CITY OF Grand Junction COLORADO

NOTICE TO PROCEED

Date: January 22, 2021

Contractor: M.A. Concrete Construction, Inc.

Project: GRJM 21.5-G95 Culvert Replacement IFB-4853-21-DH

In accordance with the contract dated January 7, 2021 the Contractor is hereby notified to begin work on the Project on or before February 1, 2021.

The date of final completion as determined is 90 Calendar Days from the start date of this Notice to Proceed.

CITY OF GRAND JUNCTION, COLORADO

DocuSigned by:
Duane Hoff Jr., Senior Buyer – City of Grand Junction
9F709E7D58F14DC...
Duane Hoff Jr., Senior Buyer

Receipt of this Notice to Proceed is hereby acknowledged:

Contractor: M.A. Concrete Construction, Inc.

By: DocuSigned by:
Andy Azcarraga – M.A. Concrete Construction, Inc.
E5B238CA743E437...

Print Name: Andy Azcarraga - M.A. Concrete Construction, Inc.

Title: Project Manager

Date: 1/22/2021 | 15:59 MST

CITY OF Grand Junction COLORADO

NOTICE OF AWARD

Date: January 7, 2021

Company: M.A. Concrete Construction, Inc.

Project: GRJM 21.5-G.95 Culvert Replacement IFB-4853-21-DH

You have been awarded the City of Grand Junction GRJM 21.5-G.95 Culvert Replacement IFB-4853-21-DH for a total price of **$212,315.50**.

Please notify Kirsten Armbruster, City of Grand Junction Project Engineer 970-244-1421 for project scheduling, and return to the City Purchasing Division an acknowledged copy of this Notice of Award., signed Contract, Payment & Performance Bonds, and Insurance Certificate, as per the contract documents.

CITY OF GRAND JUNCTION, COLORADO

DocuSigned by:
Duane Hoff Jr., Senior Buyer – City of Grand Junction
9F709E7B50F14BC...
Duane Hoff Jr., Senior Buyer

SUPPLIER ACKNOWLEDGEMENT

Receipt of this Notice to Award is hereby acknowledged:

Company: M.A. Concrete Construction, Inc.

By: DocuSigned by:
Andy Azcarraga – M.A. Concrete Construction, Inc.
E5B238CA743E437...
Andy Azcarraga - M.A. Concrete Construction, Inc

Title: Project Manager

Date: 1/7/2021 | 15:06 MST

CITY OF GRAND JUNCTION, COLORADO

****

CONTRACT

This CONTRACT made and entered into this 7th day of January, 2021 by and between the **City of Grand Junction, Colorado,** a government entity in the County of Mesa, State of Colorado, hereinafter in the Contract Documents referred to as the "Owner" and **M.A. Concrete Construction, Inc.** hereinafter in the Contract Documents referred to as the "Contractor."

WITNESSETH:

WHEREAS, the Owner advertised that sealed Bids would be received for furnishing all labor, tools, supplies, equipment, materials, and everything necessary and required for the Project described by the Contract Documents and known as **GRJM 21.5-G.95 Culvert Replacement IFB-4853-21-DH**.

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

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

ARTICLE 1

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

The order of contract document governance shall be as follows:

a. The body of this contract agreement
b. Solicitation Documents for the Project; **GRJM 21.5-G.95 Culvert Replacement;**
c. Notice of Award
d. Contractors Response to the Solicitation
e. Work Change Requests (directing that changed work be performed);

f. Field Orders
g. Change Orders.

ARTICLE 2

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

ARTICLE 3

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

ARTICLE 4

Contract Time and Liquidated Damages: Time is of the essence with respect to this Contract. The Contractor hereby agrees to commence Work under the Contract on or before the date specified in the Solicitation from the Owner, and to achieve Substantial Completion and Final Completion of the Work within the time or times specified in the Solicitation. In the event the Work is not completed in the times set forth and as agreed upon, the Contractor further agrees to pay Liquidated Damages to the Owner as set forth in the Solicitation. The Contractor acknowledges and recognizes the delays, expenses and difficulties involved in proving in a legal proceeding the actual losses suffered by the Owner if the work is not completed on time. Accordingly, instead of requiring any such proof, the Owner and the Contractor agree that as Liquidated Damages for delay, but not as a penalty, the Contractor shall pay to the Owner the amounts specified in the Solicitation.

ARTICLE 5

Contract Price and Payment Procedures: The Contractor shall accept as full and complete compensation for the performance and completion of all of the Work specified in the Contract Documents, the sum of **Two Hundred Twelve Thousand Three Hundred Fifteen and 50/100 Dollars ($212,315.50).** If this Contract contains unit price pay items, the Contract Price shall be adjusted in accordance with the actual quantities of items completed and accepted by the Owner at the unit prices quoted in the Solicitation Response. The amount of the Contract Price is and has heretofore been appropriated by the Grand Junction City Council for the use and benefit of this Project. The Contract Price shall not be modified except by Change Order or other written directive of the Owner. The Owner shall not issue a Change Order or other written directive which requires additional work to be performed, which work causes the aggregate amount payable under this Contract to exceed the amount appropriated for this Project, unless and until the Owner provides Contractor written assurance that lawful appropriations to cover the costs of the additional work have been made.

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

Upon Final Completion of the Work under the Contract and before the Contractor shall receive final payment, the Owner shall publish at least twice in a newspaper of general circulation published in the County a notice that: 1. the Owner has accepted such Work as completed according to the Contract Documents; 2. the Contractor is entitled to final payment therefore; 3. thirty days after the first publication, specifying the exact date, the Owner shall pay the full balance due under the Contract; and 4. persons having claims for labor, materials, team hire, sustenance, provisions, provender, or other supplies used or consumed by the Contractor or a subcontractor shall file a verified statement of the amount due and unpaid on account of such claim prior to the date specified for such payment. Nothing herein shall be construed as relieving the Contractor and the Sureties on the Contractor's Bonds from any claim or claims for work or labor done or materials or supplies furnished in the execution of the Contract.

ARTICLE 6

Bonds: The Contractor shall furnish currently herewith the Bonds required by the Contract Documents, such Bonds being attached hereto. The Performance Bond shall be in an amount not less than one hundred percent (100%) of the Contract Price set forth in Article 5. The Payment Bond shall be in an amount not less than one hundred (100%) of the Contract Price set forth in Article 5.

ARTICLE 7

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

ARTICLE 8

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

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

The Contract is executed in two counterparts.

CITY OF GRAND JUNCTION, COLORADO

DocuSigned by:
By: Duane Hoff Jr., Senior Buyer – City of Grand Junction 1/7/2021 | 15:59 MST
9F789E7D50F74BC...
Duane Hoff Jr., Senior Buyer Date

M.A. Concrete Construction, Inc.

DocuSigned by:
By: Andy Azcarraga – M.A. Concrete Construction, Inc. 1/7/2021 | 15:06 MST
E5B238CA743E437...
Andy Azcarraga - M.A. Concrete Construction, Inc. Project Manager Date

Purchasing Division

Invitation for Bid

IFB-4853-21-DH
GRJM 21.5-G.95 Culvert Replacement

Responses Due:

December 17, 2020 prior to 3:00pm

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)

IMPORTANT NOTICE:

Due to the recent developments with increased COVID-19 cases in Mesa County, public in-person bid openings are temporarily being suspended. Bid openings will still take place on their designated date and time virtually, and bid tabulations will still be posted for public view/access. Once the crisis has passed, public in-person bid openings will resume as normal. Attached is the virtual link and information to attend the bid opening. Public may addend through the link, or via phone.

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

Table of Contents

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 replace the existing corrugated metal pipe at 21.5 Rd south of H Rd with a 60-inch HDPE culvert with concrete headwalls, wingwalls, and toewalls. 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

The City would like to remind all Contractors, Sub-Contractors, Vendors, Suppliers, Manufacturers, Service Providers, etc. that (with the exception of Pre-Bid or Site Visit Meetings) all questions, inquiries, comments, or communication pertaining to any formal solicitation (whether process, specifications, scope, etc.) must be directed (in writing) to the Purchasing Agent assigned to the project, or Purchasing Division. Direct communication with the City assigned Project Managers/Engineers is not appropriate for public procurement, and may result in disqualification.

1.2. **Mandatory Site Visit Meeting:** **Prospective bidders are required to attend a mandatory site visit meeting on December 4, 2020 at 10:00am**. Meeting location shall be at Pritchard Wash, located at 21 ½ Road just south of H Road. 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, Colorado and is referred to throughout this Solicitation. The term Owner means the Owner or his authorized representative.

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

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

Please join Solicitation Opening, IFB-4853-21-DH, GRJM 21.5-G.95 Culvert Replacement on GoToConnect from your computer using the Chrome browser.
https://my.jive.com/meet/351927605

You can also dial in using your phone.

US: (571) 317-3116

Access Code: 351-927-605

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/business-and-economic-development/bids/ .

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 Purchasing Agent of all conflicts, errors, ambiguities or discrepancies in or among the *Contract Documents* within the designated inquiry period.

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 inquiry deadline.

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/business-and-economic-development/bids/ . 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. Exceptions and Substitutions: Bidders taking exception to the specifications and/or scope of work shall do so at their own risk. The Owner reserves the right to accept or reject any or all substitutions or alternatives. When offering substitutions and/or alternatives, Bidder must state these exceptions in the section pertaining to that area. Exception/substitution, if accepted, must meet or exceed the stated intent and/or specifications and/or scope of work. The absence of such a list shall indicate that the Bidder has not taken exceptions, and if awarded a contract, shall hold the Bidder responsible to perform in strict accordance with the specifications and/or scope of work contained herein.

1.19. 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.

1.20. 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.

1.21. 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 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, 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 be 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, Specification 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: Contractor shall submit with their bid response 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 Final Completion of the work is the date certified by the Owner when all construction, and all other work associated to include, but not be limited to: testing, QA/QC, receipt of required reports and/or forms, grant requirements (if applicable), punch list items, clean-up, receipt of drawings and/or as-builts, etc., is fully complete, and 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 readvertise, 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 **$1000.00** 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 fully 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 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/Minor Contract Revisions: Contingency/Force Account/Minor Contract Revisions 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/Minor Contract Revisions Authorization will be directed by the Owner through an approved form. Contingency/Force Account/Minor Contract Revisions funds are the property of the Owner and any Contingency/Force Account/Minor Contract Revisions funds, not required for project completion, shall remain the property of the Owner. Contractor is not entitled to any Contingency/Force Account/Minor Contract Revisions 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/County 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 Offerors: The Owner reserves the right to:

- reject any and all Bids,
- waive any and all informalities,
- take into account any prompt payment discounts offered by Bidder,
- negotiate final terms with the Successful Bidder,
- take into consideration past performance of previous awards/contracts with the Owner of any Contractor, Vendor, Firm, Supplier, or Service Provider in determining final award. 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 or Board of County Commissioners 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/County. 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/County. It does not include quantities

for any other jurisdiction. The City or County 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/County 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 the replacement of the existing corrugated metal pipe at 21.5 Rd south of H Rd with a 60-inch HDPE culvert with concrete headwalls, wingwalls, and toewalls. The replacement will include Geotextile Fabric, Aggregate Base Course, HDPE pipe, Reinforced concrete walls, and Asphalt placement.

3.2. PROJECT DESCRIPTION: The project includes 100 linear feet of 60-inch HDPE pipe with 12-inch-thick concrete headwalls and wingwalls and 8-inch-thick toewalls on each end of the culvert. 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 Site Visit Meeting: **Prospective bidders are required to attend a mandatory site visit meeting on December 4, 2020 at 10:00am**. Meeting location shall be at Pritchard Wash, located at 21 ½ Road just south of H Road. 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 and Planning
Attn: Kirsten Armbruster, Project Manager
250 North Fifth Street
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 90 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:

None

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

None

3.3.13 Project Newsletters: A newsletter for the Project will be prepared and distributed by the City. It will include general information about the Project including interruptions in utility services, street closures, parking restrictions, project schedule, and the names and telephone numbers of the contacts for the City and Contractor. The newsletter will be mailed approximately one week before the Contractor commences work.

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

3.3.17 Traffic Control: The Contractor shall provide and maintain traffic control in accordance with the approved Traffic Control Plan and the Manual on Uniform Traffic Control Devices. A Traffic Control Plan shall be prepared by the Contractor and reviewed by the City two days prior to the pre-construction meeting.

3.3.18 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.

3.3.19 Quality Control Testing: Supplier shall perform quality control testing on concrete. The City will perform all other necessary QA/QC.

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

- Traffic Control Plans
- Project Schedule

3.3.21 Uranium Mill Tailings: It is anticipated that radioactive mill tailings will not be encountered on this Project.

3.3.22 Fugitive Petroleum or Other Contamination: It is anticipated that soil contamination from fugitive petroleum or other contaminants will not be encountered with the Project.

3.3.23 Excess Material: All excess materials shall be disposed in accordance with General Contract Condition Section 50.

3.3.24 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.

3.3.25 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.

3.3.26 Survey: The Contractor shall give the City survey crew a minimum of 72 hours' notice for all requested survey.

3.3.27 Work to be Performed by the City (Prior to Construction):

- Sign removal and relocation (if any)

3.3.28 Existing Concrete Sidewalks, Pans, Fillets, Curbs and Gutters: The existing sidewalks, pans, fillets, curb and gutter are in good serviceable condition. In most instances the installation of new sidewalk and pavement will be adjacent to existing concrete. The Contractor will need to protect all 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 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: 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:

STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION:

The ***City of Grand Junction Standard Specifications for Road and Bridge Construction*** are hereby modified or supplemented for this Project by the following modifications to ***The Standard Specifications for Road and Bridge Construction***, State Department of Highways, Division of Highways, State of Colorado:

SP-1 SECTION 211 – DEWATERING

Section 211 of the Standard Specifications is hereby added for this project as follows:

Structure and Riprap Dewatering. The contractor shall be responsible for all dewatering on the project. It is anticipated that substantial dewater will be required on this project. The dewatering processes shall follow these specifications:

Prior to the preconstruction conference the Contractor shall submit their dewatering plan to the Engineer and Owner to communicate the Contractors intent in regard to dewatering to achieve the required performance contained in these specifications. *Submittal of a dewatering plan shall not be interpreted as an acceptance or approval by the Owner or Engineer of the Contractor's dewatering plan.* ***The dewatering plan shall include at a minimum:***

1. Major components of the dewatering system including size, location, spacing and details of major dewatering features the Contractor anticipates utilizing.
2. Contingency plans for equipment or power failure.
3. Procedures for verification that water levels have been lowered to the specified levels prior to trench or structure excavation and installation.
4. Location of dewatering disposal or discharge locations and the capacity to accept dewatering discharge. Provide a contingency plan for higher than anticipated flows

when capacity of planned discharge and disposal locations may conceivably be exceeded.
5. Location and details of Best Management Practices (BMP's)
6. Agreements with entities accepting discharges
7. All permits obtained by the Contractor including any permit conditions and approvals for the discharge of water generated during the execution of the Work.
8. Other permits required for construction or operation of the dewatering system including the drilling of wells, temporary power drops, etc.

Structure dewatering construction requirements:

1. The construction dewatering permit and water quality shall conform Section 7 of the General Contract Conditions of the City of Grand Junction.
2. Dewatering discharge to or across adjacent canals, drains, right-of-way, and private property outside of the designated limits of construction shall not be allowed unless the Contractor has obtained written approval from agency or property owner having jurisdiction. Provide Agreements with dewatering plan submittal as described above
3. Furnish, install and prepare for operation, all necessary machinery, appliances and equipment to maintain all structure excavations free from water during construction.
4. Contractor shall provide temporary power sources for all dewatering equipment that requires a power source.
5. Dewater and dispose of water in such a manner that it does not cause injury to public or private property, or to cause a nuisance or a menace to the general public.
6. The Contractor will be responsible for devising a system to achieve the required level of dewatering. It is anticipated that this system may incorporate wells, well points, interception trenches, sumps, etc. In addition, design and provide dewatering conveyance system to an approved disposal location. The Contractor shall submit details of this plan as described above.
7. Draw and maintain static water level to at least three feet (3') below the bottom of the excavation prior to excavating below the water table to maintain the undisturbed state of the foundation soils and allow placement of bedding material and backfill to the required density.
8. Remove all groundwater, seepage, stormwater and other water that accumulates in the excavation during construction. All structure excavations shall be kept free of water during construction or until otherwise requested by the Contractor and approved by the Engineer.
9. Prevent softening of the bottom of excavations and the formation of "quick" conditions or "boils" during excavation. The occurrence of such conditions will require over-excavation and subsequent backfilling of soils meeting the requirements of the CDOT Specifications at no additional cost to the Owner.
10. Additional cost for trench bottom stabilization resulting from inadequate dewatering and non-compliance with the performance specifications included herein, as determined by the Engineer, will be incidental to the work.
11. Compact native soil at the bottom of the excavation prior to placing bedding in accordance with the CDOT specifications and of these specifications.
12. Control surface runoff to prevent entry or collection of water in excavations.
13. Install and operate a dewatering system so that adjacent structures or property are not endangered by the reduction in the groundwater level.

14. Monitor discharge from dewatering operations for changes in visual or odor components indicating the presence of contaminants including, but not limited to, gasoline and pesticides and other hazardous materials and toxins.
15. Cease dewatering operations and notify Engineer and regulatory agencies immediately upon observation of conditions that may indicate the presence of hazardous contaminants in the dewatering discharge or excavation.

Observation Requirements:

1. Contractor's superintendent shall routinely observe conditions in excavations where dewatering is being performed on a daily basis to verify performance requirements are being met and that conditions in the excavation are in accordance with the Contract Documents.
2. Notify Engineer of any observations that may jeopardize the Work or is not in accordance with the Contract Documents.
3. Prior to advancing the structure excavation below the pre-construction groundwater level, the Contractor shall excavate a test pit or install another form of groundwater measurement. Water levels in the test pit shall be measured and recorded and the information provided to the Engineer. Measured water levels must show that the groundwater has been lowered to the minimum level stated herein. If monitoring shows that the specified level of dewatering has not been achieved, cease construction of the affected work and continue dewatering or modify dewatering activities until the specified level of dewatering is achieved at no additional cost to the Owner.

Dewatering Discharge:

1. Comply with all State & Federal requirements
2. Water quality shall conform to Section 7 of the General Contract Conditions of the City of Grand Junction
3. Work required to comply with water quality and permit requirements are considered incidental and additional payment will not be made for this Work.

Termination:

1. Allow groundwater to return to static level after excavations are backfilled as necessary to prevent floatation of constructed improvements.
2. Prevent disturbance of the compacted backfill and prevent flotation or movement of installed structure.
3. Remove or abandon all temporary improvements associated with the dewatering system in accordance with these specifications and any applicable state and federal rules and regulations.
4. Provide surface restoration as required to repair/replace any surface impacted by dewatering activities to a condition as good or better than preconstruction conditions at no additional cost to the Owner. Surface rehabilitation performed as a result of dewatering activities is considered incidental and no additional payment will be made.
5. Comply with any dewatering termination requirements of any State and Federal permits.

Measurement and Payment

PAY ITEM	PAY UNIT
Dewatering	Lump Sum

SP-2 SECTION 304 – AGGREGATE BASE COURSE

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

Subsection 304.01 shall include the following:

In areas of asphalt overlay where there is no curb and gutter and/or a drainage pan, the Contractor shall backfill the shoulder with Class-6 Aggregate Base Course immediately following the overlay. The shoulder shall have a slope of 12:1 or flatter and shall extend a maximum 4' from the edge of asphalt. The aggregate base course shall be brought level to the new pavement surface and compacted. An exception to this will be made in areas where shoulder material would extend into existing yards or landscaping adjacent to the roadway. In these locations, it will be necessary to provide materials that match the existing landscape.

SP-3 SECTION 401 – PLANT MIX PAVEMENTS - GENERAL

REVISION OF SECTION 401
PLANT MIX PAVEMENTS

Section 401 of the Standard Specifications are hereby revised for this project as follows:

401.01 Description.

Add the following:

This work **shall** consist of providing a Hot Mix Asphalt (HMA) to be placed as shown on the plans, or as directed by the Owner. The Contractor shall be responsible for Process Control (PC) of the HMA; including the design, and control of the quality of the material incorporated into the project.

401.02 Composition of Mixtures.

Delete subparagraph (a) *Mix Design* and replace with the following:

A Job Mix Formula (JMF) design shall be submitted for each mixture required, at least 10 calendar days prior to placing any mix on the project, for acceptance by the Owner. JMF's previously approved by CDOT within the past six months may be utilized. The JMF design shall be determined using AASHTO T-312 or CP-L 5115 for the Method of Mixture Design. Grading ST, SX, and S shall be designed using 100mm molds. The job mix gradation shall be wholly within the Master Range Table in subsection 703.04 before the tolerances shown in Section 401 are applied.

Designs shall be developed and performed in a materials laboratory that meets the requirements set forth by AASHTO Materials Reference Laboratory (AMRL) for all testing procedures. The design shall be stamped and signed by a Professional Engineer licensed in the State of Colorado. In

addition, the Contractor shall submit, as part of the mixture design, laboratory data documents to verify the following:

- Gradation, specific gravity, source and description of individual aggregate and properties, and the final blend.
- Aggregate physical properties.
- Source and Grade of the Performance Graded Binder.
- Proposed Design Job Mix: aggregate and additive blending, final gradation, optimum binder content.
- Mixing and compaction temperatures used.
- Mixture properties shall be determined with a minimum of four binder contents.

The JMF for each mixture shall establish a single percentage of aggregate passing each required sieve size, a single percentage of asphalt cement to be added to the aggregate, and a single temperature for the mixture at the discharge point of the plant.

The Owner reserves the right to verify the asphalt supplier's mix design for each JMF design utilizing materials produced and stockpiled. The asphalt supplier shall provide, at no cost, a sufficient quantity of each aggregate, mineral filler, Recycled Asphalt Pavement (RAP), and additive for the required laboratory tests, as well as all Certificates of Conformance/ Compliance at any time on any material used. The Asphalt Supplier shall provide copies of quality control testing results during the production of HMA used within one business day from the sampling date.

Mixture design of HMA shall meet the requirements of Table 403-1 and Table 403-2 in the Revision to Section 403. For mixes requiring a design gyration of 100 (ESALs greater than 3 million) the Project Special Conditions should be used. This gyration is not recommended for the majority of roads within Mesa County.

Delete subparagraph *(b) Mixtures Furnished to the Project* and replace with the following:

Production verification shall occur prior to, or during, the start of the project. Volumetric properties of the mix shall be verified by LabCAT Level C Certified Technicians. If the mix was produced for another project within the last 90 days, data from that project can be submitted for verification. All mixtures furnished for the project shall conform within the ranges of tolerance listed in Table 401.02A. The mix verification test reports shall be submitted to the Owner prior to mix placement.

TABLE
401.02A
Production Mix
Tolerances

Property	Tolerance
Asphalt Cement Content	± 0.3%
VMA	± 1.2%
Air Voids	± 1.2%

Verification testing for binder content, gradation and physical properties shall be performed at the frequencies listed in Table 401.23-1.

There shall be no substitutions of materials allowed during production, unless approved in advance by the Owner. All substitutions will require checkpoint verification. If the checkpoint differs from the Job Mix Formula (JMF), a new mix design will be required. Upon request of the Owner, the binder grade may be changed by one available binder grade level without requiring a new mix design.

Should a change in the source of any material used in the production of HMA (aggregate, mineral filler, lime, or performance graded asphalt binder) occur, a one point verification test (at optimum binder content) of the mix must be performed to verify that the applicable criteria shown on Table 403-1 (HMA) and Table 403-2 (VMA) of Revision to Section 403 are still met. If this testing shows noncompliance, the Contractor shall establish a new job mix design and obtain approval by the Owner before the new HMA is used.

Add the following new subparagraphs:

(c) *Reclaimed Asphalt Pavement (RAP).* RAP shall be allowed in HMA up to a maximum binder replacement of 23 percent, unless otherwise specified in the contract, and provided that all the specifications for the HMA are met. Fine Aggregate Angularity requirements shall apply only to the virgin fraction of the fine aggregate. RAP shall be of uniform quality and gradation with a maximum size no greater than the nominal aggregate size of the mix. RAP shall not contain clay balls, vegetable matter, or other deleterious substances.

The Contractor shall have an approved mix design for the amount of RAP to be used. The AC content of the RAP utilized in the Contractor RAP mix design shall be the average AC content determined in accordance with 1B or 1C, below, or alternatively, a minimum of five samples of the Contractors RAP stockpile may be sampled and the average AC content of the RAP be determined using AASHTO T-164, Method A or B, or in accordance with 1C below. The Contractor shall determine the total binder replaced by the binder in the RAP pursuant to the following equation:

Total Binder Replaced = (A x B) x 100/E
Where:

A = RAP % Binder Content *
B = RAP % in Mix *
E = Total Effective Binder Content *
* in decimal format (i.e. 2% is 0.02)

The Total Binder Replaced by the binder in the RAP shall not exceed 23 percent of the effective binder content of either the mix design or the produced mix.
The Contractor shall have an approved Quality Control (QC) Plan that details how the RAP will be processed and controlled. The QC plan shall address the following:

1. RAP Processing Techniques. This requires a schematic diagram and narrative that explains the processing (crushing, screening, and rejecting) and stockpile operation for this specific project.

2. Control of RAP Asphalt Binder Content (AASHTO T-164, Method A or B). RAP Asphalt Binder Content may also be determined in accordance with CP-L 5120, provided an RAP AC content correction factor is determined through correlation testing with AASHTO T-

164, Method A or B. The correction factor shall be determined by performing correlation testing on the first five samples of the RAP AC content, then at a frequency of one for every five AC content tests thereafter. The correction factor shall be determined by calculating the average difference in AC content between CP-L 5120 and AASHTO T-164, Method A or B, and applying the correction to the AC content determined in accordance with CP-L 5120 :

Frequency: 1 per 1000 tons of processed RAP material (minimum five tests)

3. (Alternate) The Contractor may propose a RAP asphalt content correction factor to be used in conjunction with CP-L 5120. The proposed CP-L 5120 RAP asphalt content correction factor shall be used with all RAP asphalt contents tested for the mixture design and quality control sampling and testing. The methodology of the proposed CP-L 5120 RAP asphalt content correction factor shall be outlined in detail in the approved RAP QC Plan. At a minimum, the proposed CP-L 5120 correction factor shall identify the principal source locations of the RAP aggregate, gradation of the material tested, and specific ignition oven serial number used in all the RAP asphalt content testing. The RAP source locations, material gradation, and specific equipment used shall substantiate the CP-L 5120 asphalt content correction factor used for the testing. The substantiation must be from data gathered from historical information or specific asphalt content correction data obtained from tests performed on similar virgin aggregate sources, virgin material gradations, and the specific equipment used.

4. Control of RAP Gradation (CP31 or AASHTO T-30):
   Frequency: 1 per1000 tons of processed RAP material (minimum three tests, sampling from belt feed and not stockpile).

5. Process Control Charts shall be maintained for binder content and each screen listed in Table 401.2C, during addition of any RAP material to the stockpile. The Contractor shall maintain separate control charts for each RAP stockpile. The control charts shall be displayed and shall be made available, along with RAP AC extraction testing laboratory reports to the Engineer upon request.

The processed RAP must be 100 percent passing the 31.5 mm (1¼ inch) sieve. The aggregate obtained from the processed RAP shall be 100 percent passing the 25.0 mm (1 inch) sieve. The aggregate and binder obtained from the processed RAP shall be uniform in all the measured parameters in accordance with the following:

Table 401.2C
RAP Binder & Aggregate Uniformity Tolerances

Element	StandardDeviation
Binder Content	0.5
% Passing ¾"	4.0
% Passing ½"	4.0
% Passing 3/8"	4.0
%Passing #4	4.0
% Passing #8	4.0
% Passing #30	3.0
% Passing #200	1.5

(d) *Warm Mix Asphalt (WMA) Technology.* The Contractor may choose to use a WMA Technology that is included on the CDOT approved products list (https://www.codot.gov/business/apl/asphalt-warm-mix.html).

WMA technologies (additive or foaming) used shall be identified on the mix design, indicating usage as a workability additive and/or anti-strip additive. WMA shall be submitted and approved by the Owner for use on a project.

The addition of WMA additives during production, including foaming, shall be controlled by a calibrated metering system interlocked with the plant's controls per the manufacturers' recommendation. Additives may be added at the asphalt terminal at the dosage rate recommended by the WMA technology provider. The foaming process mixes water and binder to create microscopic steam bubbles. Typical water injection rate is ≤ 2% of binder flow rate or per manufacturers' recommendation.

