Purchasing Division

Invitation for Bid

IFB-4618-19-DH
2019 Monument Road Bicycle Path Trail

Responses Due:

April 9, 2019 prior to 3:30PM

Accepting Electronic Responses Only

Responses Only Submitted Through the Rocky Mountain E-Purchasing System (RMEPS)

https://www.rockymountainbidsystem.com/default.asp

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

Purchasing Representative:
Duane Hoff Jr., Senior Buyer
duaneh@gjcity.org
970-244-1545

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

Invitation for Bids

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1. Instructions to Bidders

1.1. **Purpose:** The City of Grand Junction is soliciting competitive bids from qualified and interested companies for all labor, equipment, and materials required to complete the project, which includes approximately 8,910 square yards of new 6" concrete sidewalk underlain by 6 inches of Class 6 aggregate base course for a trail along the southeast side of Monument Road, from D Road to Lunch Loops trailhead. This project also includes reinforced concrete abutments founded on 8" micropiles to support a premanufactured steel bridge over No Thoroughfare Creek, along with various improvements to the Lunch Loops (Tabeguache) trailhead. A new sanitary sewer will also be installed prior to trail construction from 2501 Monument Road to the existing sewer at S Redlands Road. All dimensions and scope of work should be verified by Contractors prior to submission of bids.

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

1.2. **Mandatory Pre-Bid Meeting:** **Prospective bidders are required to attend a mandatory pre-bid meeting on March 19, 2019 at 10:00am**. Meeting location shall be in the Auditorium at City Hall, located at 250 N. 5th Street. The purpose of this visit will be to inspect and to clarify the contents of this Invitation for Bids (IFB).

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

1.4. **Prequalification Requirement:** Although the City no longer requires pre-qualification, Contractors are expected to have all of the proper equipment and training to perform the tasks include within this solicitation.

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

1.6. **Modification and Withdrawal of Bids Before Opening.** Bids may be modified or withdrawn by an appropriate document stating such, duly executed and submitted to the place where Bids are to be submitted at any time prior to Bid Opening.

1.7. Printed Form for Price Bid: All Price Bids must be made upon the Price Bid Schedule attached, and should give the amounts both in words and in figures, and must be signed and acknowledged by the bidder.

The Offeror shall specify a unit price in figures for each pay item for which a quantity is given and shall provide the products (in numbers) of the respective unit prices and quantities in the Extended Amount column. The total Bid price shall be equal to the sum of all extended amount prices. When an item in the Price Bid Schedule provides a choice to be made by the Offeror, Offeror's choice shall be indicated in accordance with the specifications for that particular item and thereafter no further choice shall be permitted.

Where the unit of a pay item is lump sum, the lump sum amount shall be shown in the "extended amount" column and included in the summation of the total Bid.

All blank spaces in the Price Bid Schedule must be properly filled out.

Bids by corporations must be executed in the corporate name by the president or vice president or other corporate office accompanied by evidence of authority to sign. The corporate address and state of incorporation shall be shown below the signature.

Bids by partnerships must be executed in the partnership name and signed by a partner whose title must appear under the signature and the official address of the partnership must be shown below the signature.

All names must be typed or printed below the signature.

The Offeror’s Bid shall contain an acknowledgement of receipt of all Addenda, the numbers of which shall be filled in on the Contractor’s Bid Form.

The contact information to which communications regarding the Bid are to be directed must be shown.

1.8. Exclusions: No oral, telephonic, emailed, or facsimile bid will be considered

1.9. Contract Documents: The complete IFB and bidder’s response compose the Contract Documents. Copies of bid documents can be obtained from the City Purchasing website, http://www.gjcity.org/BidOpenings.aspx.

1.10. Additional Documents: The July 2010 edition of the “City Standard Contract Documents for Capital Improvements Construction”, Plans, Specifications and other Bid Documents are available for review or download on the Public Works & Planning/Engineering page at www.gjcity.org. Electronic copies may be obtained on a CD format at the Department of Public Works and Planning at City Hall.

1.11. Definitions and Terms: See Article I, Section 3 of the General Contract Conditions in the *Standard Contract Documents for Capital Improvements Construction*.

1.12. Examination of Specifications: Bidders shall thoroughly examine and be familiar with the project Statement of Work. The failure or omission of any Offeror to receive or

examine any form, addendum, or other document shall in no way relieve any Offeror from any obligation with respect to his bid. The submission of a bid shall be taken as evidence of compliance with this section. Prior to submitting a bid, each Offeror shall, at a minimum:

a. Examine the *Contract Documents* thoroughly;

b. Visit the site to familiarize themselves with local conditions that may in any manner affect cost, progress, or performance of the Work;

c. Become familiar with federal, state, and local laws, ordinances, rules, and regulations that may in any manner affect cost, progress or performance of the Work;

d. Study and carefully correlate Bidder's observations with the *Contract Documents*, and;

e. Notify the Engineer of all conflicts, errors, ambiguities or discrepancies in or among the *Contract Documents*

On request, the Owner will provide each Offeror access to the site to conduct such investigations and tests as each Bidder deems necessary for submission of a Bid. It shall be the Offeror's responsibility to make or obtain any additional examinations, investigations, explorations, tests and studies and obtain any additional information and data which pertain to the physical conditions (including without limitation, surface, subsurface and underground utilities) at or contiguous to the site or otherwise which may affect cost, progress or performance of the work and which the Offeror deems necessary to determine its Bid for performing the work in accordance with the time, price and other terms and conditions of the Contract Documents. Location of any excavation or boring made by Offeror shall be subject to prior approval of Owner and applicable agencies. Offeror shall fill all holes, restore all pavements to match the existing structural section and shall clean up and restore the site to its former condition upon completion of such exploration. The Owner reserves the right to require the Offeror to execute an access agreement with the Owner prior to accessing the site.

The lands upon which the Work is to be performed, rights of way, and access thereto, and other lands designated for use by Contractor in performing the Work, are identified on the Drawings.

Information and data reflected in the *Contract Documents* with respect to underground utilities at or contiguous to the site are based upon information and data furnished to the Owner and the Engineer by the owners of such underground utilities or others, and the Owner does not assume responsibility for the accuracy or completeness thereof, unless it is expressly provided otherwise in the *Contract Documents*.

By submission of a Bid, the Offeror shall be conclusively presumed to represent that the Offeror has complied with every requirement of these Instructions to Bidders, that the *Contract Documents* are not ambiguous and are sufficient in scope and detail to

indicate and convey understanding of all terms and conditions for performance of the Work.

1.13. Questions Regarding Statement of Work: Any information relative to interpretation of Scope of Work or specifications shall be requested of the Purchasing Representative, in writing, in ample time prior to the response time.

1.14. Addenda & Interpretations: If it becomes necessary to revise any part of this solicitation, a written addendum will be posted electronically on the City's website at http://www.gjcity.org/BidOpenings.aspx. The Owner is not bound by any oral representations, clarifications, or changes made in the written specifications by Owner, unless such clarification or change is provided in written addendum form from the City Purchasing Representative.

1.15. Taxes: The Owner is exempt from State retail and Federal tax. The bid price must be net, exclusive of taxes.

1.16. Sales and Use Taxes: The Contractor and all Subcontractors are required to obtain exemption certificates from the Colorado Department of Revenue for sales and use taxes in accordance with the provisions of the General Contract Conditions. Bids shall reflect this method of accounting for sales and use taxes on materials, fixtures and equipment.

1.17. Offers Binding 60 Days: Unless additional time is required by the Owner, or otherwise specified, all formal offers submitted shall be binding for sixty (60) calendar days following opening date, unless the Bidder, upon request of the Purchasing Representative, agrees to an extension.

1.18. Collusion Clause: Each bidder by submitting a bid certifies that it is not party to any collusive action or any action that may be in violation of the Sherman Antitrust Act. Any and all bids shall be rejected if there is evidence or reason for believing that collusion exists among bidders. The Owner may, or may not, accept future bids for the same services or commodities from participants in such collusion.

1.19. Disqualification of Bidders: A Bid will not be accepted from, nor shall a Contract be awarded to, any person, firm, or corporation that is in arrears to the Owner, upon debt or contract, or that has defaulted, as surety or otherwise, upon any obligation to the Owner, or that is deemed irresponsible or unreliable.

Bidders may be required to submit satisfactory evidence that they are responsible, have a practical knowledge of the project bid upon and that they have the necessary financial and other resources to complete the proposed Work.

Either of the following reasons, without limitation, shall be considered sufficient to disqualify a Bidder and Bid:

a. More than one Bid is submitted for the same Work from an individual, firm, or corporation under the same or different name; and

b. Evidence of collusion among Bidders. Any participant in such collusion shall

not receive recognition as a Bidder for any future work of the Owner until such participant has been reinstated as a qualified bidder.

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

2. General Contract Conditions for Construction Projects

2.1. The Contract: This Invitation for Bid, submitted documents, and any negotiations, when properly accepted by the City, shall constitute a contract equally binding between the City and Contractor. The contract represents the entire and integrated agreement between the parties hereto and supersedes all prior negotiations, representations, or agreements, either written or oral. The contract may be amended or modified with Change Orders, Field Orders, or Addendums.

2.2. The Work: The term Work includes all labor necessary to produce the construction required by the Contract Documents, and all materials and equipment incorporated or to be incorporated in such construction.

2.3. Execution, Correlation, Intent, and Interpretations: The Contract Documents shall be signed in not less than triplicate by the Owner (City) and Contractor. City will provide the contract. By executing the contract, the Contractor represents that he/she has visited the site, familiarized himself with the local conditions under which the Work is to be performed, and correlated his observations with the requirements of the Contract Documents. The Contract Documents are complementary, and what is required by any one, shall be as binding as if required by all. The intention of the documents is to include all labor, materials, equipment and other items necessary for the proper execution and completion of the scope of work as defined in the technical specifications and drawings contained herein. All drawings, specifications and copies furnished by the City are, and shall remain, City property. They are not to be used on any other project, and with the exception of one contract set for each party to the contract, are to be returned to the owner on request at the completion of the work.

2.4. The Owner: The Owner is the City of Grand Junction and/or the State of Colorado and is referred to throughout the Contract Documents. The term Owner means the Owner or his authorized representative. The Owner shall, at all times, have access to the work wherever it is in preparation and progress. The Contractor shall provide facilities for such access. The Owner will make periodic visits to the site to familiarize himself generally with the progress and quality of work and to determine, in general, if the work is proceeding in accordance with the contract documents. Based on such observations and the Contractor's Application for Payment, the Owner will determine the amounts owing to the Contractor and will issue Certificates for Payment in such amounts, as provided in the contract. The Owner will have authority to reject work which does not conform to the Contract documents. Whenever, in his reasonable opinion, he considers it necessary or advisable to insure the proper implementation of the intent of the Contract

Documents, he will have authority to require the Contractor to stop the work or any portion, or to require special inspection or testing of the work, whether or not such work can then be fabricated, installed, or completed. The Owner will not be responsible for the acts or omissions of the Contractor, and sub-Contractor, or any of their agents or employees, or any other persons performing any of the work.

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

2.6. Sub-Contractors: A sub-contractor is a person or organization who has a direct contract with the Contractor to perform any of the work at the site. The term sub-contractor is referred to throughout the contract documents and means a sub-contractor or his authorized representative.

2.7. Award of Sub-Contractors & Other Contracts for Portions of the Work: As soon as practicable after bids are received and prior to the award of the contract, the successful Contractor shall furnish to the Owner, in writing for acceptance, a list of the names of the sub-contractors or other persons or organizations proposed for such portions of the work as may be designated in the proposal requirements, or, if none is so designated, the names of the sub-contractors proposed for the principal portions of the work. Prior to the award of the contract, the Owner shall notify the successful Contractor in writing if, after due investigation, has reasonable objection to any person or organization on such list. If, prior to the award of the contract, the Owner has a reasonable and substantial objection to any person or organization on such list, and refuses in writing to accept such person or organization, the successful Contractor may, prior to the award, withdraw their proposal without forfeiture of proposal security. If the successful Contractor submits an acceptable substitute with an increase in the proposed price to cover the difference in cost occasioned by the substitution, the Owner may, at their discretion, accept the increased proposal or may disqualify the Contractor. If, after the award, the Owner refuses to accept any person or organization on such list, the Contractor shall submit an acceptable substitute and the contract sum shall be increased or decreased by the difference in cost occasioned by such substitution and an appropriate Change Order shall be issued. However, no increase in the contract sum shall be allowed for any such substitution unless the Contractor has acted promptly and responsively in submitting a name with respect thereto prior to the award.

2.8. Quantities of Work and Unit Price: Materials or quantities stated as unit price items in the Bid are supplied only to give an indication of the general scope of the Work, and are as such, estimates only. The Owner does not expressly or by implication agree that the actual amount of Work or material will correspond therewith, and reserves the right after award to increase or decrease the quantity of any unit item of the Work without a change in the unit price except as set forth in Article VIII, Section 70 of the *General Contract*

Conditions. The City also reserves the right to make changes in the Work (including the right to delete any bid item in its entirety or add additional bid items) as set forth in Article VIII, Sections 69 through 71 of the *General Contract Conditions*.

2.9. Substitutions: The materials, products and equipment described in the *Solicitation Documents* shall be regarded as establishing a standard of required performance, function, dimension, appearance, or quality to be met by any proposed substitution. No substitution will be considered prior to receipt of Bids unless the Offeror submits a written request for approval to the City Purchasing Division at least ten (10) days prior to the date for receipt of Bids. Such requests for approval shall include the name of the material or equipment for which substitution is sought and a complete description of the proposed substitution including drawings, performance and test data, and other information necessary for evaluation, including samples if requested. The Offeror shall set forth changes in other materials, equipment, or other portions of the Work including changes of the work of other contracts, which incorporation of the proposed substitution would require to be included. The Owner's decision of approval or disapproval of a proposed substitution shall be final. If the Owner approves a proposed substitution before receipt of Bids, such approval will be set forth in an Addendum. Offerors shall not rely upon approvals made in any other manner.

2.10. Supervision and Construction Procedures: The Contractor shall supervise and direct the work, using his best skill and attention. He shall be solely responsible for all construction means, methods, techniques, sequences and procedures and for coordinating all portions of the work under the contract.

2.11. Warranty: The Contractor warrants to the Owner that all materials and equipment furnished under this contract will be new unless otherwise specified, and that all work will be of good quality, free from faults and defects and in conformance with the Contract Documents. All work not so conforming to these standards may be considered defective. If required by Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. If within ten (10) days after written notice to the Contractor requesting such repairs or replacement, the Contractor should neglect to make or undertake with due diligence to the same, the City may make such repairs or replacements. All indirect and direct costs of such correction or removal or replacement shall be at the Contractor's expense. The Contractor will also bear the expenses of making good all work of others destroyed or damaged by the correction, removal or replacement of his defective work.

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

2.13. Responsibility for Those Performing the Work: The Contractor shall be responsible to the Owner for the acts and omissions of all his employees and all sub-contractors, their agents and employees, and all other persons performing any of the work under a contract with the Contractor.

2.14. Use of the Site: The Contractor shall confine operations at the site to areas permitted by law, ordinances, permits and the Contract Documents, and shall not unreasonably encumber the site with any materials or equipment.

2.15. Cleanup: The Contractor at all times shall keep the premises free from accumulation of waste materials or rubbish caused by his operations. At the completion of work he shall remove all his waste materials and rubbish from and about the project, as well as all his tools, construction equipment, machinery and surplus materials.

2.16. Insurance: The Contractor shall secure and maintain such insurance policies as will provide the coverage and contain other provisions specified in the General Contract Conditions, or as modified in the Special Contract Conditions.

The Contractor shall file a copy of the policies or Certificates of Insurance acceptable to the City with the Engineer within ten (10) Calendar Days after issuance of the Notice of Award. These Certificates of Insurance shall contain a provision that coverage afforded under the policies shall not be canceled unless at least thirty (30) Calendar Days prior written notice has been given to the City.

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

2.18. Miscellaneous Conditions: Material Availability: Contractors must accept responsibility for verification of material availability, production schedules, and other pertinent data prior to submission of bid. It is the responsibility of the bidder to notify the Owner immediately if materials specified are discontinued, replaced, or not available for an extended period of time. OSHA Standards: All bidders agree and warrant that services performed in response to this invitation shall conform to the standards declared by the US Department of Labor under the Occupational Safety and Health Act of 1970 (OSHA). In the event the services do not conform to OSHA standards, the Owner may require the services to be redone at no additional expense to the Owner.

2.19. Time: Time is of the essence with respect to the time of completion of the Project and any other milestones or deadline which are part of the Contract. It will be necessary for each Bidder to satisfy the City of its ability to complete the Work within the Contract Time set forth in the Contract Documents. The Contract Time is the period of time allotted in the Contract Documents for completion of the work. The date of commencement of the

work is the date established in a Notice to Proceed. If there is no Notice to Proceed, it shall be the date of the Contract or such other date as may be established therein, or as established as entered on the Bid Form. The Date of Substantial Completion of the work or designated portions thereof is the date certified by the Owner when construction is sufficiently complete, in accordance with the Contract Documents.

2.20. Progress & Completion: The Contractor shall begin work on the date of commencement as defined in the Contract, and shall carry the work forward expeditiously with adequate forces and shall complete it within the contract time.

2.21. Payment & Completion: The Contract Sum is stated in the Contract and is the total amount payable by the Owner to the Contractor for the performance of the work under the Contract Documents. Upon receipt of written notice that the work is ready for final inspection and acceptance and upon receipt of application for payment, the Owner's Project Manager will promptly make such inspection and, when he finds the work acceptable under the Contract Documents and the Contract fully performed, the Owner shall make payment in the manner provided in the Contract Documents.

2.22. Bid Bond: Each Bid shall as a guaranty of good faith on the part of the Bidder be accompanied by a Bid Guaranty consisting of: a certified or cashier's check drawn on an approved national bank or trust company in the state of Colorado, and made payable without condition to the City; or a **Bid Bond** written by an approved corporate surety in favor of the City. The amount of the Bid Guaranty shall not be less than 5% of the total Bid amount. Once a Bid is accepted and a Contact is awarded, the apparent successful bidder has ten calendar days to enter into a contractor in the form prescribed and to furnish the bonds with a legally responsible and approved surety. Failure to do so will result I forfeiture of the Bid Guaranty to the City as Liquidated Damages.

Each bidder shall guaranty its total bid price for a period of sixty (60) Calendar Days from the date of the bid opening.

2.23. Performance & Payment Bonds: Contractor shall furnish a Performance and a Payment Bond, each in an amount at least equal to that specified for the contract amount as security for the faithful performance and payment of all Contractor's obligations under the Contract Documents. These bonds shall remain in effect for the duration of the Warranty Period (as specified in the Special Conditions). Contractor shall also furnish other bonds that may be required by the Special Conditions. All bonds shall be in the forms prescribed by the Contract Documents and be executed by such sureties as (1) are licensed to conduct business in the State of Colorado and (2) are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff, Bureau of Accounts, U.S. Treasury Department. All bonds singed by an agent must be accompanied by a certified copy of the Authority Act. If the surety on any bond furnished by the Contractor is declared bankrupt, or becomes insolvent, or its rights to do business in Colorado are terminated, or it ceases to meet the requirements of clauses (1) and (2) of this section, Contractor shall within five (5) days thereafter substitute another bond and surety, both of which shall be acceptable to the City.

2.24. Retention: The Owner will deduct money from the partial payments in amounts considered necessary to protect the interest of the Owner and will retain this money until after completion of the entire contract. The amount to be retained from partial payments will be five (5) percent of the value of the completed work, and not greater than five (5) percent of the amount of the Contract. When the retainage has reached five (5) percent of the amount of the Contract no further retainage will be made and this amount will be retained until such time as final payment is made.

2.25. Liquidated Damages for Failure to Enter Into Contract: Should the Successful Bidder fail or refuse to enter into the Contract within ten Calendar Days from the issuance of the Notice of Award, the City shall be entitled to collect the amount of such Bidder's Bid Guaranty as Liquidated Damages, not as a penalty but in consideration of the mutual release by the City and the Successful Bidder of all claims arising from the City's issuance of the Notice of Award and the Successful Bidder's failure to enter into the Contract and the costs to award the Contract to any other Bidder, to re-advertise, or otherwise dispose of the Work as the City may determine best serves its interest.

2.26. Liquidated Damages for Failure to Meet Project Completion Schedule: If the Contractor does not achieve Final Completion by the required date, whether by neglect, refusal or any other reason, the parties agree and stipulate that the Contractor shall pay liquidated damages to the City for each such day that final completion is late. As provided elsewhere, this provision does not apply for delays caused by the City. The date for Final Completion may be extended in writing by the Owner.

The Contractor agrees that as a part of the consideration for the City's awarding of this Contract liquidated damages in the daily amount of **$500.00** is reasonable and necessary to pay for the actual damages resulting from such delay. The parties agree that the real costs and injury to the City for such delay include hard to quantify items such as: additional engineering, inspection and oversight by the City and its agents; additional contract administration; inability to apply the efforts of those employees to the other work of the City; perceived inefficiency of the City; citizens having to deal with the construction and the Work, rather than having the benefit of a completed Work, on time; inconvenience to the public; loss of reputation and community standing for the City during times when such things are very important and very difficult to maintain.

The Contractor must complete the Work and achieve final completion included under the Bid Schedule in the number of consecutive calendar days after the City gives is written Notice to Proceed. When the Contractor considers the entire Work ready for its intended use, Contractor shall certify in writing that the Work is substantially complete. In addition to the Work being substantially complete, Final Completion date is the date by which the Contractor shall have fully completed all clean-up, and all items that were identified by the City in the inspection for final completion. Unless otherwise stated in the Special Conditions, for purposes of this liquidated damages clause, the Work shall not be finished and the Contract time shall continue to accrue until the City gives its written Final Acceptance.

If the Contractor shall fail to pay said liquidated damages promptly upon demand thereof after having failed to achieve Final Completion on time, the City shall first look to any retainage or other funds from which to pay said liquidated damages; if retainage or other

liquid funds are not available to pay said liquidated damages amounts, the Surety on the Contractor's Performance Bond and Payment Bond shall pay such liquidated damages. In addition, the City may withhold all, or any part of, such liquidated damages from any payment otherwise due the Contractor.
Liquidated damages as provided do not include any sums to reimburse the City for extra costs which the City may become obligated to pay on other contracts which were delayed or extended because of the Contractor's failure to complete the Work within the Contract Time. Should the City incur additional costs because of delays or extensions to other contracts resulting from the Contractor's failure of timely performance, the Contractor agrees to pay these costs that the City incurs because of the Contractor's delay, and these payments are separate from and in addition to any liquidated damages.

The Contractor agrees that the City may use its own forces or hire other parties to obtain Substantial or Final Completion of the work if the time of completion has elapsed and the Contractor is not diligently pursuing completion. In addition to the Liquidated Damages provided for, the Contractor agrees to reimburse the City for all expenses thus incurred.

2.27. Contingency/Force Account: Contingency/Force Account work will be authorized by the Owner's Project Manager and is defined as minor expenses to cover miscellaneous or unforeseen expenses related to the project. The expenses are not included in the Drawings, Specifications, or Scope of Work and are necessary to accomplish the scope of this contract. Contingency/Force Account Authorization will be directed by the Owner through an approved form. Contingency/Force Account funds are the property of the Owner and any Contingency/Force Account funds, not required for project completion, shall remain the property of the Owner. Contractor is not entitled to any Contingency/Force Account funds, that are not authorized by Owner or Owner's Project Manager.

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

2.29. Changes in the Work: The Owner, without invalidating the contract, may order changes in the work within the general scope of the contract consisting of additions, deletions or other revisions, the contract sum and the contract time being adjusted accordingly. All such changes in the work shall be authorized by Change Order and shall be executed under the applicable conditions of the contract documents. A Change Order is a written order to the Contractor signed by the Owner issued after the execution of the contract,

authorizing a change in the work or an adjustment in the contract sum or the contract time. The contract sum and the contract time may be changed only by Change Order.

2.30. Claims for Additional Cost or Time: If the Contractor wishes to make a claim for an increase in the contract sum or an extension in the contract time, he shall give the Owner written notice thereof within a reasonable time after the occurrence of the event giving rise to such claim. This notice shall be given by the Contractor before proceeding to execute the work, except in an emergency endangering life or property in which case the Contractor shall precede in accordance with the regulations on safety. No such claim shall be valid unless so made. Any change in the contract sum or contract time resulting from such claim shall be authorized by Change Order.

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

2.32. Field Orders: The Owner may issue written Field Orders which interpret the Contract Documents in accordance with the specifications, or which order minor changes in the work in accordance with the agreement, without change in the contract sum or time. The Contractor shall carry out such Field Orders promptly.

2.33. Uncovering & Correction of Work: The Contractor shall promptly correct all work rejected by the Owner as defective or as failing to conform to the contract documents whether observed before or after substantial completion and whether or not fabricated installed or competed. The Contractor shall bear all costs of correcting such rejected work, including the cost of the Owner's additional services thereby made necessary. If within one (1) year after the date of completion or within such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the contract documents, any of the work found to be defective or not in accordance with the contract documents, the Contractor shall correct it promptly after receipt of a written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discover of condition. All such defective or non-conforming work under the above paragraphs shall be removed from the site where necessary and the work shall be corrected to comply with the contract documents without cost to the Owner. The Contractor shall bear the cost of making good all work of separate Contractors destroyed or damaged by such removal or correction. If the Owner prefers to accept defective or non-conforming work, he may do so instead of requiring its removal and correction, in which case a Change Order will be issued to reflect an appropriate reduction in the payment or contract sum, or, if the amount is determined after final payment, it shall be paid by the Contractor.

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

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

2.32. Compliance with Laws: Bids must comply with all Federal, State, County and local laws governing or covering this type of service and the fulfillment of all ADA (Americans with Disabilities Act) requirements.

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

2.34. Conflict of Interest: No public official and/or City employee shall have interest in any contract resulting from this IFB.

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

2.36. Employment Discrimination: During the performance of any services per agreement with the Owner, the Contractor, by submitting a Bid, agrees to the following conditions:

2.36.1. The Contractor shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, age, handicap, or national origin except when such condition is a legitimate occupational qualification reasonably necessary for the normal operations of the Contractor. The Contractor agrees to post in conspicuous places, visible to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.

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

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

2.37. Affirmative Action: In executing a Contract with the City, the Contractor agrees to comply with Affirmative Action and Equal Employment Opportunity regulations presented in the General Contract Conditions.

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

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

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

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

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

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

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

Items for non-responsiveness may include, but not be limited to:

a. Submission of the Bid on forms other than those supplied by the City;

b. Alteration, interlineation, erasure, or partial detachment of any part of the forms which are supplied herein;

c. Inclusion of unauthorized additions conditional or alternate Bids or irregularities of any kind which may tend to make the Bid incomplete, indefinite, or ambiguous as to its meaning;

d. Failure to acknowledge receipt of any or all issued Addenda;

e. Failure to provide a unit price or a lump sum price, as appropriate, for each pay item listed except in the case of authorized alternative pay items;

f. Failure to list the names of Subcontractors used in the Bid preparation as may be required in the Solicitation Documents;

g. Submission of a Bid that, in the opinion of the Owner, is unbalanced so that each item does not reasonably carry its own proportion of cost or which contains inadequate or unreasonable prices for any item;

h. Tying of the Bid with any other bid or contract; and

i. Failure to calculate Bid prices as described herein.

2.45. Evaluation of Bids and Offers: The Owner reserves the right to:

- reject any and all Bids,
- waive any and all informalities,
- negotiate final terms with the Successful Bidder, and
- disregard any and all nonconforming, nonresponsive or conditional Bids.

Discrepancies between words and figures will be resolved in favor of words. Discrepancies between Unit Prices and Extended Prices will be resolved in favor of the Unit Prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in favor of the correct sum. The corrected extensions and totals will be shown in the tabulation of Bids.

The Owner may consider the qualifications and experience of Subcontractors and other persons and organizations (including those who are to furnish the principal items of material or equipment) proposed for those portions of the work as to which the identity of Subcontractors and other persons and organizations must be submitted. Operating costs, maintenance considerations performance data, and guarantees of materials and equipment may also be considered by the Owner.

The Owner will conduct such investigations as deemed necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications and financial ability of the Offeror, proposed Subcontractors and other persons and organizations to do the Work in accordance with the *Contract Documents* to the City's satisfaction within the Contract Time.

The Offeror shall furnish the Owner all information and data requested by the Owner to determine the ability of the Offeror to perform the Work. The Owner reserves the right to reject the Bid if the evidence submitted by, or investigation of such Offeror fails to satisfy the Owner that such Offeror is properly qualified to carry out the obligations of the Contract and to complete the Work contemplated therein.

By submitting a Bid, each Offeror authorizes the Owner to perform such investigation of the Offeror as the Owner deems necessary to establish the responsibility, qualifications and financial ability of the Offeror and, by its signature thereon, authorizes the Owner to obtain reference information concerning the Offeror and releases the party providing such information and the Owner from any and all liability to the Offeror as a result of such reference information so provided.

The Owner reserves the right to reject the Bid of any Offeror who does not pass any evaluation to the Owner's satisfaction.

If the Contract is to be awarded, it will be awarded to the Offeror who, by evaluation, the Owner determines will best meet the Owner's interests.

The Owner reserves the right to accept or reject the Work contained in any of the Price Bid Schedules or alternates, either in whole or in part.

2.46. Award of Contract: Unless otherwise indicated, a single award will be made for all the bid items in an individual bid schedule. In the event that the Work is contained in more than one Bid Schedule, the City may award Schedules individually or in combination. In the case of two Bid Schedules which are alternative to each other, only one of such alternative Schedules will be awarded. Within forty-five (45) Calendar Days of Bid Opening, the City will issue a Notice of Award to the Successful Bidder which will be accompanied by four (4) unsigned copies of the Contract and the Performance and Payment Bond forms. Within ten (10) Calendar Days thereafter, the Successful Bidder shall sign and deliver four (4) copies of the Contract, Performance Bond, Payment Bond and Certificates of Insurance to the City. Within ten (10) Calendar Days thereafter, the City will deliver two (2) fully executed counterparts of the Contract to the Contractor. No contract shall exist between the Successful Bidder and the City and the Successful Bidder shall have no rights at law or in equity until the Contract has been duly executed by the City.

The Successful Bidder's failure to sign and submit a Contract and other documents set forth in this Paragraph within the prescribed time shall be just cause of annulment of the award, and forfeiture of the Bid Guaranty. The award of Contract may then be made to the next qualified Bidder in the same manner as previously prescribed.

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

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

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

2.50. Remedies: The Contractor and Owner agree that both parties have all rights, duties, and remedies available as stated in the Uniform Commercial Code.

2.51. Venue: Any agreement as a result of responding to this IFB shall be deemed to have been made in, and shall be construed and interpreted in accordance with, the laws of the City of Grand Junction, Mesa County, Colorado.

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

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

2.54. Non-Appropriation of Funds: The contractual obligation of the Owner under this contract is contingent upon the availability of appropriated funds from this fiscal year budget as approved by the City Council from this fiscal year only. State of Colorado Statutes prohibit obligation of public funds beyond the fiscal year for which the budget was approved. Anticipated expenditures/obligations beyond the end of the current Owner's fiscal year budget shall be subject to budget approval. Any contract will be subject to and must contain a governmental non-appropriation of funds clause.

2.55. Cooperative Purchasing: Purchases as a result of this solicitation are primarily for the City. Other governmental entities may be extended the opportunity to utilize the resultant contract award with the agreement of the successful provider and the participating agencies. All participating entities will be required to abide by the specifications, terms, conditions and pricings established in this Bid. The quantities furnished in this bid document are for only the City. It does not include quantities for any other jurisdiction. The City will be responsible only for the award for its jurisdiction. Other participating entities will place their own awards on their respective Purchase Orders through their purchasing office or use their purchasing card for purchase/payment as authorized or agreed upon between the provider and the individual entity. The City accepts no liability for payment of orders placed by other participating jurisdictions that choose to piggy-back on our solicitation. Orders placed by participating jurisdictions under the terms of this solicitation will indicate their specific delivery and invoicing instructions.

2.56. Keep Jobs in Colorado Act: Contractor shall be responsible for ensuring compliance with Article 17 of Title 8, Colorado Revised Statutes requiring 80% Colorado labor to be employed on public works. Contractor shall, upon reasonable notice provided by the Owner, permit the Owner to inspect documentation of identification and residency required by C.R.S. §8-17-101(2)(a). If Contractor claims it is entitled to a waiver pursuant to C.R.S. §8-17-101(1), Contractor shall state that there is insufficient Colorado labor to perform the work such that compliance with Article 17 would create an undue burden that would substantially prevent a project from proceeding to completion, and shall include evidence demonstrating the insufficiency and undue burden in its response.

Unless expressly granted a waiver by the Owner pursuant to C.R.S. §8-17-101(1), Contractor shall be responsible for ensuring compliance with Article 17 of Title 8, Colorado Revised Statutes requiring 80% Colorado labor to be employed on public works. Contractor shall, upon reasonable notice provided by the Owner, permit the Owner to inspect documentation of identification and residency required by C.R.S. §8-17-101(2)(a).

2.56.1. "Public project" is defined as:

(a) any construction, alteration, repair, demolition, or improvement of any land, building, structure, facility, road, highway, bridge, or other public improvement suitable for and intended for use in the promotion of the public health, welfare, or safety and any maintenance programs for the upkeep of such projects
(b) for which appropriate or expenditure of moneys may be reasonably expected to be $500,000.00 or more in the aggregate for any fiscal year
(c) except any project that receives federal moneys.

3. Statement of Work

3.1. GENERAL: The work request is for new concrete pedestrian and bicycle trail from D Road south to Lunch Loops Trailhead along Monument Road, as well as improvements to the Tabeguache/Lunch Loops trailhead for the City of Grand Junction. The improvements will include unclassified excavation, aggregate base course, reinforced concrete placement, construction of a pedestrian bridge, and a sanitary sewer line.

3.2. PROJECT DESCRIPTION: The project includes approximately 8,910 square yards of new 6" concrete sidewalk underlain by 6 inches of Class 6 aggregate base course for a trail along the southeast side of Monument Road, from D Road to Lunch Loops trailhead. This project also includes reinforced concrete abutments founded on 8" micropiles to support a premanufactured steel bridge over No Thoroughfare Creek, along with various improvements to the Lunch Loops (Tabeguache) trailhead. A new sanitary sewer will also be installed prior to trail construction from 2501 Monument Road to the existing sewer at S Redlands Road. All dimensions and scope of work should be verified by Contractors prior to submission of bids.

3.3. SPECIAL CONDITIONS & PROVISIONS:

3.3.1 Mandatory Pre-Bid Meeting: **Prospective bidders are required to attend a mandatory pre-bid meeting on March 19, 2019 at 10:00am**. Meeting location shall be in the Auditorium at City Hall, located at 250 N. 5th Street. The purpose of this visit will be to inspect and to clarify the contents of this Invitation for Bids (IFB).

3.3.2 QUESTIONS REGUARDING SOLICIATION PROCESS/SCOPE OF WORK:

Duane Hoff Jr., Senior Buyer
City of Grand Junction
duaneh@gjcity.org

3.3.3 Project Manager: The Project Manager for the Project is Kirsten Armbruster, Project Engineer, who can be reached at (970)244-1421. During Construction, all notices, letters, submittals, and other communications directed to the City shall be addressed and mailed or delivered to:

City of Grand Junction
Department of Public Works
Attn: Kirsten Armbruster, Project Engineer
333 West Ave Building C
Grand Junction, CO 81501

3.3.4 Affirmative Action: The Contractor is not required to submit a written Affirmative Action Program for the Project.

3.3.5 Pricing: Pricing shall be all inclusive to include but not be limited to: all labor, equipment, supplies, materials, freight (F.O.B. Destination – Freight Pre-paid and Allowed to each site), travel, mobilization costs, fuel, set-up and take down costs, and full-time inspection costs, and all other costs related to the successful completion of the project.

The Owner shall not pay nor be liable for any other additional costs including but not limited to: taxes, shipping charges, insurance, interest, penalties, termination payments, attorney fees, liquidated damages, etc.

3.3.6 Freight/Shipping: All freight/shipping shall be F.O.B. Destination – Freight Pre-Paid and Allowed to the project site(s), Grand Junction, CO.

Contractor must meet all federal, state, and local rules, regulations, and requirements for providing such services.

3.3.7 Contract: A binding contract shall consist of: (1) the IFB and any amendments thereto, (2) the bidder's response (bid) to the IFB, (3) clarification of the bid, if any, and (4) the City's Purchasing Department's acceptance of the bid by "Notice of Award" or by "Purchase Order". All Exhibits and Attachments included In the IFB shall be incorporated into the contract by reference.

A. The contract expresses the complete agreement of the parties and, performance shall be governed solely by the specifications and requirements contained therein.

B. Any change to the contract, whether by modification and/or supplementation, must be accomplished by a formal contract amendment signed and approved by and between the duly authorized representative of the bidder and the City Purchasing Division or by a modified Purchase Order prior to the effective date of such modification. The bidder expressly and explicitly understands and agrees that no other method and/or no other document, including acts and oral communications by or from any person, shall be used or construed as an amendment or modification to the contract.

3.3.8 Time of Completion: The scheduled time of Completion for the Project is **168 Calendar Days** from the starting date specified in the Notice to Proceed.

Completion is achieved when site cleanup and all punch list items (resulting from the final inspection) have been completed. Completion shall have the meaning set forth in Article I, Section 3 (Definitions and Terms) of the General Contract Conditions.

3.3.9 Working Days and Hours: The working days and hours shall be as stated in the General Contract Conditions or as mutually agreed upon in the preconstruction meeting with the following exception:

All work shall be performed Monday-Friday between the hours of 7:00 AM to 5:00 PM.

3.3.10 Licenses and Permits: Contractor is responsible for obtaining all necessary licenses and permits required for Construction, at Contractors expense. See Section 2.12. Contractor shall supply to Owner all copies of finalized permits.

3.3.11 Permits: The following permits are required for the Project and will be obtained by the City at no cost to the Contractor:

- None

The following permits are required for the Project and shall be obtained and paid for by the Contractor, with the costs included in the total bid price for the Project. These include, but are not limited to:

- Stormwater Management Permit

3.3.12 City Furnished Materials: The City will furnish the following materials for the Project:

- None

3.3.13 Project Newsletters: Project Newsletters, if any, will be furnished and delivered by the City.

3.3.14 Project Sign: Project signs, if any, will be furnished and installed by the City.

3.3.15 Authorized Representatives of the City: Those authorized to represent the City shall include Purchasing Agent, Engineers, and Inspectors employed by the City, only.

3.3.16 Uranium Mill Tailings: It is not anticipated that radioactive mill tailings will be encountered on this project within the roadway. Mill tailings may be encountered during driveway construction and their removal shall be considered incidental to the concrete driveway pay item. Radioactive mill tailings generated from this project shall be deposited at the holding facility located at City Shops (333 West Avenue). All loads will be recorded in the log sheet located at the entrance to the clarifier.

3.3.17 Stockpiling Materials and Equipment: All stockpiling/storage shall be in accordance with General Contract Condition Section 51.

When approved by the Project Engineer, the Contractor may stockpile and store materials and equipment within public right-of-way. The Contractor shall be responsible for obtaining written permission to use private property for storage of materials and equipment. Copies of the above-mentioned agreements shall be submitted to the Project Engineer prior to use of the property.

3.3.18 Traffic Control: The following street and lane closures will be allowed for construction of this project:

No street or lane closures are expected to be required for this project.

Access Maintenance Plan

Unless otherwise included in the plans or directed by the Engineer, the Contractor shall maintain continuous access to all roadways, side streets, walkways, alleyways, driveways, and other sidewalks and pathways at all times. Sidewalks shall remain open to pedestrians to the greatest extent practicable. If a sidewalk has to be closed, an alternate access shall be provided with appropriate signage. To the greatest extent possible, driveways shall be re-constructed when the access is closed for pavement placement.

At least 7 calendar days prior to beginning work on any driveway or private access, the Contractor shall notify each business or resident of the expected construction schedule.

The Contractor shall develop an Access Maintenance Plan (AMP) in coordination with all affected owners and tenants. A sample form of the AMP shall be developed for this purpose by the Contractor and submitted to the Engineer for review and approval. The AMP shall address any special needs any business or residence has for Americans with Disabilities Act (ADA) access or any other special needs. A place on the AMP form shall address special needs and ADA issues.

The AMP shall detail the effects to the accesses including closing dates, time and duration, and, if applicable, barricades, fencing and temporary means of access with all affected owners and tenants in a work area. The AMP shall include the address, the station location, the work periods affected, and show documentation of coordination, including the appropriate property owner signatures, and the date of the contact. Contact information regarding the companies that make frequent deliveries to the affected businesses shall be obtained and details of access changes shall be provided to these companies by the Public Information Manager along with other routine public information.

The signed AMP shall be submitted, as part of the corresponding method of handling traffic, to the Project Engineer for approval one week prior to the start of any work which will affect the signatory properties. If the Contractor is unable to obtain approval and signatures, documentation of “good faith efforts” to obtain said approval and signatures shall be submitted.

The Contractor will not be allowed to begin work until the plan is accepted. If Contractor does not have approved AMP forms completed for all accesses within a work area, the Engineer may delay progress of work for the affected accesses. Such delay shall not be the basis for a claim for additional contract time or compensation.

Other Special Traffic Control Requirements

Signs and stands shall not be permitted to be left on sidewalks overnight.

Equipment shall not be stored within 10 feet of the currently traveled roadway lanes on city streets.

Traffic Control Management shall include all Traffic Control Supervisors and helpers necessary to perform the work. There shall be a minimum of one helper for each Traffic Control Supervisor required for the project. At least one Traffic Control Supervisor and one Helper shall be on site at all times when construction activities are underway.

Although Traffic Control items such as Variable Message Sign Panels, Traffic Control Management or Traffic Control Inspection, and construction traffic control signs may be required and used prior to the beginning of contract time, no payment will be made for the use of any item prior to the beginning of contract time. All work performed prior to commencement of Contract time shall be considered subsidiary to mobilization.

Helpers for the Traffic Control Management item may give flagger breaks. However, the time shall be included in the item for Traffic Control Management, and shall not be paid as additional flagging hours.

The Contractor shall provide Traffic Control Supervisor(s) (TCS) with at least one year of experience, as accepted by the Engineer. A copy of the certification of the Traffic Control Supervisor(s) shall be provided to the Engineer at least two days prior to the project preconstruction conference.

A meeting will be scheduled each working day with the Contractor's superintendent, the Traffic Control Supervisor(s), and the Project Engineer for discussion, submittal and approval of the method(s) of handling traffic (MHT) for the next day's scheduled work. Work that has not been scheduled and requires a MHT that has not been approved shall not be allowed. Work which does not require a MHT may proceed if approved by the Engineer.

The required TCS Diary shall be submitted to the Engineer by 10:00 a.m. each following day and shall include a listing of all flagging hours.

All Construction Zone Traffic Control Devices shall be continuously maintained in accordance with Section 630 of the Standard Specifications. The TCS shall establish a set maintenance and cleaning schedule. A copy of the maintenance and cleaning schedule shall be provided to the Engineer.

All costs incidental to the foregoing requirements shall be included in the original contract prices for the project.

3.3.19 Clean-Up: The Contractor is responsible for cleaning up all loose materials that have been deposited or swept into gutters, and onto sidewalks and driveways as a result of sidewalk operations. The costs for all clean-up work shall be considered incidental and will not be paid for separately.

3.3.20 Quality Control Testing:

Supplier shall perform Quality Control (QC) testing on the Aggregate Base Course, Backfill, and Concrete. The Contractor shall provide QC throughout the Contract, with the use of his/her own QC Technicians or the use of a certified laboratory.

The Contractor/Supplier shall perform QC testing on all concrete. The City will perform QA testing for Aggregate Base Course, Backfill, and Concrete.

3.3.21 Stormwater Management Plan (Erosion Control): The Contractor shall keep protective measures on site or excavated soil piles in the event of a rainstorm and/or snow melt event. The Contractor will only be required to use these measures when it is likely that a rainstorm and/or snowstorm event is going to occur. The Contractor should contact the NOAA National Weather Service Forecast Office in Grand Junction to obtain extended weather forecast information to help in deciding whether gravel filter socks will need to be used. The NOAA Forecast Office of Grand Junction can be reached at 970-243-7007. These measures will be considered incidental and will not be paid for separately.

If groundwater within the project area is encountered (not anticipated) and requires dewatering, the dewatering pump shall have a filter sock attached to the end of the discharge hose. This will prevent sediment in the discharge water from entering into the City's storm drainage system. The contractor will be responsible for monitoring the levels of sediment within the filter sock and replacing the filter sock when it reaches 50% of its holding capacity. It will also be the responsibility of the contractor to obtain the Dewatering Permit from the Colorado Department of Public Health and Environment if necessary.

All vehicle and equipment maintenance and fueling shall be performed in a designated area within the construction area that will not interfere with roadway traffic operations unless traffic control is provided. The fueling area shall exhibit Control Measures (Best Management Practices) in order to minimize and/or eliminate the potential of fuel spillage. Any spillage of fuel onto the ground shall be immediately cleaned up and any contaminated soil disposed of properly at the Mesa County Landfill. Documentation of spills, leaks and overflows that result in the discharge of pollutants, including logging and reporting of the spill is required to the Water Quality Control Division at their toll-free 24-hour environmental emergency spill reporting line – 1-877-518-5608.

The Contractor shall clear the site of all on-site waste daily, including scrap from construction materials.

Concrete trucks will be required to wash out in a portable concrete washout pool supplied by the Contractor or the concrete truck can wait to washout back at the concrete batching facility. The Contractor will be responsible for maintaining the washout pool. The washout pool shall be cleaned out and/or replaced when the washout pool reaches 50% of total capacity. The concrete washout pool needs to be dynamic and durable in its ability to be moved with the progress of construction.

The Contractor shall clear the site of all trash and litter daily. Portable toilets will be maintained (cleaned and emptied) by a local supplier.

A stormwater management plan will be provided to the contractor.

3.3.22 Schedule of Submittals: Contractor shall deliver these submittals at least two days prior to the pre-construction meeting:

- Traffic Control Plans
- Project Schedule
- Hourly rate tables for Labor and Equipment to be used on this project
- Concrete Mix Designs
- Stormwater Management Plan
- Concrete Washout Facility
- Aggregate Base Course and Structural Backfill gradations

3.3.23 Special Equipment: None expected.

3.3.24 Excess Material: All excess materials shall be disposed in accordance with General Contract Condition Section 50. All millings shall be delivered to City Shops, Riverside Yard, and become the property of the City of Grand Junction.

3.3.25 Existing Utilities and Structures: Utilities were **not** potholed during design of this project. The location of existing utilities and structures shown on the Plans is approximate with the information gathered during design. It is the responsibility of the Contractor to pothole/locate and protect all structures and utilities in accordance with General Contract Condition Section 37.

3.3.26 Incidental Items: Any item of work not specifically identified or paid for directly, but which is necessary for the satisfactory completion of any paid items of work, will be considered as incidental to those items, and will be included in the cost of those items.

3.3.27 Existing Concrete Slab, Sidewalks, Pans, Fillets, Curbs and Gutters: The existing slabs, sidewalks, pans, fillets, curb and gutter are in good serviceable condition. The Contractor will need to protect all existing concrete adjacent to construction. If the concrete is damaged during construction the Contractor will be responsible for its replacement at no cost to the City. The Contractor, the City Project Inspector, and/or the City Project Engineer/Manager will walk and record any concrete that is deemed to be damaged before construction has started.

3.3.29 ACI Concrete and Flatwork Finisher and Technician: The building manufacturer (WHP) will be supplying the building and installing the building upon the newly cast reinforced concrete strip foundations. The City's contractor will be required to work with WHP's contractor to coordinate the delivery and placement of the building.

3.3.30 Work By Others / Coordination: Hand finishing concrete will be permitted only when performed under the direct supervision of a craftsman holding the following certificate: ACI Concrete Flatwork Finisher and Technician (ACICFFT) or other Flatwork Finisher certification program approved by the City Engineering Manager.

3.4. SCOPE OF WORK: See attached Drawings/Scope/Specifications.

3.5. Attachments:

Appendix A: Project Submittal Form.
Appendix B: Plan Sheets
Appendix C: Geotechnical Report
Appendix D: Project Special Provisions and Standard Special Provisions

3.6. IFB TENTATIVE TIME SCHEDULE:

Invitation for Bids available	March 11, 2019
Mandatory Pre-Bid Meeting	March 19, 2019
Inquiry deadline, no questions after this date	March 25, 2019
Addendum Posted	March 26, 2019
Submittal deadline for proposals	April 9, 2019
City Council Approval	May 1, 2019
Notice of Award & Contract execution	May 2, 2019
Bonding & Insurance Cert due	May 10, 2019
Preconstruction meeting	TBD
Work begins no later than	May 15, 2019
Final Completion	168 Calendar Days from Notice to Proceed

Holidays:

Memorial Day	May 27, 2019
Independence Day	July 4, 2019
Labor Day	September 2, 2019

4. Contractor's Bid Form

Bid Date: _____

Project: IFB-4618-19-DH "2019 Monument Road Bicycle Path Trail"

Bidding Company: _____

Name of Authorized Agent: _____

Email _____

Telephone_____ Address_____

City_____State_____Zip_____

The undersigned Bidder, in compliance with the Invitation for Bids, having examined the Instruction to Bidders, General Contract Conditions, Statement of Work, Specifications, and any and all Addenda thereto, having investigated the location of, and conditions affecting the proposed work, hereby proposes to furnish all labor, materials and supplies, and to perform all work for the Project in accordance with Contract Documents, within the time set forth and at the prices stated below. These prices are to cover all expenses incurred in performing the work required under the Contract Documents, of which this Contractor's Bid Form is a part.

The undersigned Contractor does hereby declare and stipulate that this offer is made in good faith without collusion or connection to any person(s) providing an offer for the same work, and that it is made in pursuance of, and subject to, all terms and conditions of the Instructions to Bidders, the Specifications, and all other Solicitation Documents, all of which have been examined by the undersigned.

The Contractor also agrees that if awarded the Contract, to provide insurance certificates within ten (10) working days of the date of Notification of Award. Submittal of this offer will be taken by the Owner as a binding covenant that the Contractor will be prepared to complete the project in its entirety.

The Owner reserves the right to make the award on the basis of the offer deemed most favorable, to waive any formalities or technicalities and to reject any or all offers. It is further agreed that this offer may not be withdrawn for a period of sixty (60) calendar days after closing time. Submission of clarifications and revised offers automatically establish a new thirty day (30) period.

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

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

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

State number of Addenda received: _____.

It is the responsibility of the Bidder to ensure all Addenda have been received and acknowledged.
By signing below, the Undersigned agree to comply with all terms and conditions contained herein.

Company: _____

Authorized Signature: _____

Title: _____

Bid Schedule: Monument Road Trail

Item No.	CDOT, City Ref.	Description	Quantity	Units	Unit Price	Total Price
1	104.4	Concrete Cap at 8 inch Sewer Line per Standard Detail GU-04	20.	LF	$ _____	$ _____
2	108.5	Connect to Existing Manhole (8 inch Pipe) per Standard Detail SS-08	Lump	Sum	- - -	$ _____
3	108.5	Sanitary Sewer Basic Manhole (48 inch I.D.) per Standard Detail SS-02	3.	EA	$ _____	$ _____
4	108.2	8 inch Gravity Sewer Pipe (SDR 35 PVC) includes Type A Bedding and Haunching Material and Backfilling of Trench	724.	LF	$ _____	$ _____
5	108.7	Granular Stabilization Material (Type B)	465.	TON	$ _____	$ _____
6	201-00000	Clearing and Grubbing	6.	ACRE	$ _____	$ _____
7	202	Removal of Wood Border	22.	LF	$ _____	$ _____
8	202-00220	Removal of Asphalt Mat	173.	SY	$ _____	$ _____
9	202-01000	Removal of Fence	8.	LF	$ _____	$ _____
10	202	Removal of Cable Fence	225.	LF	$ _____	$ _____
11	202-04060	Dust Abatement	Lump	Sum	- - -	$ _____
12	203-00000	Unclassified Embankment	515.	CY	$ _____	$ _____
13	206-00000	Structural Excavation	103.	CY	$ _____	$ _____
14	206-00100	Structural Backfill Material (Class 1)	111.	CY	$ _____	$ _____
15	206-00520	Filter Material (Class B) (includes 6" perforated and non-perforated drain pipe and geotextile)	4.	CY	$ _____	$ _____
16	206-01750	Shoring (Area 1)	Lump	Sum	- - -	$ _____
17	208-00002	Erosion Logs (12 Inch)	60.	LF	$ _____	$ _____
18	208-00011	Erosion Bales (Weed Free)	130.	EA	$ _____	$ _____
19	208-00035	Aggregate Bag	10.	EA	$ _____	$ _____
20	208-00045	Concrete Washout Structure	1.	EA	$ _____	$ _____
21	208-00070	Vehicle Track Pad	6.	EA	$ _____	$ _____
22	208-00300	Temporary Berms	2,910.	LF	$ _____	$ _____
23	210-01200	Reset End Anchorage	1.	EA	$ _____	$ _____
24	212-00007	Seeding(Native)(Hydraulic)	4.	ACRE	$ _____	$ _____
25	304-03000	Aggregate Base Course (Class 3)	334.	CY	$ _____	$ _____

Bid Schedule: Monument Road Trail

Item No.	CDOT, City Ref.	Description	Quantity	Units	Unit Price	Total Price
26	304-06000	Aggregate Base Course (Class 6) (Shoulder)	584.	CY	$ _____	$ _____
27	306-01000	Reconditioning	9,000.	SY	$ _____	$ _____
28	403-34752	Hot Mix Asphalt (Patching)(Grading SX)(75)(PG 64-22)(5" Thick)	56.	TON	$ _____	$ _____
29	503-01080	Micropile (8 Inch)	537.	LF	$ _____	$ _____
30	504	Concrete Wall (Class D) per M and S Standard M-601-20 (Wall Design Height 3' to 7' per plan). (Includes associated headwall, toe walls and toe wall attached to walk beneath D Road.) Work shall include approximately 9365 lbs. Reinforcing Steel (Epoxy Coated), Structural Concrete Coating (Exterior of wall), 87 cy Structural Backfill (Class 1) and any necessary appurtenances to complete work.	236.	CY	$ _____	$ _____
31	504	Precast Concrete Block Retaining Wall System (includes all necessary appurtenances, work, etc. to complete).	446.	FSF	$ _____	$ _____
32	504	Stone Boulders for seating at trailhead shade structures and curb stops at tailgate area	307.	LF	$ _____	$ _____
33	506-00212	Riprap (12 Inch)(includes geogrid)	105.	CY	$ _____	$ _____
34	509-15000	Prefabricated Structural Steel Bridge (110 ft long by 10 ft wide, with concrete deck)	Lump	Sum	- - -	$ _____
35	514-00042	Pedestrian Railing (42 Inch)	15.	LF	$ _____	$ _____
36	601-03040	Concrete Class D (Bridge)	55.	CY	$ _____	$ _____
37						
38	601	Cast-in-Place Concrete Footings to support shade structures (2 ft diameter, 6 ft drilled into ground, including rebar and anchor bolts per details)	72.	LF	$ _____	$ _____
39	601-40300	Structural Concrete Coating	22.	SY	$ _____	$ _____
40	602-00010	Reinforcing Steel (Black)	6,600.	LB	$ _____	$ _____
41	602-00020	Reinforcing Steel (Epoxy Coated)	3,100.	LB	$ _____	$ _____
42	603-01125	12 Inch Reinforced Concrete Pipe (CIP)	412.	LF	$ _____	$ _____

Bid Schedule: Monument Road Trail

Item No.	CDOT, City Ref.	Description	Quantity	Units	Unit Price	Total Price
43	603-01185	18 Inch Reinforced Concrete Pipe (CIP)	85.	LF	$ _____	$ _____
44						
45	603-50006	6 Inch Plastic Pipe (with Permanent Berm at Drainage Swale)	30.	EA	$ _____	$ _____
46	603-70904	9x4 Foot Concrete Box Culvert (Precast)	660.	LF	$ _____	$ _____
47	603	Large Area Inlet (24" x 36")	3.	EA	$ _____	$ _____
48	608-00006	Concrete Sidewalk (6" Thick) to include 6" of Class 6 Aggregate Base Course.	2,319.	SY	$ _____	$ _____
49	608-00016	Colored Concrete Sidewalk (6" Thick) to include 6" of Class 6 Aggregate Base Course.	6,591.	SY	$ _____	$ _____
50	608	Colored Concrete Pad for Bike Racks (6 inch thick)(Includes 6 inch thick Class 6 ABC)	16.	SY	$ _____	$ _____
51	608-00010	Concrete Curb Ramp to include 6" of Class 6 Aggregate Base Course.	50.	SY	$ _____	$ _____
52	608-00015	Detectable Warnings (Cast Iron) Wet Set (2' x 2')	10.	EA	$ _____	$ _____
53	608-01600	Decomposed Granite Surface Course (2" Minimum Thickness)	50.	CY	$ _____	$ _____
54	609	Concrete Curb (6" Wide, 14" High) to include 6" of Class 6 Aggregate Base Course.	112.	LF	$ _____	$ _____
55	609	Concrete Curb and Spill Gutter (1.5' Wide) to include 6" of Class 6 Aggregate Base Course.	290.	LF	$ _____	$ _____
56	609	Concrete Curb and Gutter (2' Wide) to include 6" of Class 6 Aggregate Base Course.	15.	LF	$ _____	$ _____
57	620-00020	Sanitary Facility	3.	EA	$ _____	$ _____
58	625-00000	Construction Surveying	Lump	Sum	- - -	$ _____
59	626-00000	Mobilization	Lump	sum	- - -	$ _____
60	630-10005	Traffic Control	Lump	sum	- - -	$ _____
MCR		Minor Contract Revisions	- - -	- - -	- - -	$ 100,000.00
				Bid Amount:		**$** _____

Bid Amount:

_____ **dollars**

The undersigned Bidder proposes to subcontract the following portion of Work:

Name & address of Sub-Contractor	Description of work to be performed	% of Contract

The undersigned Bidder acknowledges the right of the City to reject any and all Bids submitted and to waive informalities and irregularities therein in the City's sole discretion.

By submission of the Bid, each Bidder certifies, and in the case of a joint Bid each party thereto certifies as to his own organization, that this Bid has been arrived at independently, without collusion, consultation, communication, or agreement as to any matter relating to this Bid with any other Bidder or with any competitor.

APPENDIX A
Project Submittal Form

PROJECT SUBMITTAL FORM

PROJECT: **2019 Fire Training Facility – Building Foundation & Burn Slab**

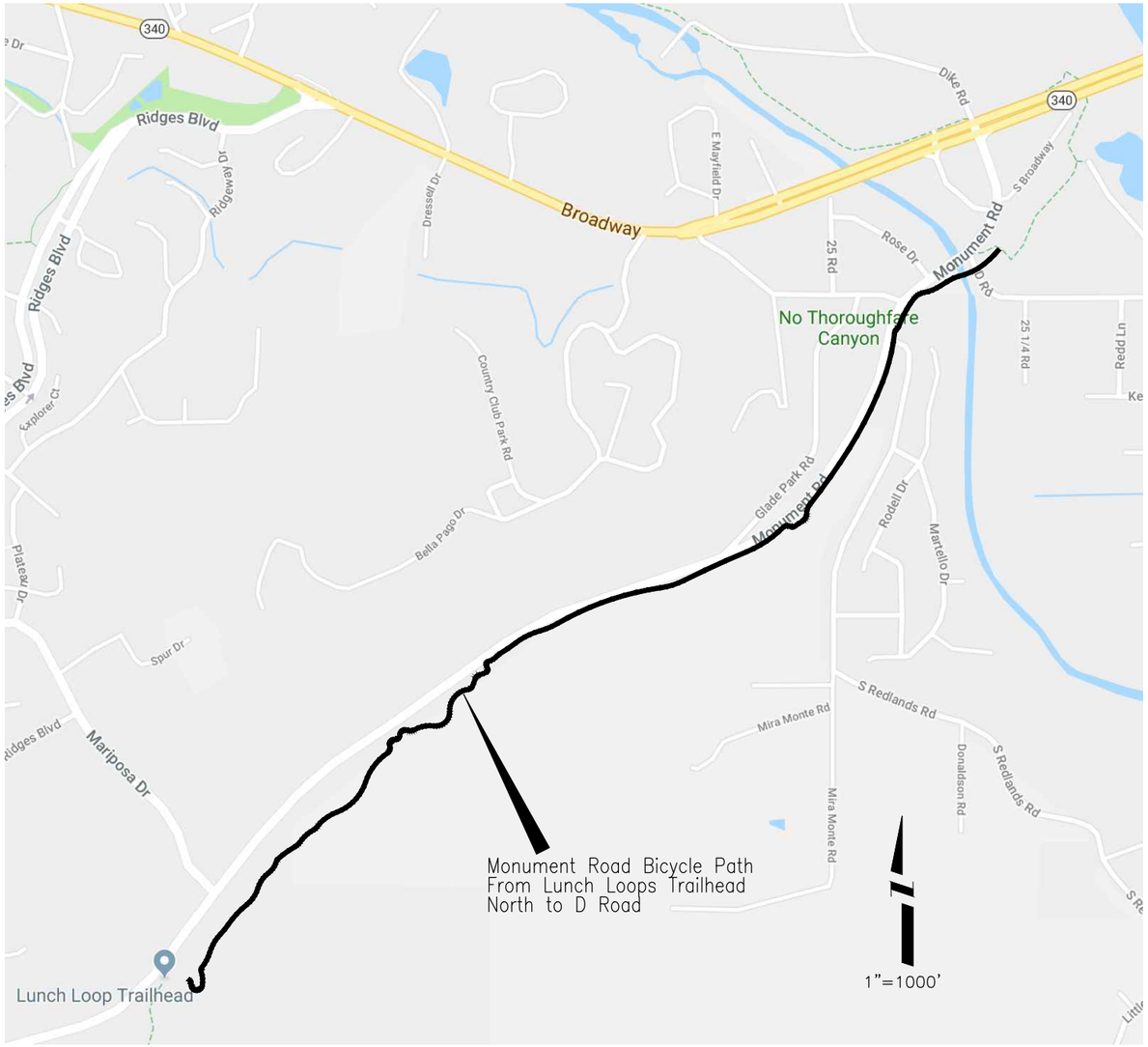
CONTRACTOR:

PROJECT ENGINEER: Kirsten Armbruster

Description	Date Received	Resubmittal Requested	Resubmittal Received	Date Accepted
FOUNDATION & SLAB CONSTRUCTION				
Base course gradation, Proctor curves				
Concrete Mix Design				
EROSION CONTROL / STORMWATER MANAGEMENT				
Vehicle Tracking Pad				
Concrete Washout				
PERMITS, PLANS, OTHER				
Traffic Control Plan				
Stormwater Management Plan				

APPENDIX B
Plan Sheets

MONUMENT ROAD BICYCLE PATH
From Lunch Loops Trailhead to D Road
March 2019



Know what's **below.** **Call** before you dig.

NOTE: NOTIFY AFFECTED UTILITY VENDOR 48 HOURS PRIOR TO EXCAVATIONS THAT WILL EXPOSE UTILITY LINES. THE UTILITY PLAN WILL HAVE A LISTING OF UTILITY VENDORS AND TELEPHONE NUMBERS.

DESCRIPTION	DATE
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DRAWN BY JCS DATE 2019
DESIGNED BY JCS DATE 2019
CHECKED BY TCP DATE 2019
APPROVED BY TCP DATE 2019

SCALES: PLAN & PROFILE HORIZONTAL 0 NA NA NA VERTICAL 0 NA NA NA

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

COVER SHEET

1

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Pnt. No.	Northing	Easting	Elevation	Description
2	29154.31	79157.411	4717.559	CP /
3	29432.392	79601.821	4707.294	CP /
4	29389.093	79795.525	4703.986	CP /
5	32468.082	83511.401	4606.484	CP /PK/
6	32637.167	83866.059	4602.24	CP /PK/
7	29612.164	79834.69	4706.866	CP /
8	29829.786	79867.275	4697.374	CP /
9	33206.308	84323.436	4594.077	CP /PK/
10	34142.597	84706.017	4582.648	CP /PK/
11	34248.304	84809.097	4580.574	CP /PK/
12	34341.592	84958.7	4578.261	CP /PK/
13	33474.784	84471.673	4591.031	CP /PK/
14	33105.647	84259.66	4595.442	CP /PK DWY/
15	32841.764	84073.262	4599.104	CP /PK BRDG/
61	32299.725	83158.029	4610.704	CP /PK/
62	32185.976	82823.329	4616.514	CP /PK/
63	32036.437	82389.643	4623.376	CP /PK/
64	31917.301	82139.485	4626.04	CP /PK/
65	31466.579	81473.145	4639.216	CP /PK/
66	31228.42	81131.458	4646.841	CP /PK/
67	30961.734	80742.26	4653.943	CP /PK/
70	30727.185	80477.167	4662.082	CP /PK/
71	30386.561	80178.661	4670.623	CP /PK/
72	30261.444	80084.409	4675.381	CP /PK/
73	30158.746	80008.409	4679.828	CP /PK/
200	31781.729	81915.874	4629.722	CP /PK/
201	31731.729	81843.912	4631.382	CP /PK/
202	31640.555	81712.344	4634.144	CP /PK/
502	33360.957	84428.993	4587.895	PIN /ALC LS10097/
504	33555.424	84539.231	4598.235	PIN /ALC LS10097/
505	33556.579	84652.062	4605.741	PIN /BENT
506	33363.248	84610.055	4619.158	PIN /ALC LS10097/
507	32897.114	84439.918	4621.824	PIN /FADED RPC LS24943/
508	32892.44	84504.971	4631.191	PIN /
509	33532.779	84508.629	4588.924	PIN /ALC LS10097/
510	32894.031	84132.033	4596.774	PIN /FADED RPC LS24943/
511	32964.842	84181.409	4593.277	PIN /FADED RPC LS24943/
512	32894.764	84190.035	4594.333	MCSM
900	30270.142	80228.195	4668.236	SM /2.5ALC SW16S21 LS12085/

CENTERLINE OF NEW BICYCLE PATH

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CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

CONTROL PLAN

2

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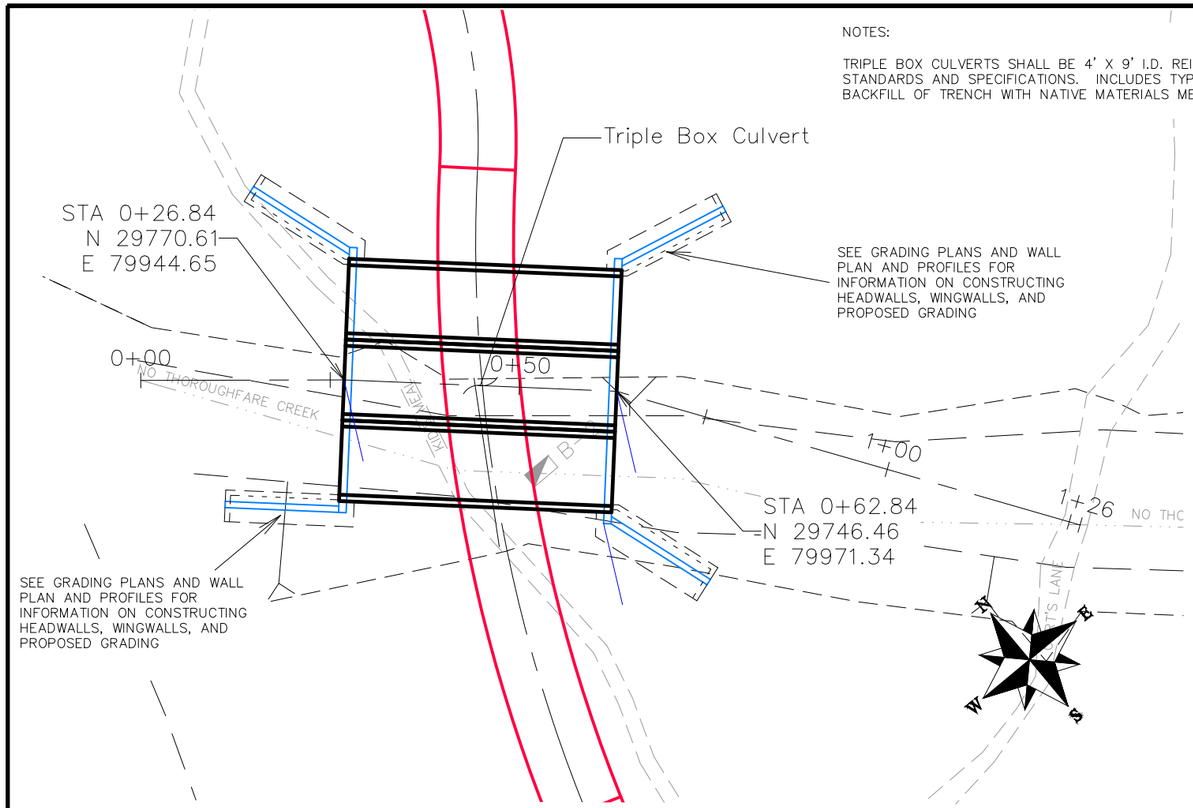
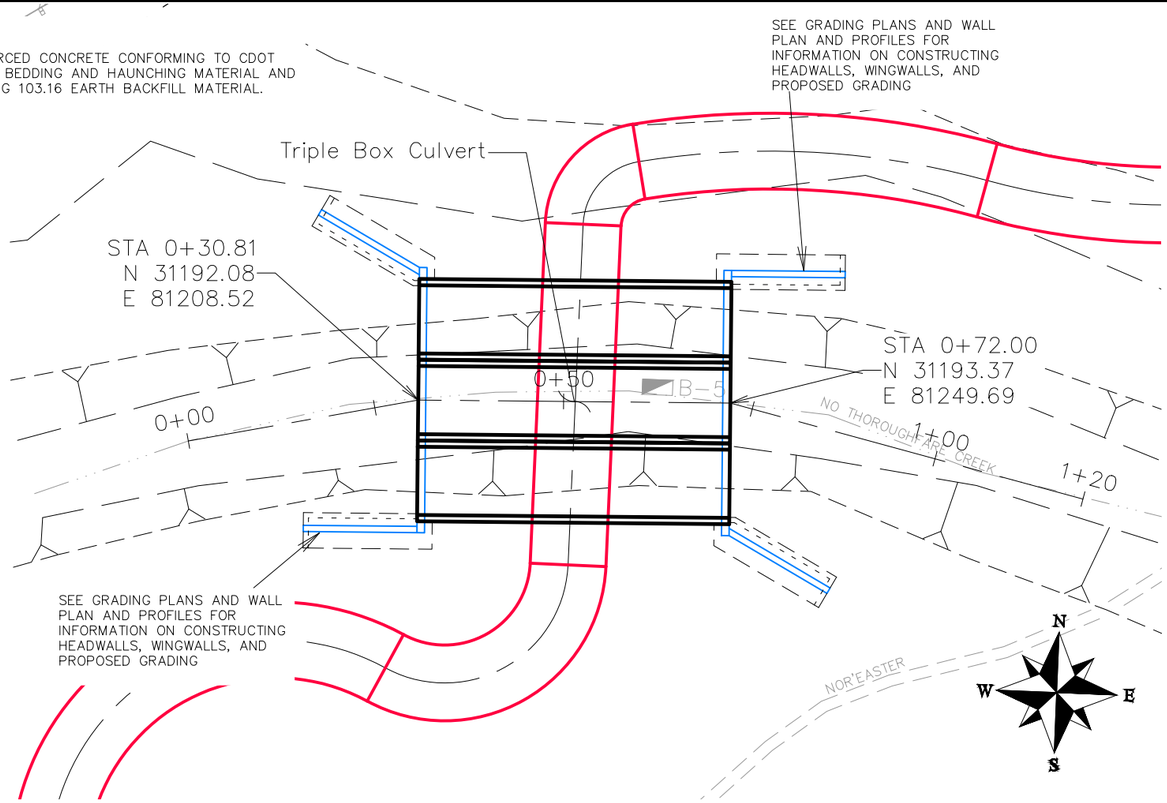
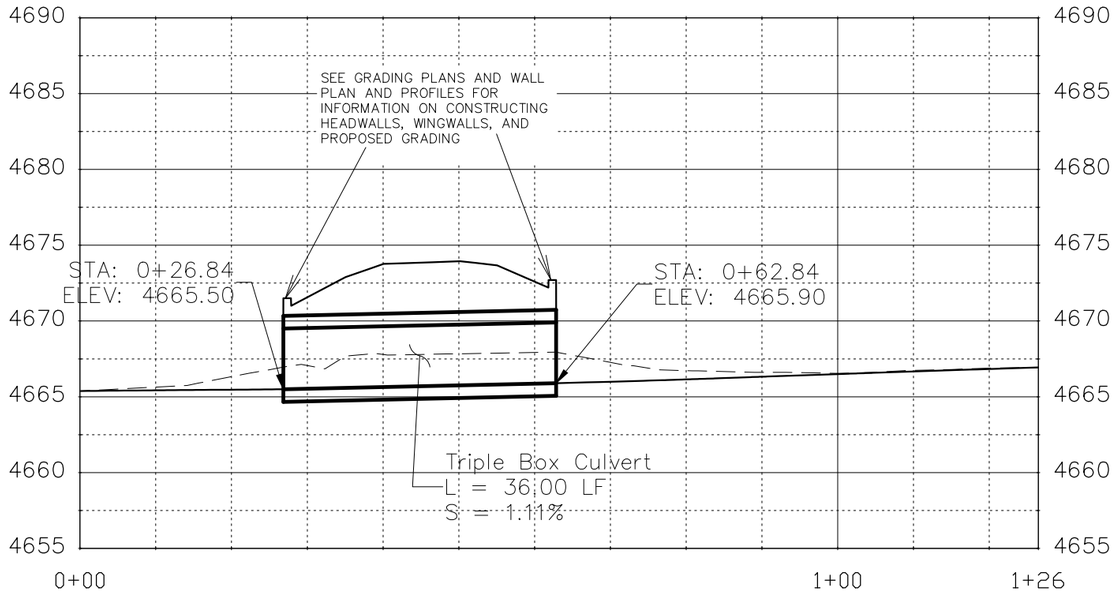
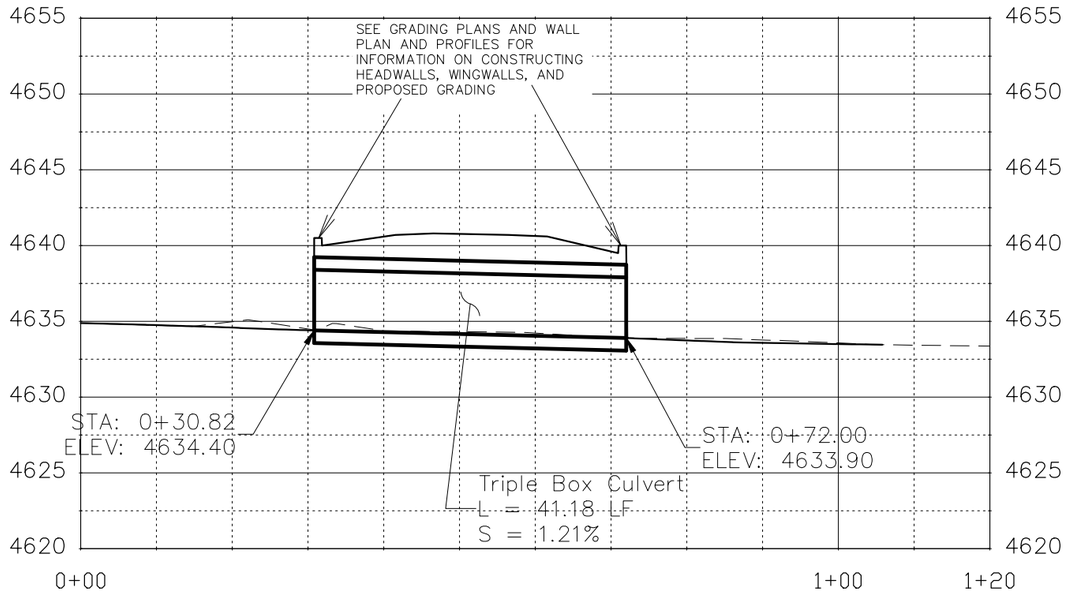
NOTES:

TRIPLE BOX CULVERTS SHALL BE 4' X 9' I.D. REINFORCED CONCRETE CONFORMING TO CDOT STANDARDS AND SPECIFICATIONS. INCLUDES TYPE A BEDDING AND HAUNCHING MATERIAL AND BACKFILL OF TRENCH WITH NATIVE MATERIALS MEETING 103.16 EARTH BACKFILL MATERIAL.









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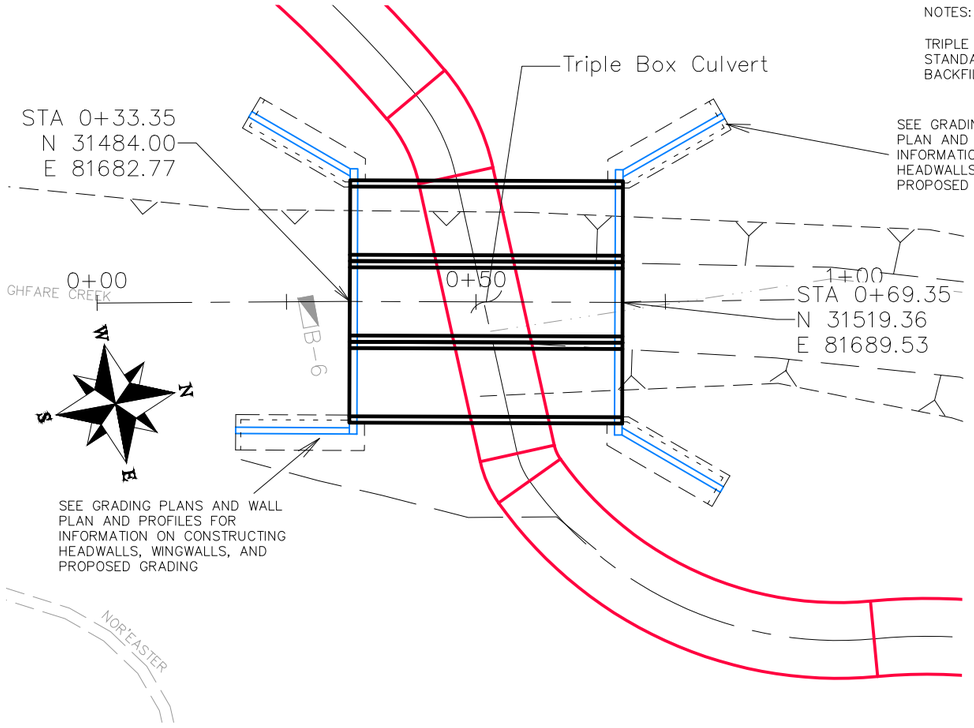
CITY OF Grand Junction COLORADO

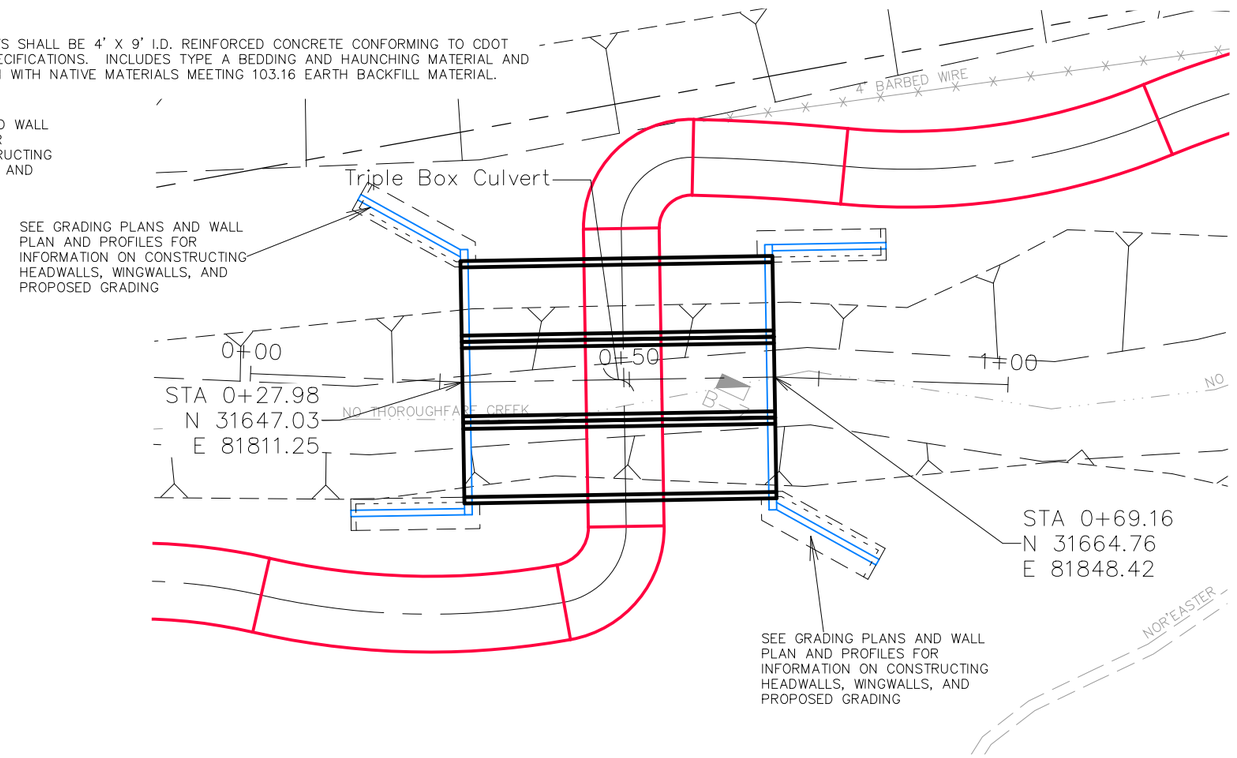
PUBLIC WORKS
ENGINEERING DIVISION

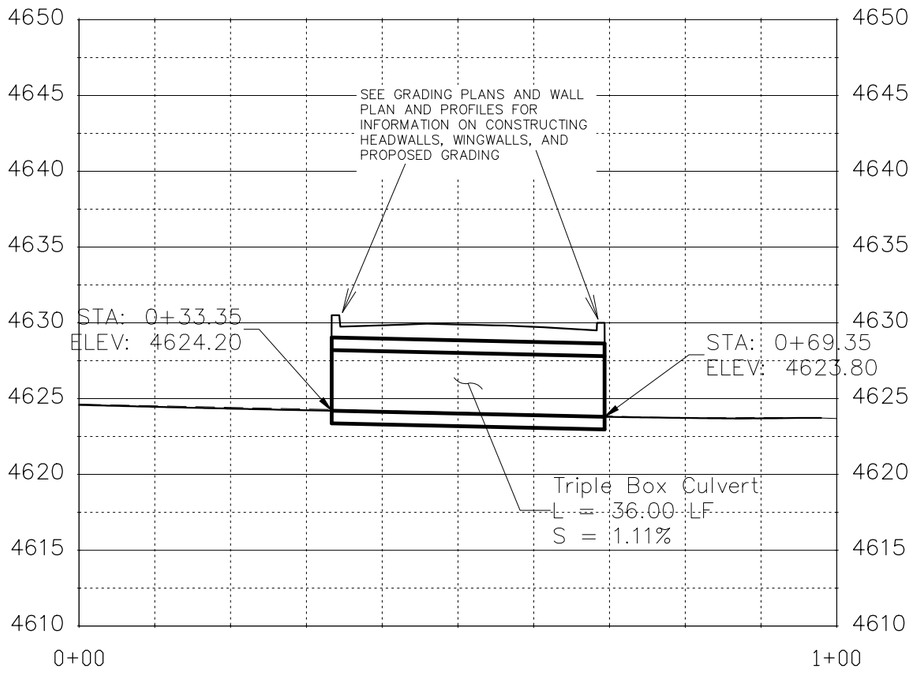
MONUMENT ROAD BICYCLE PATH
BOX CULVERT PLAN AND PROFILE

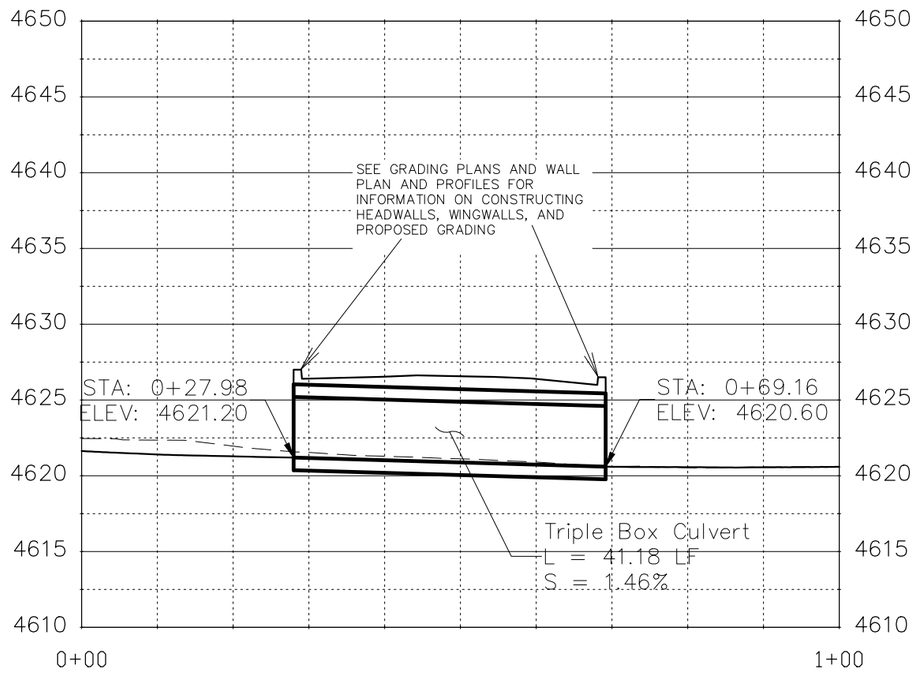
NOTES:

TRIPLE BOX CULVERTS SHALL BE 4' X 9' I.D. REINFORCED CONCRETE CONFORMING TO CDOT STANDARDS AND SPECIFICATIONS. INCLUDES TYPE A BEDDING AND HAUNCHING MATERIAL AND BACKFILL OF TRENCH WITH NATIVE MATERIALS MEETING 103.16 EARTH BACKFILL MATERIAL.









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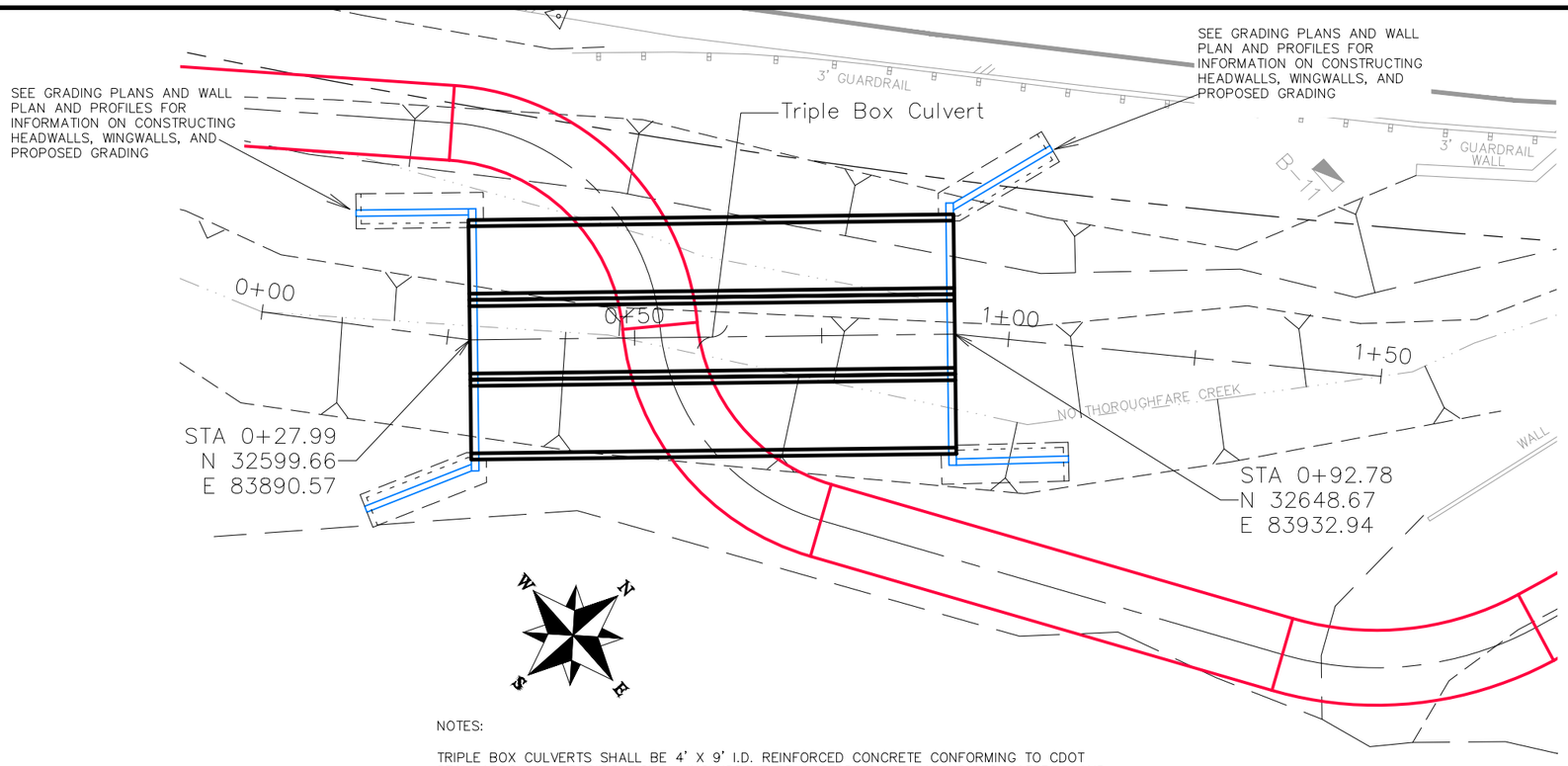
CITY OF Grand Junction COLORADO

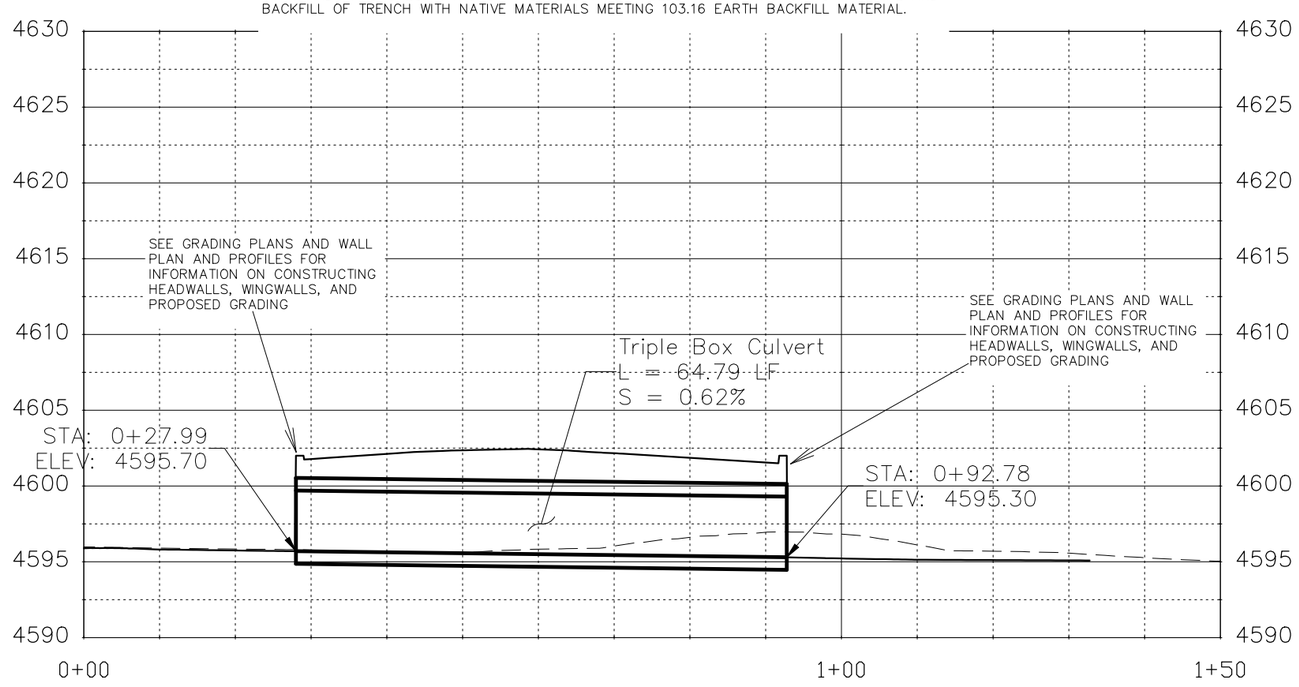
PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
BOX CULVERT PLAN AND PROFILE



NOTES:

TRIPLE BOX CULVERTS SHALL BE 4' X 9' I.D. REINFORCED CONCRETE CONFORMING TO CDOT STANDARDS AND SPECIFICATIONS. INCLUDES TYPE A BEDDING AND HAUNCHING MATERIAL AND BACKFILL OF TRENCH WITH NATIVE MATERIALS MEETING 103.16 EARTH BACKFILL MATERIAL.



