.4: $\sigma_H = 1.77 \frac{Q_p}{H^2} \frac{m^2 n^2}{(m^2 + n^2)^3}$ (psf)

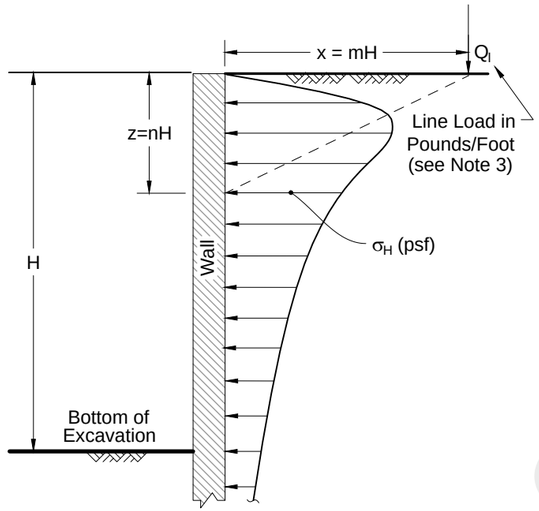


$\sigma'_H = \sigma_H \cos^2(1.1\theta)$ (psf)

PLAN VIEW

A) LATERAL PRESSURE DUE TO POINT LOAD
i.e. SMALL ISOLATED FOOTING OR WHEEL LOAD

(NAVFAC DM 7.2, 1986)



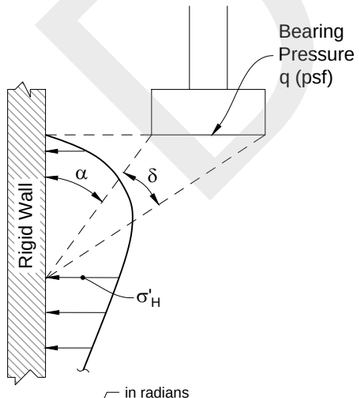
ELEVATION VIEW

For m Ò0.4: $\sigma_H = 0.20 \frac{Q_l}{H} \frac{n}{(0.16 + n^2)^2}$ (psf) (see Note 3)

For m > 0.4: $\sigma_H = 1.28 \frac{Q_l}{H} \frac{m^2 n}{(m^2 + n^2)^2}$ (psf)

B) LATERAL PRESSURE DUE TO LINE LOAD
i.e. NARROW CONTINUOUS FOOTING
PARALLEL TO WALL

(NAVFAC DM 7.02, 1986)

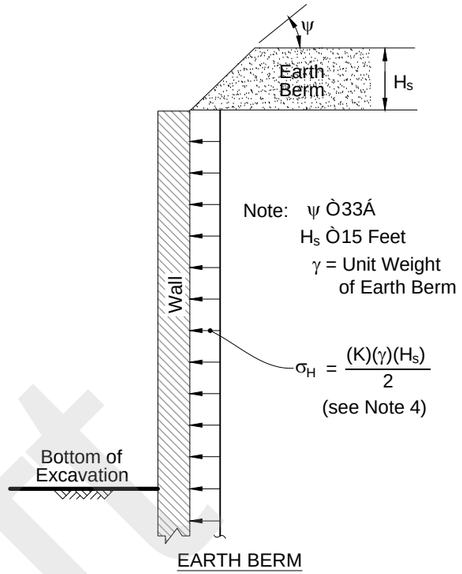


in radians

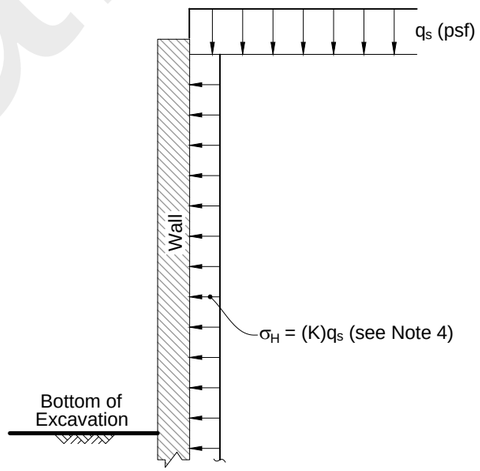
$\sigma_H = \frac{2q}{\pi} (\delta - \sin\delta \cos(\delta + 2\alpha))$ (psf)

C) LATERAL PRESSURE DUE TO STRIP LOAD

(AASHTO LRFD Bridge Design Specifications, 2017)



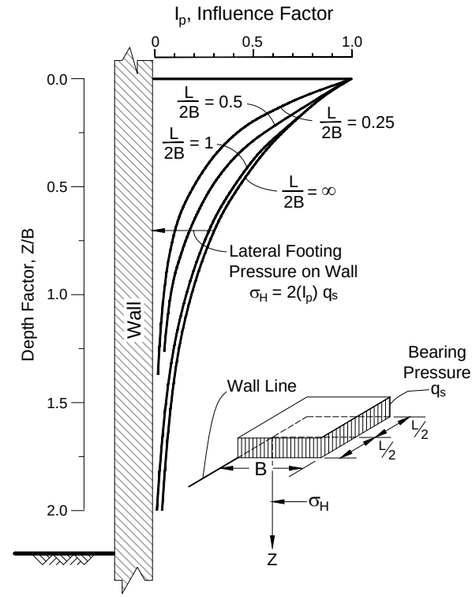
EARTH BERM



UNIFORM SURCHARGE

D) LATERAL PRESSURE DUE TO EARTH BERM
OR UNIFORM SURCHARGE

(derived from Poulos and Davis, *Elastic Solutions for Soil and Rock Mechanics*, 1974; and Terzaghi and Peck, *Soil Mechanics in Engineering Practice*, 1967)



E) LATERAL PRESSURE DUE
TO ADJACENT FOOTING
(see Notes 5 and 6)

(derived from NAVFAC DM 7.02, 1986; and Sandhu, *Earth Pressure on Walls Due to Surcharge*, 1974)

NOTES

1. Figures are not drawn to scale.
2. Applicable surcharge pressures should be added to appropriate permanent wall lateral earth and water pressure.
3. If point or line loads are close to the back of the wall such that m ≤ 0.4, it may be more appropriate to model the actual load distribution (i.e., Detail E) or use more rigorous analysis methods.
4. See text for recommended K values.
5. The stress is estimated on the back of the wall at the center of the length, L, of loading.
6. The estimated stress is based on a Poisson's ratio of 0.5.

S. Cheyenne Canyon Bridge
Colorado Springs, Colorado

RECOMMENDED SURCHARGE LOADING FOR TEMPORARY AND PERMANENT WALLS

May 2023 107347-001

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FIG. 3

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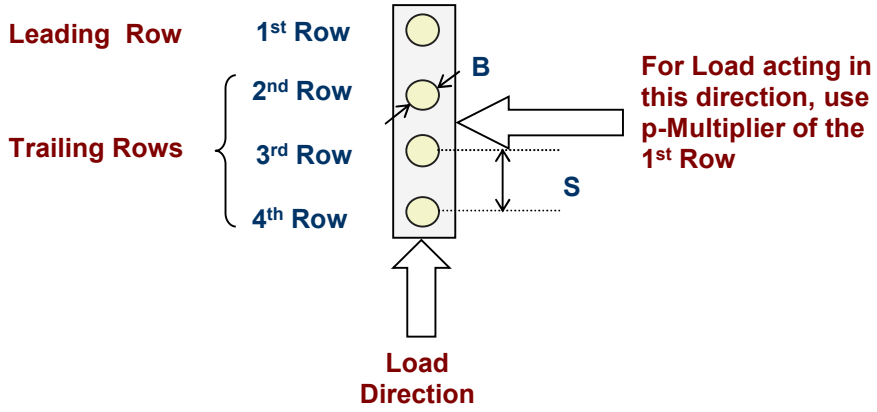
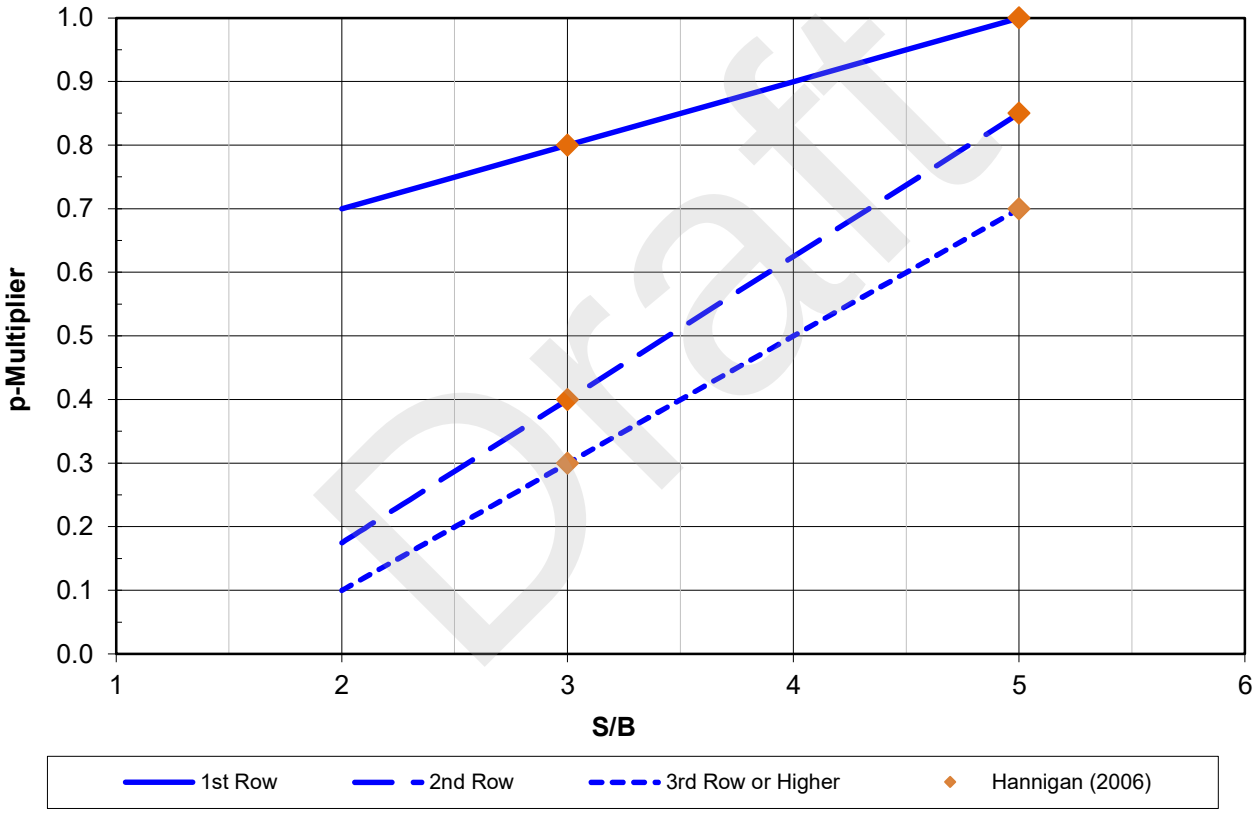
File: J:\Support\library_Standard Figures\Surcharge Loading Temp-Perm Wall_Tabloid.dwg Date: 05-30-2019 Author: sac





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Reference: AASHTO (2020) LRFD Bridge Specifications (from Hannigan et al., 2006)

NOTE:

1. The P-multipliers provided above were developed for vertical piles/shafts only.

S. Cheyenne Canyon Bridge
Colorado Springs, Colorado

RECOMMENDED P-MULTIPLIERS FOR HORIZONTALLY LOADED PILE OR DRILLED SHAFT GROUPS

May 2023 107347-001

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FIG. 4

APPENDIX A: SUBSURFACE EXPLORATIONS

Appendix A

Subsurface Explorations

CONTENTS

Figures

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APPENDIX A: SUBSURFACE EXPLORATIONS

A.1 INTRODUCTION

Shannon & Wilson conducted two field exploration programs: one in December 2021 and the other in April 2023. They consisted of drilling four borings designated SW-01 through SW-04, at the locations shown on Figure 2. The methods used to conduct the field exploration programs are described below.

A.2 EXPLORATIONS

The borings were coordinated (including subcontractor coordination, utility locates, permitting, and traffic control) and observed by Shannon & Wilson. Individual boring logs are presented in Figures A-3 and A-6. The exploration logs represent our interpretation of the contents of the field log and results of select laboratory testing.

The borings were drilled by Vine Laboratories, Inc. of Commerce City, Colorado (under subcontract to Shannon & Wilson) using a CME 75 truck-mounted drill rig. The borings were advanced through the existing asphalt and into the subsurface to depths of approximately 26 to 41.4 feet using asphalt coring, 6-inch outside-diameter (O.D) hollow-stem auger (HSA), and 7-inch outside-diameter (O.D.) ODEX drilling techniques. Hollow-stem auger drilling was suspended after encountering auger refusal in boring SW-02 at a depth of approximately 4 feet, and the driller switched to ODEX drilling in an offset hole. In boring SW-04, refusal occurred at a depth of 36 feet due to clogging of the down-hole hammer with clayey cuttings.

Where groundwater was encountered, our field representative measured the approximate depth to groundwater using an electronic water level indicator. In accordance with El Paso County permitting requirements, borings were backfilled using flow fill mixed onsite to the base of the existing pavement, and asphalt cores were replaced and patched with Utilibond. Cuttings were spread in the vicinity of the boreholes. Upon completion of the borings, we obtained the locations of the borings using a recreational-grade GPS device. Therefore, the locations of the boring locations should be considered accurate to the degree implied by the methods used. Boring elevations were estimated from existing ground surface topographic contours provided by Jacobs.

A.2.1 Soil and Rock Classification System

During drilling, our representative collected samples and prepared field logs of the explorations. Soil classification for this project was based on ASTM International (ASTM) Designation: D2487, Standard Practice for Classification of Soils for Engineering Purposes

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(Unified Soil Classification System), and ASTM Designation: D2488, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure). The Unified Soil Classification System (USCS) is summarized in Figure A-1. The Shannon & Wilson representative classified rock samples in general accordance with the International Society of Rock Mechanics (ISRM) classification method. According to this system, rocks are classified based on the stratigraphic structure, rock strength, degree of weathering, and other properties. The rock classification system is summarized in Figure A-2.

Consistent with other locations in Colorado, the bedrock encountered in the borings was found to be hard when considered as a lithified soil material. However, when compared with other types of bedrock using the ISRM classification of rock strength, the material resembles a very low strength rock. Therefore, for completeness, the boring logs included in Appendix A contain dual descriptions of the bedrock using the Unified Soil Classification System and the ISRM classification system.

A.2.2 Standard Penetration Test (SPT)

Disturbed samples were obtained in general accordance with the Standard Penetration Test (SPT) (ASTM Designation: D1586). The SPT consists of driving a 2-inch outside diameter (O.D.), 1.375-inch inside diameter split-spoon sampler a distance of 18 inches with a 140-pound hammer free-falling a distance of 30 inches. An automatic hammer system was used to advance the samplers. During sampling, the Shannon & Wilson field representative recorded the number of blows for each 6-inch increment of penetration and summed the blow counts for the last two 6-inch increments. This sum is recorded as the penetration resistance number, or N-value. If high penetration resistance prevented driving the total length of the sampler, the Shannon & Wilson field representative recorded the partial penetration depth and blow count. The N-values provide a means for evaluating the relative density or compactness of cohesionless (granular) soils and consistency or stiffness of cohesive (fine-grained) soils (see Figure A-1). The N-values are shown in the individual boring logs. Representative portions of the split-spoon sample obtained in conjunction with the SPT were placed in a screw-top plastic jar and transported to our laboratory in Denver, Colorado.

A.2.3 Modified California (MC) Test and Sampling

Samples were also obtained using a modified California (MC) barrel sampler. The MC test procedure is similar to the SPT, except a larger diameter barrel sampler (2½-inch O.D., lined with 2-inch-diameter brass tubing) is used and only driven 12 inches. During sampling, the Shannon & Wilson field representative recorded the number of blows for each 6-inch increment of penetration. As a result of the larger diameter, the MC sampler yields slightly higher raw blow count numbers when compared to SPT N-values for similar soils.

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However, this is counted by not ignoring a seating depth like is done for the SPTs. Because the difference in blow counts does not significantly impact our evaluation, we used the field MC blow counts over the 12-inch increment to define the relative density and consistency/stiffness of the subsurface materials following SPT terminology. Representative samples were sealed in the brass liner tubes with plastic caps and transported to our laboratory.

A.2.4 Pocket Penetrometer

Select cohesive soil samples were also tested in the field using a pocket penetrometer. The penetrometer estimates the unconfined compressive strength of clay soil samples by penetrating the clay with a one-quarter-inch-diameter penetrometer and measuring the resistance (in units of tons per square foot [tsf]) with a calibrated spring. Measurements can be taken to the nearest 0.25 tsf increment. The field measurements from the pocket penetrometer are included on the boring logs.

A.2.5 Grab Sample

A grab sample was obtained from ODEX drill cuttings in boring SW-04 at 25 feet. This sample was used to verify soil lithology due to no sample recovery of SPT sample S-9 at 25 feet.

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Shannon & Wilson, Inc. (S&W), uses a soil identification system modified from the Unified Soil Classification System (USCS). Elements of the USCS and other definitions are provided on this and the following pages. Soil descriptions are based on visual-manual procedures (ASTM D2488) and laboratory testing procedures (ASTM D2487), if performed.

S&W INORGANIC SOIL CONSTITUENT DEFINITIONS

CONSTITUENT[2]	FINE-GRAINED SOILS (50% or more fines)[1]	COARSE-GRAINED SOILS (less than 50% fines)[1]
Major	***Silt, Lean Clay, Elastic Silt,*** or ***Fat Clay***[3]	***Sand*** or ***Gravel***[4]
Modifying (Secondary) Precedes major constituent	30% or more coarse-grained: ***Sandy*** or ***Gravelly***[4]	More than 12% fine-grained: ***Silty*** or ***Clayey***[3]
Minor Follows major constituent	15% to 30% coarse-grained: ***with Sand*** or ***with Gravel***[4]	5% to 12% fine-grained: ***with Silt*** or ***with Clay***[3]
	30% or more total coarse-grained *and* lesser coarse-grained constituent is 15% or more: ***with Sand*** or ***with Gravel***[5]	15% or more of a second coarse-grained constituent: ***with Sand*** or ***with Gravel***[5]

[1]All percentages are by weight of total specimen passing a 3-inch sieve.
[2]The order of terms is: *Modifying Major with Minor*.
[3]Determined based on behavior.
[4]Determined based on which constituent comprises a larger percentage.
[5]Whichever is the lesser constituent.

MOISTURE CONTENT TERMS

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table

STANDARD PENETRATION TEST (SPT) SPECIFICATIONS

Hammer:	140 pounds with a 30-inch free fall. Rope on 6- to 10-inch-diam. cathead 2-1/4 rope turns, > 100 rpm NOTE: If automatic hammers are used, blow counts shown on boring logs should be adjusted to account for efficiency of hammer.
Sampler:	10 to 30 inches long Shoe I.D. = 1.375 inches Barrel I.D. = 1.5 inches Barrel O.D. = 2 inches
N-Value:	Sum blow counts for second and third 6-inch increments. Refusal: 50 blows for 6 inches or less; 10 blows for 0 inches.

NOTE: Penetration resistances (N-values) shown on boring logs are as recorded in the field and have not been corrected for hammer efficiency, overburden, or other factors.

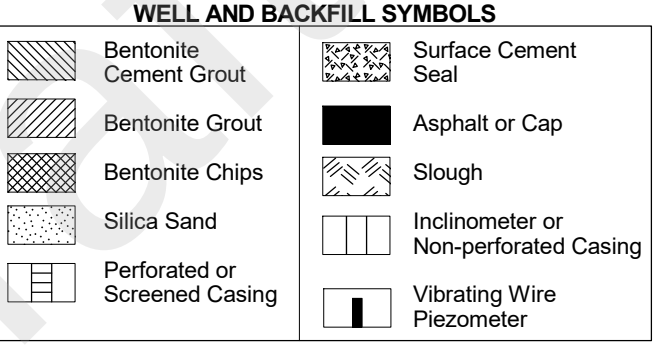
PARTICLE SIZE DEFINITIONS

DESCRIPTION	SIEVE NUMBER AND/OR APPROXIMATE SIZE
FINES	< #200 (0.075 mm = 0.003 in.)
SAND	
Fine	#200 to #40 (0.075 to 0.4 mm; 0.003 to 0.02 in.)
Medium	#40 to #10 (0.4 to 2 mm; 0.02 to 0.08 in.)
Coarse	#10 to #4 (2 to 4.75 mm; 0.08 to 0.187 in.)
GRAVEL	
Fine	#4 to 3/4 in. (4.75 to 19 mm; 0.187 to 0.75 in.)
Coarse	3/4 to 3 in. (19 to 76 mm)
COBBLES	3 to 12 in. (76 to 305 mm)
BOULDERS	> 12 in. (305 mm)

RELATIVE DENSITY / CONSISTENCY

COHESIONLESS SOILS		COHESIVE SOILS	
N, SPT, BLOWS/FT.	RELATIVE DENSITY	N, SPT, BLOWS/FT.	RELATIVE CONSISTENCY
< 4	Very loose	< 2	Very soft
4 - 10	Loose	2 - 4	Soft
10 - 30	Medium dense	4 - 8	Medium stiff
30 - 50	Dense	8 - 15	Stiff
> 50	Very dense	15 - 30	Very stiff
		> 30	Hard

WELL AND BACKFILL SYMBOLS



PERCENTAGES TERMS [1, 2]

Trace	< 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

[1]Gravel, sand, and fines estimated by mass. Other constituents, such as organics, cobbles, and boulders, estimated by volume.

[2]Reprinted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

S. Cheyenne Canyon Bridge
Colorado Springs, Colorado

SOIL DESCRIPTION AND LOG KEY

May 2023 107347-001

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FIG. A-1
Sheet 1 of 3

Draft

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)
(Modified From USACE Tech Memo 3-357, ASTM D2487, and ASTM D2488)

MAJOR DIVISIONS			GROUP/GRAPHIC SYMBOL		TYPICAL IDENTIFICATIONS
COARSE-GRAINED SOILS *(more than 50% retained on No. 200 sieve)*	Gravels *(more than 50% of coarse fraction retained on No. 4 sieve)*	Gravel *(less than 5% fines)*	GW		Well-Graded Gravel; Well-Graded Gravel with Sand
			GP		Poorly Graded Gravel; Poorly Graded Gravel with Sand
		Silty or Clayey Gravel *(more than 12% fines)*	GM		Silty Gravel; Silty Gravel with Sand
			GC		Clayey Gravel; Clayey Gravel with Sand
	Sands *(50% or more of coarse fraction passes the No. 4 sieve)*	Sand *(less than 5% fines)*	SW		Well-Graded Sand; Well-Graded Sand with Gravel
			SP		Poorly Graded Sand; Poorly Graded Sand with Gravel
		Silty or Clayey Sand *(more than 12% fines)*	SM		Silty Sand; Silty Sand with Gravel
			SC		Clayey Sand; Clayey Sand with Gravel
FINE-GRAINED SOILS *(50% or more passes the No. 200 sieve)*	Silts and Clays *(liquid limit less than 50)*	Inorganic	ML		Silt; Silt with Sand or Gravel; Sandy or Gravelly Silt
			CL		Lean Clay; Lean Clay with Sand or Gravel; Sandy or Gravelly Lean Clay
		Organic	OL		Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
	Silts and Clays *(liquid limit 50 or more)*	Inorganic	MH		Elastic Silt; Elastic Silt with Sand or Gravel; Sandy or Gravelly Elastic Silt
			CH		Fat Clay; Fat Clay with Sand or Gravel; Sandy or Gravelly Fat Clay
		Organic	OH		Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
HIGHLY-ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor		PT		Peat or other highly organic soils (see ASTM D4427)

NOTE: No. 4 size = 4.75 mm = 0.187 in.; No. 200 size = 0.075 mm = 0.003 in.

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NOTES

1. Dual symbols *(symbols separated by a hyphen, i.e., SP-SM, Sand with Silt)* are used for soils with between 5% and 12% fines or when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart. Graphics shown on the logs for these soil types are a combination of the two graphic symbols (e.g., SP and SM).

2. Borderline symbols *(symbols separated by a slash, i.e., CL/ML, Lean Clay to Silt; SP-SM/SM, Sand with Silt to Silty Sand)* indicate that the soil properties are close to the defining boundary between two groups.

S. Cheyenne Canyon Bridge
Colorado Springs, Colorado

SOIL DESCRIPTION AND LOG KEY

May 2023 107347-001

SOIL_CLASS_KEY_PG2 107347 CHEYENNE CANYON.GPJ SHAN_WIL.GDT 5/24/23

GRADATION TERMS

Poorly Graded	Narrow range of grain sizes present or, within the range of grain sizes present, one or more sizes are missing (Gap Graded). Meets criteria in ASTM D2487, if tested.
Well-Graded	Full range and even distribution of grain sizes present. Meets criteria in ASTM D2487, if tested.

CEMENTATION TERMS[1]

Weak	Crumbles or breaks with handling or slight finger pressure.
Moderate	Crumbles or breaks with considerable finger pressure.
Strong	Will not crumble or break with finger pressure.

PLASTICITY[2]

DESCRIPTION	VISUAL-MANUAL CRITERIA	APPROX. PLASITICITY INDEX RANGE
Nonplastic	A 1/8-in. thread cannot be rolled at any water content.	< 4
Low	A thread can barely be rolled and a lump cannot be formed when drier than the plastic limit.	4 to 10
Medium	A thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. A lump crumbles when drier than the plastic limit.	10 to 20
High	It takes considerable time rolling and kneading to reach the plastic limit. A thread can be rerolled several times after reaching the plastic limit. A lump can be formed without crumbling when drier than the plastic limit.	> 20

ADDITIONAL TERMS

Mottled	Irregular patches of different colors.
Bioturbated	Soil disturbance or mixing by plants or animals.
Diamict	Nonsorted sediment; sand and gravel in silt and/or clay matrix.
Cuttings	Material brought to surface by drilling.
Slough	Material that caved from sides of borehole.
Sheared	Disturbed texture, mix of strengths.

PARTICLE ANGULARITY AND SHAPE TERMS[1]

Angular	Sharp edges and unpolished planar surfaces.
Subangular	Similar to angular, but with rounded edges.
Subrounded	Nearly planar sides with well-rounded edges.
Rounded	Smoothly curved sides with no edges.
Flat	Width/thickness ratio > 3.
Elongated	Length/width ratio > 3.

ACRONYMS AND ABBREVIATIONS

ATD	At Time of Drilling
Diam.	Diameter
Elev.	Elevation
ft.	Feet
FeO	Iron Oxide
gal.	Gallons
Horiz.	Horizontal
HSA	Hollow Stem Auger
I.D.	Inside Diameter
in.	Inches
lbs.	Pounds
MgO	Magnesium Oxide
mm	Millimeter
MnO	Manganese Oxide
NA	Not Applicable or Not Available
NP	Nonplastic
O.D.	Outside Diameter
OW	Observation Well
pcf	Pounds per Cubic Foot
PID	Photo-Ionization Detector
PMT	Pressuremeter Test
ppm	Parts per Million
psi	Pounds per Square Inch
PVC	Polyvinyl Chloride
rpm	Rotations per Minute
SPT	Standard Penetration Test
USCS	Unified Soil Classification System
q_u	Unconfined Compressive Strength
VWP	Vibrating Wire Piezometer
Vert.	Vertical
WOH	Weight of Hammer
WOR	Weight of Rods
Wt.	Weight

STRUCTURE TERMS[1]

Interbedded	Alternating layers of varying material or color with layers at least 1/4-inch thick; singular: bed.
Laminated	Alternating layers of varying material or color with layers less than 1/4-inch thick; singular: lamination.
Fissured	Breaks along definite planes or fractures with little resistance.
Slickensided	Fracture planes appear polished or glossy; sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps that resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay.
Homogeneous	Same color and appearance throughout.

[1]Reprinted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

[2]Adapted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

S. Cheyenne Canyon Bridge
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SOIL DESCRIPTION AND LOG KEY

May 2023 107347-001

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FIG. A-1
Sheet 3 of 3

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WEATHERING

TERM	DESCRIPTION
Fresh	No visible sign of rock material weathering
Slightly Weathered	Slight discoloration on surface
Moderately Weathered	Discoloring evident; Less than half of the rock material is decomposed
Highly Weathered	Entire rock mass discolored; More than half of the rock material is decomposed
Completely Weathered	Rock reduced to a soil with relict rock texture
Residual Soil	All rock material is converted to soil

STRENGTH

GRADE	DESCRIPTION	APPROX. UCS (psi)
R0	Extremely Weak Rock	36 to 145
R1	Very Weak Rock	145 to 700
R2	Weak Rock	700 to 3,600
R3	Medium Strong Rock	3,600 to 7,200
R4	Strong Rock	7,200 to 14,500
R5	Very Strong Rock	14,500 to 36,250
R6	Extremely Strong Rock	>36,250

JOINT ROUGHNESS COEFFICIENT (JRC)

COEFFICIENT	DESCRIPTION
14 to 20	VERY ROUGH: Near vertical edges evident
10 to 14	ROUGH: Smooth ridges, surface abrasion
6 to 10	SLIGHTLY ROUGH: Asperities on surface can be felt
2 to 6	SMOOTH: Appears and feels smooth
0 to 2	SLICKENSIDED: Visible polishing, striated surface

DISCONTINUITY DATA

SPACING	
DESCRIPTION	SPACING
Extremely Close	< 1 in
Very Close	1 to 2.5 in
Close	2.5 to 8 in
Moderate	8 to 24 in
Wide	24 in to 6 ft
Very Wide	6 to 20 ft
Extremely Wide	> 20 ft

DISCONTINUITY TERMS

FRACTURE - Collective term for any natural break excluding shears, shear zones, and faults

JOINT (JT) - Planar break with little or no displacement

FOLIATION JOINT (FJ) or BEDDING JOINT (BJ) - Joint along foliation or bedding

INCIPIENT JOINT (IJ) or INCIPIENT FRACTURE (IF) - Joint or fracture not evident until wetted and dried; breaks along existing surface

RANDOM FRACTURE (RF) - Natural, very irregular fracture that does not belong to a set

BEDDING PLANE SEPARATION or PARTING - A separation along bedding after extraction from stress relief or slaking

FRACTURE ZONE (FZ) - Planar zone of broken rock without gouge

MECHANICAL BREAK (MB) - Breaks due to drilling or handling; drilling break (DB), hammer break (HB)

SHEAR (SH) - Surface of differential movement evident by presence of slickensides, striations, or polishing

SHEAR ZONE (SZ) - Zone of gouge and rock fragments bounded by planar shear surfaces

FAULT (FT) - Shear zone of significant extent; differentiation from shear zone may be site-specific

APERTURE WIDTH	
TERM	SPACING
Very Tight	<0.1mm
Tight	0.1 to 0.25mm
Partly Open	0.25 to 0.5mm
Open	0.5 to 2.5mm
Moderately Wide	2.5 to 10mm
Wide	10mm to 1cm
Very Wide	1 to 10cm
Extremely Wide	10 to 100cm
Cavernous	>1m

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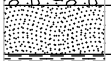
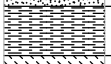
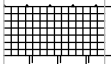
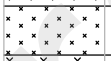
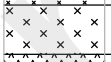
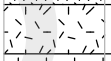
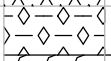
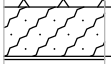
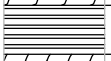
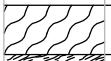
S. Cheyenne Canyon Bridge
Colorado Springs, Colorado

ROCK CLASSIFICATION AND LOG KEY

May 2023 107347-001

ROCK CLASS KEY - P1 (NEW STRENGTHS) 107347 CHEYENNE CANYON.GPJ SHAN_WIL.GDT 5/24/23

ROCK CLASSIFICATION SYMBOLS

BEDROCK TYPE	GRAPHIC SYMBOL	ROCK NAME
Clastic Sedimentary Rocks		Breccia
		Conglomerate
		Sandstone
		Siltstone
		Claystone
		Shale
		Coal
Carbonate Sedimentary Rocks		Limestone
		Dolomite
		Coral
Evaporite Rocks		Gypsum
		Halite
		Calcite
Extrusive Igneous Rocks		Tuff
		Rhyolite
		Dacite
		Andesite
		Basalt
Intrusive Igneous Rocks		Granite
		Grano-diorite
		Diorite
		Gabbro
Metamorphic Rocks		Marble
		Quartzite
		Slate
		Phyllite
		Schist
		Gneiss

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ROCK CLASSIFICATION AND LOG KEY

May 2023 107347-001

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FIG. A-2
Sheet 2 of 2

ROCK CLASS KEY - P2 107347 CHEYENNE CANYON.GPJ SHAN_WIL.GDT 5/24/23

Total Depth:	*31.5 ft.*	Latitude:	*~ 38.78653°*	Drilling Method:	*ODEX*	Hole Diam.:	*7 in.*
Top Elevation:	*~ 6355 ft.*	Longitude:	*~ -104.86917°*	Drilling Company:	*Vine Laboratories*	Rod Type.:	*AWJ*
Vert. Datum:		Station:	~	Drill Rig Equipment:	*CME 75 Truck*	Hammer Type:	*Automatic*
Horiz. Datum:		Offset:	~	Other Comments:			

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.

Depth, ft.	Soil Description
0.3	4 inches of asphalt.
0.5	2-1/2 inches of base course.
	Loose to dense, brown to red-brown, *Well-Graded Sand with Silt and Gravel (SW-SM);* moist to wet. [A-1-b] Terrace Alluvium
12.0	Dense, brown, *Well-Graded Gravel (GW);* wet; subangular gravel; few sand. Terrace Alluvium
14.0	CLAYSTONE: extremely weak, gray; blocky; fresh to moderately weathered; high angle bedding (Pierre Shale). [Hard, *Lean Clay (CL)* to *Fat Clay (CH);* moist; trace sand.]
	-Interbedded, 1-inch thick bentonite layers at 30.5-31.5 feet.
31.5	BOTTOM OF BORING COMPLETED ON 12/17/2021

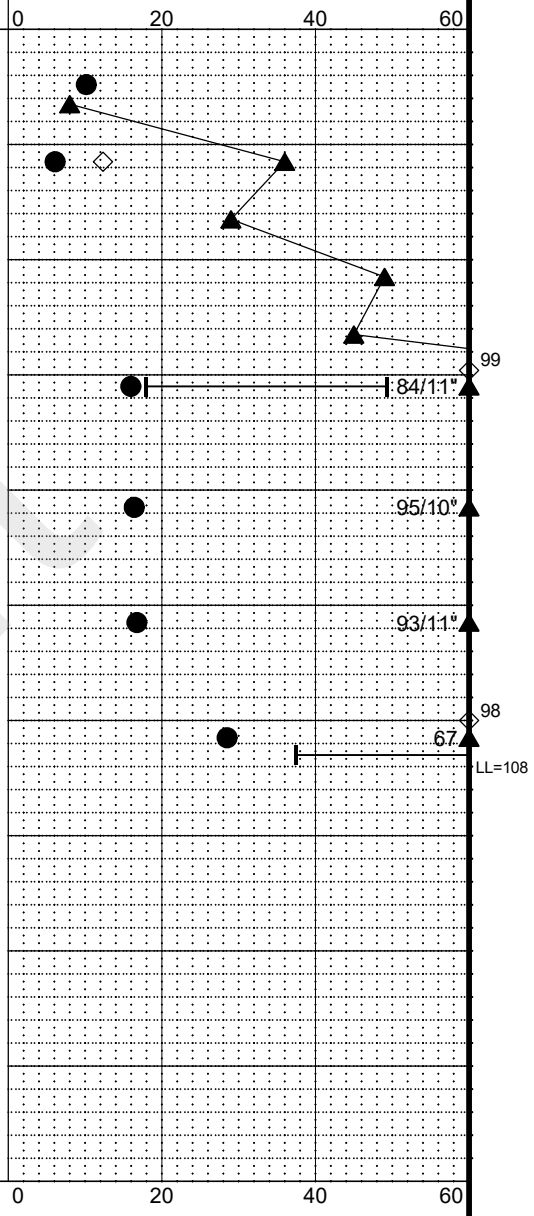
Pocket Pen., tsf: 4 (S-6)

Samples: S-1, S-2, S-3, S-4, S-5, S-6, S-7, S-8, S-9

Ground Water Depth, ft.: During Drilling ▽

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*



LEGEND

* Sample Not Recovered
Standard Penetration Test
Modified California Sampler
▽ Ground Water Level ATD

◇ % Fines (<0.075mm)
● % Water Content
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

NOTES

1. Refer to Figures A-1 and A-2 for explanation of symbols, codes, abbreviations and definitions.
2. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
4. Groundwater level, if indicated above, is for the date specified and may vary.
5. USCS designation is based on visual-manual classification and selected lab testing.
6. Boring latitude and longitude are approximate, and were measured using a handheld GPS device. Boring top elevation is approximate and was not surveyed. Top elevation was estimated using topographic contours in Jacobs file SCCB_SURV_Topo01.dgn, dated 1/28/22.

S. Cheyenne Canyon Bridge
Colorado Springs, Colorado

LOG OF BORING SW-01

May 2023 107347-001

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FIG. A-3

Draft

MASTER LOG E POCKETPEN LAT&LONG 107347 CHEYENNE CANYON.GPJ DENVER 2021.GDT 5/26/23

Total Depth:	*26 ft.*	Latitude:	*~ 38.78639°*	Drilling Method:	*ODEX*	Hole Diam.:	*7 in.*
Top Elevation:	*~ 6356 ft.*	Longitude:	*~ -104.86896°*	Drilling Company:	*Vine Laboratories*	Rod Type.:	*AWJ*
Vert. Datum:		Station:	~	Drill Rig Equipment:	*CME 75 Truck*	Hammer Type:	*Automatic*
Horiz. Datum:		Offset:	~	Other Comments:			

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.

Depth, ft.	Soil Description
0.5	6 inches of asphalt.
0.7	2 inches of base course.
	Very dense, red-brown, *Well-Graded Gravel (GW)* to *Well-Graded Gravel with Sand (GW);* moist to wet. [A-1-a] Terrace Alluvium - Cobbles and boulders inferred from drill action and cuttings. - Auger refusal encountered on cobbles/boulder at 4 feet; offset hole drilled with ODEX methods. Granitic boulder inferred by drill action and cuttings from 2 to 6 feet.
14.0	CLAYSTONE: extremely weak, gray; blocky; moderately weathered to fresh; high angle bedding; occasional calcareous stringers (Peirre Shale). [Hard, *Lean Clay (CL)* to *Fat Clay (CH);* moist; trace sand.]
26.0	BOTTOM OF BORING COMPLETED ON 12/17/2021

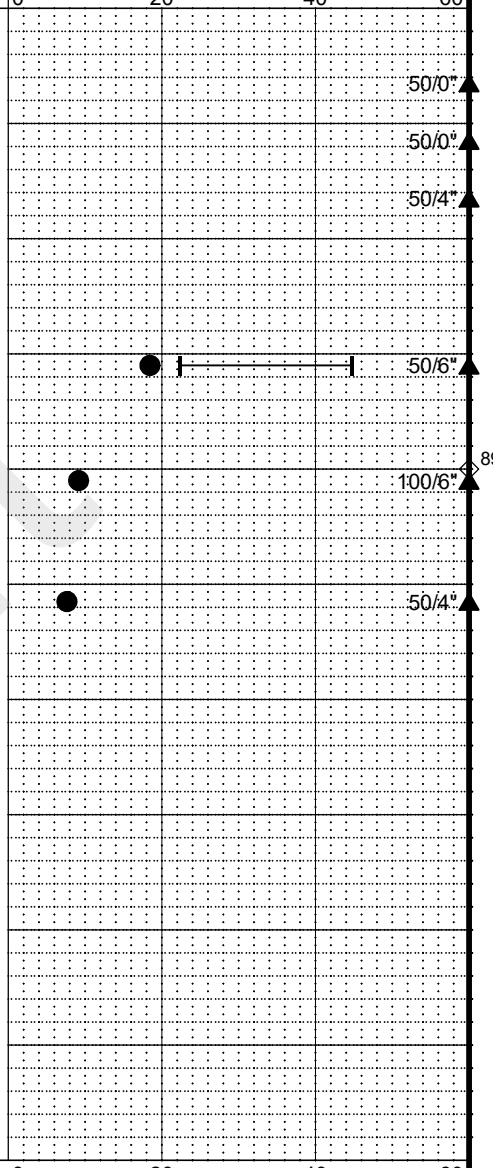
Pocket Pen., tsf: 3.75

Samples: S-1, S-2, S-3, S-4, S-5, S-6

Ground Water Depth, ft.: During Drilling

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*



LEGEND

* Sample Not Recovered

Standard Penetration Test

Modified California Sampler

Ground Water Level ATD

◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit ⊢●⊣ Liquid Limit

Natural Water Content

NOTES

1. Refer to Figures A-1 and A-2 for explanation of symbols, codes, abbreviations and definitions.
2. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
4. Groundwater level, if indicated above, is for the date specified and may vary.
5. USCS designation is based on visual-manual classification and selected lab testing.
6. Boring latitude and longitude are approximate, and were measured using a handheld GPS device. Boring top elevation is approximate and was not surveyed. Top elevation was estimated using topographic contours in Jacobs file SCCB_SURV_Topo01.dgn, dated 1/28/22.

S. Cheyenne Canyon Bridge
Colorado Springs, Colorado

LOG OF BORING SW-02

May 2023 107347-001

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FIG. A-4

Draft

MASTER LOG E POCKETPEN LAT&LONG 107347 CHEYENNE CANYON.GPJ DENVER 2021.GDT 5/26/23

Total Depth:	*41.4 ft.*	Latitude:	*~ 38.78623°*	Drilling Method:	*ODEX*	Hole Diam.:	*7 in.*
Top Elevation:	*~ 6356 ft.*	Longitude:	*~ -104.86926°*	Drilling Company:	*Vine Laboratories*	Rod Type.:	*AWJ*
Vert. Datum:		Station:	~	Drill Rig Equipment:	*CME 75 Truck*	Hammer Type:	*Automatic*
Horiz. Datum:		Offset:	~	Other Comments:			

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.

4 inches of asphalt. (0.3)

4 inches of base course. (0.6)

Loose to medium dense, red-brown to dark brown, *Well-Graded Sand with Silt and Gravel (SW-SM)* to *Silty Sand with Gravel (SM);* moist to wet. [A-1-b]
Terrace Alluvium

Very dense, red-brown to brown, *Poorly Graded Gravel (GP)* to *Silty Gravel with Sand (GM);* wet. (12.0)
Terrace Alluvium

CLAYSTONE: extremely weak to weak, light gray; massive; fresh to moderately weathered (Pierre Shale). (17.5)
[Hard, *Fat Clay (CH);* moist; trace sand.]

DISTURBED SHALE FAULT ZONE: Extremely weak to weak, dark gray; fresh to moderately weathered. (33.0)
[Hard, *Fat Clay (CH);* moist, interbedded with layers of fine to coarse grained sand.] (36.0)

SHALE: very weak to weak, dark gray to brown; fresh to moderately weathered (Pierre Shale). (41.4)
[Hard, *Fat Clay (CH);* moist; few sand.]

BOTTOM OF BORING
COMPLETED ON 04/10/2023

Depth, ft. | Symbol | Pocket Pen., tsf | Samples | Ground Water | Depth, ft.

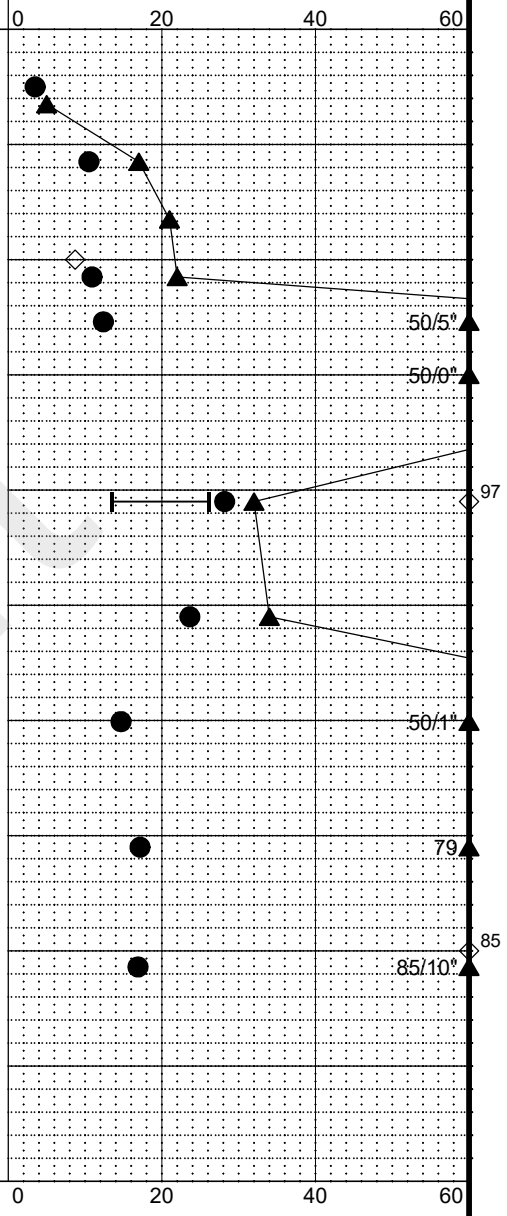
Samples: S-1, S-2, S-3, S-4, S-5, S-6, S-7, S-8, S-9, S-10, S-11

Pocket Pen., tsf: 4.25 (S-8)

Ground Water: During Drilling ▽

PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*



LEGEND

* Sample Not Recovered
Standard Penetration Test
Modified California Sampler
▽ Ground Water Level ATD

◇ % Fines (<0.075mm)
● % Water Content
Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

NOTES

1. Refer to Figures A-1 and A-2 for explanation of symbols, codes, abbreviations and definitions.
2. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
4. Groundwater level, if indicated above, is for the date specified and may vary.
5. USCS designation is based on visual-manual classification and selected lab testing.
6. Boring latitude and longitude are approximate, and were measured using a handheld GPS device. Boring top elevation is approximate and was not surveyed. Top elevation was estimated using topographic contours in Jacobs file SCCB_SURV_Topo01.dgn, dated 1/28/22.

S. Cheyenne Canyon Bridge
Colorado Springs, Colorado

LOG OF BORING SW-03

May 2023 | 107347-001

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FIG. A-5

Draft

MASTER LOG E POCKETPEN LAT&LONG 107347 CHEYENNE CANYON.GPJ DENVER 2021.GDT 5/26/23

Total Depth:	36.5 ft.	Latitude:	~ 38.7864°	Drilling Method:	ODEX	Hole Diam.:	7 in.
Top Elevation:	~ 6359 ft.	Longitude:	~ -104.86917°	Drilling Company:	Vine Laboratories	Rod Type.:	AWJ
Vert. Datum:		Station:	~	Drill Rig Equipment:	CME 75 Truck	Hammer Type:	Automatic
Horiz. Datum:		Offset:	~	Other Comments:			

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between material types, and the transition may be gradual.

Depth, ft.	Soil Description
0.4	4-1/2 inches of asphalt.
0.9	6 inches of base course.
	Medium dense, light red, *Well-Graded Sand with Silt and Gravel (SW-SM);* moist. [A-1-b] Terrace Alluvium - Cobbles and boulders inferred from drill action and cuttings.
6.5	Dense to very dense, gray-brown to red-brown, *Well-Graded Gravel with Silt and Sand (GW-GM)* to *Well-Graded Gravel with Sand, Cobbles and Boulders (GW);* moist to wet; occasional 2-inch thick clayey sand layers. Terrace Alluvium - Cobbles and boulders inferred from drill action and cuttings.
18.0	Very dense, yellow-brown to olive-gray, *Clayey Gravel with Sand (GC)* to *Poorly Graded Gravel with Clay and Sand (GP-GC);* wet; iron oxide staining. Terrace Alluvium - Cobbles and boulders inferred from drill action and cuttings.
35.5	CLAYSTONE: extremely weak to weak, blue-gray to gray, blocky to laminated; slightly weathered; high angle bedding; iron oxide staining (Pierre Shale). [Hard, *Fat Clay (CH);* moist; few sand.] - Odex refusal at 36 feet due to clayey cuttings clogging down-hole hammer.
36.5	BOTTOM OF BORING COMPLETED ON 04/24/2023

Samples: G-1, S-1, S-2, S-3, S-4, S-5, S-6, S-7, S-8, G-9, S-10, S-11

Ground Water: During Drilling

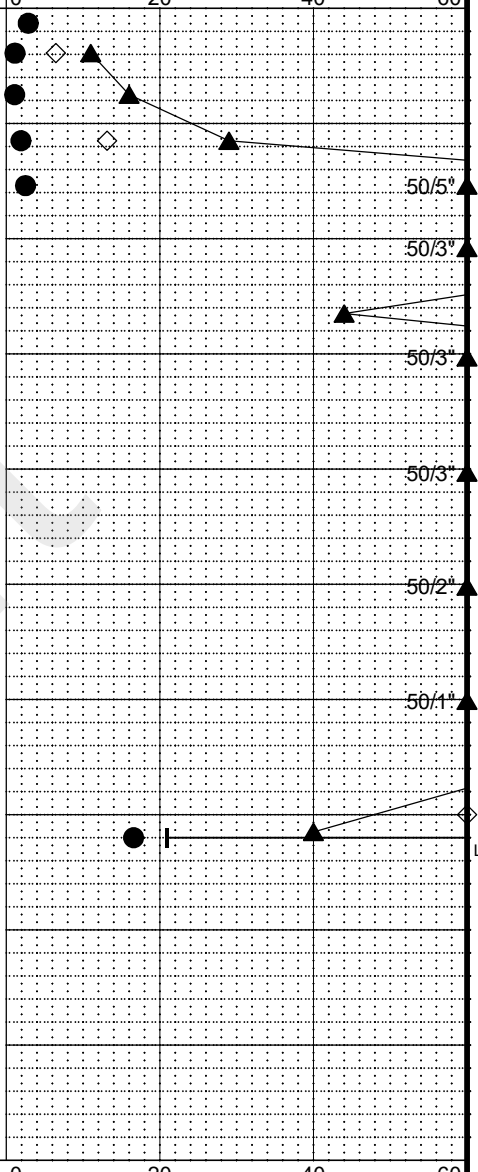
PENETRATION RESISTANCE (blows/foot)

▲ Hammer Wt. & Drop: 140 lbs / 30 inches

50/5", 50/3", 50/3", 50/3", 50/2", 50/1"

88

LL=61



LEGEND

* Sample Not Recovered
G Grab Sample
Standard Penetration Test
Ground Water Level ATD

◇ % Fines (<0.075mm)
● % Water Content
Plastic Limit — Liquid Limit
Natural Water Content

NOTES

1. Refer to Figures A-1 and A-2 for explanation of symbols, codes, abbreviations and definitions.
2. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
3. The discussion in the text of this report is necessary for a proper understanding of the nature of the subsurface materials.
4. Groundwater level, if indicated above, is for the date specified and may vary.
5. USCS designation is based on visual-manual classification and selected lab testing.
6. Boring latitude and longitude are approximate, and were measured using a handheld GPS device. Boring top elevation is approximate and was not surveyed. Top elevation was estimated using topographic contours in Jacobs file SCCB_SURV_Topo01.dgn, dated 1/28/22.

S. Cheyenne Canyon Bridge
Colorado Springs, Colorado

LOG OF BORING SW-04

May 2023 107347-001

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FIG. A-6

Draft

MASTER LOG E POCKETPEN LAT&LONG 107347 CHEYENNE CANYON.GPJ DENVER 2021.GDT 5/26/23

APPENDIX B: LABORATORY TEST RESULTS

Appendix B

Laboratory Test Results

CONTENTS

Tables

Figures

Draft

APPENDIX B: LABORATORY TEST RESULTS

B.1 INTRODUCTION

Laboratory tests were completed on soil samples retrieved from the borings in general accordance with the American Association of State Highway and Transportation Officials (AASHTO), American Society of Testing and Materials International (ASTM), and Colorado Department of Transportation (CDOT) Colorado Procedure - Laboratory (CP-L) testing methods. The laboratory testing program was performed to classify the materials into similar geologic groups and provide data that can be used for design of the project. The geotechnical laboratory testing was performed at our laboratory in Denver, Colorado. A summary of the laboratory test results is presented in Table B-1. The following sections describe the laboratory testing procedures.

B.2 GEOTECHNICAL INDEX TESTS

B.2.1 Water Content

Water content was determined for selected samples in general accordance with AASHTO T265, Laboratory Determination of Moisture Content in Soils. To perform this test, a sample was weighed before and after oven-drying, and the water content was calculated. Water content determinations are shown graphically on the boring logs presented in Appendix A and are also summarized in Table B-1.

B.2.2 Grain Size Analysis

The grain size distribution of selected samples was determined in general accordance with AASHTO T311, Standard Method of Test for Grain-Size Analysis of Granular Soil Materials. Results of these analyses are presented as grain size distribution curves by boring number series on Figure B-1 and summarized in Table B-1. Selected samples were also tested for the percentage of material passing the No. 200 sieve in general accordance with AASHTO T11, Standard Method of Test for Materials Finer than 75-µm (No. 200) Sieve in Mineral Aggregates by Washing. The percent fines (silt- and clay-sized particles passing the No. 200 sieve) are shown graphically on the boring logs in Appendix A and are also summarized in Table B-1.

B.2.3 Atterberg Limits

Soil plasticity was determined by performing Atterberg limits tests on selected fine-grained samples. The tests were completed in general accordance with AASHTO T89, Standard Method of Test for Determining the Liquid Limit of Soils and AASHTO T90, Standard

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Method of Test for Determining the Plastic Limit and Plasticity Index of Soils. The Atterberg limits include liquid limit (LL), plastic limit (PL), and plasticity index (PI equals LL minus PL) and are generally used to assist in classification of soils, to indicate soil consistency (when compared to natural water content), and to provide correlation to soil properties. The results of the Atterberg limits tests are plotted on a plasticity chart in Figure B-2, shown graphically on the boring logs in Appendix A, and summarized in Table B-1.

B.3 GEOTECHNICAL ENGINEERING PROPERTY TESTS

B.3.1 Corrosion

Corrosion testing of a sample was performed for pH, resistivity, sulfate content, and chloride content. Testing for pH was done in accordance with AASHTO T289, Standard Method of Test for Determining pH of Soil for Use in Corrosion Testing. Testing for resistivity was done in accordance with ASTM G 57, Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method. Sulfate and chloride content testing were done in accordance with CP-L 2103, Sulfate Ion Content in Soil and CP-L 2014, Determining the Chloride Ion Content in Water or Water-Soluble Chloride Ion Content in Soil, respectively. Test results for sulfate and chloride content are given in units of percent by weight. The test results are summarized in Table B-1.

B.3.2 One-Dimensional Swell/Collapse Tests

The one-dimensional swell/ collapse test was completed in general accordance with Method B of ASTM D 4546, Standard Test Methods for One-Dimensional Swell or Collapse of Soils. The relatively undisturbed drive sample was obtained from a modified California sampler lined with a thin-walled bass tube. The sample was then loaded at field moisture conditions in a fixed-ring consolidometer that measures vertical changes in volume for different loading conditions. During loading, the sample's pore pressures are allowed to drain from both the top and bottom of the sample. At a specified pressure, the sample is inundated with distilled water and then allowed to reach equilibrium. The vertical volume change caused from the water inundation was then measured and expressed in percent strain. The swell/collapse test report is provided as Figure B-3 summarized in Table B-1.

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Table B-1 - Summary of Laboratory Test Results by Boring

SAMPLE DATA						Natural Moisture Content	Moist Unit Weight	GRAIN SIZE ANALYSIS[2]			ATTERBERG LIMITS			CORROSION				SWELL TEST	
		Depth (feet)		USCS	AASHTO			Gravel	Sand	Fines	Liquid	Plastic	Plasticity	pH	Resistivity	Sulfates	Chlorides	Swell (+) Collapse (-)	Inundation Pressure
Boring	Sample	Top	Bottom	Symbol[1]	Classification	(%)	(pcf)	(%)	(%)	(%)	Limit	Limit	Index		(ohm-cm)	(%)	(%)	(%)	(psf)
	S-1	2.5	4.0			10.2													
	S-2	5.0	6.5	SW-SM	A-1-b	6.1		32	56	12									
	S-3	7.5	9.0											8.1	10,350	0.02	0.004		
SW-01	S-6	15.0	16.0	CL		16.0				100	49	18	31						
	S-7	20.0	21.5			16.4								7.6	570	0.18	0.011		
	S-8	25.0	26.5			16.7													
	S-9	30.0	31.5	CH		28.5				98	108[3]	37	71						
	S-4	15.0	16.0	CL		18.4					45	22	23						
SW-02	S-5	20.0	21.0	CH		9.2	121.5			89								-0.3	500
	S-6	25.0	26.5			7.6													
	S-1	2.5	4.0			3.5													
	S-2	5.0	6.5			10.5													
	S-4	10.0	11.5	SW-SM		10.9		33	58	9									
	S-3	12.5	12.9			12.4													
SW-03	S-7	20.0	21.0	CL		28.2				97	26	13	13						
	S-8	25.0	26.0			23.6													
	S-9	30.0	30.1			14.7													
	S-10	35.0	36.0			17.2								8.2	500	0.13	0.028		
	S-11	40.0	41.4	CL		16.9				85									
	G-1	0.4	0.9			2.9													
	S-1	1.2	2.7	SW-SM		1.1		35	58	7									
SW-04	S-2	3.0	4.5			1.1													
	S-3	5.0	6.5	SW-SM		1.9		29	58	13									
	S-4	7.5	7.9			2.5													
	S-11B	35.5	36.5	CH		16.6				88	61	21	40						

NOTES:

1 Refer to Appendix A, Figure A-1 for definitions.

2 Gravel defined as particles larger than the No. 4 sieve size, Sand as particles between the No. 4 and No. 200 sieve sizes, and Fines as particles passing the No. 200 sieve.

NP = non plastic; NV = no value; ohm-cm = ohm centimeters; psf = pounds per square foot; pcf = pounds per cubic foot

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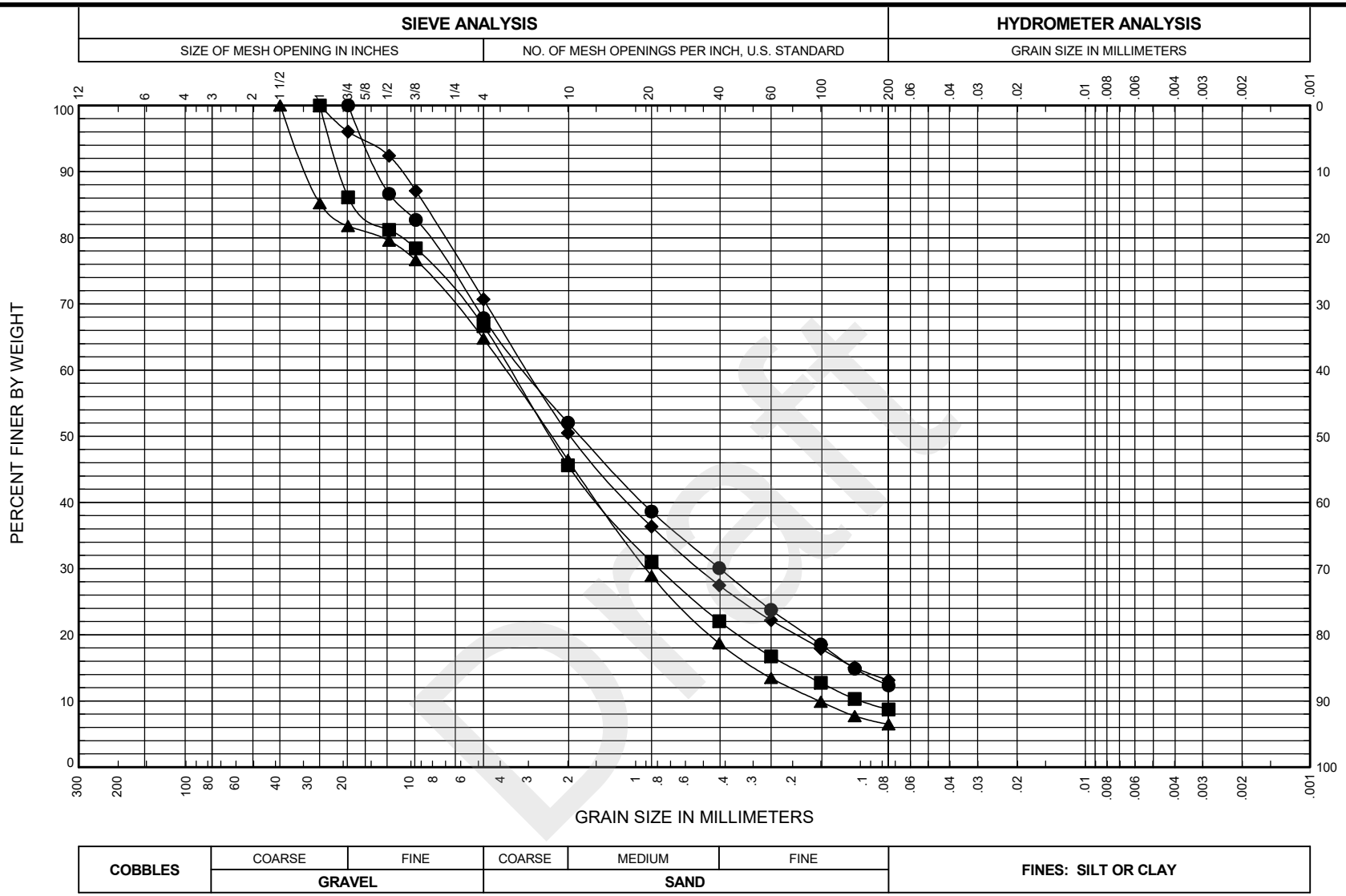

SAMPLE ID	DEPTH (feet)	U.S.C.S. SYMBOL	SAMPLE DESCRIPTION	FINES %	NAT. W.C. %	LL %	PL %	PI %
● SW-01, S-2	5.0	SW-SM	Well-Graded Sand with Silt and Gravel	12.3	6.1			
■ SW-03, S-4	10.0	SW-SM	Well-Graded Sand with Silt and Gravel	8.7	10.9			
▲ SW-04, S-1	1.2	SW-SM	Well-Graded Sand with Silt and Gravel	6.5	1.1			
◆ SW-04, S-3	5.0	SW-SM	Well-Graded Sand with Silt and Gravel	13.1	1.9			

S. Cheyenne Canyon Bridge
Colorado Springs, Colorado

GRAIN SIZE DISTRIBUTION

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FIG. B-1

FIG. B-1

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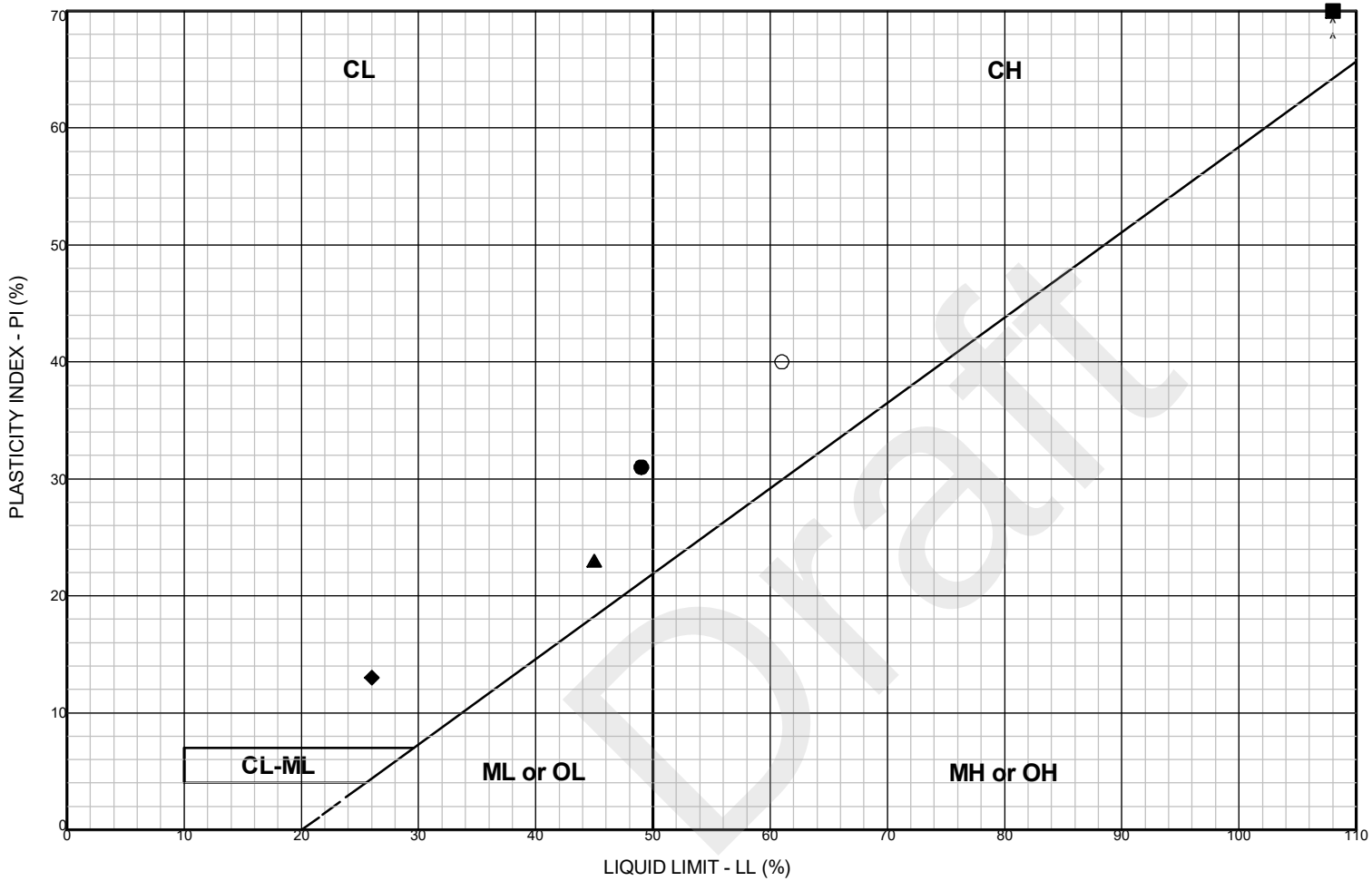

LEGEND

CL: Low plasticity inorganic clays; sandy and silty clays

CH: High plasticity inorganic clays

ML or OL: Inorganic and organic silts and clayey silts of low plasticity

MH or OH: Inorganic and organic silts and clayey silts of high plasticity

CL-ML: Silty clays and clayey silts

SAMPLE ID	DEPTH (feet)	U.S.C.S. SYMBOL	SOIL CLASSIFICATION	LL %	PL %	PI %	NAT. W.C. %	PASS. #200, %
● SW-01, S-6	15.0	CL	CLAYSTONE [Lean Clay; trace sand]	49	18	31	16.0	99.5
■ SW-01, S-9	30.0	CH	CLAYSTONE [Fat Clay; trace sand]	108	37	71	28.5	98.2
▲ SW-02, S-4	15.0	CL	CLAYSTONE [Lean Clay]	45	22	23	18.4	
◆ SW-03, S-7	20.0	CL	CLAYSTONE [Lean Clay, trace sand]	26	13	13	28.2	97.0
○ SW-04, S-11B	35.5	CH	CLAYSTONE [Fat Clay, few sand]	61	21	40	16.6	87.5

S. Cheyenne Canyon Bridge
Colorado Springs, Colorado

PLASTICITY CHART

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FIG. B-2

FIG. B-2

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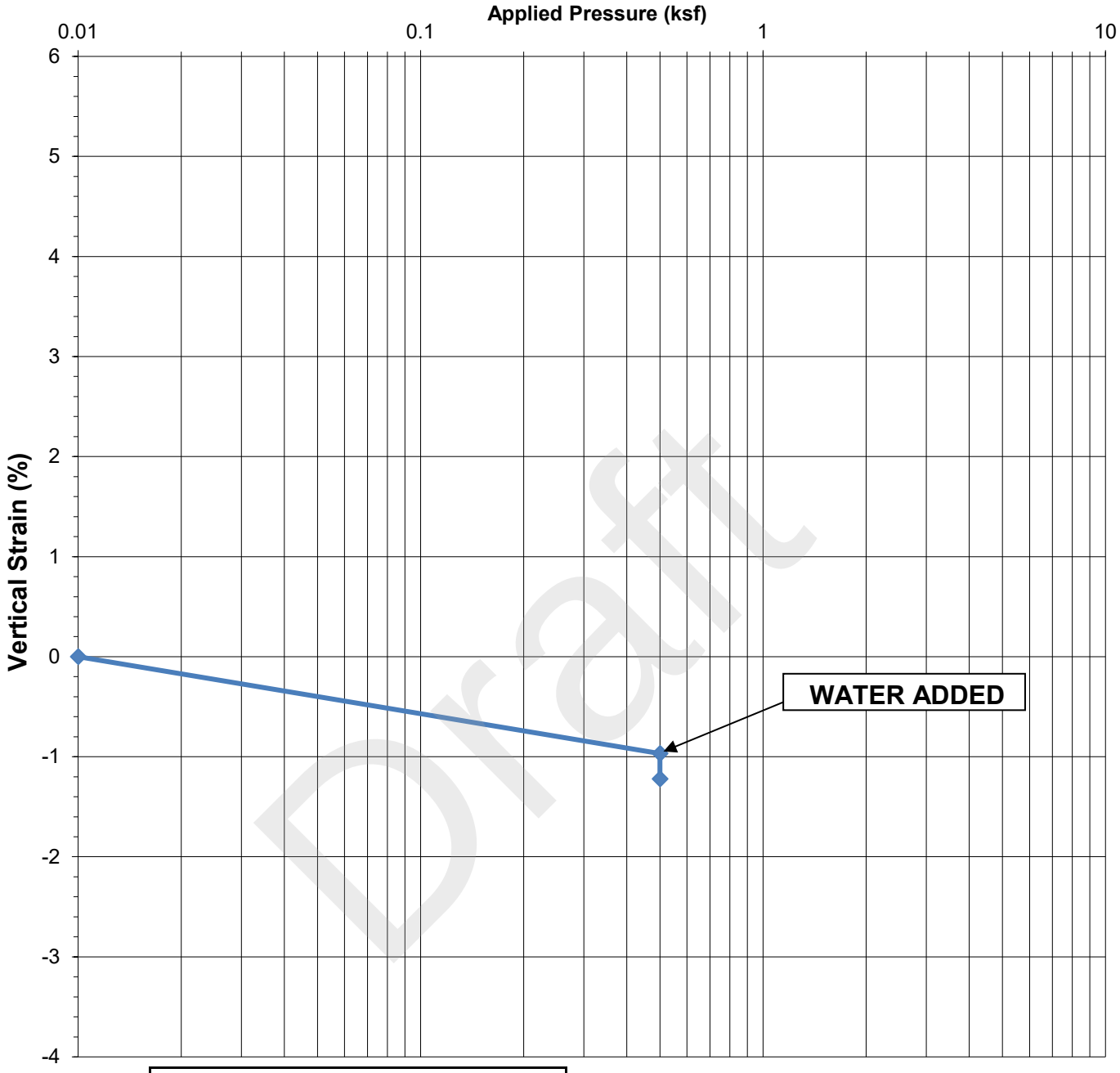
ATT. MAIN 107347 CHEYENNE CANYON.GPJ 5/26/23

SWELL/COLLAPSE TEST REPORT
Boring SW-02 Sample S-5, 20 to 21 ft



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Swell Pressure =	-	psf
Swell =	-0.3	%
Inundation Pressure =	500	psf
Initial Moisture Content =	8.3	%
Final Moisture Content =	15.6	%
Moist Unit Weight =	121.5	pcf

NOTES:

1. The swell pressure is the applied pressure required to compress the sample to its height immediately prior to inundation.
2. Testing was done in general accordance with Method B (an intact specimen obtained from a natural deposit) of ASTM D 4546, Standard Test Methods for One-Dimensional Swell or Collapse of Soils.

S Cheyenne Canyon Bridge
Colorado Springs, CO

SWELL/COLLAPSE TEST REPORT
BORING SW-02, SAMPLE S-5

May 2023 107347-001

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FIG. B-3

IMPORTANT INFORMATION

Important Information

About Your Geotechnical Report

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IMPORTANT INFORMATION

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors that were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining

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IMPORTANT INFORMATION

your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims

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IMPORTANT INFORMATION

being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports, and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland

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Appendix E. Variance Request Memorandum

5555 Tech Center Dr., Suite 212
Colorado Springs, CO 80919
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www.jacobs.com

June 2023

Ms. Erin Powers, PE

Stormwater Enterprise
30 S. Nevada Ave, Suite 401
Colorado Springs, CO 80903

Subject: South Cheyenne Cañon Bridge Replacement Project Variance Request

Dear Ms. Powers,

This letter requests a variance from the City of Colorado Springs Design Criteria Manual (DCM) to accommodate the design and construction of the bridge replacements for the South Cheyenne Cañon Bridge Replacement Project. This project was scoped knowing that a variance in freeboard would likely be required due to the constraints of the existing conditions. The variance being requested herein is for Minimum Freeboard (Chapter 11, Section 3.3). The project is replacing the bridge at South Cheyenne Canyon Road and Mesa Avenue in the North Cheyenne Cañon Park.

The project lies within a very steep, mountainous terrain where improvements are limited without significant channel improvements and larger disturbance limits. Difficulties in excavation will make changing the profile of the channel difficult. The proposed bridge is significantly larger than the existing structures and will be able to convey the 100-year flood event without overtopping whereas the existing bridge will only convey the 25-year event before overtopping.

Improvements proposed will increase the hydraulic opening and provide large diameter riprap rock in disturbed channel areas. Refer to the Final Drainage Report for calculations for riprap and the HEC-RAS analysis for both existing and proposed conditions.

<u>Requested Variance – Minimum Freeboard (Chapter 11, Section 3.3)</u>

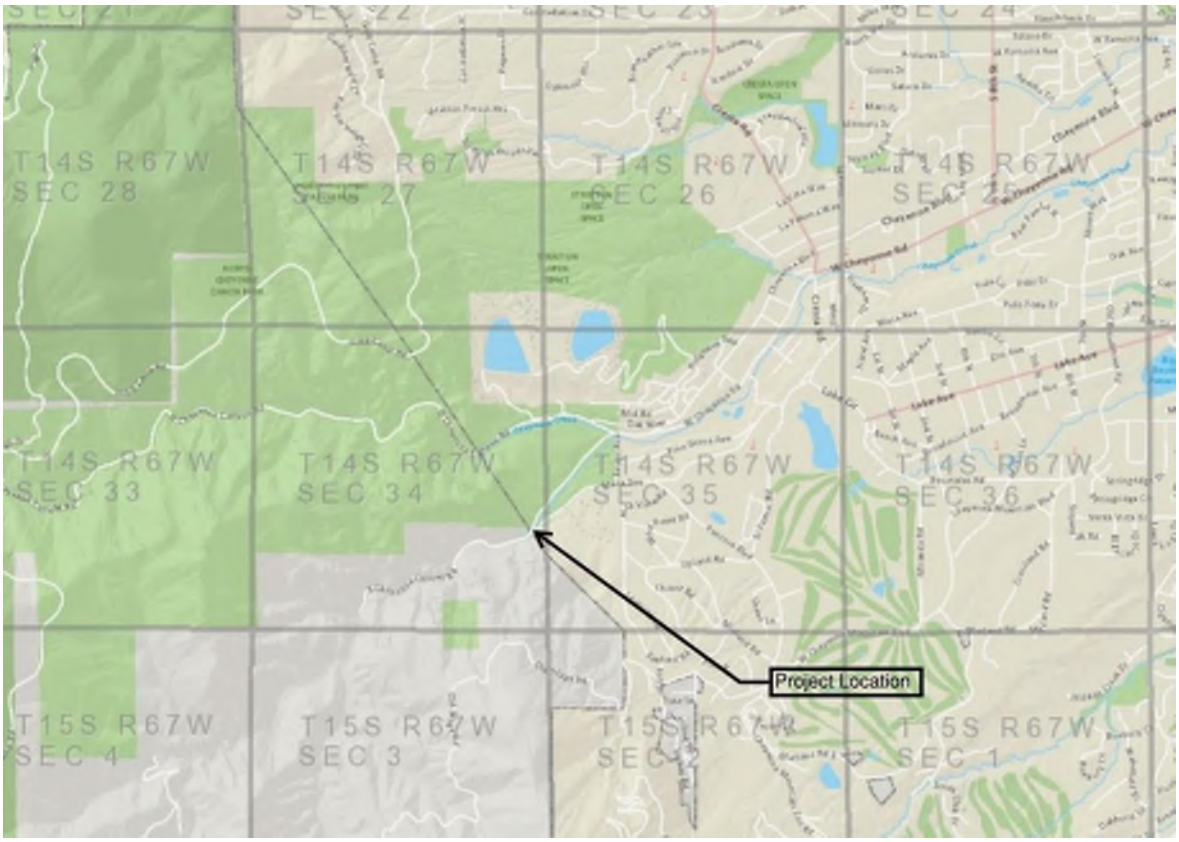
> A HEC-RAS (USACE) analysis was completed for the existing condition and the proposed improvements. The analysis determined that the proposed bridge does not meet minimum freeboard requirements. It should be noted that the headwall and bridge railing have been designed to handle flow against it should debris accumulate and reduce the hydraulic capacity. The bridge will have scour mitigations installed and the bridge will sit on drilled caissons to bedrock. Proposed riprap will resist abutment scour The velocities through the bridge are similar to existing and the channel appears to be in stable condition due the large presence of existing boulders and rock in the channel. Excavation difficulties could also hinder changing the slope of the channel. Geometric constraints of the canyon also limit the width of the opening that can be used.
>
> The proposed bridge freeboard is 0.5’

This deviation from the Colorado Springs DCM will not adversely affect water quality and peak flows discharging to Fountain Creek nor will it adversely affect adjacent or downstream properties. I have attached a vicinity map at the bottom of this page for reference.

Subject: South Cheyenne Cañon Bridge Replacement Project Variance Request

Regards,

Troy Slocum, PE, CFM
Jacobs Engineering Group, Inc.



Vicinity Map

Appendix F. 90% Construction Plans

SOUTH CHEYENNE CANYON BRIDGE IMPROVEMENTS PROJECT CITY OF COLORADO SPRINGS

CITY ENGINEERING BRIDGE MAINTENANCE

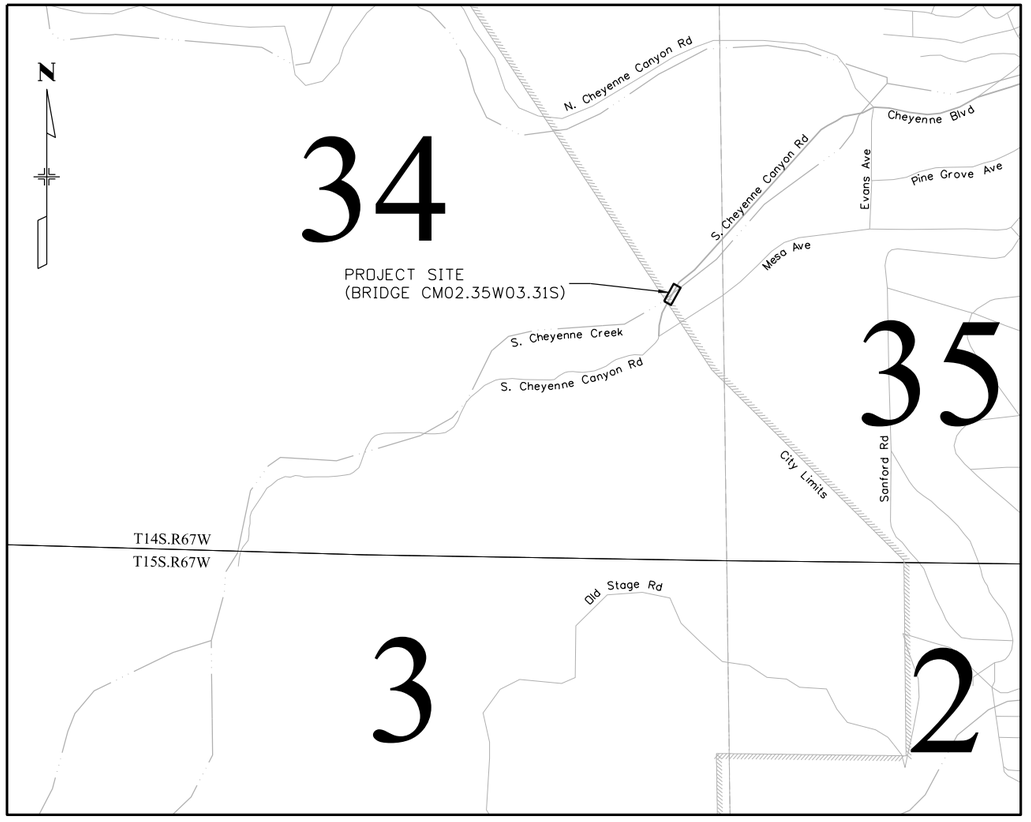
CONTRACT R010069

TASK ORDER 2021-005

90% DESIGN REVIEW JUNE 2023

APPROVED BY

CITY OF COLORADO SPRINGS ENGINEERING DIVISION	DATE
CITY OF COLORADO SPRINGS STORMWATER ENTERPRISE	DATE
CITY OF COLORADO SPRINGS PARKS AND RECREATION DEPARTMENT	DATE
CITY OF COLORADO SPRINGS UTILITIES WATER RESOURCES - WATER	DATE
CITY OF COLORADO SPRINGS UTILITIES ELECTRIC DEPARTMENT	DATE
CITY OF COLORADO SPRINGS OPERATIONS AND MAINTENANCE	DATE



SHEET NO.	INDEX OF SHEETS
1	TITLE SHEET
2	STANDARD PLANS
3	ABBREVIATIONS AND SYMBOLS
4-6	GENERAL NOTES
7	TYPICAL SECTIONS
8	SUMMARY OF APPROXIMATE QUANTITIES
9	SURVEY CONTROL DIAGRAM
10	PROJECT KEY PLAN
11	GEOMETRY CONTROL PLAN
12	REMOVAL PLAN
13	ROADWAY PLAN
14	ROADWY PROFILE
15	ROADWAY DETAIL
16	CHANNEL GRADING PLAN
17	CHANNEL DETAILS
18	BRIDGE HYDRAULIC PLANS
19	BRIDGE HYDRAULIC DETAILS
20	ROADWAY SIGNING AND STRIPING PLAN
21-39	BRIDGE SHEETS
40-46	PEDESTRIAN BRIDGE SHEETS
47	SUE SHEET

AS CONSTRUCTED INFORMATION

CONTRACTOR: _____

PROJECT ENGINEER: _____

PROJECT STARTED: _____

PROJECT COMPLETED: _____

AS CONSTRUCTED PLANS: _____

APPROVED: _____

TITLE: _____

DATE: _____

90% DESIGN - NOT FOR CONSTRUCTION

JMERRICK 5:17:57 PM pw:\\jacobs-us-va-pw.bentley.com:jacobs-us-va-pw-02\Documents\WXX26205 - S Cheyenne Canyon Bridge\4 Delivery\Project_WIP\Roadway\Drawings\000.00_SCC-GN-TITLE-01.dgn

Print Date: 6/15/2023		Sheet Revisions			As Constructed	SOUTH CHEYENNE CANYON BRIDGE TITLE SHEET	Project No./Code
File Name: 000.00_SCC-GN-TITLE-01.dgn		Date:	Comments	Init.	No Revisions:		XXXXXXXXX
Horiz. Scale: 1:1056	Vert. Scale: As Noted				Revised:	Designer: / Detailer:	Structure Numbers: XXXXX
Unit Information	Unit Leader Initials				Void:	Sheet Subset:ROADWAY	Subset Sheets: RD01 of 15
Jacobs							Sheet Number 1

PLAN NUMBER	M STANDARD TITLE	PAGE NUMBER
☐ M-100-1	STANDARD SYMBOLS (3 SHEETS)	1-3
■ M-100-2	ACRONYMS AND ABBREVIATIONS (4 SHEETS)	4-7
☐ M-203-1	APPROACH ROADS	8
☐ M-203-2	DITCH TYPES	9
☐ M-203-11	SUPERELEVATION CROWNED AND DIVIDED HIGHWAYS (3 SHEETS)	10-12
☐ M-203-12	SUPERELEVATION STREETS (2 SHEETS)	13-14
☐ M-206-1	EXCAVATION AND BACKFILL FOR STRUCTURES (2 SHEETS)	15-16
■ M-206-2	EXCAVATION AND BACKFILL FOR BRIDGES (2 SHEETS)	17-18
■ M-208-1	TEMPORARY EROSION CONTROL (11 SHEETS)	19-29
☐ M-210-1	MAILBOX SUPPORTS (2 SHEETS)	30-31
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☐ M-216-1	SOIL RETENTION COVERING (2 SHEETS)	33-34
☐ M-412-1	CONCRETE PAVEMENT JOINTS (9 SHEETS) ~~35-39~~ *(REVISED ON JANUARY 31, 2022)*	
☐ M-412-2	CONCRETE PAVEMENT CRACK REPAIR (6 SHEETS) *(REVISED ON SEPTEMBER 6, 2022)*	
☐ M-510-1	STRUCTURAL PLATE PIPE H-20 LOADING	40
☐ M-601-1	SINGLE CONCRETE BOX CULVERT (CAST-IN-PLACE) (2 SHEETS)	41-42
☐ M-601-2	DOUBLE CONCRETE BOX CULVERT (CAST-IN-PLACE) (2 SHEETS)	43-44
☐ M-601-3	TRIPLE CONCRETE BOX CULVERT (CAST-IN-PLACE) (2 SHEETS)	45-46
☐ M-601-10	HEADWALL FOR PIPES	47
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☐ M-601-12	HEADWALLS AND PIPE OUTLET PAVING	49
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☐ M-603-3	PRECAST CONCRETE BOX CULVERT ~~57~~ *(REVISED ON SEPTEMBER 10, 2020)*	
☐ M-603-4	CORRUGATED POLYETHYLENE PIPE (AASHTO M294) AND CORRUGATED POLYPROPYLENE PIPE (AASHTO M330) (2 sheets) ~~58~~ *(REVISED ON MARCH 7, 2022)*	
☐ M-603-5	POLYVINYL CHLORIDE (PVC) PIPE (AASHTO M304)	59
☐ M-603-6	STEEL REINFORCED POLYETHYLENE RIBBED PIPE (AASHTO MP 20)	60
☐ M-603-10	CONCRETE AND METAL END SECTIONS	61
☐ M-603-12	TRAVERSABLE END SECTIONS AND SAFETY GRATES (3 SHEETS)	62-64
☐ M-604-10	INLET, TYPE C	65
☐ M-604-11	INLET, TYPE D	66
☐ M-604-12	CURB INLET TYPE R (2 SHEETS)	67-68
☐ M-604-13	CONCRETE INLET TYPE 13	69
☐ M-604-20	MANHOLES (3 SHEETS)	70-72
☐ M-604-25	VANE GRATE INLET (5 SHEETS) *(REVISED ON FEBRUARY 3, 2023)*	73-77
☐ M-605-1	SUBSURFACE DRAINS	78

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■ M-606-1	MIDWEST GUARDRAIL SYSTEM TYPE 3 W-BEAM 31 INCHES (19 SHEETS) *(REVISED ON MARCH 5, 2020)* ~~79-97~~	
☐ M-606-13	GUARDRAIL TYPE 7 F-SHAPE BARRIER (4 SHEETS)	98-101
☐ M-606-14	PRECAST TYPE 7 CONCRETE BARRIER (4 SHEETS) *(REVISED ON FEBRUARY 9, 2023)* ~~102-104~~	
☐ M-606-15	GUARDRAIL TYPE 9 SINGLE SLOPE BARRIER (11 SHEETS) *(REVISED ON FEBRUARY 17, 2023)* ~~105-115~~	
☐ M-607-1	WIRE FENCES AND GATES (3 SHEETS)	116-118
☐ M-607-2	CHAIN LINK FENCE (3 SHEETS)	119-121
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COLORADO
DEPARTMENT OF TRANSPORTATION

M&S STANDARDS PLANS LIST

July 31, 2019

Revised on April 14, 2023

ALL OF THE M&S STANDARD PLANS, AS SUPPLEMENTED AND REVISED, APPLY TO THIS PROJECT WHEN USED BY DESIGNATED PAY ITEM OR SUBSIDIARY ITEM.

THE M&S STANDARD PLANS USED TO DESIGN THIS PROJECT ARE INDICATED BY A MARKED BOX ■, AND WILL BE ATTACHED TO THE PLANS. ALL OTHER M&S STANDARD PLANS ARE STILL ELIGIBLE FOR USE IN CONSTRUCTION IF APPROVED BY AN APPROPRIATE CDOT ENGINEER.

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COLORADO SPRINGS

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PROJECT SPECIFIC ABBREVIATIONS:

A

ABD	ABANDONED
AC	ASBESTOS CEMENT
AL	ALUMINUM
AHW	ALLOWABLE HEADWATER
AUX	AUXILIARY LANE
AV/AVE	AVENUE
AWWA	AMERICAN WATER WORKS ASSOCIATION

B

BF	BACK FACE
BRDG	BRIDGE
BLVD	BOULEVARD
BTM	BOTTOM
BW	BARBED WIRE

C

C&G	CURB AND GUTTER
CC	CENTER OF CURVE
CDOT	COLORADO DEPARTMENT OF TRANSPORTATION
CL	CONTROL LINE
CL.	CLASS
CO.	COMPANY
CF	CUBIC FEET

D

DA	DRAINAGE AREA
DIP	DUCTILE IRON PIPE
DR	DRIVE
DWG	DRAWING
D xx	RIPRAP SIZE

E

e	EXTERNAL DISTANCE; SUPER ELEVATION
EL	ELEVATION
ELEC	ELECTRICAL
ELT	ELECTRIC TRANSMISSION
ENT	ENTRANCE
EOP	EDGE OF PAVEMENT
EP	EDGE OF PAVEMENT
EX/EXIST	EXISTING
Exp'n	EXPANSION

F

FA	FORCE ACCOUNT
FB	STEEL
℄/FL	FLOWLINE
FO	FIBER OPTIC
FOC	FIBER OPTIC CABLE

G

GB	GRADE BREAK

H

HERCP	HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE
HGL	HYDRAULIC GRADE LINE
HP	HINGE POINT
HW/D	HEADWATER TO DEPTH RATIO

I

IRR	IRRIGATION
IP	INTERMEDIATE PRESSURE

K

K	LENGTH OF VERTICAL CURVE PER CHANGE IN GRADE
KVA	KILO VOLT AMPERES

L

L	LENGTH OF CURVE
LAT	LATERAL
LDA	LIMITS OF DISTURBED AREA
LT	LEFT

M

MDS	MAXIMUM DESIGN SPEED
MDT	MAINTENANCE OF TRAFFIC
ME	MATCH EXISTING
MED	MEDIAN
MH	MANHOLE
ML	MAINLINE
MM	MILE MARKER
MW	MILL WRAP STEEL

N

NA	NOT APPLICABLE
NC	NORMAL CROWN
NF	NOT FOUND
NE	NORTHEAST
NW	NORTHWEST

O

OH	OVERHEAD
OHE	OVERHEAD ELECTRIC
OHT	OVERHEAD TELEPHONE
OHTV	OVERHEAD TELEVISION
O/S	OFFSET

P

PCR	POINT OF CURB RETURN
PH	POTHOLE
ℙ/PL	PROPERTY LINE
POB	POINT OF BEGINNING
POE	POINT OF ENDING
PR/PROP	PROPOSED
PRVT	PRIVATE
PVRC	POINT OF VERTICAL REVERSE CURVATURE

R

RD	ROAD
RET	RETAINING
ROW	RIGHT OF WAY
RT	RIGHT

S

SAN	SANITARY
SD	STOPPING DISTANCE
SE	SOUTHEAST
SRB	SOIL RETENTION BLANKET
SSD	STOPPING SIGHT DISTANCE
STA	STATION
STM	STORM
SUPER	SUPERELEVATION
SVC	SERVICE
SW	SOUTHWEST/SIDEWALK
SWC	SWITCH CABINET
SWMP	STORM WATER MANAGEMENT PLAN
SWR	SEWER

T

T	TANGENT DISTANCE
TBW	TOP BACK WALK
TEL	TELEPHONE
TOW	TOP OF WALL
TP	TERMINAL POLE
TV	TELEVISION

U

UGE	UNDERGROUND ELECTRIC
UGFO	UNDERGROUND FIBER OPTIC
UGT	UNDERGROUND TELEPHONE
UGTV	UNDERGROUND TELEVISION

V

VT	VOLT

W

W	WIDTH
WTR	WATER
WSEL	WATER SURFACE ELEVATION

X

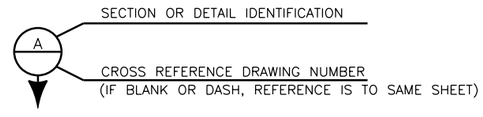
XFMR	TRANSFORMER
XING	CROSSING

Y

YR	YEAR

LIST OF SYMBOLS:

● XXX	GEOTECHNICAL BORE HOLE
- - - - - - - - - - -	SAWCUT
——LDA———LDA—	LIMITS OF DISTURBED AREA
———LDA–SC———	LIMITS OF DISTURBED AREA AND SAWCUT
———LOC———	LIMITS OF CONSTRUCTION
——LOC—LDA——	LIMITS OF CONSTRUCTION AND LIMITS OF DISTURBED AREA
——--———--——	COLORADO SPRINGS EXISTING ROW
—UG— — — G — —	EXISTING GAS LINE
—OH— — — E — —	EXISTING OVERHEAD ELECTRIC
—OH— — — T — —	EXISTING OVERHEAD TELEPHONE
— T — — — T — —	EXISTING UNDERGROUND ELECTRIC
—FO— — —FO— —	EXISTING UNDERGROUND FIBER OPTIC
—UC— — —UC— —	EXISTING UNDERGROUND TELEPHONE
—UW— — —UW— —	EXISTING WATERLINE
—SS— — —SS— —	EXISTING STORMSEWER
— TV — — TV —	EXISTING UNDERGROUND TV
— SD — — — SD— —	EXISTING SD
	PROPERTY LINE



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GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE 2022 CITY OF COLORADO SPRINGS STANDARD SPECIFICATION FOR ROAD AND BRIDGE CONSTRUCTION AND STANDARD PLANS.

2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADHERING TO ALL LOCAL ORDINANCES AND OBTAINING ALL NECESSARY PERMITTING FOR WORK.

3. THE CONTRACTOR SHALL NOT PARK ANY VEHICLES OR EQUIPMENT IN, OR DISTURB ANY AREAS NOT APPROVED BY THE CITY ENGINEER.

4. CITY OF COLORADO SPRINGS MAINTENANCE SHALL BE ALLOWED ACCESS THROUGHOUT THE PROJECT AT ALL TIMES. ACCESS THROUGH A PARTICULAR SECTION UNDER CONSTRUCTION SHALL BE COORDINATED WITH THE CITY ENGINEER.

5. IN THE EVENT OF SNOW, THE CONTRACTOR SHALL COORDINATE WITH CITY OF COLORADO SPRINGS DURING ANY PLOWING OR OTHER MAINTENANCE OPERATIONS.

6. THE CONTRACTOR SHALL WORK WITHIN THE RIGHT-OF-WAY EASEMENT LIMITS AS SHOWN IN THE PLANS AND AS DIRECTED BY THE CITY ENGINEER. THE CONTRACTOR SHALL KEEP EQUIPMENT AND MATERIALS WITHIN THESE LIMITS AND CLEAR OF THE TRAVEL WAY AS REQUIRED TO MAINTAIN TRAFFIC THROUGH THE SITE. CONSTRUCTION ACTIVITIES, STAGING, PARKING, OR OFF-SITE DISPOSAL SHALL NOT ENCROACH UPON PRIVATE LANDS WITHOUT WRITTEN APPROVAL FROM THE PROPERTY OWNER OR LAND MANAGEMENT AGENCY.

7. TRAFFIC SHALL BE MAINTAINED AT ALL TIMES INCLUDING ACCESS TO PRIVATE DRIVES.

8. REFER TO MOT PLAN FOR PHASING OF TRAFFIC.

9. TYPE OF COMPACTION FOR THIS PROJECT WILL BE AASHTO T-99. WATER USED FOR COMPACTION WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.

10. EROSION CONTROL MEASURES MUST BE IMPLEMENTED BEFORE ANY CONSTRUCTION ACTIVITIES BEGIN. BEST MANAGEMENT PRACTICES REQUIRED FOR COMPLIANCE WITH CONTRACTOR OBTAINED PERMITS ARE THE RESPONSIBILITY OF THE CONTRACTOR AND SUBSIDIARY TO THE WORK.

11. ALL MATERIAL GENERATED WITHIN THE PROJECT LIMITS SHALL BE REMOVED FROM THE PROJECT SITE AT NO COST TO THE PROJECT UNLESS SPECIFIED BY THE PLANS.

12. THE CONTRACTOR SHALL NOT DISTURB AREAS BEYOND THE LIMITS OF DISTURBANCE AS SHOWN ON THE PLANS, TYPICAL SECTIONS, OR AS DIRECTED BY THE CITY ENGINEER.

13. WHERE IT IS REQUIRED TO CUT EXISTING PAVEMENT, THE CUTTING SHALL BE DONE TO A NEAT WORK LINE FULL DEPTH WITH A PAVEMENT-CUTTING SAW OR OTHER METHOD AS APPROVED BY THE CITY OF COLORADO SPRINGS CITY ENGINEER. THIS WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF THE WORK.

14. THE CONTRACTOR SHALL COMPLY WITH THE COLORADO SPRINGS CITY CODE (CHAPTER 3, ARTICLE 3: STREETS AND PUBLIC WAYS) WHEN EXCAVATING OR GRADING IS PLANNED IN THE AREA OF UNDERGROUND UTILITY FACILITIES. THE CONTRACTOR SHALL NOTIFY ALL AFFECTED UTILITIES AT LEAST TWO (2) BUSINESS DAYS, NOT INCLUDING THE ACTUAL DAY OF NOTICE, PRIOR TO COMMENCING SUCH OPERATIONS. THE CONTRACTOR SHALL CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO (UNCC) AT 811, TO HAVE LOCATIONS OF UNCC REGISTERED LINES MARKED BY MEMBER COMPANIES. ALL OTHER UNDERGROUND FACILITIES SHALL BE LOCATED BY CONTACTING THE RESPECTIVE OWNER. UTILITY SERVICE LATERALS SHALL ALSO BE LOCATED PRIOR TO BEGINNING EXCAVATION OR GRADING.

15. UTILITIES HAVE NOT BEEN POTHOLED TO VERIFY DEPTH AND LOCATION. CONTRACTOR SHALL PROTECT ALL EXISTING UTILITIES UNLESS OTHERWISE SHOWN. CONTRACTOR SHALL VERIFY LOCATION PRIOR TO CONSTRUCTION AND FOLLOW ALL LOCAL, STATE, AND FEDERAL REGULATIONS.

16. THE CONTRACTOR MAY ALTER THE EXCAVATION LIMITS, STORM SEWER DESIGN, CONSTRUCTION METHODS OF EQUIPMENT IN ORDER TO MINIMIZE IMPACTS TO CUSTOMER SERVICE. PRIOR TO IMPLEMENTING ANY METHODS, PROPOSALS FOR THESE ALTERATIONS SHALL BE DISCUSSED WITH THE CITY PROJECT MANAGER OR THEIR APPOINTED REPRESENTATIVE FOR REVIEW AND APPROVAL PRIOR TO COMMENCING ANY WORK. ANY EXISTING UTILITY, WHICH IS TO REMAIN BUT IS DAMAGED AS A RESULT OF THE CONTRACTOR'S OPERATION, SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

17. CONTRACTOR SHALL NOTIFY THE CITY AND CONTACT EL PASO COUNTY HOUSEHOLD CHEMICAL WASTE COLLECTION FACILITY AT 719-520-7878 IN THE EVENT OF UNCOVERING ABANDONED OR HAZARDOUS WASTE.

18. CONTRACTOR IS RESPONSIBLE TO PROTECT AND PRESERVE EXISTING VEGETATION TO THE FULLEST EXTENT POSSIBLE, REMOVAL OF VEGETATION (INCLUDING TREES) REGARDLESS OF SIZE OR TYPE, SHALL NOT BE PAID FOR SEPARATELY, BUT SHALL BE INCLUDED IN THE COST OF CLEARING & GRUBBING.

19. ALL REMOVALS AND WASTE MATERIALS SHALL BECOME THE PROPERTY OF THE CONTRACTOR UNLESS OTHERWISE INDICATED IN THE PLANS OR PROJECT SPECIFICATIONS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN A DISPOSAL SITE AND REQUIRED PERMITS FOR THE UNUSABLE MATERIALS.

20. FOR PLAN QUANTITIES OF AGGREGATE BASE COURSE, THE FOLLOWING RATE OF APPLICATION WAS USED:
    AGGREGATE BASE COURSE (CLASS 6) @ 133 LBS./CU.FT.

21. DEPTH OF MOISTURE-DENSITY CONTROL FOR THIS PROJECT SHALL BE AS FOLLOWS:
    FULL DEPTH OF ALL EMBANKMENTS
    FULL DEPTH FOR AGGREGATE BASE COURSE (CLASS 6)
    BASES OF CUTS AND FILL: 0.5 FOOT

22. EXCAVATION REQUIRED FOR THE COMPACTION OF BASES OF CUTS AND FILLS WILL BE CONSIDERED AS SUBSIDIARY TO THAT OPERATION AND WILL NOT BE PAID FOR SEPARATELY.