(e) *Anti-Strip Additives.* Anti-Strip shall be added into the HMA. Anti-Strip agents may be liquids (added to the binder), lime (added to the aggregates) or other products, and shall be submitted for approval by the Owner.

The minimum value for Tensile Strength Ratio (TSR) tested in accordance with Table 401.21-1 shall be 80% for the mix design and 70% during production.

There are various types of liquid Anti-Strips. Amine and Organo-silane type liquid Anti-Strip additives are physically mixed with the asphalt binder. Liquid Anti-Strip agents shall be added per the manufacture's recommendations. Typical product dosages are provided in Table 401.2E-1.

TABLE 401.2E-1
Liquid Anti-Strip Dosage Rates

Type	Typical Dosage Rate
Amine	0.4% to 0.8%
Organo-silane	0.05% to 0.15%

WMA chemical products which display Anti-Stripping characteristics will be classified, and identified on the mix design, as a liquid Anti-Strip additive.

When a liquid Anti-Strip additive is used, the Contractor shall include the following information with the mix design submission:

- Information on the type of liquid Anti-Strip additive to be supplied, including product name, product manufacturer/supplier
- Additive rate
- TSR values for the treated mixes
- The proposed method for incorporating the additive into the plant produced mix

401.03 Aggregates.

Add the following:

The percentage of fractured faces shall be as shown in Table 403.1 of the Revision to Section 403.

Grading ST (3/8" nominal) mixes may be used for leveling, maintenance, bike paths, sidewalks and thin lift overlays. Grading SX (1/2" nominal) mixes shall be used on top and bottom lifts and for patching. Grading S (3/4" nominal) mixes may be used for bottom lifts.

401.05 Hydrated Lime.

Add the following:

When used in the HMA, hydrated lime shall be added at the rate of 1% by dry weight of the aggregate and shall be included in the amount of material passing the No. 200 sieve.

401.06 Asphalt Cement.

Revise the second paragraph to read as follows:

The asphalt cement shall meet the applicable requirements of subsection 702.01.

Add the following:

The Contractor shall provide to the Owner acceptable 'Certifications of Compliance' of each applicable asphalt binder grade from the supplier. Should testing or certificate show nonconformance with the specifications, the asphalt binder may be rejected. When production begins, the Contractor shall, upon request, provide to the Owner a one quart can of each specified asphalt binder for analysis. Additionally, the Contractor shall provide the refinery test results that pertain to the asphalt binders used during production.

Based on climatic conditions and reliability, binder grades approved for use in Mesa County are as follows in Table 401.06A-1:

TABLE
401.06A-1
Recommended Performance Graded Binders

Condition	Non-modified Binder	Modified Binder
Free flowing traffic loads and 300,000 to 1 million 18K ESAL	PG 64-22	
Free flowing traffic loads and 300,000 to 1 million 18K ESAL, plus above 6000 elevation	PG 58-28	
Slow moving or standing trucks, major street intersections and/or 10,000,000 18K ESAL		PG 76-28 (top lift only)

Binder grades other than those shown above shall not be used unless the proposed binder and the mix design are approved in writing by the OWNER. The asphalt cement shall meet the requirements of subsection 702.01

401.07 Weather Limitations and Placement Temperatures.

Revise as follows:

Surface temperatures shall be used to determine placement of APM. APM produced with documented WMA will be allowed a reduction in minimum surface temperatures for placement as provided in Table 401.07A-1. Ambient temperatures and other weather conditions shall be considered prior to placement.

TABLE 401.07A-1
Minimum Surface Temperatures for placement of APM

Compacted Layer Thickness (in.)	Minimum Surface Temperature (°F)			
	Top Layer		Layers Below the Top Layer	
Product	APM	with WMA	APM	with WMA
<1½	60	50	50	40
1½ - <3	50	45	40	35
3 or more	45	40	35	35

If the Contractor modifies the placement and compaction processes when ambient temperatures are below minimum surface temperatures in Table 401.07A-1, they shall demonstrate to the Owner the required in-place density has been achieved. APM cooling software such as PaveCool, or MultiCool can be used to determine placement and compaction times available.

401.08 Asphalt Mixing Plant.

Delete the last paragraph of the subsection.

401.09 Hauling Equipment.

Add the following:

The Owner may reject any HMA which demonstrates it has been contaminated from a petroleum distillate release agent. The Owner may reject any uncovered HMA which demonstrates it has been impacted by contamination and/or weather.

401.10 Asphalt Pavers.

Delete the twelve paragraph and replace with the following:

Contractor shall submit for and receive approval of the screed control devices to be utilized on the paver prior to use for placing HMA on the project.

Add the following:

A Material Transfer Vehicle (MTV) or Material Transfer Device (MTD) may be required for placement of the HMA when specified in the contract documents. The MTV shall be a self-propelled unit with on board storage of material. An MTD is a non-self-propelled unit. Both MTV and MTD are capable of receiving material from trucks or from the ground, transferring the material from the unit to a paver hopper insert via a conveyor system.

401.11 Tack Coat.

Delete and replace with the following:

A tack coat shall be applied between pavement course and to all existing concrete and asphalt surfaces per Section 407. Tack coat is considered incidental to the cost of the HMA.

401.15 Mixing.

Add the following:

If a WMA technology (additive or foaming) is used, the discharge temperatures may be lowered during production at the discretion of the Contractor provided all specifications are achieved. Mix design is to indicate revised allowable discharge temperatures with WMA usage.

401.16 Spreading and Finishing.

Revise as follows:

Joints in the top layer of new pavement shall be located on lane lines unless otherwise shown on the plans. Longitudinal joints shall be minimized with wide paving pulls. Transverse joints shall be formed by cutting back on the previous run to expose the full depth of the course. Tack coat material shall be applied to contact surfaces of all joints before additional mixture is placed against the previously compacted material.

401.17 Compaction.

Revise as follows:

Equipment used for compaction of the HMA will be at the discretion of the Contractor. The number, weight, and type of rollers furnished shall be sufficient to obtain the required density and surface texture.

All joints shall be compacted to 92% of maximum theoretical specific gravity (Rice), taken six inches offset from the joint. The allowable variance shall be ±2%. Joint density will be determined using nuclear density equipment.

Delete paragraphs six through eight, and paragraphs eleven to the end of the subsection and replace with the following:

Cores may be used to verify compaction results. The Contractor shall core the pavement, as required by the Owner; in accordance with AASHTO T 230, Method B, or for field calibration of nuclear

density equipment in accordance with the ASTM D 2950. At a minimum, cores for nuclear density equipment correlation shall be taken at the beginning of placement of each project or change of mixture materials or gradation, unless otherwise approved by the Engineer. If the correlation cores were produced for another project within the last 90 days, data from that project can be submitted for verification, if no change in materials or gradation has occurred. When cores are used, the Contractor shall provide all labor and equipment for the coring and repair of the holes.

Along forms, curbs, headers, walls, and all other places not accessible to the rollers, the mixture shall meet all project compaction specifications. Any mixture that is defective, shall be corrected to meet the project specifications at the expense of the Contractor.

401.20 Surface Smoothness.

Delete and replace with the following:

The finish transverse and longitudinal surface elevation of the pavement shall be measured using a 10-foot straightedge. Surface smoothness shall be verified following the finish roller pass. Surface variation shall not exceed 3/16 inch in 10 feet for full lane width paving. For patching, the variation shall not exceed 3/8 inch in 10 feet. The final pavement surface shall not vary from the specified cross section by more than one inch at any point. Transverse measurements for variations shall exclude breaks in the crown sections. If the surface tolerance exceeds 3/16" across transverse joints, measured in at least three locations, the Contractor shall make corrections to the joint before proceeding. All corrections shall be made at the Contractor's expense.

The final surface pavement adjacent to curb and gutter shall be finished from 1/8-inch to 3/8- inches above the lip for catch curb and shall not extend above the lip for spill curb.

The Contractor shall adjust all manholes, valve boxes, and survey range boxes 1/8 to 1/4- inch below final grade and adjusted to match the slope of the roadway. Valve boxes and manholes are to be maintained fully accessible at all times for emergency and maintenance operations. The cost of adjusting valve boxes, manholes, and survey range boxes shall be included in the work, unless otherwise specified. The Contractor shall be responsible for any cost incurred by the Owner to provide access to the covered manholes or valve boxes. Final adjustment of all utility access points shall be completed within seven days of from the time the HMA was placed.

Add the following new subsections:

401.23 Testing and Inspection

The Contractor shall assume full responsibility for controlling all operations and processes to meet the Specifications. The Contractor shall perform all tests necessary for process control purposes on all elements at the frequency listed in Table 401.23-1. The Contractor shall maintain a log of all process control testing. Test results that have sampling or testing errors shall not be used. Process control testing shall be performed at the expense of the Contractor.

Laboratories shall be accredited by AASHTO Materials Reference Laboratory (AMRL) for the tests being performed. Technicians obtaining samples and conducting compaction tests must have a LabCAT Level A certification. Technicians conducting tests of asphalt content and gradation must have a LabCAT Level B certification. Technicians performing volumetric testing must have a LabCAT Level C certification. Equivalent NICET certification for all technicians is acceptable.

When requested by the Owner, the Contractor shall submit a quality control plan that addresses production, sampling, testing, and qualifications of testing personnel, timing, and methods for making adjustments to meet the specifications. The Contractor will provide a process or schedule for making corrections for material that was placed but does not meet specifications as well as obtain a follow up sample immediately after corrective actions are taken to assess the adequacy of the corrections. In the event the follow-up process control sample also fails to meet Specification requirements; the Contractor shall cease production of the asphalt mixture until the problem is adequately resolved to the satisfaction of the Owner.

TABLE
401.23-1
Minimum Materials Sampling and Testing for Process Control and Owners Acceptance

Test	Standard	Minimum Frequency
Sampling	AASHTO T168, ASTM D 979 and ASTM D3665, CP 41	1/1000 tons or fraction thereof (not less than one test per day)
In-Place Density	AASHTO T 166, T 238, T 230, CP 81 (nuclear), CP 44 (coring)	One test for each 250 lineal feet per lane and one test per 1,000 lineal feet of joint per lift
Thickness (Core) (when called for in Project specs.)	ASTM D3549	One test for each 1000 lineal feet per lane
Air Voids & VMA	CP-L 5115 A.I. SP-2	1/1000 tons or fraction thereof (not less than one test per day)
Gradation	AASHTO T 27/T 11, CP 31	1/1000 tons or fraction thereof (not less than one test per day)
Hveem/Marshall Stability As Applicable	CP-L 5016	One per project per mix used
Binder Content	CP-L 5120, AASHTO T 164 or other methods agreed upon between Owner and Contractor	1/1000 tons or fraction thereof (not less than one test per day)
Maximum Theoretical Specific Gravity (Rice)	AASHTO T 209 (Rice), CP-L 51	1/1000 tons or fraction thereof (not less than one test per day)
Lottman Stripping, TSR & Dry Density	CP-L 5109	One per project per mix used.

Field control testing of dense graded asphalt mixes for the above tests shall meet the requirements of Table 403-1 and Table 403-2 in the Revision to Section 403.

401.24 Acceptance

If any materials furnished, or work performed, fails to meet the specification requirements, such deficiencies shall be documented and reported to the Owner. Copies of all process control tests shall be delivered to the Owner within one business day. Test results that cannot be completed within one day shall be provided to the Owner no later than three days after the sample was obtained.

Owners Acceptance (OA) test results, if any, and/or Process Control (PC) test results will be evaluated to determine acceptability. If the Contractor does not meet the project specifications, but acceptable work has been produced, the Owner shall determine the extent of the work to be accepted. If the Owner determines the work is not acceptable, the Contractor shall correct the work, as approved by the Owner, at the expense of the Contractor.

SP-4 SECTION 403 – HOT MIX ASPHALT

REVISION OF SECTION 403
HOT MIX ASPHALT

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

403.02 Materials

Delete and replace with the following:

The materials shall conform to the requirements of subsections 401.2 of the Revised Section 401 above.

The design mix for hot mix asphalt (HMA) shall conform to the following Table 403-1 and Table 403-2:

Table 403-1
Mixture Properties for Hot Mix Asphalt

Property	Test Method	Value
Air Voids, percent at: N (design)	AASHTO T-132, CPL 5115	3.0 – 4.0
Lab Compaction (Revolutions): N (design)	CPL 5115	75
Hveem Stability, (Grading ST, SX & S only)	CPL 5106	28 min.
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	CP 45	60% min.
Accelerated Moisture Susceptibility Tensile Strength Ratio (Lottman)(for S & SX mixes)	AASHTO T-283 Method B, CPL 5109 Method B	80 min.

Property	Test Method	Value
Minimum Dry Split Tensile Strength, kPa (psi)	CPL 5109 Method B	205 (30) min.
Voids in the Mineral Aggregate (VMA) % minimum	CP 48, AI-SP2	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.

Table 403-2
Minimum Voids in Mineral Aggregate (VMA)

Nominal Maximum Size*, mm (inches)		***Design Air Voids **	
	3.5%	4.0%	4.5%
37.5 (1½)	11.6	11.7	11.8
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

* 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.

403.03 Construction Requirements

Delete the first paragraph and replace with the following:

The construction requirements shall be as prescribed in subsections 401.3 through 401.14 of the Revised Section 401 above.

403.04 Method of Measurement

Delete and replace with the following:

Hot Mix Asphalt will be measured by the ton or the square yard. Batch weights will not be permitted as a method of measurement when measured by the ton. The tonnage shall be the weight used in the accepted pavement.

403.05 Basis of Payment

Delete and replace with the following:

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

Payment will be made under:

Pay Item	**Pay Unit**
Hot Mix Asphalt (Grading __)(PG___)	Ton
Hot Mix Asphalt (Grading __)(PG ___)	Square Yard
Hot Mix Asphalt (Patching)	Square Yard

Aggregate, asphalt cement, asphalt recycling agent, additives, hydrated lime, tack coat, and all other work necessary to complete each hot mix asphalt items will not be paid for separately but shall be included in the unit price bid.

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.

SP-5 SECTION 407 – PRIME COAT, TACK COAT, AND REJUVINATING AGENT

REVISION OF SECTION 407
PRIME COAT, TACK COAT, AND REJUVENATING AGENT

Section 407 of the Standard Specifications is hereby revised for this project as follows:

407.01 Description

Add the following:

Prior to placement of APM, a tack coat shall be applied to all existing concrete and asphalt surfaces.

407.02 Asphalt Material.

Add the following:

The tack coat shall meet the specification for emulsified asphalt, consisting of CSS-1h or SS-1h, and conform to AASHTO M208 or M140.

407.07 Application of Asphalt Material.

Add the following:

The tack coat shall be applied at the rates specified in Table 407-1. The surface receiving the tack coat shall be dry and clean, and dust, debris, and foreign matter shall be removed. Tack coat shall be applied uniformly. The Contractor shall allow the tack coat to cure (dehydrate) prior to the placement of APM. If the tack becomes contaminated during construction, it shall be cleaned, and if necessary, additional tack coat shall be reapplied and allowed to cure before paving resumes.

TABLE 407-1
Tack Coat Application
Rates

Pavement Condition	Application Rate (gal/yd^2)		
	Residual	Undiluted	Diluted (1:1)
New asphalt	0.03 - 0.04	0.05 – 0.07	0.10 – 0.13
Oxidized asphalt	0.04 – 0.06	0.07 – 0.10	0.13 – 0.20
Milled Surface (asphalt)	0.06 – 0.08	0.10 – 0.13	0.20 – 0.30
Milled Surface (PCC)	0.06 – 0.08	0.10 – 0.13	0.20 – 0.30
Portland Cement Concrete	0.04 – 0.06	0.07 – 0.10	0.13 – 0.20

407.09 Method of Measurement and Basis of Payment.

Delete and replace the following:

Tack Coat will not be measured and paid separately but shall be considered included in the work for Section 401 – Asphalt Pavement Materials.

SP-6 SECTION 601 – STRUCTURAL CONCRETE

REVISION OF SECTION 601
STRUCTURAL CONCRETE

Section 601 of the Standard Specifications is hereby revised for this project as follows:

Subsection 601.02, Classification:

CONCRETE SHALL MEET THE FOLLOWING REQUIREMENTS:

- 4,500 PSI Compressive at 28 Days
- 6% air ±1.5%
- Slump 4", Loads exceeding 4 ½" shall be rejected
- Maximum Water Cement Ratio no greater than 0.45.

Subsection 601.06, Batching:

The Contractor shall furnish a batch ticket (delivery ticket) with each load for all concrete.

Concrete delivered without a batch ticket containing complete information as specified shall be rejected. The Contractor shall collect and complete the batch ticket at the placement site and deliver all batch tickets to the Engineer or his representative at the end of each day. The Engineer or his representative shall have access to the batch tickets at any time during the placement. The following information shall be provided on each ticket:

1. Suppliers name and date
2. Truck number
3. Project name and location
4. Concrete class and designation number
5. Cubic yards batched
6. Type brand and amount of each admixture
7. Type, brand, and amount of cement and fly ash
8. Weights of fine and coarse aggregates
9. Moisture of fine and coarse aggregates
10. Gallons of batch water

The contractor shall add the following information to the batch ticket at time of placement:

1. Gallons of water added by the truck operator.
2. Number of revolutions of the drum for mixing
3. Discharge time

SP-7 UTILITIES

Known utilities within the limits of this project are:
Century Link – Underground Telephone and Underground Fiber Optic
Charter – Aerial Cable
Grand Valley Drainage District – Culvert
Grand Valley Power – Underground Electric
Grand Valley Power – Overhead Power
United Private Network – Aerial Fiber Optic
Ute Water – 8" PVC Water Line
Xcel Energy – Gas
Xcel Energy – Underground Electric
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:

Century Link – Protect Underground Telephone and Underground Fiber Optic in place
Charter – Protect Aerial Cable in place
Grand Valley Drainage District – Remove and replace existing Culvert per plans
Grand Valley Power – Protect Underground Electric in 6" conduit in place
Grand Valley Power – Protect Overhead Power in place
Unite Private Networks – Protect Aerial Fiber Optic in place
Ute Water – Protect 8" C900 Water Line in place if possible

Over 40 feet of active 8" water line may be difficult to support while installing the new culvert. The pipe should be continuously supported with a beam or pole along the length of the exposed pipeline and monitored for movement. Mechanical restraints may need to be added to the pipe joints exposed in the limits of the excavation. There is also the possibility of the fitting on the south side of the ditch being exposed within the limits of excavation. This fitting will have a thrust block that will need to be removed and replaced.

The Contractor may prefer to remove/replace this segment of pipeline from their excavation. Under this scenario, please plan on new C900 pipe, fitting(s), and couplings, mechanically disinfected, and reconstructed when fill for culvert is mostly completed.

Both above options will require the Contractor to provide temporary water service to the property at 798 21 ½ Road during construction. One option is to connect to the existing water service at 780 21 ½ Road, extend a 2-inch poly line north across Pritchard Wash, and connect to the 798 21 ½ Road meter. Ute Water will provide the parts required in the meter pits (all other materials to be provided by the Contractor). Ute Water staff can assist the Contractor with the installation of the temporary water service.

Xcel Energy – Protect 3" Gas line in place
Xcel Energy – Protect Underground Electric in 6" conduit in place
City of Grand Junction – Protect Sanitary Sewer in place

See Title Sheet of Construction Drawings for utility contact information.

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.

3.5. Attachments:

Appendix A: Project Submittal Form
Appendix B: Project Geotechnical Report
Appendix C: Construction Drawings

3.6. Contractor Bid Documents: For Contractor's convenience, the following is a list of forms/items to be submitted with the Contractor's bid response. However, should a form/item not be listed in this section, but required in the solicitation documents, it is the Contractor's responsibility to ensure all forms/items are submitted.

- **Contractor's Bid Form**
- **Price Bid Schedule**
- **References**

3.7. IFB TENTATIVE TIME SCHEDULE:

Invitation For Bids available	November 23, 2020
Mandatory Site Visit Meeting	December 4, 2020
Inquiry deadline, no questions after this date	December 10, 2020
Addendum Posted	December 14, 2020
Submittal deadline for proposals	December 17, 2020
City Council Approval	January 6, 2021
Notice of Award & Contract execution	January 7, 2021
Bonding & Insurance Cert due	January 14, 2021
Preconstruction meeting	January 14, 2021
Work begins no later than	Receipt of Notice to Proceed
Final Completion	90 Calendar Days from Notice to Proceed
Holidays:	January, 18, 2021 February 15, 2021

4. Contractor's Bid Form

Bid Date: _____

Project: IFB-4853-21-DH "GRJM 21.5-G.95 Culvert Replacement"

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. The Owner reserves the right to take into account any such discounts when determining the bid award.

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: GRJM-21.5-G.95 Culvert Replacement

Item No.	CDOT, City Ref.	Description	Quantity	Units	Unit Price	Total Price
1	108.2	60" Culvert (HDPE)	100.	Lin. Ft.	$ _____	$ _____
2	201-00000	Clearing and Grubbing	450.	Sq. Yd.	$ _____	$ _____
3	202-00220	Removal of Asphalt Mat	122.	Sq. Yd.	$ _____	$ _____
4	202	Removal of Existing Pipe (Size & type as shown on plans)	90.	Lin. Ft.	$ _____	$ _____
5	203-00000	Unclassified Excavation (Complete in Place)	Lump	Sum	- - -	$ _____
6	206-00065	Structural Backfill Material (Flow-fill, Complete in Place)	200.	Cubic Yd.	$ _____	$ _____
7	206-00100	Structural Backfill Material (Class 1, Complete in Place)	1,034.	Cubic Yd.	$ _____	$ _____
8	208-00070	Vehicle Track Pad	2.	Each	$ _____	$ _____
9	208-00011	Erosion Bales (Weed Free)	4.	Each	$ _____	$ _____
10	208-00045	Concrete Washout Structure	1.	Each	$ _____	$ _____
11	211-03005	Dewatering (To be used for Pritchard Wash Bypass if needed)	Lump	Sum	- - -	$ _____
12	212-00007	Seeding (Native) (Hydraulic)	450.	Sq. Yd.	$ _____	$ _____
13	304	Aggregate Base Course (Class 6) complete in place	56.	Cubic Yd.	$ _____	$ _____
14	403-34752	Hot Mix Asphalt (Patching) (Grading SX) (75)(PG 64-22) (4" Thick)	31.	Ton	$ _____	$ _____
15	420-00300	Geotextile (Mirafi 500x)	220.	Sq. Yd.	$ _____	$ _____
16	601	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 walls beneath 21.5 Road.) Work shall include Reinforcing Steel (Epoxy Coated), Structural Concrete Coating (Exterior of wall), and any necessary appurtenances to complete work.	15.	Cubic Yd.	$ _____	$ _____

Bid Schedule: GRJM-21.5-G.95 Culvert Replacement

Item No.	CDOT, City Ref.	Description	Quantity	Units	Unit Price	Total Price
17	606	Guardrail Type 3 (31 IN MGS). (Includes Installation)	37.5	Lin. Ft.	$ _____	$ _____
18	606	Transition Type 3J (31 IN MGS), R = 8'-6", 105° angle. (Includes Installation)	1.	Each	$ _____	$ _____
19	606	Transition Type 3J (31 IN MGS), R = 8'-6", 75° angle. (Includes Installation)	1.	Each	$ _____	$ _____
20	606	End Anchorage Type 3K (Includes Installation)	1.	Each	$ _____	$ _____
21	620-00020	Sanitary Facility	1.	Each	$ _____	$ _____
22	625-00000	Construction Surveying	Lump	Sum	---	$ _____
23	626-00000	Mobilization	Lump	Sum	---	$ _____
24	630	Traffic Control (Complete in Place, Road Closure)	Lump	Sum	---	$ _____
25	700-70170	F/A Pothole Utilities	---	---	---	$ 6,000.00
MCR		Minor Contract Revisions	---	---	---	$ 25,000.00
				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: **GRJM 21.5-G.95 Culvert Replacement**

CONTRACTOR:

PROJECT ENGINEER: Kirsten Armbruster

Description	Date Received	Resubmittal Requested	Resubmittal Received	Date Accepted
CULVERT CONSTRUCTION				
Base course gradation, Proctor curves (Str Bkfl Cl 1)				
Geotextile cut sheet				
Concrete Mix Design				
Rebar Shop Drawings				
Base course gradation, Proctor curves (ABC Cl 6)				
Asphalt Mix Design				
60-inch HDPE pipe cut sheet				
EROSION CONTROL / STORMWATER MANAGEMENT				
Vehicle Tracking Pad				
Concrete Washout				
PERMITS, PLANS, OTHER				
Construction Schedule				
Dewatering Plan				
Traffic Control Plan				

APPENDIX B
Geotechnical Investigations

Huddleston-Berry
Engineering & Testing, LLC

GEOLOGIC HAZARDS AND GEOTECHNICAL INVESTIGATION 21.5-G.95 BRIDGE OVER PRITCHARD WASH GRAND JUNCTION, COLORADO PROJECT#00208-0110

CITY OF GRAND JUNCTION
333 WEST AVENUE, BLDG C
GRAND JUNCTION, COLORADO 81501

FEBRUARY 5, 2020

Huddleston-Berry Engineering and Testing, LLC
2789 Riverside Parkway
Grand Junction, Colorado 81501

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

A geologic hazards and geotechnical investigation was conducted for the 21.5-G.95 Bridge over Pritchard wash 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, subgrade preparation, 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 two borings, drilled on December 13th, 2019. The locations of the borings are shown on Figure 2 – Site Plan. The borings generally encountered pavements above native lean clay to fat clay soils. Groundwater was encountered in the borings at depths of between 17.0 and 18.0 feet at the time of the investigation.

Geologic Hazards (p. 3)

The primary geologic hazard at the site is the presence of moisture sensitive soils. However, flooding of Pritchard wash could also impact the site.

Summary of Recommendations

- *Recommended Subgrade Below Pipe* – Minimum 24-inches of structural fill. (p. 4)
- *Recommended Foundations for Headwalls/Wingwalls*– Shallow Foundations above structural fill. (p. 4)
- *Nominal Bearing Resistance at Strength Limit State* – q_{ult} = 450*Effective footing width + 3175 psf. (p. 4)
- *Reduction Factor* – 0.45. (p. 4)
- *Nominal Bearing Resistance at Service Limit State* – See Appendix D.

Other Foundation Criteria

- *Seismic Site Class* – Site Class D (p. 5)

Summary of Pavement Recommendations (p. 6)

It is recommended that new pavements match the existing pavement section of 4.0-inches of asphalt pavement above 14.0-inches of CDOT Class 6 base course.

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FIGURES

APPENDICES

1.0 INTRODUCTION

As part of extensive infrastructure improvements in Western Colorado, the City of Grand Junction proposes to replace the 21.5-G.95 Bridge over Pritchard Wash. 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 21.5-G.95 Bridge over Pritchard Wash 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 samples and conducting laboratory testing to determine the engineering properties of the soils at the site.
- Providing recommendations for foundation type and subgrade preparation.
- Providing recommendations for bearing capacity.
- Providing recommendations for lateral earth pressure.
- 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 and Description

The site is located on 21½ Road, south of H Road in Grand Junction. The project location is shown on Figure 1 – Site Location Map.

At the time of the investigation, 21½ Road consisted of one lane in each direction. The roadway grade was fairly flat. The predominant land use in the vicinity of the bridge was commercial/industrial.

1.3 Proposed Construction

The proposed construction is anticipated to include replacement of the existing 60-inch CMP culvert with a new 60-inch HDPE pipe or larger RCP culvert.

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 soils at the site consist of Sagers silty clay loam, saline, 0 to 2 percent slopes. Soil survey data is included in Appendix A.

Road construction in the site soils is described as being very limited due to low strength, frost action, and/or shrink/swell. Excavation in the site soils is described as being somewhat limited due to dust and/or unstable excavation walls. The site soils are indicated to have a moderate potential for frost action, high risk of corrosion of uncoated steel, and high risk of corrosion of concrete.

2.2 Geology

According to the *Geologic Map of the Colorado National Monument and Adjacent Areas, Mesa County, Colorado* (2001), the site is underlain by sheetwash deposits.

2.3 Groundwater

Groundwater was encountered in the subsurface at depths of between 17.0 and 18.0 feet at the time of the investigation.

3.0 SUBSURFACE INVESTIGATION

The subsurface investigation was conducted on December 13th, 2019 and consisted of two borings. Borings B-1 and B-2 were drilled to depths of 20.5 and 21.0 feet below the existing ground surface, respectively. The locations of the borings are shown on Figure 2 – Site Plan. The borings were located in the field relative to existing site features. Typed boring logs are included in Appendix B. Samples of the native soils were collected during Standard Penetration Testing (SPT) and using bulk sampling methods at the locations shown on the logs.