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CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
BOX CULVERT PLAN AND PROFILE

5

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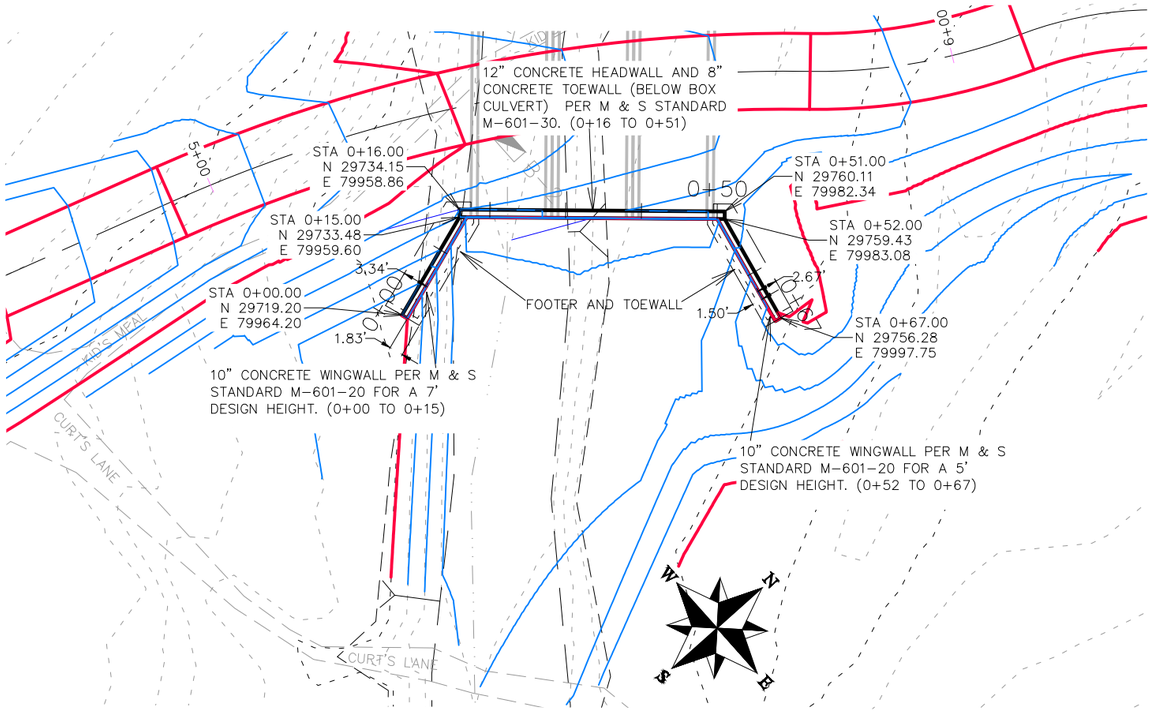

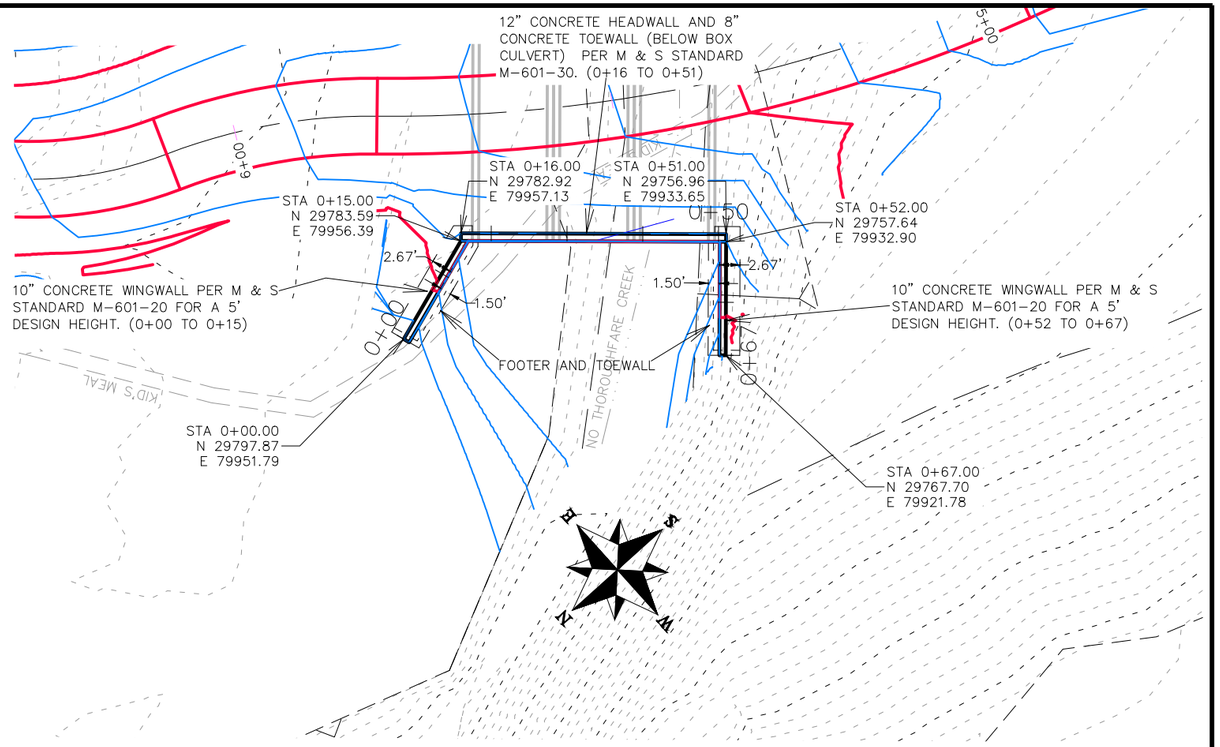

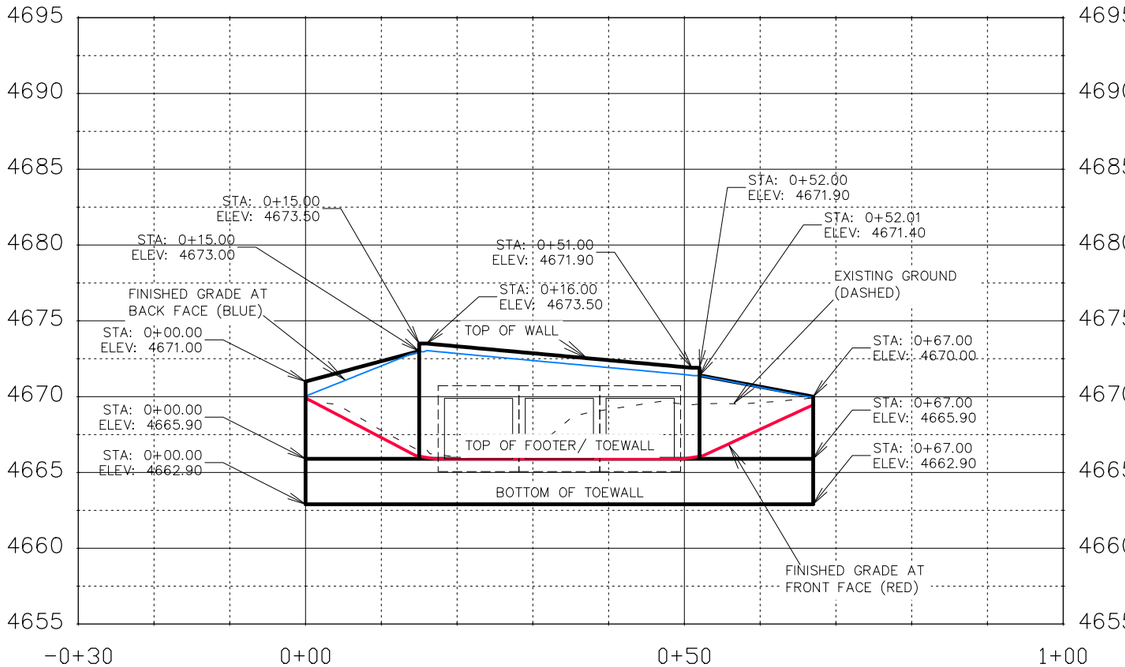

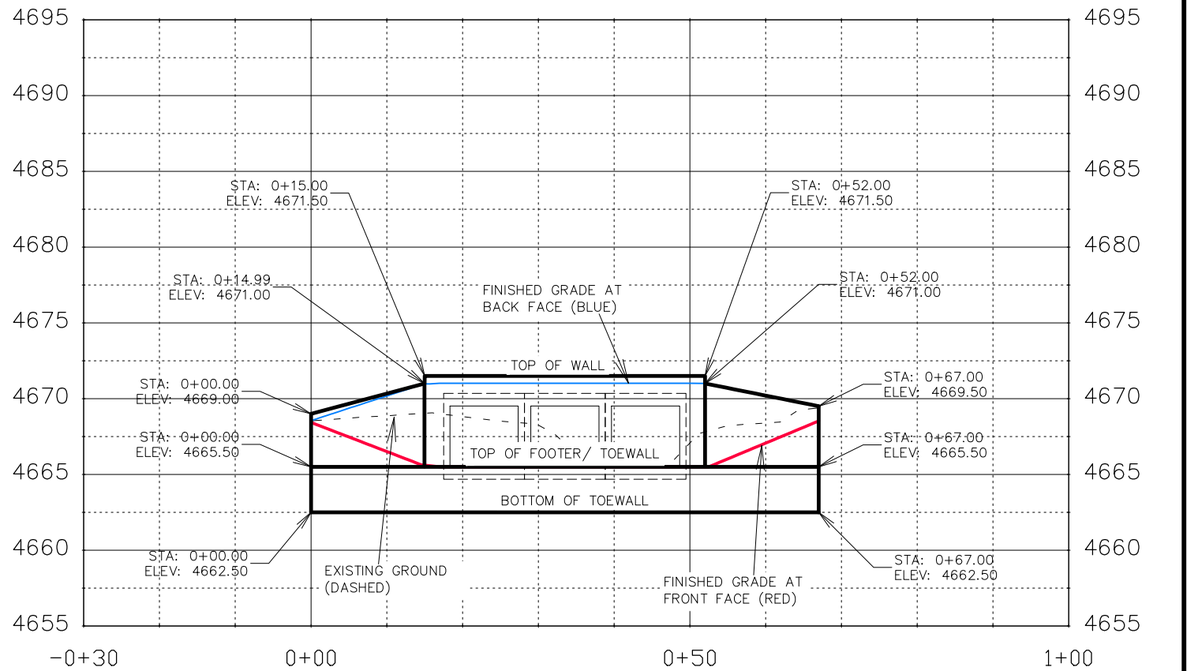

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APPROVED BY TCP DATE 2019

SCALES:
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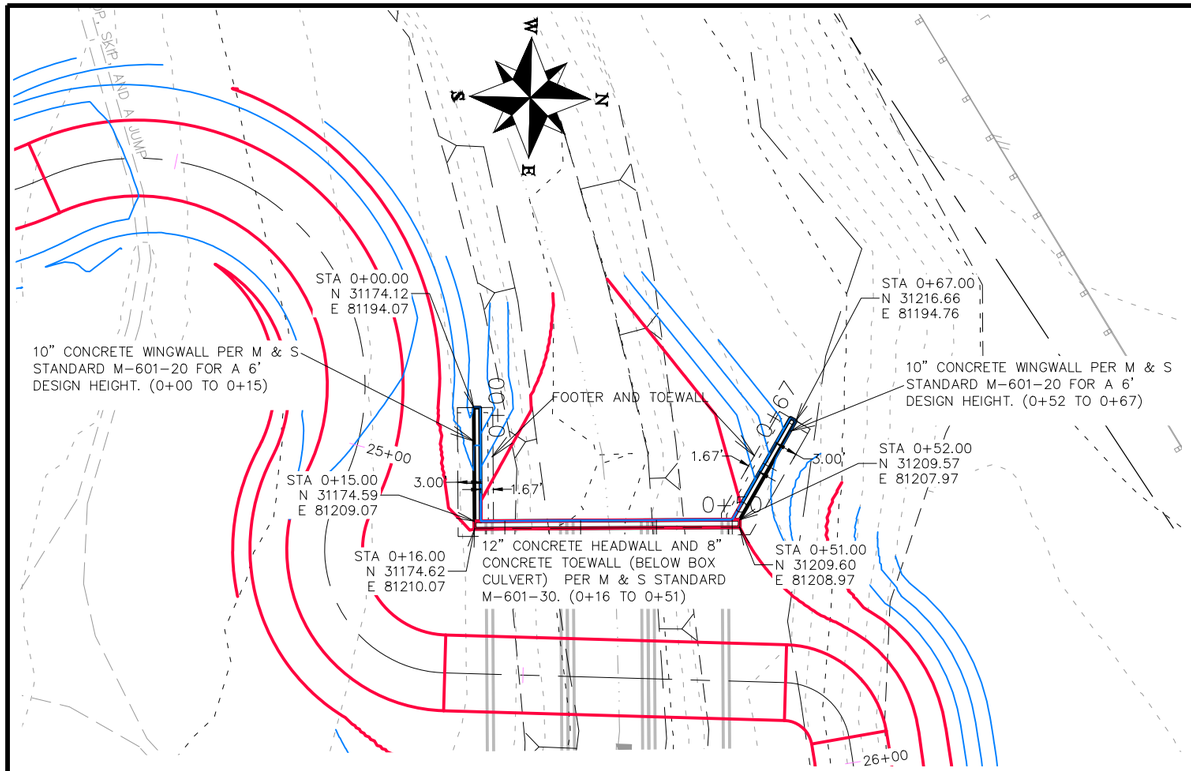
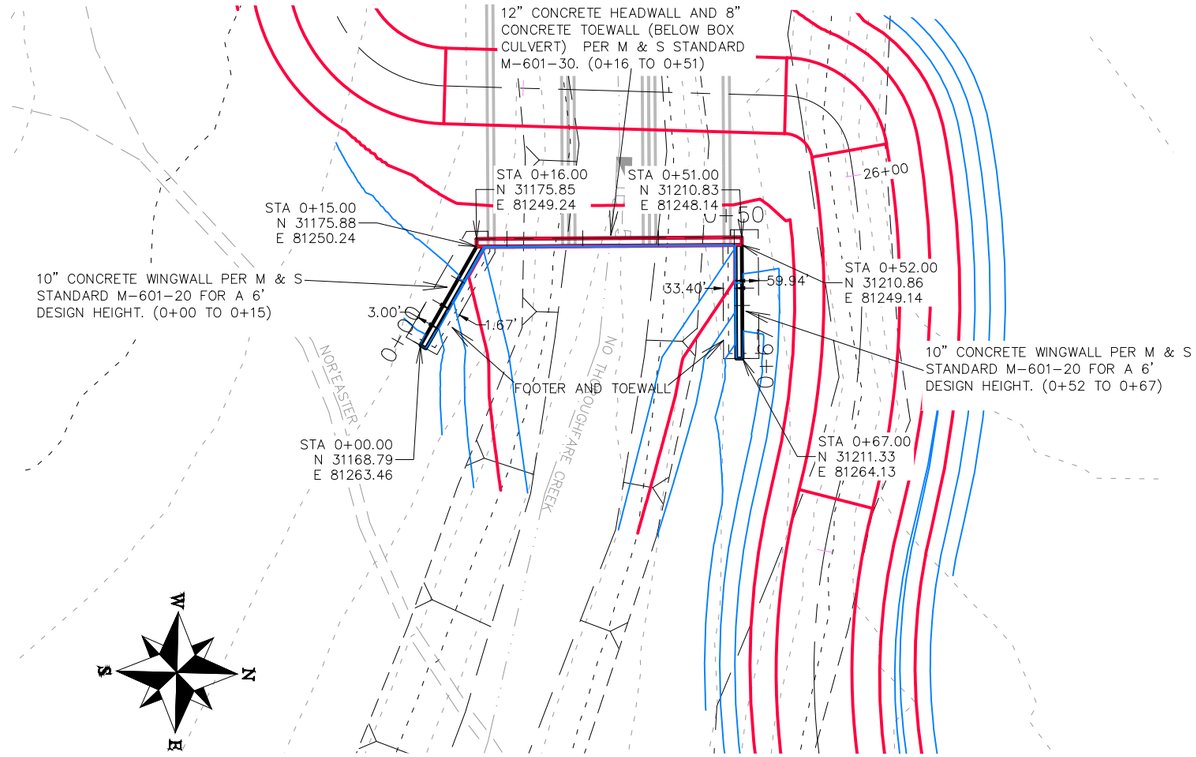
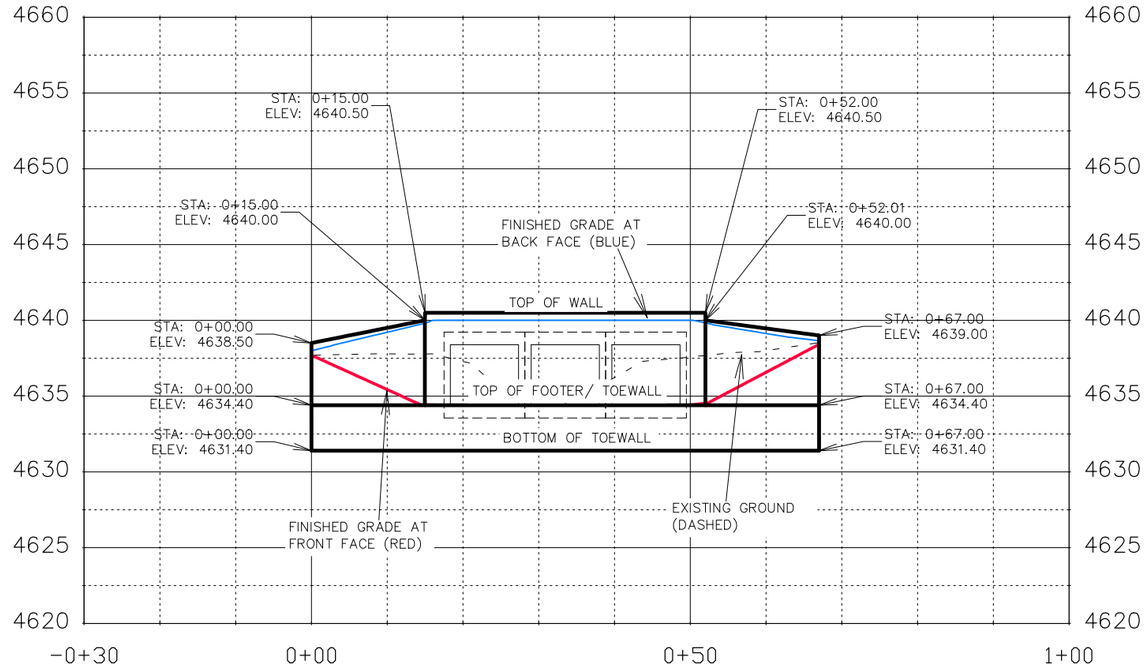
CITY OF Grand Junction COLORADO

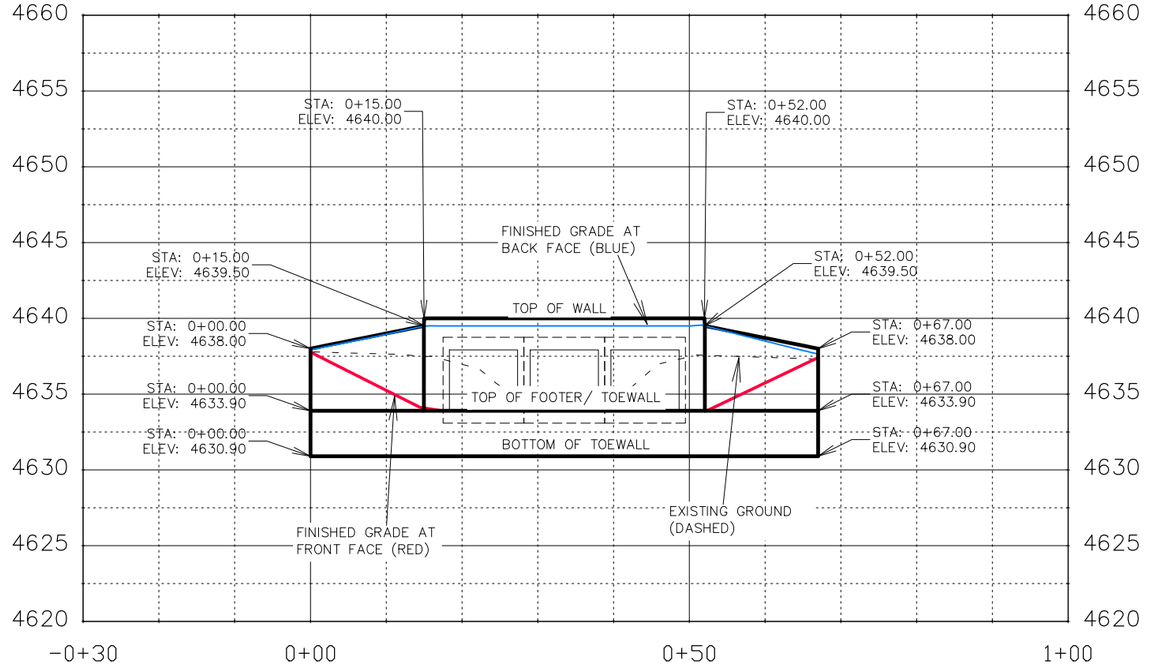
PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
WALL PLAN AND PROFILE









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SCALES:
PLAN & PROFILE
HORIZONTAL 0 5 10 20
VERTICAL 0 2.5 5 10

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
WALL PLAN AND PROFILE

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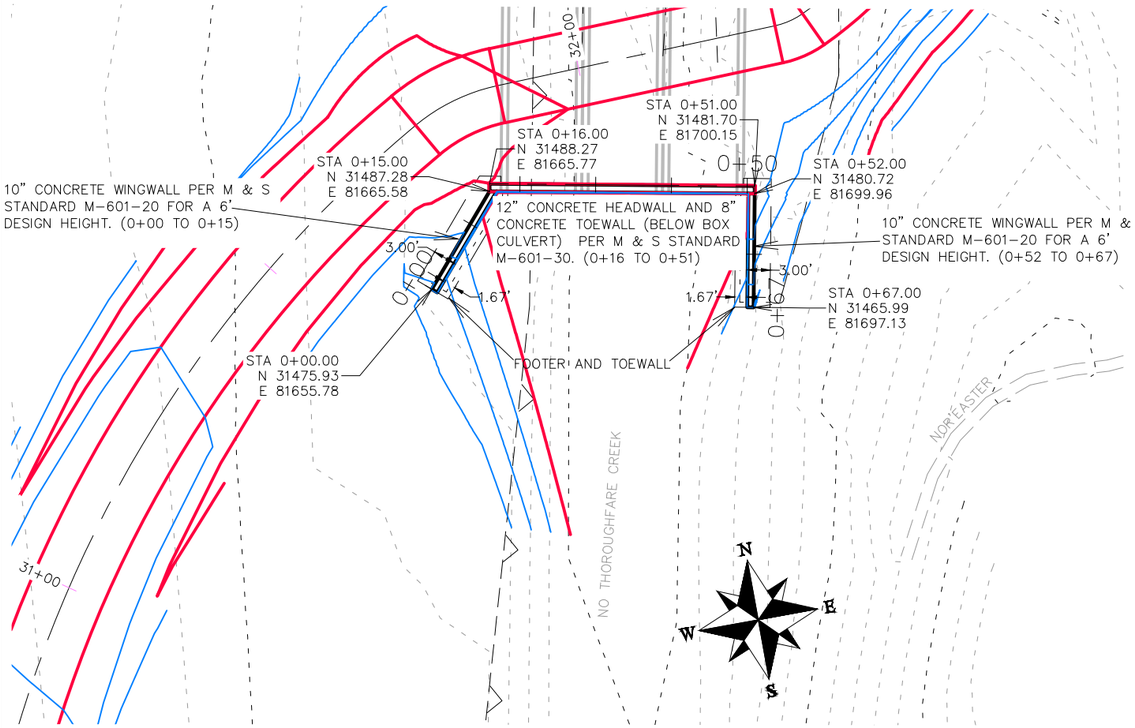

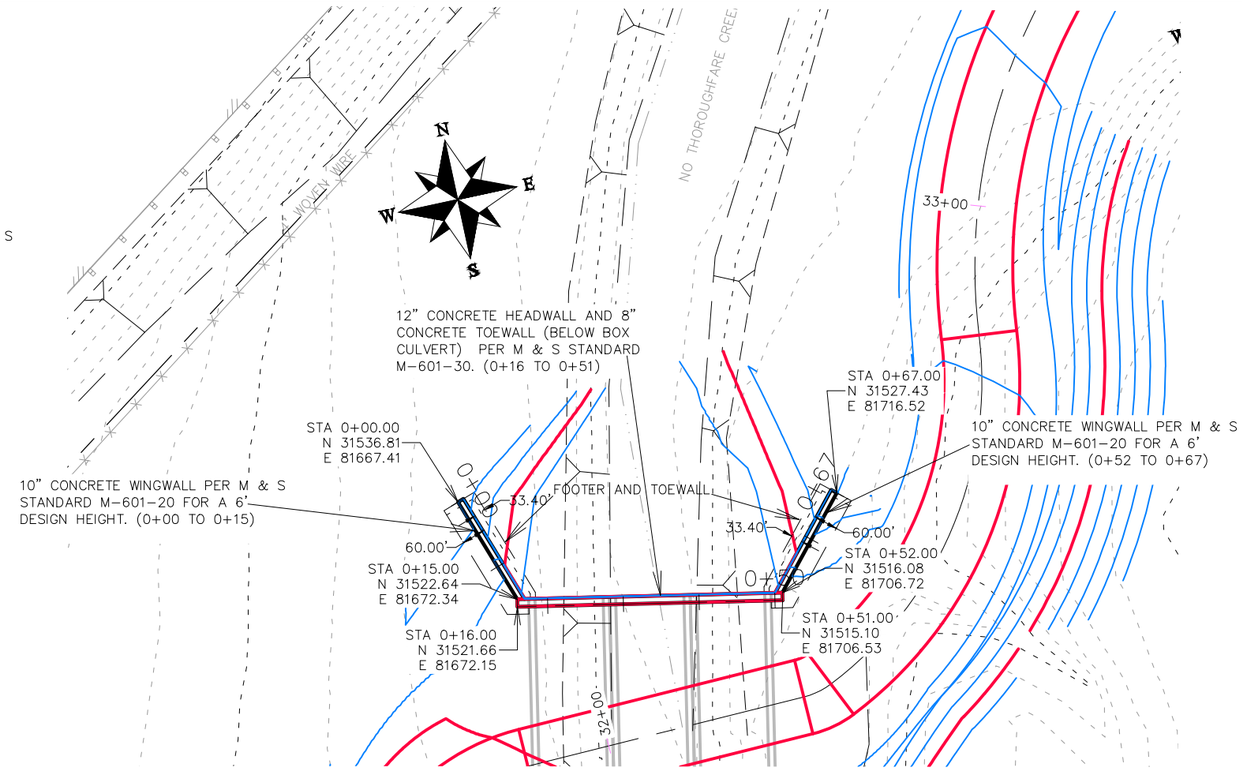

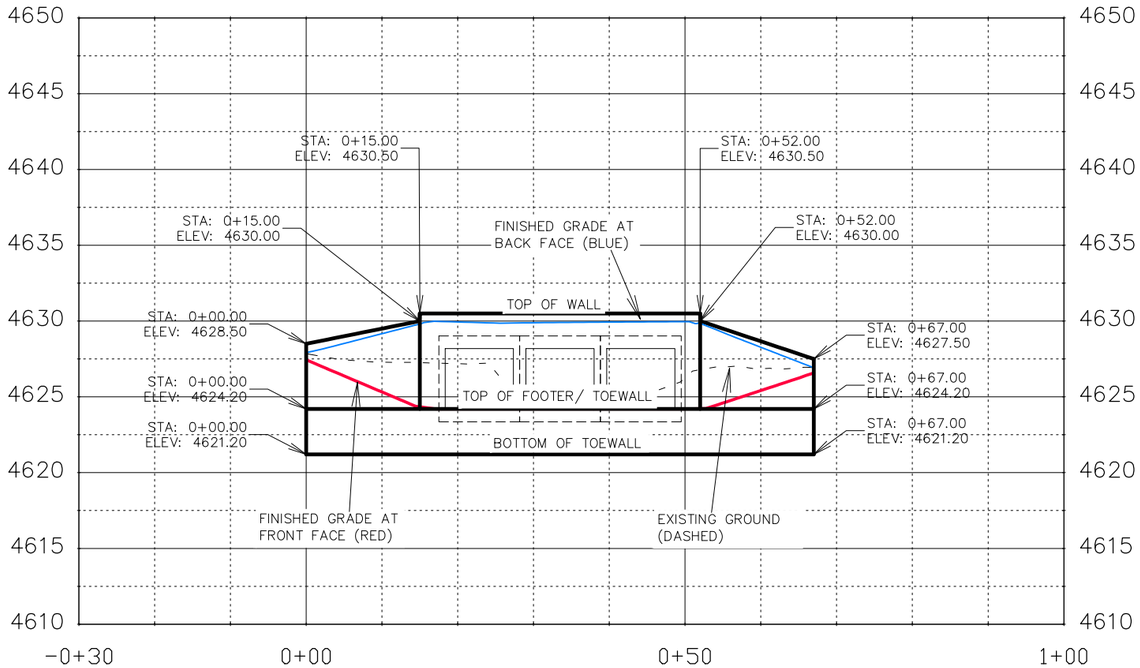

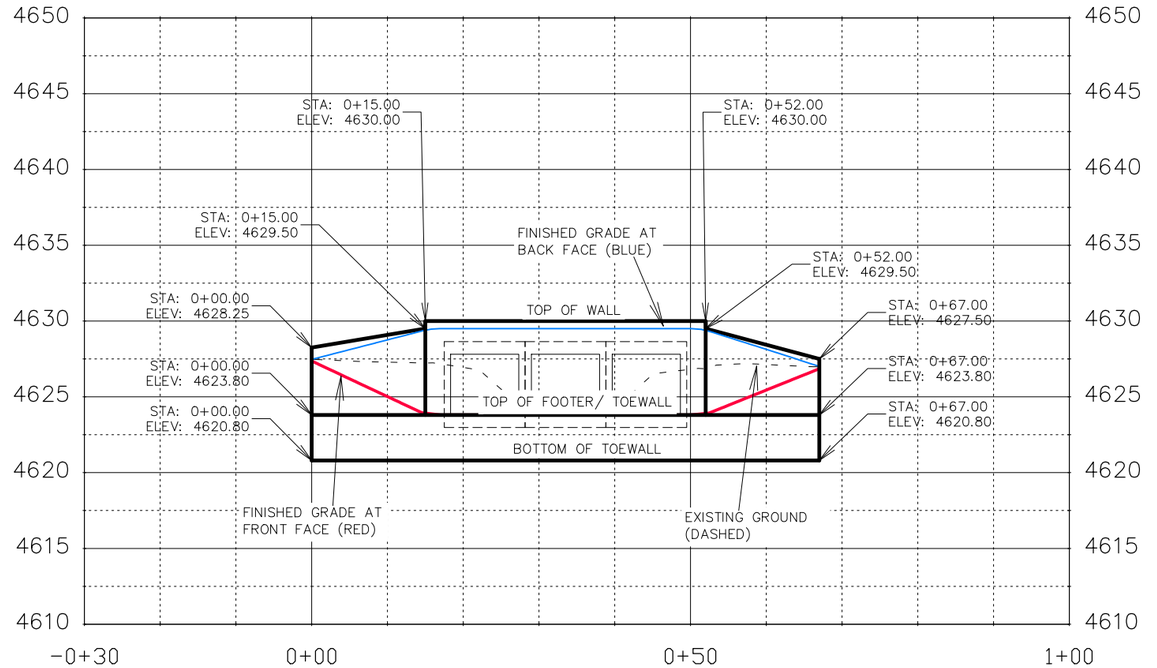

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VERTICAL 0 2.5 5 10

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MONUMENT ROAD BICYCLE PATH
WALL PLAN AND PROFILE

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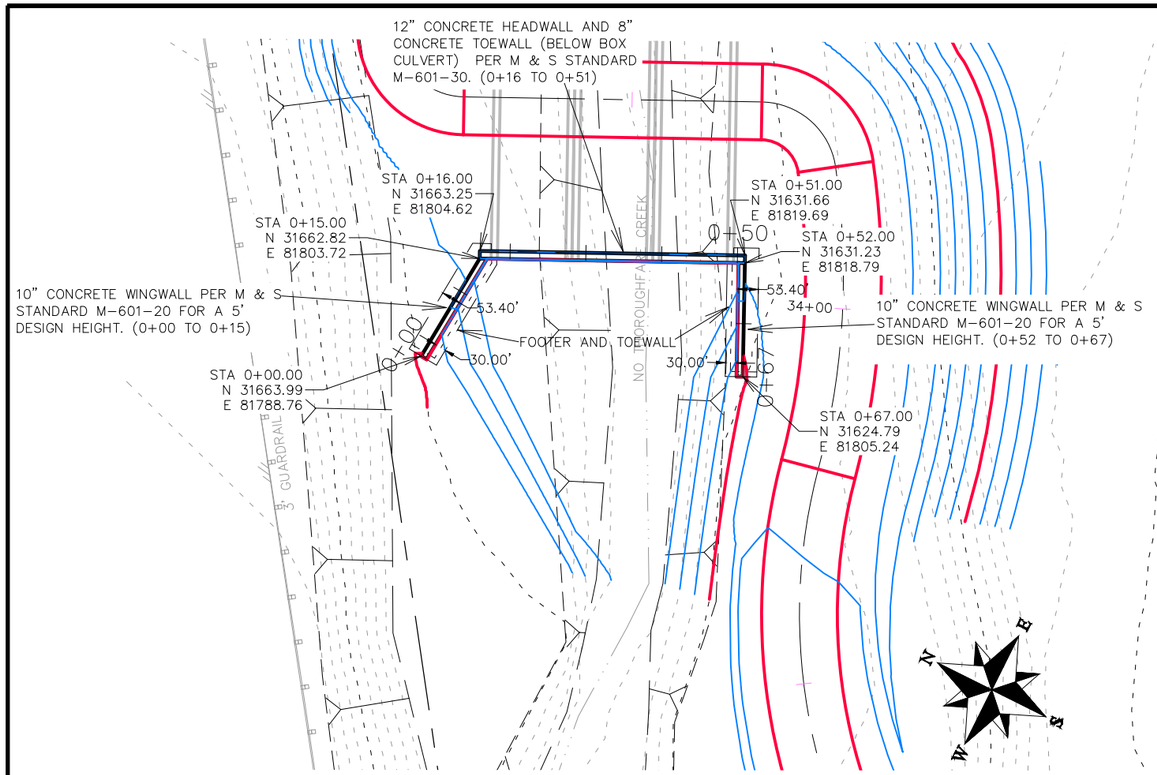

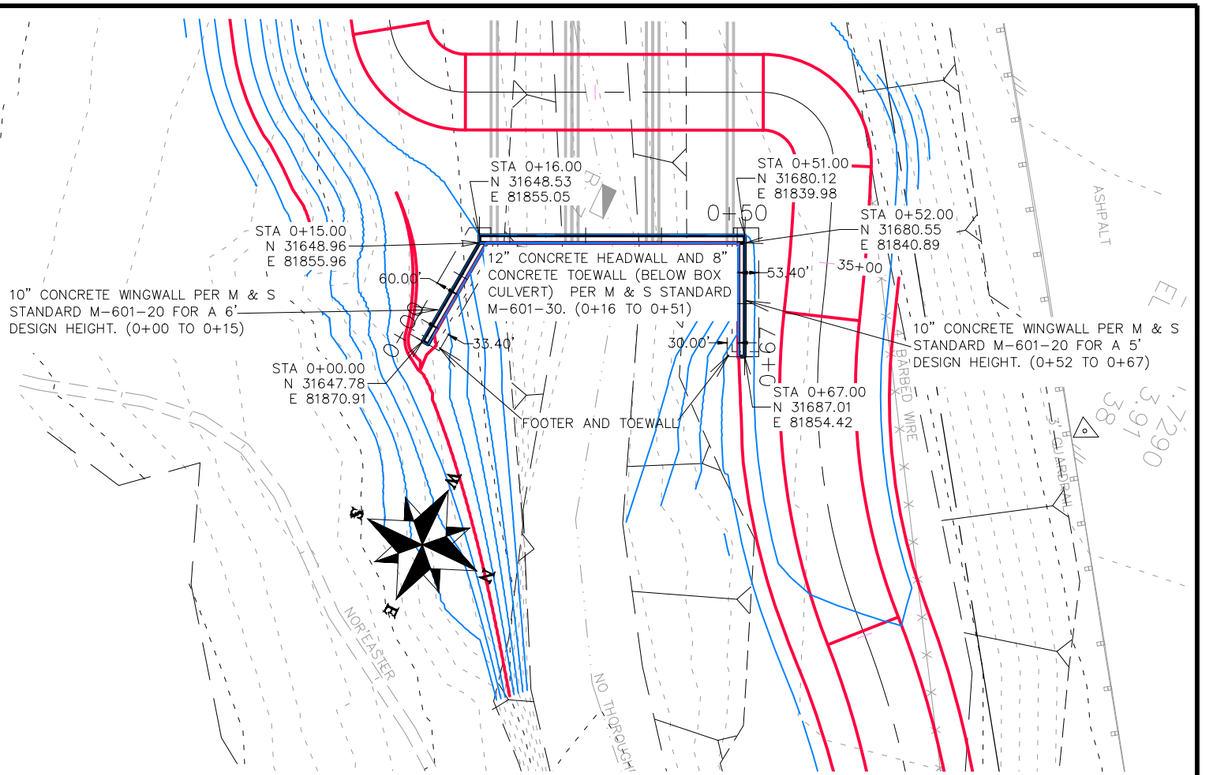

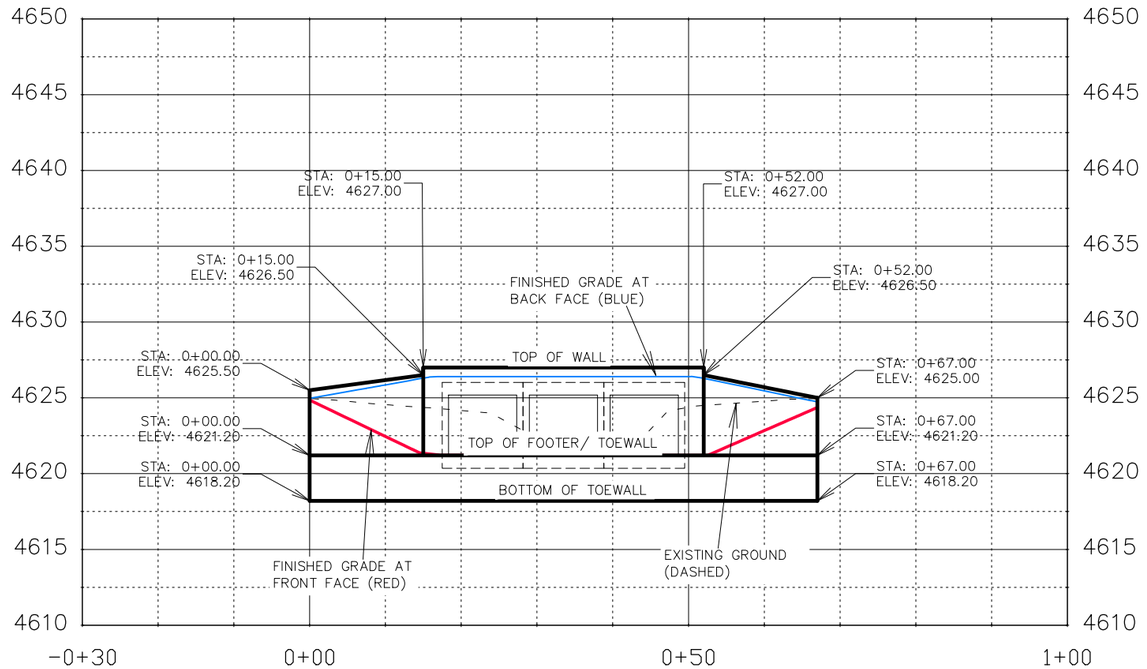

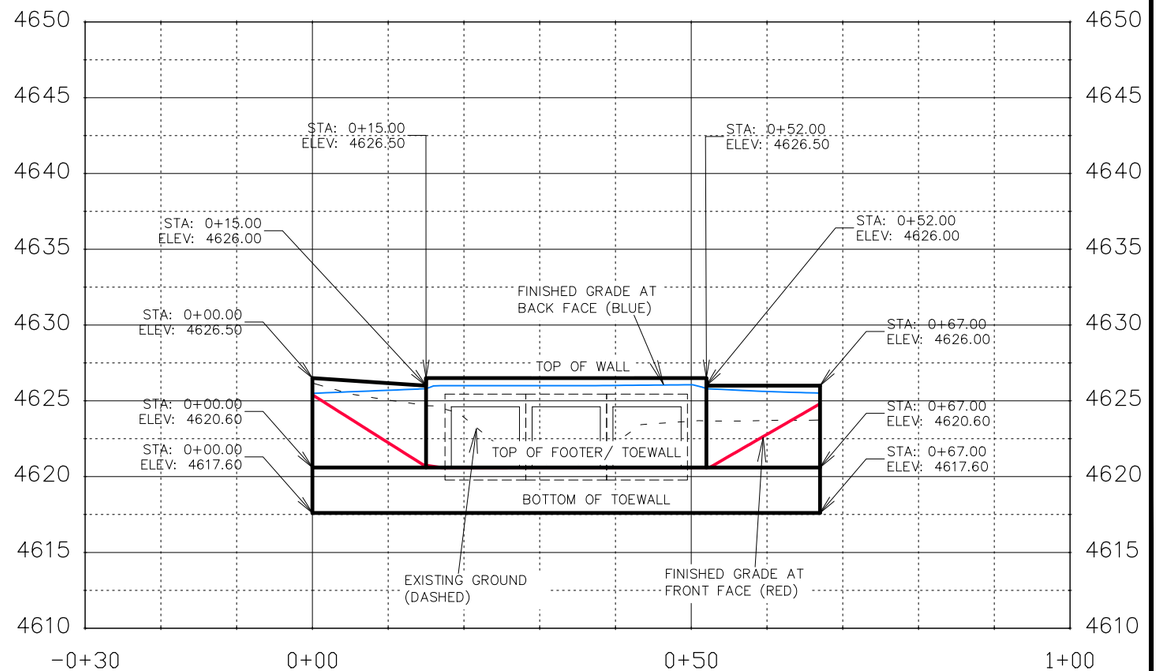

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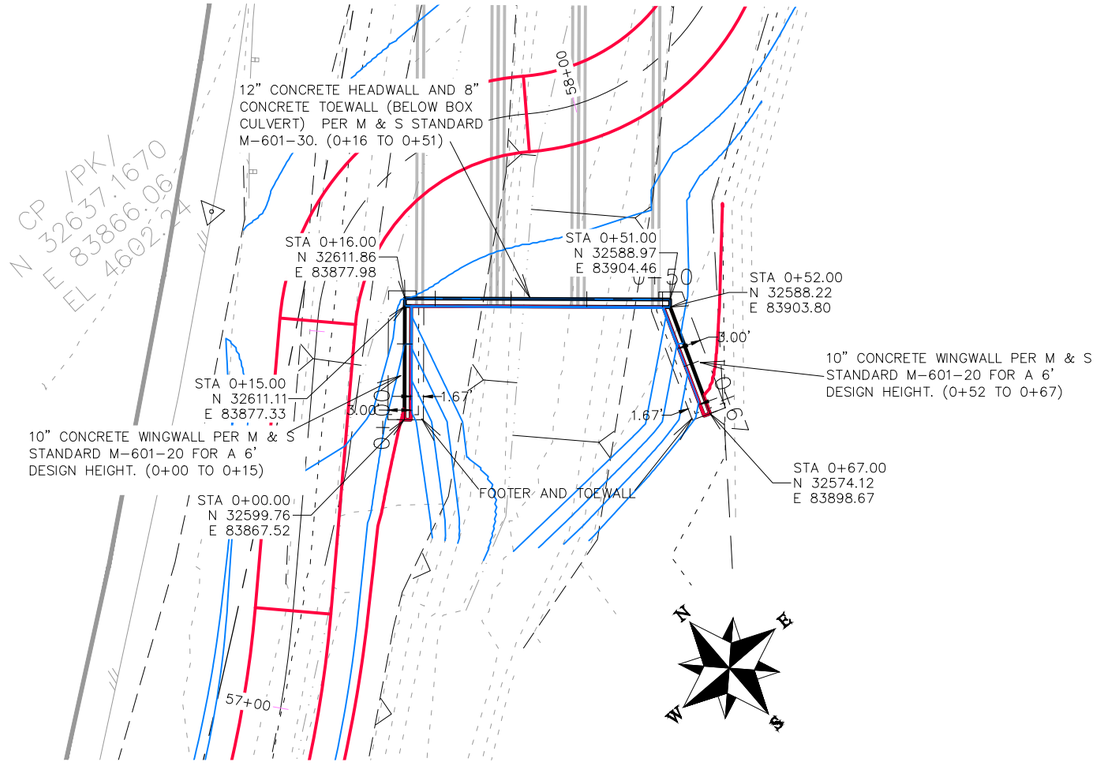
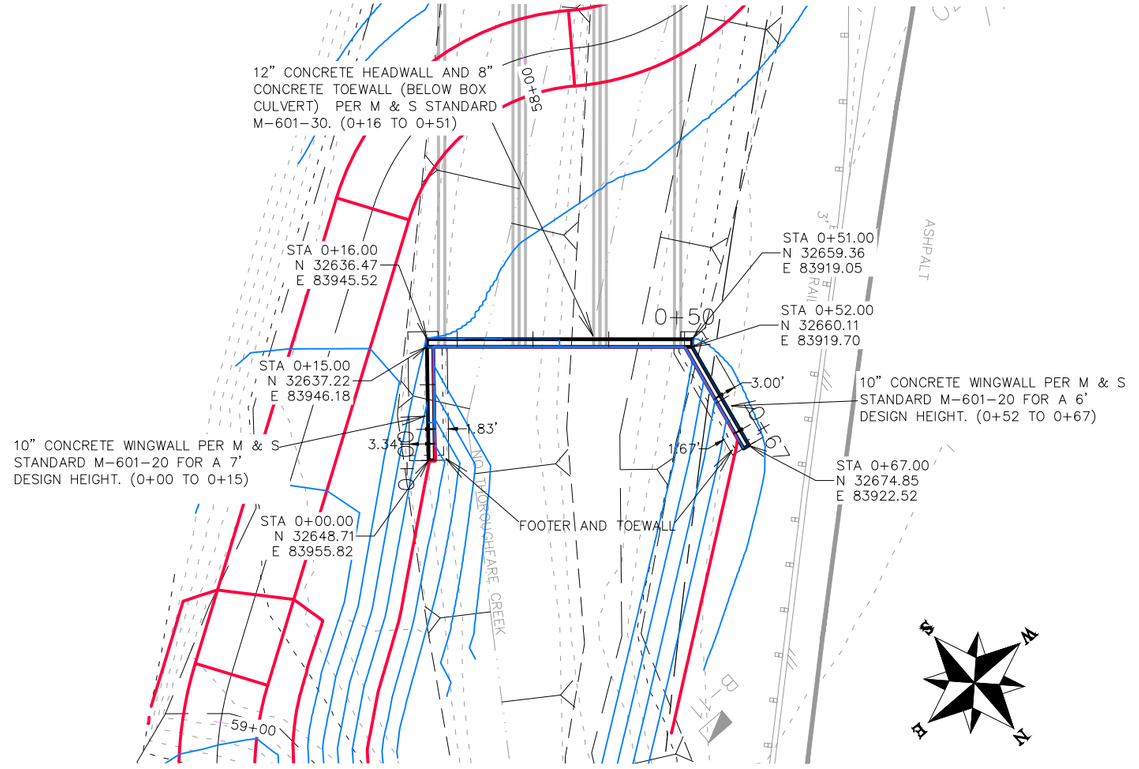
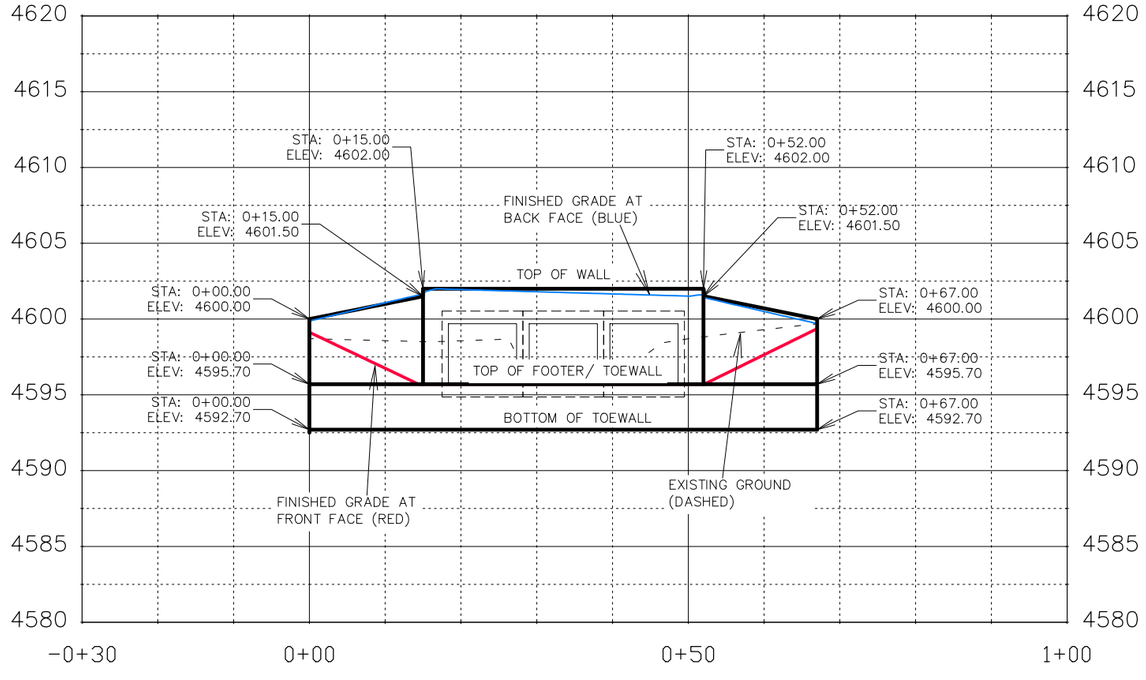
CITY OF Grand Junction COLORADO

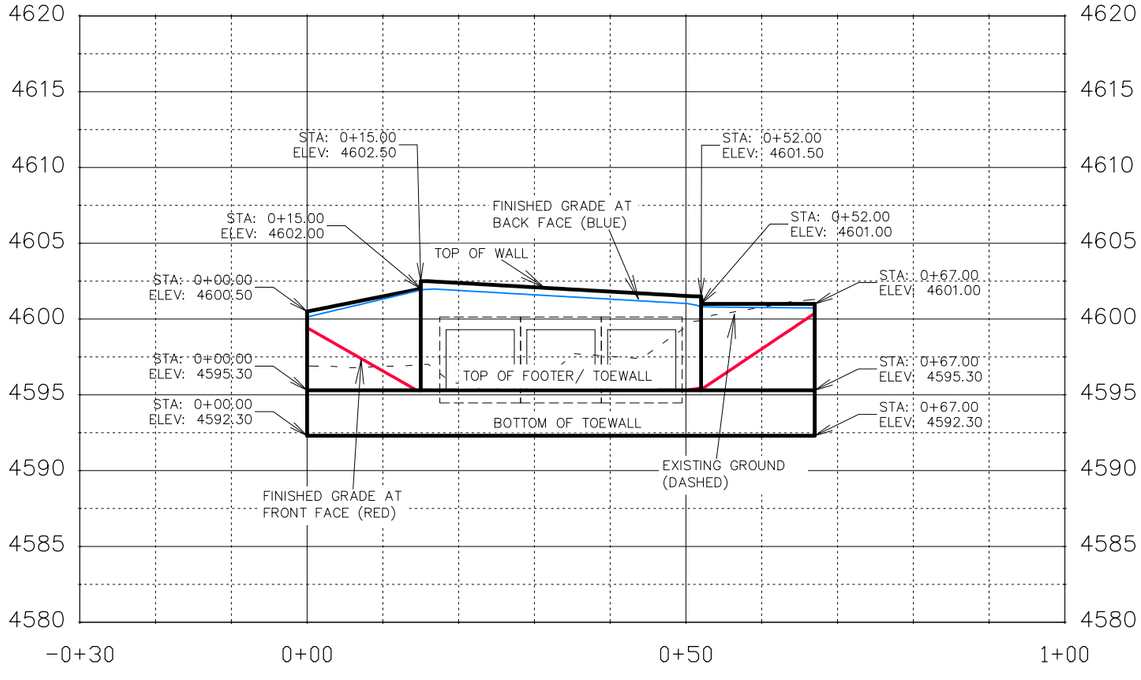
PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
WALL PLAN AND PROFILE









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CITY OF Grand Junction COLORADO

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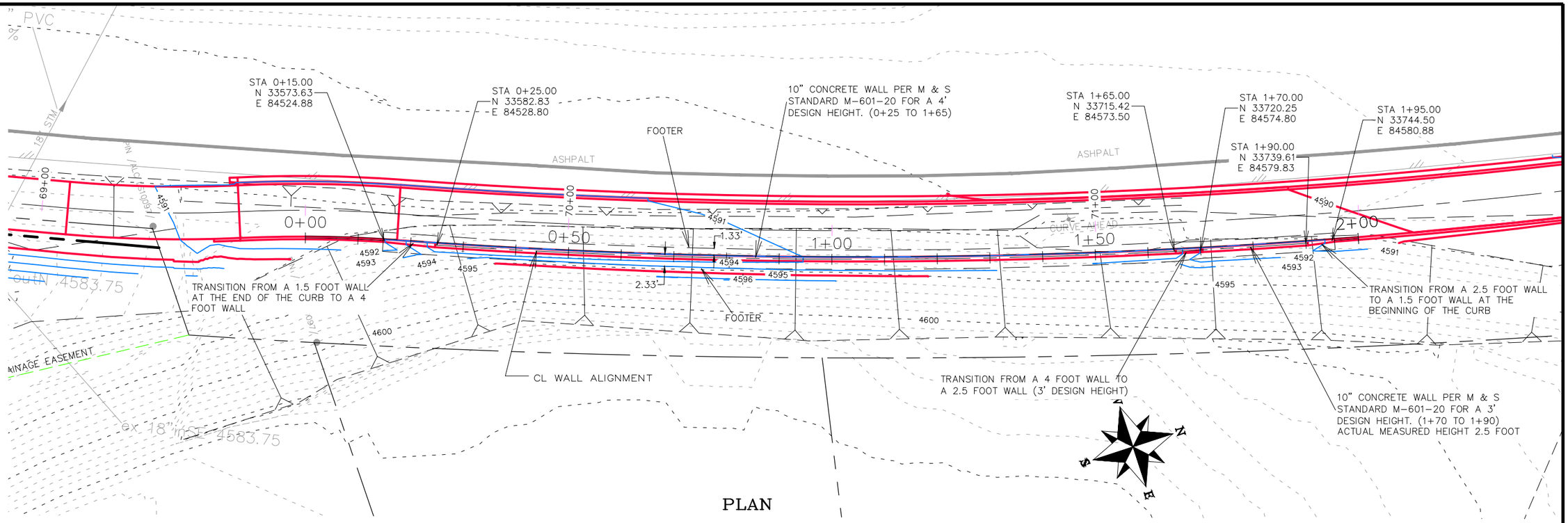
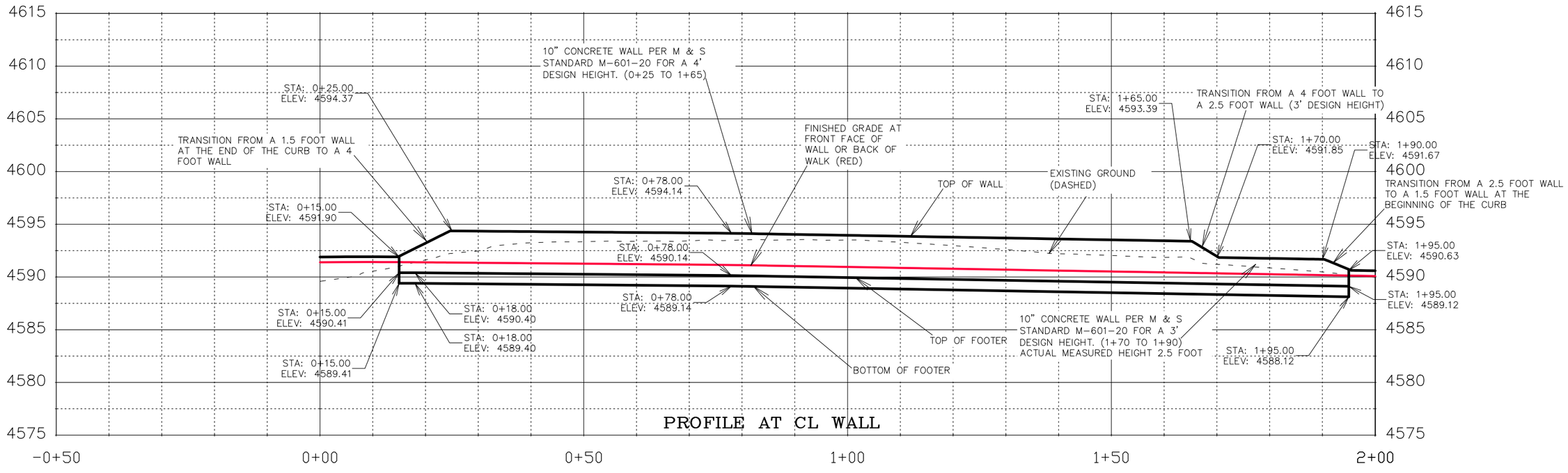
MONUMENT ROAD BICYCLE PATH
WALL PLAN AND PROFILE





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CITY OF Grand Junction COLORADO

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MONUMENT ROAD BICYCLE PATH
WALL PLAN AND PROFILE

11

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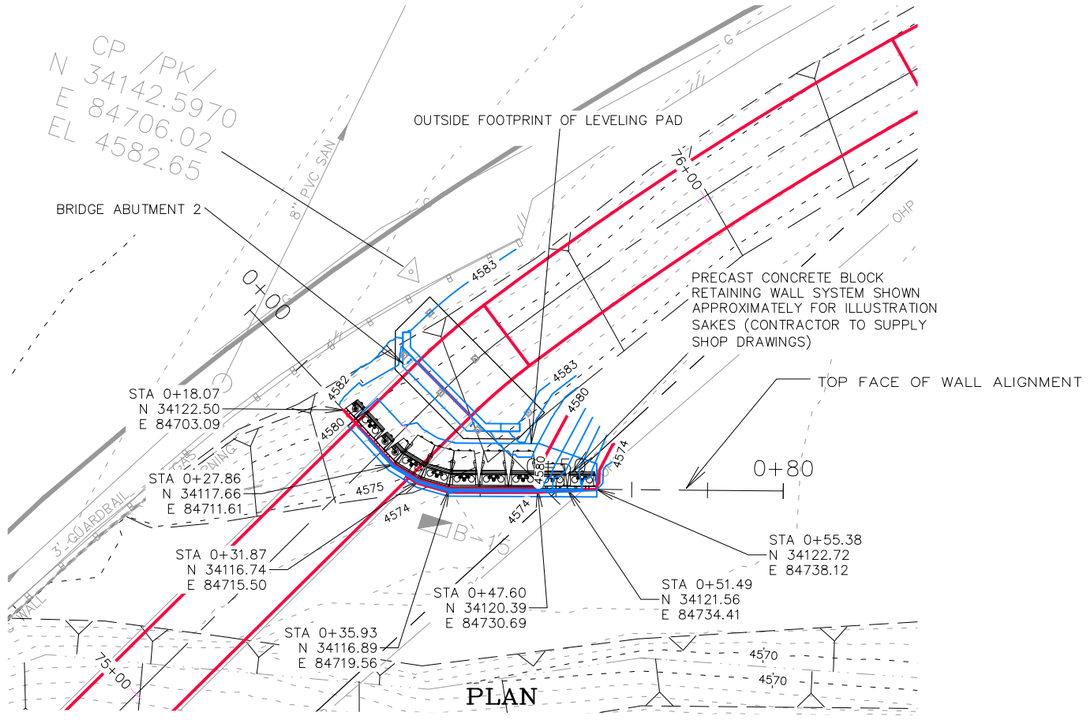

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APPROVED BY TCP DATE 2019

SCALES:
PLAN & PROFILE
HORIZONTAL 0 5 10 20
VERTICAL 0 2.5 5 10

CITY OF Grand Junction COLORADO

PUBLIC WORKS
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MONUMENT ROAD BICYCLE PATH
WALL PLAN AND PROFILE

12

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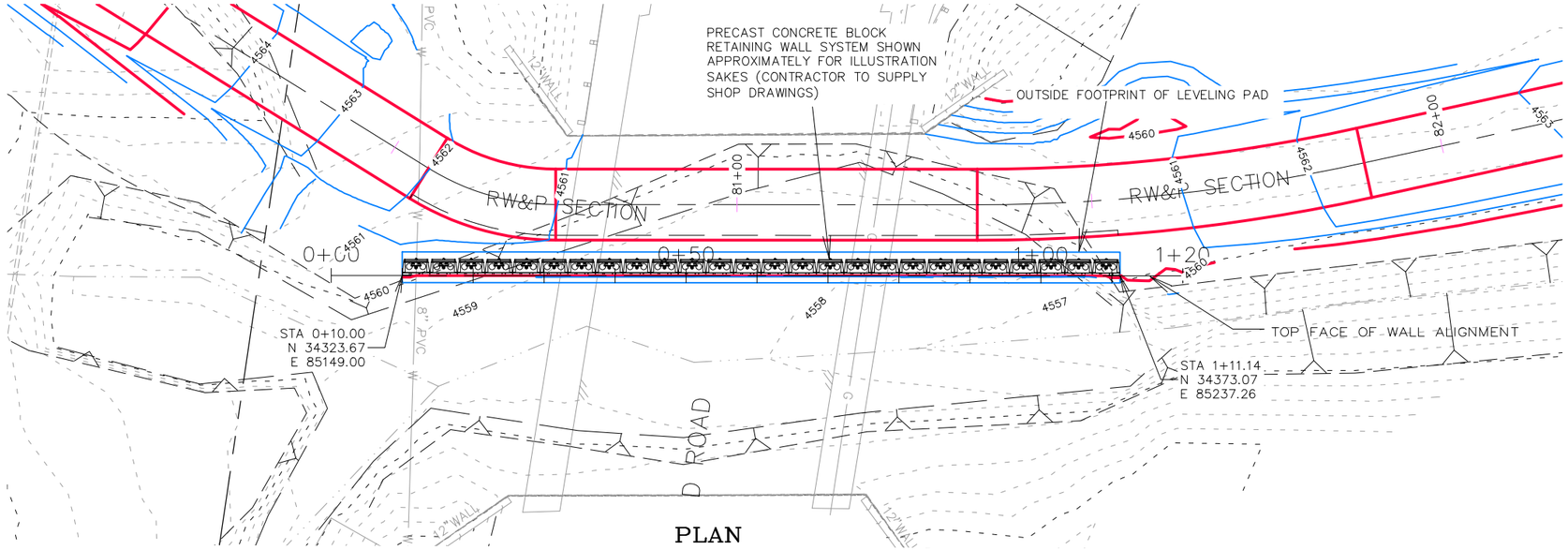
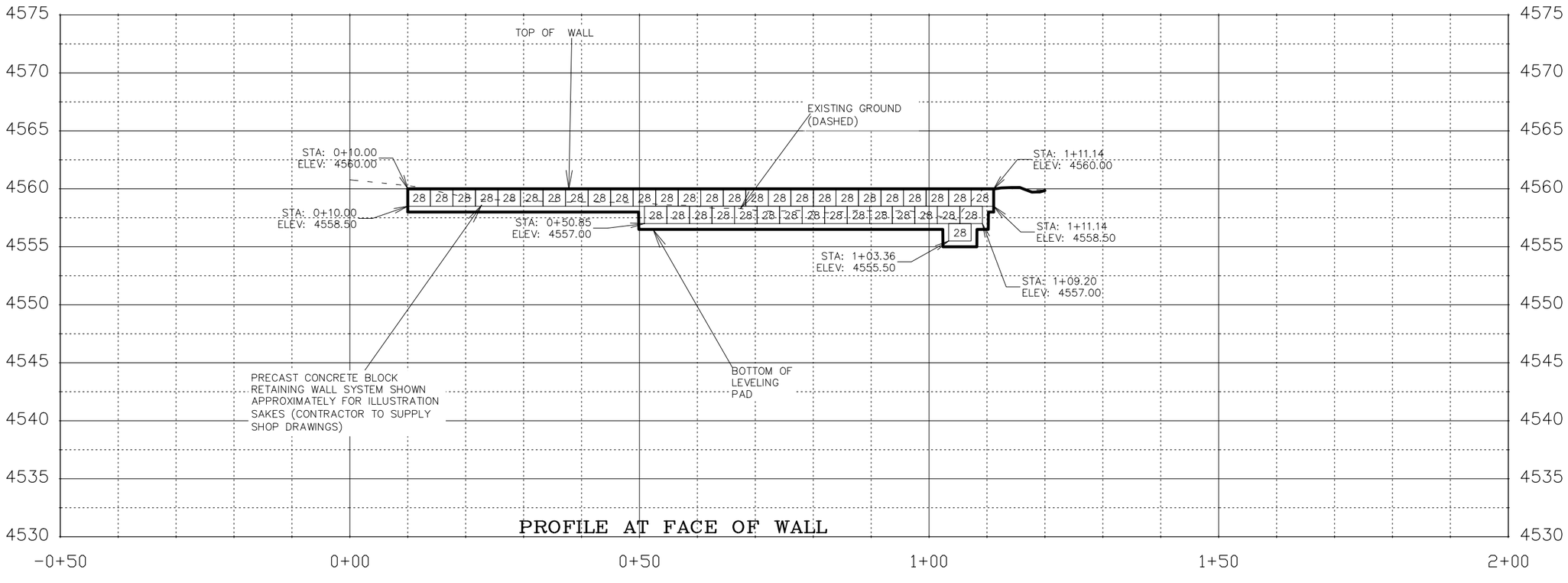


PLAN



PROFILE AT FACE OF WALL

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REVISION △	–
REVISION △	–
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DRAWN BY JCS DATE 2019
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APPROVED BY TCP DATE 2019

SCALES:
PLAN & PROFILE
HORIZONTAL 0 5 10 20
VERTICAL 0 2.5 5 10

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MONUMENT ROAD BICYCLE PATH
WALL PLAN AND PROFILE

13

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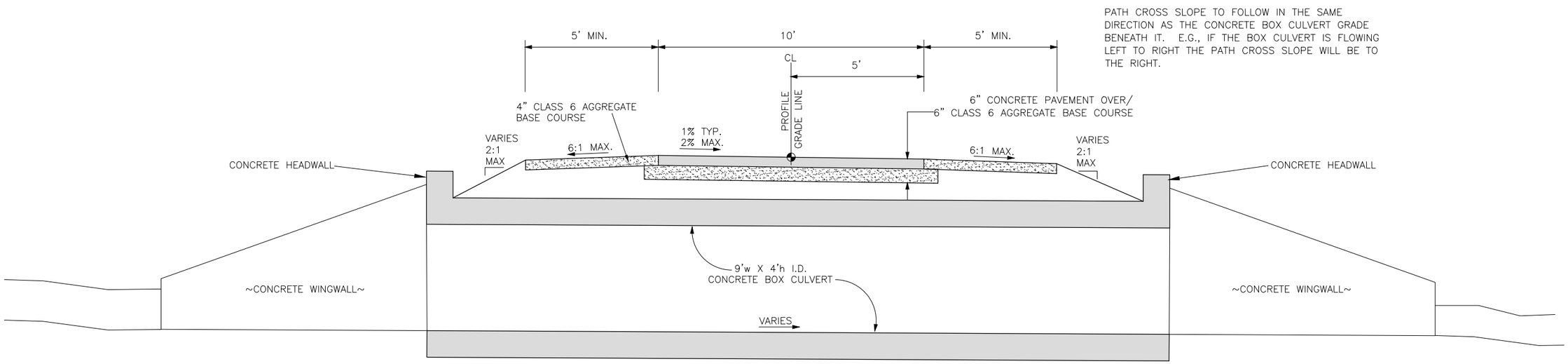
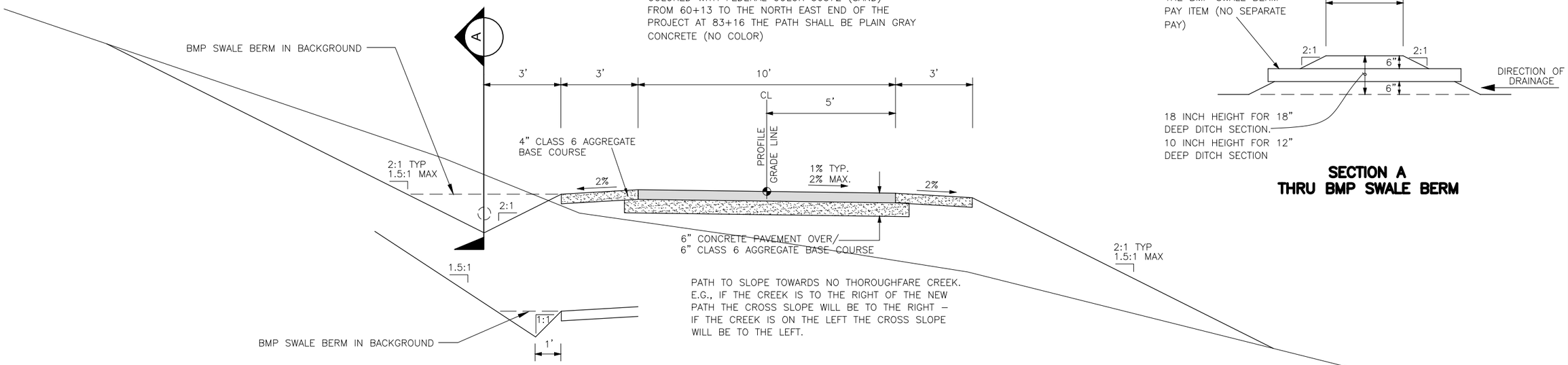
PATH CROSS SLOPE TO FOLLOW IN THE SAME DIRECTION AS THE CONCRETE BOX CULVERT GRADE BENEATH IT. E.G., IF THE BOX CULVERT IS FLOWING LEFT TO RIGHT THE PATH CROSS SLOPE WILL BE TO THE RIGHT.



AT LOW LEVEL CREEK CROSSING

NOTE:
FROM 0+81 TO 60+13 PATH CONCRETE SHALL BE COLORED WITH FEDERAL COLOR 30372 (SAND)
FROM 60+13 TO THE NORTH EAST END OF THE PROJECT AT 83+16 THE PATH SHALL BE PLAIN GRAY CONCRETE (NO COLOR)



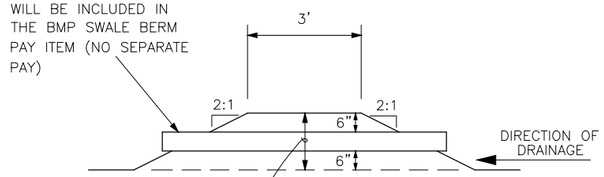
WHERE EXISTING CONDITIONS DICTATE A SHALLOWER AND NARROWER DITCH SECTION IS USED AS SHOWN ON THE PLANS

TYPCAL CROSS SECTION

PATH TO SLOPE TOWARDS NO THOROUGHFARE CREEK. E.G., IF THE CREEK IS TO THE RIGHT OF THE NEW PATH THE CROSS SLOPE WILL BE TO THE RIGHT – IF THE CREEK IS ON THE LEFT THE CROSS SLOPE WILL BE TO THE LEFT.

NOTE
SEE BRIDGE PLANS FOR SECTIONS AT BRIDGE LOCATION

7.5 LF 6" PVC PIPE FOR 18" DEEP DITCH SECTION THERE WILL BE NO PIPE IN THE 12" DEEP DITCH SECTION. COST OF PIPE WILL BE INCLUDED IN THE BMP SWALE BERM PAY ITEM (NO SEPARATE PAY)



18 INCH HEIGHT FOR 18" DEEP DITCH SECTION.
10 INCH HEIGHT FOR 12" DEEP DITCH SECTION

SECTION A THRU BMP SWALE BERM

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REVISION △	–
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REVISION △	–

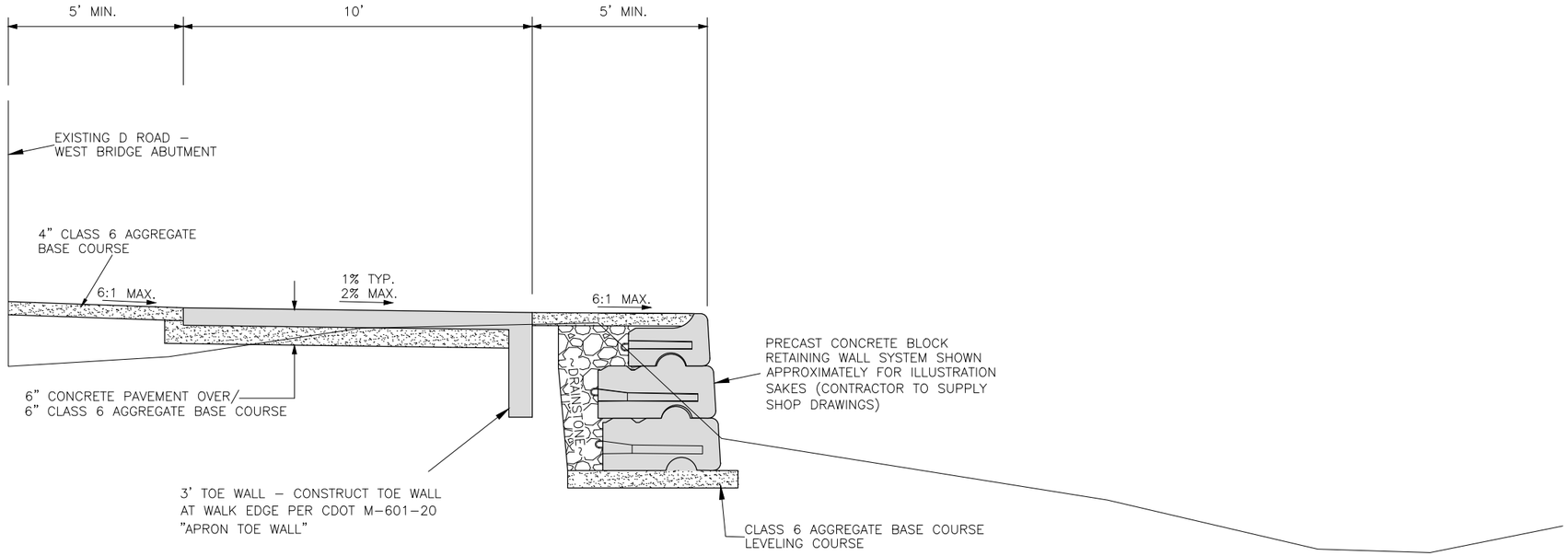
DRAWN BY JCS DATE 2019
DESIGNED BY JCS DATE 2019
CHECKED BY TCP DATE 2019
APPROVED BY TCP DATE 2019

SCALES:
PLAN & PROFILE
HORIZONTAL 0 1 2 4
VERTICAL 0 NA NA NA

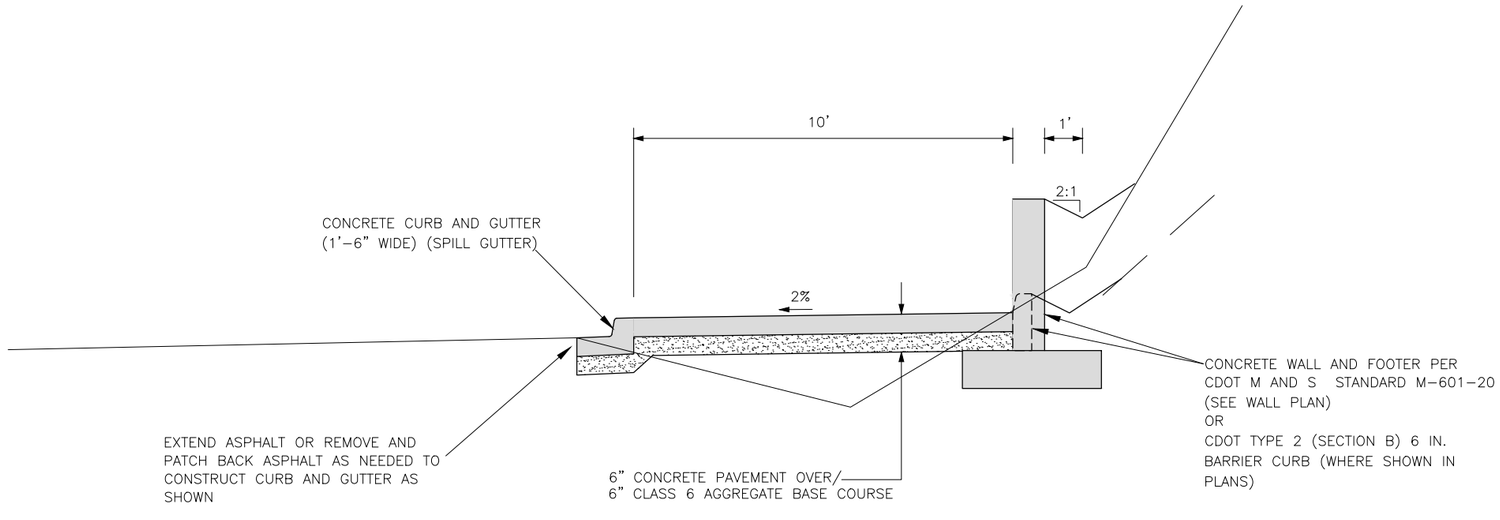
CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

PATH TYPICAL CROSS SECTIONS



TYPCAL CROSS SECTION
AT D ROAD CROSSING



TYPCAL CROSS SECTION
ATTACHED TO ROADWAY

DESCRIPTION	DATE
REVISION △	–
REVISION △	–
REVISION △	–
REVISION △	–

DRAWN BY JCS DATE 2019
DESIGNED BY JCS DATE 2019
CHECKED BY TCP DATE 2019
APPROVED BY TCP DATE 2019

SCALES:
PLAN & PROFILE
HORIZONTAL 0 1 2 4
VERTICAL 0 NA N/A NA

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

PATH TYPICAL CROSS SECTIONS

15

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DRAWN BY JCS DATE 2019
DESIGNED BY JCS DATE 2019
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SCALES:
PLAN & PROFILE
HORIZONTAL 0 150 300 600
VERTICAL 0 NA NA NA

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE KEY MAP

CONSTRUCT BIKE PATH PER TYPICAL CROSS SECTION

MATCH LINE

SEE LUNCH LOOP TRAILHEAD PLANS

DAYLIGHT LINE

3' CABLE

KID'S MEAL

SIGN

TRAIL SIGN

TRAIL SIGN

1+40.00
N 29464.42
E 79805.09
EL 5.52

1+70.00
N 29442.87
E 79823.61
EL 4.42

2+00.00
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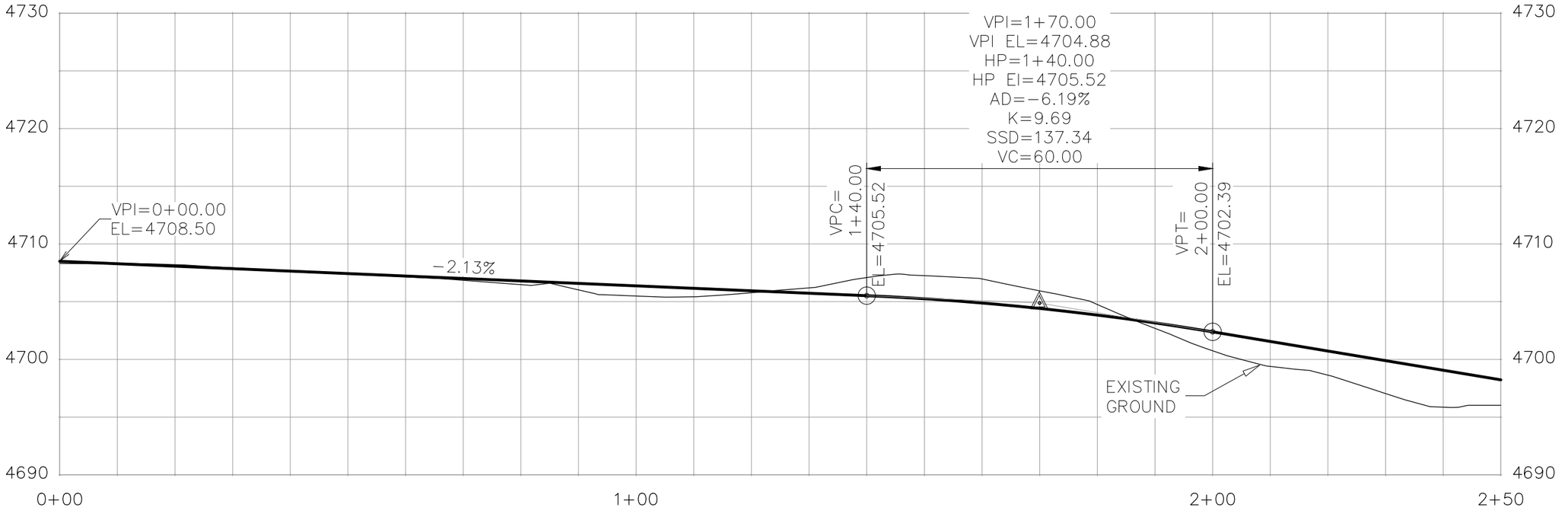
EL 2.39



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SCALES:
PLAN & PROFILE
HORIZONTAL 0 5 10 20
VERTICAL 0 2.5 5 10

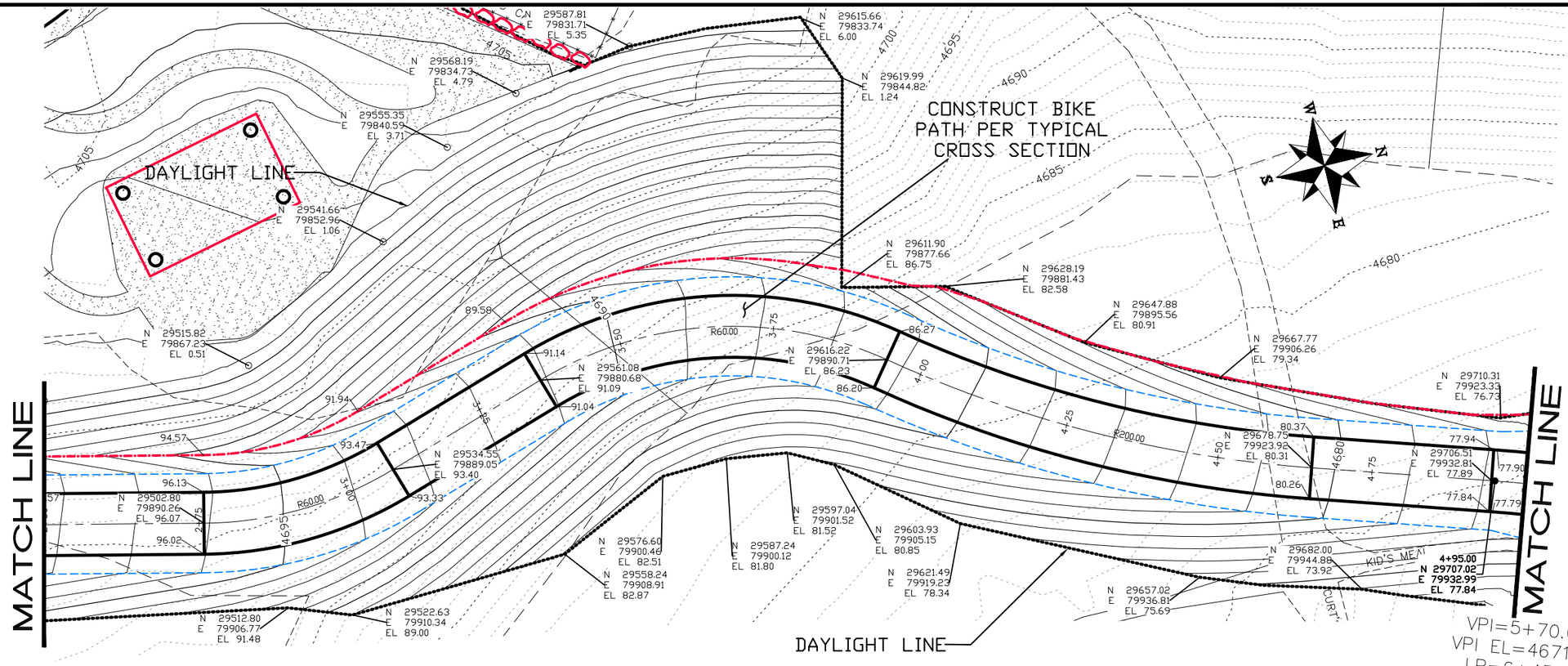
CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP01

17



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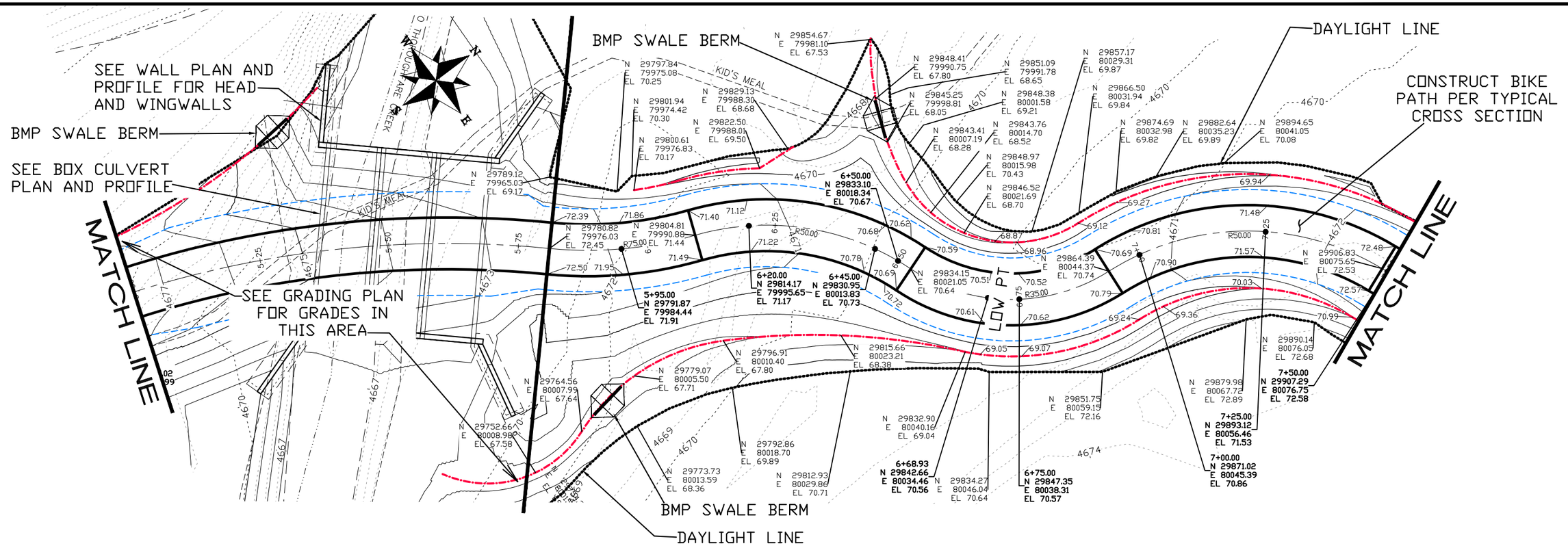
SCALES:
PLAN & PROFILE
HORIZONTAL 0 5 10 20
VERTICAL 0 2.5 5 10

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP02



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SCALES:
PLAN & PROFILE
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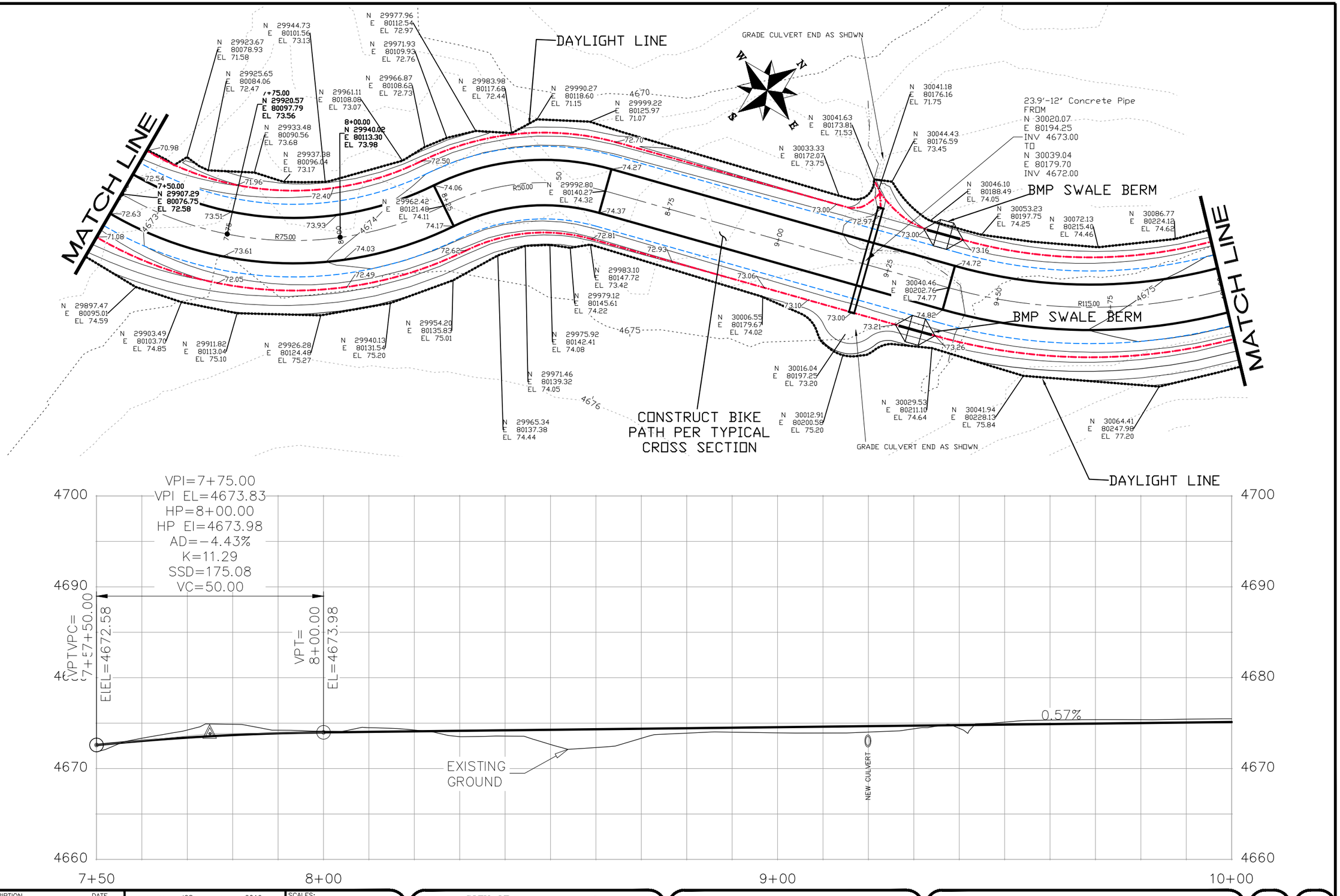
VERTICAL 0 2.5 5 10

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP03



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CITY OF Grand Junction COLORADO