23. FOR PLAN QUANTITIES OF PAVEMENT MATERIALS, THE FOLLOWING RATE OF APPLICATION WAS USED:
    HOT MIX ASPHALT @ 110 LBS./(SQ.YD. X INCH.)
    TACK COAT DILUTED EMULSIFIED ASPHALT @ 0.1 GALS./SQ.YD. (DILUTED)

    DILUTED EMULSIFIED ASPHALT FOR TACK COAT SHALL CONSIST OF 1 PART EMULSIFIED ASPHALT AND 1 PART WATER. RATES OF APPLICATION SHALL BE AS DETERMINED BY THE CITY ENGINEER AT THE TIME OF APPLICATION.

24. PRIOR TO PLACING BITUMINOUS PAVEMENT OR TACK COAT, SWEEPING OF DIRT AND GRAVEL FROM THE EXISTING MAT TO PROVIDE A CLEAN SURFACE SHALL BE COMPLETED. THIS WORK WILL NOT BE PAID FOR SEPARATELY BUT INCLUDED IN THE WORK.

25. ANY LAYER OF ASPHALT PAVEMENT THAT IS TO HAVE A SUCCEEDING LAYER PLACED THEREON SHALL BE COMPLETED FULL WIDTH BEFORE THE SUCCEEDING LAYER IS PLACED UNLESS OTHERWISE DIRECTED BY THE CITY ENGINEER.

26. THE CONTRACTOR SHALL PROVIDE A CERTIFIED SCALE AND CERTIFIED WEIGHER AT THE POINT OF LOADING FOR ALL ASPHALT AGGREGATES AND CONCRETE DELIVERED TO THE PROJECT.

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Date:	Comments	Init.

COLORADO SPRINGS

As Constructed
No Revisions:
Revised:
Void:

SOUTH CHEYENNE CANYON BRIDGE
GENERAL NOTES

Designer: TJM
Detailer: JAM
Sheet Subset: ROADWAY
Structure Numbers
Subset Sheets: RD04 of 15

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27. THE CONTRACTOR SHALL REPAIR OR REPLACE AT THEIR EXPENSE ANY EXISTING SIGN THAT IS DAMAGED DURING CONSTRUCTION ACTIVITIES NOT SCHEDULED TO BE REMOVED.

28. THE CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE DURING CONSTRUCTION IN ACCORDANCE WITH THE STORMWATER MANAGEMENT PLAN. ANY REWORK OF MATERIAL DUE TO LACK OF THIS MAINTENANCE SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. MAINTAINING DRAINAGE WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.

29. THE CONTRACTOR SHALL PROTECT ALL EXISTING SURVEY MONUMENTATION DESIGNATED TO REMAIN FROM DAMAGE DURING CONSTRUCTION OPERATIONS. ANY MONUMENTS DISTURBED BY THE CONTRACTOR SHALL BE RESET AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR AND CITY ENGINEER SHALL NOTE THOSE MONUMENTS IN THE FIELD PRIOR TO CONSTRUCTION.

30. THE CONTRACTOR SHALL PROVIDE SANITARY FACILITIES ON SITE. MAINTENANCE OF THE SANITARY FACILITIES SHALL INCLUDE A MINIMUM CLEANING SCHEDULE OF AT LEAST TWICE A WEEK. THIS WILL BE SUBSIDIARY TO THE WORK AND WILL NOT BE PAID FOR SEPARATELY.

31. FIELD FACILITY ACCESS AREAS SHALL BE PROVIDED WITH AN ALL-WEATHER SURFACE AND PLACED WITHIN THE PROJECT LIMITS UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER. THE COST FOR THIS REQUIREMENT WILL BE INCLUDED IN THE FIELD OFFICE, FIELD LABORATORY, AND SANITARY FACILITY.

32. ALL SURVEYING NECESSARY TO COMPLETE THE WORK SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

33. ALL CONCRETE PIPE SHALL BE CLASS III UNLESS OTHERWISE NOTED. CONTRACTOR MAY STOCKPILE RCP WITHIN ROW OR CLS SPECIFIED BY CITY ENGINEERING.

34. ESTIMATED CONTRACT PERIOD SEPTEMBER 7, 2022 TO MAY 27, 2023.

ENVIRONMENTAL NOTES:

1. THE PROPOSED WORK AS SHOWN ON THE PLANS HAS BEEN PERMITTED BY THE U.S. ARMY CORPS OF ENGINEERS UNDER SECTION 404 OF THE CLEAN WATER ACT. THE CONTRACTOR SHALL COMPLY WITH ALL SPECIAL AND GENERAL CONDITIONS ATTACHED TO THE PERMIT.

2. IF PROJECT ACTIVITIES RESULT IN ONE ACRE OR MORE OF EARTH DISTURBANCE A CDPS PERMIT WILL BE REQUIRED. THE CONTRACTOR SHALL NOT COMMENCE PERMIT-RELATED WORK UNTIL THE PERMIT IS RECEIVED. WORK PERFORMED MUST BE CONSISTENT WITH THAT DETAILED IN THE STORM WATER MANAGEMENT PLAN.

3. RESTORATION OF THE PROJECT AREA WILL INCLUDE REMOVAL OF ALL DEBRIS, LITTER, EXCAVATION SPOILS, AND WASTE MATERIALS GENERATED DURING CONSTRUCTION ACTIVITIES.

4. CONTRACTOR SHALL TAKE STEPS NECESSARY TO PREVENT DEMOLITION DEBRIS FROM ENTERING THE WATERWAY DURING DEMOLITION.

5. THERE SHALL BE NO STOCKPILING OR SIDE CASTING OF WASTE MATERIALS INCLUDING BUT NOT LIMITED TO PAINT CHIPS, ASPHALT, OR CONCRETE ADJACENT IN ANY DRAINAGES (INCLUDING DRY DRAINAGES). PAINT MATERIAL REMOVED FROM ROAD OR BRIDGE SHALL BE PROPERLY CONTAINED AND DISPOSED OF TO PREVENT SUCH MATERIALS FROM ENTERING WATERS OF THE STATE.

6. TEMPORARY STAGING AREAS FOR CONSTRUCTION EQUIPMENT AND MATERIALS WILL UTILIZE PREVIOUSLY DISTURBED AREAS SUCH AS ROADS, GRAVELED PARKING AREAS, AND SHOULDER PULL OUTS. MAJOR REPAIRS TO CONSTRUCTION EQUIPMENT WILL BE PERFORMED OFFSITE, WHERE PRACTICAL. EQUIPMENT OPERATION OFF THE ROADWAY PRISM SHALL BE MINIMIZED TO THE EXTENT POSSIBLE TO PREVENT POSSIBLE IMPACTS TO BIOLOGICAL RESOURCES.

7. THE CONTRACTOR SHALL REMOVE ON A DAILY BASIS ALL SEDIMENT AND CONSTRUCTION DEBRIS FROM THE FLOW LINES TO AVOID POLLUTANTS FROM DISCHARGING INTO WATERWAYS. THE COST OF REMOVAL SHALL BE INCLUDED IN THE WORK. CONTRACTOR SHALL KEEP STREETS CLEANED/SWEPT AS DIRECTED BY THE CITY ENGINEER.

8. TO PROTECT ENVIRONMENTAL RESOURCES WITHIN AND OUTSIDE CITY OF COLORADO SPRINGS ROW (E.G., CULTURAL SITES, THREATENED AND ENDANGERED SPECIES HABITAT, NESTING BIRDS), TEMPORARY USE AREAS FOR EQUIPMENT INCLUDING STAGING, SET-UP, REPAIR, OR OVERNIGHT PARKING AREAS SHALL BE PRE-APPROVED BY THE CITY ENGINEER FOLLOWING COORDINATION WITH THE REGIONAL ENVIRONMENTAL STAFF. COORDINATION FOR TEMPORARY USE AREAS WILL NOT BE MEASURED AND PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.

9. TEMPORARY ACCESS STAGING AREAS WILL BE LOCATED 75 FEET FROM STREAMS OR OTHER WATER BODIES, AND WETLANDS TO PRECLUDE DISCHARGES OF NON-PROJECT RELATED FILL MATERIAL INTO THESE AREAS.

10. ALL FILL MATERIAL WILL BE PROPERLY STABILIZED AND MAINTAINED TO PREVENT EROSION DURING AND FOLLOWING CONSTRUCTION.

11. AFTER CLEARING, GRUBBING OR EARTHMOVING/GRADING OPERATIONS, SOIL WILL BE STABILIZED IN ACCORDANCE WITH CDOT STANDARD SPECIFICATION 208.

12. ANY NECESSARY ACCESS AND EGRESS ROUTES FOR BRIDGE REPLACEMENTS WILL BE ESTABLISHED THROUGH COORDINATION WITH CITY PARKS STAFF AND THE CONTRACTOR TO MINIMIZE IMPACTS TO RIVERBANK AND ROADSIDE VEGETATION AND SOILS.

13. MODIFICATION OF SITE DRAINAGE WILL BE MANAGED TO PRECLUDE ADVERSE EFFECTS ON WATER QUALITY, FLOW CHARACTERISTICS, AND SOIL EROSION ONSITE AND OFFSITE.

14. WHERE EXCAVATION IS REQUIRED, ONLY THE MINIMAL AMOUNT OF AREA WILL BE CLEARED OR GRADED IN ORDER TO MAINTAIN VEGETATIVE GROUND COVER FOR EROSION PROTECTION.

15. NATIVE VEGETATION COVER WILL BE PRESERVED TO THE MAXIMUM EXTENT POSSIBLE. EXISTING RIPARIAN, WETLAND, AND OTHER DESIRABLE VEGETATION NOT INTENDED TO BE IMPACT BY THE PROJECT CONSTRUCTION WILL BE PLASTIC FENCED PRIOR TO CONSTRUCTION IN ACCORDANCE WITH CITY OF COLORADO SPRINGS SPECIFICATIONS SECTION 200.

16. ANY TEMPORARY IMPACTS TO RIPARIAN VEGETATION RESULTING FROM CONSTRUCTION WILL BE RESTORED BY PLANTING APPROPRIATE REPLACEMENT QUANTITY AND SPECIES OF NATIVE SHRUBS AND TREES WHERE FEASIBLE.

17. THE TIMING OF LAND DISTURBING ACTIVITIES AND INSTALLATION OF EROSION AND SEDIMENTATION CONTROL MEASURES WILL BE COORDINATED TO MINIMIZE WATER QUALITY IMPACTS.

18. FUELING AND ROUTINE MAINTENANCE OF CONSTRUCTION EQUIPMENT SHALL ONLY OCCUR AT DESIGNATED AREAS, AT LEAST 75 FEET FROM WETLAND AND AQUATIC HABITATS AND AWAY FROM DRAINAGES OR DITCHES TO PRECLUDE ADVERSE WATER QUALITY IMPACTS TO EXISTING DRAINAGES AND WETLAND HABITATS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PREVENT ADVERSE IMPACTS TO WATER QUALITY. MAJOR REPAIRS TO EQUIPMENT WILL BE MADE OFFSITE.

19. CONSTRUCTION EQUIPMENT SHALL BE CHECKED FREQUENTLY FOR LEAKS. ANY LEAKS OR SPILLS WILL BE CLEANED UP IMMEDIATELY TO PREVENT THE CONTAMINATION OF SOILS OR RESIDUE ON PAVED SURFACES. SPILL AREAS WILL NOT BE "HOSED DOWN", DRY CLEANUP METHODS WILL BE USED.

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File Name: 002.01_SCC-GN-NOTES-02.dgn	Date:	Comments	Init.
Horiz. Scale: 1:0.999999 Vert. Scale: As Noted			
Unit Information Unit Leader Initials			
Jacobs			

COLORADO SPRINGS

As Constructed	SOUTH CHEYENNE CANYON BRIDGE		Project No./Code
No Revisions:	GENERAL NOTES		XXXXXXXXX
Revised:	Designer: TJH	Structure Numbers	XXXXX
Void:	Detailer: JAM		
	Sheet Subset: ROADWAY	Subset Sheets: RD05 of 15	Sheet Number 5

20. CONSTRUCTION WILL BE PHASED SO THAT THE ACREAGE OF EXPOSED SOILS AT ANY GIVEN TIME IS MINIMIZED UNTIL TEMPORARY INTERIM BMPS CAN BE IMPLEMENTED (VERTICAL TRACKING, SURFACE ROUGHENING, MULCHING).

21. SOILS WILL BE STABILIZED AS QUICKLY AS POSSIBLE THROUGH IMMEDIATE PLANTINGS OF SEED, FOLLOWED BY MULCH AND TACKIFIER ONCE AN AREA HAS BEEN FINISH GRADED.

22. ALL SLOPES STEEPER THAN 3:1 WILL BE BLANKETED WITH STRAW/COCONUT EROSION CONTROL BLANKETS PER SPECIFICATIONS.

23. PUMPING AND DISCHARGE OF WATER FROM DEWATERING OPERATIONS MAY REQUIRE A DISCHARGE PERMIT FROM THE CDPHE WATER QUALITY CONTROL DIVISION. DISCHARGE PERMITS OR ALTERNATE ARRANGEMENTS FOR WATER MANAGEMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR (SEE STANDARD SPECIFICATION 107.25(8)6). APPLICABLE CONDITIONS FOR DISCHARGE INCLUDING MONITORING AND REPORTING SHALL BE INCLUDED IN THE COST OF THE WORK AND SHALL NOT BE COMPENSATED SEPARATELY.

24. ALL WORK IN THE CHANNEL SHALL COMPLY WITH THE CITY MAINTENANCE PROGRAM'S US ARMY CORPS OF ENGINEERS 404D NATIONWIDE PERMIT 14 FOR LINEAR TRANSPORTATION PROJECTS.

25. TREE TRIMMING/REMOVAL: TREE TRIMMING AND/OR REMOVAL ACTIVITIES SHALL BE COMPLETED BEFORE BIRDS BEGIN TO NEST OR AFTER THE YOUNG HAVE FLEDGED. IN COLORADO, MOST NESTING AND REARING ACTIVITIES OCCUR BETWEEN APRIL 1 AND AUGUST 31.

26. BRIDGE/BOX CULVERT WORK: BRIDGE OR BOX CULVERT WORK THAT MAY DISTURB NESTING BIRDS SHALL BE COMPLETED BEFORE BIRDS BEGIN TO NEST OR AFTER THE YOUNG HAVE FLEDGED. NO BRIDGE OR BOX CULVERT WORK MAY TAKE PLACE BETWEEN APRIL 1 AND AUGUST 31. IF WORK ACTIVITIES ARE PLANNED BETWEEN THESE DATES, NESTS SHALL BE REMOVED (BEFORE NESTING BEGINS) AND APPROPRIATE MEASURES TAKEN TO ASSURE NO NEW NESTS ARE CONSTRUCTED.

28. FOR BIRDS OF PREY THAT COULD POTENTIALLY NEST NEAR THE PROJECT SITE, PLEASE CONTACT THE CDOT REGION 2 BIOLOGIST AND/OR REFER TO THE COLORADO DIVISION OF WILDLIFE'S "RECOMMENDED BUFFER ZONES AND SEASONAL RESTRICTIONS FOR COLORADO RAPTORS" GUIDELINES AVAILABLE AT COLORADO DIVISION OF WILDLIFE DISTRICT OFFICES

KEY CONTACTS

CITY ENGINEERING (BRIDGE MAINTENANCE)
RYAN PHIPPS - (719) 385-5069

COLORADO SPRINGS UTILITIES (WATER)
ADAM BAKER - (719) 668-4737

COLORADO SPRINGS UTILITIES (GAS/ELEC)
TIM WENDT - (719) 668-4962

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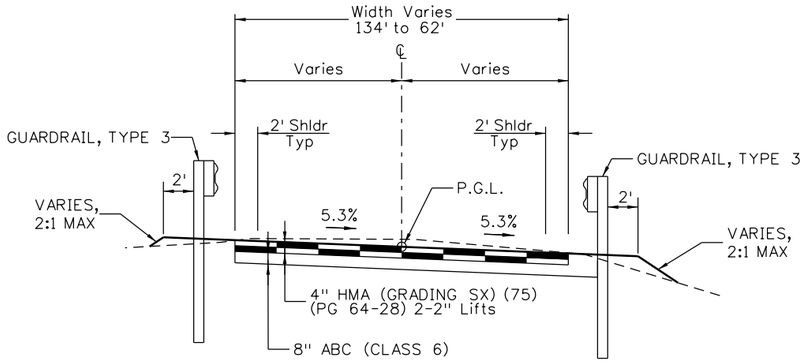
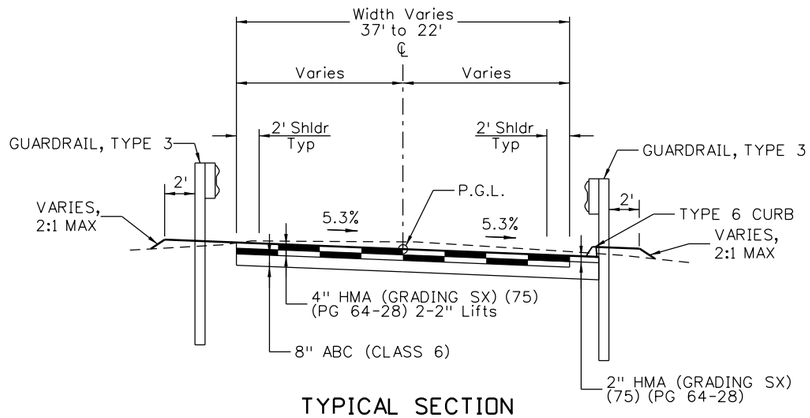


TYPICAL SECTION
STA. 10+11 TO 10+30



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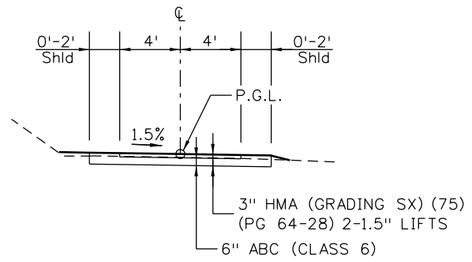
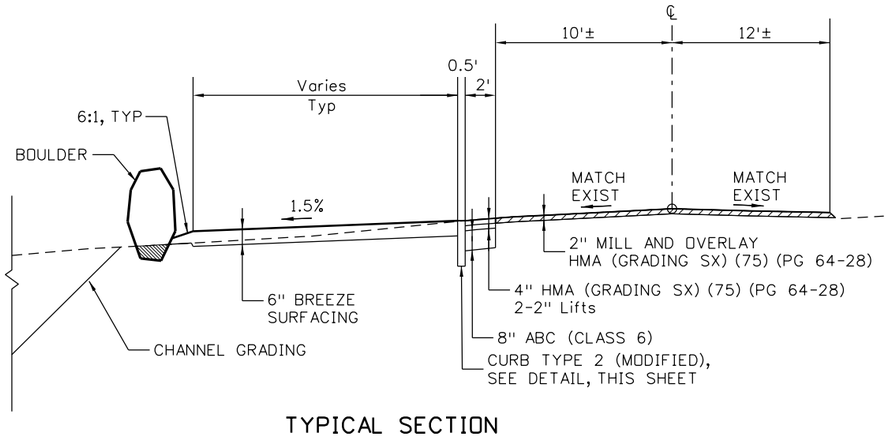
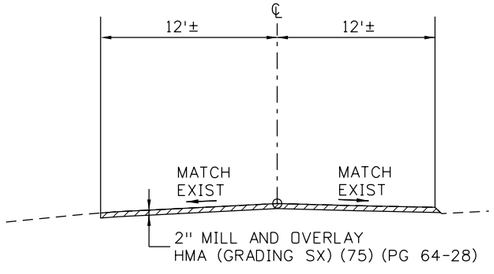


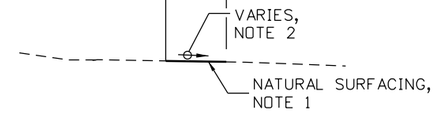
TYPICAL SECTION
(PEDESTRIAN TRAIL)
STA. 100+14 TO 100+34
STA. 100+69 TO 101+30



TYPICAL SECTION
(MESA AVE)
STA. 200+56 TO 201+66



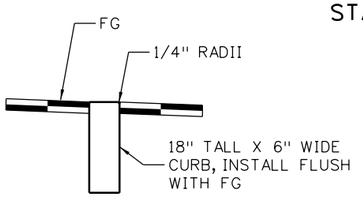
TYPICAL SECTION
(MESA AVE)
STA. 201+66 TO 204+28



TYPICAL SECTION
(NATURAL TRAIL)
SEE PLAN FOR LOCATIONS

NOTES:

1. REMOVE VEGETATION AND GRADE NATURAL SURFACING TO FORM A FIRM, SMOOTH PATHWAY.
2. CROSS SLOPE TO BE 5% MINIMUM TO 10% MAXIMUM AND DRAIN TO THE DOWNHILL SIDE. WHEN TRAIL LONGITUDINAL SLOPE IS BETWEEN 5% AND 10% THE TRAIL CROSS SLOPE SHOULD MATCH THE LONGITUDINAL SLOPE.



DETAIL
CURB TYPE 2
(MODIFIED)

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Unit Information Unit Leader Initials					Void:	Sheet Subset: ROADWAY	Subset Sheets: RD07 of 15
Jacobs					COLORADO SPRINGS		Sheet Number 7

CONTRACT ITEM NO. (CDOT)	BID ITEM	UNIT	QTY	NOTES
201-00000	CLEARING AND GRUBBING	LS	1	
202-00001	REMOVE CMP ARCH STRUCTURE	EA	1	
202-00220	REMOVAL OF ASPHALT MAT	SY	670	
202-00240	REMOVAL OF ASPHALT MAT (PLANING)	SY	970	
XXX-XXXXX	REMOVE CONCRETE BARRIER RAIL	LF	64	
202-00810	REMOVAL OF SIGN POST	EACH	5	
202-00821	REMOVAL OF SIGN PANEL	EACH	2	
202-01130	REMOVE EXISTING GUARDRAIL	LF	133	
202-05026	SAWING ASPHALT MATERIAL (6 INCH)	LF	272	
203-00000	UNCLASSIFIED EXCAVATION	CY	1100	
206-00000	STRUCTURE EXCAVATION	CY	470	
206-00100	STRUCTURE BACKFILL	CY	330	
206-00360	MECHANICAL REINFORCEMENT OF SOIL	CY	323	
207-00205	TOPSOIL	CY	100	
208-00020	SILT FENCE	LF	390	
208-00045	CONCRETE WASHOUT STRUCTURE	EA	1	
208-00070	VEHICLE TRACKING PAD	EA	1	
208-00106	SWEEPING (SEDIMENT REMOVAL)	HR	40	
208-00206	EROSION CONTROL SUPERVISOR	DAY	30	
208-00301	TEMPORARY DIVERSION	LF	200	
210-00815	RESET SIGN PANEL	EACH	1	
211-03005	DEWATERING	LS	1	
212-00032	SOIL CONDITIONING	AC	0.06	
213-00000	MULCHING	AC	0.06	
213-00061	MULCH TACKIFIER	LB	25	
213-00700	LANDSCAPE BOULDER	EA	11	
304-06007	AGGREGATE BASE COURSE (CLASS 6)	CY	100	
304-06007	AGGREGATE BASE COURSE (CLASS 6)	CY	12	TRAIL
XXX-XXXXX	BREEZE SURFACING - 6 INCH DEPTH (TAN)	SY	160	
XXX-XXXXX	CONSTRUCT NATURAL TRAIL	LS	1	
403-34751	HMA (GR SX) (75) (PG 64-28)	TON	200	
403-34751	HMA (GR SX) (75) (PG 64-28)	TON	11	TRAIL
503-00024	DRILLED CAISSON (24 INCH)	LF	380	
503-00310	CROSSHOLE SONIC LOGGING TESTING	EACH	7	
506-00224	RIPRAP (24 INCH)	CY	1030	
515-00120	WATERPROOFING (MEMBRANE)	SY	200	
601-03000	CONCRETE CLASS D (BRIDGE)	CY	160	
601-40005	CUT STONE VENEER	SF	668	
602-00000	REINFORCING STEEL	LB	7940	
602-00020	REINFORCING STEEL (EPOXY)	LB	30000	
606-00350	GUARDRAIL SYSTEM (MGS) TYPE 3	LF	56.25	
606-01370	GUARDRAIL SYSTEM (MGS) TRANSITION TYPE 3G	EA	4	
606-01385	GUARDRAIL SYSTEM (MGS) ANCHORAGE TYPE 3K	EA	4	
606-102000	BRIDGE RAIL (SPECIAL)	LF	75	
608-00015	DETECTABLE WARNINGS	SF	16	TRAIL
609-60011	CURB TYPE 6 (SECTION M)	LF	63	
XXX-XXXXX	CURB TYPE 2 (MODIFIED)	LF	110	
613-00200	2 INCH ELECTRICAL CONDUIT	LF	150	
614-00011	SIGN PANEL (CLASS I)	SF	41	
614-00012	SIGN PANEL (CLASS II)	SF	26	
614-00216	STEEL SIGN POST (2 INCH SQUARE PUNCHED)	LF	81	
618-06036	PRESTRESSED CONCRETE SLAB	SF	971	
XXX-XXXXX	PREFABRICATED TRUSS BRIDGE	EACH	1	TRAIL
XXX-XXXXX	TREE RETENTION AND PROTECTION	LS	1	
XXX-XXXXX	CREEK SIDE ACCESS	LS	1	
625-00000	CONSTRUCTION SURVEYING	LS	1	
626-00000	MOBILIZATION	LS	1	
627-00004	EPOXY PAVEMENT MARKING	SF	193	
627-30410	PREFORMED THERMOPLASTIC PAVEMENT MARKIN	SF	179	
630-00017	TRAFFIC CONTROL MANAGEMENT	DAY	60	
700-70010	F/A MINOR CONTRACT REVISIONS	FA	1	

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Horiz. Scale: 1:0.999999 Vert. Scale: As Noted
Unit Information Unit Leader Initials

Jacobs

Sheet Revisions		
Date:	Comments	Init.

COLORADO SPRINGS

As Constructed
No Revisions:
Revised:
Void:

SOUTH CHEYENNE CANYON BRIDGE
SUMMARY OF APPROX QUANTITIES

Designer: TJH
Detailer: JAM
Sheet Subset: ROADWAY
Structure Numbers
Subset Sheets: RD08 of 15

Project No./Code
XXXXXXXXX
XXXXX
Sheet Number 8

GENERAL NOTES

1. DATE OF FIELD SURVEY: SEPTEMBER 07, 2021 - OCTOBER 01, 2021

2. ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECTS IN THIS SURVEY WITH THREE (3) YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT. IN NO EVENT MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN (10) YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON.

3. THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY JACOBS ENGINEERING GROUP INC. OR THE SURVEYOR OF RECORD.

4. ALL UNITS ARE US SURVEY FEET.

PROJECT CONTROL

PROJECT COORDINATES AND ELEVATIONS SHOWN HEREON ARE BASED ON COLORADO SPRINGS UTILITIES - FACILITIES INFORMATION MANAGEMENT SYSTEM (FIMS) - SURVEY CONTROL NETWORK. CONTROL POSITIONS WERE COLLECTED USING RTK GLOBAL POSITION TECHNIQUES.

HORIZONTAL POSITIONS

HORIZONTAL POSITIONS ARE COLORADO CENTRAL (ZONE 0502) STATE PLANE NAD83(2011) EPOCH 2010.00.

BASIS OF BEARINGS: BEARINGS ARE BASED ON A GRID BEARING OF N40°27'40"E FROM FIMS MONUMENT F183 (3.25" BRASS FIMS CAP IN BOULDER STAMPED "FIMS CONTROL POINT 183 COLORADO SPRINGS DEPARTMENT OF UTILITIES") TO VS29 (3.25" BRASS FIMS CAP IN CONCRETE VAULT STAMPED "FIMS CONTROL POINT VS29 COLORADO DEPARTMENT OF UTILITIES")

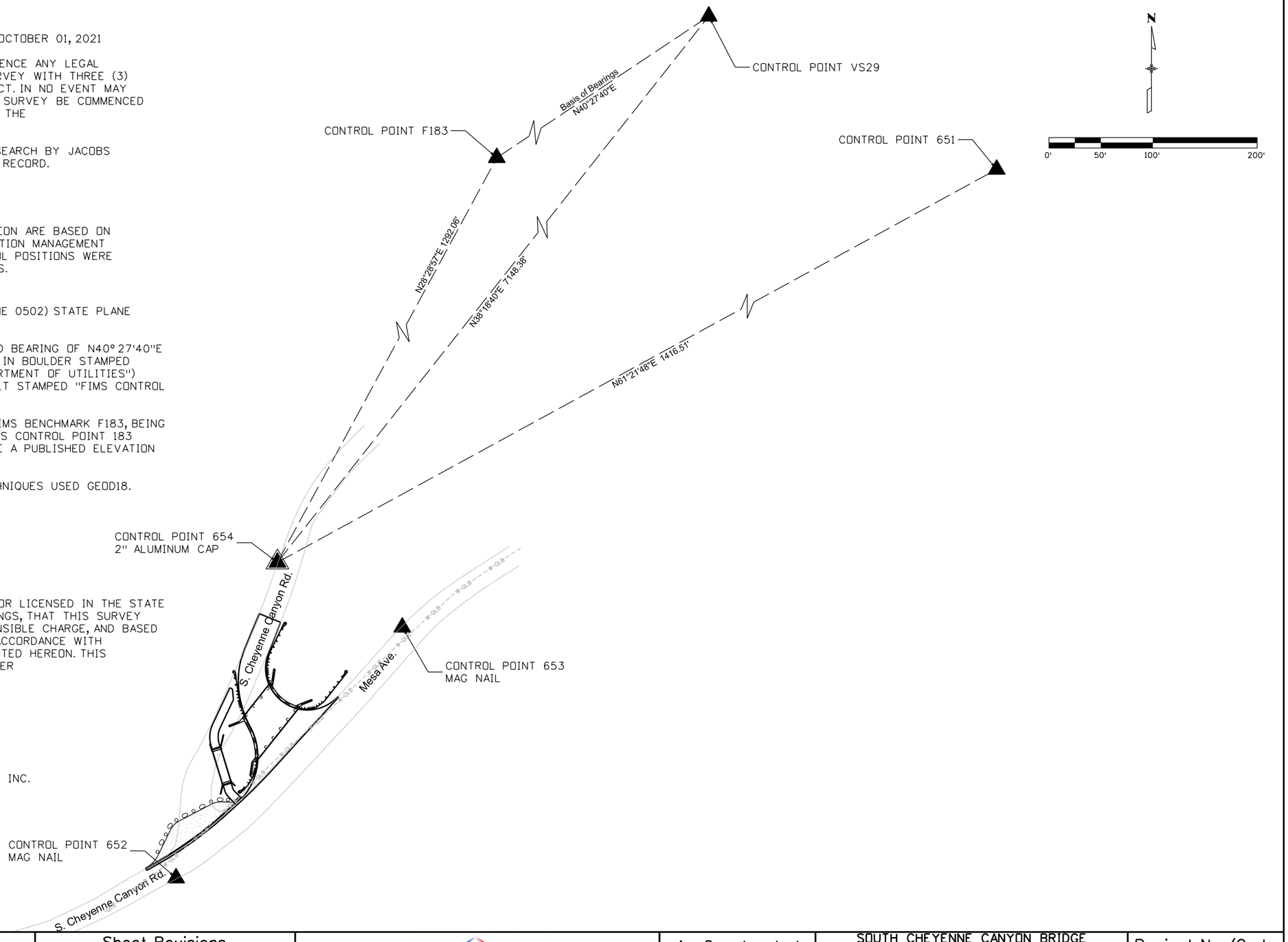
BASIS OF ELEVATIONS: ELEVATIONS ARE BASED ON FIMS BENCHMARK F183, BEING A 3.25" BRASS FIMS CAP IN BOULDER STAMPED "FIMS CONTROL POINT 183 COLORADO SPRINGS DEPARTMENT OF UTILITIES", HAVE A PUBLISHED ELEVATION OF 6383.20 FEET NAVD88.

NOTE: ELEVATIONS ESTABLISHED UTILIZING GPS TECHNIQUES USED GEOD18.

SURVEYOR'S CERTIFICATION

I, ROBERT F. GUPTILL, A PROFESSIONAL LAND SURVEYOR LICENSED IN THE STATE OF COLORADO, DO HEREBY STATE TO COLORADO SPRINGS, THAT THIS SURVEY CONTROL DIAGRAM WAS PREPARED UNDER MY RESPONSIBLE CHARGE, AND BASED UPON MY KNOWLEDGE, INFORMATION, AND BELIEF, IN ACCORDANCE WITH APPLICABLE STANDARDS OF PRACTICE, EXCEPT AS NOTED HEREON. THIS STATEMENT IS NOT A GUARANTY OR WARRANTY, EITHER EXPRESSED OR IMPLIED.

ROBERT F. GUPTILL, COLORADO PLS 38747
FOR AND ON BEHALF OF JACOBS ENGINEERING GROUP INC.
9191 JAMAICA STREET
ENGLEWOOD, CO 80112
Robert.Guptill@Jacobs.com



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Unit Information Unit Leader Initials					Void:	Sheet Subset: ROADWAY / Subset Sheets: RD09 of 15	Sheet Number 9
Jacobs							

COLORADO SPRINGS

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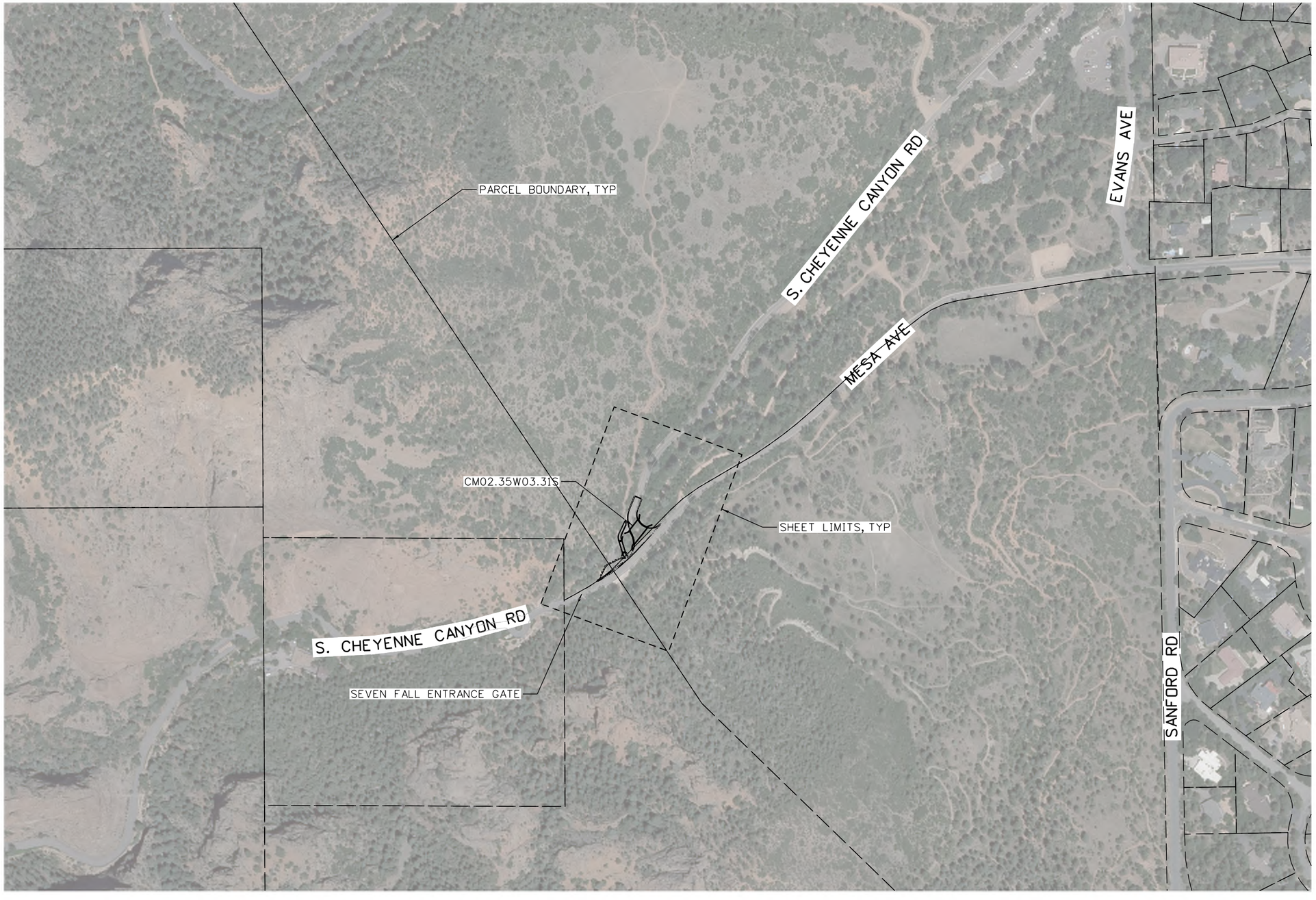

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Sheet Revisions		
Date:	Comments	Init.

COLORADO SPRINGS

As Constructed
No Revisions:
Revised:
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SOUTH CHEYENNE CANYON BRIDGE
PROJECT KEY PLAN

Designer: TJH
Detailer: JAM
Sheet Subset: ROADWAY
Structure Numbers
Subset Sheets: RD10 of 15

Project No./Code
XXXXXXXXX
XXXXX
Sheet Number 10

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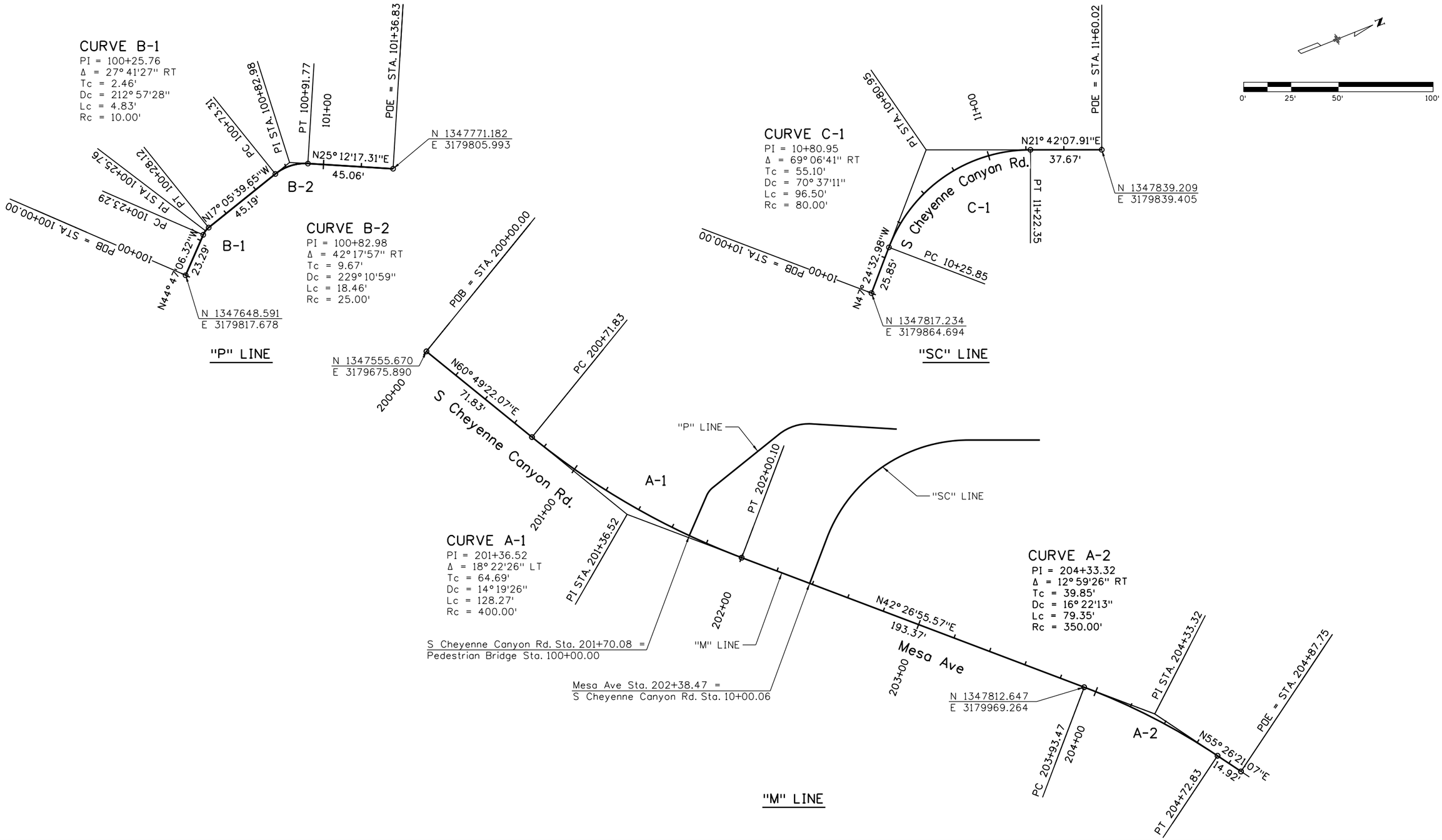

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Jacobs					

COLORADO SPRINGS

SOUTH CHEYENNE CANYON BRIDGE
GEOMETRY PLAN

Designer: TJH	Structure Numbers		Project No./Code XXXXXXXXX
Detailer: JAM			XXXXX
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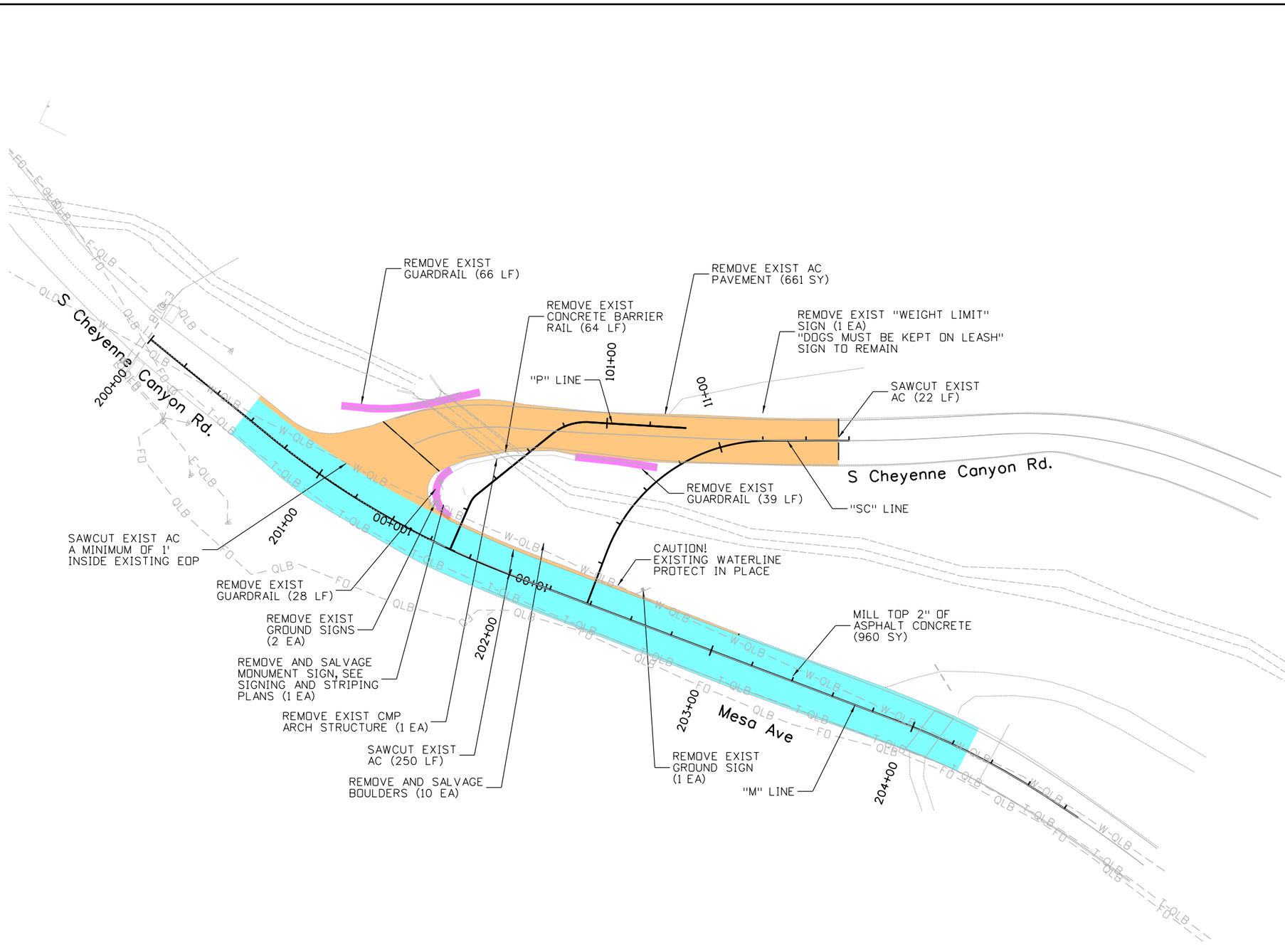

REMOVAL LEGEND

- REMOVE EXISTING PAVEMENT
- REMOVE EXISTING GUARDRAIL
- MILL TOP 2" PAVEMENT

NOTES:
1. EXISTING TREES NOT SHOWN. REMOVE TREES WHERE IN CONFLICT WITH PROPOSED WORK.

2. PROTECT EXISTING TREES AND VEGETATION THAT DOES NOT LAND WITHIN THE PROPOSED PROJECT FOOTPRINT.

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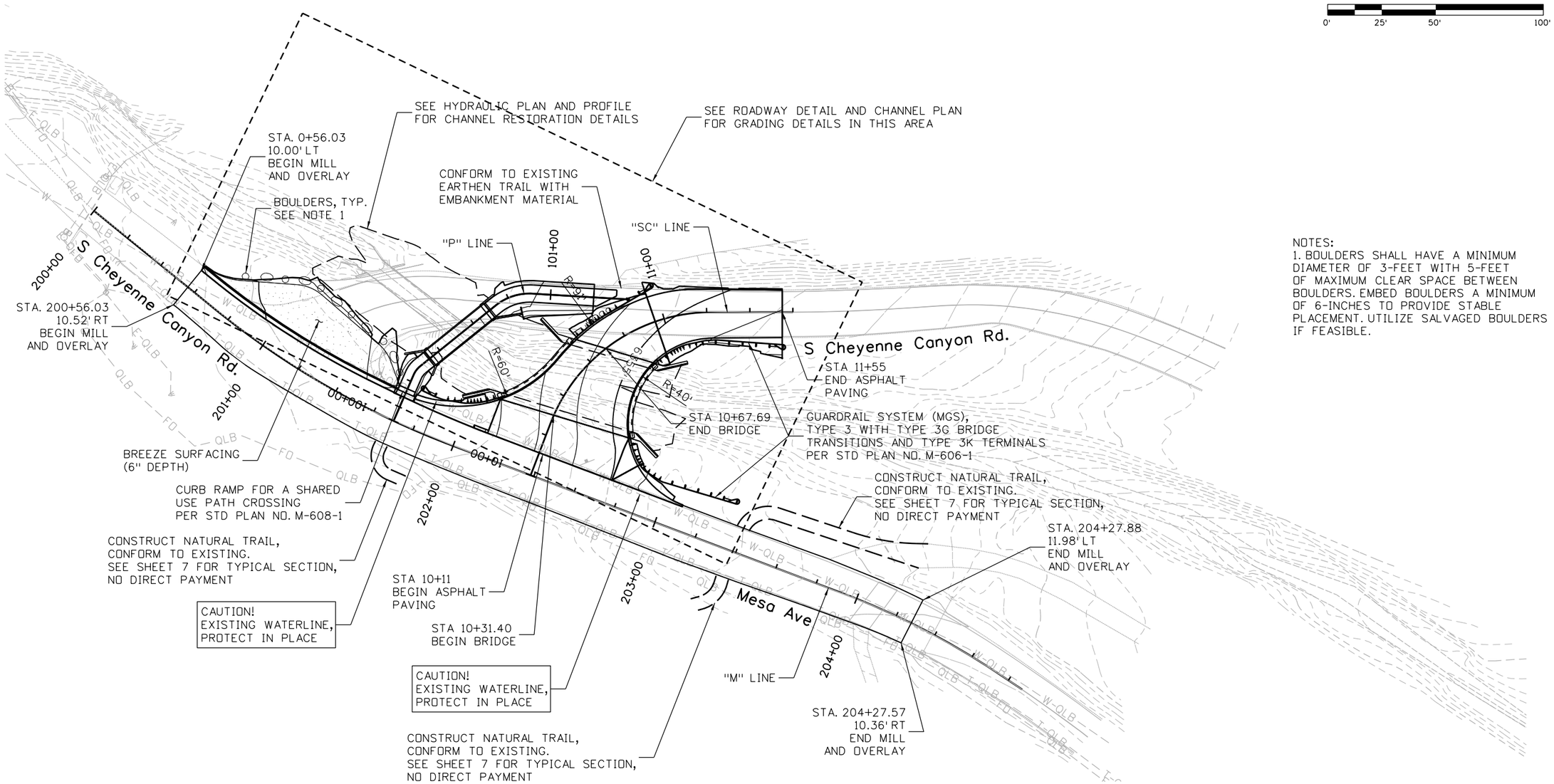
Jacobs				COLORADO SPRINGS	Sheet Number 12



NOTES:
1. BOULDERS SHALL HAVE A MINIMUM DIAMETER OF 3-FEET WITH 5-FEET OF MAXIMUM CLEAR SPACE BETWEEN BOULDERS. EMBED BOULDERS A MINIMUM OF 6-INCHES TO PROVIDE STABLE PLACEMENT. UTILIZE SALVAGED BOULDERS IF FEASIBLE.

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Jacobs			

COLORADO SPRINGS

As Constructed	SOUTH CHEYENNE CANYON BRIDGE		Project No./Code
No Revisions:	ROADWAY PLAN STA 10+11.23 TO STA 11+55.00		XXXXXXXXX
Revised:	Designer:DJ	Structure Numbers	XXXXX
Void:	Detailer: JAM		
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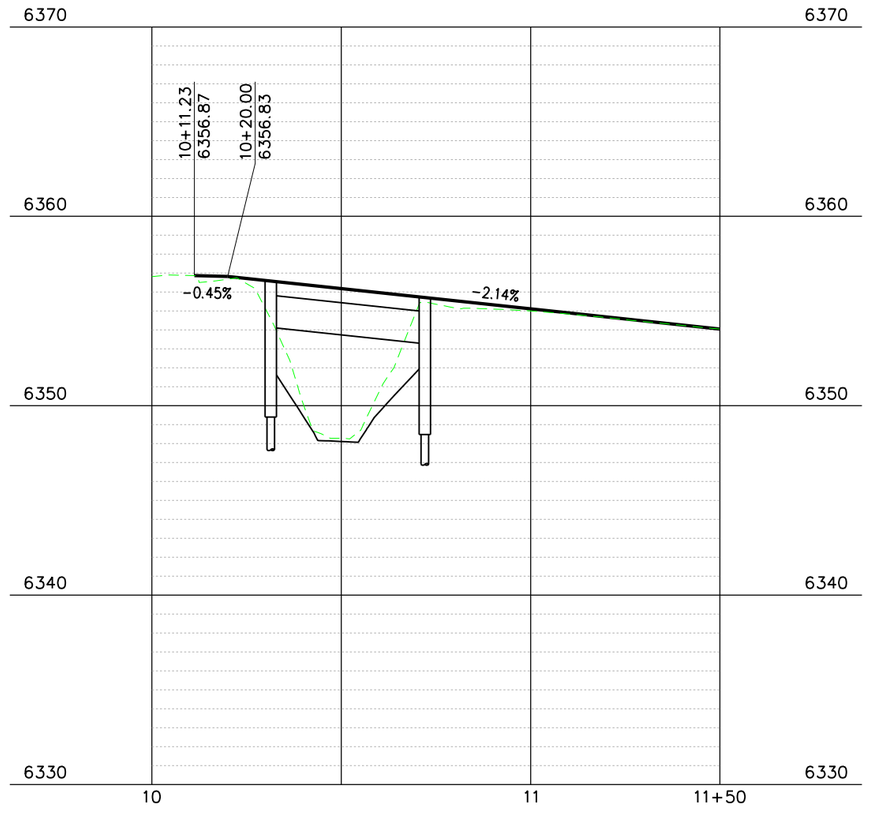
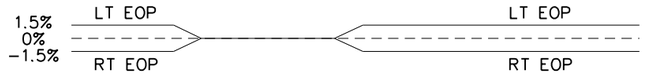
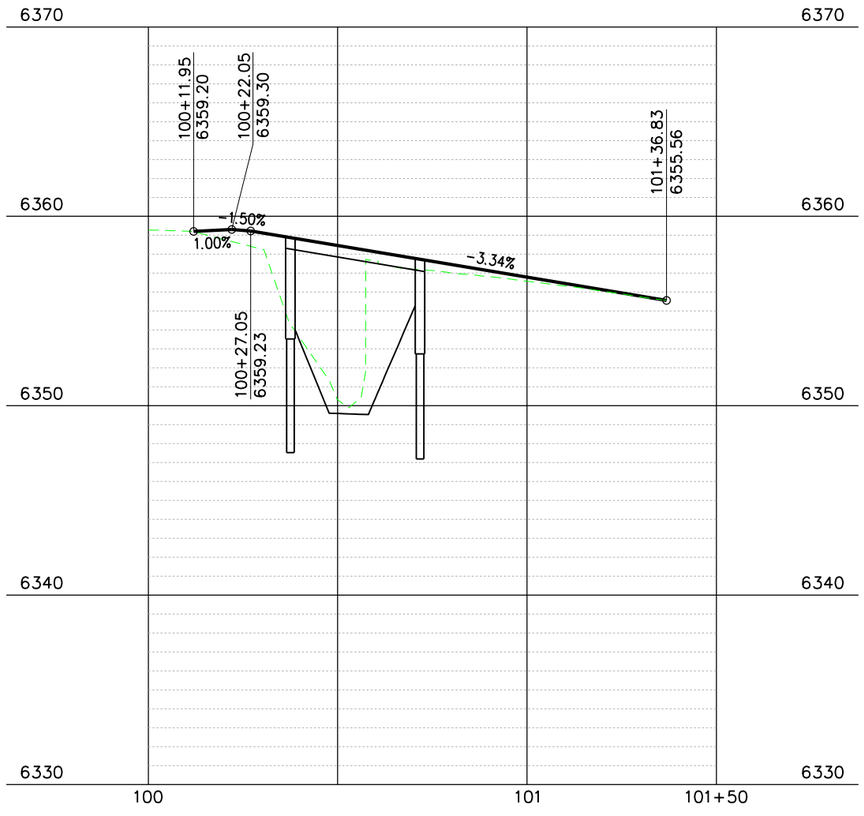
SUPERELEVATION DIAGRAM



"SC" LINE PROFILE



SUPERELEVATION DIAGRAM



"P" LINE PROFILE

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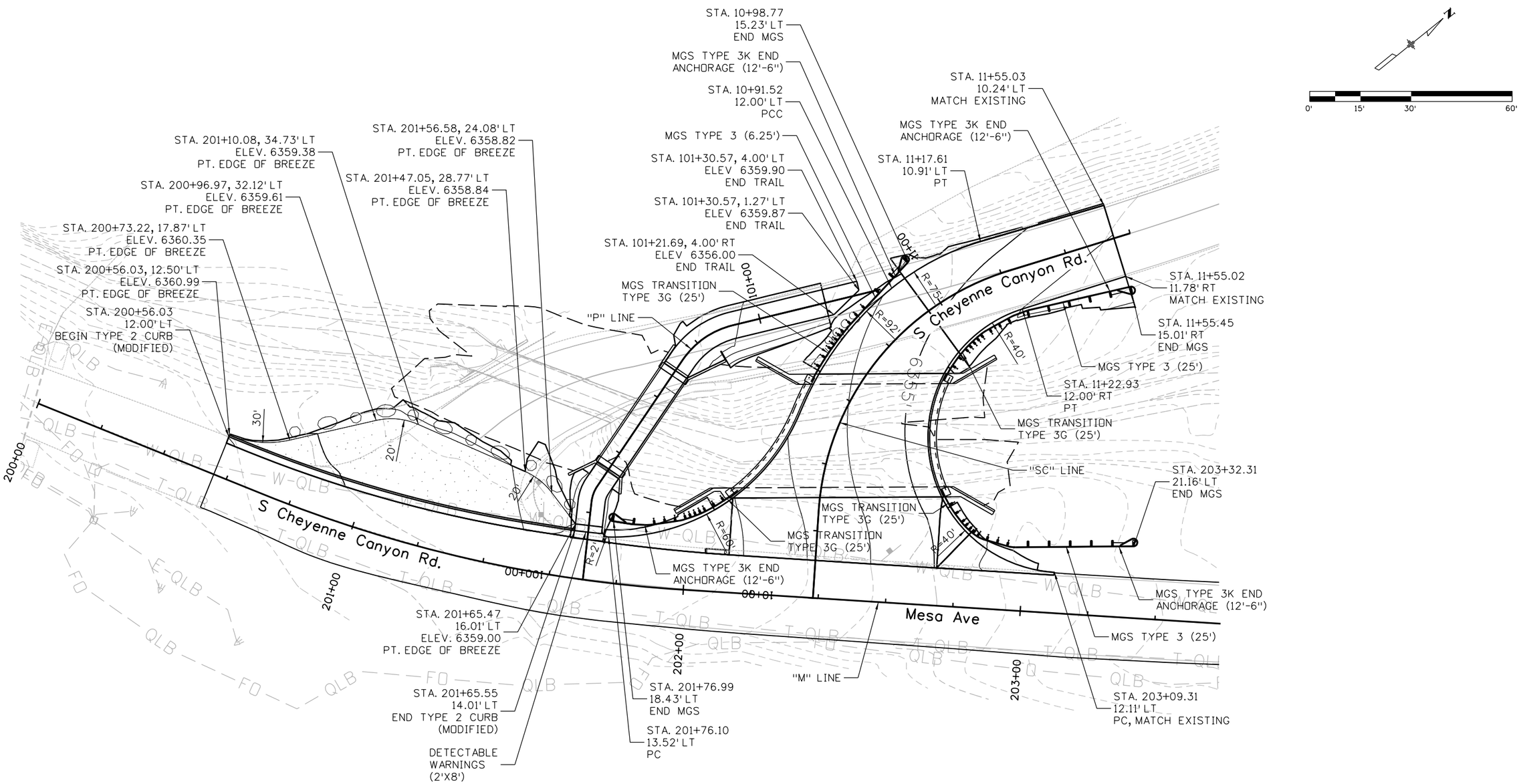
Unit Information Unit Leader Initials					Void:
Jacobs					

COLORADO SPRINGS

SOUTH CHEYENNE CANYON BRIDGE
ROADWAY PROFILES

Designer:DJ		Structure Numbers	
Detailer: JAM			
Sheet Subset:ROADWAY	Subset Sheets: RD14 of 15		

Project No./Code	XXXXXXXXX
	XXXXX
Sheet Number	14



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Unit Information Unit Leader Initials					Void:
Jacobs					

COLORADO SPRINGS

SOUTH CHEYENNE CANYON BRIDGE
ROADWAY DETAIL

Designer: TJH		Structure Numbers	
Detailer: JAM			
Sheet Subset: ROADWAY	Subset Sheets: RD15 of 15		

Project No./Code	XXXXXXXXX
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Sheet Number	15

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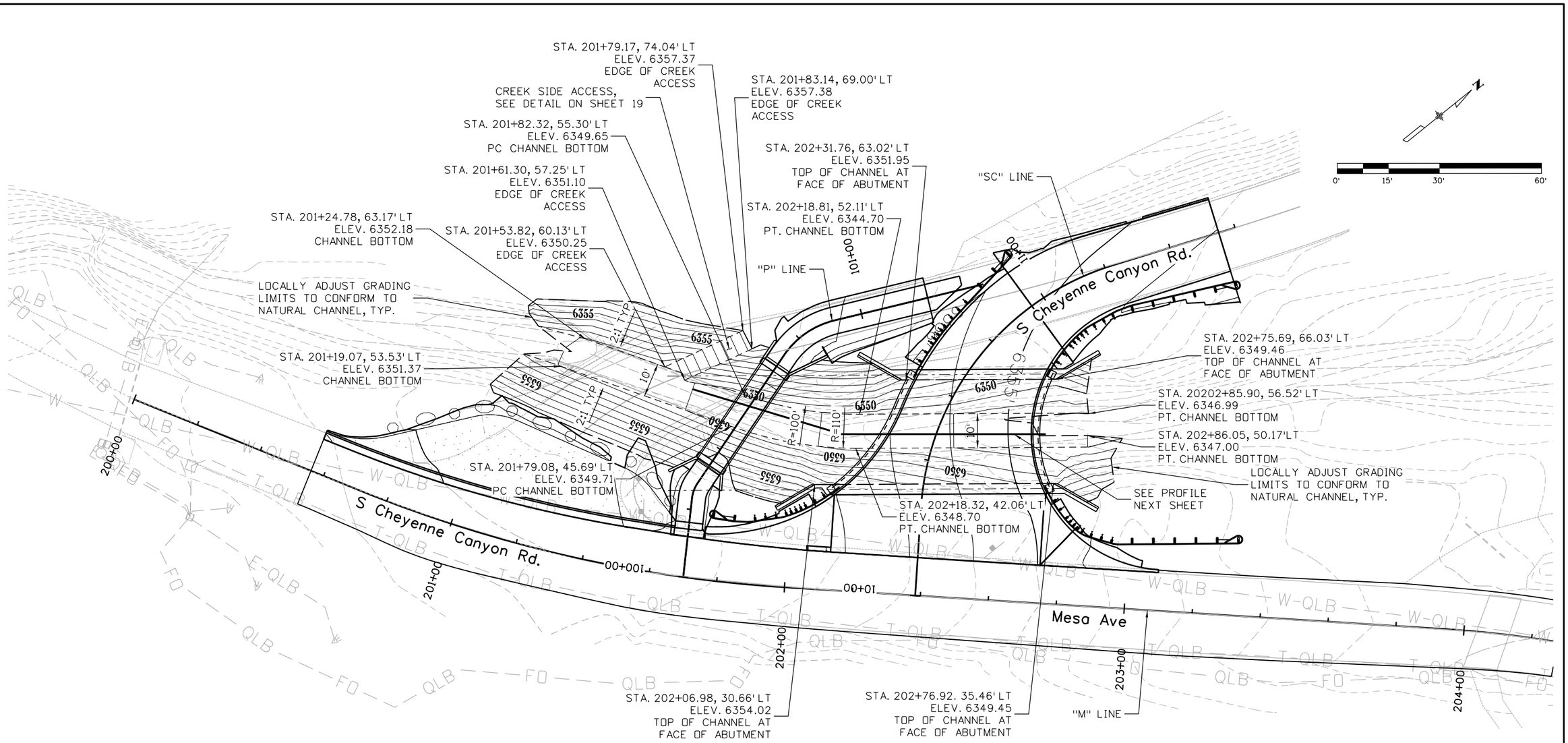

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Unit Information Unit Leader Initials					Void:
Jacobs					Designer: ZL / Detailer: JAM / Sheet Subset: HYDRAULICS / Structure Numbers / Subset Sheets: DR01 of 4

COLORADO SPRINGS

SOUTH CHEYENNE CANYON BRIDGE
GRADING PLAN

Project No./Code: XXXXXXXXX
XXXXX
Sheet Number 16

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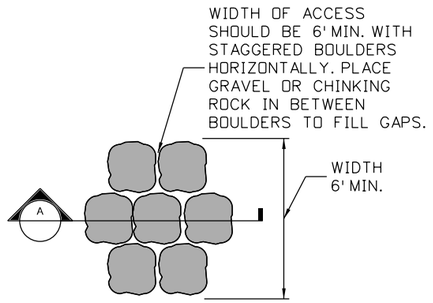
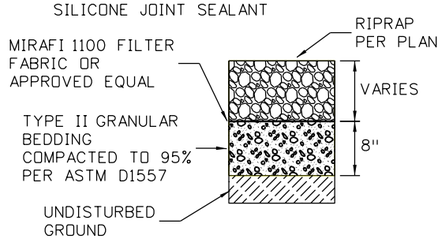


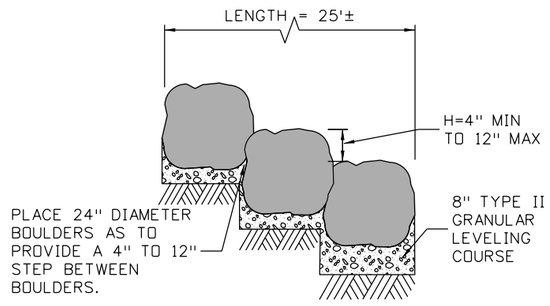
1 CREEK SIDE ACCESS
NTS PLAN VIEW

NOTES

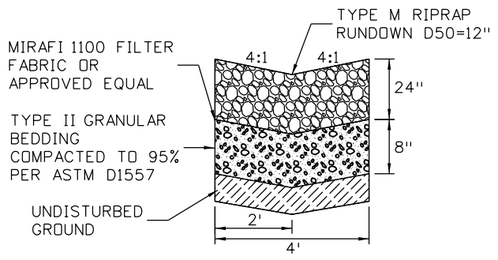
1. CONCRETE SHALL BE CLASS D
2. REBAR SHALL BE EPOXY COATED
3. WEEPHOLES SHALL BE CONSIDERED INCIDENTAL TO WORK COMPLETED
4. SAWCUT 3/16" WIDE 1.5" DEEP CONTROL JOINTS AT MID SPAN OF FALSE BOTTOM IN EACH DIRECTION AND FILL WITH SILICONE JOINT SEALANT



2 TYPICAL RIPRAP SECTION
NTS



A CREEK SIDE TRAIL ACCESS - PROFILE
NTS



3 RIPRAP RUNDOWN SECTION
NTS

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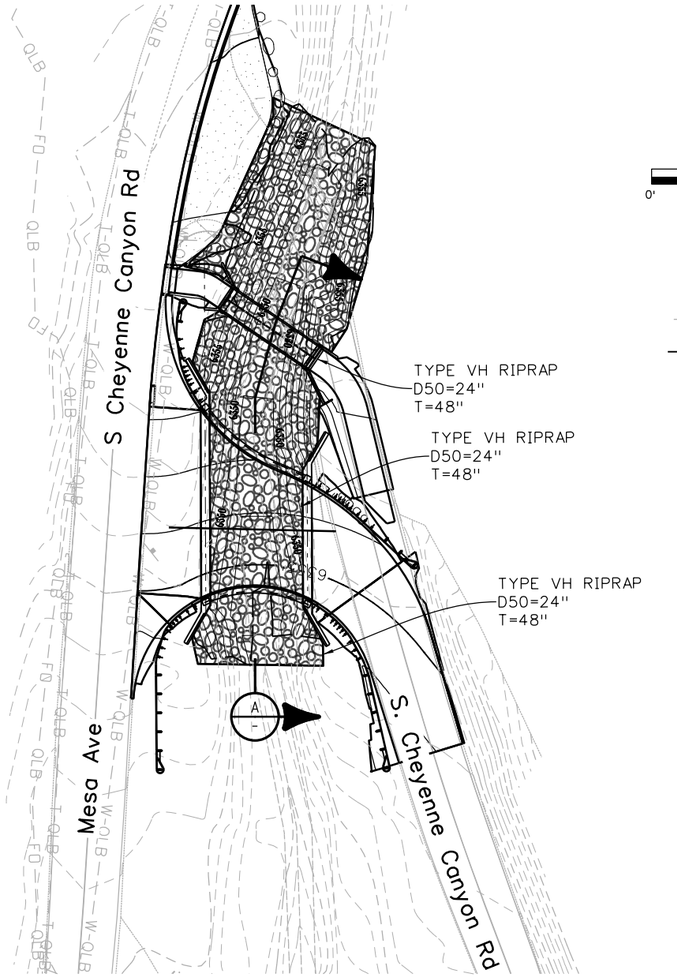
Unit Information Unit Leader Initials				Void:	Sheet Subset: HYDRAULICS / Subset Sheets: DR02 of 4
Jacobs					

COLORADO SPRINGS

Project No./Code
XXXXXXXXX
XXXXX
Sheet Number 17



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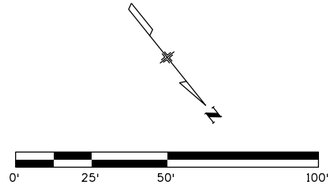
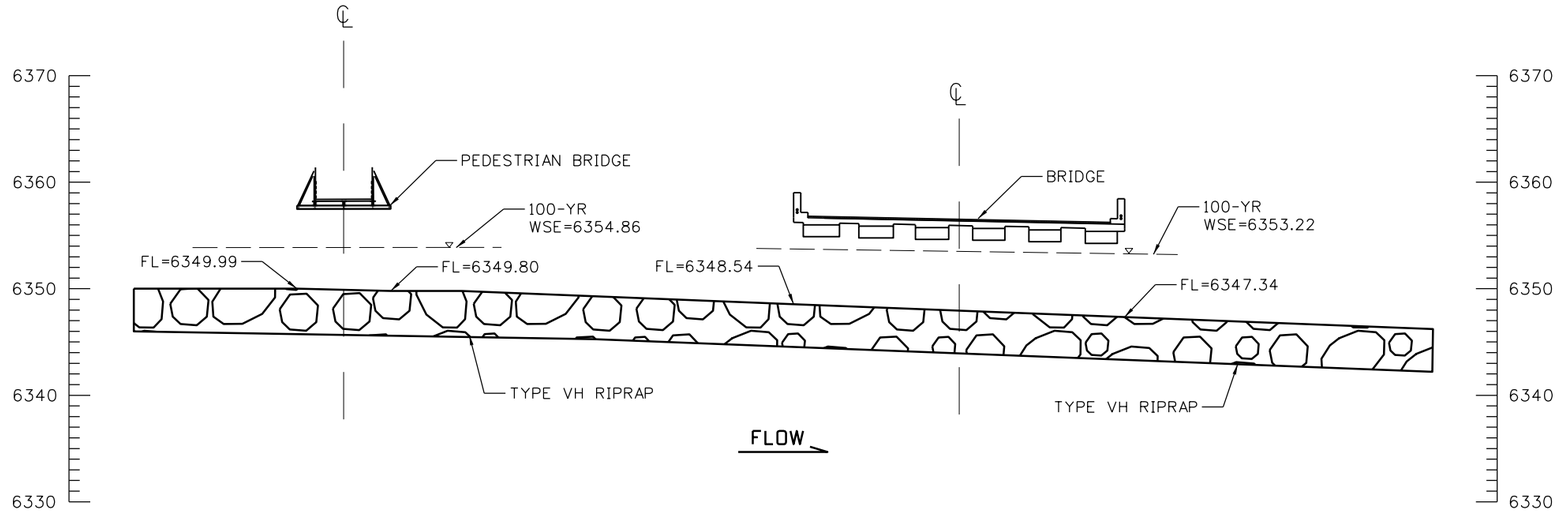


LEGEND

- RIPRAP
- 6600 EXISTING CONTOUR
- 6600 PROPOSED CONTOUR



A / XX SECTION THROUGH BRIDGE

NTS

NOTES

1. REFER TO STRUCTURE PLANS FOR BRIDGE AND WINGWALL DETAILS.
3. FOR HYDRAULIC INFORMATION REFER TO THE HYDRAULIC DATA SHEETS IN THE STRUCTRAL PLANS.

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Print Date: 6/15/2023	0000	Sheet Revisions			As Constructed
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Unit Information Unit Leader Initials					Void:
Jacobs					

COLORADO SPRINGS

SOUTH CHEYENNE CANYON BRIDGE
BRIDGE HYDRAULIC PLAN & PROFILE

Designer: ZL	Structure Numbers		Project No./Code XXXXXXXXX
Detailer: JAM			XXXXX
Sheet Subset: HYDRAULICS	Subset Sheets: DR03 of 4		Sheet Number 18

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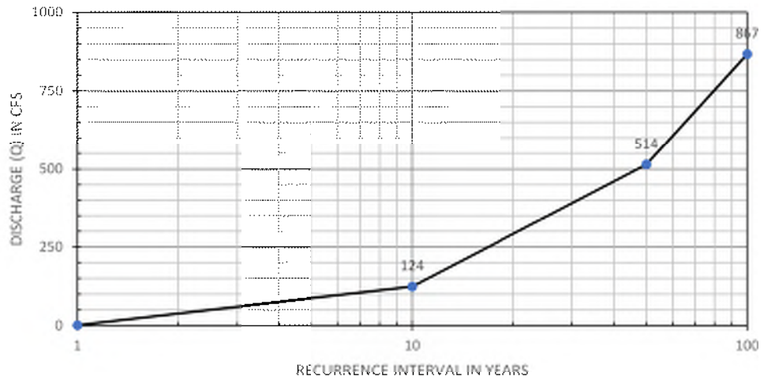
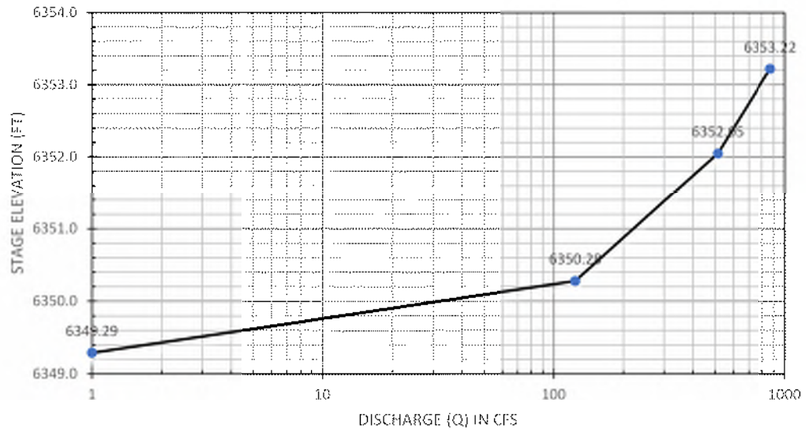
DISCHARGE VS FREQUENCY

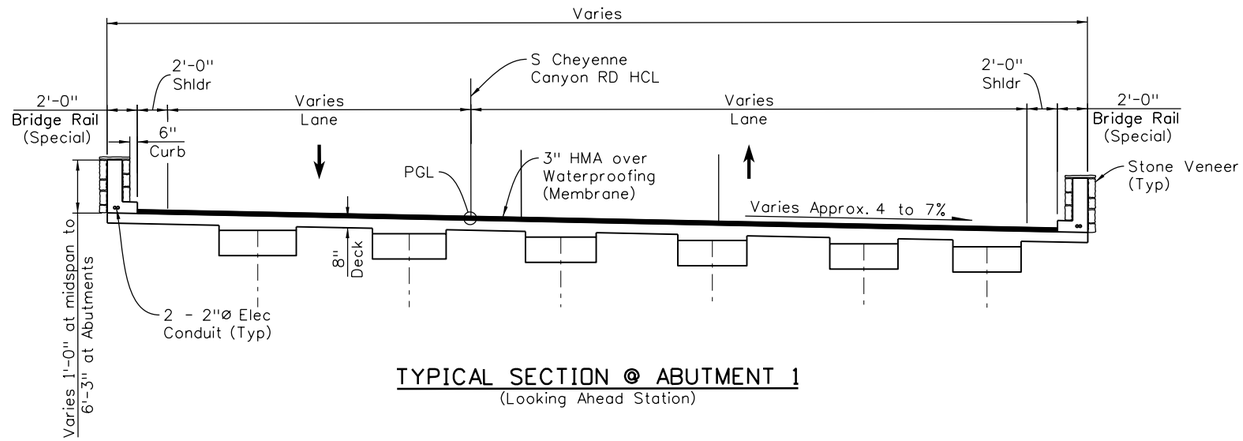


STAGE VS. DISCHARGE

STAGE UPSTREAM OF BRIDGE

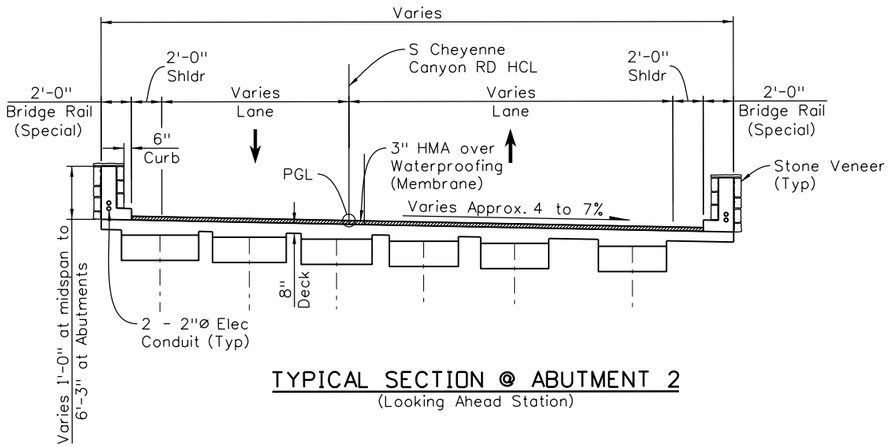


CHANNEL DESCRIPTION - BRIDGE D										
DRAINAGE AREA:	9.9	MI^2								
BOTTOM MATERIAL:		COHESIVE	X	NON-COHESIVE						
BOTTOM MATERIAL SIZE:		CLAY		SILT	X	SAND	X	GRAVEL		
	X	COBBLES		OTHER						
STREAM FORM:	X	STRAIGHT		MEANDERING		BRAIDED				
MANNING'S "n" FOR DESIGN:	0.050	CHANNEL	0.080	OVERBANK						
DEBRIS:	X	BRUSH	X	TREES/LOGS	X	ICE		OTHER		
COMPARISON OF HYDRAULICS(100 y	VELOCITY			FREEBOARD		BACKWATER				
EXISTING CHANNEL	9.8	FPS		0	FT	100	FT	OT		
PROPOSED CHANNEL	10.1	FPS		0.6	FT	20	FT			



TYPICAL SECTION @ ABUTMENT 1

(Looking Ahead Station)



TYPICAL SECTION @ ABUTMENT 2

(Looking Ahead Station)

NOTES:

1. LAYOUT LINE INTERSECTS HCL AT BF ABUT 2 ON BEARING 49° 56'16".

Print Date: 6/15/2023		Sheet Revisions						As Constructed	SOUTH CHEYENNE CANYON BRIDGE		Project No./Code
File Name: 017.05_SCC-BRDG-HYD-02.dgn		Date:	Comments		Init.			No Revisions:	BRIDGE HYDRAULIC DETAILS		XXXXXXXXX
Horiz. Scale: 1:20 Vert. Scale: As Noted						COLORADO SPRINGS		Revised:	Designer: ZL	Structure Numbers	XXXXX
Unit Information Unit Leader Initials									Detailer: JAM		
Jacobs								Void:	Sheet Subset: HYDRAULICS	Subset Sheets: DR04 of 4	Sheet Number 19

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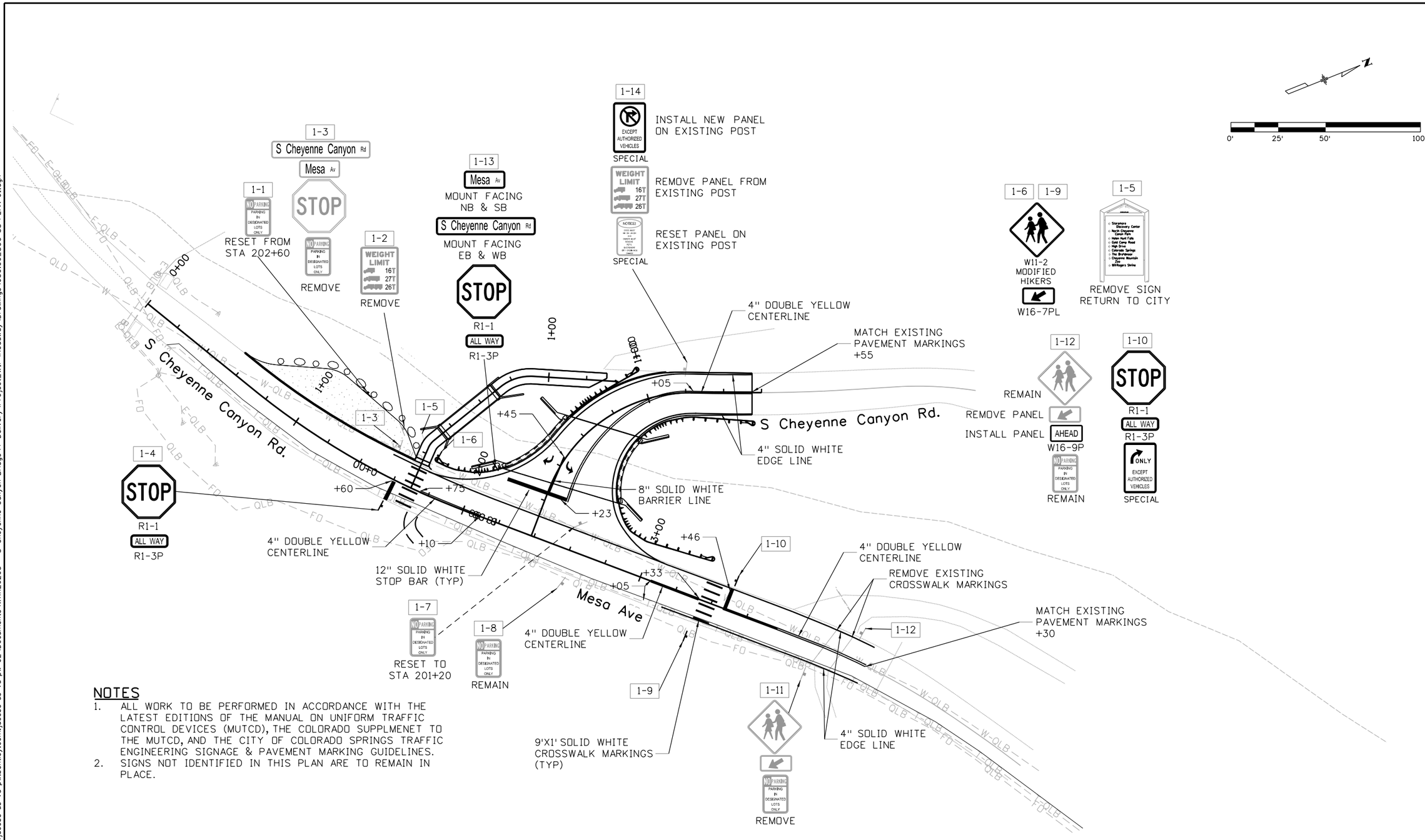

NOTES

1. ALL WORK TO BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), THE COLORADO SUPPLMENET TO THE MUTCD, AND THE CITY OF COLORADO SPRINGS TRAFFIC ENGINEERING SIGNAGE & PAVEMENT MARKING GUIDELINES.
2. SIGNS NOT IDENTIFIED IN THIS PLAN ARE TO REMAIN IN PLACE.

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Unit Information Unit Leader Initials					Void:
Jacobs					

COLORADO SPRINGS

SOUTH CHEYENNE CANYON BRIDGE
SIGNING AND STRIPING

Designer: JDB	Structure Numbers		Project No./Code XXXXXXXXX
Detailer: JDB			XXXXX
Sheet Subset: TRAFFIC	Subset Sheets: SS01 of 1		Sheet Number 20

GENERAL NOTES

ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 2022 EDITION, AS APPLICABLE TO THE PROJECT.

STRUCTURE EXCAVATION AND BACKFIL FOR BRIDGES SHALL BE AS SHOWN ON THE PLANS, AND PER CDOT M&S STANDARDS M-206-1 FOR CAST-IN-PLACE RETAINING WALLS.

EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATIONS M213.

THE FINAL FINISH FOR ALL EXPOSED CONCRETE SURFACES SHALL BE CLASS 2, TO ONE FOOT BELOW FINISHED GRADE, UNLESS OTHERWISE NOTED.

ALL EXTERIOR CONCRETE CORNERS SHALL BE CONSTRUCTED WITH ¾" CHAMFERS, UNLESS NOTED OTHERWISE.

LEVELING PADS ARE UNLAMINATED BEARINGS. THEY SHALL BE CUT OR MOLDED FROM AASHTO ELASTOMER GRADE 3, 4, OR 5 AS DESCRIBED IN TABLES 705-1 AND 705-2 WITH A DUROMETER (SHORE "A") HARDNESS OF 60.

GRADE 60 REINFORCING STEEL IS REQUIRED.

ALL REINFORCING STEEL SHALL BE EPOXY COATED UNLESS OTHERWISE NOTED.

Ⓝ DENOTES NON COATED REINFORCING STEEL.

STRUCTURAL CONCRETE EXPOSED TO SOIL SHALL CONFORM TO CEMENTITIOUS MATERIALS REQUIREMENTS CLASS 1 CORRESPONDING TO SULFATE EXPOSURE CLASS 1. ALL STRUCTURAL CONCRETE NOT EXPOSED TO SOIL SHALL CONFORM TO CEMENTITIOUS MATERIALS REQUIREMENTS CLASS 0 CORRESPONDING TO SULFATE EXPOSURE CLASS 0.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE STABLILTY OF THE STRUCTURE DURING CONSTRUCTION.

B.F.	=	BACK FACE
BRG.	=	BEARING
CONST.	=	CONSTRUCTION
EA.	=	EACH
E.F.	=	EACH FACE
HCL	=	HORIZONTAL CONTROL LINE
F.F	=	FAR FACE
N.F.	=	NEAR FACE
SPA.	=	SPACE OR SPACES

PERMANENT DECK FORMS ARE REQUIRED AND SHALL BE STEEL DECK FORMS.

COMPRESSED JOINT MATERIAL SHALL BE PRE-COMPRESSED, CHEMICALLY RESISTANT, OPEN CELL POLYURETHANE FOAM SEALANT, IMPREGNATED WITH A WATER-REPLLENT MATERIAL, WITH ADHESIVE BACKING ON BOTH SIDES. THE JOINT MATERIAL SHALL BE EPOXIED IN PLACE, AND ALL SPLICES SE ALED, AS RECOMMENDED BY THE SUPPLIER OF THE JOINT MATERIAL. THE COST SHALL BE INCLUDED N THE COST OF ITEM 601, CUT STONE VENEER.

ACCEPTABLE COMPRESSED JOINT MATERIAL ALTERNATIVES:
- WILL-SEAL
- POLY-TITE "N"
- OR APPROVED EQUAL

STATIONS, ELEVATIONS, AND DIMENSIONS CONTAINED IN THESE PLANS ARE CALCULATED FROM A RECENT FIELD SURVEY. THE CONTRACTOR SHALL VERIFY ALL DEPENDENT DIMENSIONS IN THE FIELD BEFORE ORDERING OR FABRICATING ANY MATERIAL.

UTILITIES ARE DEPICTED ON THESE PLANS IN ACCORDANCE WITH THEIR ACHIEVED "QUALITY LEVEL" AS DEFINED IN THE AMERICAN SOCIETY OF CIVIL ENGINEER'S DOCUMENT ASCE 38 "STANDARD GUIDELINE FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA." RELIANCE UPON THESE DATA FOR RISK MANAGEMENT PURPOSE DURING BIDDING DOES NOT RELIEVE THE EXCAVATOR OR UTILITY OWNER FROM FOLLOWING ALL APPLICABLE UTILITY DAMAGE PREVENTION STATUTES, POLICIES, AND/OR PROCEDURES DURING EXCAVATION.

IT IS IMPORTANT THAT THE CONTRACTOR INVESTIGATES AND UNDERSTANDS THE SCOPE OF WORK BETWEEN THE PROJECT OWNER AND THEIR ENGINEER REGARDING THE SCOPE AND LIMITS OF THE UTILITY INVESTIGATIONS LEADING TO THESE UTILITY DEPICATIONS.

THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UNDERGROUND UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. THE CONTRACTOR SHALL CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO AT 1-800-922-1987 AT LEAST 3 BUSINESS DAYS (NOT INCLUDING THE DAY OF NOTIFICATION) PRIOR TO ANY EXCAVATION OR OTHER EARTHWORK.

DESIGN DATA

AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 9th EDITION, WITH CURRENT INTERIMS AS MODIFIED BY CDOT BRIDGE DESIGN MANUAL 2023

DESIGN METHOD: LOAD AND RESISTANCE FACTOR DESIGN

LIVE LOAD: HL-93 (DESIGN TRUCK OR TANDEM, AND DESIGN LANE LOAD)
CDOT PERMIT VEHICLE 192 TONS
LIVE LOAD SURCHARGE = 3'-0" OF SOIL

DEAD LOAD:

ASSUMES 36 LBS. PER SQ. FT. FOR BRIDGE DECK OVERLAY
ASSUMES 5 LBS. PER SQ. FT. FOR UTILITIES

REINFORCED CONCRETE:

CLASS D CONCRETE:	f'c	=	4,500 psi
REINFORCING STEEL:	fy	=	60,000 psi

CAISSON CONCRETE:

CLASS BZ CONCRETE:	f'c	=	4,000 psi
REINFORCING STEEL:	fy	=	60,000 psi

PRECAST PRESTRESSED CONCRETE:

CLASS PS CONCRETE:	f'c	=	8,500 psi at 28 Days
	f'ci	=	6,500 psi at transfer of prestress
PRESTRESSED STRAND:	f's	=	270,000 psi

BACKFILL (CLASS 1) (ALL WALLS):

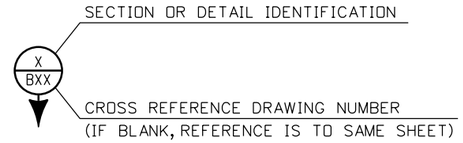
ø	=	34°
Ka	=	0.28
K	=	0.44

DESIGN EARTHQUAKE:
SOIL PROFILE: SITE CLASS C
MOMENT MAGNITUDE: PGA = 0.057

INDEX OF DRAWINGS

BRIDGE DESCRIPTION

1-SPAN (33'-7") BRIDGE
COMPOSITE CONCRETE SLAB
& PRECAST/PRESTRESSED
54"Wx20"D CONCRETE SLAB GIRDERS
S. CHEYENNE CANYON RD. OVER N. CHEYENNE CREEK
41'-9" MIN. WIDTH OUT TO OUT (VARIES)
39'-5⅞" MIN. ROADWAY CURB TO CURB (VARIES)
1° 32' 3" SKEW
2'-0" BRIDGE RAIL (SPECIAL)



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Unit Information				Void:
Jacobs				

COLORADO SPRINGS
OLYMPIC CITY USA

SOUTH CHEYENNE CANYON BRIDGE
GENERAL INFORMATION

Designer: A. Regalado	Structure Numbers		Project No./Code: XX XX-XX
Detailer: J. Mateo-Lucas			XXXXXX
Sheet Subset: STRUCTURAL	Subset Sheets: B01 of		Sheet Number 21

QuintaAH 3:47:01 PM pw:\\jacobs-us-vo-pw.bentley.com:jacobs-us-vo-pw-02\Documents\WXX76205 - S Cheyenne Canyon Bridge\4 Delivery\Project_WIP\Bridge\Drawings\SSC Bridge\009_SCC-BR-PLAN-01.dgn

SUMMARY OF QUANTITIES						
Item No.	Description	Unit	Superstructure	Abutment 1	Abutment 2	Total
206-00000	Structure Excavation	CY	0	303	226	529
206-00100	Structure Backfill (Class 1)	CY	0	232	158	390
206-00360	Mechanical Reinforcement of Soil	CY	0	197	124	321
403-34871	Hot Mix Asphalt (Grading SX) (100) (PG 76-28)	TON	30	0	0	30
503-00024	Drilled Shaft (24 Inch)	LF	0	147	91	238
503-00310	Crosshole Sonic Logging Testing	EACH	0	1	1	2
515-00120	Waterproofing (Membrane)	SY	180	0	0	180
601-03000	Concrete Class D	CY	64	38	29	131
601-40005	Cut Stone Veneer	SF	717	313	118	1148
602-00020	Reinforcing Steel (Epoxy Coated)	LB	18374	4513	3662	26549
606-10200	Bridge Rail (Special)	LF	82	0	0	82
613-00200	2 Inch Electrical Conduit	LF	168	0	0	168
618-06036	Prestressed Concrete Slab (depth Greater Than 13 Inches)	SF	971	0	0	971

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Print Date: 6/15/2023
File Name: 009_SCC-BR-PLAN-02.dgn
Horiz. Scale: Vert. Scale: As Noted
Unit Information

Jacobs

Sheet Revisions		
Date:	Comments	Init.

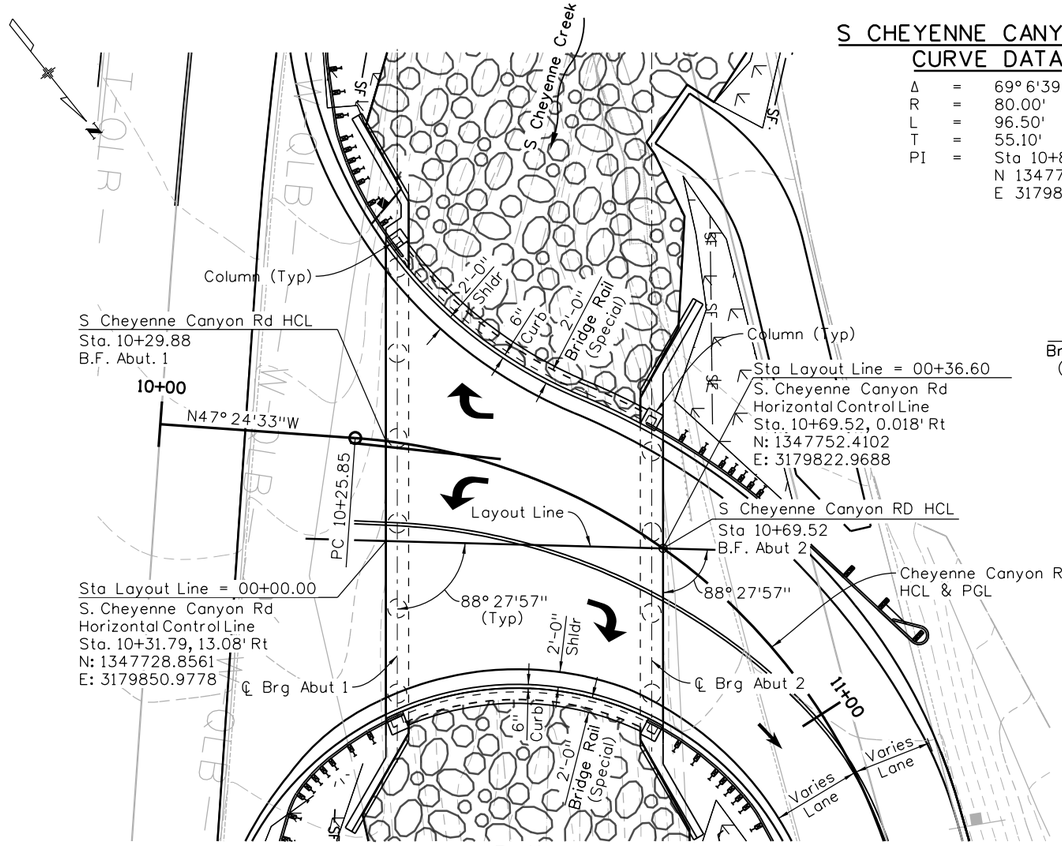
COLORADO SPRINGS
OLYMPIC CITY USA

As Constructed
No Revisions:
Revised:
Void:

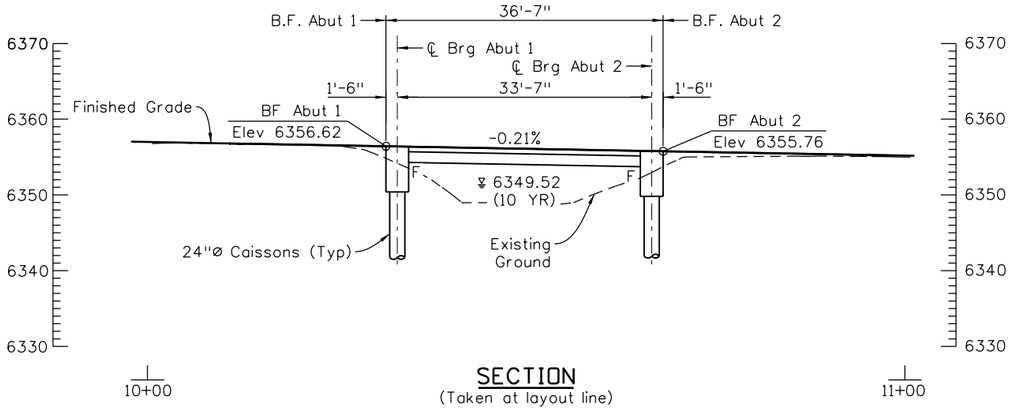
SOUTH CHEYENNE CANYON BRIDGE
SUMMARY OF QUANTITIES

Designer: A. Regalado
Detailer: Jaime Mateo-Lucas
Sheet Subset: STRUCTURAL
Structure Numbers
Subset Sheets: B02 of

Project No./Code
XX XX-XX
XXXXXX
Sheet Number 22



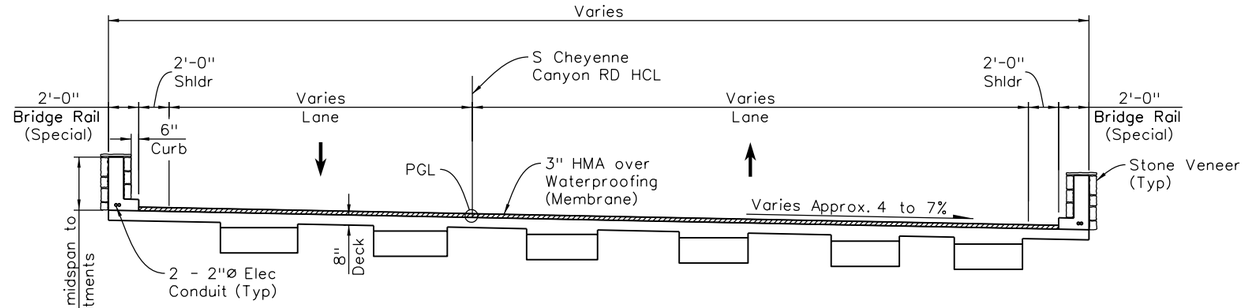
PLAN



SECTION
(Taken at layout line)

S CHEYENNE CANYON RD
CURVE DATA

Δ	=	69° 6'39.60"
R	=	80.00'
L	=	96.50'
T	=	55.10'
PI	=	Sta 10+80.95
		N 1347753.02
		E 3179805.10



TYPICAL SECTION
(Looking Ahead Station)

NOTES:

1. Layout line Intersects HCL at BF Abut 2 on bearing 49° 56'16".

90% DESIGN - NOT FOR CONSTRUCTION

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File Name: 009_SCC-BR-PLAN-03.dgn	Date:	Comments	Init.	No Revisions:
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Unit Information				Void:
Jacobs				

COLORADO SPRINGS
OLYMPIC CITY USA

SOUTH CHEYENNE CANYON BRIDGE
GENERAL LAYOUT

Designer:	A. Regalado	Structure Numbers	
Detailer:	A. Quintana		
Sheet Subset:	STRUCTURAL	Subset Sheets:	B03 of

Project No./Code	XX XX-XX
	XXXXXX
Sheet Number	23

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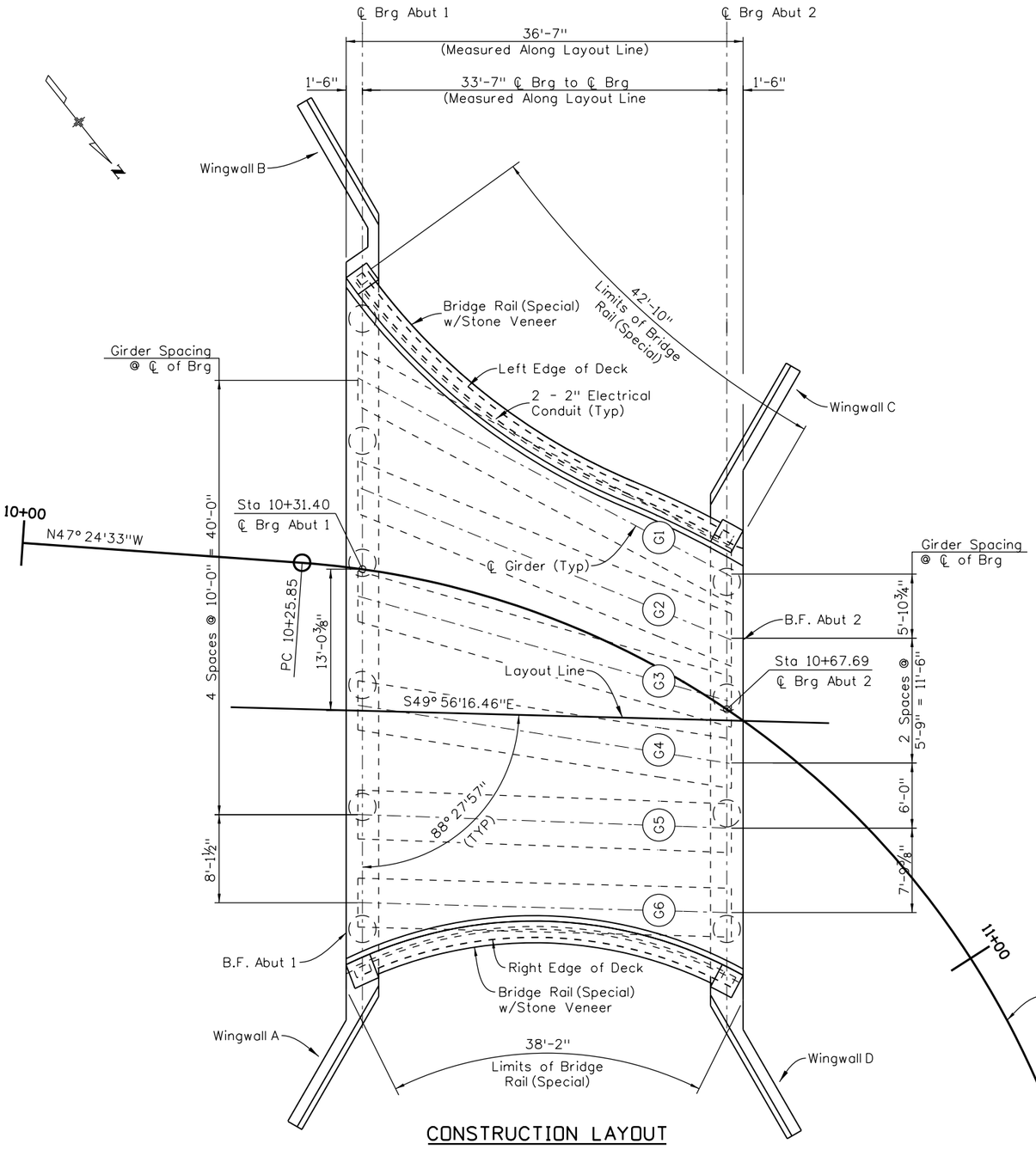

CONSTRUCTION LAYOUT

DECK OVERHANG DIMENSIONS		
Location	Left Edge of Deck	Right Edge of Deck
℄ Brg Abut 1	6'-8½"	6'-8¼"
1.1	5'-4½"	5'-2⅞"
1.2	4'-4"	4'-1⅞"
1.3	3'-7"	3'-4⅝"
1.4	3'-0"	2'-11¼"
1.5	2'-9½"	2'-9⅜"
1.6	2'-9¼"	2'-11"
1.7	3'-0"	3'-4⅜"
1.8	3'-3½"	4'-1½"
1.9	3'-5⅛"	5'-2¾'
℄ Brg Abut 2	3'-4⅞'	6'-8½"

NOTES:

1. Edge of deck overhang dimensions are from centerline of exterior girders G1 and G6 to edge of deck and are measured perpendicular to the girders.
2. For girder details see Sheet B13.
3. Electrical conduits in bridge rail: 2-2" Conduits in each rail.
4. Extend Electrical conduits 2" past the bridge rail.