As indicated on the logs, the subsurface conditions at the site were slightly variable. However, the borings generally encountered 4.0-inches of asphalt pavement above granular base course to depths of between 1.5 and 2.0 feet. Below the base course, tan to brown, moist to wet, soft to very stiff lean clay soils with fat clay layers was encountered. The clays extended to the bottom of B-1. In B-2, the clays extended to a depth of 20.0 feet and were underlain by brown, wet, dense sandy gravel to the bottom of the boring. As discussed previously, groundwater was encountered in the borings at depths of between 17.0 and 18.0 feet at the time of the investigation.

4.0 LABORATORY TESTING

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

The laboratory testing results indicate that the native clay soils are slightly to highly plastic. In addition, the CBR results indicate that the native clay soils may expand as much as 2.4% when compacted and introduced to excess moisture. Water soluble sulfates were detected in the site soils in a concentration of 0.02%.

5.0 GEOLOGIC INTERPRETATION

5.1 Geologic Hazards

The primary geologic hazard at the site is the presence of moisture sensitive soils. However, flooding of Pritchard wash could also impact the site.

5.2 Geologic Constraints

The primary geologic constraint to construction is the presence of surface water and groundwater associated with Pritchard wash. In addition, soft soil conditions associated with the surface and/or ground water may impact the construction. However, the presence of moisture sensitive soils may also impact the construction.

5.3 Water Resources

The primary water feature in the area is Pritchard wash.

5.4 Mineral Resources

No significant mineral resources were identified in the project area. Potential mineral resources in Western Colorado generally include gravel, uranium ore, and commercial rock products such as flagstone. As discussed previously, gravels were encountered in B-2. However, the gravels were deep. In general, HBET does not believe that any commercial quality mineral deposits exist at this site.

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 at the site. However, the presence of surface water, groundwater, soft soils, and/or moisture sensitive soils may impact the design and construction.

7.0 RECOMMENDATIONS

7.1 Subgrade Preparation

As discussed previously, a new pipe culvert is proposed to carry Pritchard wash under 21½ Road. Based upon information provided to HBET, the base of the existing pipe is approximately 14 feet below the roadway elevation. As indicated in the boring logs, medium stiff clay soils are present in the subsurface at this elevation. In order to provide uniform support to the new pipe and overlying roadway, it is recommended that the culvert be constructed above a minimum of 24-inches of structural fill.

In general, due to their plasticity, the native clay soils are not suitable for reuse as structural fill. Imported structural fill should consist of a granular, non-expansive, non-free draining material such as crusher fines, pit-run, or CDOT Class 6 base course. However, if pit-run is used for structural fill, a minimum of six inches of crusher fines or Class 6 base course should be placed on top of the pit run to prevent large point stresses on the bottoms of the footings due to large particles in the pit-run. ***In addition, HBET should be provided the opportunity to review all proposed structural fill materials prior to their use***.

Prior to placement of structural fill, it is recommended that the bottom of the foundation excavation be scarified to a depth of 6 to 8 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, due to the presence of surface water and/or groundwater, soft soil conditions may be encountered and compaction of the subgrade may be difficult. It may be necessary to utilize geotextile and/or geogrid in conjunction with up to 24-inches of additional 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 excavation.

HBET recommends that structural fill and any required stabilization extend to the edges of the 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 D1557C, respectively. Pit-run materials should be proofrolled to the Engineer's satisfaction.

7.1 Headwall/Wingwall Foundations

For subgrade preparation as recommended above and structural fill consisting of imported granular materials, a nominal bearing resistance for the strength limit state of q_{ult} = 450*Effective footing width + 3175 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 Earth Pressures

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

Native Lean Clay Soils

- $K_a = 0.39$
- $K_p = 2.56$

Class 1 Structural Backfill

- $K_a = 0.33$
- $K_p = 3.00$

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 21½ Road.

7.3 Corrosion of Steel and Concrete

Based upon information provided in the USDA NRCS Web Soil Survey, the soils at the site have a high risk of corrosion of uncoated steel. Therefore, it is recommended that corrosion be considered in the design of any steel structural elements or utilities.

With regard to soil corrosivity to concrete, as discussed previously, water soluble sulfates were detected in the site soils in a concentration of 0.02%. This concentration represents a negligible degree of potential sulfate attack on concrete exposed to the native soils. However, the Soil Survey data suggests that the native soils have a high risk of corrosion of concrete. Therefore, at a minimum, Type I-II sulfate resistant cement is recommended for construction at this site.

7.4 Seismic Site Classification

Based upon the results of the subsurface investigation, the site generally classifies as Seismic Site Class D for a stiff soil profile.

7.5 Excavations

Excavations in the soils at the site may stand for short periods of time but should not be considered to be stable. Trenching and excavations should be sloped back, shored, or shielded for worker protection in accordance with applicable OSHA standards. The native 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. However, at or near the water table, the soils will tend to slough and sheeting or shoring may be required.

In addition, it is important to note that the soil classification is based solely on the boring data. Some of the native clay soils may actually classify as Type B soils. It is recommended that HBET be contacted during construction to further evaluate the native soils where significant excavations are proposed.

7.1 Embankment Fill

Based upon information provided to HBET, the existing pipe is ~9 feet below the roadway elevation. As a result, significant fill will be placed above the new pipe to bring up the grade back to the roadway elevation. In general, the native soils can be used as embankment fill above the new pipe to an elevation of 24-inches below the roadway pavement section. Suitable imported structural fill materials, as described previously, should be used for the upper 24-inches below the roadway pavement section.

In order to limit the potential for excessive settlements of the embankment fill, native soils or suitable imported materials above the pipe should be placed in 6 to 9-inch lifts and compacted to a minimum of 98% of the modified Proctor maximum dry density, within ±2% of optimum moisture content in accordance with ASTM D1557. Pit-run or other non-testable materials should be moisture conditioned and proofrolled to the Engineer's satisfaction.

7.2 Pavements

The proposed construction will include new pavements above the new pipe. As discussed previously, the native pavement subgrade materials consist primarily of lean to fat clay soils. The design CBR of the native clay soils was determined in the laboratory to be less than 2.0. Therefore, the minimum recommended Resilient Modulus of 3,000 psi was used for the design.

As discussed previously, the existing pavements along 21.5 Road consist of 4.0-inches of asphalt above granular base course to depths of between 1.5 and 2.0 feet. The thinner pavement section is suitable for a design ESAL value of approximately 363,000. However, the ESAL calculations included in Appendix E for 21.5 Road based upon available traffic data yield an ESAL value of approximately 338,000. Therefore, HBET recommends that the new pavements consist of a minimum of 4.0-inches of asphalt pavement above 14.0-inches of CDOT Class 6 base course to match the thinner existing pavement section.

Prior to pavement placement, areas to be paved beyond the limits of structural fill recommended for the embankment above the pipe 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 and subbase course should be placed in maximum 9-inch loose lifts, moisture conditioned, and compacted to a minimum of 95% and 93% of the maximum dry density, respectively, 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.

It is recommended that Hot-Mix Asphaltic (HMA) pavement conform to CDOT grading SX or S specifications and consist of an approved 75 gyration Superpave method mix design. HMA pavement should be compacted to between 92% and 96% of the maximum theoretical density. An end point stress of 50 psi should be used.

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.

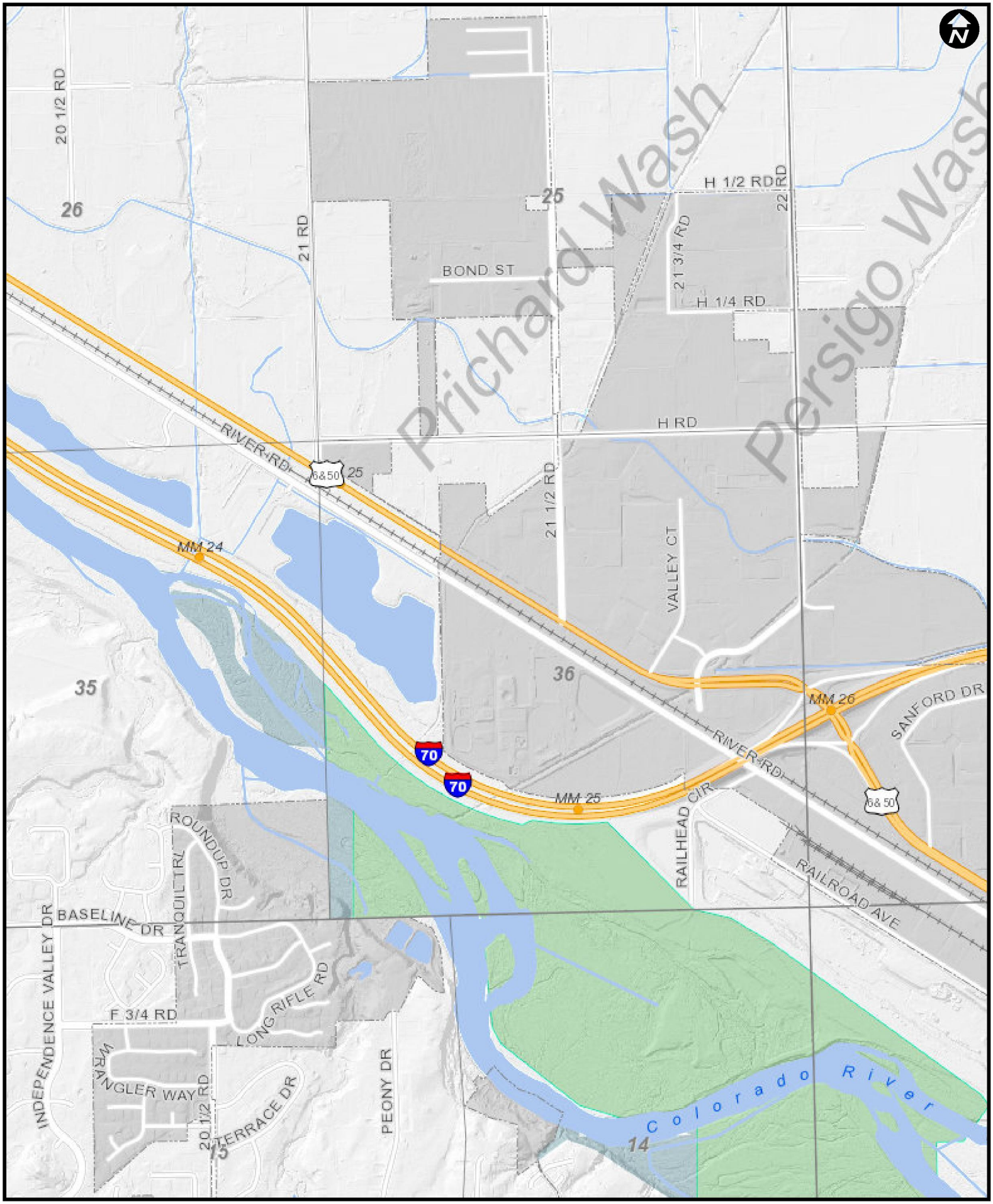
As discussed previously, the subsurface conditions at the site were slightly variable. However, the precise nature and extent of subsurface variability may not become evident until construction. Therefore, it is recommended that a representative of HBET be retained to provide engineering oversight and 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.

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



Mesa County Map

0 0.125 0.25 0.5 mi
0 0.15 0.3 0.6 km

Print Date: February 5, 2020

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

Mesa County Map

0 0.00375 0.0075 0.015 mi

0 0.0045 0.009 0.018 km

Print Date: February 5, 2020

Mesa County, Colorado

GIS/IT Department

gis.mesacounty.us

APPENDIX A
Soil Survey Data

Map Scale: 1:425 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 5 10 20 30

Feet: 0 20 40 80 120

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 10, Sep 13, 2019

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

Date(s) aerial images were photographed: Sep 13, 2010—Aug 8, 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
BcS	Sagers silty clay loam, saline, 0 to 2 percent slopes	0.8	100.0%
Totals for Area of Interest		**0.8**	**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

BcS—Sagers silty clay loam, saline, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: k0bs
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

Sagers, saline, and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sagers, Saline

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear, concave
Across-slope shape: Linear
Parent material: Cretaceous source alluvium derived from sandstone and shale

Typical profile

Ap - 0 to 12 inches: silty clay loam
C - 12 to 25 inches: silty clay loam
Cy - 25 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 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: 15 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Strongly saline (16.0 to 32.0 mmhos/cm)
Available water storage in profile: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): 7s
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 10, Sep 13, 2019

Roads and Streets, Shallow Excavations, and Lawns and Landscaping

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. This table shows the degree and kind of soil limitations that affect local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the table 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 building site development. *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).

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. 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.

Information in this table is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this table. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Report—Roads and Streets, Shallow Excavations, and Lawns and Landscaping

[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]

Roads and Streets, Shallow Excavations, and Lawns and Landscaping–Mesa County Area, Colorado							
Map symbol and soil name	Pct. of map unit	Lawns and landscaping		Local roads and streets		Shallow excavations	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
BcS—Sagers silty clay loam, saline, 0 to 2 percent slopes							
Sagers, saline	90	Very limited		Very limited		Somewhat limited	
		Salinity	1.00	Low strength	1.00	Dusty	0.50
		Dusty	0.50	Frost action	0.50	Unstable excavation walls	0.01
		Droughty	0.13	Shrink-swell	0.03		

Data Source Information

Soil Survey Area: Mesa County Area, Colorado
Survey Area Data: Version 10, Sep 13, 2019

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*			
BcS—Sagers silty clay loam, saline, 0 to 2 percent slopes									
Sagers, saline		—	—		0	0	Moderate	High	High

Data Source Information

Soil Survey Area: Mesa County Area, Colorado
Survey Area Data: Version 10, Sep 13, 2019

APPENDIX B
Typed Boring Logs

Huddleston-Berry Engineering & Testing, LLC
2789 Riverside Parkway
Grand Junction, CO 81501
970-255-8005

BORING NUMBER B-1

CLIENT City of Grand Junction
PROJECT NAME 21.5-G.95 Bridge
PROJECT NUMBER 00208-0110
PROJECT LOCATION Grand Junction, CO
DATE STARTED 12/13/19 **COMPLETED** 12/13/19
GROUND ELEVATION ---- **HOLE SIZE** 4-inch
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Track Rig
AT TIME OF DRILLING 18.0 ft
LOGGED BY SD **CHECKED BY** MAB
AT END OF DRILLING 18.0 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		ASPHALT Pavement Granular BASE COURSE										
		Lean CLAY to Lean CLAY with Sand (CL), Fat CLAY layers, tan to brown, moist to wet, medium stiff to very stiff ***Lab Classified SS1	SS 1	78	6-5-5 (10)			11	24	16	8	82
5			SS 2	78	4-4-14 (18)							
10			SS 3	72	2-4-4 (8)							
15												
20		***Lab Classified SS4	SS 4	100	5-7-11 (18)			24	58	26	32	99
		Bottom of hole at 20.5 feet.										

Huddleston-Berry Engineering & Testing, LLC
2789 Riverside Parkway
Grand Junction, CO 81501
970-255-8005

BORING NUMBER B-2

CLIENT City of Grand Junction
PROJECT NAME 21.5-G.95 Bridge
PROJECT NUMBER 00208-0110
PROJECT LOCATION Grand Junction, CO
DATE STARTED 12/13/19 **COMPLETED** 12/13/19
GROUND ELEVATION ---- **HOLE SIZE** 4-inch
DRILLING CONTRACTOR S. McKracken
GROUND WATER LEVELS:
DRILLING METHOD Simco 2000 Track Rig
AT TIME OF DRILLING 17.0 ft
LOGGED BY SD **CHECKED BY** MAB
AT END OF DRILLING 17.0 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		ASPHALT Pavement Granular BASE COURSE										
		Lean CLAY to Lean CLAY with Sand (cl), Fat CLAY layers, brown, moist to wet, soft to medium stiff	SS 1	78	4-4-3 (7)							
5			SS 2	61	1-1-2 (3)							
10			SS 3	78	1-2-3 (5)							
15												
20		Sandy GRAVEL (gw), brown, wet, dense	SS 4	100	17-20							
		Bottom of hole at 21.0 feet.										

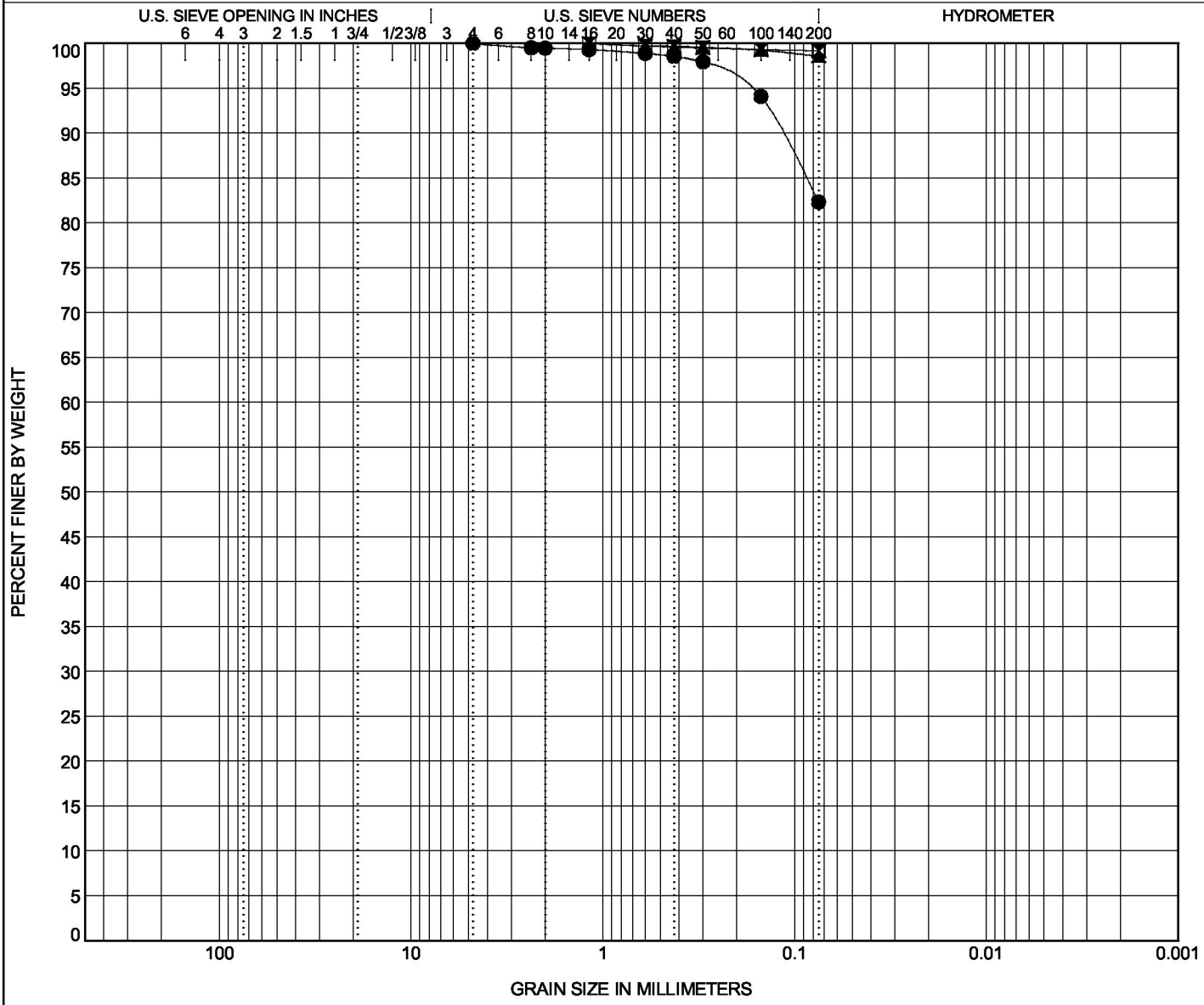
APPENDIX C
Laboratory Testing Results

Huddleston-Berry Engineering & Testing, LLC
2789 Riverside Parkway
Grand Junction, CO 81501
970-255-8005

GRAIN SIZE DISTRIBUTION

CLIENT City of Grand Junction **PROJECT NAME** 21.5-G.95 Bridge

PROJECT NUMBER 00208-0110 **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 12/19	LEAN CLAY with SAND(CL)	24	16	8		
⊠	B-1, SS4 12/19	FAT CLAY(CH)	58	26	32		
▲	Composite 12/19	LEAN CLAY(CL)	49	22	27		

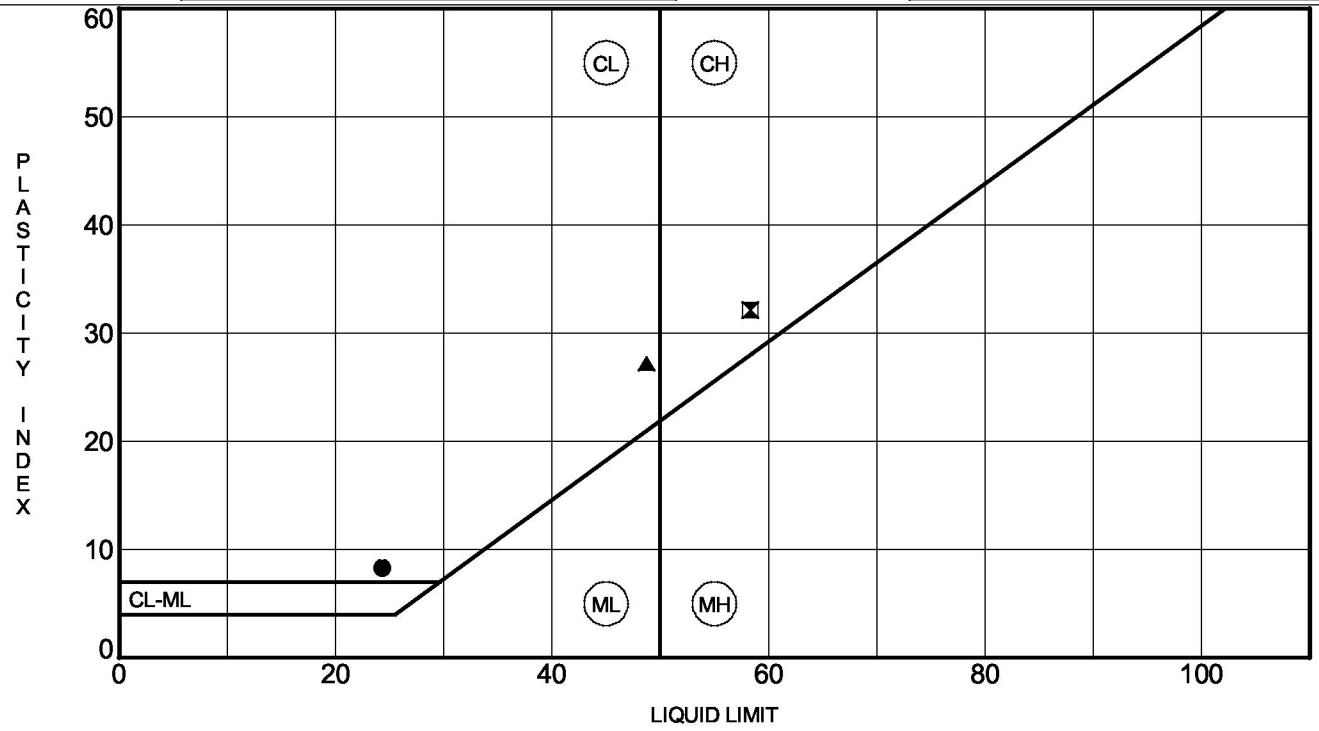
Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-1, SS1 12/19	4.75				0.0	17.7	82.3	
⊠	B-1, SS4 12/19	1.18				0.0	0.8	99.2	
▲	Composite 12/19	1.18				0.0	1.5	98.5	

Huddleston-Berry Engineering & Testing, LLC
2789 Riverside Parkway
Grand Junction, CO 81501
970-255-8005

ATTERBERG LIMITS' RESULTS

CLIENT City of Grand Junction **PROJECT NAME** 21.5-G.95 Bridge

PROJECT NUMBER 00208-0110 **PROJECT LOCATION** Grand Junction, CO

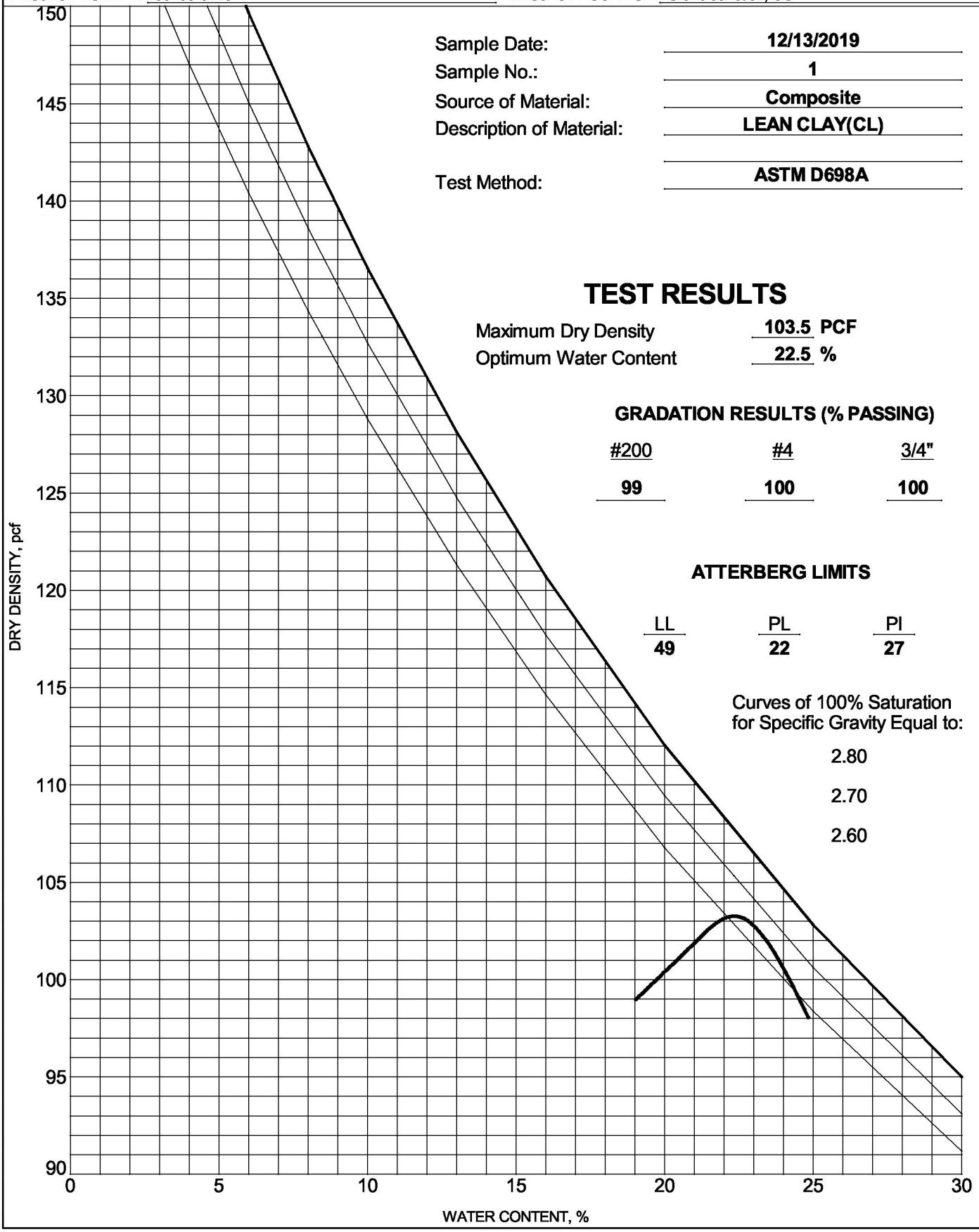


	Specimen Identification		LL	PL	PI	#200	Classification
●	B-1, SS1	12/13/2019	24	16	8	82	LEAN CLAY with SAND(CL)
⧓	B-1, SS4	12/13/2019	58	26	32	99	FAT CLAY(CH)
▲	Composite	12/13/2019	49	22	27	99	LEAN CLAY(CL)

Huddleston-Berry Engineering & Testing, LLC
2789 Riverside Parkway
Grand Junction, CO 81501
970-255-8005