PUBLIC WORKS
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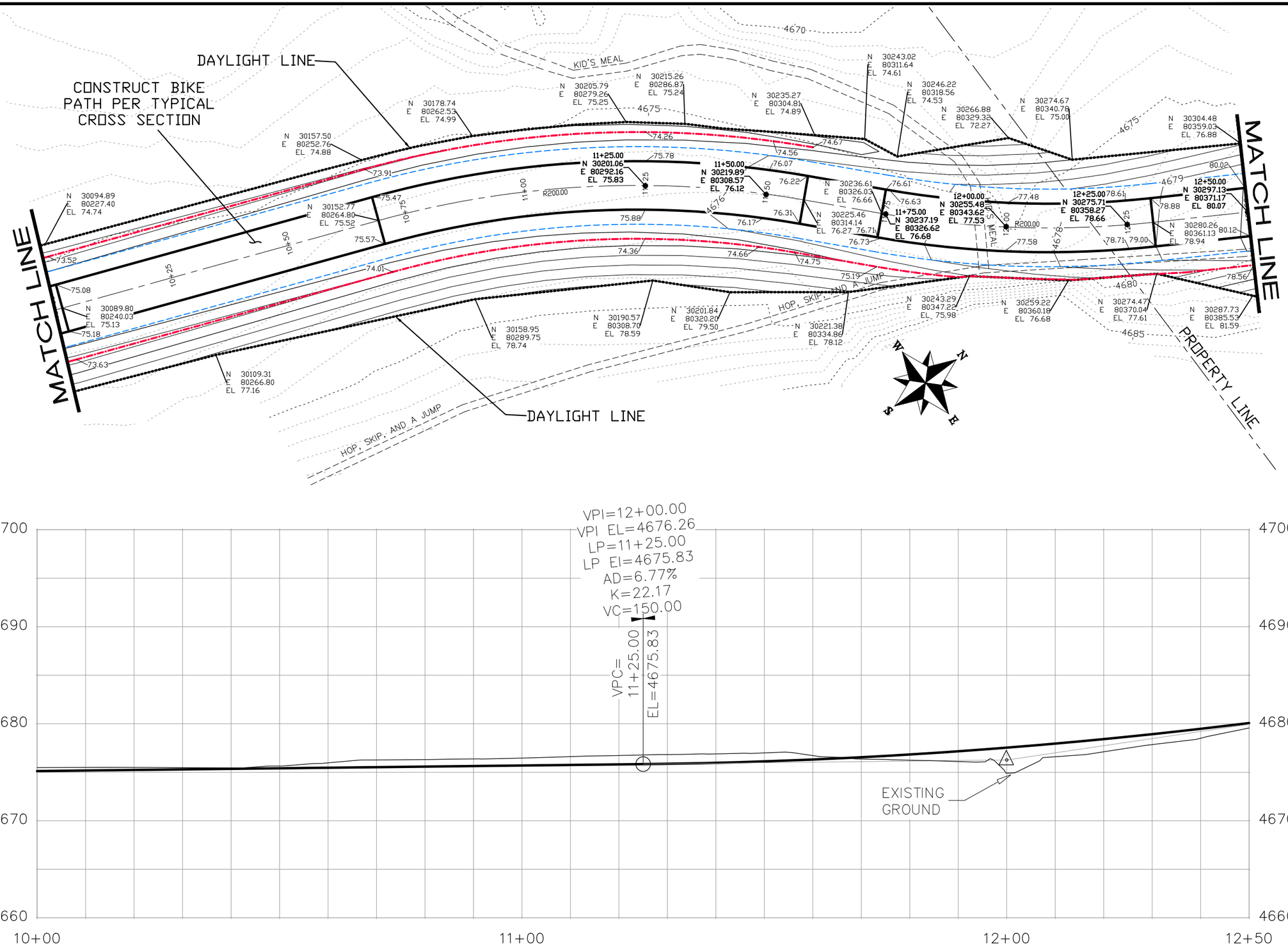
MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP04



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APPROVED BY	TCP	DATE	2019

SCALES:
PLAN & PROFILE
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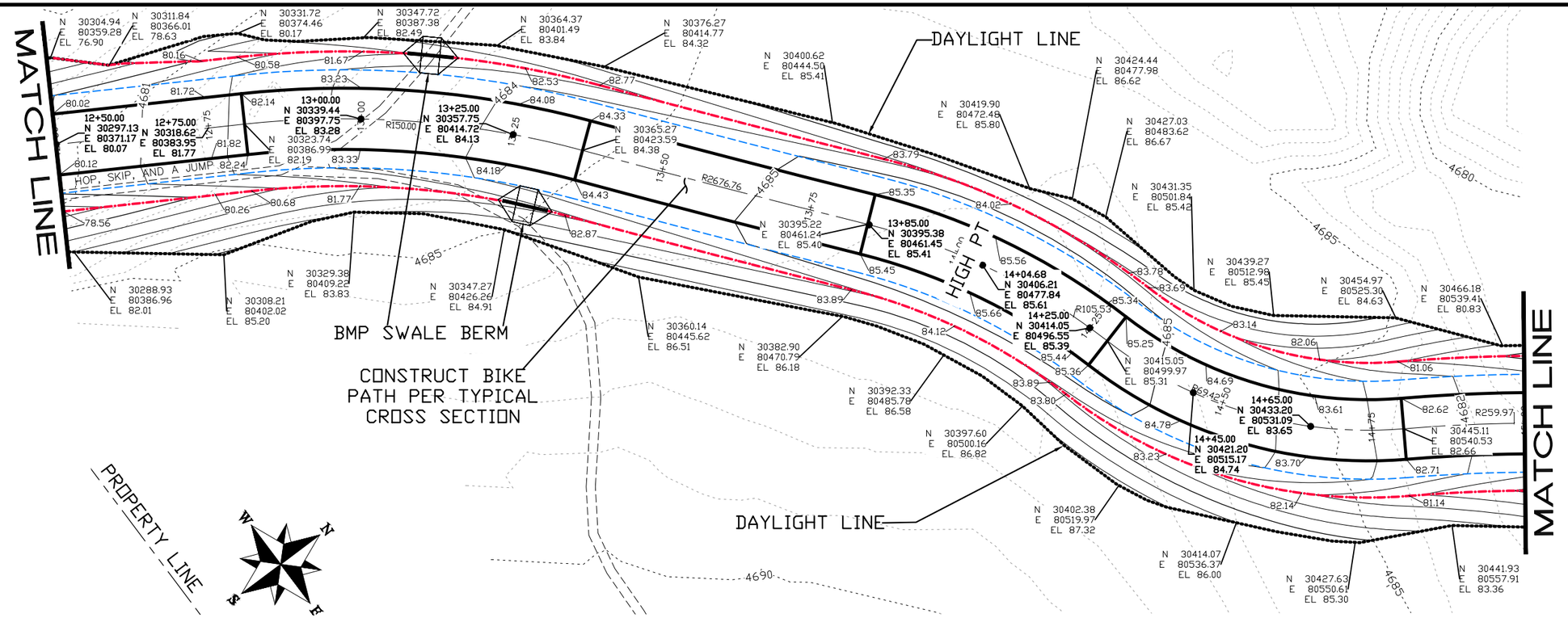
VERTICAL 0 2.5 5 10

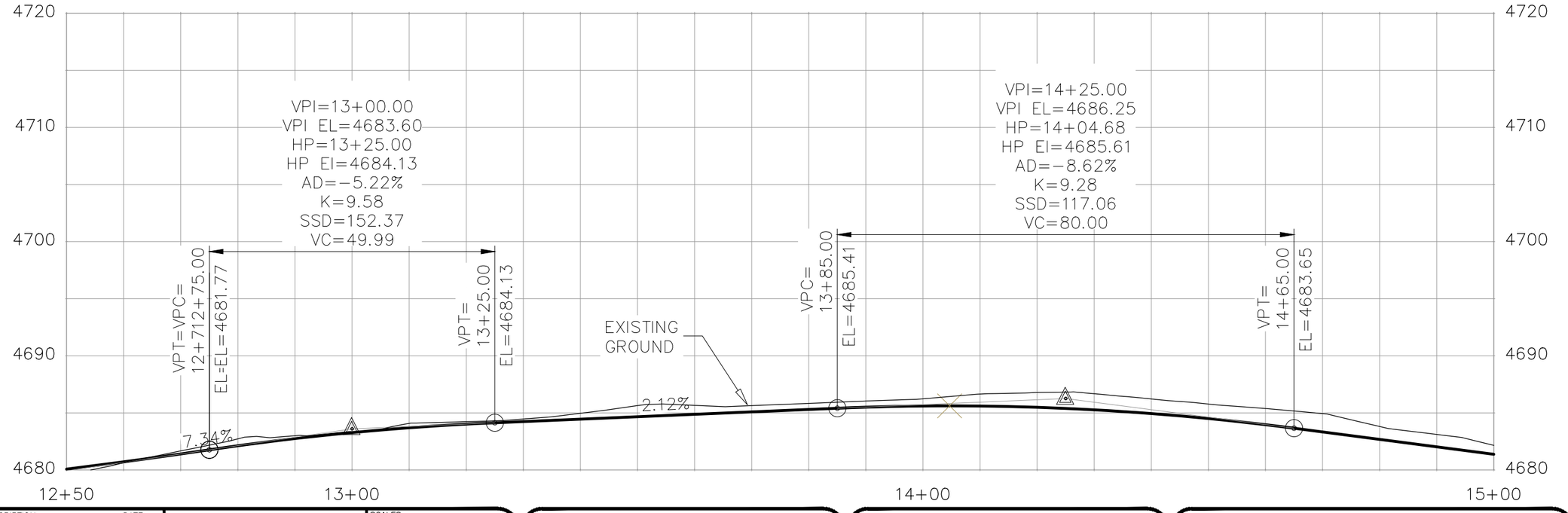
CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP05





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CITY OF Grand Junction COLORADO

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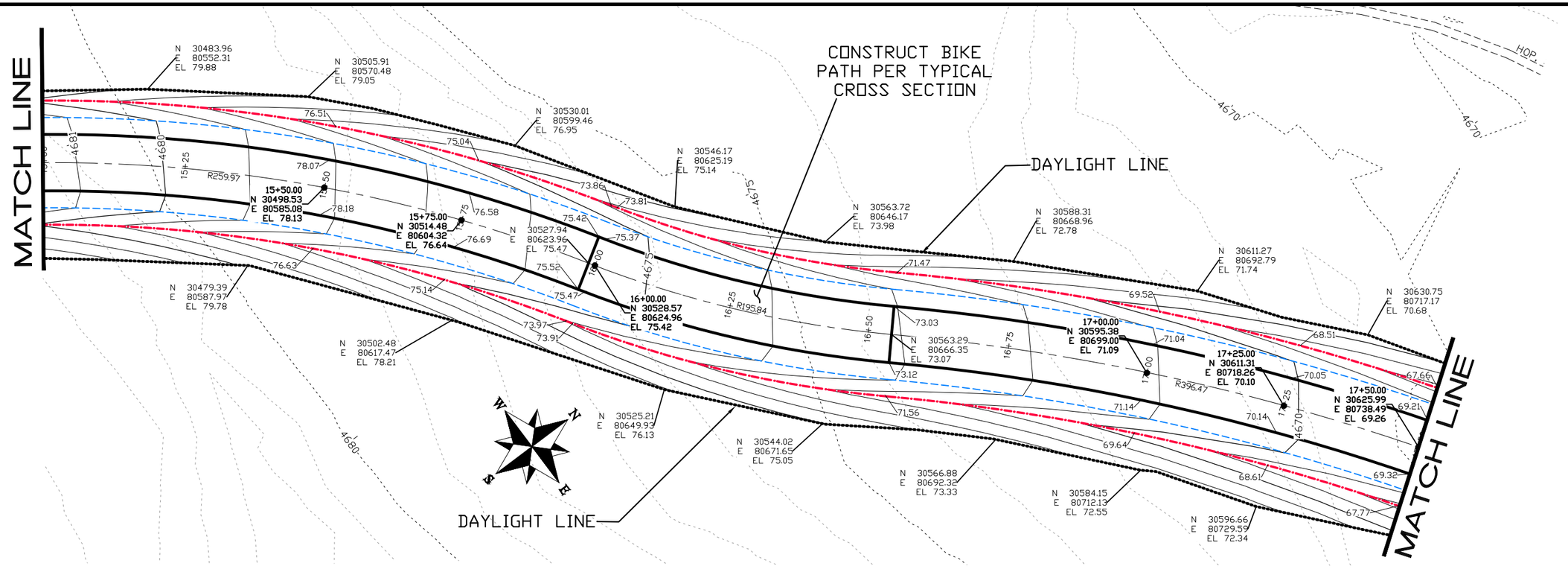
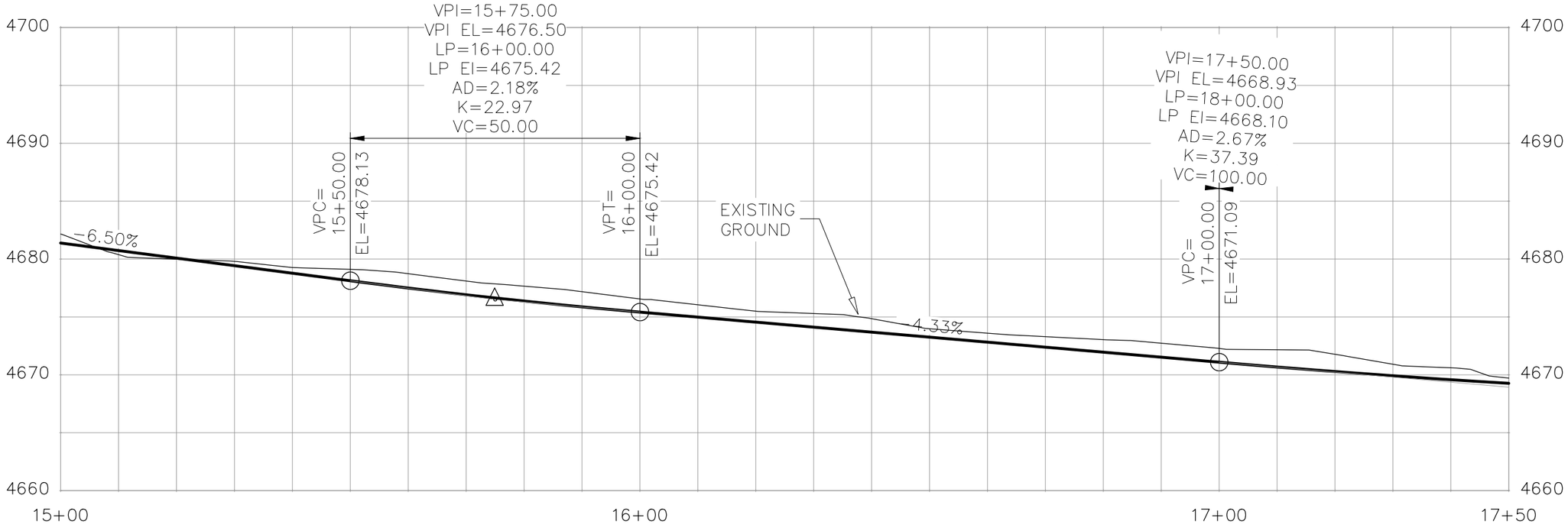
MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP06





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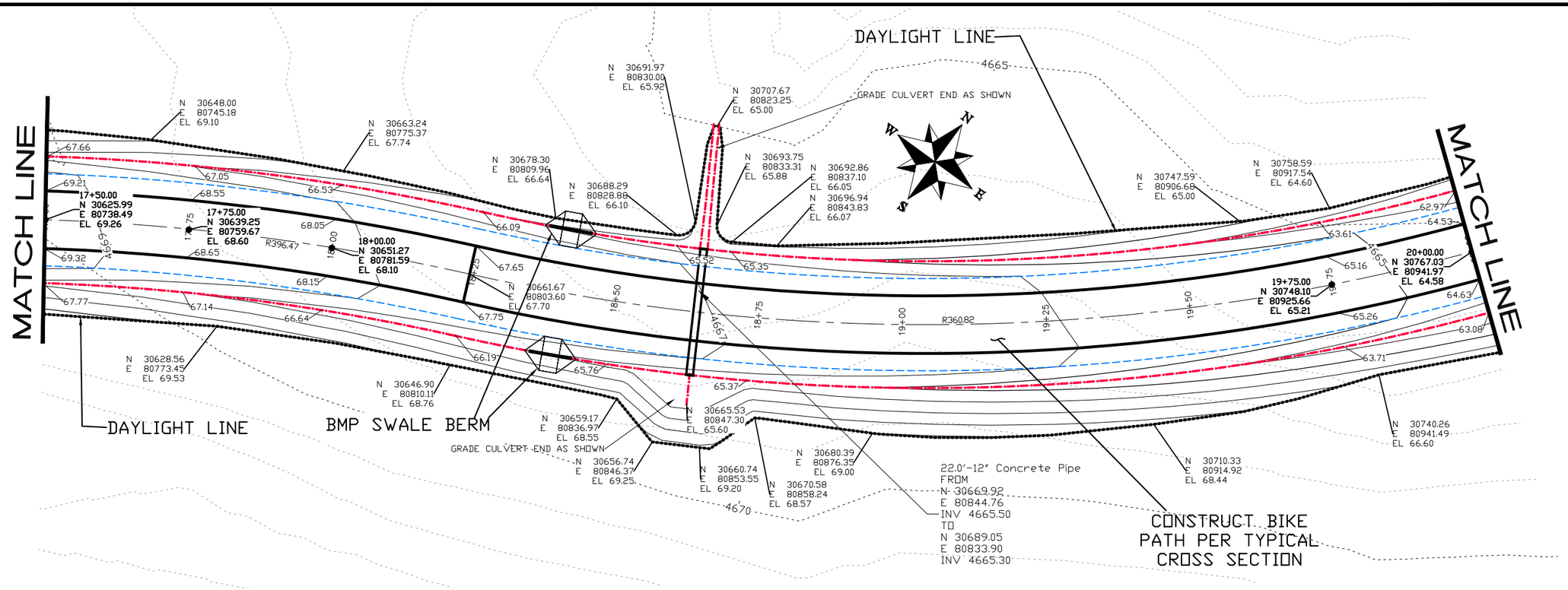
SCALES: PLAN & PROFILE HORIZONTAL 0 5 10 20 VERTICAL 0 2.5 5 10

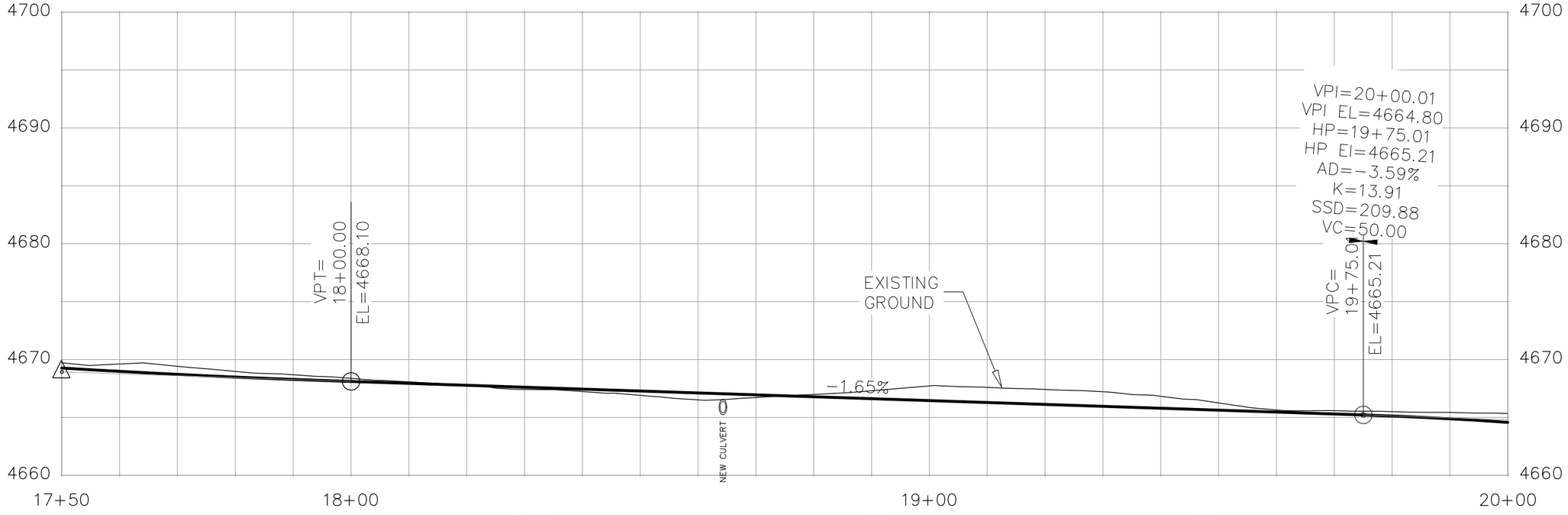
CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP07





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CITY OF Grand Junction COLORADO

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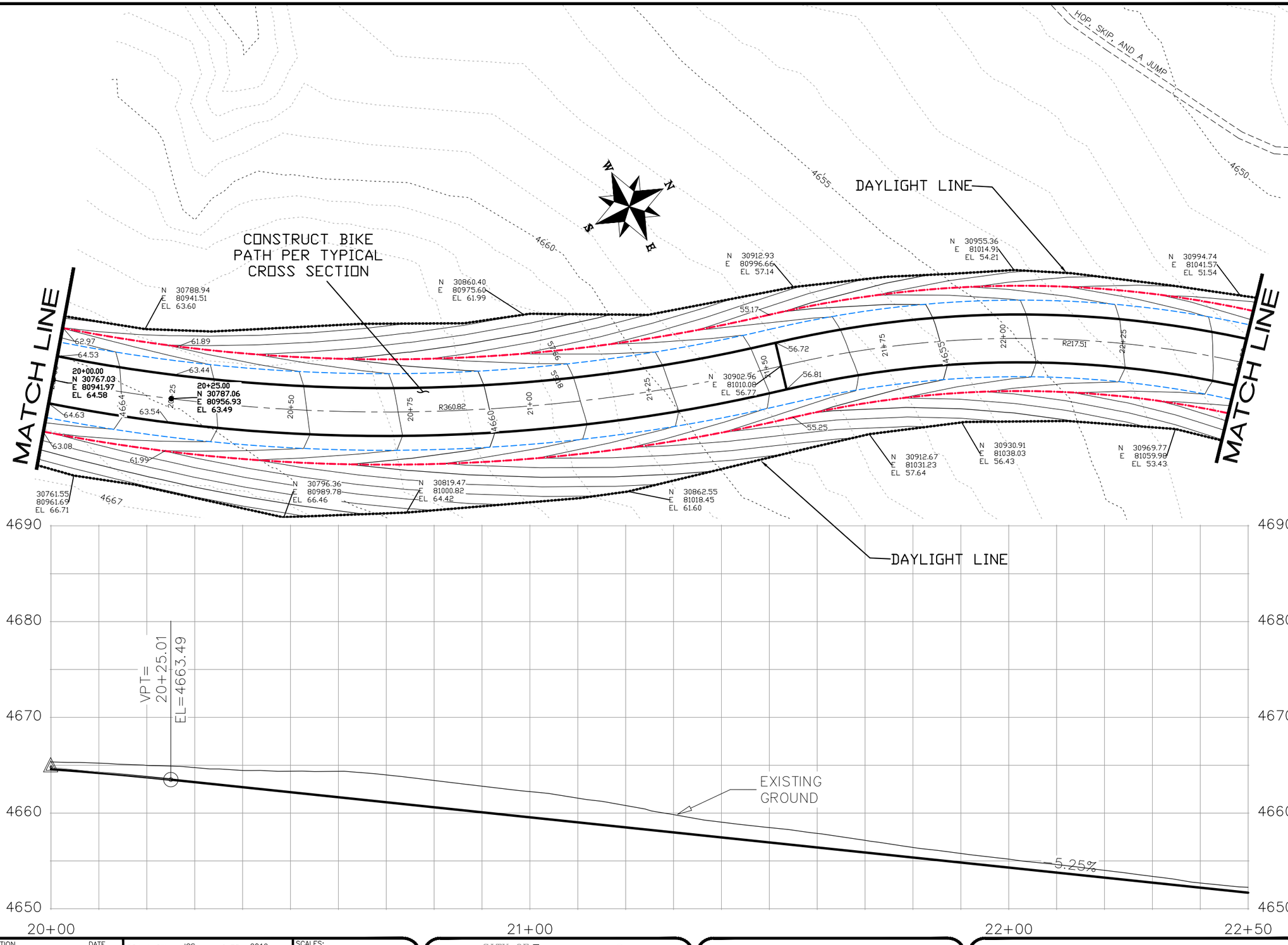
MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP08



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DRAWN BY JCS DATE 2019
DESIGNED BY JCS DATE 2019
CHECKED BY KA DATE 2019
APPROVED BY TCP DATE 2019

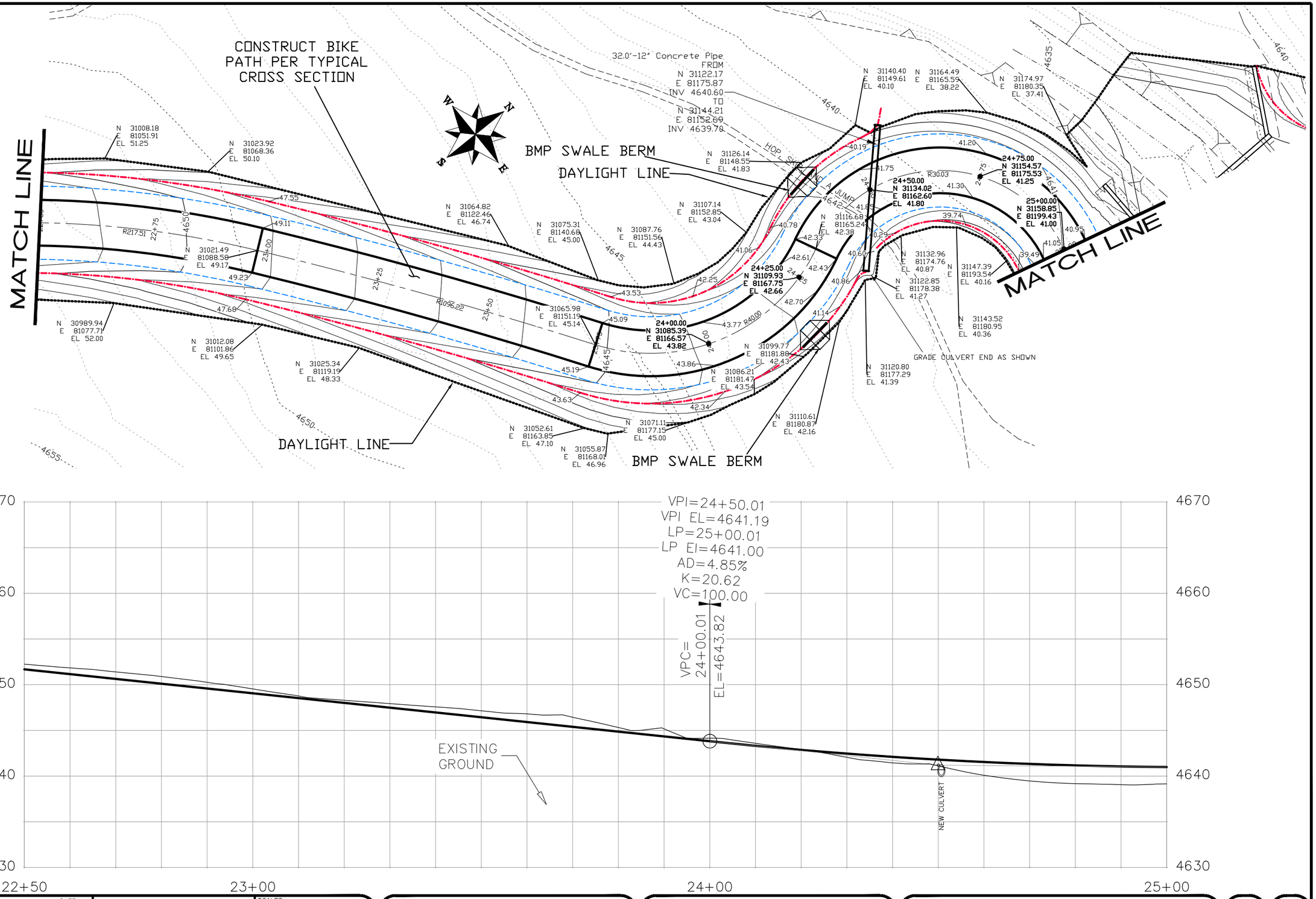
SCALES:
PLAN & PROFILE
HORIZONTAL 0 5 10 20
VERTICAL 0 2.5 5 10

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP09



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SCALES: PLAN & PROFILE
HORIZONTAL 0 5 10 20
VERTICAL 0 2.5 5 10

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP10

26

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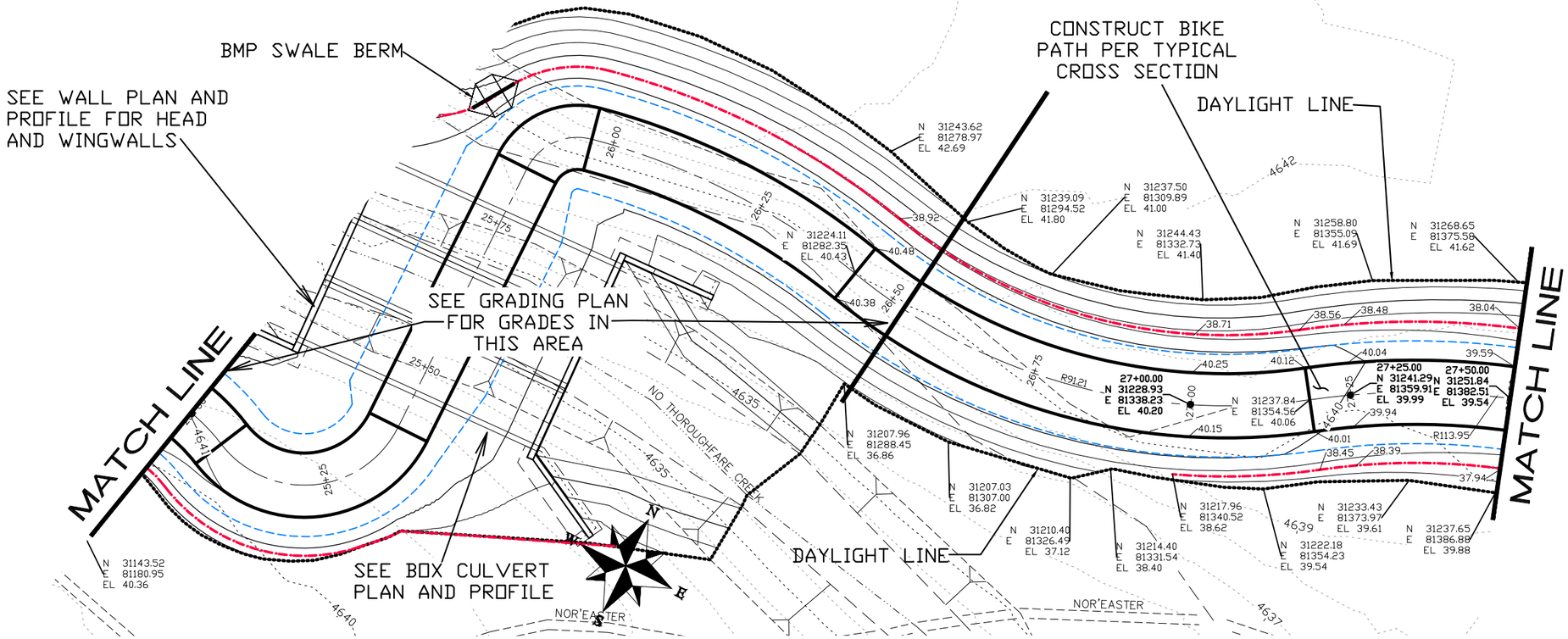

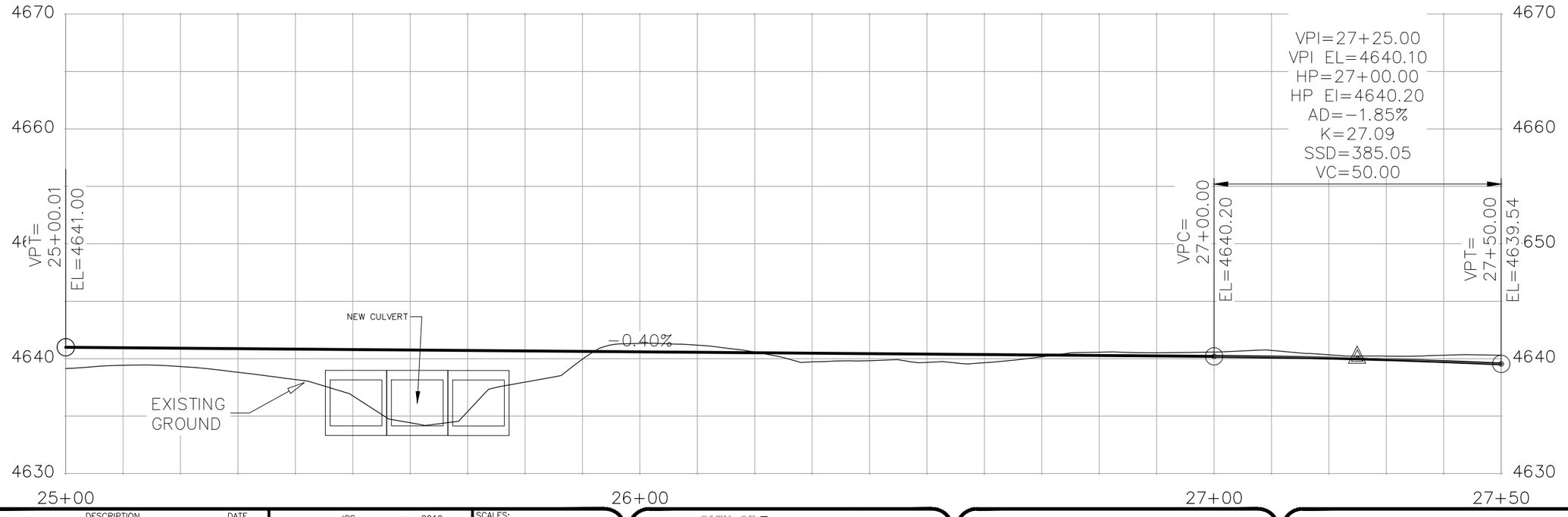

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PLAN & PROFILE
HORIZONTAL 0 5 10 20
VERTICAL 0 2.5 5 10

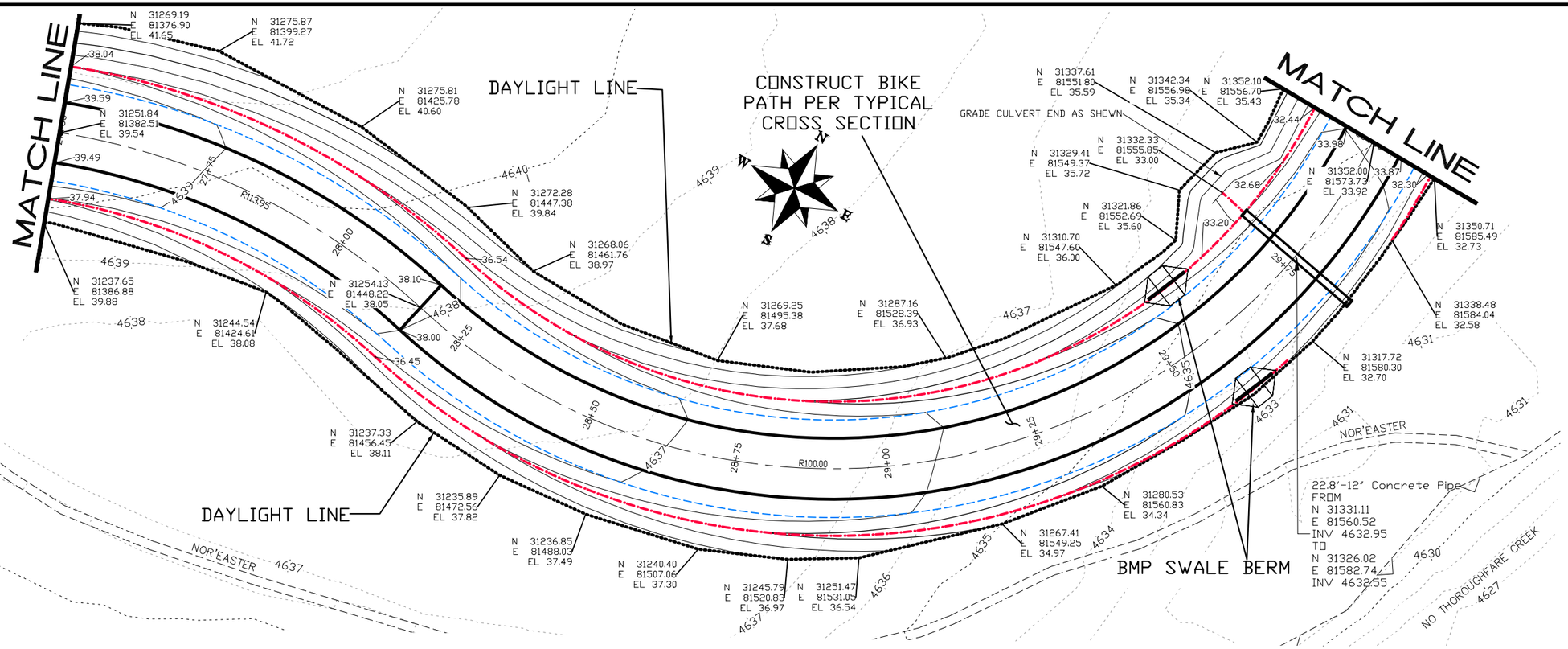
CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP11

27



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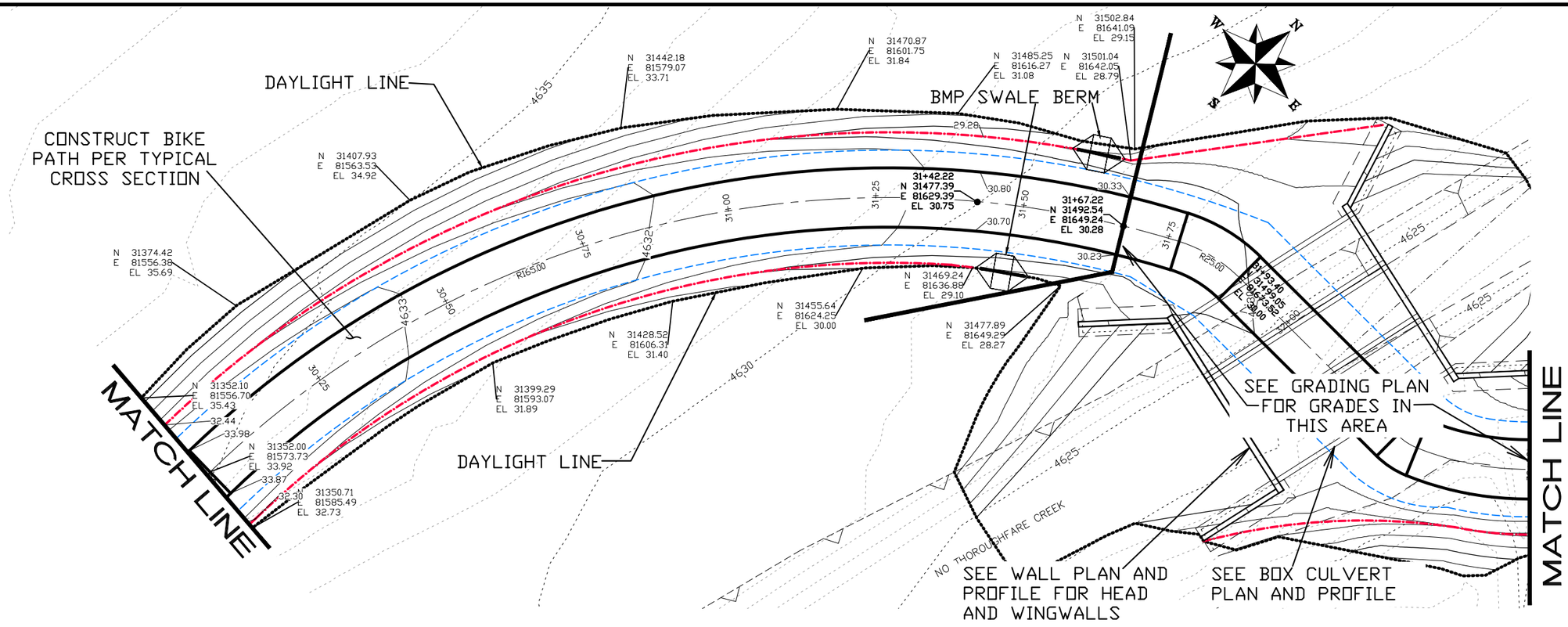
VERTICAL 0 2.5 5 10

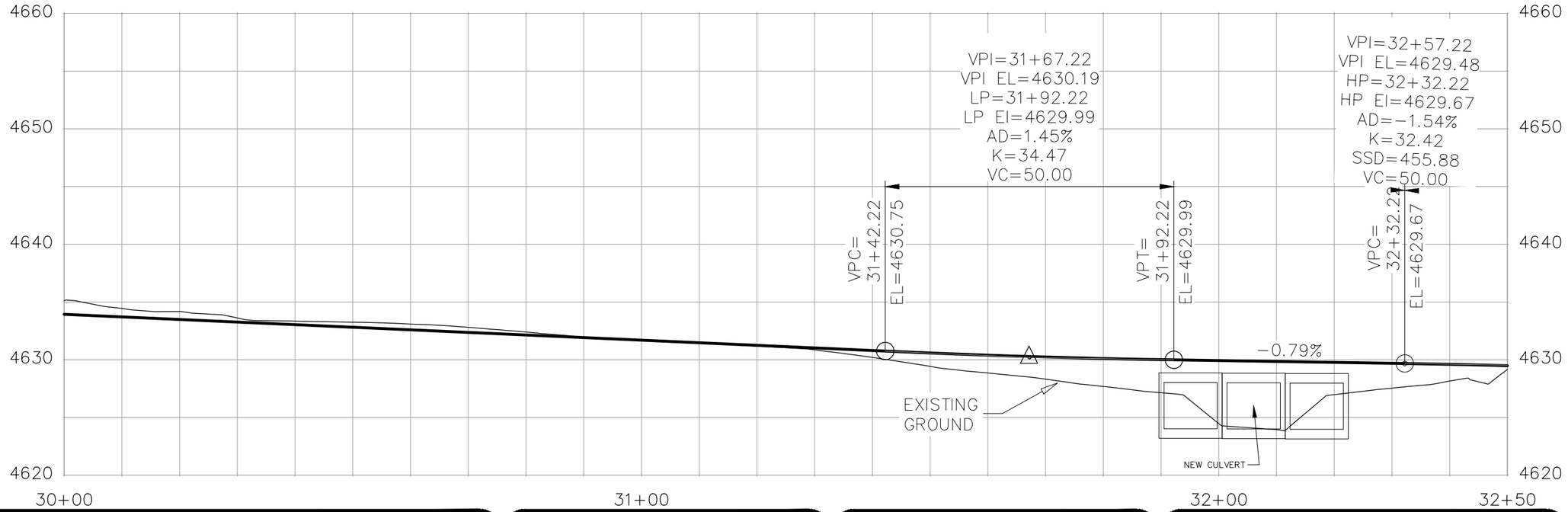
CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP12





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SCALES: PLAN & PROFILE HORIZONTAL 0 5 10 20 VERTICAL 0 2.5 5 10

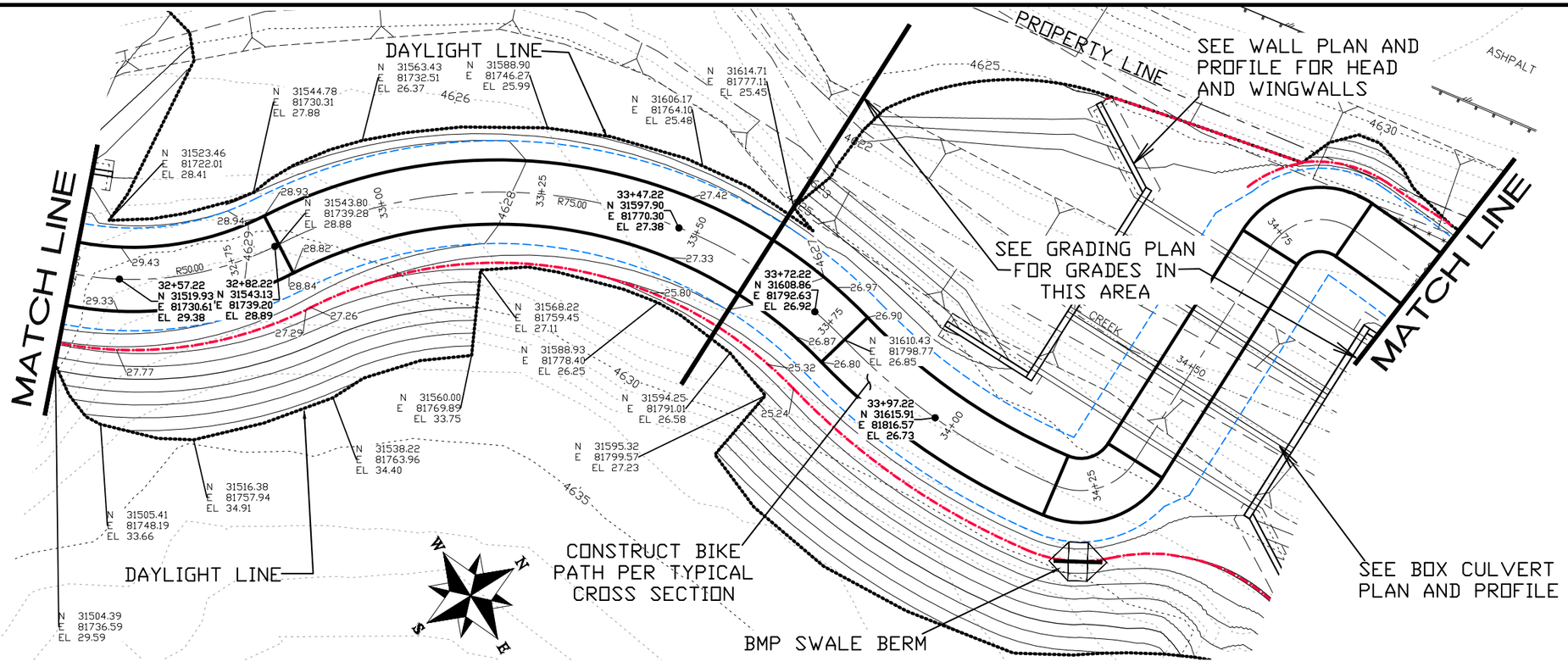
CITY OF Grand Junction COLORADO

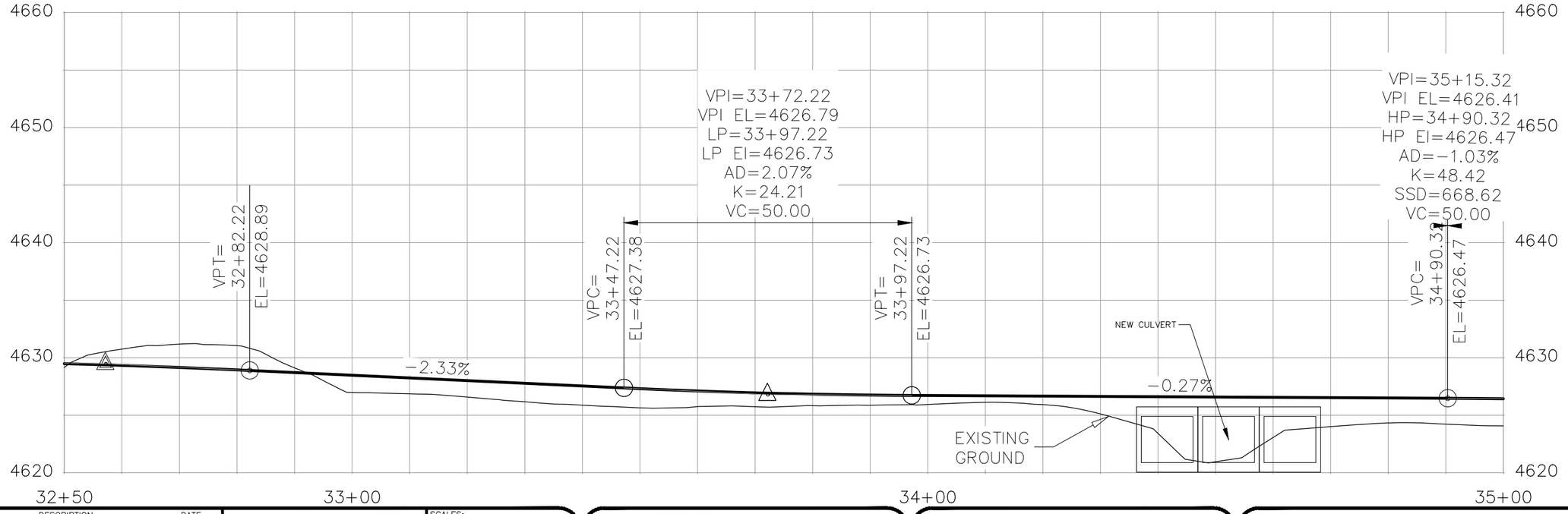
PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP13

29





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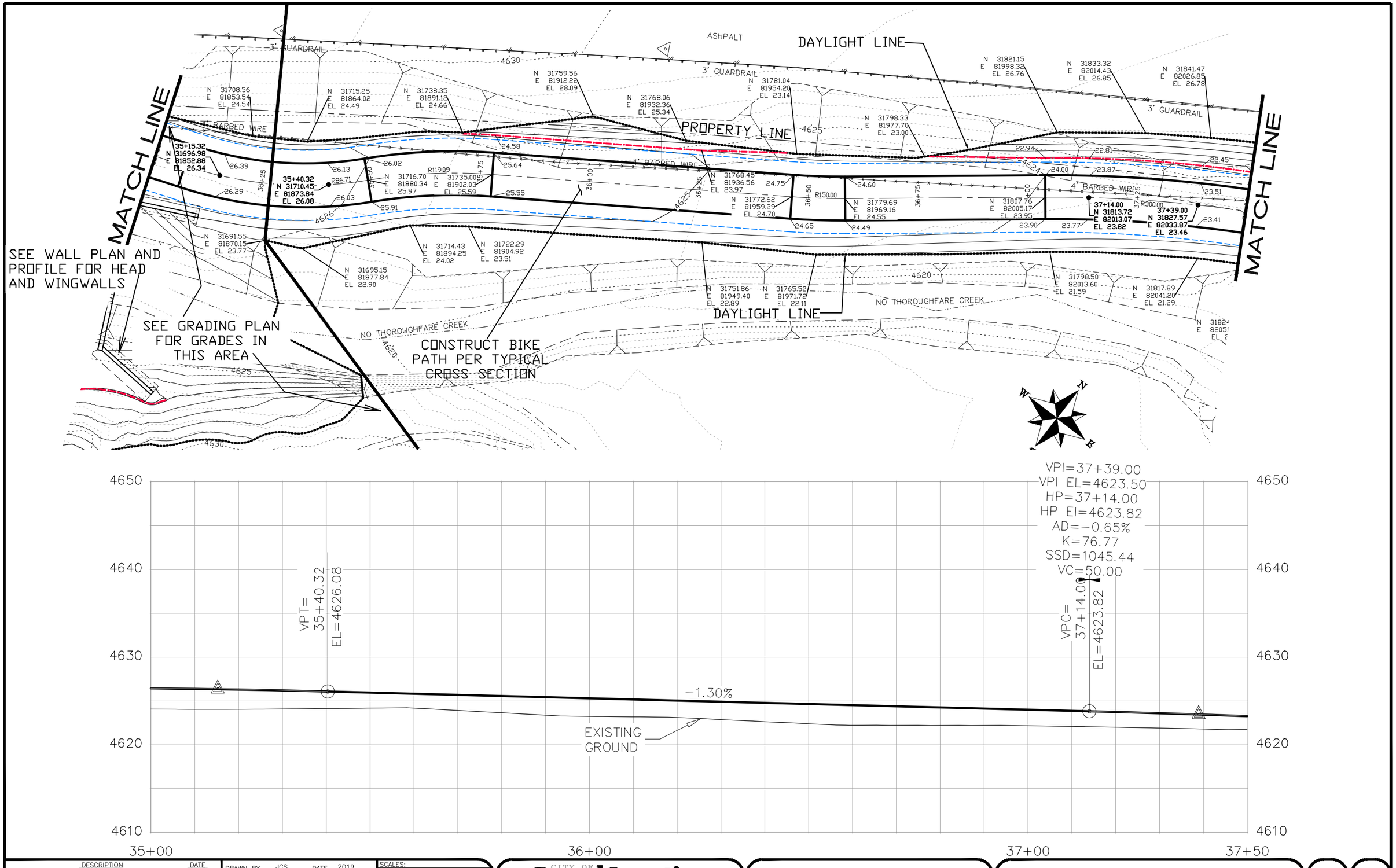
CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP14

30



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VERTICAL 0 2.5 5 10

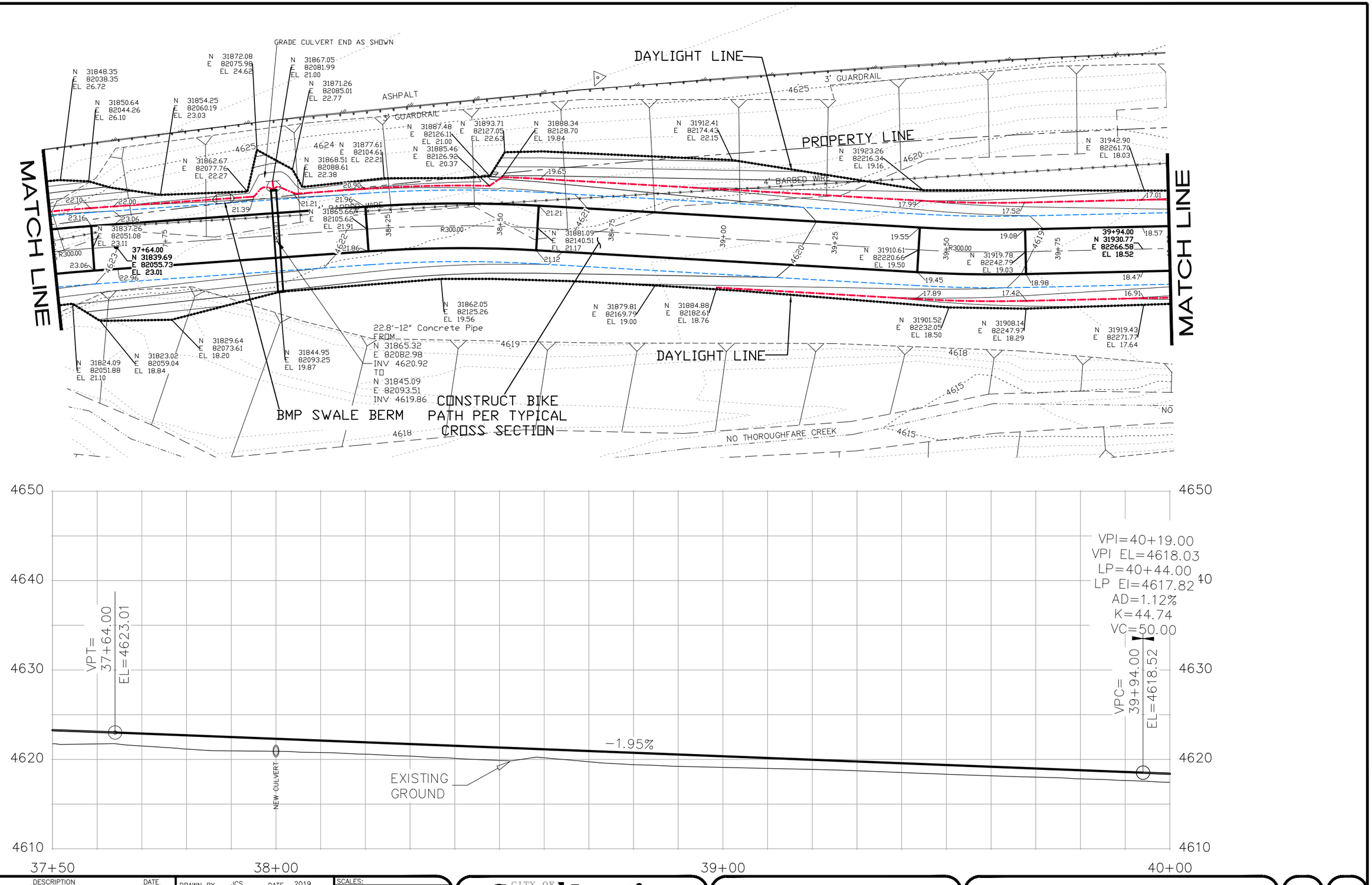
CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP15

31



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PLAN & PROFILE
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CITY OF Grand Junction COLORADO

PUBLIC WORKS
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PLAN AND PROFILE

PP16

32

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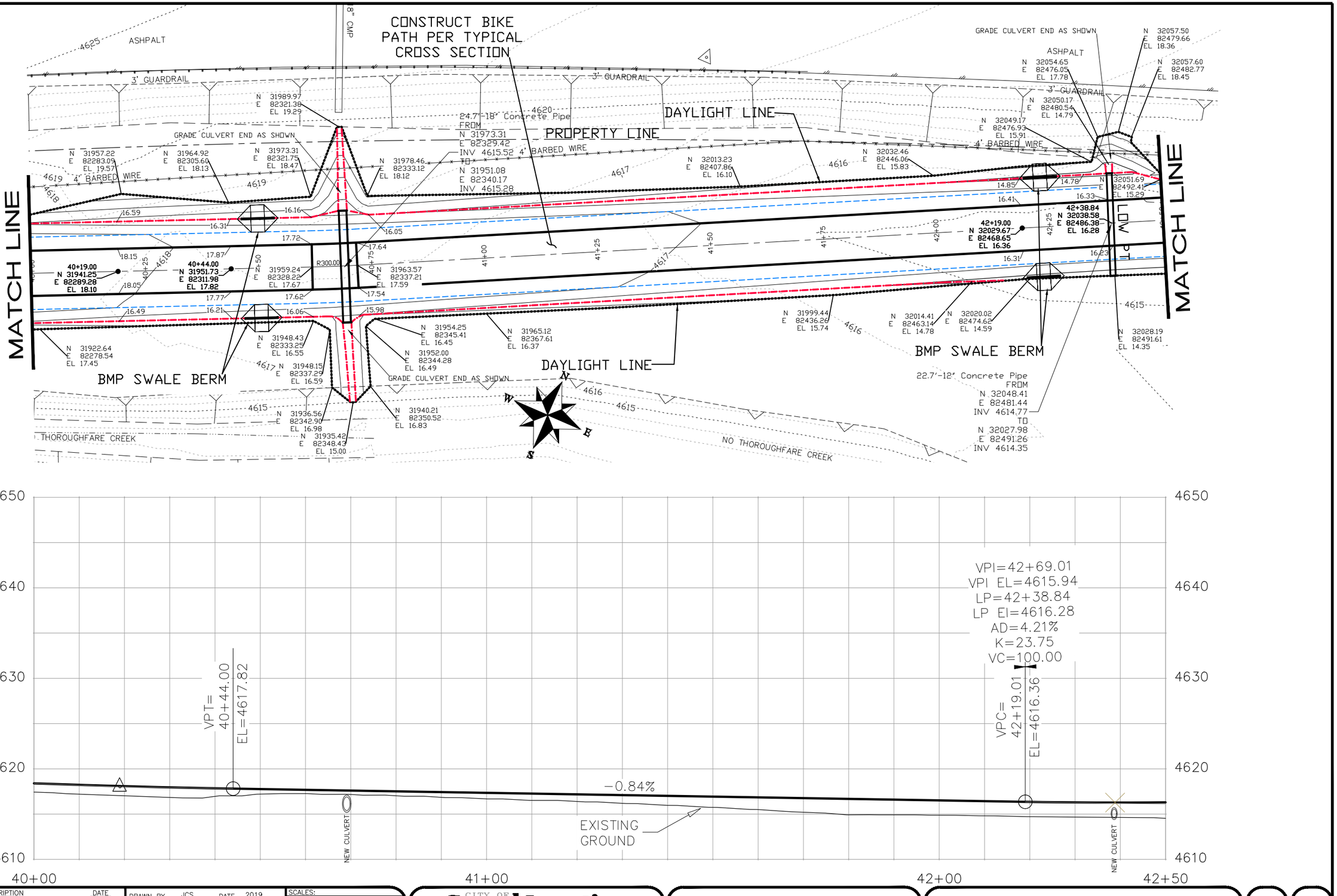

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APPROVED BY TCP DATE 2019

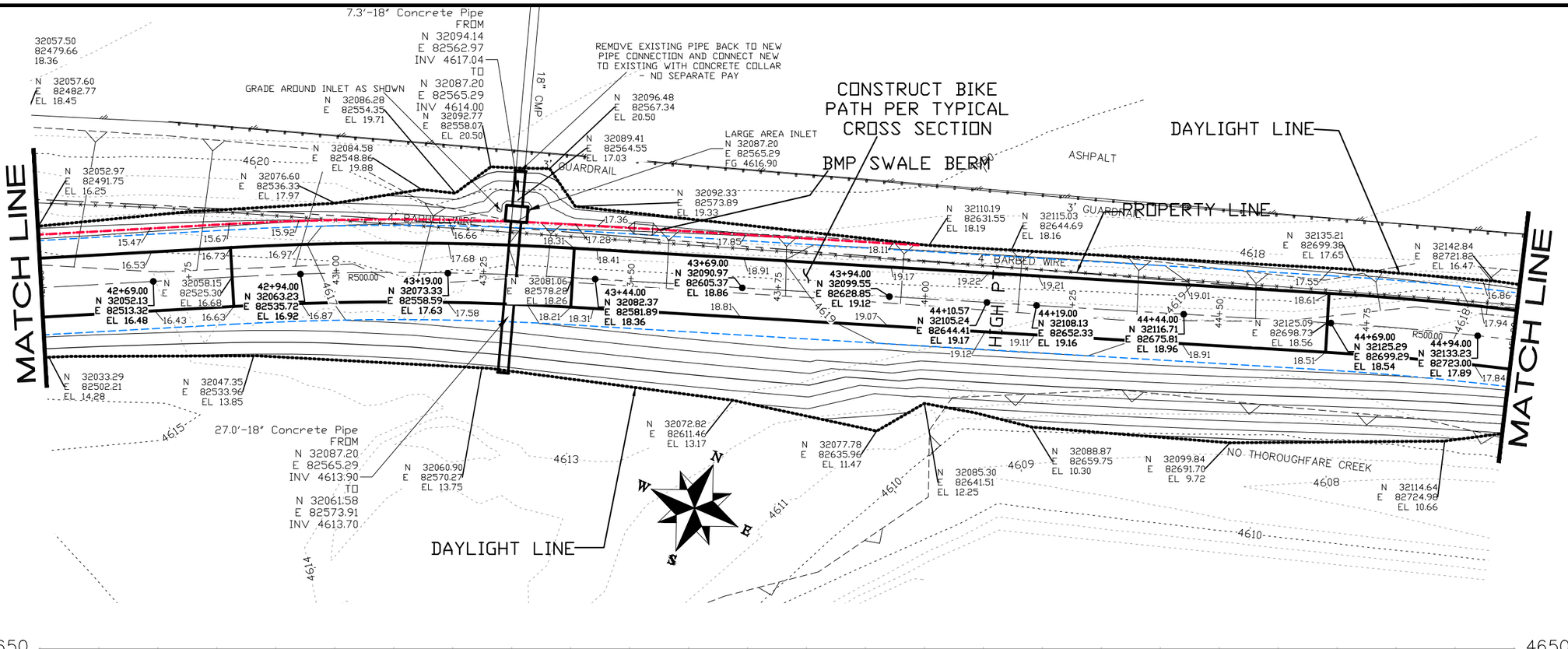
SCALES: PLAN & PROFILE HORIZONTAL 0 5 10 20 VERTICAL 0 2.5 5 10

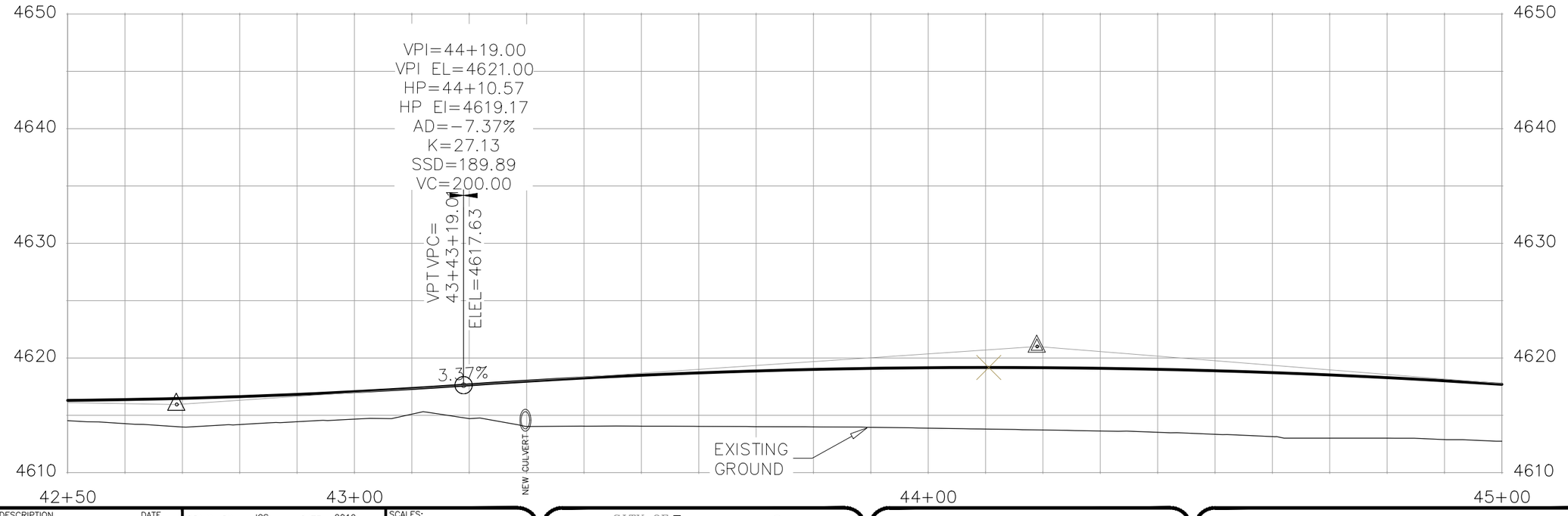
CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP17





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PLAN & PROFILE
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VERTICAL 0 2.5 5 10

CITY OF Grand Junction COLORADO

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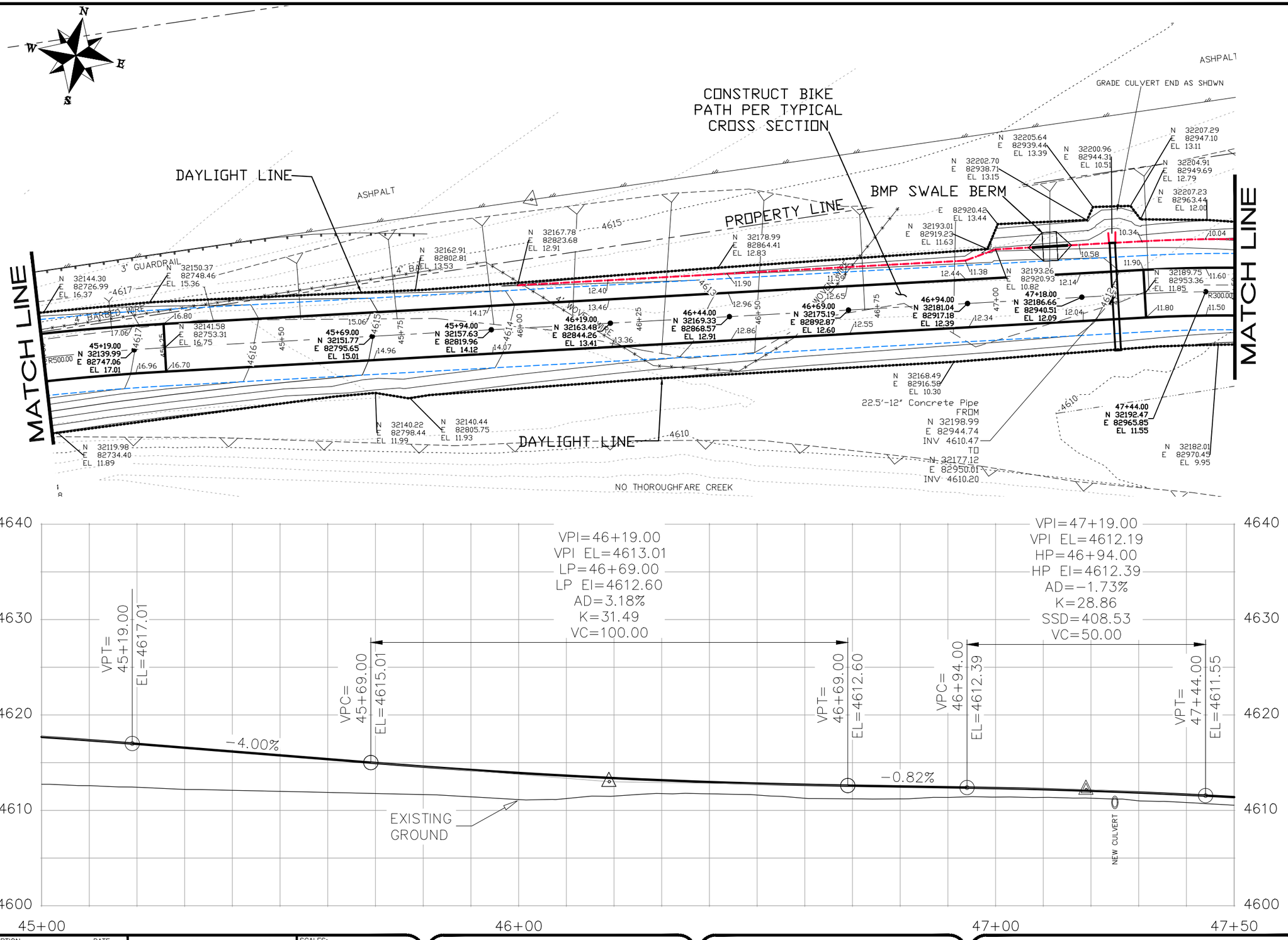
MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP18



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SCALES: PLAN & PROFILE HORIZONTAL 0 5 10 20 VERTICAL 0 2.5 5 10

CITY OF Grand Junction COLORADO

PUBLIC WORKS
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MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP19

35

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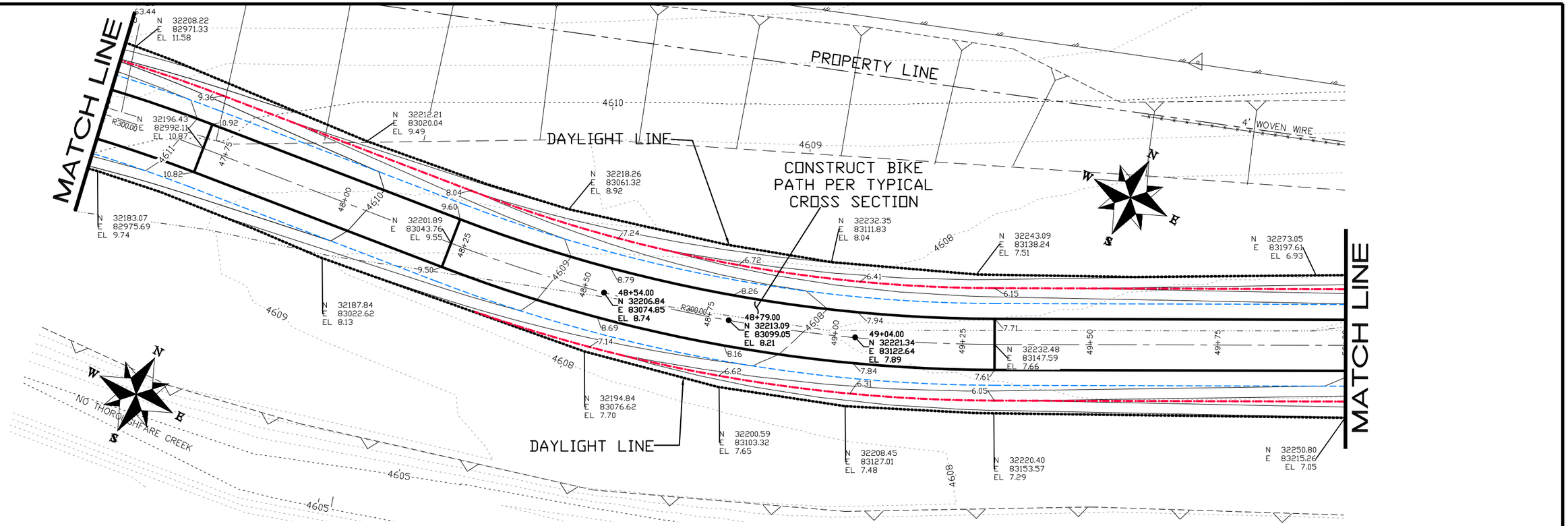

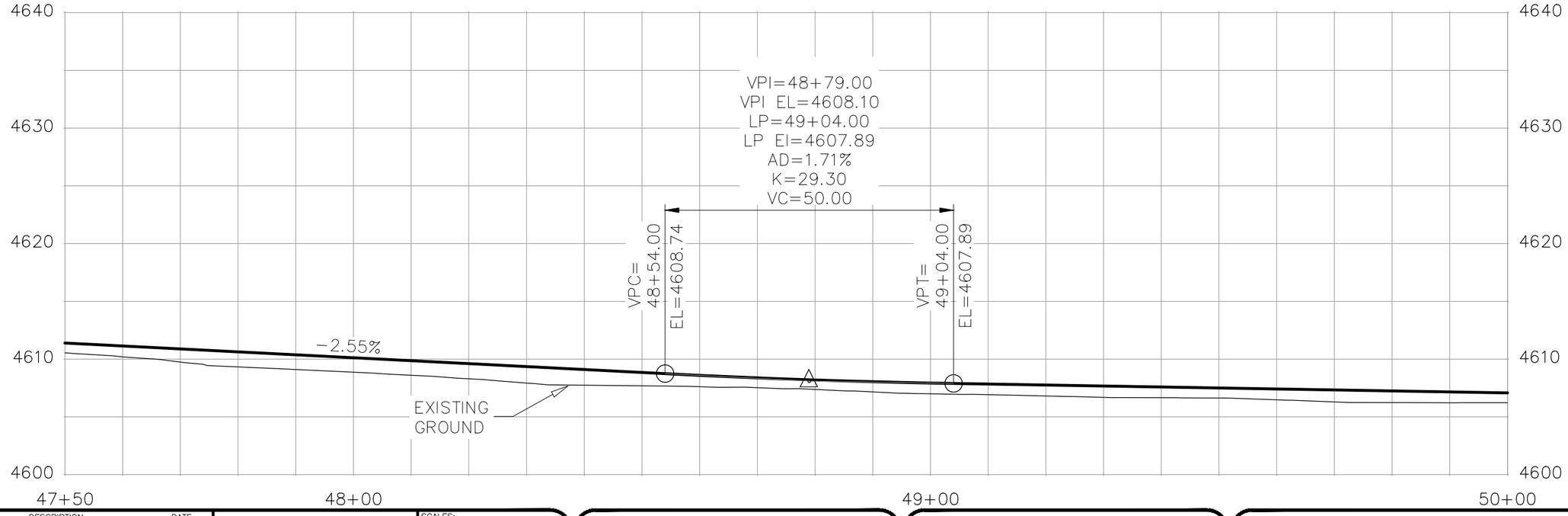

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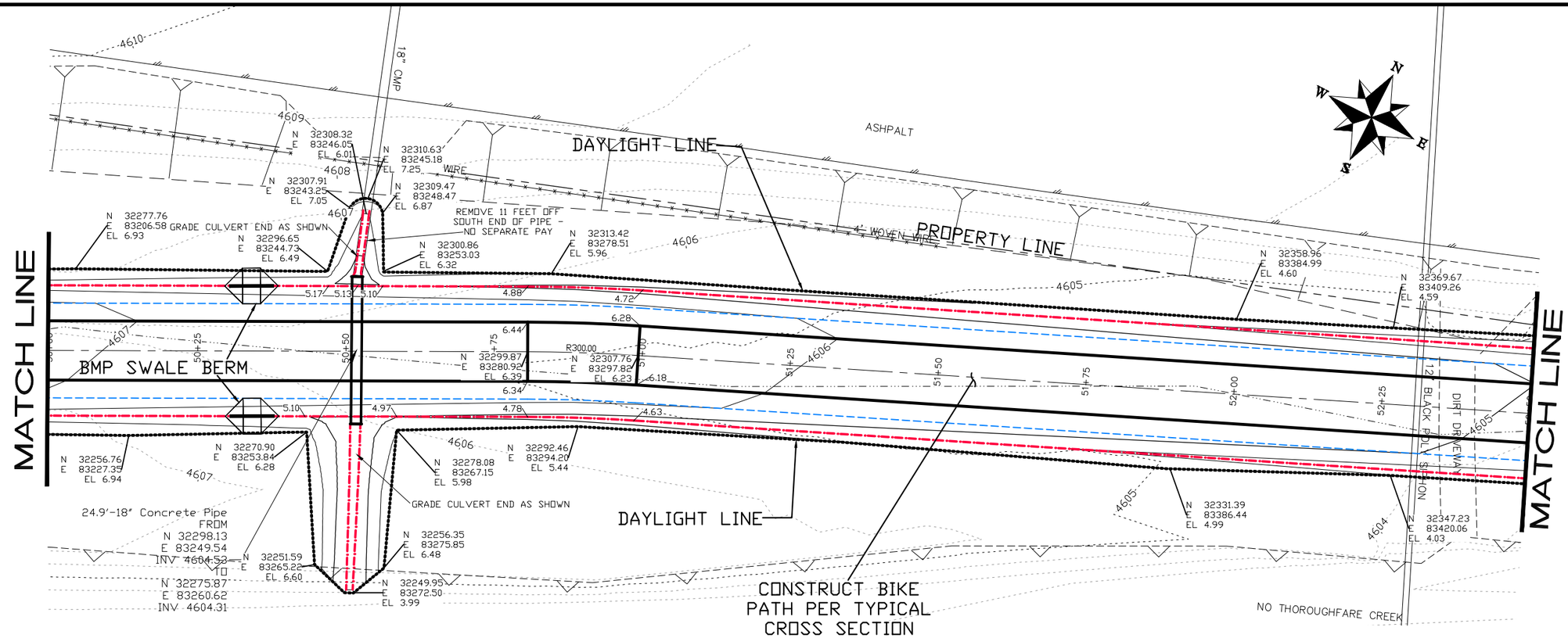
SCALES: PLAN & PROFILE HORIZONTAL 0 5 10 20 VERTICAL 0 2.5 5 10

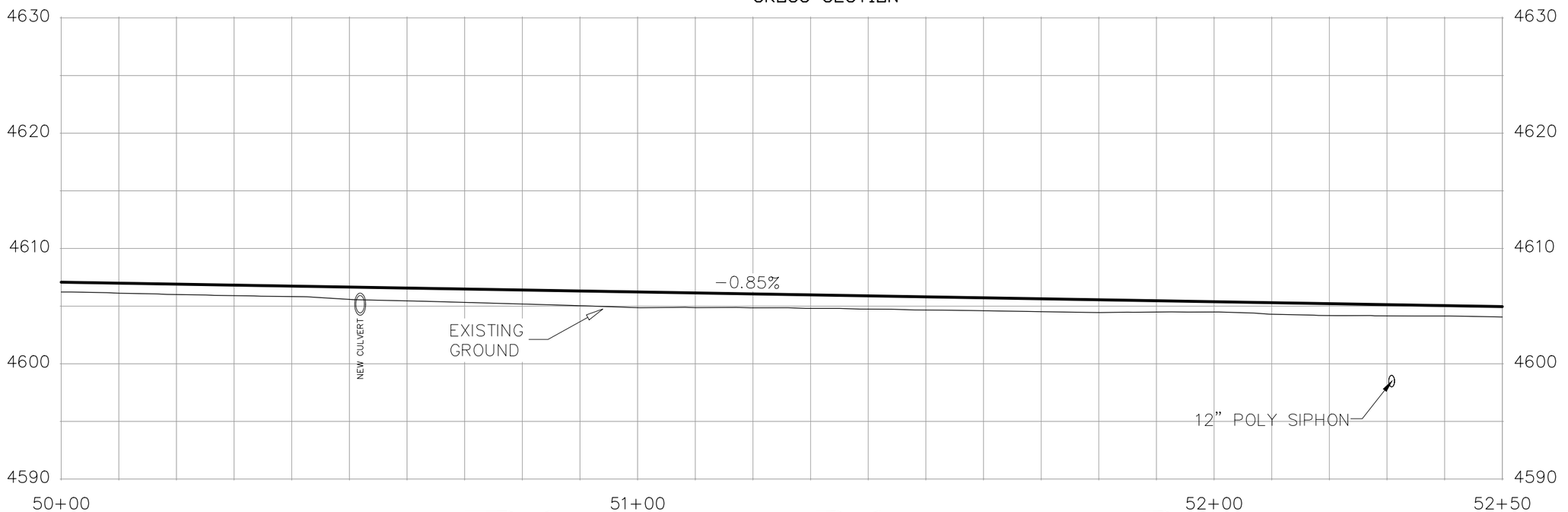
CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP20





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CHECKED BY KA DATE 2019
APPROVED BY TCP DATE 2019

SCALES: PLAN & PROFILE HORIZONTAL 0 5 10 20 VERTICAL 0 2.5 5 10

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP21

37

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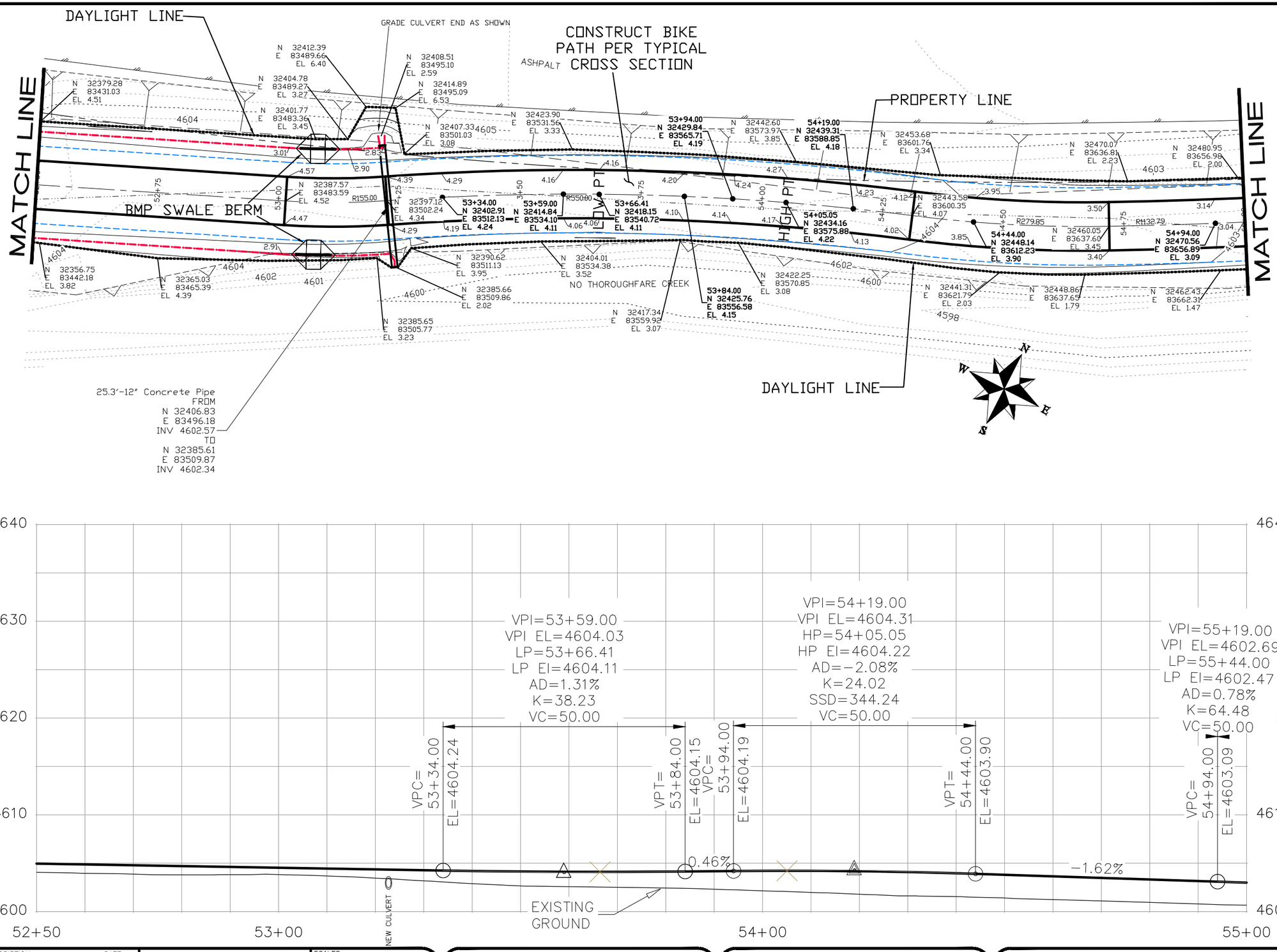

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APPROVED BY TCP DATE 2019

SCALES:
PLAN & PROFILE
HORIZONTAL 0 5 10 20
VERTICAL 0 2.5 5 10

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP22

38

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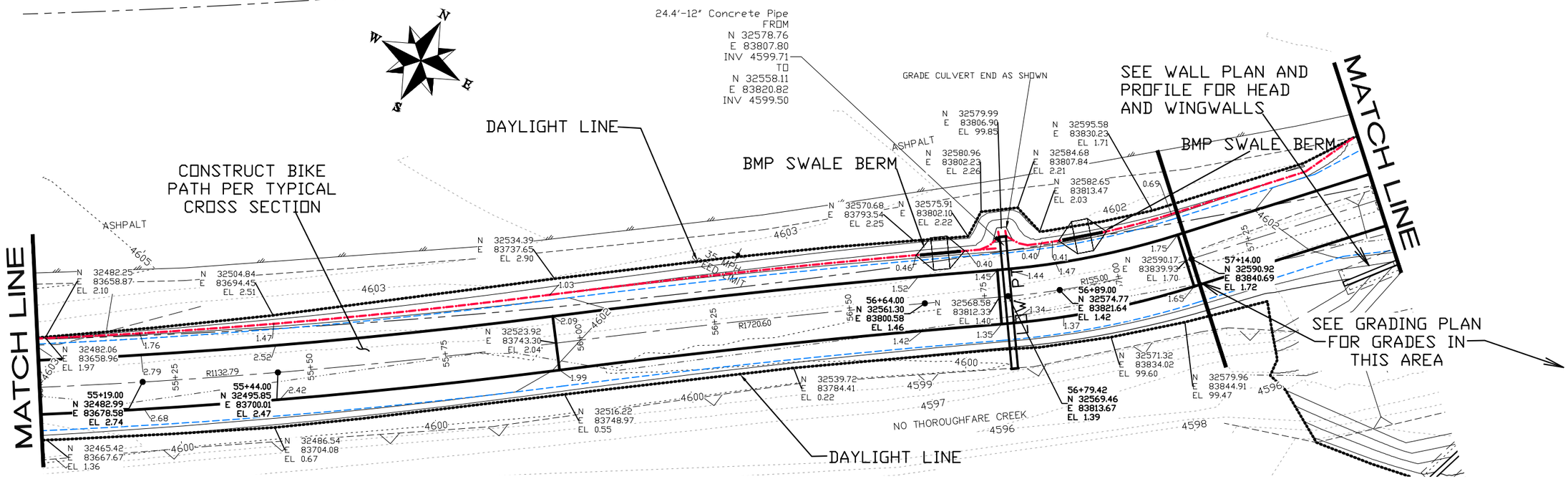

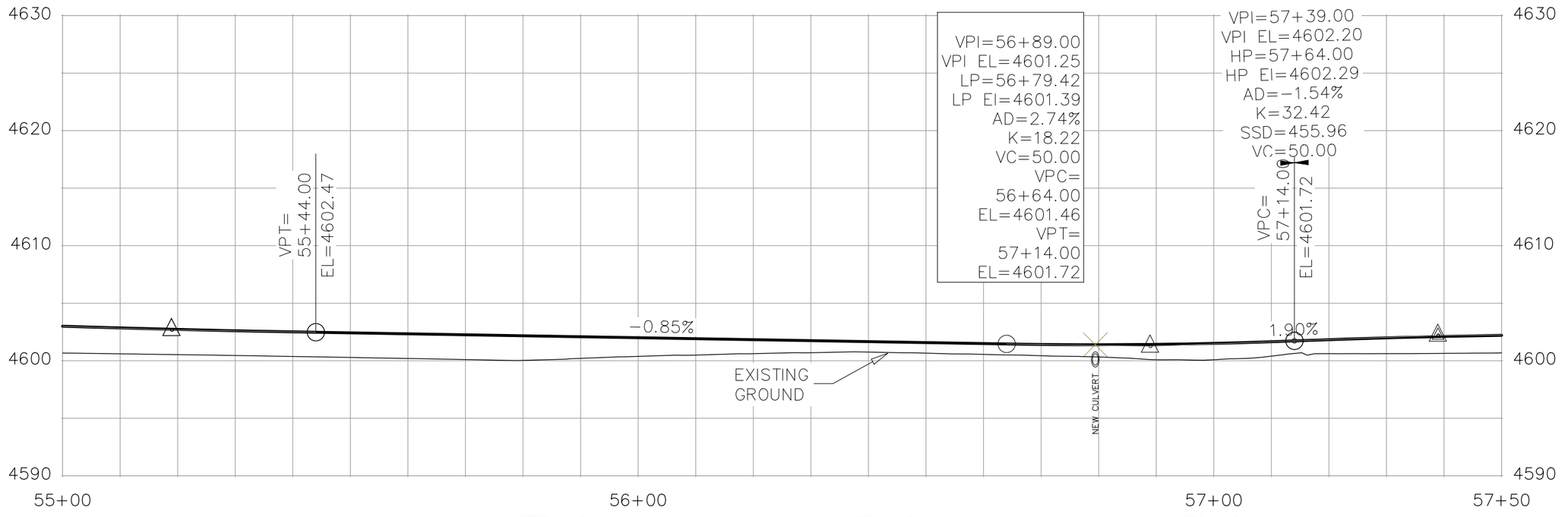

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SCALES:
PLAN & PROFILE
HORIZONTAL 0 5 10 20
VERTICAL 0 2.5 5 10

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PUBLIC WORKS
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PLAN AND PROFILE

PP23

39

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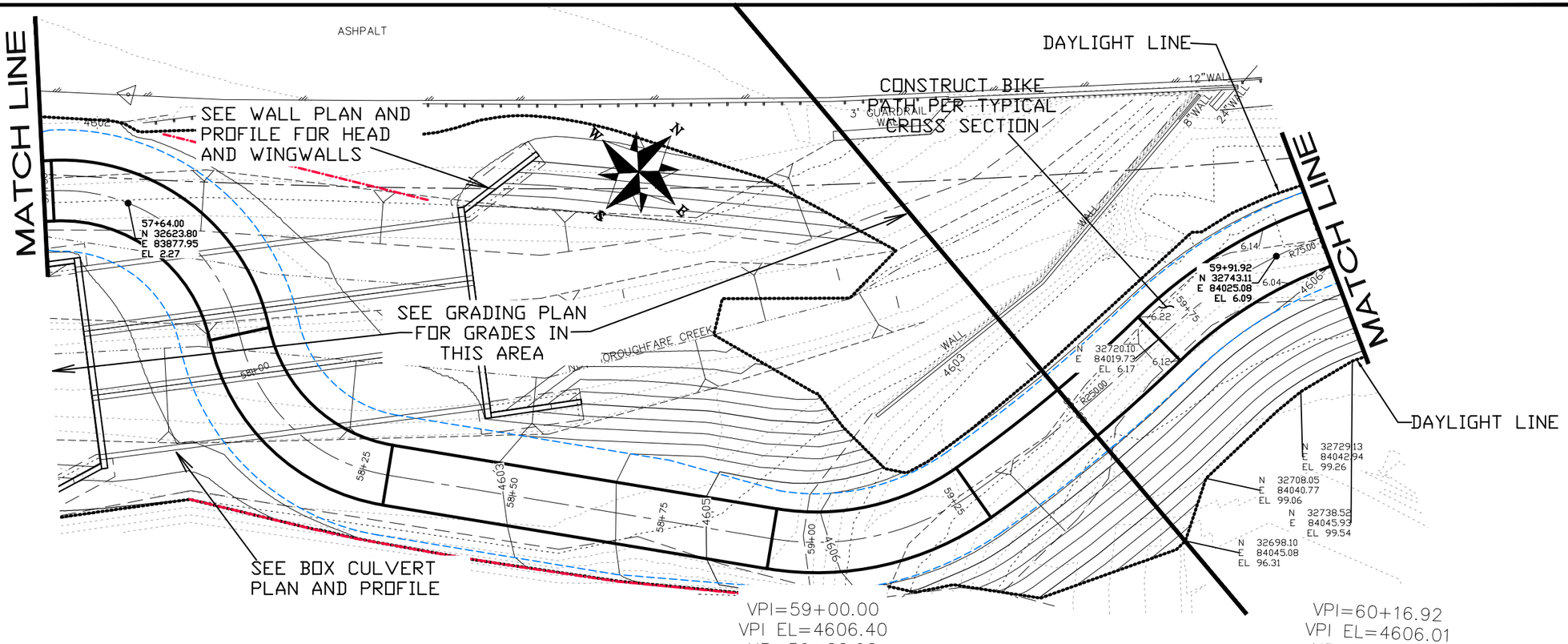

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PLAN AND PROFILE

PP24

(SEE PATH TYPICAL CROSS SECTIONS FOR ADDITIONAL INFORMATION ON CONCRETE COLORING)
COLORED (SAND) CONCRETE | PLAIN GRAY CONC. (NO COLOR)