S CHEYENNE CANYON RD
CURVE DATA

Δ = 69° 6'39.6"
R = 80.00'
L = 96.50'
T = 55.10'
PI = Sta 10+80.95
N 1347753.02
E 3179805.10

90% DESIGN - NOT FOR CONSTRUCTION

Print Date: 6/15/2023	Sheet Revisions		
File Name: 009_SCC-BR-PLAN-05.dgn	Date:	Comments	Init.
Horiz. Scale: Vert. Scale: As Noted			
Unit Information			
Jacobs			

COLORADO SPRINGS
OLYMPIC CITY USA

As Constructed	SOUTH CHEYENNE CANYON BRIDGE		Project No./Code
No Revisions:	CONSTRUCTION LAYOUT		XX XX-XX
Revised:	Designer: A. Regalado	Structure Numbers	XXXXXX
Void:	Detailer: A. Quintana		
	Sheet Subset: STRUCTURAL	Subset Sheets: B05 of	Sheet Number 24

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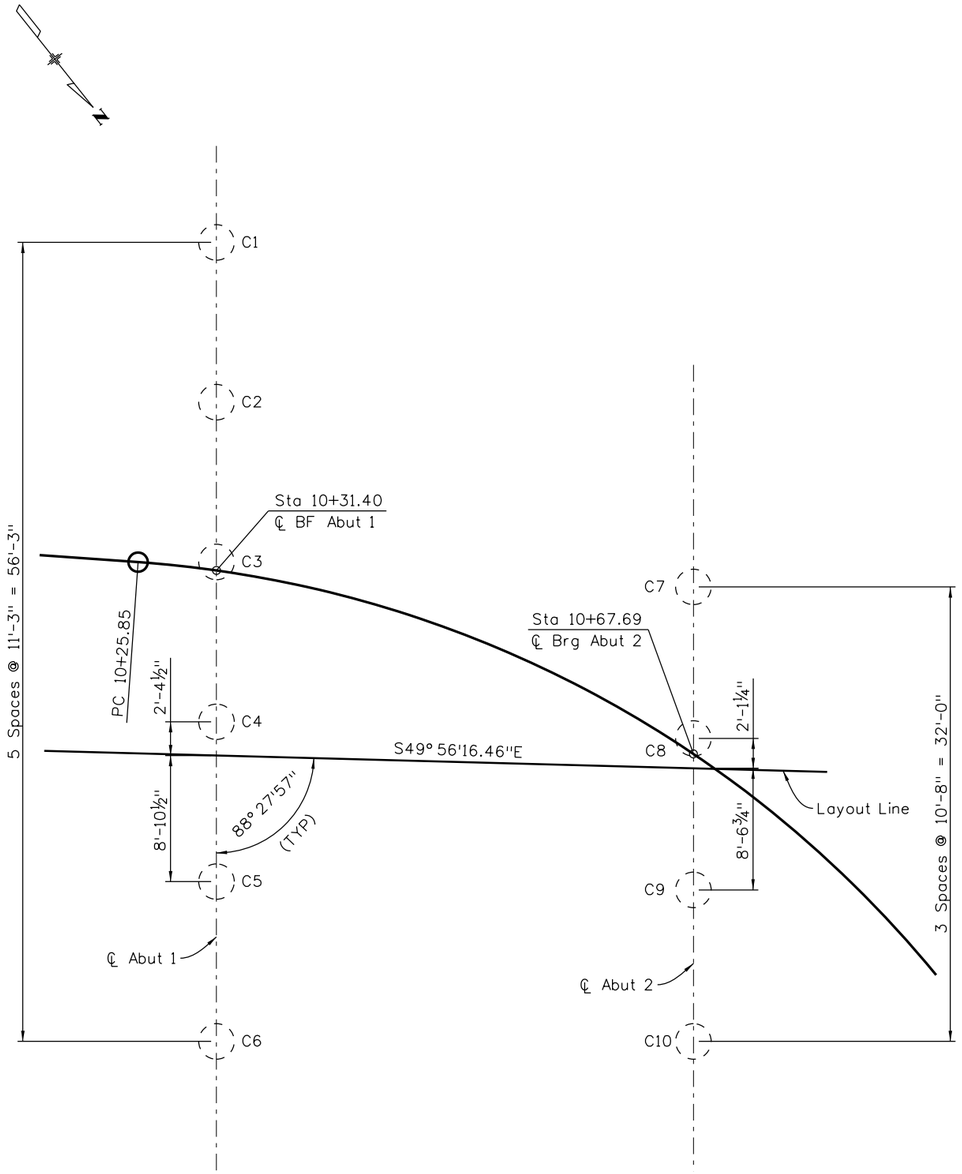
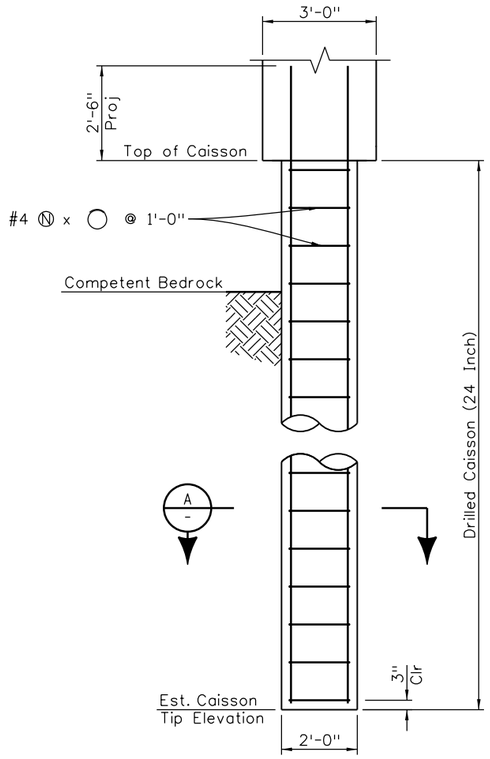
Location	Caisson	Caisson Size	Max. Load (Factored) (kips)	Max. Load (Service) (kips)	Top of Caisson Elevation	Estimated Top of Bedrock Elev.	Estimated Tip Elev.	Min. Required Tip Elevation	As-Built Tip Elev.
Abutment 1	C1	24"	230.49	158.67	6351.17	6340	6325	6325	
	C2	24"	230.49	158.67	6350.49	6340	6325	6325	
	C3	24"	230.49	158.67	6349.81	6340	6325	6325	
	C4	24"	230.49	158.67	6349.14	6340	6325	6325	
	C5	24"	230.49	158.67	6348.46	6340	6325	6325	
	C6	24"	230.49	158.67	6347.78	6340	6325	6325	
Abutment 2	C7	24"	229.71	159.59	6349.61	6341	6326	6326	
	C8	24"	229.71	159.59	6349.00	6341	6326	6326	
	C9	24"	229.71	159.59	6348.38	6341	6326	6326	
	C10	24"	229.71	159.59	6347.77	6341	6326	6326	



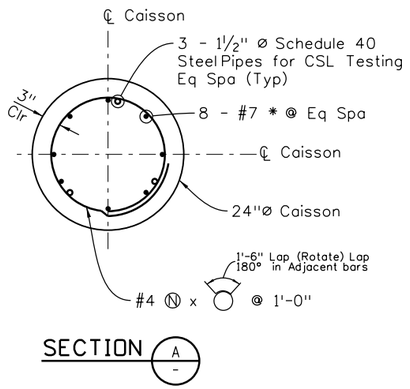
FOUNDATION LAYOUT



CAISSON DETAIL

CAISSON NOTES:

1. Top of competent bedrock elevation shall be verified at time of construction by engineer.
2. The use of temporary casing and dewatering during drilling may be required. the cost of temporary casing and dewatering shall not be paid for separetly, but shall be included in bid item 503-Drilled Caisson (24 inch).
3. The contractor shall anticipate encountering hard bedrock during drilling.
4. Resistance factor ø = 0.60 for end bearing and for side shear.
5. Ultimate allowable end bearing = 60 ksf x ø x ag.
6. Ultimate allowable side shear resistance = 5 ksf x ø x perimeter x length from 1' to 5' into bedrock.
7. Caisson construction shall proceed per CDOT specification 503, with exception that crosshole sonic log (csl) tube installation and testing not required.



SECTION A -

90% DESIGN - NOT FOR CONSTRUCTION

Print Date: 6/15/2023	Sheet Revisions		
File Name: 009_SCC-BR-PLAN-06.dgn	Date:	Comments	Init.
Horiz. Scale: Vert. Scale: As Noted			
Unit Information			
Jacobs			

COLORADO SPRINGS
OLYMPIC CITY USA

As Constructed	SOUTH CHEYENNE CANYON BRIDGE			Project No./Code
No Revisions:	FOUNDATION LAYOUT			XX XX-XX
Revised:	Designer: A. Regalado	Structure Numbers		XXXXXX
Void:	Detailer: A. Quintana			
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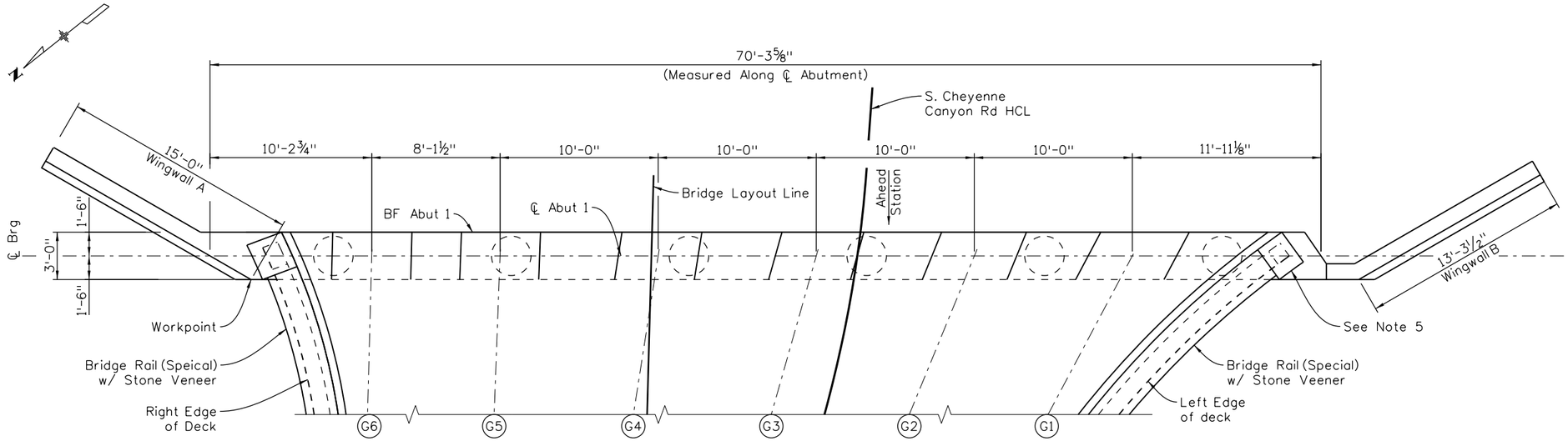
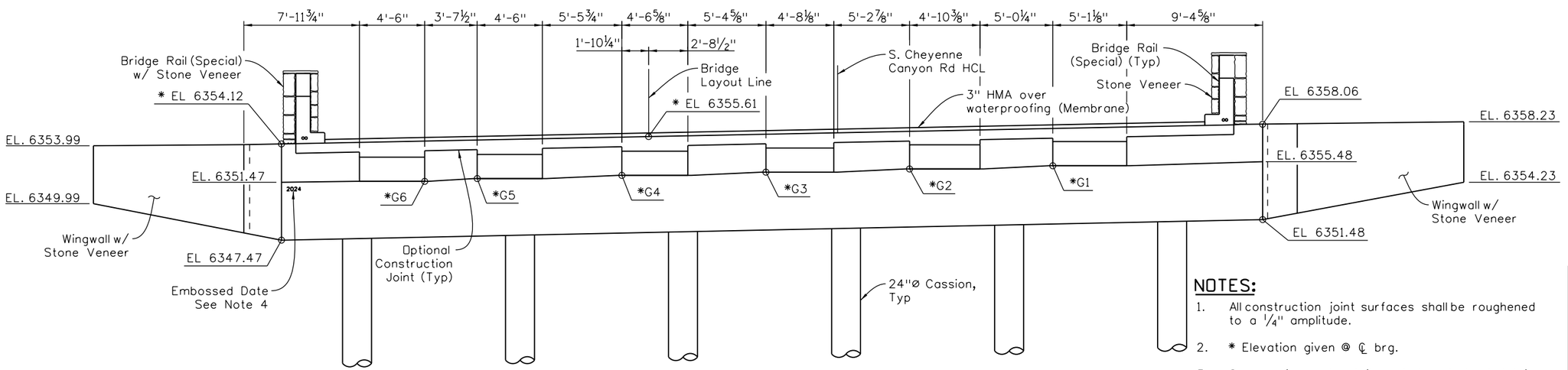


PLAN

BRG. ELEVATIONS	
LOCATION	*ELEVATION
G1	6354.58
G2	6354.04
G3	6353.45
G4	6352.87
G5	6352.28
G6	6351.78



ELEVATION
(Dimensions Along ℄ Abutment)

NOTES:

1. All construction joint surfaces shall be roughened to a ¼" amplitude.
2. * Elevation given @ ℄ brg.
3. See leveling pad detail on abutment sheet details.
4. Emboss year 4.5" high "Plantin Bold" typeface with ¼" recess. Place at one abutment face in visible corner or as directed by the City engineer.
5. See Sheet B20 for column aesthetic details.

Print Date: 6/15/2023	Sheet Revisions		
File Name: 009_SCC-BR-PLAN-07.dgn	Date:	Comments	Init.
Horiz. Scale: Vert. Scale: As Noted			
Unit Information			
Jacobs			

COLORADO SPRINGS
OLYMPIC CITY USA

As Constructed	SOUTH CHEYENNE CANYON BRIDGE		Project No./Code
No Revisions:	ABUTMENT 1 PLAN & ELEVATION		XX XX-XX
Revised:	Designer: A. Regalado	Structure Numbers	XXXXXX
Void:	Detailer: A. Quintana		
	Sheet Subset: STRUCTURAL	Subset Sheets: B07 of	Sheet Number 26

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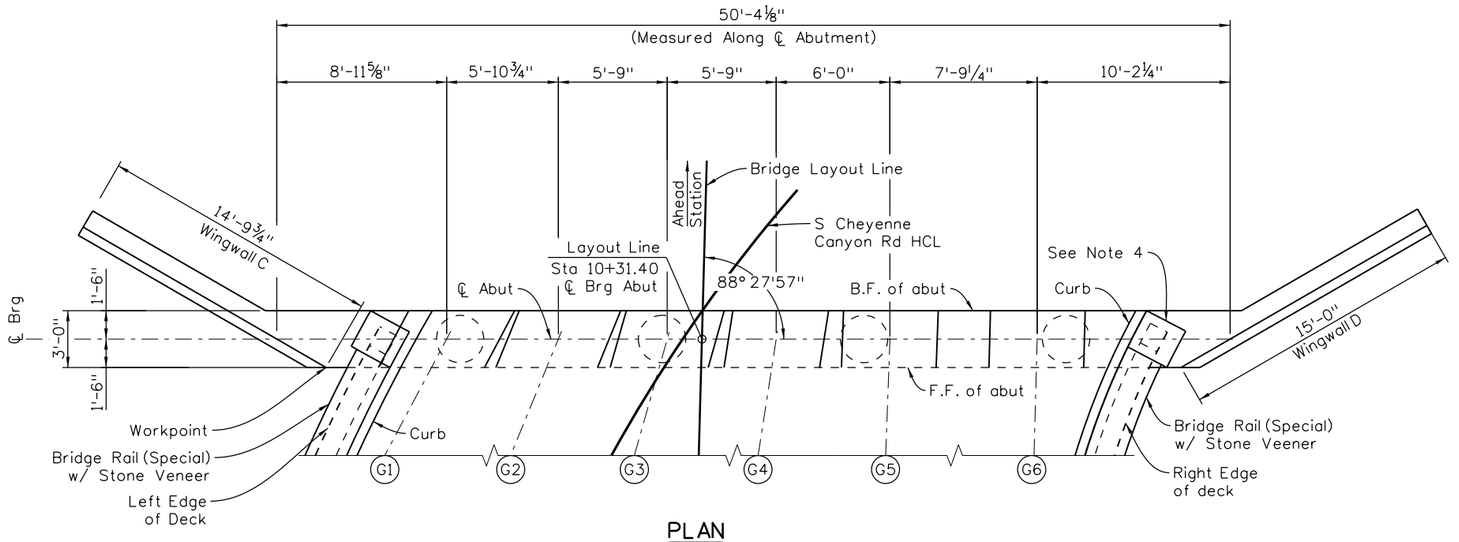
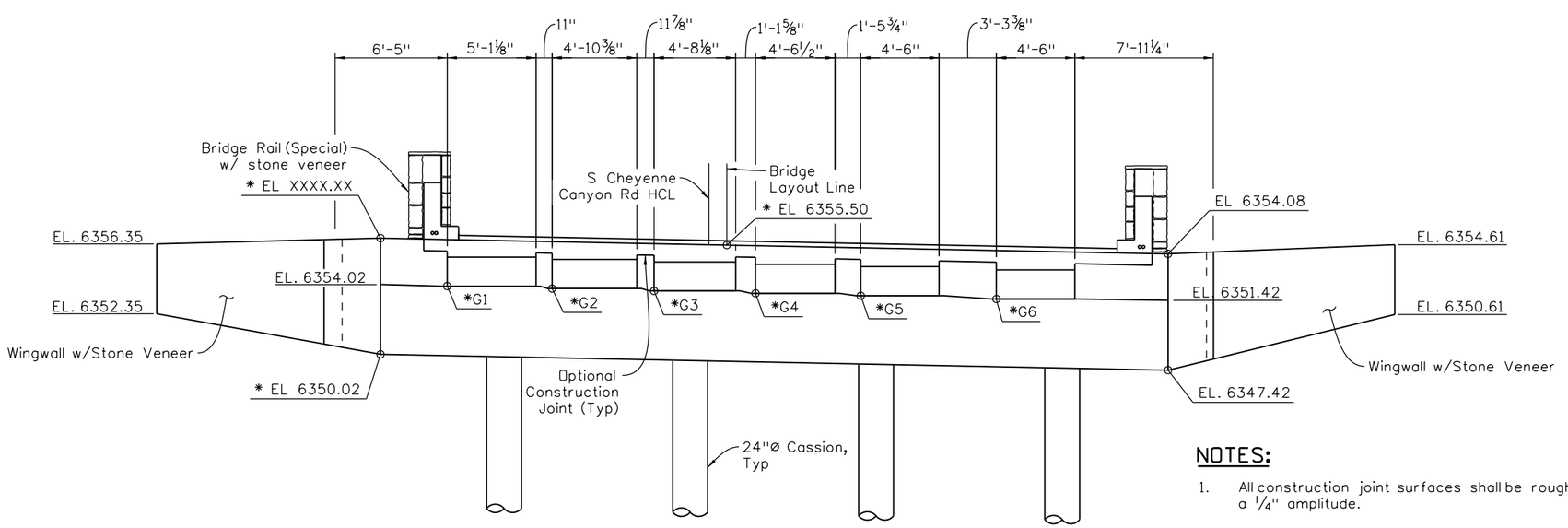


PLAN

BRG. ELEVATIONS	
LOCATION	*ELEVATION
G1	6353.55
G2	6353.22
G3	6352.87
G4	6352.53
G5	6352.17
G6	6351.70



ELEVATION
Dimensions Along ℄ Abutment

NOTES:

1. All construction joint surfaces shall be roughened to a ¼" amplitude.
2. * Elevation given @ ℄ brg.
3. See leveling pad detail on abutment sheet details.
4. See Sheet B20 for column aesthetic details.

Print Date: 6/15/2023	Sheet Revisions			As Constructed	SOUTH CHEYENNE CANYON BRIDGE	Project No./Code
File Name: 009_SCC-BR-PLAN-08.dgn	Date:	Comments	Init.	No Revisions:	ABUTMENT 2 PLAN & ELEVATION	XX XX-XX
Horiz. Scale: Vert. Scale: As Noted				Revised:	Designer: A. Regalado / Detailer: A. Quintana / Sheet Subset: STRUCTURAL	Structure Numbers: XXXXXX
Unit Information				Void:	Subset Sheets: B08 of	Sheet Number 27
Jacobs						

COLORADO SPRINGS
OLYMPIC CITY USA

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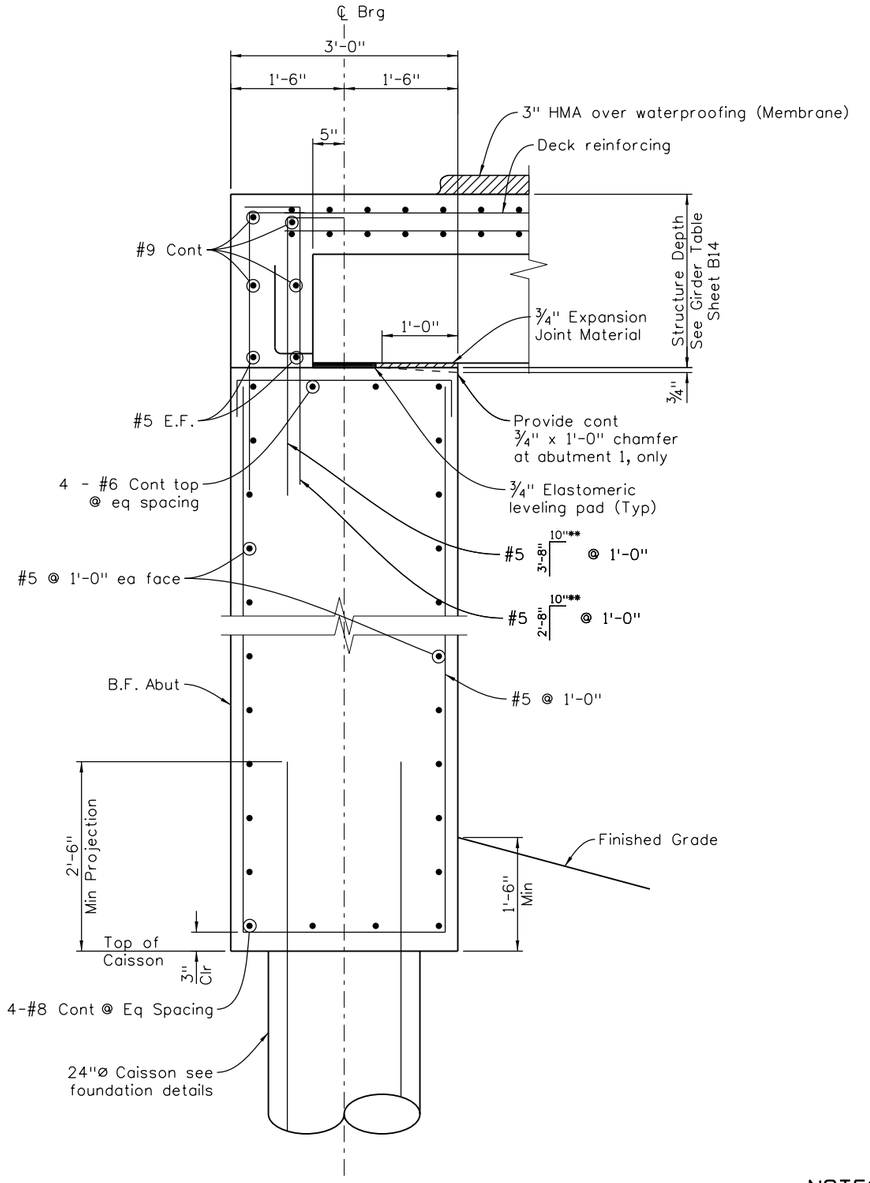
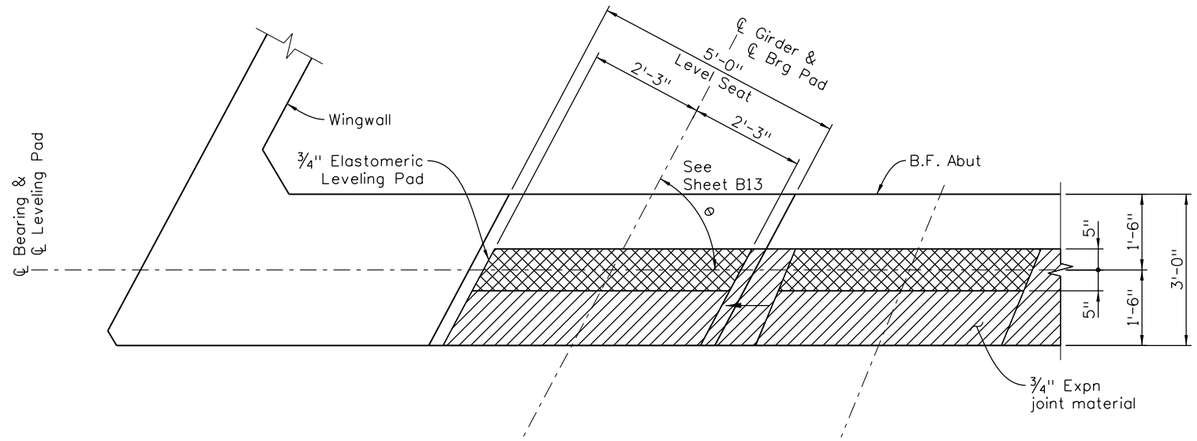
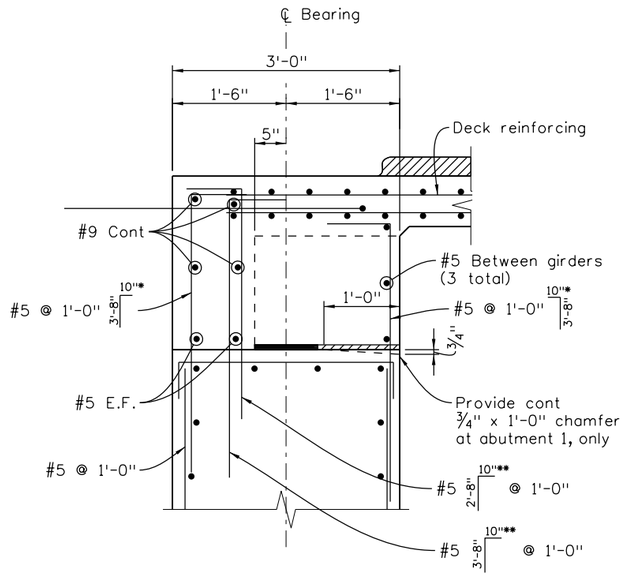


SECTION A



LEVELING PAD DETAIL



TYPICAL SECTION BETWEEN GIRDERS

LAP SPLICE TABLE	
bar size	lap length
#4	2'-4"
#5	3'-0"
#6	3'-6"
#8	4'-8"

NOTES:

1. Elastomeric bearing pad and expansion joint material will not be paid for separately, but shall be included in Item 618-Precast Concrete Slab (depth greater than 13")

** Place all horizontal legs parallel to layout line.

90% DESIGN - NOT FOR CONSTRUCTION

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Print Date: 6/15/2023
File Name: 009_SCC-BR-PLAN-09.dgn
Horiz. Scale: Vert. Scale: As Noted
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Jacobs

Sheet Revisions

Date:	Comments	Init.

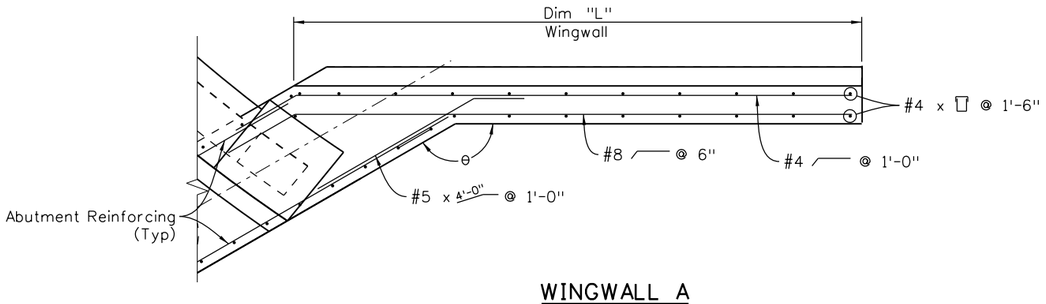
COLORADO SPRINGS
OLYMPIC CITY USA

As Constructed
No Revisions:
Revised:
Void:

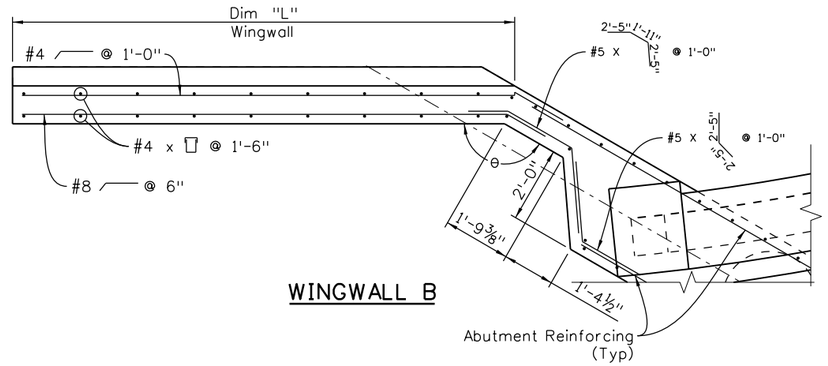
SOUTH CHEYENNE CANYON BRIDGE
ABUTMENT DETAILS

Designer: A. Regalado
Detailer: A. Quintana
Sheet Subset: STRUCTURAL
Structure Numbers:
Subset Sheets: B09 of

Project No./Code
XX XX-XX
XXXXXX
Sheet Number 28

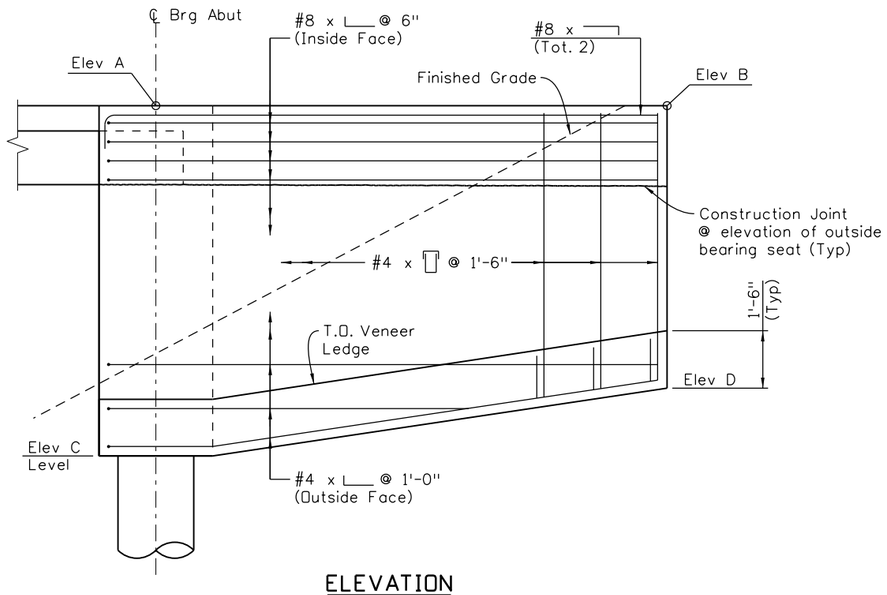


WINGWALL A
(Wingwalls C & D Similar)

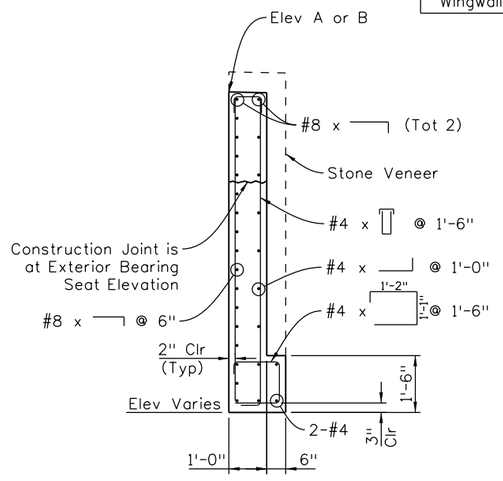


WINGWALL B

TABLE OF ELEVATIONS						
Wingwall	Elev A	Elev B	Elev C	Elev D	Dim "L"	Angle θ
Wingwall A	6354.12	6353.99	6347.47	6349.99	14'- 11 7/8"	60° 0'0"
Wingwall B	6358.06	6358.23	6351.48	6354.23	13'-3 1/2"	60° 0'0"
Wingwall C	6356.61	6356.35	6350.02	6352.35	14'-9 3/4"	60° 0'0"
Wingwall D	6354.08	6354.61	6347.42	6350.61	15'-0"	60° 0'0"



ELEVATION



TYPICAL WINGWALL SECTION

NOTES:

1. Contractor shall fill back face and front face of wingwall simultaneously (±2 ft).
2. Dovetail slots shall be installed on wingwall faces finished with stone veneer. Refer to railing details (2 of 2) sheet for additional information.

90% DESIGN - NOT FOR CONSTRUCTION

Print Date: 6/15/2023	Sheet Revisions			As Constructed	SOUTH CHEYENNE CANYON BRIDGE
File Name: 009_SCC-BR-PLAN-10.dgn	Date:	Comments	Init.	No Revisions:	WINGWALL DETAILS
Horiz. Scale: Vert. Scale: As Noted				Revised:	Designer: A. Regalado / Detailer: A. Quintana / Sheet Subset: STRUCTURAL
Unit Information				Void:	Structure Numbers / Subset Sheets: B10 of
Jacobs				COLORADO SPRINGS OLYMPIC CITY USA	Project No./Code: XX XX-XX / XXXXXX / Sheet Number 29

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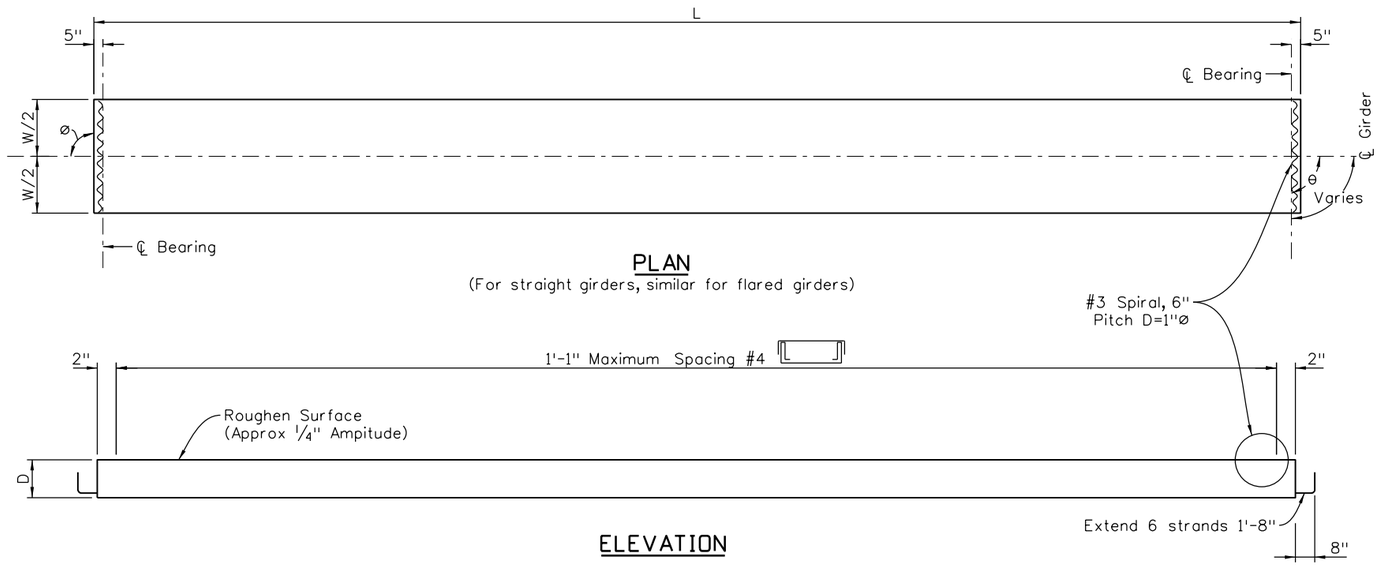
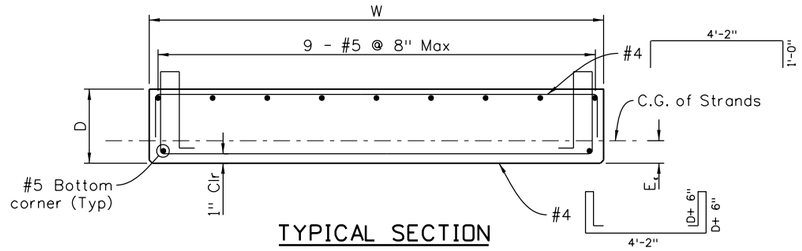
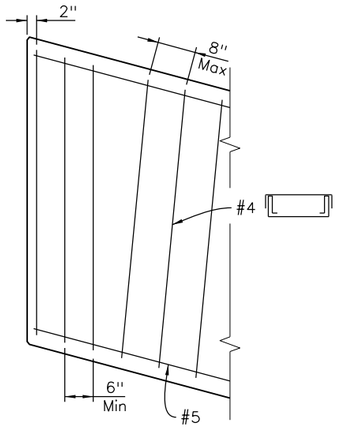


PLAN
(For straight girders, similar for flared girders)

ELEVATION



TYPICAL SECTION



END DETAIL (PLAN)
For flared girders, similar for straight girders

NOTES:

All work necessary to fabricate and install the integral parts of the girder (including the intermediate diaphragms, if any, and leveling pads), as shown on the plans, shall be included in the bid price for item no. 618, prestressed concrete slab (Depth greater than 13"), with a pay unit of sq ft measured by L x W.

Damaged coating on girder reinforcing need to be repaired. The minimum cover for reinforcing steel is 1".

Welded wire fabric may be used with D20 wires in lieu of the #4 bars shown.

Do not make cosmetic repairs (damage less than 1½" deep) to the parts of the girders embedded in concrete.

Use 0.6"ø low relaxation strands meeting the requirements of ASTM A416 grade 270. Prestressing strands shall be equally spaced horizontally. The minimum clear distance between groups or individual strands shall be 2.3(D_s) but not less than 1¼". The minimum cover for prestressing steel is 1½".

Concrete shall be Class PS.

Entrained air is not required for girder concrete.

Use ½" chamfer on all corners, except as noted.

Predicted camber is the camber for the girder alone at 60 days. The Contractor shall limit the camber growth to a value not to exceed the predicted camber plus 1" prior to the deck pour by weighting, scheduling fabrication, post tensioning, or other means and must report to the Engineer values of camber which exceed the predicted camber plus 1". Remedial measures, as approved by the engineer, shall be taken if the predicted camber plus 1" is exceeded. The approved remedial measures shall be free of any adverse impact. The costs associated with all remedial measures shall be borne by the Contractor.

The Contractor is responsible for determining necessary bracing requirements, and for providing adequate bracing for the specific wind and weather conditions to be encountered for each specific project.

The depth (d) tolerance shall be +½", -¼".

GIRDER SCHEDULE

SPAN NO.	GIRDER NO.	L (Ft)	W (In.)	D (In.)	Θ (Deg.)	A_s* (Sq In)	E_c (In.)	F_i (Kips)	F_f (Kips)	CONCRETE STRENGTH F'ci (ksi)	CONCRETE STRENGTH F'ci (ksi)	Δ (In.)	PREDICTED RELEASE CAMBER (In.)	PREDICTED CAMBER (In.)
1	G1	38.98	54	20	62	3.472	2.25	703	649	6.5	8.5	0.286	0.431	0.756
1	G2	37.19	54	20	67.72	3.038	2.25	615	572	6.5	8.5	0.233	0.335	0.589
1	G3	35.77	54	20	74.19	3.038	2.25	615	569	6.5	8.5	0.205	0.329	0.575
1	G4	34.84	54	20	81.09	3.038	2.25	615	566	6.5	8.5	0.190	0.323	0.564
1	G5	34.44	54	20	87.84	3.038	2.25	615	564	6.5	8.5	0.184	0.321	0.559
1	G6	34.43	54	20	88.44	3.038	2.25	615	562	6.5	8.5	0.182	0.320	0.558

As* = area of the prestressing steel.
Ds = nominal strand diameter.
F's = ultimate strength of prestressing steel.
Fj = jacking force per girder.
Ff = final force per girder after all losses.
F'ci = required concrete strength at release of prestress force.
F'c = required concrete strength at 28 days of age.
L = length of girder along the grade of the girder.
Δ = deflection at centerline of span due to cast-in-place slab, diaphragms, asphalt, curbs, and rails.
Θ = skew angle

90% DESIGN - NOT FOR CONSTRUCTION

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Print Date: 6/15/2023
File Name: 009_SCC-BR-PLAN-11.dgn
Horiz. Scale: Vert. Scale: As Noted
Unit Information

Jacobs

Sheet Revisions

Date:	Comments	Init.

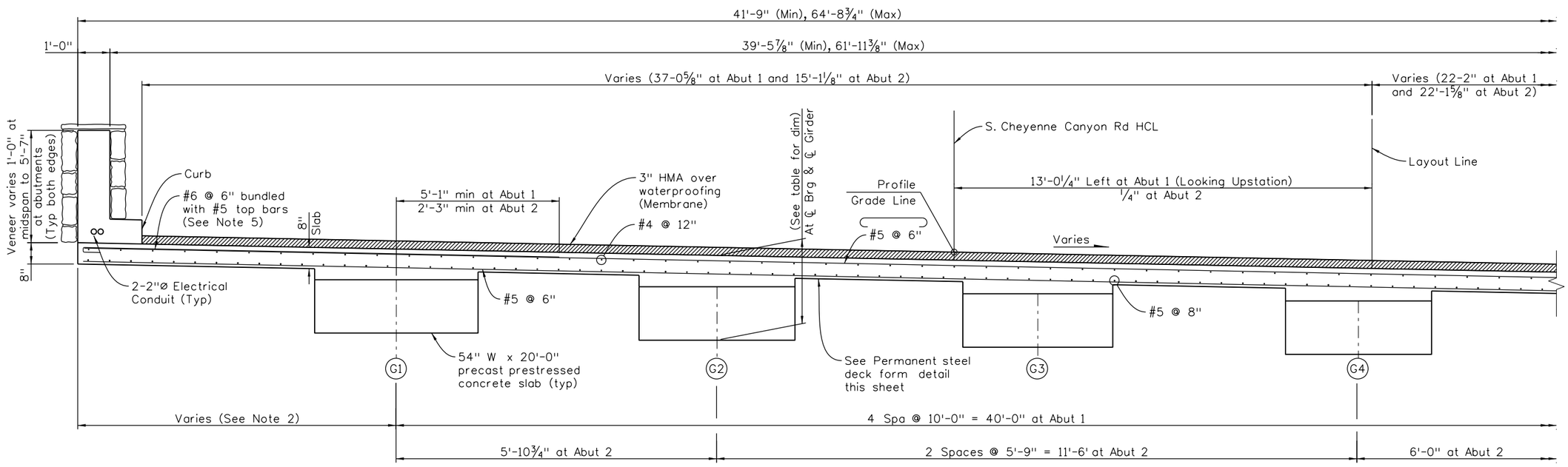
COLORADO SPRINGS
OLYMPIC CITY USA

As Constructed
No Revisions:
Revised:
Void:

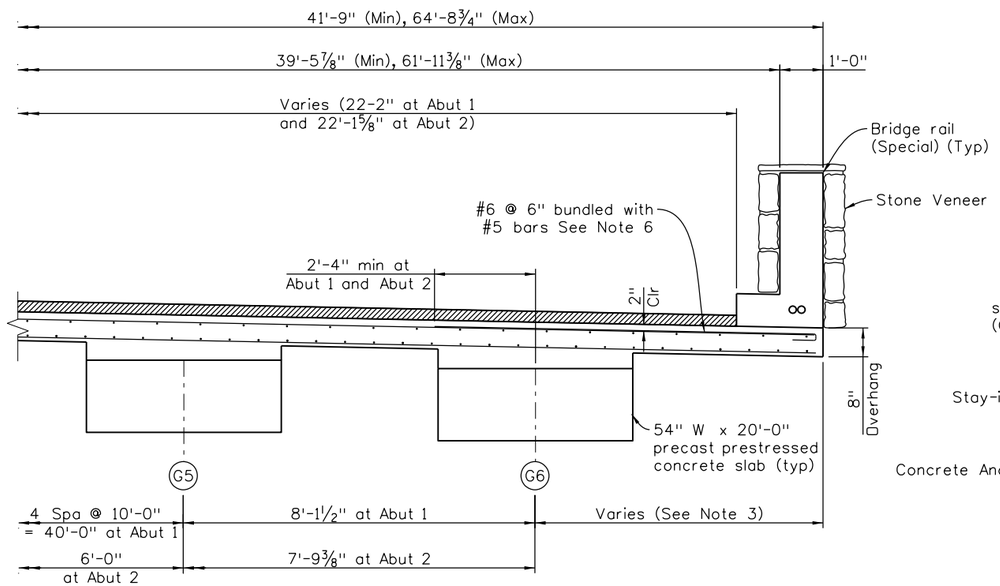
SOUTH CHEYENNE CANYON BRIDGE
GIRDER DETAILS

Designer: S. Tripathi
Detailer: A. Quintana
Sheet Subset: STRUCTURAL
Structure Numbers:
Subset Sheets: B11 of

Project No./Code
XX XX-XX
XXXXXX
Sheet Number 30

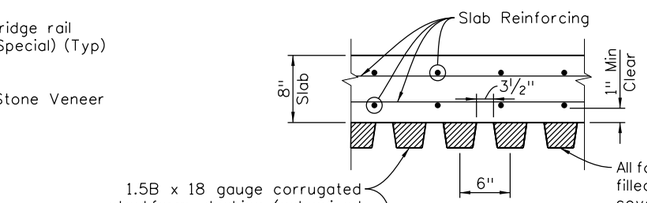


SUPERSTRUCTURE DETAIL

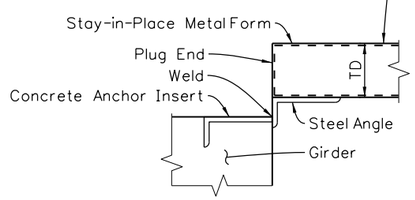


SUPERSTRUCTURE DETAIL

Haunch Depth Table	
Girder	Depth at Abutment
G1-G2	31¾"
G3	32"
G4	32¼"
G5	32½"
G6	32⅛"

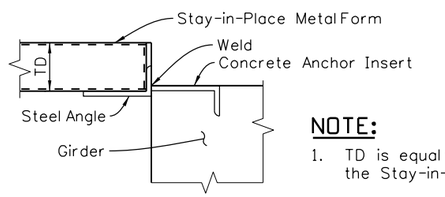


SECTION



BUILD-UP > TD

NTS



BUILD-UP < TD

NTS

NOTES:

1. Deck concrete shall be Class D (Bridge).
2. The overhang follows the curved layout as shown in sheet B07 plans with the value of 9'-11⅛" at abutment 1 and 3'-10⅝" at abutment 2 measured along abutment.
3. The overhang follows the curved layout as shown in sheet B07 plans with the value of 6'-7⅞" at abutment 1 and 6'-8⅛" abutment 2 measured along abutment.
4. The dimensions are measured at and along the ℄ bearing.
5. The length varies along the deck with maximum of 15' at Abut 1 and 6' at Abut 2 measured parallel to abutment.
6. The length varies along the deck with maximum of 9' at Abut 1 and Abut 2 measured parallel to abutment.

NOTE:

1. TD is equal to the depth of the Stay-in-Place metal form.

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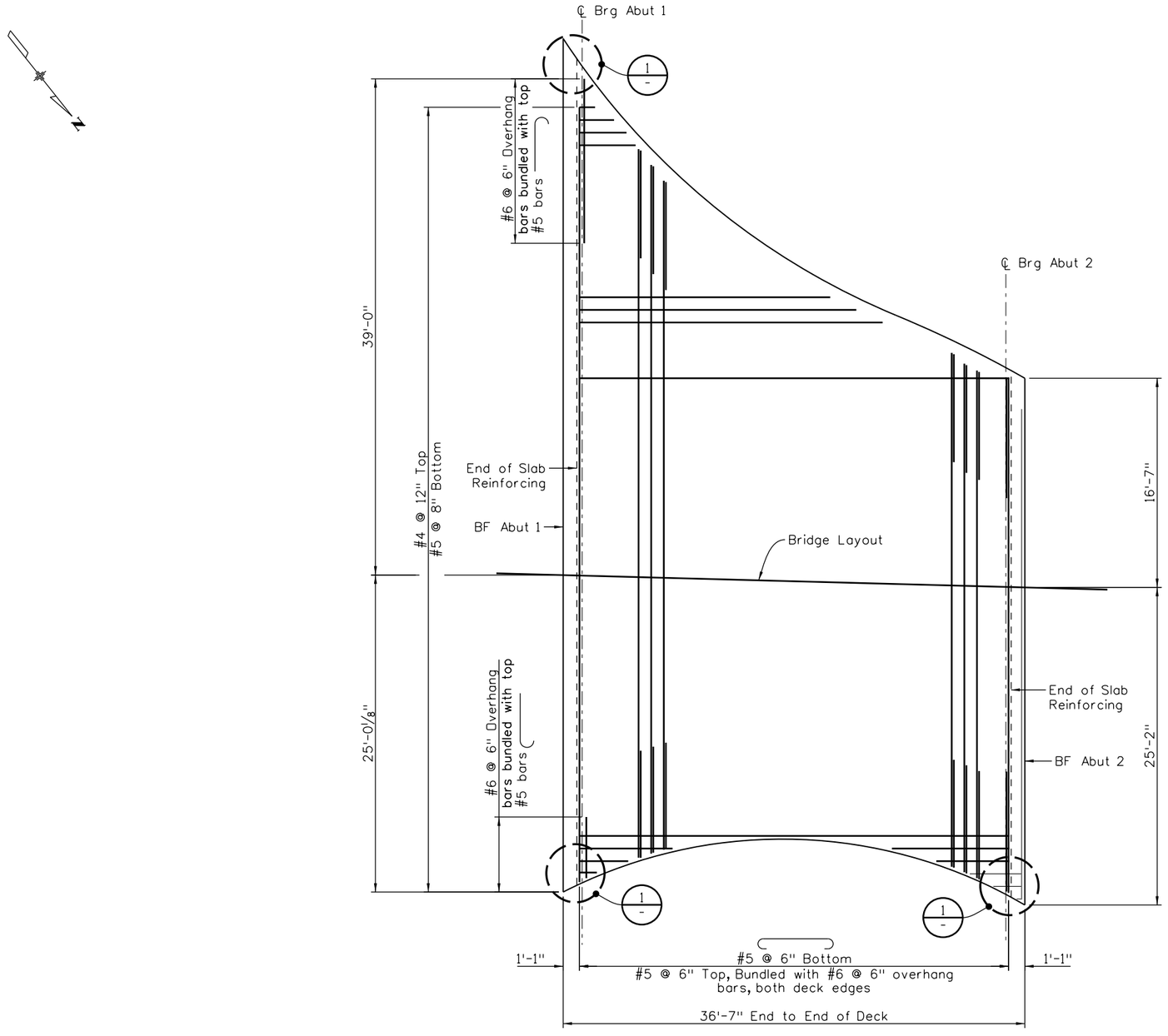
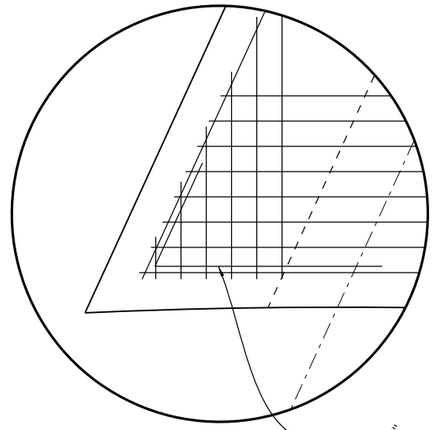
Print Date: 6/15/2023	Sheet Revisions			As Constructed	SOUTH CHEYENNE CANYON BRIDGE
File Name: 009_SCC-BR-PLAN-12.dgn	Date:	Comments	Init.	No Revisions:	SUPERSTRUCTURE DETAILS
Horiz. Scale: Vert. Scale: As Noted				Revised:	Designer: S. Tripathi / Detailer: A. Quintana / Sheet Subset: STRUCTURAL
Unit Information				Void:	Structure Numbers: / Subset Sheets: B12 of
Jacobs				COLORADO SPRINGS OLYMPIC CITY USA	Project No./Code: XX XX-XX / XXXXXX / Sheet Number 31



DECK REINFORCEMENT PLAN
Not all bars shown for clarity



ACUTE CORNER DETAIL 1 -

NOTES:

1. The offset distance are measured along the back face of abutment line.

LAP SPLICE TABLE	
BAR SIZE	LAP LENGTH
#4	2'-3"
#5	3'-4"

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Print Date: 6/15/2023
File Name: 009_SCC-BR-PLAN-13.dgn
Horiz. Scale: Vert. Scale: As Noted
Unit Information

Jacobs

Sheet Revisions

Date:	Comments	Init.

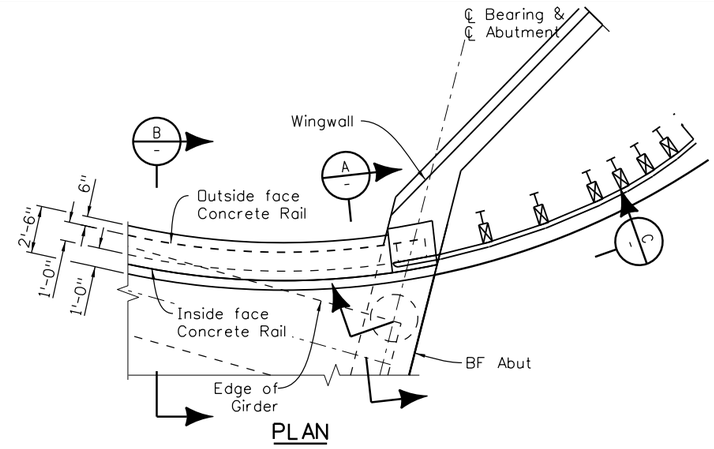
COLORADO SPRINGS
OLYMPIC CITY USA

As Constructed
No Revisions:
Revised:
Void:

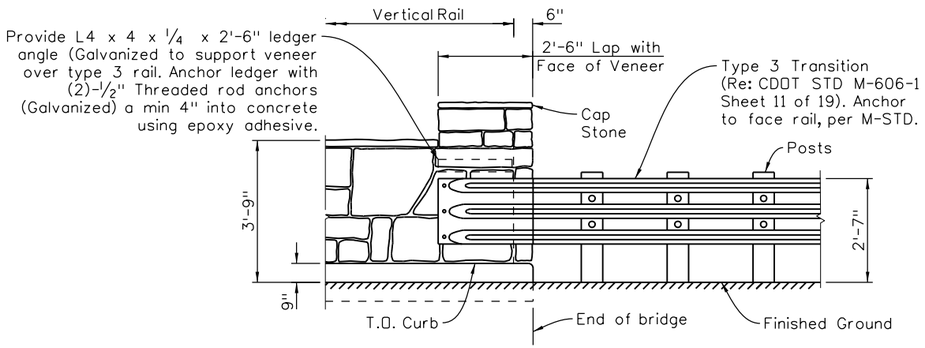
SOUTH CHEYENNE CANYON BRIDGE
DECK REINFORCING PLAN

Designer: S. Tripathi
Detailer: A. Quintana
Sheet Subset: STRUCTURAL
Structure Numbers:
Subset Sheets: B13 of

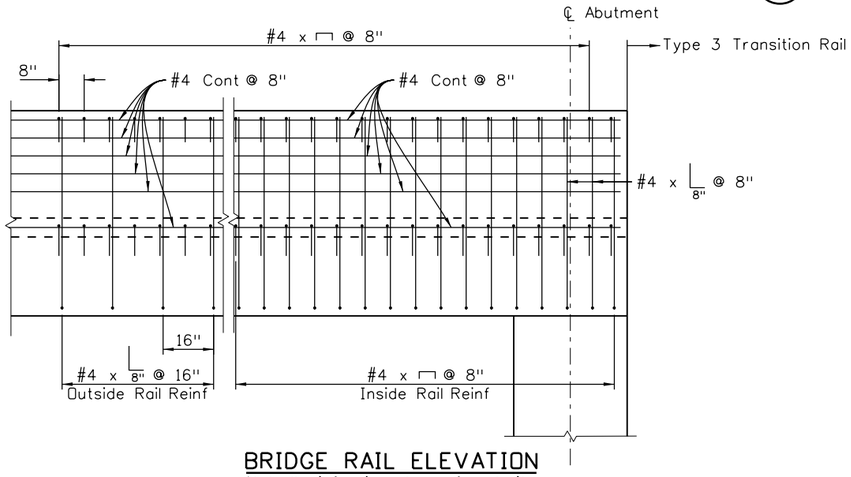
Project No./Code: XX XX-XX XXXXXX
Sheet Number 32



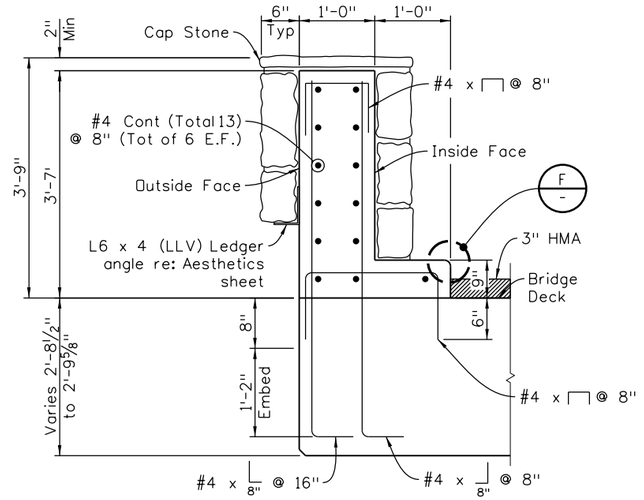
PLAN



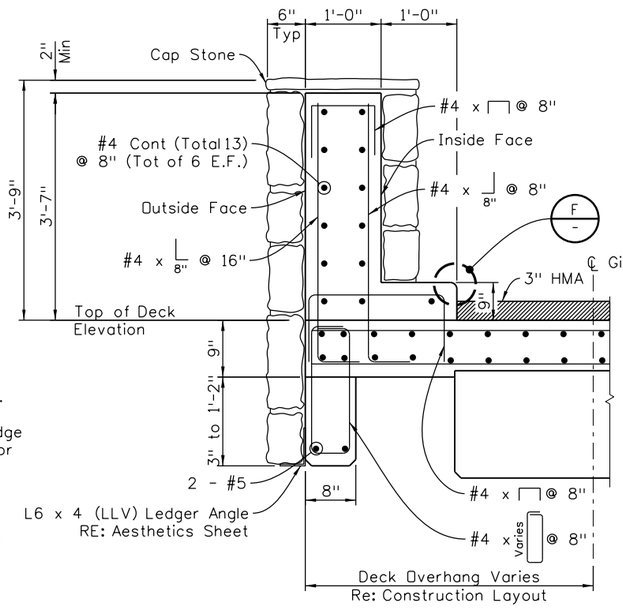
ELEVATION @ END OF STONE RAIL (C)



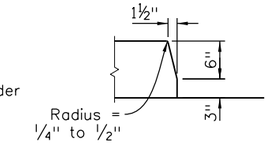
BRIDGE RAIL ELEVATION
Not all reinforcing shown for clarity



SECTION (A)



OVERHANG SECTION (B)



TYP CURB SECTION (F)

NOTES

1. All reinforcing shown on this dwg is epoxy coated.
2. All concrete and reinforcing steel required for bridge rail construction shall not be measured and paid for separately, but shall be included be in the cost of Item 606-10200 Bridge Rail (Special)
3. Dovetail slots shall be installed on railing faces finished with stone veneer. Refer to railing details (2 of 2) sheet for additional information.
4. Electrical counduit not shown for clarity.
5. Refer to revision of section 601-Cut Stone Veneer in Special Provisions and bridge aesthethics details sheet (B20) for stone material and installation requirments.

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Print Date: 6/15/2023	Sheet Revisions	As Constructed	SOUTH CHEYENNE CANYON BRIDGE
File Name: 009_SCC-BR-PLAN-14.dgn	Date: / Comments / Init.	No Revisions:	RAILING DETAILS (1 OF 2)
Horiz. Scale: Vert. Scale: As Noted		Revised:	Designer: S. Tripathi — Structure Numbers:
Unit Information		Void:	Detailer: A. Quintana
Jacobs			Sheet Subset: STRUCTURAL — Subset Sheets: B14 of

COLORADO SPRINGS
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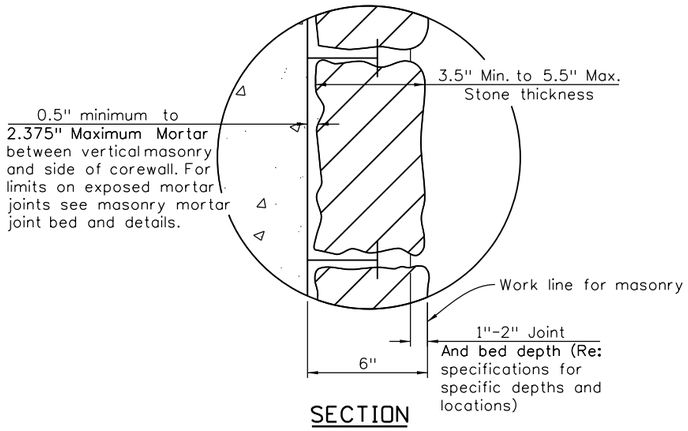
Project No./Code
XX XX-XX
XXXXXX
Sheet Number 33

TYP STONE VENEER NOTES:

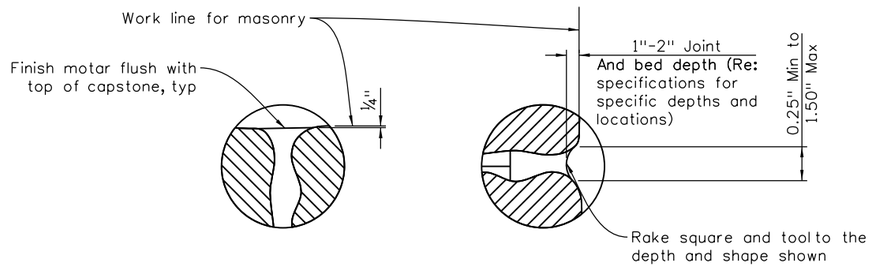
1. Refer to railing details (1 of 2), bridge aesthetics sheet, wingwall detail sheet and retaining wall details for additional locations where stone is veneer is applied. Application of veneer at these locations is to be installed in accordance with the details on this sheet.
2. Refer to revision of section 601-Cut Stone Veneer in Special Provisions and bridge aesthethics details sheet (B20) for stone material and installation requirments.

MANSORY ANCHOR NOTES:

1. The dovetail slots shall be type 305 as manufactured by Hohmann & Barnard, Inc. or an approved equal. They shall be 22 gage hot-dipped galvanized steel, filled with foam and with a throat opening width of 0.625.
2. The dovetail anchors shall be Type 303 SV as manufactured by Hohmann & Barnard, Inc. or an approved equal. Dovetail and strap anchors shall be 0.125" thick hot-dippe galvanized steel.
3. The locations of the dovetail anchors are as follows: the Type A dovetail anchors are required at the intersection of the vertical dovetail slots and each horizontal joint. The Type B strap anchors are required in the bed beneath each Class B masonry capstone at a 9" maximum spacing. The Type C dovetail anchors are required in the vertical joints between the capstones.

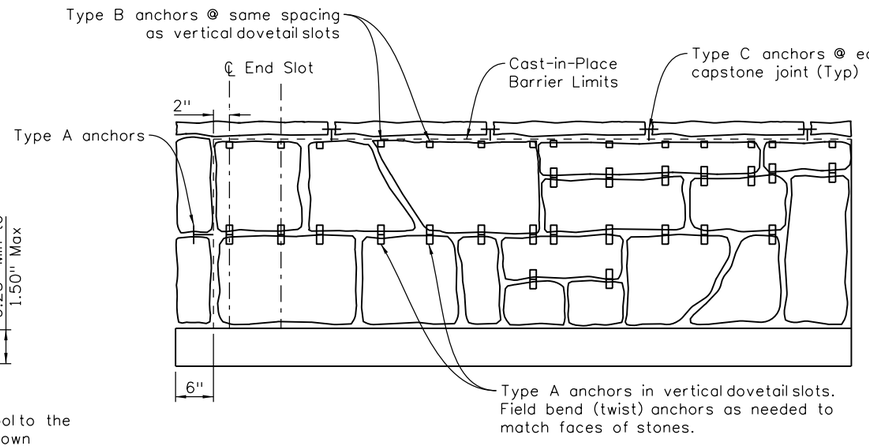


SECTION

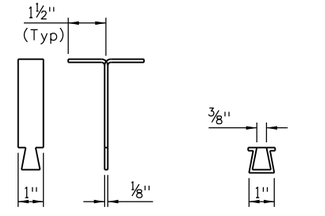


(All capstone top joints) (All other joints and beds)

MANSONRY MORTAR JOINT AND BED DETAILS

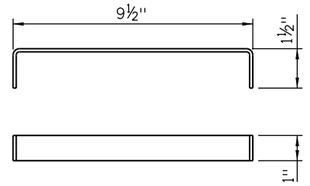


MANSONARY ANCHOR DETAILS FOR USE WITH STONE MASONRY BRIDGE RAIL (SPECIAL) WINGWALLS AND RETAINING WALLS

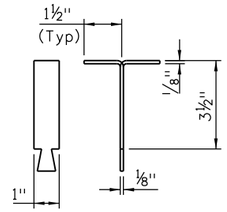


DOVETAIL ANCHOR TYPE A

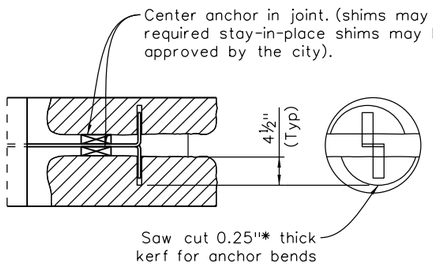
DOVETAIL SLOT



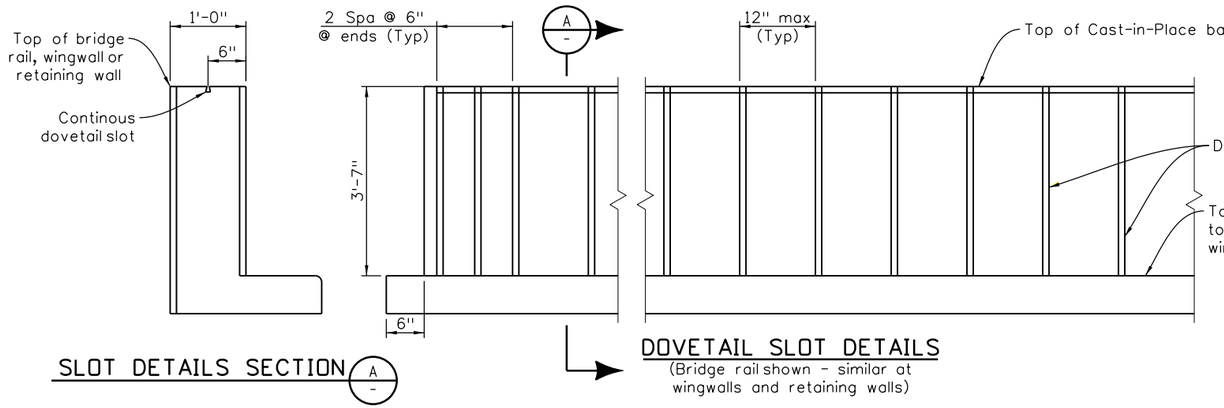
STRAP ANCHOR TYPE B



DOVETAIL ANCHOR TYPE C



MASONRY KERF DETAIL



SLOT DETAILS SECTION A

DOVETAIL SLOT DETAILS
(Bridge rail shown - similar at wingwalls and retaining walls)

Print Date: 6/15/2023	Sheet Revisions		
File Name: 009_SCC-BR-PLAN-15.dgn	Date:	Comments	Init.
Horiz. Scale: Vert. Scale: As Noted			
Unit Information			
Jacobs			

COLORADO SPRINGS
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As Constructed	SOUTH CHEYENNE CANYON BRIDGE		Project No./Code
No Revisions:	RAILING DETAILS (2 OF 2)		XX XX-XX
Revised:	Designer: S. Tripathi	Structure Numbers	XXXXXX
Void:	Detailer: A. Quintana		
	Sheet Subset: STRUCTURAL	Subset Sheets: B15 of	Sheet Number 34

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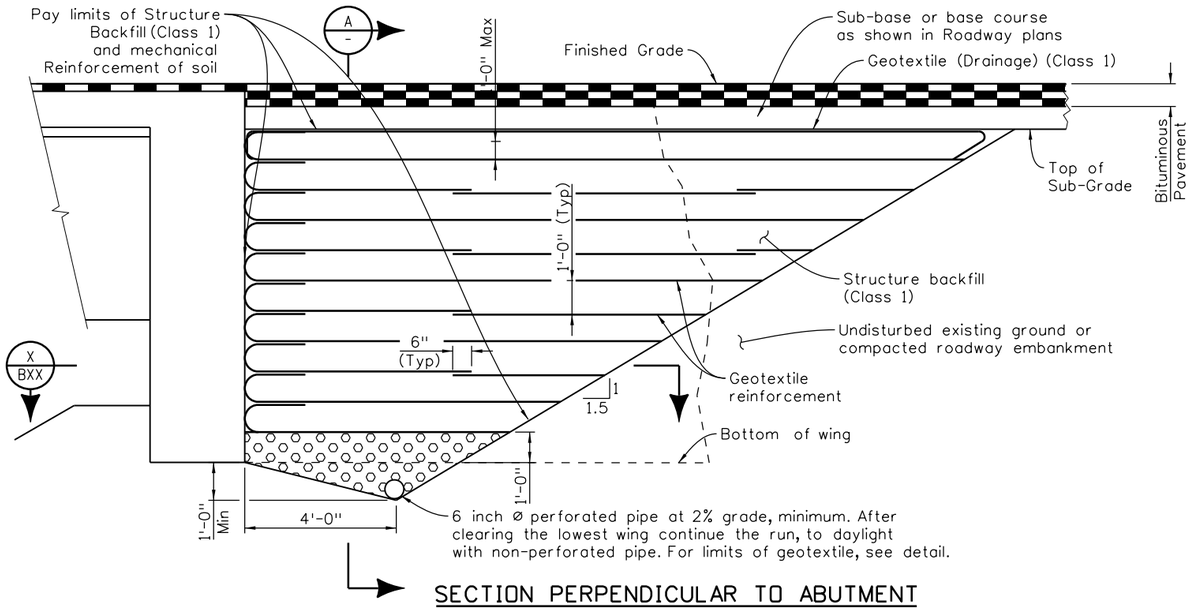
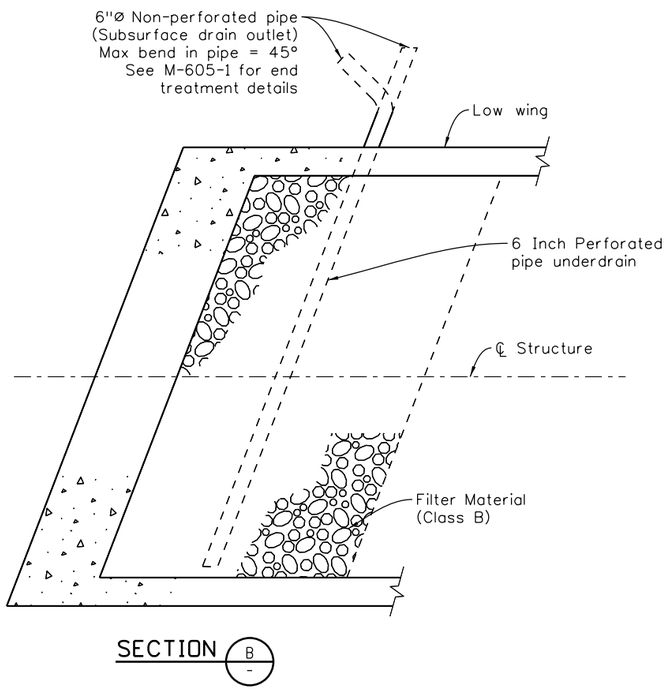
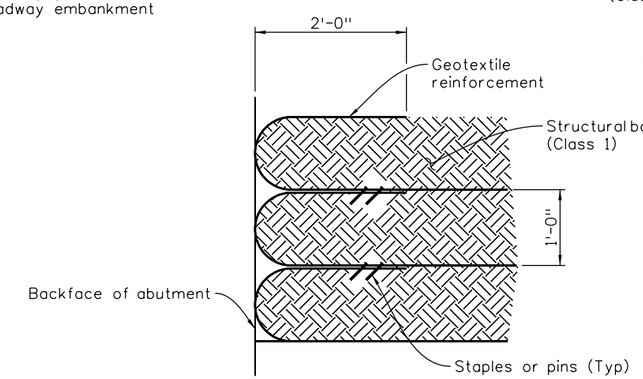


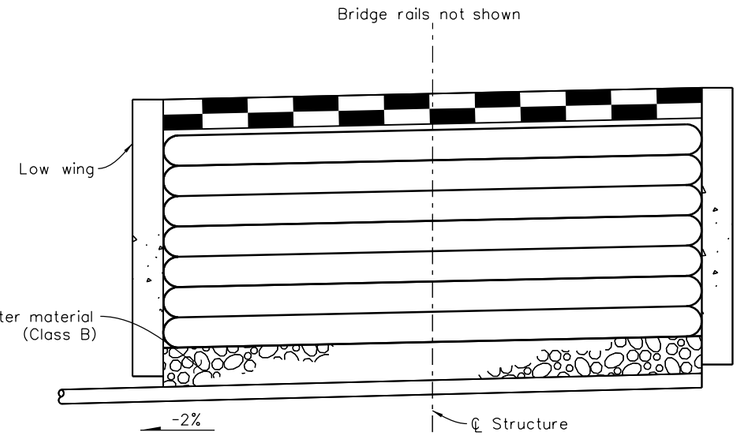
SECTION PERPENDICULAR TO ABUTMENT



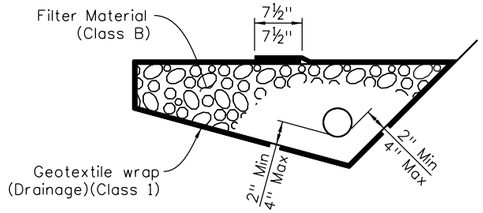
SECTION B



WRAP DETAIL



SECTION A



6 INCH PERFORATED PIPE UNDERDRAIN

6 inch perforated pipe underdrain includes all filter material (Class B) and Geotextile wrap (Drainage) (Class 1)

NOTES:

Geotextile reinforcement shall be woven fabric with a minimum average roll value of 4800 lb/ft for installations with a gap and 2400 lb/ft for installations without a gap based on ASTM D4595.

Geotextile reinforcment shall be placed by alternating machine direction (md) with cross machine direction (XD) from layer to layer.

The geotextile reinforcement wrap at back face of abutment shall be pulled back slack free with its end anchored to soil underneath with staples or pins.

Minimum splice of all geofabric shall consist of 6" of overlap.

Payment for all work items shown will be made under Item 206 Structure Backfill (Special)(CY) and Item 206 Structure Backfill (Class 1)(CY). Items include 6 Inch ø perforated pipe underdrain, subsurface drain outlet (6 Inch ø nonperforated pipe) and all other miscellaneous items needed to complete the work. Geotextile reinforement shall be paid for as Structural Backfill (Special).

Installation of pipe underdrain and subsurface drain outlet will conform to the construction requirements of section 605.03 and 605.06, respectively.

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Print Date: 6/15/2023	Sheet Revisions	As Constructed	SOUTH CHEYENNE CANYON BRIDGE
File Name: 009_SCC-BR-PLAN-16.dgn	Date: / Comments / Init.	No Revisions:	MECH. STABILIZED EARTH BACKFILL
Horiz. Scale: Vert. Scale: As Noted		Revised:	Designer: A. Regalado; Detailer: A. Quintana; Sheet Subset: STRUCTURAL; Structure Numbers: ; Subset Sheets: B16 of
Unit Information		Void:	Project No./Code: XX XX-XX; XXXXXX; Sheet Number 35
Jacobs		COLORADO SPRINGS OLYMPIC CITY USA	

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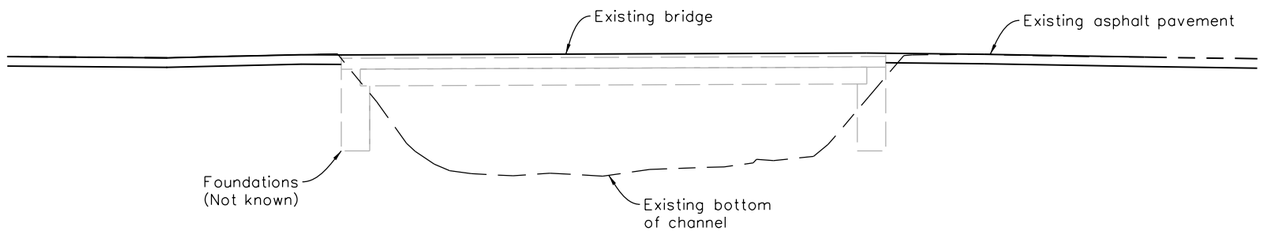
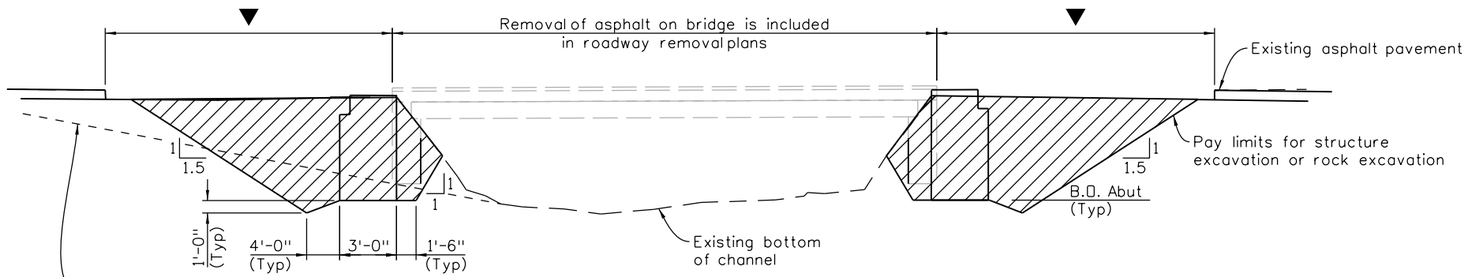
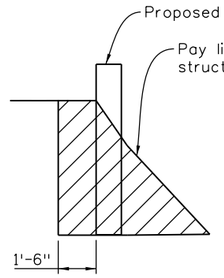


EXISTING BRIDGE

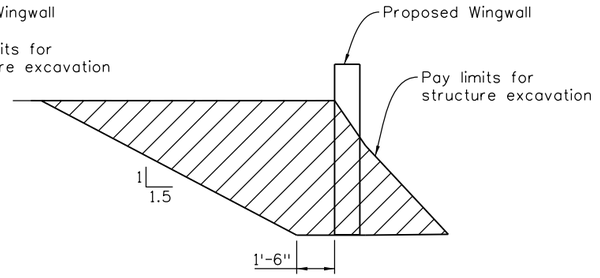


Top of bedrock is within excavation zones at abut 1, wall d1 and wall d3. See bridge general layout sheet and engineering geology sheet for estimated bedrock profile.

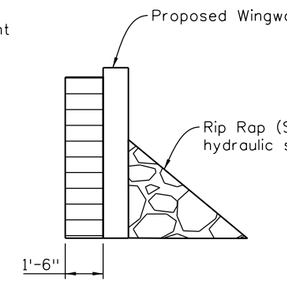
TITLE TEXT ALL CAPS
(Note: existing bridge removal is quantified in roadway plans)



EXCAVATION

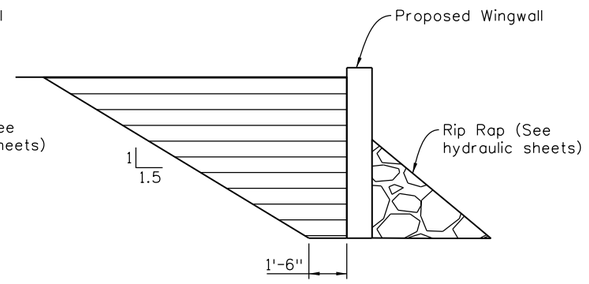


EXCAVATION



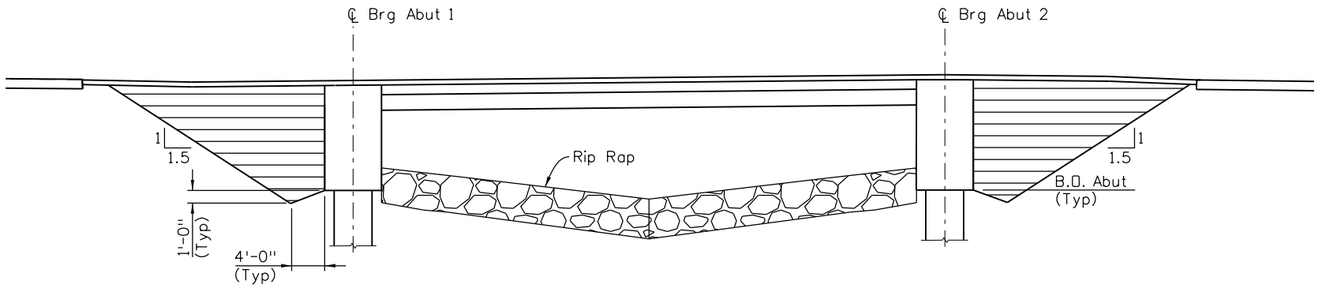
BACKFILL

AT NE WINGWALLS



BACKFILL

AT NW,SW & SE WINGWALLS



BRIDGE BACKFILL

NOTES:

Unless shown otherwise in plans, this drawing gives the minimum extents of structure excavation and backfill. The Contractor may elect to extend structure excavation and structure backfill beyond limits shown here. Any additional excavation and backfill beyond these limits will not be measured or paid for.

LEGEND

▼ - See roadway removal plans for limits of removal of asphalt and pay quantity.

\- Structure excavation or rock excavation.

\- Structure backfill (Class 1) - Structure backfill (Special)

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Print Date: 6/15/2023	Sheet Revisions	As Constructed	SOUTH CHEYENNE CANYON BRIDGE
File Name: 009_SCC-BR-PLAN-17.dgn	Date: / Comments / Init.	No Revisions:	EXCAVATION AND BACKFILL
Horiz. Scale: Vert. Scale: As Noted		Revised:	Designer: A. Regalado; Detailer: A. Quintana; Sheet Subset: STRUCTURAL; Structure Numbers; Subset Sheets: B17 of
Unit Information		Void:	Project No./Code: XX XX-XX; XXXXXX; Sheet Number 36
Jacobs	COLORADO SPRINGS OLYMPIC CITY USA		

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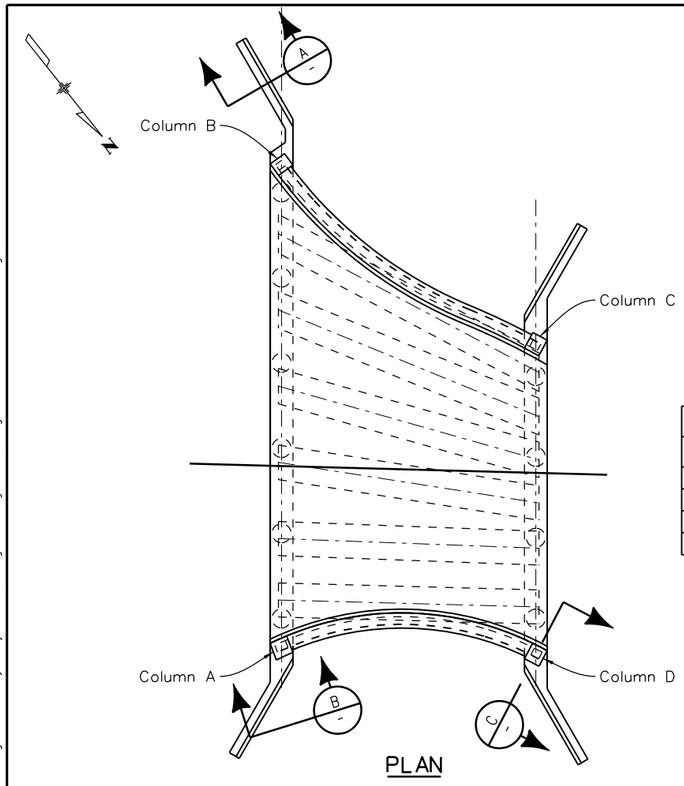
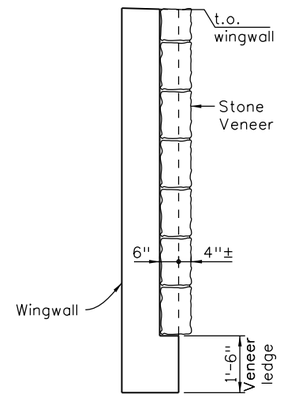
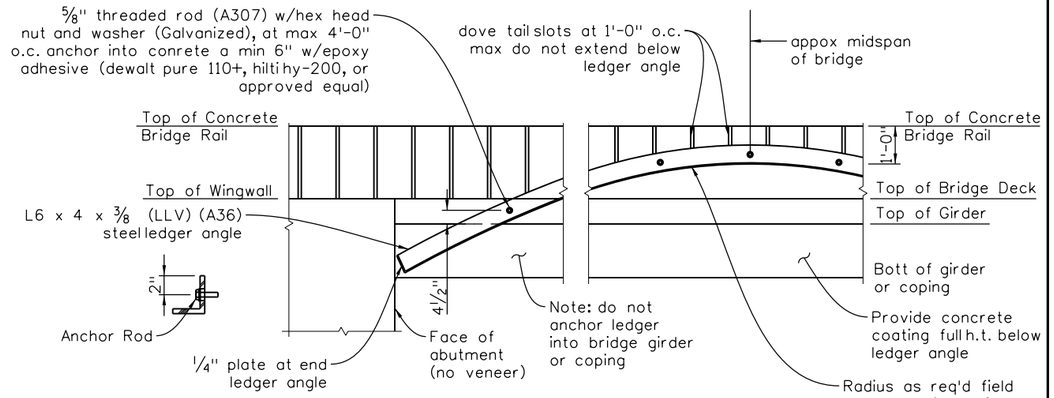


PLAN

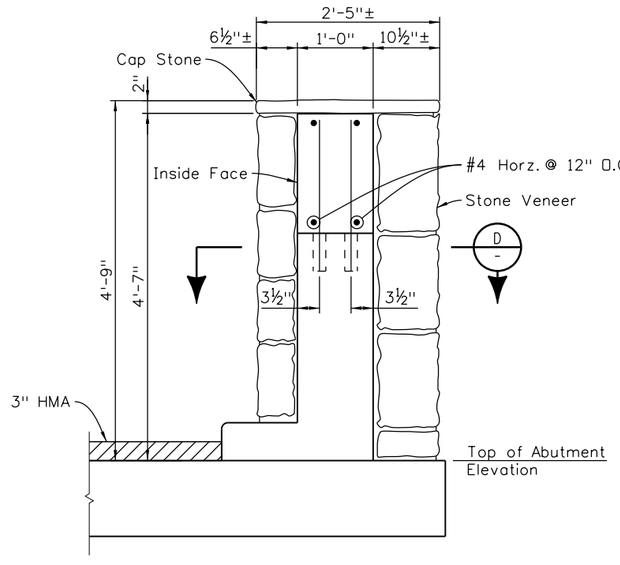
COLUMN TABLE	
Column	"W"
A	1'-6¼"
B	10½"
C	1'-2"
D	1'-2"



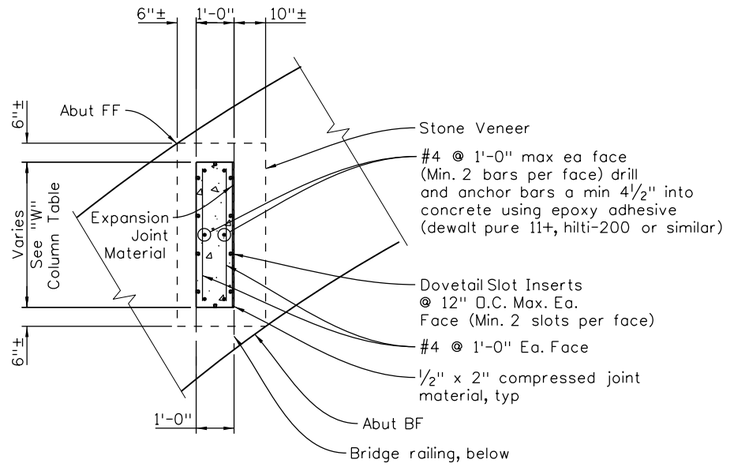
WINGWALL SECTION A



STONE VENEER ARCH DETAIL B



COLUMN SECTION C



COLUMN SECTION D

NOTES:

1. Dovetail slots shall be installed on wingwall faces finished with stone veneer. Refer to railing details (2 of 2) sheet for additional information.
2. Refer to revision of section 601-Cut Stone Veneer and brige aesthethics details sheet (AT01) for stone material and installation requirments.
3. Doweled reinforcing and conrete shown in column/pilaster construction shall be installed following bridge construction. All rebar, concrete, and jont material associated with veneer installation shall be included in the cost of Item 601 - cut stone veneer.
3. Provide a template of arch layout on bridge faces for approval by city prior to ledger fabrication.
4. Electrical conduit not shown for clarity.
5. Column to be located approximately where shown, and are intended to be constructed following bridge construction. Final location shall be verified with the city prior to placement of column concrete veneer.

90% DESIGN - NOT FOR CONSTRUCTION

QuintoAH 3:55:06 PM pw:\\jacobs-us-vo-pw.bentley.com:jacobs-us-vo-pw-02\Documents\WXXZ6205 - S Cheyenne Canyon Bridge\4 Delivery\Project_WIP\Bridge\Drawings\SSC Bridge\009_SCC-BR-PLAN-18.dgn

Print Date: 6/15/2023	Sheet Revisions			As Constructed	SOUTH CHEYENNE CANYON BRIDGE	Project No./Code
File Name: 009_SCC-BR-PLAN-18.dgn	Date:	Comments	Init.	No Revisions:	BRIDGE AESTHETICS	XX XX-XX
Horiz. Scale: Vert. Scale: As Noted				Revised:	Designer: S. Tripathi / Structure Numbers	XXXXXX
Unit Information				Void:	Detailer: A. Quintana	
Jacobs					Sheet Subset: STRUCTURAL / Subset Sheets: B18 of	Sheet Number 37

COLORADO SPRINGS OLYMPIC CITY USA

LEFT EDGE OF DECK

BENT LINE	OFFSET	X	Y	STATION	ELEVATION	ELEV + DL	NORTHING	EASTING
BF Abut 1	-42.52	-42.52	-1.14	-0+01.1390	6357.9483		1347695.5846	3179824.486
CL Abut 1	-40.36	-40.36	0.42	0+00.4200	6357.8149		1347698.236	3179824.68
F-1	-37.12	-37.12	3.07	0+03.0660	6357.6135		1347702.417	3179824.738
F-2	-34.09	-34.09	5.94	0+05.9380	6357.4220		1347706.591	3179824.495
F-3	-31.26	-31.26	9.02	0+09.0220	6357.2446		1347710.736	3179823.951
F-4	-28.67	-28.67	12.30	0+12.3020	6357.0791		1347714.824	3179823.113
F-5	-26.32	-26.32	15.76	0+15.7600	6356.9337		1347718.856	3179821.977
F-6	-24.22	-24.22	19.38	0+19.3780	6356.8082		1347722.789	3179820.557
F-7	-22.39	-22.39	23.14	0+23.1370	6356.7068		1347726.632	3179818.845
F-8	-20.82	-20.82	27.02	0+27.0150	6356.6259		1347730.31	3179816.905
F-9	-19.18	-19.18	30.86	0+30.8610	6356.5504		1347734.041	3179815.016
CL- Abut 2	-17.37	-17.37	34.63	0+34.6310	6356.4738		1347737.853	3179813.295
BF Abut 2	-16.58	-16.58	36.15	0+36.1520	6356.4418		1347739.436	3179812.639

LEFT FACE OF BARRIER

BENT LINE	OFFSET	X	Y	STATION	ELEVATION	ELEV + DL	NORTHING	EASTING
BF Abut 1	-38.98	-38.98	-1.04	-0+01.0440	6357.7810		1347698.349	3179826.687
CL Abut 1	-37.04	-37.04	0.51	0+00.5090	6357.6530		1347700.838	3179826.751
F-1	-33.97	-33.97	3.25	0+03.2450	6357.4560		1347704.948	3179826.63
F-2	-31.10	-31.10	6.16	0+06.1580	6357.2700		1347709.038	3179826.225
F-3	-28.43	-28.43	9.32	0+09.3150	6357.0960		1347713.096	3179825.546
F-4	-25.99	-25.99	12.62	0+12.6200	6356.9350		1347717.087	3179824.592
F-5	-23.78	-23.78	16.09	0+16.0850	6356.7940		1347721.01	3179823.363
F-6	-21.81	-21.81	19.69	0+19.6920	6356.6730		1347724.84	3179821.87
F-7	-20.09	-20.09	23.43	0+23.4260	6356.5760		1347728.557	3179820.117
F-8	-18.56	-18.56	27.24	0+27.2440	6356.4970		1347732.183	3179818.178
F-9	-16.91	-16.91	31.01	0+31.0070	6356.4210		1347735.872	3179816.364
CL- Abut 2	-15.09	-15.09	34.69	0+34.6920	6356.3440		1347739.638	3179814.716
BF Abut 2	-14.27	-14.27	36.21	0+36.2140	6356.3110		1347741.24	3179814.075

GIRDER A

BENT LINE	OFFSET	X	Y	STATION	ELEVATION	ELEV + DL	NORTHING	EASTING
BF Abut 1	-31.19	-31.19	-0.835	-0+00.8350	6357.3550		1347706.005	3179830.865
CL Abut 1	-30.43	-30.43	0.685	0+00.6850	6357.2920	6357.2920	1347706.004	3179830.865
F-1	-28.74	-28.74	4.090	0+04.0899	6357.1610	6357.1687	1347709.494	3179829.350
F-2	-27.04	-27.04	7.495	0+07.4948	6357.0300	6357.0444	1347712.983	3179827.836
F-3	-25.35	-25.35	10.900	0+10.8997	6356.9120	6356.9316	1347716.472	3179826.321
F-4	-23.65	-23.65	14.305	0+14.3046	6356.7960	6356.8188	1347719.961	3179824.806
F-5	-21.96	-21.96	17.710	0+17.7095	6356.6810	6356.7048	1347723.450	3179823.291
F-6	-20.26	-20.26	21.114	0+21.1144	6356.5830	6356.6057	1347726.939	3179821.776
F-7	-18.57	-18.57	24.519	0+24.5193	6356.4890	6356.5083	1347730.428	3179820.261
F-8	-16.87	-16.87	27.924	0+27.9242	6356.4030	6356.4170	1347733.917	3179818.747
F-9	-15.18	-15.18	31.329	0+31.3291	6356.3250	6356.3324	1347737.406	3179817.232
CL- Abut 2	-13.48	-13.48	34.734	0+34.7340	6356.2540	6356.2540	1347740.895	3179815.717
BF Abut 2	-12.72	-12.72	36.256	0+36.2560	6356.2250		1347742.453	3179815.040

GIRDER B

BENT LINE	OFFSET	X	Y	STATION	ELEVATION	ELEV + DL	NORTHING	EASTING
BF Abut 1	-21.01	-21.01	-0.56	-0+00.5630	6356.7980		1347712.416	3179837.888
CL Abut 1	-20.43	-20.43	0.95	0+00.9530	6356.7440	6356.7440	1347713.831	3179837.098
F-1	-19.15	-19.15	4.35	0+04.3469	6356.6280	6356.6342	1347716.999	3179835.326
F-2	-17.86	-17.86	7.74	0+07.7408	6356.5220	6356.5337	1347720.167	3179833.556
F-3	-16.58	-16.58	11.13	0+11.1347	6356.4160	6356.4319	1347723.334	3179831.785
F-4	-15.29	-15.29	14.53	0+14.5286	6356.3240	6356.3426	1347726.502	3179830.015
F-5	-14.01	-14.01	17.92	0+17.9225	6356.2370	6356.2564	1347729.670	3179828.244
F-6	-12.72	-12.72	21.32	0+21.3164	6356.1590	6356.1774	1347732.838	3179826.473
F-7	-11.44	-11.44	24.71	0+24.7103	6356.0870	6356.1027	1347736.005	3179824.703
F-8	-10.15	-10.15	28.10	0+28.1042	6356.0240	6356.0354	1347739.173	3179822.932
F-9	-8.87	-8.87	31.50	0+31.4981	6355.9700	6355.9760	1347742.341	3179821.161
CL- Abut 2	-7.59	-7.59	34.89	0+34.8920	6355.9250	6355.9250	1347745.508	3179819.391
BF Abut 2	-7.01	-7.01	36.41	0+36.4090	6355.9090		1347746.923	3179818.600

GIRDER C

BENT LINE	OFFSET	X	Y	STATION	ELEVATION	ELEV + DL	NORTHING	EASTING
BF Abut 1	-10.82	-10.82	-0.29	-0+00.2900	6356.2390		1347720.392	3179844.238
CL Abut 1	-10.43	-10.43	1.22	0+01.2210	6356.1830	6356.1830	1347721.658	3179843.329
F-1	-9.57	-9.57	4.60	0+04.6036	6356.0790	6356.0844	1347724.493	3179841.294
F-2	-8.71	-8.71	7.99	0+07.9862	6356.0050	6356.0153	1347727.328	3179839.258
F-3	-7.85	-7.85	11.37	0+11.3688	6355.9140	6355.9280	1347730.164	3179837.223
F-4	-6.99	-6.99	14.75	0+14.7514	6355.8480	6355.8643	1347732.999	3179835.187
F-5	-6.13	-6.13	18.13	0+18.1340	6355.7670	6355.7841	1347735.834	3179833.152
F-6	-5.27	-5.27	21.52	0+21.5166	6355.7280	6355.7443	1347738.669	3179831.117
F-7	-4.41	-4.41	24.90	0+24.8992	6355.6670	6355.6808	1347741.505	3179829.081
F-8	-3.55	-3.55	28.28	0+28.2818	6355.6500	6355.6601	1347744.340	3179827.046
F-9	-2.69	-2.69	31.66	0+31.6644	6355.6100	6355.6153	1347747.175	3179825.011
CL- Abut 2	-1.83	-1.83	35.05	0+35.0470	6355.6050	6355.6050	1347750.010	3179822.975
BF Abut 2	-1.45	-1.45	36.56	0+36.5580	6355.6010		1347751.277	3179822.066

GIRDER D

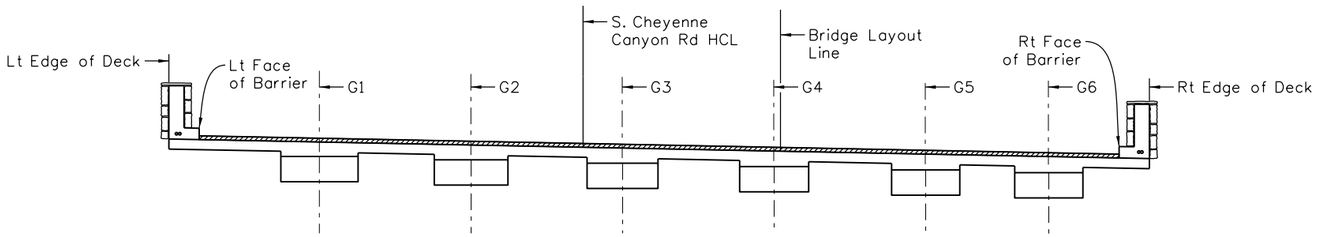
BENT LINE	OFFSET	X	Y	STATION	ELEVATION	ELEV + DL	NORTHING	EASTING
BF Abut 1	-0.625	-0.63	-0.02	-0+00.0170	6355.6650		1347728.367	3179850.588
CL Abut 1	-0.431	-0.43	1.49	0+01.4890	6355.6220	6355.6220	1347729.487	3179849.559
F-1	0.0041	0.00	4.86	0+04.8602	6355.5490	6355.5540	1347731.987	3179847.261
F-2	0.4392	0.44	8.23	0+08.2314	6355.4730	6355.4825	1347734.490	3179844.961
F-3	0.8743	0.87	11.60	0+11.6026	6355.4140	6355.4270	1347736.993	3179842.661
F-4	1.3094	1.31	14.97	0+14.9738	6355.3590	6355.3742	1347739.496	3179840.360
F-5	1.7445	1.74	18.35	0+18.3450	6355.3240	6355.3398	1347741.999	3179838.060
F-6	2.1796	2.18	21.72	0+21.7162	6355.2880	6355.3030	1347744.501	3179835.760
F-7	2.6147	2.61	25.09	0+25.0874	6355.2790	6355.2918	1347747.004	3179833.460
F-8	3.0498	3.05	28.46	0+28.4586	6355.2630	6355.2723	1347749.507	3179831.160
F-9	3.4849	3.48	31.83	0+31.8298	6355.2670	6355.2719	1347752.010	3179828.860
CL- Abut 2	3.92	3.92	35.20	0+35.2010	6355.2830	6355.2830	1347754.513	3179826.560
BF Abut 2	1.448	1.45	36.71	0+36.7070	6355.2880		1347755.630	3179825.533

GIRDER E

BENT LINE	OFFSET	X	Y	STATION	ELEVATION	ELEV + DL	NORTHING	EASTING
BF Abut 1	9.57	9.57	0.26	0+00.2560	6355.0900		1347736.334	3179856.932
CL Abut 1	9.57	9.57	1.76	0+01.7570	6355.0510	6355.0510	1347737.258	3179855.857
F-1	9.61	9.61	5.12	0+05.1175	6354.9800	6354.9848	1347739.502	3179853.244
F-2	9.64	9.64	8.48	0+08.4780	6354.9350	6354.9442	1347741.692	3179850.695
F-3	9.68	9.68	11.84	0+11.8385	6354.8960	6354.9085	1347743.881	3179848.151
F-4	9.71	9.71	15.20	0+15.1990	6354.8630	6354.8777	1347746.071	3179845.596
F-5	9.75	9.75	18.56	0+18.5595	6354.8510	6354.8663	1347748.260	3179843.046
F-6	9.78	9.78	21.92	0+21.9200	6354.8480	6354.8626	1347750.450	3179840.497
F-7	9.82	9.82	25.28	0+25.2805	6354.8530	6354.8654	1347752.640	3179837.947
F-8	9.85	9.85	28.64	0+28.6410	6354.8740	6354.8831	1347754.829	3179835.398
F-9	9.89	9.89	32.00	0+32.0015	6354.9000	6354.9048	1347757.019	3179832.848
CL- Abut 2	9.92	9.92	35.36	0+35.3620	6354.9400	6354.9400	1347759.209	3179830.299
BF Abut 2	9.94	9.94	36.86	0+36.8630	6354.9640		1347760.186	3179829.160

GIRDER F

BENT LINE	OFFSET	X	Y	STATION	ELEVATION	ELEV + DL	NORTHING	EASTING
BF Abut 1	17.69	17.69	0.47	0+00.4740	6354.6190		1347742.703	3179862.003
CL Abut 1	17.69	17.69	1.97	0+01.9740	6354.5840	6354.5840	1347743.669	3179860.855
F-1	17.69	17.69	5.33	0+05.3335	6354.5080	6354.5128	1347745.831	3179858.284
F-2	17.69	17.69	8.69	0+08.6930	6354.4540	6354.4630	1347747.993	3179855.713
F-3	17.69	17.69	12.05	0+12.0525	6354.4020	6354.4143	1347750.156	3179853.141
F-4	17.69	17.69	15.41	0+15.4120	6354.3920	6354.4064	1347752.318	3179850.570
F-5	17.69	17.69	18.77	0+18.7715	6354.3740	6354.3892	1347754.480	3179847.999
F-6	17.69	17.69	22.13	0+22.1310	6354.3720	6354.3864	1347756.642	3179845.428
F-7	17.69	17.69	25.49	0+25.4905	6354.3950	6354.4073	1347758.805	3179842.857
F-8	17.69	17.69	28.85	0+28.8500	6354.4160	6354.4250	1347760.967	3179840.286
F-9	17.69	17.69	32.21	0+32.2095	6354.4540	6354.4588	1347763.129	3179837.714
CL- Abut 2	17.69	17.69	35.57	0+35.5690	6354.5010	6354.5010	1347765.292	3179835.143
BF Abut 2	17.69	17.69	37.07	0+37.0700	6354.5280		1347766.257	3179833.994



BRIDGE GEOMETRY LONGITUDINAL LINE DESIGNATION
(Looking Ahead Station)

NOTES:

1. Refer to general layout sheet for HCL alingment and profile grade line.
2. Positive roadway cross slope is upwards from profile grade line.
3. Elevation are at top of concrete deck 3 inches below finished grade.
4. These stations, coordinates, offsets and lengths define the layout of the structure in a two dimensional horizontal plane. Elevations define the final grade of the finished concrete deck. Fabrication of structural components through the direct use of this information is not intended or advisable.
5. The stations and offsets are measured based on the layout line.