MOISTURE-DENSITY RELATIONSHIP

CLIENT City of Grand Junction
PROJECT NAME 21.5-G.95 Bridge
PROJECT NUMBER 00208-0110
PROJECT LOCATION Grand Junction, CO



Sample Date: **12/13/2019**
Sample No.: **1**
Source of Material: **Composite**
Description of Material: **LEAN CLAY(CL)**
Test Method: **ASTM D698A**

TEST RESULTS

Maximum Dry Density **103.5** PCF
Optimum Water Content **22.5** %

GRADATION RESULTS (% PASSING)

#200	#4	3/4"
99	100	100

ATTERBERG LIMITS

LL	PL	PI
49	22	27

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

Huddleston-Berry
Engineering & Testing, LLC

CALIFORNIA BEARING RATIO
ASTM D1883

Project No.:	00208-0110		**Authorized By:**	Client	**Date:** 12/13/19
Project Name:	21.5-G.95 Bridge		**Sampled By:**	SD	**Date:** 12/13/19
Client Name:	City of Grand Junction		**Submitted By:**	SD	**Date:** 12/13/19
Sample Number:	19-0693	**Location:** Composite	**Reviewed By:**	MAB	**Date:** 02/05/20

Compaction Method: ASTM D698, Method A

Maximum Dry Density (pcf): 103.5

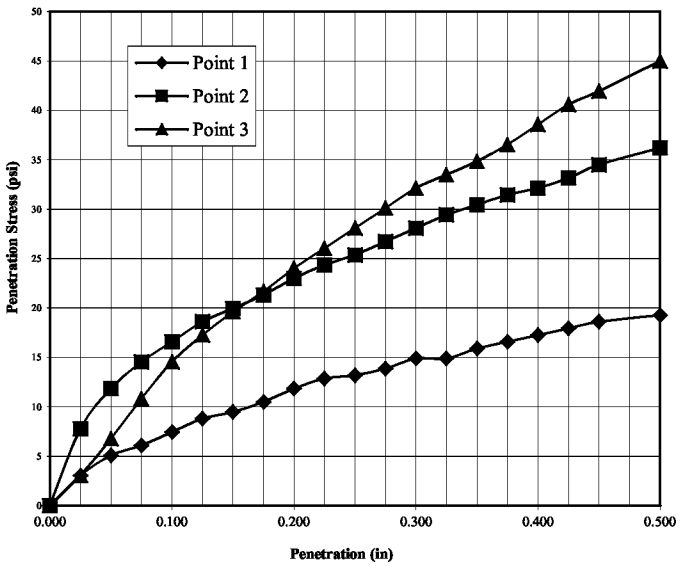
Opt. Moisture Content (%): 22.5

Sample Condition: Soaked

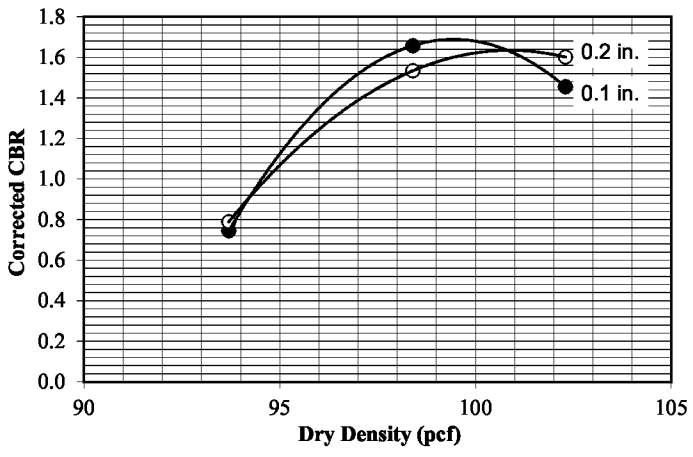
Remarks:

		Sample Data		
		Point 1	Point 2	Point 3
Blows per Compacted Lift:		15	25	56
Surcharge Weight (lbs):		10.0	10.0	10.0
Dry Density Before Soak (pcf):		93.7	98.4	102.3
Dry Density After Soak (pcf):		91.5	96.8	101.6
Moisture Content (%)	Bottom Pre-Test	21.9	22.1	22.2
	Top Pre-Test	21.6	21.8	21.6
	Top 1" After Test	30.7	28.6	26.8
	Average After Soak:	28.0	25.5	24.5
Percent Swell After Soak:		2.4	1.7	0.7

Load Pentration Curve(s)



Dry Density vs CBR



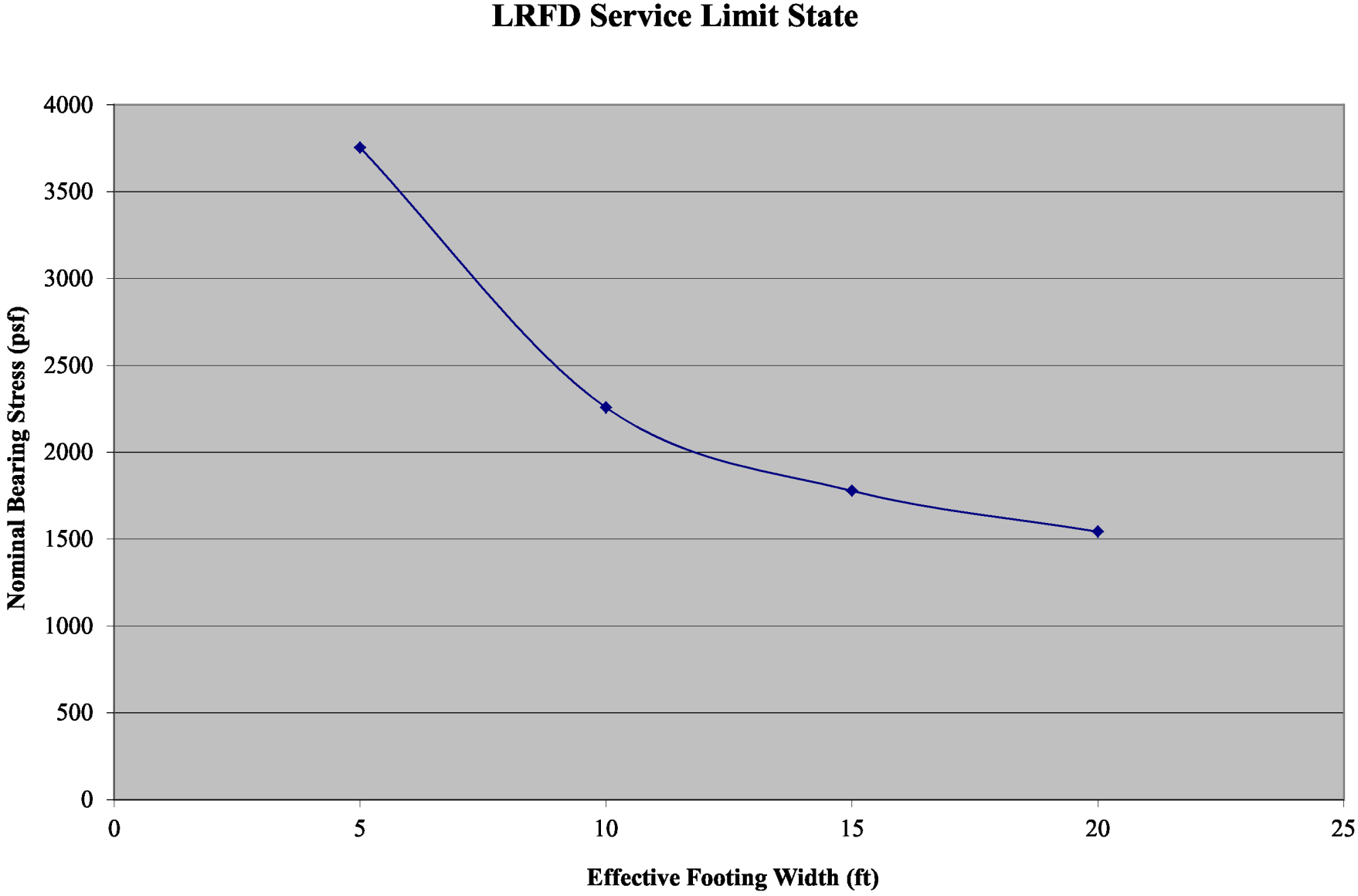
Penetration Data								
Point 1			Point 2			Point 3		
Dist. (in)	Load (lbs)	Stress (psi)	Dist. (in)	Load (lbs)	Stress (psi)	Dist. (in)	Load (lbs)	Stress (psi)
0.000	0	0	0.000	0	0	0.000	0	0
0.025	9	3	0.025	23	8	0.025	9	3
0.050	15	5	0.050	35	12	0.050	20	7
0.075	18	6	0.075	43	15	0.075	32	11
0.100	22	7	0.100	49	17	0.100	43	15
0.125	26	9	0.125	55	19	0.125	51	17
0.150	28	9	0.150	59	20	0.150	58	20
0.175	31	10	0.175	63	21	0.175	64	22
0.200	35	12	0.200	68	23	0.200	71	24
0.225	38	13	0.225	72	24	0.225	77	26
0.250	39	13	0.250	75	25	0.250	83	28
0.275	41	14	0.275	79	27	0.275	89	30
0.300	44	15	0.300	83	28	0.300	95	32
0.325	44	15	0.325	87	29	0.325	99	33
0.350	47	16	0.350	90	30	0.350	103	35
0.375	49	17	0.375	93	31	0.375	108	37
0.400	51	17	0.400	95	32	0.400	114	39
0.425	53	18	0.425	98	33	0.425	120	41
0.450	55	19	0.450	102	35	0.450	124	42
0.500	57	19	0.500	107	36	0.500	133	45

Corrected CBR @ 0.1"		
0.7	1.7	1.5
Corrected CBR @ 0.2"		
0.8	1.5	1.6

Penetration Distance Correction (in)		
0.000	0.000	0.000

Figure: _____

APPENDIX D
Nominal Bearing Resistance at the Service Limit State


LRFD Service Limit State
Nominal Bearing Stress (psf)
4000
3500
3000
2500
2000
1500
1000
500
0
0
5
10
15
20
25
Effective Footing Width (ft)

APPENDIX E
ESAL Calculations

Huddleston-Berry
Engineering & Testing, LLC

ESAL CALCULATIONS

Project No.: 00208-0110
Project Name: 21.5-G.95 Bridge
Client Name: City of Grand Junction
Completed By: MAB
Date: 2/5/2020
Current Year: 2019

GIVEN INFORMATION:

Source: Mesa County GIS

Year: 2016 **ADT:** 1349
Year: **ADT:**

ASSUMPTIONS:

Growth Rate (%): 2
Design Life (yr): 20
Truck Traffic (%): 8
Single Axle (%): 70
Combination (%): 30

DEFINED EQUIVALENCY FACTORS:

Automobiles Flexible: 0.003
Automobiles Rigid: 0.003
Single Unit Flexible: 0.249
Single Unit Rigid: 0.285
Combination Flexible: 1.087
Combination Rigid: 1.692

CALCULATIONS:

ADT at Beginning of Design Life
ADT: 1432

ADT at End of Design Life
ADT: 2128

ADT at Midpoint of Design Life
ADT: 1780

Breakdown of Vehicles Multiplied by Equivalency Factors for Flexible Pavemer

Automobiles: 5
Single Unit: 25
Combination: 47

Breakdown of Vehicles Multiplied by Equivalency Factors for Rigid Paveme

Automobiles: 5
Single Unit: 29
Combination: 73

Flexible Pavement ESAL's

ESAL's: 337260

Rigid Pavement ESAL's

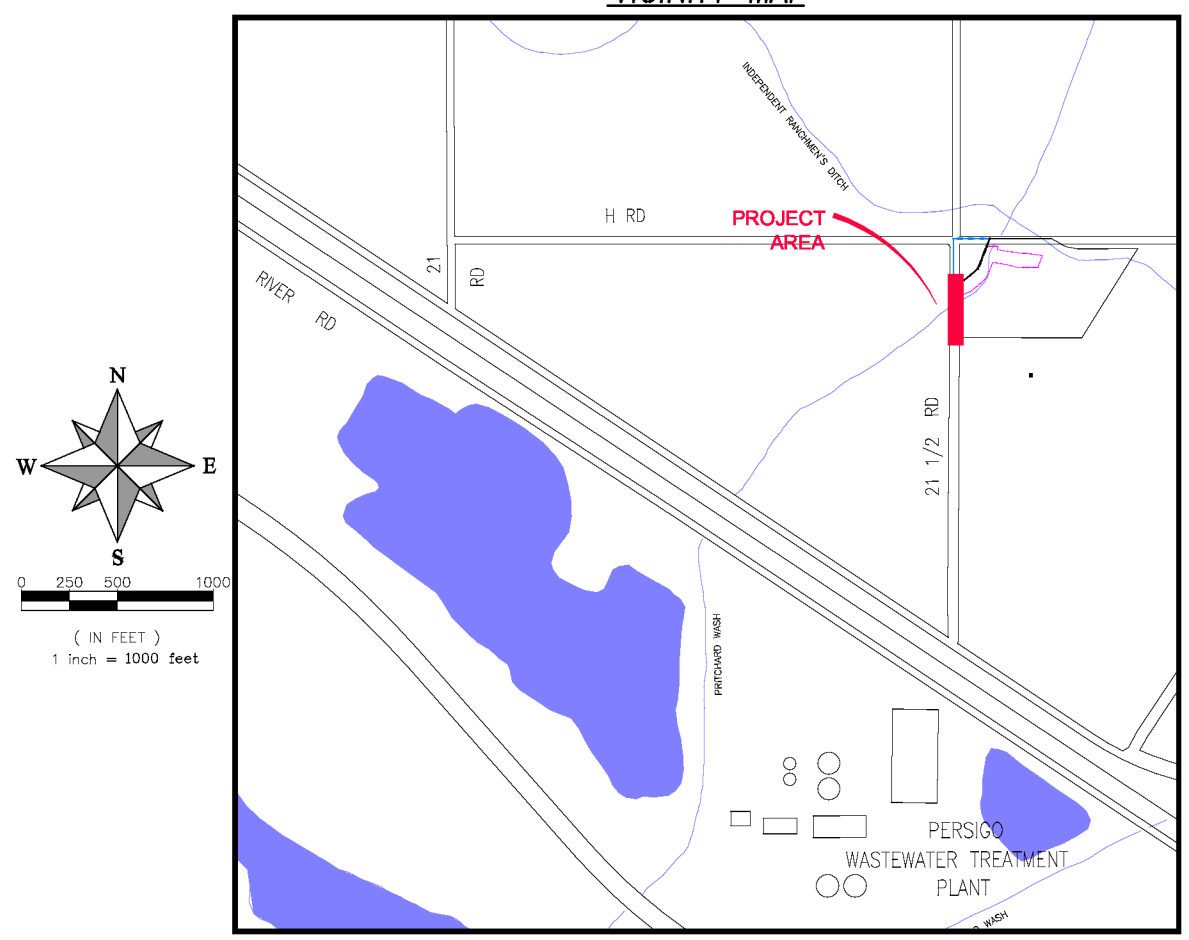
ESAL's: 468660

APPENDIX C
Construction Drawings

PROJECT NO. _____

GRJM 21.5–G.95
CULVERT REPLACEMENT
NOVEMBER, 2020

VICINITY MAP



UTILITIES AND AGENCIES								
AGENCY	NAME	POSITION	ROLE	MAILING ADDRESS	STREET ADDRESS	CITY, STATE	VOICE--WK	FAX
CITY OF GRAND JCT.	KIRSTEN ARMBRUSTER	PROJECT ENGINEER	PROJECT ENGINEER	333 WEST AVE BLDG C	333 WEST AVE BLDG C	GRAND JCT., CO 81501	(970) 244–1421	(970) 256–4022
CITY OF GRAND JCT.	LEE COOPER	PROJECT ENGINEER	SANITARY SEWER	333 WEST AVE BLDG C	333 WEST AVE BLDG C	GRAND JCT., CO 81501	(970) 256–4155	(970) 256–4022
GRAND VALLEY IRRIGATION CO.	PHIL BERTRAND	MANAGER	IRRIGATION	688 26 RD	688 26 RD	GRAND JCT., CO 81506	(970) 242–2762	
CHARTER	ED PACHECO	CONSTRUCTION COORDINATOR	CABLE	315 MOUNTAIN VIEW ST	315 MOUNTAIN VIEW ST	GRAND JCT., CO 81503	(970) 986–1195	
CENTURYLINK	CHRIS JOHNSON	ENGINEER	TELEPHONE	2524 BLICHMANN AVE	2524 BLICHMANN AVE	GRAND JCT., CO 81504	(970) 244–4311	(970) 244–4311
UTE WATER	DAVE PRISKE	SUPERVISOR	WATER	PO BOX 460	2190 H ¼ RD	GRAND JCT., CO 81502	(970) 242–7491	
GRAND VALLEY POWER	PERRY RUPP	SERVICE PLANNER	ELECTRIC	PO BOX 190	845 22 RD	GRAND JCT., CO 81505	(970) 242–0040	
XCEL	BRENDA BOES	PLANNER	ELECTRIC	2538 BLICHMANN AVE	2538 BLICHMANN AVE	GRAND JCT., CO 81506	(970) 244–2698	
XCEL	BRENDA BOES	PLANNER	GAS	2538 BLICHMANN AVE	2538 BLICHMANN AVE	GRAND JCT., CO 81506	(970) 244–2698	
UNITED PRIVATE NETWORK	TERRI KING		FIBER OPTIC	123 N 7TH ST, STE. 100	123 N 7TH ST, STE. 100	GRAND JCT., CO 81501	(720) 324–9703	

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

DESCRIPTION	DATE
REVISION 1 XXX	201X
REVISION 2 XXX	201X
REVISION 3 XXX	201X
REVISION 4 XXX	201X

CITY OF Grand Junction COLORADO

Public Works
Engineering Division

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

DRAWING STATUS:
- ○ PROGRESS
- ● FINAL CONSTRUCTION DRAWINGS
- ○ ASBUILT

DESIGNED BY:
KIRSTEN ARMBRUSTER 2020

REVIEWED BY:
TRENT C. PRALL, PUBLIC WORKS DIRECTOR 201X

AUTHORIZED FOR CONSTRUCTION
TRENT C. PRALL, PUBLIC WORKS DIRECTOR 201X

ACCEPTED AS CONSTRUCTED
LEE COOPER–ERIC MOCKO–JEROD TIMOTHY, PROJECT ENGINEER 201X

GRJM 21.5–G.95 CULVERT REPLACEMENT NOVEMBER, 2020

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PROJECT NO. _____

ABBREVIATIONS

AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY & TRANSPORTATION OFFICIALS
ABC	AGGREGATE BASE COURSE
AC	ASBESTOS CEMENT
AP	ANGLE POINT
ASB	ANCHORED STRAW BALES
ASP	ALUMINIZED STEEL PIPE
ASTM	AMERICAN SOCIETY FOR TESTING MATERIALS
AWWA	AMERICAN WATER WORKS ASSOCIATION
BC	BACK OF CURB
BF	BUTTERFLY VALVE
BOW	BACK OF WALK
BCR	BEGIN CURB RETURN
BOT	BOTTOM
BSWMP	BETTER STORM WATER MANAGEMENT PRACTICES
CH	CHORD
CAP	CORRUGATED ALUMINUM PIPE
CDOT	COLORADO DEPARTMENT OF TRANSPORTATION
CI	CAST IRON
C,G,& SW	CURB, GUTTER & SIDEWALK
℄	CENTER LINE
CL	CLEAR
CMP	CORRUGATED METAL PIPE
CO	CLEAN OUT
COMB	COMBINATION (AS IN STORM SEWER AND SANITARY SEWER)
CONC	CONCRETE
CSM	CITY SURVEY MONUMENT
CSP	CORRUGATED STEEL PIPE
CU	COPPER
DI	DUCTILE IRON
DWY	DRIVEWAY
E	ELECTRIC
ECR	END CURB RETURN
EG	EDGE OF GUTTER
EL	ELEVATION
EP	EDGE OF PAVEMENT
EX	EXISTING
FB	FULL BODY
FC	FACE OF CURB
FG	FINISHED GRADE
FL	FLOW LINE
FL	FLANGE
FM	FORCE MAIN
FO	FIBER OPTICS
FS	FAR SIDE
FTG	FOOTING
G	GAS
GB	GRADE BREAK
GM	GAS METER
GV	GATE VALVE
HBP	HOT BITUMINOUS PAVEMENT
HDPE	HIGH DENSITY POLYETHYLENE
INV	INVERT
IRR	IRRIGATION
L	LENGTH OF ARC
LC	LONG CHORD
LF	LINEAR FEET
LL	LONG ARC
LS	SHORT ARC
LT	LEFT
MB	MAILBOX
MCSM	MESA COUNTY SURVEY MONUMENT
MH	MANHOLE
MJ	MECHANICAL JOINT
MW	MILL WRAP
N/A	NOT APPLICABLE
NIC	NOT IN CONTRACT
NOP	NO ONE PERSON
NRCP	NON-REINFORMATIONRCED CONCRETE PIPE
NS	NEAR SIDE
NTS	NOT TO SCALE
OHP	OVERHEAD POWER
OHT	OVERHEAD TELEPHONE
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
PE	POLYETHYLENE
PERF	PERFORATED
PI	POINT OF INTERSECTION
PIP	PLASTIC IRRIGATION PIPE
POC	POINT ON CURVE
POT	POINT ON TANGENT
PR	PROPOSED
PRC	POINT OF REVERSE CURVATURE
PT	POINT OF TANGENCY
PVC	POLYVINYL CHLORIDE
R	RADIUS
RCP	REINFORMATIONRCED CONCRETE PIPE
REQ'D	REQUIRED
RG	RESTRAINED GLANDS
RL	LONG RADIUS
ROW	RIGHT OF WAY
RP	RADIUS POINT
RR	RAIL ROAD
RS	SHORT RADIUS
RT	RIGHT
S	SLOPE
SAN	SANITARY
SC	SHORT CHORD
SCD	STANDARD CONTRACT DOCUMENTS
SCH	SCHEDULE
SF	SILT FENCE
SL	SECTION LINE
SSRB	STANDARD SPECIFICATIONS FOR ROAD & BRIDGE CONSTRUCTION
SSUU	STANDARD SPECIFICATIONS FOR CONSTRUCTION OF UNDERGROUND UTILITIES
STA	STATION
STL	STEEL
STM	STORM
T	TELEPHONE
TAN	LENGTH OF TANGENT
TC	TOP OF CURB
TH	TEST HOLE
TV	TELEVISION
(TYP)	TYPICAL
UU	UNDERGROUND UTILITIES
VC	VERTICAL CURVE
VCP	VITRIFIED CLAY PIPE
VPC	VERTICAL POINT OF CURVATURE
VPCC	VERTICAL POINT OF COMPOUND CURVATURE
VPRC	VERTICAL POINT OF REVERSE CURVATURE
VPI	VERTICAL POINT OF INTERSECTION
VPT	VERTICAL POINT OF TANGENCY
W	WATER
△	DELTA ANGLE

LEGEND

BSWMP DRAINAGE BASIN BOUNDARY

BSWMP ANCHORED STRAW BALES — ASB ASB ASB ASB ASB ASB ASB

BSWMP SILT FENCE — SF SF SF SF SF SF SF

BUILDING

CONCRETE CURB AND GUTTER — 2' CURB AND GUTTER

7' C, G, & SW

CONCRETE CURB,GUTTER, & SIDEWALK

CONCRETE DITCH — CONCRETE

CONCRETE SIDEWALK — 4' SW

CULVERT — 18" RCP

EARTH DITCH — EARTH EARTH EARTH

EDGE OF GRAVEL

EDGE OF PAVEMENT

FENCE (BARBED WIRE)

FENCE (CHAIN LINK)

FENCE (IRON)

FENCE (PLASTIC)

FENCE (TEMPORARY CONSTRUCTION)

FENCE (WOOD)

FENCE (WOVEN WIRE)

GUARD RAIL — 9' — 9'

HATCHING: INDICATES ASPHALT REMOVAL

HATCHING: INDICATES CONCRETE REMOVAL

HATCHING: INDICATES STAGING AREA — STAGING AREA

LINE (CENTER OF IMPROVEMENTS) — CENTERLINE

LINE (CITY LIMITS) — CITY LIMITS

LINE (CONTROL) — CONTROL LINE

LINE (EASEMENT)

LINE (MONUMENT/SECTION) — MONUMENT/SECTION LINE

LINE (PROPERTY)

LINE (RIGHT OF WAY)

MATCH LINE — MATCH LINE SEE SHEET NO ?

PIPE (IRRIGATION) — 4" IRR

PIPE (SIPHON) — 4" SIPHON

PROPOSED CONCRETE CURB AND GUTTER

PROPOSED CONCRETE CURB,GUTTER,& SIDEWALK

PROPOSED CONCRETE SIDEWALK

PROPOSED "WET" UTILITIES (CONSTRUCTION NOTE WILL INDICATE TYPE, SIZE, AND MATERIAL OF NEW MAIN) — 8" PVC SANITARY SEWER

ALL PROPOSED FEATURES NOT SHOWN IN LEGEND WILL BE SHOWN THE SAME AS THEIR EXISTING COUNTERPART, BUT INDICATED BY BOLDER LINETYPE

RAIL ROAD

RETAINING WALL — 1' RETAINING WALL

STRIPING (CONTINUOUS WHITE) — WHITE

STRIPING (DASHED WHITE) — WHITE

STRIPING (CONTINUOUS YELLOW) — YELLOW

STRIPING (DASHED YELLOW) — YELLOW

TOP OF SLOPE — 4580

CONTOUR LINES (SHOWN BETWEEN TOP & TOE)

TOE OF SLOPE — 4570

TRAFFIC DETECTOR LOOP

UTILITY LINE (ABANDON) (THIS CASE A WATER LINE) — W (ABANDON) 8" W

UTILITY LINE (CABLE TV) — TV TV

UTILITY LINE (ELECTRIC) — E E

UTILITY LINE (FIBER OPTIC) — FO QWEST FO

UTILITY LINE (GAS) — G 1 1/4" MPE G

UTILITY LINE (HIGH VOLTAGE OVERHEAD POWER) — HVOHP

UTILITY LINE (OVERHEAD POWER) — OHP

UTILITY LINE (OVERHEAD TELEPHONE) — OHT

UTILITY LINE (SANITARY SEWER) — 8" SAN

UTILITY LINE (SANITARY SEWER FORCE MAIN) — 8" FM

UTILITY LINE (SANITARY SEWER SERVICE) — SS SS

UTILITY LINE (STORM SEWER) — 8" STM

UTILITY LINE (STORM SEWER, PERFORATED) — 6" PERF

UTILITY LINE (STORM/SANITARY SEWER SEWER COMBINATION) — 18" COMB

UTILITY LINE (TELEPHONE) — T T

UTILITY LINE (WATER) — W 8" W

SYMBOLS

BENCH MARK — (A)

CATCH BASIN

CLEAN OUT — CO

CURB STOP

FIRE HYDRANT

GUY WIRE ANCHOR

HEADGATE

IRRIGATION PUMP

MAILBOX

MANHOLE (ELECTRIC) — (E)

MANHOLE (GAS) — (G)

MANHOLE (SANITARY/STORM)

MANHOLE (TELEPHONE) — (T)

MANHOLE (TV) — (TV)

MANHOLE (WATER) — (W)

METER (GAS) — GM

METER (WATER)

PEDESTAL (TELEPHONE)

PEDESTAL (TV) — TV

PROPERTY PIN

PULL BOX

REDUCER FITTING

SIGN OR POST (SIGN TYPE NOTED) — STOP

SPRINKLER HEAD

STREET LIGHT

SURVEY MONUMENT (CITY) — CSM

SURVEY MONUMENT (TYPE NOTED) — MCSM

TEST HOLE — TH #1

TRAFFIC PAINT MARKING

TRAFFIC SIGNAL POLE AND MAST ARM

UTILITY POLE

VALVE (GAS) — GV

VALVE (IRRIGATION) — VIR

VALVE (WATER)

VEGETATION (HEDGE OR BUSH)

VEGETATION (TREE STUMP)

VEGETATION (TREE) (CALIPER SIZE NOTED) — 18"

WATER HYDRANT

WEIR

YARD LIGHT

BAR SCALE:

0 5 10 20

(IN FEET)
1 inch = 20 feet

NORTH ARROW:

N W E S

DESCRIPTION	DATE
REVISION △	
REVISION △	
REVISION △	
REVISION △	

DRAWN BY JCS DATE 4-02
DESIGNED BY _____ DATE _____
CHECKED BY _____ DATE _____
APPROVED BY _____ DATE _____

SCALES: PLAN & PROFILE
HORIZONTAL: 1" =
VERTICAL: 1" =

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

CITY OF GRAND JUNCTION
STANDARD ABBREVIATIONS, LEGEND, AND SYMBOLS

2

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PROJECT NO. _____

Bid Schedule: GRJM-21.5-G.95 Bridge Replacement

Item No.	CDOT, City Ref.	Description	Quantity	Units
1	108.2	60" Culvert (HDPE)	100.	Lin. Ft.
2	201-00000	Clearing and Grubbing	450.	Sq. Yd.
3	202-00220	Removal of Asphalt Mat	122.	Sq. Yd.
4	202	Removal of Existing Pipe (Size & type as shown on plans)	90.	Lin. Ft.
5	203-00000	Unclassified Excavation (Complete in Place)	Lump	Sum
6	206-00065	Structural Backfill Material (Flow-fill, Complete in Place)	200.	Cubic Yd.
7	206-00100	Structural Backfill Material (Class 1, Complete in Place)	1,034.	Cubic Yd.
8	208-00070	Vehicle Track Pad	2.	Each
9	208-00011	Erosion Bales (Weed Free)	4.	Each
10	208-00045	Concrete Washout Structure	1.	Each
11	211-03005	Dewatering (To be used for Pritchard Wash Bypass if needed)	Lump	Sum
12	212-00007	Seeding (Native) (Hydraulic)	450.	Sq. Yd.
13	304	Aggregate Base Course (Class 6) complete in place	56.	Cubic Yd.
14	403-34752	Hot Mix Asphalt (Patching) (Grading SX) (75)(PG 64-22) (4" Thick)	31.	Ton
15	420-00300	Geotextile (Mirafi 500x)	220.	Sq. Yd.
16	601	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 walls beneath 21.5 Road.) Work shall include Reinforcing Steel (Epoxy Coated), Structural Concrete Coating (Exterior of wall), and any necessary appurtenances to complete work.	15.	Cubic Yd.
17	606	Guardrail Type 3 (31 IN MGS). (Includes Installation)	37.5	Lin. Ft.
18	606	Transition Type 3J (31 IN MGS), R = 8'-6", 105° angle. (Includes Installation)	1.	Each
19	606	Transition Type 3J (31 IN MGS), R = 8'-6", 75° angle. (Includes Installation)	1.	Each
20	606	End Anchorage Type 3K (Includes Installation)	1.	Each
21	620-00020	Sanitary Facility	1.	Each
22	625-00000	Construction Surveying	Lump	Sum
23	626-00000	Mobilization	Lump	Sum
24	630	Traffic Control (Complete in Place, Road Closure)	Lump	Sum

EARTHWORKS	
CUT	861 Cubic Yd.
FILL	1034 Cubic Yd.