ASHPALT

3' GUARDRAIL

DAYLIGHT LINE

WIDENING ON MONUMENT ROAD WILL BE BY OTHERS - SHOWN FOR COORDINATION ONLY

ASHPALT

MATCH LINE

MATCH LINE

N 32756.76
E 84021.61
EL 5.44

N 32761.41
E 84035.84
EL 5.85

R75.00

60+16.92
N 32764.31
E 84038.15
EL 5.77

60+41.92
N 32783.88
E 84053.71
EL 4.96

60+60.43
N 32798.36
E 84065.23
EL 4.19

60+85.05
N 32817.63
E 84080.56
EL 2.46

61+20.05
N 32845.02
E 84102.35
EL 0.51

61+55.05
N 32872.45
E 84124.09
EL 99.57

61+74.61
N 32888.11
E 84135.81
EL 99.34

R460.00

N 32824.61
E 84072.21
EL 0.89

N 32837.18
E 84085.79
EL 1.15

N 32852.79
E 84092.52
EL 99.74

N 32815.62
E 84068.06
EL 2.74

N 32887.04
E 84118.27
EL 99.24

N 32900.98
E 84131.36
EL 97.69

N 32936.28
E 84154.69
EL 96.35

N 32869.08
E 84121.49
EL 99.63

N 32885.46
E 84120.25
EL 97.97

N 32894.66
E 84140.42
EL 99.23

61+99.61
N 32908.65
E 84150.06
EL 98.92

62+24.61
N 32929.24
E 84164.23
EL 98.29

N 32746.46
E 84050.37
EL 99.51

N 32779.06
E 84072.89
EL 99.61

N 32797.02
E 84089.23
EL 97.40

N 32849.24
E 84127.90
EL 95.08

N 32882.29
E 84157.53
EL 92.57

N 32939.21
E 84192.98
EL 92.44

CONSTRUCT BIKE PATH PER TYPICAL CROSS SECTION

DAYLIGHT LINE

4630
4620
4610
4600
4590

VPT= 60+41.92
EL=4604.96

VPI=60+60.43
EL=4604.19

VPC= 60+85.05
EL=4602.46

VPI=61+20.05
VPI EL=4600.00
LP=61+55.05
LP EI=4599.57
AD=5.81%
K=12.05
VC=70.00

VPT= 61+55.05
EL=4599.57

VPC= 61+74.61
EL=4599.34

VPI=61+99.61
VPI EL=4599.03
HP=61+74.61
HP EI=4599.34
AD=-1.74%
K=28.65
SSD=405.85
VC=50.00

VPT= 62+24.61
EL=4598.29

-4.19%
-7.03%
-1.22%

EXISTING GROUND

60+00
61+00
62+00
62+50

DESCRIPTION	DATE
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REVISION △	
REVISION △	

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PLAN AND PROFILE

PP25

41

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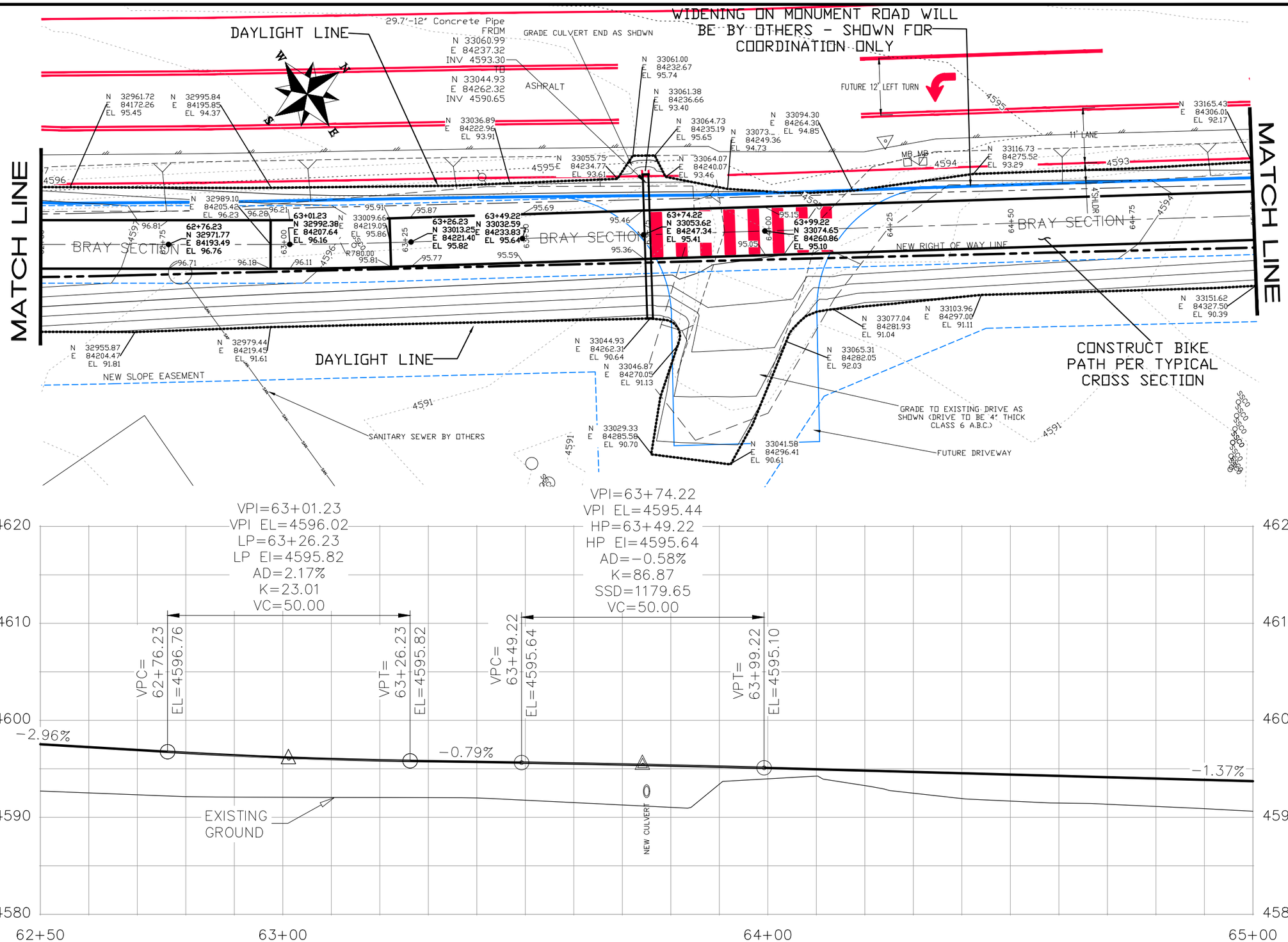

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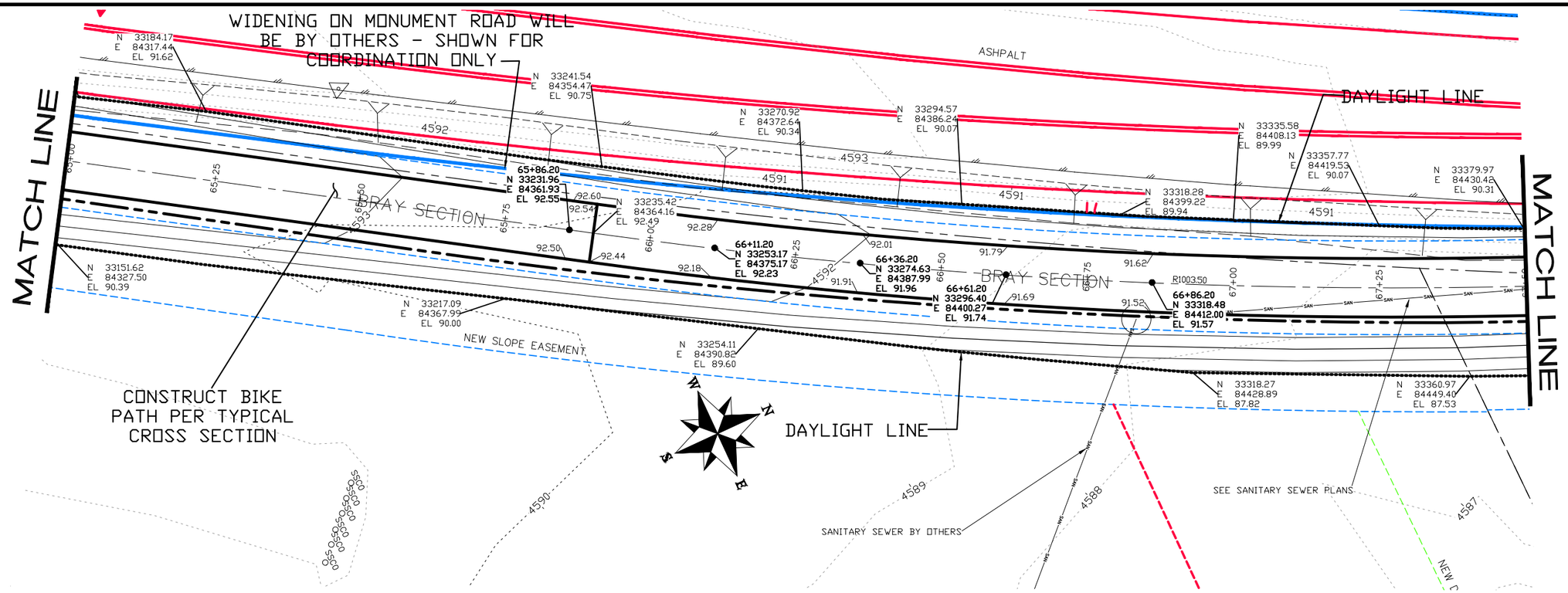

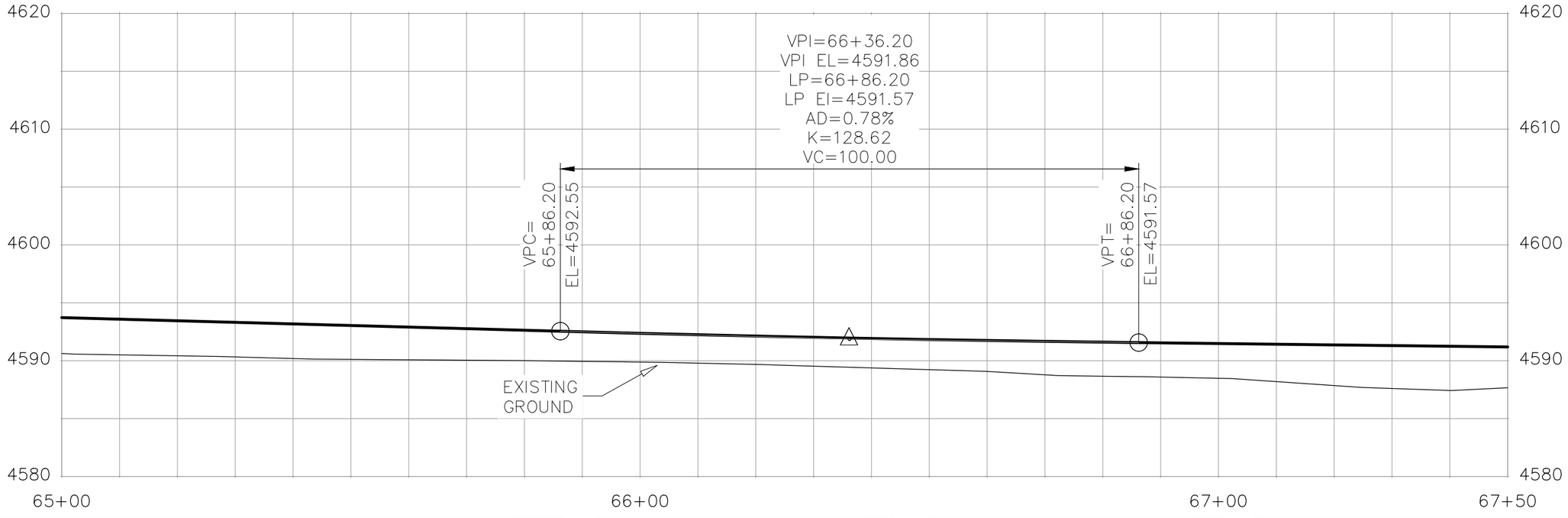

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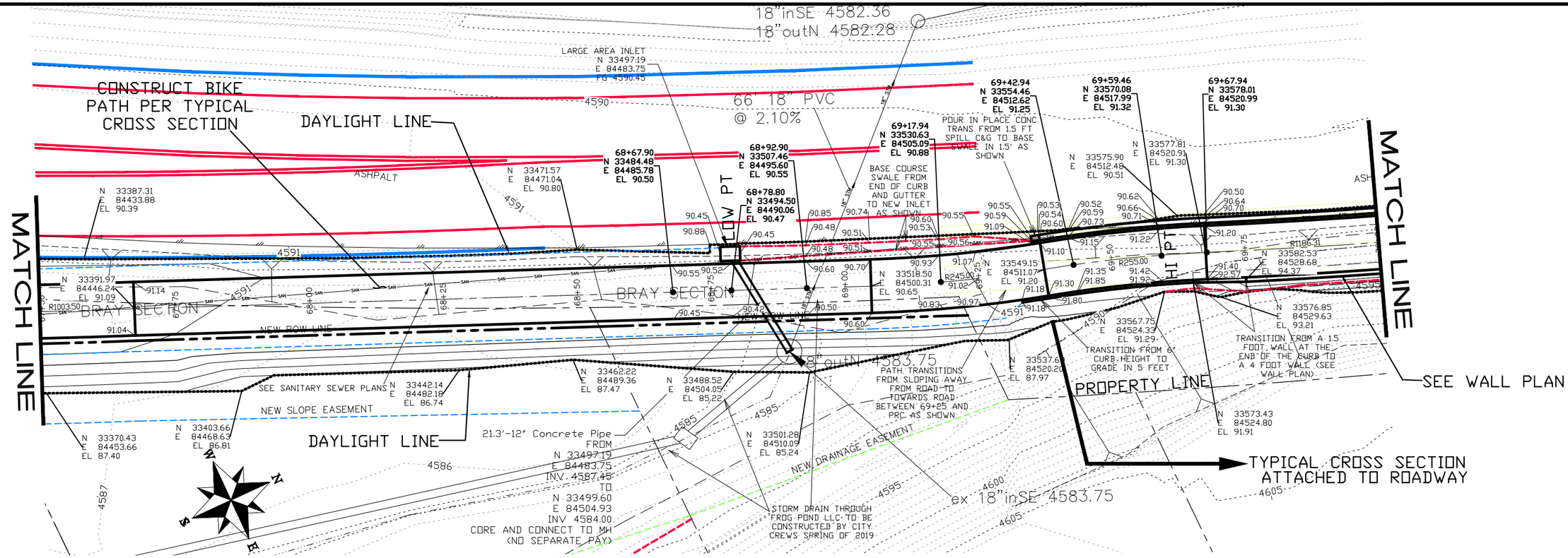
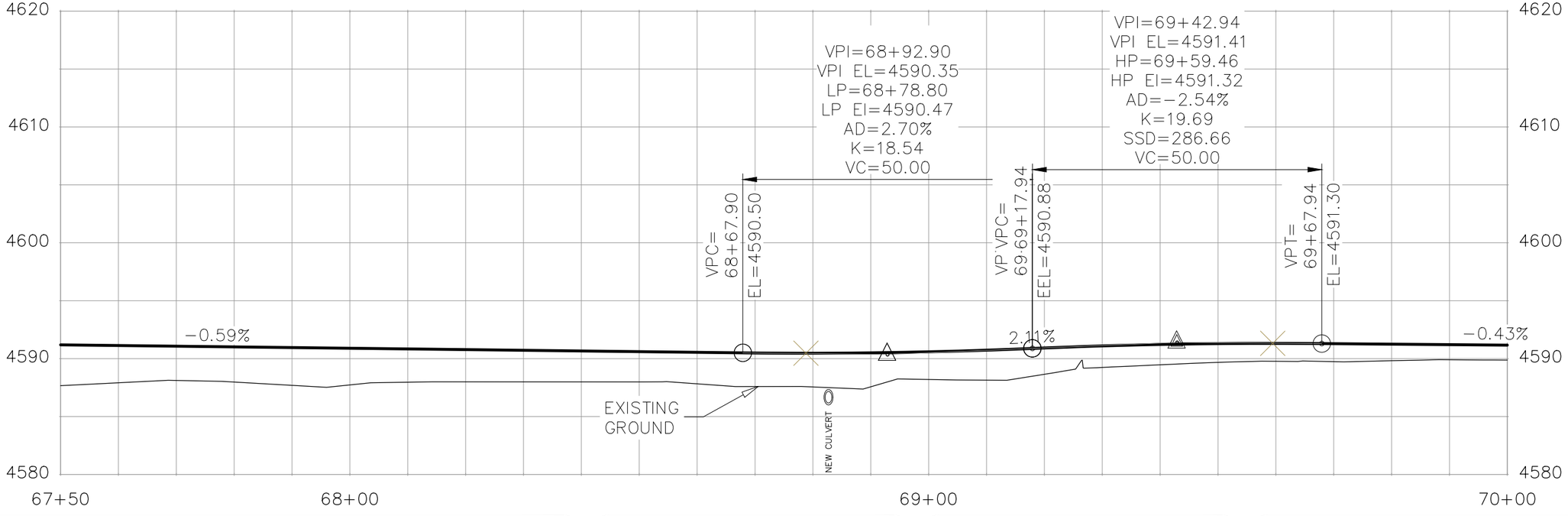
PP27





DESCRIPTION	DATE
REVISION △	–
REVISION △	–
REVISION △	–
REVISION △	–

DRAWN BY JCS DATE 2019
DESIGNED BY JCS DATE 2019
CHECKED BY KA DATE 2019
APPROVED BY TCP DATE 2019

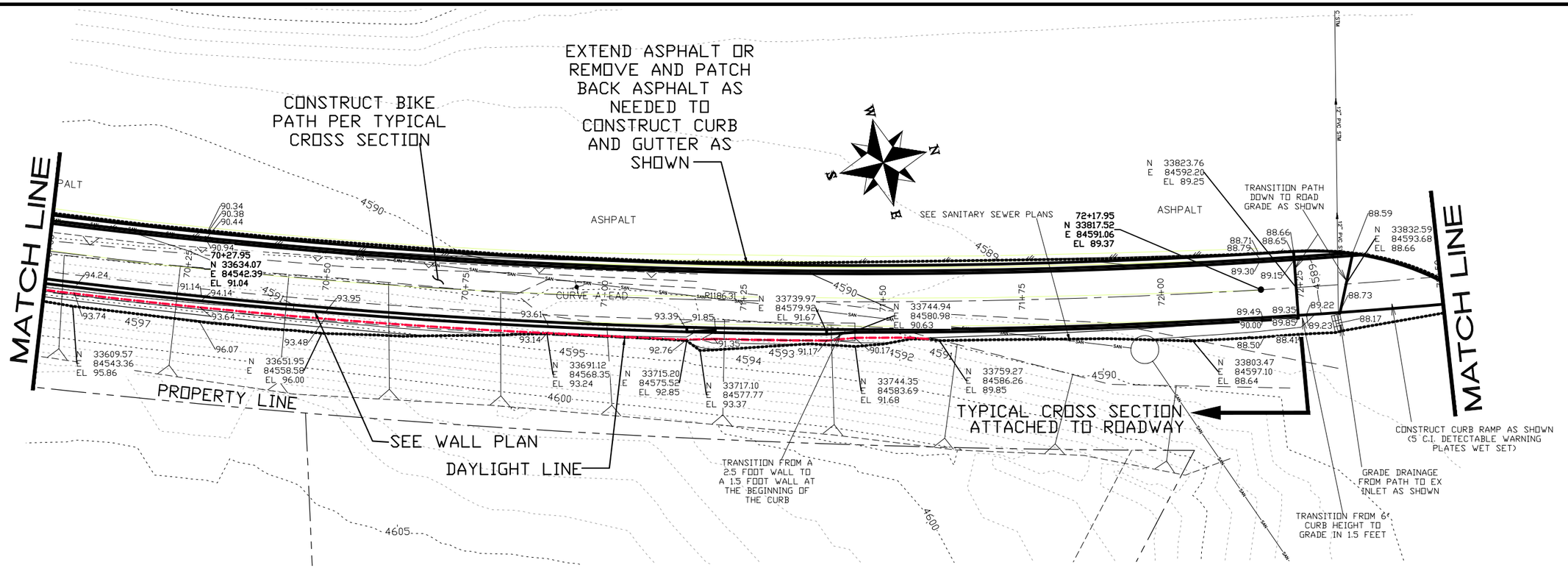
SCALES:
PLAN & PROFILE
HORIZONTAL 0 5 10 20
VERTICAL 0 2.5 5 10

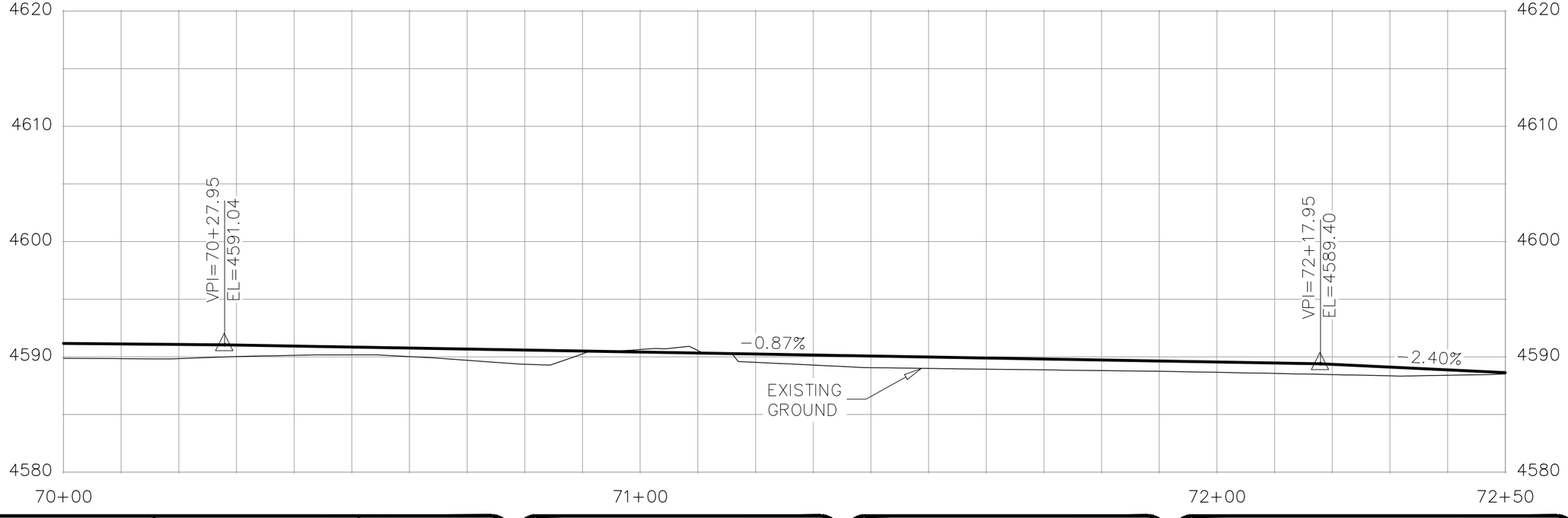
CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP28





DESCRIPTION	DATE
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REVISION △	

DRAWN BY JCS DATE 2019
DESIGNED BY JCS DATE 2019
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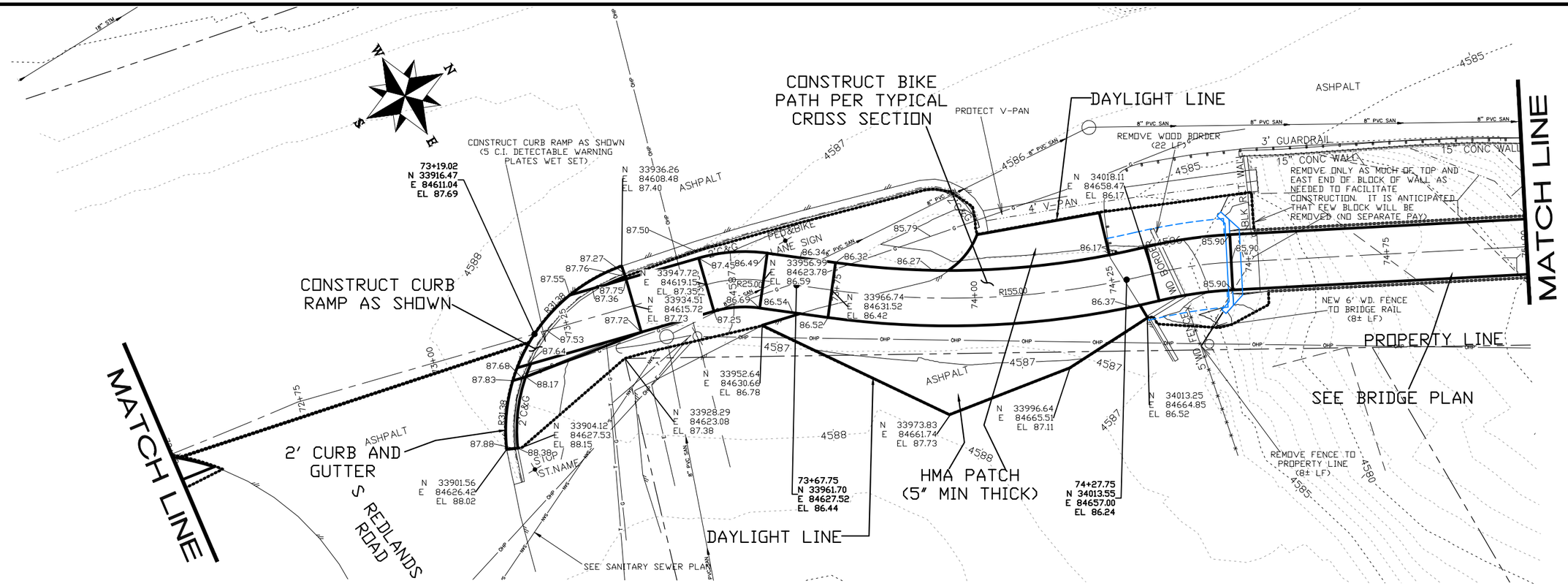
SCALES:
PLAN & PROFILE
HORIZONTAL 0 5 10 20
VERTICAL 0 2.5 5 10

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP29



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DRAWN BY JCS DATE 2019
DESIGNED BY JCS DATE 2019
CHECKED BY KA DATE 2019
APPROVED BY TCP DATE 2019

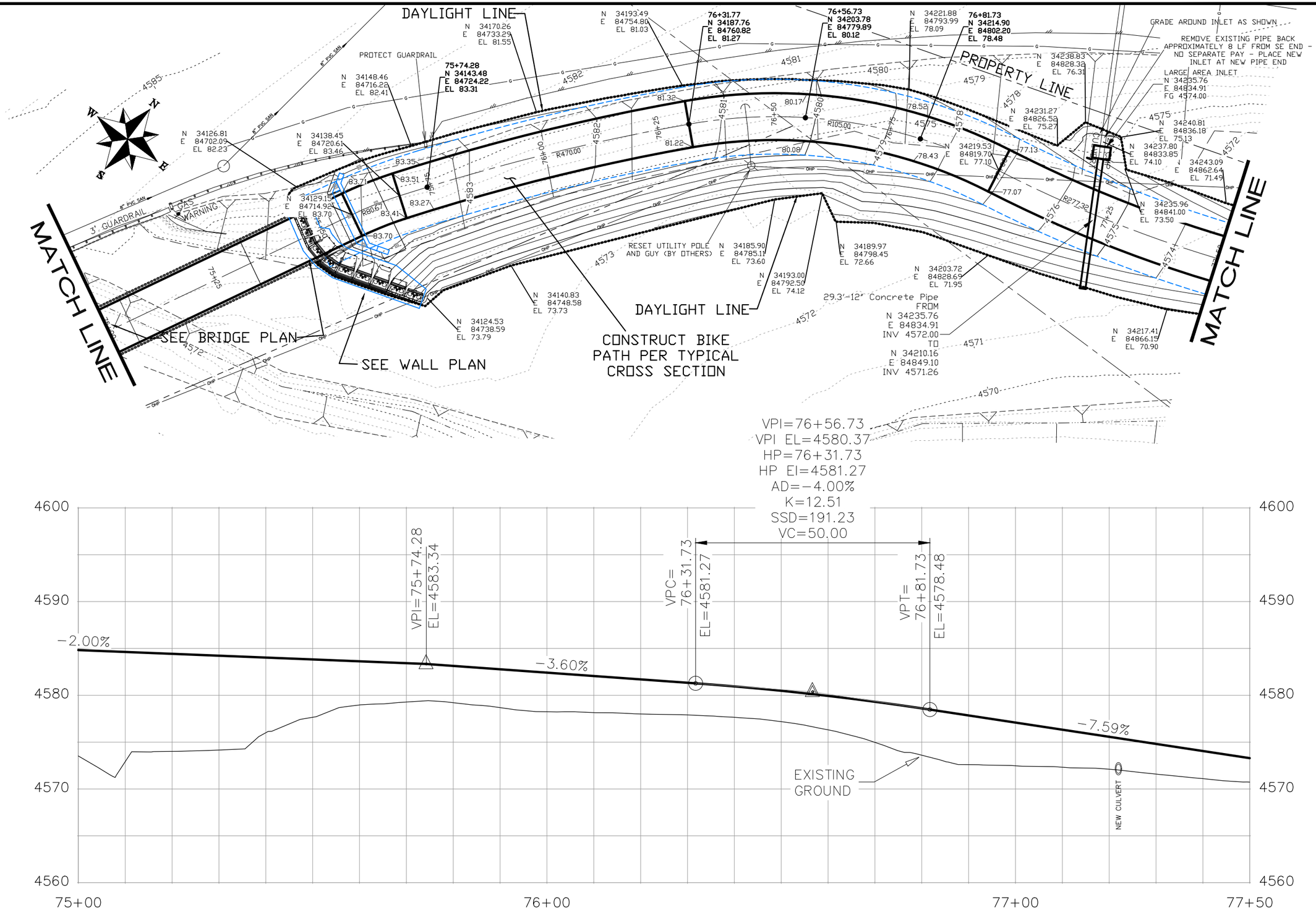
SCALES: PLAN & PROFILE HORIZONTAL 0 5 10 20 VERTICAL 0 2.5 5 10

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP30



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DRAWN BY JCS DATE 2019
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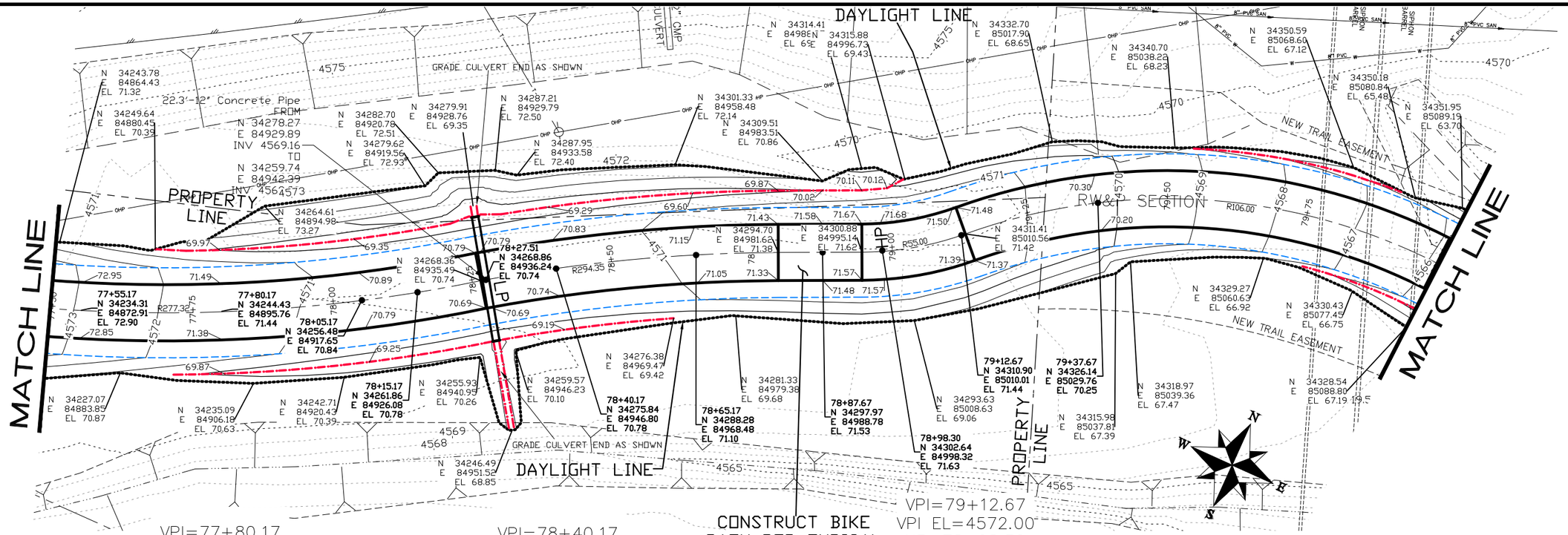
SCALES:
PLAN & PROFILE
HORIZONTAL 0 5 10 20
VERTICAL 0 2.5 5 10

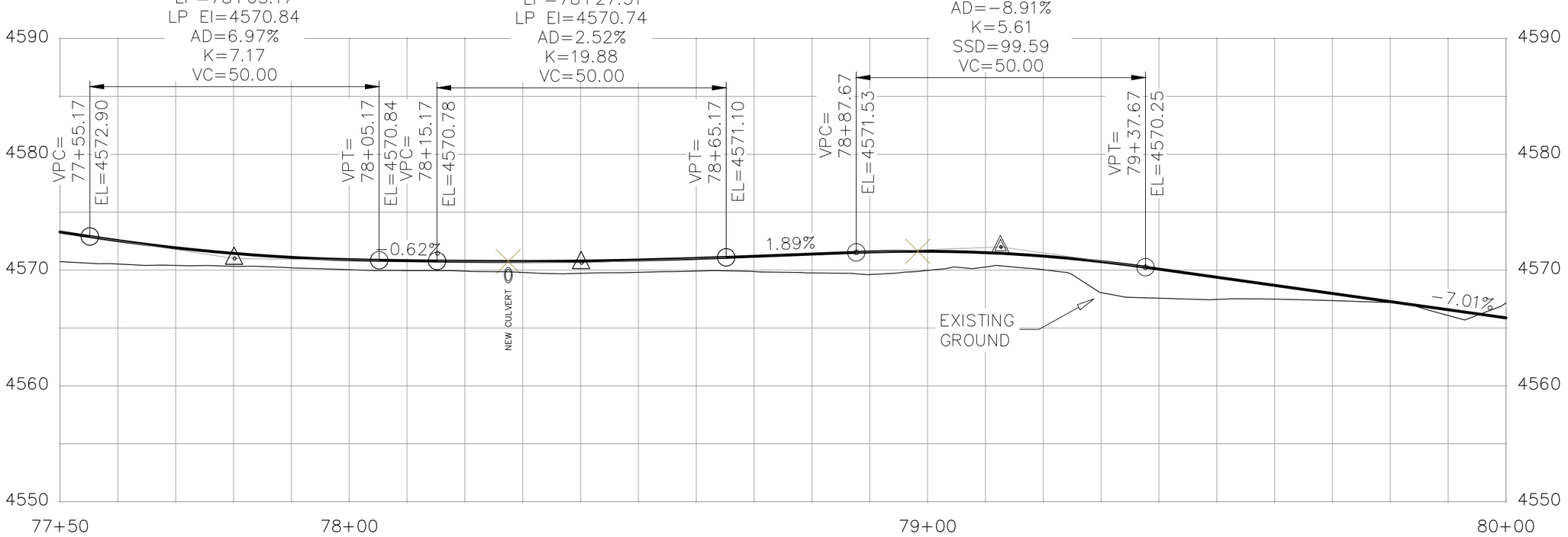
CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP31





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REVISION △	–
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DRAWN BY JCS DATE 2019
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SCALES: PLAN & PROFILE HORIZONTAL 0 5 10 20 VERTICAL 0 2.5 5 10

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP32

48

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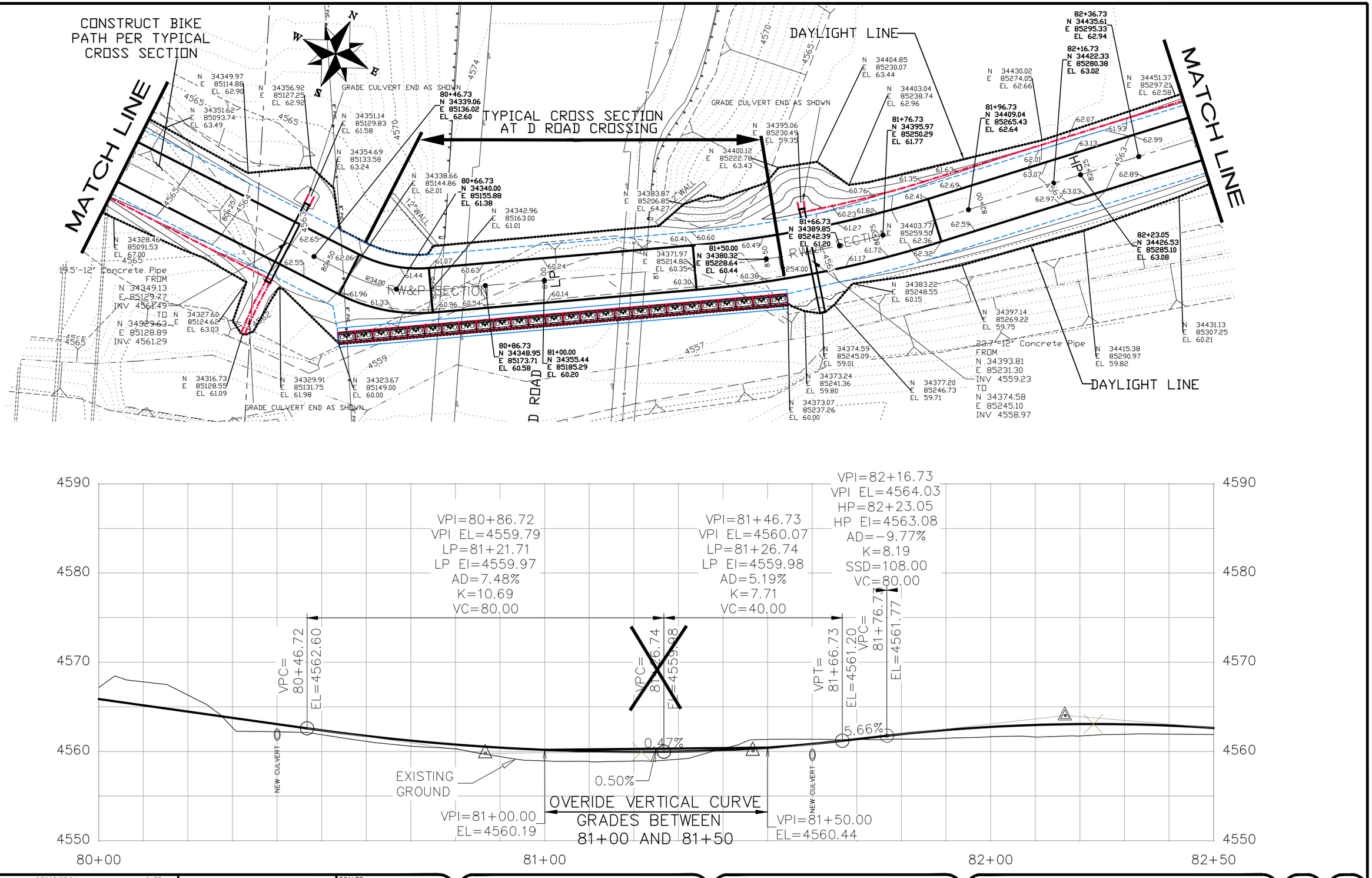

DESCRIPTION	DATE
REVISION △	
REVISION △	
REVISION △	
REVISION △	

DRAWN BY JCS DATE 2019
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SCALES:
PLAN & PROFILE
HORIZONTAL 0 5 10 20
VERTICAL 0 2.5 5 10

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP33

49

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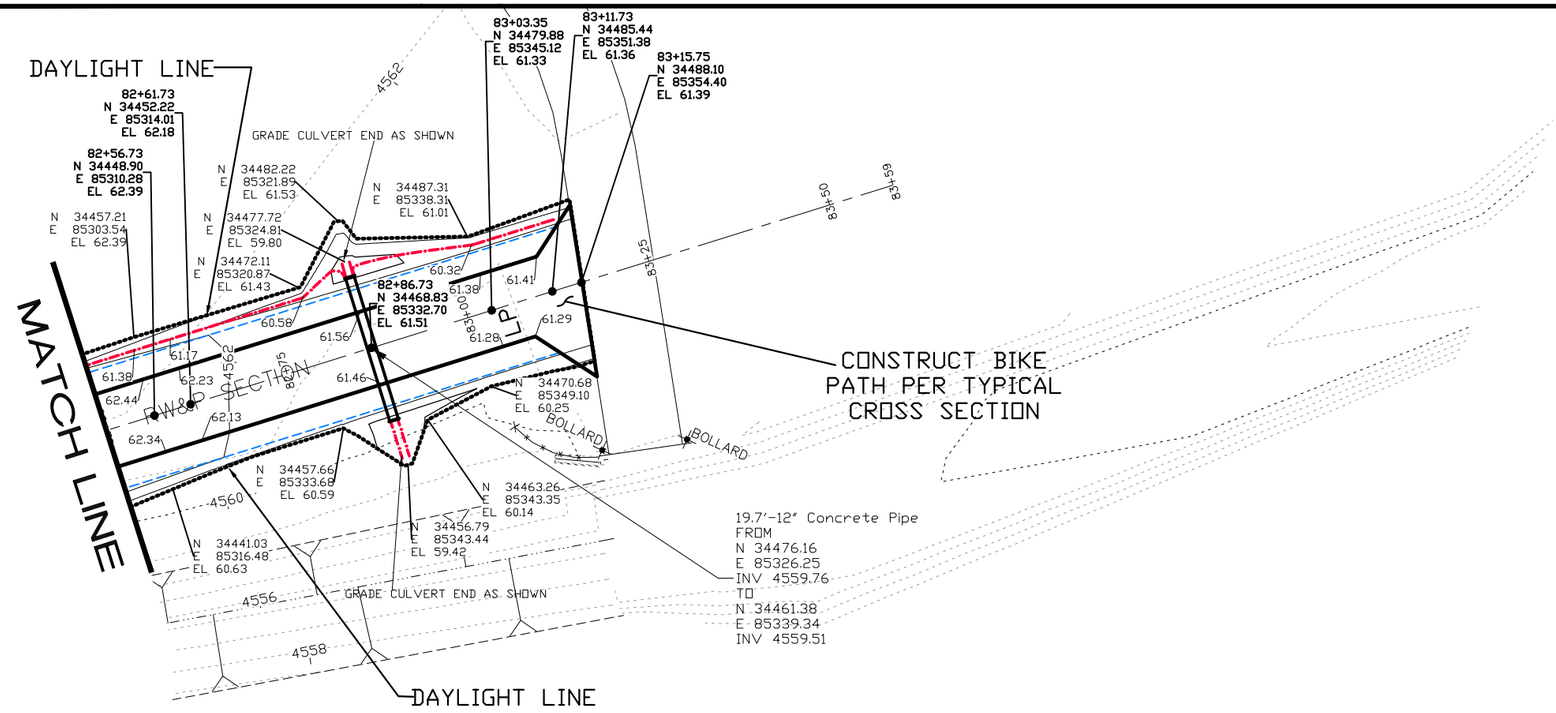

DESCRIPTION	DATE
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REVISION △	
REVISION △	
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DRAWN BY JCS DATE 2019
DESIGNED BY JCS DATE 2019
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APPROVED BY TCP DATE 2019

SCALES:
PLAN & PROFILE
HORIZONTAL 0 5 10 20
VERTICAL 0 2.5 5 10

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
PLAN AND PROFILE

PP34

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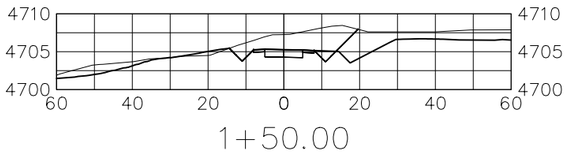

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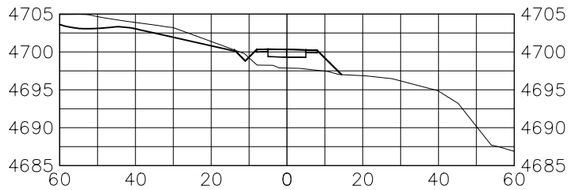

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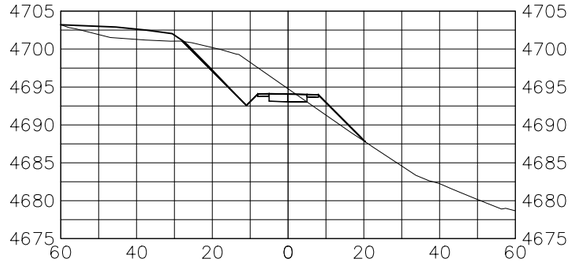

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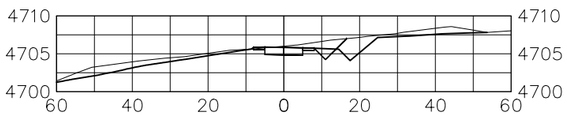

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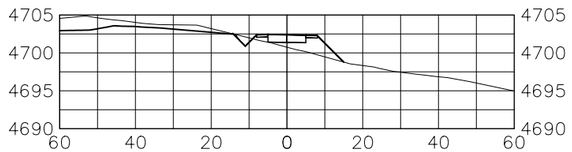

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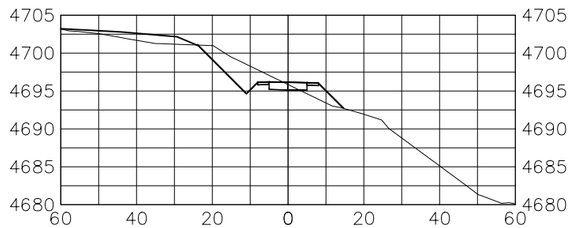

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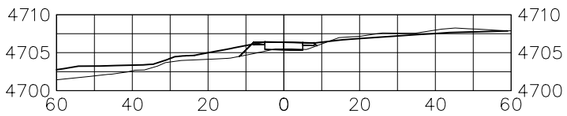

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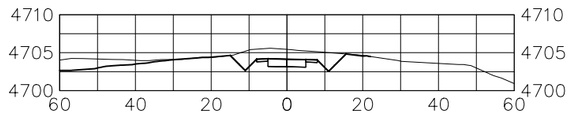

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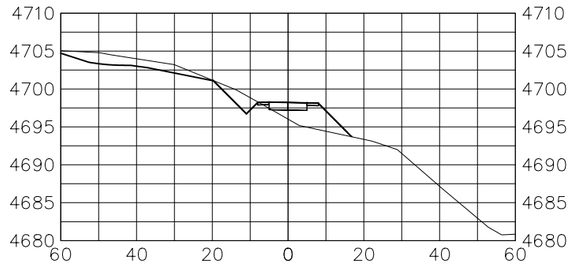

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DESCRIPTION	DATE
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REVISION △	
REVISION △	

DRAWN BY JCS DATE 2019
DESIGNED BY JCS DATE 2019
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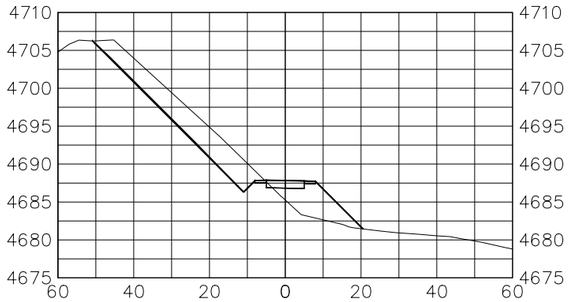
APPROVED BY TCP DATE 2019

SCALES:
PLAN & PROFILE
HORIZONTAL 0 10 20 40
VERTICAL 0 5 10 20

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
CROSS SECTIONS



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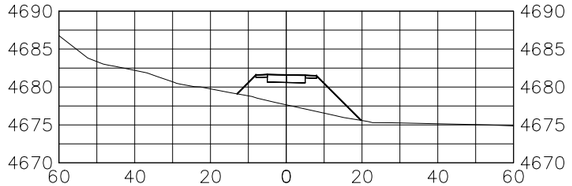

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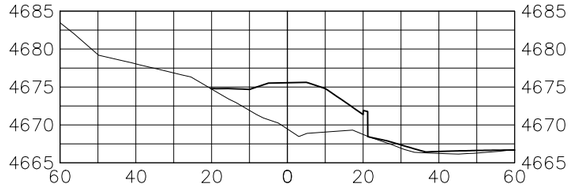

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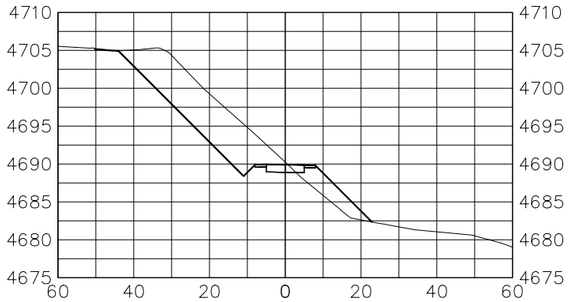

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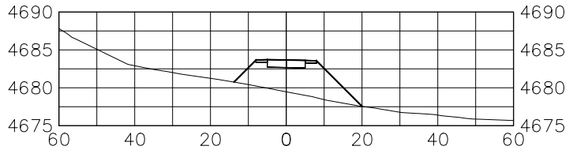

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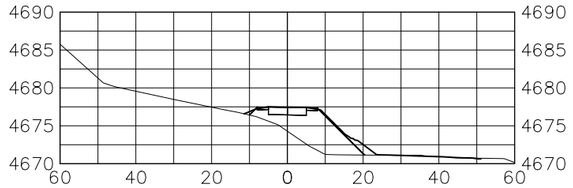

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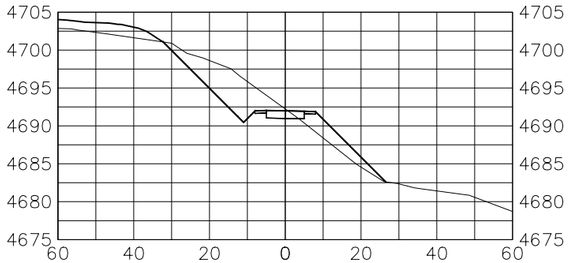

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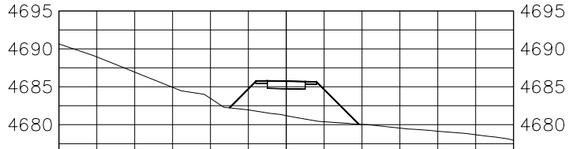

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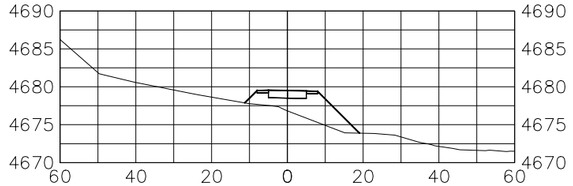

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REVISION △	–
REVISION △	–
REVISION △	–
REVISION △	–

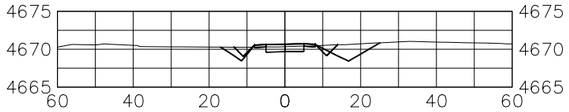
DRAWN BY JCS DATE 2019
DESIGNED BY JCS DATE 2019
CHECKED BY KA DATE 2019
APPROVED BY TCP DATE 2019

SCALES:
PLAN & PROFILE
HORIZONTAL 0 10 20 40
VERTICAL 0 5 10 20

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
CROSS SECTIONS



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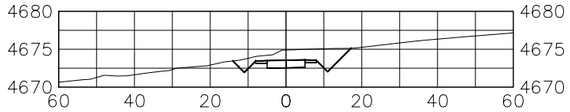

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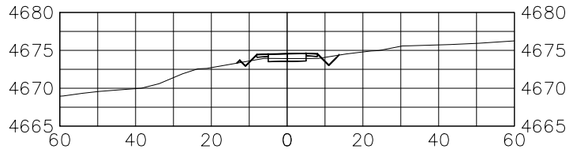

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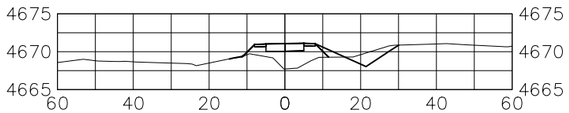

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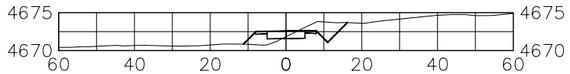

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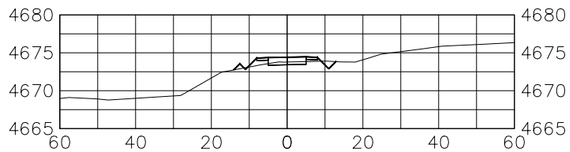

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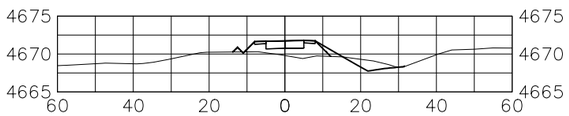

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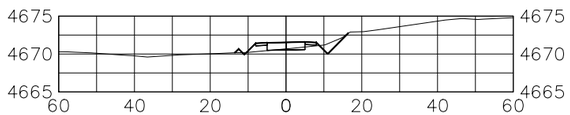

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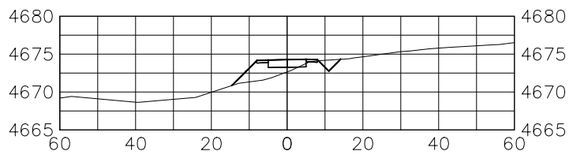

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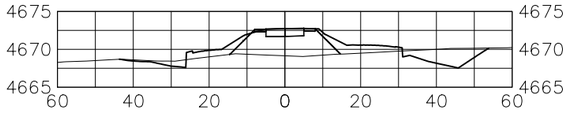

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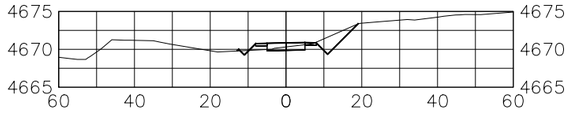

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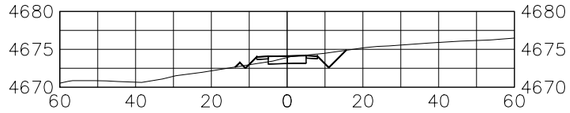

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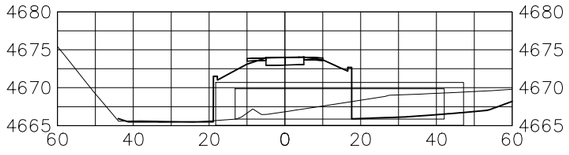

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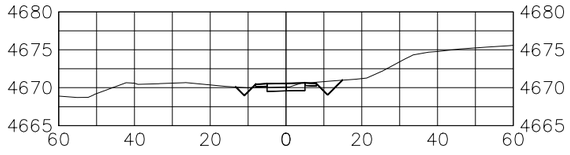

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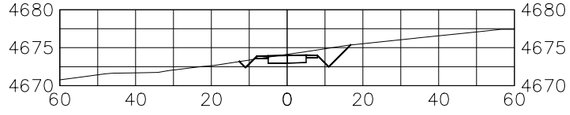

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DESCRIPTION	DATE
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REVISION △	
REVISION △	

DRAWN BY JCS DATE 2019
DESIGNED BY JCS DATE 2019
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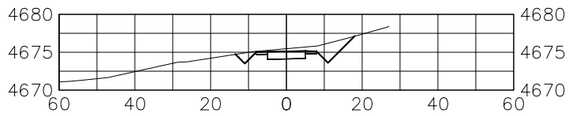
APPROVED BY TCP DATE 2019

SCALES:
PLAN & PROFILE
HORIZONTAL 0 10 20 40
VERTICAL 0 5 10 20

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
CROSS SECTIONS



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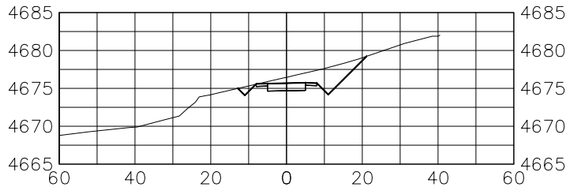

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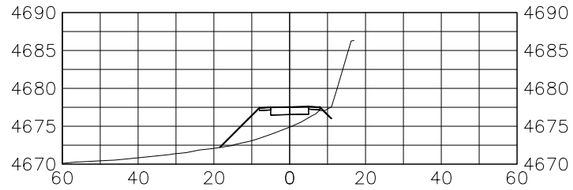

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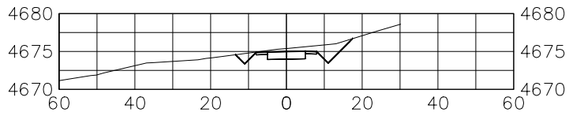

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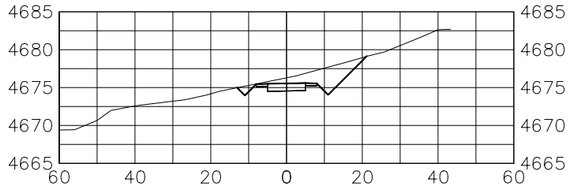

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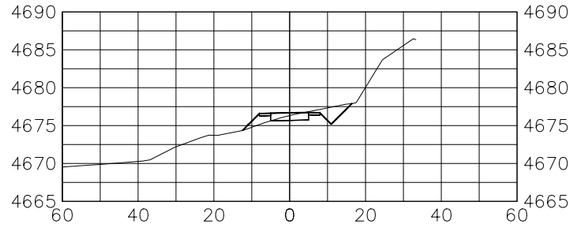

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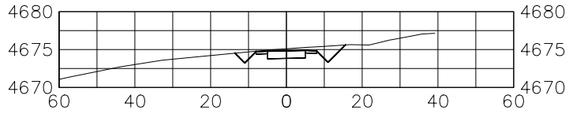

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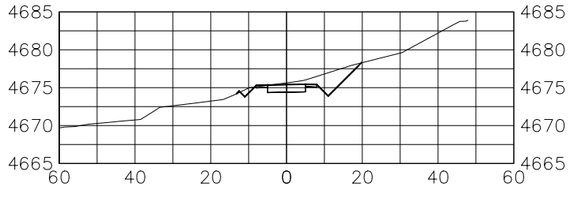

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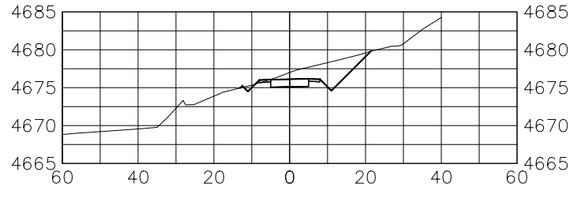

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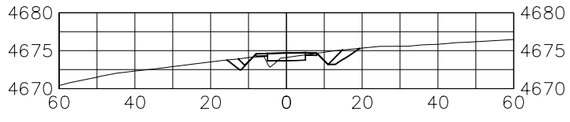

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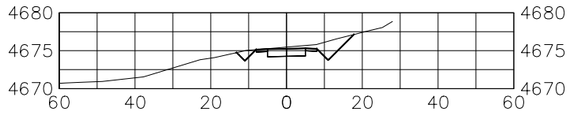

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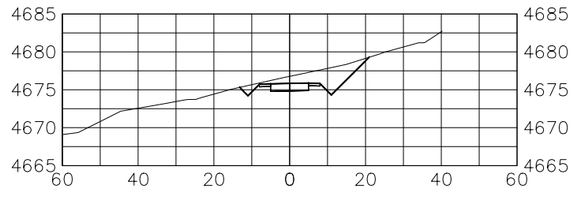

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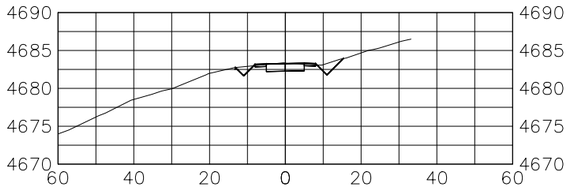
CROSS SECTIONS



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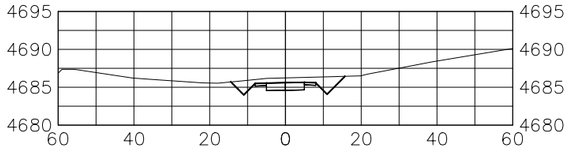

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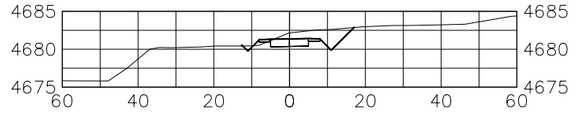

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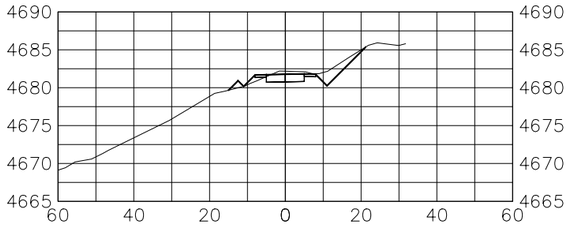

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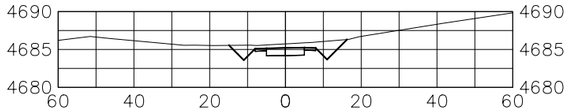

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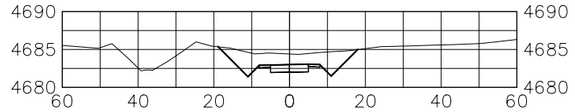

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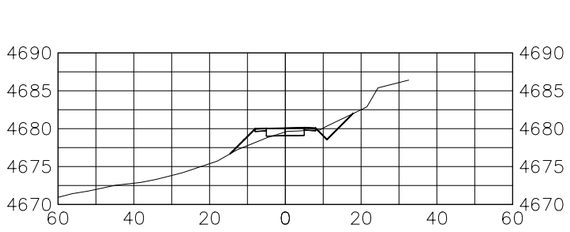

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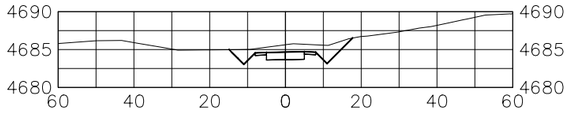

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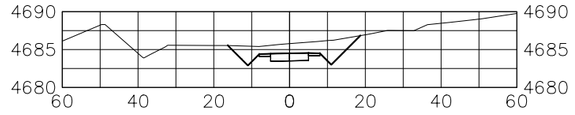

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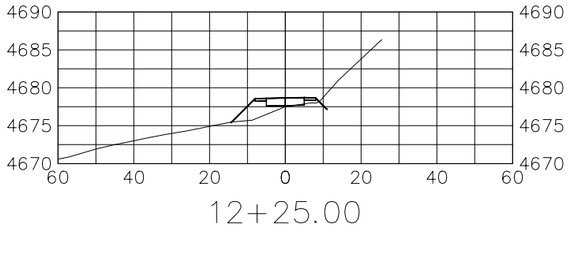

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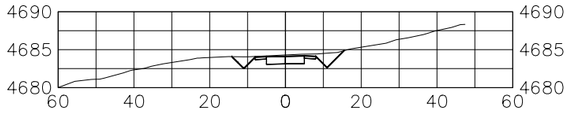

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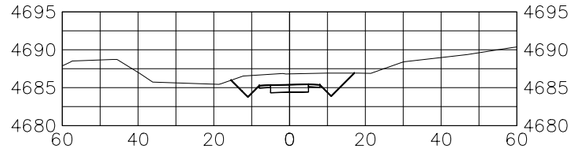

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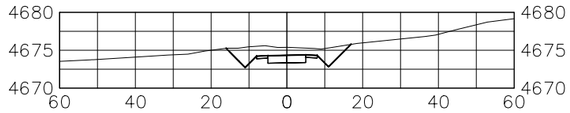

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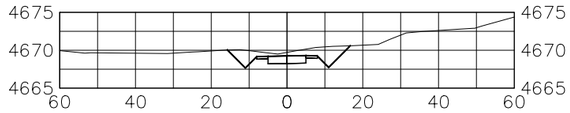

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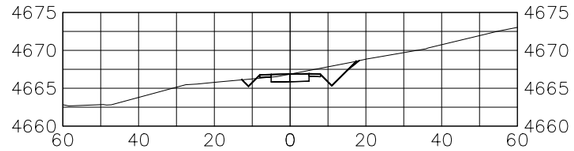

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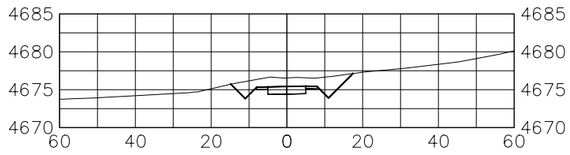

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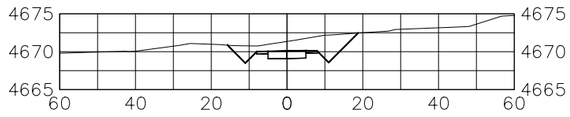

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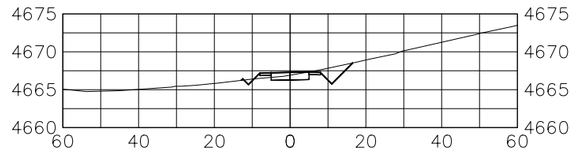

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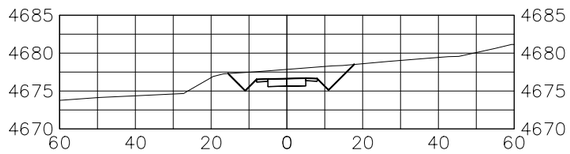

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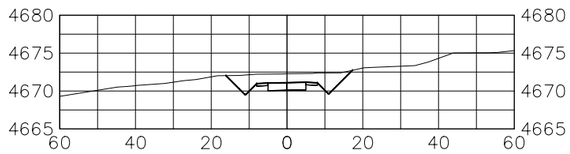

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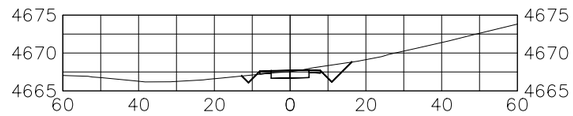

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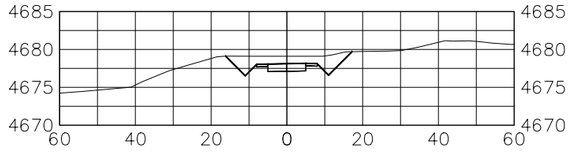

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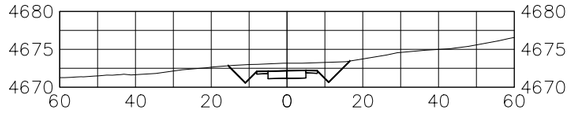

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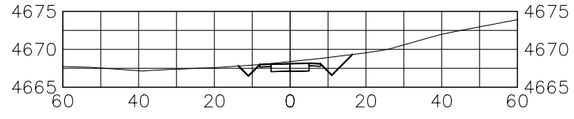

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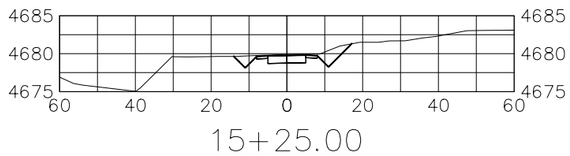

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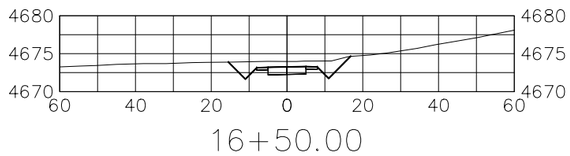

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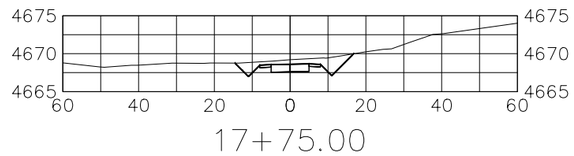

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VERTICAL 0 5 10 20

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CROSS SECTIONS

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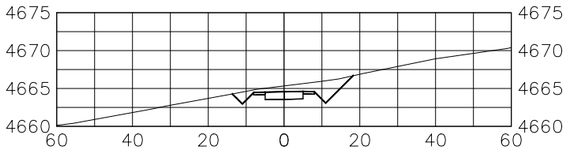

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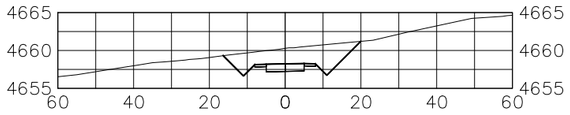

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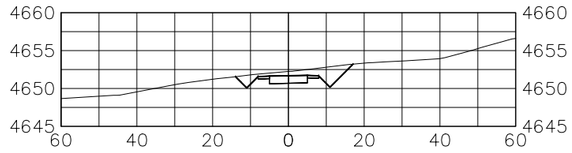

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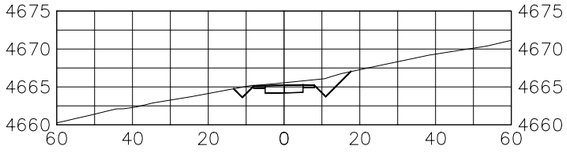

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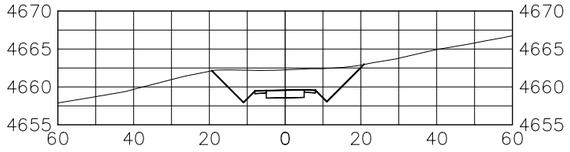

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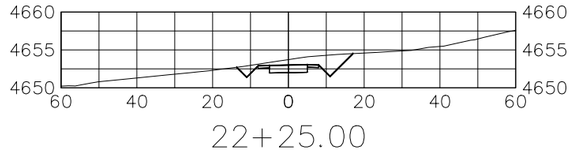

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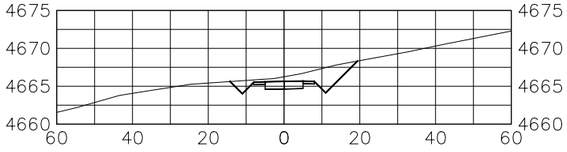

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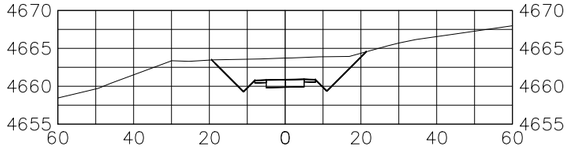

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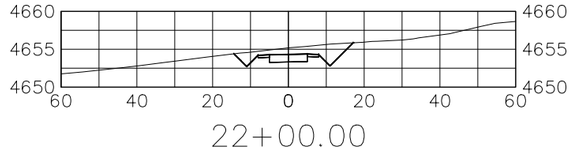

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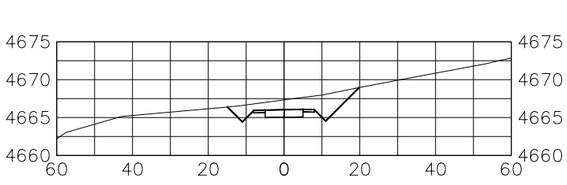

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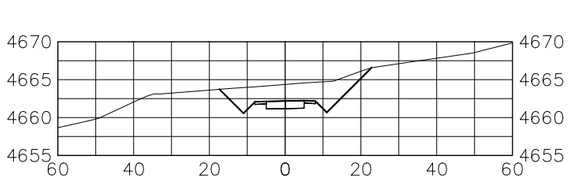

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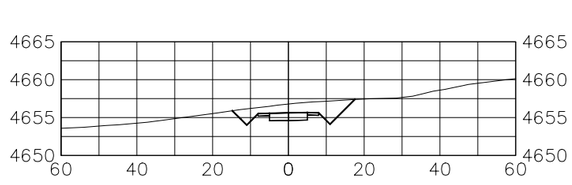

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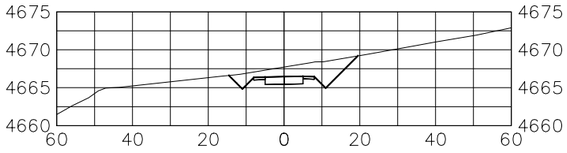

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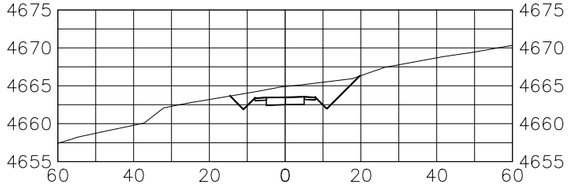

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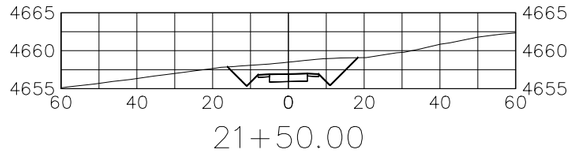

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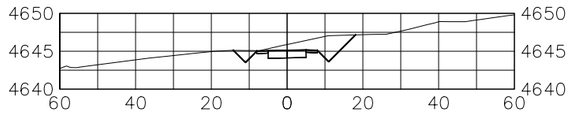

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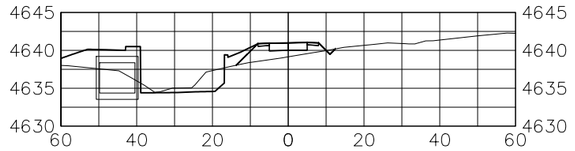

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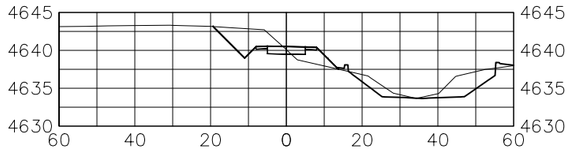

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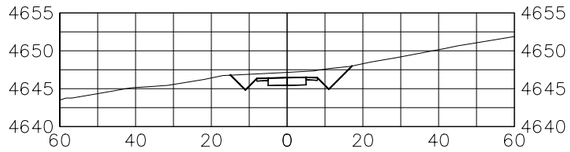

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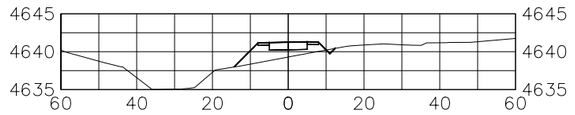

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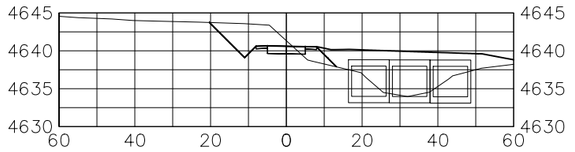

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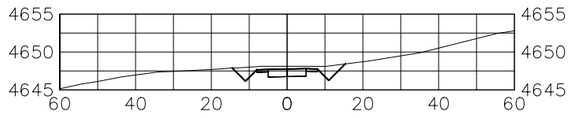

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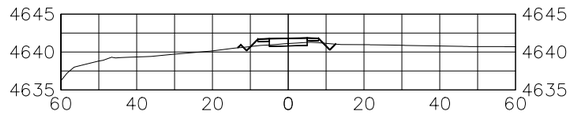

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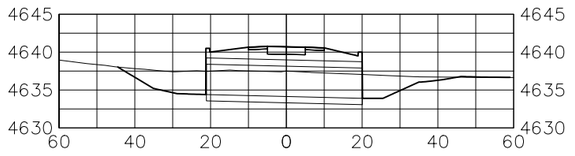

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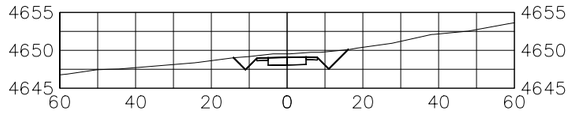

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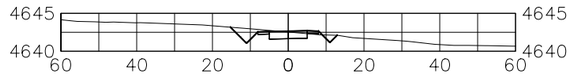

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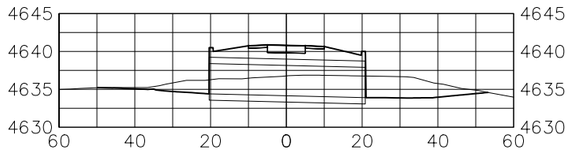

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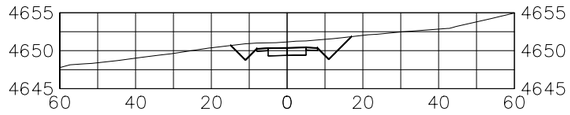

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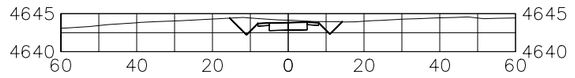

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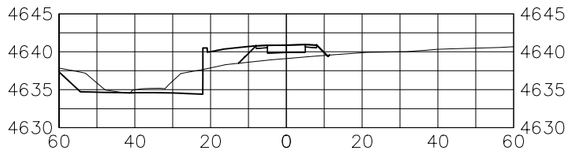

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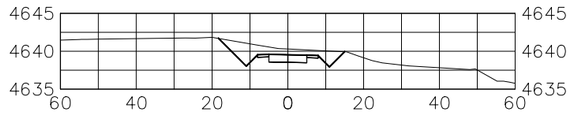

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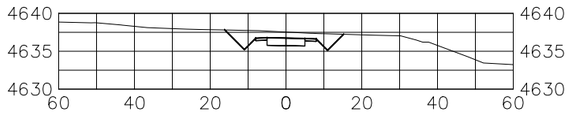

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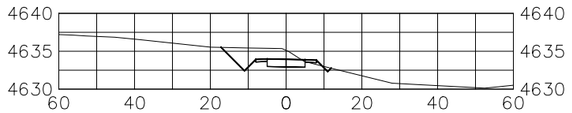

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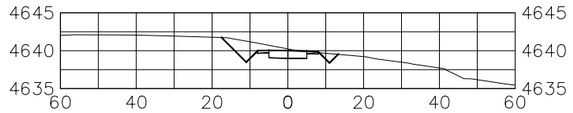

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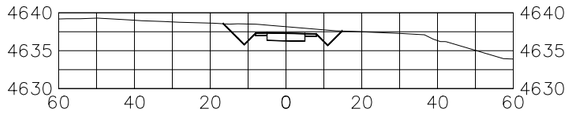

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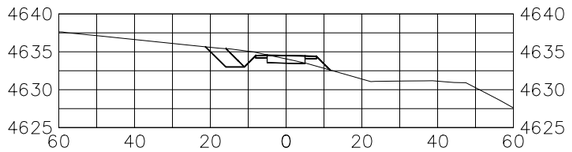

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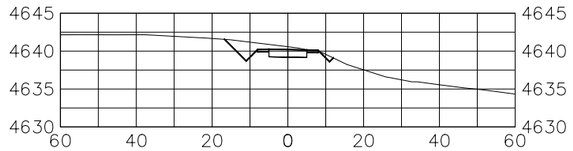

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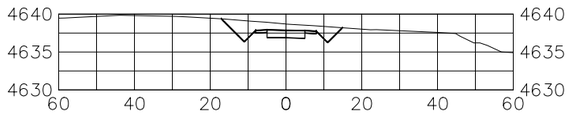

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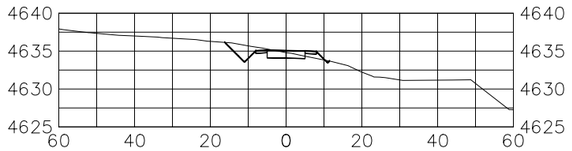

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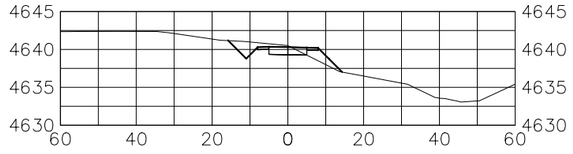

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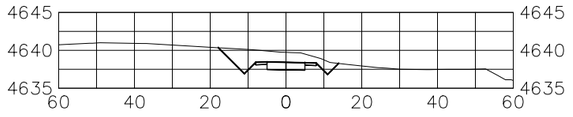

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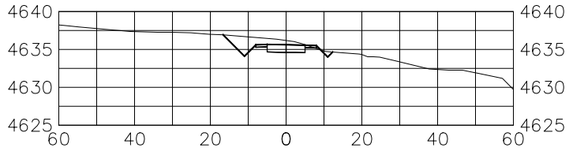

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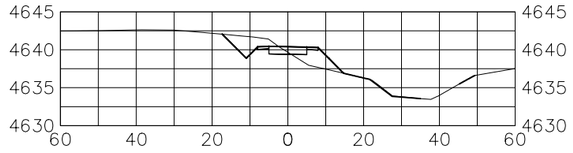

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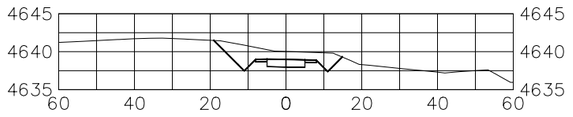

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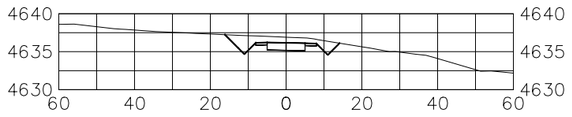

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MONUMENT ROAD BICYCLE PATH
CROSS SECTIONS

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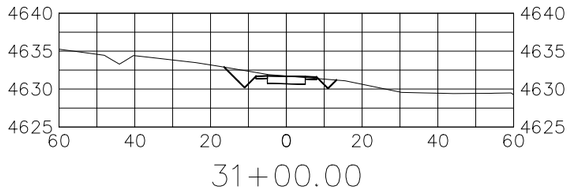

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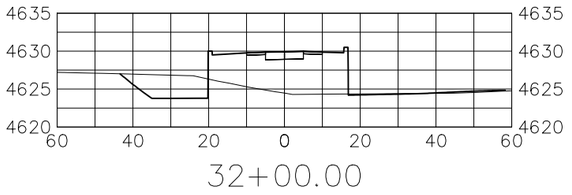

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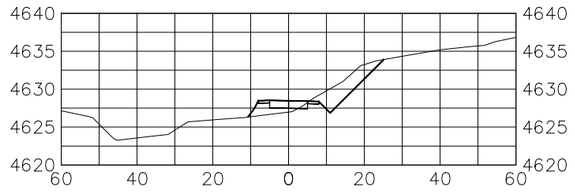

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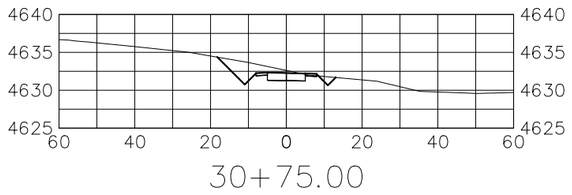

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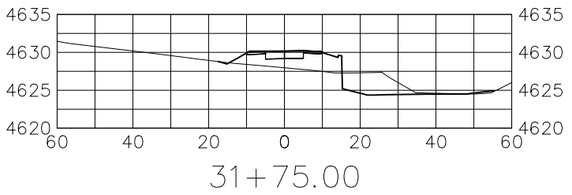

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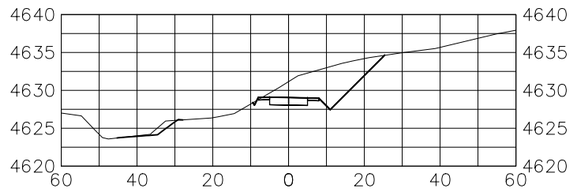

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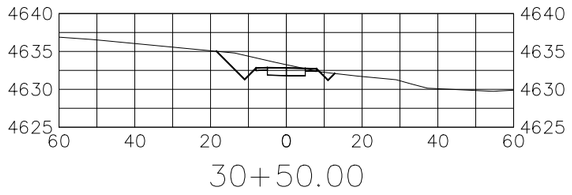

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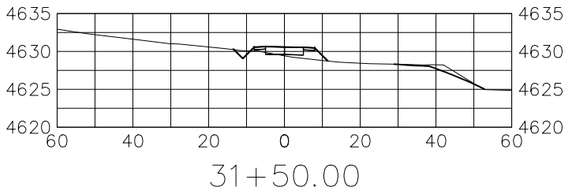

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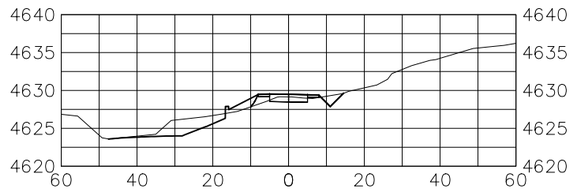

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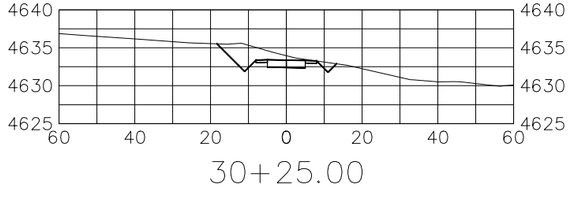

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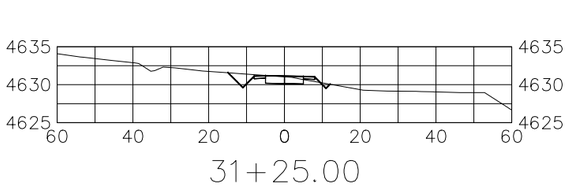

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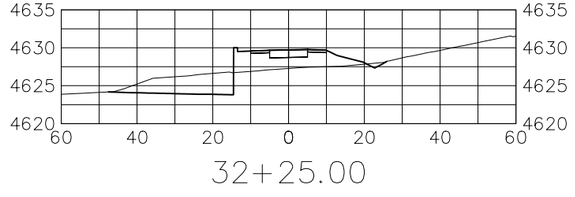

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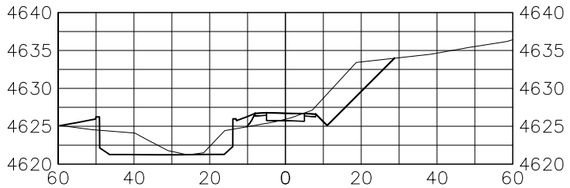

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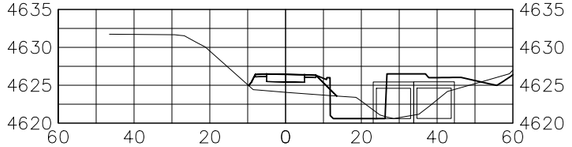

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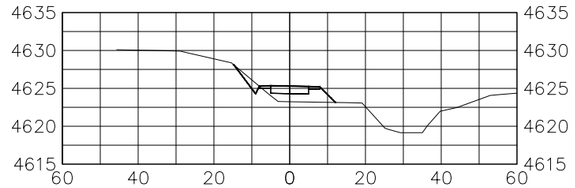

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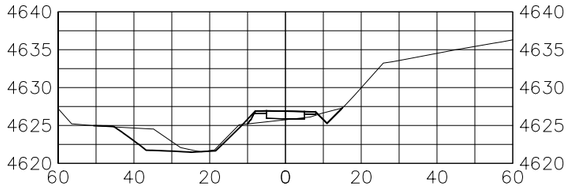

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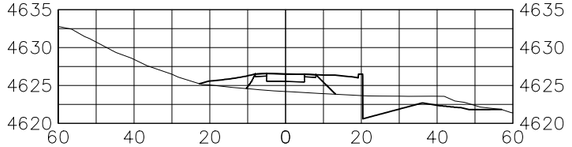

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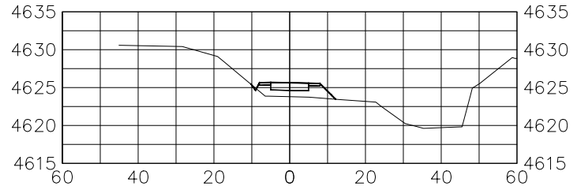

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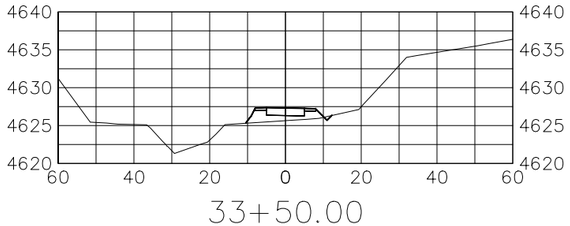

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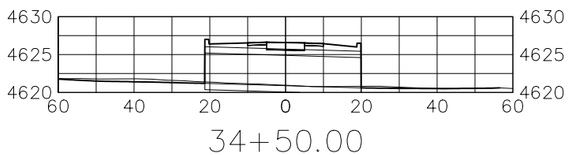

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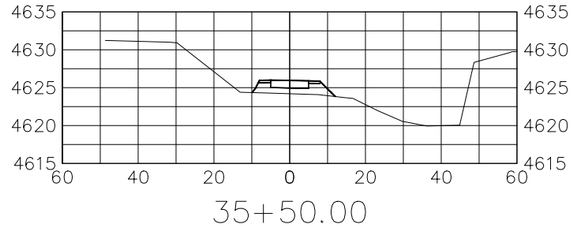

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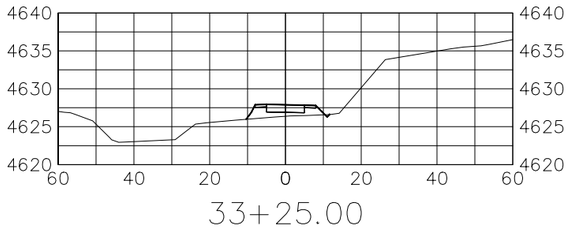

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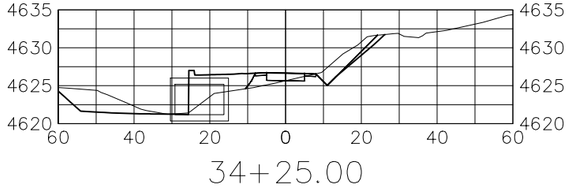

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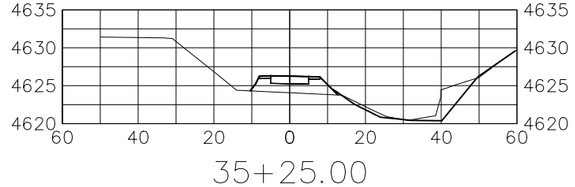

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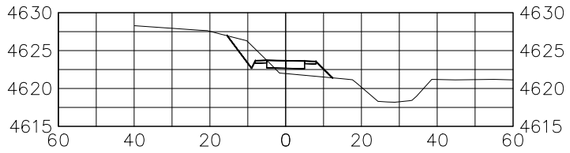

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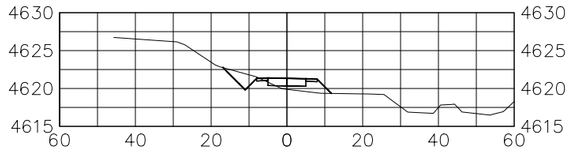

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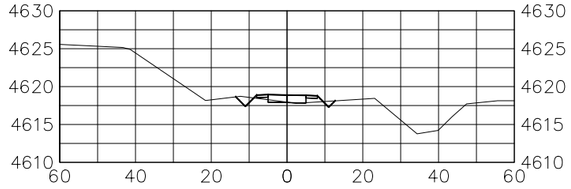

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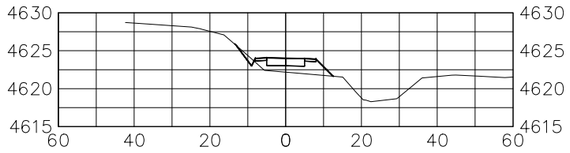

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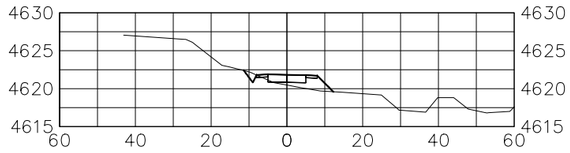

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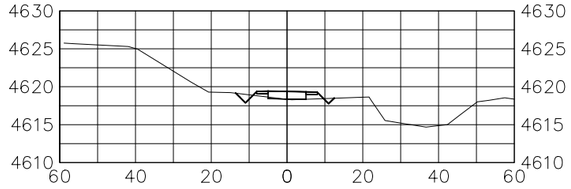

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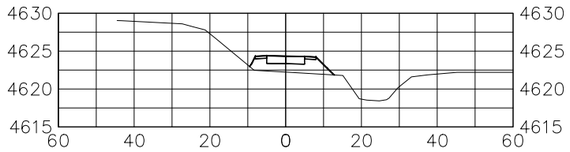

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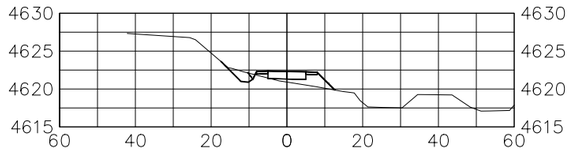

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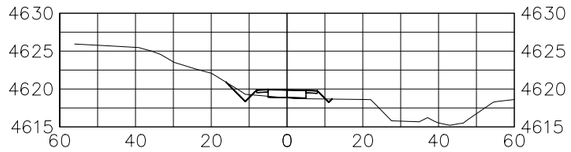

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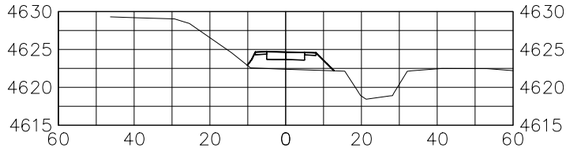

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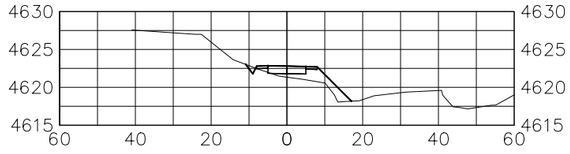