Print Date: 6/15/2023
File Name: 009_SCC-BR-PLAN-19.dgn
Horiz. Scale: Vert. Scale: As Noted
Unit Information

Jacobs

Sheet Revisions

Date:	Comments	Init.

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As Constructed
No Revisions:
Revised:
Void:

SOUTH CHEYENNE CANYON BRIDGE
BRIDGE DECK ELEVATIONS (1 OF 2)

Designer: S. Tripathi
Detailer: A. Quintana
Sheet Subset: STRUCTURAL
Structure Numbers:
Subset Sheets: B19 of

Project No./Code
XX XX-XX
XXXXXX
Sheet Number 38

90% DESIGN - NOT FOR CONSTRUCTION

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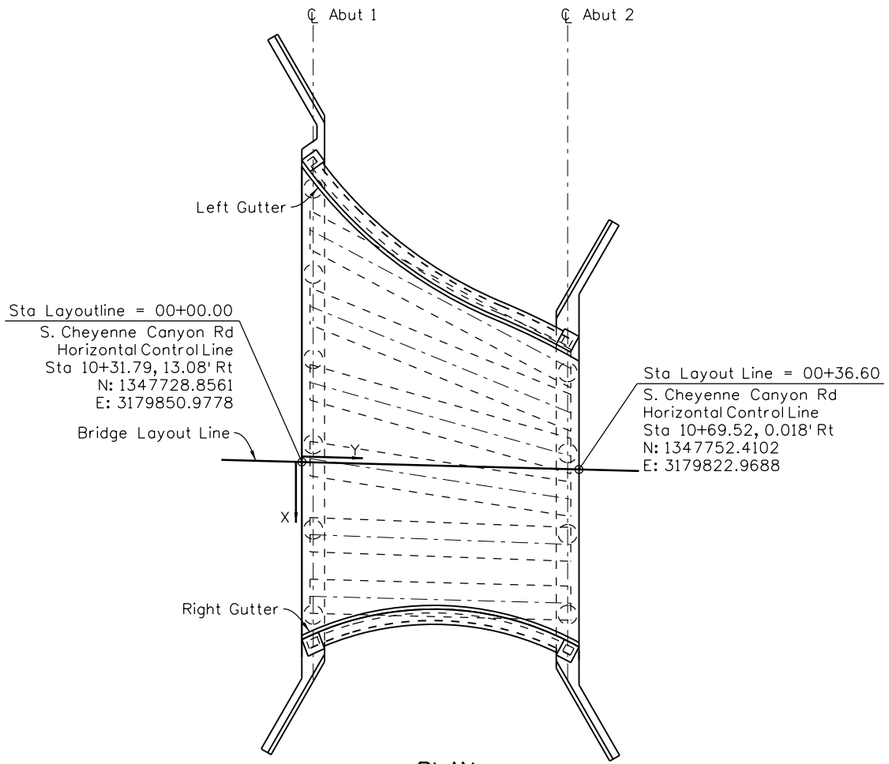
RIGHT FACE OF BARRIER

BENT LINE	OFFSET	X	Y	STATION	ELEVATION	ELEV + DL	NORTHING	EASTING
BF Abut 1	22.89	22.89	0.61	0+00.6130	6354.3140		1347746.766	3179865.238
CL Abut 1	22.16	22.16	2.09	0+02.0940	6354.3190		1347747.166	3179863.64
F-1	20.84	20.84	5.30	0+05.2980	6354.3260		1347748.215	3179860.339
F-2	19.80	19.80	8.61	0+08.6050	6354.3320		1347749.548	3179857.146
F-3	19.05	19.05	11.99	0+11.9890	6354.3330		1347751.153	3179854.065
F-4	18.60	18.60	15.43	0+15.4250	6354.3320		1347753.018	3179851.143
F-5	18.44	18.44	18.89	0+18.8870	6354.3350		1347755.127	3179848.395
F-6	18.59	18.59	22.35	0+22.3500	6354.3280		1347757.47	3179845.839
F-7	19.04	19.04	25.79	0+25.7870	6354.3130		1347760.023	3179843.495
F-8	19.78	19.78	29.17	0+29.1730	6354.2990		1347762.769	3179841.381
F-9	20.81	20.81	32.48	0+32.4820	6354.2730		1347765.689	3179839.512
CL- Abut 2	22.12	22.12	35.69	0+35.6880	6354.2240		1347768.759	3179837.903
BF Abut 2	22.86	22.86	37.21	0+37.2090	6354.2430		1347770.303	3179837.216

RIGHT EDGE OF DECK

BENT LINE	OFFSET	X	Y	STATION	ELEVATION	ELEV + DL	NORTHING	EASTING
BF Abut 1	25.12	25.12	0.67	0+00.6730	6354.2298		1347748.513	3179866.63
CL Abut 1	24.35	24.35	2.15	0+02.1530	6354.2316		1347748.877	3179865.002
F-1	22.96	22.96	5.34	0+05.3410	6354.2346		1347749.864	3179861.666
F-2	21.86	21.86	8.64	0+08.6430	6354.2366		1347751.152	3179858.434
F-3	21.08	21.08	12.03	0+12.0320	6354.2329		1347752.73	3179855.334
F-4	20.60	20.60	15.48	0+15.4780	6354.2286		1347754.585	3179852.391
F-5	20.44	20.44	18.95	0+18.9530	6354.2277		1347756.702	3179849.63
F-6	20.61	20.61	22.43	0+22.4280	6354.2167		1347759.061	3179847.074
F-7	21.08	21.08	22.87	0+22.8740	6354.1977		1347761.647	3179844.744
F-8	21.88	21.88	29.26	0+29.2610	6354.1797		1347764.431	3179842.661
F-9	22.97	22.97	32.56	0+32.5620	6354.1497		1347767.394	3179840.843
CL- Abut 2	24.37	24.37	35.75	0+35.7490	6354.0967		1347770.514	3179839.301
BF Abut 2	25.16	25.16	37.27	0+37.2700	6354.1134		1347772.102	3179838.648



PLAN

NOTES:

1. Refer to general layout sheet for HCL alingment and profile grade line.
2. Positive roadway cross slope is upwards from profile grade line.
3. Elevation are at top of concrete deck 3 inches below finished grade.
4. These stations, coordinates, offsets and lengths define the layout of the structure in a two dimensional horizontal plane. Elevations define the final grade of the finished concrete deck. Fabrication of structural components through the direct use of this information is not intended or advisable.
5. The stations and offsets are measured based on the layout line.

90% DESIGN - NOT FOR CONSTRUCTION

Print Date: 6/15/2023	
File Name: 009_SCC-BR-PLAN-20.dgn	
Horiz. Scale:	Vert. Scale: As Noted
Unit Information	
Jacobs	

Sheet Revisions		
Date:	Comments	Init.

COLORADO SPRINGS
OLYMPIC CITY USA

As Constructed	
No Revisions:	
Revised:	
Void:	

SOUTH CHEYENNE CANYON BRIDGE
BRIDGE DECK ELEVATIONS (2 OF 2)

Designer:	S. Tripathi	Structure Numbers	
Detailer:	A. Quintana		
Sheet Subset:	STRUCTURAL	Subset Sheets:	B20 of

Project No./Code
XX XX-XX
XXXXXX
Sheet Number 39

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GENERAL NOTES

Except as shown in the plans, structure excavation and backfill shall be in Accordance with M-206-1 for cast-in-place retaining walls.

Structure excavation and backfill shall be as shown on the plans, except shoring may be required for excavation adjacent to the existing roadway. Temporary excavation support shall be paid for by Item 206 Shoring. Incidental shoring that is not included as a pay item will not be measured and paid for separately but shall be included in the work.

Expansion joint material shall meet AASHTO Specification M213.

All construction shall be in accordance with the Colorado Department of Transportation 2022 standard specifications for road and bridge construction and the project special provision.

Unless noted otherwise, the final finish for the surfaces or exposed concrete shall be class 2. Deck surface shall recieve a transverse broom finish.

Unless noted otherwise, all structural steel shall be as follows:

HSS Sections:	ASTM A847 (Grade 50W)
Steel shapes and plates:	ASTM A588 (Grade 50W)
Anchor Bolts:	ASTM F1554 (Grade 55) (Galvanized)
High Strength Bolts:	ASTM A325 (Type 3)
Nuts:	ASTM A563 (Grade C3 or DH3)
Washers:	ASTM F436 (Type 3)

Grade 60 reinforcing steel is required. All reinforcing steel shall be non-epoxy coated unless otherwise noted.

Ⓔ denotes epoxy coated reinforcing steel.

All concrete shall be Class D (Bridge), f'c = 4,500 psi or Class BZ, f'c = 4,000 psi.

Grade 60 reinforcing steel is required.

All reinforcing steel shall be epoxy coated unless otherwise noted.

All the provisions for bridge deck concrete shall also apply to approach slab concrete.

Concrete in the abutments and other concrete in contact with soil shall meet the sulfate resistance requirements of potential exposure class 1. Refer to the standard speical provisions for the section 601 and 701 Structural Concrete.

Stations, Elevations and dimensions contained in these plans are calculated from a recent field survey. The Contractor shall verfiy all dependent dimensions in the field before ordering or fabricating any material.

The information shown on these plans concerning the type and location of underground utilities is not guaranteed to be accurate or all inclusive. The Contractor is responsible for making his own determination as to the type and location of underground utilities as may be necessary to avoid damage thereto. The Contractor shall contact the utility notification center of Colorado at 1-800-922-1987 at least 2 days (not including the day of notification) prior to any excavation or other earthwork.

The Contractor shall be responsible for the stability of the structure duringconstruction.

The information shown on these plans concerning the type and location of underground utilities is not guaranteed to be accurate or all inclusive.
The Contractor is responsible for making their own determination as to the type and location of underground utilities as may be necessary to avoid damage thereto. The Contractor shall contact the Utility Notification Center of Colorado at 811 (1-800-922-1987) at least 3 days (2 days not including the day of notification) prior to any excavation or other earthwork.

SUBSTRUCTURE DESIGN DATA

AASHTO, 9th Edition LRFD with current interims as modified by CDOT Bridge Design Manual 2023

Design method: Load and Resistance factor design (LRFD)

Live Load:	85psf Pedestrian Load H-5 Truck Live Load
Dead Load:	Reactions from Superstructure provided by manufactorer
Snow Laod:	100psf

Reinforced Concrete:
- Class D Concrete: f'c = 4,500 psi
- Reinforcing Steel: fy = 60,000 psi

Drilled Shaft Concrete:
- Class BZ Concrete: f'c = 4,000 psi
- Reinforcing Steel: fy = 60,000 psi

BRIDGE DESCRIPTION

1 - simple span (61'-6") Pedestrian Bridge,
Cast-in-Place Concrete Deck and
Prefabricated steel truss
over coal creek
14'-0" Truss-to-Truss clear, No Skew

SUPERSTRUCTURE DESIGN DATA

Truss manufacturer: Big "R" Bridge, Greeley, Colorado (WWW.BIGBRIDGE.COM)

Refer to manufacturer's general notes for full information on materials, construction methods, and design assumptions for bridge superstructure.

Truss to be design in accordance with AASHTO LRFD guide specifications for the design of Pedestrian Bridges, first edition (2009).

Truss deflection due to design live load shall be limited to L/600. Dynamic deflection response shal be controlled by applyling the vibration cirteria in the AASHTO guide specification for Pedestrian Bridges.

Weathering steel shall be used for all truss and railing components.

Concrete deck design to be performed by bridge manufacturer. Placement of deck reinforcing and concrete to be performed by AMES/GRANITE after erection of truss. Deck reinforcing steel shall epoxy coated and deck concrete shall be Class D (4,500psi) or approved equal.

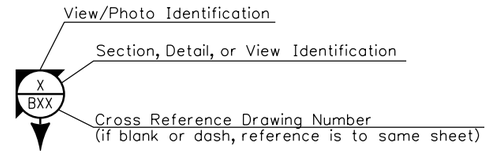
Permanent deck forms shall be designed by the fabricator and provided as part of the prefabricated truss.

Bearing pads shall be deigned and provided by bridge manufacturer at each abutment. Anchor bolts will be designed and installed by AMES/GRANITE and are shown in these plans.

Expansion gap at ends of bridge to be determined by bridge manufacturer.

Attachment of bridge tether to superstructure to be determined by bridge manufacturer. Stream velocity for design shall be for 100-year flow.

INDEX OF DRAWING



ABBREVIATIONS

(Per M-100-2 or as shown below)

Ea	= Each
BF	= Back Face
FF	= Front Face
FFBW	= Front Face Backwall
RC	= Reinforced Concrete
WSEL	= Water Surface Elevation

Know what's **below.**
Call before you dig.

Print Date: 6/15/2023	Sheet Revisions			As Constructed	SOUTH CHEYENNE CANYON BRIDGE
File Name: 009_SCC-PED-BR-PLAN-101.dgn	Date:	Comments	Init.	No Revisions:	GENERAL INFORMATION
Horiz. Scale: Vert. Scale: As Noted				Revised:	Designer: A. Regalado — Structure Numbers:
Unit Information				Void:	Detailer: A. Quintana
Jacobs					Sheet Subset: STRUCTURAL — Subset Sheets: B101 of

COLORADO SPRINGS
OLYMPIC CITY USA

Project No./Code: XX XX-XX
XXXXXX
Sheet Number 40

90% DESIGN - NOT FOR CONSTRUCTION

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SUMMARY OF QUANTITIES					
Item No.	Description	Unit	Abutment 1	Abutment 2	Total
206-00000	Structure Excavation	CY	30	38	68
206-00100	Structure Backfill (Class 1)	CY	31	34	65
206-00200	Structure Backfill (Class 2)	CY	11	13	24
206-00360	Structure Backfill (Class 2) (Special)	CY	21	22	43
503-00024	Drilled Shaft (24 Inch)	LF	47	44	91
503-00310	Crosshole Sonic Logging Testing	EACH	1	1	2
601-03000	Concrete Class D	CY	6	7	13
601-40005	Cut Stone Veneer	SF	44	55	99
602-00020	Reinforcing Steel (Epoxy Coated)	LB	688	779	1467

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Print Date: 6/15/2023
File Name: 009_SCC-PED-BR-PLAN-102.dgn
Horiz. Scale: Vert. Scale: As Noted
Unit Information

Jacobs

Sheet Revisions		
Date:	Comments	Init.

COLORADO SPRINGS
OLYMPIC CITY USA

As Constructed
No Revisions:
Revised:
Void:

SOUTH CHEYENNE CANYON BRIDGE
SUMMARY OF QUANTITIES

Designer: A. Regalado
Detailer: Mateo-Lucas
Sheet Subset: STRUCTURAL
Structure Numbers
Subset Sheets: B102 of

Project No./Code
XX XX-XX
XXXXXX
Sheet Number 41

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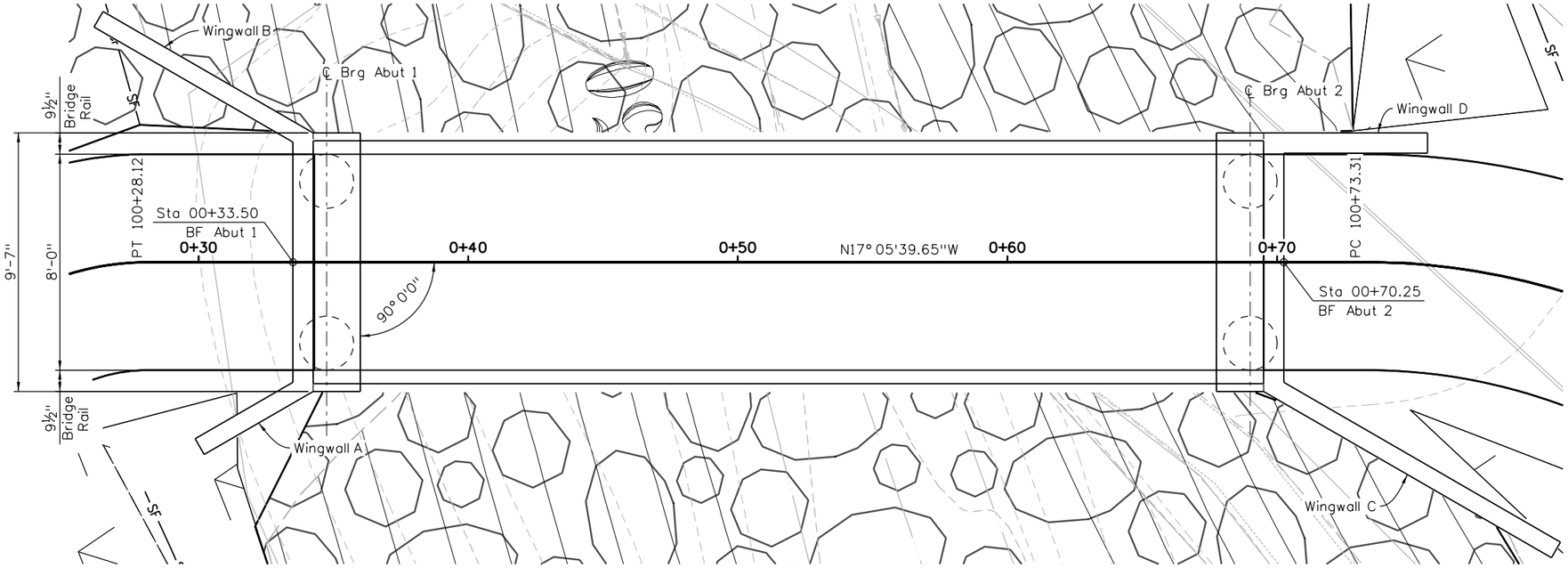
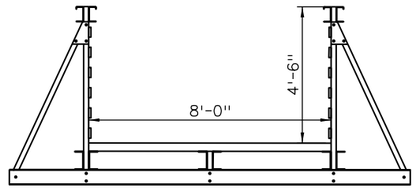
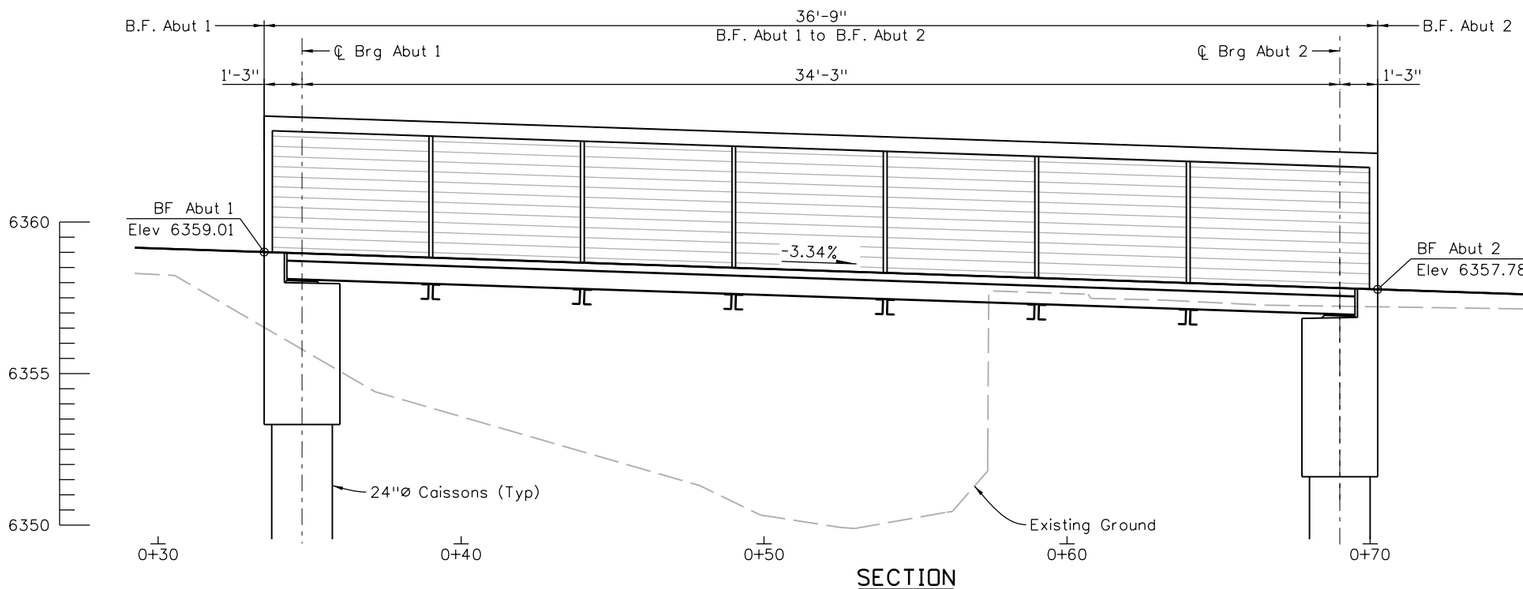


PLAN



TYPICAL SECTION



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(Taken at layout line)

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Unit Information			
Jacobs			

COLORADO SPRINGS
OLYMPIC CITY USA

As Constructed	SOUTH CHEYENNE CANYON BRIDGE		Project No./Code
No Revisions:	GENERAL LAYOUT		XX XX-XX
Revised:	Designer: A. Regalado	Structure Numbers	XXXXXX
Void:	Detailer: J. Mateo-Lucas		
	Sheet Subset: STRUCTURAL	Subset Sheets: B103 of	Sheet Number 42

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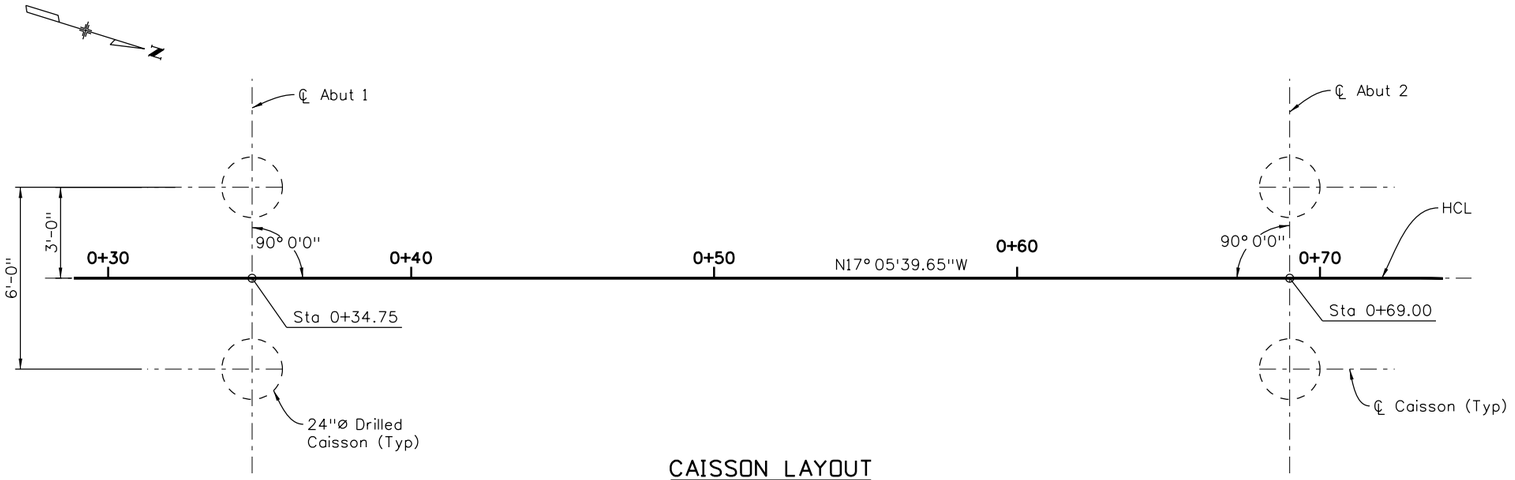
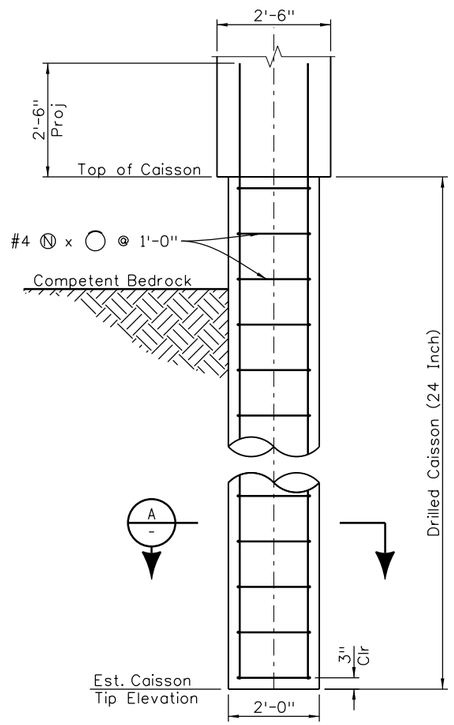
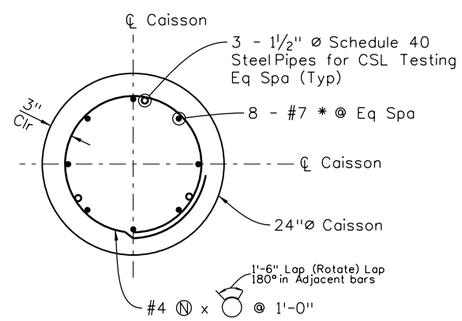


CAISSON LAYOUT



CAISSON DETAIL

Location	Caisson	Caisson Size	Max. Load (Factored) (kips)	Max. Load (Service) (kips)	Top of Caisson Elevation	Estimated Top of Bedrock Elev.	Estimated Tip Elev.	Min. Required Tip Elevation	As-Built Tip Elev.
Abutment 1	C1	24"	44.4	26.7	6354.06	6338	6331	6331	
	C2	24"	44.4	26.7	6354.06	6338	6331	6331	
Abutment 2	C3	24"	44.4	26.7	6352.91	6338	6331	6331	
	C4	24"	44.4	26.7	6352.91	6338	6331	6331	



SECTION A -

CAISSON NOTES:

1. Top of competent bedrock elevation shall be verified at time of construction by engineer.
2. The use of temporary casing and dewatering during drilling may be required. the cost of temporary casing and dewatering shall not be paid for separetly, but shall be included in bid item 503-Drilled Caisson (24 inch).
3. The contractor shall anticipate encountering hard bedrock during drilling.
4. Resistance factor ø = 0.60 for end bearing and for side shear.
5. Ultimate allowable end bearing = 60 ksf x ø x ag.
6. Ultimate allowable side shear resistance = 5 ksf x ø x perimeter x length from 1' to 5' into bedrock.
7. Caisson construction shall proceed per CDOT specification 503, with exception that crosshole sonic log (csl) tube installation and testing not required.

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Print Date: 6/15/2023	Sheet Revisions		
File Name: 009_SCC-PED-BR-PLAN-105.dgn	Date:	Comments	Init.
Horiz. Scale: Vert. Scale: As Noted			
Unit Information			
Jacobs			

COLORADO SPRINGS
OLYMPIC CITY USA

As Constructed	SOUTH CHEYENNE CANYON BRIDGE			Project No./Code
No Revisions:	FOUNDATION LAYOUT			XX XX-XX
Revised:	Designer: A. Regalado	Structure Numbers		XXXXXX
Void:	Detailer: J. Mateo-Lucas			Sheet Number 43
	Sheet Subset: STRUCTURAL	Subset Sheets: B105 of		

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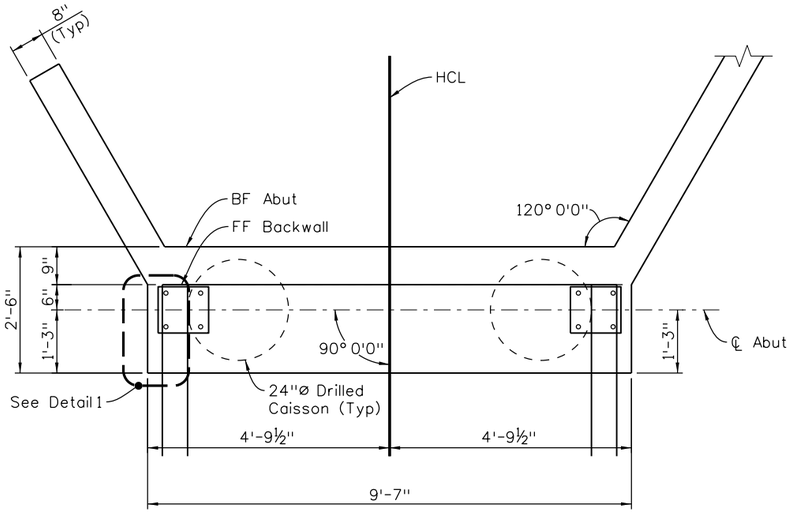

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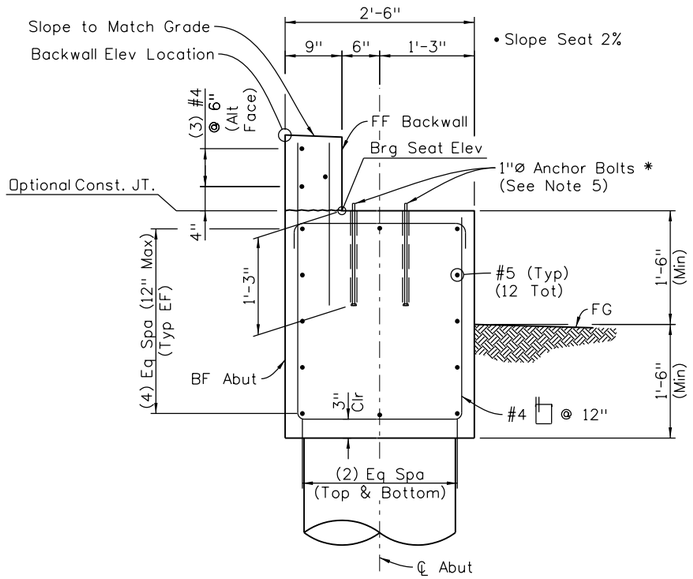
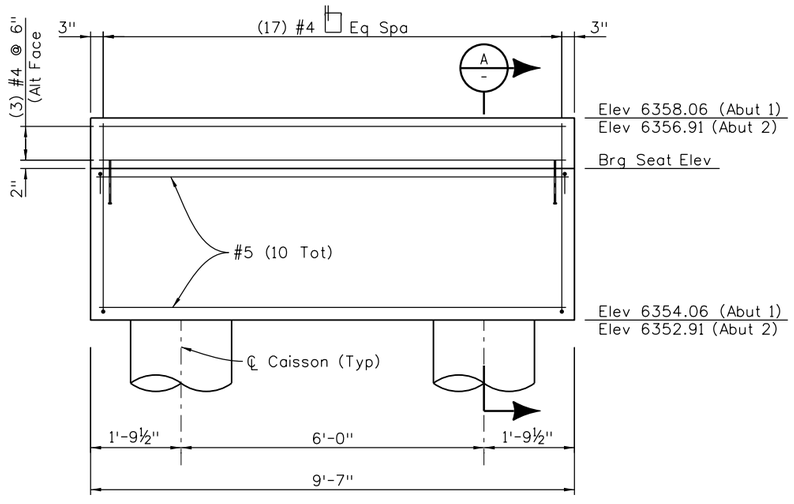


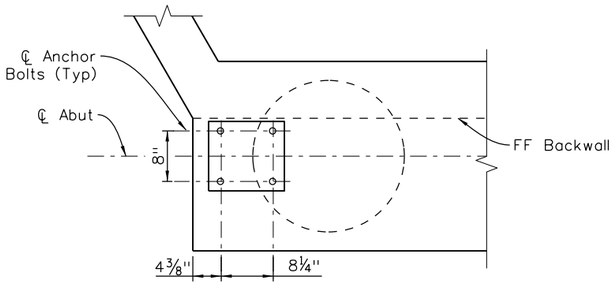
SECTION A

NOTES:

1. Abutment and wingwall concrete shall be Class D (Bridge), F'c = 4,500 psi
2. Clear cover shall be 2" unless otherwise noted.
3. Reinforcing may be shifted to accommodate anchor bolts.
4. See sheet B107 for wingwalls details.
5. Anchor bolts may be cast with cap or grouted. If grouted, blockout shall be 3"ø and grout shall be high strength, cementitous, non-shrink, CDOT approved product with 28-day compressive strength of 6000 psi.
6. Excavation and backfill shall be per CDOT Standard M-206-2. Place 6" perporated pipe underdrain within filter material and extend to daylight through wingwall.



ELEVATION



DETAIL 1

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Print Date: 6/15/2023	Sheet Revisions			As Constructed	SOUTH CHEYENNE CANYON BRIDGE	Project No./Code
File Name: 009_SCC-PED-BR-PLAN-106.dgn	Date:	Comments	Init.	No Revisions:	ABUTMENT DETAIL	XX XX-XX
Horiz. Scale: Vert. Scale: As Noted				Revised:	Designer: A. Regalado / Structure Numbers	XXXXXX
Unit Information				Void:	Detailer: J Mateo-Lucas	
Jacobs					Sheet Subset: STRUCTURAL / Subset Sheets: B106 of	Sheet Number 44

COLORADO SPRINGS OLYMPIC CITY USA

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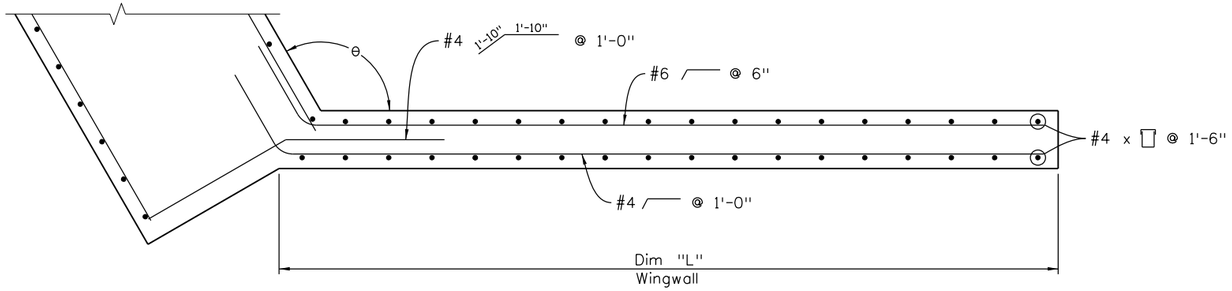
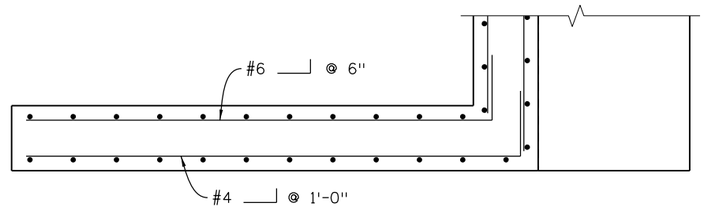
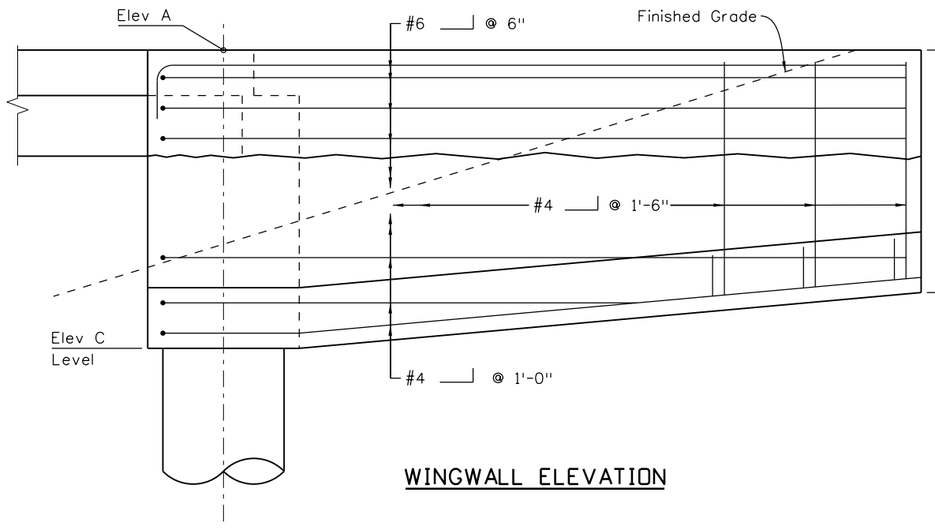


WINGWALL C PLAN
(Wingwall A & B Similar)

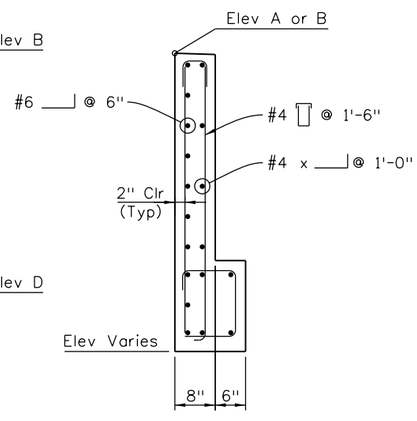


WINGWALL D PLAN

Table of Elevations						
Wingwall	Elev A	Elev B	Elev C	Elev D	Dim "L"	Angle θ
Wingwall A	6358.98	6358.74	6354.06	6354.06	4'-8"	120°
Wingwall B	6358.98	6358.48	6354.06	6354.06	9'-0"	120°
Wingwall C	6357.83	6356.60	6352.91	6352.91	12'-4"	120°
Wingwall D	6357.83	6357.70	6352.91	6352.91	6'-0"	90°



WINGWALL ELEVATION



TYPICAL WINGWALL SECTION

NOTES:

1. Contractor shall fill back face and front face of wingwall simultaneously (±2 ft)
2. Dovetail slots shall be installed on wingwall faces finished with stone veneer.

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Print Date: 6/15/2023
File Name: 009_SCC-PED-BR-PLAN-107.dgn
Horiz. Scale: Vert. Scale: As Noted
Unit Information

Jacobs

Sheet Revisions		
Date:	Comments	Init.

COLORADO SPRINGS
OLYMPIC CITY USA

As Constructed
No Revisions:
Revised:
Void:

SOUTH CHEYENNE CANYON BRIDGE
WINGWALLS DETAIL

Designer: A. Regalado
Detailer: J Mateo-Lucas
Sheet Subset: STRUCTURAL
Structure Numbers:
Subset Sheets: B107 of

Project No./Code
XX XX-XX
XXXXXX
Sheet Number 45

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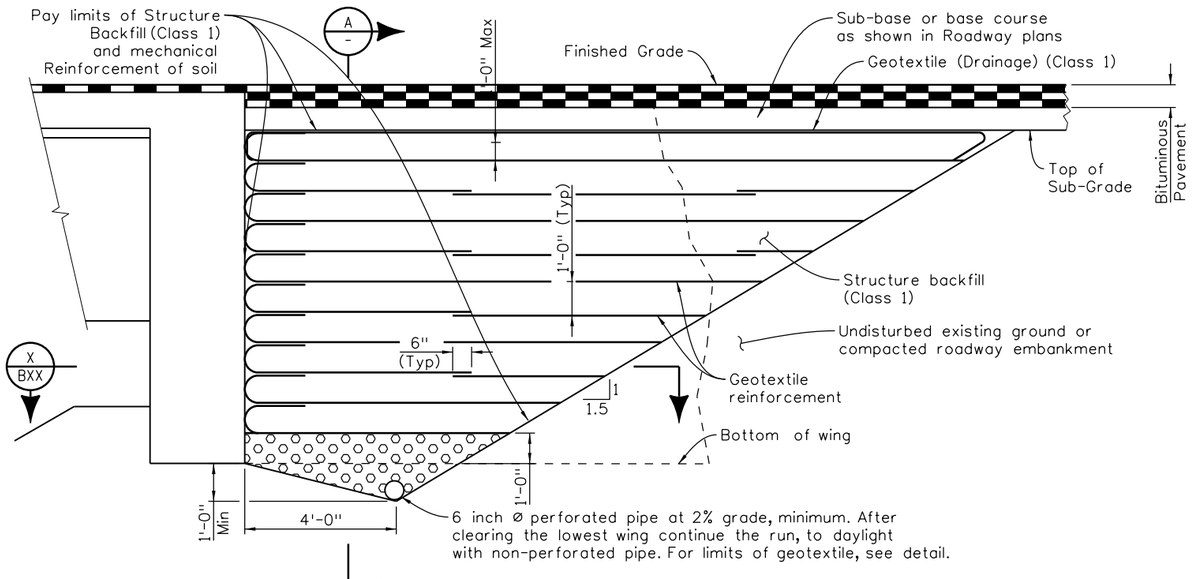
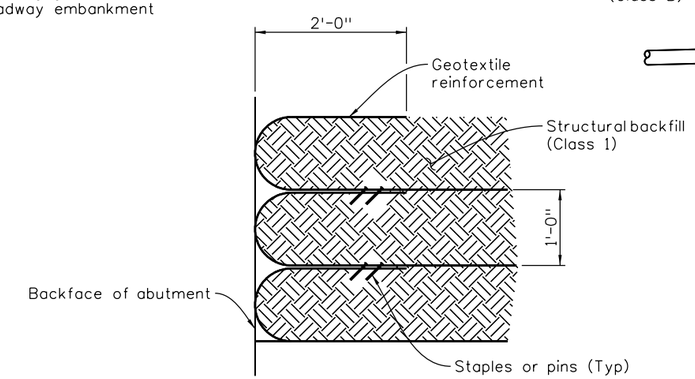
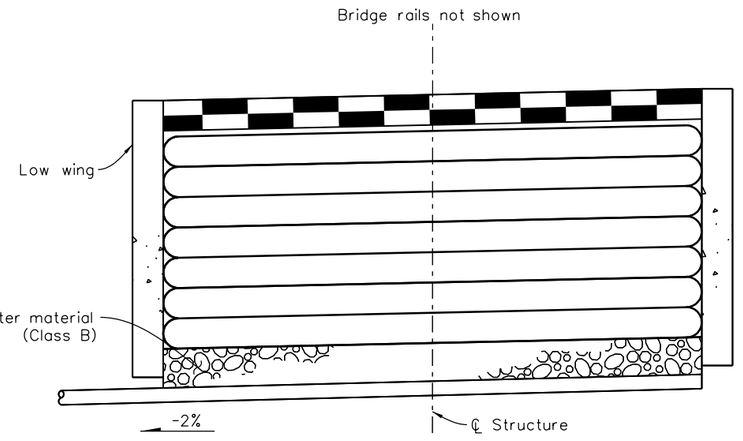


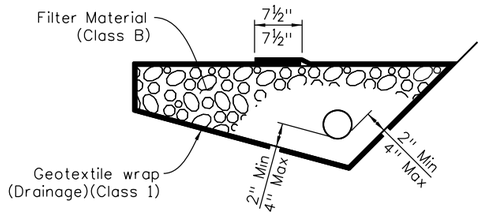
SECTION PERPENDICULAR TO ABUTMENT



WRAP DETAIL

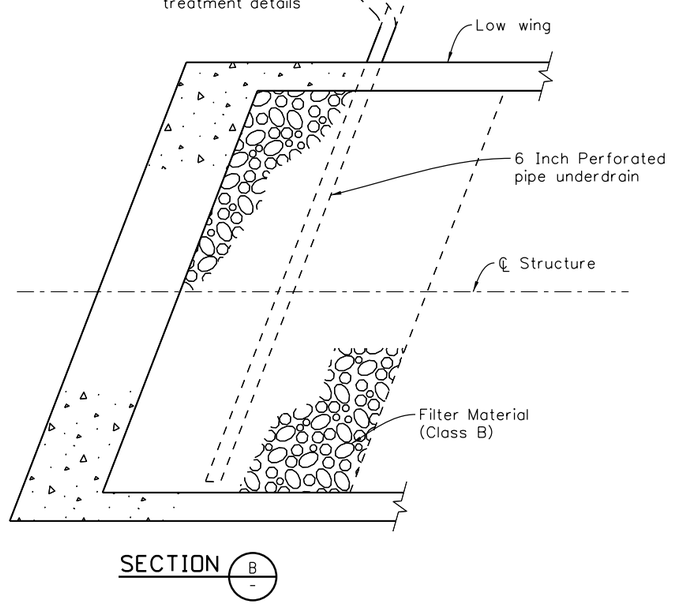


SECTION A



6 INCH PERPENDICULAR PIPE UNDERDRAIN

6 inch perforated pipe underdrain includes all filter material (Class B) and Geotextile wrap (Drainage) (Class 1)



SECTION B

NOTES:

Geotextile reinforcement shall be woven fabric with a minimum average roll value of 4800 lb/ft for installations with a gap and 2400 lb/ft for installations without a gap based on ASTM D4595.

Geotextile reinforcment shall be placed by alternating machine direction (md) with cross machine direction (XD) from layer to layer.

The geotextile reinforcement wrap at back face of abutment shall be pulled back slack free with its end anchored to soil underneath with staples or pins.

Minimum splice of all geofabric shall consist of 6" of overlap.

Payment for all work items shown will be made under Item 206 Structure Backfill (Special)(CY) and Item 206 Structure Backfill (Class 1)(CY). Items include 6 Inch ø perforated pipe underdrain, subsurface drain outlet (6 Inch ø nonperforated pipe) and all other miscellaneous items needed to complete the work. Geotextile reinforement shall be paid for as Structural Backfill (Special).

Installation of pipe underdrain and subsurface drain outlet will conform to the construction requirements of section 605.03 and 605.06, respectively.

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Print Date: 6/15/2023	Sheet Revisions		
File Name: 009_SCC-PED-BR-PLAN-108.dgn	Date:	Comments	Init.
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Unit Information			
Jacobs			

COLORADO SPRINGS
OLYMPIC CITY USA

As Constructed	SOUTH CHEYENNE CANYON BRIDGE		Project No./Code
No Revisions:	MECH. STABILIZED EARTH BACKFILL		XX XX-XX
Revised:	Designer: A. Regalado	Structure Numbers	XXXXXX
Void:	Detailer: A. Quintana		
	Sheet Subset: STRUCTURAL	Subset Sheets: B108 of	Sheet Number 46

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UTILITY NOTES:

1. EXISTING UTILITY INFORMATION WAS COLLECTED IN ACCORDANCE WITH AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE) 38-22 STANDARD GUIDELINE FOR INVESTIGATING AND DOCUMENTING EXISTING UTILITIES.

2. THE QUALITY LEVELS OBTAINED, AS DEFINED BY ASCE 38-22, ARE AS FOLLOWS:
   QUALITY LEVEL A - PRECISE HORIZONTAL AND VERTICAL LOCATION OF UTILITIES OBTAINED BY THE ACTUAL EXPOSURE AND SUBSEQUENT MEASUREMENT OF SUBSURFACE UTILITIES, USUALLY AT A SPECIFIC POINT.

   QUALITY LEVEL B - INFORMATION OBTAINED THROUGH THE APPLICATION OF APPROPRIATE SURFACE GEOPHYSICAL METHODS TO DETERMINE THE EXISTENCE AND APPROXIMATE HORIZONTAL POSITION OF SUBSURFACE UTILITIES.

   QUALITY LEVEL C - INFORMATION OBTAINED BY SURVEYING AND PLOTTING VISIBLE ABOVE-GROUND UTILITY FEATURES AND BY USING PROFESSIONAL JUDGEMENT IN CORRELATING THIS INFORMATION TO QUALITY LEVEL D.

   QUALITY LEVEL D - INFORMATION DERIVED FROM EXISTING RECORDS OR ORAL RECOLLECTIONS.

3. SUBSURFACE UTILITIES WERE TRACED USING INDUCTIVE OR CONDUCTIVE METHODS. GROUND PENETRATING RADAR OR OTHER GEOPHYSICAL INVESTIGATION TECHNIQUES WERE NOT UTILIZED TO SEARCH FOR NONCONDUCTIVE UTILITIES OR UTILITIES NOT IDENTIFIED BY SURFACE OR MAP EVIDENCE.

4. ALL QUALITY LEVELS OF THE EXISTING UTILITIES ARE SHOWN BY THEIR LINE TYPE.

5. STORM AND SANITARY LINES SHOWN MEET ASCE 38-22 QUALITY LEVEL C. MANHOLE LIDS WERE OPENED AND INVERT ELEVATIONS WERE MEASURED USING A DIP ROD.

6. EXISTING SANITARY SERVICE LINES WERE NOT INVESTIGATED OR SHOWN ON DRAWING.

7. ABANDONED FACILITIES WERE NOT DESIGNATED AS PART OF THE SCOPE OF WORK. ABANDONED FACILITIES ARE SHOWN AS A QL-D LINE ON THIS PLAN SET IN CASES WERE DEPICTED ON UTILITY PROVIDER MAPS.

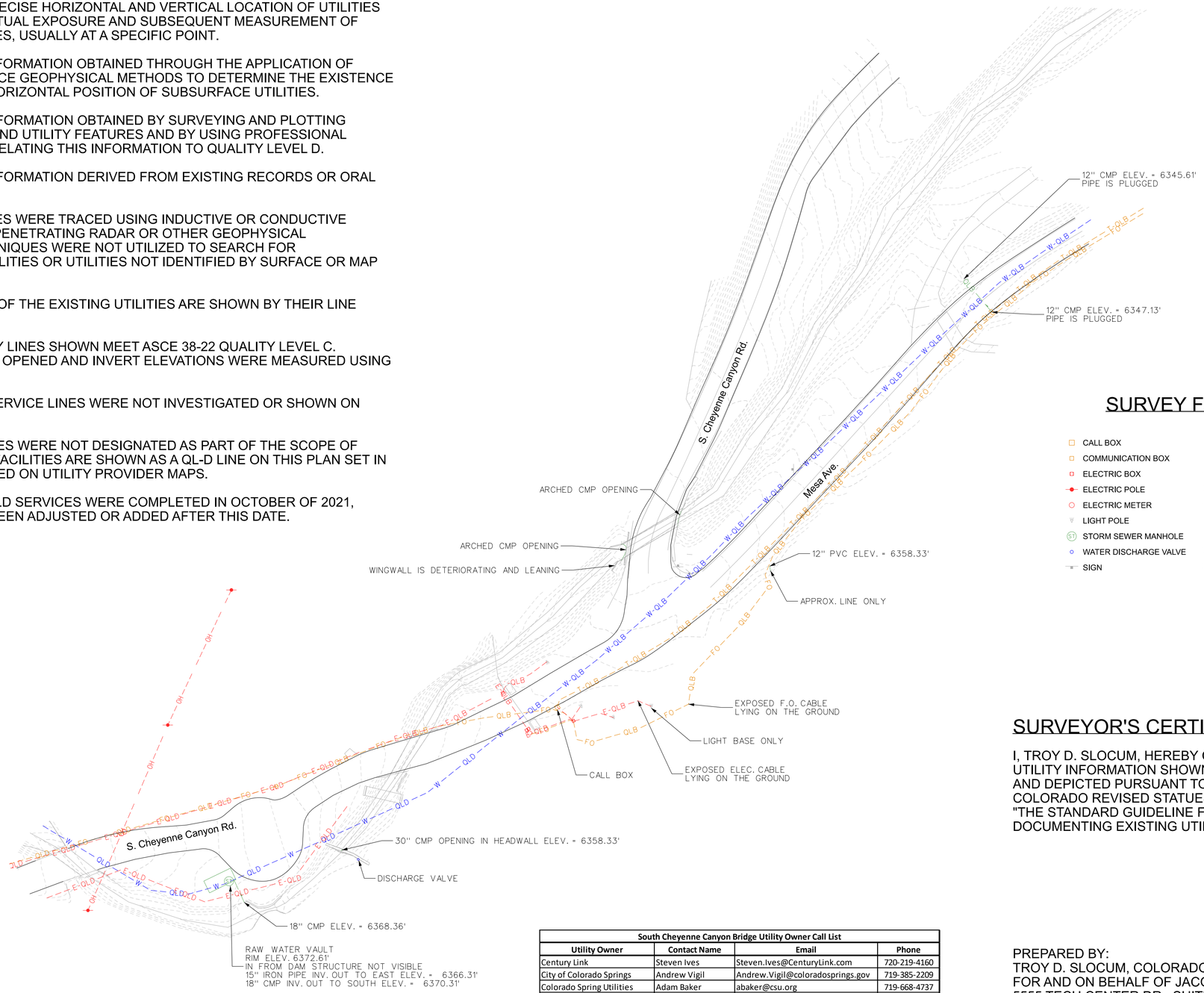
8. UTILITY MAPPING FIELD SERVICES WERE COMPLETED IN OCTOBER OF 2021, UTLITIES MAY HAVE BEEN ADJUSTED OR ADDED AFTER THIS DATE.

CITY OF COLORADO SPRINGS
SOUTH CHEYENNE CANYON
SUE DIAGRAM

N

0' 20' 40' 80'

1" = 40'



SURVEY FEATURE LEGEND

- CALL BOX
- COMMUNICATION BOX
- ELECTRIC BOX
- ELECTRIC POLE
- ELECTRIC METER
- LIGHT POLE
- STORM SEWER MANHOLE
- WATER DISCHARGE VALVE
- SIGN
- TELEPHONE QL-B LINE
- FIBER OPTIC QL-B LINE
- ELECTRIC OVERHEAD LINE
- ELECTRIC QL-B LINE
- ELECTRIC QL-D LINE
- STORM SEWER QL-B LINE
- STORM SEWER QL-D LINE
- WATER QL-B LINE
- WATER QL-D LINE

South Cheyenne Canyon Bridge Utility Owner Call List			
Utility Owner	**Contact Name**	**Email**	**Phone**
Century Link	Steven Ives	Steven.Ives@CenturyLink.com	720-219-4160
City of Colorado Springs	Andrew Vigil	Andrew.Vigil@coloradosprings.gov	719-385-2209
Colorado Spring Utilities	Adam Baker	abaker@csu.org	719-668-4737
Comcast	Artjahmel Davis	artjahmel_davis@comcast.com	303-603-2682
El Paso County Public Works	Samantha Sherman	SamanthaSherman@elpasoco.com	719-352-9601

SURVEYOR'S CERTIFICATION:

I, TROY D. SLOCUM, HEREBY CERTIFY THAT THE EXISTING UTILITY INFORMATION SHOWN HEREIN WAS COLLECTED AND DEPICTED PURSUANT TO THE REQUIREMENTS OF COLORADO REVISED STATUES 9-1.5-103 AND ASCE 38-22, "THE STANDARD GUIDELINE FOR INVESTIGATING AND DOCUMENTING EXISTING UTILITIES".

PREPARED BY:
TROY D. SLOCUM, COLORADO PE 35270
FOR AND ON BEHALF OF JACOBS ENGINEERING GROUP INC.
5555 TECH CENTER DR., SUITE 210
COLORADO SPRINGS, CO 80919
TROY.SLOCUM@JACOBS.COM

COLORADO SPRINGS
OLYMPIC CITY USA

	NAME	DATE
DRAWN	T. TOBIN	4/20/23
DESIGNED	N/A	N/A
QC REVIEW	R. GUPTILL	5/8/23
APPROVED	T. SLOCUM	5/8/23

CLIENT PROJECT NO. N/A
JACOBS PROJECT NO. WXXZ6205
SCALE: 1=40'
DGN FILE NAME V-WXXZ6205-SCCR-SUE.dgn

Jacobs
9191 Jamaica Street
Englewood, Colorado 80112
T (720) 286-2000

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TITLE:
COLORADO SPRINGS
SOUTH CHEYENNE CANYON
SUBSURFACE UTILITY PLANS
COLORADO SPRINGS, EL PASO COUNTY, STATE OF COLORADO

SHEET NO. 1 OF 1
DRAWING NAME: V-WXXZ6205-SCCR-SUE.dgn
REVISION N/A

SHEET NO.	INDEX OF SHEETS
1	TITLE SHEET
2	STANDARD PLANS
3	ABBREVIATIONS AND SYMBOLS
4-6	GENERAL NOTES
7	TYPICAL SECTIONS
8	SUMMARY OF APPROXIMATE QUANTITIES
9-10	TABULATION OF TRAFFIC ITEMS
11	SURVEY CONTROL DIAGRAM
12	PROJECT KEY PLAN
13	GEOMETRY CONTROL PLAN
14	REMOVAL PLAN
15	ROADWAY PLAN
16	ROADWY PROFILE
17	ROADWAY DETAIL
18	CHANNEL PLAN
19	BRIDGE HYDRAULIC PLAN AND PROFILE
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21	BRIDGE HYDRAULIC DETAILS
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23-41	BRIDGE SHEETS
42-48	PEDESTRIAN BRIDGE SHEETS

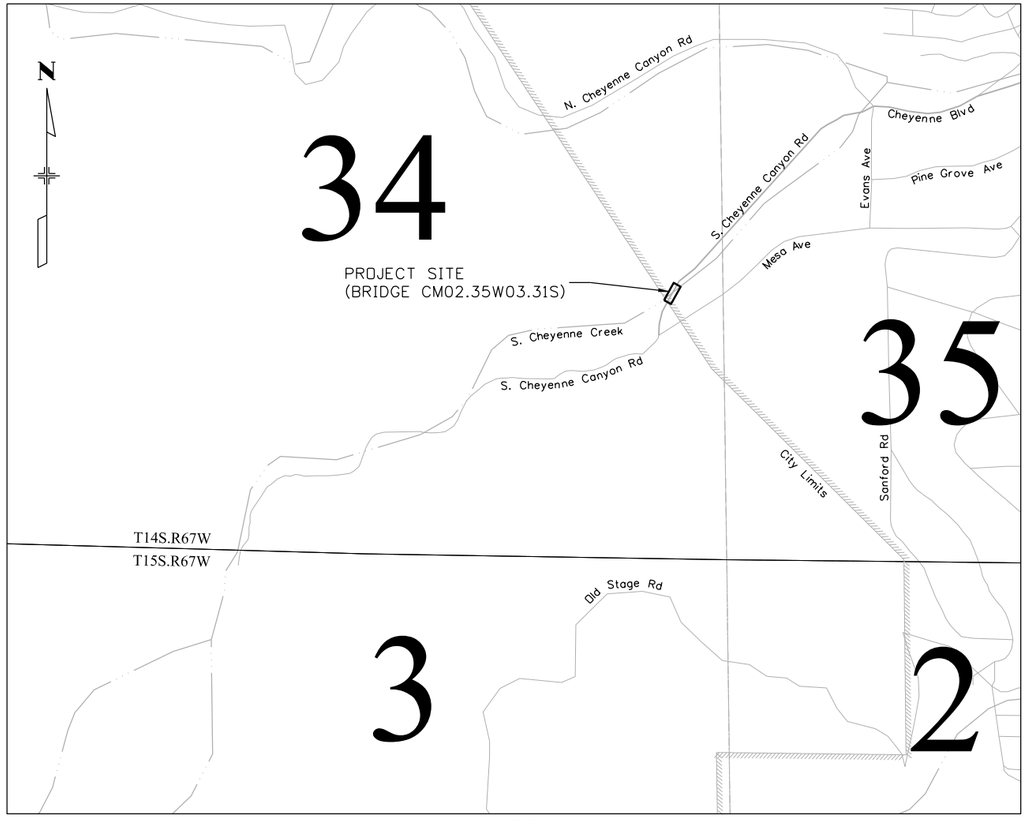
SOUTH CHEYENNE CANYON BRIDGE IMPROVEMENTS PROJECT CITY OF COLORADO SPRINGS

CITY ENGINEERING BRIDGE MAINTENANCE

CONTRACT R010069

TASK ORDER 2021-005

CONSTRUCTION DRAWINGS AUGUST 2023



NTS

ENGINEER'S STATEMENT:

THIS REPORT AND PLAN FOR THE DRAINAGE DESIGN OF SOUTH CHEYENNE CANYON BRIDGE REPLACEMENT WAS PREPARED BY ME (OR UNDER MY DIRECT SUPERVISION) AND IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF. SAID REPORT AND PLAN HAD BEEN PREPARED IN ACCORDANCE WITH THE CITY OF COLORADO SPRINGS DRAINAGE CRITERIA MANUAL AND IS IN CONFORMITY WITH THE MASTER PLAN OF THE DRAINAGE BASIN. I UNDERSTAND THAT THE CITY OF COLORADO SPRINGS DOES NOT AND WILL NOT ASSUME LIABILITY FOR DRAINAGE FACILITIES DESIGNED BY OTHERS. I ACCEPT RESPONSIBILITY FOR ANY LIABILITY CAUSED BY ANY NEGLIGENT ACTS, ERRORS OR OMISSIONS ON MY PART IN PREPARING THIS REPORT.

SIGNATURE (AFFIX SEAL): _____

COLORADO P.E. NO. 35270 DATE 7-28-23

JAMES A. MERRICK 35270 PROFESSIONAL ENGINEER

CITY PROJECT MANAGER'S STATEMENT:

I HEREBY CERTIFY THAT THE DRAINAGE IMPROVEMENTS FOR SOUTH CHEYENNE CANYON BRIDGE REPLACEMENT SHALL BE CONSTRUCTED ACCORDING TO THE DESIGN PRESENTED IN THESE PLANS. I FURTHER UNDERSTAND THAT FIELD CHANGES MUST BE REVIEWED BY THE CITY REVIEW ENGINEER TO ENSURE CONFORMANCE WITH THE ORIGINAL DESIGN INTENT. I AM EMPLOYED BY AND PERFORM ENGINEERING SERVICES SOLELY FOR THE CITY OF COLORADO SPRINGS, AND THEREFORE AM EXEMPT FOR COLORADO REVISED STATUTE TITLE 12, ARTICLE 25 PART 1 ACCORDING TO § 12-25-103(1) C.R.S.

NAME OF CITY PROJECT MANAGER

AUTHORIZED SIGNATURE DATE

PROVIDE CITY OF COLORADO SPRINGS STATEMENT:

FILED IN ACCORDANCE WITH SECTION 7.7.906 OF THE CODE OF THE CITY OF COLORADO SPRINGS, 2001, AS AMENDED.

FOR CITY ENGINEER DATE

APPROVED BY

CITY OF COLORADO SPRINGS
ENGINEERING DIVISION DATE

CITY OF COLORADO SPRINGS
STORMWATER ENTERPRISE DATE

CITY OF COLORADO SPRINGS
PARKS AND RECREATION DEPARTMENT DATE

CITY OF COLORADO SPRINGS UTILITIES
WATER RESOURCES - WATER DATE

CITY OF COLORADO SPRINGS UTILITIES
ELECTRIC DEPARTMENT DATE

CITY OF COLORADO SPRINGS
OPERATIONS AND MAINTENANCE DATE

AS CONSTRUCTED INFORMATION

CONTRACTOR: _____

PROJECT ENGINEER: _____

PROJECT STARTED: _____

PROJECT COMPLETED: _____

AS CONSTRUCTED PLANS: _____

APPROVED: _____

TITLE: _____

DATE: _____

FINAL DESIGN - FOR CONSTRUCTION

JMERRICK 9:04:18 AM pw:\\jacobs-us-vo-pw.bentley.com:jacobs-us-vo-pw-02\Documents\WXXZ6205 - S Cheyenne Canyon Bridge\4 Delivery\Project_WIP\Roadway\Drawings\000.00_SCC-GN-TITLE-01.dgn

Print Date: 8/3/2023
File Name: 000.00_SCC-GN-TITLE-01.dgn
Horiz. Scale: As Noted Vert. Scale: As Noted
Unit Information Unit Leader Initials

Jacobs

Sheet Revisions		
Date:	Comments	Init.

COLORADO SPRINGS

As Constructed	SOUTH CHEYENNE CANYON BRIDGE TITLE SHEET			Project No./Code
No Revisions:				R010069
Revised:	Designer: TS	Structure Numbers		XXXXX
Void:	Detailer: JAM			
	Sheet Subset: ROADWAY	Subset Sheets: RD01 of 15		Sheet Number 1

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COLORADO
DEPARTMENT OF TRANSPORTATION

M&S STANDARDS PLANS LIST

July 31, 2019

Revised on June 15, 2023

ALL OF THE M&S STANDARD PLANS, AS SUPPLEMENTED AND REVISED, APPLY TO THIS PROJECT WHEN USED BY DESIGNATED PAY ITEM OR SUBSIDIARY ITEM.

THE M&S STANDARD PLANS USED TO DESIGN THIS PROJECT ARE INDICATED BY A MARKED BOX ■, AND WILL BE ATTACHED TO THE PLANS. ALL OTHER M&S STANDARD PLANS ARE STILL ELIGIBLE FOR USE IN CONSTRUCTION IF APPROVED BY AN APPROPRIATE CDOT ENGINEER.

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FINAL DESIGN - FOR CONSTRUCTION

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Print Date: 8/1/2023		Sheet Revisions			As Constructed
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Horiz. Scale: As Noted Vert. Scale: As Noted					Revised:
Unit Information Unit Leader Initials					Void:
Jacobs					

COLORADO SPRINGS

SOUTH CHEYENNE CANYON BRIDGE
STANDARD PLANS LIST

Designer: TJH		Structure Numbers	
Detailer: JAM			
Sheet Subset: ROADWAY	Subset Sheets: RD02 of 15		

Project No./Code: R010069

XXXXX

Sheet Number 2

PROJECT SPECIFIC ABBREVIATIONS:

A

ABD	ABANDONED
AC	ASBESTOS CEMENT
AL	ALUMINUM
AHW	ALLOWABLE HEADWATER
AUX	AUXILIARY LANE
AV/AVE	AVENUE
AWWA	AMERICAN WATER WORKS ASSOCIATION

B

BF	BACK FACE
BRDG	BRIDGE
BLVD	BOULEVARD
BTM	BOTTOM
BW	BARBED WIRE

C

C&G	CURB AND GUTTER
CC	CENTER OF CURVE
CDOT	COLORADO DEPARTMENT OF TRANSPORTATION
CL	CONTROL LINE
CL.	CLASS
CO.	COMPANY
CF	CUBIC FEET

D

DA	DRAINAGE AREA
DIP	DUCTILE IRON PIPE
DR	DRIVE
DWG	DRAWING
D xx	RIPRAP SIZE

E

e	EXTERNAL DISTANCE; SUPER ELEVATION
EL	ELEVATION
ELEC	ELECTRICAL
ELT	ELECTRIC TRANSMISSION
ENT	ENTRANCE
EOP	EDGE OF PAVEMENT
EP	EDGE OF PAVEMENT
EX/EXIST	EXISTING
Exp'n	EXPANSION

F

FA	FORCE ACCOUNT
FB	STEEL
℄/FL	FLOWLINE
FO	FIBER OPTIC
FOC	FIBER OPTIC CABLE

G

GB	GRADE BREAK

H

HERCP	HORIZONTAL ELLIPTICAL REINFORCED CONCRETE PIPE
HGL	HYDRAULIC GRADE LINE
HP	HINGE POINT
HW/D	HEADWATER TO DEPTH RATIO

I

IRR	IRRIGATION
IP	INTERMEDIATE PRESSURE

K

K	LENGTH OF VERTICAL CURVE PER CHANGE IN GRADE
KVA	KILO VOLT AMPERES

L

L	LENGTH OF CURVE
LAT	LATERAL
LDA	LIMITS OF DISTURBED AREA
LT	LEFT

M

MDS	MAXIMUM DESIGN SPEED
MDT	MAINTENANCE OF TRAFFIC
ME	MATCH EXISTING
MED	MEDIAN
MH	MANHOLE
ML	MAINLINE
MM	MILE MARKER
MW	MILL WRAP STEEL

N

NA	NOT APPLICABLE
NC	NORMAL CROWN
NF	NOT FOUND
NE	NORTHEAST
NW	NORTHWEST

O

OH	OVERHEAD
OHE	OVERHEAD ELECTRIC
OHT	OVERHEAD TELEPHONE
OHTV	OVERHEAD TELEVISION
O/S	OFFSET

P

PCR	POINT OF CURB RETURN
PH	POTHOLE
ℙ/PL	PROPERTY LINE
POB	POINT OF BEGINNING
POE	POINT OF ENDING
PR/PROP	PROPOSED
PRVT	PRIVATE
PVRC	POINT OF VERTICAL REVERSE CURVATURE

R

RD	ROAD
RET	RETAINING
ROW	RIGHT OF WAY
RT	RIGHT

S

SAN	SANITARY
SD	STOPPING DISTANCE
SE	SOUTHEAST
SRB	SOIL RETENTION BLANKET
SSD	STOPPING SIGHT DISTANCE
STA	STATION
STM	STORM
SUPER	SUPERELEVATION
SVC	SERVICE
SW	SOUTHWEST/SIDEWALK
SWC	SWITCH CABINET
SWMP	STORM WATER MANAGEMENT PLAN
SWR	SEWER

T

T	TANGENT DISTANCE
TBW	TOP BACK WALK
TEL	TELEPHONE
TOW	TOP OF WALL
TP	TERMINAL POLE
TV	TELEVISION

U

UGE	UNDERGROUND ELECTRIC
UGFO	UNDERGROUND FIBER OPTIC
UGT	UNDERGROUND TELEPHONE
UGTV	UNDERGROUND TELEVISION

V

VT	VOLT

W

W	WIDTH
WTR	WATER
WSEL	WATER SURFACE ELEVATION

X

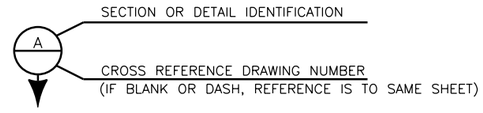
XFMR	TRANSFORMER
XING	CROSSING

Y

YR	YEAR

LIST OF SYMBOLS:

● XXX	GEOTECHNICAL BORE HOLE
- - - - - - - - - - -	SAWCUT
——LDA———LDA—	LIMITS OF DISTURBED AREA
———LDA—SC———	LIMITS OF DISTURBED AREA AND SAWCUT
———LOC———	LIMITS OF CONSTRUCTION
——LOC—LDA——	LIMITS OF CONSTRUCTION AND LIMITS OF DISTURBED AREA
——--———--——	COLORADO SPRINGS EXISTING ROW
—UG— — — G — —	EXISTING GAS LINE
—OH— — — E — —	EXISTING OVERHEAD ELECTRIC
—OH— — — T — —	EXISTING OVERHEAD TELEPHONE
— T — — — T — —	EXISTING UNDERGROUND ELECTRIC
—FO— — —FO— —	EXISTING UNDERGROUND FIBER OPTIC
—UC— — —UC— —	EXISTING UNDERGROUND TELEPHONE
—UW— — —UW— —	EXISTING WATERLINE
—SS— — —SS— —	EXISTING STORMSEWER
— TV — — TV —	EXISTING UNDERGROUND TV
— SD — — — SD— —	EXISTING SD
	PROPERTY LINE



FINAL DESIGN - FOR CONSTRUCTION

Print Date: 8/1/2023	Sheet Revisions			As Constructed	SOUTH CHEYENNE CANYON BRIDGE		Project No./Code
File Name: 002.00_SCC-GN-ABS-01.dgn	Date:	Comments	Init.	No Revisions:	ABBREVIATIONS AND SYMBOLS		R010069
Horiz. Scale: As Noted Vert. Scale: As Noted				Revised:	Designer: TJH	Structure Numbers	XXXXX
Unit Information Unit Leader Initials				Void:	Detailer: JAM		
Jacobs					Sheet Subset: ROADWAY	Subset Sheets: RD03 of 15	Sheet Number 3

COLORADO SPRINGS

JMERRICK 8:20:23 AM pw:\\jacobs-us-va-pw.bentley.com:jacobs-us-va-pw-02\Documents\WXX76205 - S Cheyenne Canyon Bridge\4 Delivery\Project_WIP\Roadway\Drawings\002.00_SCC-GN-ABS-01.dgn

GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE 2019 CITY OF COLORADO SPRINGS STANDARD SPECIFICATION FOR ROAD AND BRIDGE CONSTRUCTION AND STANDARD PLANS.

2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADHERING TO ALL LOCAL ORDINANCES AND OBTAINING ALL NECESSARY PERMITTING FOR WORK.

3. THE CONTRACTOR SHALL NOT PARK ANY VEHICLES OR EQUIPMENT IN, OR DISTURB ANY AREAS NOT APPROVED BY THE CITY ENGINEER.

4. CITY OF COLORADO SPRINGS MAINTENANCE SHALL BE ALLOWED ACCESS THROUGHOUT THE PROJECT AT ALL TIMES. ACCESS THROUGH A PARTICULAR SECTION UNDER CONSTRUCTION SHALL BE COORDINATED WITH THE CITY ENGINEER.

5. IN THE EVENT OF SNOW, THE CONTRACTOR SHALL COORDINATE WITH CITY OF COLORADO SPRINGS DURING ANY PLOWING OR OTHER MAINTENANCE OPERATIONS.

6. THE CONTRACTOR SHALL WORK WITHIN THE RIGHT-OF-WAY EASEMENT LIMITS AS SHOWN IN THE PLANS AND AS DIRECTED BY THE CITY ENGINEER. THE CONTRACTOR SHALL KEEP EQUIPMENT AND MATERIALS WITHIN THESE LIMITS AND CLEAR OF THE TRAVEL WAY AS REQUIRED TO MAINTAIN TRAFFIC THROUGH THE SITE. CONSTRUCTION ACTIVITIES, STAGING, PARKING, OR OFF-SITE DISPOSAL SHALL NOT ENCROACH UPON PRIVATE LANDS WITHOUT WRITTEN APPROVAL FROM THE PROPERTY OWNER OR LAND MANAGEMENT AGENCY.

7. TRAFFIC SHALL BE MAINTAINED AT ALL TIMES INCLUDING ACCESS TO PRIVATE DRIVES.

8. REFER TO MOT PLAN FOR PHASING OF TRAFFIC.

9. TYPE OF COMPACTION FOR THIS PROJECT WILL BE AASHTO T-99. WATER USED FOR COMPACTION WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.

10. EROSION CONTROL MEASURES MUST BE IMPLEMENTED BEFORE ANY CONSTRUCTION ACTIVITIES BEGIN. BEST MANAGEMENT PRACTICES REQUIRED FOR COMPLIANCE WITH CONTRACTOR OBTAINED PERMITS ARE THE RESPONSIBILITY OF THE CONTRACTOR AND SUBSIDIARY TO THE WORK.

11. ALL MATERIAL GENERATED WITHIN THE PROJECT LIMITS SHALL BE REMOVED FROM THE PROJECT SITE AT NO COST TO THE PROJECT UNLESS SPECIFIED BY THE PLANS.

12. THE CONTRACTOR SHALL NOT DISTURB AREAS BEYOND THE LIMITS OF DISTURBANCE AS SHOWN ON THE PLANS, TYPICAL SECTIONS, OR AS DIRECTED BY THE CITY ENGINEER.

13. WHERE IT IS REQUIRED TO CUT EXISTING PAVEMENT, THE CUTTING SHALL BE DONE TO A NEAT WORK LINE FULL DEPTH WITH A PAVEMENT-CUTTING SAW OR OTHER METHOD AS APPROVED BY THE CITY OF COLORADO SPRINGS CITY ENGINEER. THIS WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF THE WORK.

14. THE CONTRACTOR SHALL COMPLY WITH THE COLORADO SPRINGS CITY CODE (CHAPTER 3, ARTICLE 3: STREETS AND PUBLIC WAYS) WHEN EXCAVATING OR GRADING IS PLANNED IN THE AREA OF UNDERGROUND UTILITY FACILITIES. THE CONTRACTOR SHALL NOTIFY ALL AFFECTED UTILITIES AT LEAST TWO (2) BUSINESS DAYS, NOT INCLUDING THE ACTUAL DAY OF NOTICE, PRIOR TO COMMENCING SUCH OPERATIONS. THE CONTRACTOR SHALL CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO (UNCC) AT 811, TO HAVE LOCATIONS OF UNCC REGISTERED LINES MARKED BY MEMBER COMPANIES. ALL OTHER UNDERGROUND FACILITIES SHALL BE LOCATED BY CONTACTING THE RESPECTIVE OWNER. UTILITY SERVICE LATERALS SHALL ALSO BE LOCATED PRIOR TO BEGINNING EXCAVATION OR GRADING.

15. UTILITIES HAVE NOT BEEN POTHOLED TO VERIFY DEPTH AND LOCATION. CONTRACTOR SHALL PROTECT ALL EXISTING UTILITIES UNLESS OTHERWISE SHOWN. CONTRACTOR SHALL VERIFY LOCATION PRIOR TO CONSTRUCTION AND FOLLOW ALL LOCAL, STATE, AND FEDERAL REGULATIONS.

16. THE CONTRACTOR MAY ALTER THE EXCAVATION LIMITS, STORM SEWER DESIGN, CONSTRUCTION METHODS OF EQUIPMENT IN ORDER TO MINIMIZE IMPACTS TO CUSTOMER SERVICE. PRIOR TO IMPLEMENTING ANY METHODS, PROPOSALS FOR THESE ALTERATIONS SHALL BE DISCUSSED WITH THE CITY PROJECT MANAGER OR THEIR APPOINTED REPRESENTATIVE FOR REVIEW AND APPROVAL PRIOR TO COMMENCING ANY WORK. ANY EXISTING UTILITY, WHICH IS TO REMAIN BUT IS DAMAGED AS A RESULT OF THE CONTRACTOR'S OPERATION, SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

17. CONTRACTOR SHALL NOTIFY THE CITY AND CONTACT EL PASO COUNTY HOUSEHOLD CHEMICAL WASTE COLLECTION FACILITY AT 719-520-7878 IN THE EVENT OF UNCOVERING ABANDONED OR HAZARDOUS WASTE.

18. CONTRACTOR IS RESPONSIBLE TO PROTECT AND PRESERVE EXISTING VEGETATION TO THE FULLEST EXTENT POSSIBLE, REMOVAL OF VEGETATION (INCLUDING TREES) REGARDLESS OF SIZE OR TYPE, SHALL NOT BE PAID FOR SEPARATELY, BUT SHALL BE INCLUDED IN THE COST OF CLEARING & GRUBBING.

19. ALL REMOVALS AND WASTE MATERIALS SHALL BECOME THE PROPERTY OF THE CONTRACTOR UNLESS OTHERWISE INDICATED IN THE PLANS OR PROJECT SPECIFICATIONS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN A DISPOSAL SITE AND REQUIRED PERMITS FOR THE UNUSABLE MATERIALS.

20. FOR PLAN QUANTITIES OF AGGREGATE BASE COURSE, THE FOLLOWING RATE OF APPLICATION WAS USED:
    AGGREGATE BASE COURSE (CLASS 6) @ 133 LBS./CU.FT.

21. DEPTH OF MOISTURE-DENSITY CONTROL FOR THIS PROJECT SHALL BE AS FOLLOWS:
    FULL DEPTH OF ALL EMBANKMENTS
    FULL DEPTH FOR AGGREGATE BASE COURSE (CLASS 6)
    BASES OF CUTS AND FILL: 0.5 FOOT

22. EXCAVATION REQUIRED FOR THE COMPACTION OF BASES OF CUTS AND FILLS WILL BE CONSIDERED AS SUBSIDIARY TO THAT OPERATION AND WILL NOT BE PAID FOR SEPARATELY.

23. FOR PLAN QUANTITIES OF PAVEMENT MATERIALS, THE FOLLOWING RATE OF APPLICATION WAS USED:
    HOT MIX ASPHALT @ 110 LBS./(SQ.YD. X INCH.)
    TACK COAT DILUTED EMULSIFIED ASPHALT @ 0.1 GALS./SQ.YD. (DILUTED)

    DILUTED EMULSIFIED ASPHALT FOR TACK COAT SHALL CONSIST OF 1 PART EMULSIFIED ASPHALT AND 1 PART WATER. RATES OF APPLICATION SHALL BE AS DETERMINED BY THE CITY ENGINEER AT THE TIME OF APPLICATION.

24. PRIOR TO PLACING BITUMINOUS PAVEMENT OR TACK COAT, SWEEPING OF DIRT AND GRAVEL FROM THE EXISTING MAT TO PROVIDE A CLEAN SURFACE SHALL BE COMPLETED. THIS WORK WILL NOT BE PAID FOR SEPARATELY BUT INCLUDED IN THE WORK.

25. ANY LAYER OF ASPHALT PAVEMENT THAT IS TO HAVE A SUCCEEDING LAYER PLACED THEREON SHALL BE COMPLETED FULL WIDTH BEFORE THE SUCCEEDING LAYER IS PLACED UNLESS OTHERWISE DIRECTED BY THE CITY ENGINEER.

26. THE CONTRACTOR SHALL PROVIDE A CERTIFIED SCALE AND CERTIFIED WEIGHER AT THE POINT OF LOADING FOR ALL ASPHALT AGGREGATES AND CONCRETE DELIVERED TO THE PROJECT.

COLORADO REGISTERED
35270
7-28-23
PROFESSIONAL ENGINEER

FINAL DESIGN - FOR CONSTRUCTION

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Jacobs					

COLORADO SPRINGS

SOUTH CHEYENNE CANYON BRIDGE
GENERAL NOTES

Designer: TJM	Structure Numbers		Project No./Code: R010069
Detailer: JAM			XXXXX
Sheet Subset: ROADWAY	Subset Sheets: RD04 of 15		Sheet Number 4

27. THE CONTRACTOR SHALL REPAIR OR REPLACE AT THEIR EXPENSE ANY EXISTING SIGN THAT IS DAMAGED DURING CONSTRUCTION ACTIVITIES NOT SCHEDULED TO BE REMOVED.

28. THE CONTRACTOR SHALL MAINTAIN POSITIVE DRAINAGE DURING CONSTRUCTION IN ACCORDANCE WITH THE STORMWATER MANAGEMENT PLAN. ANY REWORK OF MATERIAL DUE TO LACK OF THIS MAINTENANCE SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. MAINTAINING DRAINAGE WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.

29. THE CONTRACTOR SHALL PROTECT ALL EXISTING SURVEY MONUMENTATION DESIGNATED TO REMAIN FROM DAMAGE DURING CONSTRUCTION OPERATIONS. ANY MONUMENTS DISTURBED BY THE CONTRACTOR SHALL BE RESET AT THE CONTRACTOR'S EXPENSE. THE CONTRACTOR AND CITY ENGINEER SHALL NOTE THOSE MONUMENTS IN THE FIELD PRIOR TO CONSTRUCTION.

30. THE CONTRACTOR SHALL PROVIDE SANITARY FACILITIES ON SITE. MAINTENANCE OF THE SANITARY FACILITIES SHALL INCLUDE A MINIMUM CLEANING SCHEDULE OF AT LEAST TWICE A WEEK. THIS WILL BE SUBSIDIARY TO THE WORK AND WILL NOT BE PAID FOR SEPARATELY.

31. FIELD FACILITY ACCESS AREAS SHALL BE PROVIDED WITH AN ALL-WEATHER SURFACE AND PLACED WITHIN THE PROJECT LIMITS UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER. THE COST FOR THIS REQUIREMENT WILL BE INCLUDED IN THE FIELD OFFICE, FIELD LABORATORY, AND SANITARY FACILITY.

32. ALL SURVEYING NECESSARY TO COMPLETE THE WORK SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.

33. ALL CONCRETE PIPE SHALL BE CLASS III UNLESS OTHERWISE NOTED. CONTRACTOR MAY STOCKPILE RCP WITHIN ROW OR CLS SPECIFIED BY CITY ENGINEERING.

34. ESTIMATED CONTRACT PERIOD SEPTEMBER 7, 2022 TO MAY 27, 2023.

ENVIRONMENTAL NOTES:

1. THE PROPOSED WORK AS SHOWN ON THE PLANS HAS BEEN PERMITTED BY THE U.S. ARMY CORPS OF ENGINEERS UNDER SECTION 404 OF THE CLEAN WATER ACT. THE CONTRACTOR SHALL COMPLY WITH ALL SPECIAL AND GENERAL CONDITIONS ATTACHED TO THE PERMIT.

2. IF PROJECT ACTIVITIES RESULT IN ONE ACRE OR MORE OF EARTH DISTURBANCE A CDPS PERMIT WILL BE REQUIRED. THE CONTRACTOR SHALL NOT COMMENCE PERMIT-RELATED WORK UNTIL THE PERMIT IS RECEIVED. WORK PERFORMED MUST BE CONSISTENT WITH THAT DETAILED IN THE STORM WATER MANAGEMENT PLAN.

3. RESTORATION OF THE PROJECT AREA WILL INCLUDE REMOVAL OF ALL DEBRIS, LITTER, EXCAVATION SPOILS, AND WASTE MATERIALS GENERATED DURING CONSTRUCTION ACTIVITIES.

4. CONTRACTOR SHALL TAKE STEPS NECESSARY TO PREVENT DEMOLITION DEBRIS FROM ENTERING THE WATERWAY DURING DEMOLITION.

5. THERE SHALL BE NO STOCKPILING OR SIDE CASTING OF WASTE MATERIALS INCLUDING BUT NOT LIMITED TO PAINT CHIPS, ASPHALT, OR CONCRETE ADJACENT IN ANY DRAINAGES (INCLUDING DRY DRAINAGES). PAINT MATERIAL REMOVED FROM ROAD OR BRIDGE SHALL BE PROPERLY CONTAINED AND DISPOSED OF TO PREVENT SUCH MATERIALS FROM ENTERING WATERS OF THE STATE.
6. TEMPORARY STAGING AREAS FOR CONSTRUCTION EQUIPMENT AND MATERIALS WILL UTILIZE PREVIOUSLY DISTURBED AREAS SUCH AS ROADS, GRAVELED PARKING AREAS, AND SHOULDER PULL OUTS. MAJOR REPAIRS TO CONSTRUCTION EQUIPMENT WILL BE PERFORMED OFFSITE, WHERE PRACTICAL. EQUIPMENT OPERATION OFF THE ROADWAY PRISM SHALL BE MINIMIZED TO THE EXTENT POSSIBLE TO PREVENT POSSIBLE IMPACTS TO BIOLOGICAL RESOURCES.
7. THE CONTRACTOR SHALL REMOVE ON A DAILY BASIS ALL SEDIMENT AND CONSTRUCTION DEBRIS FROM THE FLOW LINES TO AVOID POLLUTANTS FROM DISCHARGING INTO WATERWAYS. THE COST OF REMOVAL SHALL BE INCLUDED IN THE WORK. CONTRACTOR SHALL KEEP STREETS CLEANED/SWEPT AS DIRECTED BY THE CITY ENGINEER.

8. TO PROTECT ENVIRONMENTAL RESOURCES WITHIN AND OUTSIDE CITY OF COLORADO SPRINGS ROW (E.G., CULTURAL SITES, THREATENED AND ENDANGERED SPECIES HABITAT, NESTING BIRDS), TEMPORARY USE AREAS FOR EQUIPMENT INCLUDING STAGING, SET-UP, REPAIR, OR OVERNIGHT PARKING AREAS SHALL BE PRE-APPROVED BY THE CITY ENGINEER FOLLOWING COORDINATION WITH THE REGIONAL ENVIRONMENTAL STAFF. COORDINATION FOR TEMPORARY USE AREAS WILL NOT BE MEASURED AND PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.

9. TEMPORARY ACCESS STAGING AREAS WILL BE LOCATED 75 FEET FROM STREAMS OR OTHER WATER BODIES, AND WETLANDS TO PRECLUDE DISCHARGES OF NON-PROJECT RELATED FILL MATERIAL INTO THESE AREAS.

10. ALL FILL MATERIAL WILL BE PROPERLY STABILIZED AND MAINTAINED TO PREVENT EROSION DURING AND FOLLOWING CONSTRUCTION.

11. AFTER CLEARING, GRUBBING OR EARTHMOVING/GRADING OPERATIONS, SOIL WILL BE STABILIZED IN ACCORDANCE WITH CDOT STANDARD SPECIFICATION 208.

12. ANY NECESSARY ACCESS AND EGRESS ROUTES FOR BRIDGE REPLACEMENTS WILL BE ESTABLISHED THROUGH COORDINATION WITH CITY PARKS STAFF AND THE CONTRACTOR TO MINIMIZE IMPACTS TO RIVERBANK AND ROADSIDE VEGETATION AND SOILS.

13. MODIFICATION OF SITE DRAINAGE WILL BE MANAGED TO PRECLUDE ADVERSE EFFECTS ON WATER QUALITY, FLOW CHARACTERISTICS, AND SOIL EROSION ONSITE AND OFFSITE.

14. WHERE EXCAVATION IS REQUIRED, ONLY THE MINIMAL AMOUNT OF AREA WILL BE CLEARED OR GRADED IN ORDER TO MAINTAIN VEGETATIVE GROUND COVER FOR EROSION PROTECTION.

15. NATIVE VEGETATION COVER WILL BE PRESERVED TO THE MAXIMUM EXTENT POSSIBLE. EXISTING RIPARIAN, WETLAND, AND OTHER DESIRABLE VEGETATION NOT INTENDED TO BE IMPACT BY THE PROJECT CONSTRUCTION WILL BE PLASTIC FENCED PRIOR TO CONSTRUCTION IN ACCORDANCE WITH CITY OF COLORADO SPRINGS SPECIFICATIONS SECTION 200.

16. ANY TEMPORARY IMPACTS TO RIPARIAN VEGETATION RESULTING FROM CONSTRUCTION WILL BE RESTORED BY PLANTING APPROPRIATE REPLACEMENT QUANTITY AND SPECIES OF NATIVE SHRUBS AND TREES WHERE FEASIBLE.

17. THE TIMING OF LAND DISTURBING ACTIVITIES AND INSTALLATION OF EROSION AND SEDIMENTATION CONTROL MEASURES WILL BE COORDINATED TO MINIMIZE WATER QUALITY IMPACTS.

18. FUELING AND ROUTINE MAINTENANCE OF CONSTRUCTION EQUIPMENT SHALL ONLY OCCUR AT DESIGNATED AREAS, AT LEAST 75 FEET FROM WETLAND AND AQUATIC HABITATS AND AWAY FROM DRAINAGES OR DITCHES TO PRECLUDE ADVERSE WATER QUALITY IMPACTS TO EXISTING DRAINAGES AND WETLAND HABITATS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PREVENT ADVERSE IMPACTS TO WATER QUALITY. MAJOR REPAIRS TO EQUIPMENT WILL BE MADE OFFSITE.

19. CONSTRUCTION EQUIPMENT SHALL BE CHECKED FREQUENTLY FOR LEAKS. ANY LEAKS OR SPILLS WILL BE CLEANED UP IMMEDIATELY TO PREVENT THE CONTAMINATION OF SOILS OR RESIDUE ON PAVED SURFACES. SPILL AREAS WILL NOT BE "HOSED DOWN", DRY CLEANUP METHODS WILL BE USED.

FINAL DESIGN - FOR CONSTRUCTION

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COLORADO SPRINGS

SOUTH CHEYENNE CANYON BRIDGE
GENERAL NOTES

Designer: TJH	Structure Numbers		Project No./Code R010069
Detailer: JAM			XXXXX
Sheet Subset: ROADWAY	Subset Sheets: RD05 of 15		Sheet Number 5

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20. CONSTRUCTION WILL BE PHASED SO THAT THE ACREAGE OF EXPOSED SOILS AT ANY GIVEN TIME IS MINIMIZED UNTIL TEMPORARY INTERIM BMPS CAN BE IMPLEMENTED (VERTICAL TRACKING, SURFACE ROUGHENING, MULCHING).

21. SOILS WILL BE STABILIZED AS QUICKLY AS POSSIBLE THROUGH IMMEDIATE PLANTINGS OF SEED, FOLLOWED BY MULCH AND TACKIFIER ONCE AN AREA HAS BEEN FINISH GRADED.

22. ALL SLOPES STEEPER THAN 3:1 WILL BE BLANKETED WITH STRAW/COCONUT EROSION CONTROL BLANKETS PER SPECIFICATIONS.

23. PUMPING AND DISCHARGE OF WATER FROM DEWATERING OPERATIONS MAY REQUIRE A DISCHARGE PERMIT FROM THE CDPHE WATER QUALITY CONTROL DIVISION. DISCHARGE PERMITS OR ALTERNATE ARRANGEMENTS FOR WATER MANAGEMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR (SEE STANDARD SPECIFICATION 107.25(B)6). APPLICABLE CONDITIONS FOR DISCHARGE INCLUDING MONITORING AND REPORTING SHALL BE INCLUDED IN THE COST OF THE WORK AND SHALL NOT BE COMPENSATED SEPARATELY.

24. ALL WORK IN THE CHANNEL SHALL COMPLY WITH THE CITY MAINTENANCE PROGRAM'S US ARMY CORPS OF ENGINEERS 404D NATIONWIDE PERMIT 14 FOR LINEAR TRANSPORTATION PROJECTS.

25. TREE TRIMMING/REMOVAL: TREE TRIMMING AND/OR REMOVAL ACTIVITIES SHALL BE COMPLETED BEFORE BIRDS BEGIN TO NEST OR AFTER THE YOUNG HAVE FLEDGED. IN COLORADO, MOST NESTING AND REARING ACTIVITIES OCCUR BETWEEN APRIL 1 AND AUGUST 31.

26. BRIDGE/BOX CULVERT WORK: BRIDGE OR BOX CULVERT WORK THAT MAY DISTURB NESTING BIRDS SHALL BE COMPLETED BEFORE BIRDS BEGIN TO NEST OR AFTER THE YOUNG HAVE FLEDGED. NO BRIDGE OR BOX CULVERT WORK MAY TAKE PLACE BETWEEN APRIL 1 AND AUGUST 31. IF WORK ACTIVITIES ARE PLANNED BETWEEN THESE DATES, NESTS SHALL BE REMOVED (BEFORE NESTING BEGINS) AND APPROPRIATE MEASURES TAKEN TO ASSURE NO NEW NESTS ARE CONSTRUCTED.