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DESCRIPTION	DATE
REVISION △	
REVISION △	
REVISION △	
REVISION △	

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SCALES: PLAN & PROFILE

CITY OF Grand Junction COLORADO

PUBLIC WORKS
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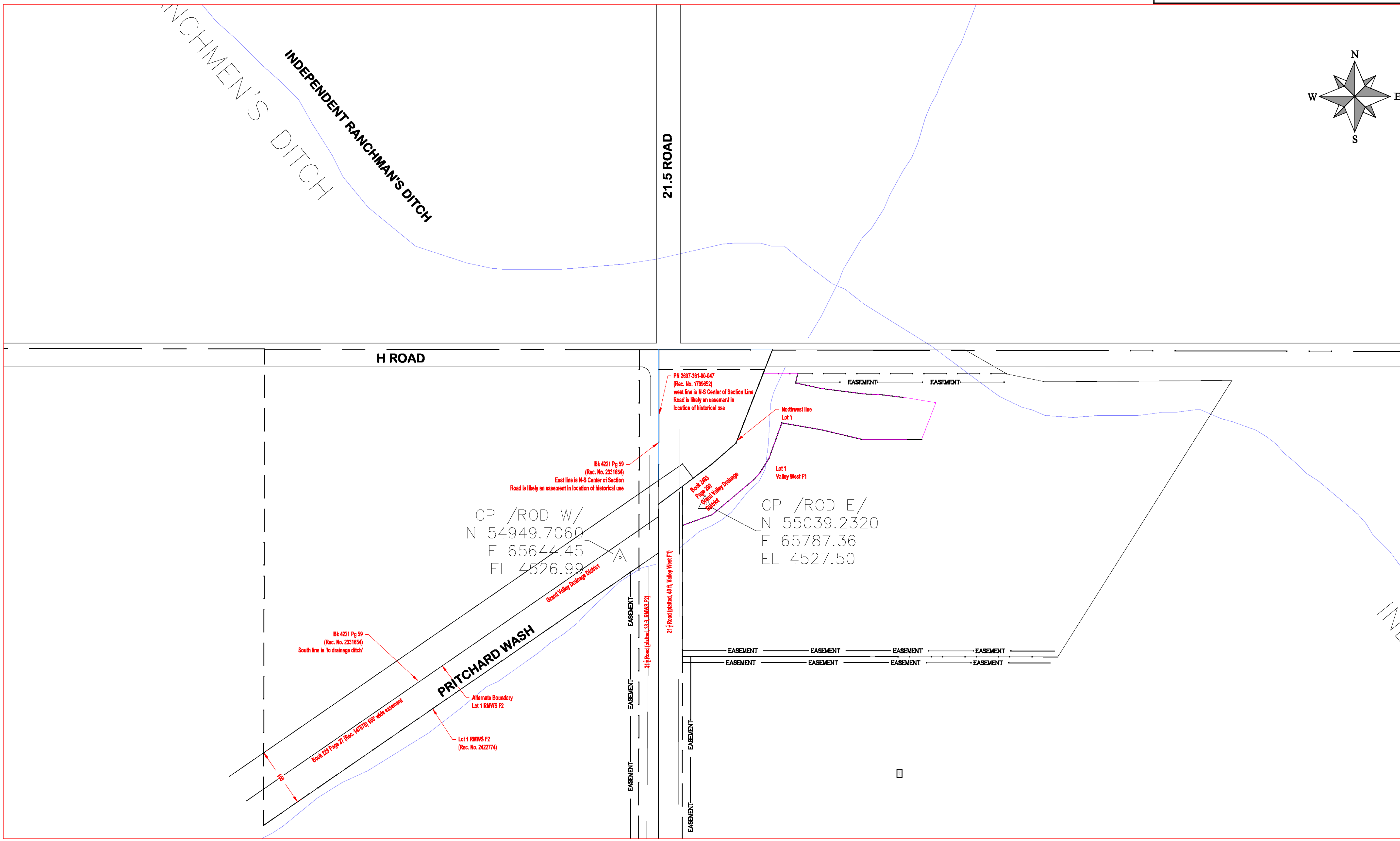
GRJM–21.5–G.95 CULVERT REPLACEMENT
SUMMARY OF APPROXIMATE QUANTITIES



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APPROVED BY XXX DATE 201X

SCALES: PLAN & PROFILE
HORIZONTAL: 1" = 150'
0 37.5 75 150

CITY OF Grand Junction COLORADO

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GRJM–21.5–G.95 CULVERT REPLACEMENT
PROJECT CONTROL MAP

PROJECT NO. _____

CONSTRUCTION NOTES

(1) 202 – REMOVAL OF ASPHALT MAT. CUT AND REMOVE ASPHALT AS SHOWN. (INDICATED BY DOT HATCH PATTERN)

(3) 202 – REMOVAL OF CONCRETE. SAW CUT AND REMOVE CONCRETE AS SHOWN. (INDICATED BY CROSS HATCH PATTERN) INCLUDES BUT NOT LIMITED TO CURB, GUTTER, SIDEWALK, DRIVEWAY, SLABS, V–PAN, CURB RAMPS, INTERSECTION CORNERS, APRONS, AND LANDSCAPE BORDERS.

(26) 202 – REMOVAL OF EXISTING CULVERT. (SIZE AND TYPE AS SHOWN ON PLAN)

(103) 210 – REMOVE AND RESET SIGN – BY CITY

(828) 828 – PROTECT EXISTING UTILITIES IN PLACE. SEE TABLE BELOW FOR MORE INFORMATION ABOUT EACH UTILITY. ALSO SEE PROJECT SPECIFICATIONS – UTILITY SECTION FOR COORDINATION WITH UTILITY OWNERS.

N 55056.96
E 65698.83
EL 4529.13

54" DIA CMP

60" DIA CMP

N 54976.64
E 65698.72
EL 4528.73

LIMITS OF CONSTRUCTION

PROTECT UTILITIES

	UTILITY	OWNER
A	PROTECT 2" GAS LINE	XCEL ENERGY
B	PROTECT 6" ELECTRIC LINE	XCEL ENERGY
C	PROTECT 6" ELECTRIC LINE	GRAND VALLEY POWER
D	PROTECT OVERHEAD POWER	GRAND VALLEY POWER
E	PROTECT OVERHEAD CABLE	CHARTER?
F	PROTECT 2 TELEPHONE LINES	CENTURY LINK
G	PROTECT OVERHEAD FIBER OPTIC	UNITED PRIVATE NETWORK
H	PROTECT 8" WATER LINE	UTE WATER
I	PROTECT 8" SANITARY SEWER	CITY OF GRAND JUNCTION
J	PROTECT 2" FIBER OPTIC	CENTURY LINK

DESCRIPTION	DATE
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SCALES: PLAN & PROFILE
HORIZONTAL: 1" = 10'
0 2.5 5 10

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GRJM–21.5–G.95 CULVERT REPLACEMENT
DEMOLITION PLAN
STA 0+00 TO STA 1+15

5

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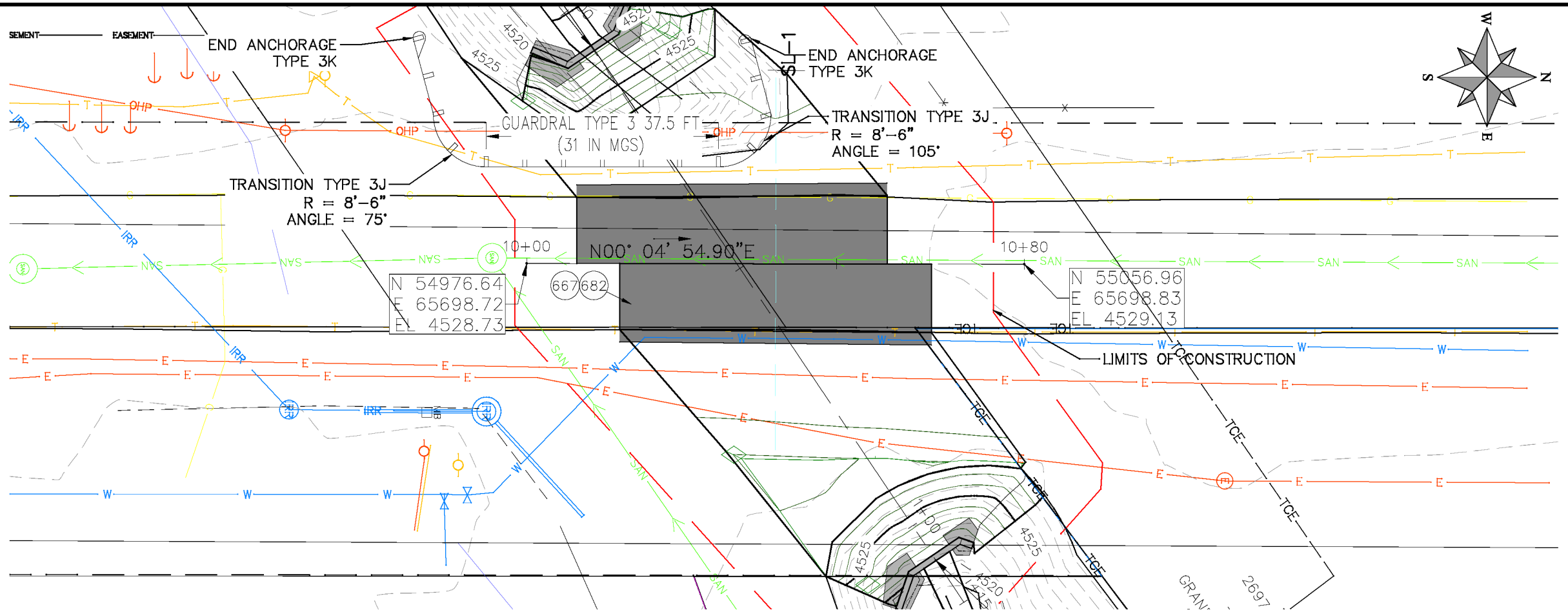
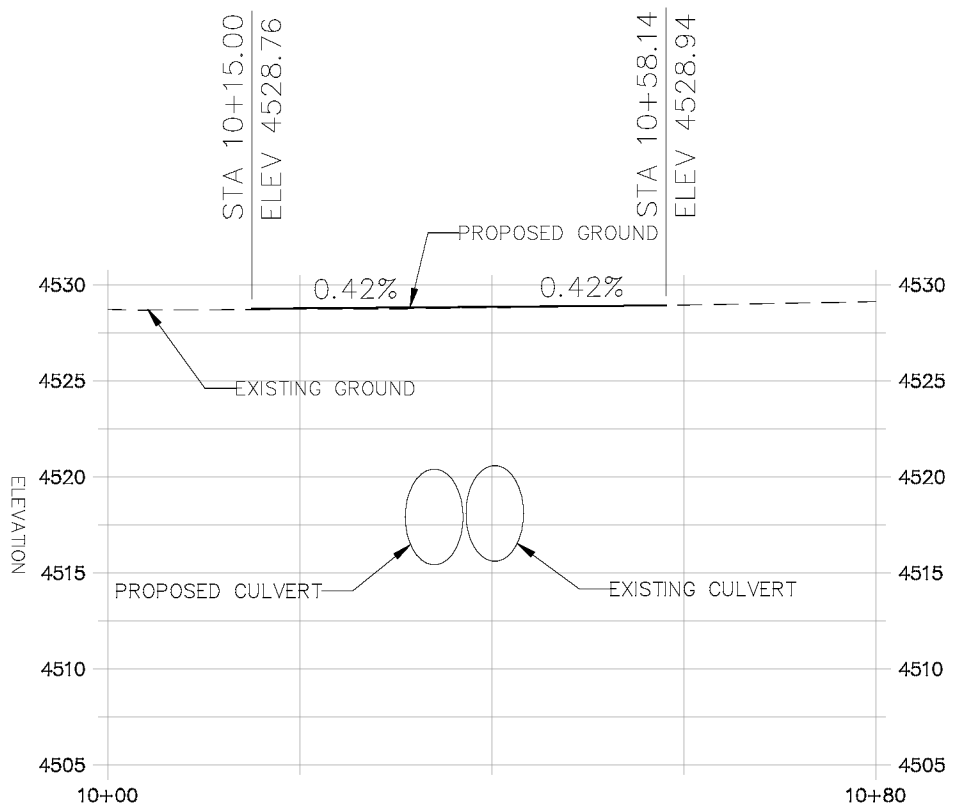
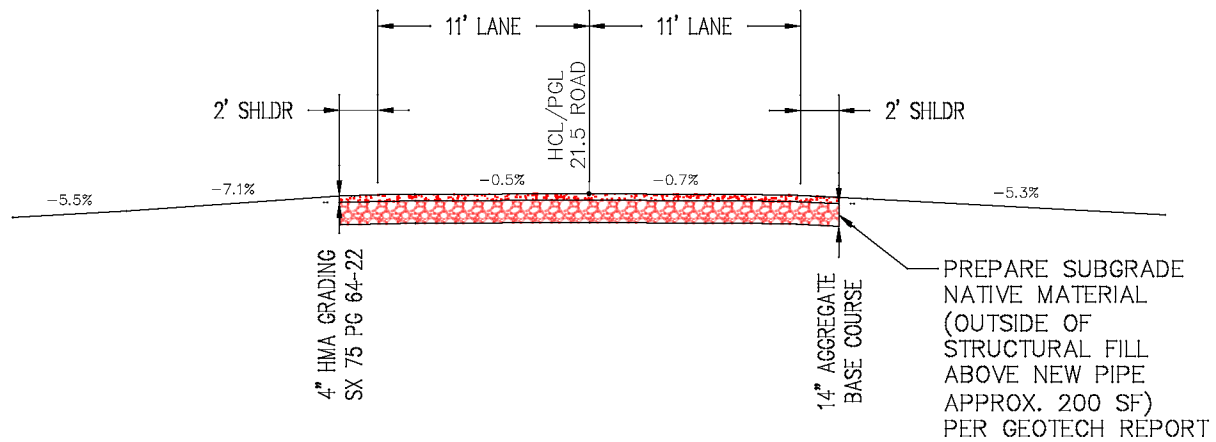


PLAN



PROFILE



ROADWAY CROSS-SECTION
SCALE: 1" = 10'

PROJECT NO. _____

CONSTRUCTION NOTES

667 304 – AGGREGATE BASE COURSE (CLASS 6) (COMPLETE IN PLACE)

682 401.08 – HOT BITUMINOUS PAVEMENT (PATCHING) (4" THICK) (GRADING SX, PG 64-22, GYR.=75) (TWO 2" LIFT)

DESCRIPTION	DATE
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REVISION △	

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SCALES: PLAN & PROFILE
HORIZONTAL: 1" = 20'
0 5 10 20
VERTICAL: 1" = 10'
0 2.5 5 10

CITY OF Grand Junction COLORADO

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GRJM-21.5-G.95 CULVERT REPLACEMENT
ROADWAY CONSTRUCTION
STA 10+00 TO STA 10+80

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PROJECT NO. _____

GENERAL NOTES:

1 PURPOSE: TO SEARCH, INTERPRET, AND DEPICT SPECIFIC EXISTING UNDERGROUND UTILITIES AS PER THE SCOPE OF WORK FOR THE GRJM–21.5–G.95 CULVERT REPLACEMENT PROJECT.

2 THE SUBSURFACE UTILITIES SHOWN ON THE SUBSURFACE UTILITY INVESTIGATION WERE IDENTIFIED USING APPROPRIATE INDUSTRY STANDARD DETECTION METHODOLOGIES IN ACCORDANCE WITH THE AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE) STANDARD GUIDELINE FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA. QUALITY LEVELS AND DEFINITIONS PER CI/ASCE STANDARD NO. 38.

3 QUALITY LEVEL "D" – QL–D – DEPICTED ACCORDING TO UTILITY RECORD INFORMATION AND IN–FIELD VISUAL INSPECTION. NO ELECTRONIC DESIGNATING INFORMATION WAS OBTAINED. UTILITIES WITH A QL–D LABEL ARE DEPICTED ON THE PLANS USING PROFESSIONAL JUDGMENT IN INTERPRETING THIRD–PARTY RECORDS OR OTHER INFORMATION.

4 QUALITY LEVEL "C" – QL–C – EXISTING UTILITY STRUCTURES HAVE BEEN FIELD LOCATED AND SURVEYED TO ASSIST IN THE DEPICTING OF THE UTILITIES SHOWN ON THE RECORDS. NO ELECTRONIC DESIGNATING INFORMATION WAS OBTAINED. UTILITIES WITH A QL–C LABEL ARE DEPICTED ON THE PLANS USING PROFESSIONAL JUDGMENT IN INTERPRETING AND CORRELATING THE SURVEYED UTILITY APPURTENANCES, WITH THIRD–PARTY RECORDS INFORMATION.

5 QUALITY LEVEL "B" – QL–B – INFORMATION WAS OBTAINED THROUGH THE APPLICATION OF APPROPRIATE SURFACE GEOPHYSICAL METHODS TO DETERMINE THE EXISTENCE AND APPROXIMATE HORIZONTAL POSITION OF THE SUBSURFACE UTILITIES. QL–B DATA SHOULD BE REPRODUCIBLE BY SURFACE GEOPHYSICS AT ANY POINT OF THEIR DEPICTION. ALL UTILITIES ARE QL–B UNLESS OTHERWISE NOTED, THEY ARE DEPICTED ON THE PLANS USING PROFESSIONAL JUDGMENT IN SELECTING AND INTERPRETING APPROPRIATE GEOPHYSICAL DATA, SURVEYING TO APPROPRIATE PROJECT ACCURACIES, AND USING JUDGMENT TO CORRELATE THIRD–PARTY RECORDS OR OTHER INFORMATION, IF AVAILABLE, TO THESE QL–B DEPICTIONS.

6 QUALITY LEVEL "A" – QL–A – OBTAIN PRECISE HORIZONTAL AND VERTICAL POSITION OF THE UTILITY LINE BY EXCAVATING A TEST HOLE. THE TEST HOLE SHALL BE DONE USING VACUUM EXCAVATION OR COMPARABLE NON–DESTRUCTIVE EQUIPMENT IN A MANNER AS TO CAUSE NO DAMAGE TO UTILITY LINE.

7 RELIANCE UPON SUBSURFACE UTILITY DATA FOR RISK MANAGEMENT PURPOSES DURING BIDDING DOES NOT RELIEVE THE EXCAVATOR OR UTILITY OWNER FROM FOLLOWING ALL APPLICABLE UTILITY DAMAGE PREVENTION STATUTES, POLICIES, AND/OR PROCEDURES DURING EXCAVATION.

8 IT IS IMPORTANT THAT THE CONTRACTOR INVESTIGATES AND UNDERSTANDS THE SCOPE OF WORK AND LIMITS OF THE UTILITY INVESTIGATIONS LEADING TO THESE UTILITY DEPICTIONS.

9 UTILITY SIZE AND TYPE ARE DETERMINED THROUGH AVAILABLE UTILITY OWNER INFORMATION OR FIELD OBSERVATIONS; UTILITIES LABELED AS UNKNOWN HAVE NO CORRELATED RECORDS OR VISIBLE APPURTENANCES TO DETERMINE FUNCTION OR TYPE.

10 UTILITY MAPPING WAS COMPLETED IN THE FIELD ON 11/14/2019. UTILITIES MAY HAVE BEEN CHANGED OR ADDED AFTER THIS DATE.

11 "END OF INFORMATION" (EOI) SIGNIFIES GEOPHYSICAL EQUIPMENT LOST THE SIGNAL OF THE TARGET UTILITY AND THE LINE WAS UNABLE TO BE DESIGNATED ANY FURTHER. LINES MAY CONTINUE ON OR MAY STOP. POSITIVE VERIFICATION BY EXCAVATION IS REQUIRED TO CONFIRM PRESENCE BEYOND END OF SIGNAL.

12 THE FOLLOWING EQUIPMENT WAS USED IN THE UTILITY INVESTIGATION: VM–810 METROTECH UTILITY LINE LOCATOR, TRIMBLE GPS SURVEY CONTROL AND/OR TOTAL STATION.

13 HORIZONTAL COORDINATE SYSTEM: PROJECT COORDINATES ARE BASED ON MESA COUNTY LOCAL COORDINATE SYSTEM, MCLS ZONE GVA.

14 VERTICAL DATUM: WGS 1984

15 SEE THE STANDARD ABBREVIATIONS, LEGENDS, AND SYMBOLS FOR UTILITY LINE LINE TYPE DEPICTIONS, UTILITY APPURTENANCES SYMBOLS, AND ABBREVIATIONS USED FOR THE SUBSURFACE UTILITY ENGINEERING PLAN.

16 THE FOLLOWING COMPANIES HAVE NOT SUPPLIED RECORDS AS OF 11/05/2020: NONE.

17 THE OWNERS WITHIN THE PROJECT LIMITS ARE LISTED IN THE TABLE ON THE COVER SHEET BUT MAY NOT BE LIMITED TO THOSE LISTED IN THE TABLE.

DESCRIPTION	DATE
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REVISION △	–

DRAWN BY KSO DATE 2020
DESIGNED BY KA DATE 2020
CHECKED BY XXX DATE 201X
APPROVED BY XXX DATE 201X

SCALES: PLAN & PROFILE
HORIZONTAL: 1" = 20'
0 5 10 20
VERTICAL: 1" = 10'
0 2.5 5 10

CITY OF Grand Junction COLORADO

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ENGINEERING DIVISION

GRJM–21.5–G.95 CULVERT REPLACEMENT
S.U.E. GENERAL NOTES

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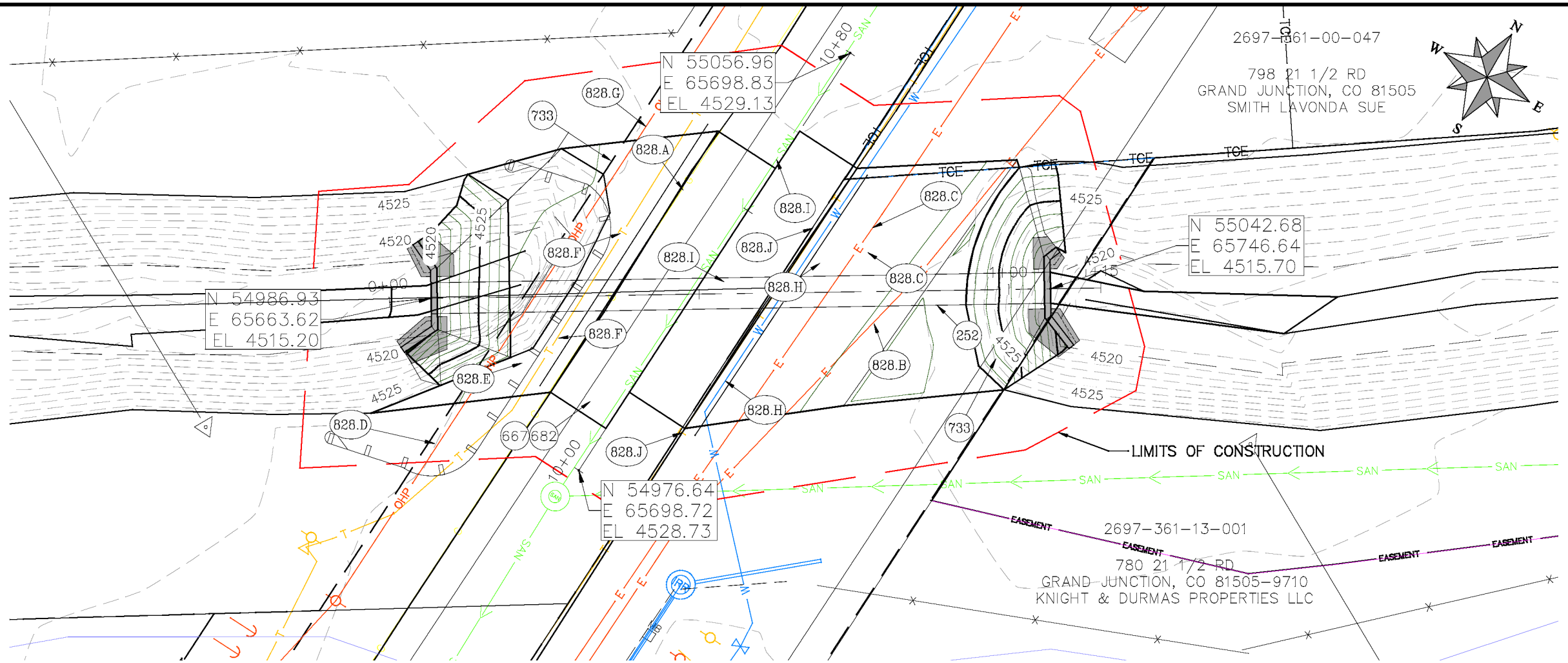
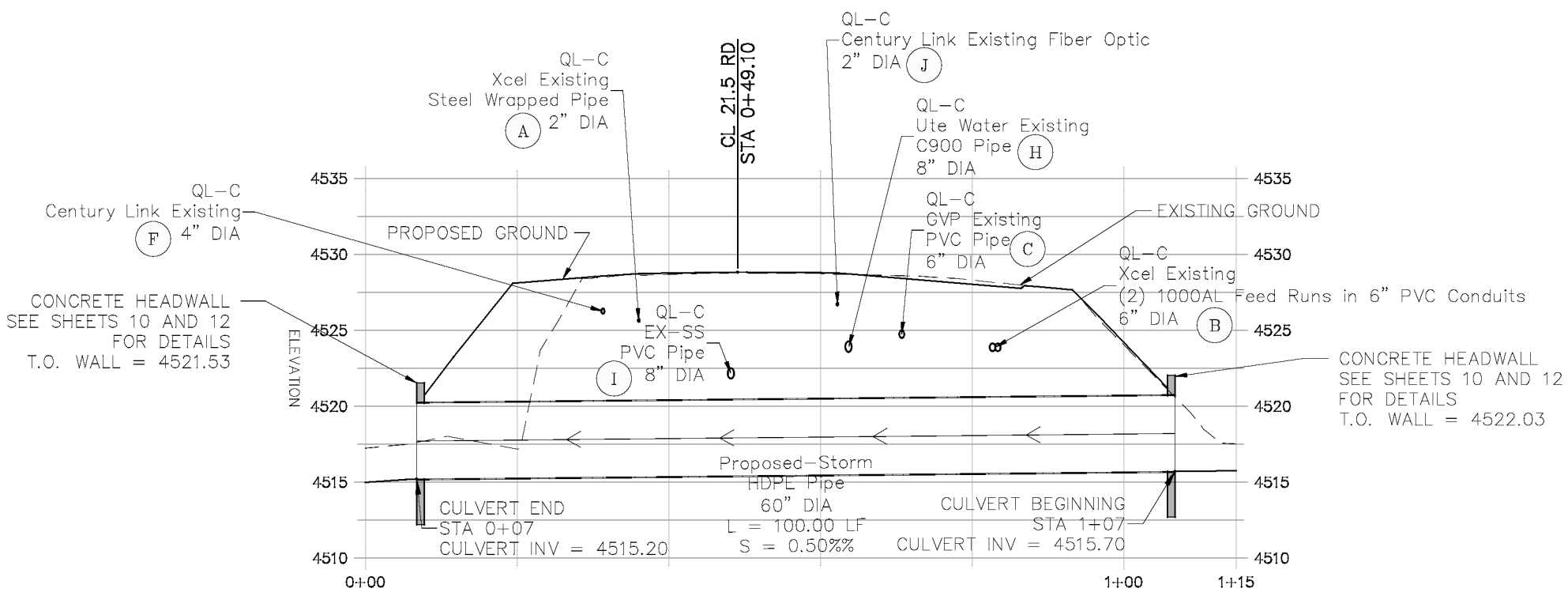


PLAN



PROFILE

PROJECT NO. _____

CONSTRUCTION NOTES

252	60" CULVERT (HDPE)
667	304 – AGGREGATE BASE COURSE (CLASS 6) (6" THICK)
682	401.08 – HOT BITUMINOUS PAVEMENT (PATCHING) (4" THICK) (GRADING SX, PG 64-22, GYR.=75) (TWO 2" LIFT)
733	212 – HYDROSEED WITH NATIVE SEED MIX.
828	PROTECT UTILITIES

NOTE:
ALL UTILITIES DEPICTED AT QUALITY LEVEL B (QL-B) UNLESS OTHERWISE NOTED.