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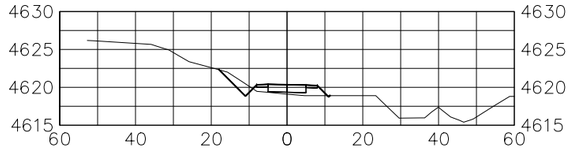

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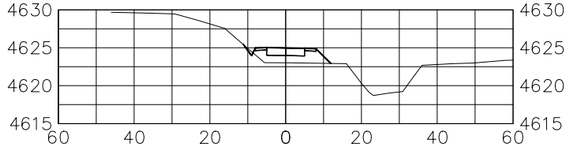

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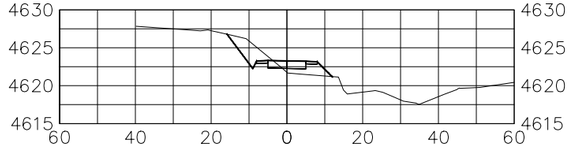

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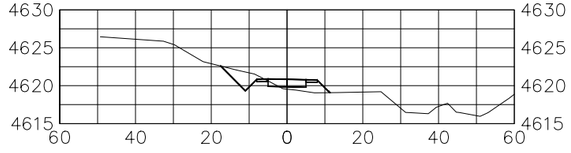

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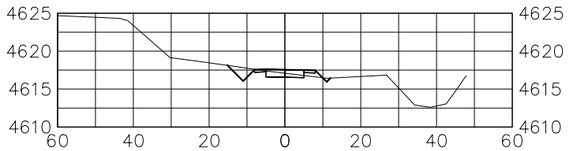

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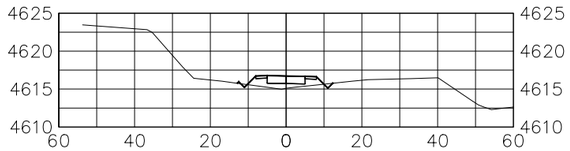

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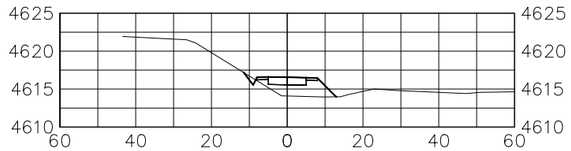

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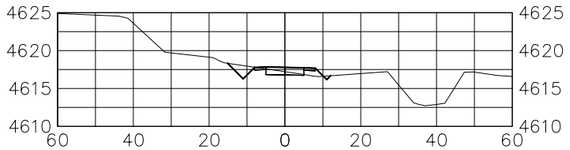

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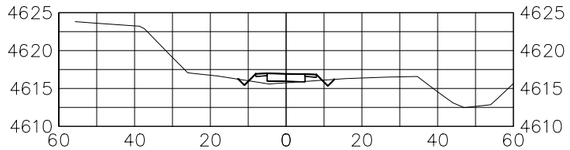

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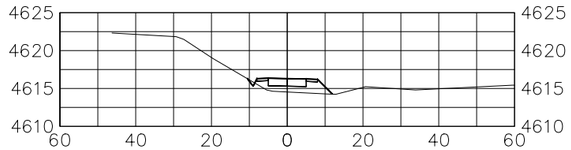

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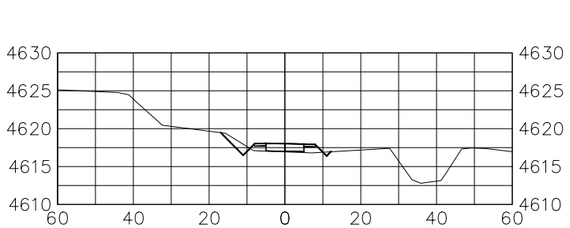

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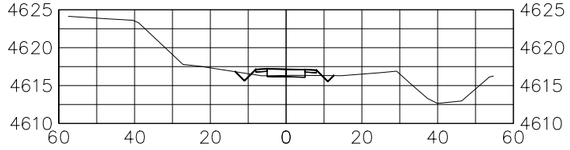

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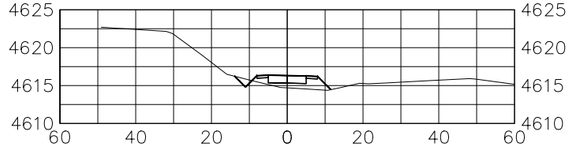

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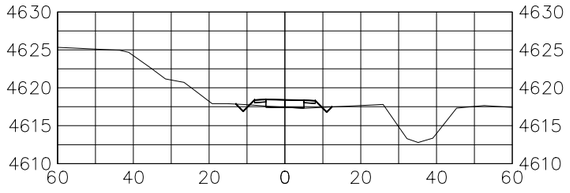

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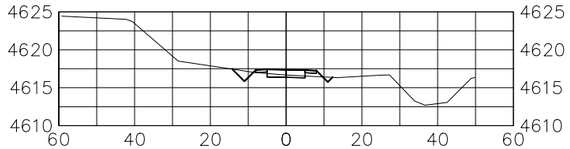

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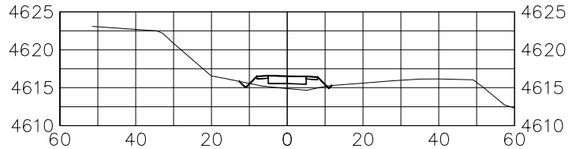

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VERTICAL 0 5 10 20

CITY OF Grand Junction COLORADO

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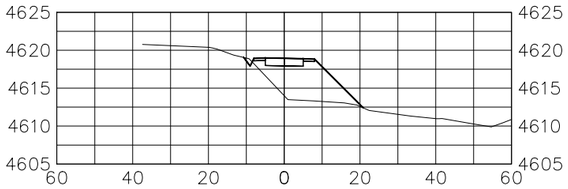

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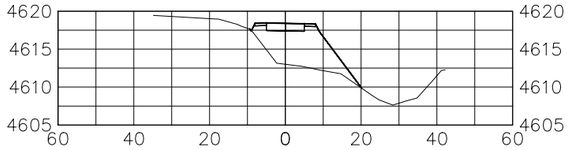

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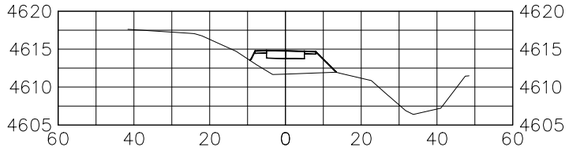

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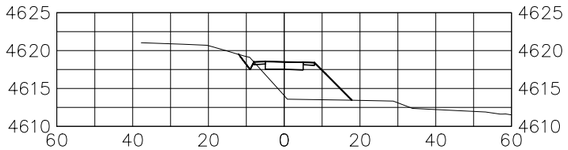

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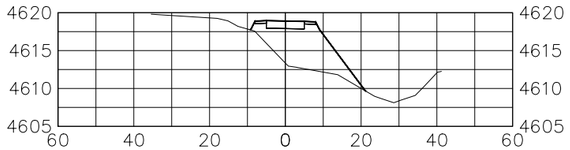

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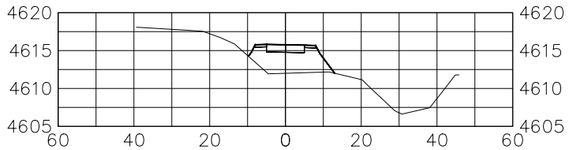

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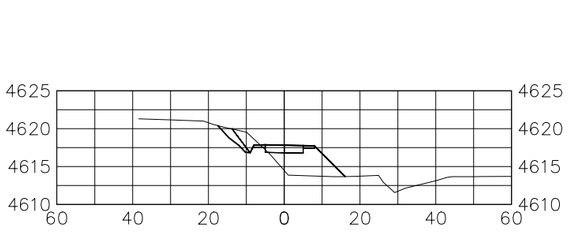

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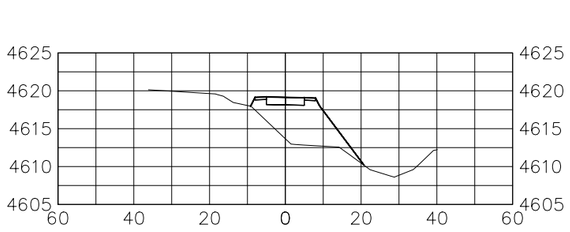

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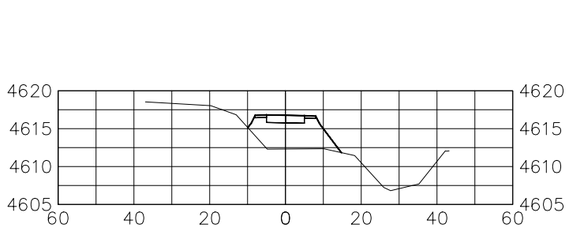

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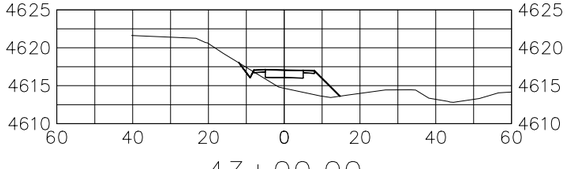

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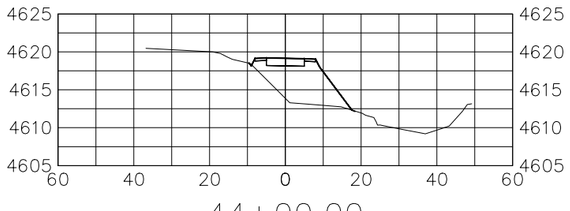

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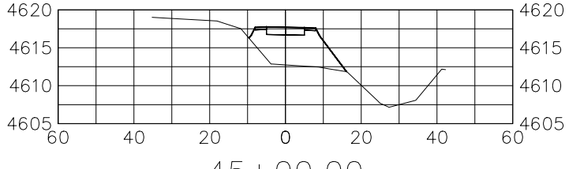

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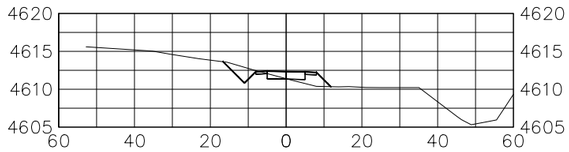

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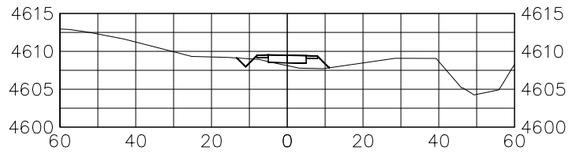

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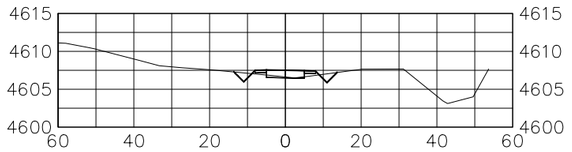

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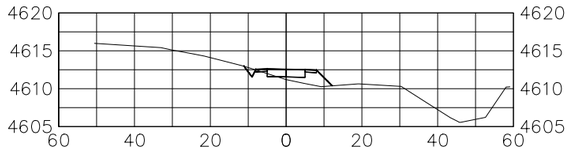

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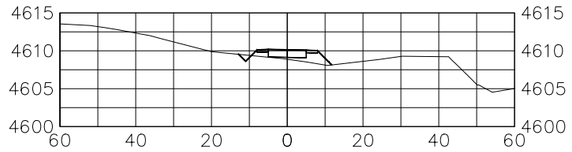

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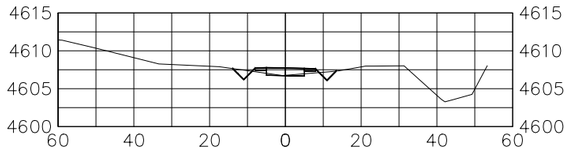

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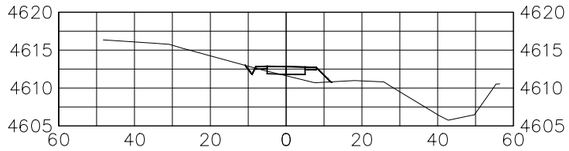

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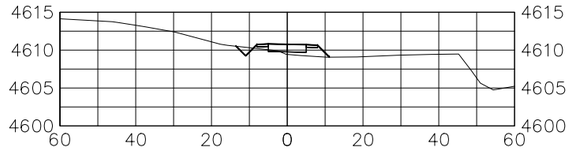

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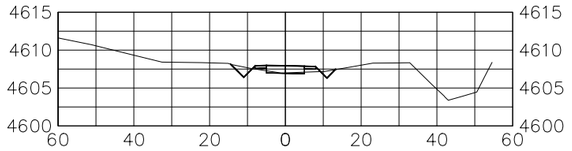

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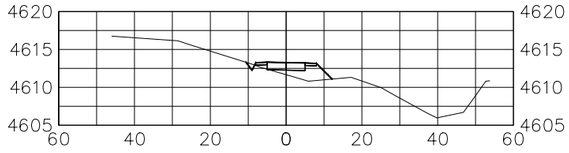

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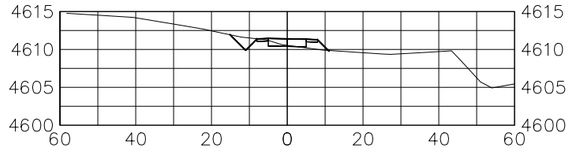

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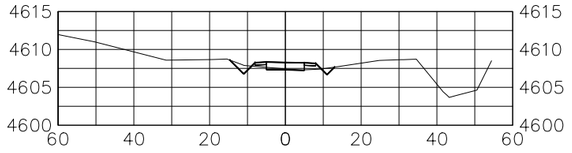

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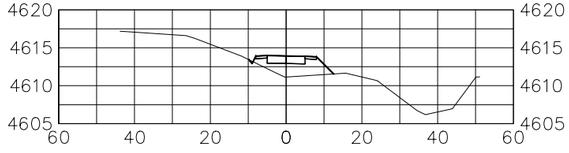

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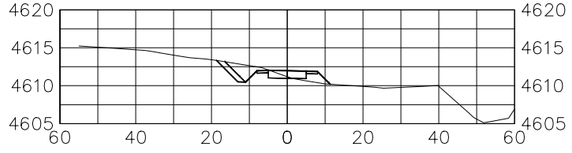

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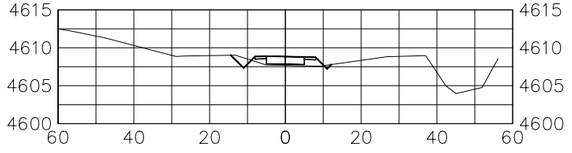

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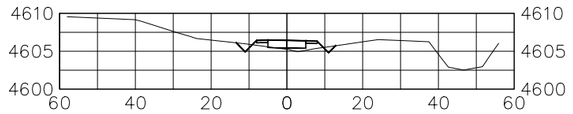
APPROVED BY TCP DATE 2019

SCALES:
PLAN & PROFILE
HORIZONTAL 0 10 20 40
VERTICAL 0 5 10 20

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
CROSS SECTIONS



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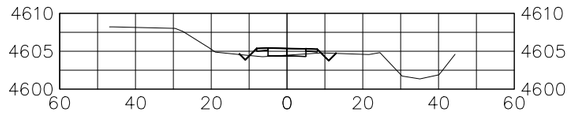

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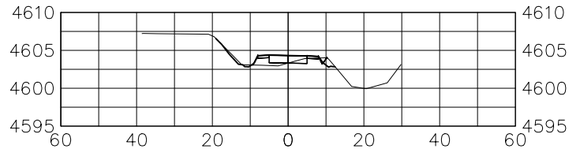

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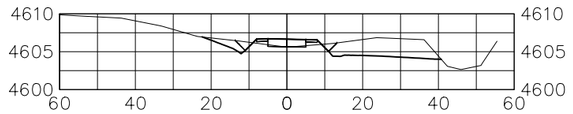

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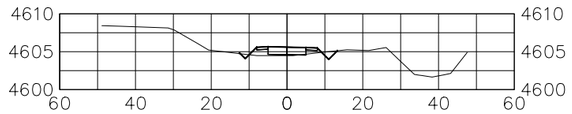

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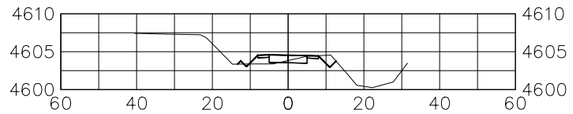

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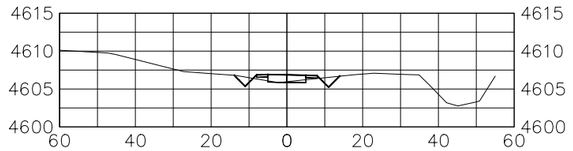

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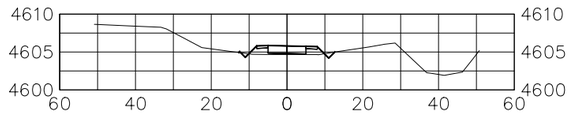

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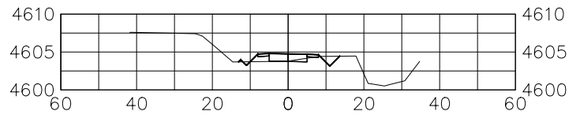

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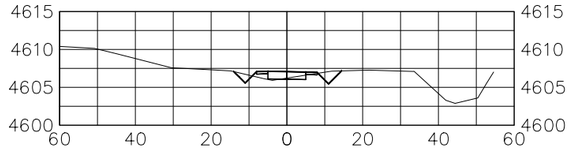

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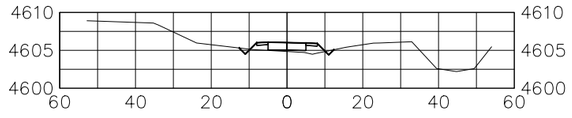

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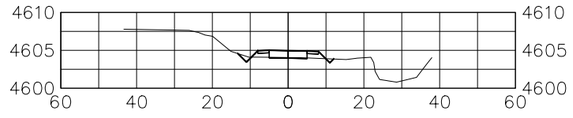

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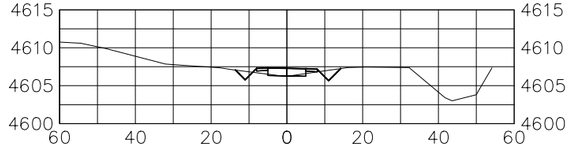

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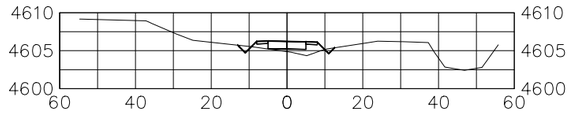

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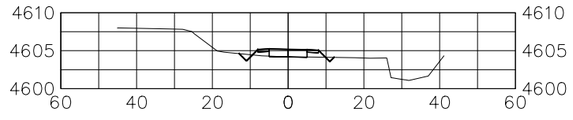

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CROSS SECTIONS

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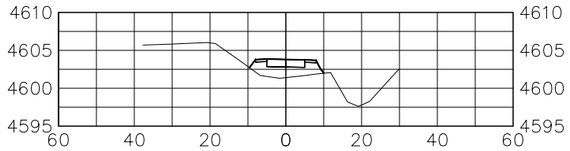

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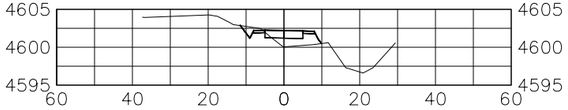

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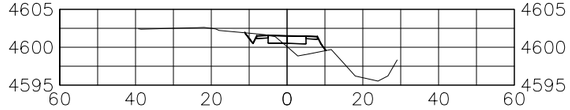

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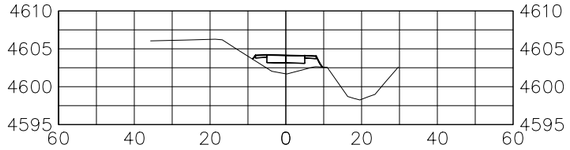

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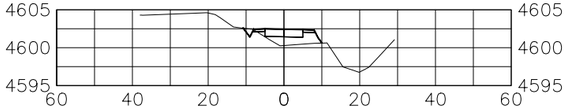

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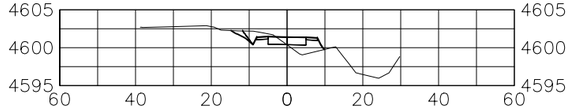

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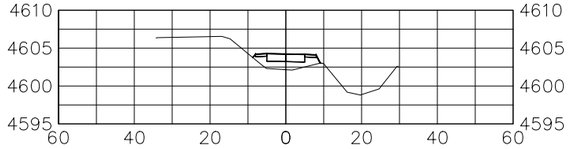

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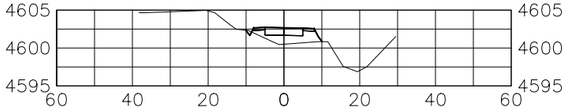

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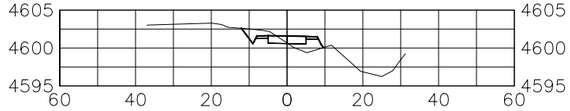

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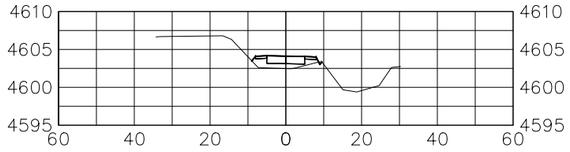

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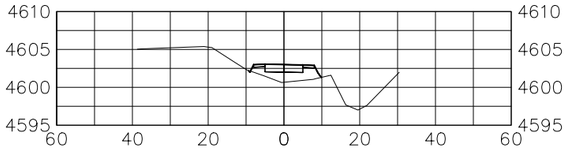

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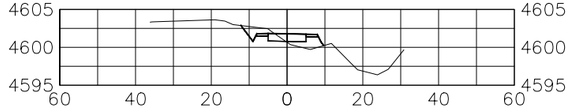

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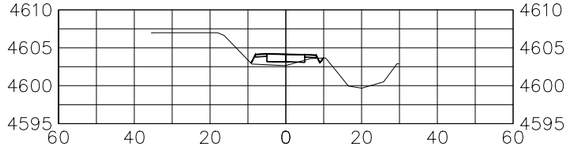

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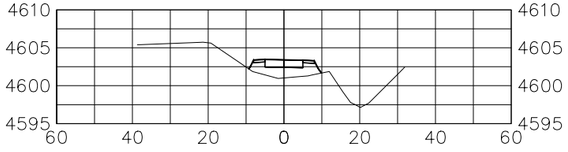

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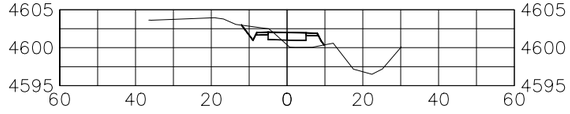

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CROSS SECTIONS

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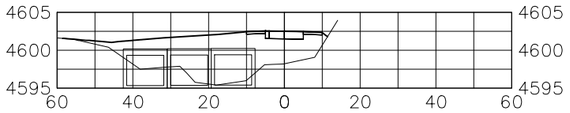

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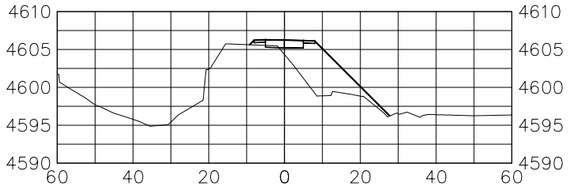

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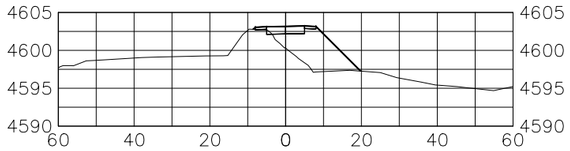

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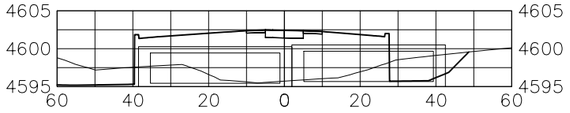

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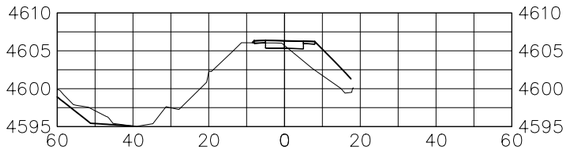

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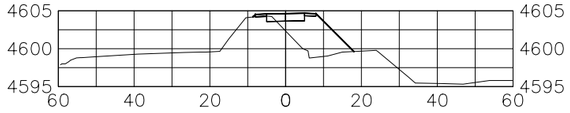

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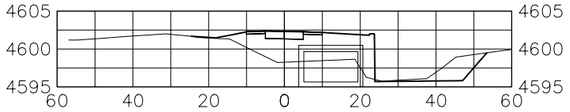

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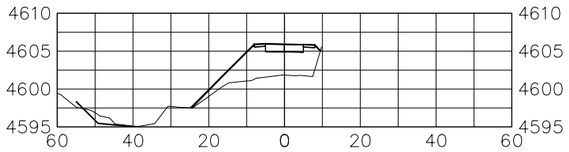

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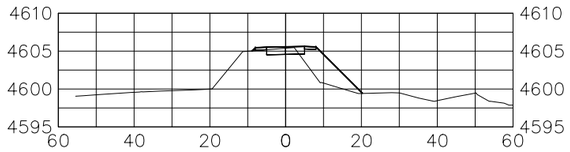

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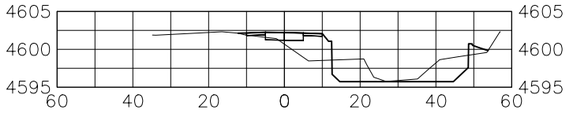

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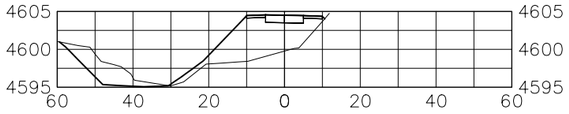

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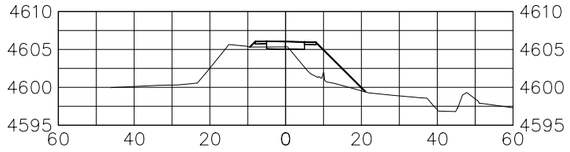

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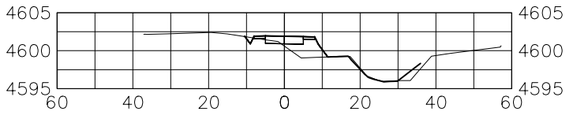

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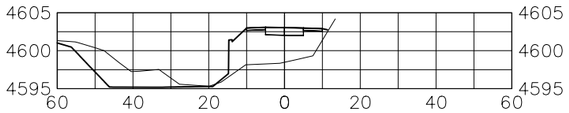

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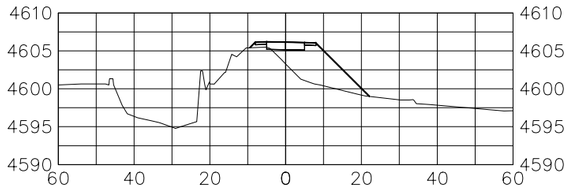

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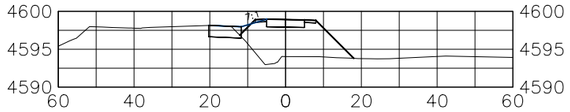

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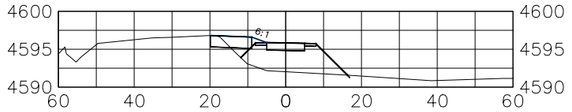

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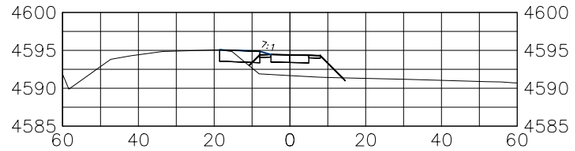

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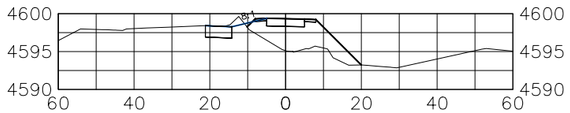

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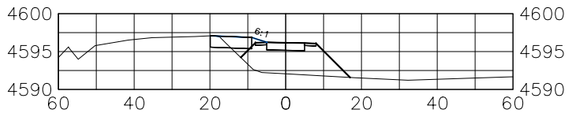

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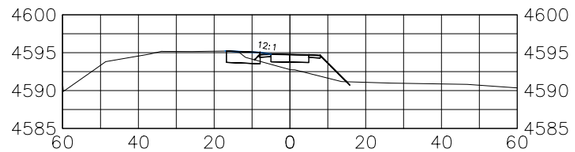

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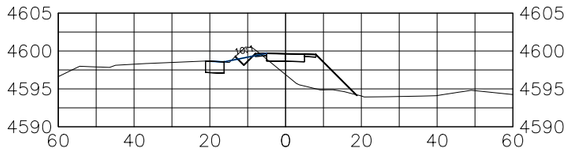

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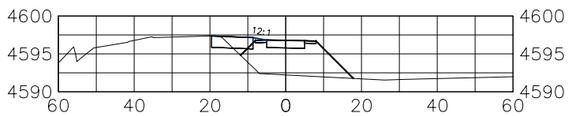

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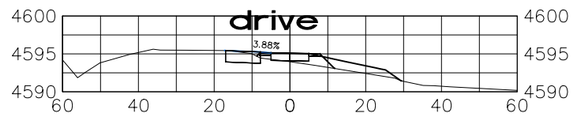

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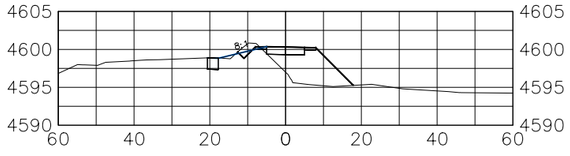

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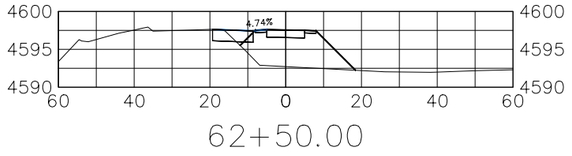

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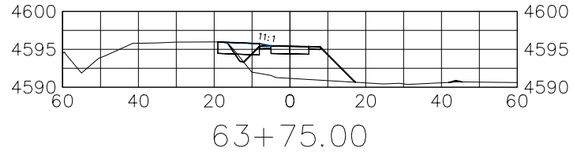

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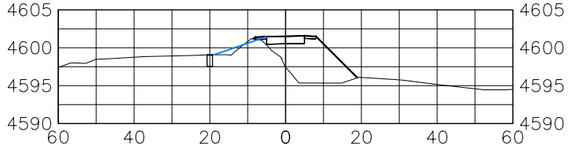

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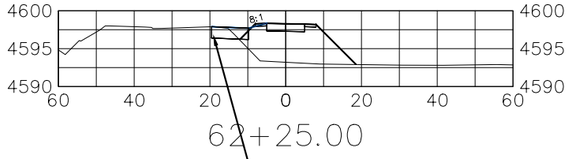

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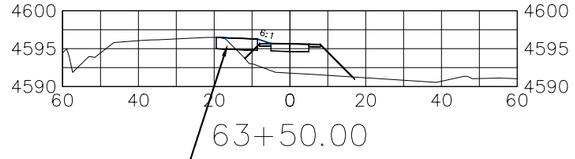

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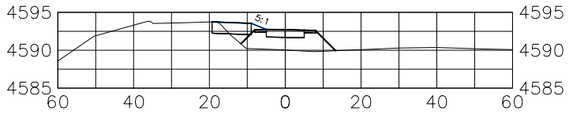

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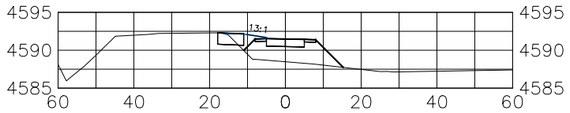

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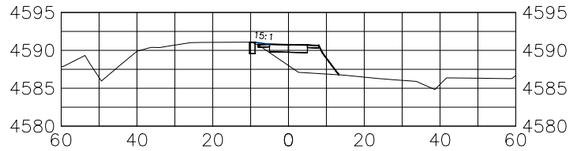

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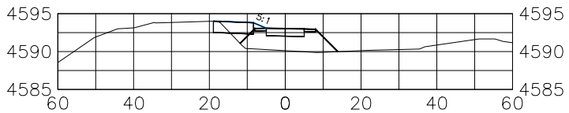

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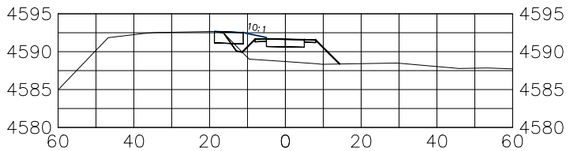

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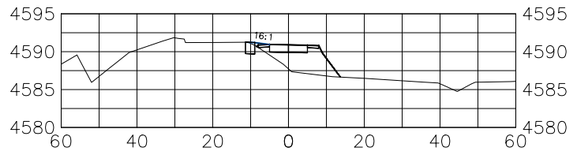

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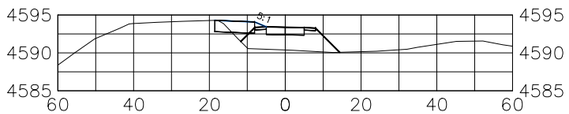

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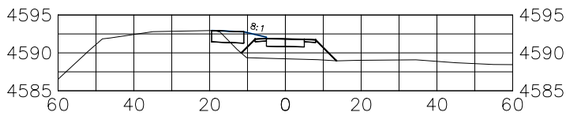

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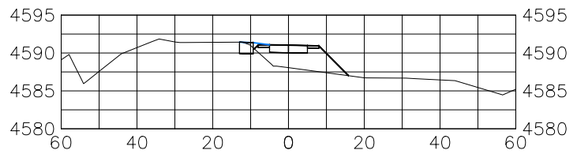

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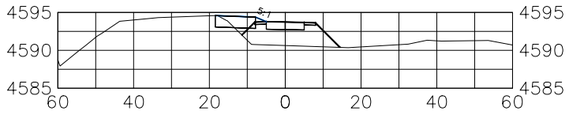

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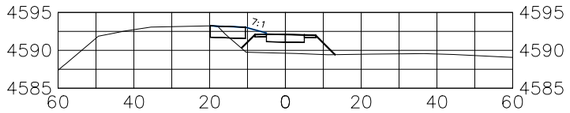

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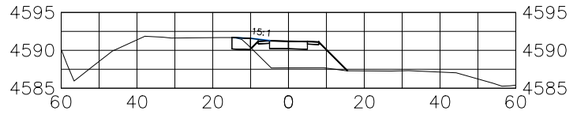

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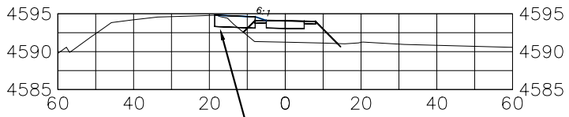

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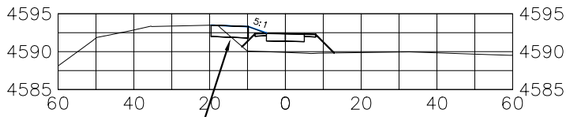

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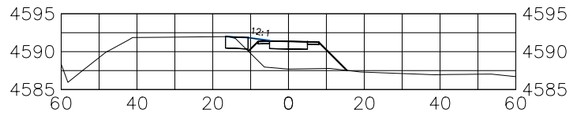

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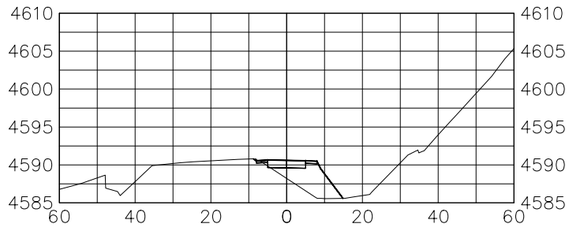

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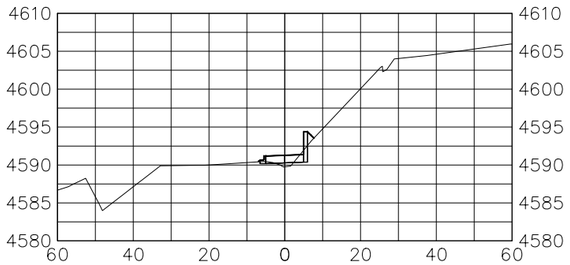

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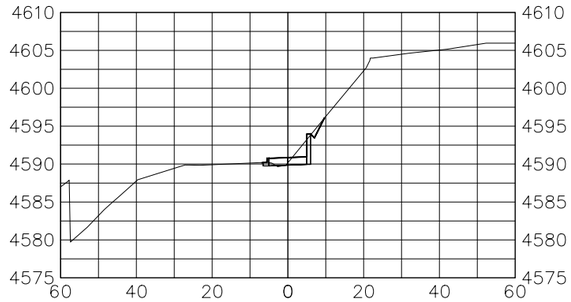

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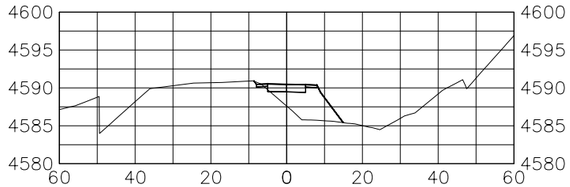

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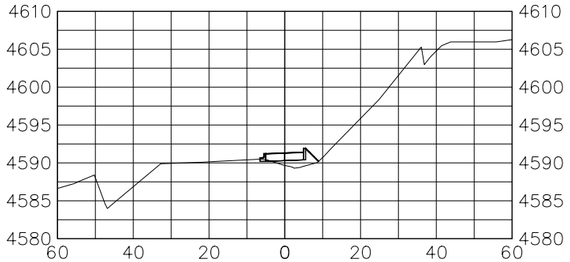

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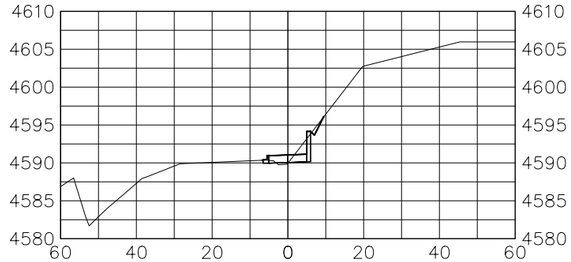

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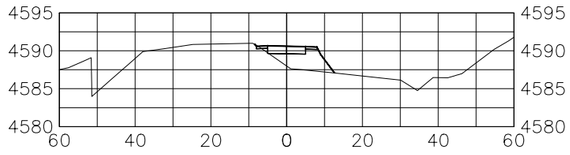

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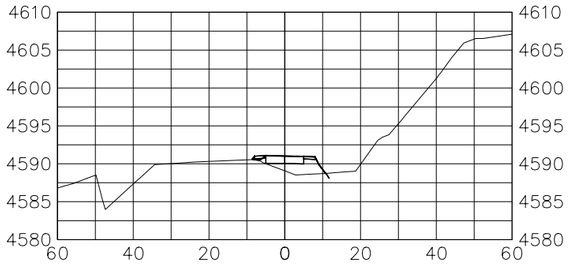

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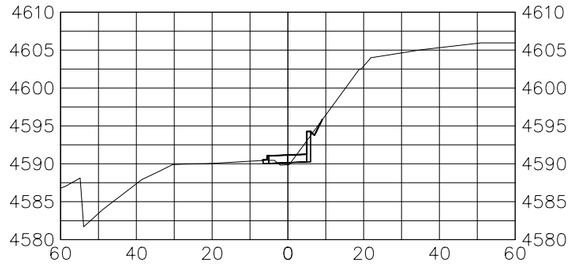

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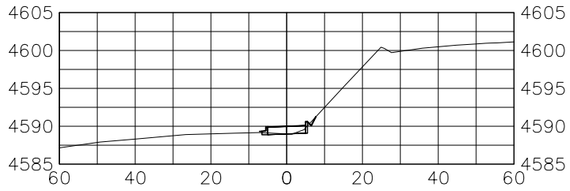

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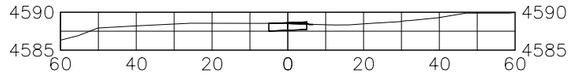

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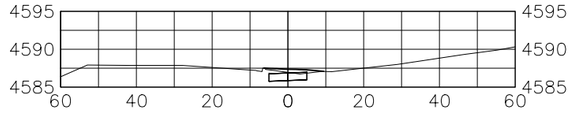

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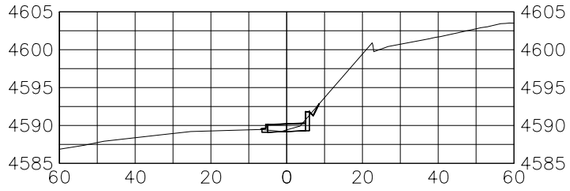

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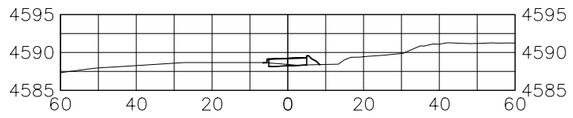

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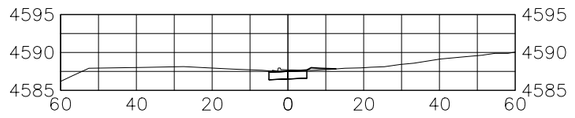

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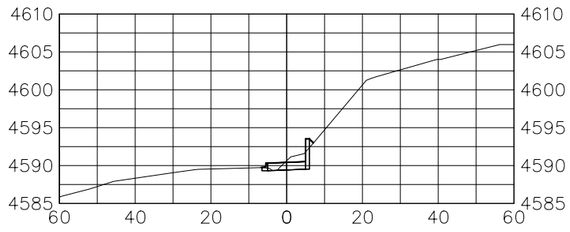

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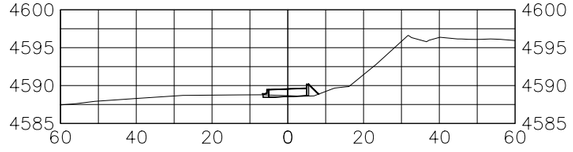

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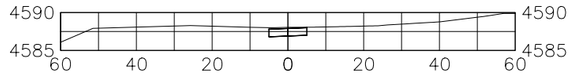

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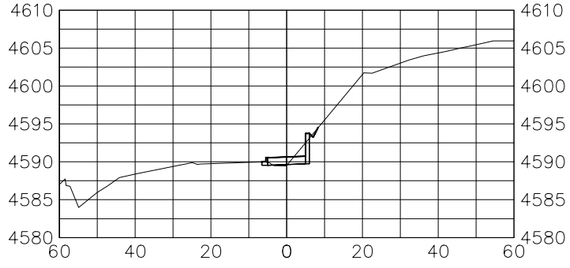

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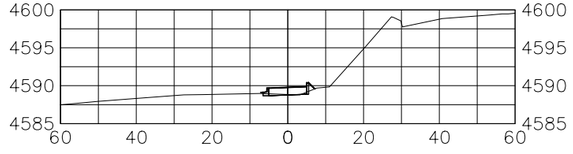

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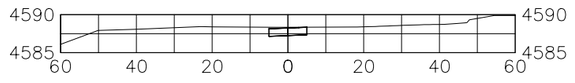

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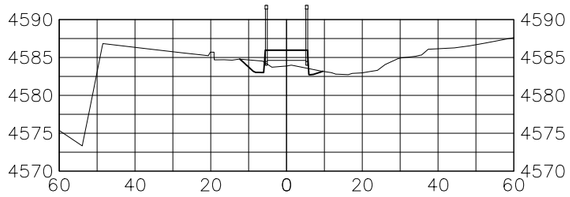

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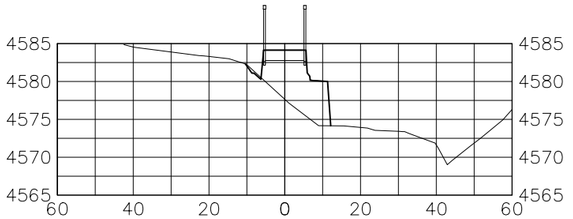

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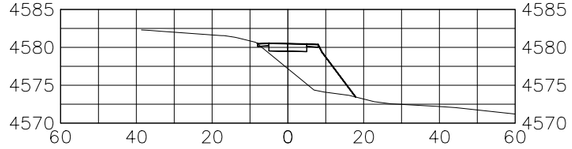

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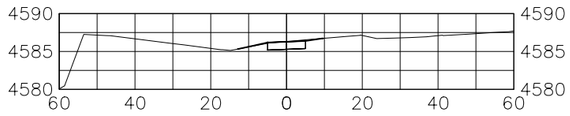

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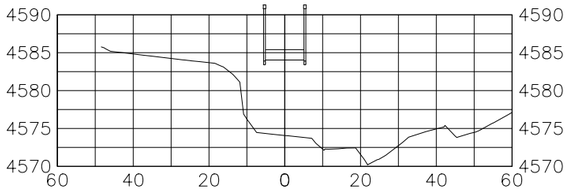

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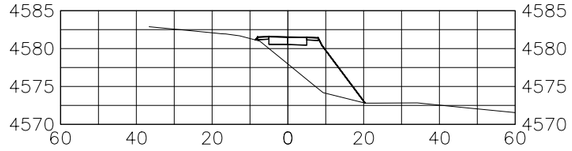

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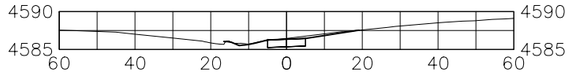

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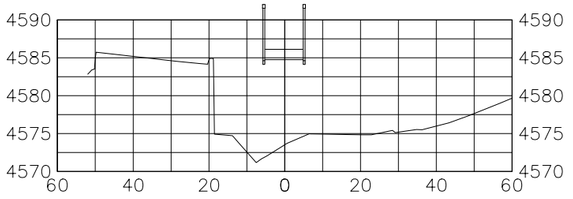

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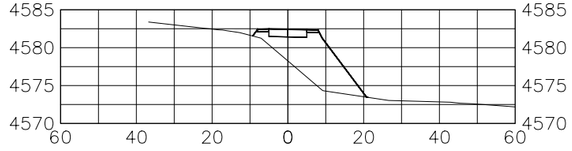

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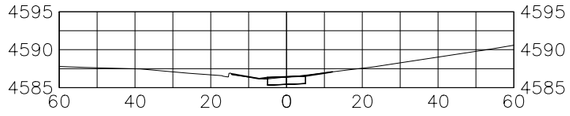

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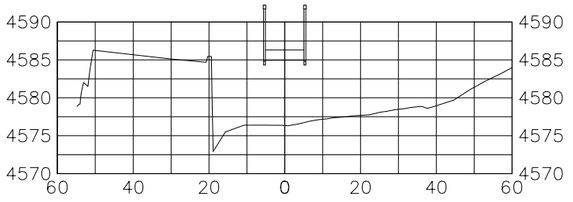

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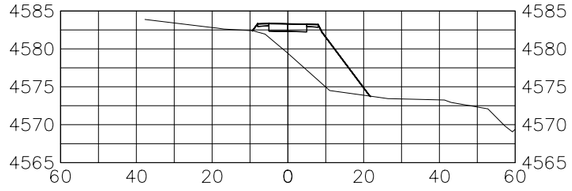

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SCALES:
PLAN & PROFILE
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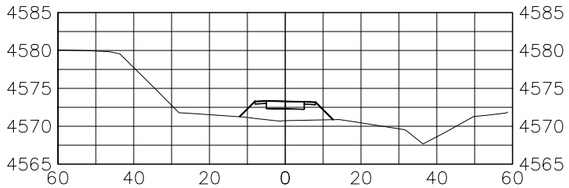
CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
CROSS SECTIONS



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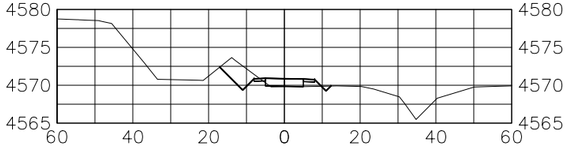

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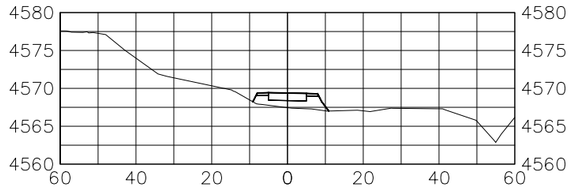

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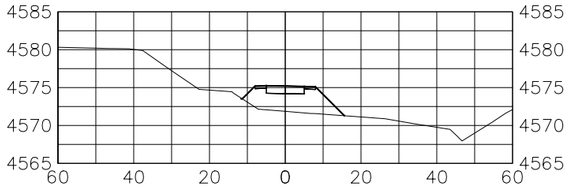

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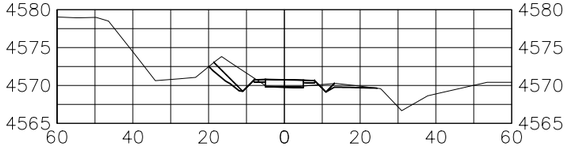

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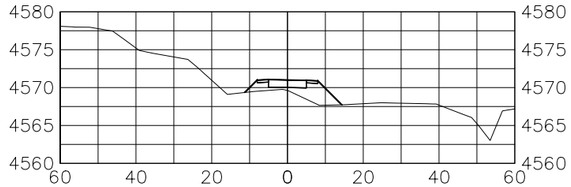

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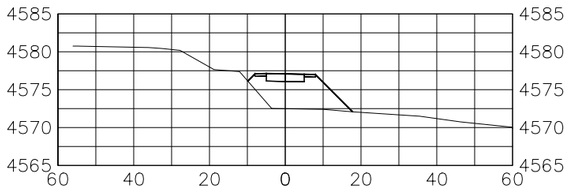

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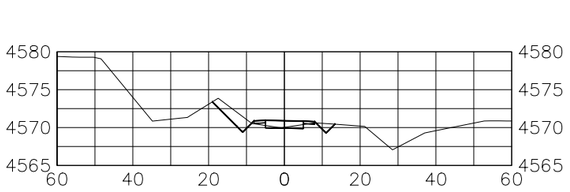

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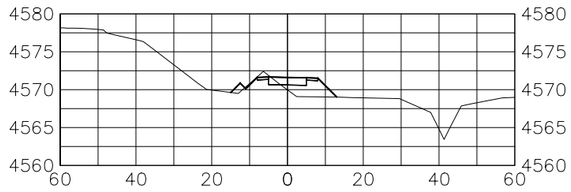

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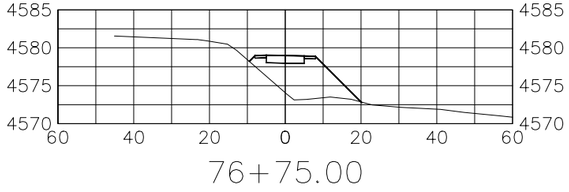

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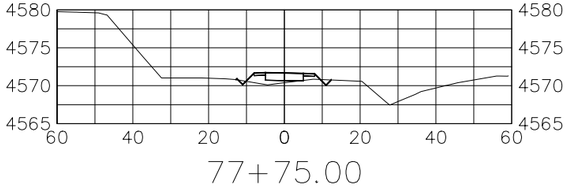

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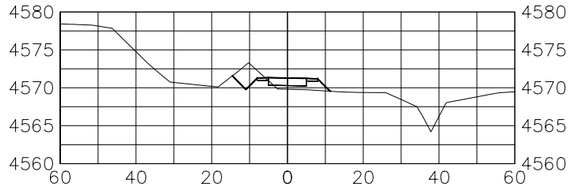

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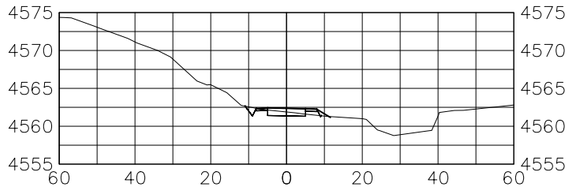
MONUMENT ROAD BICYCLE PATH
CROSS SECTIONS



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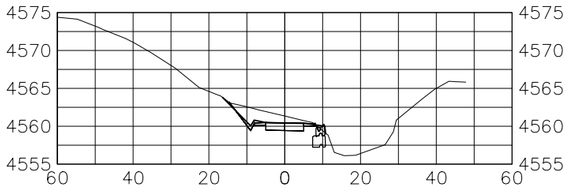

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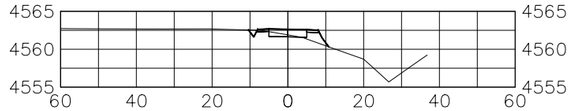

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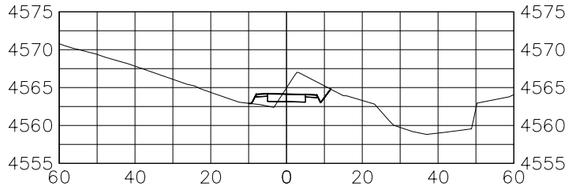

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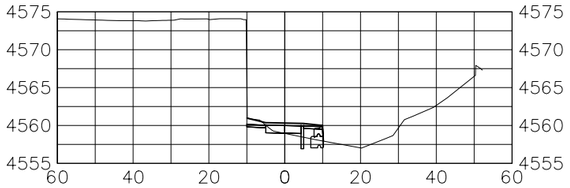

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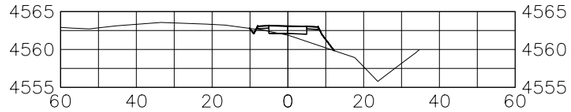

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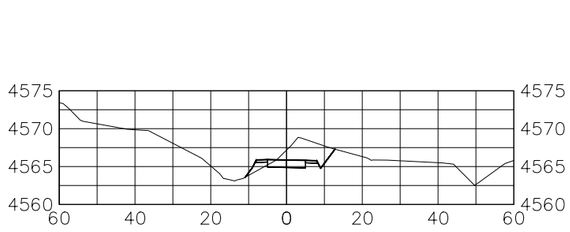

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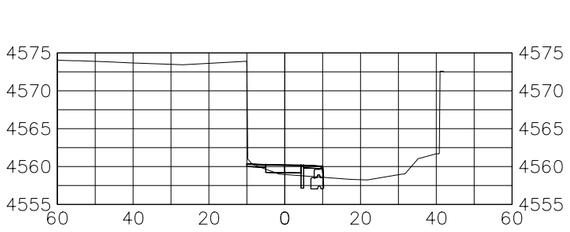

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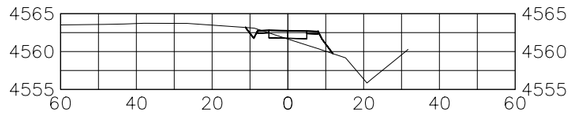

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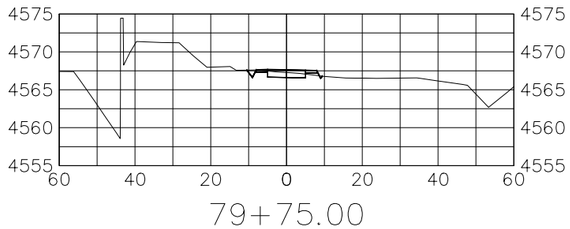

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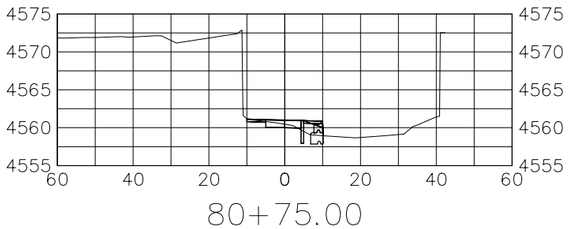

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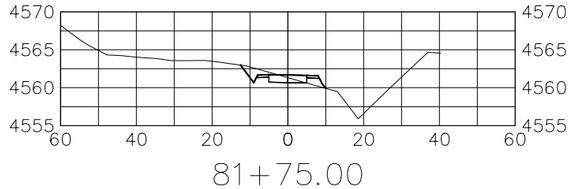

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DRAWN BY JCS DATE 2019
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APPROVED BY TCP DATE 2019

SCALES:
PLAN & PROFILE
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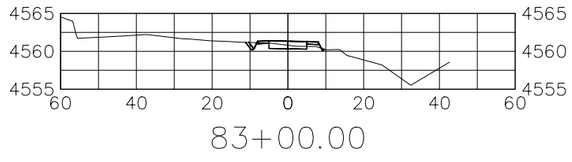
VERTICAL 0 5 10 20

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
CROSS SECTIONS



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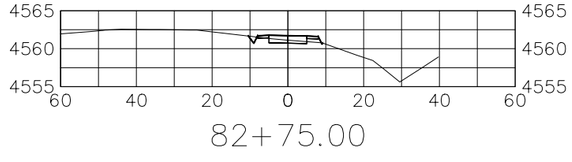

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SCALES:
PLAN & PROFILE
HORIZONTAL 0 10 20 40
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CITY OF Grand Junction COLORADO

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MONUMENT ROAD BICYCLE PATH
CROSS SECTIONS

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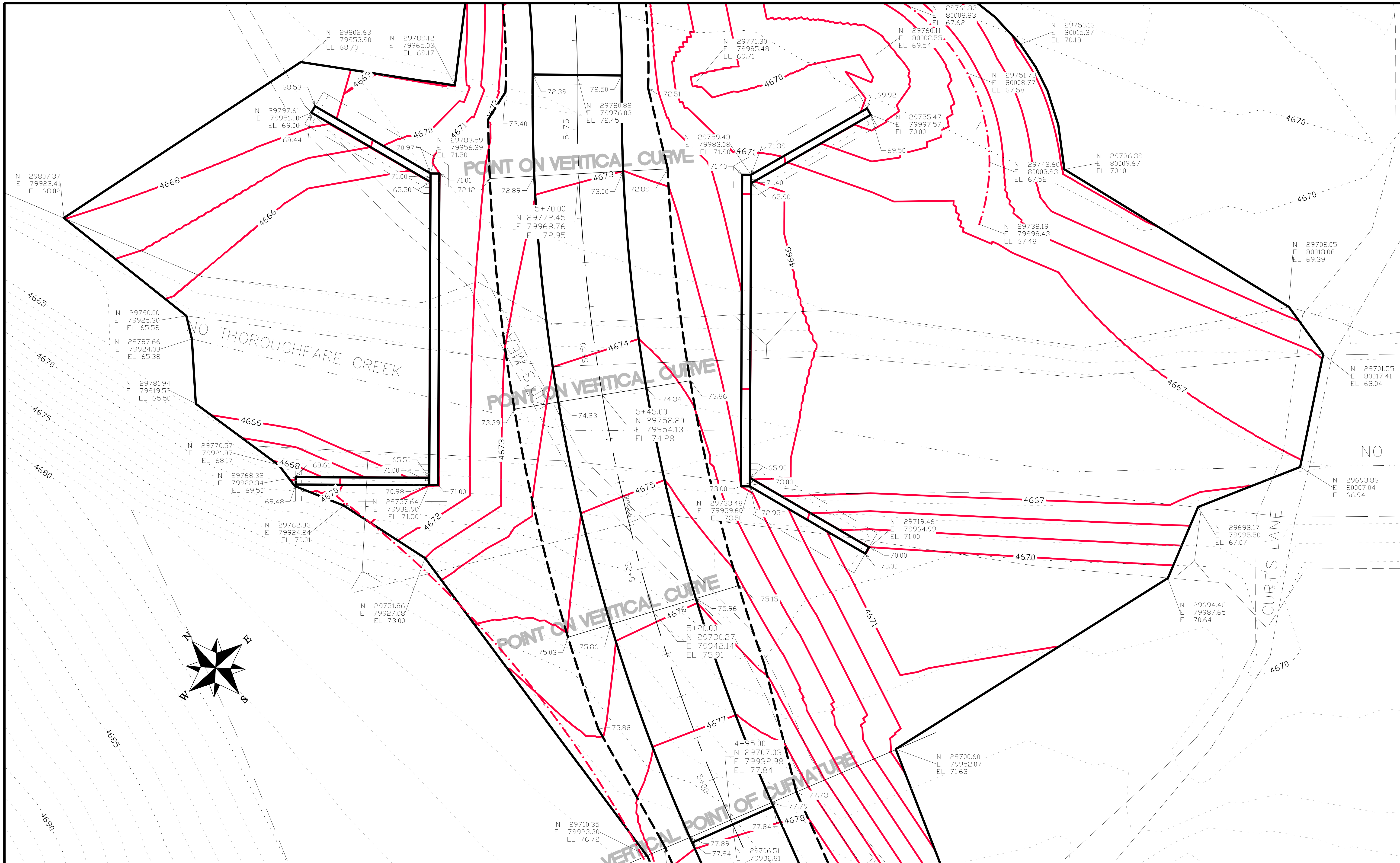

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SCALES:
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CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
GRADING PLAN

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N 31239.11
E 81221.40
EL 43.44

N 31232.62
E 81215.41
EL 43.27

N 31216.81
E 81194.78
EL 38.55

N 31215.93
E 81194.36
EL 39.00

N 31209.57
E 81207.97
EL 40.50

N 31216.15
E 81229.32
EL 40.66

N 31224.71
E 81236.34
EL 40.61

N 31224.11
E 81282.35
EL 40.43

N 31210.86
E 81249.14
EL 40.00

N 31210.50
E 81264.16
EL 38.00

N 31207.96
E 81288.43
EL 36.86

N 31207.04
E 81307.00
EL 36.82

N 31197.28
E 81175.27
EL 37.64

N 31174.95
E 81194.05
EL 38.50

N 31174.05
E 81188.56
EL 37.63

N 31174.59
E 81209.07
EL 40.50

N 31175.88
E 81250.24
EL 40.00

N 31169.52
E 81263.85
EL 38.00

N 31166.06
E 81167.86
EL 38.23

N 31171.15
E 81229.17
EL 40.84

25+00.00
N 31158.85
E 81199.43
EL 41.00

N 31156.59
E 81205.63
EL 40.97

24+75.00
N 31154.58
E 81175.53
EL 41.25

N 31156.84
E 81236.65
EL 39.11

N 31147.62
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EL 39.66

N 31147.46
E 81189.68
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N 31146.95
E 81196.64
EL 40.10

N 31144.41
E 81182.31
EL 40.35

26+00
26+25
25+75
25+50
25+25
24+75

R108.41
R91.21
R1630
R36.03

POINT OF VERTICAL CURVE
VERTICAL POINT TANGENCY

NO THOROUGHFARE CREEK
NOR'EASTER

N
W
E
S

DESCRIPTION	DATE
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REVISION △	
REVISION △	
REVISION △	

DRAWN BY JCS DATE 2019
DESIGNED BY JCS DATE 2019
CHECKED BY TCP DATE 2019
APPROVED BY TCP DATE 2019

SCALES:
PLAN & PROFILE
HORIZONTAL 0 2.5 5 10
VERTICAL NA NA NA NA

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
GRADING PLAN

N:\Landproj\2018 Monument Road Trail\dwg\00 PUBLICATION DRAWINGS\Grading Plan.dwg, Layout2, 2/28/2019 10:57:33 AM

NO THOROUGHFARE CREEK

NOR'EASTER

POINT ON VERTICAL CURVE

VERTICAL POINT OF CURVATURE

VERTICAL POINT OF TANGENCY

POINT OF VERTICAL CURVATURE

POINT OF VERTICAL TANGENCY

31+67.22
N 31492.56
E 81649.23
EL 30.28

31+75

31+76.96
N 31497.59
E 81657.56
EL 30.13

31+92.22
N 31500.92
E 81672.28
EL 29.99

32+00

32+22.22
N 31503.69
E 81711.96
EL 29.67

32+25

32+50

32+57.22
N 31519.93
E 81730.62
EL 29.38

32+75

32+82.22
N 31543.13
E 81739.21
EL 28.89

33+00

R50.00

R100.00

DESCRIPTION	DATE
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SCALES:
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HORIZONTAL 0 2.5 5 10
VERTICAL 0 NA NA NA

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ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
GRADING PLAN

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NO THOROUGHFARE CREEK

3' GUARDRAIL

4' BARBED WIRE

VERTICAL POINT OF CURVATURE

VERTICAL POINT OF TANGENCY

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REVISION △	–
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DRAWN BY	JCS	DATE	2019
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CHECKED BY	TCP	DATE	2019
APPROVED BY	TCP	DATE	2019

SCALES:
PLAN & PROFILE
HORIZONTAL 0 2.5 5 10
VERTICAL 0 NA NA NA

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
GRADING PLAN

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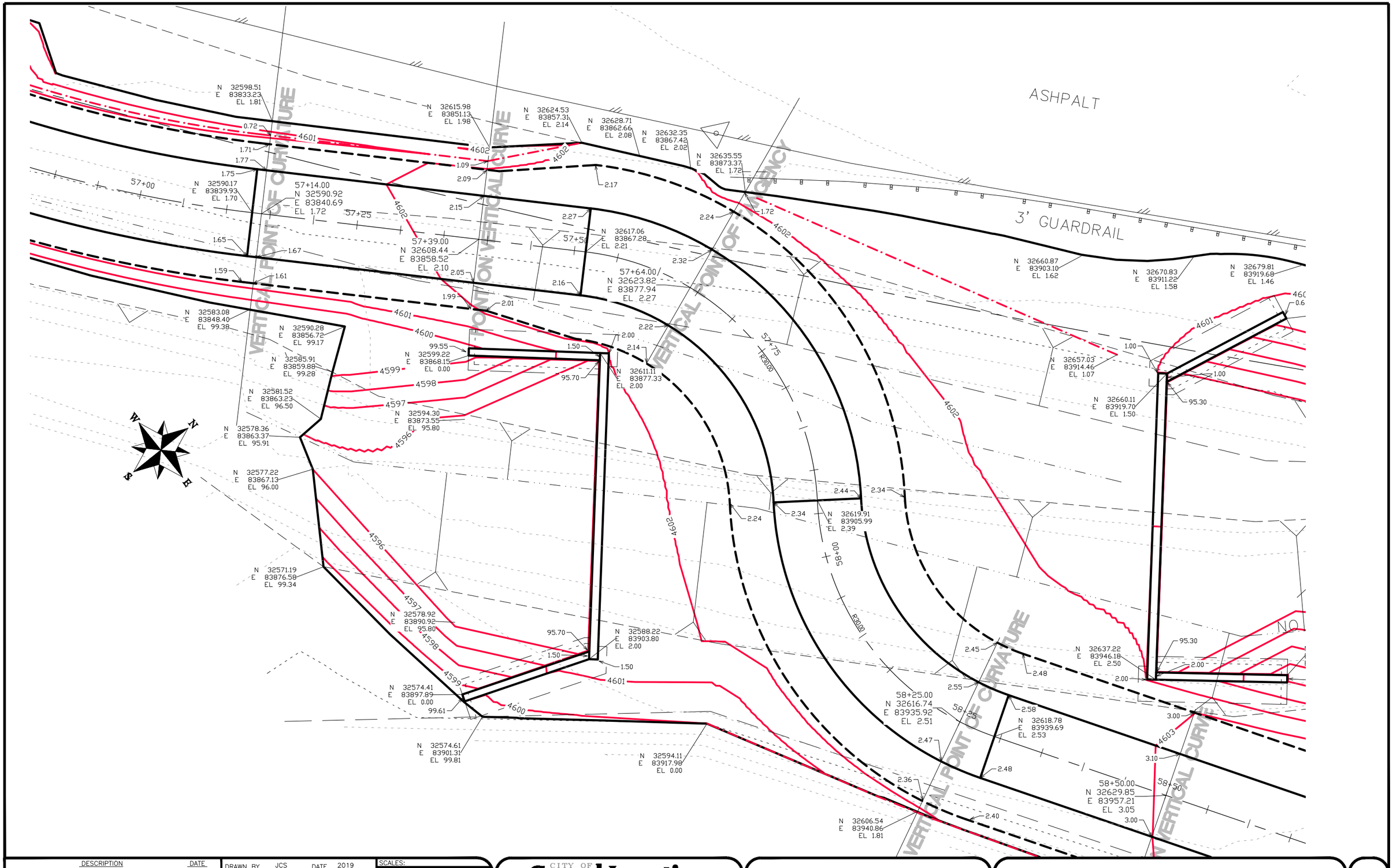

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CHECKED BY	TCP	DATE	2019
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SCALES:
PLAN & PROFILE
HORIZONTAL 0 2.5 5 10
VERTICAL 0 NA NA NA

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
GRADING PLAN

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3' GUARDRAIL WALL

NO THOROUGHFARE CREEK

VERTICAL POINT OF CURVATURE

POINT ON VERTICAL CURVE

VERTICAL POINT OF REVERSE CURVATURE

VERTICAL POINT OF TANGENCY

WALL

DESCRIPTION	DATE
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REVISION △	

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APPROVED BY TCP DATE 2019

SCALES:
PLAN & PROFILE
HORIZONTAL 0 2.5 5 10
VERTICAL 0 NA NA NA

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
GRADING PLAN

EROSION CONTROL MEASURES

Contractor to update the SWMP according to specific construction phasing and stormwater management practices for current construction activity when warranted.

Site Description

1. The site has a total disturbance area of 6 acres with the majority of disturbance being caused by the construction of the bike path adjacent to Monument Road
2. Stormwater leaves the site through No Thoroughfare Creek which drains directly to the Colorado River.
3. Proposed utilities for this project include: concrete box culverts, culverts, and storm drain.

EROSION CONTROL MEASURES

Performance Standards

The general requirements for erosion control work shall be as follows:

1. Any grading shall be conducted in such a manner so as to effectively reduce accelerated soil erosion and resulting sedimentation.
2. All grading shall be designed, constructed and completed in such a manner so that exposed area of any disturbed land shall be limited to the shortest time period.
3. Sediment caused by accelerated soil erosion shall be removed from runoff water before leaving the site.
4. The contractor shall try to minimize the amount of disturbance necessary for the construction project by preserving established vegetation to act as a BMP.

During Construction (Temporary Measures)

1. Anchored Straw Bales (ASB): The use of hay bales is proposed as culvert outlet traps at various locations that discharge to No Thoroughfare Creek as shown on the construction drawings.
2. Erosion Logs: The use of erosion logs is proposed at drop inlet locations as shown on the plans to prevent sediment from upstream flows to enter the existing drainage system. Installation shall be in accordance with plan details.
3. Gravel Erosion Bag: a gravel erosion bag is proposed in the gutter that discharges directly into No Thoroughfare Creek North of the intersection of South Redlands Road.
4. Temporary Berm: Temporary berms are proposed at the toes of slopes upslope of No Thoroughfare Creek to prevent sediment from construction activities entering No Thoroughfare Creek.

After Construction (Permanent Measures)

1. Rip-Rap: The use of rip-rap per construction drawings is proposed for around the outlet of several pipes as noted and shown.

1. Reseeding: the majority of the site will be seeded with a native seed mix in accordance with project specifications. All disturbed areas will be seeded if otherwise not proposed to be paved.

Maintenance

1. The contractor or his designated representative shall make routine checks on all erosion control measures to determine if repairs or sediment removal is necessary.
2. After each rainfall or moderate snow melt, erosion control measures are to be checked. If repairs are needed, they shall be completed immediately.
3. Silt and sediment shall be removed when they reach a height of one-half of the barrier (erosion log or anchored straw bale).
4. When temporary measures are to be removed, any silt and sediment deposits shall be removed and spread evenly in fill areas.

General Notes

1. The SWMP establishes the minimum acceptable requirements for stormwater pollution prevention on site. The Contractor may supplement these requirements as appropriate for specific construction activites. Any changes to the practices shown on this plan must be reviewed by Project Inspector/Engineer prior to implementation.
2. At all times during construction, erosion and sediment control shall be maintained by the contractor or his designated representative.
3. Erosion control systems shall be installed as grading progresses.
4. The Contractor shall provide and maintain a portable concrete washout facilty.
5. Details shown are schematic only. Adjust as necessary to fit field conditions.
6. Erosion bales shall be placed to avoid runoff flowing between, around or under bales. Bales shall be anchored with 2" x 2" x 4' wooden stakes or #4 reinforcing bars, two per bale (see details for further instructions).
7. Negative impacts to downstream areas (or receiving waters) caused by the slope grading to be monitored and corrected by the contractor.
8. Construction traffic entrances shall be cleaned on a continual basis during slope grading.
9. A copy of the SWMP and construction plans shall be maintained on site at all times.

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SCALES:
PLAN & PROFILE
HORIZONTAL 0 25 50 100
VERTICAL 0 NA NA NA

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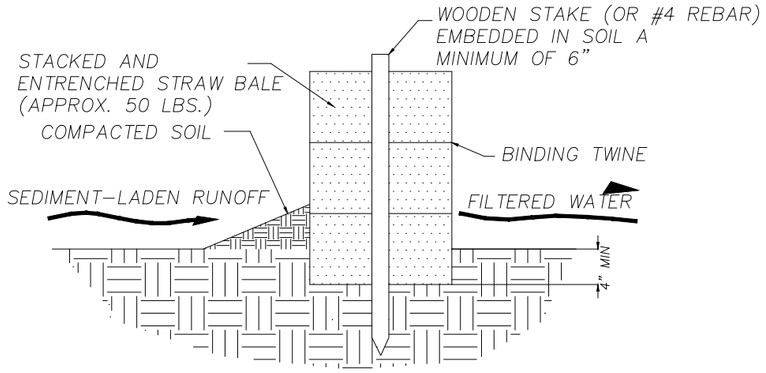
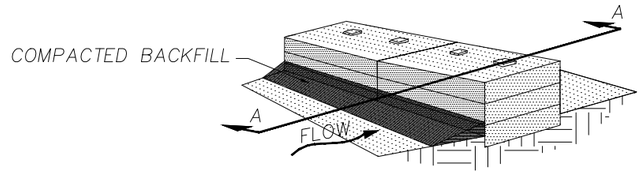
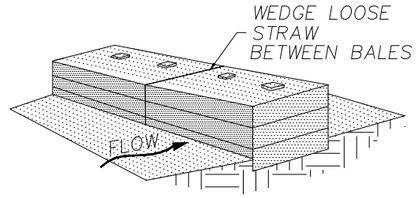
MONUMENT ROAD BICYCLE PATH
STORM WATER MANAGEMENT PLAN



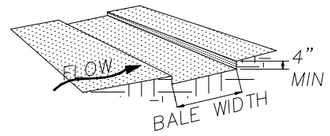
SECTION A–A



STEP 3. PLACE COMPACTED BACKFILL AGAINST THE UPSTREAM FACE.

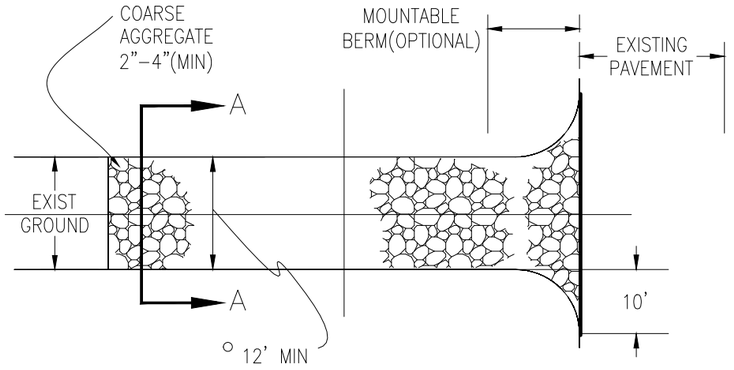


STEP 2. PLACE BALE IN TRENCH, STAKE IN PLACE



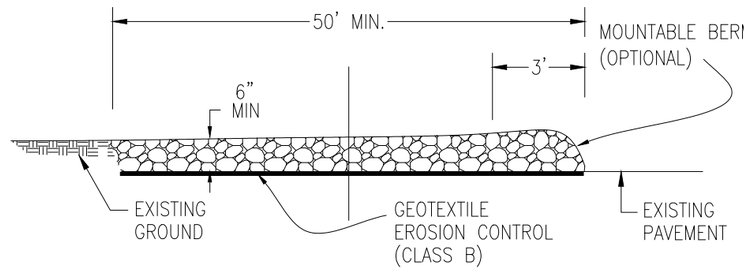
STEP 1. EXCAVATE TRENCH FOR BALES

BALE INSTALLATION PROCEDURE

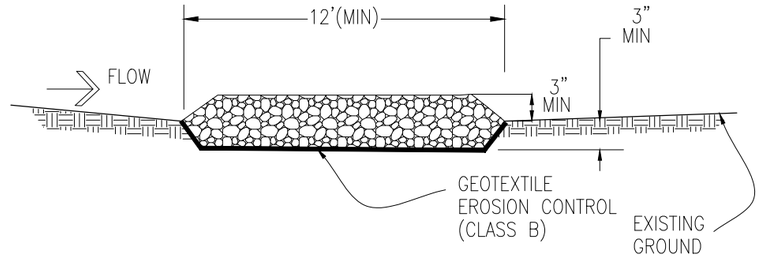


PLAN VIEW

○ MUST EXTEND FULL WIDTH OF INGRESS AND EGRESS OPERATION.

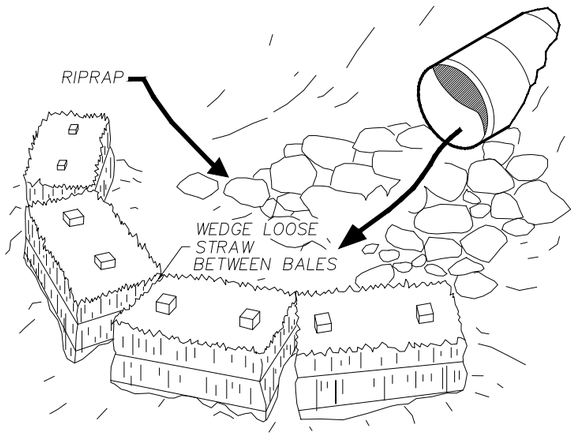


SIDE ELEVATION



SECTION A–A

STABILIZED CONSTRUCTION ENTRANCE



CULVERT OUTLET TRAP
N.T.S.
ANCHORED STRAW BALE (A.S.B.)

DESCRIPTION	DATE
REVISION △	–
REVISION △	–
REVISION △	–
REVISION △	–

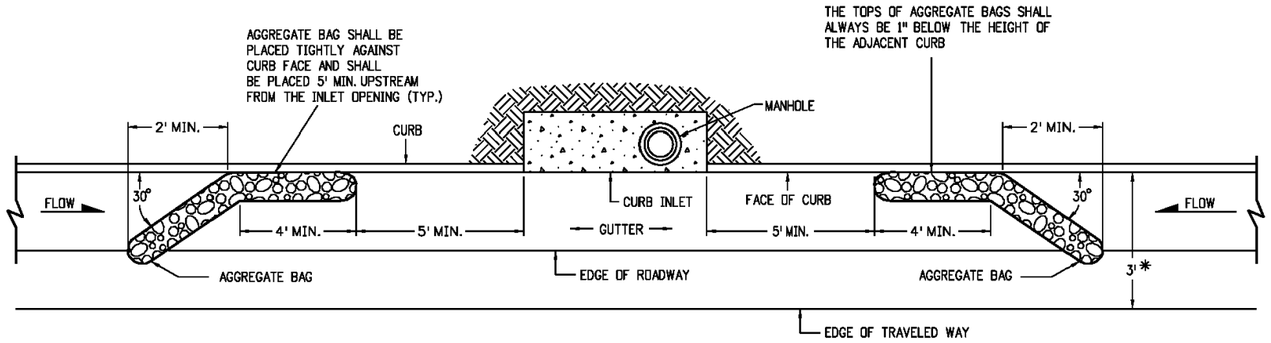
DRAWN BY JCS DATE 2019
DESIGNED BY JCS DATE 2019
CHECKED BY KA DATE 2019
APPROVED BY TCP DATE 2019

SCALES:
PLAN & PROFILE
HORIZONTAL 0 25 50 100
VERTICAL 0 NA NA NA

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
STORM WATER MANAGEMENT PLAN

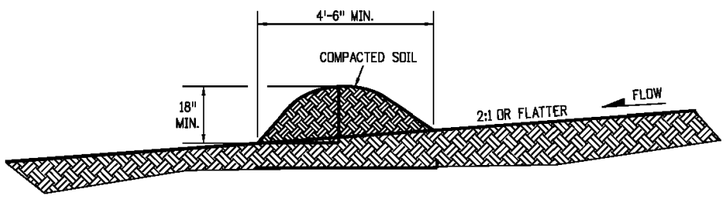


PLAN VIEW

* NOTE: USE AGGREGATE BAGS ONLY WHEN THERE IS A MINIMUM CLEARANCE OF 3 FEET FROM THE EDGE OF THE TRAVELED WAY TO THE FACE OF CURB.

LENGTH OF INLET (L)	NUMBER OF AGGREGATE BAGS UPSTREAM OF INLET
0' - 5'	1
6' -10'	2
L > 10'	3

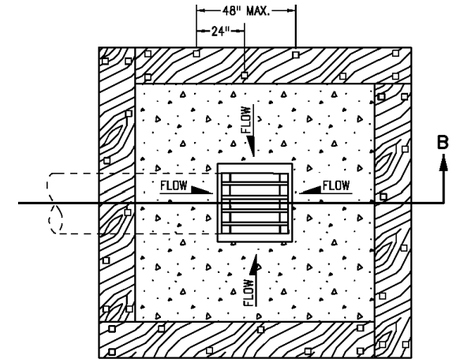
AGGREGATE BAGS AT STORM DRAIN INLET (TYPE I)



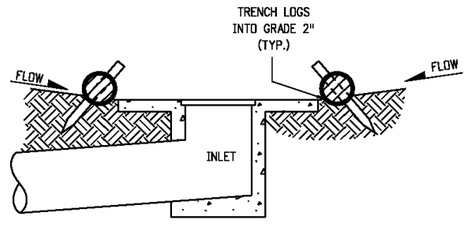
NOTES:

1. BERMS SHALL HAVE A HEIGHT OF 18 INCHES, SIDE SLOPES OF 2:1 OR FLATTER AND A MINIMUM BASE WIDTH OF 4'-6" FEET.
2. BERMS SHALL BE USED TO INTERCEPT AND DIVERT DRAINAGE TO A DESIGNATED OUTLET.
3. BERMS SHALL NOT BE USED WHERE DRAINAGE AREA EXCEEDS 10 ACRES.
4. BERMS SHALL BE CONSTRUCTED OUT OF MATERIAL COMPACTED WITH AT LEAST A MINIMUM OF ONE WHEEL ROLLED COMPACTION.
5. THE PAY ITEM NUMBER FOR TEMPORARY BERM (LF) IS 208-00300.
6. BERMS SHALL BE CONSTRUCTED OUT OF ACCEPTABLE MATERIAL THAT CAN BE COMPACTED AND RECEIVE AT A MINIMUM HEAVY EQUIPMENT WHEEL ROLLED COMPACTION.

TEMPORARY BERM



PLAN VIEW



SECTION B-B

NOTE: LOCATE EROSION LOGS AT THE OUTSIDE EDGE OF THE CONCRETE APRON.

EROSION LOG FILTER AT DROP INLET

DESCRIPTION	DATE
REVISION △	
REVISION △	
REVISION △	
REVISION △	

DRAWN BY JCS DATE 2019
DESIGNED BY JCS DATE 2019
CHECKED BY KA DATE 2019
APPROVED BY TCP DATE 2019

SCALES:
PLAN & PROFILE
HORIZONTAL 0 25 50 100
VERTICAL 0 NA NA NA

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
STORM WATER MANAGEMENT PLAN

CULVERT OUTLET TRAP
ANCHORED STRAW BALE
PLACED JUST UPSTREAM OF
WHERE PATHSIDE SWALE
DISCHARGES TO NO THOROUGH
FARE CREEK

CULVERT OUTLET TRAP
ANCHORED STRAW BALE
PLACED JUST BELOW WHERE
PATHSIDE SWALE AND CULVERT
DISCHARGES TO EXISTING EARTH SWALE

MARIPOSA DR

9' X 4' ID CONC
BOX CULVERTS
(3 EA)

MONUMENT ROAD

LUNCH LOOPS TRAILHEAD

NO THOROUGHFARE CREEK

STABILIZED CONSTRUCTION ENTRANCE

0+00 1+00 2+00 3+00 4+00 5+00 6+00 7+00 8+00 9+00 10+00 11+00 12+00 13+00 14+00 15+00 16+00

TEMPORARY BERM
AT TOE OF FILL

NO THOROUGHFARE CREEK

12" CULVERT
CROSSING PATH

HIGH POINT

CULVERT OUTLET TRAP
ANCHORED STRAW BALE
PLACED JUST BELOW WHERE
PATHSIDE SWALE DISCHARGES
TO EXISTING EARTH SWALE

CULVERT OUTLET TRAP
ANCHORED STRAW BALE

CULVERT OUTLET TRAP
ANCHORED STRAW BALE
PLACED JUST UPSTREAM OF
WHERE PATHSIDE SWALE
DISCHARGES TO NO THOROUGH
FARE CREEK

DESCRIPTION	DATE
REVISION △	–
REVISION △	–
REVISION △	–
REVISION △	–

DRAWN BY JCS DATE 2019
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CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
STORM WATER MANAGEMENT PLAN

CULVERT OUTLET TRAP
ANCHORED STRAW BALE
PLACED JUST BELOW WHERE
PATHSIDE SWALE AND CULVERT
DISCHARGES TO EXISTING EARTH SWALE

CULVERT OUTLET TRAP
ANCHORED STRAW BALE
PLACED JUST UPSTREAM OF
WHERE PATHSIDE SWALE
DISCHARGES TO NO THOROUGH
FARE CREEK

TEMPORARY BERM
AT TOE OF FILL

9' X 4' ID CONC
BOX CULVERTS
(3 EA)

NO THOROUGHFARE CREEK

MONUMENT ROAD

12" CULVERT
CROSSING PATH

17+00
18+00
19+00
20+00
21+00
22+00
23+00
24+00
25+00
26+00
27+00
28+00
29+00
30+00
31+00
32+00
33+00
34+00

12" CULVERT
CROSSING PATH

TEMPORARY BERM
AT TOE OF FILL

CULVERT OUTLET TRAP
ANCHORED STRAW BALE
PLACED JUST UPSTREAM OF
WHERE PATHSIDE SWALE
DISCHARGES TO NO THOROUGH
FARE CREEK

CULVERT OUTLET TRAP
ANCHORED STRAW BALE

NO THOROUGHFARE CREEK

9' X 4' ID CONC
BOX CULVERTS
(3 EA)

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DESCRIPTION	DATE
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REVISION △	–
REVISION △	–

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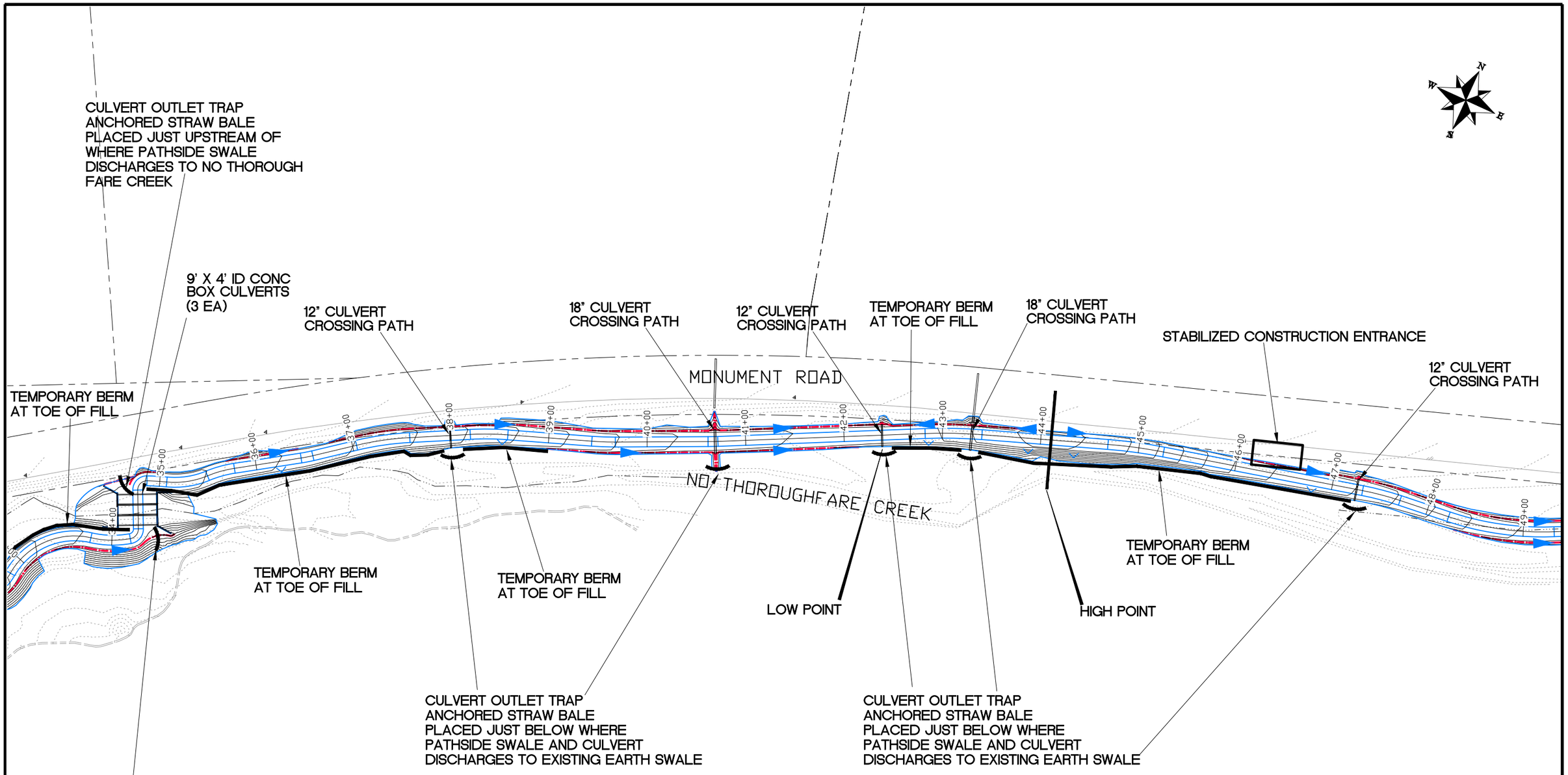
CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
STORM WATER MANAGEMENT PLAN



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VERTICAL 0 NA NA NA

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
STORM WATER MANAGEMENT PLAN

12" CULVERT
CROSSING PATH

GLADE PARK RD

CULVERT OUTLET TRAP
ANCHORED STRAW BALE
PLACED JUST UPSTREAM OF
WHERE PATHSIDE SWALE
DISCHARGES TO NO THOROUGH
FARE CREEK

MONUMENT ROAD

TEMPORARY BERM
AT TOE OF FILL

CULVERT OUTLET TRAP
ANCHORED STRAW BALE
PLACED JUST BELOW WHERE
PATHSIDE SWALE AND CULVERT
DISCHARGES TO EXISTING
EARTH SWALE

TEMPORARY BERM
AT TOE OF FILL

18" CULVERT
CROSSING PATH

LOW POINT

12" CULVERT
CROSSING PATH

LOW POINT

50+00
51+00
52+00
53+00
54+00
55+00
56+00
57+00
58+00
59+00
60+00
61+00
62+00
63+00
64+00
65+00
66+00

NO THOROUGHFARE CREEK

TEMPORARY BERM
AT TOE OF FILL

9' X 4' ID CONC
BOX CULVERTS
(3 EA)

HIGH POINT

CULVERT OUTLET TRAP
ANCHORED STRAW BALE
PLACED JUST BELOW WHERE
PATHSIDE SWALE AND CULVERT
DISCHARGES TO EXISTING EARTH SWALE

HIGH POINT

CULVERT OUTLET TRAP
ANCHORED STRAW BALE
PLACED JUST BELOW WHERE
PATHSIDE SWALE AND CULVERT
DISCHARGES TO EXISTING EARTH SWALE

S REDLANDS RD

N
W
E
S

DESCRIPTION	DATE
REVISION △	
REVISION △	
REVISION △	
REVISION △	

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VERTICAL 0 NA NA NA

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
STORM WATER MANAGEMENT PLAN

STABILIZED CONSTRUCTION ENTRANCES

BRIDGE

LOW POINT

HIGH POINT

AGGREGATE BAG
AT EX GUTTER

12" CULVERT
CROSSING PATH

CULVERT OUTLET TRAP
ANCHORED STRAW BALE

12" CULVERT
CROSSING PATH

NO THOROUGHFARE CREEK

EXISTING STORM

TEMPORARY BERM
AT TOE OF FILL

CULVERT OUTLET TRAP
ANCHORED STRAW BALE

LOW POINT

D RD

HIGH POINT

TEMPORARY BERM
AT TOE OF FILL

NO THOROUGHFARE CREEK

MONUMENT ROAD

EROSION LOG FILTER
AT DROP INLET

LOW POINT

STABILIZED CONSTRUCTION ENTRANCES

S REDLANDS RD

EROSION LOG FILTER
AT DROP INLET

12" CULVERT
CROSSING PATH

HIGH POINT

TEMPORARY BERM
AT TOE OF FILL

CULVERT OUTLET TRAP
ANCHORED STRAW BALE

EXISTING STORM
BY CITY CREWS

TEMPORARY BERM
AT TOE OF FILL

DESCRIPTION	DATE
REVISION △	
REVISION △	
REVISION △	
REVISION △	

DRAWN BY	JCS	DATE	2019
DESIGNED BY	JCS	DATE	2019
CHECKED BY	KA	DATE	2019
APPROVED BY	TCP	DATE	2019

SCALES:
PLAN & PROFILE
HORIZONTAL 0 25 50 100
VERTICAL 0 NA NA NA

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
STORM WATER MANAGEMENT PLAN

GENERAL NOTES

DETAILING

EXCEPT AS SHOWN IN THE PLANS, STRUCTURE EXCAVATION AND BACKFILL SHALL BE IN ACCORDANCE WITH M-206-1.

EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATION M213.

A COLORED STRUCTURAL CONCRETE COATING FINISH WILL BE REQUIRED, AS SHOWN ON THE PLANS, ON EXPOSED CONCRETE SURFACES. THE COLOR SHALL BE FEDERAL COLOR 30372 (SAND).CONTRACTOR SHALL PROVIDE TEST PANELS, PRIOR TO APPLICATION, FOR APPROVAL.

ALL EXPOSED CONCRETE SURFACES SHALL RECEIVE A CLASS 2 FINAL FINISH TO ONE FOOT BELOW THE GROUND LINE, EXCEPT THOSE SURFACES NOTED TO RECEIVE STRUCTURAL CONCRETE COATING. CLASS 2 FINAL FINISH IS INCIDENTAL TO CONCRETE.

THE FOLLOWING STRUCTURAL STEEL SHALL BE ASTM A847 GRADE 50W: PREFABRICATED STRUCTURAL STEEL BRIDGE TUBING.

THE FOLLOWING STRUCTURAL STEEL SHALL BE ASTM A709 GRADE 50W: BEARING PLATES AND BEARING DEVICES, AND PREFABRICATED STRUCTURAL STEEL BRIDGE STRUCTURAL SHAPES.

THE FOLLOWING STRUCTURAL STEEL SHALL BE AASHTO M270 GRADE 50 (ASTM A-572): BRIDGE RAILING TUBES, POSTS, AND BASE PLATES.

THE FOLLOWING STRUCTURAL STEEL SHALL BE ASTM A53 GRADE B: PERMANENT CASING FOR MICROPILES.

THE FOLLOWING STRUCTURAL STEEL SHALL BE ASTM A572 GRADE 50 (MIN): BEARING PLATE STEEL FOR MICROPILES

AASHTO M-222 (ASTM A-588) MAY BE SUBSTITUTED FOR M270 GRADE 50 (ASTM A-572) AT NO ADDITIONAL COST TO THE PROJECT.

ALL BOLTS SHALL BE ⅞" DIAMETER, HIGH STRENGTH, UNLESS OTHERWISE NOTED.

ANCHOR BOLTS SHALL BE ASTM F1554, GRADE 105 AND SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A153. EACH ANCHOR. BOLT SHALL BE PROVIDED WITH TWO NUTS FOR JAMMING. NUTS FOR ANCHOR BOLTS SHALL CONFORM TO ASTM A563, GRADE A, HEAVY HEX. INJECTION MORTAR SHALL BE HILTI-HY 200 OR APPROVED EQUAL.

GRADE 60 REINFORCING STEEL IS REQUIRED.

ALL REINFORCING STEEL SHALL BE EPOXY COATED UNLESS OTHERWISE NOTED.

(N) DENOTES NON-EPOXY COATED (BLACK) REINFORCING STEEL.

AN EMERGENCY DECK CONSTRUCTION JOINT MAY BE LOCATED AT THE ONE QUARTER SPAN POINT BACK FROM A PIER OR ABUTMENT WITH RESPECT TO THE DIRECTION OF THE TOPPING SLAB PLACEMENT.

THE FOLLOWING TABLE GIVES THE MINIMUM LAP SPLICE LENGTH FOR EPOXY COATED REINFORCING BARS PLACED IN ACCORDANCE WITH SUBSECTION 602.06. THESE SPLICE LENGTHS SHALL BE INCREASED BY 25% FOR BARS SPACED AT LESS THAN 6" ON CENTER OR LESS THAN 3" OF LATERAL COVER.

BAR SIZE	#4	#5	#6	#7	#8	#9	#10	#11
SPLICE LENGTH FOR CLASS D CONCRETE	1'-3"	1'-7"	2'-5"	2'-10"	3'-8"	4'-8"	5'-11"	7'-3"

THE FOLLOWING TABLE GIVES THE MINIMUM LAP SPLICE LENGTH FOR BLACK REINFORCING BARS PLACED IN ACCORDANCE WITH SUBSECTION 602.06. THESE SPLICE LENGTHS SHALL BE INCREASED BY 25% FOR BARS SPACED AT LESS THAN 6" ON CENTER OR LESS THAN 3" OF LATERAL COVER.

BAR SIZE	#4	#5	#6	#7	#8	#9	#10	#11
SPLICE LENGTH FOR CLASS D CONCRETE	1'-1"	1'-4"	1'-7"	1'-11"	2'-6"	3'-1"	3'-11"	4'-10"

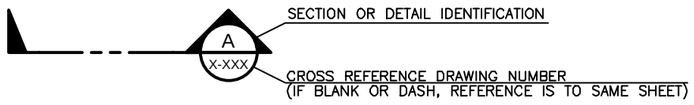
THE ABOVE SPLICE LENGTHS SHALL BE INCREASED BY 20% FOR 3 BAR BUNDLES AND 33% FOR 4 BAR BUNDLES.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION.

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 PRIOR TO ORDERING, FABRICATING, OR INSTALLING ANY MATERIAL.

ALL LONGITUDINAL AND TRANSVERSE DIMENSIONS ARE MEASURED HORIZONTALLY AND INCLUDE NO CORRECTION FOR GRADE.

ALL CONCRETE COVER OVER REINFORCING BARS SHALL BE 2" UNLESS NOTED OTHERWISE.



THE INFORMATION SHOWN ON THESE PLANS CONCERNING THE TYPE AND LOCATION OF UNDERGROUND UTILITIES AND THE EXISTING BRIDGE FOUNDATIONS 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 811 (1-800-922-1987) AT LEAST 3 DAYS (2 DAYS NOT INCLUDING THE DAY OF NOTIFICATION) PRIOR TO ANY EXCAVATION OR OTHER EARTHWORK.

BRIDGE DESCRIPTION

ONE SPAN 110' LENGTH, 10' WIDTH CARRYING THE MONUMENT ROAD BIKE PATH OVER NO THOROUGHFARE CREEK. SIMPLE SPAN. FABRICATED STEEL PONY TRUSS WITH CAST IN PLACE CONCRETE DECK. BRIDGE CENTERLINE IS APPROXIMATELY 50° TO THE NO THOROUGHFARE CREEK FLOW LINE.

DESIGN DATA

AASHTO, EIGHTH EDITION LRFD WITH CURRENT INTERIMS

DESIGN METHOD: LOAD AND RESISTANCE FACTOR DESIGN

LIVE LOAD: H5 VEHICLES LOADING (LESS THAN 20,000 CYCLES)
PEDESTRIAN LOAD: 90 PSF ON FULL DECK AREA.
WIND LOAD: 35 PSF ON FULL HEIGHT OF BRIDGE AS IF ENCLOSED.
20 PSF UPWARD FORCE APPLIED AT THE WINDWARD QUARTER POINT OF TRANVERSE BRIDGE WIDTH.
DEAD LOAD: AS DEFINED IN SECTION 3 OF AASHTO LRFD SPECIFICATIONS.

REINFORCED CONCRETE:

ABUTMENT CAPS, AND WINGWALLS:
CLASS D CONCRETE: f'c = 4,500 PSI
REINFORCING STEEL: fy = 60,000 PSI

ABUTMENT DIAPHRAGMS, DECK, AND APPROACH SLABS:
CLASS D CONCRETE: f'c = 4,500 PSI
REINFORCING STEEL: fy = 60,000 PSI

MICROPILE GROUT:
CLASS BZ CONCRETE: f'c = 4,000 PSI
REINFORCING STEEL: fy = 75,000 PSI

GROUT SHALL BE A NEAT MIX OF PORTLAND CEMENT (TYPE I/II) CONFORMING TO ASTM C150 WITH A WATER/CEMENT RATIO OF 0.45.

SEISMIC DESIGN CRITERIA

EARTHQUAKE DESIGN METHOD: FORCE BASED
LATITUDE = 39° 03' 45"N
LONGITUDE = 108° 35' 16"W

AASHTO SPECTRUM FOR 7% PE IN 75 YEARS (1000YR RETURN PERIOD)
PERIOD (sec) SA (G)
0.0 0.06 PGA - SITE CLASS B
0.2 0.13 SS - SITE CLASS B
1.0 0.03 S1 - SITE CLASS B

SPECTRAL RESPONSE ACCELERATIONS:
AS = FPGA*PGA, SDS = FA*SS, AND SD1 = FV*S1
FPGA = 1.60, FA = 1.60, FV = 2.40
PERIOD (sec) SA (G)
0.0 0.07 AS - SITE CLASS C
0.2 0.16 SDS - SITE CLASS C
1.0 0.06 SD1 - SITE CLASS C

OPERATIONAL CLASS: TYPICAL

SEISMIC ZONE OR SEISMIC DESIGN CATEGORY: ZONE=1 OR CATEGORY=A

RESPONSE MODIFICATION FACTORS:
R-FACTOR: 0.8 (CONNECTIONS)

STRUCTURE QUANTITIES

ITEM NO.	DESCRIPTION	UNIT	SUPERSTRUCTURE	ABUTMENT 1	ABUTMENT 2	TOTAL
206	STRUCTURE EXCAVATION	CY	–	25	78	103
206	STRUCTURE BACKFILL (CLASS 1)	CY	–	53	58	111
206	FILTER MATERIAL (CLASS B)	CY	–	2	2	4
206	SHORING (AREA 1)	LS	–	–	–	1
503	MICROPILE (8 INCH)	LF	–	245	292	537
506	RIPRAP (12 INCH)	CY	–	27	78	105
509	PREFABRICATED STRUCTURAL STEEL BRIDGE	LS	1	–	–	1
514	SAFETY FENCE	LF	15	–	–	15
601	CONCRETE CLASS D (BRIDGE)	CY	20	16	19	55
601	STRUCTURAL CONCRETE COATING	SY	–	11	11	22
602	REINFORCING STEEL (BLACK)	LB	–	3200	3400	6600
602	REINFORCING STEEL (EPOXY COATED)	LB	3100	–	–	3100

SHEET LIST

DESCRIPTION	DATE
REVISION △	
REVISION △	
REVISION △	
REVISION △	

DRAWN BY JCS DATE 2018
DESIGNED BY JCS DATE 2018
CHECKED BY KA DATE 2018
APPROVED BY TCP DATE 2018

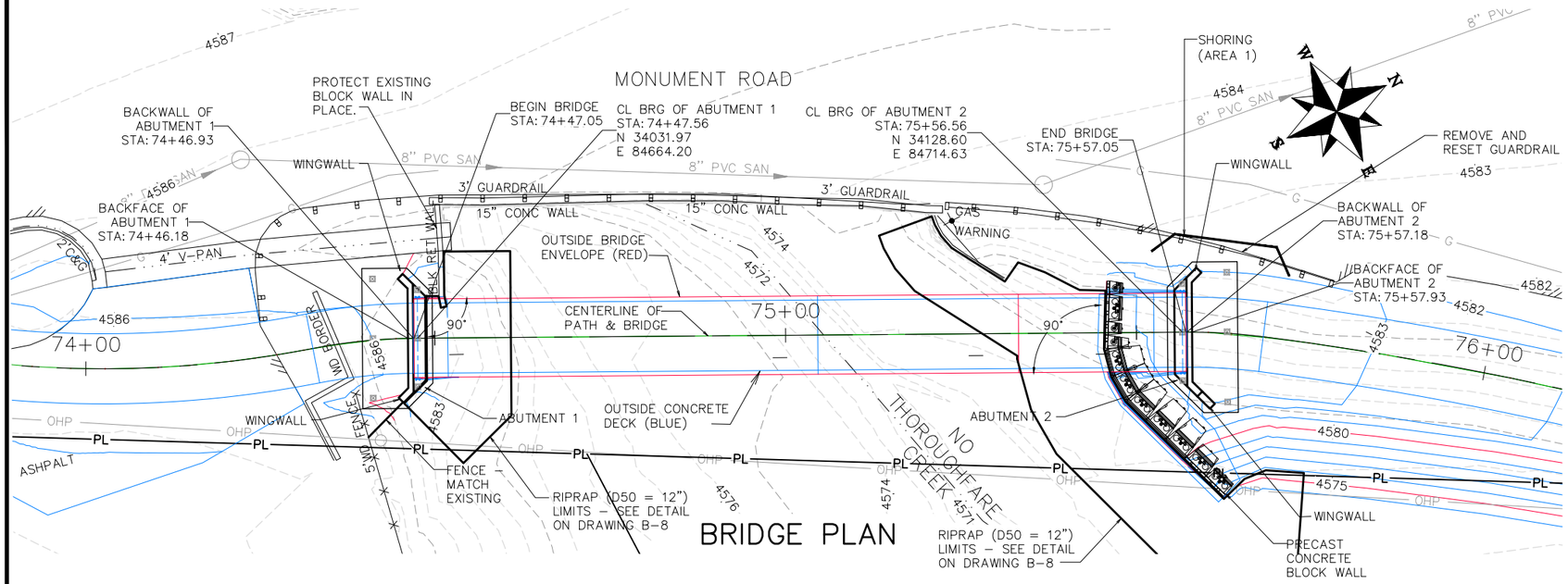
SCALES:
PLAN & PROFILE
HORIZONTAL 0 1 2 4
VERTICAL 0 NA NA NA

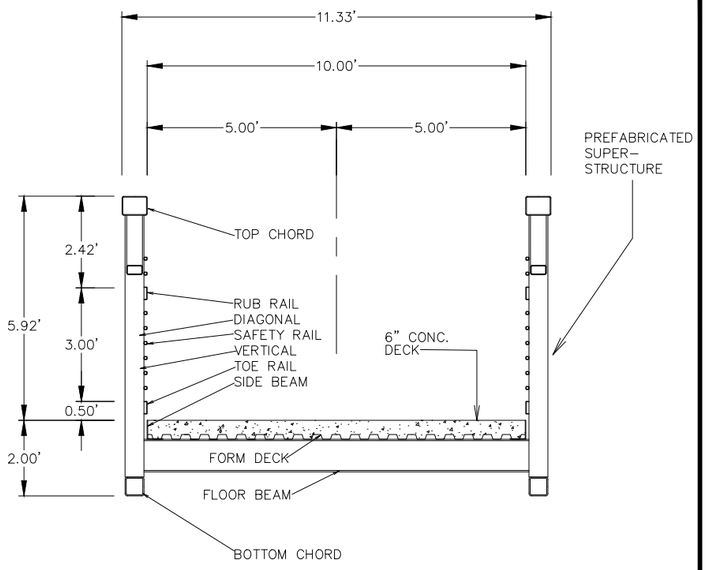
CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
BRIDGE GENERAL INFORMATION

B-1

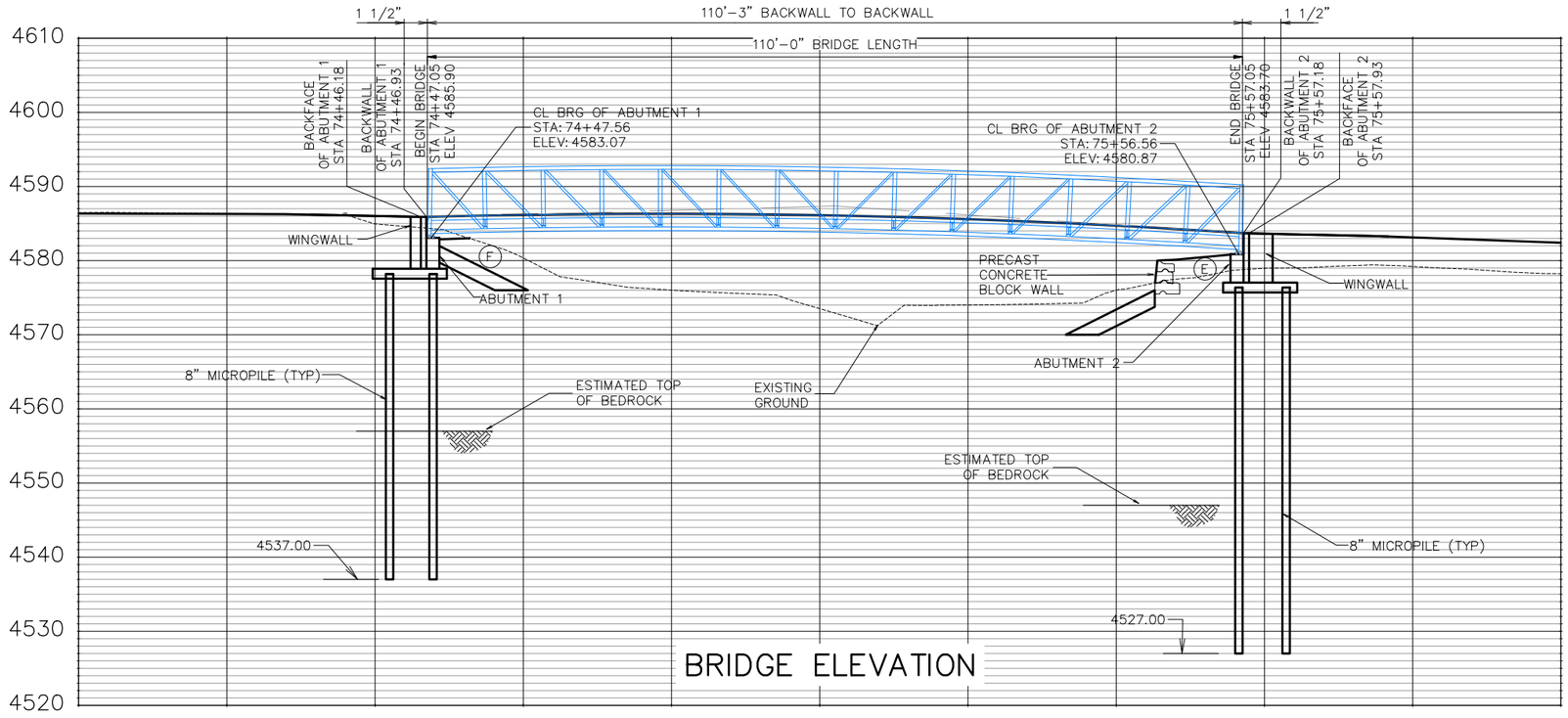




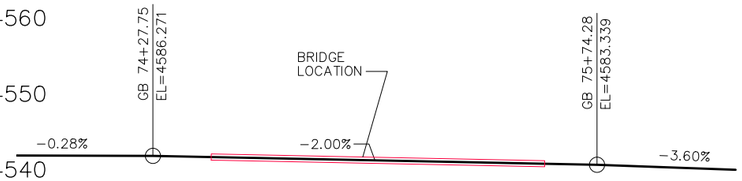
NOTE:
CONTRACTOR TO COORDINATE WITH BRIDGE SUPPLIER TO DETERMINE BRIDGE DECK QUANTITIES

TYPICAL BRIDGE SECTION

1/4"=1'



BRIDGE ELEVATION



BICYCLE PATH PROFILE GRADE

1"=50'

DESCRIPTION	DATE
REVISION △	
REVISION △	
REVISION △	
REVISION △	

DRAWN BY JCS DATE 2018
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APPROVED BY TCP DATE 2018

SCALES: PLAN & PROFILE HORIZONTAL 0 5 10 20 VERTICAL 0 5 10 20

CITY OF Grand Junction COLORADO

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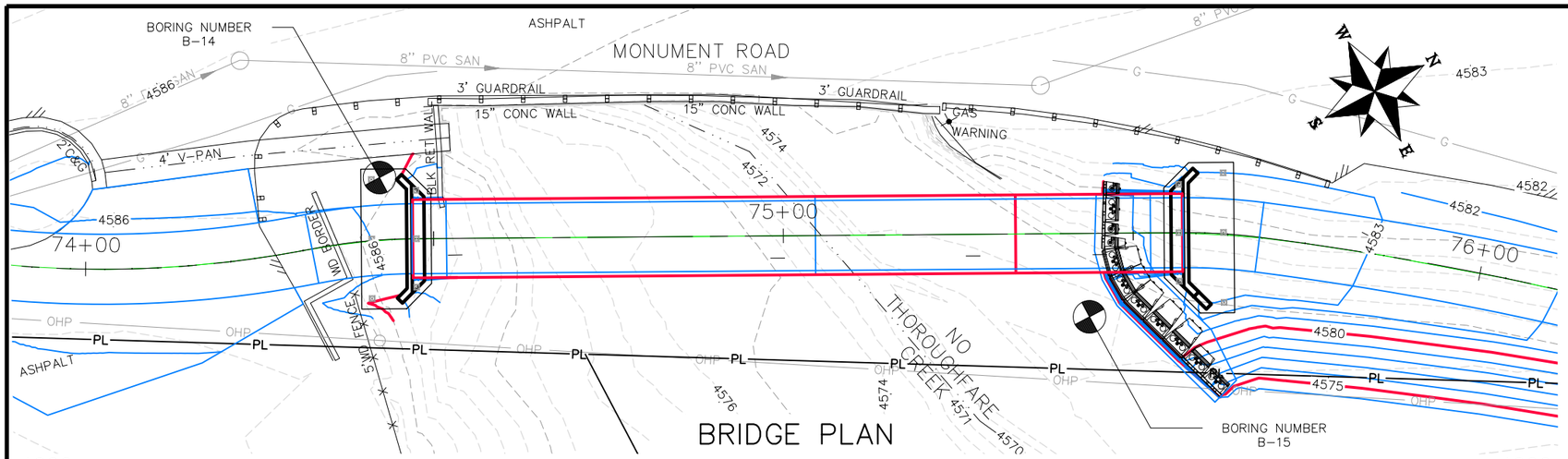
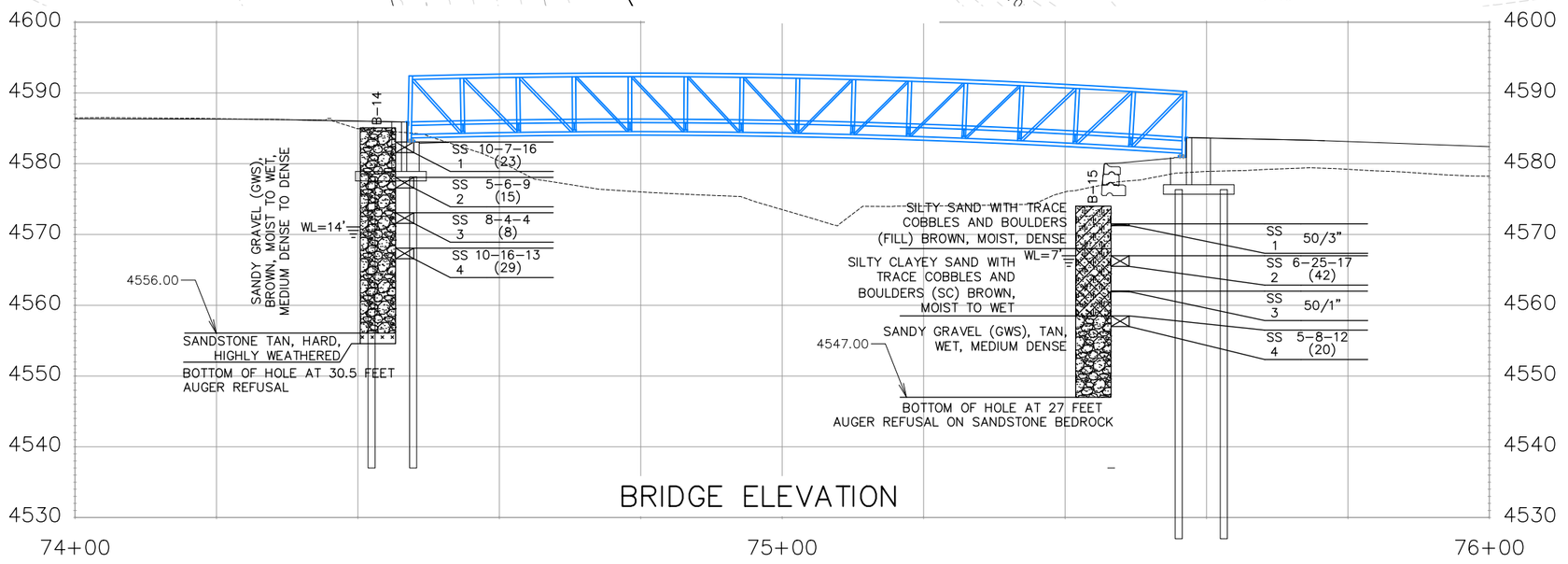
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
BRIDGE GENERAL PLAN

B-2





NOTES:

1. THE EXPLORATORY BORINGS WERE DRILLED ON AUGUST 7, 2019 WITH A 4 INCH DIAMETER CONTINUOUS FLIGHT POWER AUGER BY HUDDLESTON-BERRY ENGINEERING AND TESTING LLC.
2. THE LOCATIONS OF THE EXPLORATORY BORINGS WERE SURVEYED IN THE FIELD AUGUST 20, 2019 USING CONVENTIONAL SURVEY METHODS BY THE CITY OF GRAND JUNCTION.
3. THE LINES BETWEEN MATERIALS SHOWN IN THE EXPLORATORY BORING LOGS REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN MATERIAL TYPES AND THE ACTUAL TRANSITIONS MAY BE GRADUAL.
4. GROUND WATER LEVELS SHOWN ON THE LOGS WERE MEASURED AT THE TIME OF DRILLING AND END OF DRILLING. FLUCTUATIONS IN THE WATER LEVEL MAY OCCUR WITH TIME.
5. FOR FURTHER INFORMATION OR CLARIFICATION OF DATA THIS SHEET PLEASE REFER TO THE GEOTECHNICAL AND GEOLOGIC HAZARDS INVESTIGATION MONUMENT ROAD TRAIL GRAND JUNCTION, COLORADO DATED OCTOBER 15, 2019

LEGEND

LOCATION OF EXPLORATORY BORING

SPLIT SPOON SAMPLER. THE SYMBOL 10-7-16 INDICATES THAT 10 BLOWS FROM A 140 POUND HAMMER FALLING 30 INCHES WAS USED TO DRIVE A 1.5 INCH I.D. SAMPLER 6 INCHES, FOLLOWED BY 7 BLOWS IN THE SAME MANNER TO DRIVE THE SAMPLER THE NEXT 6 INCHES, FOLLOWED BY 16 BLOWS IN THE SAME MANNER TO DRIVE THE SAMPLER THE NEXT 6 INCHES. THE SYMBOL (23) SIMPLY INDICATES THAT IT TOOK 23 COMBINED BLOWS TO DRIVE THE SAMPLER THE LAST 12 INCHES OF THE SERIES. 50/3" INDICATES IT TOOK 50 BLOW OF THE SAME HAMMER IN THE SAME MANNER TO DRIVE THE SAMPLER 3 INCHES

WL=14' INDICATES APPROXIMATE GROUND WATER LEVEL (IN THIS CASE BOTH AT TIME OF DRILLING AND END OF DRILLING).

Huddleston-Berry Engineering & Testing, LLC

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

Sample Location Test Hole No.	Depth (feet)	Natural Moisture Content (%)	Natural Dry Density (pcf)	Gradation Gravel (%)	Sand (%)	Percent Passing No. 200 Sieve	Atterberg Limits Liquid Limit	Plastic Limit	Plasticity Index	Aggregate Specific Gravity Dry	SSD	Apparent	Unconfined Compressive Strength (psf)	USCS Classification	Soil or Bedrock Type
B-1	2.0	2	-	34.6	52.4	13	NP	NP	NP	-	-	-	-	SM	Silty Sand with Gravel
B-2	2.5	34	-	-	-	-	108	34	74	-	-	-	-	-	Bentonite
B-7	6	23	-	-	-	-	34	21	13	-	-	-	-	-	Claystone
Comp	-	-	-	4.2	53.2	42.6	22	21	1	-	1.803	-	-	SM	Silty Sand
HS-1	-	-	-	28.9	23.7	47.5	26	19	7	-	1.947	-	-	GC-GM	Silty Clayey Gravel with Sand
HS-2	-	-	-	39.8	38.3	21.9	23	17	6	-	2.067	-	-	GC-GM	Silty Clayey Gravel with Sand

MATERIAL

CLAY OR CLAYEY

GRAVEL

SANDSTONE

COBBLES AND BOULDERS

SAND OR SANDY

SILT OR SILTY

B-3

DESCRIPTION	DATE
REVISION	
REVISION	
REVISION	
REVISION	

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SCALES: PLAN & PROFILE HORIZONTAL 0 5 10 20 VERTICAL 0 5 10 20

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MONUMENT ROAD BICYCLE PATH
BRIDGE GEOTECHNICAL INFORMATION

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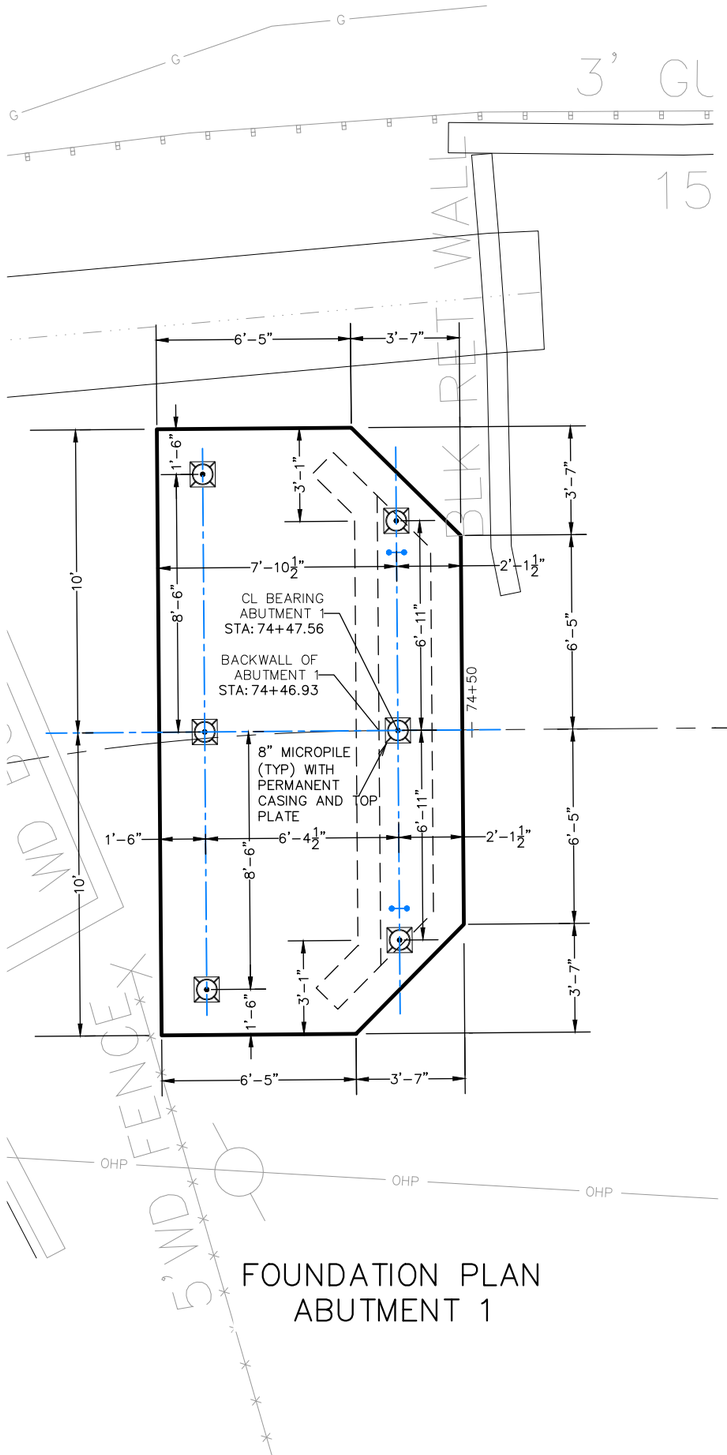
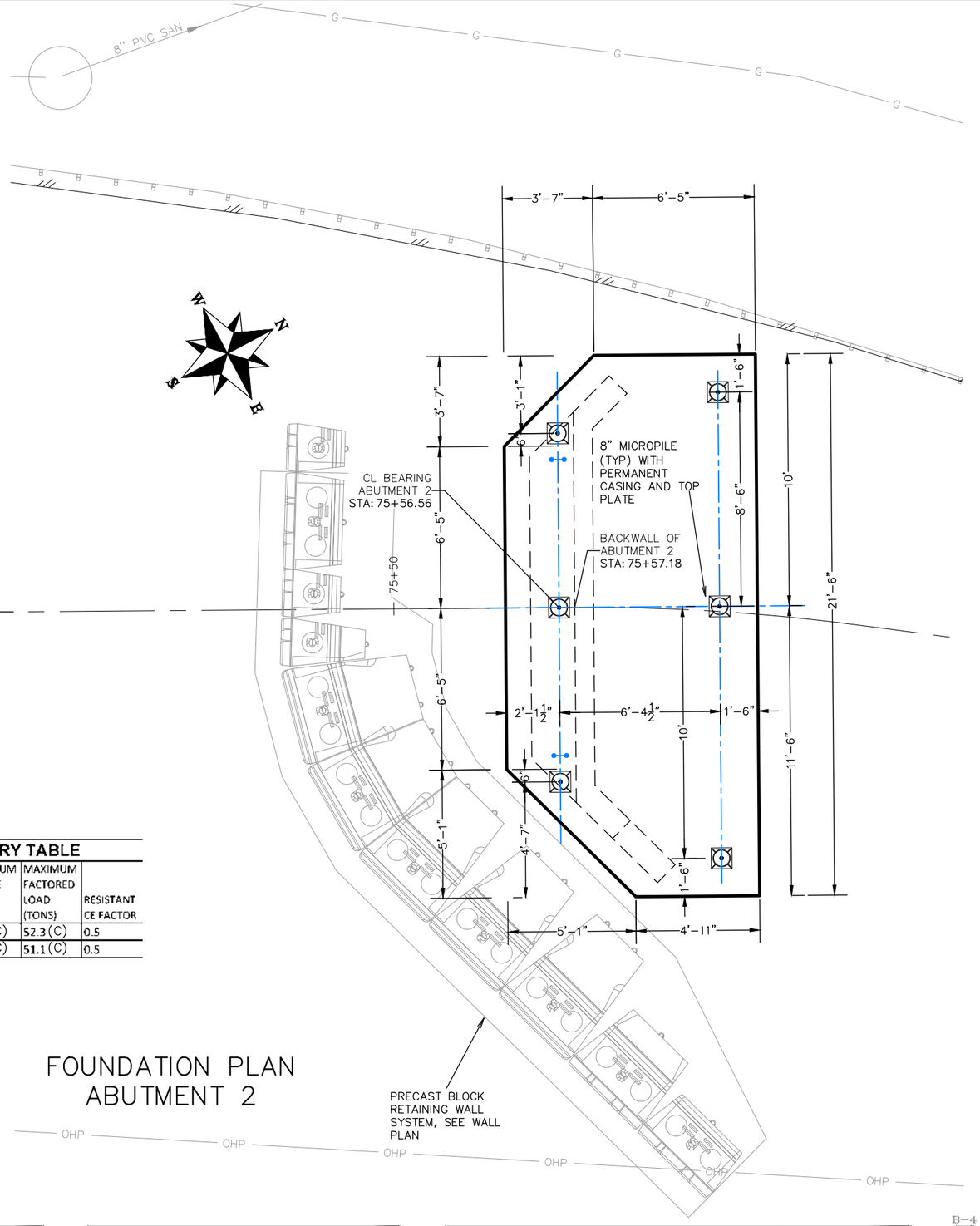


FOUNDATION PLAN
ABUTMENT 1

PEDESTRIAN BRIDGE
HCL

N 27° 33' 43" E

MICROPILE SUMMARY TABLE					
LOCATION	ESTIMATED CASING TIP ELEV.	ESTIMATED BOND TIP ELEV.	MAXIMUM SERVICE LOAD (TONS)	MAXIMUM FACTORED LOAD (TONS)	RESISTANT CE FACTOR
ABUT. 1	4557.0	4537.0	38.5 (C)	52.3 (C)	0.5
ABUT. 2	4547.0	4527.0	37.5 (C)	51.1 (C)	0.5



FOUNDATION PLAN
ABUTMENT 2

B-4

DESCRIPTION	DATE
REVISION △	–
REVISION △	–
REVISION △	–
REVISION △	–

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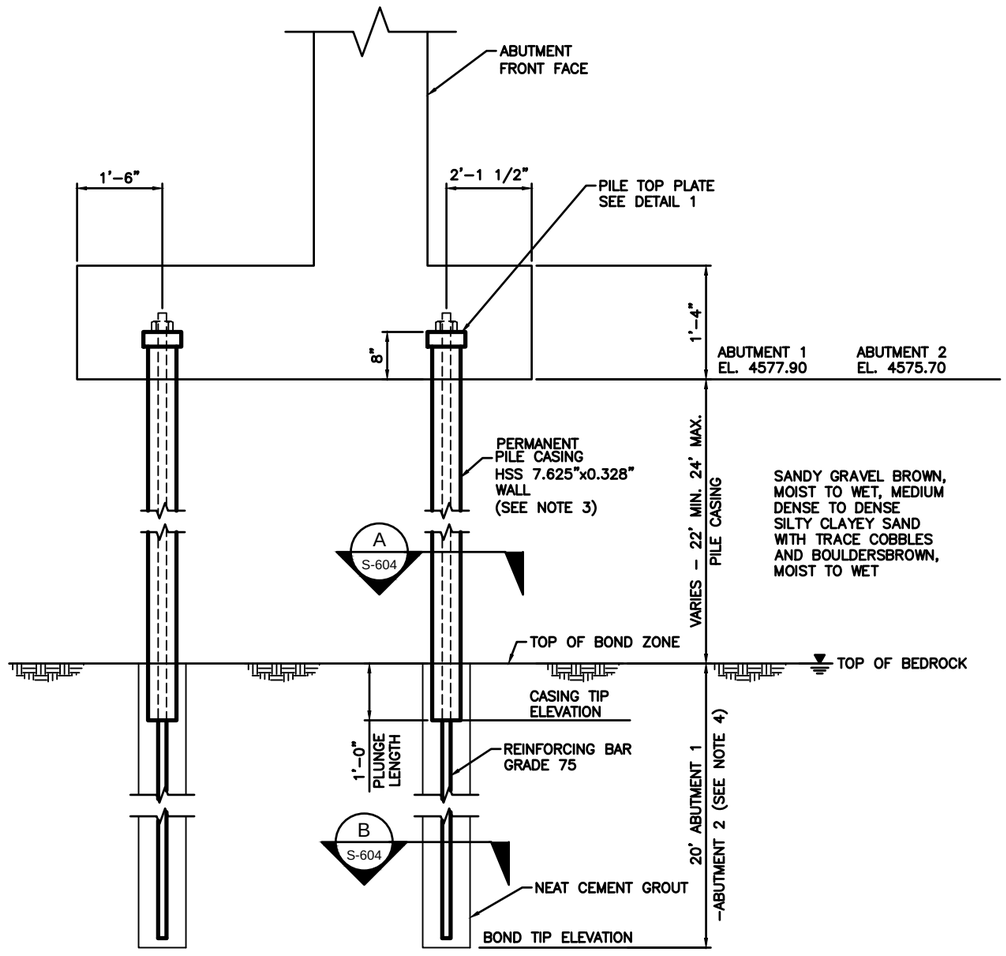
DESIGNED BY JCS DATE 2018
CHECKED BY KA DATE 2018
APPROVED BY TCP DATE 2018

SCALES:
PLAN & PROFILE
HORIZONTAL 0 1.25 2.5 5
VERTICAL 0 NA NA NA

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
BRIDGE FOUNDATION PLAN



TYPICAL SECTION
ABUTMENT FOOTING
SCALE: NTS

1 Micropile dimensions shown are at the bottom of the concrete pile cap.

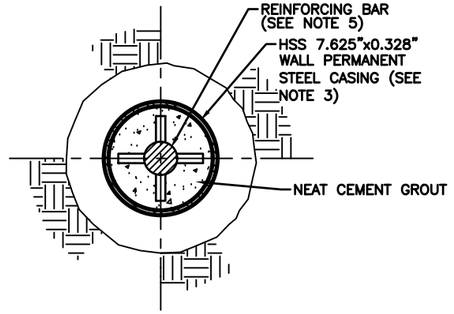
2 Pile load test program shall be conducted as described in the Project Special Provisions. Proof load tests shall be performed at 1 pile per abutment. Pile to be tested shall be determined by the Engineer.

3 Permanent micropile steel casing shall conform to API N-80. Cased section and length shall be as shown on the plans. See Project Special Provisions for Contractor responsibilities.

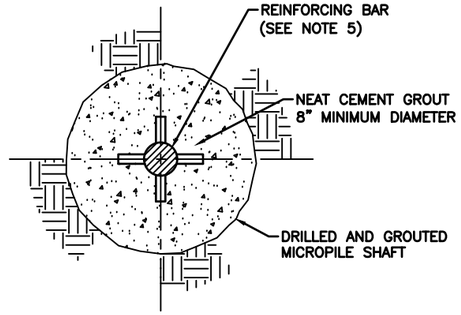
4 The estimated micropile bond length provided is based on a Type A micropile classification and a drill hole diameter of 9-5/8 inches. The type of micropile drill hole diameter of uncased length, and reinforcing shall be determined by the Contractor.

5 No threaded joints shall be allowed within the top 5 feet of casing measured from the bottom of the abutment, unless otherwise approved by the Engineer.

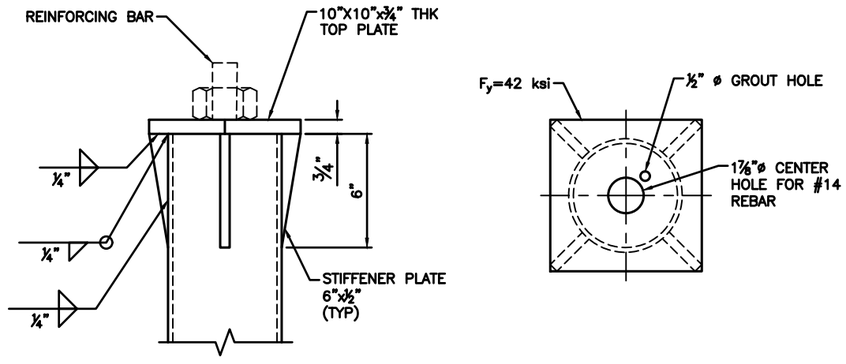
6 Contractor shall anticipate encountering large cobbles and boulders when installing micropiles.



SECTION A
SCALE: NTS



SECTION B
SCALE: NTS



DETAIL 1
SCALE: NTS

DESCRIPTION	DATE
REVISION △	
REVISION △	
REVISION △	
REVISION △	

DRAWN BY JCS DATE 2019
DESIGNED BY KA DATE 2019
CHECKED BY KA DATE 2019
APPROVED BY TCP DATE 2019

SCALES:
PLAN & PROFILE
HORIZONTAL 0 NA NA NA
VERTICAL 0 NA NA NA

CITY OF Grand Junction COLORADO

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MONUMENT ROAD BICYCLE PATH
BRIDGE FOUNDATION DETAILS

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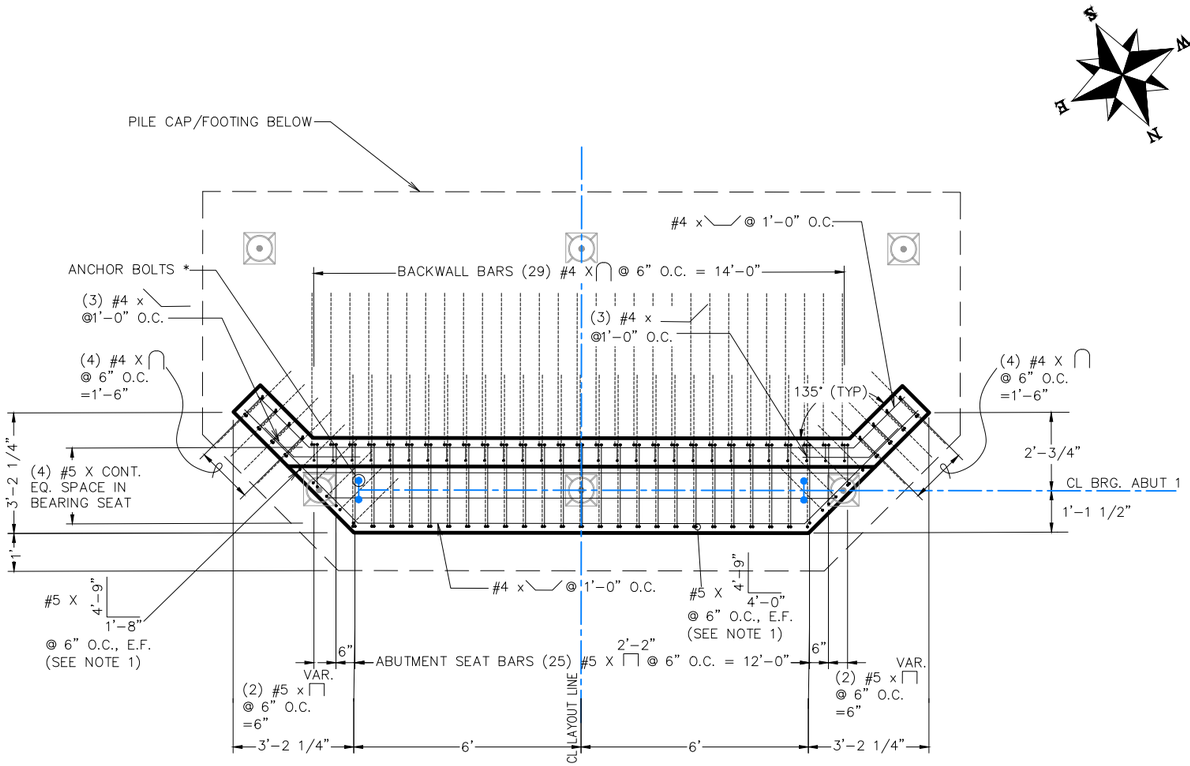
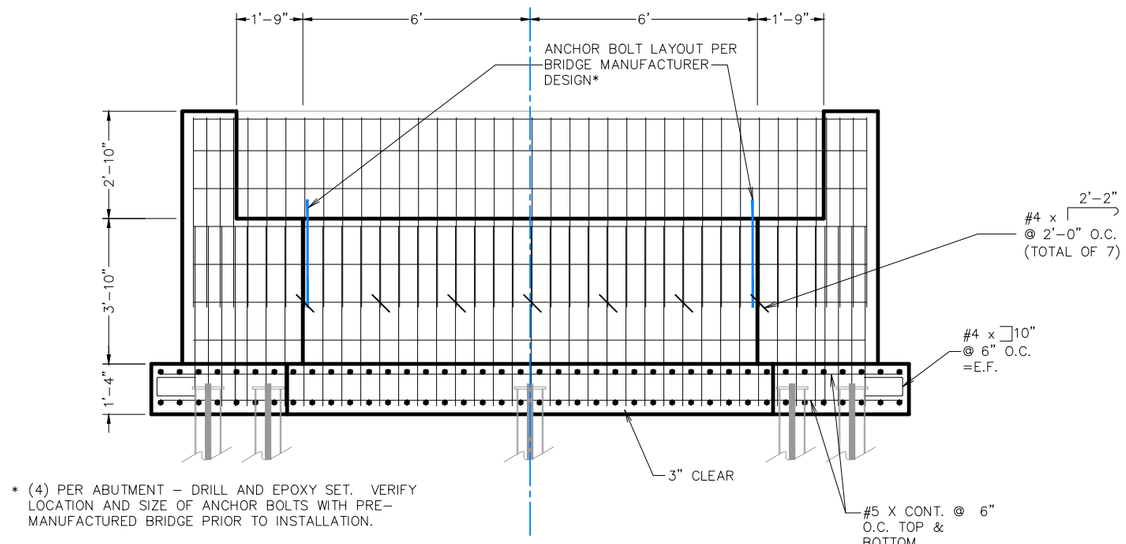


ABUTMENT 1 PLAN

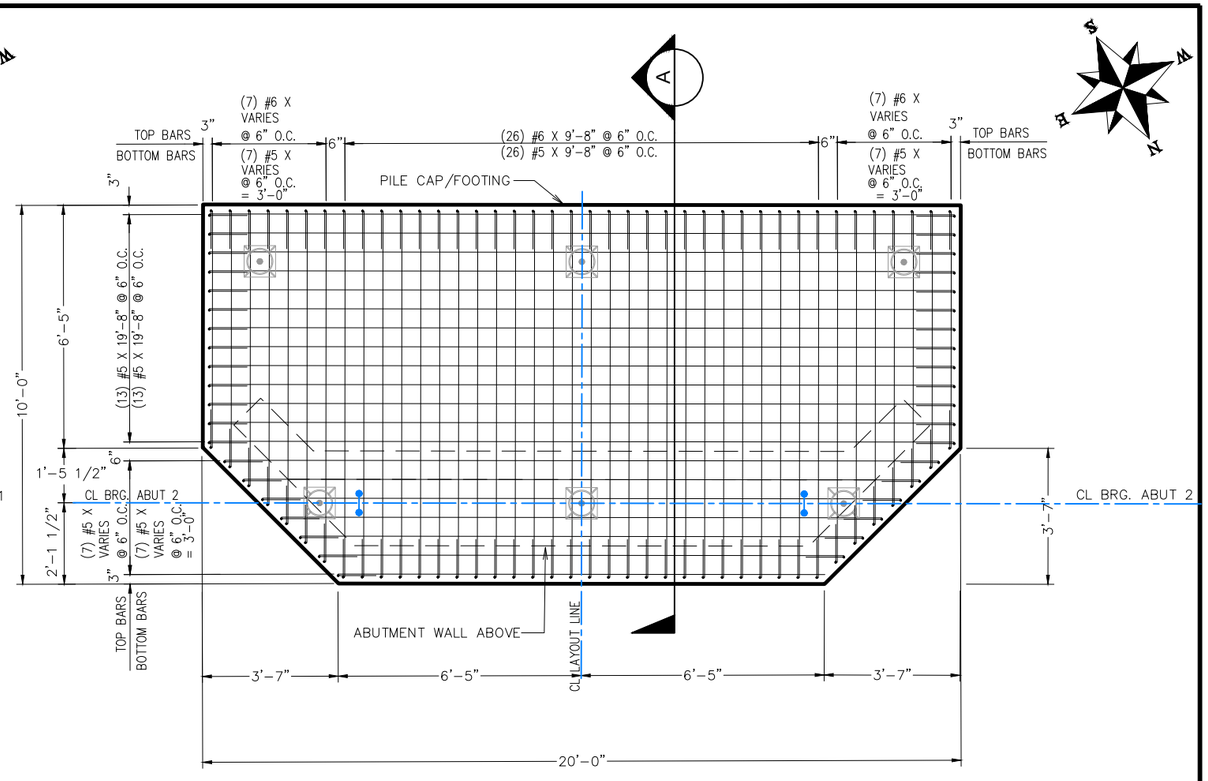
REBAR IN ABUTMENT WALL

NOTES:
1. HORIZONTAL REBAR LEG TIES WITH BOTTOM REBAR LAYER IN PILE CAP/FOOTING.
2. ADJUST REBAR SPACING AS NEEDED TO FIT AROUND MICROPILES.



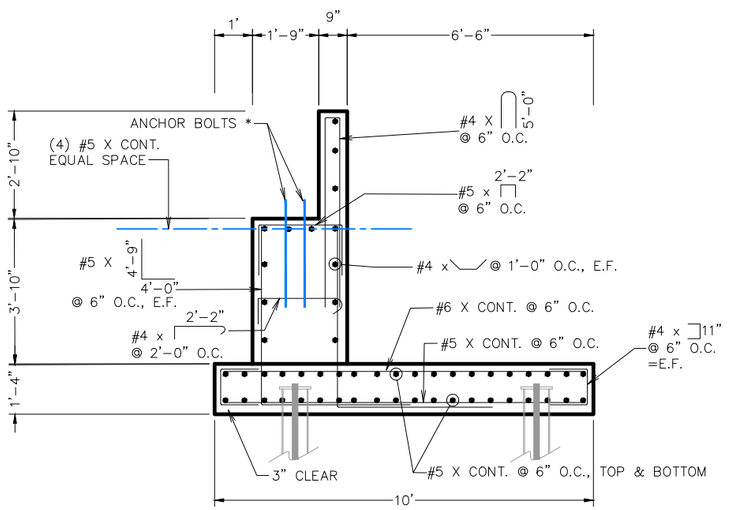
* (4) PER ABUTMENT – DRILL AND EPOXY SET. VERIFY LOCATION AND SIZE OF ANCHOR BOLTS WITH PRE-MANUFACTURED BRIDGE PRIOR TO INSTALLATION.

ABUTMENT 1 ELEVATION



ABUTMENT 1 PLAN

REBAR IN ABUTMENT FOOTING



SECTION A–A

DESCRIPTION	DATE
REVISION △	
REVISION △	
REVISION △	
REVISION △	

DRAWN BY JCS DATE 2018
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SCALES: PLAN & PROFILE HORIZONTAL 0 1 2 4 VERTICAL 0 NA NA NA

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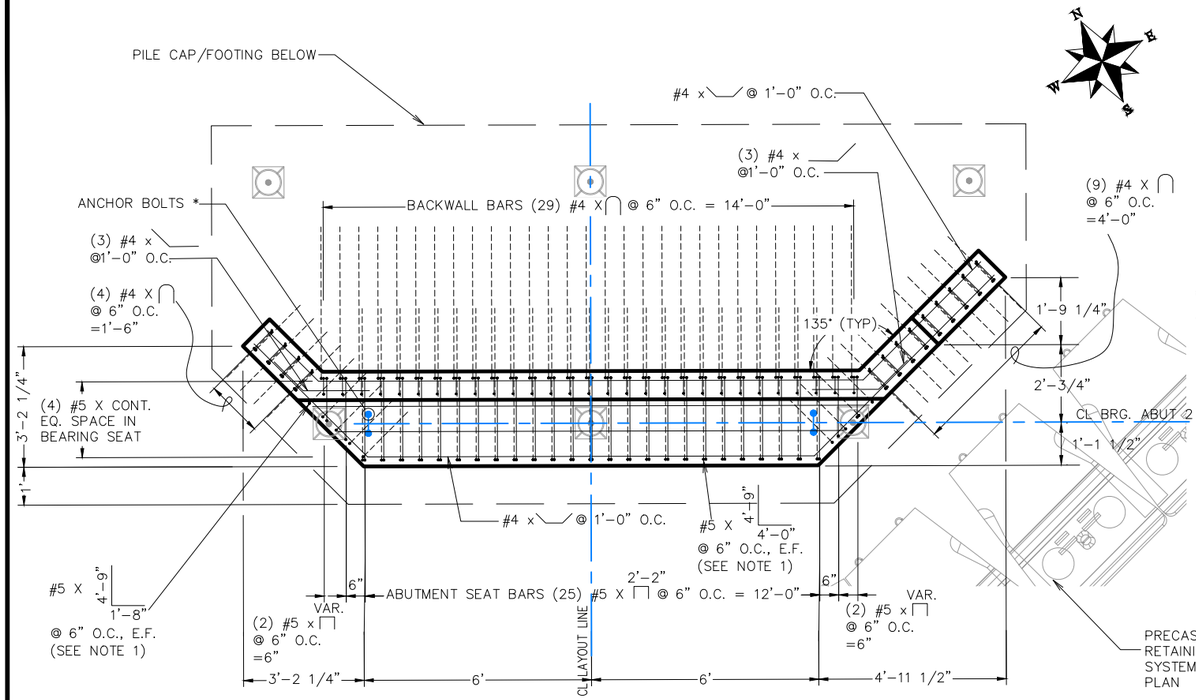
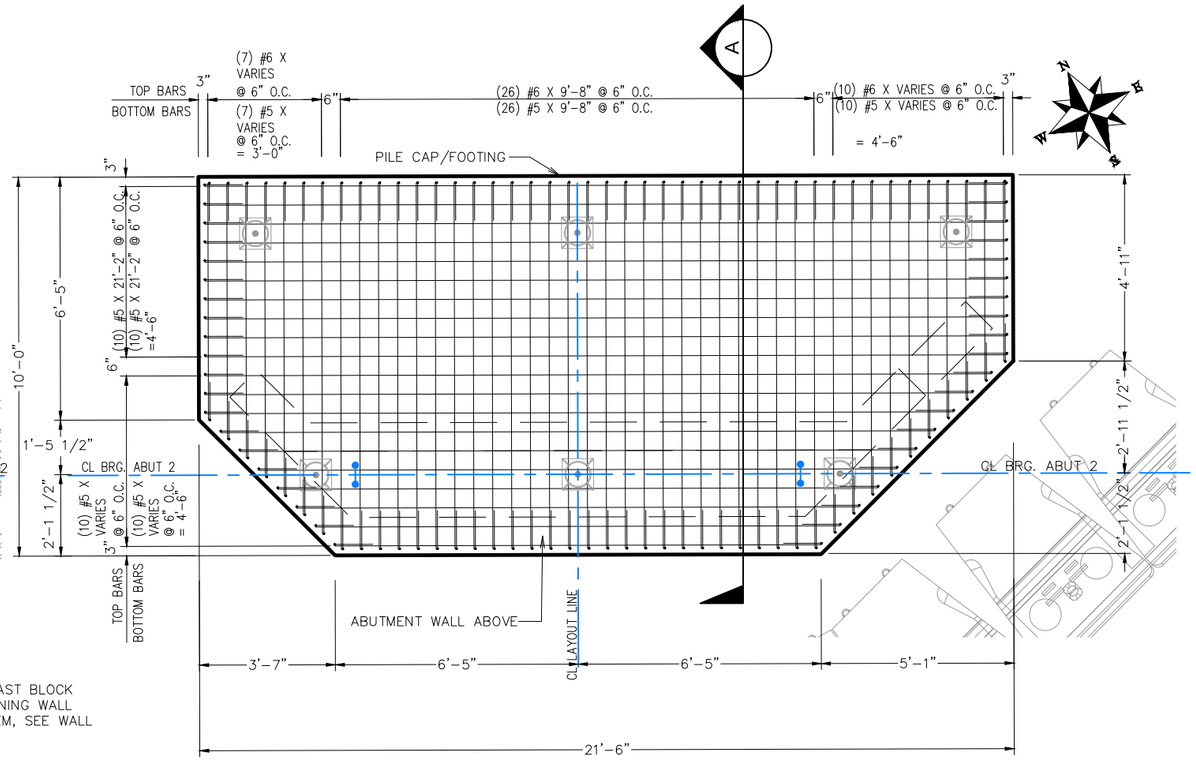
MONUMENT ROAD BICYCLE PATH
BRIDGE ABUTMENT 1 PLAN

B-6

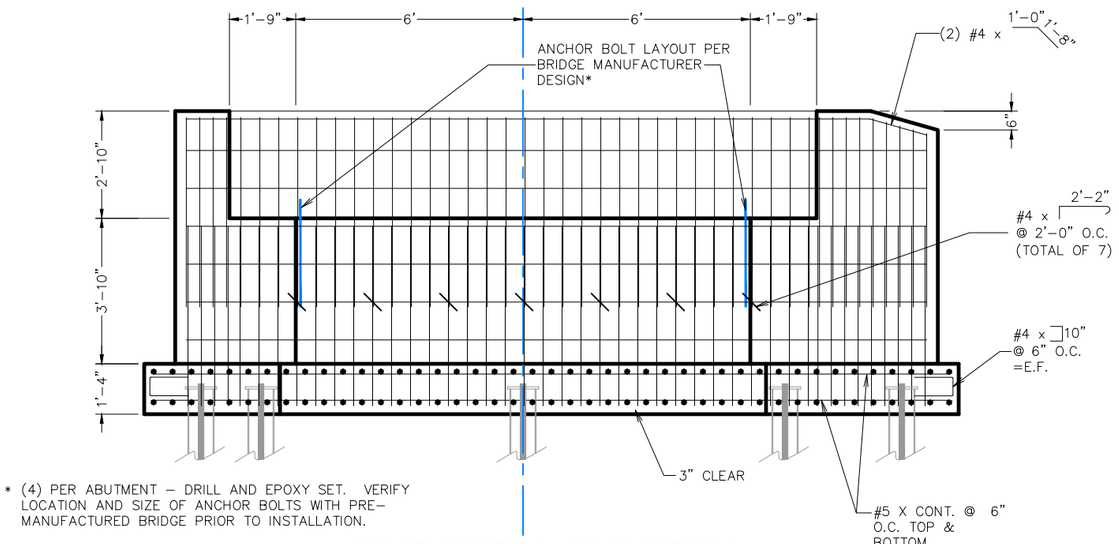


ABUTMENT 2 PLAN
REBAR IN ABUTMENT WALL



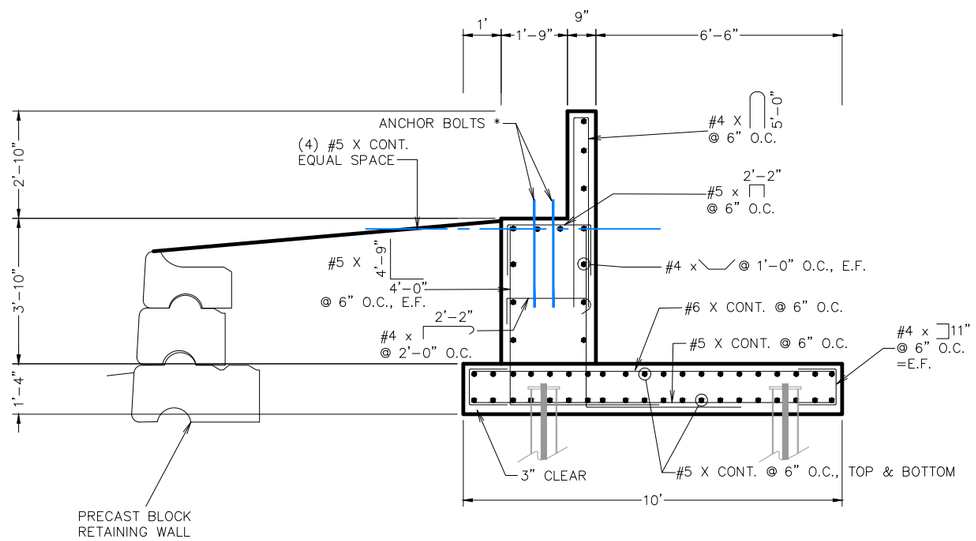
ABUTMENT 2 PLAN
REBAR IN ABUTMENT FOOTING

NOTES:
1. HORIZONTAL REBAR LEG TIES WITH BOTTOM REBAR LAYER IN PILE CAP/FOOTING.
2. ADJUST REBAR SPACING AS NEEDED TO FIT AROUND MICROPILES.



* (4) PER ABUTMENT – DRILL AND EPOXY SET. VERIFY LOCATION AND SIZE OF ANCHOR BOLTS WITH PRE-MANUFACTURED BRIDGE PRIOR TO INSTALLATION.

ABUTMENT 2 ELEVATION



SECTION A–A

DESCRIPTION	DATE
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MONUMENT ROAD BICYCLE PATH
BRIDGE ABUTMENT 2 PLAN

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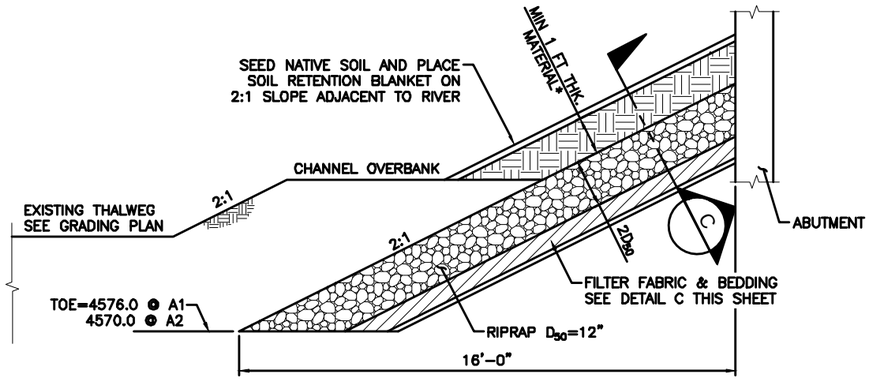
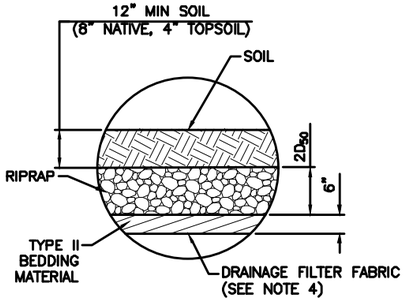


B RIPRAP CROSS-SECTION
SCALE:NTS

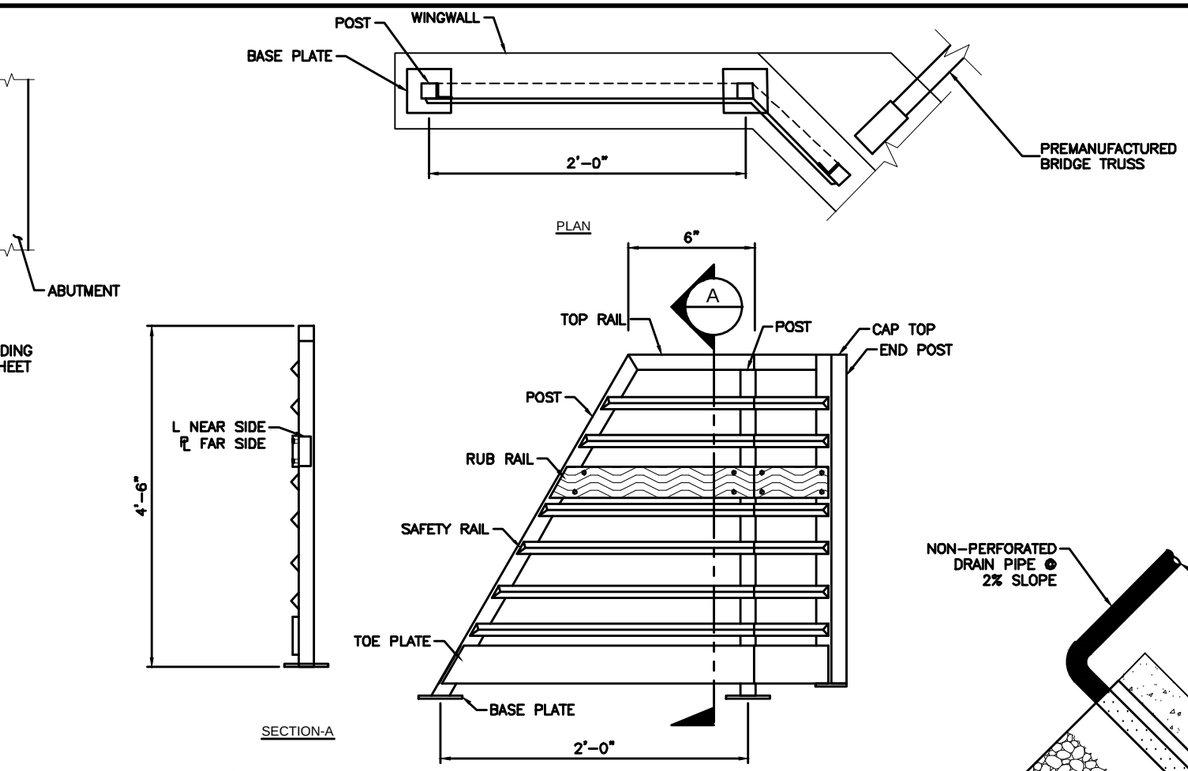


NOTES:
1. ALL RIPRAP ABOVE CHANNEL OVERBANK SHALL BE INSTALLED 12 INCHES BELOW FINAL GRADE AND BURIED WITH NATIVE CHANNEL BED MATERIAL (SAND, GRAVEL, & COBBLE), THEN TOPPED WITH TOPSOIL.
2. GENERAL PLACEMENT TECHNIQUES SHOULD RESULT IN LARGER ROCK AT THE SURFACE WITH ROCK SECURELY INTERLOCKED AT THE DESIGN THICKNESS AND GRADE, COMPACTION AND LEVELING SHOULD RESULT IN MINIMAL VOIDS AND PROJECTIONS ABOVE GRADE.
3. REFER TO SPECIFICATIONS FOR MATERIALS AND PLACEMENT REQUIREMENTS FOR RIPRAP AND GRANULAR BEDDING MATERIAL.
4. FILTER FABRIC SHALL CONFORM TO AASHTO M-288 STANDARDS FOR A CLASS 1 SUBSURFACE DRAINAGE APPLICATION (US205NW OR APPROVED EQUAL).
5. DRAINAGE FILTER FABRIC AND BEDDING MATERIALS ARE INCLUDED IN THE UNIT PRICE OF THE RIPRAP.

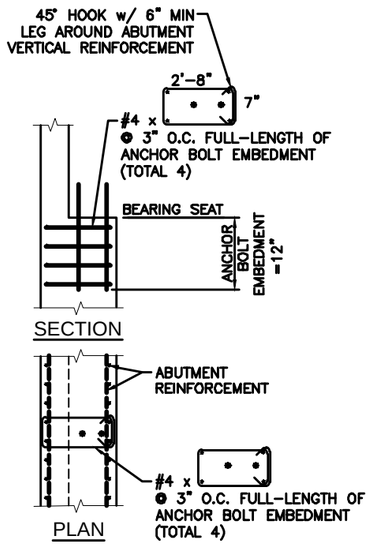
C RIPRAP
SCALE:NTS

GRADATION OF ROCK FOR RIPRAP		
PAY ITEM	PERCENT SMALLER THAN GIVEN SIZE (BY WEIGHT)	IMTERMEDIATE ROCK DIMENSION (POUNDS, INCHES)
RIPRAP (12 INCHES)	70–100	440, 21
	50–70	275, 18
	35–50	85, 12
	2–10	3, 4

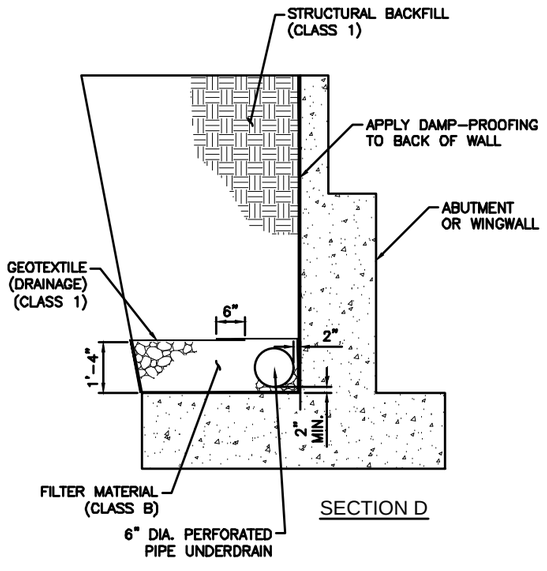
GRADATION OF TYPE II BEDDING MATERIAL	
SIEVE SIZE	PERCENT PASSING (BY WEIGHT)
3"	90–100
¾"	20–90
#4	0–20
#200	0–3



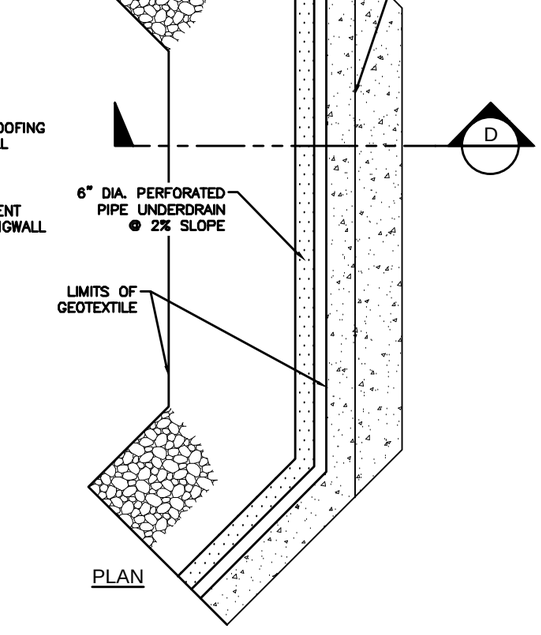
A BRIDGE RAILING DETAIL
SCALE:NTS



E ANCHOR BOLT CONFINEMENT
SCALE:NTS



D DRAINAGE
SCALE:NTS



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SCALES: PLAN & PROFILE HORIZONTAL 0 NA NA NA VERTICAL 0 NA NA NA

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ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
BRIDGE ABUTMENT DETAILS

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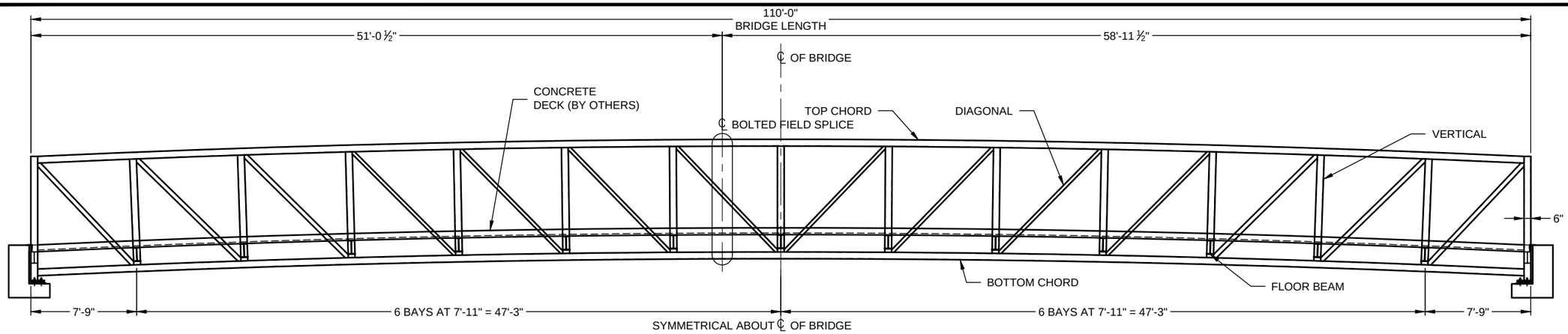


BRIDGE ELEVATION

GENERAL NOTES

1. DESIGN STRESSES ARE IN ACCORDANCE WITH "STANDARD SPECIFICATION FOR HIGHWAY BRIDGES" & "GUIDE SPECIFICATIONS FOR DESIGN OF PEDESTRIAN BRIDGES" BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO), 2009.

2. BRIDGE MEMBERS ARE FABRICATED FROM HIGH STRENGTH, LOW ALLOY, ENHANCED ATMOSPHERIC CORROSION RESISTANT ASTM A847 COLD-FORMED WELDED SQUARE AND RECTANGULAR TUBING, AND ASTM A588, ASTM A606, OR ASTM A242 PLATE AND STRUCTURAL SHAPES (Fy=50,000 PSI).

3. CONCRETE DECK: GALVANIZED FORM DECK SUPPLIED BY CONTECH. CONCRETE, REINFORCING AND EXPANSION MATERIAL SUPPLIED BY OTHERS. SEE CONCRETE DECK SHEET.

4. THE GAS METAL ARC WELDING PROCESS OR FLUX CORED ARC WELDING PROCESS WILL BE USED. WELDING TO BE IN ACCORDANCE WITH AWS D1.1.

5. ALL TOP AND BOTTOM CHORD SHOP SPLICES TO BE COMPLETE PENETRATION TYPE WELDS. WELD BETWEEN TOP CHORD AND END VERTICAL SHALL BE AS DETAILED.

6. UNLESS OTHERWISE NOTED, WELDED CONNECTIONS SHALL BE FILLET WELDS (OR HAVE THE EFFECTIVE THROAT OF A FILLET WELD) OF A SIZE EQUAL TO THE THICKNESS OF THE LIGHTEST GAGE MEMBER IN THE CONNECTION. WELDS SHALL BE APPLIED AS FOLLOWS:

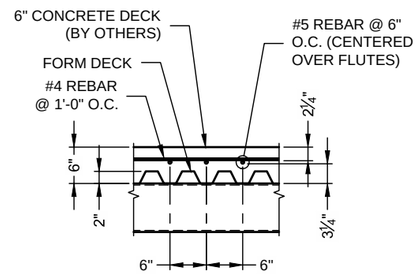
   A. BOTH ENDS OF VERTICALS, DIAGONALS, AND FLOOR BEAMS SHALL BE WELDED ALL AROUND.
   B. BRACE DIAGONALS WILL BE WELDED ALL AROUND.
   C. MISCELLANEOUS NON-STRUCTURAL MEMBERS WILL BE STITCH WELDED TO THEIR SUPPORTING MEMBERS.

7. BRIDGE DESIGN WAS ONLY BASED ON COMBINATIONS OF THE FOLLOWING LOADS WHICH WILL PRODUCE MAXIMUM CRITICAL MEMBER STRESSES.

   A. 90 PSF UNIFORM LIVE LOADING ON THE FULL DECK AREA OR ONE 10,000 LB VEHICLE LOAD. THE LOAD SHALL BE DISTRIBUTED AS A FOUR-WHEEL VEHICLE WITH 80% OF THE LOAD ON THE REAR WHEELS. THE WHEEL TRACK WIDTH OF THE VEHICLE SHALL BE 6'-0" AND THE WHEEL BASE SHALL BE 10'-0". THE VEHICLE SHALL BE POSITIONED SO AS TO PRODUCE THE MAXIMUM STRESSES IN EACH MEMBER, INCLUDING DECKING.
   B. 35 PSF WIND LOAD ON THE FULL HEIGHT OF THE BRIDGE, AS IF ENCLOSED.
   C. 20 PSF UPWARD FORCE APPLIED AT THE WINDWARD QUARTER POINT OF THE TRANVERSE BRIDGE WIDTH (AASHTO 3.15.3).

8. CLEANING: ALL EXPOSED SURFACES OF STEEL SHALL BE CLEANED IN ACCORDANCE WITH STEEL STRUCTURES PAINTING COUNCIL SURFACES PREPARATION SPECIFICATIONS NO. 7 BRUSH-OFF BLAST CLEANING. SSPC-SP7-LATEST EDITION.

9. MINIMUM MATERIAL THICKNESS OF 1/4" ON ALL STRUCTURAL MEMBERS.



2/1 TYP SLAB REINFORCEMENT DETAIL

COMBINE REACTIONS AS PER LOCAL OR GOVERNING BUILDING CODES AS REQUIRED

BRIDGE REACTIONS		P (LBS)	H (LBS)	L (LBS)
			+ DOWNWARD LOAD - UPWARD LOAD	
DEAD LOAD	②	25,875		
UNIFORM LIVE LOAD		24,750		
VEHICLE LOAD		5,000		
WIND UPLIFT 20 PSF	WINDWARD / LEEWARD	-9,075 / -3,025		
WIND		±7,115	15,240	
THERMAL	②			3,885

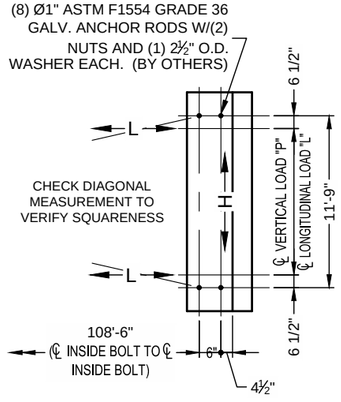
"P" - VERTICAL LOAD EACH BASE PLATE (4 PER BRIDGE)
"H" - HORIZONTAL LOAD EACH FOOTING (2 PER BRIDGE)
"L" - LONGITUDINAL LOAD EACH BASE PLATE (4 PER BRIDGE)

① BRIDGE LIFTING WEIGHT: 36,400 LBS

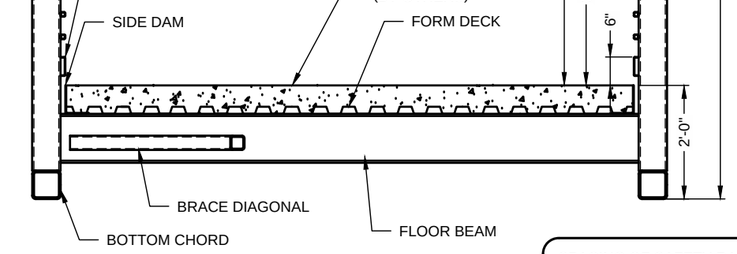
② BRIDGE FINAL WEIGHT: 103,500 LBS

① DOES NOT INCLUDE WEIGHT OF CONCRETE DECK

② INCLUDES WEIGHT OF CONCRETE DECK

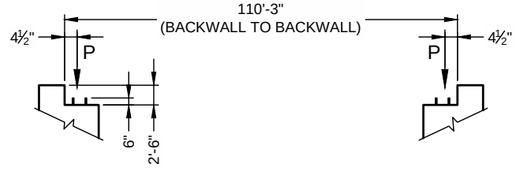


PLAN



1/1 BRIDGE SECTION

SPACING OF SAFETY RAIL PRODUCES OPENINGS OF LESS THAN 4" UP TO A MINIMUM HEIGHT OF 42" ABOVE THE DECK AND OPENINGS OF 8" OR LESS ABOVE 42" FROM DECK.



ANCHOR BOLT ELEVATION

CONTECH
FABRICATION
DRAWING

B-9

DESCRIPTION	DATE
REVISION △	–
REVISION △	–
REVISION △	–
REVISION △	–

DRAWN BY JCS DATE 2019
DESIGNED BY KA DATE 2019
CHECKED BY KA DATE 2019
APPROVED BY TCP DATE 2019

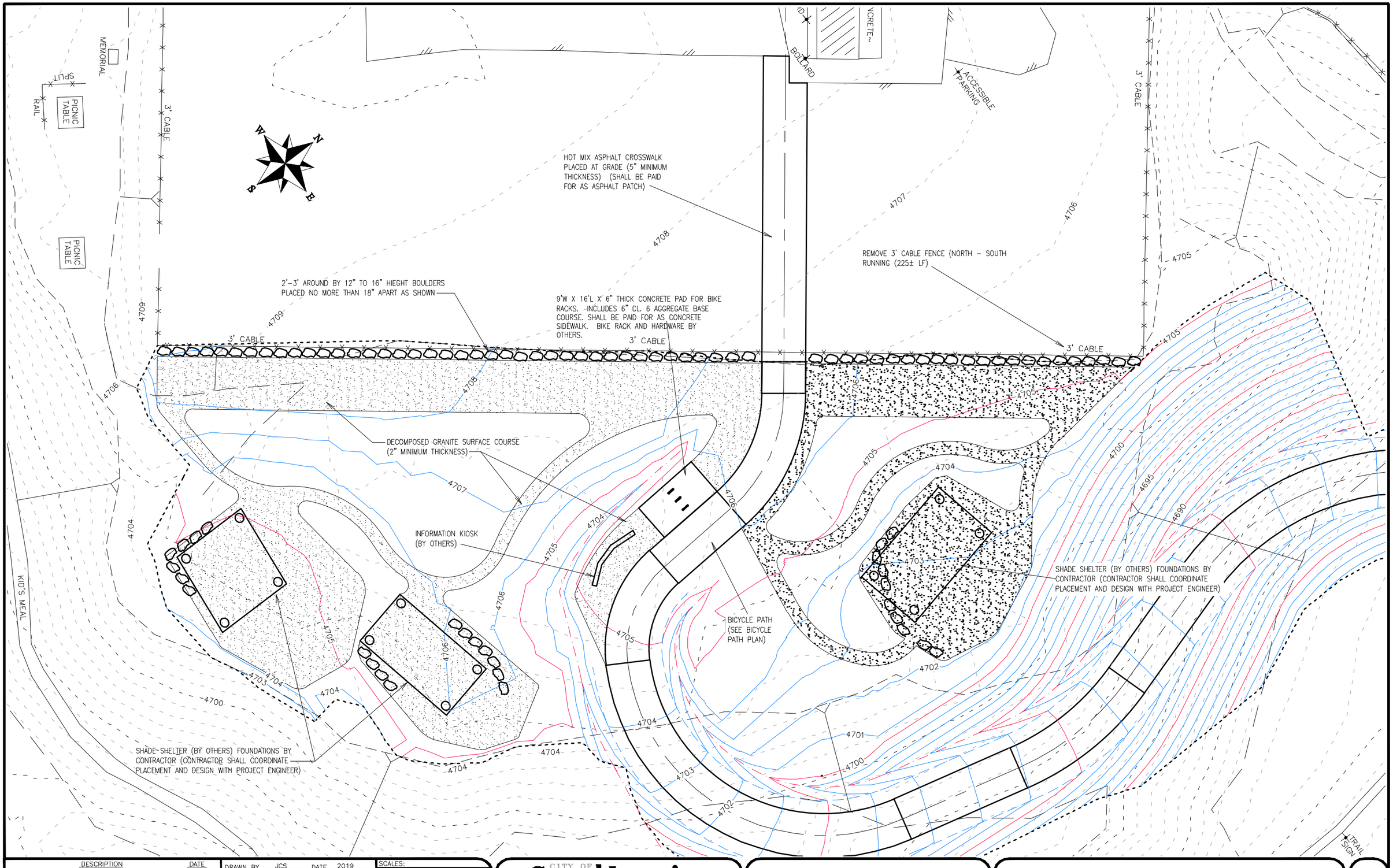
SCALES:
PLAN & PROFILE
HORIZONTAL 0 NA NA NA
VERTICAL 0 NA NA NA

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
MANUFACTURED TRUSS DETAILS

99



DESCRIPTION	DATE
REVISION △	
REVISION △	
REVISION △	
REVISION △	

DRAWN BY JCS DATE 2019
DESIGNED BY JCS DATE 2019
CHECKED BY KA DATE 2019
APPROVED BY TCP DATE 2019

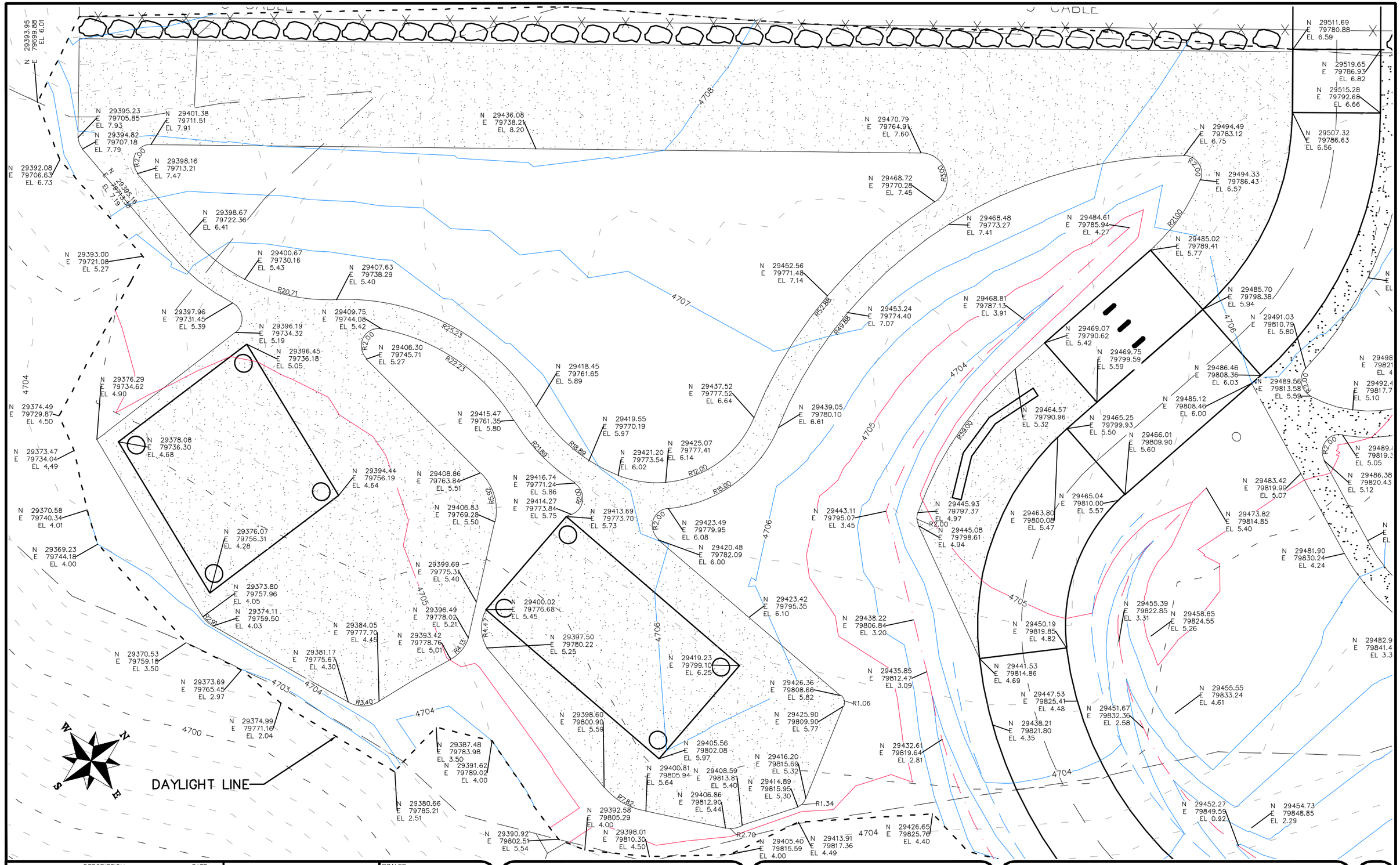
SCALES:
PLAN & PROFILE
HORIZONTAL 0 5 10 20
VERTICAL 0 NA NA NA

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
LUNCH LOOP TRAIL HEAD SITE PLAN

100



DESCRIPTION	DATE
REVISION △	
REVISION △	
REVISION △	
REVISION △	

DRAWN BY JCS DATE 2019
DESIGNED BY JCS DATE 2019
CHECKED BY KA DATE 2019
APPROVED BY TCP DATE 2019

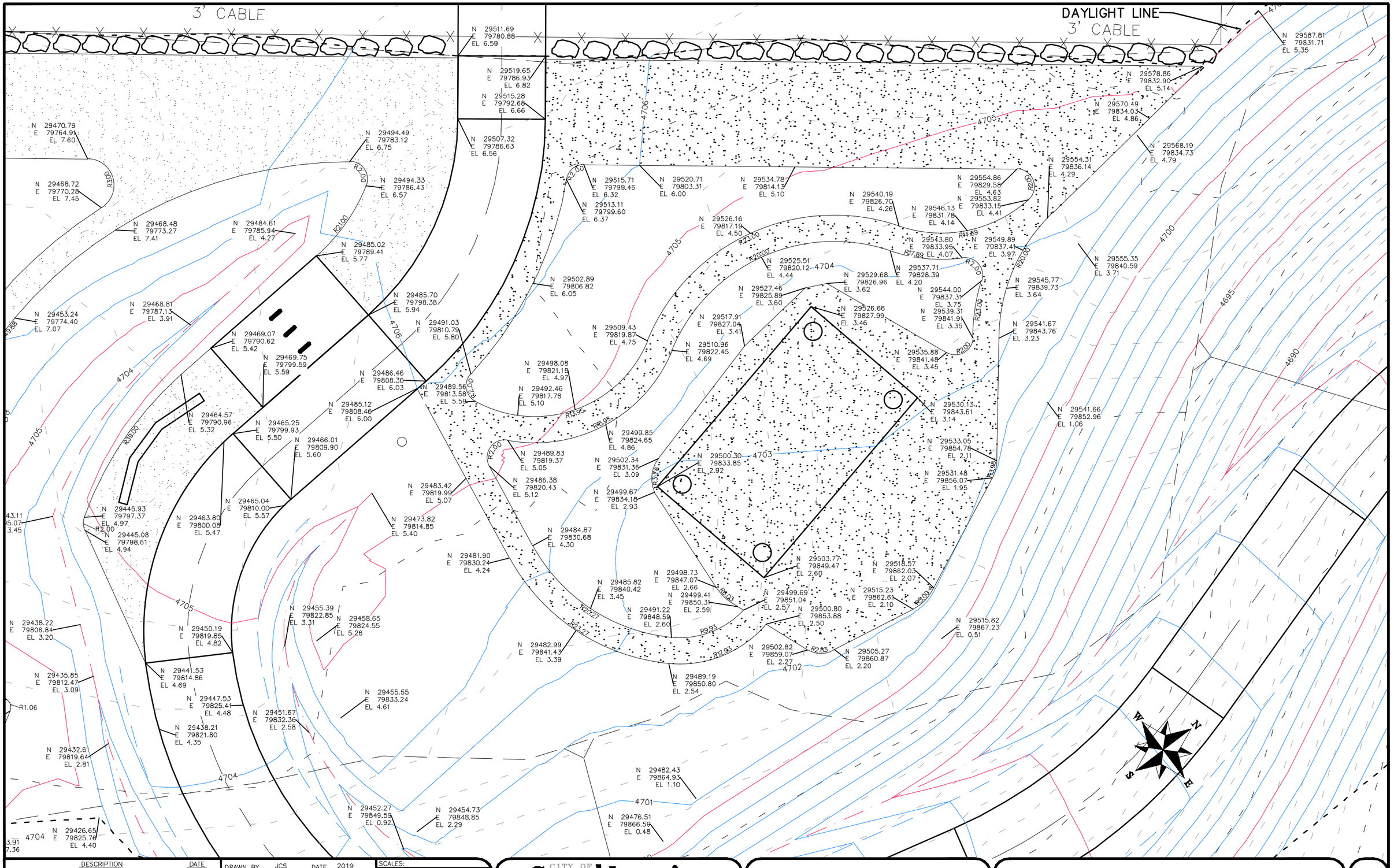
SCALES:
PLAN & PROFILE
HORIZONTAL 0 2.5 5 10
VERTICAL 0 NA NA NA

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
LUNCH LOOP TRAIL HEAD STAKING PLAN

101



DESCRIPTION	DATE
REVISION △	–
REVISION △	–
REVISION △	–
REVISION △	–

DRAWN BY JCS DATE 2019
DESIGNED BY JCS DATE 2019
CHECKED BY KA DATE 2019
APPROVED BY TCP DATE 2019

SCALES:
PLAN & PROFILE
HORIZONTAL 0 2.5 0 10
VERTICAL 0 NA NA NA

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

MONUMENT ROAD BICYCLE PATH
LUNCH LOOP TRAIL HEAD STAKING PLAN

102

SEWER MANHOLE-3 AND ALL SEWER TO NORTH - THIS CONTRACT

THIS WORK BY OTHERS

48" Manhole
(PR-SS SVC Structure-6)
N: 32970.47
E: 84199.61
Sta: 6+33.67
Rim: 4596.63

Area Inlet
(PR-SD Structure-AI 2)
Sta: 6+20.48
FL El: 4592.64
Grate: 4592.11

6+00

124.69 LF 8" SDR 35 PVC @ 0.42%

18" HDPE Pipe
118.71 LF @ 0.48%

48" Manhole
(PR-SS SVC Structure-5)
N: 32973.43
E: 84324.26
Sta: 5+08.98
Rim: 4593.00

5+00

315.47 LF 8" SDR 35 PVC @ 0.42%

3+00

2+00

48" Manhole
(PR-SS SVC Structure-4)
N: 33246.62
E: 84482.01
Sta: 1+93.51
Rim: 4590.97

18" HDPE Pipe
288.80 LF @ 0.48%

48" SD Manhole
(PR-SD Structure-MH)
N: 33251.64
E: 84461.80
Rim: 4588.28

8" SDR 35 PVC
93.51 LF @ 0.42%

18" HDPE Pipe
112.75 LF
@ 0.5%

48" Manhole
(PR-SS Manhole-3)
N: 33313.39
E: 84416.54
Sta: 8+23.24
Rim: 4591.51

8+00

7+00

N: 33361.68
E: 84486.48

18" HDPE Pipe
116.38 LF @ 0.50%

48" SD Manhole
(PR-SD Structure-A5)
N: 33503.99
E: 84500.63
Rim: 4590.47

Ex. 18" PVC Pipe Storm Drain

513.90 LF 8" SDR 35 PVC @ 0.49%

6+00

5+00

18" HDPE Pipe
30.66 LF @ 0.50%

Type 13 Inlet
(PR-SD Structure-A3)
FL El: 4583.78
Grate: 4587.20

Ex. 18" PVC Pipe Storm Drain

MONUMENT ROAD

4+00

48" Manhole
(PR-SS Manhole-2)
N: 33794.71
E: 84596.58
Sta: 3+09.35
Rim: 4589.36

8" SDR 35 PVC
85.54 LF @ 1.11%

3+00

Ex. 24" AWWA C151 ductile iron

8" SDR 35 PVC
123.81 LF @ 0.41%

48" Manhole
(C4-251-020)
N: 33936.76
E: 84623.59
Sta: 1+00.00
Rim: 4587.13

CAP SEWER W/
CONCRETE PER
CITY STANDARDS

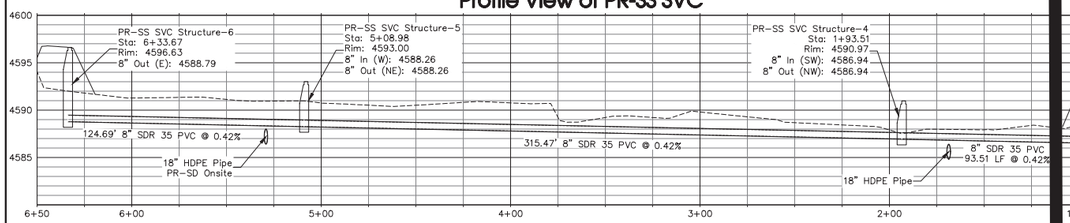
48" Manhole
(PR-SS Manhole-1)
N: 33824.89
E: 84676.62
Sta: 2+23.81
Rim: 4591.22

2+00

1+00

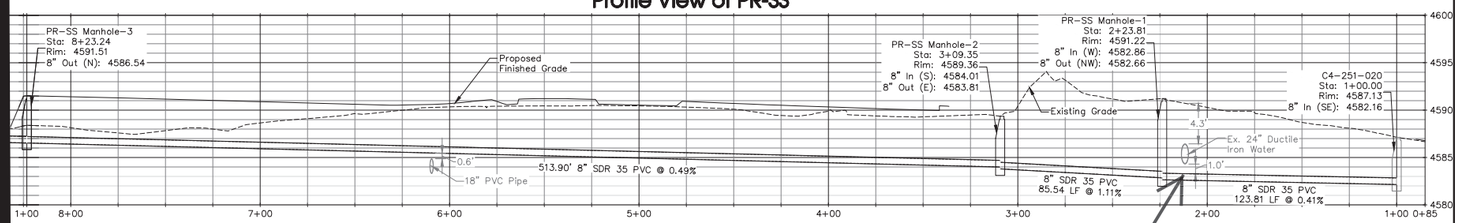
THIS WORK BY OTHERS

Profile View of PR-SS SVC



SEWER MANHOLE-3 AND ALL SEWER TO NORTH - THIS CONTRACT

Profile View of PR-SS



UNCC Know what's below. Call before you dig.
800.922.1987
www.uncc.org
CALL 2 BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

SCALE
0 40 80
Feet
CONTOUR INTERVAL = 1 FOOT
ORIGINAL SHEET SIZE: 22 x 34

REVISIONS			
NO.	DATE	DESCRIPTION	BY

S:\PROJECTS\0422 Bray\031 Frog Pond\Design\DWG\02-Base Files\0422-031 Pr Utilities.dwg [C1 Sanitary Sewer] 3/6/2019 4:39:52 PM

PRELIMINARY

RIVER CITY CONSULTANTS
744 Horizon Court, Suite 110
Grand Junction, CO 81506
Phone: 970.241.4722
www.rccwest.com
Fax: 970.241.8841

PROJECT #:	0422-031	DATE ISSUED:	dd.MMM.yyyy
DRAWN BY:	jel	HORIZ:	1"=40'
CHECKED BY:	jwm	VERT:	1"=8'

BRAY & CO.