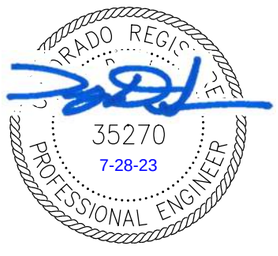
28. FOR BIRDS OF PREY THAT COULD POTENTIALLY NEST NEAR THE PROJECT SITE, PLEASE CONTACT THE CDOT REGION 2 BIOLOGIST AND/OR REFER TO THE COLORADO DIVISION OF WILDLIFE'S "RECOMMENDED BUFFER ZONES AND SEASONAL RESTRICTIONS FOR COLORADO RAPTORS" GUIDELINES AVAILABLE AT COLORADO DIVISION OF WILDLIFE DISTRICT OFFICES

KEY CONTACTS

CITY ENGINEERING (BRIDGE MAINTENANCE)
RYAN PHIPPS - (719) 385-5069

COLORADO SPRINGS UTILITIES (WATER)
AJ WERTZ - (719) 668-4737

COLORADO SPRINGS UTILITIES (GAS/ELEC)
TIM WENDT - (719) 668-4962



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Jacobs						Sheet Subset: ROADWAY / Subset Sheets: RD06 of 15	Sheet Number 6

COLORADO SPRINGS

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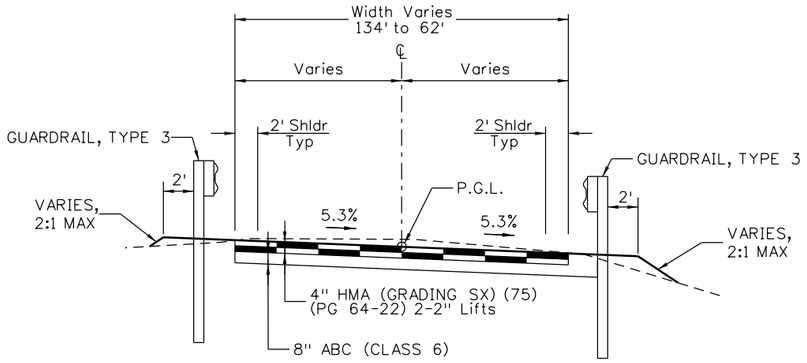
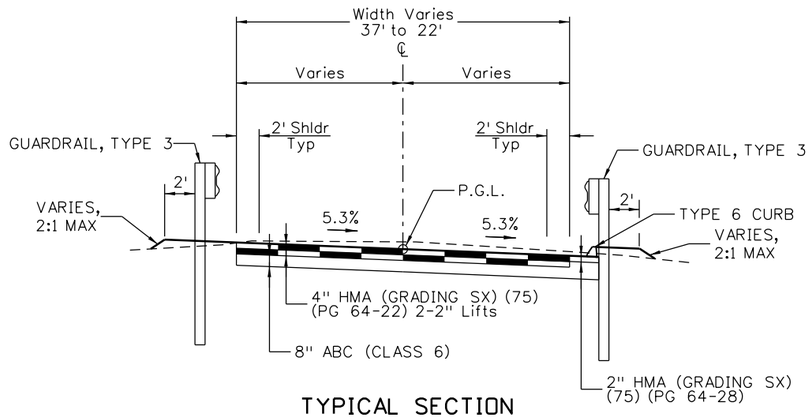
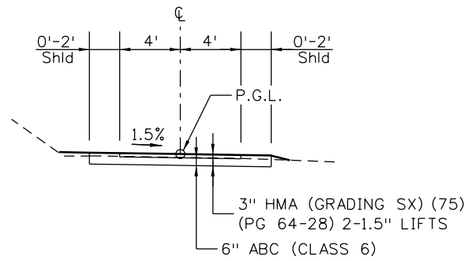


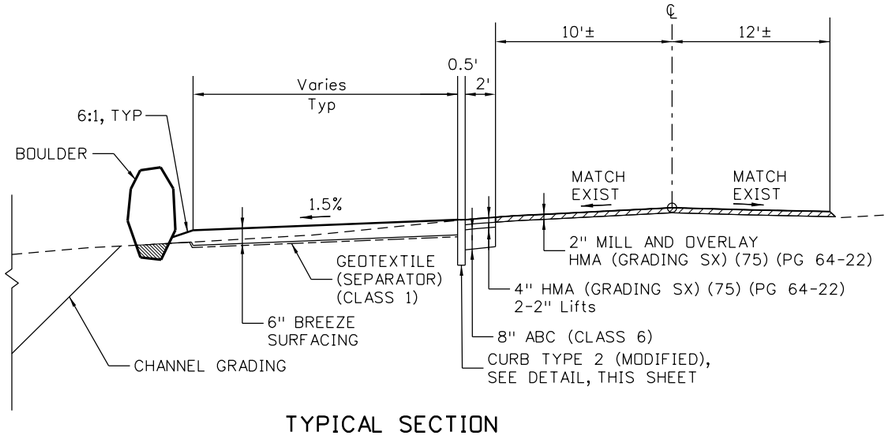
TYPICAL SECTION
STA. 10+11 TO 10+30



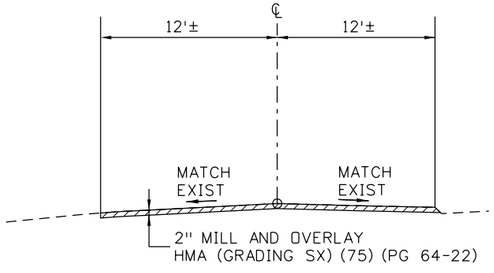
TYPICAL SECTION
STA. 10+70 TO 11+55



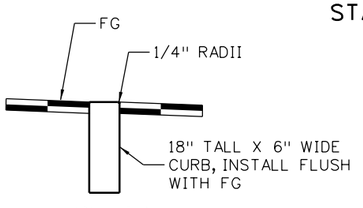
TYPICAL SECTION
(PEDESTRIAN TRAIL)
STA. 100+14 TO 100+34
STA. 100+69 TO 101+30



TYPICAL SECTION
(MESA AVE)
STA. 200+56 TO 201+66



TYPICAL SECTION
(MESA AVE)
STA. 201+66 TO 204+28



DETAIL
CURB TYPE 2
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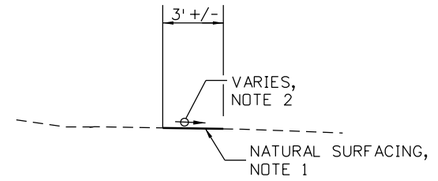

TYPICAL SECTION
(NATURAL TRAIL)
SEE PLAN FOR LOCATIONS

NOTES:

1. REMOVE VEGETATION AND GRADE NATURAL SURFACING TO FORM A FIRM, SMOOTH PATHWAY.
2. CROSS SLOPE TO BE 5% MINIMUM TO 10% MAXIMUM AND DRAIN TO THE DOWNHILL SIDE. WHEN TRAIL LONGITUDINAL SLOPE IS BETWEEN 5% AND 10% THE TRAIL CROSS SLOPE SHOULD MATCH THE LONGITUDINAL SLOPE.

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Jacobs			COLORADO SPRINGS		

SOUTH CHEYENNE CANYON BRIDGE			Project No./Code
TYPICAL SECTIONS			R010069
Designer: TJM	Structure Numbers		XXXXX
Detailer: JAM			
Sheet Subset: ROADWAY	Subset Sheets: RD07 of 15		Sheet Number 7

CONTRACT ITEM NO.	BID ITEM	UNIT	QTY	NOTES
201-00000	CLEARING AND GRUBBING	LS	1	
202-00001	REMOVE CMP ARCH STRUCTURE	EA	1	
202-00220	REMOVAL OF ASPHALT MAT	SY	670	
202-00240	REMOVAL OF ASPHALT MAT (PLANING)	SY	970	
202-01171	REMOVE CONCRETE BARRIER RAIL	LF	64	
202-00027	REMOVAL OF RIPRAP	SY	80	
202-00150	REMOVAL OF WALL	EA	1	
202-01035	REMOVAL OF GATE	EA	1	
202-01130	REMOVE EXISTING GUARDRAIL	LF	133	
202-05026	SAWING ASPHALT MATERIAL (6 INCH)	LF	272	
203-00000	UNCLASSIFIED EXCAVATION	CY	1100	
206-00000	STRUCTURE EXCAVATION	CY	470	
206-00100	STRUCTURE BACKFILL	CY	330	
206-00360	MECHANICAL REINFORCEMENT OF SOIL	CY	323	
207-00205	TOPSOIL	CY	100	
208-00020	SILT FENCE	LF	390	
208-00045	CONCRETE WASHOUT STRUCTURE	EA	1	
208-00070	VEHICLE TRACKING PAD	EA	1	
208-00106	SWEEPING (SEDIMENT REMOVAL)	HR	40	
208-00206	EROSION CONTROL SUPERVISOR	DAY	30	
208-00301	TEMPORARY DIVERSION	LF	200	
211-03005	DEWATERING	LS	1	
212-00006	SEEDING (NATIVE)	AC	0.06	
212-00032	SOIL CONDITIONING	AC	0.06	
212-00100	TREE RETENTION AND PROTECTION	LS	1	
213-00000	MULCHING	AC	0.06	
213-00061	MULCH TACKIFIER	LB	25	
213-00700	LANDSCAPE BOULDER	EA	11	
220-00810	REMOVAL OF SIGN POST	EACH	4	
220-00821	REMOVAL OF SIGN PANEL	EACH	2	
240-00810	RESET SIGN POST	EACH	1	
240-00821	RESET SIGN PANEL	EACH	1	
304-06007	AGGREGATE BASE COURSE (CLASS 6)	CY	100	
304-06007	AGGREGATE BASE COURSE (CLASS 6)	CY	12	TRAIL
304-06012	BREEZE SURFACING - 6 INCH DEPTH (TAN)	SY	160	
304-06013	CONSTRUCT NATURAL TRAIL	LF	150	
403-34751	HMA (GR SX) (75) (PG 64-28)	TON	200	
403-34751	HMA (GR SX) (75) (PG 64-28)	TON	11	TRAIL
420-00132	GEOTEXTILE (SEPARATOR) (CLASS 1)	SY	200	
503-00024	DRILLED CAISSON (24 INCH)	LF	380	
503-00310	CROSSHOLE SONIC LOGGING TESTING	EACH	7	
506-00224	RIPRAP (24 INCH)	CY	1030	
506-00601	CREEKSIDE ACCESS	LS	1	
515-00120	WATERPROOFING (MEMBRANE)	SY	200	
601-03000	CONCRETE CLASS D (BRIDGE)	CY	160	
601-40005	CUT STONE VENEER	SF	668	
602-00000	REINFORCING STEEL	LB	7940	
602-00020	REINFORCING STEEL (EPOXY)	LB	30000	

CONTRACT ITEM NO.	BID ITEM	UNIT	QTY	NOTES
606-00350	GUARDRAIL SYSTEM (MGS) TYPE 3	LF	62.50	PAINTED
606-01370	GUARDRAIL SYSTEM (MGS) TRANSITION TYPE 3G	EA	4	PAINTED
606-01385	GUARDRAIL SYSTEM (MGS) ANCHORAGE TYPE 3K	EA	4	PAINTED
606-10200	BRIDGE RAIL (SPECIAL)	LF	75	
608-00015	DETECTABLE WARNINGS	SF	16	TRAIL
609-24000	CURB TYPE 2 (SPECIAL)	LF	110	
609-60011	CURB TYPE 6 (SECTION M)	LF	63	
613-00200	2 INCH ELECTRICAL CONDUIT	LF	150	
618-06036	PRESTRESSED CONCRETE SLAB	SF	971	
625-00000	CONSTRUCTION SURVEYING	LS	1	`
626-00000	MOBILIZATION	LS	1	
628-00002	PREFABRICATED TRUSS BRIDGE	EACH	1	TRAIL
630-00017	TRAFFIC CONTROL MANAGEMENT	DAY	60	
700-70010	F/A MINOR CONTRACT REVISIONS	FA	1	
814-00010	SIGN PANEL (CLASS I)	SF	40	
814-00020	SIGN PANEL (CLASS II)	SF	23	
814-20200	STEEL SIGN POST (2 INCH SQUARE PUNCHED)	LF	70	
827-32000	EPOXY PAVEMENT MARKING	SF	390	
827-34050	PREFORMED THERMOPLASTIC PAVEMENT MARKING	SF	180	

COLORADO REGISTERED
35270
7-28-23
PROFESSIONAL ENGINEER

FINAL DESIGN - FOR CONSTRUCTION

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Unit Information Unit Leader Initials
Jacobs

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Sheet Revisions

Date:	Comments	Init.

COLORADO SPRINGS

As Constructed
No Revisions:
Revised:
Void:

SOUTH CHEYENNE CANYON BRIDGE
SUMMARY OF APPROX QUANTITIES

Designer: TJH
Detailer: JAM
Sheet Subset: ROADWAY
Structure Numbers
Subset Sheets: RD08 of 15

Project No./Code
R010069
XXXXX
Sheet Number 8

TABULATION OF SIGNS

Sign Number		Station	Alignment	Direction	Location	Offset	Sign Code	Panel Size (in.) W	x	H	Background Color	Legend	220-00810 Removal of Sign Post* EACH	220-00821 Removal of Sign Panel EACH	240-00810 Reset Sign Post EACH	240-00821 Reset Sign Panel EACH	814-00010 Sign Panel (Class I) SF	814-00020 Sign Panel (Class II) SF	814-10200 Steel Sign Post (2 Inch, Tubular) LF	Notes
1-1	x	201+20	Mesa	SB	LT	35	R7-107 Modified	12	x	18	WHITE	NO PARKING PARKING IN DESIGNATED LOTS ONLY								RESET FROM STATION 202+60, 15' RT
1-2	x	201+53	Mesa	NB	LT	27	R12-5	REMOVE			WHITE	WEIGHT LIMIT 16T 27T 26T	1							
1-3	w	201+55	Mesa	WB	LT	17	D3-1	REMOVE			GREEN	S Cheyenne Canyon Rd	1							
	x						D3-1				GREEN	Mesa Ave								
	y						R1-1				RED	STOP								
	z						R7-107 Modified				WHITE	NO PARKING PARKING IN DESIGNATED LOTS ONLY								
1-4	X	201+60	Mesa	EB	RT	15	R1-1	30	x	30	RED	STOP					6.25		13.0	MOUNT ABOVE R1-3P PANEL
	Y						R1-3P	18	x	6	RED	ALL WAY					0.75			MOUNT AT 7 FEET ABOVE GROUND
1-5	x	201+60	Mesa	NB/SB	LT	27	SPECIAL	REMOVE			WHITE	DESTINATIONS	1							CONTRACTOR TO DELIVER SIGN PANEL AND POSTS TO CITY PARKS DEPARTMENT
1-6	x	201+75	Mesa	WB	LT	15	W11-2 Modified	30	x	30	FYG	[hiker crossing]					6.25		14.5	MOUNT ABOVE W16-7PL PANEL; LEGEND IS HIKERS SYMBOL
	y						W16-7PL	24	x	12	FYG	[downward left arrow]					2.00			MOUNT AT 7 FEET ABOVE GROUND
1-7	x	202+60	Mesa	WB	RT	15	R7-107 Modified	RESET			WHITE	NO PARKING PARKING IN DESIGNATED LOTS ONLY			1					RESET SIGN AND POST TO STATION 201+20, 35' LT, FACING SB
1-8	x	202+63	Mesa	EB	RT	18	R7-107 Modified	REMAIN			WHITE	NO PARKING PARKING IN DESIGNATED LOTS ONLY								EXISTING SIGN TO REMAIN
1-9	x	203+33	Mesa	EB	RT	21	W11-2 Modified	30	x	30	FYG	[hiker crossing]					6.25		14.5	MOUNT ABOVE W16-7PL PANEL; LEGEND IS HIKERS SYMBOL
	y						W16-7PL	24	x	12	FYG	[downward left arrow]					2.00			MOUNT AT 7 FEET ABOVE GROUND
1-10	x	203+48	Mesa	WB	LT	16	R1-1	30	x	30	RED	STOP					6.25		13.0	MOUNT ABOVE R1-3P PANEL
	y						R1-3P	18	x	6	RED	ALL WAY					0.75			MOUNT AT 7 FEET ABOVE GROUND
	z						SPECIAL	24	x	30	WHITE	[right arrow] ONLY] / EXCEPT AUTHORIZED VEHICLES						5.00		MOUNT BELOW R1-3P PANEL
1-11	x	204+00	Mesa	EB	RT	17	W11-2 Modified	REMOVE			FYG	[hiker crossing]	1							
	y						W16-7PL				FYG	[downward left arrow]								
	z						R7-107 Modified				WHITE	NO PARKING PARKING IN DESIGNATED LOTS ONLY								
1-12	w	204+18	Mesa	WB	LT	15	W11-2 Modified	REMAIN			FYG	[hiker crossing]								
	x						W16-7PL	REMOVE			FYG	[downward left arrow]		1						REMOVE EXISTING PANEL FROM EXISTING POST
	y						W16-9P	24	x	12	FYG	AHEAD					2.00			INSTALL NEW PANEL BELOW W11-1 PANEL
	z						R7-107 Modified	REMAIN			WHITE	NO PARKING PARKING IN DESIGNATED LOTS ONLY								
1-13	w	10+25	S. Cheyenne Canyon	NB/SB	LT	31	D3-1	30	x	9	GREEN	Mesa Ave						3.75	15.0	MOUNT FACING NB & SB ABOVE S CHEYENNE CANYON RD PANELS
	x			WB/EB			D3-1	66	x	9	GREEN	S Cheyenne Canyon Rd						8.25		MOUNT FACING EB & WB ABOVE R1-1 PANEL
	y			SB			R1-1	30	x	30	RED	STOP					6.25			MOUNT ABOVE R1-3P PANEL
	z			SB			R1-3P	18	x	6	RED	ALL WAY					0.75			MOUNT AT 7 FEET ABOVE GROUND
1-14	x	11+20	S. Cheyenne Canyon	SB	LT	12	SPECIAL	24	x	36	WHITE	[no right turn] / EXCEPT AUTHORIZED VEHICLES						6.0		INSTALL PANEL SO IT IS ALIGNED WITH TOP OF EXISTING POST
	x						R12-5	REMOVE			WHITE	WEIGHT LIMIT 16T 27T 26T		1						REMOVE PANEL FROM EXISTING POST
	y						SPECIAL	RESET			WHITE	NOTICE DOGS ON LEASH				1				RESET EXISTING SIGN PANEL BELOW NEW SPECIAL SIGN PANEL ON EXISTING POST
PROJECT TOTALS													4	2	1	1	40	23	70	

* Removal of Sign Post pay item includes existing panels attached to post, unless otherwise specified in Notes column.

NB Northbound WB Westbound Location RT: Right side of centerline

SB Southbound EB Eastbound Location LT: Left side of centerline

FYG: Fluorescent Yellow Green

COLORADO LICENSED
JACQUELINE DOWDS GUNNETT
32233
08/03/2023
PROFESSIONAL ENGINEER

FINAL DESIGN - FOR CONSTRUCTION

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Unit Information Unit Leader Initials
Jacobs

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Sheet Revisions

Date:	Comments	Init.

COLORADO SPRINGS

As Constructed
No Revisions:
Revised:
Void:

SOUTH CHEYENNE CANYON BRIDGE
TABULATION OF SIGNS

Designer: JDB
Detailer: JAM
Sheet Subset: TAB
Structure Numbers
Subset Sheets: TB01 of 2

Project No./Code
R010069
XXXXX
Sheet Number 9

TABULATION OF PAVEMENT MARKING

LOCATION	827-32000 EPOXY PAVEMENT MARKING LINES						827-34050 PREFORMED THERMOPLASTIC PAVEMENT MARKING								NOTES
	CENTER		EDGE		BARRIER		TURN ARROW				CROSSWALK		STOP BAR		
	SOLID YELLOW 4 INCH		SOLID WHITE 4 INCH		SOLID WHITE 8 INCH		LEFT		RIGHT		SOLID WHITE 12 INCH		SOLID WHITE 12 INCH		
	LF		LF		LF		EA		EA		EACH		LF		
	PLAN	FINAL	PLAN	FINAL	PLAN	FINAL	PLAN	FINAL	PLAN	FINAL	PLAN	FINAL	PLAN	FINAL	
S Cheyenne Canyon Avenue	255		340		20		1		1				33		
Mesa Avenue	285		240								12		22		
PAY QUANTITY CALCULATIONS															
TOTAL LINEAR FEET	540		580		20		1		1		108		55		
TOTAL SQUARE FEET	180.0		193.3		13.3		16		16		108		55		
PROJECT TOTALS (SQUARE FEET)	390						180								

COLORADO LICENSED
JACQUELINE DOWDS-KENNETT
32233
08/03/2023
PROFESSIONAL ENGINEER

FINAL DESIGN - FOR CONSTRUCTION

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Sheet Revisions		
Date:	Comments	Init.

COLORADO SPRINGS

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Revised:
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SOUTH CHEYENNE CANYON BRIDGE
TABULATION OF PAVEMENT MARKING

Designer: JDB
Detailer: JAM
Sheet Subset: TAB
Structure Numbers
Subset Sheets: TB02 of 2

Project No./Code
R010069
XXXXX
Sheet Number 10

GENERAL NOTES

1. DATE OF FIELD SURVEY: SEPTEMBER 07, 2021 - OCTOBER 01, 2021

2. ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECTS IN THIS SURVEY WITH THREE (3) YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT. IN NO EVENT MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN (10) YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON.

3. THIS SURVEY DOES NOT CONSTITUTE A TITLE SEARCH BY JACOBS ENGINEERING GROUP INC. OR THE SURVEYOR OF RECORD.

4. ALL UNITS ARE US SURVEY FEET.

PROJECT CONTROL

PROJECT COORDINATES AND ELEVATIONS SHOWN HEREON ARE BASED ON COLORADO SPRINGS UTILITIES - FACILITIES INFORMATION MANAGEMENT SYSTEM (FIMS) - SURVEY CONTROL NETWORK. CONTROL POSITIONS WERE COLLECTED USING RTK GLOBAL POSITION TECHNIQUES.

HORIZONTAL POSITIONS

HORIZONTAL POSITIONS ARE COLORADO CENTRAL (ZONE 0502) STATE PLANE NAD83(2011) EPOCH 2010.00.

BASIS OF BEARINGS: BEARINGS ARE BASED ON A GRID BEARING OF N40°27'40"E FROM FIMS MONUMENT F183 (3.25" BRASS FIMS CAP IN BOULDER STAMPED "FIMS CONTROL POINT 183 COLORADO SPRINGS DEPARTMENT OF UTILITIES") TO VS29 (3.25" BRASS FIMS CAP IN CONCRETE VAULT STAMPED "FIMS CONTROL POINT VS29 COLORADO DEPARTMENT OF UTILITIES")

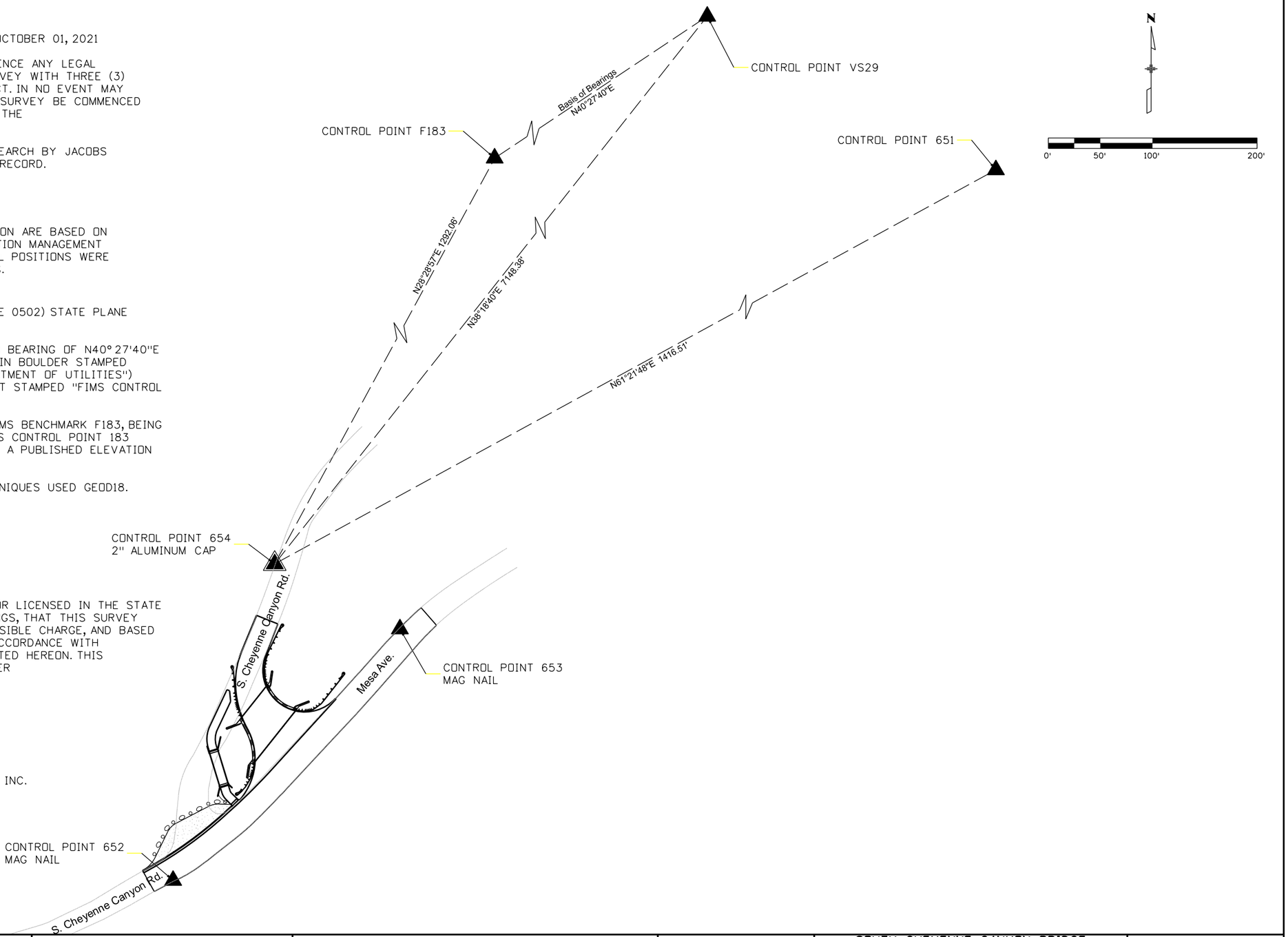
BASIS OF ELEVATIONS: ELEVATIONS ARE BASED ON FIMS BENCHMARK F183, BEING A 3.25" BRASS FIMS CAP IN BOULDER STAMPED "FIMS CONTROL POINT 183 COLORADO SPRINGS DEPARTMENT OF UTILITIES", HAVE A PUBLISHED ELEVATION OF 6383.20 FEET NAVD88.

NOTE: ELEVATIONS ESTABLISHED UTILIZING GPS TECHNIQUES USED GEOD18.

SURVEYOR'S CERTIFICATION

I, ROBERT F. GUPTILL, A PROFESSIONAL LAND SURVEYOR LICENSED IN THE STATE OF COLORADO, DO HEREBY STATE TO COLORADO SPRINGS, THAT THIS SURVEY CONTROL DIAGRAM WAS PREPARED UNDER MY RESPONSIBLE CHARGE, AND BASED UPON MY KNOWLEDGE, INFORMATION, AND BELIEF, IN ACCORDANCE WITH APPLICABLE STANDARDS OF PRACTICE, EXCEPT AS NOTED HEREON. THIS STATEMENT IS NOT A GUARANTY OR WARRANTY, EITHER EXPRESSED OR IMPLIED.

ROBERT F. GUPTILL, COLORADO PLS 38747
FOR AND ON BEHALF OF JACOBS ENGINEERING GROUP INC.
9191 JAMAICA STREET
ENGLEWOOD, CO 80112
Robert.Guptill@Jacobs.com



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Horiz. Scale: As Noted	Vert. Scale: As Noted				Revised:	Designer: TJH / Detailer: JAM / Structure Numbers	XXXXX
Unit Information	Unit Leader Initials				Void:	Sheet Subset: ROADWAY / Subset Sheets: RD09 of 15	Sheet Number 11
Jacobs							

COLORADO SPRINGS

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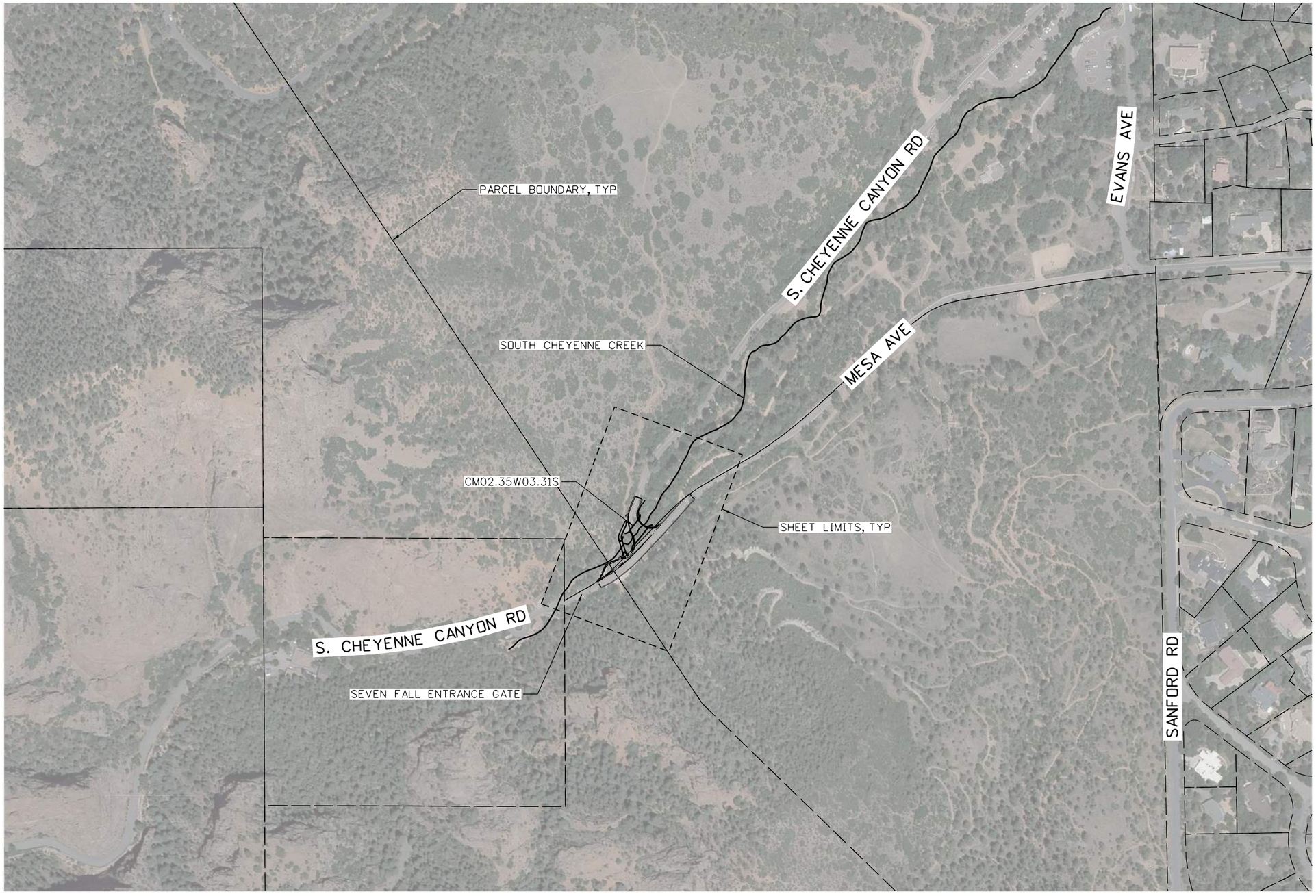

COLORADO LICENSED
RAVI SHOWARD
59035
8/3/23
PROFESSIONAL ENGINEER

FINAL DESIGN - FOR CONSTRUCTION

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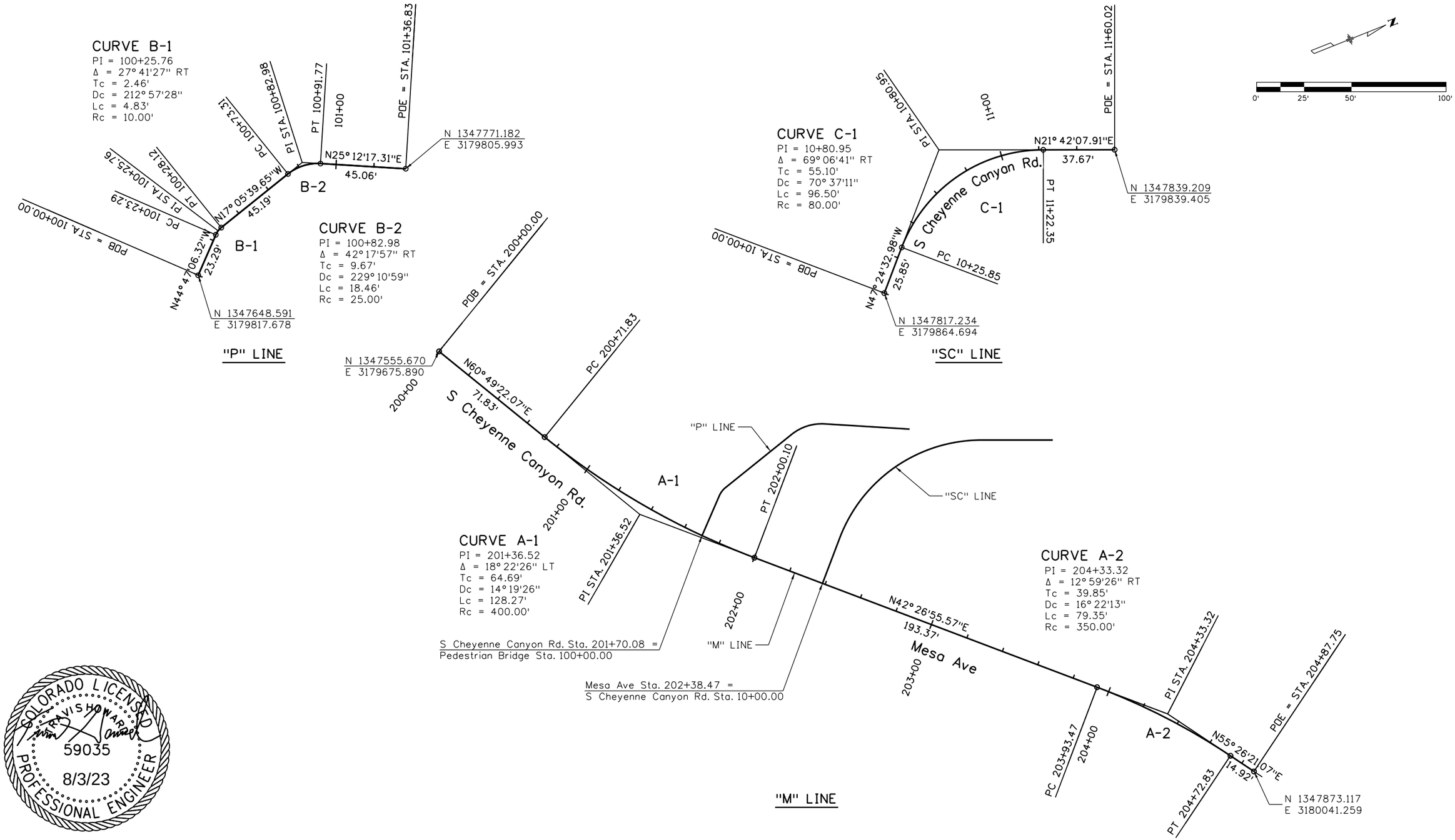
Print Date: 8/1/2023		Sheet Revisions	
File Name: 006.01_SCC-GN-KEY-01.dgn		Date:	Comments: Init.
Horiz. Scale: As Noted Vert. Scale: As Noted			
Unit Information Unit Leader Initials			
Jacobs			

COLORADO SPRINGS

As Constructed	SOUTH CHEYENNE CANYON BRIDGE		Project No./Code
No Revisions:	PROJECT KEY PLAN		R010069
Revised:	Designer: TJH	Structure Numbers	XXXXX
Void:	Detailer: JAM		
	Sheet Subset: ROADWAY	Subset Sheets: RD10 of 15	Sheet Number 12



COLORADO LICENSED
TRAVIS HOWARD
59035
8/3/23
PROFESSIONAL ENGINEER

Print Date: 8/1/2023		Sheet Revisions			As Constructed	SOUTH CHEYENNE CANYON BRIDGE GEOMETRY PLAN	Project No./Code
File Name: 006.02_SCC-GC-GPL-01.dgn		Date:	Comments	Init.	No Revisions:		R010069
Horiz. Scale: As Noted Vert. Scale: As Noted					Revised:	Designer: TJH / Detailer: JAM / Structure Numbers	XXXXX
Unit Information Unit Leader Initials					Void:	Sheet Subset: ROADWAY / Subset Sheets: RD11 of 15	Sheet Number 13
Jacobs					COLORADO SPRINGS		

FINAL DESIGN - FOR CONSTRUCTION

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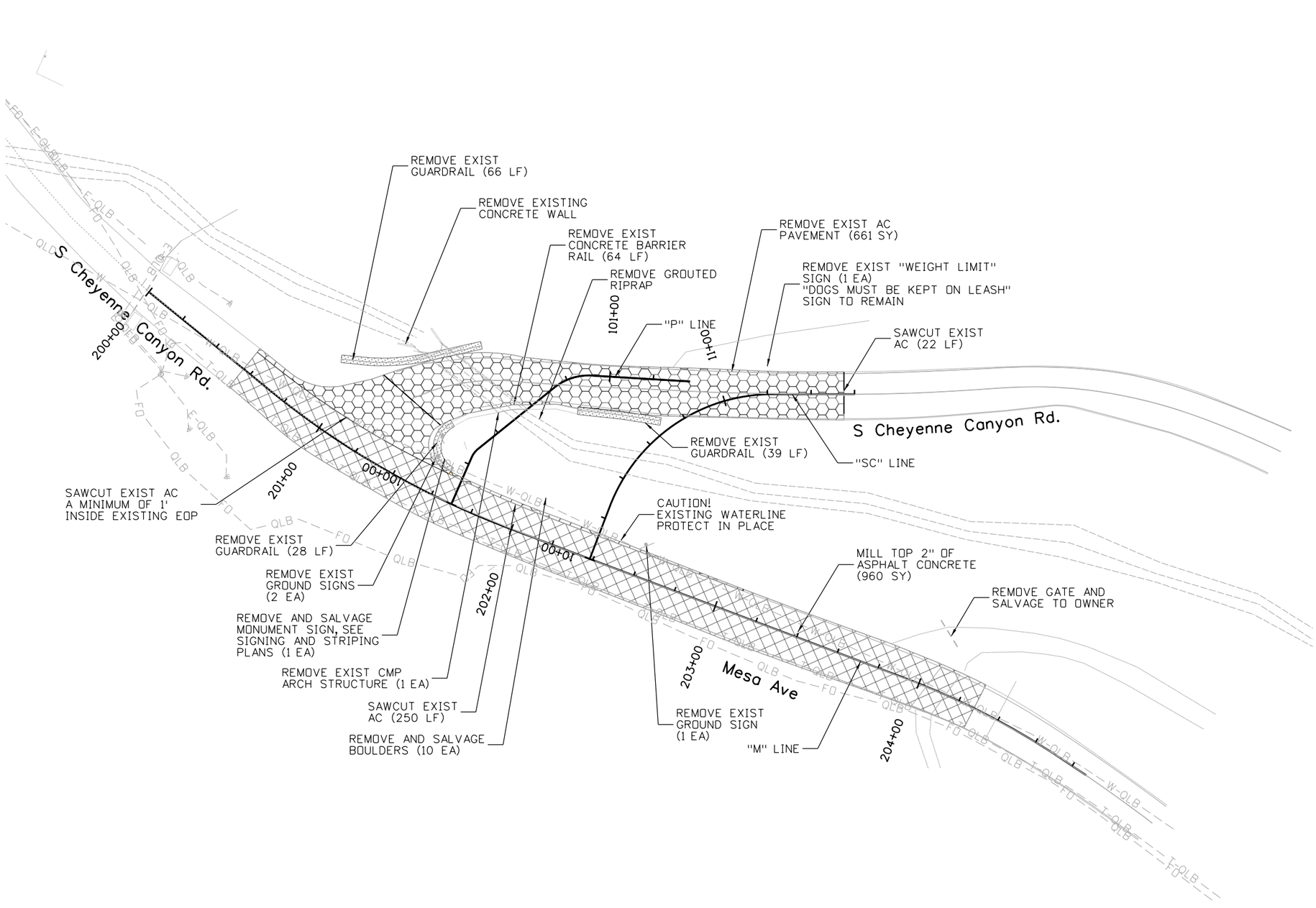

REMOVAL LEGEND

- REMOVE EXISTING PAVEMENT AND BASE COURSE
- MILL TOP 2" PAVEMENT
- REMOVE EXISTING GUARDRAIL

NOTES:
1. EXISTING TREES NOT SHOWN. REMOVE TREES WHERE IN CONFLICT WITH PROPOSED WORK.

2. PROTECT EXISTING TREES AND VEGETATION THAT DOES NOT LAND WITHIN THE PROPOSED PROJECT FOOTPRINT.

COLORADO LICENSED RAVI S. HOWARD 59035 8/3/23 PROFESSIONAL ENGINEER

FINAL DESIGN - FOR CONSTRUCTION

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Print Date: 8/1/2023	Sheet Revisions			As Constructed	SOUTH CHEYENNE CANYON BRIDGE REMOVAL PLAN	Project No./Code
File Name: 008.00_SCC-RM-PLAN-01.dgn	Date:	Comments	Init.	No Revisions:		R010069
Horiz. Scale: As Noted Vert. Scale: As Noted				Revised:	Designer: TJH / Detailer: JAM	Structure Numbers: XXXXX
Unit Information Unit Leader Initials				Void:	Sheet Subset: ROADWAY / Subset Sheets: RD12 of 15	Sheet Number 14
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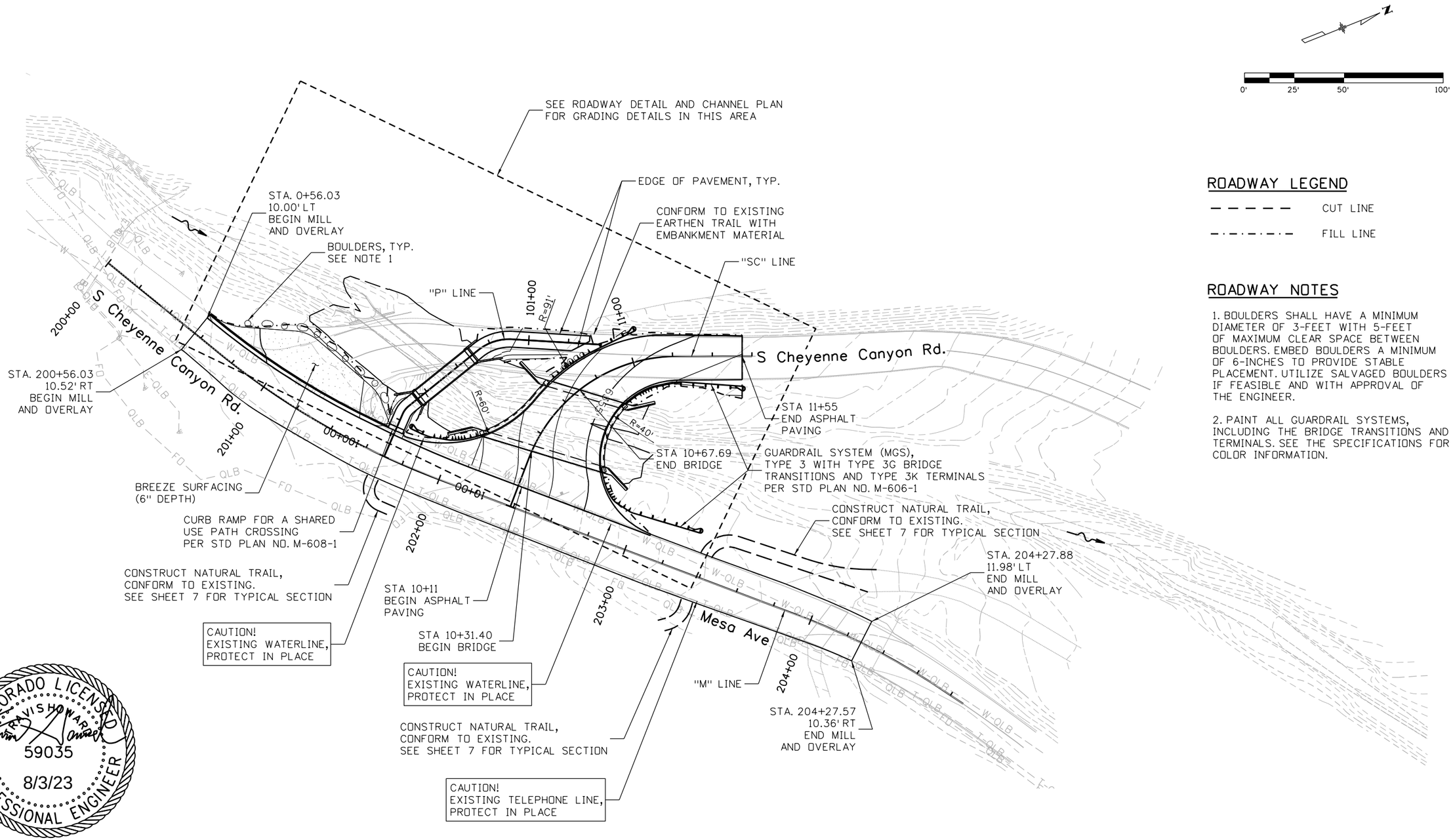
COLORADO SPRINGS



ROADWAY LEGEND

CUT LINE

FILL LINE

ROADWAY NOTES

1. BOULDERS SHALL HAVE A MINIMUM DIAMETER OF 3-FEET WITH 5-FEET OF MAXIMUM CLEAR SPACE BETWEEN BOULDERS. EMBED BOULDERS A MINIMUM OF 6-INCHES TO PROVIDE STABLE PLACEMENT. UTILIZE SALVAGED BOULDERS IF FEASIBLE AND WITH APPROVAL OF THE ENGINEER.

2. PAINT ALL GUARDRAIL SYSTEMS, INCLUDING THE BRIDGE TRANSITIONS AND TERMINALS. SEE THE SPECIFICATIONS FOR COLOR INFORMATION.

COLORADO LICENSED
TRAVIS HOWARD OWEN
59035
8/3/23
PROFESSIONAL ENGINEER

Print Date: 8/1/2023	Sheet Revisions		
File Name: 009.00_SCC-RD-PLAN-01.dgn	Date:	Comments	Init.
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COLORADO SPRINGS

As Constructed	SOUTH CHEYENNE CANYON BRIDGE		Project No./Code
No Revisions:	ROADWAY PLAN STA 10+11.23 TO STA 11+55.00		R010069
Revised:	Designer:DJ	Structure Numbers	XXXXX
Void:	Detailer: JAM		Sheet Number 15
	Sheet Subset:ROADWAY	Subset Sheets: RD13 of 15	

FINAL DESIGN - FOR CONSTRUCTION

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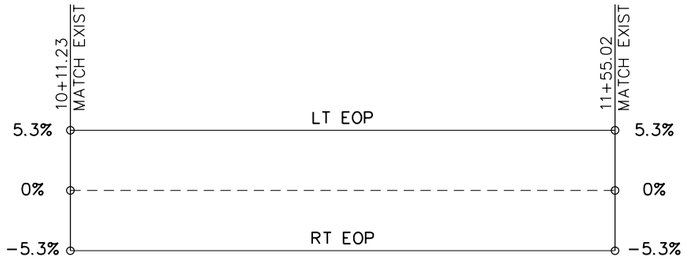
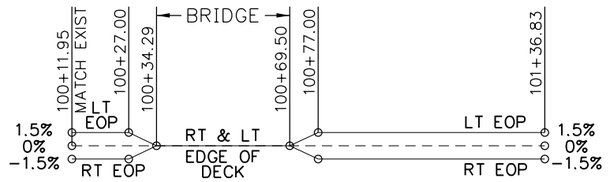
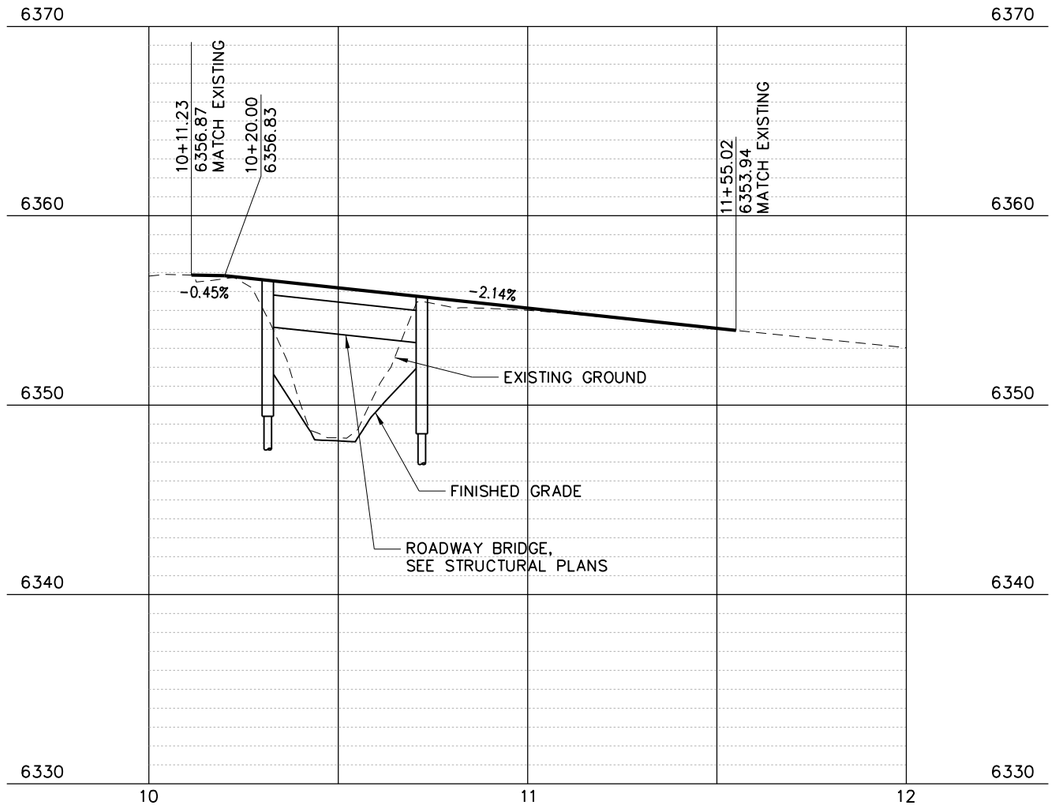


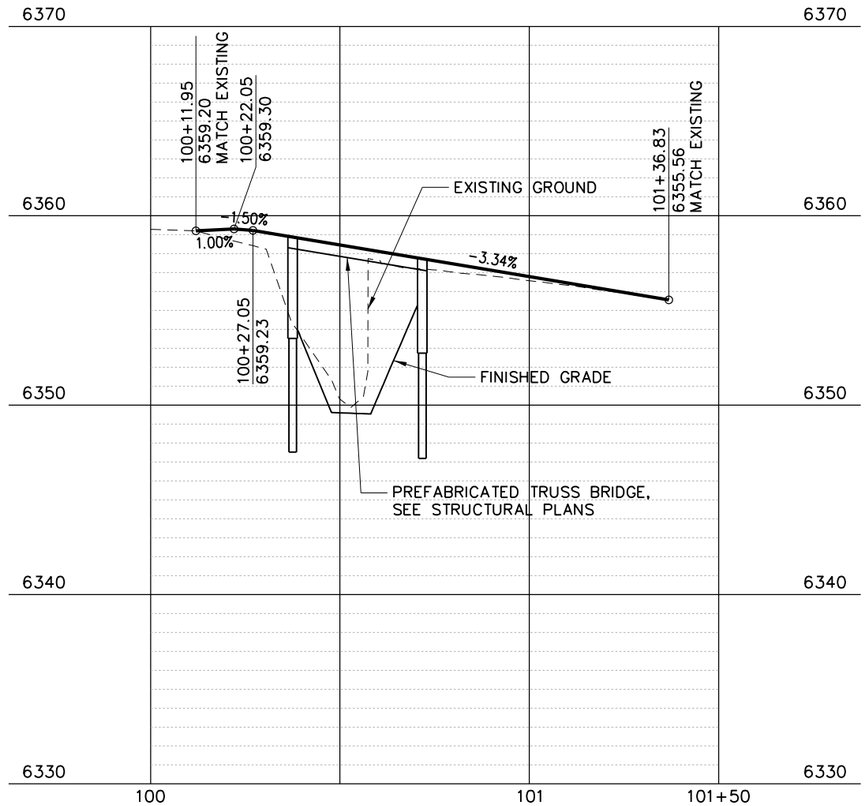
SUPERELEVATION DIAGRAM



SUPERELEVATION DIAGRAM



"SC" LINE PROFILE



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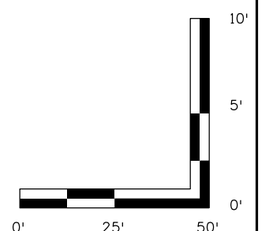

COLORADO LICENSED
RAVISH HARI
59035
8/3/23
PROFESSIONAL ENGINEER

FINAL DESIGN - FOR CONSTRUCTION

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Print Date: 8/1/2023		Sheet Revisions			As Constructed
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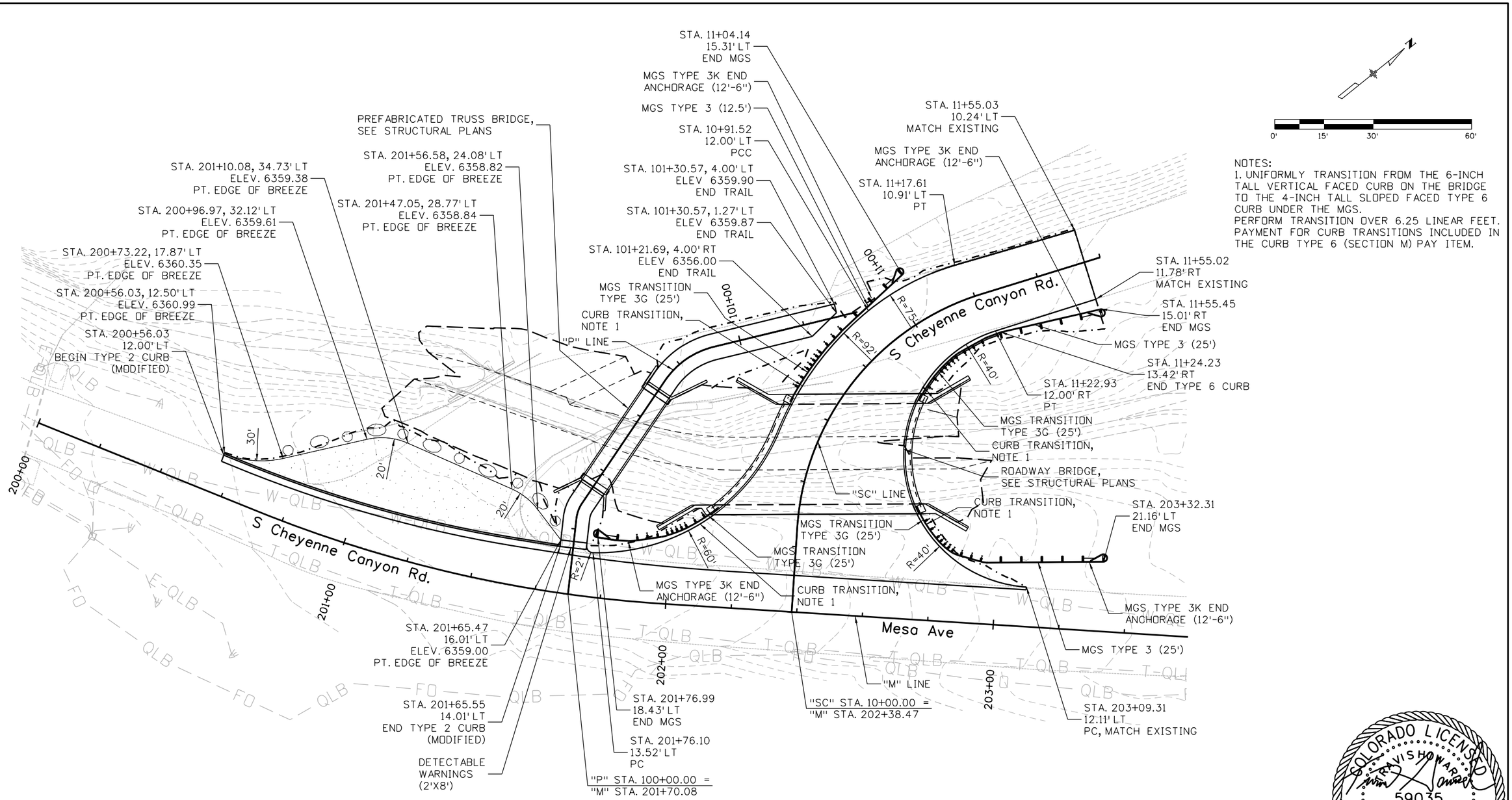
Unit Information Unit Leader Initials					Void:
Jacobs	0000				

COLORADO SPRINGS

SOUTH CHEYENNE CANYON BRIDGE
ROADWAY PROFILES

Designer:DJ	Structure Numbers		Project No./Code R010069
Detailer: JAM			XXXXX
Sheet Subset:ROADWAY	Subset Sheets: RD14 of 15		Sheet Number 16



NOTES:
1. UNIFORMLY TRANSITION FROM THE 6-INCH TALL VERTICAL FACED CURB ON THE BRIDGE TO THE 4-INCH TALL SLOPED FACED TYPE 6 CURB UNDER THE MGS.
PERFORM TRANSITION OVER 6.25 LINEAR FEET. PAYMENT FOR CURB TRANSITIONS INCLUDED IN THE CURB TYPE 6 (SECTION M) PAY ITEM.

COLORADO LICENSED
TRAVIS H. WARD
59035
8/3/23
PROFESSIONAL ENGINEER

FINAL DESIGN - FOR CONSTRUCTION

Print Date: 8/1/2023		Sheet Revisions			As Constructed
File Name: 010.01_SCC-RD-DTL-01.dgn		Date:	Comments	Init.	No Revisions:
Horiz. Scale: As Noted Vert. Scale: As Noted					Revised:
Unit Information Unit Leader Initials					Void:
Jacobs					

COLORADO SPRINGS

SOUTH CHEYENNE CANYON BRIDGE
ROADWAY DETAIL

Designer: TJH	Structure Numbers		Project No./Code R010069
Detailer: JAM			XXXXX
Sheet Subset: ROADWAY	Subset Sheets: RD15 of 15		Sheet Number 17

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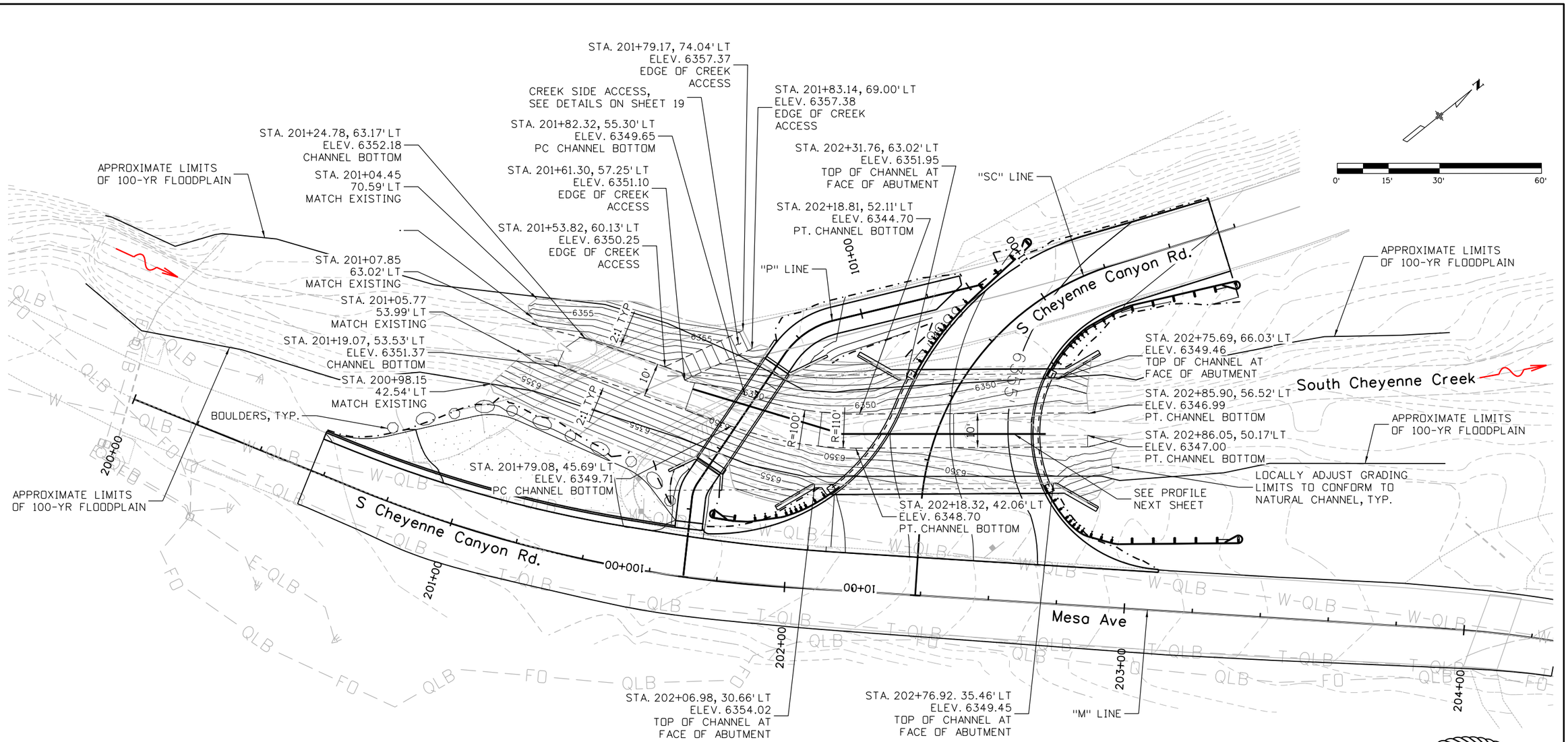

COLORADO LICENSED
TRAVIS HOWARD
59035
8/3/23
PROFESSIONAL ENGINEER

FINAL DESIGN - FOR CONSTRUCTION

Print Date: 8/1/2023		Sheet Revisions			As Constructed
File Name: 015.03_SCC-HYD-PLAN-01.dgn		Date:	Comments	Init.	No Revisions:
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Unit Information Unit Leader Initials					Void:
Jacobs	COLORADO SPRINGS				Designer: ZL / Detailer: JAM / Sheet Subset: HYDRAULICS

SOUTH CHEYENNE CANYON BRIDGE
CHANNEL PLAN

Structure Numbers
Subset Sheets: DR01 of 4

Project No./Code: R010069
XXXXX
Sheet Number 18

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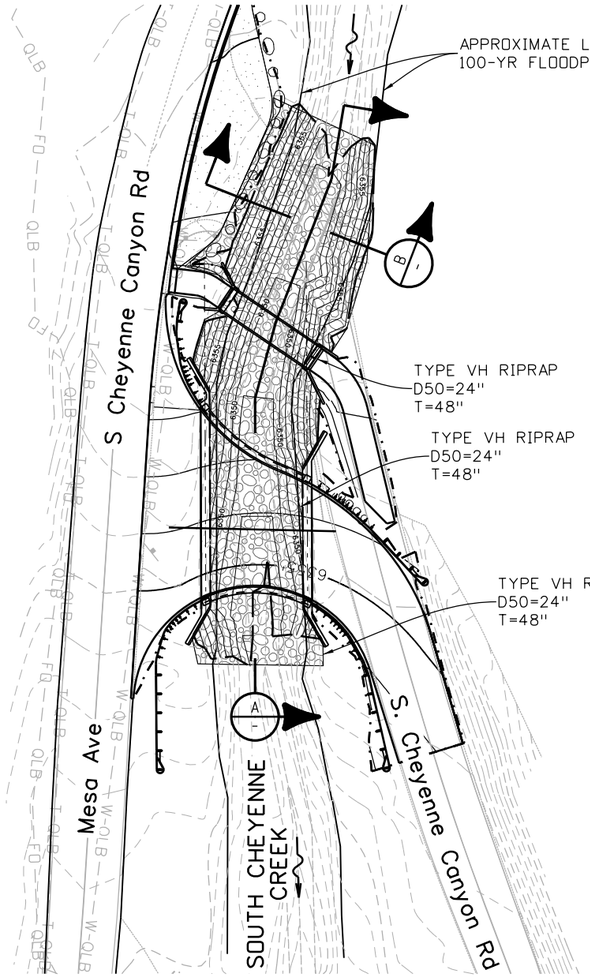
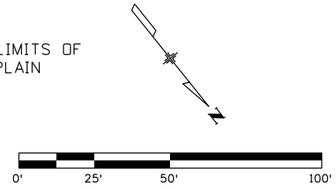


PLAN

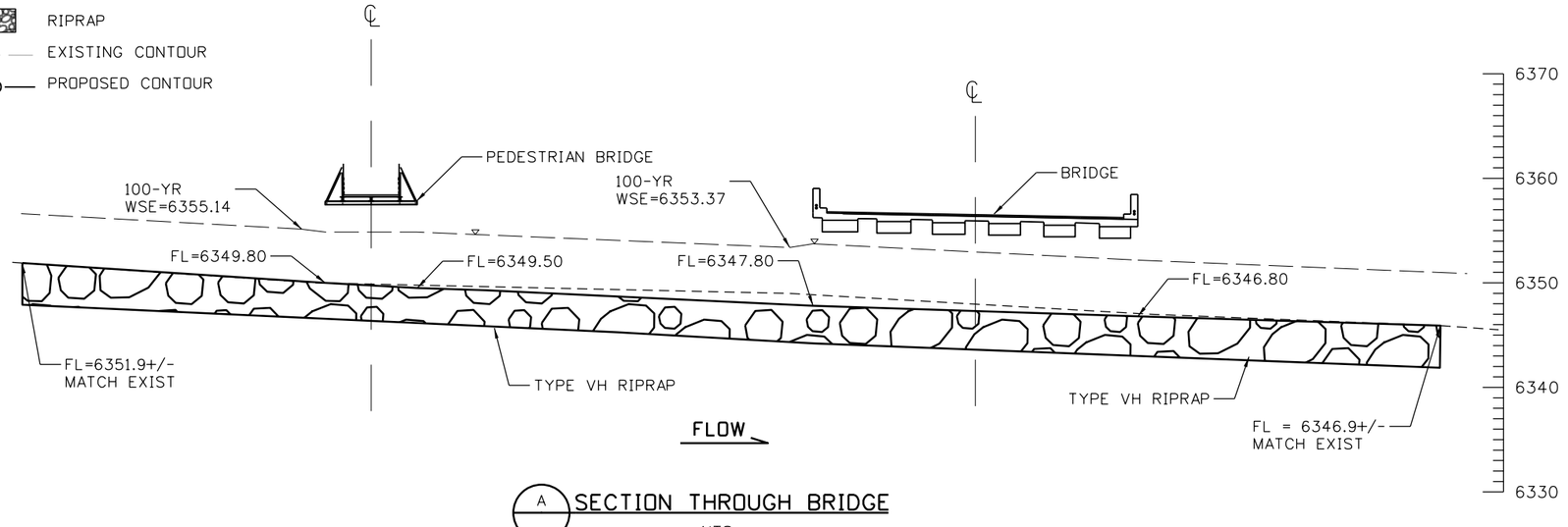


LEGEND

- RIPRAP
- 6600 EXISTING CONTOUR
- 6600 PROPOSED CONTOUR

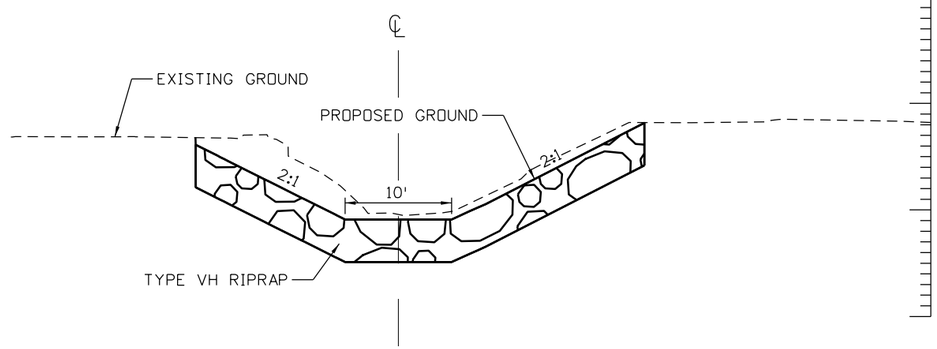
NOTES

1. REFER TO STRUCTURE PLANS FOR BRIDGE AND WINGWALL DETAILS.
2. REFER TO THE HYDRAULIC DATA ON SHEET DR04, BRIDGE HYDRAULIC DETAILS.



A SECTION THROUGH BRIDGE

NTS



B TYPICAL CREEK SECTION

NTS

35270
7-28-23
PROFESSIONAL ENGINEER

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Unit Information Unit Leader Initials					Void:
Jacobs	0000				

COLORADO SPRINGS

SOUTH CHEYENNE CANYON BRIDGE			Project No./Code
BRIDGE HYDRAULIC PLAN & PROFILE			R010069
Designer: ZL	Structure Numbers		XXXXX
Detailer: JAM			
Sheet Subset: HYDRAULICS	Subset Sheets: DR02 of 4		Sheet Number 19

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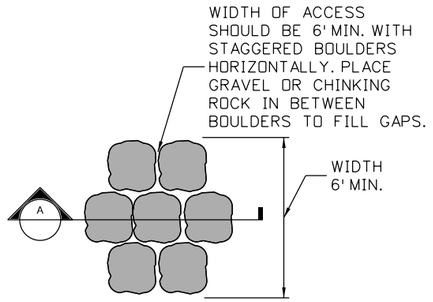
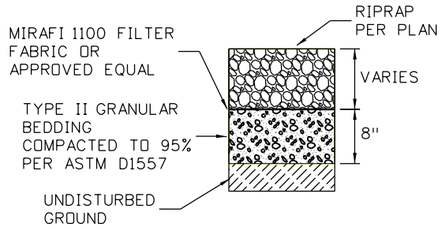
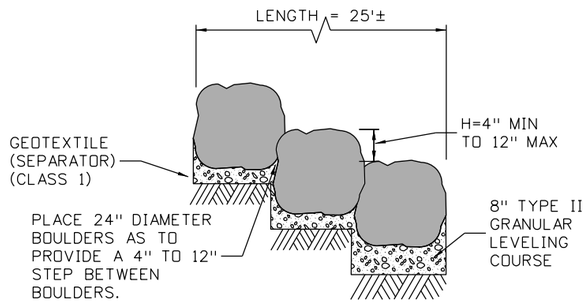


1 CREEK SIDE ACCESS
NTS PLAN VIEW



2 TYPICAL RIPRAP SECTION
NTS



A CREEK SIDE TRAIL ACCESS - PROFILE
NTS

COLORADO REGISTERED PROFESSIONAL ENGINEER
35270
7-28-23

FINAL DESIGN - FOR CONSTRUCTION

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Unit Information Unit Leader Initials					Void:
Jacobs					

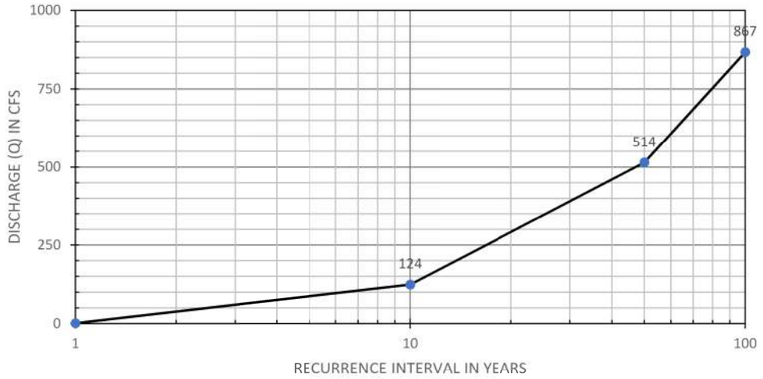
COLORADO SPRINGS

SOUTH CHEYENNE CANYON BRIDGE
CHANNEL DETAILS

Designer: ZL		Structure Numbers	
Detailer: JAM			
Sheet Subset: HYDRAULICS	Subset Sheets: DR03 of 4		

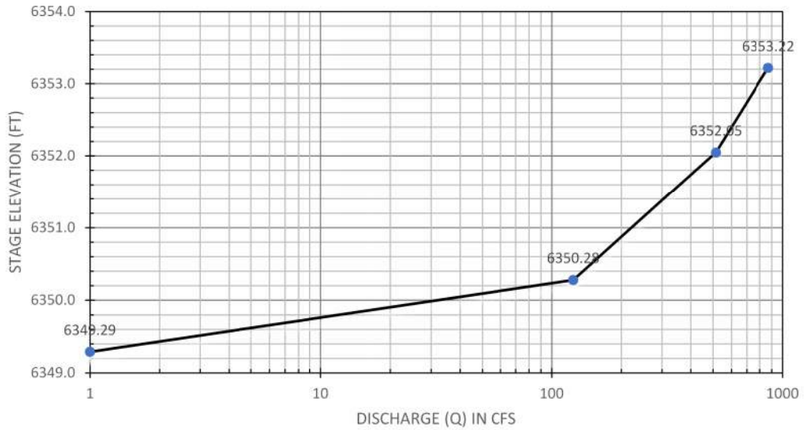
Project No./Code	R010069
	XXXXX
Sheet Number	20

DISCHARGE VS FREQUENCY



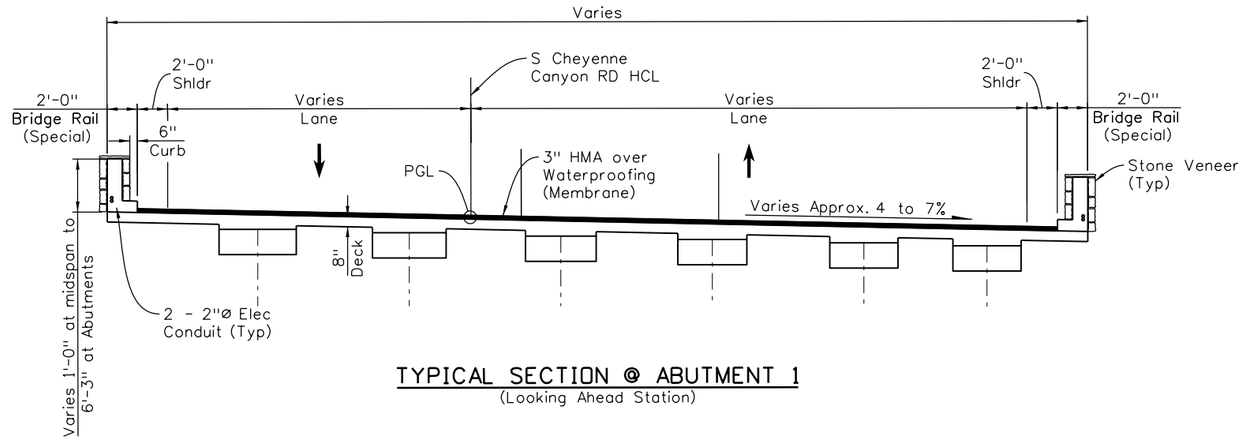
STAGE VS. DISCHARGE

STAGE UPSTREAM OF BRIDGE



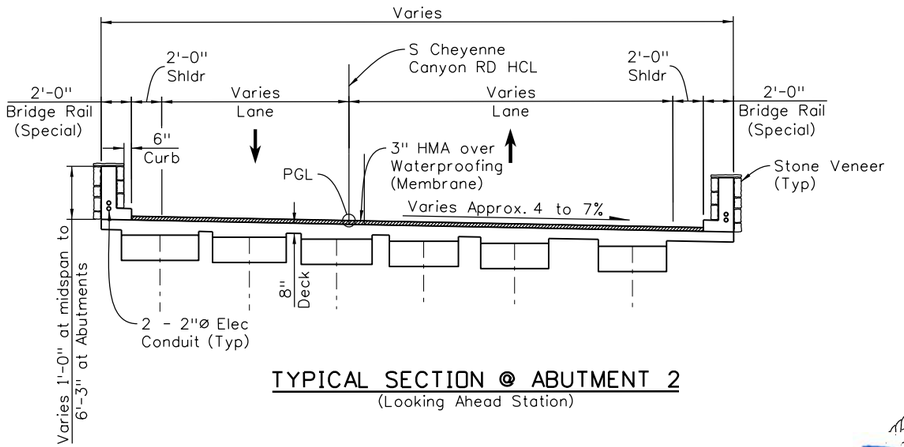
CHANNEL DESCRIPTION - BRIDGE D									
DRAINAGE AREA:	9.9	MI^2							
BOTTOM MATERIAL:		COHESIVE	X	NON-COHESIVE					
BOTTOM MATERIAL SIZE:		CLAY		SILT	X	SAND	X	GRAVEL	
	X	COBBLES		OTHER					
STREAM FORM:	X	STRAIGHT		MEANDERING		BRAIDED			
MANNING'S "n" FOR DESIGN:	0.050	CHANNEL	0.080	OVERBANK					
DEBRIS:	X	BRUSH	X	TREES/LOGS	X	ICE		OTHER	

COMPARISON OF HYDRAULICS(100 y	VELOCITY		FREEBOARD		BACKWATER		
EXISTING CHANNEL	9.8	FPS	0	FT	100	FT	OT
PROPOSED CHANNEL	10.1	FPS	0.6	FT	20	FT	



TYPICAL SECTION @ ABUTMENT 1

(Looking Ahead Station)



TYPICAL SECTION @ ABUTMENT 2

(Looking Ahead Station)

NOTES:

1. LAYOUT LINE INTERSECTS HCL AT BF ABUT 2 ON BEARING 49° 56'16".

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35270
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FINAL DESIGN - FOR CONSTRUCTION

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Horiz. Scale: As Noted Vert. Scale: As Noted
Unit Information Unit Leader Initials

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Sheet Revisions		
Date:	Comments	Init.

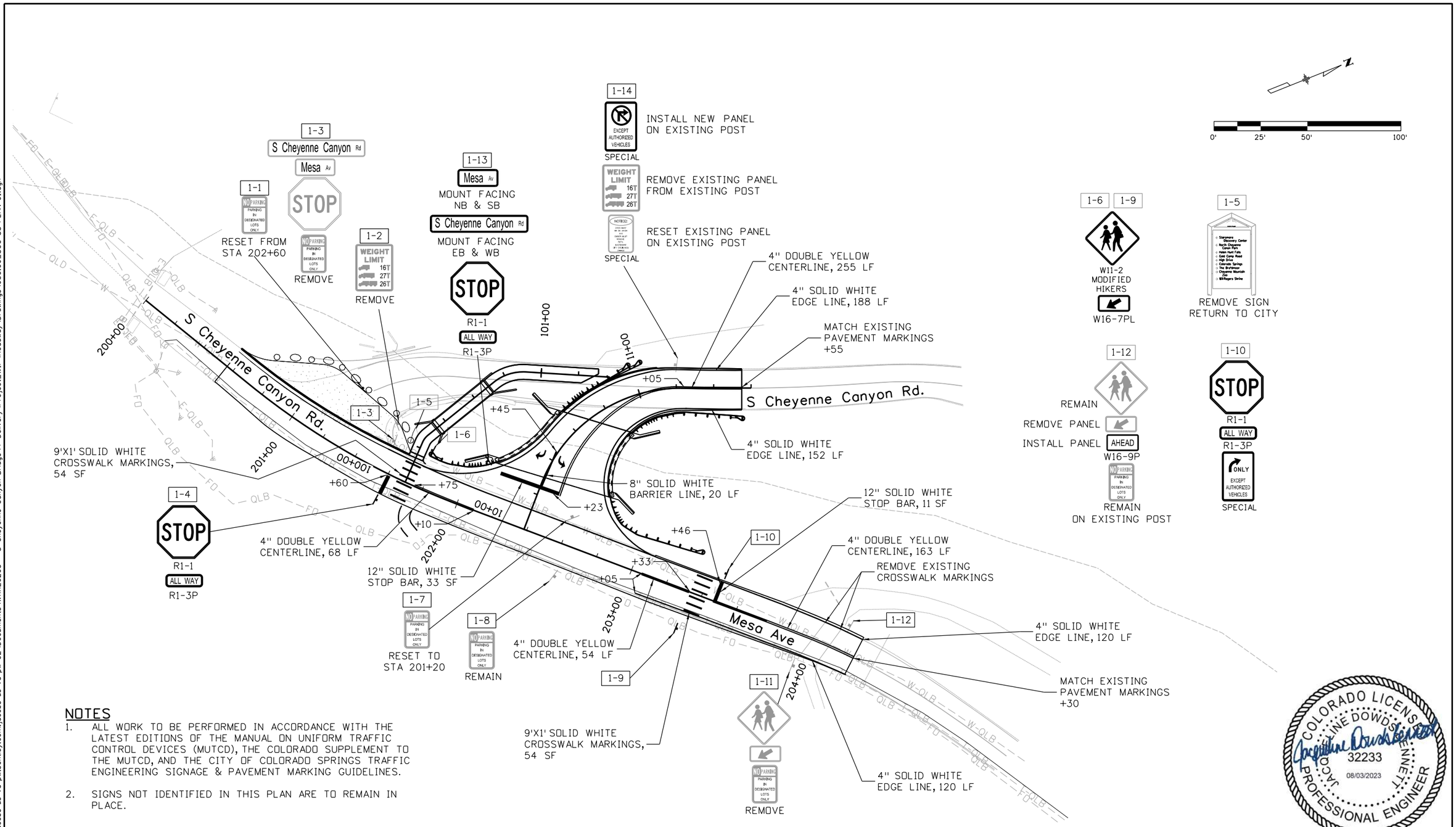
COLORADO SPRINGS

As Constructed
No Revisions:
Revised:
Void:

SOUTH CHEYENNE CANYON BRIDGE
BRIDGE HYDRAULIC DETAILS

Designer: ZL
Detailer: JAM
Sheet Subset: HYDRAULICS
Structure Numbers
Subset Sheets: DR04 of 4

Project No./Code
R010069
XXXXX
Sheet Number 21



NOTES

1. ALL WORK TO BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), THE COLORADO SUPPLEMENT TO THE MUTCD, AND THE CITY OF COLORADO SPRINGS TRAFFIC ENGINEERING SIGNAGE & PAVEMENT MARKING GUIDELINES.
2. SIGNS NOT IDENTIFIED IN THIS PLAN ARE TO REMAIN IN PLACE.

COLORADO LICENSED JANE DOWDS JACOBS PROFESSIONAL ENGINEER 32233 08/03/2023

FINAL DESIGN - FOR CONSTRUCTION

Print Date: 8/3/2023	Sheet Revisions			As Constructed	SOUTH CHEYENNE CANYON BRIDGE SIGNING AND STRIPING
File Name: 030.00_SCC-SS-PLAN-01.dgn	Date:	Comments	Init.	No Revisions:	Designer: JDB / Detailer: JDB / Sheet Subset: TRAFFIC
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Unit Information / Unit Leader Initials				Void:	Project No./Code: R010069 / XXXXX
Jacobs				COLORADO SPRINGS	Sheet Number 22

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GENERAL NOTES

All work shall be done in accordance with the Colorado Department of Transportation (CDOT) Standard Specifications for road and bridge construction, 2022 Edition, as applicable to the project.

Structure Excavation and Backfill for bridges shall be as shown on the plans, and per CDOT M&S Standards M-206-1 for Cast-in-Place Retaining Walls.

Expansion Joint Material shall meet AASHTO Specifications M213.

The final finish for all exposed concrete surfaces shall be Class 2, to one foot below Finished Grade, unless otherwise noted.

All exterior concrete corners shall be constructed with ¾" chamfers, unless noted otherwise.

Leveling pads are unlaminated bearings. They shall be cut or molded from AASHTO Elastomer Grade 3, 4, or 5 as described in tables 705-1 and 705-2 with a durometer (Shore "A") hardness of 60.

Grade 60 Reinforcing Steel is required.

All reinforcing steel shall be epoxy coated unless otherwise noted.

Ⓝ denotes non coated reinforcing steel.

Structural concrete exposed to soil shall conform to cementitious materials requirements Class 1 corresponding to sulfate exposure Class 1. All structural concrete not exposed to soil shall conform to cementitious materials requirements Class 0 corresponding to sulfate exposure Class 0.

The Contractor shall be responsible for the stablilty of the structure during construction.

B.F.	=	Back Face
Brg.	=	Bearing
Const.	=	Construction
Ea.	=	Each
E.F.	=	Each Face
HCL	=	Horizontal Control Line
F.F	=	Far Face
N.F.	=	Near Face
Spa.	=	Space or Spaces

Permanent deck forms are required and shall be steel deck forms.

Compressed joint material shall be pre-compressed, chemically resistant, open cell polyurethane foam sealant, impregnated with a water-repllent material, with adhesive backing on both sides. The joint material shall be epoxied in place, and all splices sealed, as recommended by the supplier of the joint material. The cost shall be included the cost of Item 601, Cut Stone Veneer.

Acceptable Compressed Joint Material Alternatives:
Will-seal
Poly-tite "N"
or approved equal

Stations, elevations, and dimensions contained in these plans are calculated from a recent field survey. The Contractor shall verify all dependent dimensions in the field before ordering or fabricating any material.

Utilities are depicted on these plans in accordance with their achieved "quality level" as defined in the american society of civil engineer's document ASCE 38 "Standard guideline for the collection and depiction of existing subsurface utility data." Reliance upon these data for risk management purpose during bidding does not relieve the excavator or utility owner from following all applicable utility damage prevention statutes, policies, and/or procedures during excavation.

It is important that the Contractor investigates and understands the scope of work between the project owner and their Engineer regarding the scope and limits of the utility investigations leading to these utility depications.

The information shown on these plans concerning the type and location of underground utilities is not guaranteed to be accurate or all inclusive. The Contractor is responsible for making their own determination as to the Type and location of underground utilities as may be necessary to avoid damage thereto. The Contractor shall contact the utility notification center of Colorado at 811 (1-800-922-1987) at least 3 days (2 days not including the day of notification) prior to any excavation or other earthwork.

DESIGN DATA

AASHTO LRFD Bridge Design Specifications, 9th Edition, with current interims as modified By CDOT Bridge Design Manual 2023

Design Method: Load and Resistance Factor Design

Live Load: HI-93 (Design Truck or Tandem, and Design Lane Load)
CDOT Permit Vehicle 192 Tons
Live Load Surcharge = 3'-0" of Soil

Dead Load:

Assumes 36 Lbs. Per Sq. Ft. for Bridge Deck Overlay
Assumes 5 Lbs. Per Sq. Ft. for Utilities

Reinforced Concrete:

Class D Concrete:	F'c	=	4,500 Psi
Reinforcing Steel:	Fy	=	60,000 Psi

Caisson Concrete:

Class BZ Concrete:	F'c	=	4,000 Psi
Reinforcing Steel:	Fy	=	60,000 Psi

Precast Prestressed Concrete:

Class PS Concrete:	F'c	=	8,500 Psi At 28 Days
	F'ci	=	6,500 Psi At Transfer Of Prestress
Prestressed Strand:	F's	=	270,000 Psi

Backfill (class 1) (all Walls):

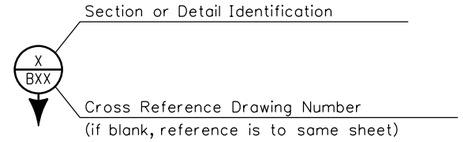
ø	=	34°
Ka	=	0.28
K	=	0.44

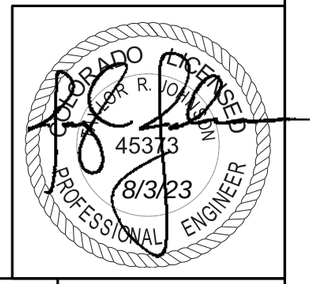
Design Earthquake:
Soil Profile: Site Class C
Moment Magnitude: PGA = 0.057

INDEX OF DRAWINGS

BRIDGE DESCRIPTION

1-Span (33'-7") Bridge
Composite Concrete Slab
& Precast/Prestressed
54"Wx20"D Concrete Slab Girders
S. Cheyenne Canyon Rd. over N. Cheyenne Creek
41'-9" Min. Width Out to Out (Varies)
39'-5⅞" Min. Roadway Curb to Curb (Varies)
1° 32' 3" Skew
2'-0" Bridge Rail (Special)





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Horiz. Scale:		Vert. Scale: As Noted	
Unit Information			

Jacobs

Sheet Revisions		
Date:	Comments	Init.

COLORADO SPRINGS

As Constructed
No Revisions:
Revised:
Void:

SOUTH CHEYENNE CANYON BRIDGE
BRIDGE STRUCTURAL SHEETS
GENERAL INFORMATION

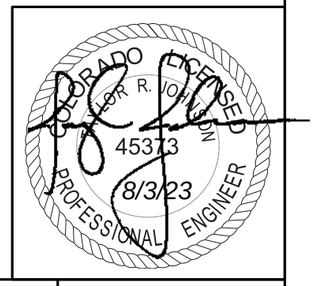
Designer: A. Regalado
Detailer: J. Mateo-Lucas
Sheet Subset: STRUCTURAL
Structure Numbers:
Subset Sheets: B01 of B20

Project No./Code
R010069

Sheet Number 23

Jaime.MateoLucas@jacobs.com 4:51:40 PM pw:\\jacobs-us-va-pw.bentley.com:jacobs-us-va-pw-02\Documents\WXXZ6205 - S Cheyenne Canyon Bridge\4 Delivery\Project_WIP\Bridge\Drawings\SSC Bridge\009_SCC-BR-PLAN-01.dgn

SUMMARY OF QUANTITIES						
Item No.	Description	Unit	Superstructure	Abutment 1	Abutment 2	Total
206-00000	Structure Excavation	CY	0	303	226	529
206-00100	Structure Backfill (Class 1)	CY	0	232	158	390
206-00360	Mechanical Reinforcement of Soil	CY	0	197	124	321
403-34871	Hot Mix Asphalt (Grading SX) (100) (PG 76-28)	TON	30	0	0	30
503-00024	Drilled Shaft (24 Inch)	LF	0	147	91	238
513-00606	Bridge Drain (Neenah R-3930 or approved equivalent)	EACH	0	1	1	2
503-00310	Crosshole Sonic Logging Testing	EACH	0	1	1	2
515-00120	Waterproofing (Membrane)	SY	180	0	0	180
601-03000	Concrete Class D	CY	64	38	29	131
601-40005	Cut Stone Veneer	SF	737	164	179	1080
602-00020	Reinforcing Steel (Epoxy Coated)	LB	18374	4513	3662	26549
606-10200	Bridge Rail (Special)	LF	80	0	0	80
613-00200	2 Inch Electrical Conduit	LF	168	0	0	168
618-06036	Prestressed Concrete Slab (depth Greater Than 13 Inches)	SF	971	0	0	971



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Unit Information					Void:	Sheet Subset:STRUCTURAL / Subset Sheets: B02 of B20	Sheet Number 24
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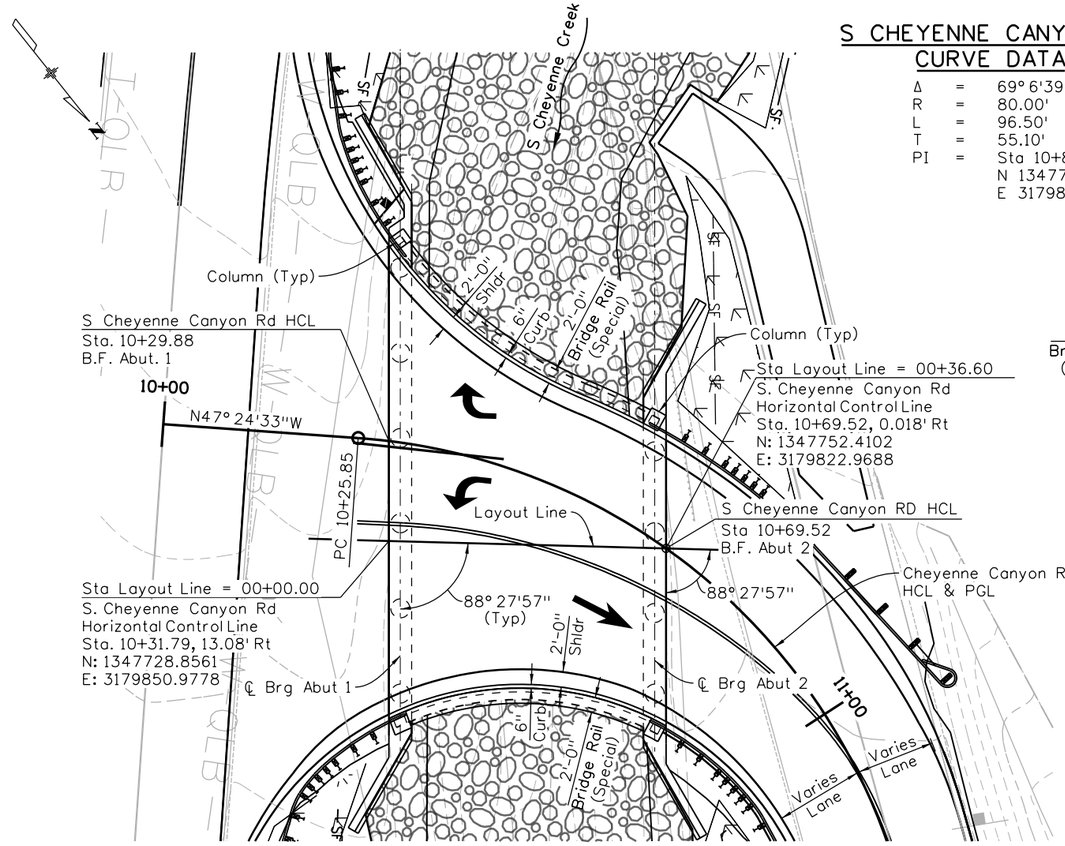
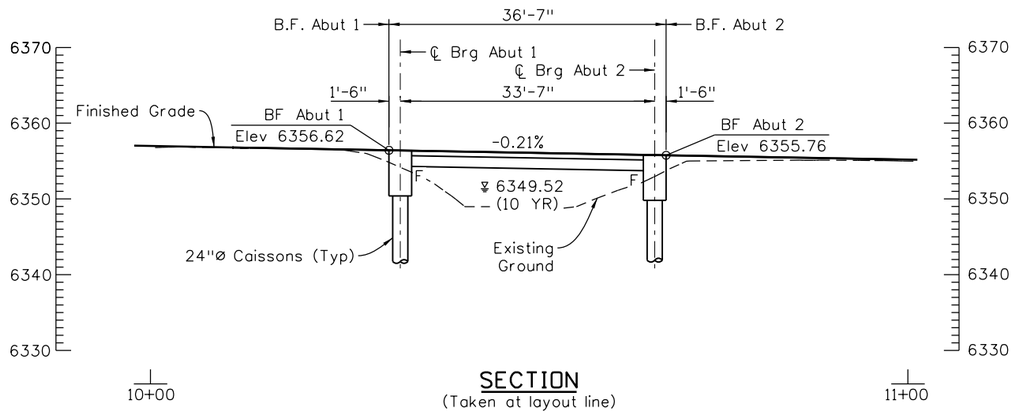


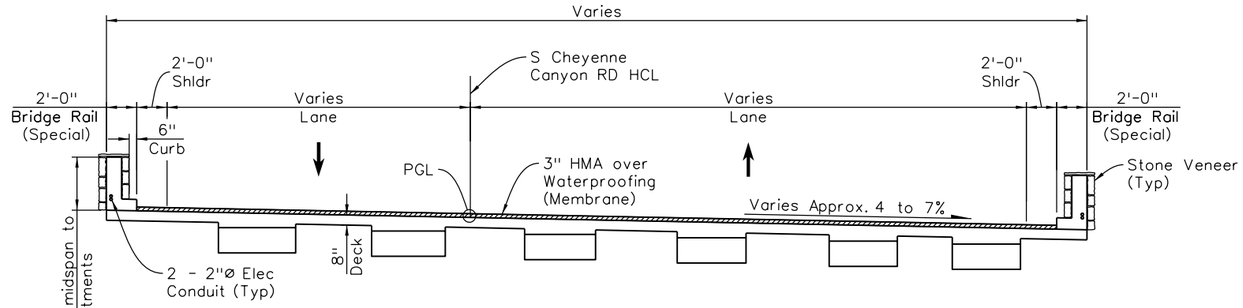
PLAN



SECTION
(Taken at layout line)

S CHEYENNE CANYON RD
CURVE DATA

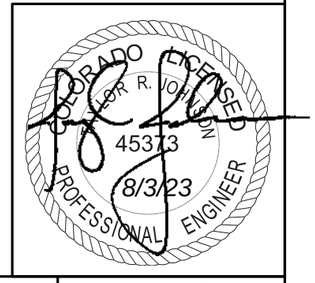
Δ	=	69° 6'39.60"
R	=	80.00'
L	=	96.50'
T	=	55.10'
PI	=	Sta 10+80.95
		N 1347753.02
		E 3179805.10



TYPICAL SECTION
(Looking Ahead Station)
(Section Taken Perpendicular to Layout Line)
* Slope Perpendicular to Layout Line

NOTES:

1. Layout line Intersects HCL at BF Abut 2 on bearing 49° 56'16".



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Horiz. Scale: Vert. Scale: As Noted				Revised:	Designer: A. Regalado / Structure Numbers	
Unit Information					Detailer: A. Quintana	
Jacobs				Void:	Sheet Subset: STRUCTURAL / Subset Sheets: B03 of B20	Sheet Number 25

COLORADO SPRINGS

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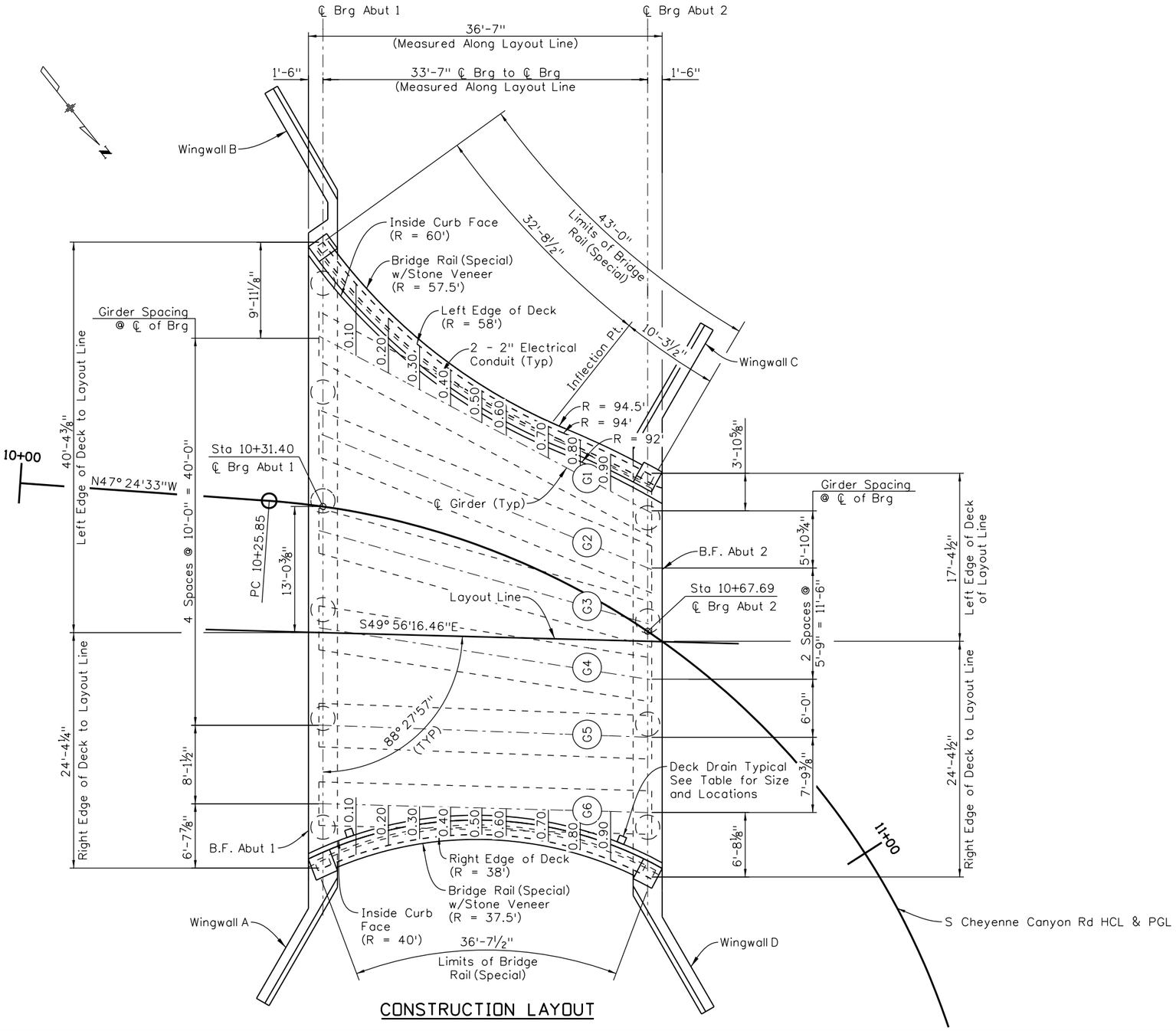

CONSTRUCTION LAYOUT

DECK OVERHANG DIMENSIONS		
Location (Along Layout Line)	Left Edge of Deck	Right Edge of Deck
℄ Brg Abut 1	9'-11"	6'-7⅞"
0.1	7'-5⅝"	5'-2⅝"
0.2	5'-8½"	4'-1½"
0.3	4'-5¾"	3'-4⅜"
0.4	3'-8⅛"	2'-10⅞"
0.5	3'-2⅞'	2'-9"
0.6	3'-1⅛"	2'-10¾"
0.7	3'-3¼"	3'-4"
0.8	3'-7⅜"	4'-1⅛"
0.9	3'-10"	5'-2⅜"
℄ Brg Abut 2	3'-10⅝"	6'-8⅛"

NOTES:

1. Deck overhang dimensions are from centerline of exterior girders to the nearest edge of deck. They are measured parallel to the ℄ of abutments and taken at 10th along the layout line.
2. For girder details see Sheet B11.
3. Electrical conduits in bridge rail: 2-2" Conduits in each rail.
4. Junction box to be installed at end of rail, see Sheet B14 for details.
5. Bridge rail limits measured along inside face of bridge rail.
6. The outlet pile shall extend 1" to 2" below bottom of the deck.
7. See Sheet B12 for reinforcing adjustment for deck drain penetration. Deck drain inlet shall be Neenah R-3930 or an approved equivalent capable of supporting HL-93 loading.