PROTECT UTILITIES

	UTILITY	OWNER
A	PROTECT 2" GAS LINE	XCEL ENERGY
B	PROTECT 6" ELECTRIC LINE	XCEL ENERGY
C	PROTECT 6" ELECTRIC LINE	GRAND VALLEY POWER
D	PROTECT OVERHEAD POWER	GRAND VALLEY POWER
E	PROTECT OVERHEAD CABLE	CHARTER
F	PROTECT 2 TELEPHONE LINES	CENTURY LINK
G	PROTECT OVERHEAD FIBER OPTIC	UNITE PRIVATE NETWORKS
H	PROTECT 8" WATER LINE	UTE WATER
I	PROTECT 8" SANITARY SEWER	CITY OF GRAND JUNCTION
J	PROTECT 2" FIBER OPTIC	CENTURY LINK

DESCRIPTION	DATE
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DRAWN BY KSO DATE 2020
DESIGNED BY KA DATE 2020
CHECKED BY XXX DATE 201X
APPROVED BY XXX DATE 201X

SCALES: PLAN & PROFILE
HORIZONTAL: 1" = 20'
0 5 10 20
VERTICAL: 1" = 10'
0 2.5 5 10

CITY OF Grand Junction COLORADO

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ENGINEERING DIVISION

GRJM-21.5-G.95 CULVERT REPLACEMENT
PLAN AND PROFILE
STA 0+00 TO STA 1+15

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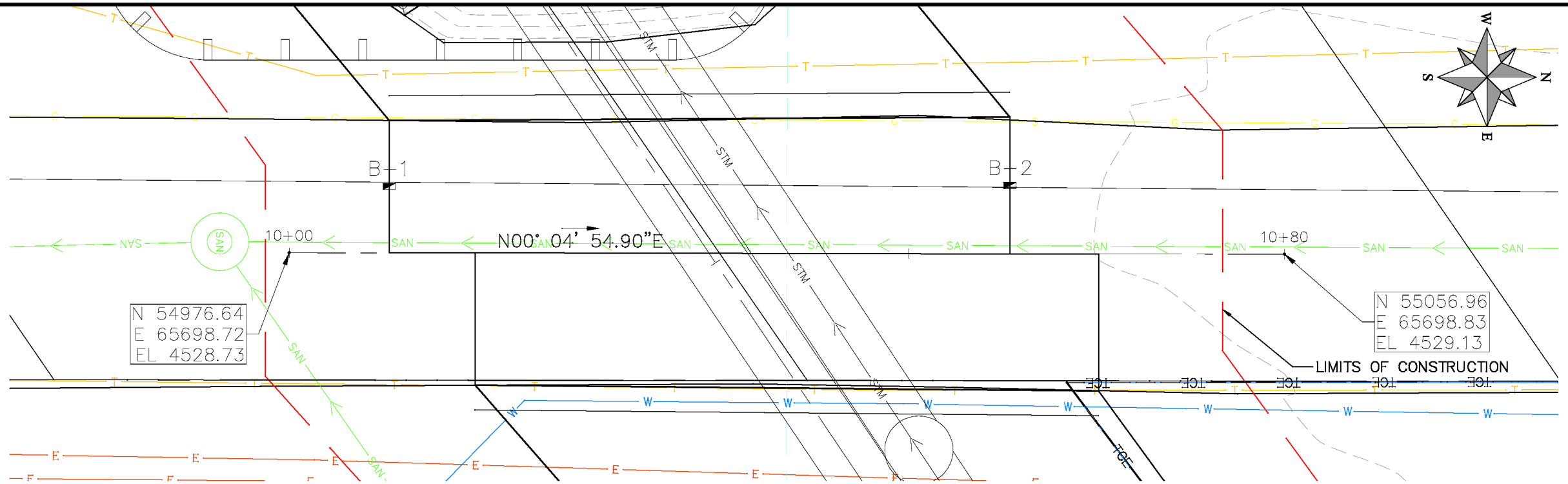

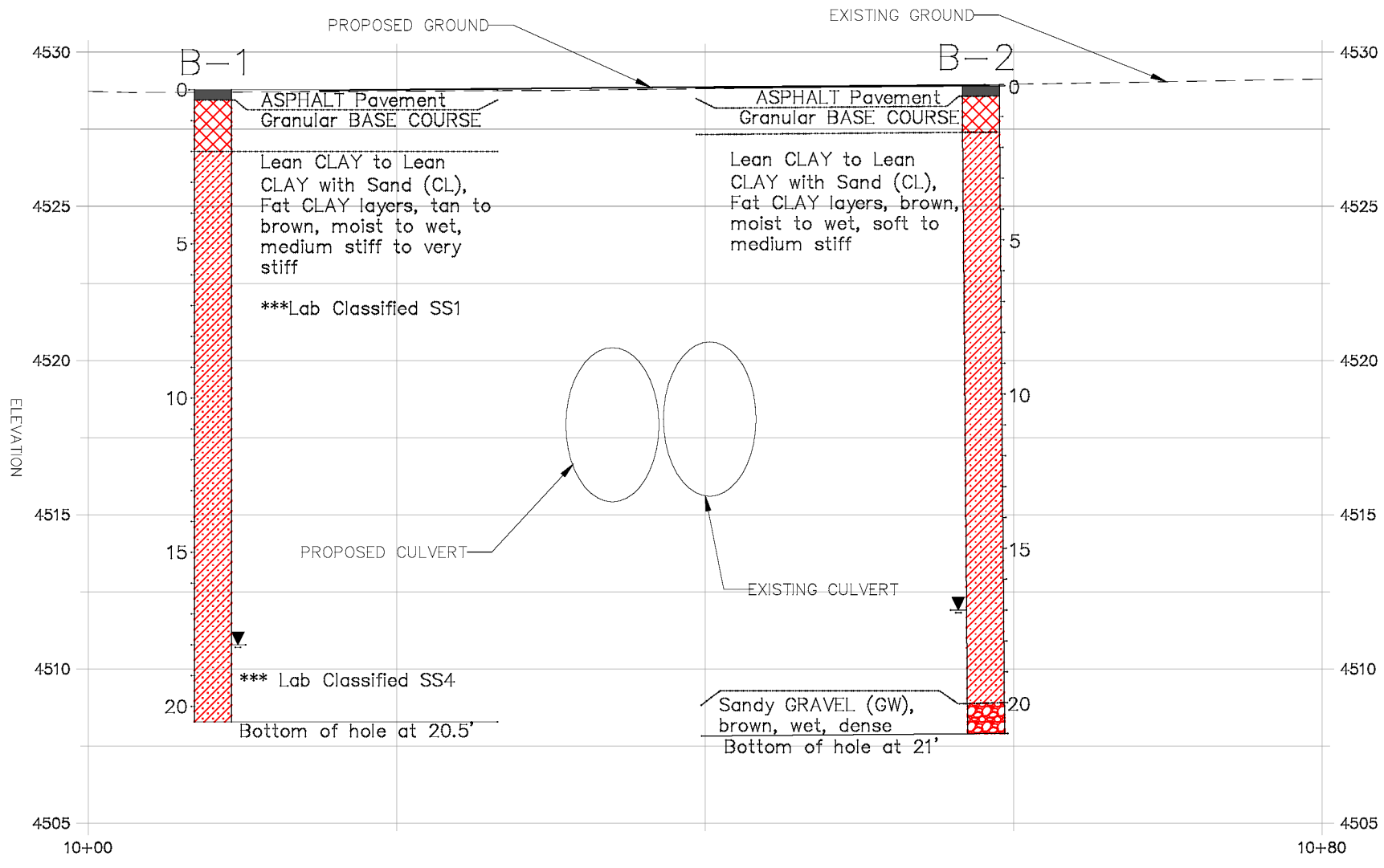

PROJECT NO. _____

CONSTRUCTION NOTES

NOTES:

1. THESE EXPLORATORY BORINGS WERE DRILLED ON DECEMBER 13, 2019 WITH A 4 INCH DIAMETER CONTINUOUS FLIGHT POWER AUGER BY HUDDLESTON–BERRY ENGINEERING AND TESTING LLC.
2. THE LINES BETWEEN MATERIALS SHOWN IN THE EXPLORATORY BORING LOGS REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN MATERIAL TYPES AND THE ACTUAL TRANSITIONS MAY BE GRADUAL.
3. 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.
4. FOR FURTHER INFORMATION OR CLARIFICATION OF DATA ON THIS SHEET PLEASE REFER TO THE GEOTECHNICAL AND GEOLOGIC HAZARDS INVESTIGATION 21.5–G.95 BRIDGE OVER PRITCHARD WASH GRAND JUNCTION, COLORADO DATED FEBRUARY 5, 2020.

LEGEND

- LOCATION OF EXPLORATORY BORING
- INDICATES APPROXIMATE GROUND WATER LEVEL (IN THIS CASE BOTH AT THE TIME OF DRILLING AND END OF DRILLING)

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DESCRIPTION	DATE
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REVISION 4	

DRAWN BY KSO DATE 2020
DESIGNED BY KA DATE 2020
CHECKED BY XXX DATE 201X
APPROVED BY XXX DATE 201X

SCALES: PLAN & PROFILE
HORIZONTAL: 1" = 10'
0 2.5 5 10
VERTICAL: 1" = 5'
0 1.25 2.5 5

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

GRJM–21.5–G.95 CULVERT REPLACEMENT
ENGINEERING GEOLOGY
STA 10+00 TO STA 10+80

PROJECT NO. _____

LEGEND

H = MAXIMUM ALLOWABLE HEIGHT OF COVER OVER THE TOP OF THE PIPE, EXCLUDING PAVEMENT THICKNESS.

FILL HEIGHTS AND DESIGN ASSUMPTIONS ARE BASED ON AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 4TH EDITION, SECTION 12, FOR 900 PSI LONG TERM STRENGTH OF HDPE, AND AASHTO T180 MINIMUM RELATIVE COMPACTION OF 95% OR 90%.

FILL HEIGHTS ARE BASED ON AASHTO M294 FOR POLYLEHTELENE ~~AND AASHTO M330 FOR POLYPROPYLENE, TYPE S~~ PIPES WITH OUTER, CORRUGATED WALLS AND SMOOTH INNER LINEARS.

FILL HEIGHTS, FOR INSTALLATION WITH HIGH WATER TABLE, REQUIRE A SPECIAL DESIGN. THE MAXIMUM HEIGHT IN HIGHWATER LOCATIONS SHOULD BE 15 FEET OR BASED ON AASHTO LRFD DESIGN SPECIFICATIONS.

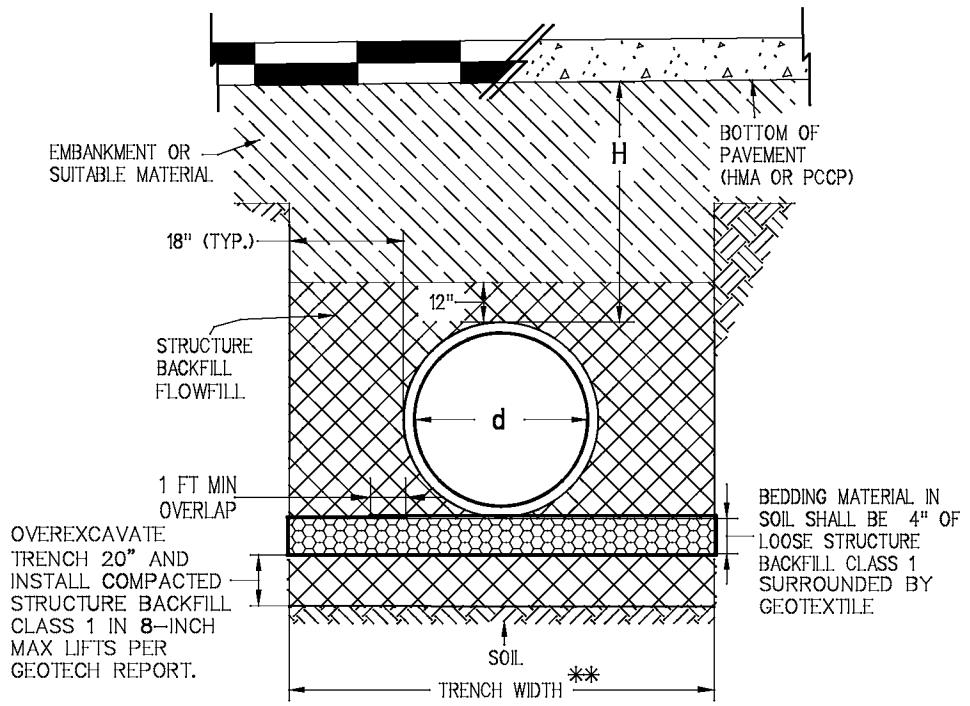
THE MINIMUM COVER SHALL BE AS SHOWN ON THESE TABLES OR CONFORM TO AASHTO REQUIREMENTS, WHICHEVER IS GREATER. THE MINIMUM COVER FOR PIPE IS MEASURED FROM THE TOP OF THE PIPE TO THE BOTTOM OF THE PAVEMENT: HMA OR PCCP.

THE MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE SUBGRADE DURING CONSTRUCTION. THE MINIMUM COVER IS BASED ON DUAL AXLE LOADS UP TO 50,000 POUNDS.

L_1 = LENGTH OF PIPE TO BE MEASURED WHEN PLACED IN ACCORDANCE WITH SECTION 624.

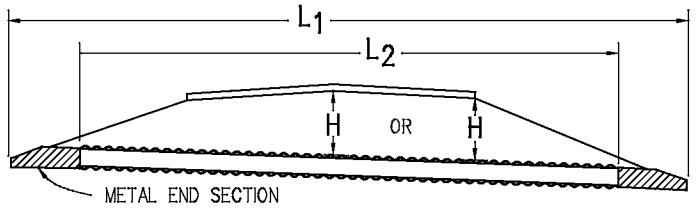
L_2 = LENGTH OF PIPE TO BE MEASURED WHEN PLACED IN ACCORDANCE WITH SECTION 603.

\+ = THE MINIMUM SPACING BETWEEN THE OUTSIDE WALLS OF MULTIPLE PIPES OR END SECTIONS IS 18" OR ½(d), WHICHEVER IS GREATER.



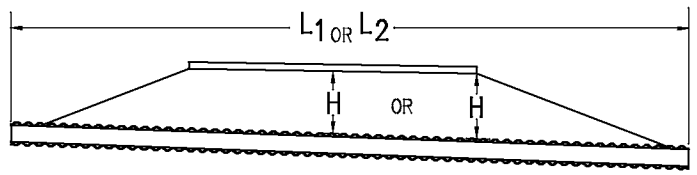
INSTALLATION OF PIPE

** TRENCH WIDTH ASSUMES STABLE IN-SITU SIDE WALL



NOTE: USE THE H THAT IS GREATER FOR MAXIMUM ALLOWABLE FILL HEIGHT.

PIPE WITH END SECTIONS

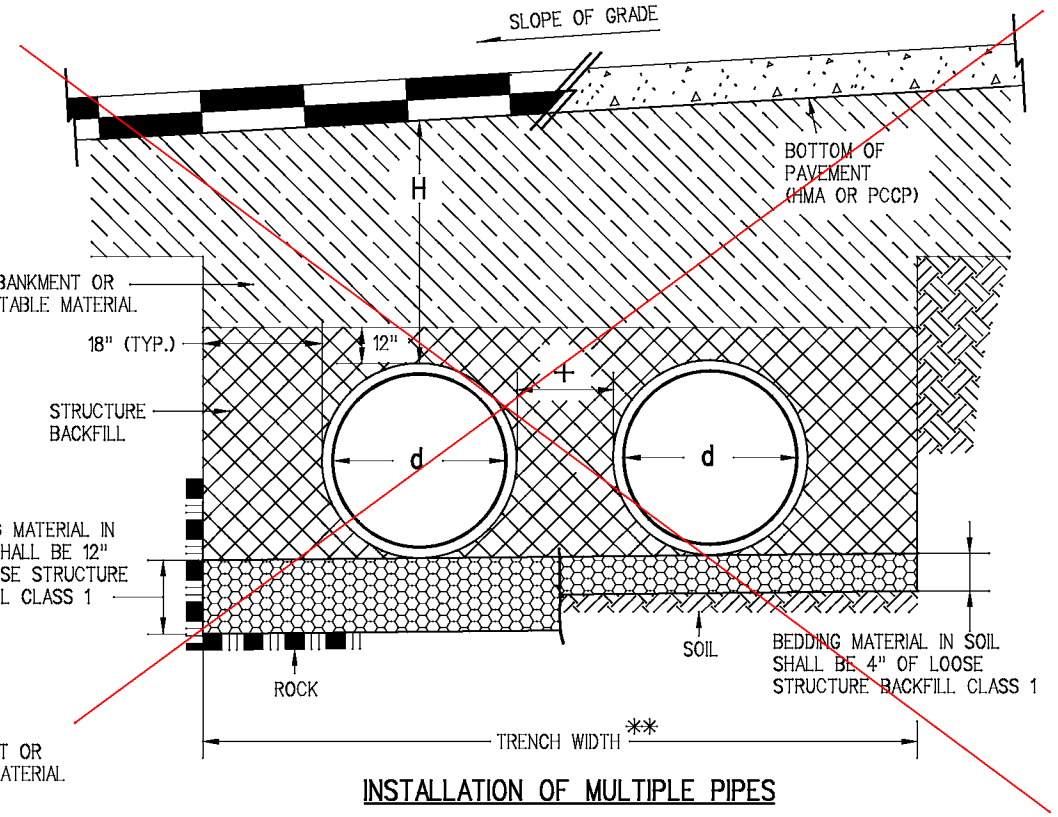


NOTE: USE THE H THAT IS GREATER FOR MAXIMUM ALLOWABLE FILL HEIGHT.

PIPE WITHOUT END SECTIONS

GENERAL NOTES

1. ALL PIPES SHALL MEET THE REQUIREMENTS OF AASHTO M294 FOR POLYETHELENE ~~AND AASHTO M330 FOR POLYPROPYLENE, TYPE S~~ FOR HIGH DENSITY CORRUGATED POLYETHYLENE PIPE (HDPE) ~~AND POLYPROPYLENE PIPE (PP) RESPECTIVELY,~~ WITH SMOOTH INNER SURFACE.
2. WHEN A PIPE IS TO BE EXTENDED, THE SAME PIPE MATERIAL AND SIZE AS IN THE ORIGINAL INSTALLATION SHALL BE USED.
3. MINIMUM COVER SHALL BE PROVIDED DURING CONSTRUCTION TO PROTECT THE PIPE FROM DAMAGE.
4. WHEN INSTALLING A GUARDRAIL OR A SIGN POST DIRECTLY ABOVE A PIPE, THE POST'S BOTTOM MUST BE AT LEAST 1 FOOT ABOVE THE TOP OF THE PIPE. THE HOLE FOR THE POST SHALL BE DRILLED INTO THE SOIL.
5. STRUCTURE BACKFILL MATERIAL SHALL BE CLASS 1.
6. ~~FOR PIPES 24 INCHES OR LESS IN DIAMETER, H MIN. MAY BE REDUCED TO ONE FOOT FOR LOW VOLUME APPROACH ROADS NOT ON STATE HIGHWAYS.~~

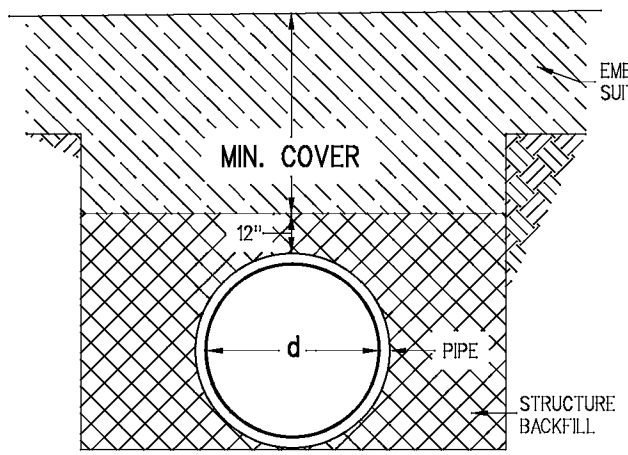


INSTALLATION OF MULTIPLE PIPES

PIPE DIAMETER, d (IN.)	H MINIMUM HEIGHT OF COVER (FT.)		H MAXIMUM HEIGHT OF COVER (FT.) 95% COMPACTION		90% COMPACTION	
12	2	~~*2*~~	27	~~*25*~~	19	~~*17*~~
15	2	~~*2*~~	29	~~*27*~~	20	~~*20*~~
18	2	~~*2*~~	24	~~*23*~~	17	~~*17*~~
24	2	~~*2*~~	21	~~*20*~~	15	~~*14*~~
30	2	~~*2*~~	18	~~*23*~~	12	~~*17*~~
36	2	~~*2*~~	20	~~*20*~~	13	~~*14*~~
42	2	~~*2*~~	19	~~*18*~~	13	~~*13*~~
48	3	~~*2*~~	17	~~*20*~~	12	~~*13*~~
60	3	~~*2.5*~~	20	~~*21*~~	13	~~*14*~~

~~*NOTE: THE VALUES FOR POLYPROPYLENE PIPES (AASHTO M330) ARE SHOWN IN ITALICS.*~~

MINIMUM AND MAXIMUM COVER



CONSTRUCTION MINIMUM COVER FOR PIPE

NOMINAL PIPE DIAMETER (IN.)	MINIMUM COVER (IN.) FOR INDICATED AXLE LOADS (KIPS)			
	18.0-50.0	50.0-75.0	75.0-110.0	110.0-150.0
24 - 36	24.0	30.0	36.0	36.0
42 - 48	36.0	36.0	42.0	48.0
54 - 60	36.0	36.0	42.0	48.0

AASHTO MINIMUM COVER FOR CONSTRUCTION LOADS

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REVISION △	

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APPROVED BY XXX DATE 201X

SCALES: PLAN & PROFILE

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ENGINEERING DIVISION

GRJM-21.5-G.95 CULVERT REPLACEMENT
CORRUGATED POLYETHYLENE PIPE (AASHTO M294)
DETAILS

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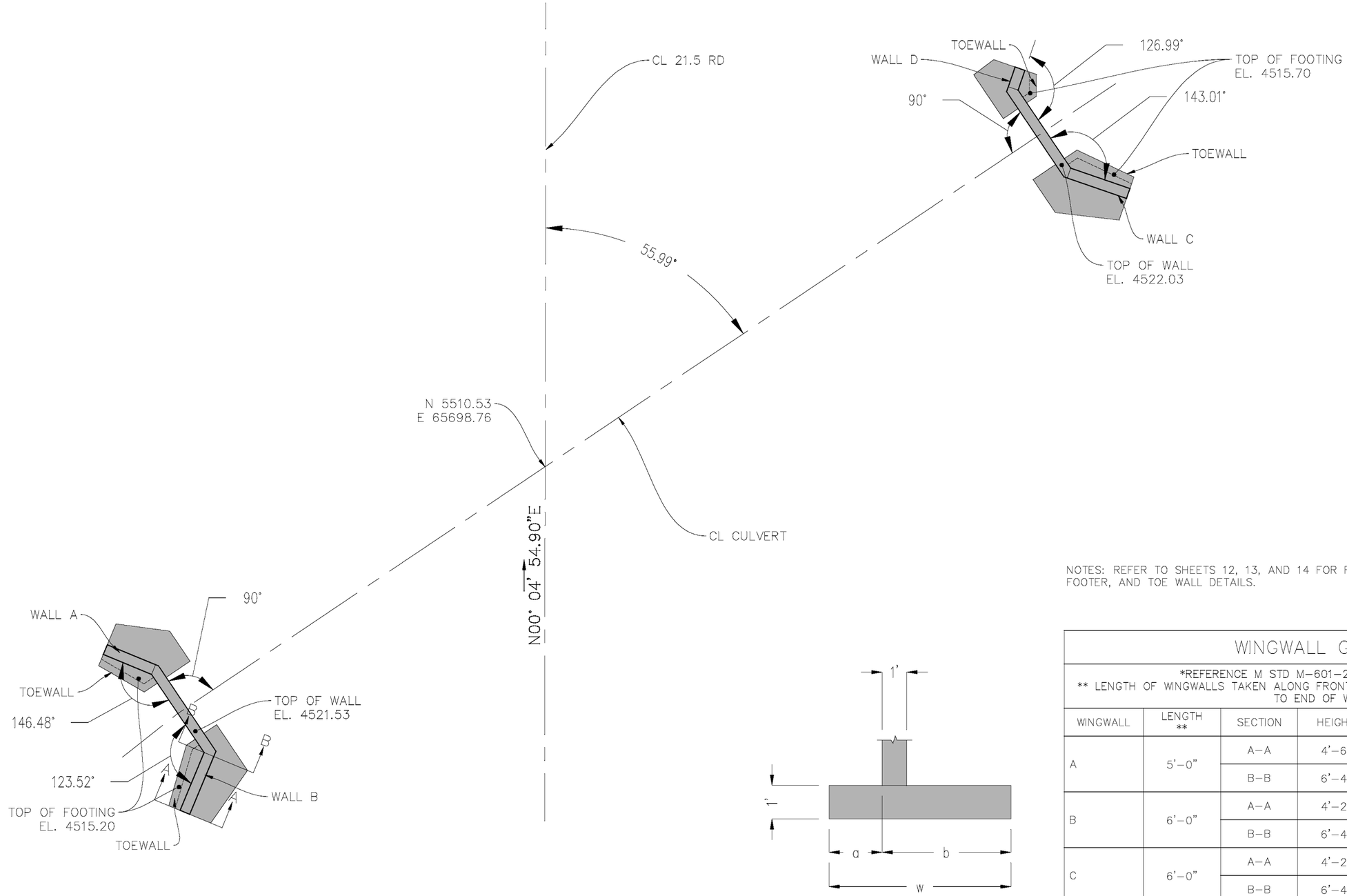
PROJECT NO. _____



NOTES: REFER TO SHEETS 12, 13, AND 14 FOR REBAR, FOOTER, AND TOE WALL DETAILS.