Frog Pond 103

Sanitary Sewer
Plan & Profile

C1

APPENDIX C
Geotechnical Report

Huddleston-Berry
Engineering & Testing, LLC

GEOTECHNICAL AND GEOLOGIC HAZARDS INVESTIGATION
MONUMENT ROAD TRAIL
GRAND JUNCTION, COLORADO
PROJECT#00208-0087

CITY OF GRAND JUNCTION
333 WEST AVENUE, BUILDING E
GRAND JUNCTION, COLORADO 81501

OCTOBER 15, 2018

Huddleston-Berry Engineering and Testing, LLC
640 White Avenue,
Grand Junction, Colorado 81501

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

A geologic hazards and geotechnical investigation was conducted for the proposed Monument Road Trail project in Grand Junction, Colorado. The project location is shown on Figure 1 – Site Location Map. The purpose of the investigation was to evaluate the surface and subsurface conditions at the site with respect to geologic hazards, foundation design, pavement design, and earthwork for the proposed construction. This summary has been prepared to include the information required by civil engineers, structural engineers, and contractors involved in the project.

Subsurface Conditions (p. 2)

The subsurface investigation consisted of fourteen borings, drilled in August 2018. The borings generally encountered native sand and gravel soils. However, shallow bedrock was observed in the southern portion of the project area. Groundwater was only encountered in six of the borings at depths of between 2.0 and 14.0 feet at the time of the investigation. The native sand soils are non-plastic to slightly plastic and slightly collapsible. The claystone and bentonite bedrock materials were moderately to highly plastic and are anticipated to range from slightly to highly expansive.

Geologic Hazards and Constraints (p. 5)

No geologic hazards were identified which would preclude construction. However, construction should consider the risks of movement associated with the moisture sensitive soils and/or bedrock at the site. In addition, shallow groundwater and the potential for flooding could impact some portions of the trail.

Summary of Foundation Recommendations

Southern four Low-Flow Crossings (culverts)

- *Recommended Foundation Alternative* – Shallow Foundations. (p. 6)
- *Nominal Bearing Resistance at Strength Limit State* – q_{ult} = 1,450*Effective footing width + 10,000 psf. (p. 7)
- *Resistance Factor* – 0.45. (p. 7)
- *Nominal Bearing Resistance at Service Limit State* – See Appendix D.

Northern Low-Flow Crossing (culvert)

- *Recommended Foundation Alternative* – Shallow Foundations. (p. 7)
- *Nominal Bearing Resistance at Strength Limit State* – q_{ult} = 450*Effective footing width + 1,750 psf. (p. 7)
- *Resistance Factor* – 0.45. (p. 7)
- *Nominal Bearing Resistance at Service Limit State* – See Appendix D.

Pedestrian Bridge

H-Piles

- *Pile Type* – Minimum HP 10x57. (p. 8)
- *Nominal Axial Capacity* – 18 ksi times the pile bottom area for 36 ksi steel piles. 25 ksi times the pile bottom area for 50 ksi steel piles. (p. 8)
- *Resistance Factor* – 0.65 where PDA used to establish field driving criteria (p.8)

Micro Piles

- *Anticipated Length* – up to 40 feet. (p. 8)
- *Unit Side Resistance* – 5,250 psf. (p. 9)
- *Resistance Factor* – 0.5 (p. 9)

Shade Structures

- *Recommended Foundation Alternative* – Shallow Foundations. (p. 9)
- *Nominal Bearing Resistance at Strength Limit State* – q_{ult} = 450*Effective footing width + 1,750 psf. (p. 9)
- *Resistance Factor* – 0.45. (p. 9)
- *Nominal Bearing Resistance at Service Limit State* – See Appendix D.

Summary of Pavement Recommendations (p. 11)

It is recommended that the path consist a minimum of 4-inches of concrete. It is recommended that the path in areas where automobile traffic may use and/or cross the path consist of a minimum of 6-inches of concrete. All concrete should be constructed above a minimum of 6-inches of CDOT Class 6 base course.

TABLE OF CONTENTS

FIGURES

APPENDICES

1.0 INTRODUCTION

As part of improvements to infrastructure in Western Colorado, the City of Grand Junction proposes to construct a new pedestrian path along Monument Road from D Road to the Lunch Loops parking lot. As part of the design development process, Huddleston-Berry Engineering and Testing, LLC (HBET) was retained by the City of Grand Junction to conduct a geologic hazards and geotechnical investigation at the site.

1.1 Scope

As discussed above, a geologic hazards and geotechnical investigation was conducted for the proposed Monument Road Trail in Grand Junction, Colorado. The scope of the investigation included the following components:

- Conducting a subsurface investigation to evaluate the subsurface conditions at the site.
- Collecting soil and bedrock samples and conducting laboratory testing to determine the engineering properties of the soils and bedrock at the site.
- Providing recommendations for bridge and culvert foundations.
- Providing recommendations for subgrade preparation.
- Providing recommendations for drainage, grading, and general earthwork.
- Providing recommendations for pavements.
- Evaluating potential geologic hazards at the site.

The investigation and report were completed by a Colorado registered professional engineer in accordance with generally accepted geotechnical and geological engineering practices. This report has been prepared for the exclusive use of the City of Grand Junction.

1.2 Site Location

The project is located on the southeast side of Monument Road between D Road and the Lunch Loops parking lot. The project location is shown on Figure 1 – Site Location Map.

1.3 Proposed Construction

The proposed construction is anticipated to consist of a new pedestrian path. The construction is also anticipated to include one bridge and five culverts. In addition, new shade structures are proposed at the Lunch Loops parking lot. Significant earthwork is also likely.

2.0 GEOLOGIC SETTING

2.1 Soils

Soils data was obtained from the USDA Natural Resource Conservation Service Web Soil Survey. The data indicates that the several soil types are present at the site. Soil survey data is included in Appendix A.

Path and trail construction in the site soils is indicated to range from somewhat limited to very limited due to sand content, large stones content, slope, dust, and/or water erosion. The site soils are indicated to have a low to moderate potential for frost action, moderate to high risk of corrosion of uncoated steel, and low to high risk of corrosion of concrete.

2.2 Geology

According to the *Geologic Map of the Grand Junction Quadrangle, Mesa County, Colorado* (2002), several geologic units are present along the trail alignment. The north end of the trail alignment is mapped as being underlain by young fan alluvium and debris flow deposits. The area of the northern bridge structure is mapped as being underlain by the Dakota formation, alluvium deposited by tributary streams, and/or local gravel deposits over terrace alluvium 30 of the Colorado River. The remainder of the trail area is mapped as being underlain by alluvium deposited by tributary streams and/or eolian sand and sheetwash deposits. A geologic map is included as Figure 2.

2.3 Groundwater

Groundwater was only encountered in Borings B-7 and B-10 through B-15 at depths of between 2.0 and 14.0 feet at the time of the investigation.

3.0 SUBSURFACE INVESTIGATION

The subsurface investigation was conducted between August 3rd and August 7th, 2018. Fifteen boring locations were proposed for the project area; however, only fourteen of the borings were drilled. The location of Boring B-12 was inaccessible to the track mounted drill rig. In addition to the borings, a hand sample was collected at the north end of the project area that was inaccessible to the drill rig. Another hand sample was collected at a proposed borrow area on the west side of Monument Road.

The borings were drilled to depths of between 5.5 and 30.5 feet below the existing ground surface. The locations of the borings and hand samples are shown on Figures 3 through 7. Typed boring logs are included in Appendix B. Samples of the native soils and bedrock were collected during Standard Penetration Testing (SPT) and using bulk sampling methods at the locations shown on the logs. In addition, a bulk sample was collected from the proposed borrow area. A second bulk sample was collected at the north end of the project that was inaccessible to the drilling equipment.

As shown on the logs, the subsurface conditions along the trail alignment were variable. Boring B-1, conducted near where the new trail will intersect the Lunch Loops parking lot, encountered red, moist, dense cobbles and boulders in a silty sand with gravel matrix from the ground surface to the bottom of the boring. Groundwater was not encountered in B-1 at the time of the investigation.

Boring B-2, conducted at the southernmost No Thoroughfare Canyon crossing, encountered 0.5 feet of red, moist, loose silty sand with gravel above white to green, soft, highly weathered bentonite to the bottom of the boring. Groundwater was not encountered in B-2 at the time of the investigation.

Borings B-3 and B-4, conducted along a trail section between creek crossings, encountered tan, moist, loose to medium dense silty sand with gravel soils at the ground surface. In B-3, the sand extended to a depth of 7.0 feet and was underlain by ran, moist, dense to very dense cobbles and boulders in a silty sand with gravel matrix to the bottom of the boring. In B-4, the sand extended to a depth of 6.0 feet where sandstone bedrock was encountered. Groundwater was not encountered in B-3 or B-4 at the time of the investigation.

Borings B-5 through B-7, conducted at the next three crossings of No Thoroughfare Canyon, encountered tan, moist to wet, medium dense to very dense silty sand with gravel or cobbles and boulders in a silty sand with gravel matrix from the ground surface to depths of between 3.5 and 5.5 feet. In B-5, the sand was underlain by tan, hard, moderately weathered sandstone bedrock to the bottom of the boring. In B-6, the sand was underlain by gray to green, medium hard, highly weathered bentonite to the bottom of the boring where sandstone bedrock was encountered. In B-7, the granular soils were underlain by red, medium hard, highly weathered claystone bedrock to the bottom of the boring. Groundwater was only encountered in B-7 at a depth of 2.0 feet at the time of the investigation.

Borings B-8 through B-10, conducted along a trail section north of the three crossings, encountered tan, moist to wet, very loose to medium dense silty sand soils from the ground surface to depths of between 5.0 and 7.5 feet. In B-8, the sand was underlain by gray to green, medium hard, highly weathered bentonite to the bottom of the boring. In B-9, the sand extended to the bottom of the boring where sandstone bedrock was encountered. In B-10, the sand was underlain by brown, wet, medium dense sandy gravel to the bottom of the boring where sandstone bedrock was encountered. Groundwater was only encountered in B-10 at a depth of 2.0 feet at the time of the investigation.

Boring B-11, conducted at the northernmost culvert crossing of No Thoroughfare Canyon, encountered 12.0 feet of tan, moist to wet, loose to medium dense silty sand with gravel above brown, wet, very dense sandy gravel to a depth of 17.0 feet. The gravel was underlain by brown, wet, loose silty sand with gravel to a depth of 22.0 feet. Below the sand, tan, hard, moderately weathered sandstone bedrock extended to the bottom of the boring. Groundwater was encountered in B-11 at a depth of 3.0 feet at the time of the investigation.

Boring B-13, conducted along a trail section south of the pedestrian bridge, encountered 7.0 feet of tan, moist to wet, very loose silty sand above tan, wet, medium dense to loose sandy gravel with trace cobbles to the bottom of the boring. Groundwater was encountered in B-13 at a depth of 3.5 feet at the time of the investigation.

Boring B-14, conducted at the south abutment of the pedestrian bridge, encountered brown, moist to wet, medium dense to dense sandy gravel soils from the ground surface to a depth of 29.0 feet where sandstone bedrock was encountered. Boring B-15, conducted at the north abutment of the pedestrian bridge, encountered 6.0 feet of dense fill materials above brown, moist to wet, dense to very dense silty clayey sand with trace cobbles and boulders to a depth of 15.5 feet. The sand was underlain by tan, wet, medium dense to dense sandy gravel to the bottom of the boring where sandstone bedrock was encountered. Groundwater was encountered in B-14 at a depth of 14.0 feet and in B-15 at a depth of 7.0 feet.

Bulk samples HS-1 and HS-2, collected from the proposed borrow area and north end of the project, respectively, encountered silty gravel with sand soils.

4.0 LABORATORY TESTING

Selected native soil and bedrock samples collected from the borings were tested in the Huddleston-Berry Engineering and Testing LLC geotechnical laboratory for natural moisture content and density determination, grain size analysis, Atterberg limits determination, maximum dry density and optimum moisture (Proctor) determination, swell/consolidation testing, and soluble sulfates content determination. The laboratory testing results are included in Appendix C.

The laboratory testing results indicate that the native sand soils are non-plastic to slightly plastic. In addition, the sand soils were shown to be slightly collapsible at their existing density with up to approximately 1.6% collapse measured in the laboratory. Water soluble sulfates were detected in the sand soils in a concentration of 0.04%.

The bentonite materials encountered in some of the borings were indicated to be highly plastic. Based upon the Atterberg limits of these materials and upon our experience with bentonite in the vicinity of the subject site, the bentonite is anticipated to be highly expansive.

The claystone bedrock was determined to be moderately plastic. Based upon the Atterberg limits of the material and upon our experience with claystone in the vicinity of the subject site, the claystone bedrock at this site is anticipated to be slightly to moderately expansive.

The native silty, clayey gravel with sand soils encountered at the bulk sampling locations were indicated to be slightly plastic.

5.0 GEOLOGIC INTERPRETATION

5.1 Geologic Hazards

The primary geologic hazard at the site is the potential for flooding of No Thoroughfare Canyon. However, moisture sensitive soils and bedrock were also encountered at the site.

5.2 Geologic Constraints

The primary geologic constraint to construction is the presence of moisture sensitive soils and bedrock. However, shallow groundwater may also impact construction in some areas of the site.

5.3 Water Resources

No water supply wells were observed in the project area. However, shallow groundwater was encountered in several of the borings. In addition, the site runs along No Thoroughfare Canyon. In general, with proper grading and stormwater management, the proposed construction at the site is not anticipated to adversely affect surface water or groundwater.

5.4 Mineral Resources

Potential mineral resources in Western Colorado generally include gravel, uranium ore, and commercial rock products such as flagstone. As discussed previously, sands and gravels were encountered in the subsurface along the trail alignment. However, based upon the location of the proposed trail along No Thoroughfare Canyon, HBET does not believe that the existing sands and gravels represent an economically recoverable resource.

6.0 CONCLUSIONS

Based upon the available data sources, field investigation, and nature of the proposed construction, HBET does not believe that there are any geologic conditions which should preclude construction of the new trail, culvert crossings, and bridges in the project area. However, the presence of shallow groundwater, moisture sensitive soils and bedrock, and/or potential for flooding may impact the design and/or construction.

7.0 RECOMMENDATIONS

7.1 Foundations

As discussed previously, five culvert crossings and one bridge crossing are proposed along the trail alignment. Also, as discussed previously, bedrock materials were encountered fairly shallow at the southern four culvert crossings (Borings B-2, 5, 6, 7). As a result, shallow foundation design will likely be appropriate for these culverts.

At the next culvert crossing (Boring B-11), at the elevation of the proposed culvert, silty sand soils were encountered. As discussed previously, the native sand soils are collapsible. However, the foundation loading is not anticipated to be large. As a result, shallow foundations are anticipated to be appropriate at this location.

At the pedestrian bridge (B-14 and B-15), sand and gravel soils were encountered above sandstone bedrock. Due to the variable density of the granular soils, deep foundations to competent bedrock should be considered. Driven piles may be appropriate; however, driven piles may have difficulties penetrating the dense clayey sand layer encountered in B-15. An alternative to driven piles is micro-piles.

As indicated previously, Boring B-1, conducted near the Lunch Loops parking lot encountered dense granular materials in the subsurface. In general, HBET anticipates similar soil conditions at the locations of the proposed shade structures. Therefore, HBET anticipates that shallow foundations will be appropriate for the shade structures.

7.1.1. Shallow Foundations for Southern Four Culverts (B-2, 5, 6, 7)

As discussed previously, expansive claystone and bentonite bedrock materials were encountered in borings at three of the crossings. However, claystone and bentonite are common to the geology in the area and even though they were not encountered in the fourth boring, it is likely that they are present in the bedrock below all of the crossings. Due to the high likelihood of moisture fluctuations in the subgrade at the culverts, volume changes in the claystone and/or bentonite are likely. Unfortunately, there is no cost effective way to limit the potential for movement of culverts. The only way to limit the potential for movement would be to construct micro-pile supported bridges at the crossings. However, this would likely be cost prohibitive. Therefore, HBET generally recommends that the culverts be constructed above competent bedrock materials or structural fill extending to bedrock.

Structural fill should consist of granular, non-free draining, non-expansive material such as ¼-inch minus crusher fines or CDOT Class 6 Base course. Controlled Low Strength Material (CLSM/Flowable Fill) is also acceptable below the culverts down to bedrock. However, unless it can be demonstrated that they are not free-draining, pit-run materials are not suitable for use as structural fill.

In accordance with LRFD design methodology, for culverts constructed/placed above competent weathered bedrock, a nominal bearing resistance for the strength limit state of q_{ult} = 1,450*Effective footing width + 10,000 psf may be used. A resistance factor of 0.45 is recommended. Nominal bearing resistance for the service limit state should be in accordance with the attached plot of Bearing Stress versus Effective Footing Width for a maximum total settlement of 1.0-inch included in Appendix D.

7.1.2. Shallow Foundations for Fifth Culvert (B-11)

As discussed previously, collapsible sand soils were encountered in the subsurface at the elevation of the proposed culvert base. Therefore, HBET recommends that the culvert(s) be constructed above a minimum of 24-inches of structural fill consisting of the proposed borrow materials or imported granular material such as crusher fines or CDOT Class 6 base course.

Prior to placement of structural fill, it is recommended that the bottom of the foundation excavation be scarified to a depth of 6 to 9 inches, moisture conditioned, and compacted to a minimum of 95% of the standard Proctor maximum dry density, within ± 2% of the optimum moisture content as determined in accordance with ASTM D698. However, soft, wet conditions may exist at the bottom of the foundation excavation and this may make compaction of the subgrade difficult. It may be necessary to utilize geotextile and/or geogrid in conjunction with up to 30-inches of granular fill to stabilize the subgrade. HBET should be contacted to provide specific recommendations for subgrade stabilization based upon the actual conditions in the bottom of the foundation excavation.

Structural fill should be moisture conditioned, placed in maximum 8-inch loose lifts, and compacted to a minimum of 95% of the standard Proctor maximum dry density for fine grained soils and modified Proctor maximum dry density for coarse grained soils, within ± 2% of the optimum moisture content as determined in accordance with ASTM D698 and D1557, respectively. Structural fill should extend laterally beyond the edges of the culvert(s) a distance equal to the thickness of structural fill.

In accordance with LRFD design methodology, for foundation preparation as recommended, a nominal bearing resistance for the strength limit state of q_{ult} = 450*Effective footing width + 1,750 psf may be used. A resistance factor of 0.45 is recommended. Nominal bearing resistance for the service limit state should be in accordance with the attached plot of Bearing Stress versus Effective Footing Width for a maximum total settlement of 1.0-inch included in Appendix D. Foundations subject to frost should be at least 24-inches below the finished grade.

7.1.3. Driven Piles for Pedestrian Bridge

As discussed previously, driven steel H-piles may be appropriate for the pedestrian bridge. For driven piles, it is anticipated that most of the axial pile capacity will be developed in end bearing on sandstone bedrock. Based upon the anticipated working loads and pile driving conditions, piles should be a minimum of HP 10x57. However, if larger piles are proposed, it is important to ensure the pile driving contractor has a large enough hammer to achieve the design capacities.

The piles should penetrate the native sand and gravel soils and bear into the sandstone bedrock. The actual penetration of individual piles will be dependent upon driving conditions and size of pile used; however, it is anticipated that H-piles will reach refusal within 2 to 10 feet of the top of the bedrock. Therefore, pile lengths of up to approximately 39 feet may be possible (measured from existing grade). In order to protect the pile tip, pile tip reinforcement is recommended.

In accordance with LRFD design methodology, for Grade 36 steel H-piles, a nominal combined skin friction and end bearing capacity of 18 ksi times the cross sectional area of the pile is recommended. For Grade 50 steel H-piles, a nominal combined skin friction and end bearing capacity of 25 ksi times the cross sectional area of the pile is recommended. However, it is recommended that pile load testing be conducted to evaluate actual achievable capacities and pile lengths. In accordance with AASHTO LRFD bridge design specifications, where a pile driving analyzer is utilized to establish the field pile driving criteria, a resistance factor of 0.65 may be used.

To eliminate reductions in capacity from group effects, the minimum center-to-center spacing of piles should be 3 pile diameters. Group effects should be considered for piles grouped less than 3 diameters apart.

In general, for properly installed H-piles refused on bedrock, HBET anticipates that total settlements will be 1.0-inch or less. However, this should be verified during pile load testing. A reduction in capacity may be necessary where pile load tests indicate excessive deflection.

7.1.4. Micro Piles for Pedestrian Bridge

As discussed previously, micro-piles are an appropriate foundation alternative for the pedestrian bridge. In general, micro-piles should be designed as unbonded elements in the overburden sand and gravel soils with bearing capacity developing from side shear in the sandstone bedrock. Due to the granular nature of the overburden soils, conventional micro-piles will likely require casing to maintain an open hole. However, injection grouted piles may also be considered.

For a micro pile foundation, it is recommended that micro piles extend into competent bedrock a minimum of 10 feet. Therefore, pile lengths of up to approximately 40 feet are anticipated (as measured from existing grade).

Side resistance should be ignored along the portion of the piles in the overburden soils. Assuming a weighted load factor of 1.5, a unit side resistance (q_s) value of 5,250 psf may be used for the sandstone bedrock. The side resistance is applicable in both compression and uplift. A resistance factor of 0.5 is recommended. However, where a different load factor is used, the load factor should be divided by 3 to determine the corresponding resistance factor. To ensure friction capacity, pile load testing is strongly recommended. Grout used in the bond zone of the micro piles should have a minimum 28 day compressive strength of 3,000 psi.

In general, micro piles should be installed with a center-to-center spacing of greater than 3 feet. However, to the extent practical, smaller numbers of longer micro piles should be used in lieu of larger numbers of shorter piles. The longer the piles and larger the loads on the piles, the lower the risk of movement.

For properly installed micro-piles, HBET anticipates that total settlements will be 1.0-inch or less. However, this should be verified during pile load testing. A reduction in capacity may be necessary where pile load tests indicate excessive deflection.

7.1.5. Shallow Foundations for Shade Structures

As discussed previously, dense granular materials were encountered at the south end of the trail. It is anticipated that similar conditions will be present at the proposed shade structure locations. Therefore, spread footing type foundations are appropriate for these structures. However, to provide a uniform bearing stratum and limit the potential for excessive differential settlements, it is recommended that the shade structure foundations be constructed above a minimum of 18-inches of structural fill consisting of the proposed borrow materials or imported granular material such as crusher fines or CDOT Class 6 base course.

Prior to placement of structural fill, it is recommended that the bottom of the foundation excavation be scarified to a depth of 6 to 9 inches, moisture conditioned, and proofrolled to the Engineer's satisfaction. Structural fill should be moisture conditioned, placed in maximum 8-inch loose lifts, and compacted to a minimum of 95% of the standard Proctor maximum dry density for fine grained soils and modified Proctor maximum dry density for coarse grained soils, within ± 2% of the optimum moisture content as determined in accordance with ASTM D698 and D1557, respectively. Structural fill should extend laterally beyond the edges of the foundations a distance equal to the thickness of structural fill.

In accordance with LRFD design methodology, for foundation preparation as recommended, a nominal bearing resistance for the strength limit state of q_{ult} = 450*Effective footing width + 1,750 psf may be used. A resistance factor of 0.45 is recommended. Nominal bearing resistance for the service limit state should be in accordance with the attached plot of Bearing Stress versus Effective Footing Width for a maximum total settlement of 1.0-inch included in Appendix D. Foundations subject to frost should be at least 24-inches below the finished grade

7.2 Lateral Pile Capacity

Based upon the results of the subsurface investigation, the following soil parameters are recommended for use in lateral capacity analyses utilizing the LPile software program:

Depth from Grade (in).	Above Water Table	Below Water Table
Soil Type	Sand	Sand
Density (pci)	0.0637	0.0275
Cohesion (psi)	0	0
Friction Angle (ϕ)	28	28
ε_{50} (in/in)	-	-
K_h (pci)	90	60

7.3 Corrosion of Steel and Concrete

The Soil Survey data suggest that the native soils have a moderate to high potential for corrosion of steel. The risk of corrosion may be increased where flooding or groundwater fluctuations result in periods of wetting and drying. Therefore, it is recommended that the structural engineer consider corrosion in the design of H-piles.

With regard to soil corrosivity to concrete, as discussed previously, water soluble sulfates were detected in the site soils in a concentration of 0.04%. This concentration of sulfates represents a negligible degree of sulfate attack on concrete exposed to the native soils. However, the Soil Survey data suggest that the native soils have lot to high potential for corrosion of concrete. Therefore, at a minimum, Type I-II sulfate resistant cement is recommended for construction at this site.

7.4 Borrow Materials

As indicated in the attached laboratory testing data, the proposed borrow materials consist of silty, clayey gravel with sand. In general, these materials are suitable for use as structural fill, embankment fill, etc.

7.5 Lateral Earth Pressures

The structures should be designed to resist lateral earth pressures. HBET recommends that the structures be designed using the following earth pressure coefficients:

<u>Native Sand Soils</u>

- $K_o = 0.53$
- $K_a = 0.36$
- $K_p = 2.77$

Native Gravels / Cobbles and Boulders and Gravel Borrow

- $K_o = 0.44$
- $K_a = 0.31$
- $K_p = 3.26$

The earth pressure coefficients above assume horizontal backslope and should be increased where the backslope is not level. Computed lateral earth pressures on the structures should consider surcharge loading from vehicular traffic on the trail, where applicable.

7.6 Seismic Site Classification

At the four southern culverts, shallow bedrock was present. As a result, Seismic Site Class C is recommended for these structures.

At the northern low-flow crossing, loose sand soils are present below the water table and some of these soils are potentially liquefiable. In general, HBET does not believe that there is a significant risk of structural damage, loss of life, etc. associated with a concrete culvert structure at this location. However, in accordance with the International Building Code (IBC), the northern crossing area technically classifies as Seismic Site Class F.

At the pedestrian bridge crossing, sand and gravel soils were present in the shallow subsurface. While some of these soils were below the water table, based upon the SPT blow counts of these materials, HBET does not believe that these soils are liquefiable. In addition, deep foundations are proposed for this structure. Therefore, HBET recommends that Seismic Site Class D be used for the pedestrian bridge.

7.7 Excavations

Excavations in the soils at the site may stand for short periods of time but should not be considered to be stable. The native sand soils generally classify as Type C soil with regard to OSHA's *Construction Standards for Excavations*. In general, for Type C soils, the maximum allowable slope in temporary cuts is 1.5H:1V.

In general, for bedrock excavation in the southern portion of the project area, HBET recommends that the materials be classified as Type A soil. For Type A soil, the maximum allowable slope in temporary cuts is 0.75H:1V. However, HBET should be contacted to further evaluate bedrock materials exposed during construction.

7.8 Path Pavements

The proposed construction is anticipated to include a new concrete path. The subgrade materials along the path will consist of native sand and gravel soils or gravel soils from the borrow area.

In general, the native sand soils will be critical for the pavement section design as any fills will consist of suitable controlled materials. Due to the collapse potential of the native sand soils, the recommended minimum Resilient Modulus of 3,000 psi was used for the pavement design.

In general, HBET recommends that the concrete path be a minimum of 4-inches in thickness in accordance with Mesa County standards. In addition, in areas where automobile traffic may use and/or cross the path, a minimum thickness of 6-inches of concrete is recommended. For all areas of the path, a minimum of 6-inches of CDOT Class 6 base course is recommended below the concrete.

Prior to new pavement placement, areas to be paved should be stripped of all topsoil, uncontrolled fill, or other unsuitable materials. It is recommended that the subgrade soils be scarified to a depth of 12-inches; moisture conditioned, and recompacted to a minimum of 95% of the standard Proctor maximum dry density, within ±2% of optimum moisture content as determined by AASHTO T-99.

Aggregate base course should be placed in maximum 9-inch loose lifts, moisture conditioned, and compacted to a minimum of 95% of the maximum dry density, at -2% to +3% of optimum moisture content as determined by AASHTO T-180. In addition to density testing, base course should be proofrolled to verify subgrade stability.

The long-term performance of the pavements is dependent on positive drainage away from the pavements. Ditches, culverts, and inlet structures in the vicinity of paved areas must be maintained to prevent ponding of water on the pavement.

8.0 GENERAL

The recommendations included above are based upon the results of the subsurface investigation and on our local experience. These conclusions and recommendations are valid only for the proposed construction.

As discussed previously, the subsurface conditions at the site were variable. Although HBET believes that the investigation was sufficient to adequately characterize the range of subsurface conditions at the site, the precise nature and extent of subsurface variability may not become evident until construction. Therefore, it is recommended that a representative of HBET be retained to provide engineering oversight and construction materials testing services during the construction. This is to verify compliance with the recommendations included in this report or permit identification of significant variations in the subsurface conditions which may require modification of the recommendations.

It is important to note that moisture sensitive soils and bedrock were encountered at the site. In general, with proper design and construction, HBET believes that the risk of excessive differential movements is low. However, where significant changes in the subsurface moisture conditions occur either during or after construction, significant differential movements of the sidewalks are possible.

Huddleston-Berry Engineering and Testing, LLC is pleased to be of service to your project. Please contact us if you have any questions or comments regarding the contents of this report.

Respectfully Submitted:
Huddleston-Berry Engineering and Testing, LLC

Michael A. Berry, P.E.
Vice President of Engineering

FIGURES

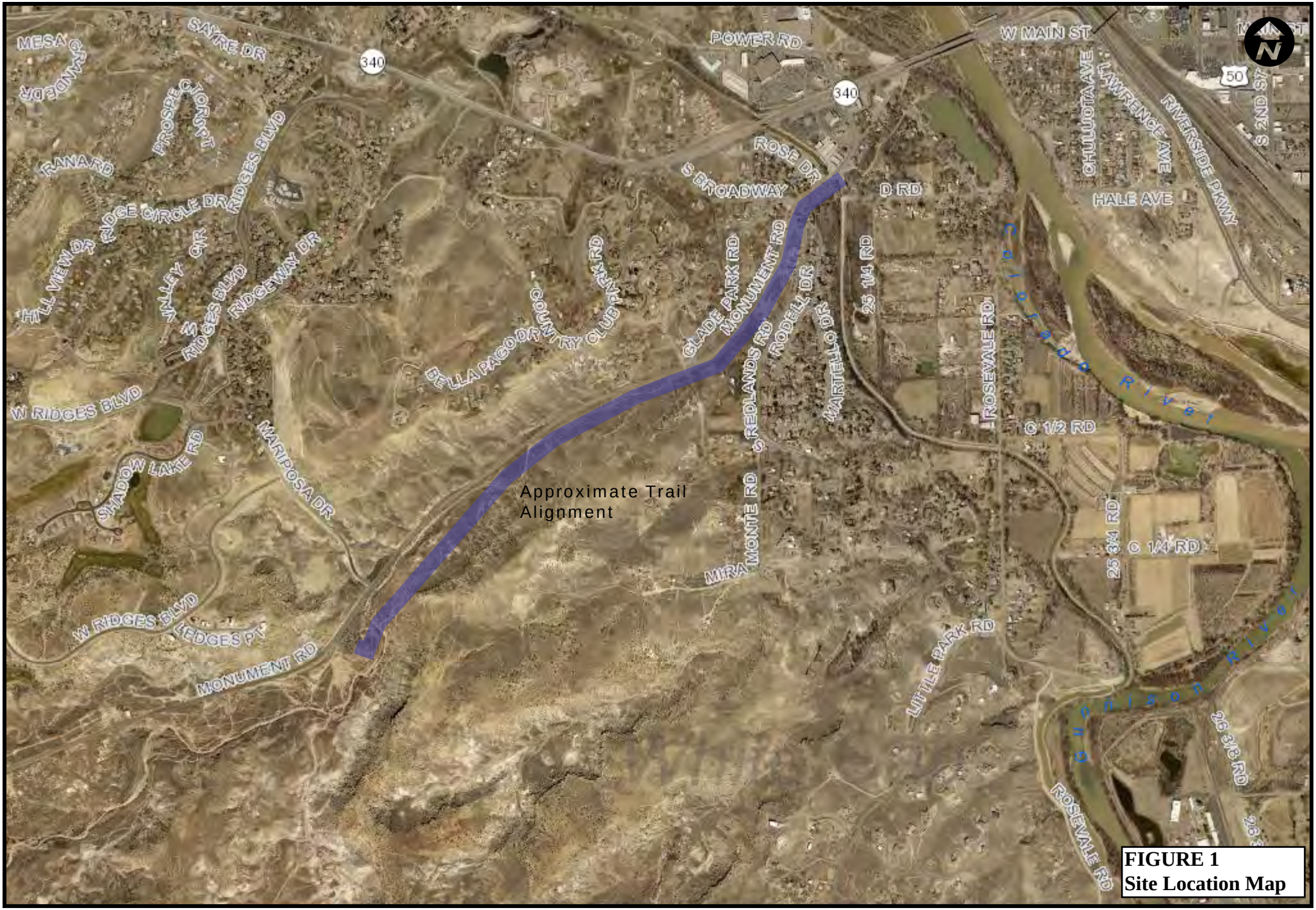


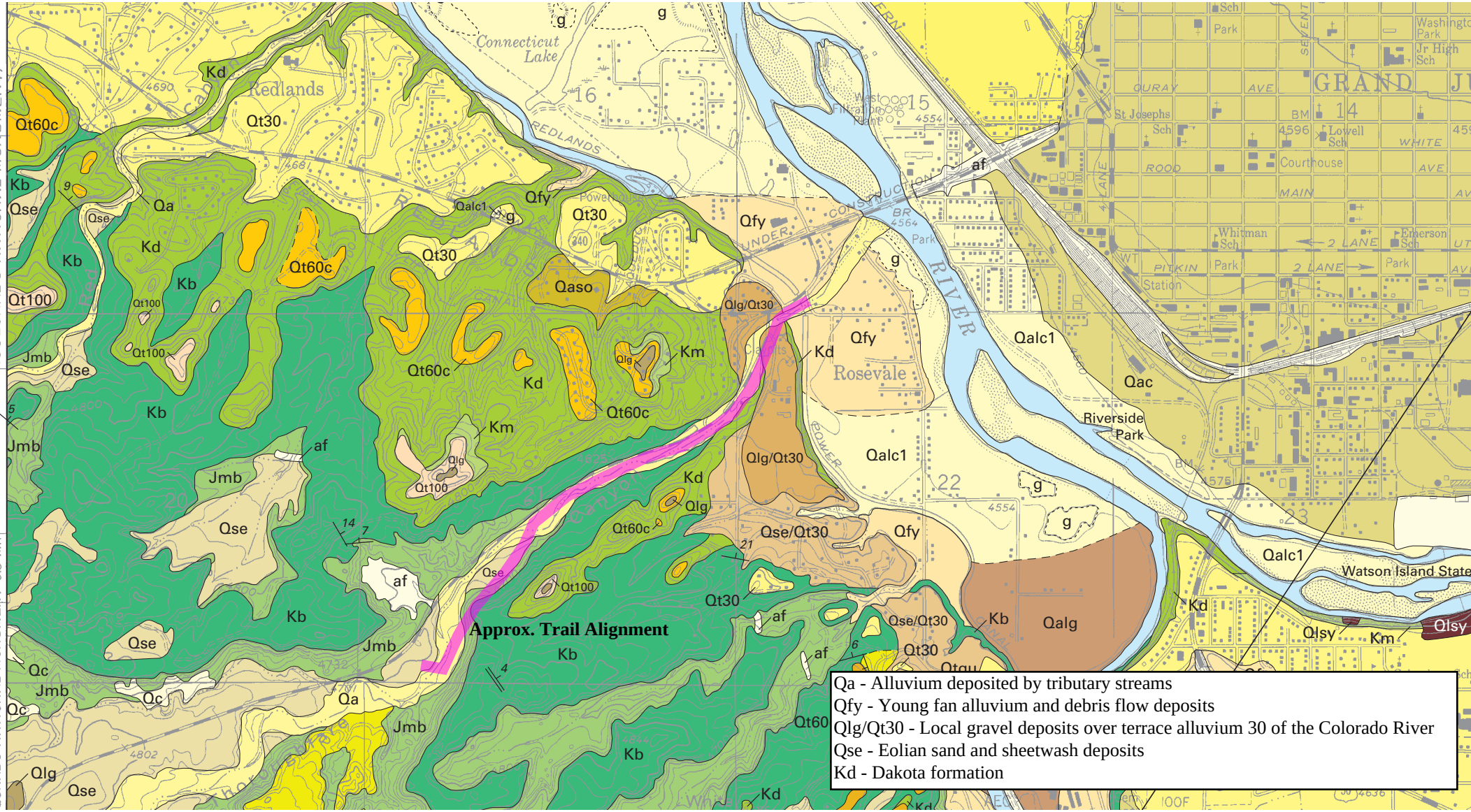
FIGURE 1
Site Location Map

Mesa County Map

0 0.125 0.25 0.5 mi
0 0.15 0.3 0.6 km

Print Date: October 15, 2018

Mesa County, Colorado
GIS/IT Department
gis.mesacounty.us



Printed portion of map titled G*eologic Map of the Grand Junction Quadrangle, Mesa County, Colorado* by Scott, Carrara, Hood, and Murray (2002)

FIGURE 2
Geologic Map

FIGURE 3
Site Plan

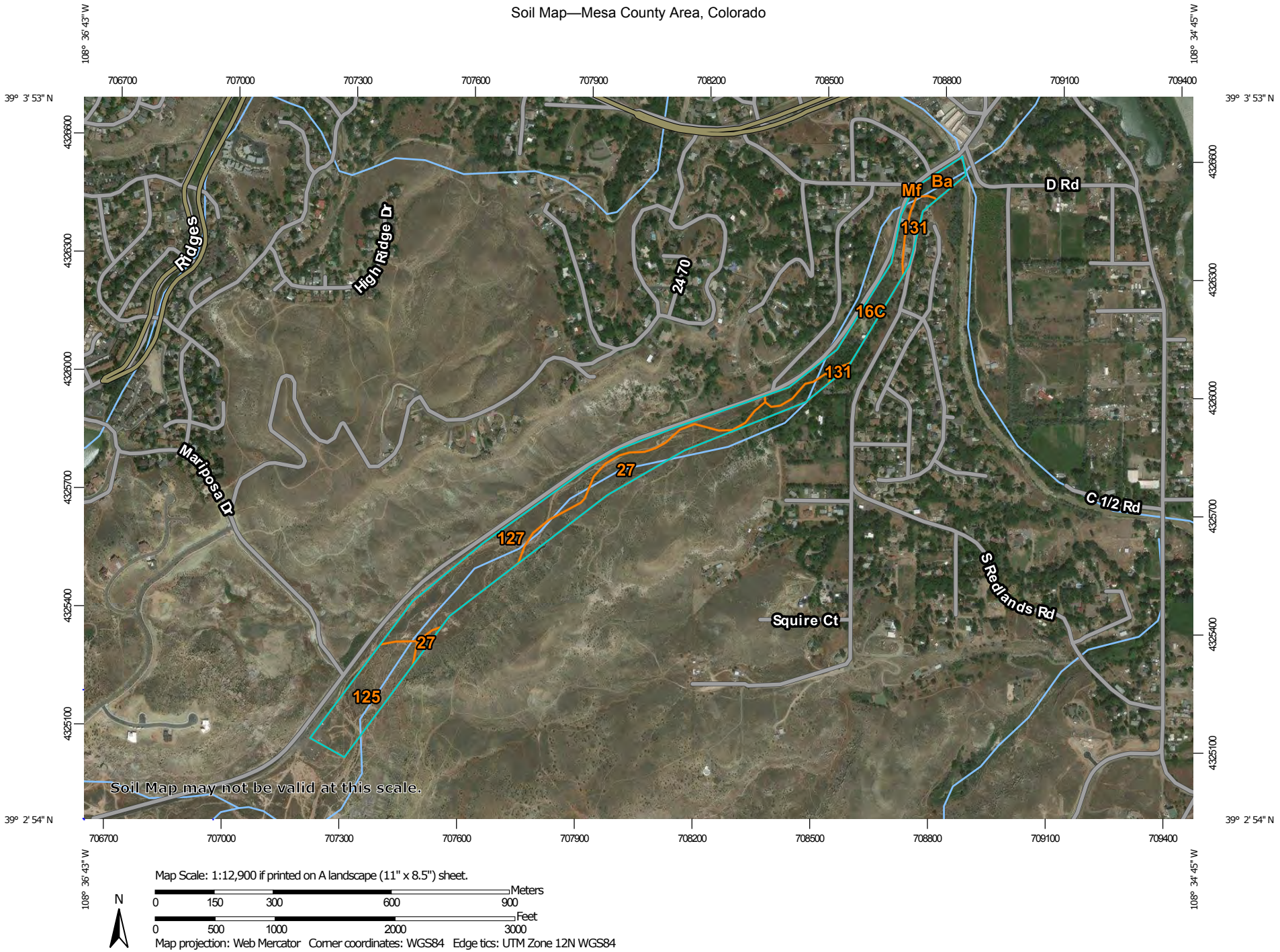
FIGURE 4
Site Plan

FIGURE 5
Site Plan

FIGURE 6
Site Plan

FIGURE 7
Site Plan

APPENDIX A
Soil Survey Data



Map Scale: 1:12,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 150 300 600 900

Feet
0 500 1000 2000 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 12N WGS84

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.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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: Mesa County Area, Colorado
Survey Area Data: Version 9, Sep 10, 2018

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

Date(s) aerial images were photographed: Dec 31, 2009—Mar 2, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background 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
16C	Luster loamy fine sand, 3 to 8 percent slopes	5.7	13.9%
27	Rock outcrop-Biedsaw complex, 25 to 65 percent slopes, extremely bouldery	8.8	21.5%
125	Moffat sandy loam, 2 to 6 percent slopes	8.0	19.4%
127	Rock outcrop-Persayo-Hostage complex, 25 to 65 percent slopes, extremely bouldery	15.1	37.0%
131	Mack-Gyprockmesa complex, 1 to 5 percent slopes	1.6	4.0%
Ba	Massadona silty clay loam, 0 to 2 percent slopes	1.6	4.0%
Mf	Gyprockmesa cobbly clay loam, 5 to 12 percent slopes	0.0	0.0%
Totals for Area of Interest		**40.9**	**100.0%**

Map Unit Description

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 in this report, 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, soils that are similar to the named components, and some minor components that differ in use and management from the major soils.

Most of the soils similar to the major components 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. Some minor components, however, have properties and behavior 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*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. Soils of a given 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.

Additional information about the map units described in this report is available in other soil reports, which give properties of the soils and the limitations, capabilities, and potentials for many uses. Also, the narratives that accompany the soil reports define some of the properties included in the map unit descriptions.

Report—Map Unit Description

Mesa County Area, Colorado

16C—Luster loamy fine sand, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: k06j
Elevation: 5,400 to 6,500 feet

Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 49 to 54 degrees F
Frost-free period: 120 to 165 days
Farmland classification: Not prime farmland

Map Unit Composition

Luster and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Luster

Setting

Landform: Hillslopes
Landform position (two-dimensional): Footslope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Slope alluvium derived from sandstone

Typical profile

Ap1 - 0 to 3 inches: loamy fine sand
Ap2 - 3 to 8 inches: fine sandy loam
AB - 8 to 12 inches: fine sandy loam
Bk1 - 12 to 32 inches: loamy fine sand
Bk2 - 32 to 45 inches: loamy fine sand
Bk3 - 45 to 60 inches: loamy fine sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.13 to 7.09 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 6.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Sandy Foothills (R036XY310CO)
Hydric soil rating: No

27—Rock outcrop-Biedsaw complex, 25 to 65 percent slopes, extremely bouldery

Map Unit Setting

National map unit symbol: k08s
Elevation: 5,800 to 8,000 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 49 to 54 degrees F
Frost-free period: 120 to 165 days
Farmland classification: Not prime farmland

Map Unit Composition

Rock outcrop: 55 percent
Biedsaw, extremely bouldery, and similar soils: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Outcrop

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Description of Biedsaw, Extremely Bouldery

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope, shoulder
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Colluvium derived from sandstone and shale over residuum weathered from clayey shale

Typical profile

A - 0 to 16 inches: very cobbly clay loam
2C1 - 16 to 32 inches: silty clay
2C2 - 32 to 60 inches: silty clay

Properties and qualities

Slope: 25 to 65 percent
Percent of area covered with surface fragments: 9.0 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.07 to 0.21 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent

Salinity, maximum in profile: Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
Available water storage in profile: Moderate (about 7.8 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: Steep Shallow Clay Loam - (Pinyon-Utah Juniper) (R036XY111CO)
Hydric soil rating: No

125—Moffat sandy loam, 2 to 6 percent slopes

Map Unit Setting
National map unit symbol: k07l
Elevation: 4,400 to 5,000 feet
Mean annual precipitation: 7 to 10 inches
Mean annual air temperature: 50 to 54 degrees F
Frost-free period: 150 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition
Moffat and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Moffat

Setting
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex, linear
Across-slope shape: Linear
Parent material: Slope alluvium derived from sandstone

Typical profile
Ap - 0 to 2 inches: sandy loam
Bw1 - 2 to 7 inches: fine sandy loam
Bw2 - 7 to 16 inches: fine sandy loam
Bk1 - 16 to 24 inches: sandy loam
Bk2 - 24 to 32 inches: sandy loam
Bk3 - 32 to 44 inches: loamy sand
Bk4 - 44 to 61 inches: sandy loam

Properties and qualities
Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.71 to 2.13 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 7.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: B
Ecological site: Desert Sandy Loam (Indian Ricegrass) (R034BY115UT)
Hydric soil rating: No

127—Rock outcrop-Persayo-Hostage complex, 25 to 65 percent slopes, extremely bouldery

Map Unit Setting

National map unit symbol: k07k
Elevation: 4,700 to 5,400 feet
Mean annual precipitation: 6 to 9 inches
Mean annual air temperature: 50 to 55 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Rock outcrop: 35 percent
Persayo, extremely bouldery, and similar soils: 30 percent
Hostage, extremely bouldery, and similar soils: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Outcrop

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Description of Persayo, Extremely Bouldery

Setting

Landform: Pediments
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Cretaceous source residuum weathered from clayey shale

Typical profile

A - 0 to 2 inches: very parachannery clay loam
C - 2 to 11 inches: very parachannery silty clay loam
Cr - 11 to 60 inches: bedrock

Properties and qualities

Slope: 25 to 65 percent
Percent of area covered with surface fragments: 9.0 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.00 to 0.28 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 40 percent
Gypsum, maximum in profile: 10 percent
Salinity, maximum in profile: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: D
Ecological site: Semidesert Very Steep Loam (Shadscale) (R034BY248UT)
Hydric soil rating: No

Description of Hostage, Extremely Bouldery

Setting

Landform: Pediments
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Colluvium derived from sandstone and shale over cretaceous source residuum weathered from clayey shale

Typical profile

A - 0 to 4 inches: clay loam
Bw - 4 to 25 inches: clay loam
C1 - 25 to 50 inches: silty clay loam
C2 - 50 to 55 inches: silty clay loam
Cr - 55 to 72 inches: bedrock

Properties and qualities

Slope: 25 to 50 percent
Percent of area covered with surface fragments: 10.0 percent
Depth to restrictive feature: 40 to 60 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.00 to 0.28 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Calcium carbonate, maximum in profile: 15 percent
Gypsum, maximum in profile: 1 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: C
Ecological site: Semidesert Very Steep Loam (Shadscale) (R034BY248UT)
Hydric soil rating: No

131—Mack-Gyprockmesa complex, 1 to 5 percent slopes

Map Unit Setting

National map unit symbol: k0df
Elevation: 4,360 to 4,990 feet
Mean annual precipitation: 6 to 9 inches
Mean annual air temperature: 50 to 55 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Mack and similar soils: 50 percent
Gyprockmesa and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mack

Setting

Landform: Fan remnants
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Slope alluvium over alluvium derived from sandstone and shale

Typical profile

Ap - 0 to 6 inches: loam
Btk1 - 6 to 14 inches: clay loam
Btk2 - 14 to 20 inches: clay loam
Btk3 - 20 to 50 inches: gravelly clay loam
Bk - 50 to 80 inches: gravelly clay loam

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.21 to 0.71 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 35 percent
Gypsum, maximum in profile: 4 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 10.0
Available water storage in profile: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: C
Ecological site: Desert Loam (Shadscale) (R034BY106UT)
Hydric soil rating: No

Description of Gyprockmesa

Setting

Landform: Fan remnants
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy slope alluvium derived from shale over cobbly alluvium derived from sandstone and shale

Typical profile

Ap - 0 to 5 inches: clay loam
Btk1 - 5 to 10 inches: clay loam
Btk2 - 10 to 15 inches: clay loam
Btk3 - 15 to 23 inches: cobbly clay loam
2Bky1 - 23 to 35 inches: very cobbly clay loam
2Bky2 - 35 to 44 inches: cobbly clay loam
2Bky3 - 44 to 70 inches: stony loam

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.21 to 0.71 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 25 percent
Gypsum, maximum in profile: 35 percent
Salinity, maximum in profile: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 10.0

Available water storage in profile: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: C
Ecological site: Desert Loam (Shadscale) (R034BY106UT)
Hydric soil rating: No

Ba—Massadona silty clay loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: k06n
Elevation: 4,490 to 4,920 feet
Mean annual precipitation: 6 to 9 inches
Mean annual air temperature: 50 to 55 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Massadona and similar soils: 70 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Massadona

Setting

Landform: Fan remnants
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Cretaceous source alluvium derived from clayey shale

Typical profile

A - 0 to 2 inches: silty clay loam
Bw - 2 to 12 inches: silty clay
Bkyz - 12 to 24 inches: silty clay
BCkyz1 - 24 to 48 inches: fine sandy loam
BCkyz2 - 48 to 60 inches: silty clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.07 to 0.21 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Gypsum, maximum in profile: 2 percent

Salinity, maximum in profile: Moderately saline to strongly saline (10.0 to 30.0 mmhos/cm)
Available water storage in profile: Low (about 5.3 inches)

Interpretive groups
Land capability classification (irrigated): 7s
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: C
Ecological site: Desert Clay (Castlevalley saltbush) (R034BY103UT)
Hydric soil rating: No

Mf—Gyprockmesa cobbly clay loam, 5 to 12 percent slopes

Map Unit Setting
National map unit symbol: k0ct
Elevation: 4,490 to 4,890 feet
Mean annual precipitation: 6 to 9 inches
Mean annual air temperature: 50 to 55 degrees F
Frost-free period: 140 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition
Gyprockmesa and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gyprockmesa

Setting
Landform: Strath terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy slope alluvium derived from shale over cobbly alluvium derived from sandstone and shale

Typical profile
Ap - 0 to 5 inches: cobbly clay loam
Btk1 - 5 to 10 inches: clay loam
Btk2 - 10 to 15 inches: clay loam
Btk3 - 15 to 23 inches: cobbly clay loam
2Bky1 - 23 to 35 inches: very cobbly clay loam
2Bky2 - 35 to 44 inches: cobbly clay loam
2Bky3 - 44 to 70 inches: stony loam

Properties and qualities
Slope: 5 to 12 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.21 to 0.71 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 25 percent
Gypsum, maximum in profile: 35 percent
Salinity, maximum in profile: Very slightly saline to moderately saline (2.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 10.0
Available water storage in profile: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 7c
Hydrologic Soil Group: C
Ecological site: Desert Loam (Shadscale) (R034BY106UT)
Hydric soil rating: No

Data Source Information

Soil Survey Area: Mesa County Area, Colorado
Survey Area Data: Version 9, Sep 10, 2018

Paths, Trails, and Golf Fairways

The soils of the survey area are rated in this table according to limitations that affect their suitability for paths, trails, and golf fairways. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Off-road motorcycle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

Report—Paths, Trails, and Golf Fairways

[Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the potential limitation. The table shows only the top five limitations for any given soil. The soil may have additional limitations]

Paths, Trails, and Golf Fairways–Mesa County Area, Colorado							
Map symbol and soil name	Pct. of map unit	Golf fairways		Off-road motorcycle trails		Paths and trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
16C—Luster loamy fine sand, 3 to 8 percent slopes							
Luster	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Low exchange capacity	0.75	Too sandy	0.92	Too sandy	0.92
27—Rock outcrop-Biedsaw complex, 25 to 65 percent slopes, extremely bouldery							
Rock outcrop	55	Not rated		Not rated		Not rated	
Biedsaw, extremely bouldery	30	Very limited		Very limited		Very limited	
		Slope	1.00	Large stones content	1.00	Large stones content	1.00
		Large stones content	1.00	Slope	1.00	Slope	1.00
		Dusty	0.42	Dusty	0.42	Dusty	0.42
		Gravel content	0.13				

Paths, Trails, and Golf Fairways–Mesa County Area, Colorado							
Map symbol and soil name	Pct. of map unit	Golf fairways		Off-road motorcycle trails		Paths and trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
87—Persayo-Blackston complex, 6 to 45 percent slopes							
Persayo	65	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Water erosion	1.00	Slope	1.00
		Slope	1.00	Dusty	0.50	Water erosion	1.00
		Droughty	0.87	Slope	0.01	Dusty	0.50
		Dusty	0.50				
		Low exchange capacity	0.50				
Blackston	25	Very limited		Somewhat limited		Somewhat limited	
		Slope	1.00	Dusty	0.19	Dusty	0.19
		Droughty	0.75			Slope	0.02
		Gravel content	0.39				
		Dusty	0.19				
125—Moffat sandy loam, 2 to 6 percent slopes							
Moffat	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Low exchange capacity	0.50	Dusty	0.04	Dusty	0.04
		Dusty	0.04				
127—Rock outcrop-Persayo-Hostage complex, 25 to 65 percent slopes, extremely bouldery							
Rock outcrop	35	Not rated		Not rated		Not rated	
Persayo, extremely bouldery	30	Very limited		Very limited		Very limited	
		Slope	1.00	Large stones content	1.00	Large stones content	1.00
		Droughty	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Dusty	0.50	Dusty	0.50
		Dusty	0.50				
Hostage, extremely bouldery	25	Very limited		Very limited		Very limited	
		Slope	1.00	Large stones content	1.00	Large stones content	1.00
		Dusty	0.36	Slope	0.92	Slope	1.00
				Dusty	0.36	Dusty	0.36

Paths, Trails, and Golf Fairways–Mesa County Area, Colorado							
Map symbol and soil name	Pct. of map unit	Golf fairways		Off-road motorcycle trails		Paths and trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
131—Mack-Gyprockmesa complex, 1 to 5 percent slopes							
Mack	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.38	Dusty	0.38	Dusty	0.38
Gyprockmesa	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.35	Dusty	0.35	Dusty	0.35
Ba—Massadona silty clay loam, 0 to 2 percent slopes							
Massadona	70	Somewhat limited		Somewhat limited		Somewhat limited	
		Dusty	0.50	Dusty	0.50	Dusty	0.50
Mf—Gyprockmesa cobbly clay loam, 5 to 12 percent slopes							
Gyprockmesa	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Large stones content	0.99	Dusty	0.35	Dusty	0.35
		Dusty	0.35	Large stones content	0.01	Large stones content	0.01
		Slope	0.04				

Data Source Information

Soil Survey Area: Mesa County Area, Colorado
Survey Area Data: Version 9, Sep 10, 2018

Soil Features

This table gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage, or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, saturated hydraulic conductivity (Ksat), content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high.* It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Report—Soil Features

Soil Features–Mesa County Area, Colorado									
Map symbol and soil name	Restrictive Layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		Low-RV-High	*Range*		*Low-High*	*Low-High*			
		In	*In*		*In*	*In*			
16C—Luster loamy fine sand, 3 to 8 percent slopes									
Luster		—	—		0	0	Low	Moderate	Low
27—Rock outcrop-Biedsaw complex, 25 to 65 percent slopes, extremely bouldery									
Rock outcrop		—	—		—	—			
Biedsaw, extremely bouldery		—	—		0	0	Low	High	Moderate
125—Moffat sandy loam, 2 to 6 percent slopes									
Moffat		—	—		0	0	Moderate	Moderate	Low

Soil Features–Mesa County Area, Colorado									
Map symbol and soil name	Restrictive Layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		Low-RV-High	*Range*		*Low-High*	*Low-High*			
127—Rock outcrop-Persayo-Hostage complex, 25 to 65 percent slopes, extremely bouldery									
Rock outcrop		—	—		—	—			
Persayo, extremely bouldery	Paralithic bedrock	10-11-20	—	Weakly cemented	0	0	Moderate	High	High
Hostage, extremely bouldery	Paralithic bedrock	40-55-60	—	Weakly cemented	0	0	Moderate	Moderate	Low
131—Mack-Gyprockmesa complex, 1 to 5 percent slopes									
Mack		—	—		0	0	Moderate	Moderate	Low
Gyprockmesa		—	—		0	0	Moderate	Moderate	High
Ba—Massadona silty clay loam, 0 to 2 percent slopes									
Massadona		—	—		0	0	Low	High	High
Mf—Gyprockmesa cobbly clay loam, 5 to 12 percent slopes									
Gyprockmesa		—	—		0	0	Moderate	Moderate	High

Data Source Information

Soil Survey Area: Mesa County Area, Colorado
Survey Area Data: Version 9, Sep 10, 2018

APPENDIX B
Typed Boring Logs

Huddleston-Berry Engineering & Testing, LLC
640 White Avenue, Unit B
Grand Junction, CO 81501
970-255-8005
970-255-6818

BORING NUMBER B-1

CLIENT City of Grand Junction
PROJECT NAME Monument Road Trail
PROJECT NUMBER 00208-0087
PROJECT LOCATION Grand Junction, CO
DATE STARTED 8/3/18 **COMPLETED** 8/7/18
GROUND ELEVATION ---- **HOLE SIZE** 4-inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Track Rig
AT TIME OF DRILLING dry
LOGGED BY SD **CHECKED BY** MAB
AT END OF DRILLING dry
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		COBBLES and BOULDERS in a Silty SAND with Gravel Matrix (SM), red, moist, dense										
2.5		*** Lab Classified SS1	SS 1	83	25-17-24 (41)			2	NP	NP	NP	13
5.0												
7.5												
			SS 2	61	24-27							
10.0												
12.5			SS 3	83	52							
15.0		Bottom of hole at 15.0 feet.										

Huddleston-Berry Engineering & Testing, LLC
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970-255-8005
970-255-6818

BORING NUMBER B-2

CLIENT City of Grand Junction
PROJECT NAME Monument Road Trail
PROJECT NUMBER 00208-0087
PROJECT LOCATION Grand Junction, CO
DATE STARTED 8/3/18 **COMPLETED** 8/7/18
GROUND ELEVATION _____ **HOLE SIZE** 4-inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Track Rig
AT TIME OF DRILLING dry
LOGGED BY SD **CHECKED BY** MAB
AT END OF DRILLING dry
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Silty SAND with GRAVEL (sm), red, moist, loose										
		BENTONITE, white to green, soft, highly weathered										
2.5			SS 1	0	6-6-10 (16)			34	108	34	**74**	
5.0												
7.5			SS 2	100	6-7-12 (19)							
10.0		Bottom of hole at 10.0 feet.										

Huddleston-Berry Engineering & Testing, LLC
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Grand Junction, CO 81501
970-255-8005
970-255-6818

BORING NUMBER B-3

CLIENT City of Grand Junction
PROJECT NAME Monument Road Trail
PROJECT NUMBER 00208-0087
PROJECT LOCATION Grand Junction, CO
DATE STARTED 8/3/18 **COMPLETED** 8/7/18
GROUND ELEVATION _____ **HOLE SIZE** 4-inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Track Rig
AT TIME OF DRILLING dry
LOGGED BY SD **CHECKED BY** MAB
AT END OF DRILLING dry
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Silty SAND with Gravel (sm), tan, moist, medium dense										
2.5			SS 1	78	6-7-8 (15)							
5.0												
7.5		COBBLES and BOULDERS in a Silty SAND with Gravel Matrix (sm), tan, moist, dense to very dense	SS 2	58	24-26							
10.0		Bottom of hole at 10.0 feet.										

Huddleston-Berry Engineering & Testing, LLC
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970-255-8005
970-255-6818

BORING NUMBER B-4

CLIENT City of Grand Junction
PROJECT NAME Monument Road Trail
PROJECT NUMBER 00208-0087
PROJECT LOCATION Grand Junction, CO
DATE STARTED 8/3/18 **COMPLETED** 8/7/18
GROUND ELEVATION _____ **HOLE SIZE** 4-inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Track Rig
AT TIME OF DRILLING dry
LOGGED BY SD **CHECKED BY** MAB
AT END OF DRILLING dry
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Silty SAND with Gravel (sm), tan, moist, loose										
2.5			SS 1	89 (39)	5-4							
5.0		*** Auger refusal on SANSTONE bedrock										
		Bottom of hole at 6.0 feet.										

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BORING NUMBER B-5

CLIENT City of Grand Junction
PROJECT NAME Monument Road Trail
PROJECT NUMBER 00208-0087
PROJECT LOCATION Grand Junction, CO
DATE STARTED 8/3/18 **COMPLETED** 8/7/18
GROUND ELEVATION ---- **HOLE SIZE** 4-inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Track Rig
AT TIME OF DRILLING dry
LOGGED BY SD **CHECKED BY** MAB
AT END OF DRILLING dry
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Silty SAND with Gravel (sm), tan, moist, medium dense										
			SS 1	78	14-11-12 (23)							
2.5		SANDSTONE, tan, hard, moderately weathered										
5.0		*** Auger refusal										
		Bottom of hole at 5.5 feet.										

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BORING NUMBER B-6

CLIENT City of Grand Junction
PROJECT NAME Monument Road Trail
PROJECT NUMBER 00208-0087
PROJECT LOCATION Grand Junction, CO
DATE STARTED 8/3/18 **COMPLETED** 8/7/18
GROUND ELEVATION _____ **HOLE SIZE** 4-inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Track Rig
AT TIME OF DRILLING dry
LOGGED BY SD **CHECKED BY** MAB
AT END OF DRILLING dry
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Silty SAND with Gravel (sm), tan, moist, medium dense										
2.5			SS 1	83	21-12-8 (20)							
		BENTONITE, grey to green, medium hard, highly weathered										
5.0												
7.5			SS 2	100	25-13							
		*** Auger refusal on SANDSTONE bedrock										
		Bottom of hole at 9.0 feet.										

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BORING NUMBER B-7

CLIENT City of Grand Junction
PROJECT NAME Monument Road Trail
PROJECT NUMBER 00208-0087
PROJECT LOCATION Grand Junction, CO
DATE STARTED 8/3/18 **COMPLETED** 8/7/18
GROUND ELEVATION ---- **HOLE SIZE** 4-inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Track Rig
AT TIME OF DRILLING 2.0 ft
LOGGED BY SD **CHECKED BY** MAB
AT END OF DRILLING 2.0 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		COBBLES and BOULDERS in a Silty SAND Matrix (sm), tan, moist to wet, very dense										
2.5												
5.0		CLAYSTONE, red, medium hard, highly weathered	SS 1	67	17-36			23	34	21	13	
7.5												
10.0		Bottom of hole at 10.0 feet.										

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BORING NUMBER B-8

CLIENT City of Grand Junction
PROJECT NAME Monument Road Trail
PROJECT NUMBER 00208-0087
PROJECT LOCATION Grand Junction, CO
DATE STARTED 8/3/18 **COMPLETED** 8/7/18
GROUND ELEVATION _____ **HOLE SIZE** 4-inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Track Rig
AT TIME OF DRILLING dry
LOGGED BY SD **CHECKED BY** MAB
AT END OF DRILLING dry
NOTES _____
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Silty SAND (sm), tan, moist, medium dense										
2.5			SS 1	78	8-8-6 (14)							
5.0												
7.5		BENTONITE, grey to green, medium hard, highly weathered	SS 2	100	50							
10.0		Bottom of hole at 10.0 feet.										

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BORING NUMBER B-9

CLIENT City of Grand Junction
PROJECT NAME Monument Road Trail
PROJECT NUMBER 00208-0087
PROJECT LOCATION Grand Junction, CO
DATE STARTED 8/3/18 **COMPLETED** 8/7/18
GROUND ELEVATION ---- **HOLE SIZE** 4-inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Track Rig
AT TIME OF DRILLING dry
LOGGED BY SD **CHECKED BY** MAB
AT END OF DRILLING dry
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Silty SAND (sm), tan, moist, medium dense										
2.5			MC 1	94	10-8-7 (15)		100	2				
5.0		*** Auger refusal on SANDSTONE bedrock										
		Bottom of hole at 6.0 feet.										

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BORING NUMBER B-10

CLIENT City of Grand Junction
PROJECT NAME Monument Road Trail
PROJECT NUMBER 00208-0087
PROJECT LOCATION Grand Junction, CO
DATE STARTED 8/3/18 **COMPLETED** 8/7/18
GROUND ELEVATION ---- **HOLE SIZE** 4-inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Track Rig
AT TIME OF DRILLING 2.0 ft
LOGGED BY SD **CHECKED BY** MAB
AT END OF DRILLING 2.0 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Silty SAND (sm), tan, moist to wet, very loose										
2.5			MC 1	83	1-1-1 (2)		98	19				
5.0		Sandy GRAVEL (gws), brown, wet, medium dense										
7.5			SS 1	72	21-14-16 (30)							
10.0												
12.5												
		*** Auger refusal on SANDSTONE bedrock										
		Bottom of hole at 14.5 feet.										

GEOTECH BH COLUMNS 00208-0087MONUMENT ROAD TRAIL.GPJ GINT US LAB.GDT 10/5/18

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BORING NUMBER B-11

CLIENT City of Grand Junction
PROJECT NAME Monument Road Trail
PROJECT NUMBER 00208-0087
PROJECT LOCATION Grand Junction, CO
DATE STARTED 8/3/18 **COMPLETED** 8/7/18
GROUND ELEVATION ---- **HOLE SIZE** 4-inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Track Rig
AT TIME OF DRILLING 3.0 ft
LOGGED BY SD **CHECKED BY** MAB
AT END OF DRILLING 3.0 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Silty SAND with Gravel (sm), tan, moist, loose to medium dense										
			SS 1	67	5-3-2 (5)							
5			SS 2	94	4-8-7 (15)							
10		Sandy GRAVEL (gws), brown, wet, very dense	SS 3	42	19-39							
15		Silty SAND with Gravel (gws), brown, wet, loose	SS 4	72	2-4-3 (7)							
20		SANDSTONE, tan, hard, moderately weathered										
		*** Auger refusal										
		Bottom of hole at 23.0 feet.										

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BORING NUMBER B-13

CLIENT City of Grand Junction
PROJECT NAME Monument Road Trail
PROJECT NUMBER 00208-0087
PROJECT LOCATION Grand Junction, CO
DATE STARTED 8/3/18 **COMPLETED** 8/7/18
GROUND ELEVATION ---- **HOLE SIZE** 4-inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Track Rig
AT TIME OF DRILLING 3.5 ft
LOGGED BY SD **CHECKED BY** MAB
AT END OF DRILLING 3.5 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		Silty SAND (sm), tan, moist to wet, very loose										
2.5			SS 1	50	3-2-1 (3)							
5.0												
7.5		Sandy GRAVEL with tarec cobbles (gws), tan, wet, medium dense to loose	SS 2	89	4-13-15 (28)							
10.0												
12.5												
15.0			SS 3	72	5-3-5 (8)							
		Bottom of hole at 15.5 feet.										

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BORING NUMBER B-14

CLIENT City of Grand Junction
PROJECT NAME Monument Road Trail
PROJECT NUMBER 00208-0087
PROJECT LOCATION Grand Junction, CO
DATE STARTED 8/3/18 **COMPLETED** 8/7/18
GROUND ELEVATION ---- **HOLE SIZE** 4-inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Track Rig
AT TIME OF DRILLING 14.0 ft
LOGGED BY SD **CHECKED BY** MAB
AT END OF DRILLING 14.0 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Sandy GRAVEL (gws), brown, moist to wet, medium dense to dense										
			SS 1	44	10-7-16 (23)							
5												
			SS 2	89	5-6-9 (15)							
10												
			SS 3	89	8-4-4 (8)							
15												
			SS 4	67	10-16-13 (29)							
20												
25												
30		SANDSTONE tan, hard, highly weathered *** Auger refusal Bottom of hole at 30.5 feet.										

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BORING NUMBER B-15

CLIENT City of Grand Junction
PROJECT NAME Monument Road Trail
PROJECT NUMBER 00208-0087
PROJECT LOCATION Grand Junction, CO
DATE STARTED 8/3/18 **COMPLETED** 8/7/18
GROUND ELEVATION ---- **HOLE SIZE** 4-inches
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Track Rig
AT TIME OF DRILLING 7.0 ft
LOGGED BY SD **CHECKED BY** MAB
AT END OF DRILLING 7.0 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		Silty SAND with trace Cobbles and Boulders (FILL), brown, moist, dense	SS 1	100	50/3"							
5		Silty Clayey SAND with trace Cobbles and Boulders (sc), brown, moist to wet,	SS 2	67	6-25-17 (42)							
10			SS 3	0	50/1"							
15		Sandy GRAVEL (gws), tan, wet, medium dense	SS 4	67	5-8-12 (20)							
20												
25		*** Auger refusal on SANDSTONE bedrock Bottom of hole at 27.0 feet.										

APPENDIX C
Laboratory Testing Results

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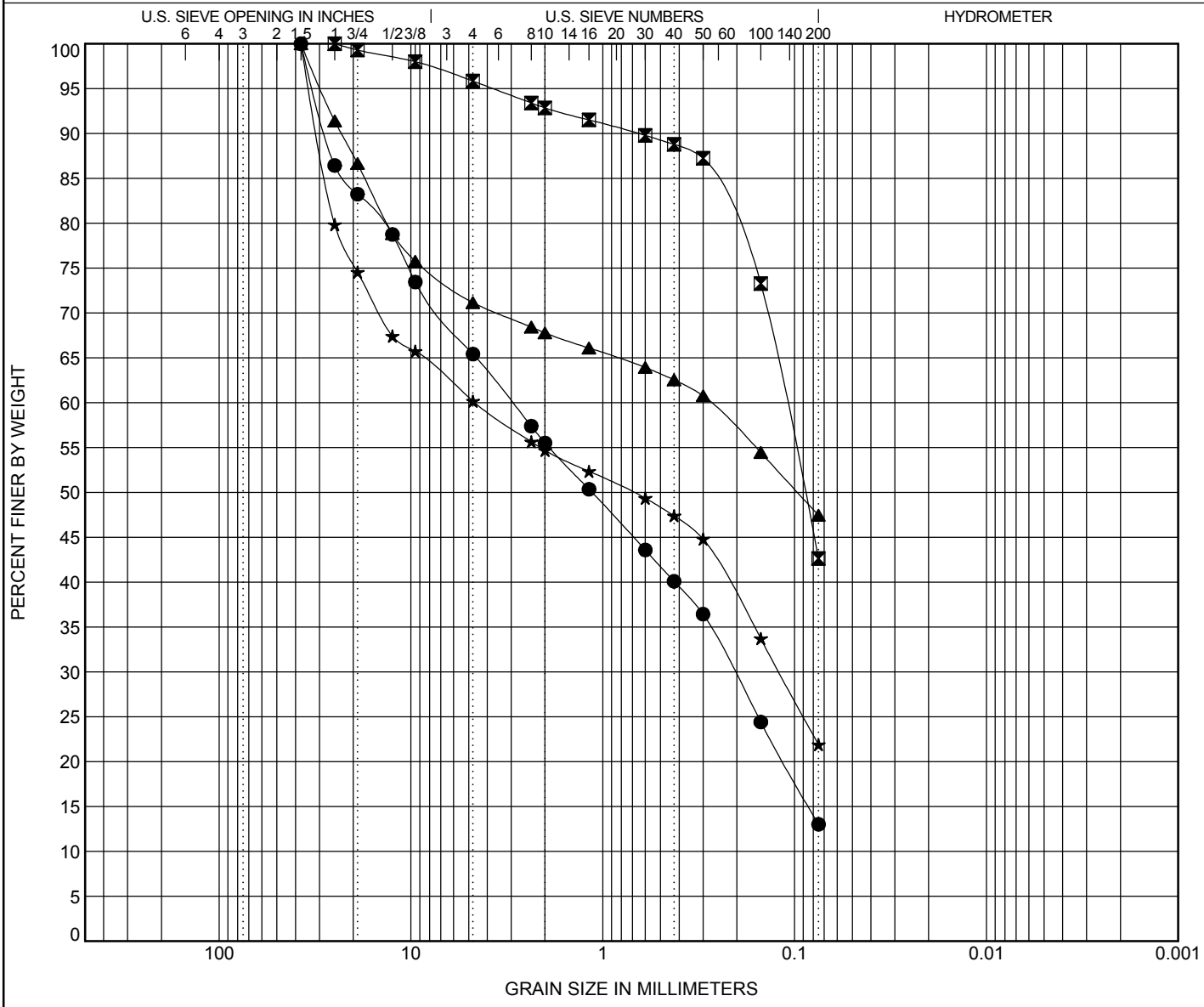
GRAIN SIZE DISTRIBUTION

CLIENT City of Grand Junction **PROJECT NAME** Monument Road Trail

PROJECT NUMBER 00208-0087 **PROJECT LOCATION** Grand Junction, CO



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			Classification	LL	PL	PI	Cc	Cu
●	B-1, SS1	8/2018	SILTY SAND with GRAVEL(SM)	NP	NP	NP		
⊠	Composite	8/2018	SILTY SAND(SM)	22	21	1		
▲	HS-1, GB1	8/2018	SILTY, CLAYEY GRAVEL with SAND(GC-GM)	26	19	7		
★	HS-2, GB1	8/2018	SILTY, CLAYEY GRAVEL with SAND(GC-GM)	23	17	6		

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-1, SS1	8/2018	37.5	2.964	0.207		34.6	52.4	13.0	
⊠	Composite	8/2018	25	0.111			4.2	53.2	42.6	
▲	HS-1, GB1	8/2018	37.5	0.276			28.9	23.7	47.5	
★	HS-2, GB1	8/2018	37.5	4.629	0.121		39.8	38.3	21.9	

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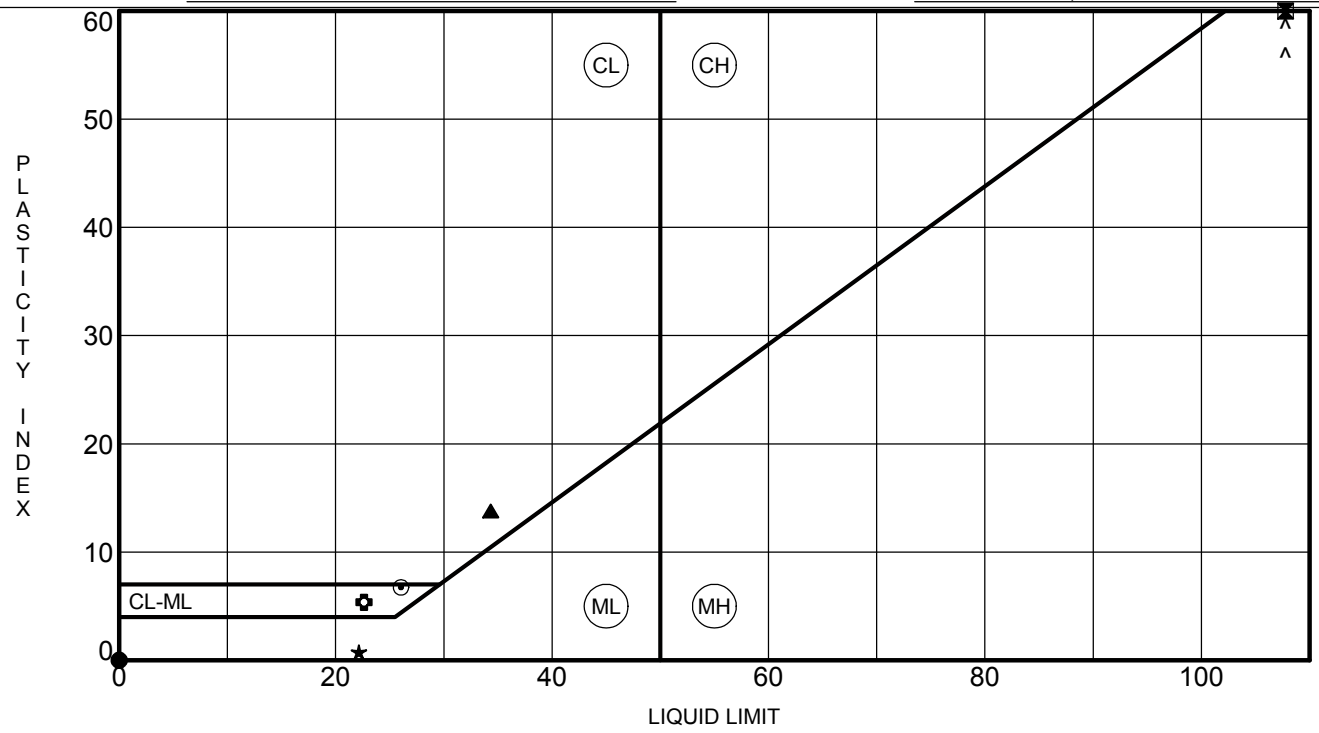
ATTERBERG LIMITS' RESULTS

CLIENT City of Grand Junction **PROJECT NAME** Monument Road Trail

PROJECT NUMBER 00208-0087 **PROJECT LOCATION** Grand Junction, CO



	Specimen Identification		LL	PL	PI	#200	Classification
●	**B-1, SS1**	**8/2018**	**NP**	**NP**	**NP**	**13**	**SILTY SAND with GRAVEL(SM)**
⧓	**B-2, SS2**	**8/2018**	**108**	**34**	**74**		
▲	**B-7, SS1**	**8/2018**	**34**	**21**	**13**		
★	**Composite**	**8/2018**	**22**	**21**	**1**	**43**	**SILTY SAND(SM)**
⊙	**HS-1, GB1**	**8/2018**	**26**	**19**	**7**	**47**	**SILTY, CLAYEY GRAVEL with SAND(GC-GM)**
✿	**HS-2, GB1**	**8/2018**	**23**	**17**	**6**	**22**	**SILTY, CLAYEY GRAVEL with SAND(GC-GM)**

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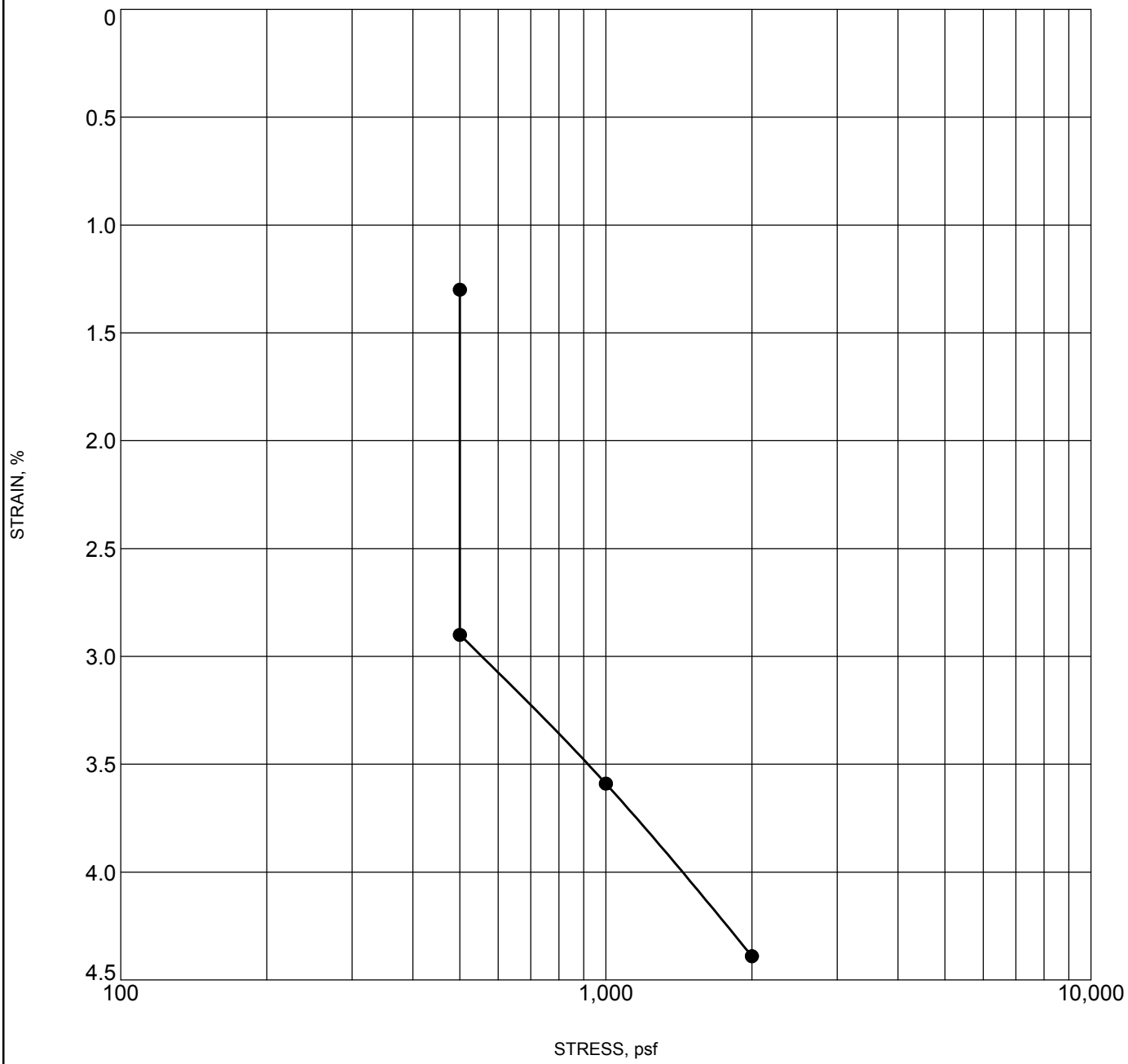
CONSOLIDATION TEST

CLIENT City of Grand Junction **PROJECT NAME** Monument Road Trail

PROJECT NUMBER 00208-0087 **PROJECT LOCATION** Grand Junction, CO



Specimen Identification		Classification	γ_d	MC%
● **B-9**	**2.0**		**97**	**2**

CONSOL STRAIN 00208-0087MONUMENT ROAD TRAIL.GPJ GINT US LAB.GDT 10/4/18

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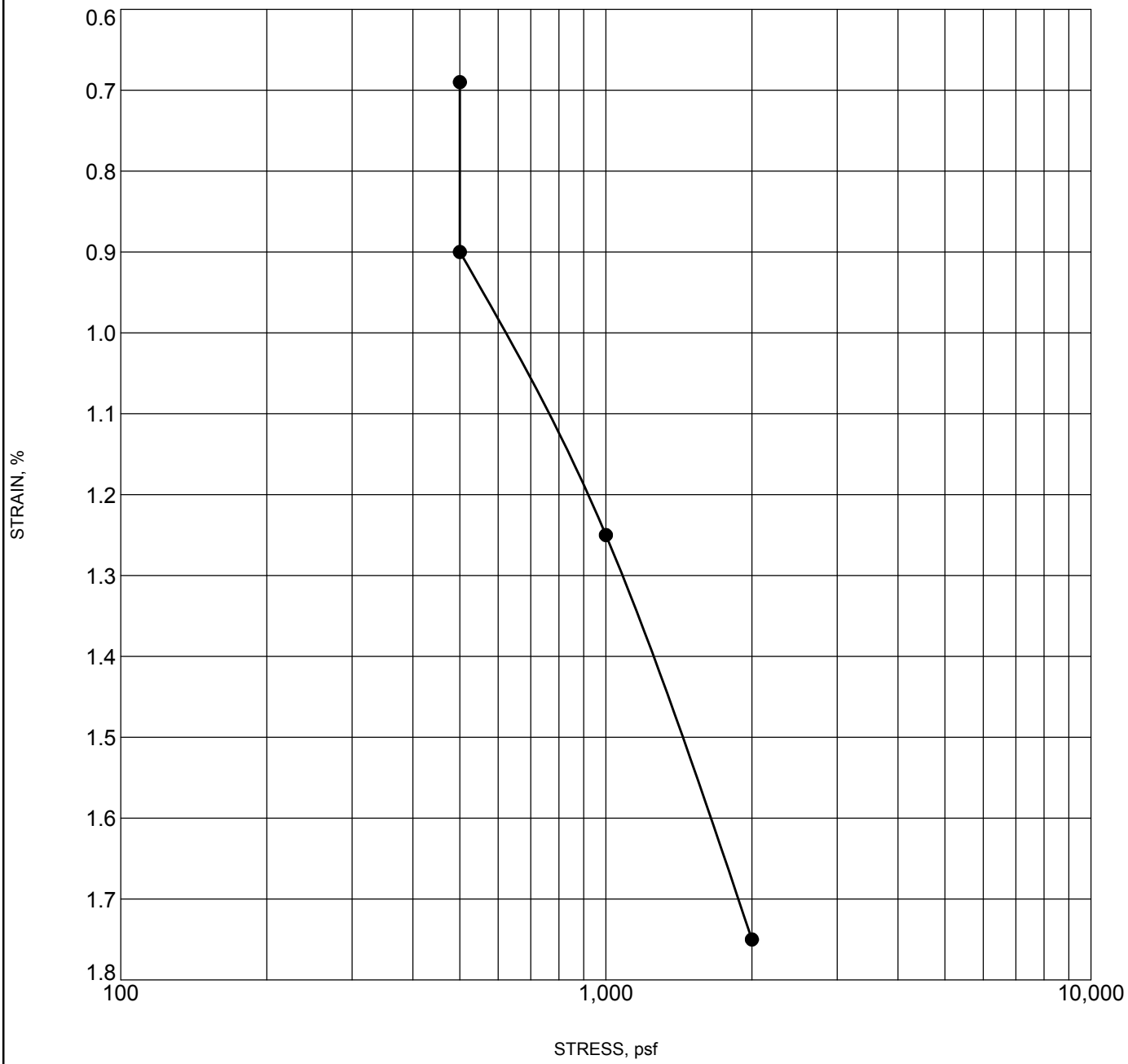
CONSOLIDATION TEST

CLIENT City of Grand Junction **PROJECT NAME** Monument Road Trail

PROJECT NUMBER 00208-0087 **PROJECT LOCATION** Grand Junction, CO



Specimen Identification		Classification	γ_d	MC%
● **B-10**	**2.0**		**98**	**19**