DECK DRAIN INFORMATION				
Location	Type	Size	Offset*	Station*
Abut 1	R-3930	9"x9"	20.89'	0+04.04
Abut 2	R-3930	9"x9"	20.85'	0+33.65

* Measured along the layout line

S CHEYENNE CANYON RD
CURVE DATA

Δ = 69° 6'39.6"
R = 80.00'
L = 96.50'
T = 55.10'
PI = Sta 10+80.95
N 1347753.02
E 3179805.10

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TYLER R. JOHNSON
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Print Date: 8/2/2023	Sheet Revisions			As Constructed	SOUTH CHEYENNE CANYON BRIDGE BRIDGE STRUCTURAL SHEETS CONSTRUCTION LAYOUT	Project No./Code
File Name: 009_SCC-BR-PLAN-05.dgn	Date:	Comments	Init.	No Revisions:		R010069
Horiz. Scale: Vert. Scale: As Noted				Revised:	Designer: A. Regalado / Detailer: A. Quintana / Structure Numbers	
Unit Information				Void:	Sheet Subset: STRUCTURAL / Subset Sheets: B05 of B20	Sheet Number 26

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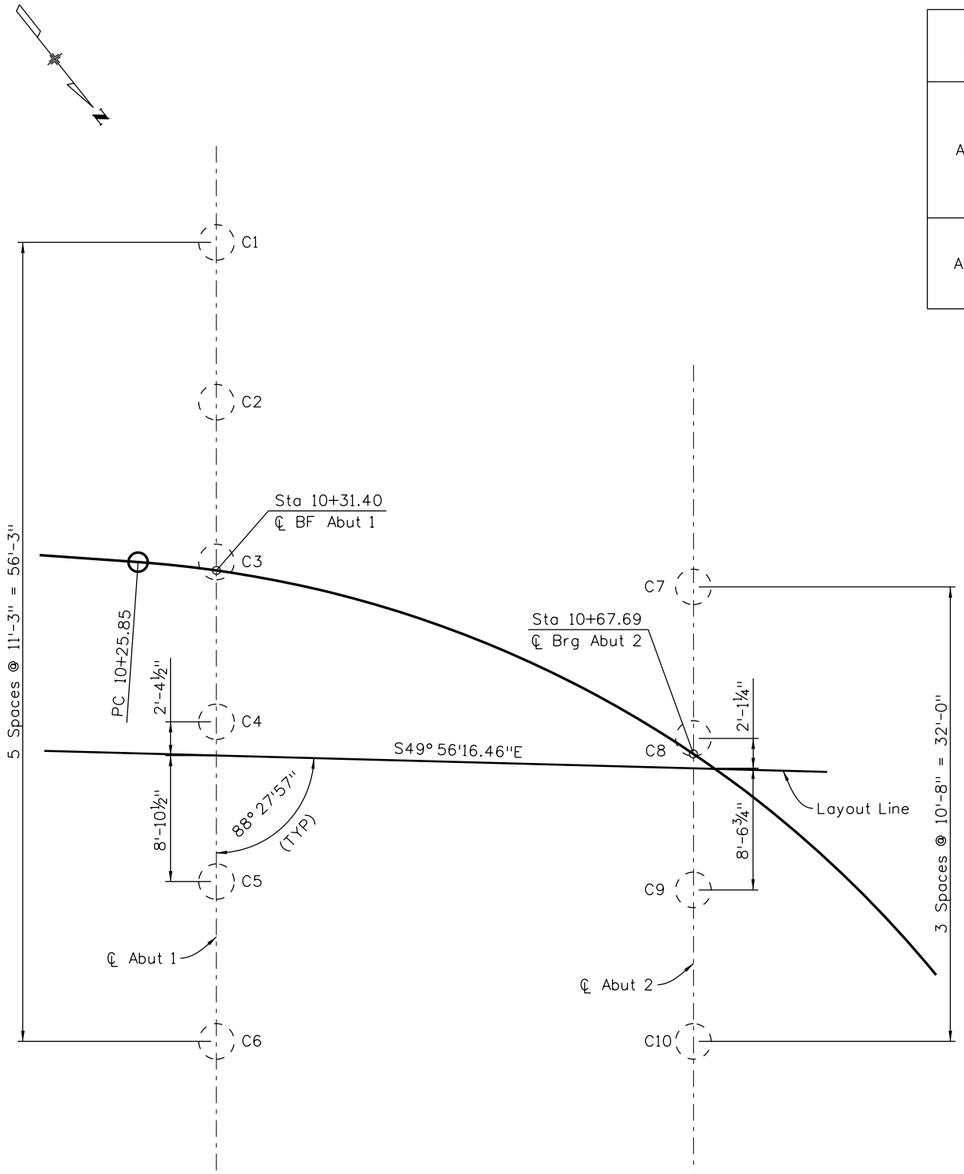
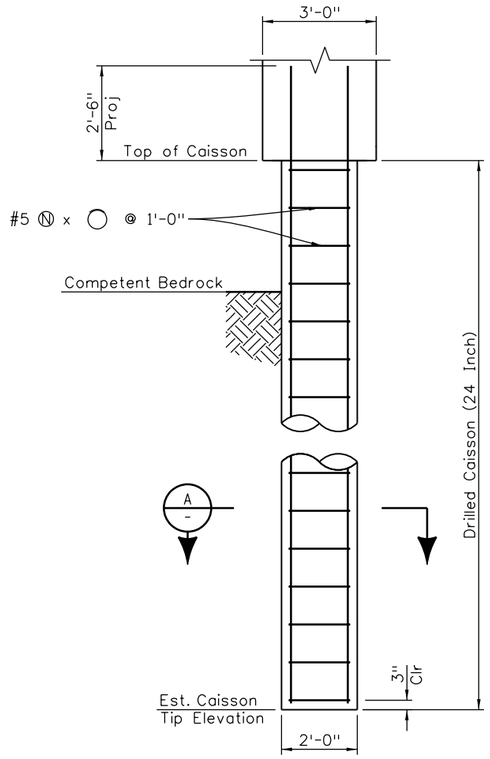
Location	Caisson	Caisson Size	Max. Load (Factored) (kips)	Max. Load (Service) (kips)	Top of Caisson Elevation	Estimated Top of Bedrock Elev.	Minimum Bedrock Penetration	Estimated Tip Elev.	Min. Required Tip Elevation	As-Built Tip Elev.
Abutment 1	C1	24"	230.49	158.67	6351.17	6340	15	6325	6325	
	C2	24"	230.49	158.67	6350.49	6340	15	6325	6325	
	C3	24"	230.49	158.67	6349.81	6340	15	6325	6325	
	C4	24"	230.49	158.67	6349.14	6340	15	6325	6325	
	C5	24"	230.49	158.67	6348.46	6340	15	6325	6325	
	C6	24"	230.49	158.67	6347.78	6340	15	6325	6325	
Abutment 2	C7	24"	229.71	159.59	6349.61	6341	15	6326	6326	
	C8	24"	229.71	159.59	6349.00	6341	15	6326	6326	
	C9	24"	229.71	159.59	6348.38	6341	15	6326	6326	
	C10	24"	229.71	159.59	6347.77	6341	15	6326	6326	



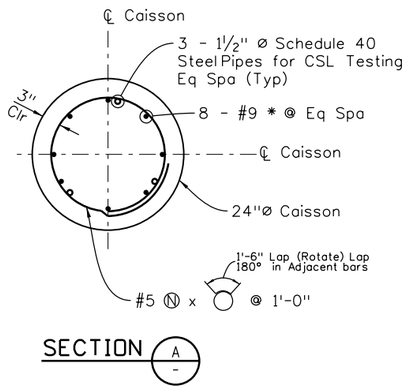
FOUNDATION LAYOUT



CAISSON DETAIL

CAISSON NOTES:

1. Top of competent bedrock elevation shall be verified at time of construction by engineer.
2. The use of temporary casing and dewatering during drilling may be required. the cost of temporary casing and dewatering shall not be paid for separetly, but shall be included in bid item 503-Drilled Caisson (24 inch).
3. The contractor shall anticipate encountering hard bedrock during drilling.
4. Resistance factor ø = 0.60 for end bearing and for side shear.
5. Ultimate allowable end bearing = 60 ksf x ø x ag.
6. Ultimate allowable side shear resistance = 5 ksf x ø x perimeter x length from 1' to 5' into bedrock.
7. Caisson construction shall proceed per CDOT specification 503, with exception that crosshole sonic log (csl) tube installation and testing is not required.



SECTION A

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Horiz. Scale: Vert. Scale: As Noted				Revised:	Designer: A. Regalado / Detailer: A. Quintana / Structure Numbers	
Unit Information				Void:	Sheet Subset: STRUCTURAL / Subset Sheets: B06 of B20	Sheet Number 27
Jacobs				COLORADO SPRINGS		

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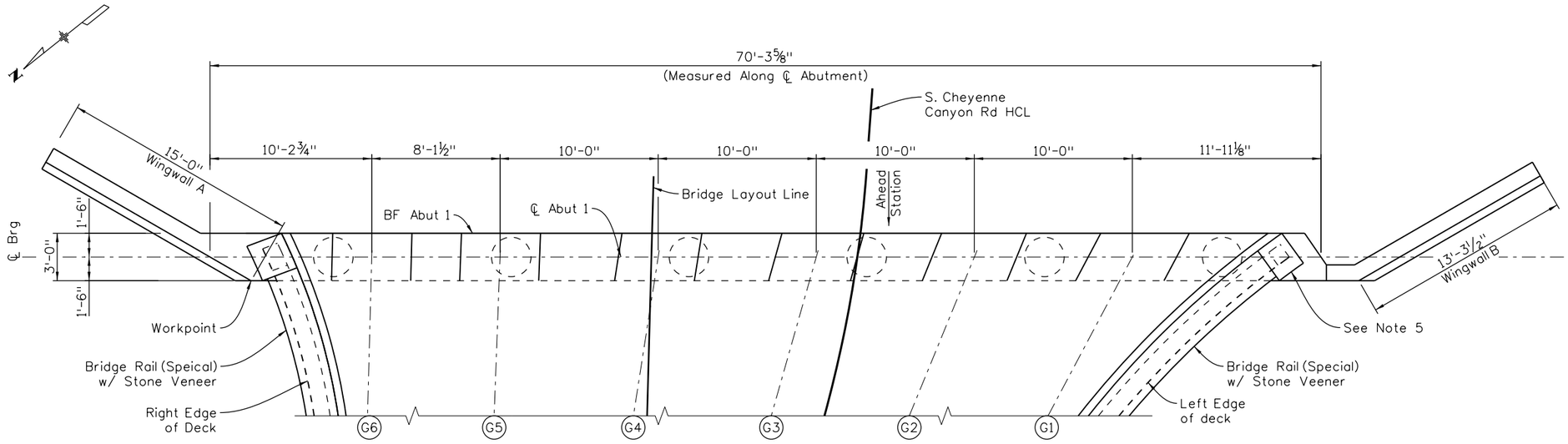
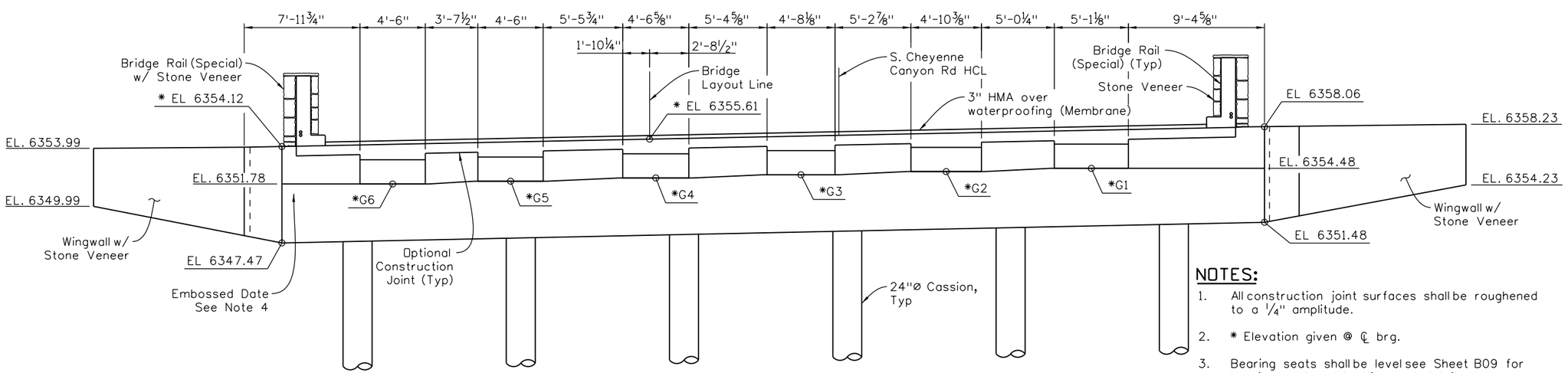


PLAN

BRG. ELEVATIONS	
LOCATION	*ELEVATION
G1	6354.58
G2	6354.04
G3	6353.45
G4	6352.87
G5	6352.28
G6	6351.78



ELEVATION
(Dimensions Along ℄ Abutment)

NOTES:

1. All construction joint surfaces shall be roughened to a ¼" amplitude.
2. * Elevation given @ ℄ brg.
3. Bearing seats shall be level see Sheet B09 for bearing seat and leveling pad details.
4. Emboss year 4.5" high "Plantin Bold" typeface with ¼" recess. Place at one abutment face in visible corner or as directed by the City engineer.
5. See Sheet B18 for column aesthetic details.

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Horiz. Scale: Vert. Scale: As Noted				Revised:	Designer: A. Regalado / Detailer: A. Quintana / Structure Numbers	
Unit Information				Void:	Sheet Subset: STRUCTURAL / Subset Sheets: B07 of B20	Sheet Number 28

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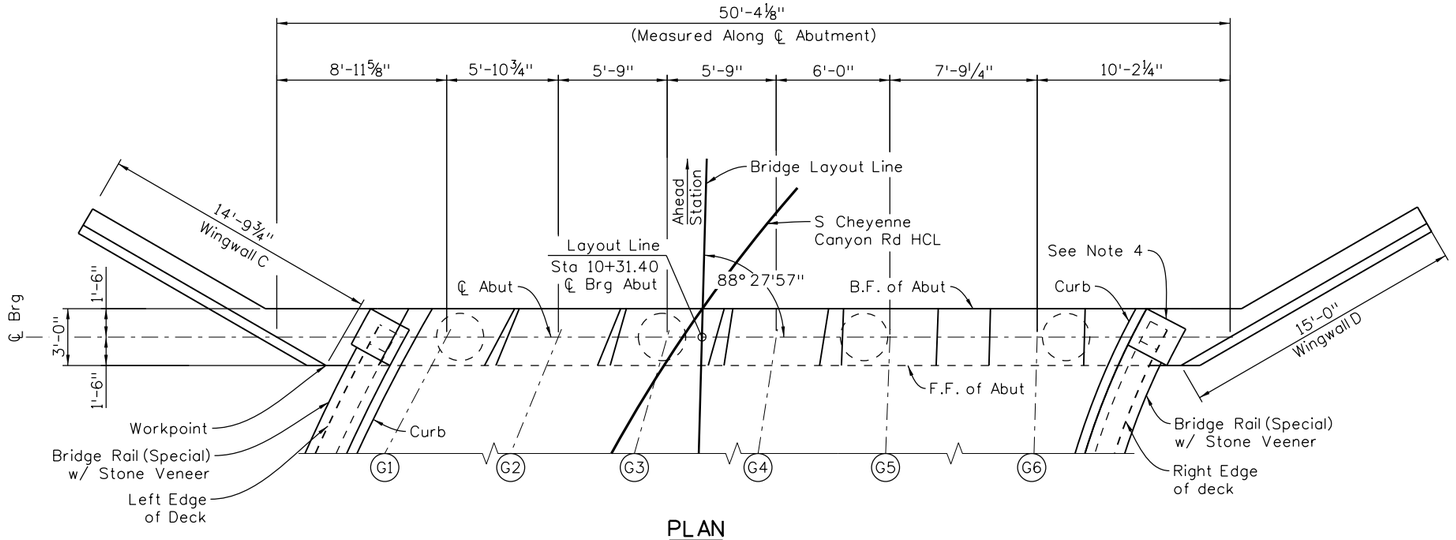
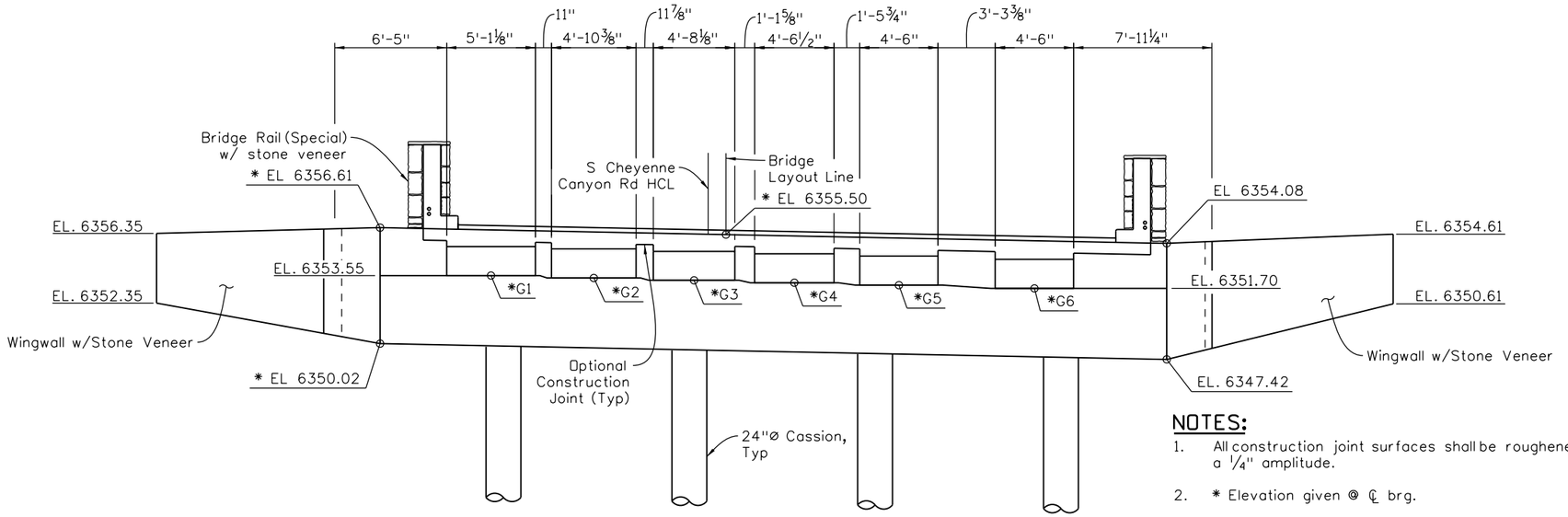


PLAN

BRG. ELEVATIONS	
LOCATION	*ELEVATION
G1	6353.55
G2	6353.22
G3	6352.87
G4	6352.53
G5	6352.17
G6	6351.70



ELEVATION
Dimensions Along ℄ Abutment

NOTES:

1. All construction joint surfaces shall be roughened to a ¼" amplitude.
2. * Elevation given @ ℄ brg.
3. Bearing seats shall be level see Sheet B09 for bearing seat and leveling pad details.
4. See Sheet B18 for column aesthetic details.

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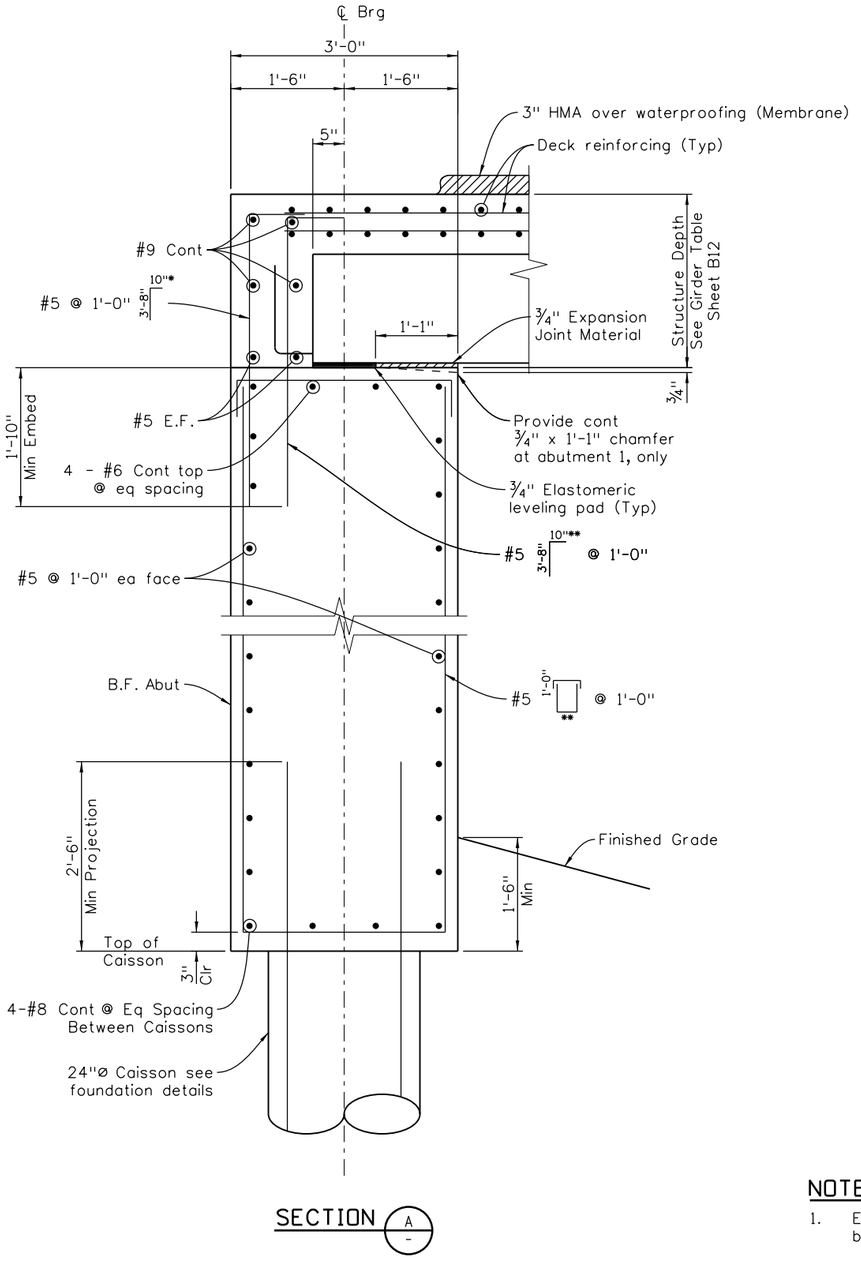
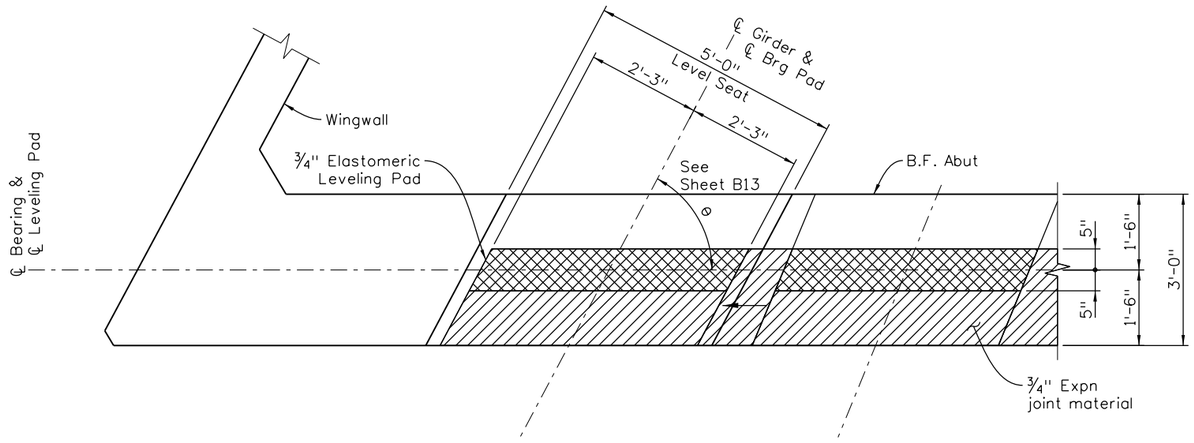
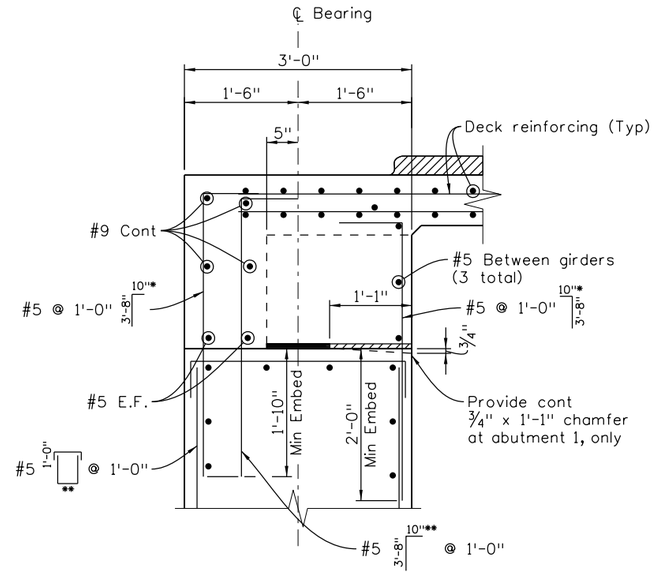
File Name: 009_SCC-BR-PLAN-08.dgn	Date:	Comments	Init.	No Revisions:		R010069
Horiz. Scale: Vert. Scale: As Noted				Revised:	Designer: A. Regalado / Detailer: A. Quintana / Sheet Subset: STRUCTURAL	Structure Numbers
Unit Information				Void:	Subset Sheets: B08 of B20	Sheet Number 29
Jacobs				COLORADO SPRINGS		



SECTION A



BEARING SEAT DETAIL



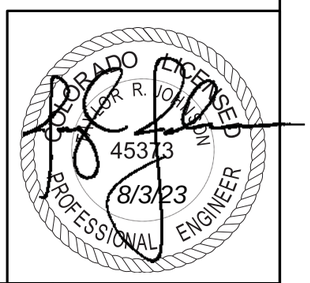
TYPICAL SECTION BETWEEN GIRDERS

NOTES:

1. Elastomeric bearing pad and expansion joint material will not be paid for separately, but shall be included in Item 618-Precast Concrete Slab (depth greater than 13")

** Place all horizontal legs perpendicular to the face of abutment.

LAP SPLICE TABLE	
bar size	lap length
#4	2'-4"
#5	3'-0"
#6	3'-6"
#8	4'-8"



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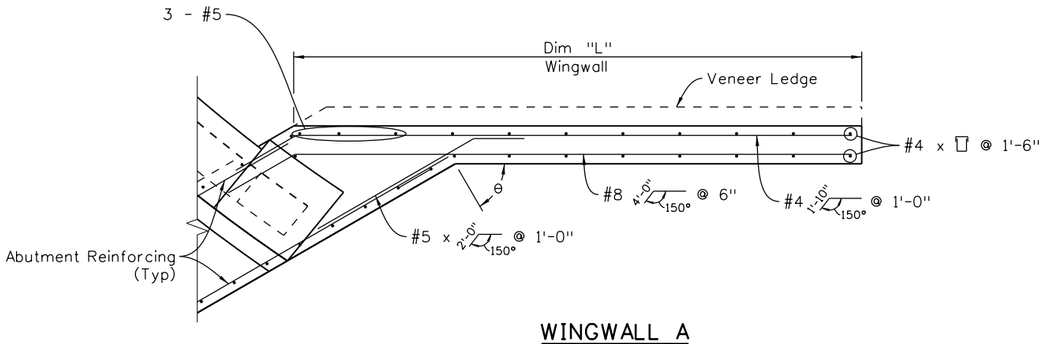
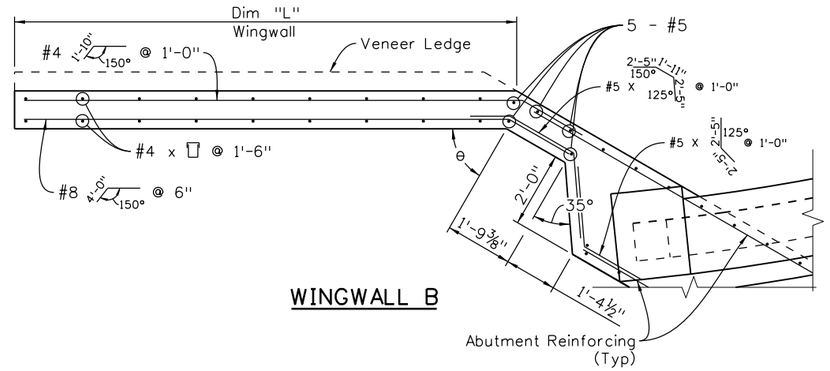
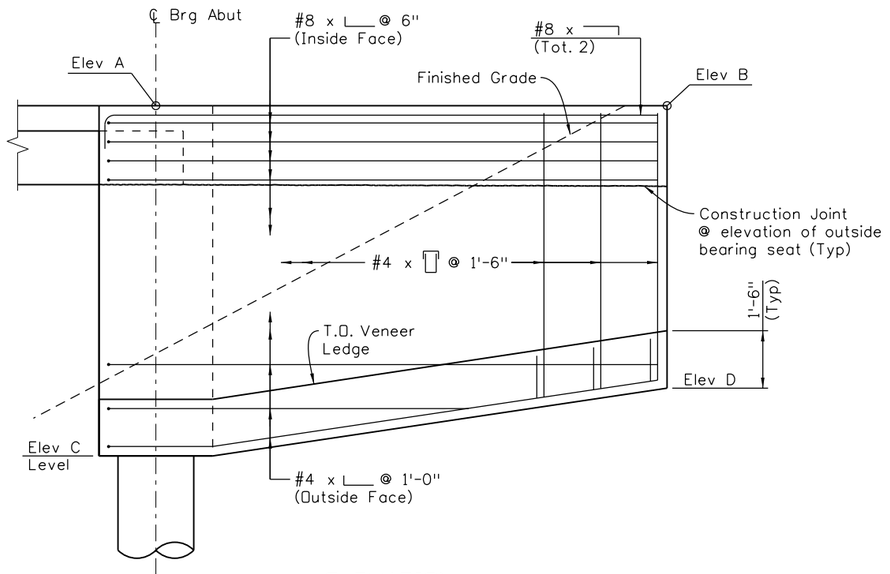


WINGWALL A
(Wingwalls C & D Similar)

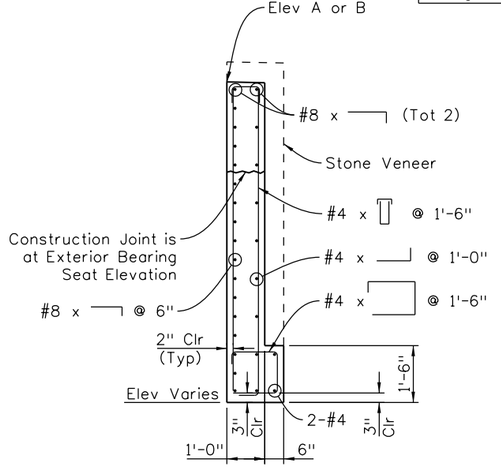


WINGWALL B

TABLE OF ELEVATIONS						
Wingwall	Elev A	Elev B	Elev C	Elev D	Dim "L"	Angle θ
Wingwall A	6354.12	6353.99	6347.47	6349.99	15'-0"	60° 0'0"
Wingwall B	6358.06	6358.23	6351.48	6354.23	13'-6"	60° 0'0"
Wingwall C	6356.61	6356.35	6350.02	6352.35	15'-0"	60° 0'0"
Wingwall D	6354.08	6354.61	6347.42	6350.61	15'-0"	60° 0'0"



ELEVATION



TYPICAL WINGWALL SECTION

NOTES:

1. Contractor shall fill back face and front face of wingwall simultaneously (±2 ft).
2. Dovetail slots shall be installed on wingwall faces finished with stone veneer. Refer to Sheet B15 for additional information.

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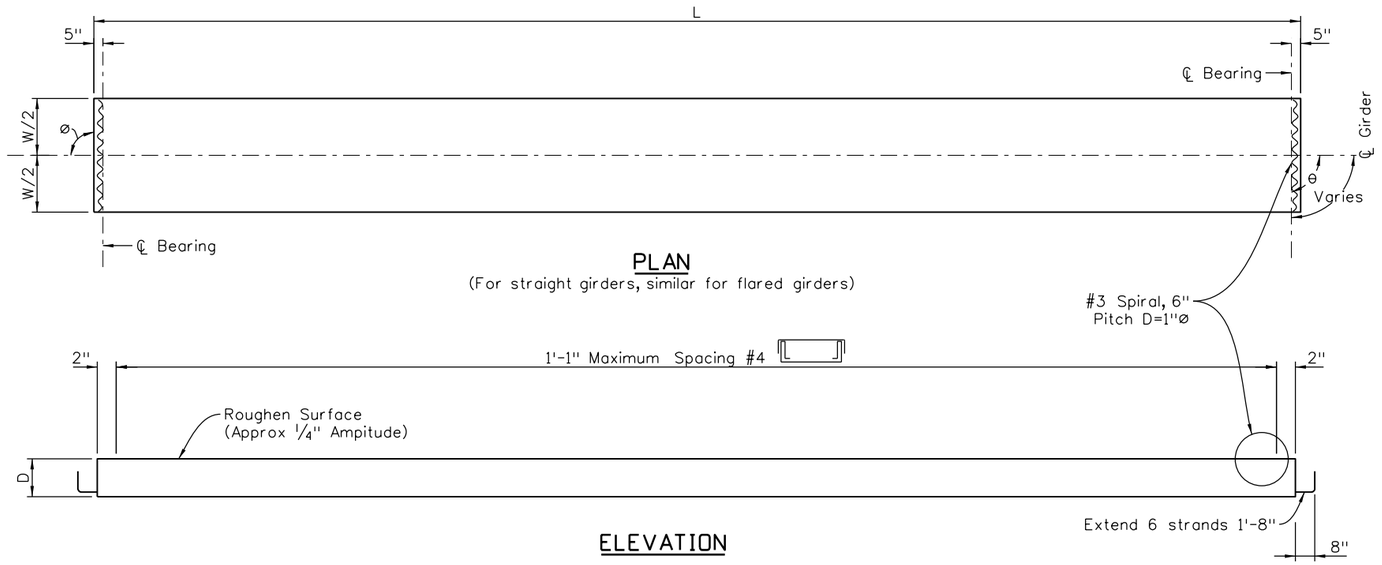
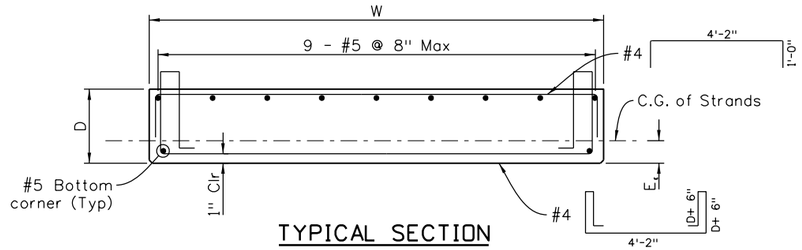
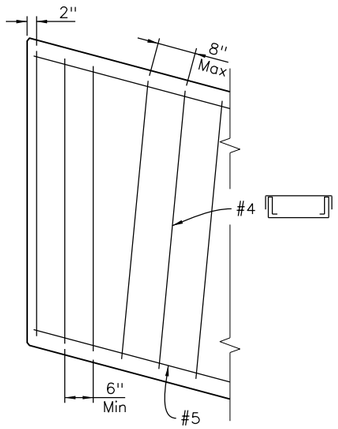


PLAN
(For straight girders, similar for flared girders)

ELEVATION



TYPICAL SECTION



END DETAIL (PLAN)
For flared girders, similar
for straight girders

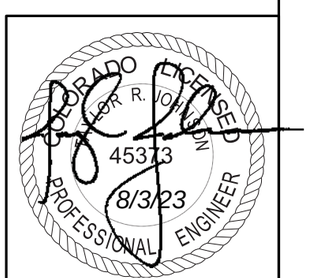
NOTES:

1. All work necessary to fabricate and install the integral parts of the girder (including the intermediate diaphragms, if any, and leveling pads), as shown on the plans, shall be included in the bid price for item no. 618, prestressed concrete slab (Depth greater than 13"), with a pay unit of sq ft measured by L x W.
2. Damaged coating on girder reinforcing need to be repaired. The minimum cover for reinforcing steel is 1".
3. Welded wire fabric may be used with D20 wires in lieu of the #4 bars shown.
4. Do not make cosmetic repairs (damage less than 1½" deep) to the parts of the girders embedded in concrete.
5. Use 0.6"ø low relaxation strands meeting the requirements of ASTM A416 grade 270. Prestressing strands shall be equally spaced horizontally. The minimum clear distance between groups or individual strands shall be 2.3(D$_s$) but not less than 1¼". The minimum cover for prestressing steel is 1½".
6. Concrete shall be Class PS.
7. Entrained air is not required for girder concrete.
8. Use ½" chamfer on all corners, except as noted.
9. Predicted camber is the camber for the girder alone at 60 days. The Contractor shall limit the camber growth to a value not to exceed the predicted camber plus 1" prior to the deck pour by weighting, scheduling fabrication, post tensioning, or other means and must report to the Engineer values of camber which exceed the predicted camber plus 1". Remedial measures, as approved by the engineer, shall be taken if the predicted camber plus 1" is exceeded. The approved remedial measures shall be free of any adverse impact. The costs associated with all remedial measures shall be borne by the Contractor.
10. The Contractor is responsible for determining necessary bracing requirements, and for providing adequate bracing for the specific wind and weather conditions to be encountered for each specific project.
11. The depth (d) tolerance shall be +½", -¼".

GIRDER SCHEDULE

SPAN NO.	GIRDER NO.	L (Ft)	W (In.)	D (In.)	Θ (Deg.)	A_s* (Sq In)	E_s (In.)	F_j (Kips)	F_f (Kips)	CONCRETE STRENGTH F'ci (ksi)	CONCRETE STRENGTH F'ci (ksi)	Δ (In.)	PREDICTED RELEASE CAMBER (In.)	PREDICTED CAMBER (In.)
1	G1	38.98	54	20	62	3.472	2.25	703	649	6.5	8.5	0.286	0.431	0.756
1	G2	37.19	54	20	67.72	3.038	2.25	615	572	6.5	8.5	0.233	0.335	0.589
1	G3	35.77	54	20	74.19	3.038	2.25	615	569	6.5	8.5	0.205	0.329	0.575
1	G4	34.84	54	20	81.09	3.038	2.25	615	566	6.5	8.5	0.190	0.323	0.564
1	G5	34.44	54	20	87.84	3.038	2.25	615	564	6.5	8.5	0.184	0.321	0.559
1	G6	34.43	54	20	88.44	3.038	2.25	615	562	6.5	8.5	0.182	0.320	0.558

As* = area of the prestressing steel.
Ds = nominal strand diameter.
F's = ultimate strength of prestressing steel.
Fj = jacking force per girder.
Ff = final force per girder after all losses.
F'ci = required concrete strength at release of prestress force.
F'c = required concrete strength at 28 days of age.
L = length of girder along the grade of the girder.
Δ = deflection at centerline of span due to cast-in-place slab, diaphragms, asphalt, curbs, and rails.
Θ = skew angle



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COLORADO SPRINGS

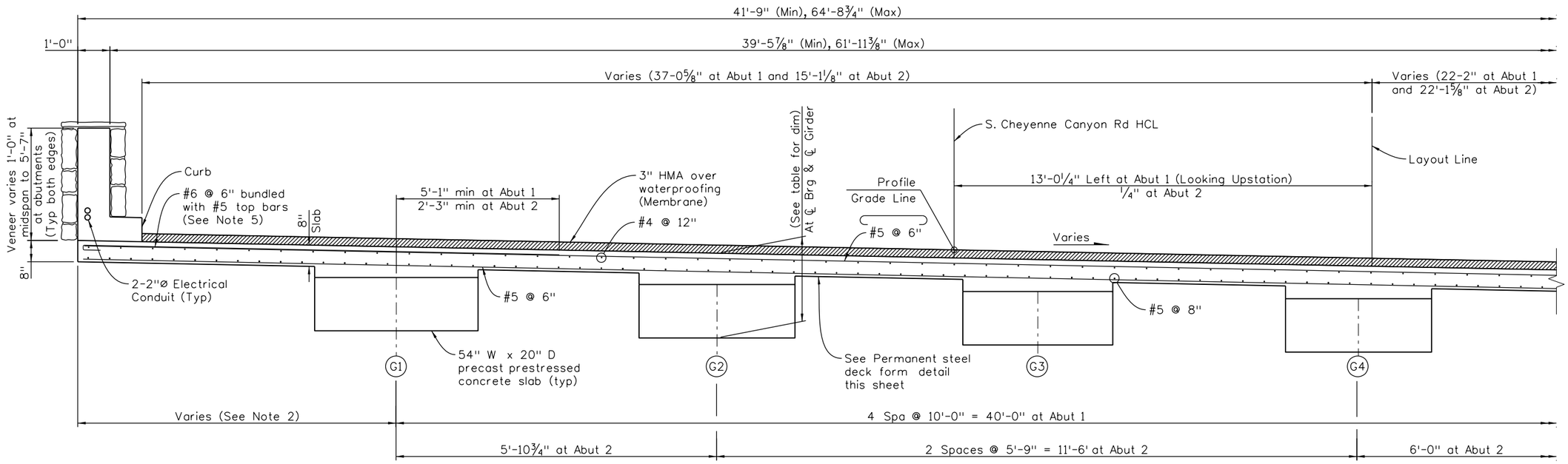
As Constructed
No Revisions:
Revised:
Void:

SOUTH CHEYENNE CANYON BRIDGE
BRIDGE STRUCTURAL SHEETS
GIRDER DETAILS

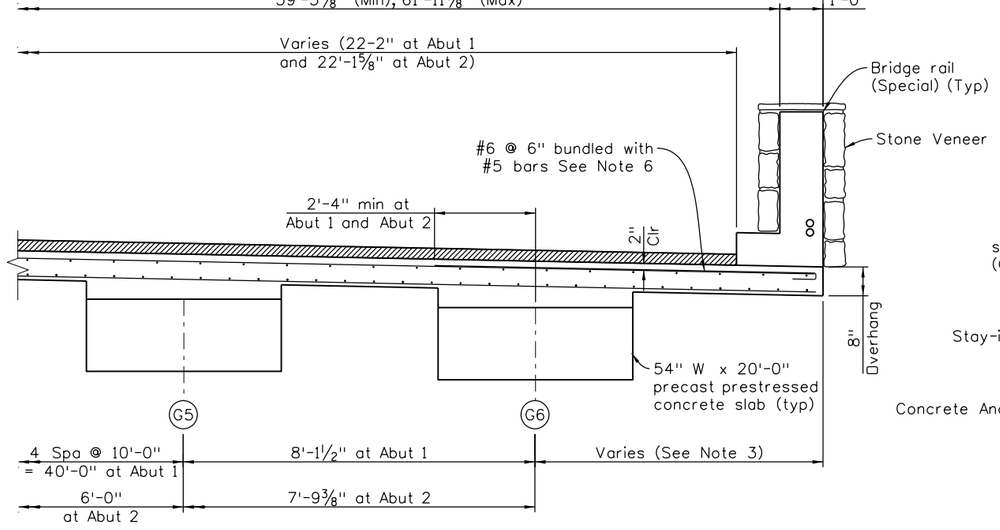
Designer: S. Tripathi
Detailer: A. Quintana
Sheet Subset: STRUCTURAL
Structure Numbers:
Subset Sheets: B11 of B20

Project No./Code: R010069

Sheet Number 32

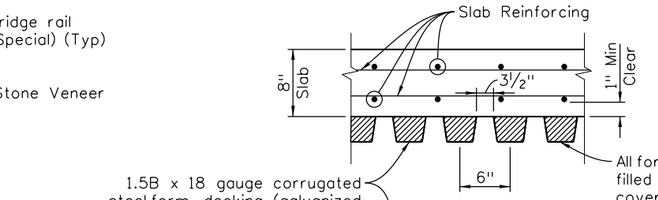


SUPERSTRUCTURE DETAIL



SUPERSTRUCTURE DETAIL

Haunch Depth Table	
Girder	Depth at Abutment
G1-G2	31¾"
G3	32"
G4	32¼"
G5	32½"
G6	32⅞"



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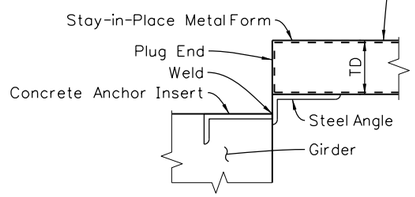
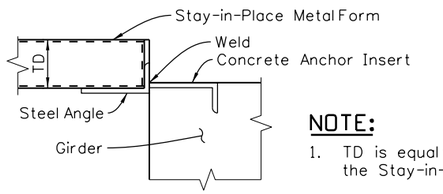


BUILD-UP > TD
NTS



BUILD-UP < TD
NTS

NOTE:

1. TD is equal to the depth of the Stay-in-Place metal form.

NOTES:

1. Deck concrete shall be Class D (Bridge).
2. The overhang follows the curved layout as shown in sheet B05 plans with the value of 9'-11⅛" at abutment 1 and 3'-10⅝" at abutment 2 measured along abutment.
3. The overhang follows the curved layout as shown in sheet B05 plans with the value of 6'-7⅞" at abutment 1 and 6'-8⅛" abutment 2 measured along abutment.
4. The dimensions are measured at and along the ℄ bearing.
5. The length varies along the deck with maximum of 15' at Abut 1 and 6' at Abut 2 measured parallel to abutment.
6. The length varies along the deck with maximum of 9' at Abut 1 and Abut 2 measured parallel to abutment.

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Print Date: 8/2/2023	Sheet Revisions			As Constructed	SOUTH CHEYENNE CANYON BRIDGE BRIDGE STRUCTURAL SHEETS SUPERSTRUCTURE DETAILS	Project No./Code
File Name: 009_SCC-BR-PLAN-12.dgn	Date:	Comments	Init.	No Revisions:		R010069
Horiz. Scale: Vert. Scale: As Noted				Revised:	Designer: S. Tripathi / Detailer: A. Quintana / Structure Numbers	
Unit Information				Void:	Sheet Subset: STRUCTURAL / Subset Sheets: B12 of B20	Sheet Number 33

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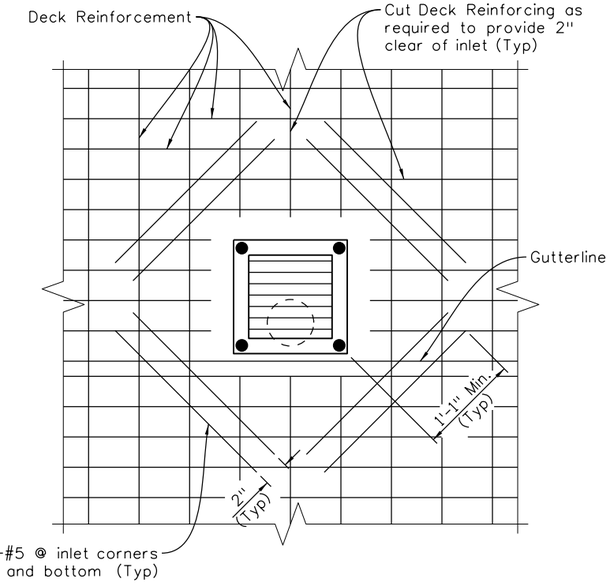
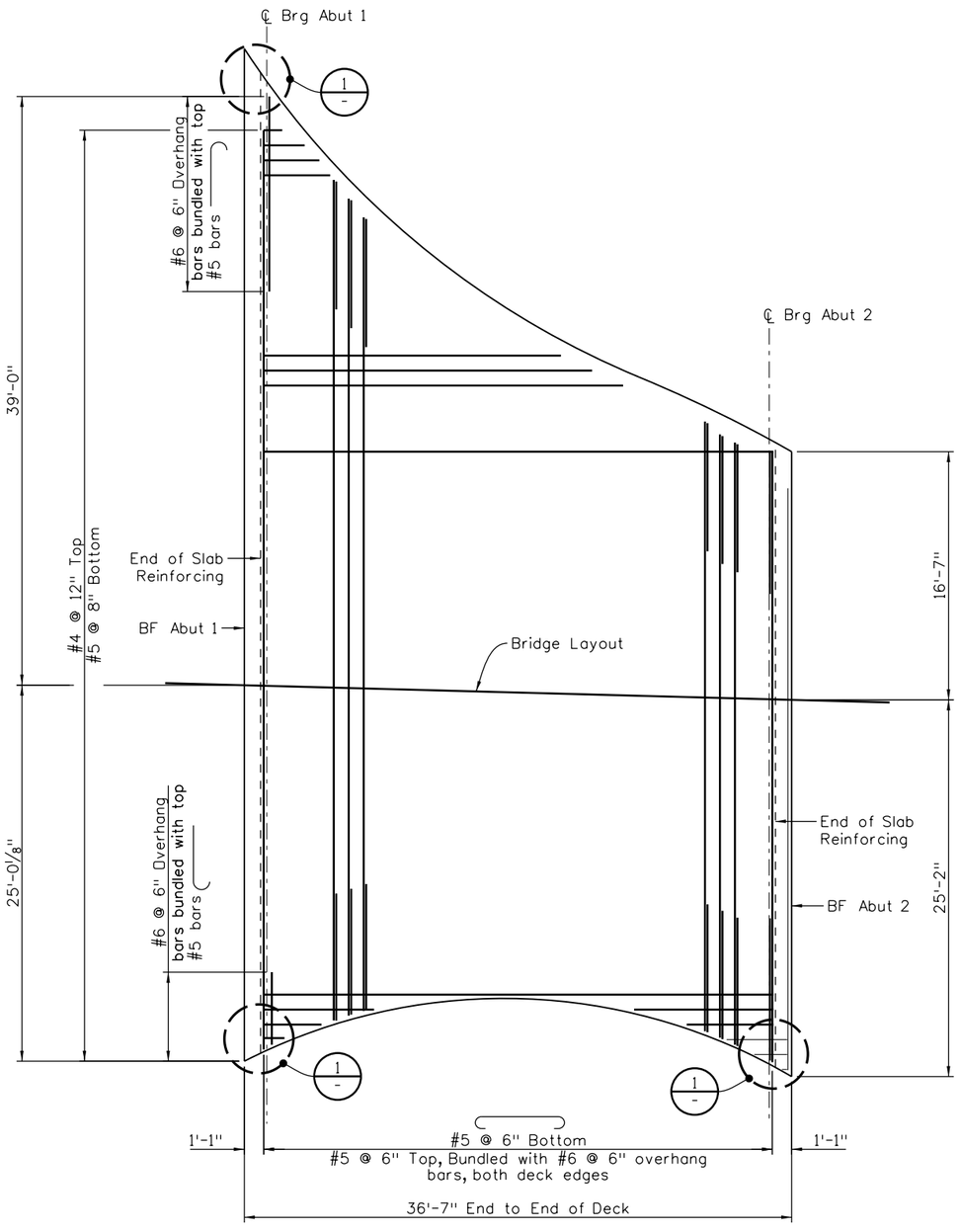
COLORADO SPRINGS



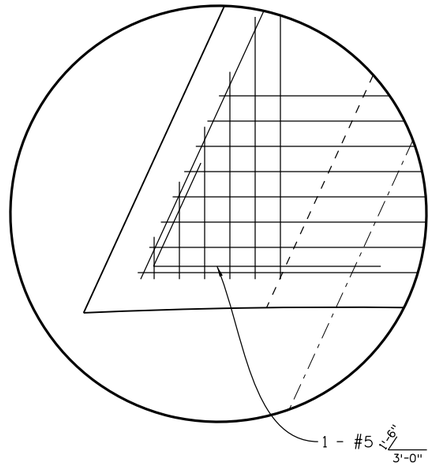
DECK DRAIN REINFORCEMENT DETAIL

(For Location, See Sheet B05)



DECK REINFORCEMENT PLAN

Not all bars shown for clarity



ACUTE CORNER DETAIL 1/-

NOTES:

1. The offset distance are measured along the back face of abutment line.

LAP SPLICE TABLE	
BAR SIZE	LAP LENGTH
#4	2'-3"
#5	3'-4"

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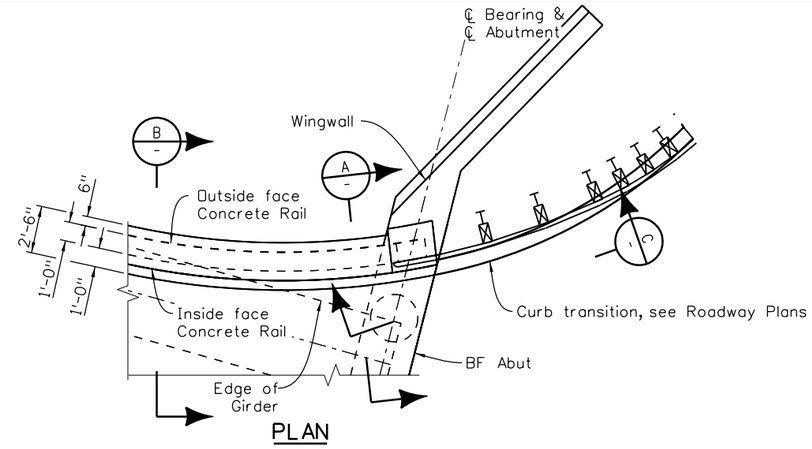
Print Date: 8/2/2023	Sheet Revisions		
File Name: 009_SCC-BR-PLAN-13.dgn	Date:	Comments	Init.
Horiz. Scale: Vert. Scale: As Noted			
Unit Information			
Jacobs			

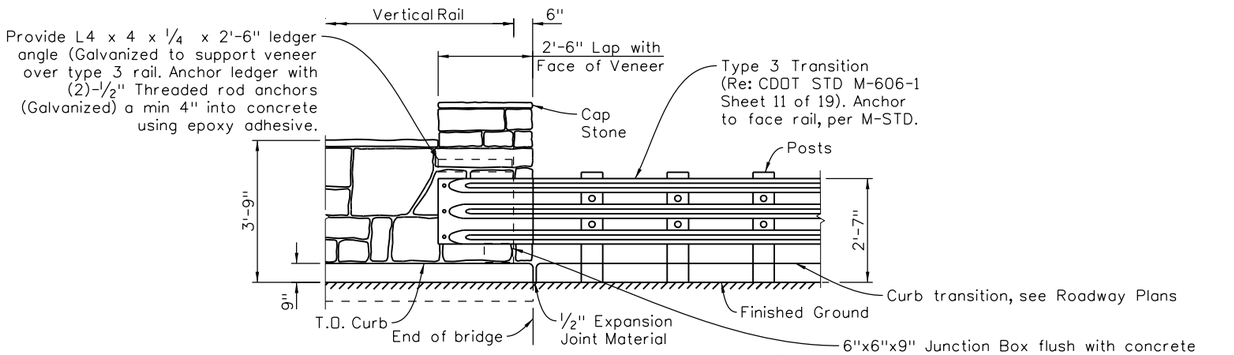
COLORADO SPRINGS

As Constructed	SOUTH CHEYENNE CANYON BRIDGE BRIDGE STRUCTURAL SHEETS DECK REINFORCING PLAN		Project No./Code
No Revisions:			R010069
Revised:	Designer: S. Tripathi	Structure Numbers	
Void:	Detailer: A. Quintana		
	Sheet Subset:STRUCTURAL	Subset Sheets: B13 of B20	Sheet Number 34

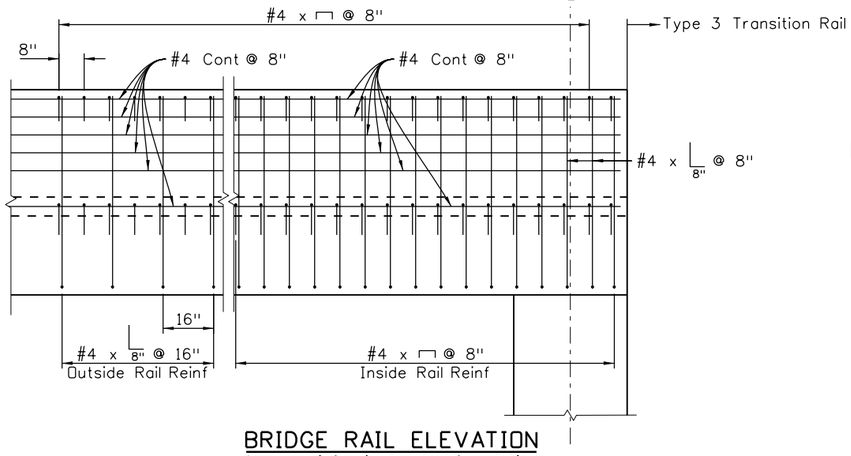
Jaime.MateoLucas@jacobs.com 4:29:32 PM pw:\\jacobs-us-va-pw.bentley.com:jacobs-us-va-pw-02\Documents\WXXZ6205 - S Cheyenne Canyon Bridge\4 Delivery\Project_WIP\Bridge\Drawings\SSC Bridge\009_SCC-BR-PLAN-13.dgn



PLAN



ELEVATION @ END OF STONE RAIL (C)

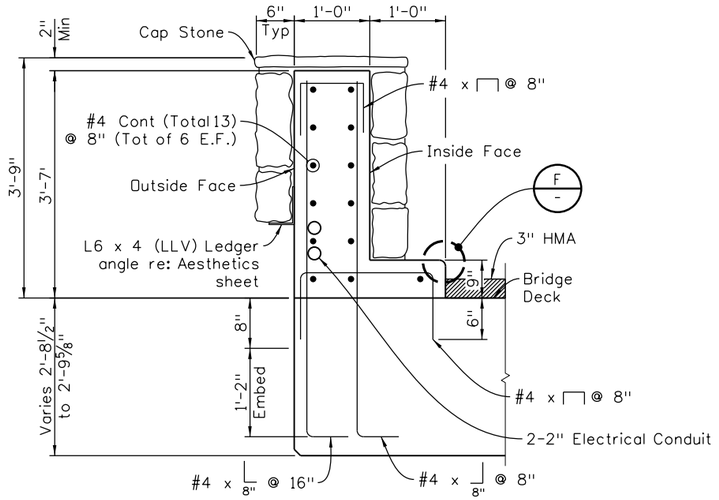


BRIDGE RAIL ELEVATION

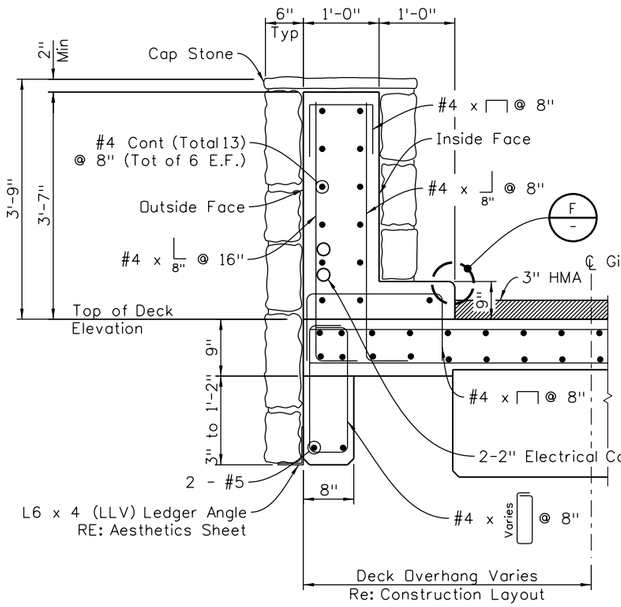
Not all reinforcing shown for clarity

NOTES

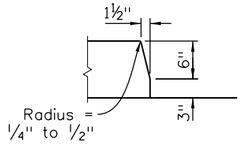
1. All concrete and reinforcing steel required for bridge rail construction shall not be measured and paid for separately, but shall be included be in the cost of Item 606-10200 Bridge Rail (Special)
2. Dovetail slots shall be installed on railing faces finished with stone veneer. Refer to Sheet B15 for additional information.
3. Refer to revision of section 601-Cut Stone Veneer in Special Provisions and Sheet B18 for stone material and installation requirments.



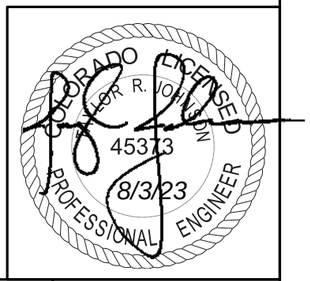
SECTION (A)



OVERHANG SECTION (B)



TYP CURB SECTION (F)



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File Name: 009_SCC-BR-PLAN-14.dgn	Date:	Comments	Init.	No Revisions:		R010069
Horiz. Scale: Vert. Scale: As Noted				Revised:	Designer: S. Tripathi / Detailer: A. Quintana / Structure Numbers	
Unit Information				Void:	Sheet Subset: STRUCTURAL / Subset Sheets: B14 of B20	Sheet Number 35

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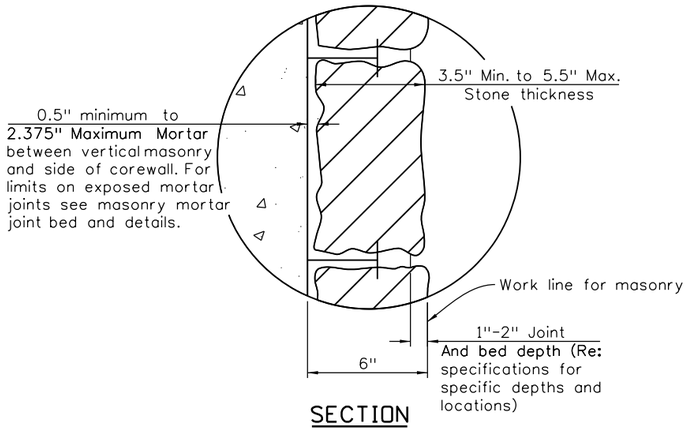
TYP STONE VENEER NOTES:

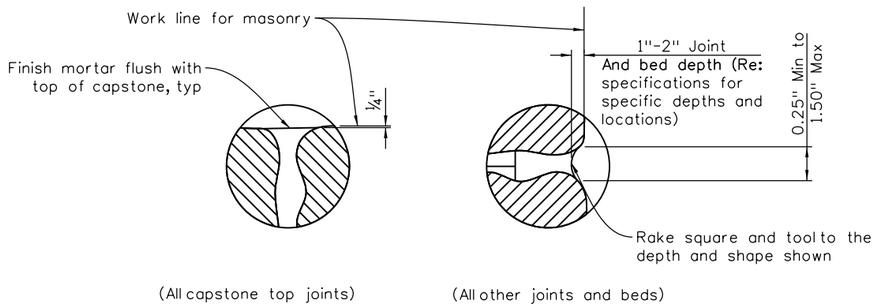
1. Refer to Sheets B10, B15, and B18 for additional locations where stone is veneer is applied. Application of veneer at these locations is to be installed in accordance with the details on this sheet.
2. Refer to revision of section 601-Cut Stone Veneer in Special Provisions and Sheet B18 for stone material and installation requirments.

MANSORY ANCHOR NOTES:

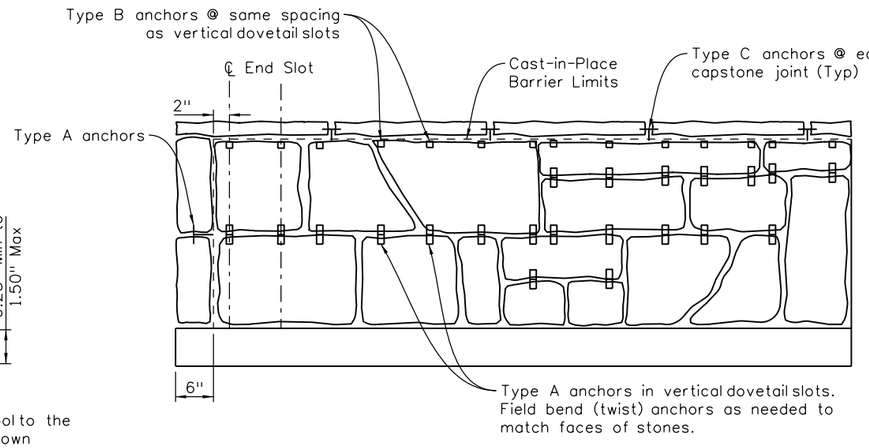
1. The dovetail slots shall be type 305 as manufactured by Hohmann & Barnard, Inc. or an approved equal. They shall be 22 gage hot-dipped galvanized steel, filled with foam and with a throat opening width of 0.625.
2. The dovetail anchors shall be Type 303 SV as manufactured by Hohmann & Barnard, Inc. or an approved equal. Dovetail and strap anchors shall be 0.125" thick hot-dipped galvanized steel.
3. The locations of the dovetail anchors are as follows: the Type A dovetail anchors are required at the intersection of the vertical dovetail slots and each horizontal joint. The Type B strap anchors are required in the bed beneath each Class B masonry capstone at a 9" maximum spacing. The Type C dovetail anchors are required in the vertical joints between the capstones.



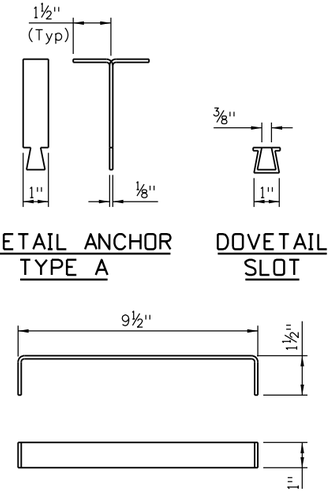
SECTION

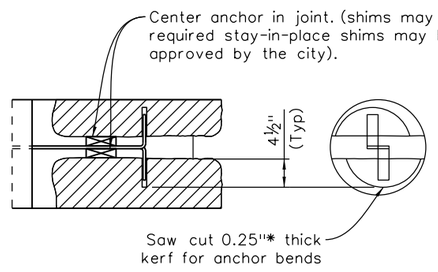


MANSONRY MORTAR JOINT AND BED DETAILS

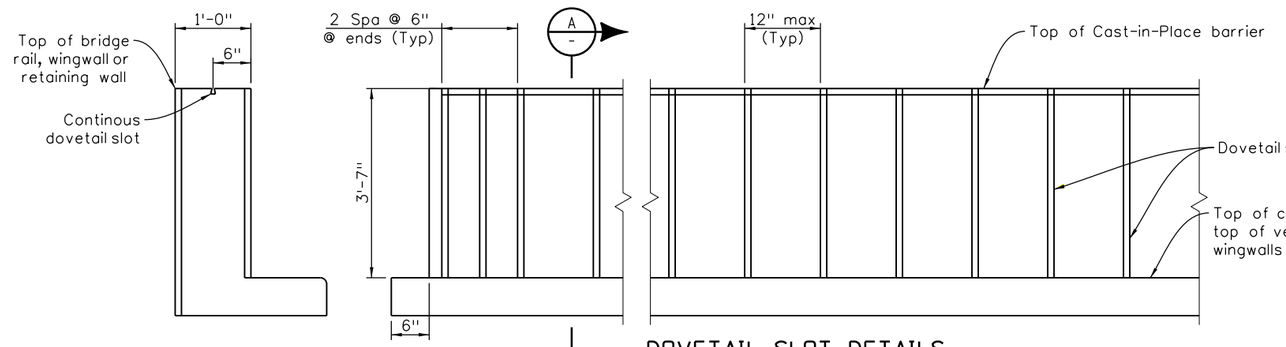


MANSONARY ANCHOR DETAILS FOR USE WITH STONE MASONRY BRIDGE RAIL (SPECIAL) WINGWALLS AND RETAINING WALLS



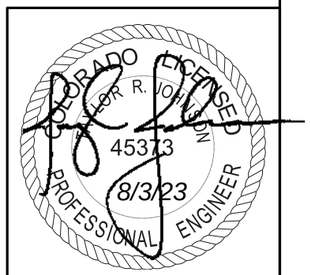


MASONRY KERF DETAIL



SLOT DETAILS SECTION A-

DOVETAIL SLOT DETAILS
(Bridge rail shown - similar at wingwalls and retaining walls)



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File Name: 009_SCC-BR-PLAN-15.dgn	Date:	Comments	Init.
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Unit Information			
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COLORADO SPRINGS

As Constructed	
No Revisions:	
Revised:	
Void:	

SOUTH CHEYENNE CANYON BRIDGE
BRIDGE STRUCTURAL SHEETS
RAILING DETAILS (2 OF 2)

Designer:	S. Tripathi	Structure Numbers	
Detailer:	A. Quintana		
Sheet Subset:	STRUCTURAL	Subset Sheets:	B15 of B20

Project No./Code	R010069
Sheet Number	36

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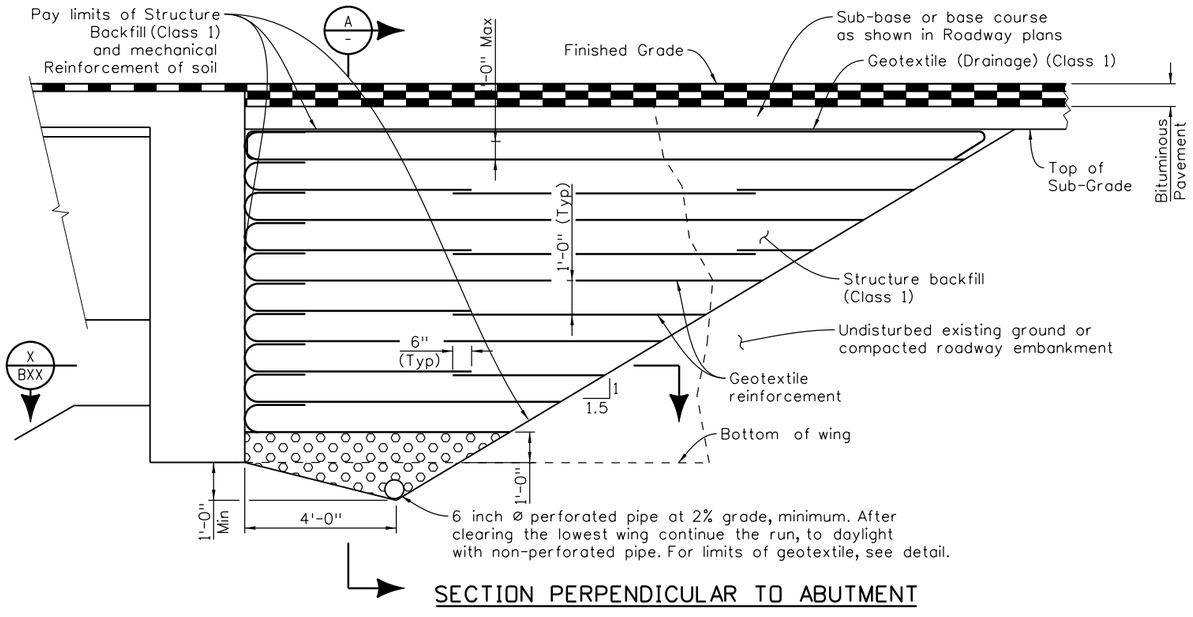
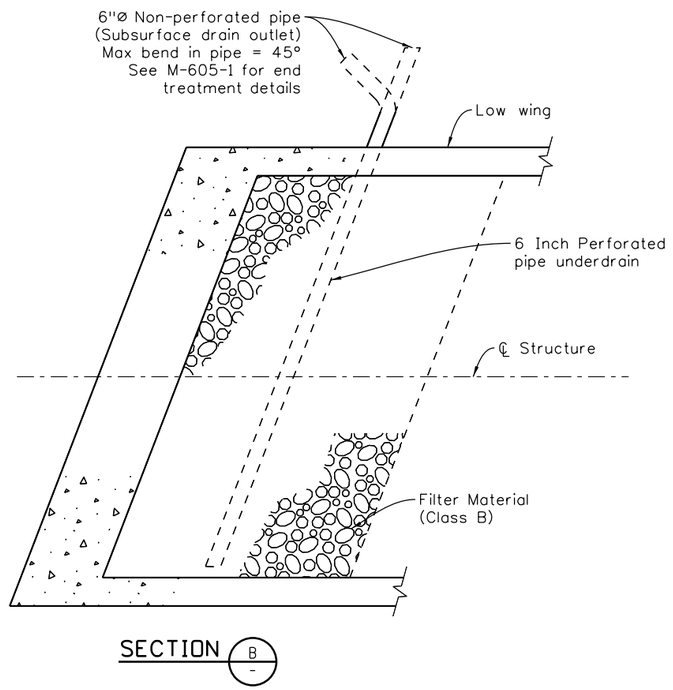
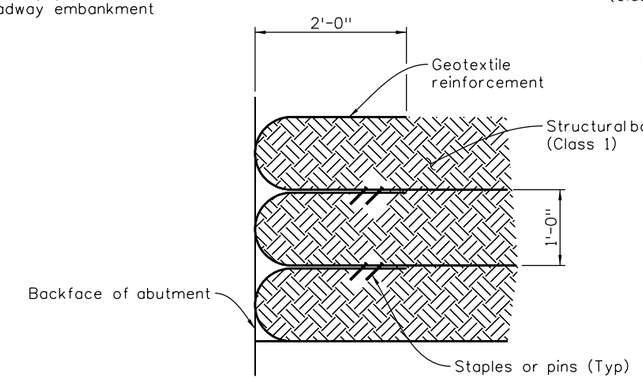


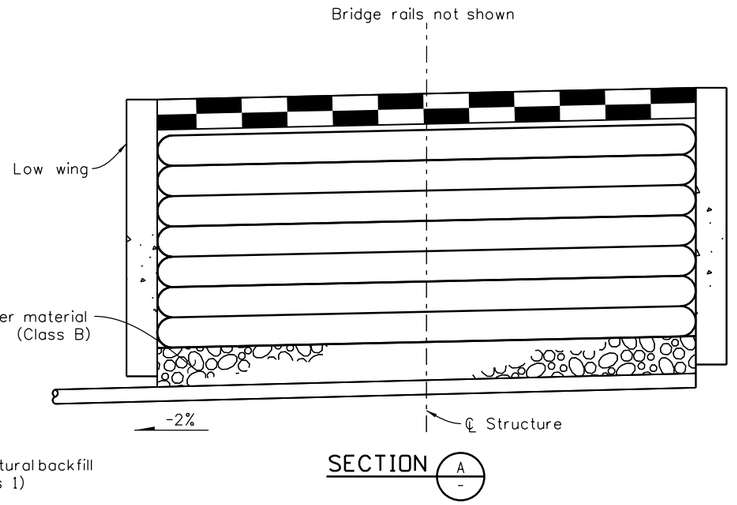
SECTION PERPENDICULAR TO ABUTMENT



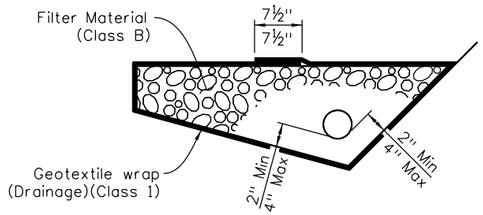
SECTION B



WRAP DETAIL



SECTION A

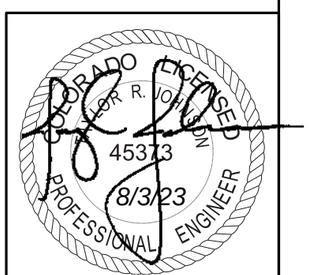


6 INCH PERFORATED PIPE UNDERDRAIN

6 inch perforated pipe underdrain includes all filter material (Class B) and Geotextile wrap (Drainage) (Class 1)

NOTES:

1. Geotextile reinforcement shall be woven fabric with a minimum average roll value of 4800 lb/ft for installations with a gap and 2400 lb/ft for installations without a gap based on ASTM D4595.
2. Geotextile reinforcment shall be placed by alternating machine direction (md) with cross machine direction (XD) from layer to layer.
3. The geotextile reinforcement wrap at back face of abutment shall be pulled back slack free with its end anchored to soil underneath with staples or pins.
4. Minimum splice of all geofabric shall consist of 6" of overlap.
5. Payment for all work items shown will be made under Item 206 Structure Backfill (Special)(CY) and Item 206 Structure Backfill (Class 1)(CY). Items include 6 Inch ø perforated pipe underdrain, subsurface drain outlet (6 Inch ø nonperforated pipe) and all other miscellaneous items needed to complete the work. Geotextile reinforcement shall be paid for as Structural Backfill (Special).
6. Installation of pipe underdrain and subsurface drain outlet will conform to the construction requirements of section 605.03 and 605.06, respectively.



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File Name: 009_SCC-BR-PLAN-16.dgn	Date:	Comments	Init.
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Unit Information			
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As Constructed	SOUTH CHEYENNE CANYON BRIDGE BRIDGE STRUCTURAL SHEETS MECH. STABILIZED EARTH BACKFILL			Project No./Code
No Revisions:				R010069
Revised:	Designer: A. Regalado	Structure Numbers		
Void:	Detailer: A. Quintana			
	Sheet Subset: STRUCTURAL	Subset Sheets: B16 of B20		Sheet Number 37

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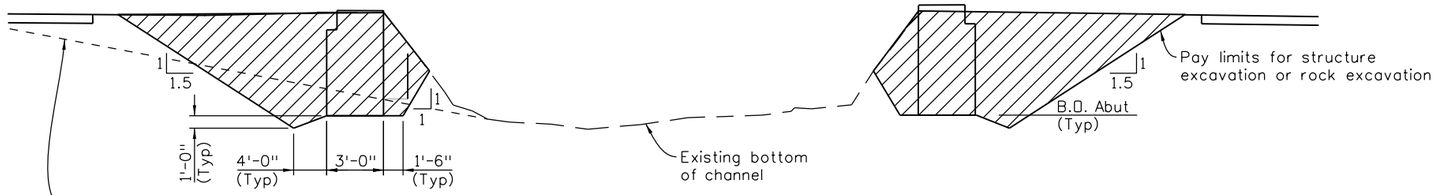
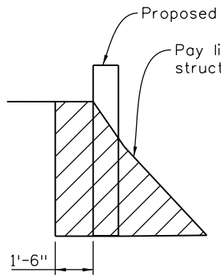


BRIDGE EXCAVATION



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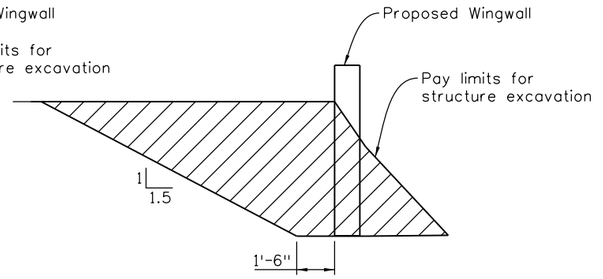
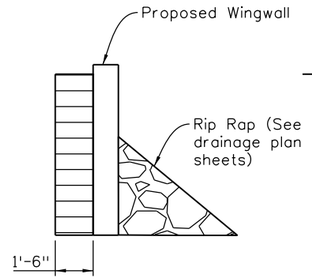
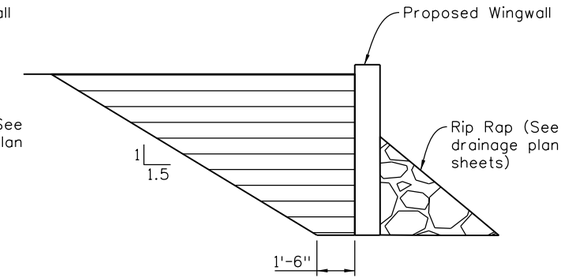


EXCAVATION



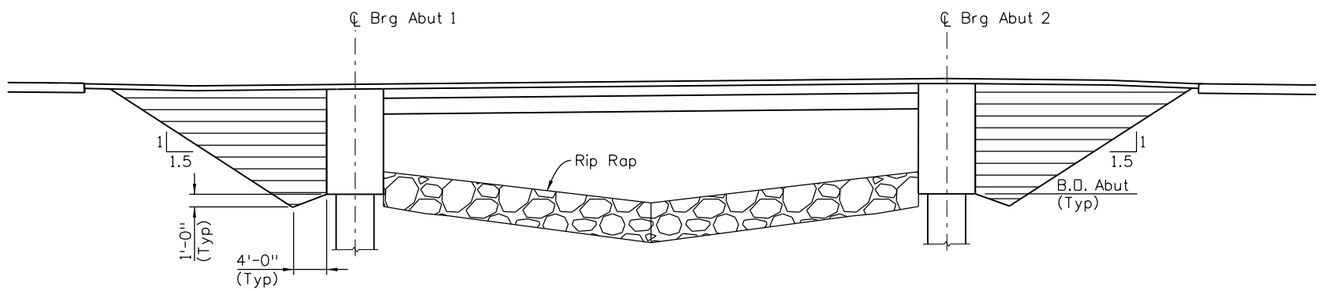
BACKFILL

AT NE WINGWALLS



BACKFILL

AT NW,SW & SE WINGWALLS



BRIDGE BACKFILL

NOTES:

1. Unless shown otherwise in plans, this drawing gives the minimum extents of structure excavation and backfill. The Contractor may elect to extend structure excavation and structure backfill beyond limits shown here. Any additional excavation and backfill beyond these limits will not be measured or paid for.

LEGEND

- Structure excavation or rock excavation.
- Structure backfill (Class 1) - Structure backfill (Special)

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8/3/23
PROFESSIONAL ENGINEER

Print Date: 8/2/2023	Sheet Revisions		
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Unit Information			
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As Constructed
No Revisions:
Revised:
Void:

SOUTH CHEYENNE CANYON BRIDGE
BRIDGE STRUCTURAL SHEETS
EXCAVATION AND BACKFILL

Designer: A. Regalado
Detailer: A. Quintana
Sheet Subset: STRUCTURAL
Structure Numbers:
Subset Sheets: B17 of B20

Project No./Code: R010069

Sheet Number 38

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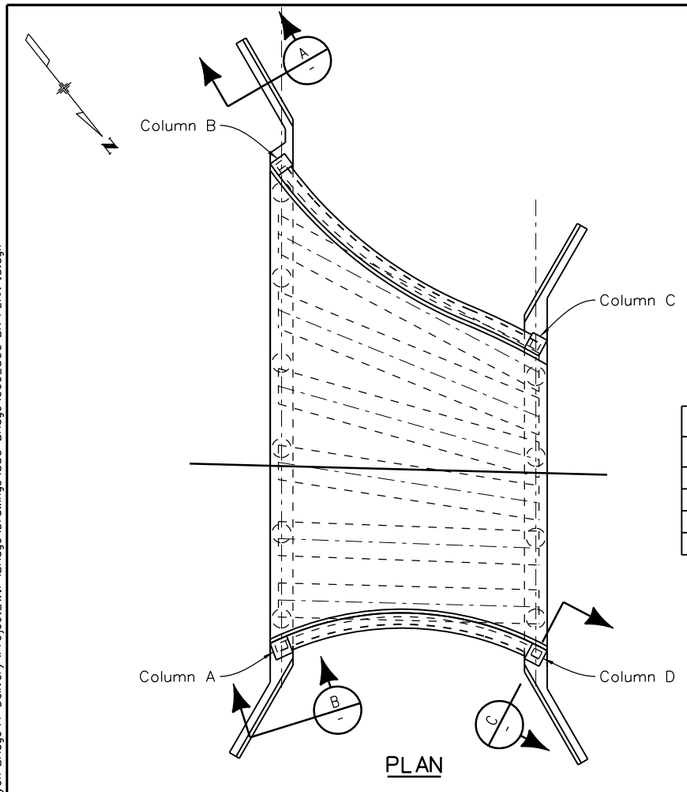
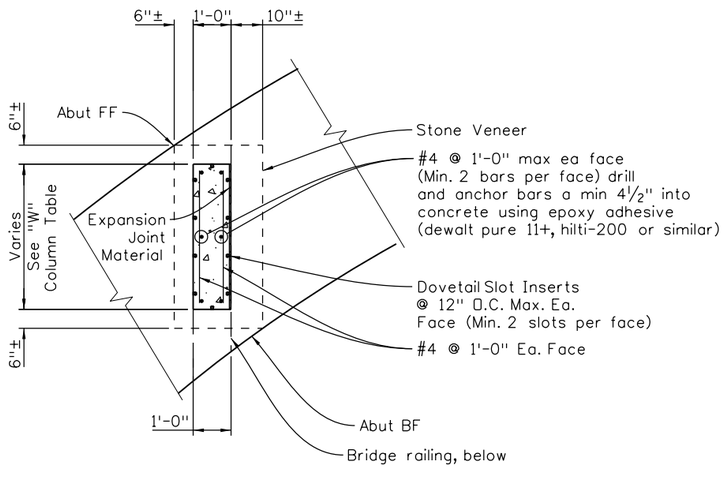
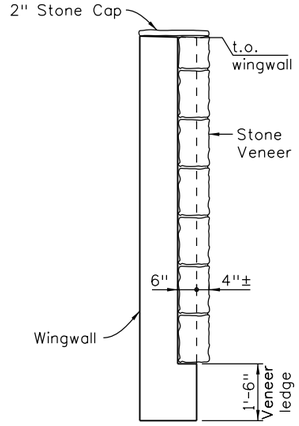


PLAN

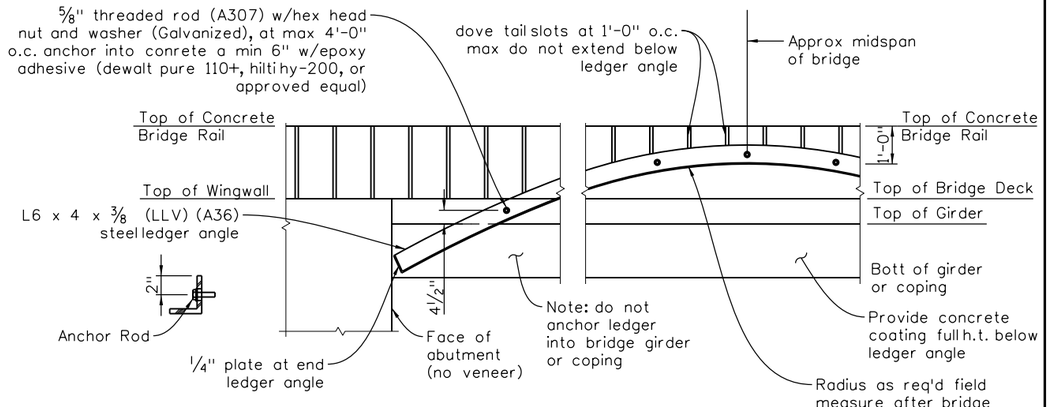
COLUMN TABLE	
Column	"W"
A	1'-6 1/4"
B	10 1/2"
C	1'-2"
D	1'-2"



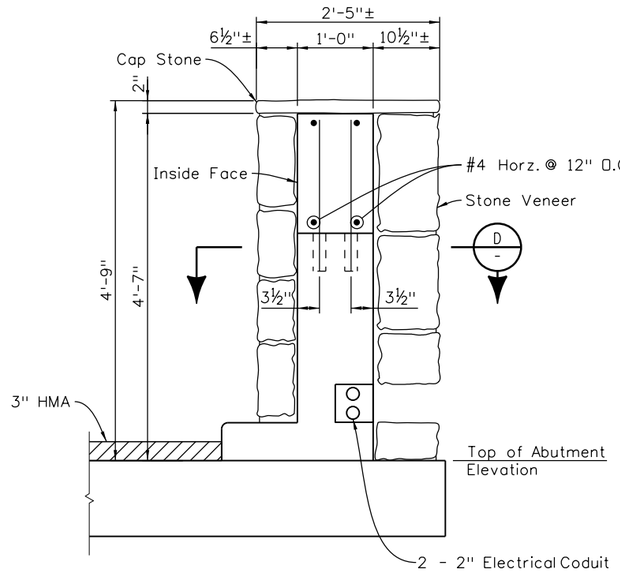
COLUMN SECTION D



WINGWALL SECTION A



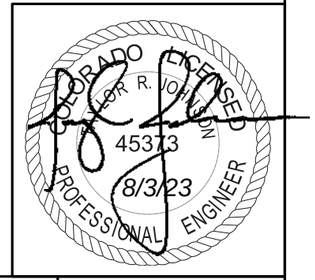
STONE VENEER ARCH DETAIL B



COLUMN SECTION C

NOTES:

1. Dovetail slots shall be installed on wingwall faces finished with stone veneer. Refer to Railing Details (2 of 2) sheet for additional information.
2. Refer to revision of Section 601-Cut Stone Veneer and Brige Aesthethics details sheet (AT01) for stone material and installation requirments.
3. Doweled reinforcing and concrete shown in column/pilaster construction shall be installed following bridge construction. All rebar, concrete, and joint material associated with veneer installation shall be included in the cost of Item 601 - Cut Stone Veneer.
4. Provide a template of arch layout on bridge faces for approval by city prior to ledger fabrication.
5. Columns to be located approximately where shown, and are intended to be constructed following bridge construction. Final location shall be verified with the city prior to placement of column concrete veneer.



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Print Date: 8/2/2023	Sheet Revisions			As Constructed	SOUTH CHEYENNE CANYON BRIDGE BRIDGE STRUCTURAL SHEETS BRIDGE AESTHETICS	Project No./Code
File Name: 009_SCC-BR-PLAN-18.dgn	Date:	Comments	Init.	No Revisions:		R010069
Horiz. Scale: Vert. Scale: As Noted				Revised:	Designer: S. Tripathi / Structure Numbers	
Unit Information					Detailer: A. Quintana	
Jacobs				Void:	Sheet Subset: STRUCTURAL / Subset Sheets: B18 of B20	Sheet Number 39

LEFT EDGE OF DECK

BENT LINE	OFFSET	X	Y	STATION	ELEVATION	ELEV + DL	NORTHING	EASTING
BF Abut 1	-42.52	-42.52	-1.14	-0+01.1390	6357.9483		1347695.584	3179824.486
CL Abut 1	-40.36	-40.36	0.42	0+00.4200	6357.8149		1347698.236	3179824.680
F-1	-37.12	-37.12	3.07	0+03.0660	6357.6135		1347702.417	3179824.738
F-2	-34.09	-34.09	5.94	0+05.9380	6357.4220		1347706.591	3179824.495
F-3	-31.26	-31.26	9.02	0+09.0220	6357.2446		1347710.736	3179823.951
F-4	-28.67	-28.67	12.30	0+12.3020	6357.0791		1347714.824	3179823.113
F-5	-26.32	-26.32	15.76	0+15.7600	6356.9337		1347718.856	3179821.977
F-6	-24.22	-24.22	19.38	0+19.3780	6356.8082		1347722.789	3179820.557
F-7	-22.39	-22.39	23.14	0+23.1370	6356.7068		1347726.632	3179818.845
F-8	-20.82	-20.82	27.02	0+27.0150	6356.6259		1347730.310	3179816.905
F-9	-19.18	-19.18	30.86	0+30.8610	6356.5504		1347734.041	3179815.016
CL- Abut 2	-17.37	-17.37	34.63	0+34.6310	6356.4738		1347737.853	3179813.295
BF Abut 2	-16.58	-16.58	36.15	0+36.1520	6356.4418		1347739.436	3179812.639

LEFT FACE OF BARRIER

BENT LINE	OFFSET	X	Y	STATION	ELEVATION	ELEV + DL	NORTHING	EASTING
BF Abut 1	-38.98	-38.98	-1.04	-0+01.0440	6357.7810		1347698.349	3179826.687
CL Abut 1	-37.04	-37.04	0.51	0+00.5090	6357.6530		1347700.838	3179826.751
F-1	-33.97	-33.97	3.25	0+03.2450	6357.4560		1347704.948	3179826.630
F-2	-31.10	-31.10	6.16	0+06.1580	6357.2700		1347709.038	3179826.225
F-3	-28.43	-28.43	9.32	0+09.3150	6357.0960		1347713.096	3179825.546
F-4	-25.99	-25.99	12.62	0+12.6200	6356.9350		1347717.087	3179824.592
F-5	-23.78	-23.78	16.09	0+16.0850	6356.7940		1347721.010	3179823.363
F-6	-21.81	-21.81	19.69	0+19.6920	6356.6730		1347724.840	3179821.870
F-7	-20.09	-20.09	23.43	0+23.4260	6356.5760		1347728.557	3179820.117
F-8	-18.56	-18.56	27.24	0+27.2440	6356.4970		1347732.183	3179818.178
F-9	-16.91	-16.91	31.01	0+31.0070	6356.4210		1347735.872	3179816.364
CL- Abut 2	-15.09	-15.09	34.69	0+34.6920	6356.3440		1347739.638	3179814.716
BF Abut 2	-14.27	-14.27	36.21	0+36.2140	6356.3110		1347741.240	3179814.075

GIRDER A

BENT LINE	OFFSET	X	Y	STATION	ELEVATION	ELEV + DL	NORTHING	EASTING
BF Abut 1	-31.19	-31.19	-0.835	-0+00.8350	6357.3550		1347706.005	3179830.865
CL Abut 1	-30.43	-30.43	0.685	0+00.6850	6357.2920	6357.2920	1347706.004	3179830.865
F-1	-28.74	-28.74	4.090	0+04.0899	6357.1610	6357.1687	1347709.494	3179829.350
F-2	-27.04	-27.04	7.495	0+07.4948	6357.0300	6357.0444	1347712.983	3179827.836
F-3	-25.35	-25.35	10.900	0+10.8997	6356.9120	6356.9316	1347716.472	3179826.321
F-4	-23.65	-23.65	14.305	0+14.3046	6356.7960	6356.8188	1347719.961	3179824.806
F-5	-21.96	-21.96	17.710	0+17.7095	6356.6810	6356.7048	1347723.450	3179823.291
F-6	-20.26	-20.26	21.114	0+21.1144	6356.5830	6356.6057	1347726.939	3179821.776
F-7	-18.57	-18.57	24.519	0+24.5193	6356.4890	6356.5083	1347730.428	3179820.261
F-8	-16.87	-16.87	27.924	0+27.9242	6356.4030	6356.4170	1347733.917	3179818.747
F-9	-15.18	-15.18	31.329	0+31.3291	6356.3250	6356.3324	1347737.406	3179817.232
CL- Abut 2	-13.48	-13.48	34.734	0+34.7340	6356.2540	6356.2540	1347740.895	3179815.717
BF Abut 2	-12.72	-12.72	36.256	0+36.2560	6356.2250		1347742.453	3179815.040

GIRDER B

BENT LINE	OFFSET	X	Y	STATION	ELEVATION	ELEV + DL	NORTHING	EASTING
BF Abut 1	-21.01	-21.01	-0.56	-0+00.5630	6356.7980		1347712.416	3179837.888
CL Abut 1	-20.43	-20.43	0.95	0+00.9530	6356.7440	6356.7440	1347713.831	3179837.098
F-1	-19.15	-19.15	4.35	0+04.3469	6356.6280	6356.6342	1347716.999	3179835.326
F-2	-17.86	-17.86	7.74	0+07.7408	6356.5220	6356.5337	1347720.167	3179833.556
F-3	-16.58	-16.58	11.13	0+11.1347	6356.4160	6356.4319	1347723.334	3179831.785
F-4	-15.29	-15.29	14.53	0+14.5286	6356.3240	6356.3426	1347726.502	3179830.015
F-5	-14.01	-14.01	17.92	0+17.9225	6356.2370	6356.2564	1347729.670	3179828.244
F-6	-12.72	-12.72	21.32	0+21.3164	6356.1590	6356.1774	1347732.838	3179826.473
F-7	-11.44	-11.44	24.71	0+24.7103	6356.0870	6356.1027	1347736.005	3179824.703
F-8	-10.15	-10.15	28.10	0+28.1042	6356.0240	6356.0354	1347739.173	3179822.932
F-9	-8.87	-8.87	31.50	0+31.4981	6355.9700	6355.9760	1347742.341	3179821.161
CL- Abut 2	-7.59	-7.59	34.89	0+34.8920	6355.9250	6355.9250	1347745.508	3179819.391
BF Abut 2	-7.01	-7.01	36.41	0+36.4090	6355.9090		1347746.923	3179818.600

GIRDER C

BENT LINE	OFFSET	X	Y	STATION	ELEVATION	ELEV + DL	NORTHING	EASTING
BF Abut 1	-10.82	-10.82	-0.29	-0+00.2900	6356.2390		1347720.392	3179844.238
CL Abut 1	-10.43	-10.43	1.22	0+01.2210	6356.1830	6356.1830	1347721.658	3179843.329
F-1	-9.57	-9.57	4.60	0+04.6036	6356.0790	6356.0844	1347724.493	3179841.294
F-2	-8.71	-8.71	7.99	0+07.9862	6356.0050	6356.0153	1347727.328	3179839.258
F-3	-7.85	-7.85	11.37	0+11.3688	6355.9140	6355.9280	1347730.164	3179837.223
F-4	-6.99	-6.99	14.75	0+14.7514	6355.8480	6355.8643	1347732.999	3179835.187
F-5	-6.13	-6.13	18.13	0+18.1340	6355.7670	6355.7841	1347735.834	3179833.152
F-6	-5.27	-5.27	21.52	0+21.5166	6355.7280	6355.7443	1347738.669	3179831.117
F-7	-4.41	-4.41	24.90	0+24.8992	6355.6670	6355.6808	1347741.505	3179829.081
F-8	-3.55	-3.55	28.28	0+28.2818	6355.6500	6355.6601	1347744.340	3179827.046
F-9	-2.69	-2.69	31.66	0+31.6644	6355.6100	6355.6153	1347747.175	3179825.011
CL- Abut 2	-1.83	-1.83	35.05	0+35.0470	6355.6050	6355.6050	1347750.010	3179822.975
BF Abut 2	-1.45	-1.45	36.56	0+36.5580	6355.6010		1347751.277	3179822.066

GIRDER D

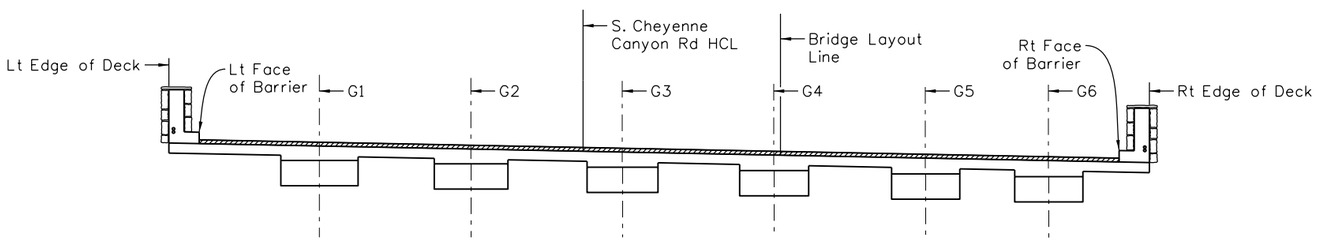
BENT LINE	OFFSET	X	Y	STATION	ELEVATION	ELEV + DL	NORTHING	EASTING
BF Abut 1	-0.625	-0.63	-0.02	-0+00.0170	6355.6650		1347728.367	3179850.588
CL Abut 1	-0.431	-0.43	1.49	0+01.4890	6355.6220	6355.6220	1347729.487	3179849.559
F-1	0.0041	0.00	4.86	0+04.8602	6355.5490	6355.5540	1347731.987	3179847.261
F-2	0.4392	0.44	8.23	0+08.2314	6355.4730	6355.4825	1347734.490	3179844.961
F-3	0.8743	0.87	11.60	0+11.6026	6355.4140	6355.4270	1347736.993	3179842.661
F-4	1.3094	1.31	14.97	0+14.9738	6355.3590	6355.3742	1347739.496	3179840.360
F-5	1.7445	1.74	18.35	0+18.3450	6355.3240	6355.3398	1347741.999	3179838.060
F-6	2.1796	2.18	21.72	0+21.7162	6355.2880	6355.3030	1347744.501	3179835.760
F-7	2.6147	2.61	25.09	0+25.0874	6355.2790	6355.2918	1347747.004	3179833.460
F-8	3.0498	3.05	28.46	0+28.4586	6355.2630	6355.2723	1347749.507	3179831.160
F-9	3.4849	3.48	31.83	0+31.8298	6355.2670	6355.2719	1347752.010	3179828.860
CL- Abut 2	3.92	3.92	35.20	0+35.2010	6355.2830	6355.2830	1347754.513	3179826.560
BF Abut 2	1.448	1.45	36.71	0+36.7070	6355.2880		1347755.630	3179825.533

GIRDER E

BENT LINE	OFFSET	X	Y	STATION	ELEVATION	ELEV + DL	NORTHING	EASTING
BF Abut 1	9.57	9.57	0.26	0+00.2560	6355.0900		1347736.334	3179856.932
CL Abut 1	9.57	9.57	1.76	0+01.7570	6355.0510	6355.0510	1347737.258	3179855.857
F-1	9.61	9.61	5.12	0+05.1175	6354.9800	6354.9848	1347739.502	3179853.244
F-2	9.64	9.64	8.48	0+08.4780	6354.9350	6354.9442	1347741.692	3179850.695
F-3	9.68	9.68	11.84	0+11.8385	6354.8960	6354.9085	1347743.881	3179848.151
F-4	9.71	9.71	15.20	0+15.1990	6354.8630	6354.8777	1347746.071	3179845.596
F-5	9.75	9.75	18.56	0+18.5595	6354.8510	6354.8663	1347748.260	3179843.046
F-6	9.78	9.78	21.92	0+21.9200	6354.8480	6354.8626	1347750.450	3179840.497
F-7	9.82	9.82	25.28	0+25.2805	6354.8530	6354.8654	1347752.640	3179837.947
F-8	9.85	9.85	28.64	0+28.6410	6354.8740	6354.8831	1347754.829	3179835.398
F-9	9.89	9.89	32.00	0+32.0015	6354.9000	6354.9048	1347757.019	3179832.848
CL- Abut 2	9.92	9.92	35.36	0+35.3620	6354.9400	6354.9400	1347759.209	3179830.299
BF Abut 2	9.94	9.94	36.86	0+36.8630	6354.9640		1347760.186	3179829.160

GIRDER F

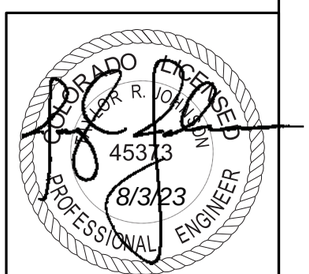
BENT LINE	OFFSET	X	Y	STATION	ELEVATION	ELEV + DL	NORTHING	EASTING
BF Abut 1	17.69	17.69	0.47	0+00.4740	6354.6190		1347742.703	3179862.003
CL Abut 1	17.69	17.69	1.97	0+01.9740	6354.5840	6354.5840	1347743.669	3179860.855
F-1	17.69	17.69	5.33	0+05.3335	6354.5080	6354.5128	1347745.831	3179858.284
F-2	17.69	17.69	8.69	0+08.6930	6354.4540	6354.4630	1347747.993	3179855.713
F-3	17.69	17.69	12.05	0+12.0525	6354.4020	6354.4143	1347750.156	3179853.141
F-4	17.69	17.69	15.41	0+15.4120	6354.3920	6354.4064	1347752.318	3179850.570
F-5	17.69	17.69	18.77	0+18.7715	6354.3740	6354.3892	1347754.480	3179847.999
F-6	17.69	17.69	22.13	0+22.1310	6354.3720	6354.3864	1347756.642	3179845.428
F-7	17.69	17.69	25.49	0+25.4905	6354.3950	6354.4073	1347758.805	3179842.857
F-8	17.69	17.69	28.85	0+28.8500	6354.4160	6354.4250	1347760.967	3179840.286
F-9	17.69	17.69	32.21	0+32.2095	6354.4540	6354.4588	1347763.129	3179837.714
CL- Abut 2	17.69	17.69	35.57	0+35.5690	6354.5010	6354.5010	1347765.292	3179835.143
BF Abut 2	17.69	17.69	37.07	0+37.0700	6354.5280		1347766.257	3179833.994



BRIDGE GEOMETRY LONGITUDINAL LINE DESIGNATION
(Looking Ahead Station)

NOTES:

1. Refer to general layout sheet for HCL alignment and profile grade line.
2. Positive roadway cross slope is upwards from profile grade line.
3. Elevations are at top of concrete deck 3 inches below finished grade.
4. These stations, coordinates, offsets and lengths define the layout of the structure in a two dimensional horizontal plane. Elevations define the final grade of the finished concrete deck. Fabrication of structural components through the direct use of this information is not intended or advisable.
5. The stations and offsets are measured based on the layout line.