WINGWALL GEOMETRY

*REFERENCE M STD M-601-20 FOR REBAR & FOOTER
** LENGTH OF WINGWALLS TAKEN ALONG FRONT FACE OF WALL, FROM END OF HEADWALL TO END OF WINGWALL

WINGWALL	LENGTH **	SECTION	HEIGHT	a	b	w
A	5'-0"	A-A	4'-6"	1'-6"	2'-8"	4'-2"
		B-B	6'-4"	1'-8"	3'-0"	4'-8"
B	6'-0"	A-A	4'-2"	1'-4"	2'-4"	3'-8"
		B-B	6'-4"	1'-8"	3'-0"	4'-8"
C	6'-0"	A-A	4'-2"	1'-4"	2'-4"	3'-8"
		B-B	6'-4"	1'-8"	3'-0"	4'-8"
D	2'-0"	A-A	6'-4"	1'-10"	3'-4"	5'-2"
		B-B	6'-4"	1'-8"	3'-0"	4'-8"

DESCRIPTION	DATE
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SCALES: PLAN & PROFILE
HORIZONTAL: 1" = 10'
0 2.5 5 10

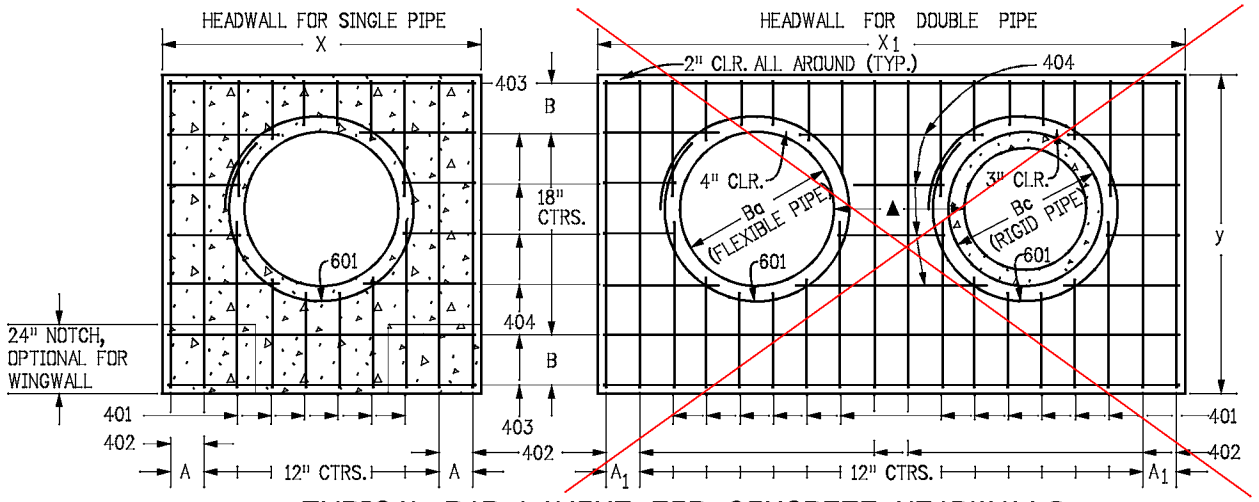
CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

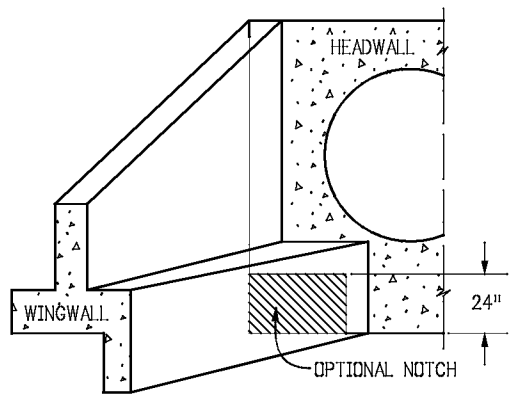
GRJM-21.5-G.95 CULVERT REPLACEMENT
HEADWALLS AND WINGWALLS

N:\Landproj\2019 GRJM 21.5-G.95 Culvert Rep\dwg\culvert_4-27-20.dwg, 11/5/2020 8:35:52 AM

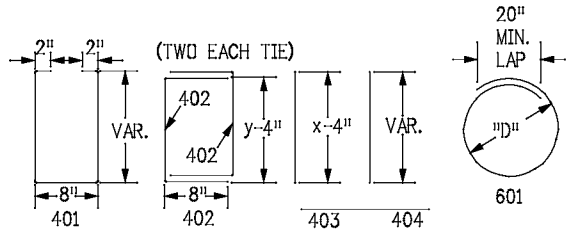
PROJECT NO. _____



TYPICAL BAR LAYOUT FOR CONCRETE HEADWALLS

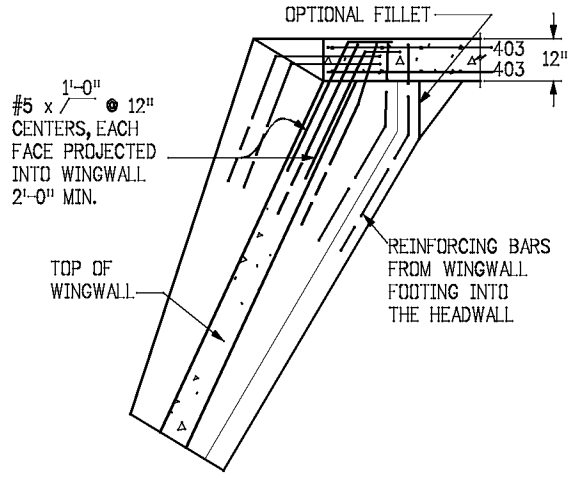


FRONT VIEW



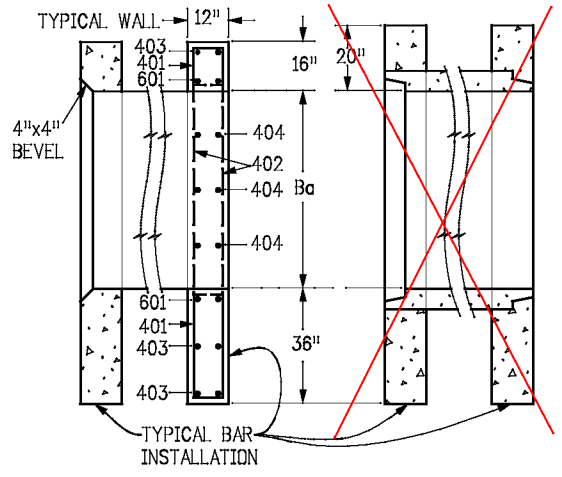
RIGID PIPE = Bc + 6"
"D" = FLEXIBLE PIPE = Ba + 8"
FLEXIBLE ARCH = SPAN + 8"
STRUCTURAL PLATE ARCH = RISE + 8"

BAR BENDING



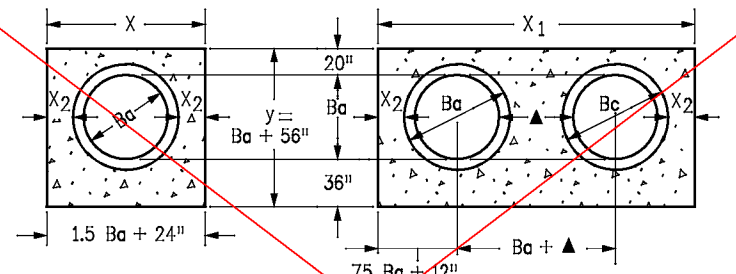
TOP VIEW

WINGWALL CONNECTION



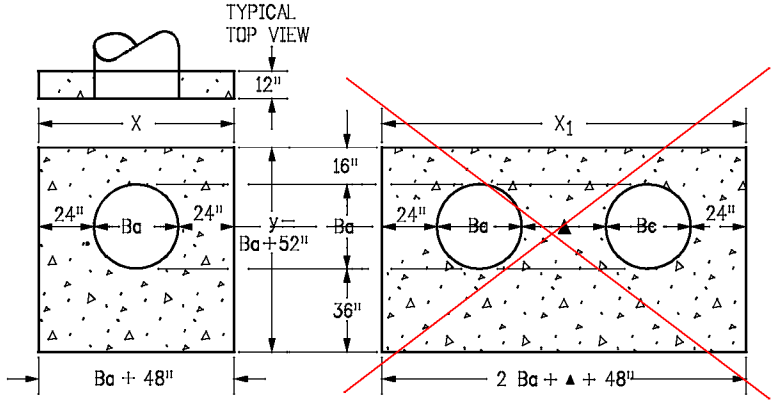
INLET OUTLET ENDS OF FLEXIBLE PIPE

INLET OUTLET ENDS OF RIGID PIPE



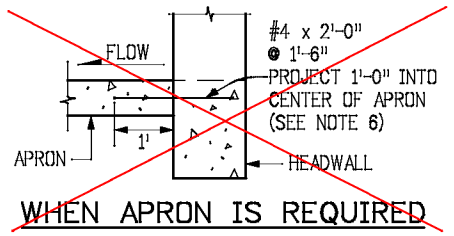
DIMENSIONS									QUANTITIES			
									CONCRETE		STEEL ■	
Ba IN.	Bc IN.	X FT.-IN.	A IN.	X_1 FT.-IN.	A_1 IN.	y FT.-IN.	B IN.	X_2 IN.	SGL. CU.YD.	DBL. CU.YD.	SGL. LBS.	DBL. LBS.
54	65	8-9	8½	15-6	7	9-2	17	20	2.12	3.55	209	364
60	72	9-6	7	17-0	10	9-8	11	21	2.35	3.99	236	414
66	79	10-3	11½	18-6	7	10-2	14	22	2.60	4.44	249	453
72	86	11-0	10	20-0	10	10-8	17	23	2.85	4.91	270	476
78	93	11-9	8½	21-3	11	11-2	11	24	3.11	5.29	306	527
84	100	12-6	7	22-6	7	11-8	14	25	3.38	5.68	333	572
90	107	13-3	11½	23-9	8½	12-2	17	26	3.66	6.08	335	593
96	114	14-0	10	25-0	10	12-8	11	27	3.94	6.48	379	649
102	121	14-9	8½	26-3	11½	13-2	14	28	4.24	6.89	400	664
108	128	15-6	7	27-6	7	13-8	17	29	4.54	7.30	424	707

HEADWALL FOR RIGID ROUND PIPE



DIMENSIONS								QUANTITIES			
								CONCRETE		STEEL ■	
Ba IN.	X FT.-IN.	A IN.	X_1 FT.-IN.	A_1 IN.	y FT.-IN.	B IN.	X_2 IN.	SGL. CU. YD.	DBL. CU. YD.	SGL. LBS.	DBL. LBS.
54	8-6	7	15-3	11½	8-10	15	18	2.19	3.81	211	358
60	9-0	10	16-6	7	9-4	18		2.38	4.25	217	396
66	9-6	7	17-9	8½	9-10	12	15	2.58	4.70	252	454
72	10-0	10	19-0	10	10-4	15		2.78	5.17	255	472
78	10-6	7	20-0	10	10-10	18	12	2.98	5.56	276	499
84	11-0	10	21-0	10	11-4	12		3.19	5.95	297	553
90	11-6	7	22-0	10	11-10	15	18	3.40	6.36	317	517
96	12-0	10	23-0	10	12-4	18		3.62	6.79	321	597
102	12-6	7	24-0	10	12-10	12	15	3.84	7.21	364	663
108	13-0	10	25-0	10	13-4	15		4.06	7.63	362	678

HEADWALL FOR FLEXIBLE ROUND PIPE



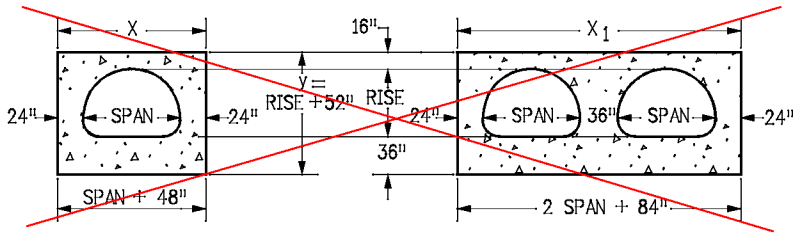
WHEN APRON IS REQUIRED

GENERAL NOTES

1. CONCRETE SHALL BE CLASS B. D
2. HEADWALL SHALL BE PERPENDICULAR TO THE PIPE ℄ UNLESS OTHERWISE SHOWN ON THE PLANS. TABULATED DIMENSIONS AND QUANTITIES MUST BE ADJUSTED FOR SKEWED INSTALLATIONS.
3. FOR WINGWALL DETAILS, SEE STANDARD PLAN M-601-20.
4. VOLUME OCCUPIED BY PIPE HAS BEEN DEDUCTED FROM STEEL AND CONCRETE QUANTITIES.
5. EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED ¾ IN.
6. ALL REINFORCING BARS SHALL HAVE A 2 IN. MINIMUM CLEARANCE.

▲ WHEN TWO OR MORE PIPES ARE LAID SIDE BY SIDE, THEY SHALL BE PLACED SO THAT THE ADJACENT PIPES WILL BE ½ INSIDE DIAMETER APART, OR ½ INSIDE SPAN APART, OR 3 FT. APART (INCLUDING WALL THICKNESS), WHICHEVER IS LESS.

■ ADD 0.89 x (X OR X_1) (LB.) WHEN APRON IS REQUIRED.



DIMENSIONS									QUANTITIES			
									CONCRETE		STEEL ■	
EQUIV. Ba IN.	SPAN IN.	RISE IN.	X FT.-IN.	A IN.	X_1 FT.-IN.	A_1 IN.	y FT.-IN.	B IN.	SGL. CU. YD.	DBL. CU. YD.	SGL. LBS.	DBL. LBS.
72	81	59	10-9	8½	20-6	7	9-3	17½	2.72	5.10	250	467
78	87	63	11-3	11½	21-6	7	9-7	10½	2.85	5.34	275	531
84	95	67	11-9	8½	22-10	9	9-11	12½	3.08	5.79	290	547
90	103	71	12-7	7½	24-2	11	10-3	15	3.30	6.21	321	591
96	112	75	13-4	12	25-8	8	10-7	16½	3.52	6.65	314	606
102	117	79	13-9	8½	26-6	7	10-11	9½	3.63	6.86	356	672
108	128	83	14-8	8	28-4	12	11-3	11½	3.96	7.51	376	699

HEADWALL FOR FLEXIBLE PIPE ARCH

DIMENSIONS										QUANTITIES			
										CONCRETE		STEEL ■	
EQUIV. Ba IN.	SPAN FT.-IN.	RISE FT.-IN.	X FT.-IN.	A IN.	X_1 FT.-IN.	A_1 IN.	y FT.-IN.	B IN.		SGL. CU. YD.	DBL. CU. YD.	SGL. LBS.	DBL. LBS.
66	6-1	4-7	10-1	10½	19-2	11	8-11	15½		2.52	4.70	232	424
75	7-0	5-1	11-0	10	21-0	10	9-5	9½		2.80	5.25	282	509
84	7-11	5-7	11-11	9½	22-10	9	9-11	12½		3.08	5.79	291	540
93	8-10	6-1	12-10	9	24-8	8	10-5	15½		3.36	6.33	309	622
102	9-9	6-7	13-9	8½	26-6	7	10-11	9½		3.63	6.86	379	673
111	10-11	7-1	14-11	9½	28-10	9	11-5	12½		4.05	7.67	377	711
120	11-10	7-7	15-10	9	30-8	8	11-11	15½		4.36	8.28	395	731
132	12-10	8-4	16-10	9	32-8	8	12-8	11		4.75	9.03	441	839
141	14-1	8-9	18-1	10½	35-2	11	13-1	13½		5.17	9.86	448	931
150	15-4	9-3	19-4	12	37-8	8	13-7	16½		5.69	10.88	490	953
159	15-10	9-10	19-10	9	38-8	8	14-2	11		5.89	11.25	534	1019

HEADWALL FOR STRUCTURAL PLATE ARCH

SKEW ANGLE A°	90	85	80	75	70	65	60	55	50	45	40	35	30
FACTOR (cosecA°)	1.000	1.004	1.015	1.035	1.064	1.103	1.155	1.221	1.305	1.414	1.556	1.743	2.000

SKEW FACTOR TABLE

N:\Landproj\2019 GRJM 21.5-G.95 Culvert Replacement\culvert_4-27-20.dwg, 12 Headwalls Details, 11/4/2020 3:54:58 PM

DESCRIPTION	DATE
REVISION △	
REVISION △	
REVISION △	
REVISION △	

DRAWN BY KSO DATE 2020
DESIGNED BY KA DATE 2020
CHECKED BY XXX DATE 201X
APPROVED BY XXX DATE 201X

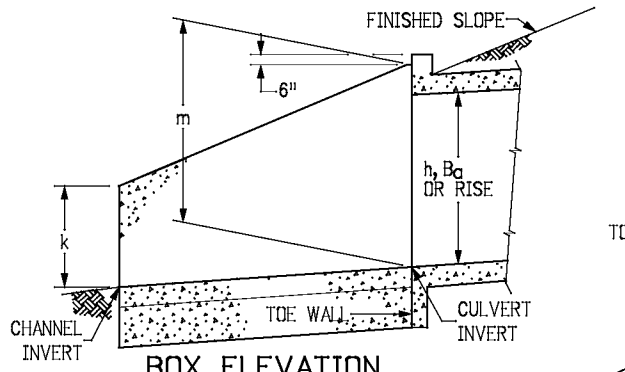
SCALES: PLAN & PROFILE

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

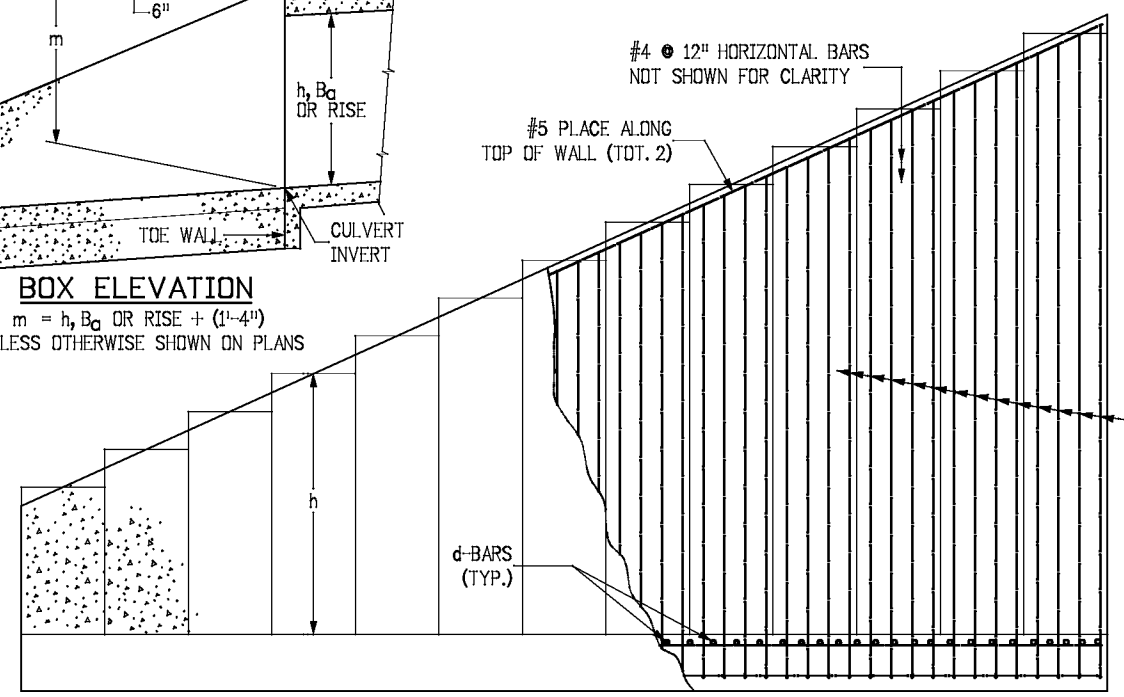
GRJM-21.5-G.95 CULVERT REPLACEMENT
M-601-10 HEADWALLS
DETAILS

PROJECT NO. _____



BOX ELEVATION

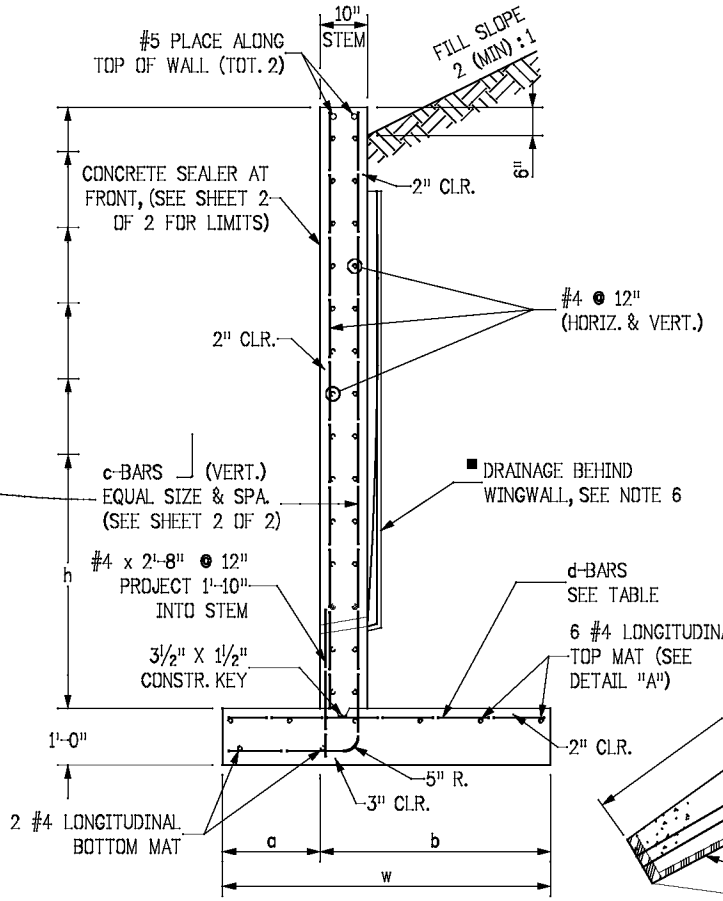
m = h, B_d OR RISE + (1'-4")
UNLESS OTHERWISE SHOWN ON PLANS



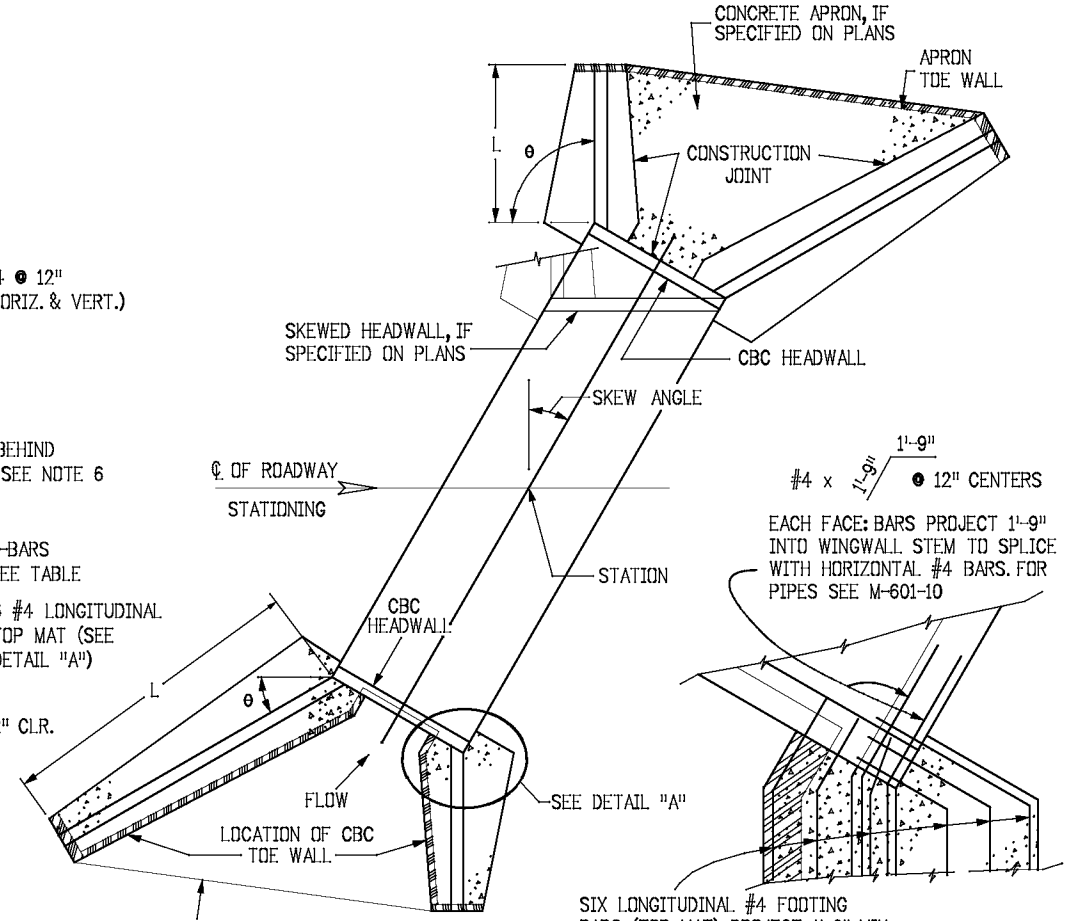
h =	2'	3'	4'	5'	6'	7'	8'	9'	10'	11'	■ 12'	■ 13'	■ 14'
a =	1'-0"	1'-2"	1'-4"	1'-6"	1'-8"	1'-10"	2'-0"	2'-2"	2'-4"	2'-6"	2'-8"	2'-10"	3'-0"
b =	1'-8"	2'-0"	2'-4"	2'-8"	3'-0"	3'-4"	3'-8"	4'-0"	4'-4"	4'-8"	5'-0"	5'-4"	5'-8"
w =	2'-8"	3'-2"	3'-8"	4'-2"	4'-8"	5'-2"	5'-8"	6'-2"	6'-8"	7'-2"	7'-8"	8'-2"	8'-8"
d-BARS	#4 @ 9"	#4 @ 9"	#4 @ 9"	#4 @ 9"	#4 @ 9"	#4 @ 9"	#5 @ 11"	#5 @ 10"	#5 @ 10"	#5 @ 8"	#6 @ 8"	#7 @ 9"	#7 @ 7"
✱ CONC. CY/LF	0.161	0.210	0.259	0.309	0.358	0.407	0.457	0.506	0.556	0.605	0.654	0.704	0.753

✱ DOES NOT INCLUDE TOE WALL QUANTITIES (0.05 CY/FT)
SEE SHEET 2 OF 2 FOR REINFORCING STEEL QUANTITY

■ REQUIRED DRAINAGE BEHIND WINGWALLS
SEE NOTE 6

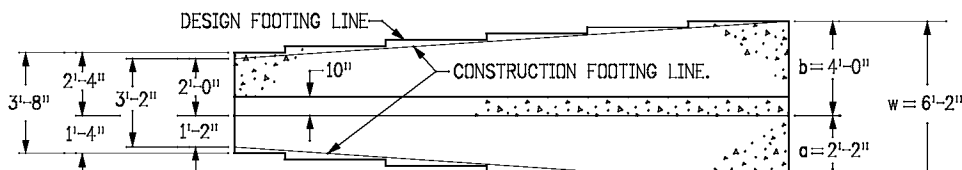


TYPICAL SECTION

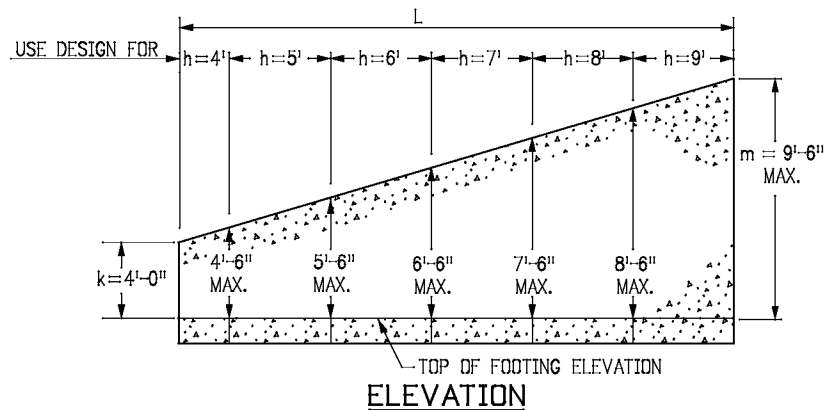


TYPICAL CULVERT LAYOUT

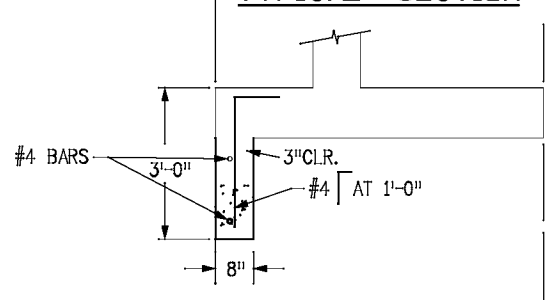
DETAIL "A"



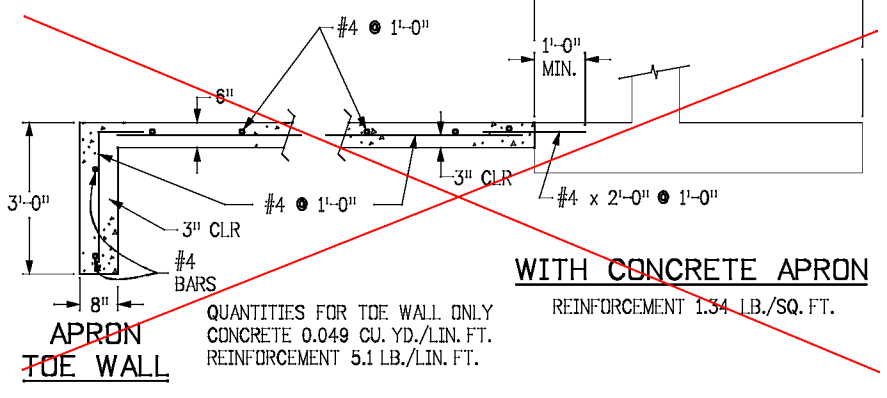
PLAN



ELEVATION DESIGN EXAMPLE



WITH TOE WALL



APRON TOE WALL

QUANTITIES FOR TOE WALL ONLY
CONCRETE 0.049 CU. YD./LIN. FT.
REINFORCEMENT 5.1 LB./LIN. FT.