CONSOL STRAIN 00208-0087MONUMENT ROAD TRAIL.GPJ GINT US LAB.GDT 10/4/18

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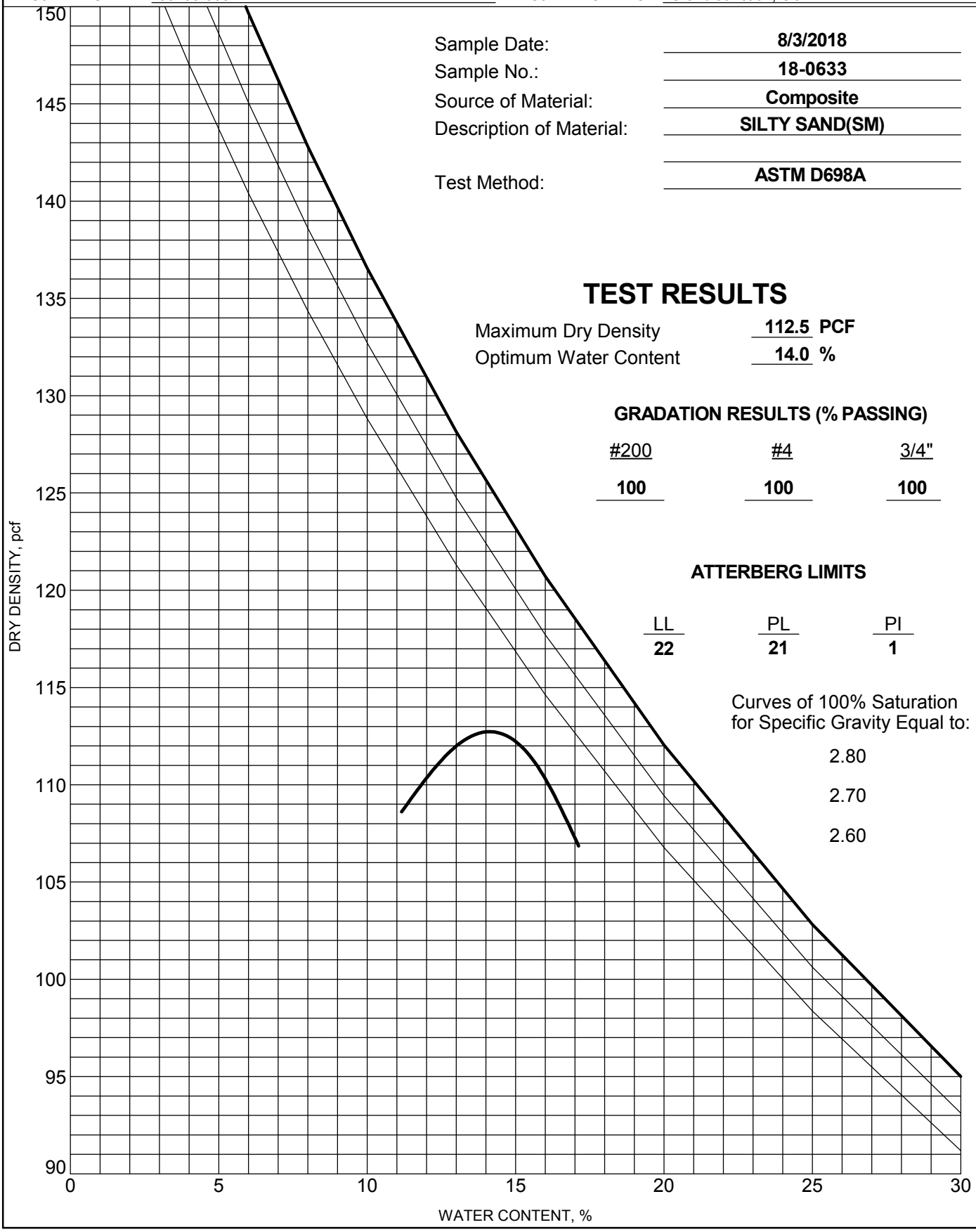
MOISTURE-DENSITY RELATIONSHIP

CLIENT City of Grand Junction
PROJECT NAME Monument Road Trail
PROJECT NUMBER 00208-0087
PROJECT LOCATION Grand Junction, CO



Sample Date: **8/3/2018**
Sample No.: **18-0633**
Source of Material: **Composite**
Description of Material: **SILTY SAND(SM)**
Test Method: **ASTM D698A**

TEST RESULTS

Maximum Dry Density **112.5** **PCF**
Optimum Water Content **14.0** **%**

GRADATION RESULTS (% PASSING)

#200	#4	3/4"
100	**100**	**100**

ATTERBERG LIMITS

LL	PL	PI
22	**21**	**1**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

COMPACTION 00208-0087MONUMENT ROAD TRAIL.GPJ GINT US LAB.GDT 10/4/18

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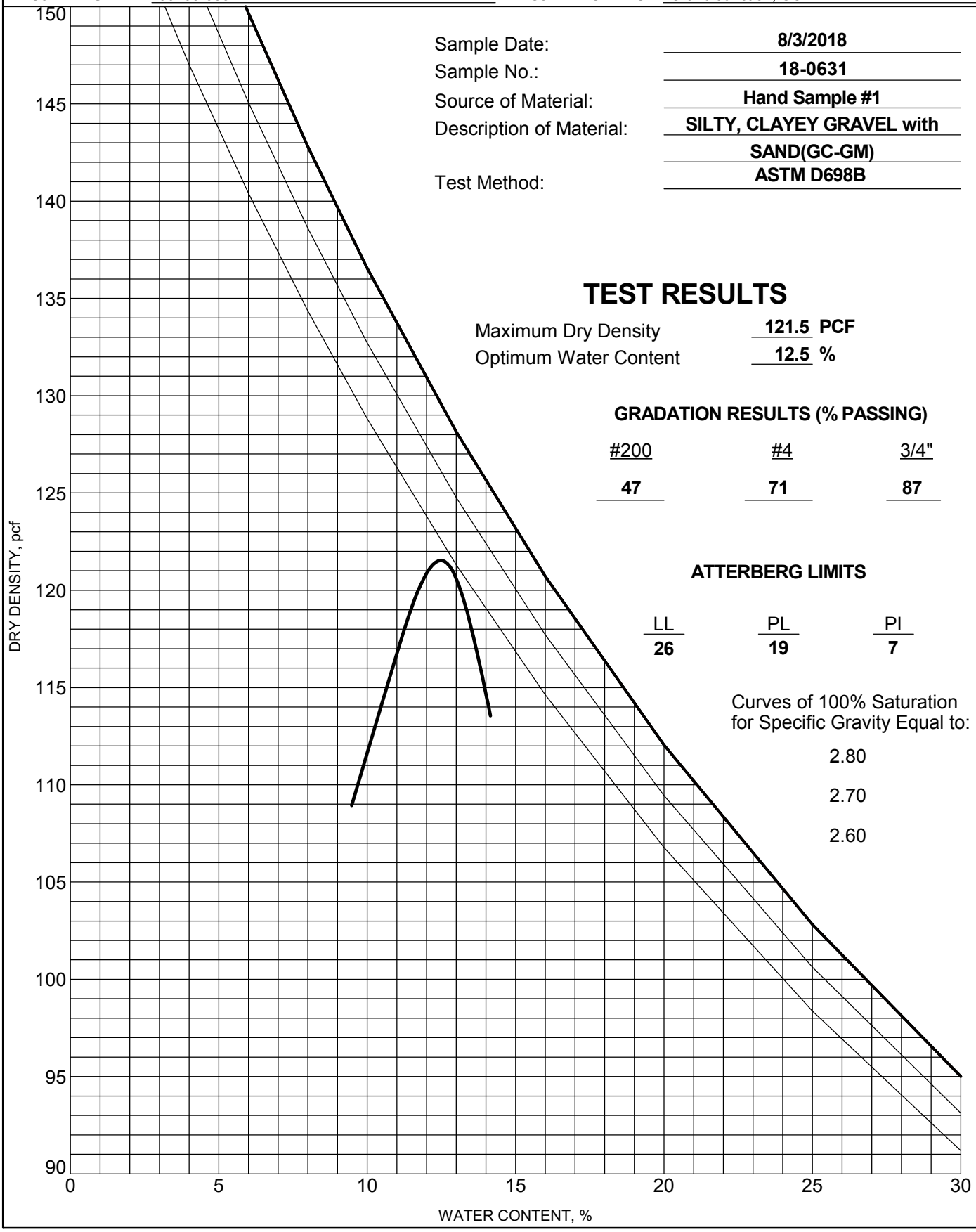
MOISTURE-DENSITY RELATIONSHIP

CLIENT City of Grand Junction
PROJECT NAME Monument Road Trail
PROJECT NUMBER 00208-0087
PROJECT LOCATION Grand Junction, CO



Sample Date: **8/3/2018**
Sample No.: **18-0631**
Source of Material: **Hand Sample #1**
Description of Material: **SILTY, CLAYEY GRAVEL with SAND(GC-GM)**
Test Method: **ASTM D698B**

TEST RESULTS

Maximum Dry Density **121.5** PCF
Optimum Water Content **12.5** %

GRADATION RESULTS (% PASSING)

#200	#4	3/4"
47	71	87

ATTERBERG LIMITS

LL	PL	PI
26	19	7

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

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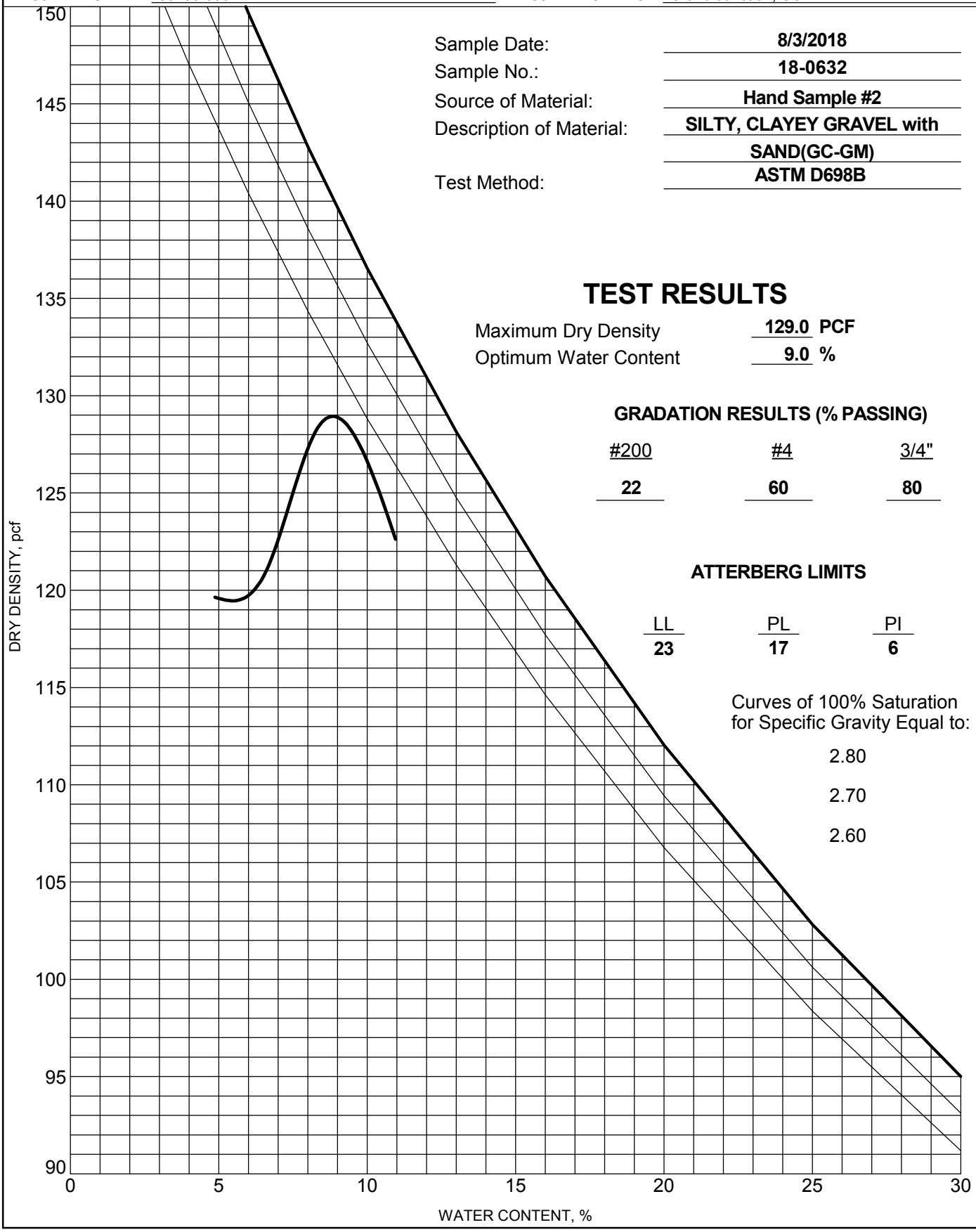
MOISTURE-DENSITY RELATIONSHIP

CLIENT City of Grand Junction
PROJECT NAME Monument Road Trail
PROJECT NUMBER 00208-0087
PROJECT LOCATION Grand Junction, CO



Sample Date: **8/3/2018**
Sample No.: **18-0632**
Source of Material: **Hand Sample #2**
Description of Material: **SILTY, CLAYEY GRAVEL with SAND(GC-GM)**
Test Method: **ASTM D698B**

TEST RESULTS

Maximum Dry Density **129.0** PCF
Optimum Water Content **9.0** %

GRADATION RESULTS (% PASSING)

#200	#4	3/4"
22	60	80

ATTERBERG LIMITS

LL	PL	PI
23	17	6

Curves of 100% Saturation for Specific Gravity Equal to:

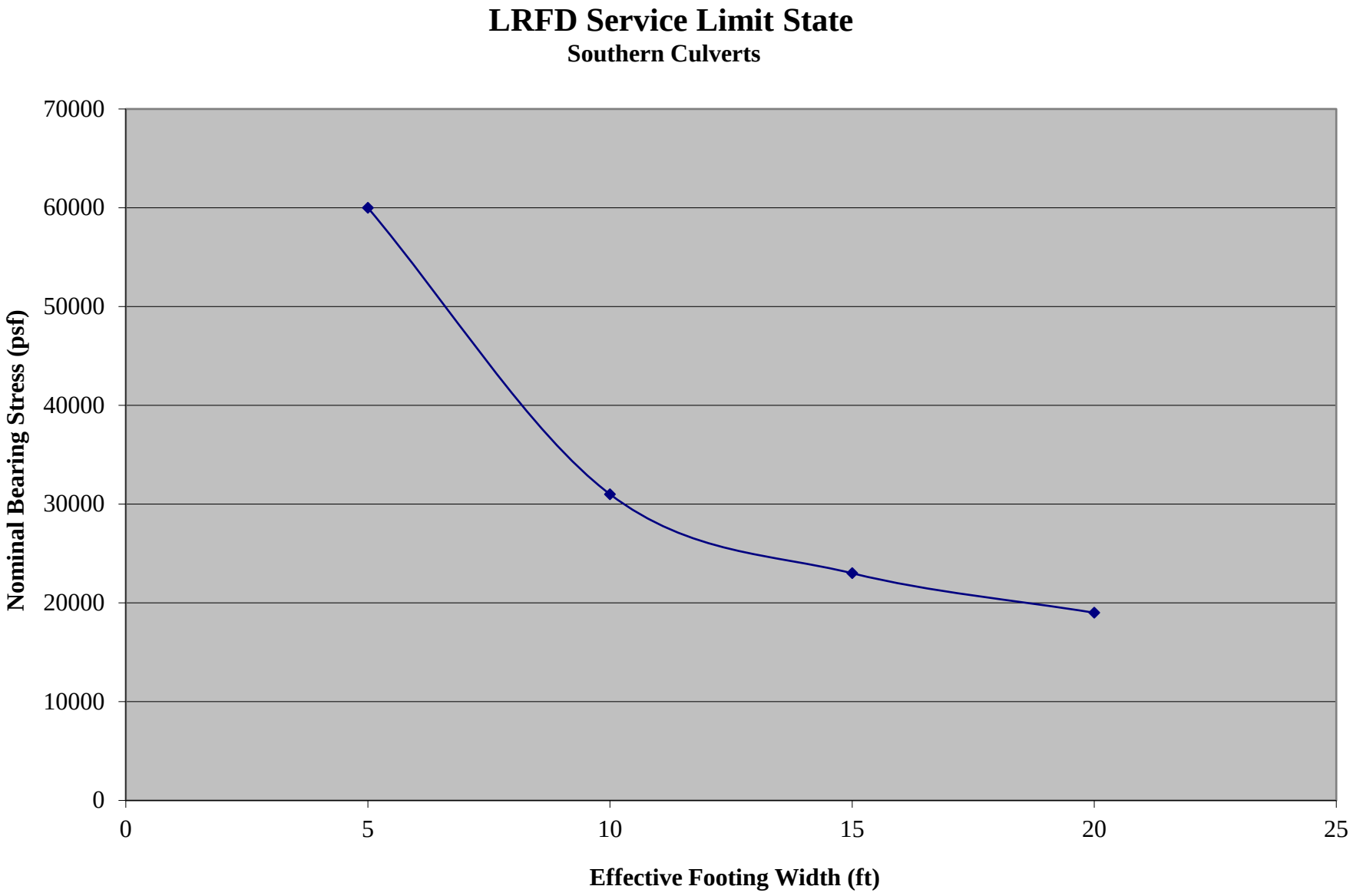
2.80

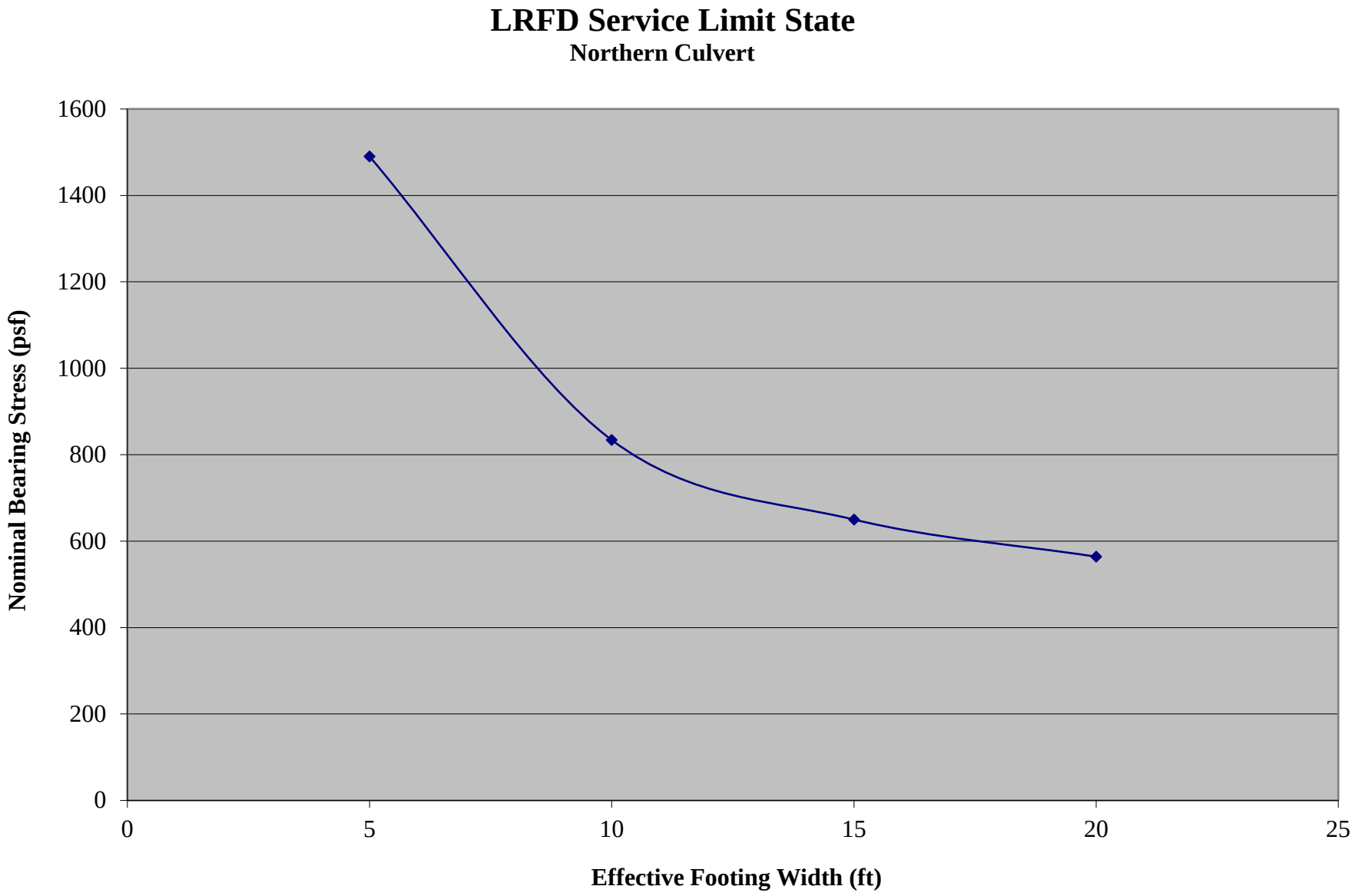
2.70

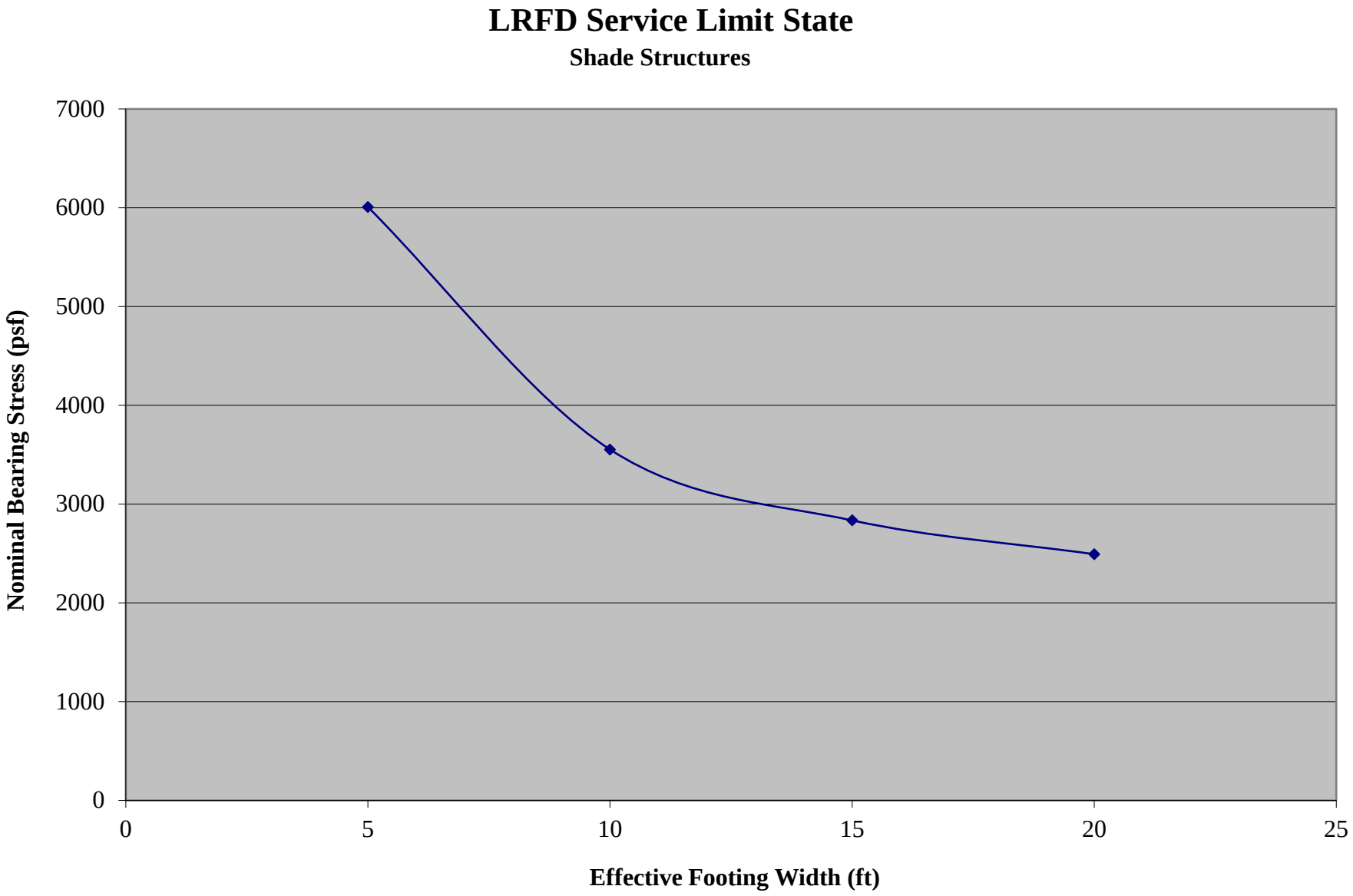
2.60

COMPACTION 00208-0087MONUMENT ROAD TRAIL.GPJ GINT US LAB.GDT 10/4/18

APPENDIX D
Bearing Resistance for Service Limit State


LRFD Service Limit State
Southern Culverts
70000
60000
50000
40000
30000
20000
10000
0
Nominal Bearing Stress (psf)
0
5
10
15
20
25
Effective Footing Width (ft)


LRFD Service Limit State
Northern Culvert
Nominal Bearing Stress (psf)
1600
1400
1200
1000
800
600
400
200
0
0
5
10
15
20
25
Effective Footing Width (ft)


LRFD Service Limit State
Shade Structures
Nominal Bearing Stress (psf)
7000
6000
5000
4000
3000
2000
1000
0
0
5
10
15
20
25
Effective Footing Width (ft)

Appendix D

Project Special Provisions
and Standard Special Provisions

COLORADO
DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISIONS
F171002 Monument Road Trail

The 2017 Standard Specifications for Road and Bridge Construction controls construction of this project. The following special provisions supplement or modify the Standard Specifications and take precedence over the Standard Specifications and Plans.

PROJECT SPECIAL PROVISIONS

COLORADO
DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISIONS
F171002 Monument Road Trail
STANDARD SPECIAL PROVISIONS

Name	Date	No. of Pages
Revision of Section 206 – Removability Modulus	(October 12, 2017)	1
Revision of Section 208 – Erosion Control	(July 3, 2017)	1
Revision of Section 250 – Environmental, Health and Safety Management	(July 3, 2017)	4
Revision of Section 412 – Dowel Bars for Joints	(Dec. 12, 2018)	1
Revision of Sections 601, 701 and 711 – Structural Concrete	(Nov. 8, 2018)	3
Revision of Section 625 – Construction Surveying	(July 3, 2017)	1
Revision of Section 703 – Classification for Aggregate Base Course	(October 12, 2017)	1
Special Construction Requirements, Fire Protection Plan	(July 3, 2017)	2

REVISION OF SECTION 304
AGGREGATE BASE COURSE

Section 304 of the Standard Specifications is hereby revised for this project as follows:

Subsection 304.02 shall include the following:

Materials for the base course shall be Aggregate Base Course (Class 6) as shown in subsection 703.03

The aggregate base course (Class 6) must meet the gradation requirements and have a resistance value of at least 78 respectively when tested by the Hveem Stabilometer method.

1
REVISION OF SECTION 403
HOT MIX ASPHALT

Section 403 of the Standard Specifications is hereby revised for this project as follows:

Subsection 403.02 shall include the following:

The design mix for hot mix asphalt shall conform to the following:

Table 403-1

Property	Test Method	Value For Grading
		Patching
Air Voids, percent at: N (design)	CPL 5115	3.5 – 4.5
Lab Compaction (Revolutions): N (design)	CPL 5115	75
Stability, minimum	CPL 5106	28
Aggregate Retained on the 4.75 mm (No. 4) Sieve for S, SX and SG, and on the 2.36mm (No. 8) Sieve for ST and SF with at least 2 Mechanically Induced fractured faces, % minimum*	CP 45	60
Accelerated Moisture Susceptibility Tensile Strength Ratio (Lottman), minimum	CPL 5109 Method B	80
Minimum Dry Split Tensile Strength, kPa (psi)	CPL 5109 Method B	205 (30)
Grade of Asphalt Cement, Top Layer		PG 64-22
Grade of Asphalt Cement, Layers below Top		PG 64-22
Voids in the Mineral Aggregate (VMA) % minimum	CP 48	See Table 403-2
Voids Filled with Asphalt (VFA), %	AI MS-2	65 - 80
Dust to Asphalt Ratio Fine Gradation Coarse Gradation	CP 50	 0.6 - 1.2 0.8 – 1.6

Note: AI MS-2 = Asphalt Institute Manual Series 2

Note: Mixes with gradations having less than 40% passing the 4.75 mm (No. 4) sieve shall be approached with caution because of constructability problems.

Note: Gradations for mixes with a nominal maximum aggregate size of one-inch or larger are considered a coarse gradation if they pass below the maximum density line at the #4 screen.
Gradations for mixes with a nominal maximum aggregate size of 3/4” to 3/8” are considered a coarse gradation if they pass below the maximum density line at the #8 screen.
Gradations for mixes with a nominal maximum aggregate size of #4 or smaller are considered a coarse gradation if they pass below the maximum density line at the #16 screen.

*Fractured face requirements for SF may be waived by RME depending on project conditions.

2
REVISION OF SECTION 403
HOT MIX ASPHALT

All mix designs shall be run with a gyratory compaction angle of 1.25 degrees and properties must satisfy Table 403-1. Form 43 will establish construction targets for Asphalt Cement and all mix properties at Air Voids up to 1.0 percent below the mix design optimum. CDOT will establish the production asphalt cement and volumetric targets based on the Contractor's mix design and the relationships shown between the hot mix asphalt mixture volumetric properties and asphalt cement contents on the Form 429. CDOT may select a different AC content other than the one shown at optimum on the Contractor's mix design in order to establish the production targets as contained on the Form 43. Historically, Air Voids adjustments typically result in asphalt cement increases from 0.1 to 0.5 percent. Contractors bidding the project should anticipate this change and factor it into their unit price bid.

Table 403-2

	Minimum Voids in the Mineral Aggregate (VMA)			
Nominal Maximum Size*, mm (inches)	***Design Air Voids **			
	3.5%	**4.0%**	**4.5%**	**5.0%**
37.5 (1½)	11.6	11.7	11.8	N/A
25.0 (1)	12.6	12.7	12.8	
19.0 (¾)	13.6	13.7	13.8	
12.5 (½)	14.6	14.7	14.8	
9.5 (⅜)	15.6	15.7	15.8	
4.75 (No. 4)	16.6	16.7	16.8	16.9
	* The Nominal Maximum Size is defined as one sieve larger than the first sieve to retain more than 10%. ** Interpolate specified VMA values for design air voids between those listed. *** Extrapolate specified VMA values for production air voids beyond those listed.			

The Contractor shall prepare a quality control plan outlining the steps taken to minimize segregation of HMA. This plan shall be submitted to the Engineer and approved prior to beginning the paving operations. When the Engineer determines that segregation is unacceptable, the paving shall stop and the cause of segregation shall be corrected before paving operations will be allowed to resume.

CDOT approved Warm Mix Asphalt (WMA) may be allowed on this project in accordance with CP 59. Unique requirements for WMA design, production and acceptance testing as documented during CDOT WMA approval shall be submitted and approved prior to creation of the Form 43 and before any WMA production on the project. Delays to the project due to WMA submittal and review will be considered within the Contractor's control and will be non-excusable.

Hot mix asphalt for patching shall conform to the gradation requirements for Hot Mix Asphalt (Grading 64-22).

Acceptance samples shall be taken at the location specified in either Method B or C of CP 41.

Subsection 403.03 shall include the following:

3
REVISION OF SECTION 403
HOT MIX ASPHALT

The Contractor shall use an approved anti-stripping additive. The amount of additive used shall be a minimum of 0.5 percent by weight of the asphalt cement. The additive shall be added at the refinery or at the hot plant. If liquid anti-stripping additive is added at the plant, an approved in-line blender must be used. The blender shall be in the line from the storage tank to the drier drum or pugmill. The blender shall apply sufficient mixing action to thoroughly mix the asphalt cement and anti-stripping additive.

The Contractor shall construct the work such that all roadway pavement placed prior to the time paving operations end for the year, shall be completed to the full thickness required by the plans. The Contractor's Progress Schedule shall show the methods to be used to comply with this requirement.

Delete subsection 403.05 and replace with the following:

403.05 The accepted quantities of hot mix asphalt will be paid for in accordance with subsection 401.22, at the contract unit price per ton for the bituminous mixture.

Payment will be made under:

Pay Item	**Pay Unit**
Hot Mix Asphalt (Patching) (Grading SX)(75)(PG64-22)	Ton

Aggregate, asphalt recycling agent, asphalt cement, additives, hydrated lime, and all other work and materials necessary to complete each hot mix asphalt item will not be paid for separately, but shall be included in the unit price bid. When the pay item includes the PG binder grade, any change to the submitted mix design optimum asphalt cement content to establish production targets on the Form 43 will not be measured and paid for separately, but shall be included in the work. No additional compensation will be considered or paid for any additional asphalt cement, plant modifications and additional personnel required to produce the HMA as a result in a change to the mix design asphalt cement content.

Historically, typical asphalt cement increases reflected on the Form 43 are from 0.1 to 0.5 percent. However, the Contractor should anticipate the AC increases typical of his mixes. Contractors bidding the project should anticipate this change and factor it into their unit price bid.

When the pay item does not include the PG binder grade, asphalt cement will be measured and paid for in accordance with Section 411. Asphalt cement used in Hot Mix Asphalt (Patching) will not be measured and paid for separately, but shall be included in the work.

Excavation, preparation, and tack coat of areas to be patched will not be measured and paid for separately, but shall be included in the work.

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REVISION OF SECTION 503 MICROPILES

Section 503 of the Standard Specifications is hereby revised for this project to include the following:

DESCRIPTION

503.10 The work consists of furnishing all necessary, supervision, labor, materials, and equipment to perform all work necessary to install and test the micropiles per the specifications described herein, and as shown on the design drawings. The micropile Contractor shall install a micropile system that will develop the load capacities indicated on the drawings. The micropile load capacities and measurements shall be verified by testing and as specified herein.

MATERIALS

503.11 Water. Water for mixing grout shall be potable, clean and free from substances which may be in any way deleterious to grout or steel. If water is not potable, it shall be tested in accordance with AASHTO T26 for acceptability.

503.12 Admixtures. Admixtures shall conform to the requirements of ASTM C494 (AASHTO M194). Admixtures which control bleed, improve flowability, reduce water content, and retard set may be used in the grout subject to the review and acceptance of the Engineer. Expansive admixtures shall only be added to the grout used for filling sealed encapsulations. Admixtures shall be compatible with the grout and mixed in accordance with the manufacturer's recommendations. Their use will only be permitted after appropriate field tests on fluid and set grout properties. Admixtures with chlorides shall not be permitted.

503.13 Cement. All cement shall be Portland cement conforming to ASTM C150 (AASHTO M85) Type V, or Type II modified, and shall be the product of one manufacturer. If the brand or type of cement is changed during a project, additional grout mix tests shall be conducted to ensure consistency of quality and performance in situ.

503.14 Fillers. Inert fillers such as sand may be used in the grout in special situations (e.g., presence of large voids in the ground, when grout take and travel are to be limited) as approved by the Engineer.

503.15 Bar Reinforcement. Reinforcing steel shall be deformed bars in accordance with ASTM A615 (AASHTO M31) Grade 75 or ASTM A722 (AASHTO M275) Grade 150. For cases of tensile loading, bar couplers, if required, shall develop the ultimate tensile stress of the bar, without any evidence of failure. For compressive loading, the coupler shall be compatible with efficient load transfer and overall reinforcement performance requirements.

503.16 Pipe/Casing. Shall meet the requirements of ASTM A53, Grade B.

503.17 Plates and Shapes. Structural steel plates and shapes for pile top attachments shall conform to ASTM A36 (AASHTO M183) or ASTM A 572 Grade 50 (AASHTO M183).

503.18 Centralizers. Centralizers shall be fabricated from plastic, steel, or material that is non-detrimental to the reinforcing steel. Wood shall not be used.

503.19 Corrosion Protection. Epoxy Coating: The thickness of coating applied electrostatically to the reinforcing steel shall be 7-12 mils. Epoxy coating shall be in accordance with ASTM A775/AASHTO M282 or ASTM A936. Bend test requirements shall be waived. Epoxy coating is not required on bearing plates and nuts encased in the pile concrete footing.

REVISION OF SECTION 503 MICROPILES

EXECUTION

503.20 Qualifications of the Contractor. The micropile Contractor shall be fully experienced in all aspects of micropile installation and shall furnish all necessary equipment, materials, skilled labor, and supervision to carry out the contract. The micropile Contractor shall not sublet the whole or any part of the contract without the express permission in writing of the Owner.

503.21 Control of Runoff from Installation. The micropile Contractor shall control and properly dispose of drill flush and construction related waste, including excess grout, in accordance with the standard specifications and site permits. Provide positive control and discharge of all surface water that will affect construction of the micropile installation. Provide erosion and sediment control measures to prevent discharge into Red Canyon or other drainage areas in accordance with project or site specific construction stormwater plans and permits.

503.22 Allowable Tolerances

(a) Centerline of piling shall not be more than 3 in. from indicated plan location.

(b) Pile-hole alignment shall be within 2% of design alignment.

(c) Plate elevation shall be within +3 in. to –2 in. of the design vertical elevation.

503.23 Ground Conditions. If, during installation of a pile, an obstruction is encountered that prevents the practical advancement of the hole, the hole shall be abandoned and filled with grout. A new pile shall be drilled at a location to be determined by the Engineer, although it must be acknowledged that in certain structures, relocation options may be severely limited, and further attempts at the original location with different methods may be required.

If during drilling, obstructions are encountered of a frequency, composition and location that were not portrayed, inferable, expected and/or notified at the time of preparation of the bid, the additional costs utilized in trying to overcome such obstructions shall be paid for.

503.24 Construction Submittals.

(a) The Contractor shall submit a detailed description of the construction procedures proposed for use to the Engineer for review.

(b) The Contractor shall submit certified mill test reports, properly marked, for the reinforcing steel, as the materials are delivered, to the Engineer for record purposes. The ultimate strength, yield strength, elongation, and composition shall be included. For steel pipe used as permanent casing, or core steel, the Contractor shall submit a minimum of two representative coupon tests or mill certifications (if available) on each load delivered to the project.

(c) The Contractor shall submit the grout mix designs, including details of all materials to be incorporated, and the procedure for mixing and placing the grout to the Engineer for review.

REVISION OF SECTION
503 MICROPILES

(d) The Contractor shall submit detailed plans for the method proposed for testing the micropiles to the Engineer for review and acceptance prior to beginning load tests. This shall include all necessary drawings and details to clearly describe the test method and equipment proposed.

(e) The Contractor shall submit to the Engineer calibration reports for each test jack, pressure gauge, and master pressure gauge to be used. The calibration tests shall have been performed by an independent testing laboratory and tests shall have been performed within one year of the date submitted. Testing shall not commence until the Engineer has approved the jack, pressure gauge and master pressure gauge calculations.

503.25 Installation Records. The following records will be prepared for the Engineer by the micropile Contractor. The records shall be completed within 24 hours after each pile installation is completed. The records shall include the following minimum information:

(a) Pile drilling duration and observations (e.g., flush return)

(b) Information on soil and rock encountered, including description of strata, water, etc.

(c) Approximate final tip elevation

(d) Cut-off elevation

(e) Design Loads

(f) Description of unusual installation behavior, conditions

(g) Any deviations from the intended parameters

(h) Grout pressures attained, where applicable

(i) Grout quantities pumped

(j) Pile materials and dimensions

(k) Micropile test records, analysis, and details

503.26 Utility Clearance. The micropile Contractor shall contact the utility notification center (One Call) and obtain the required documentation prior to the commencement of any drilling.

503.27 Preconstruction Meeting. A pre-construction meeting will be scheduled by the micropile Contractor prior to the start of micropile construction. Required attendees are the Engineer, micropile Contractor and the geotechnical inspector (as applicable). The bridge Contractor, excavation Contractor and Owner shall also be notified in advance of the Pre-Construction Meeting.

REVISION OF SECTION 503 MICROPILES

503.28 Installation Method. The micropile installation technique shall be such that it is consistent with the geotechnical, logistical, environmental, and load carrying conditions of the project. The micropile Contractor shall select the drilling method and the grouting procedures used for the installation of the micropiles, subject to the approval of the Engineer.

The drilling equipment and methods shall be suitable for drilling through the conditions to be encountered, with minimal disturbance to these conditions or any overlying or adjacent structure or service. The borehole must be open to the defined nominal diameter, full length, prior to placing grout and reinforcement.

All installation techniques shall be determined and scheduled such that there will be no interconnection or damage to piles in which grout has not achieved final set.

503.29 Installation of Reinforcing Bar. Centralizers shall be provided. Centralizers shall permit the free flow of grout without misalignment of the reinforcement.

The central reinforcement steel with centralizers shall be lowered into the stabilized drill holes to the desired depth without difficulty. Partially inserted reinforcing bars shall not be driven or forced into the hole such that there will be no interconnection or damage to piles in which the grout has not achieved final set.

The Contractor shall check pile top elevations and adjust all installed micropile plates to the planned elevations.

503.30. Grouting. The Contractor shall provide systems and equipment to measure the grout quality, quantity, and pumping pressure during the grouting operations. This information is to be measured and recorded by the Contractor.

After drilling, the hole shall be flushed with water and/or air to remove drill cuttings and/or other loose debris. The Contractor shall provide a stable, homogenous neat cement grout or a sand cement grout with a minimum 28-day unconfined compressive strength of 3000 psi. The grout shall not contain lumps or any other evidence of poor or incomplete mixing. Admixtures, if used, shall be mixed in accordance with manufacturer's recommendations. The pump shall be equipped with a pressure gauge to monitor grout pressures. The pressure gauge shall be capable of measuring pressures of at least 150 psi or twice the actual grout pressures used by the Contractor, whichever is greater. The grouting equipment shall be sized to enable the grout to be pumped in one continuous operation. The grout should be kept in constant agitation prior to pumping.

The grout shall be injected from the lowest point of the drill hole (by tremie methods) until clean, pure grout flows from the top of the micropile. The tremie grout may be pumped through grout tubes, hollow stem augers, or drill rods. Subsequent to tremie grouting, all grouting operations associated with, for example, extraction of drill casing and pressure grouting, must ensure complete continuity of the grout column. The use of compressed air to directly pressurize the fluid grout is not permissible. The grout pressures and grout takes shall be controlled to prevent excessive heave in cohesive soils or fracturing of soil or rock formations. The entire pile shall be grouted to the design cut-off level.

Upon completion of grouting of piles, the grout tube may remain in the hole, but it shall be filled with grout.

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REVISION OF SECTION 503 MICROPILES

Grout within the micropiles shall be allowed to attain the minimum design strength prior to being loaded.

If the Contractor uses a post-grouting system, all relevant details including grouting pressure, volume, location and mix design, shall be submitted as part of Section 3.1.

During production, micropile grout shall be regularly tested for compressive strength. Compressive strength shall be determined in accordance with AASHTO T106 at a frequency of no less than one set of three samples from each grout plant each day of operation. The compressive strength shall be the average of the three samples tested, and shall meet or exceed the strength required in the plans. Provide grout compressive strength test results to the Engineer within 24 hours of testing.

503.31 Pile Load Tests. The Contractor shall proof test at least one micropile per abutment. The piles to be tested will be selected by the Engineer. At the Contractor's suggestion, but with the Engineer's concurrence, tension tests may be performed based on maximum DL in compression or tension for friction piles with sufficient structural tension capacity.

The test sequence shall be as follows:

STEP	LOADING	LOAD	HOLD TIME (MINUTES)
1	Apply AL		2.5
2	Load Cycle	0.15 DL	2.5
		0.30 DL	2.5
		0.45 DL	2.5
		0.60 DL	2.5
		0.75 DL	2.5
		0.90 DL	2.5
		1.00 DL	2.5
		1.15 DL	2.5
		1.30 DL	Per Step 3
3	Hold load for at least 10 minutes while recording movement at specified times. If the total movement measured during the load hold exceeds the specified maximum value below then the load hold should be extended to a total of 60 minutes.		
4		1.45 DL	2.5
		1.60 DL	2.5
5	Unload Cycle	1.30 DL	4
		1.00 DL	4
		0.75 DL	4
		0.50 DL	4
		0.25 DL	4
		AL	4
6	Remove the load and compare results to acceptance criteria.		

Notes: AL = Alignment Load, DL = Design Load

REVISION OF SECTION 503 MICROPILES

The acceptance criteria for micropile proof load tests are:

(a) The pile shall sustain the compression and tension design loads (1.0 DL) with no more than 1/2 in. total vertical movement at the top of the pile as measured relative to the pile prior to the start of testing. If an Alignment Load is used, then the allowable movement will be reduced by multiplying by a factor of (DL-AL)/DL. (This conservatively accounts for the movement in reaching AL.)

(b) Test piles shall have a creep rate at the end of the 133% DL increment which is not greater than 0.040 in./log cycle time from 1 to 10 minutes or 0.080 in./log cycle time from 6 to 60 minutes and has a linear or decreasing creep rate.

(c) Failure does not occur at the 1.60 DL maximum compression and tension load increment. Failure is defined as load at which attempts to further increase the test load simply result in continued pile movement.

If a micropile that is proof tested fails to meet the acceptance criteria, the Contractor shall be directed to proof test another micropile in the vicinity. For failed piles and further construction of other piles, the Contractor shall modify the design, the construction procedure, or both. These modifications include, but are not limited to, installing replacement micropiles, incorporating piles of reduced load capacities, modifying the installation methods, increasing the bond length, or changing the micropile type. Any modification which requires changes to the structure shall have prior review and acceptance of the Engineer. The cause for any modifications of design or construction procedures shall be decided in order to appropriately determine any additional cost implications.

MEASUREMENT AND PAYMENT

503.32 Payment will be made under:

Pay Item	**Pay Unit**
Micropile (8 inch)	Lineal Foot
Proof Testing	Incidental to work

REVISION OF SECTION 509
PREFABRICATED STRUCTURAL STEEL BRIDGE

Section 509 of the Standard Specifications is hereby revised to include the following:

Subsection 509.01 shall include the following:

This work consists of fabricating the Structural Steel Bridge that includes the steel truss structure (Weathering Steel), Structural Fasteners, Anchor Bolts, Bearing Plates, furnish and installation of the Structural Steel Bridge in accordance with these specifications, and in conformity to the plans.

Add subsection 509.051 immediately following subsection 509.05 under the Materials section.

509.051 Structural Steel Bridge Materials

Bridges specified as "weathering" shall be fabricated from rolled beam or wide flange shapes designated ASTM A709 Grade 50W. Secondary weathering members may be tubular shapes carrying the ASTM A847 (50 ksi) designation; all domestically produced and provided by an AISC recognized supplier.

All bolted connections shall utilize ASTM A-325 High Strength Bolts. All bolts for weathering steel components shall be ASTM A325 Type 3. Galvanized bolts shall be A325 Type 1, hot dip galvanized in accordance with ASTM A-153 specifications.

The anchor bolts supplied with all bridge systems shall be ASTM A449 Full Thread Studs Hot Dip Galvanized as per ASTM A153. Each anchor bolt shall be provided with one A563 Galvanized Heavy Hex Nut and one F436 Galvanized Flat Washer.

The Stay-in-Place (SIP) corrugated metal decking forms shall have a minimum depth of 2", Type 8.5P, as supplied by Wheeling Corrugated. The minimum thickness shall be 20 gage and shall have G165 Galvanized Coating. The minimum laying width per sheet of decking shall be 34". The SIP forms shall be supported by support angles "field welded" to the stringer beams. SIP form shall be attached to support angles using self- tapping screws approved by the SIP manufacturer.

The bridge shall utilize the following bridge bearings: Laminated Elastomeric Bearing Pads beneath Load Plates. Laminated elastomeric bearing pads shall be custom molded from neoprene or natural rubber. Laminated pads shall be reinforced with internal steel plates and vulcanize-bonded to alternating layers of the elastomer during the molding process.

The bridge style in section shall be an all-bolted Warren half through-truss (a.k.a. pony truss) as shown in the contract drawings. The elevation of each truss shall have a polygonal top chord, two diagonal members in each truss panel, and a vertical member at each interior bottom chord panel point. The bottom (tension) chord of each truss shall consist of two equal-sized members with adequate section properties to provide redundancy. The truss girders shall be designed using gusset plates on each side of the chord member and high strength structural fasteners (bolts) to connect web (diagonal and vertical) members to the chord members. Shim or fill plates shall be used where web members do not dimensionally fit up with the larger chord members.

All steel materials shall meet Buy America requirements and supporting documentation shall be submitted prior to delivery.

REVISION OF SECTION 509
PREFABRICATED STRUCTURAL STEEL BRIDGE

Manufacturers:

1. CONTECH Engineered Solutions, LLC
   9025 Centre Pointe Drive
   West Chester, OH 45069
2. Big-R Bridge, Inc.
   P.O. Box 1290
   Greeley, Colorado 80632
3. US Bridge
   5765 Leehigh Circle
   Nashport, OH 43830
4. Or approved equal

   All other prospective manufacturers, not pre-approved by the Owner are required to submit a signed application with the following documentation supporting their ability to meet the above referenced qualifications no less than seven (7) business days prior to bid opening:

   - Copy of current AISC certifications as provided below.
   - Copy of Quality Assurance Programs.
   - Splicing and erection procedures.
   - Approved welding process procedures.
   - The name and qualifications of the Manufacturer's representative designated to represent the Manufacturer for all pre-bid activities.
   - The name and qualifications of the Technical Assistant that will conduct on-site assistance during field installation of the Bridge until secure and stable.
   - If any part of the Bridge is to be galvanized, a copy of the written warranty issued by the galvanizer that warrants against corrosion of the superstructure (other than bridge flooring) for a period of not less than 35 years.
   - List ten (10) permanent steel bridges similar in size and configuration to the Bridge, which the applicant has manufactured in the preceding five (5) years, together with drawings, calculations, project details and contact information.
   - Complete list of plant, equipment, employees and others to be used by the applicant to design and manufacture the Bridge including copies of all Professional Engineering licenses for designers and welding certificates for welders.
   - **AISC Certification:** The Manufacturer shall be an approved steel fabricator under the AISC Quality Management System Certification Program as an Intermediate Steel Bridge Fabricator including Fracture Critical and Sophisticated Paint System endorsements, for a period of at least five (5) continuous years immediately preceding the bid opening.

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REVISION OF SECTION 509
PREFABRICATED STRUCTURAL STEEL BRIDGE

The Structural Steel Bridge shall be delivered to the site in pre-assembled sections ready for installation with no field welding of the major structure required.

Deliver anchor bolts, sleeves and anchorage devices which are to be embedded in concrete to the project site in time for installation under appropriate trades. Furnish setting drawings, templates and installation instructions as required.

Subsection 509.14(a) shall include the following:

A current copy of the AISC Program Manual describing the Bridge Manufacturer's operations and practices shall be maintained by the quality Control Manager for review by designated quality control inspectors. Copies of the AISC Certification Manual shall be made available to customers and their representatives, upon requests.

Subsection 509.15 shall include the following:

The engineering design of the Bridge shall be performed by, or under the direct supervision of a Licensed Professional Engineer in the State in which the Bridge will be erected. The design shall be completed in accordance with recognized engineering principles and design practices and with a standard of care commensurate with the Manufacturer's role in the project.

The Bridge shall be designed in accordance with AASHTO LRFD Bridge Design Specifications 7th Edition including all interims. Additionally, the live load shall be specified as HL-93 (AASHTO LRFD)

The structural analysis for the Bridge shall include, at a minimum, a two dimensional analysis for gravity dead loads and moving live (truck) loads on transverse and longitudinal members, as applicable. Location of axle loads, lane loads, wheel loads; and the distribution of wheel loads shall be applied as such to produce the maximum stress (or applied force) in the member or members under consideration.

Due to their configuration, a U-frame analysis is required for half-through trusses, to confirm the top chord's stability by computing the relative stiffness of the Bridge's cross sectional members to determine the resistance of the top chord members to buckling. The analysis shall follow E. C. Holt, Jr. and R. M. Barnoff's research performed for the Column Research Council, (1950-1957).

The Manufacturer shall utilize three-dimensional CAD software with integrated model-data-CNC file transfer of the Bridge components and assemblies to prepare Engineering and Shop Drawings. This is to promote efficiency during plan development and to improve quality of the delivered Bridge order.

A load rating of the Bridge's superstructure shall be supplied to the Owner, after the bridge's fabrication is complete. The Load Rating shall be follow AASHTO LRFD and CDOT Bridge Rating requirements.

All applicable dead and live loads shall be applied and combined as specified in the Design Specification. A wearing surface of 36 psf shall be applied as a dead load. Longitudinal forces from thermal expansion and contraction, and vehicles; along with lateral forces from wind, flood or seismic events shall be computed and combined as applicable and in accordance with the Design Specification.

REVISION OF SECTION 509
PREFABRICATED STRUCTURAL STEEL BRIDGE

Gusset plates shall be adequately designed to transfer member forces in accordance with governing sections of the Design Specifications and FHWA Publication Number IF-09-014. All gusset plates shall have 1" radiused corners, except for the lower corners aligned toward the mid-line of the bridge. They shall be square to aid their orientation during assembly.

Calculation of the Bridge's dead and live load deflection is required. Live load deflection of the primary members should be limited to the span-to- deflection ratio of L/600 unless otherwise specified. Dead load deflection shall be accommodated by forming camber into the unloaded geometry of the members. Profile grade curvature shall also be taken into account when determining the fabricated (or induced) camber of the members.

The concrete deck slab shall be designed by the bridge manufacturer in accordance with the Design Specification.

Bolted steel connections of truss components and gusset plates provide a greater level of internal redundancy than welded connections. These connections shall be utilized within the design and fabrication process. Exceptions to their use should be justified to the owner and submitted in writing for approval, prior to commencing design.

The Manufacturer shall design the prefabricated bridge and prepare Drawings in accordance with the following minimum requirements. Engineering Drawings and Calculations, sealed by a Registered Professional Engineer in the state where the Bridge is to be erected, will be submitted to the Owner for Approval within (4) weeks of receipt of the Purchase Order, contingent upon receiving all scope information at the time of purchase order; and after receiving answers to requests for information (RFI). Shop Drawings will be supplied to the Owner.

Unless otherwise requested, an electronic version of the Shop Drawings will be submitted in portable document format (.PDF) via email to the Owner or the Owner's designated contact. After final approval by the Owner, the Manufacturer shall provide the Owner with two 24" x 36" paper copies of the Engineering Drawings. (2) sets of the As-Fabricated Drawings (11" x 17") shall be transmitted to the Contractor at the time of Bridge Delivery.

Subsection 509.16 shall include the following:

For all welded assemblies the inspector shall be a Certified Weld Inspector that is qualified under the AWS QC-1 program. Each inspection shall include as a minimum requirement the following: review of Shop Drawings, weld procedures, welder qualifications and weld testing reports, visual inspection of welds and verification of overall dimensions and geometry of the Bridge. Non-destructive testing of welds shall be performed both prior to and after galvanizing. All welds shall be visually inspected 100%. All welds shall be magnetic particle tested for a minimum length or 12". Welds over 12" long shall be magnetic particle tested at least 12" for every 10" of length. A report of these inspections shall be provided.

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REVISION OF SECTION 509
PREFABRICATED STRUCTURAL STEEL BRIDGE

Subsection 509.19(a) shall include the following:

The Manufacturer shall maintain a program to receive, inspect, record and trace materials used in the Bridge. Material Test Reports shall be used to prove domesticity, and document chemistry and physical test records. Certificates of Conformance shall be used to document compliance with specifications. Traceability shall be met by heat and lot numbers records from the producing mill or supplier. This program shall be in evidence by the Manufacturer's AISC Certification and a written copy found in the Manufacturer's AISC Certification Manual.

Subsection 509.20(k) shall include the following:

All bolt hole fabrication for high strength, slip critical bolted connections shall conform to the workmanship requirements of the Research Council on Structural Connections (RCSC) Specifications for Structural Joint Using A325 or A490 Bolts. Computer Numerically Controlled (CNC) drilling equipment shall be utilized as a manufacturing method as it allows for highly accurate hole location along with precise and rapid shop operations. Exceptions to CNC processing should be submitted in writing to the owner for approval, prior to commencing fabrication.

Subsection 509.20 shall include the following:

(l) Welding of tubular connections is covered in the AWS D1.1 Welding Code. All welding shall utilize E70 or E80 series electrodes. The weld process used shall be Flux Core Arc Welding (FCAW) or Shielded Manual Arc Welding (SMAW) per ANSI/AASHTO/AWS D1.5 "Bridge Welding Code." Welding operators shall be properly accredited and experienced. Qualifications of welders shall be made available upon request.

(m) *Plate & Shape Cutting:* Plate and shape cutting shall conform to methods specified in AASHTO/AWS D1.5 Bridge Welding Code Section 3 Workmanship. Computer Numerically Controlled (CNC) cutting equipment shall be utilized as a manufacturing method as it allows for highly accurate dimensional cutting along with precise and rapid shop operations. Exceptions to CNC processing should be submitted in writing to the owner for approval, prior to commencing fabrication.

Subsection 509.27 shall include the following:

Delivery of the Bridge will be within an agreed period of time after approval of Engineering Drawings (12 weeks). Bearing plates, anchor bolts and expansion joints shall be furnished in advance of the Bridge for incorporation into the abutment construction, upon receipt of a timely request by the Contractor. Delivery of the bridge shall be coordinated between the Manufacturer or their Supplier and the Contractor. The Supplier shall communicate this information to the Manufacturer depending on the agreement and subsequent responsibilities.

The Manufacturer will advise the Owner/Contractor of the attachment points and other necessary information required to install the bridge. The method and sequence of erection shall be the responsibility of the Contractor unless otherwise included in the agreement. Unloading, stabilization, splicing, bolting, and proper rigging and lifting are the responsibility of the Contractor.

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REVISION OF SECTION 509
PREFABRICATED STRUCTURAL STEEL BRIDGE

The successful bidder through the Manufacturer and/or Supplier shall provide a qualified Technical Assistant at the jobsite while the primary structure components are installed. The Contractor shall notify the Manufacturer or their representative at least two weeks in advance of the planned installation. The Technical Assistant shall have at least five (5) years of experience in the installation of similar bridges.

Subsection 509.32 shall include the following:

Prefabricated Structural Steel Bridge will be measured and paid for by Lump Sum (LS), installed complete. Work shall include all steel, hardware, anchor bolts, bearing plates, washers, nuts, temporary shoring and other incidentals to the erection of the bridge.

Subsection 509.33 shall include the following:

Payment will be made under:

Pay Item	**Pay Unit**
Prefabricated Structural Steel Bridge	Lump Sum

FORCE ACCOUNT ITEMS

DESCRIPTION

This special provision contains the Department's estimate for force account items included in the Contract. The estimated amounts 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 subsection 109.04. 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	Quantity	Estimated Amount
F/A Minor Contract Revisions	F.A.	$ 100,000.00

TRAFFIC CONTROL PLAN - GENERAL

The key elements of the Contractor's method of handling traffic (MHT) are outlined in subsection 630.10(a).

The components of the TCP for this project are included in the following:

(1) Subsection 104.04 and Section 630 of the specifications.
(2) Standard Plan S-630-1, Traffic Controls for Highway Construction and Standard Plan S-630-2.
(3) Schedule of Construction Traffic Control Devices.
(4) Signing Plans.
(5) Construction phasing details.
(6) Detour Details.
(7) Other.

Unless otherwise approved by the Engineer, the Contractor’s equipment shall follow normal and legal traffic movements. The Contractor’s ingress and egress of the work area shall be accomplished with as little disruption to traffic as possible. Traffic control devices shall be removed by picking up the devices in a reverse sequence to that used for installation. This may require moving backwards through the work zone. When located behind barrier or at other locations shown on approved traffic control plans, equipment may operate in a direction opposite to adjacent traffic.

CDOT may have entered into operating agreements with one or more law enforcement organizations for cooperative activities. Under such agreements, at the sole discretion of CDOT, law enforcement personnel may enter the work zone for enforcement purposes and may participate in the Contractor’s traffic control activities. The responsibility under the Contract for all traffic control resides with the Contractor and any such participation by law enforcement personnel in Contractor traffic control activities will be referenced in either the Special Provisions or General Notes of the plans depending on whether the Contractor is to hire local law enforcement or if CDOT is contracting with Colorado State Patrol for uniformed traffic control. Nothing in this Contract is intended to create an entitlement, on the part of the Contractor, to the services or participation of the law enforcement organization.

Special Traffic Control Plan requirements for this project are as follows:

During the construction of this project, traffic shall use the present traveled roadway unless identified on the plans or approved by the Engineer.

The Contractor shall not have construction equipment or materials in the lanes open to traffic at any time, unless approved by the Engineer.

During the resurfacing work, only one lane may be closed to traffic at any time unless approved by the Engineer. Traffic shall not be delayed for more than 3 minutes or as directed by the Engineer.

At least one week prior to starting construction, the Contractor shall notify the City Engineer of the date the Contractor intends to start construction.

All costs incidental to the foregoing requirements shall be included in the original contract prices for the project.

UTILITIES

Known utilities within the limits of this project are:
Ute Water
Xcel Energy – Power & Gas
Redlands Water & Power
City of Grand Junction Sanitary Sewer

The work described in these plans and specifications requires coordination between the Contractor and the utility companies in accordance with subsection 105.11 in conducting their respective operations as necessary to complete the utility work with minimum delay to the project.

The work listed below shall be performed by the Contractor in accordance with the plans and specifications, and as directed by the Engineer. The Contractor shall keep each utility company advised of any work being done to its facility, so that the utility company can coordinate its inspections for final acceptance of the work with the Engineer.

FOR:
Xcel Energy – Tillmon McSchooler – 970-244-2695
Redlands Water & Power – Kevin Jones – 970-243-2173

The work listed below will be performed by the utility owners or their agents:

- Overhead power line – Xcel Energy will temporarily de-energize the overhead electric lines in the vicinity of the proposed pedestrian bridge to allow for the drilling of the micropiles adjacent to the wires. The Contractor shall coordinate and schedule this work with Xcel Energy. The Contractor shall comply with High Voltage Electric Transmission Line Clearance Requirements published by Xcel refer to Appendix B. An on-site patrolman may be required by Xcel, if required this shall be paid for by the Contractor.
- Redlands Water & Power – The proposed trail crosses the existing Redlands Water & Power canal siphon. The Contractor shall only work within the trail easement crossing this structure and coordinate with Redlands Water & Power if any issues arise during construction.

GENERAL:

The Contractor shall comply with Article 1.5 of Title 9, CRS ("Excavation Requirements") when excavation 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 day of notification, prior to commencing such operations. The Contractor shall contact the Utility Notification Center of Colorado (UNCC) at (8-1-1) or 1-800-922-1987 to have locations of UNCC registered lines marked by member companies. All other underground facilities shall be located by contacting the respective company. Utility service laterals shall also be located prior to beginning excavating or grading.

The location of utility facilities as shown on the plan and profile sheets, and herein described, were obtained from the best available information.

All costs incidental to the foregoing requirements will not be paid for separately but shall be included in the work.

STANDARD SPECIAL PROVISIONS

October 12, 2017

REVISION OF SECTION 206
REMOVABILITY MODULUS

Section 206 of the Standard Specifications is hereby revised for this project as follows:

In subsection 206.02 (a) 2., delete the third paragraph and replace with the following

Removability Modulus, RM, is calculated as follows:

$$RM = \frac{W^{1.5} \times 104 \times C^{0.5}}{10^6}$$

where : W = unit weight (pcf)
C = 28-day compressive strength (psi)

REVISION OF SECTION 208
EROSION CONTROL

Section 208 of the Standard Specifications is hereby revised for this project as follows:

In subsection 208.03(c) delete the first paragraph and replace it with the following

Erosion Control Management (ECM). Erosion Control Management for this project shall consist of Erosion Control Inspection and the SWMP Administration. All ECM staff shall have working knowledge and experience in construction, and shall have successfully completed the Transportation Erosion Control Supervisory Certificate Training (TECS) as provided by the Department. The Superintendent will not be permitted to serve in an ECM role. The Erosion Control Inspector (ECI) and the SWMP Administrator may be the same person in projects involving less than 40 acres of disturbed area.

In subsection 208.03(c)1 delete the first paragraph and replace it with the following:

SWMP Administration. The SWMP shall be maintained by a SWMP Administrator. In the case of a project requiring only one TECS, the SWMP Administrator may also be the ECI for the project. The name of the SWMP Administrator shall be recorded on the SWMP Section 3. B. The SWMP Administrator shall have full responsibility to maintain and update the SWMP and identify to the Superintendent critical action items needed to conform to the CDPS-SCP as follows:

In subsection 208.03(c)2 delete the first paragraph and replace It with the following:

One ECI is required for every 40 acres of total disturbed area which is currently receiving temporary and interim stabilization measures as defined in subsection 208.04 (e). An ECI shall not be responsible for more than 40 acres in the project. Accepted permanent stabilization methods as defined in subsection 208.04 (e) will not be included in the 40 acres.

In subsection 208.03(d)1 delete item (1) and replace it with the following:

(1) SWMP Site Maps and Plan Title Sheet - Construction site boundaries, ground surface disturbance, limits of cut and fill, flow arrows, structural BMPs, non-structural BMPs, Springs, Streams, Wetlands and surface water. Also included on the sheets is the protection of trees, shrubs and cultural resources.

In subsection 208.05(n), in the list of requirements for pre-fabricated concrete washout structures, delete item (2) and replace it with the following:

(2) Structure shall be located 50 horizontal feet away from State waters, and shall be confined so that no potential pollutants will enter State waters and other sensitive areas are as defined in the Contract. Locations shall be as approved by the Engineer. The site shall signed as “Concrete Washout”.

In subsection 208.11 delete the first paragraph and replace it with the following:

Erosion Control Management will be measured as the actual number of days of ECM work performed, regardless of the number of personnel required for SWMP Administration and Erosion Control Inspection, including erosion control inspections, documentation, meeting participation, SWMP Administration, and the preparation of the SWMP notebook. If the combined hours of SWMP Administration and Erosion Control Inspection is four hours or less in a day, the work will be measured as ½ day. If the combined hours of SWMP Administration and Erosion Control Inspection is more than four hours in a day, the work will be measured as one day. Total combined hours of ECM work exceeding eight hours in a day will still be paid as one day.

REVISION OF SECTION 250
ENVIRONMENTAL, HEALTH AND SAFETY MANAGEMENT

Section 250 of the Standard Specifications is hereby revised for this project as follows:

In subsection 250.03 delete the second paragraph and replace with the following:

This project may be in the vicinity of property associated with petroleum products, heavy metal based paint, landfill, buried foundations, abandoned utility lines, industrial area or other sites which can yield hazardous substances or produce dangerous gases. These hazardous substances or gases can migrate within or into the construction area and could create hazardous conditions. The Contractor shall use appropriate methods to reduce and control known landfill, industrial gases, and visible emissions from asbestos encounters and hazardous substances which exist or migrate into the construction area. The Contractor shall follow CDOT's Regulated *Asbestos-Contaminated Soil Management Standard Operating Procedure, dated October 18, 2016* for proper handling of asbestos-contaminated soil, and follow all applicable Solid and Hazardous Waste Regulations for proper handling of soils encountered that contain any other substance mentioned above.

In subsection 250.03(a) delete the second paragraph and replace with the following:

When regulated asbestos contaminated soil (RACS) is present or is suspected to be present on or near a project, the HSO shall have knowledge of RACS regulations. The HSO shall meet the minimum training and medical surveillance requirements established by the Occupational Safety and Health Administration (OSHA) and the Environmental Protection Agency (EPA) for a supervisory Site Safety Official per 29 CFR 1962.65. The Contractor shall furnish documentation to the Engineer, at the preconstruction conference, that the above requirements have been met. Certification as an Asbestos Building Inspector in accordance with subsection 250.03 (b) is recommended.

In subsection 250.03(b) delete the first and second paragraphs and replace with the following:

The Contractor shall designate a monitoring technician to be responsible for monitoring of hazardous substances during work on the project. The MT shall have a minimum of two years of actual field experience in assessment and remediation of hazardous substances that may be encountered during highway construction projects. When asbestos is present or is suspected to be present on or near a project, the MT shall have additional 40 hours experience in RACS project management and certification as an Asbestos Building Inspector in accordance with the Colorado Air Quality Control Commission Regulation No. 8 Part B. The MT shall be experienced in the operation of monitoring devices, identifying substances based upon experience and observation, and field sampling (for testing) of all media that may be found on the site. Completion of the 40 hour hazardous waste and 8 hour supervisory training required by OSHA and U.S. EPA rules and regulations which complies with the accreditation criteria under the provisions of the proposed 29 CFR 1910.121 is required prior to beginning work. The Contractor shall furnish documentation at the Preconstruction Conference that demonstrates these requirements have been met.

The MT shall be equipped with the following:

(1) Communication equipment as required in subsection 250.03(d) 2.A. and a vehicle.

(2) Monitoring and detection equipment for flammable gas, oxygen sufficiency, toxic gas, radiological screening and other hazards. This includes, as required, a combustible gas indicator, flame ionization or photo ionization detector, oxygen meter, radiation monitor with Geiger Mueller detector and other foreseeable equipment.

(3) Depth gauging equipment, sampling equipment and sampling containers.

(4) Personal protective equipment (levels C and D) when required.

Delete subsection 250.07 and replace with the following:

250.07 Regulated Asbestos Contaminated Soils (RACS) Management. Environmental documents or plans listed in the special provisions should include known or suspected locations that could involve encounters with RACS during excavation and other soil disturbing construction activities. Unexpected discoveries of RACS may occur during excavation and soil disturbing construction activities. RACS shall be properly managed or remediated, in accordance with subsection 250.07(a).

All asbestos related activities shall be performed by CDPHE certified asbestos professionals, contractors, or consultants. Certifications are issued by the CDPHE, Indoor Air Quality Unit. A Colorado Certified Asbestos Building Inspector shall manage the assessment and disposal of RACS and other ACM. The Indoor Air Quality Unit within CDPHE is the only unit that certifies such professionals. The Contactor shall furnish a copy of the certification to the Engineer.

(a) *Regulatory Compliance.* RACS management is governed by 6 CCR 1007-2, Section 5.5, which includes and references regulatory compliance with Colorado Air Quality Control Commission *Regulation* No. 8 Part B-Asbestos. Colorado Regulation No. 8 governs all asbestos activities, demolition, permitting, and certification of Certified Asbestos Professionals in the State of Colorado. The Contractor shall conform to all current regulations, policy directives, or both, issued by the CDPHE, and the Department.

(b) *Asbestos Management and Visual Inspections* Asbestos management shall be performed by a CDPHE certified asbestos building inspector. All inspections of the area of asbestos contaminated soil removal shall be performed by a CDPHE certified Asbestos Building Inspector to determine what, if any, controls must be instituted to allow future activity in the excavation area.

(c) *Permitting and Notification.* The CDPHE requires notification of any soil disturbing activity where asbestos is known, suspected, or discovered. A 24-hour notification to CDPHE is required after any soil disturbing activity of an unplanned asbestos discovery. A 10 working day notification to CDPHE is required prior to any soil disturbing activity in an area with known or potential RACS. Removal of asbestos-containing material on a facility component, that is located on or in soil that will be disturbed, with asbestos quantities above the following trigger levels shall be permitted and abated in accordance with the requirements of Colorado Air Quality Control Commission Regulation No. 8 (5 CCR 1001-10, Part B):

(1) 260 linear feet on pipes,

(2) 160 square feet on other surfaces, or

(3) The volume of a 55-gallon drum.

All permit applications shall be submitted to the Colorado Department of Public Health and Environment a minimum of 10 days prior to start of work for approval. The permit application and notification shall be submitted simultaneously. A CDPHE certified General Abatement Contractor shall obtain all required State and local permits and shall be responsible for all associated fees. Permit application, notification, and waiver request forms shall be submitted to:

Colorado Department of Public Health and Environment Permit Coordinator/APCD - SS - B1 4300 Cherry Creek Drive South Denver, CO 80246-1530 Phone: (303) 692-3100 Fax: (303) 782-0278

Application and waiver forms are available on the CDPHE website: asbestos@state.co.us

(d) *CDOT's Regulated Asbestos-Contaminated Soil Management Standard Operating Procedure, dated October 18, 2016.* Asbestos contaminated soil shall be managed in accordance with 6 CCR 1007-2, Part 1, Section 5.5, Management of RACS.. . Regulations apply only upon unexpected discovery of asbestos materials during excavation and soil disturbing activities on construction projects, or when asbestos encounters are expected during construction. The Contractor shall comply with procedures detailed in the *CDPHE's Management of Regulated Asbestos Contaminated Soil Regulation* and CDOT's CDPHE approved Regulated *Asbestos-Contaminated Soil Management Standard Operating Procedure, dated October 18, 2016*, including the following minimum requirements:

(1) Immediate actions and implementation of interim controls to prevent visible emissions, exposure, and asbestos contamination in surrounding areas.

(2) Soil Characterization.

(3) Training required for all personnel involved in excavation and other soil disturbing activities, once asbestos is encountered during construction or on projects where asbestos encounters are expected.

Asbestos Awareness Training shall be given by a qualified and certified Asbestos Building Inspector with a minimum of six months experience inspecting asbestos contaminated soil.

(4) Assessment for the presence and extent, within the proposed area of disturbance, of asbestos discoveries, whether expected or unexpected, by a CDPHE Certified Asbestos Building Inspector.

(5) Investigation and sampling required for risk assessment and management. Investigation, if required, shall be conducted by a CDPHE Certified Asbestos Building Inspector.

(6) Risk assessment and determinations for further management or abatement.

(i) Risk assessment and determinations must be made by a CDPHE Certified Asbestos Building Inspector, and coordinated with the Engineer.

(ii) Soil remediation is not necessarily required, depending on the circumstances.

(7) Submit CDPHE 24-hour Notification form for unexpected RACS discovery included in Attachment 1 of the CDOT Regulated Asbestos-Contaminated Soil Management Standard Operating Procedure

(8) Submit CDPHE 10-day Notification form for planned RACS management included in Attachment 1 of the CDOT Regulated Asbestos-Contaminated Soil Management Standard Operating Procedure.

(e) *Risk Assessment and Determinations for Further Management Or Remediation.* Risk assessment and determinations for further management or remediation must be closely coordinated with the Project Engineer and Project Manager of the Statewide Management Plan.

REVISION OF SECTIONS 412 AND 705
PREFORMED COMPRESSION SEALS

Sections 412 and 705 of the Standard Specifications are hereby revised for this project as follows:

Subsection 412.13 shall include the following:

Transverse and untied longitudinal joints shall be sawed and sealed as shown in the following diagram for preformed compression seals. Installation shall conform to subsection 412.18, as revised for this project, and the compression seal and lubricant materials shall conform to subsection 705.01, as revised for this project.

Subsection 412.18 shall include the following:

Before installation of the preformed compression seal the following shall be completed:

(1) Repair of defective pavement slabs and repair and proper curing of cracks or spalls in accordance with subsection 412.16.

(2) Corrective work for texturing.

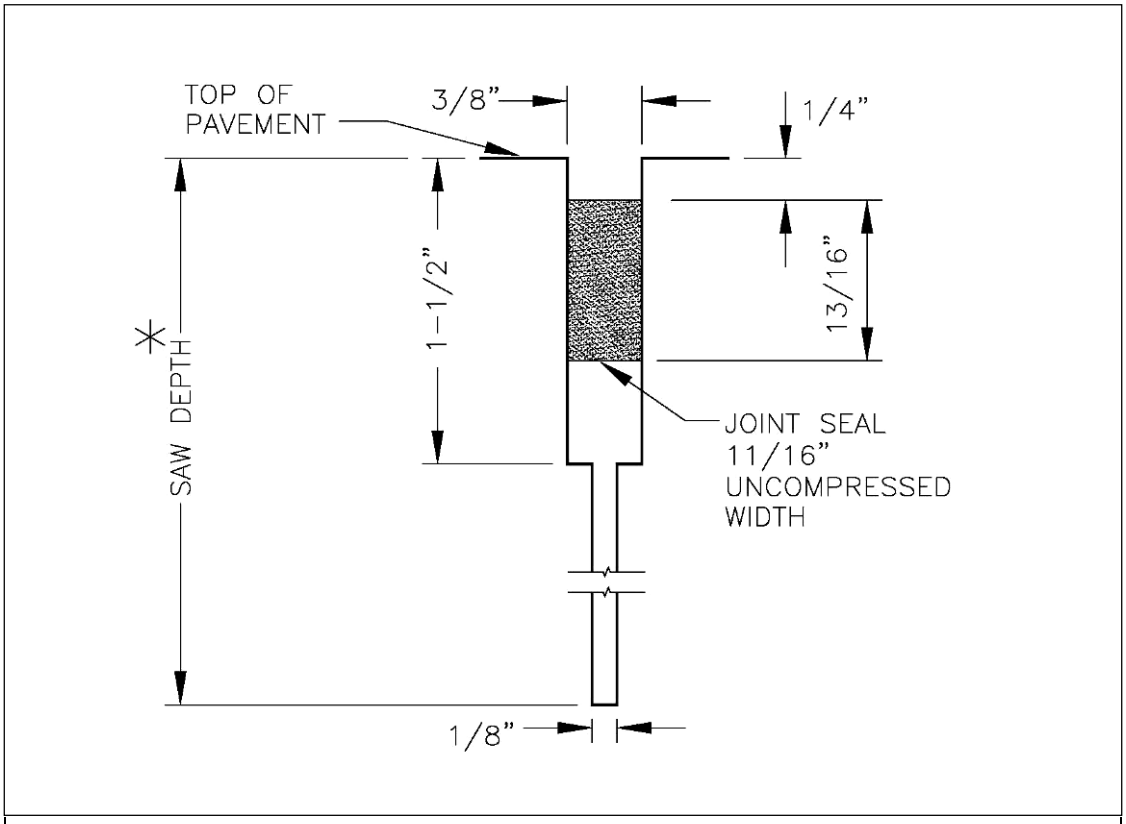
(3) Corrective work for smoothness in accordance with subsection 105.08.

Air temperature at the time of installation shall be from 40 to 80 °F or as recommended by the manufacturer. The joint shall be air cleaned with oil free air at 100 psi minimum just before seal installation. The preformed compression seal shall have an uncompressed width of $^{11}\!/_{16}$ inch. Installation shall be in conformance with the following diagram and shall follow the manufacturers recommendations. A machine shall be used for installation which results in proper depth of the seal without damage or twisting of the seal. Elongation during installation shall not exceed 5 percent.

Subsection 705.01 shall include the following:

(c) *Preformed Compression Seals.* Preformed compression seals shall conform to AASHTO M 220. The lubricant adhesive used for installation of the preformed compression seal shall conform to ASTM D 2835. The Contractor shall provide the Engineer with certified test reports that indicate conformance of the preformed compression seals and lubricant adhesive with these specifications before installation begins.

JOINT SHAPE AND JOINT FILLER DETAILS FOR TRANSVERSE SAWED CONTRACTION JOINT AND UNTIED LONGITUDINAL CONTRACTION JOINT



* Saw Depth
T/4 for transverse sawed contraction joint
T/3 for untied longitudinal contraction joint
Where:
T = pavement thickness

Tolerances of all joint width dimensions: 0 to $+^{1}/_{16}$ inch

Installation of preformed compression joint seals shall be in accordance with manufacturer's recommendations.

The joint locations, spacing, and general notes on the standard for concrete pavement joints for this project shall apply.

All materials and installation required for compression joint seals will be included in the work.

All other joints shall be constructed in accordance with standard specifications.

REVISION OF SECTIONS 601, 701 AND 711
STRUCTURAL CONCRETE

Sections 601 and 701 of the Standard Specifications are hereby revised for this project as follows:

In subsection 601.02, after the thirteenth paragraph, delete item (2) and replace it with the following:

(2) The maximum amount of fly ash substituted for ASTM C150 cement or the maximum pozzolan content when ASTM C595 or C1157 cement is used may exceed the limits in subsection 601.05 if lab test results show that the permeability of the mix does not exceed 2,500 Coulombs at an age of not more than 56 days as determined by ASTM C1202.

Subsection 601.03 shall include the following:

Slag Cement 701.05

In subsection 601.04, under Class 1 requirements for sulfate resistance, delete items (5) and (6) and replace them with the following:

(5) ASTM C595 Type IL(MS), IL(HS), IT(MS) or (HS); Class C fly ash shall not be substituted for cement.

In subsection 601.04, under Class 2 requirements for sulfate resistance, delete items (1), (2), (5), (6), (7), (8) and (9) and replace them with the following:

(1) ASTM C150 Type V with a minimum of a 20 percent substitution of Class F fly ash or slag cement by weight

(2) ASTM C150 Type II or III with a minimum of a 20 percent substitution of Class F fly ash or slag cement by weight. The Type II or III cement shall have no more than 0.040 percent expansion at 14 days when tested according ASTM C452

(5) ASTM C1157 Type MS plus Class F fly ash, slag cement, or High-Reactivity Pozzolan where the blend has less than 0.05 percent expansion at 6 months or 0.10 percent expansion at 12 months when tested according to ASTM C1012

(6) A blend of portland cement meeting ASTM C150 Type II or III with a minimum of 20 percent Class F fly ash or slag cement by weight, where the blend has less than 0.05 percent expansion at 6 months or 0.10 percent expansion at 12 months when tested according to ASTM C1012.

(7) ASTM C595 Type IP(HS), IL(HS) or IT(HS). Class F fly ash, slag cement, or High-Reactivity Pozzolan may be substituted for Type IL cement. Class C fly ash shall not be substituted for cement.

(8) ASTM C595 Type IL(MS) or IT(MS) plus Class F fly ash, slag cement, or High-Reactivity Pozzolan where the blend has less than 0.05 percent expansion at 6 months or 0.10 percent expansion at 12 months when tested according to ASTM C1012

In subsection 601.04, under Class 3 requirements for sulfate resistance, delete items (1), (2), (3), (5), (6) and (7) and replace them with the following:

(1) A blend of portland cement meeting ASTM C150 Type II, III, or V with a minimum of a 20 percent substitution of Class F fly ash or slag cement by weight, where the blend has less than 0.10 percent expansion at 18 months when tested according to ASTM C1012.

(2) ASTM C 1157 Type HS having less than 0.10 percent expansion at 18 months when tested according to ASTM C1012. Class F fly ash, slag cement, or High-Reactivity Pozzolan may be substituted for cement. Class C fly ash shall not be substituted for cement.

(3) ASTM C1157 Type MS or HS plus Class F fly ash, slag cement, or High-Reactivity Pozzolan where the blend has less than 0.10 percent expansion at 18 months when tested according to ASTM C1012.

(5) ASTM C595 Type IL(MS) or IT(MS) plus High-Reactivity Pozzolan where the blend has less than 0.10 percent expansion at 18 months when tested according to ASTM C1012.

(6) ASTM C595 Type IP(HS), IL(HS) or IT(HS) having less than 0.10 percent expansion at 18 months when tested according to ASTM C1012. Class F fly ash, slag cement, or High-Reactivity Pozzolan may be substituted for Type IL cement. Class C fly ash shall not be substituted for cement.

(7) ASTM C595 Type IL with a minimum of a 20 percent substitution of Class F fly ash or slag cement by weight, where the blend has less than 0.10 percent expansion at 18 months when tested according to ASTM C1012.

(8) ASTM C150 Type I, II, III or V plus a minimum of 20% Class F fly ash when the R factor of the fly ash is less than 0.75. R factor is determined using the following from the chemical composition of the fly ash.

$$R = \frac{CaO - 5}{Fe_2O_3}$$

In subsection 601.04, the last paragraph shall include the following:

ASTM C1012 test results are acceptable for up to two years from the completion date of the test.

In subsection 601.05, first paragraph, delete the sixth (last) sentence and replace it with the following:

When determining the w/cm, the weight of cementitious material (cm) shall be the sum of the weights of the cement, slag cement, fly ash, silica fume, and high-reactivity pozzolan.

In subsection 601.05 delete the fifteenth through twenty-second paragraphs and replace them with the following:

The Concrete Mix Design Report shall include certified test reports showing that the cement, fly ash, slag cement, high-reactivity pozzolan, and silica fume meet the specification requirements and shall support this statement with actual test results. The certification for silica fume shall state the solids content if the silica fume admixture is furnished as slurry.

For all concrete mix designs with ASTM C150 cements, up to a maximum of 20 percent Class C fly ash, 30 percent Class F fly ash, or 30 percent high-reactivity pozzolan by weight of total cementitious material may be substituted for cement. Up to a maximum of 50% slag cement by weight of total cementitious material may be substituted for cement. When slag cement and pozzolans are substituted for cement, the total substitution of cement shall not exceed 50% by weight of total cementitious material.

For all concrete mix designs with ASTM C595 Type IL cements, up to a maximum of 20 percent Class C fly ash, 30 percent Class F fly ash, or 30 percent high-reactivity pozzolan by weight of total cementitious material may be substituted for cement. Up to a maximum of 50% slag cement by weight of total cementitious material may be substituted for cement. When slag cement and pozzolans are substituted for cement, the total substitution of cement shall not exceed 50% by weight of total cementitious material.

For all concrete mix designs with ASTM C595 Type IP, IP(MS), IP(HS) or IT cements: fly ash or high-reactivity pozzolan shall not be substituted for cement.

For all concrete mix designs with ASTM C595 IT cements: slag cement shall not be substituted for cement.

For all concrete mix designs with ASTM C595 Type IP, IP(MS), IP(HS) cements, when slag cement is substituted for cement, the total substitution of cement shall not exceed 50% by weight of total cementitious material.

For all concrete mix designs with ASTM C1157 cements, the total pozzolan content including pozzolan in cement shall not exceed 30 percent by weight of the cementitious material content. Up to a maximum of 30% slag cement by weight of total cementitious material may be substituted for cement.

The Contractor shall submit a new Concrete Mix Design Report meeting the above requirements when a change occurs in the source, type, or proportions of cement, slag cement, fly ash, high-reactivity pozzolan, silica fume, or aggregate. When a change occurs in the source of approved admixtures, the Contractor shall submit a letter stamped by the Concrete Mix Design Engineer approving the changes to the existing mix design. The change shall be approved by the Engineer prior to use.

Delete 601.17(g) and replace it with the following:

(g) *Water to Cementitious Material Content (w/cm) Ratio.* When a non-standard concrete is used the maximum w/cm ratio is the w/cm ratio that was used in the in the laboratory trial mix for the Concrete mix design except when an optimized gradation is the only deviation from the Standard Class B, Class BZ, Class D, Class DT, Class E, and Class P concrete requirements. The w/cm ratio shall be determined for each batch of non-standard concrete by the Contractor and provided to the Engineer for approval prior to placement. If an adjustment to the mix is made after the Engineer's approval, the w/cm shall be determined and submitted to the Engineer prior to the continuation of placement. Any non-standard concrete that is placed without the Engineer's approval shall be removed and replaced at the Contractor's expense.

In subsection 701.01, the third paragraph shall include the following:

ASTM C595 Type IL(MS)
ASTM C595 Type IL(HS)
ASTM C595 Type IT(MS)
ASTM C595 Type IT(HS)

Add subsection 701.05 as follows:

701.05 Slag Cement Slag cement shall conform to the requirements of ASTM C989. Slag cement shall be Grade 100 or Grade 120. Slag cement shall have a maximum Aluminum Oxide content of 11.0%

Slag cement shall be from a pre-approved source listed on the Department's Approved Products List.

Slag Cement shall be subject to sampling and testing by the Department. Test results that do not meet the physical and chemical requirements may result in the suspension of the use of Slag Cement until the necessary corrections have been taken to ensure that the material conforms to the specifications.

Subsection 711.03 shall include the following:

Corrosion inhibiting admixtures shall conform to the requirements of ASTM C1582.

Pigments for integrally coloring concrete shall conform to the requirements of ASTM C979.

July 3, 2017

REVISION OF SECTION 625
CONSTRUCTION SURVEYING

Section 625 of the Standard Specifications is hereby revised for this project as follows:

Subsection 625.01 shall include the following:

If the Revision of Section 102 Project Plans and Other Data states 3D modeling data is available, the Contractor may choose to perform 3D Engineered Construction Surveying (3DECS).

3DECS is the use of global positioning and or robotic instruments to guide construction equipment operations by comparing 3D model information in real time. For 3DECS, either the construction equipment is fed modeling information and makes automatic adjustments (machine control) or the equipment operator is fed the information and makes manual adjustments.

In subsection 625.04, delete the first paragraph and replace with the following:

The Contractor shall perform all construction surveying and staking necessary for construction of the project. Construction surveying and staking shall be based on the Primary Horizontal and Vertical Control established by the Department. Bid items which require stakes to be set by the Contractor's Surveyor are shown on the Surveyor Tabulation Sheet of the plans and shall be in accordance with the CDOT Survey Manual Chapter 6.

If the Contractor uses 3D Engineered Surveying the following shall apply:

(1) All surveying shall be based on the Primary Horizontal and Vertical Control established by the Department.

(2) The Contractor shall provide construction stakes for the control points of the project centerline or Engineer approved offset line (i.e. POT, POC, PCC, PC, PT, TS, ST, SC, CS per the Survey Manual) and angle points, all of which shall be established from primary control monuments and their assigned coordinates as shown on the plans.

(3) Staking for the project centerline or offset, shall be established from the project centerline control points as shown on the plans in order to provide a method of machine control equipment checks, inspection, and field verification.

(4) The maximum staking interval for the project centerline shall be 500 feet on tangents and 100 feet on curves or as specified on the survey tabulation sheet. All project centerline control points as shown on the plans shall be staked.

(5) Within the first week of the Contractor utilizing 3DECS, the Contractor shall check their 3DECS system and verify on writing to CDOT that the accuracy of the system complies with the contract requirements.

At no cost to the Department, the Contractor shall revert to traditional surveying and disband using 3DECS should the Engineer determine the existence of contractor quality or accuracy issues related to 3DECS.

Subsection 625.06 shall include the following:

3D Engineered surveying accuracy and tolerances shall be the same as the staking accuracy and tolerances stated in the CDOT Survey Manual.

Subsection 625.13 shall include the following:

All costs associated with 3DECS surveying will not be measured and paid for separately, but shall be included in the work.

October 12, 2017

REVISION OF SECTION 703
CLASSIFICATION FOR AGGREGATE BASE COURSE

Section 703 of the Standard Specifications is hereby revised for this project as follows:

In subsection 703.03, delete Table 703-2 and replace with the following:

Table 703-2
CLASSIFICATION FOR AGGREGATE BASE COURSE

Sieve Size	Mass Percent Passing Square Mesh Sieves						
	LL not greater than 35			LL not greater than 30			
	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7
150mm (6")			100				
100mm (4")		100					
75mm (3")		95-100					
60mm (2 ½")	100						
50mm (2")	95-100			100			
37.5mm (1.5")				90-100	100		
25mm (1")					95-100	100	100
19mm (3/4")				50-90		95-100	
4.75mm (#4)	30-65			30-50	30-70	30-65	
2.36mm (#8)						25-55	20-85
75 □m (#200)	3-15	3-15	20 max	3-12	3-15	3-12	5-15
NOTE: Class 3 material shall consist of bank or pit run material.							

SPECIAL CONSTRUCTION REQUIREMENTS
FIRE PROTECTION PLAN

(a) *Fire Protection Plan*. Prior to start of work, the Contractor shall submit a Fire Control Plan in writing to the Engineer for approval. The plan shall include the following:

(1) The name and contact information of a Fire Control Coordinator who shall be assigned to the project.

(2) A list of numbers to call in case of a fire, including 911 (or the equivalent in the area).

(3) A complete list, including storage locations, of all tools and equipment the Contractor will use in the event of a fire within project limits.

(4) Methods that will be employed if a fire is encountered or started during construction activities within the project limits.

(5) Specific fire prevention precautions, and the required firefighting equipment, for every activity which has the potential for starting a fire. At a minimum the plan shall address prevention planning related to use of heavy equipment, vehicles, hand tools, storage and parking areas.

(6) Specific precautions for fueling operations.

(7) Provisions for field safety meetings. The Contractor shall conduct field safety meetings (also known as toolbox or tailgate meetings) at least once per week. The Contractor shall encourage participation by all persons working at the project site. Participants shall discuss specific fire prevention precautions for construction activities.

(b) *Equipment and Procedures*.

(1) Fire Boxes. Fire boxes shall contain tools and equipment that shall be used exclusively for controlling or suppressing fires which occur due to construction activities on project sites. Each fire box shall contain, as a minimum, the following:

(1) five round-pointed shovels,
(2) two double-bitted axes,
(3) three pulaskis or mattocks, and
(4) two backpack pumps

(2) Welding. If welding at field locations is required, the welding shall be done at a location where all flammable material has been cleared away for a distance of 16 feet around the area.

(3) Spark Arrestors. All diesel and gasoline powered engines, both mobile and stationary, shall be equipped with serviceable spark arrestors.

(4) Power Saws. Each gasoline power saw shall be provided with a spark screen and a muffler in good condition. Spill-proof metal safety cans shall be used for refueling.

(5) Storage and Parking Areas. Batch plant areas, equipment service areas, parking areas, gas and oil drum storage areas, and explosive storage areas shall be cleared of all flammable materials for a distance of 50 feet. Small stationary engine sites shall be cleared of all flammable material for distance of 17 feet. Other mitigation methods may be used as approved by the Engineer

(c) *Fire Control Coordinator Responsibilities.* The Fire Control Coordinator shall:

(1) Implement the Fire Control Plan.

(2) Monitor, manage, and adjust the Fire Control Plan as needed as construction work progresses.

(3) Document in a letter to the Engineer changes to the Fire Control Plan.

(4) Immediately contact firefighting authorities when a fire is started due to construction activities within project limits.

(5) Coordinate fire control and suppression activities until authorities arrive, including the evacuation of staff.

(6) When the Fire Control Coordinator cannot be on the project site, he shall designate a person who is on site to serve as the Fire Control Coordinator. The Fire Control Coordinator, or his designee, shall be on site at all times that work is being performed.

(d) *Costs.* All costs associated with the preparation and implementation of the Plan and compliance with all fire protection provisions and requirements will not be measured and paid for separately, but shall be included in the work.