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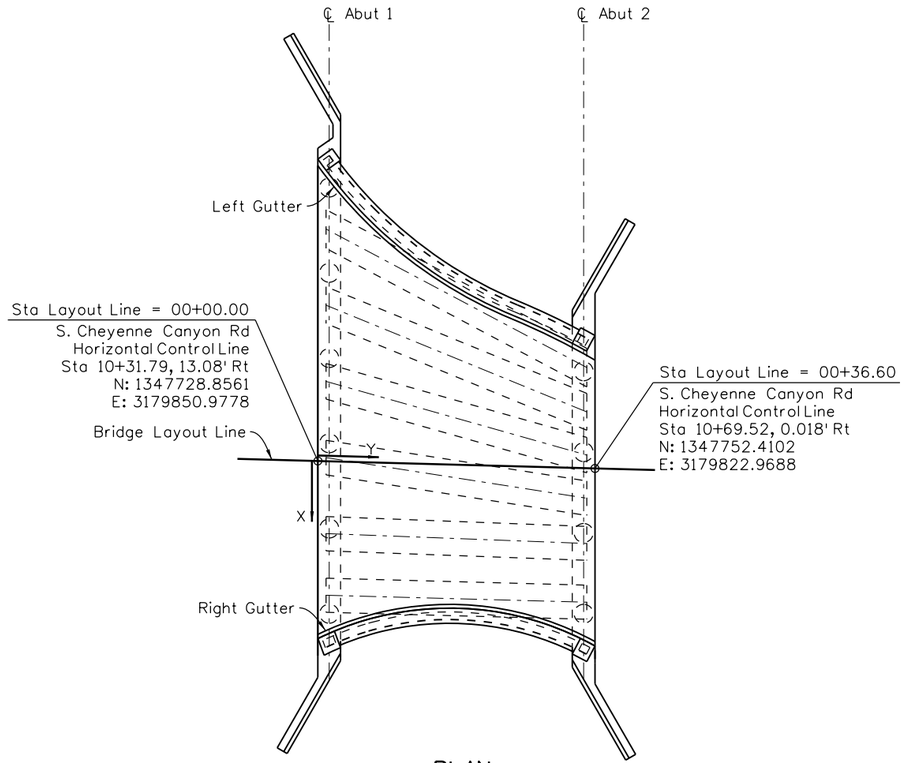
Print Date: 8/2/2023	Sheet Revisions			As Constructed	SOUTH CHEYENNE CANYON BRIDGE BRIDGE STRUCTURAL SHEETS BRIDGE DECK ELEVATIONS (1 OF 2)	Project No./Code
File Name: 009_SCC-BR-PLAN-19.dgn	Date:	Comments	Init.	No Revisions:		R010069
Horiz. Scale: Vert. Scale: As Noted				Revised:	Designer: S. Tripathi / Structure Numbers	
Unit Information					Detailer: A. Quintana	
Jacobs				Void:	Sheet Subset: STRUCTURAL / Subset Sheets: B19 of B20	Sheet Number 40

RIGHT FACE OF BARRIER

BENT LINE	OFFSET	X	Y	STATION	ELEVATION	ELEV + DL	NORTHING	EASTING
BF Abut 1	22.89	22.89	0.61	0+00.6130	6354.3140		1347746.766	3179865.238
CL Abut 1	22.16	22.16	2.09	0+02.0940	6354.3190		1347747.166	3179863.640
F-1	20.84	20.84	5.30	0+05.2980	6354.3260		1347748.215	3179860.339
F-2	19.80	19.80	8.61	0+08.6050	6354.3320		1347749.548	3179857.146
F-3	19.05	19.05	11.99	0+11.9890	6354.3330		1347751.153	3179854.065
F-4	18.60	18.60	15.43	0+15.4250	6354.3320		1347753.018	3179851.143
F-5	18.44	18.44	18.89	0+18.8870	6354.3350		1347755.127	3179848.395
F-6	18.59	18.59	22.35	0+22.3500	6354.3280		1347757.470	3179845.839
F-7	19.04	19.04	25.79	0+25.7870	6354.3130		1347760.023	3179843.495
F-8	19.78	19.78	29.17	0+29.1730	6354.2990		1347762.769	3179841.381
F-9	20.81	20.81	32.48	0+32.4820	6354.2730		1347765.689	3179839.512
CL- Abut 2	22.12	22.12	35.69	0+35.6880	6354.2240		1347768.759	3179837.903
BF Abut 2	22.86	22.86	37.21	0+37.2090	6354.2430		1347770.303	3179837.216

RIGHT EDGE OF DECK

BENT LINE	OFFSET	X	Y	STATION	ELEVATION	ELEV + DL	NORTHING	EASTING
BF Abut 1	25.12	25.12	0.67	0+00.6730	6354.2298		1347748.513	3179866.630
CL Abut 1	24.35	24.35	2.15	0+02.1530	6354.2316		1347748.877	3179865.002
F-1	22.96	22.96	5.34	0+05.3410	6354.2346		1347749.864	3179861.666
F-2	21.86	21.86	8.64	0+08.6430	6354.2366		1347751.152	3179858.434
F-3	21.08	21.08	12.03	0+12.0320	6354.2329		1347752.730	3179855.334
F-4	20.60	20.60	15.48	0+15.4780	6354.2286		1347754.585	3179852.391
F-5	20.44	20.44	18.95	0+18.9530	6354.2277		1347756.702	3179849.630
F-6	20.61	20.61	22.43	0+22.4280	6354.2167		1347759.061	3179847.074
F-7	21.08	21.08	22.87	0+22.8740	6354.1977		1347761.647	3179844.744
F-8	21.88	21.88	29.26	0+29.2610	6354.1797		1347764.431	3179842.661
F-9	22.97	22.97	32.56	0+32.5620	6354.1497		1347767.394	3179840.843
CL- Abut 2	24.37	24.37	35.75	0+35.7490	6354.0967		1347770.514	3179839.301
BF Abut 2	25.16	25.16	37.27	0+37.2700	6354.1134		1347772.102	3179838.648



PLAN

NOTES:

1. Refer to general layout sheet for HCL alignment and profile grade line.
2. Positive roadway cross slope is upwards from profile grade line.
3. Elevations are at top of concrete deck 3 inches below finished grade.
4. These stations, coordinates, offsets and lengths define the layout of the structure in a two dimensional horizontal plane. Elevations define the final grade of the finished concrete deck. Fabrication of structural components through the direct use of this information is not intended or advisable.
5. The stations and offsets are measured based on the layout line.

COLORADO LICENSED
TAYLOR R. JOHNSON
45373
8/3/23
PROFESSIONAL ENGINEER

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Print Date:	8/2/2023
File Name:	009_SCC-BR-PLAN-20.dgn
Horiz. Scale:	Vert. Scale: As Noted
Unit Information	

Jacobs

Sheet Revisions		
Date:	Comments	Init.

COLORADO SPRINGS

As Constructed

No Revisions:

Revised:

Void:

SOUTH CHEYENNE CANYON BRIDGE
BRIDGE STRUCTURAL SHEETS
BRIDGE DECK ELEVATIONS (2 OF 2)

Designer:	S. Tripathi	Structure Numbers	
Detailer:	A. Quintana		
Sheet Subset:	STRUCTURAL	Subset Sheets:	B20 of B20

Project No./Code: R010069

Sheet Number: 41

Jaime.MateoLucas@jacobs.com 3:44:45 PM pw:\\jacobs-us-va-pw.bentley.com:jacobs-us-va-pw-02\Documents\WXX26205 - S Cheyenne Canyon Bridge\4 Delivery\Project_WIP\Bridge\Drawings\PED Bridge\009_SCC-PED-BR-PLAN-101.dgn

GENERAL NOTES

Except as shown in the plans, structure excavation and backfill shall be in Accordance with M-206-1 for cast-in-place retaining walls.

Structure excavation and backfill shall be as shown on the plans, except shoring may be required for excavation adjacent to the existing roadway. Temporary excavation support shall be paid for by Item 206 Shoring. Incidental shoring that is not included as a pay item will not be measured and paid for separately but shall be included in the work.

Expansion joint material shall meet AASHTO Specification M213.

All construction shall be in accordance with the Colorado Department of Transportation 2022 Standard Specifications for Road and Bridge Construction and the Project Special Provisions.

Unless noted otherwise, the final finish for the surfaces or exposed concrete shall be class 2. Deck surface shall recieve a transverse broom finish.

Unless noted otherwise, all structural steel shall be as follows:

HSS Sections:	ASTM A847 (Grade 50W)
Steel shapes and plates:	ASTM A588 (Grade 50W)
Anchor Bolts:	ASTM F1554 (Grade 55) (Galvanized)
High Strength Bolts:	ASTM A325 (Type 3)
Nuts:	ASTM A563 (Grade C3 or DH3)
Washers:	ASTM F436 (Type 3)

Grade 60 reinforcing steel is required. All reinforcing steel shall be non-epoxy coated unless otherwise noted.

Ⓔ denotes epoxy coated reinforcing steel.

All concrete shall be Class D (Bridge), f'c = 4,500 psi or Class BZ, f'c = 4,000 psi.

Concrete in the abutments and other concrete in contact with soil shall meet the sulfate resistance requirements of potential exposure class 1. Refer to the standard special provisions for the section 601 and 701 Structural Concrete.

Stations, Elevations and dimensions contained in these plans are calculated from a recent field survey. The Contractor shall verfiy all dependent dimensions in the field before ordering or fabricating any material.

The Contractor shall be responsible for the stability of the structure during construction.

The information shown on these plans concerning the type and location of underground utilities is not guaranteed to be accurate or all inclusive.
The Contractor is responsible for making their own determination as to the type and location of underground utilities as may be necessary to avoid damage thereto. The Contractor shall contact the Utility Notification Center of Colorado at 811 (1-800-922-1987) at least 3 days (2 days not including the day of notification) prior to any excavation or other earthwork.

SUBSTRUCTURE DESIGN DATA

AASHTO, 9th Edition LRFD with current interims as modified by CDOT Bridge Design Manual 2023

Design method: Load and Resistance factor design (LRFD)

Live Load:	85psf Pedestrian Load H-5 Truck Live Load
Dead Load:	Reactions from Superstructure provided by manufactorer
Snow Laod:	100psf

Reinforced Concrete:
- Class D Concrete: f'c = 4,500 psi
- Reinforcing Steel: fy = 60,000 psi

Drilled Shaft Concrete:
- Class BZ Concrete: f'c = 4,000 psi
- Reinforcing Steel: fy = 60,000 psi

BRIDGE DESCRIPTION

1 - simple span (34'-3") Pedestrian Bridge,
Timber Decking and Prefabricated Truss
over South Cheyenne Creek.
8'-0" Truss-to-Truss clear, No Skew

SUPERSTRUCTURE DESIGN DATA

Truss manufacturer: Arete Structures, Blowing Rock, North Carolina (www.aretestructures.com)

Refer to manufacturer's general notes for full information on materials, construction methods, and design assumptions for bridge superstructure.

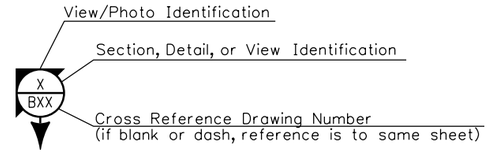
Truss to be designed in accordance with AASHTO LRFD Guide Specifications for the Design of Pedestrian Bridges, First Edition (2009).

Truss deflection due to design live load shall be limited to L/600. Dynamic deflection response shall be controlled by applyling the vibration cirteria in the AASHTO Guide Specification for the Design of Pedestrian Bridges.

Bearing pads shall be designed and provided by bridge manufacturer at each abutment.

Expansion gap at ends of bridge to be determined by bridge manufacturer.

INDEX OF DRAWING

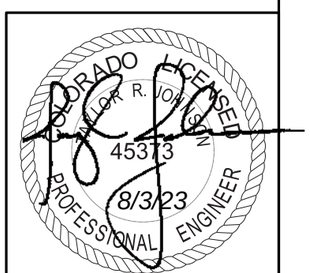


ABBREVIATIONS

(Per M-100-2 or as shown below)

Ea	= Each
BF	= Back Face
FF	= Front Face
FFBW	= Front Face Backwall
RC	= Reinforced Concrete
WSEL	= Water Surface Elevation

Know what's below. Call before you dig.



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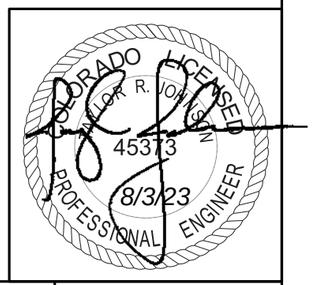
Unit Information				Void:	Sheet Subset: STRUCTURAL / Subset Sheets: B101 of B107	Sheet Number 42
Jacobs					COLORADO SPRINGS	

SUMMARY OF QUANTITIES					
Item No.	Description	Unit	Abutment 1	Abutment 2	Total
206-00000	Structure Excavation	CY	30	38	68
206-00100	Structure Backfill (Class 1)	CY	31	34	65
206-00200	Structure Backfill (Class 2)	CY	11	13	24
206-00360	Structure Backfill (Class 2) (Special)	CY	21	22	43
503-00024	Drilled Shaft (24 Inch)	LF	47	44	91
503-00310	Crosshole Sonic Logging Testing	EACH	1	1	2
601-03000	Concrete Class D	CY	6	7	13
601-40005	Cut Stone Veneer	SF	72	92	164
602-00020	Reinforcing Steel (Epoxy Coated)	LB	699	789	1488



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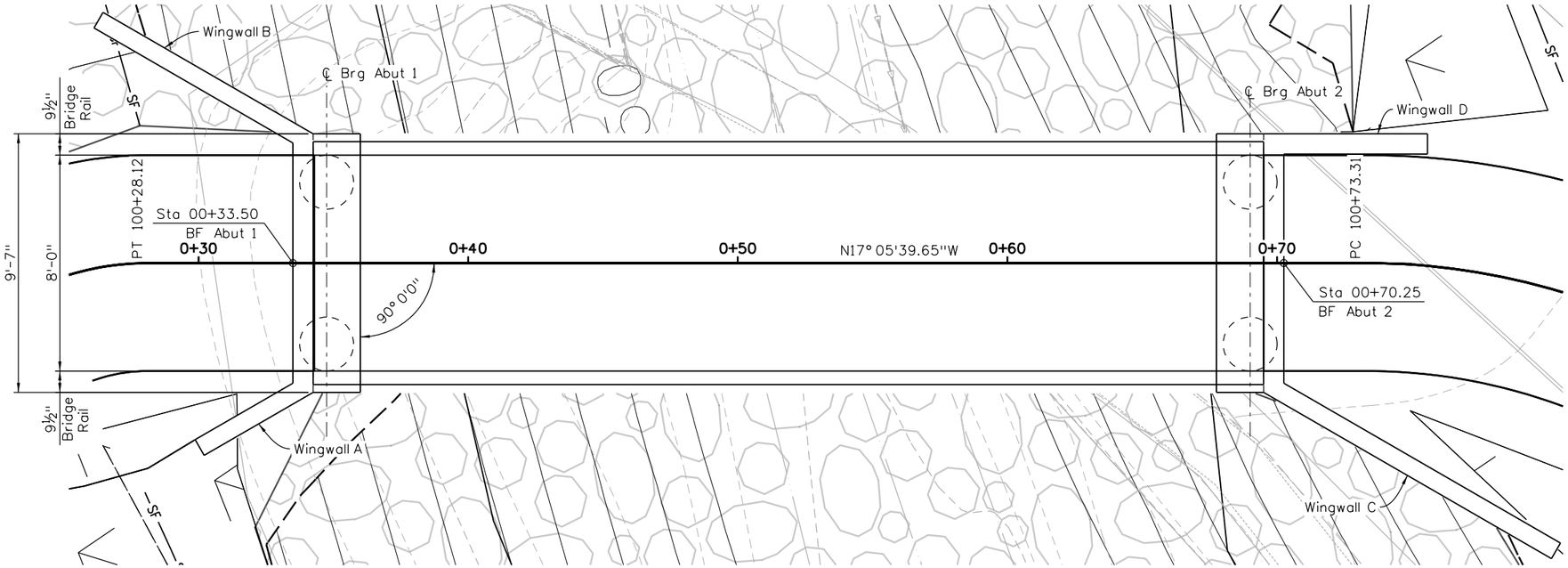
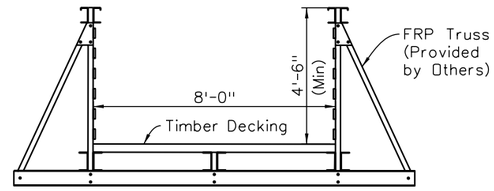
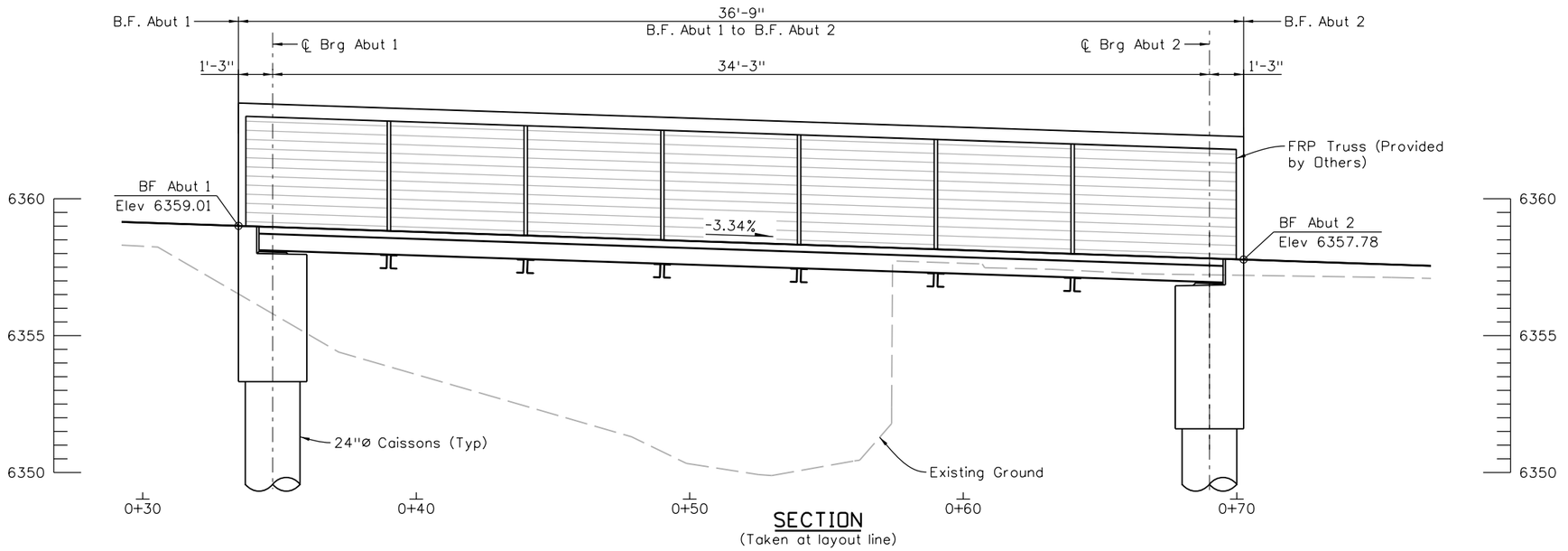
Horiz. Scale:	Vert. Scale: As Noted				Revised:	Designer: A. Regalado / Structure Numbers	
Unit Information						Detailer: Mateo-Lucas	
Jacobs					Void:	Sheet Subset: STRUCTURAL / Subset Sheets: B102 of B107	Sheet Number 43



PLAN



TYPICAL SECTION



SECTION
(Taken at layout line)

COLORADO LICENSED
TAYLOR R. JOHNSON
45373
8/3/23
PROFESSIONAL ENGINEER

Print Date: 8/1/2023	Sheet Revisions			As Constructed	SOUTH CHEYENNE CANYON BRIDGE PEDESTRIAN BRIDGE STRUCTURAL SHEETS GENERAL LAYOUT	Project No./Code
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Horiz. Scale: Vert. Scale: As Noted				Revised:	Designer: A. Regalado / Detailer: J. Mateo-Lucas / Structure Numbers	
Unit Information				Void:	Sheet Subset:STRUCTURAL / Subset Sheets: B103 of B107	Sheet Number 44
Jacobs				COLORADO SPRINGS		

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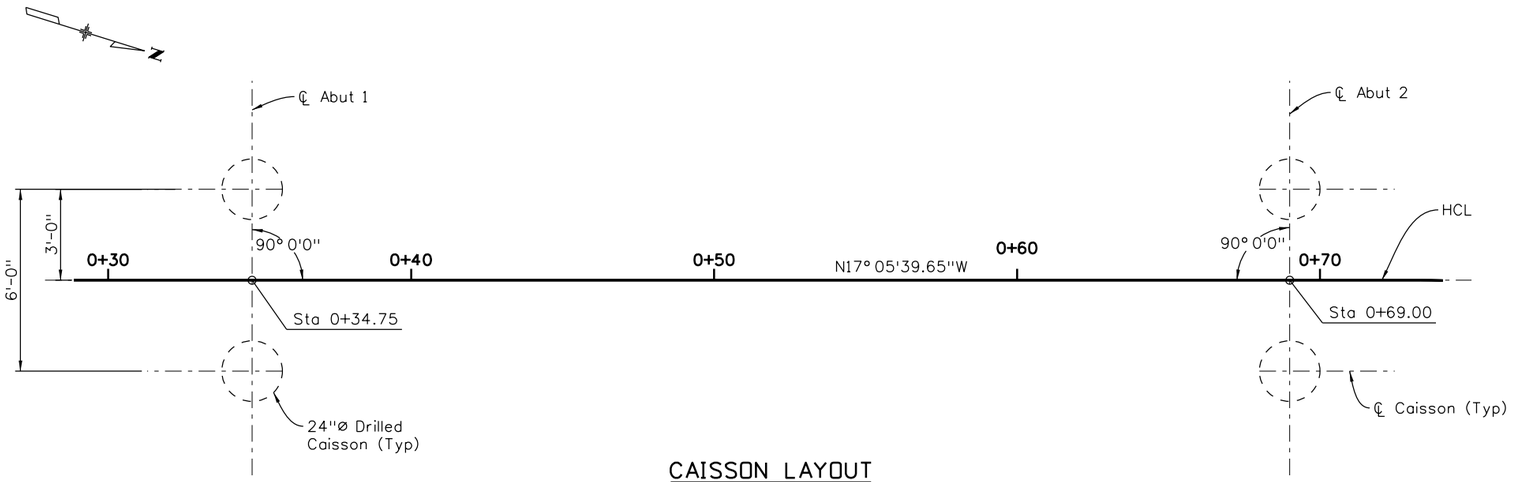
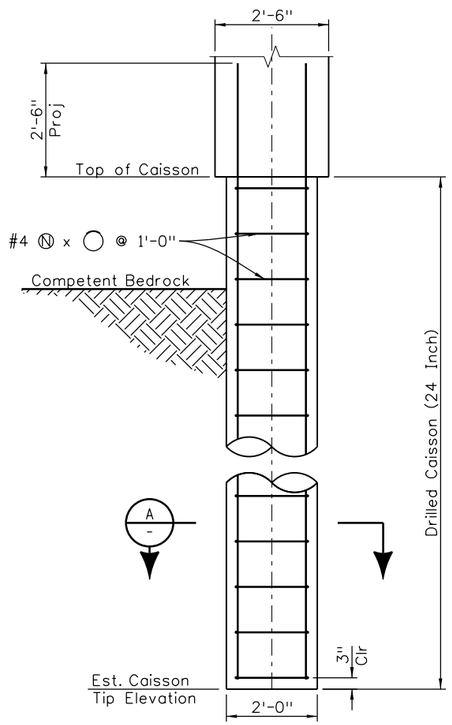
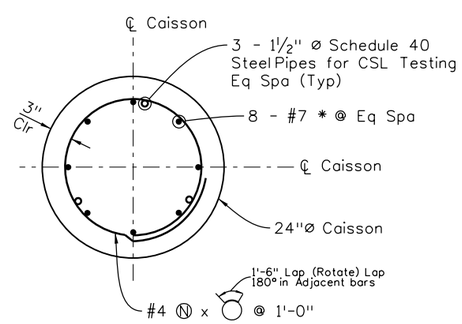


CAISSON LAYOUT



CAISSON DETAIL

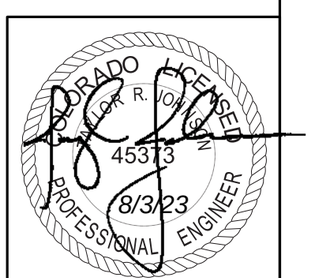
Location	Caisson	Caisson Size	Max. Load (Factored) (kips)	Max. Load (Service) (kips)	Top of Caisson Elevation	Estimated Top of Bedrock Elev.	Minimum Bedrock Penetration	Estimated Tip Elev.	Min. Required Tip Elevation	As-Built Tip Elev.
Abutment 1	C1	24"	44.4	26.7	6354.06	6338	7	6331	6331	
	C2	24"	44.4	26.7	6354.06	6338	7	6331	6331	
Abutment 2	C3	24"	44.4	26.7	6352.91	6338	7	6331	6331	
	C4	24"	44.4	26.7	6352.91	6338	7	6331	6331	



SECTION A -

CAISSON NOTES:

1. Top of competent bedrock elevation shall be verified at time of construction by engineer.
2. The use of temporary casing and dewatering during drilling may be required. the cost of temporary casing and dewatering shall not be paid for separetly, but shall be included in bid item 503-Drilled Caisson (24 inch).
3. The contractor shall anticipate encountering hard bedrock during drilling.
4. Resistance factor ø = 0.60 for end bearing and for side shear.
5. Ultimate allowable end bearing = 60 ksf x ø x ag.
6. Ultimate allowable side shear resistance = 5 ksf x ø x perimeter x length from 1' to 5' into bedrock.
7. Caisson construction shall proceed per CDOT specification 503, with exception that crosshole sonic log (csl) tube installation and testing is not required.



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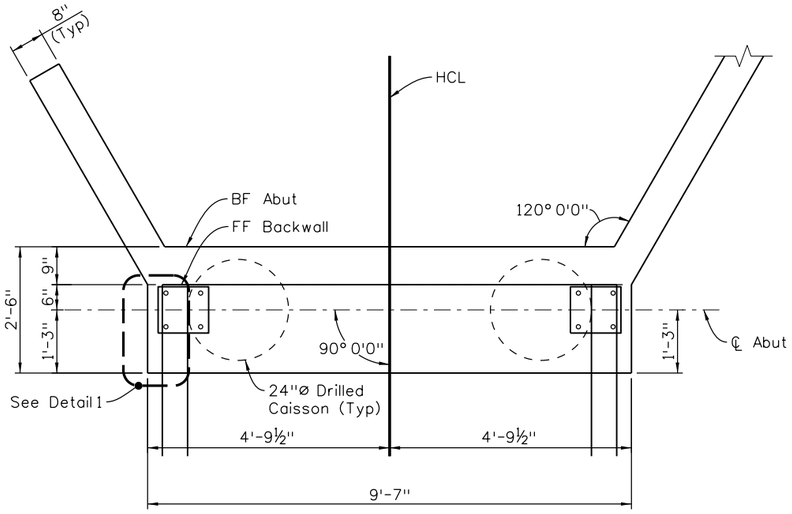
Unit Information					Detailer: J. Mateo-Lucas	
Jacobs				Void:	Sheet Subset: STRUCTURAL / Subset Sheets: B104 of B107	Sheet Number 45

COLORADO SPRINGS



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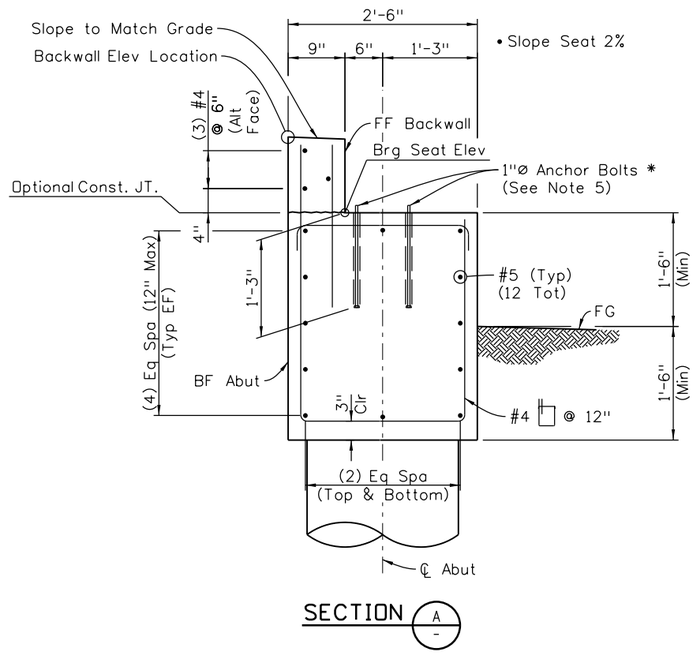
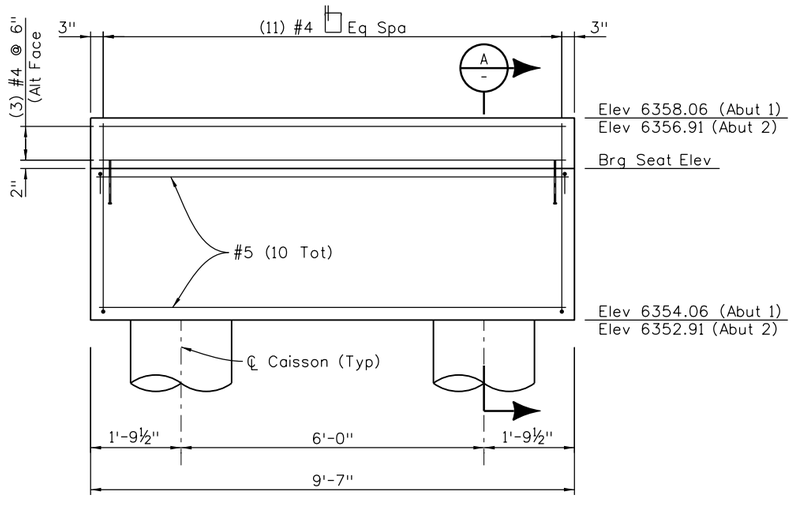


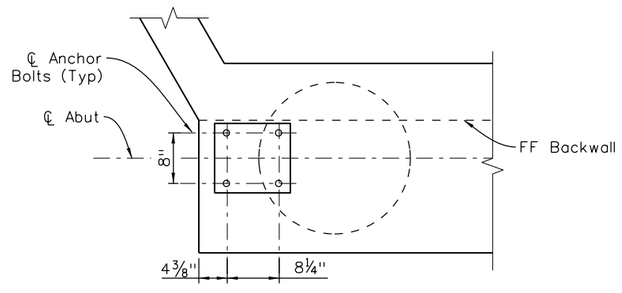
SECTION A

NOTES:

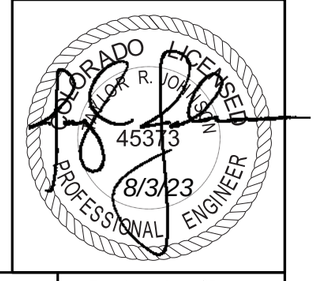
1. Abutment and wingwall concrete shall be Class D (Bridge), F'c = 4,500 psi
2. Clear cover shall be 2" unless otherwise noted.
3. Reinforcing may be shifted to accommodate anchor bolts.
4. See sheet B107 for wingwalls details.
5. Anchor bolts may be cast with cap or grouted. If grouted, blockout shall be 3"ø and grout shall be high strength, cementitous, non-shrink, CDOT approved product with 28-day compressive strength of 6000 psi.
6. Excavation and backfill shall be per CDOT Standard M-206-2. Place 6" perporated pipe underdrain within filter material and extend to daylight through wingwall.



ELEVATION



DETAIL 1



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			R010069
Designer: A. Regalado	Structure Numbers		
Detailer: J Mateo-Lucas			
Sheet Subset: STRUCTURAL	Subset Sheets: B105 of B107		Sheet Number 46

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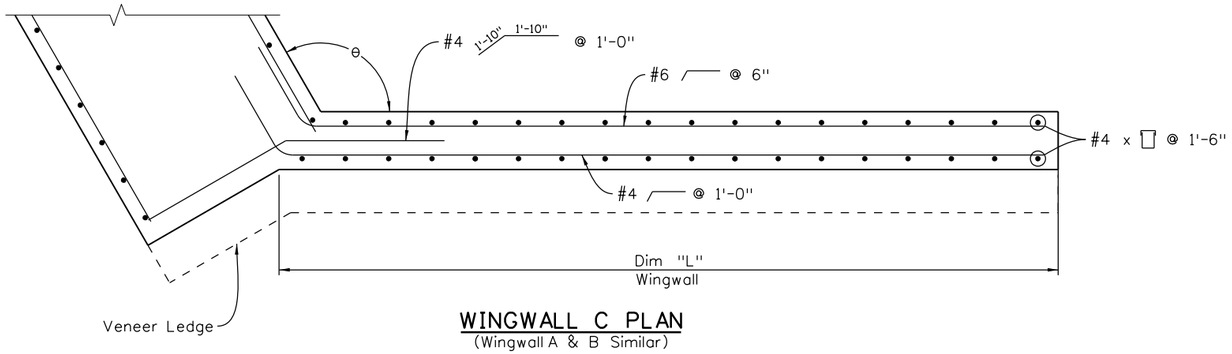
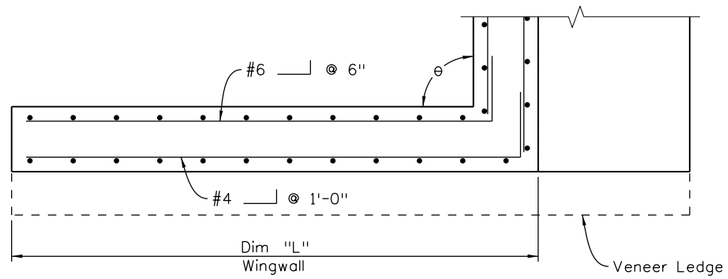
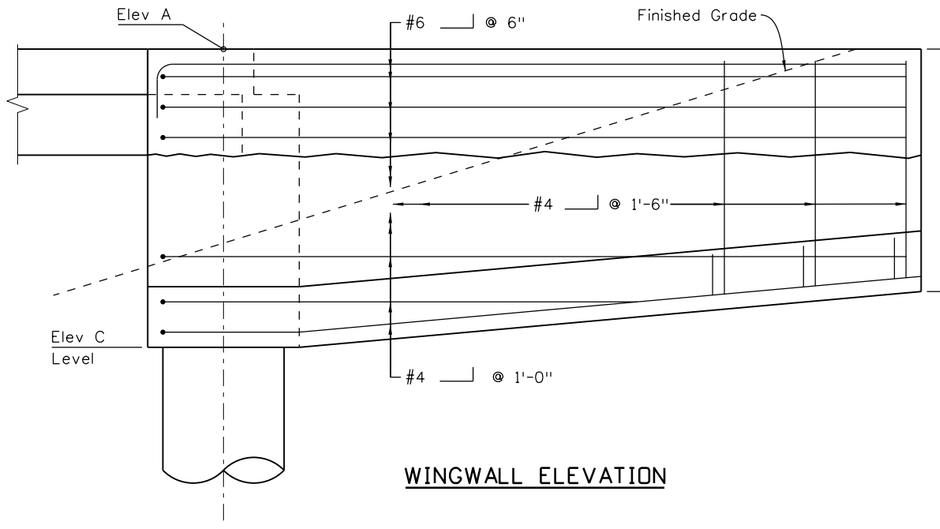


WINGWALL C PLAN
(Wingwall A & B Similar)

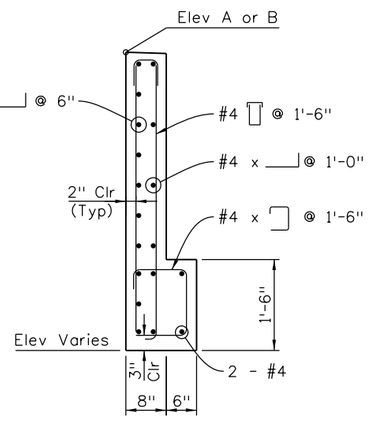


WINGWALL D PLAN

Table of Elevations						
Wingwall	Elev A	Elev B	Elev C	Elev D	Dim "L"	Angle θ
Wingwall A	6358.98	6358.74	6354.06	6354.06	4'-8"	120°
Wingwall B	6358.98	6358.48	6354.06	6354.06	9'-0"	120°
Wingwall C	6357.83	6356.60	6352.91	6352.91	12'-4"	120°
Wingwall D	6357.83	6357.70	6352.91	6352.91	6'-0"	90°



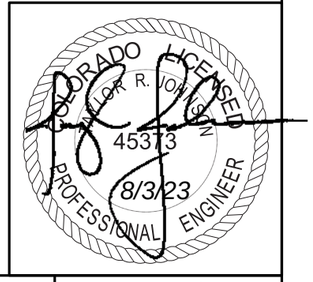
WINGWALL ELEVATION



TYPICAL WINGWALL SECTION

NOTES:

1. Contractor shall fill back face and front face of wingwall simultaneously (±2 ft)
2. Dovetail slots shall be installed on wingwall faces finished with stone veneer. Refer to sheet B18 for aesthetic details and B15 for dovetail details.



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Unit Information						Detailer: J Mateo-Lucas	
Jacobs					Void:	Sheet Subset:STRUCTURAL / Subset Sheets: B106 of B107	Sheet Number 47

COLORADO SPRINGS

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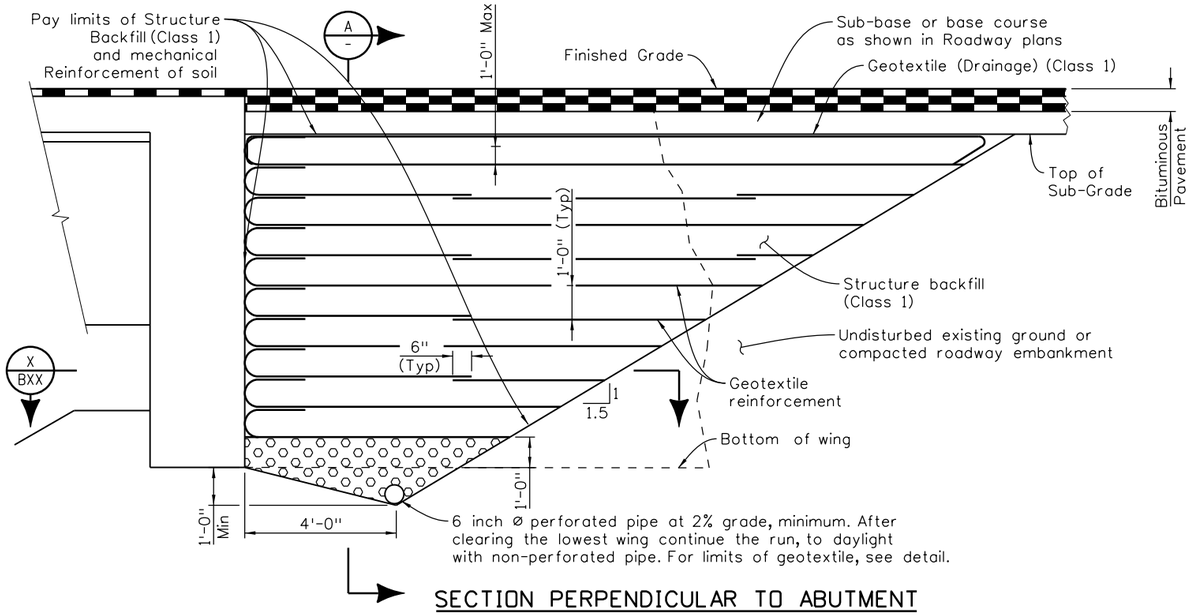

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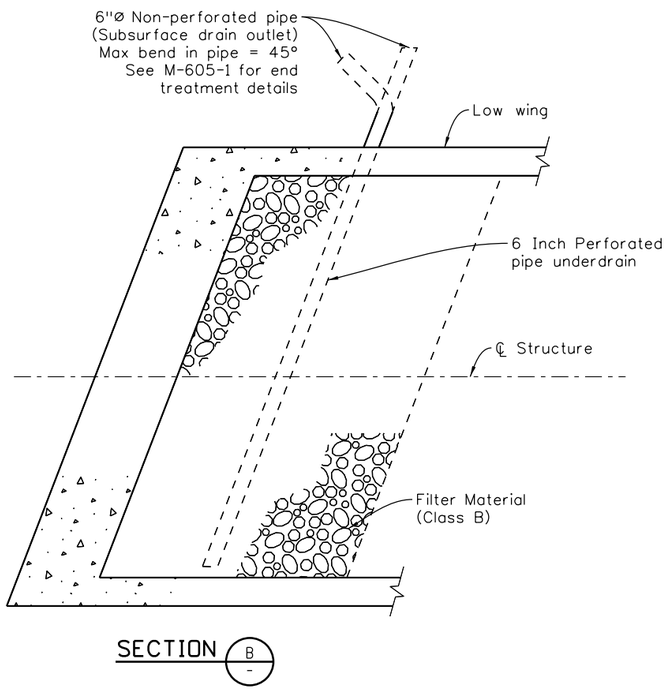

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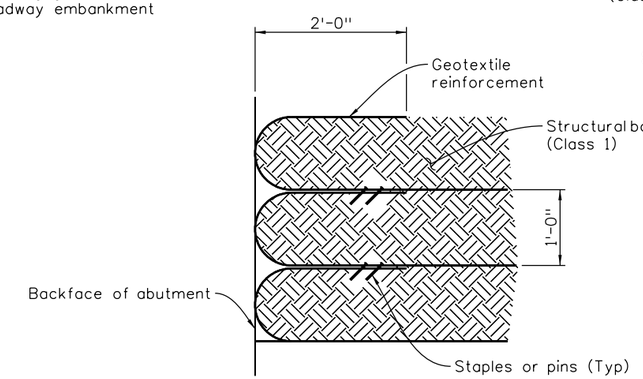

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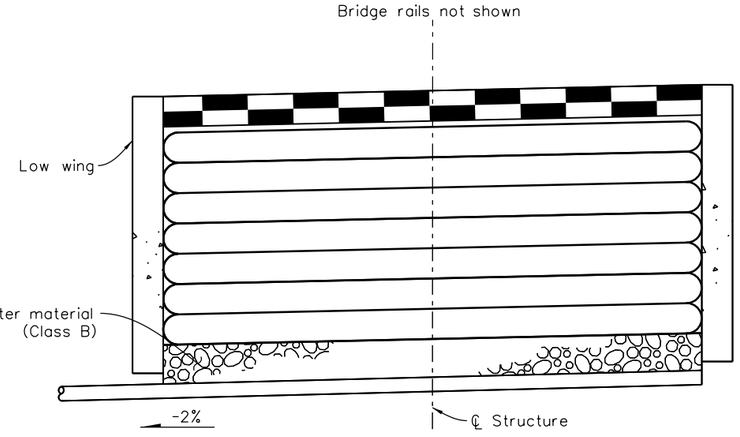
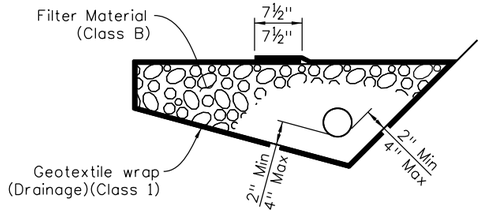


SECTION A

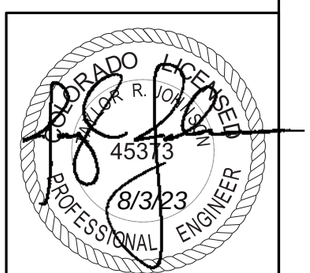


6 INCH PERFORATED PIPE UNDERDRAIN

6 inch perforated pipe underdrain includes all filter material (Class B) and Geotextile wrap (Drainage) (Class 1)

NOTES:

1. Geotextile reinforcement shall be woven fabric with a minimum average roll value of 4800 lb/ft for installations with a gap and 2400 lb/ft for installations without a gap based on ASTM D4595.
2. Geotextile reinforcment shall be placed by alternating machine direction (md) with cross machine direction (XD) from layer to layer.
3. The geotextile reinforcement wrap at back face of abutment shall be pulled back slack free with its end anchored to soil underneath with staples or pins.
4. Minimum splice of all geofabric shall consist of 6" of overlap.
5. Payment for all work items shown will be made under Item 206 Structure Backfill (Special)(CY) and Item 206 Structure Backfill (Class 1)(CY). Items include 6 Inch ø perforated pipe underdrain, subsurface drain outlet (6 Inch ø nonperforated pipe) and all other miscellaneous items needed to complete the work. Geotextile reinforcement shall be paid for as Structural Backfill (Special).
6. Installation of pipe underdrain and subsurface drain outlet will conform to the construction requirements of section 605.03 and 605.06, respectively.



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Unit Information
Jacobs

Sheet Revisions

Date:	Comments	Init.

COLORADO SPRINGS

As Constructed
No Revisions:
Revised:
Void:

SOUTH CHEYENNE CANYON BRIDGE
PEDESTRIAN BRIDGE STRUCTURAL SHEETS
MECH. STABILIZED EARTH BACKFILL

Designer: A. Regalado
Detailer: A. Quintana
Sheet Subset: STRUCTURAL
Structure Numbers:
Subset Sheets: B107 of B107

Project No./Code: R010069

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UTILITY NOTES:

1. EXISTING UTILITY INFORMATION WAS COLLECTED IN ACCORDANCE WITH AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE) 38-22 STANDARD GUIDELINE FOR INVESTIGATING AND DOCUMENTING EXISTING UTILITIES.

2. THE QUALITY LEVELS OBTAINED, AS DEFINED BY ASCE 38-22, ARE AS FOLLOWS: QUALITY LEVEL A - PRECISE HORIZONTAL AND VERTICAL LOCATION OF UTILITIES OBTAINED BY THE ACTUAL EXPOSURE AND SUBSEQUENT MEASUREMENT OF SUBSURFACE UTILITIES, USUALLY AT A SPECIFIC POINT.

   QUALITY LEVEL B - INFORMATION OBTAINED THROUGH THE APPLICATION OF APPROPRIATE SURFACE GEOPHYSICAL METHODS TO DETERMINE THE EXISTENCE AND APPROXIMATE HORIZONTAL POSITION OF SUBSURFACE UTILITIES.

   QUALITY LEVEL C - INFORMATION OBTAINED BY SURVEYING AND PLOTTING VISIBLE ABOVE-GROUND UTILITY FEATURES AND BY USING PROFESSIONAL JUDGEMENT IN CORRELATING THIS INFORMATION TO QUALITY LEVEL D.

   QUALITY LEVEL D - INFORMATION DERIVED FROM EXISTING RECORDS OR ORAL RECOLLECTIONS.

3. SUBSURFACE UTILITIES WERE TRACED USING INDUCTIVE OR CONDUCTIVE METHODS. GROUND PENETRATING RADAR OR OTHER GEOPHYSICAL INVESTIGATION TECHNIQUES WERE NOT UTILIZED TO SEARCH FOR NONCONDUCTIVE UTILITIES OR UTILITIES NOT IDENTIFIED BY SURFACE OR MAP EVIDENCE.

4. ALL QUALITY LEVELS OF THE EXISTING UTILITIES ARE SHOWN BY THEIR LINE TYPE.

5. STORM AND SANITARY LINES SHOWN MEET ASCE 38-22 QUALITY LEVEL C. MANHOLE LIDS WERE OPENED AND INVERT ELEVATIONS WERE MEASURED USING A DIP ROD.

6. EXISTING SANITARY SERVICE LINES WERE NOT INVESTIGATED OR SHOWN ON DRAWING.

7. ABANDONED FACILITIES WERE NOT DESIGNATED AS PART OF THE SCOPE OF WORK. ABANDONED FACILITIES ARE SHOWN AS A QL-D LINE ON THIS PLAN SET IN CASES WERE DEPICTED ON UTILITY PROVIDER MAPS.

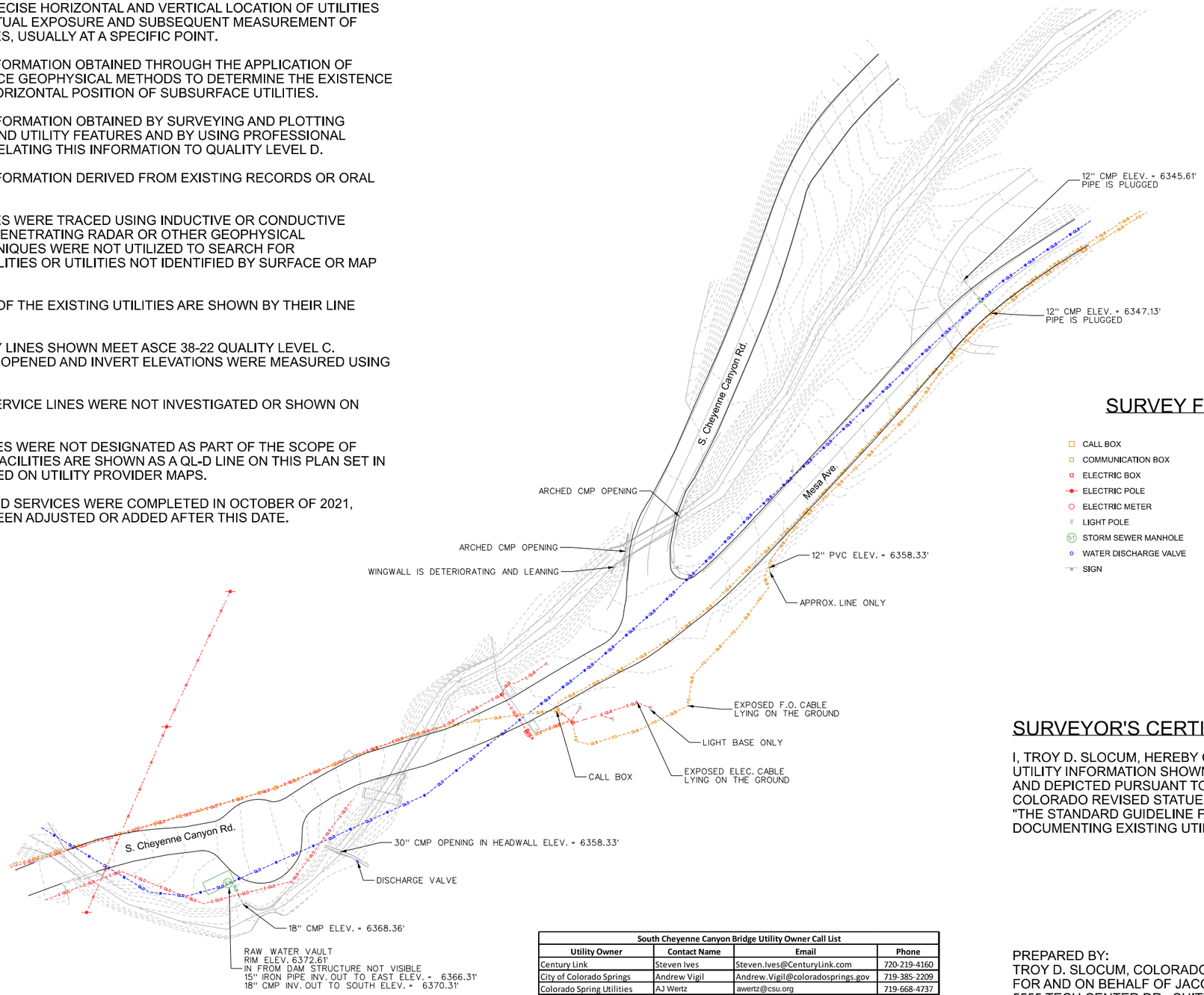
8. UTILITY MAPPING FIELD SERVICES WERE COMPLETED IN OCTOBER OF 2021, UTLITIES MAY HAVE BEEN ADJUSTED OR ADDED AFTER THIS DATE.

CITY OF COLORADO SPRINGS
SOUTH CHEYENNE CANYON
SUE DIAGRAM

N

0' 20' 40' 80'

1" = 40'



SURVEY FEATURE LEGEND

- CALL BOX
- COMMUNICATION BOX
- ELECTRIC BOX
- ELECTRIC POLE
- ELECTRIC METER
- LIGHT POLE
- STORM SEWER MANHOLE
- WATER DISCHARGE VALVE
- SIGN
- TELEPHONE QL-B LINE
- FIBER OPTIC QL-B LINE
- ELECTRIC OVERHEAD LINE
- ELECTRIC QL-B LINE
- ELECTRIC QL-D LINE
- STORM SEWER QL-B LINE
- STORM SEWER QL-D LINE
- WATER QL-B LINE
- WATER QL-D LINE

South Cheyenne Canyon Bridge Utility Owner Call List

Utility Owner	Contact Name	Email	Phone
Century Link	Steven Ives	Steven.Ives@CenturyLink.com	720-219-4160
City of Colorado Springs	Andrew Vigil	Andrew.Vigil@coloradosprings.gov	719-385-2209
Colorado Spring Utilities	AJ Wertz	awertz@csu.org	719-668-4737
Comcast	Artjahmel Davis	artjahmel_davis@comcast.com	303-603-2682
El Paso County Public Works	Samantha Sherman	SamanthaSherman@elpasoco.com	719-352-9601

SURVEYOR'S CERTIFICATION:

I, TROY D. SLOCUM, HEREBY CERTIFY THAT THE EXISTING UTILITY INFORMATION SHOWN HEREIN WAS COLLECTED AND DEPICTED PURSUANT TO THE REQUIREMENTS OF COLORADO REVISED STATUES 9-1.5-103 AND ASCE 38-22, "THE STANDARD GUIDELINE FOR INVESTIGATING AND DOCUMENTING EXISTING UTILITIES".

COLORADO REGISTERED TROY D. SLOCUM 35270 7-28-23 PROFESSIONAL ENGINEER

PREPARED BY:
TROY D. SLOCUM, COLORADO PE 35270
FOR AND ON BEHALF OF JACOBS ENGINEERING GROUP INC.
5555 TECH CENTER DR., SUITE 210
COLORADO SPRINGS, CO 80919
TROY.SLOCUM@JACOBS.COM

COLORADO SPRINGS OLYMPIC CITY USA

	NAME	DATE
DRAWN	T. TOBIN	4/2023
DESIGNED	N/A	N/A
QC REVIEW	R. GUPTILL	5/823
APPROVED	T. SLOCUM	5/823

CLIENT PROJECT NO. N/A
JACOBS PROJECT NO. WXXZ6205
SCALE: 1=40'
DRAWING NAME: V-WXXZ6205-SCCR-SUE.dgn

Jacobs
9191 Jamaica Street
Englewood, Colorado 80112
T (720) 286-2000

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COLORADO SPRINGS
SOUTH CHEYENNE CANYON
SUBSURFACE UTILITY PLANS
COLORADO SPRINGS, EL PASO COUNTY, STATE OF COLORADO

SHEET NO. 1 OF 1
DRAWING NAME: V-WXXZ6205-SCCR-SUE.dgn
REVISION N/A
TITLE

SCHEDULE E – SPECIAL AND TECHNICAL SPECIFICATIONS

The document SCCB_Special Provisions and Technical Specifications_Final reduced.pdf follows this page.

SCHEDULE E (SECTION 8)

PROJECT SPECIFIC SPECIAL PROVISIONS

8.0 SPECIAL PROVISIONS

This section contains any Special Provisions or revisions to the General Provisions that are applicable on the subject project. If the terminology of the Special Provisions conflicts with the terminology in the "City of Colorado Springs Engineering Division Standard Specifications", latest revision, the Special Provisions listed herein will take precedence.

8.1 DESCRIPTION OF WORK

The Contractor shall perform all operations necessary for the construction of this work as described in the plans and specifications, including restoration of all areas disturbed by the construction activities to a condition better than the pre- construction condition.

The Contractor shall obtain all permits and furnish all transportation, materials, tools, equipment, labor and supplies necessary to complete in a workmanlike manner the improvements as shown and specified in these documents. The Contractor shall comply with all the requirements of these permits.

The Contractor shall be responsible for verification and acceptance of the existing site conditions prior to proposing on the project. The Contractor shall notify the engineer 48 hours prior to the commencement of construction activities.

The Contractor shall be responsible for all work, whether it be performed by them or by others under a subcontract agreement.

All work required to construct all items in this contract shall be performed in a safe, careful, and orderly manner with due consideration given to protection of adjoining property, the public, and workmen. Any damage to streets, utilities, public or private property, or the benchmarks and construction staking due to the negligence of the Contractor, shall be repaired and restored to its original condition by the Contractor at their expense to the satisfaction of the Engineer. It will be the Contractor's responsibility to ensure that areas not in conflict with new work are not disturbed or damaged during the construction process.

8.2 PRECONSTRUCTION CONFERENCE

Within 10 calendar days after issuance of the Notice to Proceed, or as otherwise established by the Owner and Engineer, a preconstruction conference shall be held for review of the construction schedule, Contractor's list of Subcontractors and suppliers, project contracts, Traffic Control Plan with Supervisor name and telephone number and certifications, procedures for handling shop drawings, processing Applications for Payment, and other pertinent items. The Contractor (and Subcontractor) should address any construction problems which may be foreseen in the execution of the project work at the preconstruction conference.

8.3 DRAINAGE AND EROSION CONTROL

Contractor shall provide for the drainage of storm water and such water as may be applied or discharged on the site in performance of the work. Drainage facilities shall be adequate to prevent damage to the work, the site and adjacent property. Supervision of the Erosion Control Items is considered subsidiary to each item.

The Contractor shall prevent the pollution of drains and watercourses by sanitary waste, sediment, debris or other substances resulting from this work. Contractor shall be required to clean up and isolate such materials on a continuing basis to prevent risk of washing into such drainage ways.

Contractor shall obtain a copy of and follow the language of the City of Colorado Springs MS4 permit and all other state and local permits.

Contractor shall be responsible for preparing a Stormwater Management Plan (SWMP) and obtaining all state and local storm water discharge permits. The Stormwater Management Plan shown in the contract documents is provided as a guide for the completed condition of the project for the contractor to bid on the project and may be used by the contractor as a portion of the project SWMP or the Contractor may elect to modify or prepare a new SWMP. The approved SWMP must include a Stormwater Management Plan for all phases throughout construction. When a modified or new SWMP is prepared, it must be prepared by a licensed engineer in the State of Colorado and submitted to the Engineer for review and approval prior to applying for permits. The SWMP used to obtain the permits, and any modifications to the SWMP as directed by the permitting agencies, shall be considered the approved SWMP. The approved SWMP shall be submitted to the Engineer with a copy of permit notice prior to beginning construction.

Contractor shall be responsible for maintaining erosion control and updating the SWMP for all phases of the project construction.

8.4 PROJECT INFORMATION SIGNS

The Contractor shall be responsible for installing and maintaining all project signs throughout the duration of the Contract. The City will furnish project signs with the PPRTA Logo for placement within the project by the Contractor. The Contractor shall be responsible for moving project signs and for installing completion signs after completion of the project. Project signs will not be paid for separately, but will be considered subsidiary to the work.

8.5 CONSTRUCTION WORK HOURS

The Contractor shall conduct normal activities between the hours of 7:00 a.m. and 7:00 p.m., unless otherwise approved by the Owner. Except during the full closure of the road, between 6:00 a.m. to 9:00 a.m. and 4:00 p.m. to 7:00 p.m. Monday through Friday, all work done next to live traffic shall be outside of the area used by the traveling public.

All work shall be done behind the protection of temporary guarding or barricade system unless otherwise approved by the Owner. It is the responsibility of the contractor to submit a traffic control and barricade plan for permitting to the City.

8.6 WORK SITE RESTRICTIONS

Prior to the Pre-Construction Conference, the Contractor shall submit a staging area plan showing their proposed location for field facilities, laydown areas, equipment storage areas, and site access routes to the Engineer for approval. The Contractor shall confine the work activities generally to the areas shown in the construction drawings. The established work zone shall be marked and secured with an appropriate fence. The fence type shall be approved by the Engineer prior to installation. Temporary fences are considered incidental to the work and will not be paid for separately. The Contractor shall restore any damage or disruption to other properties utilized in the performance of this project to an equal or better than pre-construction condition at no cost to the City. The Contractor shall hold the City harmless from any claims to damage or disruption of private property.

Contractor personnel shall not unnecessarily enter upon private property without the express written consent of the landowner. The Contractor shall provide the Engineer with a copy of the written permission. The City will be held harmless of Contractor negligence in matters of trespassing. The Contractor shall minimize construction traffic along residential streets where practical.

8.7 CONSTRUCTION TRAFFIC RESTRICTIONS

Construction traffic control shall conform to Section 800 of the City of Colorado Springs Standard Specifications as revised herein and the City of Colorado Springs Supplement to the Manual on Uniform Traffic Control devices.

The Contractor shall comply with all traffic restrictions that are included in the plans (including general notes).

The City of Colorado Springs Traffic Technician or the Engineer will field check the Traffic Control operations. The City Traffic Technician and the Engineer have the authority to immediately stop work if traffic control is not functioning properly or if the approved plan is not adhered to in order to maintain safe operations of traffic in the project area. If the City Traffic Technician or the Engineer feels that the traffic control is not adequate, they will require a review and approval of the Contractor's Traffic Control Plans. If a new Submittal Review and approval is required, all time delays and expenses incurred by the contractor related to the additional requirements shall be the responsibility of the contractor. Contractor shall be responsible for preparing traffic control plans and obtaining all required permits.

8.8 BUSINESS AND RESIDENTIAL ACCESS

There are no residential accesses within the project limits. There is business access through the project limits. Access must always accommodate emergency services vehicles through the project. Additional coordination with emergency services is required if the access location to the property is relocated from the existing location. This supersedes City Standard Specification 805.08.

8.9 COORDINATION WITH COMMUNITY

The Contractor shall coordinate with the City Communications Office and the neighboring property owners to ensure that residents are notified a minimum of 7 days in advance of street closures.

South Cheyenne Canyon Road or Mesa Ave can be closed for construction but they cannot be closed simultaneously. All road closures are contingent upon an approved detour plan.

The Contractor shall coordinate with Mountain Metro Transit to identify and notify area residents with special needs (sight, hearing and/or mobility impaired) to ensure that modified pedestrian routes and detours are communicated and access to transit stops is maintained.

8.10 SOIL CONDITIONS

The Contractor assumes all risks connected with the surface and subsurface conditions actually encountered by them in performing the work, even though such actual conditions may result in the Contractor performing more or less work than they originally estimated. The Contractor shall perform whatever exploratory excavations and tests they deem necessary to determine the site conditions.

The Contractor shall utilize all suitable excavated material as approved by the Engineer for raising grades and backfilling the new construction. Additional imported material shall be a well graded non-expansive inorganic soil or as herein after specified. A geotechnical investigation report is available upon request.

8.11 UTILITIES

The size and location of all existing utilities as known to the Engineer have been noted on the plans for the information and guidance of the Contractor. The Contractor shall be responsible for the location and protection of all utilities located within their working area regardless of whether or not their existence or location is shown or noted on the drawings.

All overtime costs for inspection by City Utilities shall be at the Contractor's expense and will be billed directly from Colorado Springs Utilities to the Contractor.

It is the Contractor's responsibility to complete required work and to schedule inspections during normal working hours. The Contractor is responsible for contacting each affected utility for their inspectors' working hours. The Contractor is responsible to request an inspection three (3) working days in advance of the inspection. In the case of an overtime inspection, the request must be in writing. The City will not entertain any requests for time extensions for delays caused by the Contractor's failure to properly notify the affected utility of a required inspection or the Contractor's failure to complete the required work by the time of the scheduled inspection.

The accuracy of information furnished in the contract documents with respect to underground utilities is not guaranteed. The Contractor shall make their own investigations, including exploratory excavations, to determine the locations and type of existing mains and service laterals or appurtenances.

The Contractor shall notify all utility companies who may have installations in the area where the work is to be performed and solicit their aid in locating horizontally and vertically utilities prior to any excavation. All utilities encountered must be kept in operation by the Contractor and must be protected and/or repaired at the Contractor's expense.

City of Colorado Springs Utilities

Utility Problems or Questions	719-448-4800
Utility Notification Center of Colorado (UNCC)	800-922-1987

Miscellaneous Utility Services

Utility Notification Center of Colorado (UNCC)	800-922-1987
Engineering Division for Inquiries	719-385-5918

At least three (3) business days prior to commencing excavation, the Contractor shall call UNCC at 1-800-922-1987 between the hours of 7:30 A.M. and 4:30 P.M., Monday through Friday, for information concerning the location of buried utilities in the area of construction.

Below is a Pre-Excavation Checklist which the Contractor shall follow prior to commencing construction on the project.

Pre-Excavation List

_ Utility Notification Center of Colorado (UNCC) called at least three (3) business days prior to construction at: 1-800-922-1987

_ Utilities marked and located on the ground

_ Employees briefed and knowledgeable on marking and color codes*

_ Employees trained on excavation and safety procedure for Natural Gas Lines

_ When excavation approaches gas lines, employees expose lines by careful probing and hand digging

Standard Utility Marking Color Code

Natural Gas	Yellow
Electric	Red
Water	Blue
Wastewater	Green
Communications	Orange

The Contractor shall be responsible for coordination and cost of all utility relocations indicated on the plans and not specified to be done by others. Utility locations shown on the plans are approximate.

The contractor shall coordinate work with various Utility companies and other construction taking place within project limits. Notify applicable Utility companies and other Contractors prior to commencing work, if damage occurs, or if conflicts or emergencies arise during work. No schedule extensions will be granted to the Contractor due to utility coordination issues. It is the responsibility of the Contractor to coordinate with utilities in advance to prevent impacts to the project schedule. The following utility companies are believed to have facilities within or near the project limits:

Water: Colorado Springs Utilities: AJ Wertz, 719-668-4737
Telecom: Century Link Communications: Patti Moore 719.964.1052

The work described in the plans and specifications will require full coordination between the Contractor and Utility Companies while performing their respective operations, so the utility work can be completed with minimum delays to all parties concerned.

The Contractor shall coordinate with residences and businesses affected by any sanitary sewer, electric, gas, or water service shutdowns at least 48 hours prior to shut down.

The Contractor shall be responsible for coordinating the adjustment of all utilities on this project. The Contractor shall keep each utility company advised of any work being done to their facilities, so that each utility company can coordinate their inspections for final acceptance with the Engineer.

For utility work that is to be performed by a utility company, Contractor shall provide notice to the utility company that the site is ready for the utility work. The written notice, with a copy to the Engineer, shall be given a minimum of three weeks prior to the requested start of the utility work.

The Contractor shall provide, at the preconstruction meeting, a detailed description of the proposed utility coordination program for the project. The program will describe the steps that will be taken to avoid delays in the event that unknown or differing conditions are encountered during construction. The program shall address both public and private utilities. The program shall be submitted to both the affected utilities and the Engineer immediately following the Notice to Proceed for review and approval. Furthermore, any claims made for delay of critical path schedule, shall be submitted immediately to the Engineer.

8.12 PROTECTING PLANTINGS

The Contractor shall protect all existing trees, shrubs and other plantings from above ground and root structure damage during the construction activities not designated for removal in the plans. Unnecessary damage to plants or trees will subject the Contractor to cash penalties as determined by the Engineer.

Tree branches shall be trimmed back to the trunk, all around, to a minimum height of 8’ above the adjacent walkway. Work shall be done only by a licensed Tree Service.

8.13 SCHEDULE

General Provision Section 105 of the City of Colorado Springs Engineering Division Standard Specifications is hereby revised for this project as follows:

In General Provision 105.01 Schedule, the software requirements in the first paragraph shall be revised as follows:

All CPM schedules submitted for review by the Project Engineer shall include capability of being read and manipulated by Microsoft Project 2016.

General Provision 105.01 Schedule shall include the following:

Upon approval of the baseline schedule by the Engineer, no changes to schedule task durations or schedule logic ties shall be permitted without prior written approval by the Engineer.

General Provision 105.01 Schedule shall include the following:

The Contractor's schedule shall contain the following:

a) "Notice to Proceed" is anticipated in November 2023.
b) The Contractor shall complete all work within 120 CALENDAR DAYS in accordance with the "Notice to Proceed".
c) The project shall generally be progressed as follows:
    a. Install temporary Construction Control Measures (CCMs)
    b. Clearing and grubbing operations
    c. Install water diversion
    d. Vehicle Bridge Construction
    e. Demolition
    f. Pedestrian Bridge Abutment Construction
    g. Channel Grading
    h. Channel improvements
    i. Paving improvements and operations
    j. Site cleaning and demobilization

8.14 ACCIDENT PREVENTION

General Provision Section 106 of the City of Colorado Springs Engineering Division Standard Specifications is hereby revised for this project as follows:

General Provision Subsection 106.05 Accident Prevention, second paragraph shall include the following:

The Contractor shall determine the need for piling, sheeting and/or shoring as part of the bid and shall include all costs for such work in the appropriate bid item(s). Design calculations, plans and shop drawings for piling, sheeting and/or shoring shall be submitted in accordance with Special Provision 8.18 Shop Drawings and Submittals.

8.15 LIQUIDATED DAMAGES

General Provision Section 109 of the City of Colorado Springs Engineering Division Standard Specifications is hereby revised for this project as follows:

In General Provision Subsection 109.02 Failure to Complete Work on Time, Liquidated Damages, delete the table and replace with the following:

The liquidated damages for this project shall be $2,600 per day.

The following provision is hereby added to General Provision Subsection 109.02:

Failure to implement the Stormwater Management Plan puts the project in automatic violation of the City MS4 Permit and project specifications. Penalties may be assessed to the Contractor by the appropriate agencies. All fines assessed to the City for the Contractor's failure to implement the SWMP shall be deducted from moneys due the Contractor.

The Engineer will immediately notify the Contractor in writing of each incident of failure to perform erosion control in accordance with the SWMP. The Contractor will be allowed 48 hours, but correction shall be made as soon as possible from the date of notification to correct the failure.

8.16 PROTECTION OF UTILITIES

General Provision Section 109 of the City of Colorado Springs Engineering Division Standard Specifications is hereby revised for this project as follows:

In General Provision Subsection 109.13 Protection of Utilities, delete the first sentence in the fifth paragraph and replace with the following:

> Before any excavation is begun in the vicinity of existing utilities or structures, each utility company, department, or company concerned shall be notified in advance of such excavation, and such excavation shall not be made until an authorized representative of the utility concerned is at the site.

In General Provision Subsection 109.13 Protection of Utilities, change references to “Cablevision” to “Comcast.”

8.17 STAKING WORK

General Provision Section 109 of the City of Colorado Springs Engineering Division Standard Specifications is hereby revised for this project as follows:

In General Provision Subsection 109.20 Staking Work, first paragraph, shall include:

> Staking requirements shall include all structures, underground construction including storm drain and utilities, bridges, retaining walls, privacy walls, noise walls, and vaults.
>
> Contractor is wholly responsible for the correct horizontal and vertical location of all project items. Items not constructed in the proper location will be removed and replaced in the correct location without additional cost to the project or time to the schedule.

8.18 SHOP DRAWINGS AND SUBMITTALS

The selected contractor will participate in utilizing Masterworks for project management and collaboration effort with City and consultant staff. The City will provide user access to the selected contractor during the construction contract award process.

The City of Colorado Springs will require the use of this web-based project management tool in order to streamline project management, facilitate the appropriate distribution of information, and manage the communication needs of the project between participating City, contractor and consultant staff.

At a minimum this system will be used by the selected contractor, consultant and City staff to post, review, track, and approve items such as:

- Schedules
- Requests for Information (RFI’s),
- Submittals
- Shop drawings
- Change orders
- Materials testing data
- Project pay estimates
- Project photos
- Meeting agenda and minutes

All documents submitted by the contractor shall be submitted in electronic format in Masterworks.

General Provision Section 109 of the City of Colorado Springs Engineering Division Standard Specifications is hereby revised for this project as follows:

In General Provision Subsection 109.23 Shop Drawings and Submittals, delete the first sentence in the first paragraph and replace with the following:

The Contractor shall submit to the Engineer all shop drawings, working drawings, and submittals in a timely manner, considering the 14-day review period for shop drawings. Colorado Springs Utilities review of submittals requires a minimum of 21 days. At no time shall shop drawings be submitted less than 30 days prior to anticipated construction of that element. The Contractor shall submit to the Engineer all project schedules within 21 calendar days of Notice of Award for review. The Contractor shall include Engineer review time in the work schedule. Failure of the Contractor to deliver submittals in sufficient time for the Engineer's review shall not constitute a delay on the part of the City. Submittals which may require a review beyond the first submittal shall not constitute a delay on the part of the City. Shop drawings and submittals shall be at a minimum of those items listed in Table 109-1 and any other additional submittals which may be required by the Engineer. The submittals shown in the table is not all inclusive. Other submittals may be required.

In General Provision Subsection 109.23 Shop Drawings and Submittals, delete the first sentence of the second paragraph and replace with the following:

One electronic (scanned) copy of all shop drawings, working drawings, and schedules shall be submitted to the Engineer, who after checking will return an electronic (scanned) copy of the submittal to the Contractor. These submittals and responses shall be done in the City's Masterworks system. Colorado Springs Utilities may require additional copies for components that may be reviewed by CSU. Contractor shall not begin work until shop drawings and schedules are approved by the Engineer.

General Provision Subsection 109.23 Shop Drawings and Submittals shall include the following:

Shop Drawings, Working Drawings, Other submittals, and Construction Drawings.

A. Shop drawings, Working Drawings, and Other Submittals - General. All work shall be performed in accordance with the plans, reviewed shop drawings, working drawings, or other submittals. Specific requirements for the required shop drawings, working drawings, and other submittals for this project are contained in the specifications.

B. The Contractor shall be responsible for the accuracy of all dimensions and quantities shown on the shop drawings, working drawings, and other submittals. The Contractor shall correlate all information in the Contract, in the submittals, and in all revisions at the project site to ensure that there are no conflicts and that the work can be constructed as shown. The Contractor shall be responsible for all information that pertains to the fabrication processes and methods of construction.

C. Shop drawings, working drawings, and other submittals shall be delivered to the Engineer. The Contractor shall notify the Engineer, in writing, at the time of submittal of shop drawings, working drawings, and other submittals, of any information submitted that deviates from the requirements of the plans and specifications. In addition, specific notation of the deviations or changes from the plans and specifications shall be placed on the shop drawing, working drawing, or other submittal.

D. The first sheet or page of each set of shop drawings, working drawings, and other submittals shall be reviewed by the Contractor for conformance with the other work on the project, and stamped with a stamp indicating their review of the submittal. Submittals shall be made in complete packages which will allow the Engineer to properly review them for general compliance with the Contract and to effectively evaluate the proposed methods of construction. The allowed time for review shall not begin until such submittals are complete.

E. The format of the shop drawings, working drawings, and other submittals shall be as follows:

1. All manually drafted shop drawings and working drawings shall be either 34 inches long by 22 inches wide overall, or 17 inches long by 11 inches wide overall. There shall be a 2-inch margin on the left side of the sheet and a ½ inch margin on the other three sides. A blank space, 4 inches long by 3 inches wide, shall be left available near the lower right-hand corner of shop drawings, for the Engineer's review stamp.
2. A title block shall be located in the lower right-hand corner of each sheet, and shall show the project number, structure name, contents of the sheet, designer/engineer, sheet number, and revision number.
3. Design notes, calculations, lists, reports, descriptions, catalog cuts, and other on-drawing submittals shall be submitted on 8½ inch by 11-inch sheets.
4. The shop drawings, working drawings, other submittals and all revisions shall be signed and sealed for the Contractor, by a professional engineer registered in the state of Colorado when required by the specifications. Submittals without the required signature and seal will not be accepted and will be returned to the Contractor without action.

Table 109-1 summarizes the minimum required submittals and is included at the end of this subsection. Table 109-1 lists submittals in one location for information. The table clarifies the type of submittal and whether the Contractor's Engineer must sign and seal the submittal. Table 109-1 may not be all inclusive. The Contractor shall provide all submittals required by the Contract, including those not listed in the table.

Shop Drawings. The Contractor shall provide shop drawings to adequately control the work. The Contractor shall submit shop drawings to the Engineer for formal review.

The Engineer will review the shop drawings to evaluate that general conformance with the design concept and that general compliance with the information given in the plans and specifications has been achieved. The review does not extend to accuracy of dimensions, means, methods, techniques, sequences, schemes, procedures of construction, or to safety precautions. The review by the Engineer is not a complete check. Review of the shop drawings does not relieve the Contractor of the responsibility for the correctness of the shop drawings. All work done prior to the Engineer's review of shop drawings shall be at the Contractor's sole risk.

The Engineer may request additional details and require the Contractor to make changes in the shop drawings which are necessary to conform to the provisions and intent of the plans and specifications without additional cost to the project.

After review, the Engineer will return an electronic (scanned) set of shop drawings, for use by the Contractor and the Fabricator or Supplier. Returned shop drawings will be stamped with the Engineer's review stamp to indicate one of the following:

Reviewed, no exception taken	Shop drawings have been reviewed and do not require resubmittal.
Reviewed, revise as noted	Shop drawings have been reviewed and the Contractor shall incorporate the comments noted in the shop drawings into the work. The shop drawings do not require resubmittal.
Resubmit, revise as noted	Shop drawings require correction or redrawing and shall be resubmitted for review. Corrections shall be made and the shop drawings shall be resubmitted by the Contractor in the same manner as the first submittal. Specific notation shall be made on the shop drawing to indicate the revisions.
Rejected	Submittal may or may not have been reviewed, but does not meet the minimum requirements for a review. Rejected submittals shall be repackaged and resubmitted after the submittal meets minimum requirements for review.

Submit Specified Item	Shop drawings have been reviewed and are not approved without the submittal of the specified item. Engineer is not responsible for project delays when additional items are required for approval.

The time required for the Engineer's review of each submittal will not exceed 14 days after a complete submittal of shop drawings is received by the Engineer, except reviews performed by Colorado Springs Utilities which will not exceed 21 days. It is the intent of these specifications that no more than one submittal of shop drawings shall be required for any one particular item. If additional submittals are required by actions of the Contractor, resulting delays shall be the responsibility of the Contractor. If additional submittals are required by the Engineer's actions or if shop drawing review is delayed by the Engineer, and if the resulting delay is material to the project schedule critical path, the Contractor may request an extension of time equal to the number of days exceeding the 14 or 21-day review per submittal for review performed by the Engineer.

All revisions made to the shop drawings after the Engineer's initial review process require re-submittal and will be required to follow time frames as set forth for the initial submittal.

Working Drawings. The Contractor shall supplement the plans with working drawings to detail the construction or to provide the Engineer with information on the proposed methods of construction. These drawings will not be formally reviewed by the Engineer. The Contractor shall submit working drawings to the Engineer 21 days before the start of work.

Other Submittals. Other submittals shall be prepared and submitted by the Contractor as defined for working drawings. The plans or specifications will indicate which submittals require formal review by the Engineer. One record set of all design work performed by the Contractor's Engineer shall be submitted to the Project Engineer.

Construction Drawings. The Contractor shall keep one set of plans, reviewed shop drawings, working drawings, and other submittals available on the project site at all times. This set shall be defined as the "construction drawings." The Contractor shall note on these construction drawings all changes and deviations from the work shown on the plans, shop drawings, working drawings, and other submittals. The construction drawings shall be kept current as the work progresses and notations shall be made within seven days of the change or deviation. Requests for Information (RFIs) and the answer/response shall be attached to the construction drawings.

At the completion of the project, the first sheet or page of each set of construction drawings shall be stamped "As Constructed" and signed by the Contractor. Upon completion of the work and prior to final payment, the construction drawings shall be submitted to the Engineer.

Furnishing the shop drawings, working drawings, construction drawings, and other submittals will not be measured and paid for separately, but shall be included in the work.

Failure of the Contractor to comply with the requirements for shop drawings, working drawings, other submittals, and construction drawings may be considered unsatisfactory contract progress. Monthly progress payments may be withheld until the requirements are met.

Except as specifically noted, all time required for review of shop drawings, working drawings, and other submittals shall be included in the work and shall not be the basis for any claim for a time extension or monetary adjustment except as provided for herein.

Table 109-1
Summary of Contractor Submittals (not all-inclusive)

CDOT SPEC SECTION	DESCRIPTION	TYPE	CONTRACTOR P.E. SEAL REQUIRED?
202	Bridge Removal Plan	Working Drawing	No
208	Water Control Plan	Plan / Working Drawings	No
208	Temporary Diversion	Working Drawing	No
211	Seeding	Shop Drawings	No
216	Erosion Control Blanket	Shop Drawings	No
304	Aggregate Base Course (ABC)	Shop Drawings	No
310	Hot Mix Asphalt (HMA) Mix Design	Shop Drawings	No
506	Riprap (all gradations)	Shop Drawing	No
601	Permanent Steel Bridge Deck Forms	Working Drawing	No
601	Concrete Mix Design(s)	Shop Drawings	No
602	Reinforcing Steel	Working Drawing	No
608	Detectable Warnings	Shop Drawings	No
614	Sign Panels	Shop Drawings	No
618	Prestressed Concrete (Pre-Tensioned)	Shop Drawing	No
627	Pavement Markings	Shop Drawings	No
628	Pedestrian Bridge	Shop Drawings	Yes
643	Stone Veneer Stone Samples	Samples	No

* A PE seal is required where the Contractor has provided the design for the item, or performed engineering to modify the details shown on the plans. The PE seal is not required where complete details are provided on the plans.

8.19 FINAL INSPECTION AND ACCEPTANCE

General Provision Section 110 of the City of Colorado Springs Engineering Division Standard Specifications is hereby revised for this project as follows:

General Provision Subsection 110.04 shall include the following:

Upon written notice that the Contractor considers all work complete, the Engineer shall make a final inspection with the Owner and Contractor and shall notify the Contractor in writing of incomplete or defective work revealed by the inspection. The Contractor shall promptly remedy such deficiencies.

After the Contractor has remedied all deficiencies to the satisfaction of the Engineer and delivered all construction records, as-built drawings, maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection and other documents (all as required by the Contract Documents), the Owner and Contractor shall be promptly notified in writing.

SCHEDULE F (SECTION 10)

TECHNICAL SPECIFICATIONS

This section contains the Standard Specifications and Revisions of Standard Specifications.

10.1 STANDARD SPECIFICATIONS

The following are the Standard Specifications which apply to this project. In the event there are conflicting Standard Specifications, the order of precedence will be based upon the order in which the Standard Specifications are listed.

All Contractors are required to have on the job site and use the current updated copy of the Standard Specifications applicable to the work.

Revisions to the Standard Specifications can be found in Subsection 10.2 of this document.

CITY OF COLORADO SPRINGS ENGINEERING DIVISION STANDARD SPECIFICATIONS

- The *City of Colorado Springs Engineering Division Standard Specifications*, current edition and addenda, except as modified hereinafter, which are incorporated in the contract documents by reference as though embodied herein in their entirety, shall apply to this project.
- The *Pikes Peak Region Asphalt Paving Specifications Version 3*, current edition, except as modified hereinafter, which are incorporated in the contract documents by reference as though embodied herein in their entirety, shall apply to this project.
- The *Colorado Springs City Traffic Signal Installation and Parts Specifications for Contractors*, current edition, except as modified hereinafter, which are incorporated in the contract documents by reference as though embodied herein in their entirety, shall apply to this project.
- The *City of Colorado Springs Traffic Engineering Signage and Pavement Markings Guidelines*, current edition, except as modified hereinafter, which are incorporated in the contract documents by reference as though embodied herein in their entirety, shall apply to this project.
- The *City of Colorado Springs Supplement to MUTCD for Traffic Controls for Street Construction, Utility Work, and Maintenance Operations*, current edition, except as modified hereinafter, which are incorporated in the contract documents by reference as though embodied herein in their entirety, shall apply to this project.
- The *City of Colorado Springs Drainage Criteria Manual, Volume II*, current edition, which are incorporated in the contract documents by reference as though embodied herein in their entirety, shall apply to this project.
- The *Colorado Department of Transportation Standard Specifications for Road and Bridge Construction*, current version, as modified by standard special provisions released by CDOT prior to bid date, and as modified hereinafter, which are incorporated in the contract documents by reference as though embodied herein in their entirety, shall apply to this project.

Copies of City Engineering Manuals are available online or from the City of Colorado Springs, Office Services Division, 30 South Nevada Avenue, Colorado Springs, during regular business hours.

Copies of the CDOT specifications and standard special provisions are available online from the CDOT website, here: https://www.codot.gov/business/designsupport/cdot-construction-specifications

10.2 REVISIONS TO STANDARD SPECIFICATIONS

REVISIONS TO CITY OF COLORADO SPRINGS ENGINEERING DIVISION STANDARD SPECIFICATIONS

The following revisions supplement or modify the *City of Colorado Springs Engineering Division Standard Specifications* and *Colorado Department of Transportation Standard Specifications for Roads and Bridge Construction 2022*. Measurement and Payment for all bid items shall be in accordance with the measurement and payment sections of the Standard Specifications or revisions thereof.

REVISION OF CDOT SECTION 202
REMOVAL OF BRIDGE

Section 202 of the Standard Specifications is hereby revised for this project as follows:

Subsection 202.01 shall include the following:

This work consists of removal of the existing bridge in South Cheyenne Canon. The bridge is owned by the City of Colorado Springs, and the existing structure number is as follows:

1. CM02.356W03.31S

As-built plans for the existing bridge is not available, but inspection reports can be provided by the City.

Bridge removal shall consist of the complete removal of all superstructure and substructure elements unless otherwise shown on the plans. Stone veneer on the existing bridge is to be saved and stockpiled on site for re-use on the replacement bridge being constructed at each site. Removal and stockpile of the veneer shall not be measured and paid for separately, but included in the removal of bridge.

Subsection 202.02 shall include the following:

The Contractor is responsible for submitting the Demolition Nonratification Application Form to the Colorado Department of Health and Environment for each bridge to be removed.

The removal of the existing bridge shall be performed in a safe manner.

All materials removed from the existing bridge shall become property of the Contractor, except for the existing stone veneer and repurposed rails at each bridge being salvaged and stockpiled. The remaining materials shall be disposed of off the project site unless noted or approved otherwise by the Engineer. Components of the structure that are structural steel may be coated with paint which contains lead. Management and disposal of the steel railing and girder and any paint debris waste shall be accomplished in accordance with Revision of Section 250 – Environmental, Health and Safety Management

The Contractor shall submit a Bridge Removal Plan to the Engineer for review and acceptance at least 20 working days prior to the proposed start of removal operations. This Plan shall detail procedures, sequences, and all features required to perform the removal in a safe and controlled manner**.** The Bridge Removal Plan shall be stamped “Approved for Construction” and signed by the Contractor. The Bridge Removal Plan will be submitted to the City for review concurrent with the Engineer’s review for general specification compliance, but will not be approved by the Engineer. Comments from the Engineer’s review of the Bridge Removal Plan shall be submitted in writing to the Contractor within seven calendar days from receipt of the**.** Acceptance of the Bridge Removal Plan will be contingent upon the Contractor adequately addressing all written comments provided by the Engineer.
The Bridge Removal Plan shall provide details of the bridge removal process, including:

(1) The removal sequence corresponding to the construction phasing shown on the plans, and the Contractor’s removal equipment. Sequence of operation shall include a schedule that complies with the working hour limitations.

(2) Roles, responsibilities, and positioning of all critical workers during removal activities. This section shall include instructions for communicating and managing a 'safe-all-stop' scenario if unexpected hazards are discovered during the activity.

(3) Details, locations, and types of protective coverings to be used. The protective covering shall prevent materials, equipment, and debris from falling into the creek below.

(4) Methods for protection of live waterways including minimization of turbidity and sedimentation, and protection of existing wetlands.

(5) Detailed methods for mitigation of fugitive dust resulting from the demolition.

(6) Contingency planning for unexpected weather.

(7) Details for emergency and post-incident management in a catastrophic failure or other serious incident or worker injury.

The final Bridge Removal Plan shall be stamped "Approved for Construction" and signed by the Contractor. The Contractor shall submit a final Bridge Removal plan to the Engineer prior to bridge removal for record purposes only. The Contractor shall not begin the removal process without the Engineer's written authorization.

The Contractor shall notify all emergency response agencies of the proposed removal work and any detours a minimum of three (3) days in advance of work. This shall include the local Police Department, local Fire Department, all local ambulance services, and the local Sheriff's Department, as appropriate.

The Engineer shall be notified in writing when all work is complete, at which time the Engineer will require a final site inspection with the Contractor to ensure that the Contractor's removal work has been satisfactorily completed.

Should an unplanned event occur or the bridge removal operation deviate from the submitted bridge removal plan, the bridge removal operations shall immediately cease after performing any work necessary to ensure worksite safety. The Contractor shall submit to the Engineer, the procedure or operation proposed by the Contractor's Engineer to correct or remedy the occurrence of this unplanned event or to revise the final Bridge Removal Plan. The Contractor shall submit their Engineer's report in writing, within 24 hours of the event, summarizing the details of the event and the procedure for correction. Bridge removal operations shall not resume until a written notice to resume work is issued by the Engineer.

Bridge removal may be suspended by the Engineer for the following reasons:

(1) Final Bridge Removal Plan has not been submitted, or written acceptance has not been provided by the Engineer to begin the removal.
(2) The Contractor is not proceeding in accordance with the final Bridge Removal Plan, procedures, or sequence.
(3) The Contractor's Engineer is not onsite to conduct inspection for the written approval of the work.
(4) Safety precautions are deemed to be inadequate.
(5) Existing neighboring facilities are damaged as a result of bridge removal.

Suspension of bridge removal operations shall in no way relieve the Contractor of their responsibility under the terms of the Contract. Bridge removal operations shall not resume until modifications have been made to correct the conditions that resulted in the suspension, as approved in writing by the Engineer.

Prior to reopening the roadway to public traffic, all debris, protective pads, materials, and devices shall be removed, and the roadways swept clean.

Explosives shall not be used for removal work without the written approval of the Engineer.

Existing stone veneer and repurposed rails removed from the existing structure shall be salvaged and stockpiled for re-use on the new bridges. All other removed material shall become the property of the Contractor and shall be properly disposed of offsite at the Contractor's expense, unless otherwise stated on the plans.

Existing structures, facilities, and surrounding roadways shall not be damaged by the removal operations. Damage that occurs shall be repaired immediately at the Contractor's expense.

Subsection 202.11 shall include the following:

Measurement of Removal of Bridge will be based on the number of bridges removed in entirety and accepted by the Engineer. Preparation of the Bridge Removal Plans shall not be measured or paid for separately. Measurement of the removal, salvage and stockpiling of the existing stone veneer and railings for reuse on the new bridges shall be on a Force Account basis as determined and approved by the Engineer.

Subsection 202.12 shall include the following:

Payment will be made under:

Pay Item	**Unit**
Removal of Bridge	Each

Payment for Removal of Bridge will be full compensation for all labor and materials required to complete the work, including, preparation and implementation of the Bridge Removal Plan, Engineering work, inspection, equipment, debris handling and disposal, salvaging, handling and storage of salvable materials, handling and disposal of all hazardous materials and disposal of non-salvable materials.

Costs associated with the Demolition permits shall be included in the cost of the bridge removals.

END OF SECTION

REVISION OF CDOT SECTION 206
STRUCTURAL BACKFILL (SPECIAL)

Section 206 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

This work shall consist of Structural Backfill (Special) in the location as designated in the plan.

MATERIALS

For Structural backfill (special) see material requirements for Structural Backfill (Class 1)

CONSTRUCTION REQUIREMENTS

For Structural backfill (special) see construction requirements for Structural Backfill (Class 1)

BASIS OF PAYMENT

Pay Item	**Pay Unit**
Structural Backfill (Special)	Cubic Yard

END OF SECTION

CDOT SECTION 308
BREEZE SURFACING

Section 308 is hereby added to the Standard Specifications for this project as follows:

DESCRIPTION

308.01 This work consists of constructing a breeze surfacing (6-inch depth) pull-out.

MATERIALS

304.02 Breeze Surfacing. The breeze surfacing shall meet the requirements of subsection 703.11.

304.03 Solidifying Emulsion. The solidifying emulsion shall meet the requirements of subsection 702.05.

CONSTRUCTION REQUIREMENTS

304.04 Placing. Place breeze surfacing uniformly in layers no more than 1-1/2 inches thick.

Do not place breeze surfacing during rainy conditions.

304.05 Mixing. Mix solidifying emulsion thoroughly and uniformly throughout the breeze surfacing per the manufacturer's instructions. Mix the material in the field using portable mixing equipment or have it delivered in mixer truck from a local ready-mixed plant. For field-mixed material, apply a solidifying emulsion after compaction as recommended by the manufacturer. Prevent runoff or overspray of solidifying emulsion onto adjacent paved or planting areas.

304.06 Shaping and Compacting. Compact each layer of breeze surfacing to a relative compaction of not less than 90 percent. Start compaction at least 6 hours but no more than 48 hours after placement. Provide a finished breeze surfacing surface that is smooth and uniform. Maintain the finished surface slope gradients shown on the plans.

METHOD OF MEASUREMENT

304.07 Breeze surfacing (6-inch depth) will be measured by the square yard compacted in place.

BASIS OF PAYMENT

304.08 The accepted quantities of breeze surfacing will be paid for at the contract price bid per square yard, as shown in the bid schedule.

Payment will be made under:

Pay Item	**Pay Unit**
Breeze Surfacing	Square Yard

Water will not be measured and paid for separately but shall be included in the work.

Solidifying emulsion, when used, will not be measured and paid for separately but shall be included in the work.

END OF SECTION

CDOT SECTION 628
PREFABRICATED PEDESTRIAN BRIDGE

Section 628 is hereby added to the Standard Specifications for this project as follows:

DESCRIPTION

628.01 This work consists of the design, fabrication, and erection of a fully engineered clear span truss pedestrian bridge of fiber-reinforced polymer (FRP) composite construction with timber decking in accordance with the specifications and plan details.

Approved bridge suppliers are:

Arete Structures
7668 Valley Blvd
PO Box 745
Blowing Rock, NC 28605
828-434-0587

Additional bridge suppliers may be considered for approval upon submission of qualifications as defined in the specifications and demonstration of conformance to the specifications and plans.

MATERIALS

628.02 FRP Composites. FRP bridges shall be fabricated from pultruded high-strength E-glass and isophthalic polyester resin unless otherwise specified. Weathering and ultraviolet light protection shall be provided by addition of a veil to the laminate construction. Minimum material strengths and properties are as follows:

Tension – 30ksi
Compression – 30ksi
Shear – 4ksi
Bending – 30ksi
Modulus – 2,800,000psi
Young's Modulus – 2,800,000psi

The minimum thickness of FRP composite shapes shall be as follows unless otherwise specified:

Square tube members (closed-type shape) – 0.25in
Wide-flange beams, channels, and angles (open-type shapes) – 0.25in
Plates – 0.25in

628.03 Timber Decking. Timber decking shall be standard 3x12, No. 2 southern yellow pine and treated according to the American Wood Preservers Bureau.

628.04 Hardware. Bolted connections shall be A307 hot-dipped galvanized steel or A325 hot-dipped galvanized steel. Mounting devices shall be 6061-T6 aluminum. Stainless steel hardware is an acceptable alternative.

CONSTRUCTION REQUIREMENTS

628.05 Design. Structural design of the bridge shall be performed by or under the direct supervision of a Professional Engineer licensed in the State of Colorado and done in accordance with recognized engineering practices and principles and per the AASHTO LRFD Guide Specifications for Design of Pedestrian Bridges, as applicable to FRP truss type structures.

The bridge shall be designed for the following loads:

Dead Load: an 100psf snow load and as further specified in the AASHTO LRFD Guide Specifications for Design of Pedestrian Bridges.

Live Load: an 85psf pedestrian live load and H5 vehicular live load. The pedestrian and vehicular live load need not be applied concurrently. Vehicular impact considerations are not required. The timber decking shall be designed for an equestrian live load of 1kip distributed over a 4in x 4in square.

Wind Loads: as specified in the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals with an Importance Factor of 1.15. Additionally, the bridge shall be designed for wind uplift as specified in the AASHTO LRFD Guide Specifications for Design of Pedestrian Bridges.

Seismic: no seismic design of bridge truss superstructure is necessary

The bridge may be designed using Allowable Stress Design (ASD) or Load and Resistance Factored Design (LRFD) with a factor of safety for tension, compression, bending, bearing, shear, and all connection failure modes of 3.0.

Bridge deflection (vertically and horizontally) shall not exceed L/360, where L is the span length from centerline of bearing to centerline of bearing. The fundamental frequency of the bridge should be greater than 5.0Hz (vertically) and 3.0Hz (horizontally).

Bridge shall be mechanically pre-cambered over the full-length of the bridge such that the bridge will not sag when fully loaded.

628.06 Qualifications. The bridge manufacturer shall have been in business designing and fabricating the types of bridges described for a minimum of 5 years.

Submit 10 project examples of similar size and scope for review and approval by the City. Include project name. location, description, masonry bid value, general contractor and contact information, and owner's representative and contact information.

628.07 Fabrication. All cutting and drilling fabrication to be done by experienced fiberglass workers using carbide or diamond-tipped tooling of 1/16in. No material deviations beyond industry standards are accepted. All cut edges to be cleaned and sealed.

Bridge color shall be Olive Green. Color shall be added during the manufacturing process and not painted. A sample member shall be provided to the City for approval of color prior to bridge fabrication.

manufacturer shall have been in business designing and fabricating the types of bridges described for ridge shall be delivered to project site in component parts or partially assembled

and completely assembled on site using standard hand tools. Unloading, assembly, and placement of the bridge shall be responsibility of the Contractor, not the bridge manufacturer. The manufacturer shall provide assembly drawings and procedures. Temporary supports, rigging or lifting equipment is the responsibility of the Contractor, not the bridge manufacturer. The manufacturer shall provide lifting weights and attachment points at the request of the Contractor.

628.08 Shop Drawings. The Contractor shall submit Working and/or Shop Drawings of the following for approval:

Signed and sealed calculation and fabrication Shop Drawings for the bridge superstructure
Qualifications of the bridge designer and manufacturer
Assembly and/or erection Working Drawings for approval prior to any work on site.

METHOD OF MEASUREMENT

628.09 The bridge shall be paid for as a Lump Sum. Payment will be full compensation for all labor, materials, and incidentals required to complete the design, fabrication, and installation, including, but not limited to, the FRP truss, timber decking, bearing pads, and anchor bolts.

BASIS OF PAYMENT

642.20 The accepted quantity of Stone Fascia will be paid for at the contract unit price for the pay item listed below:

PAY ITEM	PAY UNIT
Bridge Girder and Deck Unit	EACH

END OF SECTION

CDOT SECTION 642
CUT STONE VENEER

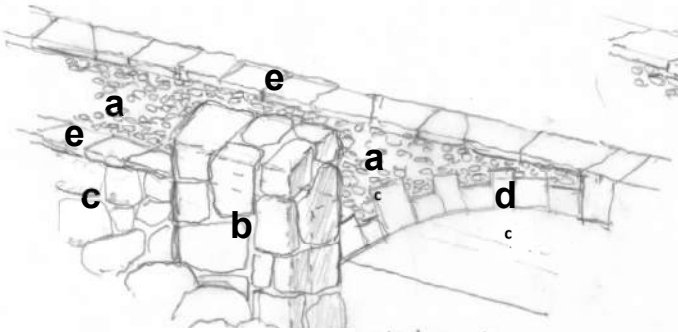
Section 642 is hereby added to the Standard Specifications for this project as follows:

DESCRIPTION

642.01 This work consists of furnishing native stone veneer on the retaining walls and bridge abutments throughout the project, in accordance with these specifications, and in conformity with the details shown on the plans, or as directed by the Owner's Representative. Stone Veneer is designated according to this section, as designated on the diagram below, and as follows:

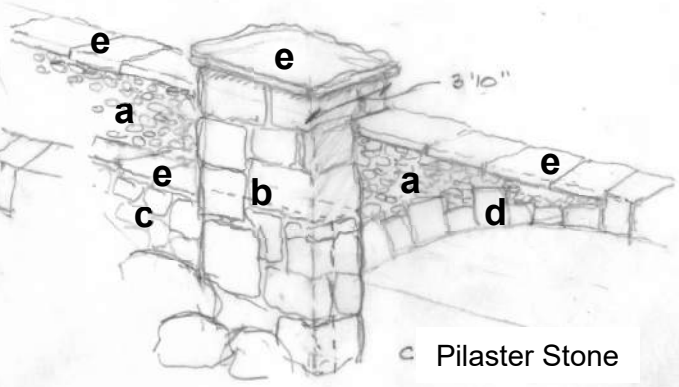
a. **Cobble Field.**
b. **Pilaster Stone.**
c. **Wall Stone.**
d. **Arch Border.**
e. **Capstone.**

Roadside Elevation

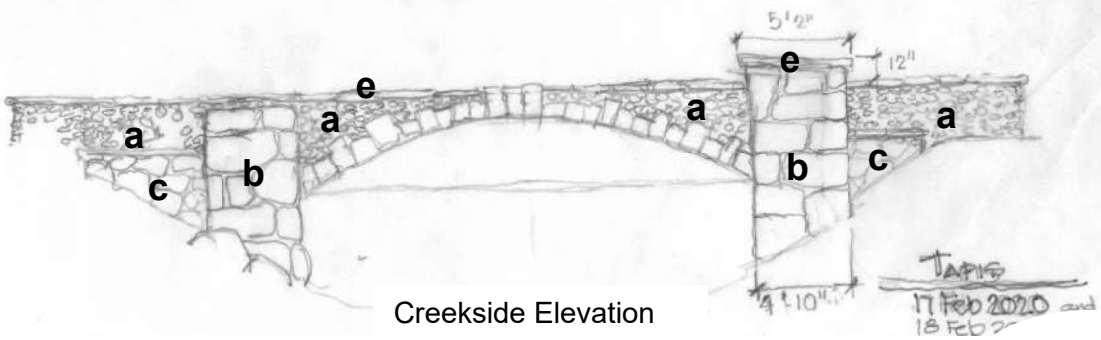


Pilaster Stone

abutment detail



c Pilaster Stone



Creekside Elevation

MATERIALS

642.02 Cobble Field. Cobble Field shall meet the requirements of subsection 704.05.

642.03 Pilaster Stone. Pilaster Stone shall meet the requirements of subsection 704.06.

642.04 Wall Stone. Wall Stone shall meet the requirements of subsection 704.07.

642.05 Arch Border. Arch Border shall meet the requirements of subsection 704.08.

642.06 Capstone. Capstone shall meet the requirements of subsection 704.09.

642.07 Masonry Joint Material. Masonry Joint Material shall meet the requirements of subsection 704.04.

642.08 Product Delivery, Storage, and Handling.

a. Stone salvaged on-site shall be cleaned of dirt, debris and existing mortar/concrete, then stored and protected on-site per the following directions for imported stone.
b. During transport and storage of imported stone, separate units from one another by wood strips or wedges.
    i. Rest units on wood or other approved types of material.
c. Do not allow stone to rest on earth.
d. Store so that stone veneer designation corresponding to drawings are easily discernible.
e. Cover stone and all materials of this section with waterproof covering and protect from weather and dirt.
f. Handle thin units carefully.
g. Store Capstone in vertical position.
h. Mortar and other moisture-sensitive materials shall be stored in protected enclosures; and handled by methods which avoid exposure to moisture. The Contractor shall protect materials from rain, moisture, and freezing temperatures prior to, during, and for 48 hours after completion of work.
i. Do not allow masonry joint material to rest on earth.
j. Cover all masonry joint material with waterproof covering and protect from weather and dirt.
k. Mortar and other moisture-sensitive materials shall be stored in protected enclosures; and handled by methods which avoid exposure to moisture. The Contractor shall protect materials from rain, moisture, and freezing temperatures prior to, during, and for 48 hours after completion of work.

642.09 Stone Anchors and Dowels. Refer to the Bridge Construction Drawings for rock anchorage details to the bridge, railing, and retaining wall structures.

CONSTRUCTION REQUIREMENTS

642.10 General.

a. Furnish sound, durable rock that is native to the vicinity of the work or is similar in texture and color to the native rock and has been proven satisfactory for the intended use.
b. Keep an adequate inventory of the stone on the site to provide an ample variety of stones for the masons. When additional stone is added, mix the new stone with the existing stone in a uniform pattern and color.
c. Furnish dimensioned masonry rock free of reeds, rifts, seams, laminations, and minerals that may cause discoloration or deterioration from weathering.
d. **Finish for exposed faces.** Remove all drill, quarry, and storage marks from exposed faces. Pitch face stones to the line along all beds and joints. Finish the exposed faces as specified in this section.
e. Remove all thin or weak portions.
f. Do not use rock with depressions or projections that might weaken it or prevent it from being properly bedded.
g. Provide an irregular projecting surface without tool marks, concave surfaces below the pitch line, and no projections 1½ inches beyond the specified pitch line. Uniformly distribute stones of the same height of projection.
h. All rock utilized in construction shall be installed in the mockup, approved in writing by the landscape architect, and proven satisfactory for the intended use.
i. Do not place stone masonry when the ambient temperature is below 32°F. Maintain completed masonry at a temperature above 40°F for 24 hours after construction.
j. Concrete surfaces to receive native stone veneer shall be thoroughly examined to ensure that the surface contains no releasing agents (form oil). If it does contain release agents, the surface shall be etched with muriatic acid, and rinsed thoroughly using high pressure water.
    i. Concrete core walls will have a minimum 28-day to cure prior to stone veneer application.
k. All stone shall be consistent color range and texture throughout the work.

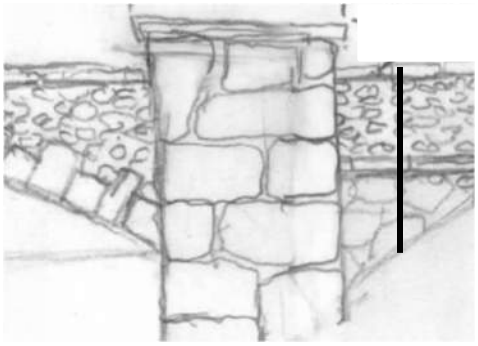
642.11 Installer Qualifications. Engage an Installer experienced in the type of stonework required having not less than 5 years successful experience on projects of similar size and scope. Installer shall be equipped to provide the quantity shown without delaying the work.

Submit 3 project examples of similar size and scope completed in the past 5 years for review and approval by the City. Include project name. location, description, masonry bid value, general contractor and contact information, and owner's representative and contact information.

642.12 Mock-Up.

a. Submit stone samples representing the range of colors and sizes to be used on the project to the Owners Representative 14-days before beginning work.
    i. Place stone samples in a secure location in the Park approved by the City and Owner's Representative.
    ii. City and Owner's Representative to approve submitted samples prior to proceeding.
b. City and Owner's Representative to approve mock-up location prior to proceeding.

c. Construct a 42” height sample section of bridge wall, minimum 8-foot in length, with one pilaster formed at each bridge location. Stone veneer shall show examples of Cobble Field, Pilaster Stone, Wall Stone, Arch Border, Capstone, method of stone type interface and connection, method of turning corners, and joint color, material and method of forming joints.
    i. Format mockup as shown in the sketch. Place mockup joint in location indicated by dark solid line.



    ii. If initial Mock-Up is not approved, additional mock-ups will be required until acceptable mock-up is approved by the City and Owner’s Representative.
d. Obtain City and Owner Representative written approvals before proceeding with stone veneer installation on the bridge and wall structures.
e. Maintain and protect Mock-up until all stone veneer work is completed.

642.13 Samples. Contractor shall:
a. Submit samples in sufficient quantity to show extreme variation which may reasonably occur in each kind of stone, regarding color, texture, and quality.
b. Obtain current samples of color range from quarry.
c. Place stone samples in a secure location in the Park approved by the City and Owner’s Representative.
d. City and Owner’s Representative reserve the right to approve more limited range of variation.
e. City and Owner’s Representative to approve submitted samples prior to proceeding.

642.14 Schedule. Provide planning schedule for purchase, storage, and delivery. Obtain current samples of color range from quarry or other available sources. Plan to secure and store appropriate quantities of materials. This scheduling may need purchasing of product a season ahead of the work being planned

642.15 Placing Stone Veneer. Contractor shall:
a. Clean all stones thoroughly and moisten immediately before placing. Clean and moisten the bed.
b. When removing and resetting stone masonry, use hand tools to clean the exposed faces of the stones of all mortar before resetting.
c. Install stone with stone anchors per the Bridge Construction drawings.
    i. Keep the concrete face continuously wet for 2 hours preceding the placing of the stone and fill spaces between the stones and concrete with mortar.
d. Spread the mortar.
    i. The thicknesses of beds and joints for stone veneer types are as specified in

MATERIALS of this section.

ii. Construct joints at varied angles to conform with the rock. Joints may be at angles with the vertical from 0 to 45 degrees.

iii. Level the cross beds for vertical walls. Beds for battered walls may vary from level to normal to the batter line of the face of the wall.

e. Place the stones.

i. Lay the stones with the longest face horizontal and the exposed face parallel to the masonry face. Flush the joints with mortar.

ii. Set face stones in random bond to produce the effect shown on the plans, specified herein and to correspond with the approved mockup section.

1. Place all stones, including the capstones, randomly to avoid a pattern. Use various size stones to coin or key the corners of the bridge wall.
2. Refer to construction drawings for expansion and movement joint locations and details in veneer. Lay stones to reflect the width of the expansion joints, and seal as detailed in plans. Alternate joint sealing details may be submitted for review and approval.

iii. Do not extend beds in an unbroken line through more than 5 stones and joints through more than 2 stones.

iv. Do not bunch small stones or stones of the same size, color, or texture. In general, the stones decrease in size from the bottom to the top of work.

v. Use large stones for the bottom courses and large, selected stones in the corners.

vi. Do not construct so that the corners of four stones are adjacent to each other.

f. Bond each face stone with all contiguous face stones.

g. Do not jar or displace the stones already set. If a stone is loosened after the mortar has taken initial set, remove it, clean off the mortar, and relay the stone with fresh mortar.

h. Accommodate weep holes with stone veneer, as needed.

642.16 Constructing Arch Borders. Follow all instructions for Placing Stone Veneer in the section above and Place Arch Border before Cobble Field to ensure tight joints and interlocking stonework where Arch Border stones allow.

642.17 Placing Capstone. Follow all instructions for placing Stone Veneer in the section above and the following:

a. Place Capstone on top of bridge railing wall after all other stone veneer is installed.

b. Use a one-piece capstone for the full width of the bridge wall for at least 80% of the total length. Use a two-piece capstone with the joint within 4 inches of the bridge wall center for the remaining length.

c. Capstone shall overhang 1½”-2” on all sides except capstone edge shall be flush with stone veneer face on the roadway traffic side.

642.18 Pointing. Conform to the following:

a. Where raked joints are required, squarely rake all mortar in exposed face joints and beds to the required depth.

b. Crown the mortar in the joints on top capstone surfaces slightly at the center of the masonry to provide drainage.

c. Clean all face stone of mortar stains while the mortar is fresh. After the mortar sets, clean again using wire brushes and acid. Protect the masonry during hot or dry weather and keep it wet for at least 3 days after the work is completed.

642.19 Sealer. Following placement and curing of all stone and mortar, seal the stone veneer with a clear Siloxane concrete/masonry sealer per manufacturer recommendations.

METHOD OF MEASUREMENT

642.20 Cut Stone Veneer will be measured by the vertical and horizontal square foot, for each fascia thickness, from the top of cap to the limits shown below grade on the plans. Payment will be full compensation for all labor, materials, and incidentals required to complete the installation, including, but not limited to, the stones, mortar, steel ledger angles, ledger anchors, and weep drains.

BASIS OF PAYMENT

642.21 The accepted quantity of Stone Fascia will be paid for at the contract unit price for the pay item listed below:

PAY ITEM	**PAY UNIT**
Cut Stone Veneer	Square Foot

END OF SECTION

REVISION OF CDOT SECTION 606
BRIDGE RAIL (SPECIAL)

Section 606 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

This work consists of construction of the concrete section of the bridge rail in accordance with these specifications and in conformity with the lines and grades shown in the bridge plans.

MATERIALS

Concrete for Bridge Rail (Special) shall conform to the requirements of Section 601 for Concrete Class D. Reinforcing shall conform to the requirements of Section 602.

METHOD OF MEASUREMENT

Bridge Rail (Special) will be measured by the linear foot for the extents indicated on the construction drawings.

BASIS OF PAYMENT

Pay Item	**Pay Unit**
Bridge Rail (Special)	Linear Foot

Payment shall be full compensation for all concrete, reinforcing and any other materials incidental to constructing the concrete section of the bridge rail, as well as all labor to construct the concrete section of the bridge rail prior to installation of stone veneer. Items associated with the veneer anchor system, hardware and stone material attached to the concrete section of the bridge rail shall be paid for separately, per Item 601 – Cut Stone Veneer.

END OF SECTION

Delete City of Colorado Springs Engineering Division Standard Specifications Subsection 621.04 and replace with the following:

621.04 DEWATERING AND WATER CONTROL

The WORK of this section consists of controlling groundwater, site drainage, and storm flows during construction. CONTRACTOR is cautioned that the WORK involves construction in and around drainage channels, local rivers, and areas of local drainage. These areas are subject to frequent periodic inundation.

621.04.01 SUBMITTALS

A. CONTRACTOR shall submit to the ENGINEER a Water Control Plan two weeks prior to execution of the PROJECT. At a minimum, the Water Control Plan shall include:

1. Descriptions of proposed groundwater and surface water control facilities including, but not limited to, equipment, methods, standby equipment and power supply, means of measuring inflow to excavations, pollution control facilities, discharge locations to be utilized, and provisions for immediate temporary water supply as required by this section.

2. Drawings showing locations, dimensions, and relationships of elements of each system.

3. Design calculations demonstrating adequacy of proposed dewatering systems and components.

4. If system is modified during installation or operation, revise or amend and resubmit Water Control Plan.

621.04.02 MATERIALS

A. Onsite materials may be used within the limits of construction to construct temporary dams and berms. Materials such as plastic sheeting, sandbags, and storm sewer pipe may also be used if desired by CONTRACTOR.

621.04.03 EXECUTION

A. For all excavation, CONTRACTOR shall provide suitable equipment and labor to remove water, and keep the excavation dewatered so that construction can be carried on under dewatered conditions.

1. Water control shall be accomplished such that no damage is done to adjacent channel banks or structures.

2. Continuously control water during course of construction, including weekends and holidays and during periods of work stoppages, and provide adequate backup systems to maintain control of water.

B. CONTRACTOR is responsible for investigating and becoming familiar with all site conditions that may affect the WORK including surface water, potential flooding

conditions, level of groundwater and the time of year the work is to be done.

C. CONTRACTOR shall conduct operations in such a manner that storm, or other waters may proceed uninterrupted along their existing drainage courses.

1. By submitting a BID, CONTRACTOR acknowledges that CONTRACTOR has investigated the risk arising from such waters and has prepared BID accordingly, and assumes all of said risk.

D. At no time during construction shall CONTRACTOR affect existing surface or subsurface drainage patterns of adjacent property.

1. Any damage to adjacent property resulting from CONTRACTOR's alteration of surface or subsurface drainage patterns shall be repaired by CONTRACTOR at no additional cost to OWNER.

E. Pumps and generators used for dewatering and water control shall be quiet equipment enclosed in sound deadening devices.

F. CONTRACTOR shall remove all temporary water control facilities when they are no longer needed or at the completion of the PROJECT.

G. All excavations made as part of dewatering operations shall be backfilled with the same type material as was removed and compacted to ninety-five percent (95%) of Maximum Standard Proctor Density (ASTM D698) except where replacement by other materials and/or methods are required.

621.04.04 CONSTRUCTION

A. Surface Water Control:

1. Surface water control generally falls into the following categories:

a. Normal low flows along the channel.

b. Storm/flood flows along the channel.

c. Flows from existing storm drain pipelines.

d. Local surface inflows not conveyed by pipelines.

2. CONTRACTOR shall coordinate, evaluate, design, construct, and maintain temporary water conveyance systems.

a. These systems shall not worsen flooding, alter major flow paths, or worsen flow characteristics during construction. CONTRACTOR is responsible to ensure that any such worsening of flooding does not occur.

b. CONTRACTOR is solely responsible for determining the methods and adequacy of water control measures.

3. At a minimum, CONTRACTOR shall be responsible for diverting the quantity of surface flow around the construction area so that the excavations will remain free of surface water for the time it takes to install these materials, and the time required for curing of any concrete or grout. CONTRACTOR is cautioned that the minimum quantity of water to be diverted is for erosion control and construction purposes and not for general protection of the construction site.

    a. It shall be CONTRACTOR's responsibility to determine the quantity of water which shall be diverted to protect the WORK from damage caused by stormwater.

    b. Pumping operations shall continue continuously until the concrete false bottom has cured for a minimum of 10 days after the last pour. The riprap channel improvements shall be made prior to removing the pumps.

    c. Pumps shall not be removed without the approval of the ENGINEER.

4. CONTRACTOR shall, at all times, maintain a flow path for all channels.

    a. Temporary structures such as berms, sandbags, pipeline diversions, etc., may be permitted for the control of channel flow, as long as such measures are not a major obstruction to flood flows, do not worsen flooding, or alter historic flow routes.

B. Groundwater Control:

1. CONTRACTOR shall install adequate measures to maintain the level of groundwater below the foundation subgrade elevation and maintain sufficient bearing capacity for all structures, pipelines, earthwork, and rockwork.

    a. Such measures may include, but are not limited to, installation of perimeter subdrains, pumping from drilled holes or by pumping from sumps excavated below the subgrade elevation.

    b. Dewatering from within the foundation excavations shall not be allowed.

2. The foundation bearing surfaces are to be kept dewatered and stable until the structures or other types of work are complete and backfilled.

    a. Disturbance of foundation subgrade by CONTRACTOR operations shall not be considered as originally unsuitable foundation subgrade and shall be repaired at CONTRACTOR's expense.

3. Contractor shall dispose of groundwater as follows:

    a. Obtain discharge permit for water disposal from authorities having jurisdiction.

    b. Treat water collected by dewatering operations, as required by regulatory agencies, prior to discharge.

c. Discharge water as required by discharge permit and in manner that will not cause erosion or flooding, or otherwise damage existing facilities, completed Work, or adjacent property.

d. Remove solids from treatment facilities and perform other maintenance of treatment facilities as necessary to maintain their efficiency.

4. Any temporary dewatering trenches or well points shall be restored following dewatering operations to reduce permeability in those areas as approved by ENGINEER.

621.04.05 MEASUREMENT AND PAYMENT

Measurement and payment of temporary diversion shall be made by linear foot of stream bed diverted. Payment shall include, but is not limited to, providing discharging piping for dewatering pipes, protecting pipes from freezing, protecting pipes from traffic, relocating piping as construction progress, end screen rodent protection, and all pipe connections and fitting required to install the temporary diversion. Payments shall be made at the unit price set forth in the approved contract documents and shall be full compensation for all materials, tools, equipment and labor necessary to complete the work under this section in accordance with the approved contract documents and these specifications. Temporary diversion will be measured and paid for under CDOT 208-00206.

Measurement and payment of dewatering shall be made by lump sum. Payment shall include, but is not limited to, excavation, unclassified backfill, stone backfill, geosynthetic filter fabric, coffer dams, temporary grading, pumps, generators and electricity for pumping, connection to temporary diversion piping, stream restoration, pump protection, and pump insulation. Payments shall be made at the unit price set forth in the approved contract documents and shall be full compensation for all materials, tools, equipment and labor necessary to complete the work under this section in accordance with the approved contract documents and these specifications. Dewatering will be measured and paid for under CDOT 211-03005.

Pay Item	Description	Unit
208-00301	Temporary Diversion	LF
211-03005	Dewatering	LS

END OF SECTION

Delete City of Colorado Springs Engineering Division Standard Specifications Section 624 in its entirety and replace with the following:

624 RIP RAP AND CREEKSIDE ACCESS

624.01 RIP RAP CHANNEL

Rip rap shall consist of hard, durable, angular stone of approximate cubical shape.

The Contractor shall submit a mix design in writing to the Engineer for approval, cooperate with the Engineer in obtaining and providing samples of all specified materials, and submit certified laboratory test certificates for all items required in this section. The size, gradation, and thickness of the rip rap shall be as shown in the approved contract documents and shall conform to the following requirements:

CLASSIFICATION AND GRADATION OF ORDINARY RIP RAP			
Rip Rap Designation by Weight	**% Smaller Than Given Size (inches)**	**Intermediate Rock Dimension**	**d_{50}* (inches)**
Type VL	70 – 100	12	6**
	50 – 70	9	
	35 – 50	6	
	2 - 10	2	
Type L	70 – 100	15	9**
	50 – 70	12	
	35 – 50	9	
	2 - 10	3	
Type M	70 – 100	21	12
	50 – 70	18	
	35 – 50	12	
	2 - 10	4	
Type H	70 – 100	30	18
	50 – 70	24	
	35 – 50	18	
	2 - 10	6	
Type VH	70 – 100	42	24
	50 – 70	33	
	35 – 50	24	
	2 - 10	9	

*d50 = Mean particle size

**Bury types VL and L with native topsoil and revegetate to protect from vandalism.

The riprap designation and total thickness of riprap shall be as shown on the Plans. The maximum stone size shall not be larger than the thickness of the riprap. Neither width nor

thickness of a single stone of riprap shall be less than one-third (1/3) of its length. Riprap shall conform to the dimensions specified on the Plans with the following characteristics:

Characteristic	Limits
Specific Gravity (according to bulk-saturated, surface- dry basis as per AASHTO T85)	2.5 or greater
Bulk Density	1.3 ton/cy or greater
Percentage Loss	< 35% after 500 revolutions when tested in accordance with AASHTO 96 < 10% after 5 cycles when tested in accordance with AASHTO T104 for ledge rock using Sodium Sulfate < 10% after 12 cycles of freezing and thawing when tested in accordance with AASHTO T103 for ledge rock, Procedure A
Calcite Intrusions	None

At the request of the Engineer, the Contractor shall furnish laboratory test results indicating that the material meets the requirements for abrasion or compressive strength as indicated in the following table:

Test Description	Test Method	Specification Requirement
Abrasion Resistance by Los Angeles Machine	ASTM C 535	50% Loss, max.
Unconfined Compressive Strength of Drilled Core Specimen	AASHTO T 24	2500 psi, min

Each load of riprap shall be reasonably well graded from the smallest to the largest size specified. Stones smaller than the two to ten percent size will not be permitted in an amount exceeding 10 percent by weight of each load.

For stones equal to or larger than 12 inches, control of gradation shall be by visual inspection. However, in the event Engineer determines the riprap to be unacceptable by visual inspection, Engineer will pick two random truckloads to be dumped and checked for gradation.

For stones smaller than 12 inches, control of gradation shall be completed by screening the rock material to ensure rock riprap falls within the acceptable gradation limits described in Section 624.01. After the rock is screened, the Engineer shall perform a visual inspection prior to placement.

Mechanical equipment and labor needed to assist in checking gradation shall be provided by

Contractor at no additional cost.

The color of the riprap shall be per Section 705.09, or other acceptable colors approved by Engineer prior to delivery to the Project site. Color shall be consistent on the entire Project and shall match the color of rock to be used for all other portions of the Work. Broken concrete or asphalt pavement shall not be acceptable for use in the Work. Rounded riprap (river rock) is not acceptable, unless specifically designated on the Plans.

The type, gradation, and thickness of granular bedding material shall be as shown in the approved contract documents and shall conform to the following requirements:

GRADATION FOR GRANULAR BEDDING MATERIAL		
U.S. Standard Sieve Size	**Percent Passing by Weight**	
	Type I	**Type II**
3"	-	0 - 100
1-1/2"	-	-
3/4"	-	20 - 90
3/8"	100	-
# 4	95 - 100	0 - 20
# 16	45 - 80	-
# 50	10 - 30	-
#100	2 - 10	-
#200	0 - 2	0 - 3

Filter fabric shall be manufactured especially for erosion control applications and shall conform to the requirements of AASHTO M-288. The fabric shall be a woven or nonwoven fabric consisting of long chain polymeric filaments or yarns such as polyvinylidene chloride, nylon/polypropylene, polypropylene, polyethylene, polyester, or polyamide formed into a stable network such that the filaments or yarn retain their relative position to each other. The fabric shall be inert to commonly encountered chemicals and shall be resistant to insect, rodent, and moisture damage.

The filter fabric shall be placed as shown in the approved contract documents and secured in accordance with the manufacturer's recommendations. Securing pins shall be galvanized wire or as otherwise approved by the Engineer. Wire pins shall be made of wire 0.091-inches or larger in diameter and "U"-shaped with legs six (6) inches long and a one (1) inch crown.

Rip rap shall be placed to the thickness and limits as shown in the approved contract documents and plan details. Rip rap shall be placed in such a manner as to produce a well graded mass or of rock with a minimum of voids. The larger stones shall be well distributed, and the finished

surface shall be free from pockets of small stones and clusters of larger stones. Re-arranging of individual stones by equipment or by hand shall be required if necessary, to maintain a well graded distribution of rock conforming to the contour specified. Add 1 ½" crushed chinking rock to fill voids in riprap as necessary to get a compacted consistent grade and finish.

Rip rap with stones that are 12-inches in diameter or larger shall not be dumped directly onto filter fabric. The subgrade materials shall be stable. Subgrade material approved by the Engineer shall be placed and compacted in a maximum of 4-inch lifts to 95 percent per ASTM D1557. Unsuitable material shall be removed from the Project site and disposed of by the Contractor. Removal and replacement of unsuitable material will only be completed at the direction of the Engineer for subgrade that has been excavated in undisturbed soil.

Additional compaction shall not be required unless specified by the Engineer. When subgrade is built up with embankment material it shall be compacted to 95 percent maximum density (ASTM D1557). In-place bedding materials shall not be contaminated with soils, debris or vegetation before the riprap is placed. If contaminated, the bedding material shall be removed and replaced at Contractor's expense. If bedding material is disturbed for any reason, it shall be replaced and graded at Contractor's expense.

Preparation of the channel slope, bottom, or other areas that are to be protected with riprap shall be free of brush, trees, stumps, and other objectionable material and be graded to a smooth compacted surface as shown on the Plans. Contractor shall excavate areas to receive riprap to the subgrade as shown on the Plans, accounting for granular bedding.

Excavation for toe walls shall be made to the lines of the walls. Allowance will not be made for work outside the lines.

Following the acceptable placement of granular bedding, riprap shall be placed on the prepared slope or channel bottom areas in a manner which will produce a reasonably well-graded mass of stone with the minimum practicable percentage of voids. Riprap shall be machine placed, unless otherwise stipulated in the Plans or Specifications. It is the intent of these Specifications to produce a compact riprap protection in which all sizes of material are placed in their proper proportions. Unless otherwise authorized by the Engineer, the riprap protection shall be placed in conjunction with the construction of embankment or channel bottom with only sufficient delay in construction of the riprap protection, as maybe necessary, to allow for proper construction of the portion of the embankment and channel bottom which is to be protected.

When riprap is placed on a slope, the placement shall commence at the bottom of the slope working up the slope. The entire mass of riprap shall be placed on either channel slope or bottom to be in conformance with the required gradation mixture and to line, grade, and thickness shown on the Plans. Side slopes shall be graded to no steeper than two (2') feet horizontal to one (1') foot vertical (2:1) (unless otherwise approved by the Engineer) prior to placing filter fabric, granular bedding material, or riprap.

Riprap shall be placed to full course thickness at one operation and in such a manner as to avoid displacing the underlying bedding material. Placing of riprap in layers, or by dumping into chutes, or by similar methods shall not be permitted. All material used for riprap protection for channel slope or bottom shall be placed and distributed such that there shall be no large accumulations of either the larger or smaller sizes of stone. Some hand placement may be required to achieve this distribution.

The basic procedure shall result in larger materials flush to the top surface with faces and shapes arranged to minimize voids, and smaller material below and between larger materials. Surface grade shall be a plane or as indicated, but projections above or depressions under the finished design grade by more than 10 percent of the rock layer thickness shall not be allowed. Smaller rock shall be securely locked between the larger stone.

It is essential that the chinking rock material between the larger stones not be loose or easily displaced by flow or by vandalism. The stone shall be consolidated by the bucket of the excavator or other means that will cause interlocking of the material. All rock is to be placed in a dewatered condition beginning at the toe of the slope or other lowest point. The Contractor shall maintain the riprap protection until accepted. Any material displaced for any reason shall be replaced to the lines and grades shown on the Plans at no additional cost to the City. If the bedding materials are removed or disturbed, such material shall be replaced prior to replacing the displaced riprap.

Hand placed riprap shall be performed during machine placement of riprap and shall conform to all the requirements above. Hand placed riprap shall also be required when the depth of riprap is less than 2 times the nominal stone size, or when required by the Plans or Specifications. After the riprap has been placed, hand placing or rearranging of individual stones by mechanical equipment shall be required to the extent necessary to secure a flat uniform surface and the specified depth of riprap, to the lines and grades as shown on the Plans.

Rejection of Work and Materials. The Engineer will reject placed riprap and bedding which does not conform to this section. The Contractor shall immediately remove and re-lay the riprap and bedding to conform to these Specifications. Riprap and bedding shall be rejected, which is either delivered to the job site or placed, that does not conform to this section. Rejected riprap and bedding shall be removed from the Project site by the Contractor at the Contractor’s expense.

624.02 CREEKSIDE ACCESS

The Creekside access shall be installed per details in the construction drawings and furnished with 24” boulders that match the color requirements set forth in Section 705.09, or other acceptable colors approved by Engineer prior to delivery to the Project site. Color shall be consistent on the entire Project and shall match the color of rock to be used for all other portions of the Work. Boulders shall have flat level surfaces, stair stepped 4-12”, that will allow for pedestrian access to the creek after construction.

624.03 MEASUREMENT AND PAYMENT

Measurement and payment for rip rap shall be made by the cubic yard to the limits shown in the approved contract documents. Payment for riprap shall include, but is not limited to, excavation for riprap and embankment material for filling existing voids, subgrade preparation, granular bedding, filter fabric, furnishing and placing riprap and filling voids of riprap as specified, and disposal of excess excavated material. Payments shall be made at the unit price set forth in the approved contract documents and shall be full compensation for all materials, tools, equipment and labor necessary to complete the work under this section in accordance with the approved contract documents and these specifications. Pay items follow CDOT standards numbers.

Measurement and payment for Creekside boulder access shall be made per lump sum. Payment

shall include, but is not limited to, excavation for bedding and boulders, embankment fill, subgrade preparation, gravel backfill, granular bedding, furnishing and placing boulders, chinking rock, and disposal of excess excavated material. Payments shall be made at the unit price set forth in the approved contract documents and shall be full compensation for all materials, tools, equipment and labor necessary to complete the work under this section in accordance with the approved contract documents and these specifications.

Pay Item	Description	Unit
506-00212	Riprap (12-inch)	CY
506-00224	Riprap (24-inch)	CY
624-00000	Creekside Access	LS

END OF SECTION

REVISION OF CDOT SECTION 702
BITUMINOUS MATERIALS

Section 702 of the Standard Specifications is hereby revised for this project as follows:

Add subsection 702.05 which shall include the following:

702.05 Solidifying Emulsion. A water based polymer or nontoxic organic powdered binder specifically manufactured to harden breeze surfacing. The solidifying emulsion must not change the breeze surfacing color.

END OF SECTION

REVISION OF CDOT SECTION 703
AGGREGATE

Section 703 of the Standard Specifications is hereby revised for this project as follows:

Add subsection 703.11 which shall include the following:

702.11 Breeze Surfacing. Uniform gray or tan color crushed granite rock from only one source that complies with the gradation requirements shown in the following table:

Table 703-1
Gradation Requirements

Sieve size	Percentage passing
3/8 inch	100
No.	95-100
No. 8	75-80
No. 16	55-65
No. 30	40-50
No. 50	25-35
No. 100	20-25

NOTE: Gradation is based on AASHTO T 11 and T 274.

Add subsection 703.12 which shall include the following:

702.12 Riprap Stone.

a. Color and Finish
   i. Furnish sound, durable rock that is compatible in texture and color to the native rock including a mix of gray, reddish, and tan/beige.
   ii. All visible edges and the exposed face surface shall be angular.
   iii. Import pre-approved materials meeting all required engineering specifications.
b. Size and Shape
   i. Stones used for riprap shall meet the requirements per City of Colorado Springs Engineering Division Standard Specifications Subsection Section 624.

END OF SECTION

REVISION OF CDOT SECTION 704
MASONRY UNITS

Section 704 of the Standard Specifications is hereby revised for this project as follows:

Delete subsection 704.04 and replace it with the following :

a. All Mortar color to be Dark Grey color and approved in the mockup by the City.
b. Furnish mortar and material for use in mortar conforming to the following:
   i. Cement
      (1) *Portland Cement:* ASTM C 150, Type I or II, except III may be used for cold-weather construction
   ii. Fine aggregate — AASHTO M 45
   iii. Hydrated Lime — ASTM C 207, Type S
   iv. Water — Potable
   v. Air Entraining Admixture — Per ASTM C 260
   vi. Cold Weather Admixture — Nonchloride, noncorrosive, accelerating admixture complying with ASTMM C 494, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
   vii. Composition: — Conform to the proportions for the mix in Table 660-1. Uniformly mix with water to a spreading consistency.
   viii. Compressive strength: — 2,000 pounds per square inch, 28-day min., per AASHTI T 106

Table 660-1
Mortar Proportions by Volume

Mortar	Portland Cement	Hydraulic Cement	Masonry Cement	Lime	Aggregate	Air (%)*
Cement Lime	1	—	—	¼ to ½	Not less than 2-1/4 and not more than 3 times total volume of cementitious material	8-12

* When air is required, determine air content per ASTM C 91 except use the same material and proportions used in construction.

Add subsection 704.05 which shall include the following:

704.05 COBBLE FIELD.

a. Color and Finish

i. Furnish sound, durable rounded cobble rock that is native to the vicinity of the work or is similar in texture and color to the native cobble rock.

ii. All visible edges and the exposed face surface shall be rounded and smooth like the illustration below.

b. Size and Shape

i. Minimum thickness: 3 inches

ii. Maximum thickness: 6 inches

iii. Minimum exposed face dimension: 4 inches

iv. Maximum exposed face dimension: 12 inches

v. Average exposed face dimension: 8 inches
vi. Minimum Percentage of stone veneer within specified sizes: 90% min.

c. Joint Surfaces
i. Joint width ¼" minimum and 1½" maximum for not more than 2" length.
ii. Rake the joints and beds to a depth of 1¾-2" from veneer edge face.
iii. Do not align vertical or horizontal rock joints.

Add subsection 704.06 which shall include the following:

704.06 PILASTER STONE.

a. Color and Finish
i. Furnish sound, durable rock that is native to the vicinity of the work or is similar in texture and color to the native rock.
ii. All visible edges and the exposed face surface shall be angular and/or weathered like the illustration below.

b. Size and Shape
i. Minimum thickness: 3 inches
ii. Maximum thickness: 6 inches on bridge surfaces facing the roadway and 6-8 inches on bridge surfaces facing the creek.
iii. Minimum exposed face dimension: 8 inches
iv. Maximum exposed face dimension: 30 inches
v. Average exposed face dimension: 24 inches
vi. Minimum Percentage of stone veneer within specified sizes: 85% min.

c. Joint Surfaces
   i. Joint width 1/2” minimum and 2” maximum for not more than 3” length.
   ii. Rake the joints and beds to a depth of 1¾-2” from veneer edge face.
   iii. Do not align vertical rock joints for more than 2 stone courses. Do not align horizontal joint for more than 5 stones. Dress face rock joint surfaces to form an angle with the horizontal bed surface of not less than 45 degrees.

Add subsection 704.07 which shall include the following:

704.07 WALL STONE.

a. Color and Finish
   i. Furnish sound, durable rock that is native to the vicinity of the work or is similar in texture and color to the native rock.
   ii. All visible edges and the exposed face surface shall be angular and/or weathered like the illustration below.

b. Size and Shape
   i. Minimum thickness: 3 inches
   ii. Maximum thickness: 6 inches on bridge surfaces facing the roadway and 6-8 inches on bridge surfaces facing the creek.
   iii. Minimum exposed face dimension: 6 inches
   iv. Maximum exposed face dimension: 18 inches
   v. Average exposed face dimension: 8 inches
   vi. Minimum Percentage of stone veneer within specified sizes: 85% min.

c. Joint Surfaces

i. Joint width 1/2” minimum and 2” maximum for not more than 3” length.
ii. Rake the joints and beds to a depth of 1¾-2” from veneer edge face.
iii. Do not align vertical rock joints for more than 2 stone courses. Do not align horizontal joint for more than 5 stones. Dress face rock joint surfaces to form an angle with the horizontal bed surface of not less than 45 degrees.

Add subsection 704.08 which shall include the following:

704.08 ARCH BORDER.

a. Color and Finish
   i. Furnish sound, durable rock that is native to the vicinity of the work or is similar in texture and color to the native rock.
   ii. All visible edges and the exposed face surface shall be angular and/or weathered like the illustration below.

b. Size and Shape
   i. Minimum thickness: 4 inches
   ii. Maximum thickness: 8 inches
   iii. Minimum exposed face dimension: 6 inches
   iv. Maximum exposed face dimension: 18 inches
   v. Average exposed face dimension: 10 inches
   vi. Minimum Percentage of stone veneer within specified sizes: 95% min.
c. Joint Surfaces

i. Joint width ¼” minimum and 1½” maximum for not more than 2” length.

ii. Rake the joints and beds to a depth of 1-1 ½” from arch border edge face.

iii. Place arch border stones and joint surfaces radial to the arch. Departure from the radial may not exceed 3/4 inch in 12 inches.

Add subsection 704.09 which shall include the following:

704.09 CAPSTONE.

a. Color and Finish

i. Furnish sound, durable rock that is Rocky Mountain Chocolate Select.

(i) Arizona Chocolate Flagstone is NOT an acceptable substitution because of surface flaking due to low adhesion between sedimentary layers.

ii. All visible edges shall be split face or hand-finished to match a naturally spilt face like the illustration below.

iii. All exposed face surface shall be natural surface cleft like the illustration below.

b. Size and Shape

i. Minimum thickness: 2 inches

ii. Maximum thickness: 2¼ inches

iii. Width at top of bridge: 25-26 inches

iv. Width at top of Foundation Veneer: 20-22 inches

v. Minimum length: 1½ times the width

vi. Minimum Percentage of stone veneer within specified sizes: 100% min.

c. Joint Surfaces
   i. Joint width ¼” minimum and 1¼” maximum for not more than 2” length.
   ii. Rake the joints and beds flush on top surface and to a depth of 1-1 ½” on the side faces.
   iii. Use a one-piece capstone for the full width of the bridge wall for at least 80% of the total length. Use a two-piece capstone with the joint within 4 inches of the bridge wall center for the remaining length.

END OF SECTION

Section 900 of the Standard Specifications is hereby deleted and replaced with the following 2022 CDOT Standard Specifications (SP), Standard Special Provisions (SSP), and Project Special Provisions (PSP) provided on the following pages:

- CDOT Section 207: Topsoil (SSP Dated October 1, 2022)
- CDOT Section 208: Erosion Control (SSP Dated October 1, 2022)
- CDOT Section 212: Soil Amendments, Seeding, and Sodding (SSP Dated October 1, 2022)
- CDOT Section 213: Mulching (SP)
- CDOT Section 214: Planting (SSP Dated October 1, 2022)
- CDOT Section 216: Soil Retention Covering (SP)
- CDOT Section 250: Environmental, Health and Safety Management (SP)

The measurement and payment sections of the following CDOT specifications are hereby deleted and replaced with the following:

CDOT Section 207 Topsoil

CDOT Section 212 Soil Amendments, Seeding, and Sodding

CDOT Section 213 Mulching

CDOT Section 214 Planting

All pay items listed in this specification will not be measured or paid for separately, but shall be included in the cost of the 214-00001 Landscape Plantings, lump sum item.

END OF SECTION

REVISION TO CDOT SECTION 212

TREE RETENTION AND PROTECTION

Section 212 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

The Contractors shall perform all work necessary to protect and preserve existing trees indicated on the Plans, or as directed by the Engineer. This shall include installation of protective chain link fencing and signage, mitigation of excavation exposure to the trees and root systems, and removal of the protective chain link fence and signage at the conclusion of the Project.

MATERIALS

The protective chain link fence shall be shall have a minimum exposed height of six feet, measured from the ground surface, with metal fence posts installed in concrete or other approved permanent foundation fixture. Temporary, free-standing chain link fence shall not be permitted for the installation around the specified trees to be protected and preserved.

Signs shall be metal, with a size of 11 inches by 17 inches. Sign color shall be a color other than white, to be easily visible. Sign letters shall be black, and read “TREE PRESERVATION AREA”. Lettering shall be block letters, with a minimum height of 2.5 inches.

CONSTRUCTION REQUIREMENTS

Prior to the start of construction, the Contractor, Engineer, and Landscape Architect shall identify the existing trees to be protected and preserved. The Contractor shall stake the location of the protective fence to be installed with the Engineer and Landscape Architect prior to installation of the fence. The fence shall then be installed as indicated at the approved, staked locations. The fence shall be installed and maintained in an upright position until all construction activity has been completed and accepted by the City.

The Contractor shall affix the “TREE PRESERVATION AREA” signs to the protective fencing. Signs shall be clearly visible from all directions on the construction site. Each tree preservation area shall require a minimum of two signs, which shall be posted no further than 150 feet apart along the fenced perimeter.

The Contractor shall prevent parking, construction traffic, material storage, trash disposal, foot traffic and vehicular traffic near the tree preservation areas.

The Contractor shall provide siltation control at the tree preservation areas by attaching silt fence to the uphill side of the protective fencing.

The Contractor shall provide concrete washout in areas which drain away from the tree preservation areas, and as indicated on the plans.

The Contractor shall continuously maintain the existing trees bounded by the protective fencing from the start of site work through final completion. The Contractor shall provide a licensed Arborist to deep root fertilize and water the trees. The trees shall have deep root watering and fertilization under pressure to reduce soil compaction and restore air spaces lost by compaction. The Arborist shall use discretion as some stressed trees may not respond well to immediate post-construction fertilization.

The Contractor shall water the trees during periods of subnormal rainfall at a rate equivalent to one inch per month during construction.

The contractor shall remove protective fencing, including foundation materials and all surplus construction materials from the site following construction, in a manner that will not damage the tree preservation areas. The Contractor shall refurbish and restore disturbed ground as soon as practical following removal of the fencing and materials.

QUALITY CONTROL

The Owner's Representative shall monitor the construction site. If, in their opinion, the general contractor, their agents, employees, sub-contractors or licensees are exercising procedures that are determined to be detrimental to the trees that are to be preserved, the Owner's Representative shall issue a "STOP WORK ORDER". If, in the opinion of the Landscape Architect or licensed arborist, the contractor has damaged a tree beyond repair, the general contractor shall be required to reimburse the owner at a rate of $1,000.00 per caliper inch for each tree that is damaged or destroyed due to the contractor's negligent operations. The general contractor shall be responsible for the cost of remedial maintenance of or removal of any damaged tree. Activities which are detrimental to existing trees include, but are not limited to the following:

A. Placing backfill in protected areas where not indicated by the grading plan.
B. Felling trees into protected areas.
C. Driving construction equipment into or through protected areas.
D. Stacking or storing supplies in protected areas.
E. Changing site grades which cause drainage to flow into, or to collect in protected areas.
F. Conducting trenching operations in the vicinity of trees.
G. Grading in the vicinity of trees.
H. Pedestrian traffic in or through protected areas.
I. Physical damage to a tree.

BASIS OF PAYMENT

The work as described in this section to preserve and protect existing trees shall be paid on a lump sum basis as Tree Retention and Protection and shall be full compensation for labor and materials to install and remove the chain link fence, metal posts, post foundations, signs, silt fence and all appurtenances and hardware required. Payment will also include the Arborist, watering, fertilizing and moisture maintenance of the trees.

Payment will be made under:

ITEM	UNIT
Tree Retention and Protection	Lump Sum

END OF SECTION

FORCE ACCOUNT ITEMS

DESCRIPTION

This special provision contains the City's estimate for force account items included in the Contract. The estimated amounts marked with an asterisk will be added to the total bid to determine the amount of the performance and payment bonds. Force Account work shall be performed as directed by the Engineer.

BASIS OF PAYMENT

Payment will be made in accordance with Section 109. Payment will constitute full compensation for all work necessary to complete the item.

Force account work valued at $5,000 or less, that must be performed by a licensed journeyman in order to comply with federal, state, or local codes, may be paid for after receipt of an itemized statement endorsed by the Contractor.

Force Account Item	Estimated Quantity	Amount
F/A Minor Contract Revisions	F.A.	$ 2**0,000***

F/A Minor Contract Revisions

This force account amount will be used to pay for minor revisions needed as work progresses, as agreed to by the Engineer.

END OF SECTION

REVISION OF CDOT SECTION 708
PAINTS

Section 708 of the Standard Specifications is hereby revised for this project to include the following:

Add to subsection 708.03 which shall include the following:

Color to match FED-STD-595B, color 10233.

METHOD OF MEASUREMENT

708.10 Paint used for guardrail will be included in the quantities of guardrail of the specified type and not measured separately.

END OF SECTION

SCHEDULE F – EXHIBITS

Exhibit 1 Sample Contract
Exhibit 2 Minimum Insurance Requirements
Exhibit 3 Qualification Statement
Exhibit 4 Bid Certification and Representations and Certifications
Exhibit 5 Bid Bond

EXHIBIT 1 – SAMPLE CONTRACT

CONSTRUCTION CONTRACT

Contract Number:		Project Name/Title	South
Vendor/Contractor			
Contact Name:		Telephone:	
Email Address:			
Address:			
Federal Tax ID #		Please check one:	☐ Corporation ☐ Individual ☐ Partnership
City Contracting Specialist		City Dept Rep	
NOT TO EXCEED Contract Amount:		City Account #	
Contract Type:	Fixed Unit Price	Period of Performance:	

1. INTRODUCTION

THIS *Fixed Unit Price* CONTRACT ("Contract") is made and entered into this XXX day of XXX, 2022 by and between the City of Colorado Springs, a Colorado municipal corporation and home rule city, in the County of El Paso, State of Colorado, (the "City"), and _____ (the "Contractor").

THE CITY AND THE CONTRACTOR HEREBY AGREE AS FOLLOWS:

The City has heretofore prepared the necessary Contract Documents for the following Activity: XXXX.

The Contractor did on the XXX day of XXX, 2023 submit to the City the Contractor's written offer and proposal to do the work therein described under the terms and conditions therein set forth and furnish all materials, supplies, labor, services, transportation, tools, equipment, and parts for said work in strict conformity with the accompanying Contract Documents, which are attached hereto and incorporated herein by this reference, including the following:

1. This Contract
2. Schedule A – Price Sheet
3. Schedule B – General Construction Terms and Conditions
4. Schedule C – Special Contract Terms and Conditions
5. Schedule D – General Specifications
6. Schedule E – Special and Technical Specifications
7. Schedule F – Scope of Work
8. Exhibit 1 – Performance, Labor and Material Payment, and Maintenance Bonds
9. Exhibit 2 – Minimum Insurance Requirements

2. COMPENSATION/CONSIDERATION

THIS FIXED UNIT PRICE CONTRACT is established at the Not to Exceed amount of $xxxxxxxx.

Subject to the terms and conditions of the Contract Documents, Contractor agrees to furnish all materials and to perform all work as set forth in its proposal and as required by the Contract Documents.

All pricing is in accordance with the fixed unit prices found in Schedule A, as proposed by the Contractor. Payment made for actual quantities as set forth in Schedule B, General Construction Terms and Conditions. At no time shall the total obligation of the City exceed the not to exceed amount of this Contract.

3. TERM OF CONTRACT

Contractor will start work promptly after the Notice to Proceed and continue to work diligently until completed. The Contractor shall complete all work on an as ordered basis throughout the Contract period which is **450 Calendar Days** ("Period of Performance") as per the specifications and drawings. The Contractor shall provide a two-year guarantee on all work performed under this Contract after the job has been completed and accepted.

4. INSURANCE

The Contractor shall provide and maintain acceptable Insurance Policy(s) consistent with the Minimum Insurance Requirements attached as Exhibit 2, which includes Property, Liability, and as otherwise listed in Exhibit 2. The City of Colorado Springs shall be reflected as an additional insured on the Property and Liability policy(s).

Further, Contractor understands and agrees that Contractor shall have no right of coverage under any existing or future City comprehensive, self, or personal injury policies. Contractor shall provide insurance coverage for and on behalf of Contract that will sufficiently protect Contractor, or Contractor's agents, employees, servants or other personnel, in connection with the services which are to be provided by Contractor pursuant to this Contract, including protection from claims for bodily injury, death, property damage, and lost income. Contractor shall provide worker's compensation insurance coverage for Contractor and all Contractor personnel. Contractor shall file applicable insurance certificates with the City and shall also provide additional insurance as indicated in this Contract. ***A CURRENT CERTIFICATE OF INSURANCE IS REQUIRED PRIOR TO COMMENCEMENT OF SERVICES LISTING THE CITY AND PPRTA AS ADDITIONALLY INSURED.***

5. RESPONSIBILITY OF THE CONTRACTOR

A. The Contractor shall be responsible for the professional quality, technical accuracy, and the coordination of all Scope of Work services furnished by the Contractor under this Contract. The Contractor shall, without additional compensation, correct or revise any errors or deficiencies in services provided under this Contract to the satisfaction of the City.

B. The City's review, approval of, acceptance of, or payment for the services required under this Contract shall not be construed to operate as a waiver of any rights under this Contract or of any cause of action arising out of the performance of this Contract, and the Contractor shall be and remain liable to the City for any and all damages to the City caused by the Contractor's negligent performance of any of the services furnished under this Contract.

C. The rights and remedies of the City provided for under this Contract are in addition to any other rights and remedies provided by law.

D. If the Contractor is comprised of more than one legal entity, each such entity shall be jointly and severally liable hereunder.

6. WORK OVERSIGHT

A. The extent and character of the work to be done by the Contractor shall be subject to the general approval of the City's delegated Project Manager.

B. If any of the work or services being performed does not conform with Contract requirements, the City may require the Contractor to perform the work or services again in conformity with Contract requirements, at no increase in Contract amount. When defects in work or services cannot be corrected by re-performance, the City may (1) require the Contractor to take necessary action to ensure that future performance conforms to Contract requirements and (2) reduce the Contract price to reflect the reduced value of the work or services performed.

C. If the Contractor fails to promptly perform the defective work or services again or to take the necessary action to ensure future performance is in conformity with Contract requirements, the City may (1) by Contract or otherwise, perform the services and charge to the Contractor any cost incurred by the City that is directly related to the performance of such work or service or (2) terminate the Contract for breach of contract.

7. SUBCONTRACTORS, ASSOCIATES, AND OTHER CONTRACTORS

A. Any subcontractor, outside associates, or other contractors used by the Contractor in connection with Contractor's work under this Contract shall be limited to individuals or firms that are specifically identified by the Contractor in the Contractor's proposal and agreed to by the City. The Contractor shall obtain the City's Project Manager's written consent before making any substitution of these subcontractors, associates, or other contractors.

B. The Contractor shall include a flow down clause in all of its subcontracts, agreements with outside associates, and agreements with other contractors. The flow down clause shall cause all of the terms and conditions of this Contract, including all of the applicable parts of the Contract Documents, to be incorporated into all subcontracts, agreements with outside associates, and agreements with other contractors. The flow down clause shall provide clearly that there is no privity of contract between the City and the Contractor's subcontractors, outside associates, and other contractors.

8. KEY PERSONNEL

The key personnel listed in the proposal and/or below will be the individuals used in the performance of the work. If any of the listed key personnel leave employment or are otherwise not utilized in the performance of the work, approval to substitute must be obtained by the Contractor from the City's Project Manager. Any substitute shall have the same or a higher standard of qualifications that the key personnel possessed at the time of Contract award.

9. START AND CONTINUANCE OF WORK

It is further agreed that the Contractor will start work promptly and continue to work diligently until this Contract is completed.

10. APPROPRIATION OF FUNDS

This Contract is expressly made subject to the limitations of the Colorado Constitution and Section 7-60 of the Charter of the City of Colorado Springs. Nothing herein shall constitute, nor be deemed to constitute, the creation of a debt or multi-year fiscal obligation or an obligation of future appropriations by the City Council of Colorado Springs, contrary to Article X, § 20, Colo. Const., or any other constitutional, statutory, or charter debt limitation. Notwithstanding any other provision of this Contract, with respect to any financial obligation of the City which may arise under this Agreement in any fiscal year after the year of execution, in the event the budget or other means of appropriation for any such year fails to provide funds in sufficient amounts to discharge such obligation, such failure (i) shall act to terminate this Contract at such time as the then-existing and available appropriations are depleted, and (ii) neither such failure nor termination shall constitute a default or breach of this Contract, including any sub-agreement, attachment, schedule, or exhibit thereto, by the City. As used herein, the term “appropriation” shall mean and include the due adoption of an appropriation ordinance and budget and the approval of a Budget Detail Report (Resource Allocations) which contains an allocation of sufficient funds for the performance of fiscal obligations arising under this Contract.

11. CHANGES

The Contractor and the City agree and acknowledge as a part of this Contract that no change order or other form or order or directive may be issued by the City which requires additional compensable work to be performed, which work causes the aggregate amount payable under the Contract to exceed the amount appropriated for this Contract as listed above, unless the Contractor has been given a written assurance by the City that lawful appropriations to cover the costs of the additional work have been made or unless such work is covered under a remedy-granting provision of this Contract. The Contractor and the City further agree and acknowledge as a part of this Contract that no change order or other form or order or directive which requires additional compensable work to be performed under this Contract shall be issued by the City unless funds are available to pay such additional costs, and, regardless of any remedy-granting provision included within this Contract, the Contractor shall not be entitled to any additional compensation for any change which increases or decreases the Contract completion date, or for any additional compensable work performed under this Contract, and expressly waives any rights to additional compensation, whether by law or equity, unless, prior to commencing the additional work, the Contractor is given a written change order describing the change in Contract completion date or the additional compensable work to be performed, and setting forth the amount of compensation to be paid, and such change order is signed by the authorized City representative, as defined below. The amount of compensation to be paid, if any, shall be deemed to cover any and all additional, direct, indirect or other cost or expense or profit of the Contractor whatsoever. It is the Contractor's sole responsibility to know, determine, and ascertain the authority of the City representative signing any change order under this Contract.

No change, amendment, or modification to this Contract shall be valid unless duly approved and issued in writing by the City of Colorado Springs Procurement Services Division. The City shall not be liable for any costs incurred by the Contractor resulting from work performed for changes not issued in writing by the City of Colorado Springs Procurement Services Division.

The following personnel are authorized to sign changes, amendments, or modifications to this Contract.

The Project Manager: Changes up to $14,999.99
The City of Colorado Springs Chief of Staff: Changes up to $499,999.99
The Mayor of the City of Colorado Springs: Unlimited

12. ECONOMIC PRICE ADJUSTMENT

A. The Contractor shall notify the City of Colorado Springs Procurement Services Division if, at any time during contract performance, the rate of pay for labor or the unit prices for material shown in Schedule A experiences a significant increase. A change in price shall be considered significant when the unit price of an item increases by 10% from the execution date of this Contract. The Contractor shall furnish notice of this increase within 60 days after the increase, or within any additional period that the City Procurement Services Division may approve in writing, but not later than the date of final payment under this Contract. The notice shall include the Contractor's proposal for an adjustment in the Contract unit prices to be negotiated under paragraph (b) of this clause, and shall include, in the form required by the City Procurement Services Division, supporting data explaining the cause, effective date, and amount of the increase and the amount of the Contractor's adjustment proposal.

B. Promptly after the City Procurement Services Division receives the notice and data under paragraph (a) of this clause, the City Procurement Services Division and the Contractor shall negotiate a price adjustment in the contract unit prices and its effective date. However, the City Procurement Services Division may postpone the negotiations until an accumulation of increases in the labor rates (including fringe benefits) and unit prices of material shown in Schedule A results in an adjustment allowable under paragraph (c)(3) of this clause. The City Procurement Services Division shall modify this contract (1) to include the price adjustment and its effective date and (2) to revise the labor rates (including fringe benefits) or unit prices of material as shown in Schedule A to reflect the increases resulting from the adjustment. The Contractor shall continue performance at current rates pending agreement on, or determination of, any adjustment and its effective date.

C. Any price adjustment under this clause is subject to the following limitations:
   1. Any adjustment shall be limited to the effect on unit prices of the increases in the rates of pay for labor (including fringe benefits) or unit prices for material shown in Schedule A. There shall be no adjustment for:
      (i) Supplies or services for which the production cost is not affected by such changes;
      (ii) Changes in rates or unit prices other than those shown in Schedule A; or
      (iii) Changes in the quantities of labor or material used from those shown in Schedule A for each item.
   2. No upward adjustment shall apply to supplies or services that are required to be delivered or performed before the effective date of the adjustment, unless the Contractor's failure to deliver or perform according to the delivery schedule results from causes beyond the Contractor's control and without its fault or negligence, within the meaning of the Default clause.
   3. There shall be no adjustment for any change in rates of pay for labor (including fringe benefits) or unit prices for material which would not result in a net change of at least 3 percent of the then-current total contract price. This limitation shall not apply, however, if, after final delivery of all line items, either party requests an adjustment under paragraph (b) of this clause.

4. The aggregate of the increases in any contract unit price made under this clause shall not exceed 10 percent of the original unit price.

13. ASSIGNMENT

No assignment or transfer by the Contractor of this Contract or any part thereof or of the funds to be received thereunder by the Contractor will be recognized unless such assignment has had the prior written approval of the City and the surety has been given due notice of such assignment. Such written approval by the City shall not relieve the Contractor of the obligations under the terms of this Contract. In addition to the usual recitals in assignment contracts, the following language must be included in the assignment:

It is agreed that the funds to be paid to the assignee under this assignment are subject to a prior lien for services rendered or materials supplied for the performance of the work called for in said contract in favor of all persons, firms, or corporations rendering such services or supplying such materials.

14. CHOICE OF LAW

This Contract is subject to and shall be interpreted under the law of the State of Colorado, and the Charter, City Code, Ordinances, Rules and Regulations of the City of Colorado Springs, Colorado, a Colorado home rule city. Court venue and jurisdiction shall be exclusively in the Colorado District Court for El Paso County, Colorado. The Parties agree that the place of performance for this Contract is deemed to be in the City of Colorado Springs, El Paso County, State of Colorado. The Contractor shall ensure that the Contractor and the Contractor's employees, agents, officers and subcontractors are familiar with, and comply with, applicable Federal, State, and Local laws and regulations as now written or hereafter amended.

15. WORKERS' COMPENSATION INSURANCE

Contractor shall take out and maintain during the Period of Performance, Colorado Worker's Compensation Insurance for the Contractor and all employees of the Contractor. If any service is sublet by the Contractor, the Contractor shall require the subcontractor to provide the same coverage for the subcontractor and subcontractor's employees. Workers' Compensation Insurance shall include occupational disease provisions covering any obligations of the Contractor in accord with the provisions of the Workers' Compensation Act of Colorado.

16. INDEMNIFICATION

Contractor agrees that the Contractor shall indemnify, defend and hold harmless the City, its officers, employees and agents, from and against any and all loss, damage, injuries, claims, cause or causes of action, or any liability whatsoever resulting from, or arising out of, or in connection with the Contractor's obligations or actions under this Contract caused by any willful or negligent error, omission or act or a failure to observe any applicable standard of care by the Contractor or any person employed by it or anyone for whose acts the Contractor is legally liable. In consideration of the award of this Contract, to the extent damages are covered by insurance, the Contractor agrees to waive all rights of subrogation against the City, its subsidiary, parent, associated and/or affiliated entities, successors, or assigns, its elected officials, trustees, employees, agents, and volunteers for losses arising from the work performed by the Contractor for the City. The indemnification obligation shall survive the expiration or termination of this Contract

17. INDEPENDENT CONTRACTOR

In the performance of the Contractor's obligations under this Contract, it is understood, acknowledged and agreed between the parties that the Contractor is at all times acting and performing as an independent contractor, and the City shall neither have nor exercise any control or direction over the manner and means by which the Contractor performs the Contractor's obligations under this Contract, except as otherwise stated within the Contract terms. The City shall not provide any direction to the Contractor on the work necessary to complete the project. Contractor understands that it is an independent contractor responsible for knowing how to perform all work or tasks necessary to complete project. The Contractor understands and agrees that the Contractor and the Contractor's employees, agents, servants, or other personnel are not City employees. The Contractor shall be solely responsible for payment of salaries, wages, payroll taxes, unemployment benefits or any other form of compensation or benefit to the Contractor or any of the Contractor's employees, agents, servants or other personnel performing services or work under this Contract, whether it is of a direct or indirect nature. Further in that regard, it is expressly understood and agreed that for such purposes neither the Contractor nor the Contractor's employees, agents, servants or other personnel shall be entitled to any City payroll, insurance, unemployment, worker's compensation, retirement or any other benefits whatsoever.

18. APPLICABLE LAW AND LICENSES

In the conduct of the services or work contemplated in this Contract, the Contractor shall ensure that the Contractor and all subcontractors comply with all applicable state, federal and City and local law, rules and regulations, technical standards or specifications. The Contractor shall qualify for and obtain any required licenses prior to commencement of work.

19. PRIOR AGREEMENTS

This is a completely integrated Contract and contains the entire agreement between the parties. Any prior written or oral agreements or representations regarding this Contract shall be of no effect and shall not be binding on the City. This Contract may only be amended in writing, and executed by duly authorized representatives of the parties hereto.

20. INTELLECTUAL PROPERTY

The Parties hereby agree, and acknowledge, that all products, items writings, designs, models, examples, or other work product of the Contractor produced pursuant to this Contract are works made for hire, and that the City owns, has, and possesses any and all ownership rights and interests to any work products of the Contractor made under this Contract, including any and all copyright, trademark, or patent rights, and that compensation to the Contractor for Agreement and acknowledgment of this intellectual property right section of this Contract is included in any compensation or price whatsoever paid to the Contractor under this Contract. It is the intent of the parties that the City shall have full ownership and control of the Contractor's work products produced pursuant to this Contract, and the Contractor specifically waives and assigns to the City all rights which Contractor may have under the 1990 Visual Artists Rights Act, federal, and state law, as now written or later amended or provided. In the event any products, items writings, designs, models, examples, or other work product produced pursuant to this Contract is deemed by a court of competent jurisdiction not to be a work for hire under federal copyright laws, this intellectual property rights provision shall act as an irrevocable assignment to the City by the Contractor of any and all copyrights, trademark rights, or patent rights in the Contractor's products,

items writings, designs, models, examples, or other work product produced pursuant to this Contract, including all rights in perpetuity. Under this irrevocable assignment, the Contractor hereby assigns to the City the sole and exclusive right, title, and interest in and to the Contractor's products, items writings, designs, models, examples, or other work product produced pursuant to this Contract, without further consideration, and agrees to assist the City in registering and from time to time enforcing all copyrights and other rights and protections relating to the Contractor's products, items writings, designs, models, examples, or other work product in any and all countries. It is the Contractor's specific intent to assign all right, title, and interest whatsoever in any and all copyright rights in the Contractor's products, items writings, designs, models, examples, or other work product produced pursuant to this Contract, in any media and for any purpose, including all rights of renewal and extension, to the City. To that end, the Contractor agrees to execute and deliver all necessary documents requested by the City in connection therewith and appoints the City as Contractor's agent and attorney-in-fact to act for and in Contractor's behalf and stead to execute, register, and file any such applications, and to do all other lawfully permitted acts to further the registration, prosecution, issuance, renewals, and extensions of copyrights or other protections with the same legal force and effect as if executed by the Contractor; further, the parties expressly agree that the provisions of this intellectual property rights section shall be binding upon the parties and their heirs, legal representatives, successors, and assigns.

21. WAIVERS

No waiver of default by the City of any of the terms, covenants, and conditions hereof to be performed, kept, and observed by the Contractor shall be construed, or shall operate, as a waiver of any subsequent default of any of the terms, covenants, or conditions herein contained to be performed, kept, and observed by the Contractor.

22. THIRD PARTIES

It is expressly understood and agreed that enforcement of the terms and conditions of this Contract, and all rights of action relating to such enforcement, shall be strictly reserved to the Parties hereto, and nothing contained in this Contract shall give or allow any such claim or right of action by any other or third person or entity on such Contract. It is the express intention of the Parties hereto that any person or entity, other than the Parties to this Contract, receiving services or benefits under this Contract shall be deemed to be incidental beneficiaries only.

23. TERMINATION

A. Termination for Convenience.

By signing this Contract, Contractor represents that it is a sophisticated business and enters into the Contract voluntarily, has calculated all business risks associated with this Contract, and understands and assumes all risks of being terminated for convenience, whether such risks are known or not known. Contractor agrees that the City may terminate this Contract at any time for convenience of the City, upon written notice to the Contractor. Contractor expressly agrees to and assumes the risk that the City shall not be liable for any costs or fees of whatsoever kind and nature if termination for convenience occurs before Contractor begins any work or portion of the work. Contractor further expressly agrees and assumes the risks that the City shall not be liable for any unperformed work, anticipated profits, overhead, mobilizations costs, set-up, demobilization costs, relocation costs of employees, layoffs or severance costs, administrative costs, productivity costs, losses on disposal of equipment or materials, cost associated with the

termination of subcontractors, costs associated with purchase orders or purchases, or any other costs or fees of any kind and nature, if Contractor has started or performed portions of the Contract prior to receiving notice from the City. The City shall be liable only for the portions of work Contractor actually satisfactorily completed up to the point of the issuance of the Notice of Termination for convenience. Upon receipt of this notice the Contractor shall immediately: discontinue all services affected (unless the notice directs otherwise), and deliver to the City all data, drawings, specifications, reports, estimates, summaries, and other information and materials accumulated in performing this Contract, whether completed or in process.

B. Termination for Cause: The occurrence of any one or more of the following events ("Event of Default") will justify termination for cause:

1. Contractor's failure to perform the work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule as adjusted from time to time.
2. Contractor's disregard of the laws or regulations of any public body having jurisdiction.
3. Contractor's disregard of the authority of Project Manager.
4. Contractor's violation in any material provision of the Contract Documents.
5. Contractor's failure to make prompt payments to its subcontractors, and suppliers of any tier, or laborers or any person working on the work by, through, or under the Contractor or any of them, any all of their employees, officers, servants, members, and agents.
6. Contractor files a petition commencing a voluntary case under the U.S. Bankruptcy Code, or for liquidation, reorganization, or an arrangement pursuant to any other U.S. or state bankruptcy Laws, or shall be adjudicated a debtor or be declared bankrupt or insolvent under the U.S. Bankruptcy Code, or any other federal or state laws relating to bankruptcy, insolvency, winding-up, or adjustment of debts, or makes a general assignment for the benefit of creditors, or admits in writing its inability to pay its debts generally as they become due, or if a petition commencing an involuntary case under the U.S. Bankruptcy Code or an answer proposing the adjudication of Contractor as a debtor or bankrupt or proposing its liquidation or reorganization pursuant to the Bankruptcy Code or any other U.S. federal or state bankruptcy laws is filed in any court and Contractor consents to or acquiesces in the filing of that pleading or the petition or answer is not discharged or denied within sixty (60) Calendar Days after it is filed.
7. A custodian, receiver, trustee or liquidator of Contractor, all or substantially all of the assets or business of Contractor, or of Contractor's interest in the Work or the Contract, is appointed in any proceeding brought against Contractor and not discharged within sixty (60) Calendar Days after that appointment, or if Contractor shall consent to or acquiesces in that appointment.
8. Contractor fails to commence correction of defective work or fails to correct defective work within a reasonable period of time after written notice.

If one or more of the events identified in Paragraphs 1-8 above occur, City may give Contractor written notice of the event and direct the event be cured. Any such Notice to Cure will provide Contractor a minimum of ten (10) calendar days to prepare and submit to the Project Manager a plan to correct the Event of Default. If such plan to correct the Event of Default is not submitted to the Project Manager within ten (10) days after the date of the written notice or such plan is unacceptable to the City, the City may, give Contractor (and the Surety, if any) written notice that Contractor's services are being terminated for cause. Upon delivery of the termination notice, City may terminate the services of Contractor in whole or in part, exclude Contractor from the site, and take possession of the work and of all Contractor's tools, appliances, construction equipment, and machinery at the project site, and use the same to

the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion), incorporate in the work all materials and equipment stored at the site or for which City has paid Contractor but which are stored elsewhere, and finish the work as City may deem expedient. In such case, Contractor shall not be entitled to receive any further payment until Certificate of Completion of the work. In the event City terminates this Contract for Cause and the cost of completing the work exceeds the unpaid balance of the Contract price, Contractor shall pay City for any costs of completion which exceed the Contract price when combined with all amounts previously paid to Contractor. When exercising any rights or remedies under this paragraph City shall not be required to obtain the lowest price for the work performed. Should the cost of such completion, including all proper charges, be less than the original Contract price, the amount so saved shall accrue to the City. Neither the City nor any officer, agent or employee of the City shall be in any way liable or accountable to the Contractor or the Surety for the method by which the completion of the said work, or any portion thereof, may be accomplished or for the price paid.

Where Contractor's services have been so terminated by City, the termination will not affect any rights or remedies of City against Contractor or Surety then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by City will not release Contractor from liability.

C. Termination Notice. Upon receipt of a termination notice, whether for convenience or cause, the Contractor shall immediately: discontinue all services affected (unless the notice directs otherwise), and deliver to the City all data, drawings, specifications, reports, estimates, summaries, and other information and materials accumulated in performing this Contract, whether completed or in process.

D. Removal of Equipment. Except as provided above, in the case of termination of this Contract before completion from any cause whatever, the Contractor, if notified to do so by the City, shall promptly remove any part or all of Contractor's equipment and supplies from the property of the City, failing which the City shall have the right to remove such equipment and supplies at the expense of the Contractor.

24. BOOKS OF ACCOUNT AND AUDITING

The Contractor shall make available to the City if requested, true and complete records, which support billing statements, reports, performance indices, and all other related documentation. The City's authorized representatives shall have access during reasonable hours to all records, which are deemed appropriate to auditing billing statements, reports, performance indices, and all other related documentation. The Contractor agrees that it will keep and preserve for at least seven years all documents related to the Contract which are routinely prepared, collected or compiled by the Contractor during the performance of this Contract.

The City's Auditor and the Auditor's authorized representatives shall have the right at any time to audit all of the related documentation. The Contractor shall make all documentation available for examination at the Auditor's request at either the Auditor's or Contractor's offices, and without expense to the City.

25. COMPLIANCE WITH IMMIGRATION REFORM AND CONTROL ACT OF 1986

Contractor certifies that Contractor has complied with the United States Immigration Reform and Control Act of 1986. All persons employed by Contractor for performance of this Contract have completed and signed Form I-9 verifying their identities and authorization for employment.

26. LABOR

The Contractor shall employ only competent and skilled workmen and foremen in the conduct of work on this Contract. The Contractor shall at all times enforce strict discipline and good order among Contractor's employees. The Project Manager shall have the authority to order the removal from the work of any person, including Contractor's or any subcontractor's employees, who refuses or neglects to observe any of the provisions of these Plans or Specifications, or who is incompetent, abusive, threatening, or disorderly in conduct and any such person shall not again be employed on the Project.

In accord with the Keep Jobs in Colorado Act, codified at sections 8-17-101, et seq., C.R.S., Colorado labor shall be employed to perform the work to the extent of not less than eighty percent (80%) of each type or class of labor in the several classifications of skilled and common labor employed on this Project et seq.=; provided however, that this paragraph shall not apply if the Project receives federal funding.

In no event shall the City be responsible for overtime pay.

27. GRATUITIES

A. This Contract may be terminated if the Mayor, the Mayor's designee, and/or the Procurement Services Manager determine, in their sole discretion, that the Contractor or any officer, employee, agent, or other representative whatsoever, of the Contractor offered or gave a gift or hospitality to a City officer, employee, agent or Contractor for the purpose of influencing any decision to grant a City contract or to obtain favorable treatment under any City contract.

B. The terms "hospitality" and "gift" include, but are not limited to, any payment, subscription, advance, forbearance, acceptance, rendering or deposit of money, services, or anything of value given or offered, including but not limited to food, lodging, transportation, recreation or entertainment, token or award.

C. Contract termination under this provision shall constitute a breach of contract by the Contractor, and the Contractor shall be liable to the City for all costs of reletting the contract or completion of the project. Further, if the Contractor is terminated under this provision, or violates this provision but is not terminated, the Contractor shall be subject to debarment under the City's Procurement Regulations. The rights and remedies of the City provided in this clause shall not be exclusive and are in addition to any other rights and remedies provided by law or under this Contract.

28. NON-DISCRIMINATION

A. In accord with section 24-34-402, C.R.S., Title VII of the Civil Rights Act of 1964, Americans with Disabilities Act of 1990 as amended, all applicable federal and state laws, the Contractor will not discriminate against any employee or applicant for employment because of disability, race, creed, color, sex, sexual orientation, gender identity, gender expression, religion, age, national origin, or ancestry.

B. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

C. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to disability, race, creed, color, sex, sexual orientation, gender identity, gender expression, religion, age, national origin, or ancestry.

29. ORDER OF PRECEDENCE

Any inconsistency in this Contract shall be resolved by giving precedence in the following order:

A. This Contract document with its terms and conditions
B. Specific Construction Terms and Conditions
C. General Construction Terms and Conditions
D. The Statement of Work
E. Specific Specifications
F. General Specifications
G. Other Appendices, Attachments, Exhibits, or Schedules

30. HEADINGS

The section headings contained in this Contract are for reference purposes only and shall not affect the meaning or interpretation of this Contract.

31. DISPUTES

A. All administrative and contractual disputes arising from or related to this Contract other than those arising under Unanticipated Circumstances provisions (in section107.27 of Schedule B General Construction Terms and Conditions) shall be addressed in the following manner:
    1. If either Party disputes or disagrees with a Contract term or the other Party's interpretation of a Contract term or has any other administrative or contractual dispute not addressed in the Unanticipated Circumstances provisions, such Party shall promptly give the other Party written notice of said dispute.
    2. The Parties shall hold a meeting as soon as reasonably possible, but in no event later than thirty (30) calendar days from the initial written notice of the dispute, attended by persons with decision-making authority regarding the dispute, to attempt in good faith to negotiate a resolution of the dispute; provided, however, that no such meeting shall be deemed to vitiate or reduce the obligations and liabilities of the Parties or be deemed a waiver by a Party of any remedies to which such Party would otherwise be entitled unless otherwise agreed to by the Parties in writing.
    3. If, within thirty (30) calendar days after such meeting, the Parties have not succeeded in negotiating a resolution of the dispute, they agree to submit the dispute to non-binding mediation and to bear equally the costs of the mediation.
    4. The Parties will jointly appoint a mutually acceptable mediator. If they fail to do so within twenty (20) calendar days from the conclusion of the negotiation period, they shall each select a mediator. The two mediators will then appoint a third mediator who shall conduct mediation for the Parties as the sole mediator.
    5. The Parties agree to participate in good faith in the mediation and negotiations for a period of thirty (30) calendar days. The substantive and procedural law of the State of Colorado

shall apply to the proceedings. If the Parties are not successful in resolving the dispute through mediation, then the Parties shall be free to pursue any other remedy afforded by the laws of the State of Colorado.

6. Until final resolution of any dispute hereunder, the Contractor shall diligently proceed with the performance of this Contract as directed by the City. For purposes of this Contract, termination for convenience shall not be deemed a dispute. The City of Colorado Springs and the Contractor agree to notify each other in a timely manner of any claim, dispute, or cause of action arising from or related to this Contract, and to negotiate in good faith to resolve any such claim, dispute, or cause of action. To the extent that such negotiations fail, the City of Colorado Springs and the Contractor agree that any lawsuit or cause of action that arises from or is related to this Contract shall be filed with and litigated only by the Colorado District Court for El Paso County, CO.

32. DELIVERY

The City may cancel this Contract or any portion thereof if delivery is not made when and as specified, time being of the essence in this Contract. Contractor shall pay the City for any loss or damage sustained by the City because of failure to perform in accordance with this Contract.

33. PAYMENTS

All invoices shall be sent to the Project Manager identified in this Contract.

The City will pay the Contractor, upon submission of proper invoices, the prices stipulated in the Contract for services rendered and accepted, less any deductions provided in this Contract within 30 days (Net 30). The City will not pay late fees or interest. Any discount payment terms offered on the invoice may be taken by the City.

All payments for Construction will be made in accordance with the Payment provisions found in Schedule B – General Construction Terms and Conditions.

Each invoice must contain at least the following information:

Contract number, issued purchase order number, invoice number, invoice date, timeframe covered by invoice, type and amount of labor and materials used for that time period, dollar amount in unit price, extended price, and total value of invoice.

34. INSPECTION OF SERVICES

The Contractor is responsible for performing or having performed all inspections and tests necessary to substantiate that the services furnished under this Contract conform to Contract requirements, including any applicable technical requirements for specified manufacturers' parts. This clause takes precedence over any City inspection and testing required in the Contract's specifications, except for specialized inspections or tests specified to be performed solely by the City.

A. Definition of "services", as used in this clause, includes services performed, workmanship, and material furnished or utilized in the performance of services.

B. The Contractor shall provide and maintain an inspection system acceptable to the City covering the services under this Contract. Complete records of all inspection work performed

by the Contractor shall be maintained and made available to the City during Contract performance and for as long afterwards as the Contract requires.

C. The City has the right to inspect and test all services called for by the Contract, to the extent practicable at all times and places during the term of the Contract. The City will perform inspections and tests in a manner that will not unduly delay the work.

D. If the City performs inspections or test on the premises of the Contractor or a subcontractor, the Contractor shall furnish, and shall require subcontractors to furnish, at no increase in Contract price, all reasonable facilities and assistance for the safe and convenient performance of these duties.

35. SECURITY

The City maintains security requirements regarding access to City buildings and other City workplaces and worksites on City property. All Contractor personnel accessing City buildings, workplaces, or worksites, may be required to produce a valid, Government issued picture identification. Contractor personnel lacking such identification may not be allowed access to such sites. No costs incurred by the Contractor due to City security requirements shall be allowable or payable under this Contract.

36. TIME IS OF THE ESSENCE

In as much as the Contract concerns a needed or required service, the terms, conditions, and provisions of the Contract relating to the time of performance and completion of work are of the essence of this Contract. The Contractor shall begin work on the day specified and shall prosecute the work diligently so as to assure completion of the work within the number of calendar days or date specified, or the date to which the time for completion may have been extended.

37. EMPLOYMENT OF LABOR

The Contractor shall comply with, and defend and hold the City harmless from any violation of all laws and lawful rules and regulations, both of the State of Colorado and of the United States, relating to Workmen's Compensation, unemployment compensation, Social Security, payment for overtime, and all other expenses and conditions of employment under this Contract.

38. SALES TAX

The Contractor must have a tax-exemption certificate from the Colorado Department of Revenue for this project. The certificate does not apply to City of Colorado Springs Sales and Use Tax which shall be applicable. The tax exempt project number and the exemption certificate only applies to County, PPRTA (Pikes Peak Rural Transportation Authority), and State taxes when purchasing construction and building materials **to be incorporated into this project**.

Furthermore, the exemption **does not** include or apply to the purchase or rental of equipment, supplies or materials that **do not become a part of the completed project or structure**. Such purchases and rentals are subject to full applicable taxation.

All contracts with subcontractors must include the City of Colorado Springs Sales and Use Tax on the work covered by the Contract, and other taxes as applicable.

Note: For all equipment, materials and supplies incorporated into the work purchased from vendors or suppliers not licensed to collect City Sales Tax (i.e. out of state suppliers, etc.), City Use Tax is due and payable to the City. The Contractor shall execute and deliver, and shall cause the Contractor's subcontractors to execute and deliver to the City Sales Tax Office, ST 16 forms listing all said equipment, materials and supplies and the corresponding use tax due, along with payment for said taxes. Any outstanding taxes due may be withheld from the final payment due the Contractor and may result in suspension of Contractor from bidding on City projects.

Forms and instructions can be downloaded at https://coloradosprings.gov/cat/government/tax-information/sales-tax. Questions can be directed to the City Sales Tax Division at (719) 385-5903.

Our Registration Numbers are as follows:
City of Colorado Springs
Federal I.D.: 84-6000573
Federal Excise: A-138557
State Sales Tax: 98-03479

The Contractor's payment or exemption of State of Colorado, El Paso County and City Sales and Use Taxes shall be as specified herein.

39. SEVERABILITY

If any terms, conditions, or provisions of this Contract shall be held unconstitutional, illegal, or void, such finding shall not affect any other terms, conditions, or provisions of this Contract.

40. LIABILITY OF CITY EMPLOYEES

All authorized representatives of the City are acting solely as agents and representatives of the City when carrying out and exercising the power or authority granted to them under the Contract. There shall not be any liability on them either personally or as employees of the City.

41. USE OF CITY NAME OR LOGO

Except as otherwise provided in this Contract, the Contractor shall not refer to this Contract or the City of Colorado Springs in any advertising or promotions in such a manner as to state or imply that the product or service provided is endorsed or preferred by the City of Colorado Springs, its employees, or its Departments, or is considered by these entities to be superior to other products or services. Any use of the name or logo of the City of Colorado Springs in advertising or promotions must be approved in writing by the City of Colorado Springs Contracts Specialist assigned to the Contract prior to such use.

42. TRAVEL

If travel expenses are included as a line item in this Contract, all travel expenses incurred and billable by the Contractor are subject to City approval. Air travel shall be limited to the round trip "economy coach" fare. Travel from the Colorado Springs Airport is encouraged. Unless there are extenuating circumstances, the Contract should take advantage of lower airfares by purchasing tickets more than 14 days in advance of travel. In-state travel by air must be more economical than travel by private vehicle. Use of a private vehicle may be reimbursed per mile at the current rate published by the IRS annually. Short-term parking, long-term parking or cab fare associated

with airport departure and arrival may be allowable expenses. Valet parking will not be allowed unless it is the least expensive or only option. Car rental rates may be reimbursed for car rentals no greater than the intermediate or standard classification. The City will not reimburse any other travel methods or expenses. The City will pay for lodging, meals, and miscellaneous expenses on a per diem basis only, in accordance with the current per diem rates published by the IRS annually. The City will not pay for Contractor expenses exceeding the per diem rates. Receipts for all reimbursable expenses must be provided with the Contractor's invoice.

43. ELECTRONIC SIGNATURE

This Agreement and all other documents contemplated hereunder may be executed using electronic signature with delivery via facsimile transmission, by scanning and transmission of electronic files in Portable Document Format (PDF) or other readily available file format, or by copy transmitted via email, or by other electronic means and in one or more counterparts, each of which shall be (i) an original, and all of which taken together shall constitute one and the same agreement, (ii) a valid and binding agreement and fully admissible under state and federal rules of evidence, and (iii) enforceable in accordance with its terms

44. APPENDICES

The following Appendices are made a part of this Agreement:

1. Schedule A – Price Sheet
2. Schedule B – General Construction Terms and Conditions
3. Schedule C – Special Contract Terms and Conditions
4. Schedule D – General Specifications
5. Schedule E – Special and Technical Specifications
6. Schedule F – Scope of Work
7. Exhibit 1 – Performance, Labor and Material Payment, and Maintenance Bonds
8. Exhibit 2 – Minimum Insurance Requirements

CONTRACT SIGNATURE PAGE

IN WITNESS WHEREOF, the parties have caused these presents to be executed on the day and the year first above written.

This Contract is executed in one (1) original copy.

THE CITY OF COLORADO SPRINGS, COLORADO:

SECOND PARTY:	
Corporate Name	
Signature	Date
Title	

EXHIBIT 2 – MINIMUM INSURANCE REQUIREMENTS

The following listed minimum insurance requirements shall be carried by all contractors and consultants unless otherwise specified in the City's solicitation package, Special Provisions or Standard Specifications.

☒	Commercial General Liability for limits not less than $1,000,000 combined single limit with $2,000,000 aggregate for bodily injury and property damage for each occurrence. Coverage shall include blanket contractual, broad form property damage, products and completed operations
☒	Workers' Compensation and Employers Liability as required by statute. Employers Liability coverage is to be carried for a minimum limit of $100,000.
☒	Automobile Liability covering any auto (including owned, hired, and non-owned autos) with a minimum of $1,000,000 each accident combined single limit.
☒	Builders Risk or Installation Floater Insurance: Contractor shall purchase and maintain property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made or until no person or entity other than the Owner has an insurable interest in the property.

Except for workers' compensation and employer's liability insurance, the **City of Colorado Springs and PPRTA must be named as an additional insured**. Certificates of Insurance must be submitted before commencing the work and provide 30 days' notice prior to any cancellation, non-renewal, or material changes to policies required under the contract.

All coverage furnished by contractor is primary, and any insurance held by the City of Colorado Springs is excess and non-contributory.

The undersigned certifies and agrees to carry and maintain the insurance requirements indicated above throughout the contract Period of Performance.

_____

(Name of Company)

_____

(Signature) *(Date)*

EXHIBIT 3 – QUALIFICATION STATEMENT

This statement will provide information which will enable the City to evaluate the qualifications of your firm and staff with regard to the requirements of this Invitation for Bid. Please complete this form in its entirety and submit it (in the number of copies requested) along with the other required proposal documents. If a request in the Qualification Statement is contained in the Bid, indicate the section in the Bid where that information can be found.

(PRINT)
FIRM NAME: _____
ADDRESS: _____
CITY STATE ZIP: _____
AUTHORIZED REPRESENTATIVE: _____
TITLE: _____
AUTHORIZED SIGNATURE: _____
PHONE: _____ FAX: _____
E-MAIL ADDRESS: _____
1. TYPE OF BUSINESS _____
2. TYPE OF LICENSE AND LOCATION _____
CORPORATION ☐ INDIVIDUAL ☐
PARTNERSHIP ☐ JOINT VENTURE ☐
OTHER: _____

3. TYPE OF SERVICE TO BE PROVIDED FOR IFB: _____

4. NUMBER OF YEARS IN BUSINESS: _____

5. ON A SEPARATE SHEET PROVIDE A BRIEF HISTORY OF YOUR FIRM, STAFF SIZE AND EXPERIENCE. SUBMIT A RESUME FOR THE PROJECT MANAGER AND EACH KEY PERSONNEL ASSIGNED TO THIS PROJECT.

6. WHAT OTHER NAME(S) HAS YOUR COMPANY OPERATED UNDER:

7. HAVE YOU OR YOUR FIRM EVER FAILED TO COMPLETE ANY WORK AWARDED TO YOU? YES ☐ NO ☐ IF "YES", EXPLAIN:

8. HAS ANY OFFICER OR PARTNER OF YOUR ORGANIZATION EVER BEEN AN OFFICER OR PARTNER OF ANOTHER ORGANIZATION THAT FAILED TO COMPLETE A CONTRACT WITHIN THE LAST FIVE (5) YEARS? YES ☐ NO ☐
IF "YES", EXPLAIN:

9. HAS YOUR FIRM OR ANY PARTNERS OR OFFICERS EVER BEEN INVOLVED IN ANY BANKRUPTCY ACTION? YES ☐ NO ☐ IF "YES", EXPLAIN:

_____

_____

_____

_____

10. ARE YOU PRESENTLY INVOLVED IN ANY LITIGATION WITH ANY GOVERNMENT AGENCY? YES ☐ NO ☐ IF "YES", EXPLAIN TYPE, KIND, PLAINTIFF, DEFENDANT, ETC., AND STATE THE CURRENT STATUS:

_____

_____

_____

_____

11. BANK REFERENCE: _____

ADDRESS: _____

CONTACT: PHONE:

12. LIST THREE (3) SIMILAR PROJECTS (LOCAL OR STATE-WIDE) **FROM LAST FIVE (5) YEARS**-INCLUDE LOCATION OF PROJECT, SIZE OF PROJECT (CONTRACT AMOUNT), CONTACT NAME, ADDRESS, TELEPHONE NUMBERS

NOTE: DETAILED INFORMATION ON THESE PROJECTS MAY ALSO BE REQUESTED IN THE IFB PACKAGE.

1. Location of Project:
Size of Project:
Contract Amount:
Contact Name and Title:
Contract Address:
Contact telephone and FAX Numbers:

2. Location of Project:
Size of Project:
Contract Amount:
Contact Name:
Contact Address:
Contact telephone and FAX Numbers:

3. Location of Project:
Size of Project:
Contract Amount:
Contact Name:
Contact Address:
Contact telephone and FAX Numbers:

13. LIST **CURRENT** SIMILAR PROJECTS (LOCAL OR STATE-WIDE) UNDER CONTRACT-INCLUDE LOCATION OF PROJECT, SIZE OF PROJECT (CONTRACT AMOUNT) CONTACT NAME, ADDRESS, TELEPHONE NUMBERS.

NOTE: DETAILED INFORMATION ON THESE PROJECTS MAY ALSO BE REQUESTED IN THE IFB PACKAGE.

1. Location of Project:
Size of Project:
Contract Amount:
Contact Name and Title:
Contact Address:
Contact telephone and FAX Numbers:

2. Location of Project:
Size of Project:
Contract Amount:
Contact Name and Title:
Contact Address:
Contact telephone and FAX Numbers:

3. Location of Project:
Size of Project:
Contract Amount:
Contact Name and Title:
Contact Address:
Contact telephone and FAX Numbers:

14. LIST OF SUB-CONTRACTORS TO BE USED FOR THIS PROJECT:
(INCLUDE NAME, ADDRESS, TELEPHONE NUMBER, TYPE OF WORK)

1. Name:
Address:
Telephone Number:
Type of Work:

2. Name:
Address:
Telephone Number:
Type of Work:

3. Name:
Address:
Telephone Number:
Type of Work:

IF ADDITIONAL INFORMATION IS PROVIDED ON A SEPARATE SHEET FOR ANY OF THE ITEMS, CLEARLY SPECIFY WHERE IT CAN BE LOCATED IN YOUR BID PACKAGE.

EXHIBIT 4 – BID CERTIFICATION AND REPRESENTATIONS AND CERTIFICATIONS

Check or Mark the space after each number to indicate compliance.

1. _____ Address of Offeror's Principal Place of Business:

   _____

   _____

Does Offeror have an established office or facility in Colorado Springs?

Yes _____ No _____

If yes, indicate address below if different than Principal Place of Business.

Colorado Springs Facility - Year established _____

Address of Colorado Springs Facility:

   _____

   _____

Percent of Work to be Performed from Principal Place of Business? _____

Percent of Work to be Performed from Colorado Springs Facility? _____

2. _____ Indicate your ability to provide a certificate of insurance evidencing the required coverage types and limits specified in Minimum Insurance Requirements Exhibit. (The certificate of insurance must reflect the City of Colorado Springs as an Additional Insured, as applicable.)

Indicate your ability to comply with the following requirements:

The City shall be added as an Additional Insured to all liability policies:

Yes _____ No _____

Your property and liability insurance company is licensed to do business in Colorado:

Yes _____ No _____

Provide the name of your property and liability insurance company here:

Name: _____

Your property and liability insurance company has an AM best rating of not less than B+ and/or VII:

Yes _____ No _____

Worker's Compensation Insurance is carried for all employees and covers work done in Colorado:

Yes _____ No _____

3. _____ Provide one (1) copy of current financial statements (if required). Enclose financial information in a separate envelope; do not bind with the other proposal copies. If review of the information is to be restricted to the City's financial officer, it must be marked accordingly.

4. _____ Provide the completed and signed bid. (Bids must be identified as specified in this IFB document). All required Exhibits are attached.

By signing below, the Offeror certifies that no person or firm other than the Offeror or as otherwise indicated has any interest whatsoever in this offer or any Contract that may be entered into as a result of this offer and that in all respects the offer is legal and firm, submitted in good faith without collusion or fraud. The undersigned additionally declares that it has carefully examined the Bid information and the complete Solicitation prior to submitting a Bid. The Bidder's signature will be considered the Bidder's acknowledgement of understanding and ability to comply with all items in the solicitation.

Offeror has appointed _____ as the Offeror's representative and contact for all questions or clarifications in regard to this Offeror.

Telephone: (___) _____

Email: _____

The undersigned acknowledges and understands the terms, conditions, Specifications and all Requirements contained and/or referenced and are legally authorized by the Offeror to make the above statements or representations.

_____ _____
(Name of Company) (Signature)

_____ _____
(Address) Date

_____ _____
(City, State and Zip) (Telephone Number)

_____ _____
(Name typed/Printed) (Title)

_____
(E-Mail Address)

FEDERAL TAX ID #_____

This Company Is: Corporation___ Individual____ Partnership____ LLC____

Offeror hereby acknowledges receipt of the following amendments, if applicable. Offeror agrees that it is bound by all Amendments identified herein.

AMENDMENT #1_____ DATED:_____

AMENDMENT #2_____ DATED:_____

AMENDMENT #3_____ DATED:_____

Please Note: the following Representations and Certifications must be initialed by Offeror in the spaces provided and returned with this certification.

1. INSURANCE REQUIREMENTS

Offeror shall comply with all insurance requirements and will submit the Insurance Certificates prior to performance start date. If limits are different from the stated amounts, Offeror shall explain variance. Certain endorsements and "additionally insured" statements may require further clarification and specific statements on a project specific basis and should have been described in the Offeror's Bid.

_____
Initials for 1

2. ETHICS VIOLATIONS

A. The Offeror shall have in place and follow reasonable procedures designed to prevent and detect possible violations described in this clause in its own operations and direct business relationships.
B. Offeror certifies the Offeror has not violated or caused any person to violate, and shall not violate or cause any person to violate, the City's Code of Ethics contained in Article 3, of Chapter 1 of the City Code and in the City's Procurement Rules and Regulations
C. When the Offeror has reasonable grounds to believe that a violation described in this clause may have occurred, the Offeror shall promptly report the possible violation to the City Contracts Specialist in writing.
D. The Offeror must disclose with the signing of this Bid, the name of any officer, director, or agent who is also an employee of the City and any City employee who owns, directly or indirectly, an interest of ten percent (10%) or more in the Offeror's firm or any of its branches.
E. In addition, the Offeror must report any conflict or apparent conflict, current or discovered during the performance of the Contract, to the City Contracts Specialist.
F. The Offeror shall not engage in providing gifts, meals or other amenities to City employees. The right of the Offeror to proceed may be terminated by written notice issued by City Contracts Specialist if Offeror offered or gave a gratuity to an officer, official, or employee of the City and intended by the gratuity to obtain a contract or favorable treatment under a contract.
G. The Offeror shall cooperate fully with the City or any agency investigating a possible violation on behalf of the City. If any violation is determined, the Offeror will properly compensate the City.
H. The Offeror agrees to incorporate the substance of this clause (after substituting "Contractor" for "Offeror") in all subcontracts under this offer.

_____
Initials for 2

3. COOPERATION WITH OTHER CONTRACTORS

Other City activities/contracts may be in progress or start during the performance of this contract. The Offeror shall coordinate the work harmoniously with the other contractors or City personnel, if applicable.

_____
Initials for 3

4. INTERNET USE

Should the Offeror require access to City Internet resources in the performance of this requirement, a "Contractor's Internet Use Agreement" form must be separately signed by each individual having access to the City Network. The completed Contractor's Internet Use Agreement will be maintained with this agreement. Inappropriate use of the City Network will be grounds for immediate termination of any awarded contact.

_____

Initials for 4

5. LITIGATION

If awarded a contract, Offeror shall notify the City within five (5) calendar days after being served with a summons, complaint, or other pleading in any matter which has been filed in any federal or state court or administrative agency. The Offeror shall deliver copies of such document(s) to the City's Procurement Services Manager. The term "litigation" includes an assignment for the benefit of creditors, and filings of bankruptcy, reorganization and/or foreclosure.

_____

Initials for 5

6. CONTRACTOR'S REGISTRATION INFORMATION

Offeror's firm verifies and states that they are (check all that apply):

_____ Large Business (i.e. do not qualify as a small business or non-profit)

_____ Nonprofit

_____ Small Business

_____ Minority Owned Business/Small Disadvantaged Business

_____ Woman Owned Business

_____ Veteran Owned Business

_____ Service-Disabled Veteran Owned Business

_____ HUBZone Business

Note: The City accepts self-certification for these categories in accordance with Small Business Administration (SBA) standards. The SBA size standards are found on the SBA website https://www.sba.gov/content/am-i-small-business-concern.

_____
Initials for 6

7. CONTRACTOR PERSONNEL

A. The Offeror shall appoint one of its key personnel as the "Authorized Representative" who shall have the power and authority to interface with the City and represent the Offeror in all administrative matters concerning this Bid and any awarded contract, including without limitation such administrative matters as correction of problems modifications, and reduction of costs.
B. The Authorized Representative shall be the person identified in the Offeror's Bid, unless the Offeror provides written notice to the City naming another person to serve as its Authorized Representative. Communications received by the City Contracts Specialist from the Authorized Representative shall be deemed to have been received from the Offeror.

The individual, _____ (Name)
with position, _____ (Title)
Can be reached at
Work telephone number: _____

Home telephone number: _____
Cellular telephone number: _____
E-mail address: _____

_____
Initials for 7

8. OFFEROR's CERTIFICATION

The undersigned hereby affirms that:

A. He/She is a duly authorized agent of the Offeror;
B. He/She has read and agrees to the City's standard terms and conditions attached.
C. The offer is presented in full compliance with the collusive prohibitions of the City of Colorado Springs. The Offeror certifies that no employee of its firm has discussed, or compared the offer with any other offeror or City employee and has not colluded with any other offeror or City employee.
D. The Offeror certifies that it has checked all of its figures, and understands that the City will not be responsible for any errors or omissions on the part of the Offeror in preparing its Bid.
E. By submitting an offer the Offeror certifies that it has complied and will comply with all requirements of local, state, and federal laws, and that no legal requirements have been or will be violated in making or accepting this solicitation.
F. If awarded the contract, the Offeror agrees to execute and enter into a contract with the City, and furnish the necessary security within ten (10) days of receipt of the "Notice of Award:, and to begin the work within ten (10) day from the date of the receipt of the "Notice to Proceed", and to complete the Work with the above specifications.
G. I hereby certify that I am submitting the Bid based on my company's capabilities to provide quality products and/or services on time.

_____
Initials for 8

9. OFFEROR CERTIFICATION REGARDING DEBARMENT, SUSPENSION, PROPOSED DEBARMENT, AND OTHER RESPONSIBILITY MATTERS:

A. The Offeror certifies to the best of its knowledge and belief, that (i) the Offeror and/or any of its Principals
    1. Are ( ), Are not ( ) presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency;
    2. Have ( ), Have not ( ), within a three year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (federal, state, local) contract or subcontract; violation of Federal or state antitrust statutes relation to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statement, tax evasion, or receiving stolen property; and
    3. Are ( ), Are not ( ) presently indicated for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in any paragraphs above.
B. The Offeror shall provide immediate written notice to the City Contracts Specialist if, at any time prior to contract award, the Offeror learns that its certification was erroneous when submitted or has become erroneous by reasons of changed circumstances.
C. The certification in paragraph 1. above, is a material representation of fact upon which reliance was placed when making award. If it is later determined that the Offeror knowingly rendered an erroneous certification, in addition to other remedies available to the City, the City Contracts Specialist may terminate the contract resulting from this solicitation for default. Termination for default may result in additional charges being levied for the costs incurred by the City to initiate activities to replace the awarded Contractor.

_____
Initials for 9

10. ACCEPTANCE OF CITY CONTRACTS SPECIALIST'S SOLE AUTHORITY FOR CHANGES

Unless otherwise specified in the Contract, the Offeror hereby agrees that any changes to the scope of work, subsequent to the original contract signing, shall be generated in writing and an approval signature shall be obtained from the City Contracts Specialist prior to additional work performance.

_____
Initials for 10

11. CITY CONTRACTOR SAFETY PROGRAM

The Offeror hereby agrees to adhere to a worker safety program for contractor employees on a City job site or location. By initialing below, the Offeror has reviewed the information and will abide by the City Policy which is available for review:

https://coloradosprings.gov/finance/page/procurement-regulations-and-documents

_____
Initials for 11

12. ACCEPTANCE OF CITY ENVIRONMENTALLY PREFERRED PURCHASING (EPP) POLICY

The City of Colorado Springs is committed to buying more environmentally preferable goods and services, as long as they meet performance needs, are available within a reasonable time and at a reasonable cost. The Offeror hereby acknowledges review of this policy by initialing below.

https://coloradosprings.gov/finance/page/procurement-regulations-and-documents

_____
Initials for 12

13. FRAUD, WASTE, AND ABUSE

Everyone has a duty to report any suspected unlawful act impacting the City of Colorado Springs operations and its enterprises. Anyone who becomes aware of the existence or apparent existence of fraud, waste, and abuse in City of Colorado Springs is encouraged to report such matters to the City Auditor's Office in writing or on the telephone hotline 385-2387 (ADTR). Written correspondence can be mailed to:

City Auditor
P.O. Box 2241
Colorado Springs CO 80901

Or via email FraudHotline@coloradosprings.gov. Any of these mechanisms allow for anonymous reporting. For more information, please go to the website https://coloradosprings.gov/cityfraud.

_____
Initials for 13

Name of Company: _____

Federal Tax ID Number: _____

DUNS Number: _____

Principal Place of Business: _____

_____
Signature of Authorized Representative

Printed Name:_____

Title:_____

Date:_____

EXHIBIT 5 – CITY OF COLORADO SPRINGS BID BOND

1. KNOW ALL MEN BY THESE PRESENTS, THAT:

_____
(Name)

_____ As Principal, hereinafter called Principal, and
(Address)

_____
(SURETY Name)

a corporation organized and existing under the laws of the State of:

_____
(SURETY Address)

and AUTHORIZED TO DO BUSINESS IN THE STATE OF COLORADO, as Surety, hereinafter called Surety, are held firmly bound to the CITY OF COLORADO SPRINGS, COLORADO, as Obligee, hereinafter called the Obligee, in the sum of: (Insert Bid Amount in Words)

_____ ($ DOLLARS),

lawful money of the United States of America, for payment of which sum well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, successors and assigns, jointly and severally, firmly by these presents.

2. WHEREAS, the Principal has submitted to the Obligee,

a contract bid dated the _____ day of _____ For the following contract:

_____

3. NOW THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH THAT, If Principals bid is accepted by Obligee and Principal is awarded the contract in whole or in part, and the Principal shall enter into the contract with the Obligee in accordance with the terms of such bid, and give such Payment, Performance, and Maintenance bond or bonds as may be specified in the bidding or contract documents with good and sufficient surety for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof, or in the event of the failure of the Principal to enter such contract and give such bond or bonds, if the Principal shall promptly pay to the Obligee the amount of this bond as set forth herein above, then this obligation shall be null and void, otherwise this obligation to remain in full force and effect.

Signed and sealed on the dates set forth below:

_____ FOR: _____
(Witness) (Principals Name)

BY: _____

ITS: _____

(Seal)

This _____ day of _____

_____ FOR: _____
(Witness) (Surety's Name)

BY: _____

ITS: _____

(Seal)

This _____ Day of _____

Bond # _____ This Bond __(is) __ (is not) a SBA Guaranteed Bond.