WITH CONCRETE APRON

REINFORCEMENT 1.34 LB./SQ. FT.

DESIGN DATA:

AASHTO LRFD EIGHTH EDITION, 2017
DESIGN METHOD: LOAD AND RESISTANCE FACTOR DESIGN, YIELD LINE METHOD

REINFORCED CONCRETE:
CONCRETE CLASS D (BOX CULVERT): f'_c = 4,500 PSI
REINFORCING STEEL: f_y = 60,000 PSI

LOADING:
AT-REST EARTH (FLUID) PRESSURE FOR CONCRETE STEM DESIGN = 55 PCF FOR 2 (MIN.) : 1 SLOPED BACKFILL
ACTIVE EARTH (FLUID) PRESSURE FOR CONCRETE FOOTING DESIGN = 40 PCF FOR 2 (MIN.) : 1 SLOPED BACKFILL
LIVE LOAD SURCHARGE = 2'
MINIMUM RESISTANCE FOR SOIL BEARING = 5.5 KSF
SOIL BEARING RESISTANCE FACTOR = 0.45

GENERAL NOTES:

1. ALL EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED ¾ IN.
2. WINGWALL FOOTING AND FLOOR OF BOX CULVERT SHALL BE PLACED MONOLITHICALLY.
3. DIMENSIONS "h", "k", "L", "m" AND ANGLE "θ" FOR WINGWALL SHALL BE AS SHOWN ON THE PLANS.
4. MINIMUM CLASS B LAP SPLICE LENGTH FOR BLACK REINFORCING BARS:

BAR SIZE:	#4	#5	#6	#7
SPLICE LENGTH:	1'- 6"	1'-11"	2'-3"	2'-7"

5. DESIGN DOES NOT CONSIDER ANY SCOUR EFFECTS.
6. WINGWALL DRAIN SHALL BE REQUIRED IF "h" ≥ 12.0 FT., SEE SHEET 2 OF 2 FOR DETAILS.

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DESCRIPTION	DATE
REVISION △	
REVISION △	
REVISION △	
REVISION △	

DRAWN BY KSO DATE 2020
DESIGNED BY KA DATE 2020
CHECKED BY XXX DATE 201X
APPROVED BY XXX DATE 201X

SCALES: PLAN & PROFILE

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

GRJM-21.5-G.95 CULVERT REPLACEMENT
M-601-20 (SHEET 1 OF 2) WINGWALLS
DETAILS

PROJECT NO. _____

c-BARS AND REINFORCING STEEL QUANTITY (EXCLUDE TOE WALL)

✳ REINFORCING STEEL QUANTITY INCLUDES STEM AND FOOTING QUANTITIES, BUT DOES NOT INCLUDE TOE WALL QUANTITIES.

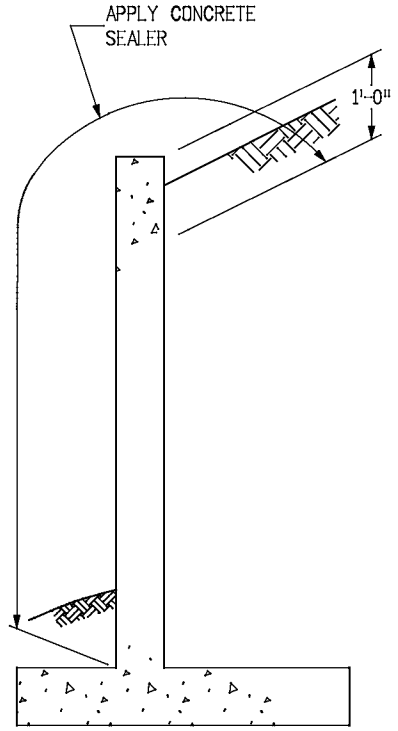
L (MULTIPLE OF m)		≤ (1.0 x m)		≤ (1.25 x m)		≤ (1.5 x m)		≤ (1.75 x m)		≤ (2.0 x m)		≤ (2.25 x m)		≤ (2.5 x m)		≤ (2.75 x m)		≤ (3.0 x m)		≤ (3.25 x m)		≤ (3.5 x m)	
m (FT)	k (FT)	c-BARS	✳ REINF. LB./L.F.	c-BARS	✳ REINF. LB./L.F.	c-BARS	✳ REINF. LB./L.F.	c-BARS	✳ REINF. LB./L.F.	c-BARS	✳ REINF. LB./L.F.	c-BARS	✳ REINF. LB./L.F.	c-BARS	✳ REINF. LB./L.F.	c-BARS	✳ REINF. LB./L.F.	c-BARS	✳ REINF. LB./L.F.	c-BARS	✳ REINF. LB./L.F.	c-BARS	✳ REINF. LB./L.F.
14	4	#4 @ 10"	53.60	#5 @ 10"	57.95	#5 @ 10"	57.10	#5 @ 8"	60.22	#5 @ 7"	62.43	#5 @ 7"	62.09	#5 @ 6"	65.38	#5 @ 6"	65.15	#6 @ 8"	67.10	#6 @ 8"	66.94	#6 @ 7"	70.66
	5	#4 @ 10"	55.86	#5 @ 10"	60.46	#5 @ 10"	59.60	#5 @ 8"	62.89	#5 @ 7"	65.23	#5 @ 7"	64.88	#5 @ 6"	68.34	#5 @ 6"	68.11	#6 @ 8"	70.17	#6 @ 8"	70.00	#6 @ 7"	73.90
	6	#5 @ 10"	64.43	#6 @ 10"	70.60	#6 @ 10"	69.69	#6 @ 8"	74.93	#6 @ 8"	74.45	#6 @ 7"	78.30	#6 @ 6"	83.64	#6 @ 6"	83.40	#6 @ 6"	83.22	#6 @ 6"	83.05	#7 @ 7"	89.64
	7	#5 @ 10"	67.29	#6 @ 10"	73.76	#6 @ 10"	72.83	#6 @ 8"	78.32	#6 @ 8"	77.84	#6 @ 7"	81.87	#6 @ 6"	87.45	#6 @ 6"	87.21	#6 @ 6"	87.02	#6 @ 6"	86.86	#7 @ 7"	93.73
	8	#5 @ 8"	74.71	#6 @ 8"	83.46	#6 @ 7"	87.09	#6 @ 6"	92.54	#7 @ 7"	99.47	#7 @ 7"	99.08	#7 @ 6"	107.11	#7 @ 6"	106.86	#7 @ 6"	106.66	#7 @ 6"	106.49	#7 @ 6"	106.35
	9	#5 @ 8"	78.10	#6 @ 8"	87.23	#6 @ 7"	91.03	#6 @ 6"	96.72	#7 @ 7"	103.93	#7 @ 7"	103.54	#7 @ 6"	111.90	#7 @ 6"	111.65	#7 @ 6"	111.45	#7 @ 6"	111.28	#7 @ 6"	111.13
13	4	#4 @ 10"	50.51	#4 @ 10"	49.25	#5 @ 10"	53.71	#5 @ 10"	53.09	#5 @ 10"	52.36	#5 @ 9"	53.85	#5 @ 8"	55.54	#5 @ 7"	57.85	#5 @ 7"	57.67	#5 @ 7"	57.51	#6 @ 9"	59.93
	5	#4 @ 10"	52.66	#4 @ 10"	51.37	#5 @ 10"	56.09	#5 @ 10"	55.46	#5 @ 10"	54.99	#5 @ 9"	56.29	#5 @ 8"	58.08	#5 @ 7"	60.51	#5 @ 7"	60.33	#5 @ 7"	60.17	#6 @ 9"	62.72
	6	#4 @ 10"	54.92	#5 @ 10"	59.48	#5 @ 9"	60.31	#6 @ 9"	67.56	#6 @ 9"	67.08	#6 @ 9"	66.70	#6 @ 8"	69.53	#6 @ 8"	69.28	#6 @ 7"	73.12	#6 @ 7"	72.95	#6 @ 7"	72.81
	7	#4 @ 10"	57.36	#5 @ 10"	62.16	#5 @ 9"	63.05	#6 @ 9"	70.66	#6 @ 9"	70.16	#6 @ 9"	69.78	#6 @ 8"	72.75	#6 @ 8"	72.50	#6 @ 7"	76.52	#6 @ 7"	76.35	#6 @ 7"	76.20
	8	#5 @ 10"	66.39	#6 @ 10"	72.82	#6 @ 8"	77.97	#6 @ 7"	81.68	#6 @ 7"	81.19	#6 @ 6"	86.67	#6 @ 6"	86.37	#7 @ 7"	93.18	#7 @ 7"	92.97	#7 @ 7"	92.80	#7 @ 7"	92.64
	9	#5 @ 10"	69.37	#6 @ 10"	76.10	#6 @ 8"	81.49	#6 @ 7"	85.37	#6 @ 7"	84.87	#6 @ 6"	90.59	#6 @ 6"	90.29	#7 @ 7"	97.39	#7 @ 7"	97.18	#7 @ 7"	97.00	#7 @ 7"	96.85
12	2	#4 @ 10"	43.91	#4 @ 10"	42.65	#4 @ 10"	41.82	#4 @ 10"	41.22	#4 @ 10"	40.78	#4 @ 9"	41.29	#5 @ 10"	44.61	#5 @ 10"	44.37	#5 @ 10"	44.18	#5 @ 10"	44.01	#5 @ 10"	43.87
	3	#4 @ 10"	45.82	#4 @ 10"	44.55	#4 @ 10"	43.71	#4 @ 10"	43.11	#4 @ 10"	42.66	#4 @ 9"	43.22	#5 @ 10"	46.75	#5 @ 10"	46.51	#5 @ 10"	46.32	#5 @ 10"	46.15	#5 @ 10"	46.01
	4	#4 @ 10"	47.80	#4 @ 10"	46.51	#4 @ 10"	45.65	#5 @ 10"	50.06	#5 @ 10"	49.59	#5 @ 10"	49.23	#5 @ 10"	48.94	#5 @ 10"	48.69	#5 @ 9"	50.00	#5 @ 8"	51.72	#5 @ 8"	51.57
	5	#4 @ 10"	49.84	#4 @ 10"	48.53	#4 @ 10"	47.66	#5 @ 10"	52.33	#5 @ 10"	51.85	#5 @ 10"	51.48	#5 @ 10"	51.19	#5 @ 10"	50.94	#5 @ 9"	52.33	#5 @ 8"	54.14	#5 @ 8"	54.00
	6	#4 @ 10"	51.99	#4 @ 10"	50.65	#5 @ 10"	55.34	#5 @ 8"	58.41	#5 @ 8"	57.93	#6 @ 10"	60.60	#6 @ 10"	60.29	#6 @ 9"	62.42	#6 @ 9"	62.22	#6 @ 9"	62.04	#6 @ 8"	64.89
	7	#4 @ 10"	54.30	#5 @ 10"	58.80	#5 @ 10"	57.87	#5 @ 8"	61.10	#5 @ 8"	60.61	#6 @ 10"	63.43	#6 @ 10"	63.11	#6 @ 9"	65.35	#6 @ 9"	65.15	#6 @ 9"	64.97	#6 @ 8"	67.96
	8	#5 @ 10"	62.91	#5 @ 10"	61.45	#5 @ 7"	67.46	#5 @ 6"	70.68	#5 @ 6"	70.20	#6 @ 7"	76.44	#6 @ 7"	76.13	#6 @ 7"	75.87	#6 @ 6"	81.30	#6 @ 6"	81.12	#6 @ 6"	80.98
	9	#5 @ 10"	65.64	#5 @ 10"	64.15	#5 @ 7"	70.44	#5 @ 6"	73.82	#5 @ 6"	73.33	#6 @ 7"	79.86	#6 @ 7"	79.54	#6 @ 7"	79.28	#6 @ 6"	84.95	#6 @ 6"	84.77	#6 @ 6"	84.62
11	2	#4 @ 10"	41.70	#4 @ 10"	40.42	#4 @ 10"	39.57	#4 @ 10"	38.96	#4 @ 10"	38.50	#4 @ 10"	38.15	#4 @ 10"	37.87	#4 @ 10"	37.63	#4 @ 9"	38.25	#5 @ 10"	41.46	#5 @ 10"	41.31
	3	#4 @ 10"	43.57	#4 @ 10"	42.27	#4 @ 10"	41.40	#4 @ 10"	40.79	#4 @ 10"	40.33	#4 @ 10"	39.97	#4 @ 10"	39.69	#4 @ 10"	39.45	#4 @ 9"	40.12	#5 @ 10"	43.54	#5 @ 10"	43.39
	4	#4 @ 10"	45.48	#4 @ 10"	44.16	#4 @ 10"	43.28	#4 @ 10"	42.66	#4 @ 9"	43.09	#5 @ 10"	46.57	#5 @ 10"	46.27	#5 @ 10"	46.02	#5 @ 10"	45.82	#5 @ 10"	45.65	#5 @ 10"	45.50
	5	#4 @ 10"	47.46	#4 @ 10"	46.10	#4 @ 10"	45.21	#4 @ 10"	44.58	#4 @ 9"	45.06	#5 @ 10"	48.74	#5 @ 10"	48.44	#5 @ 10"	48.19	#5 @ 10"	47.99	#5 @ 10"	47.81	#5 @ 10"	47.67
	6	#4 @ 10"	49.52	#4 @ 10"	48.14	#4 @ 9"	48.23	#5 @ 10"	51.88	#5 @ 10"	51.38	#5 @ 9"	52.57	#5 @ 9"	52.27	#5 @ 8"	53.99	#5 @ 8"	53.79	#5 @ 7"	56.16	#5 @ 7"	56.01
	7	#4 @ 10"	51.73	#4 @ 10"	50.31	#4 @ 9"	50.43	#5 @ 10"	54.29	#5 @ 10"	53.78	#5 @ 9"	55.04	#5 @ 9"	54.73	#5 @ 8"	56.55	#5 @ 8"	56.35	#5 @ 7"	58.84	#5 @ 7"	58.70
	8	#4 @ 10"	54.00	#5 @ 10"	58.44	#5 @ 10"	57.45	#5 @ 8"	60.64	#5 @ 7"	62.92	#5 @ 6"	66.25	#5 @ 6"	65.94	#5 @ 6"	65.69	#6 @ 8"	67.76	#6 @ 8"	67.57	#6 @ 7"	71.45
	9	#4 @ 10"	56.20	#5 @ 10"	60.87	#5 @ 10"	59.85	#5 @ 8"	63.21	#5 @ 7"	65.60	#5 @ 6"	69.09	#5 @ 6"	68.78	#5 @ 6"	68.52	#6 @ 8"	70.69	#6 @ 8"	70.51	#6 @ 7"	74.57
10	2	#4 @ 10"	39.84	#4 @ 10"	38.53	#4 @ 10"	37.65	#4 @ 10"	37.03	#4 @ 10"	36.57	#4 @ 10"	36.20	#4 @ 10"	35.91	#4 @ 10"	35.67	#4 @ 10"	35.48	#4 @ 9"	36.07	#4 @ 9"	35.93
	3	#4 @ 10"	41.68	#4 @ 10"	40.35	#4 @ 10"	39.47	#4 @ 10"	38.84	#4 @ 10"	38.36	#4 @ 10"	38.00	#4 @ 10"	37.71	#4 @ 10"	37.46	#4 @ 10"	37.27	#4 @ 9"	37.91	#4 @ 9"	37.76
	4	#4 @ 10"	43.58	#4 @ 10"	42.22	#4 @ 10"	41.31	#4 @ 10"	40.67	#4 @ 10"	40.19	#4 @ 10"	39.82	#4 @ 10"	39.53	#4 @ 10"	39.28	#4 @ 10"	39.08	#4 @ 9"	39.77	#4 @ 9"	39.63
	5	#4 @ 10"	45.53	#4 @ 10"	44.14	#4 @ 10"	43.21	#4 @ 10"	42.56	#4 @ 10"	42.07	#5 @ 10"	46.44	#5 @ 10"	46.13	#5 @ 10"	45.87	#5 @ 10"	45.67	#5 @ 10"	45.49	#5 @ 10"	45.34
	6	#4 @ 10"	47.58	#4 @ 10"	46.14	#4 @ 10"	45.20	#4 @ 10"	44.53	#4 @ 10"	44.03	#5 @ 10"	48.67	#5 @ 10"	48.35	#5 @ 10"	48.08	#5 @ 10"	47.88	#5 @ 10"	47.69	#5 @ 10"	47.54
	7	#4 @ 10"	49.79	#4 @ 10"	48.31	#4 @ 10"	47.34	#5 @ 10"	51.97	#5 @ 10"	51.45	#5 @ 10"	51.04	#5 @ 9"	52.29	#5 @ 9"	52.03	#5 @ 8"	53.79	#5 @ 8"	53.61	#5 @ 7"	56.00
	8	#4 @ 10"	52.06	#4 @ 10"	50.54	#4 @ 10"	49.54	#5 @ 10"	54.43	#5 @ 10"	53.89	#5 @ 10"	53.47	#5 @ 9"	54.80	#5 @ 9"	54.53	#5 @ 8"	56.39	#5 @ 8"	56.20	#5 @ 7"	58.72
9	2	#4 @ 10"	38.01	#4 @ 10"	36.75	#4 @ 10"	35.85	#4 @ 10"	35.21	#4 @ 10"	34.73	#4 @ 10"	34.36	#4 @ 10"	34.06	#4 @ 10"	33.81	#4 @ 10"	33.61	#4 @ 10"	33.44	#4 @ 10"	33.30
	3	#4 @ 10"	39.93	#4 @ 10"	38.56	#4 @ 10"	37.64	#4 @ 10"	36.99	#4 @ 10"	36.51	#4 @ 10"	36.13	#4 @ 10"	35.83	#4 @ 10"	35.58	#4 @ 10"	35.38	#4 @ 10"	35.21	#4 @ 10"	35.06
	4	#4 @ 10"	41.81	#4 @ 10"	40.40	#4 @ 10"	39.47	#4 @ 10"	38.81	#4 @ 10"	38.31	#4 @ 10"	37.93	#4 @ 10"	37.63	#4 @ 10"	37.37	#4 @ 10"	37.17	#4 @ 10"	36.99	#4 @ 10"	36.84
	5	#4 @ 10"	43.75	#4 @ 10"	42.30	#4 @ 10"	41.35	#4 @ 10"	40.67	#4 @ 10"	40.17	#4 @ 10"	39.78	#4 @ 10"	39.47	#4 @ 10"	39.20	#4 @ 9"	39.86	#5 @ 10"	43.28	#5 @ 10"	43.12
	6	#4 @ 10"	45.79	#4 @ 10"	44.30	#4 @ 10"	43.31	#4 @ 10"	42.62	#4 @ 10"	42.10	#4 @ 10"	41.71	#4 @ 10"	41.39	#4 @ 10"	41.12	#4 @ 9"	41.82	#5 @ 10"	45.46	#5 @ 10"	45.30
	7	#4 @ 10"	48.04	#4 @ 10"	46.50	#4 @ 10"	45.49	#4 @ 10"	44.77	#5 @ 10"	49.29	#5 @ 10"	48.86	#5 @ 10"	48.53	#5 @ 10"	48.24	#5 @ 10"	48.03	#5 @ 10"	47.84	#5 @ 10"	47.67
	8	#4 @ 10"	50.43	#4 @ 10"	48.84	#4 @ 10"	47.80	#4 @ 10"	47.06	#5 @ 10"	51.83	#5 @ 10"	51.40	#5 @ 10"	51.05	#5 @ 10"	50.77	#5 @ 10"	50.54	#5 @ 10"	50.35	#5 @ 10"	50.18
8	2	#4 @ 10"	36.41	#4 @ 10"	35.01	#4 @ 10"	34.08	#4 @ 10"	33.42	#4 @ 10"	32.92	#4 @ 10"	32.54	#4 @ 10"	32.23	#4 @ 10"	31.97	#4 @ 10"	31.77	#4 @ 10"	31.59	#4 @ 10"	31.44
	3	#4 @ 10"	38.23	#4 @ 10"	36.80	#4 @ 10"	35.85	#4 @ 10"	35.18	#4 @ 10"	34.67	#4 @ 10"	34.28	#4 @ 10"	33.97	#4 @ 10"	33.70	#4 @ 10"	33.50	#4 @ 10"	33.32	#4 @ 10"	33.17
	4	#4 @ 10"	40.09	#4 @ 10"	38.61	#4 @ 10"	37.64	#4 @ 10"	36.95	#4 @ 10"	36.44	#4 @ 10"	36.04	#4 @ 10"	35.72	#4 @ 10"	33.45	#4 @ 10"	35.25	#4 @ 10"	35.07	#4 @ 10"	34.91
	5	#4 @ 10"	41.99	#4 @ 10"	40.47	#4 @ 10"	39.47	#4 @ 10"	38.76	#4 @ 10"	38.24	#4 @ 10"	37.83	#4 @ 10"	37.50	#4 @ 10"	37.23	#4 @ 10"	37.02	#4 @ 10"	36.84	#4 @ 10"	36.68
	6	#4 @ 10"	43.97	#4 @ 10"	42.40	#4 @ 10"	41.36	#4 @ 10"	40.64	#4 @ 10"	40.10	#4 @ 10"	39.68	#4 @ 10"	39.35	#4 @ 10"	39.07	#4 @ 9"	43.33	#5 @ 10"	43.13	#5 @ 10"	42.96
	7	#4 @ 10"	46.19	#4 @ 10"	44.56	#4 @ 10"	43.49	#4 @ 10"	42.74	#4 @ 10"	42.18	#4 @ 10"	41.75	#4 @ 10"	41.41	#4 @ 10"	41.13	#4 @ 9"	45.65	#5 @ 10"	45.45	#5 @ 10"	45.28
7	2	#4 @ 10"	34.90	#4 @ 10"	33.44	#4 @ 10"	32.47	#4 @ 10"	31.78	#4 @ 10"	31.27	#4 @ 10"	30.86	#4 @ 10"	30.54	#4 @ 10"	30.27	#4 @ 10"	30.06	#4 @ 10"	29.88	#4 @ 10"	29.72
	3	#4 @ 10"	36.73	#4 @ 10"	35.23	#4 @ 10"	34.23	#4 @ 10"	33.53	#4 @ 10"	33.00	#4 @ 10"	32.59	#4 @ 10"	32.26	#4 @ 10"	31.99	#4 @ 10"	31.78	#4 @ 10"	31.59	#4 @ 10"	31.43
	4	#4 @ 10"	38.59	#4 @ 10"	37.04	#4 @ 10"	36.01	#4 @ 10"	35.29	#4 @ 10"	34.75	#4 @ 10"	34.33	#4 @ 10"	33.99	#4 @ 10"	33.71	#4 @ 10"	33.50	#4 @ 10"	33.31	#4 @ 10"	33.14
	5	#4 @ 10"	40.48	#4 @ 10"	38.86	#4 @ 10"	37.80	#4 @ 10"	37.06	#4 @ 10"	36.50	#4 @ 10"	36.07	#4 @ 10"	35.73	#4 @ 10"	35.44	#4 @ 10"	35.22	#4 @ 10"	35.03	#4 @ 10"	34.86
	6	#4 @ 10"	42.39	#4 @ 10"	40.71	#4 @ 10"	39.61	#4 @ 10"	38.84	#4 @ 10"	38.26	#4 @ 10"	37.82	#4 @ 10"	37.47	#4 @ 10"	37.17	#4 @ 10"	36.95	#4 @ 10"	36.75	#4 @ 10"	36.58

EXAMPLE:

SELECT THE c-BARS SIZE, SPACING AND STEEL QUANTITY FOR A 25.0 FEET LONG WINGWALL WITH m = 11.8 FT. AND k = 6.3 FT.

SOLUTION:

1. DETERMINE WINGWALL LENGTH IN MULTIPLE OF m:
   L / m = 25.0 / 11.8 = 2.12
   L = (2.12 x m), USE L ≤ (2.25 x m)
2. ROUND TO REAREST WHOLE NUMBER FOR m AND k:
   m = 11.8 FT., USE m = 12.0 FT.
   k = 6.3 FT., USE k = 6.0 FT.
3. DETERMINE c-BARS BY USING THE TABLE:
   L ≤ (2.25 x m)
   m = 12
   k = 6
   c-BARS: #6 @ 10"
   REINF. STEEL = 60.60 LB / LF
4. DETERMINE REINFORCING STEEL QUANTITY OF WHOLE WINGWALL:
   REINFORCING STEEL QUANTITY = 25.0 x 60.60 = 1,515 LB.



LIMITS OF CONCRETE SEALER AND WINGWALL DRAIN DETAILS

NOTES:
1. LIMITS OF SEALER SHALL INCLUDE HEADWALL.
2. COST OF CONCRETE SEALER SHALL BE INCLUDED IN THE WORK.
3. CONTRACTOR MAY USE TAMMSCOAT ACRYLIC COATING SYSTEM IN A SMOOTH FINISH WITH SAND COLOR. SUBSTITUTIONS MUST BE APPROVED BY THE ENGINEER.

N:\Landproj\2019 GRJM 21.5-G.95 Culvert Replacement_4-27-20.dwg, 14 Wingwalls Details (2), 11/4/2020 3:55:07 PM

DESCRIPTION	DATE
REVISION △	
REVISION △	
REVISION △	
REVISION △	

DRAWN BY KSO DATE 2020
DESIGNED BY KA DATE 2020
CHECKED BY XXX DATE 201X
APPROVED BY XXX DATE 201X

SCALES: PLAN & PROFILE

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

GRJM-21.5-G.95 CULVERT REPLACEMENT
M-601-20 (SHEET 2 OF 2) WINGWALLS
DETAILS

CITY OF Grand Junction COLORADO

Purchasing Division

ADDENDUM NO. 1

DATE: December 8, 2020
FROM: City of Grand Junction Purchasing Division
TO: All Offerors
RE: GRJM 21.5-G.95 Culvert Replacement IFB-4853-21-DH

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

Please make note of the following clarifications:

1. Q. What is City going to allow for traffic control? Who is responsible?

A. The contractor shall provide a cost for the Traffic Control (Complete-in-place, Road Closure) item #24 of the Bid Schedule. The contractor will work with a full road closure. Contractor must also provide VMS two weeks prior to the road closure (south and north of the project site on 21.5 Road).

2. Q. What right of ways are involved in the project?

A. The contractor will need to work with Lori Seeley at Mesa County Road and Bridge to obtain a permit to work in the Right of Way.

3. Q. Are re-seeding and erosion control required?

A. Yes, re-seeding is required. If seed is unavailable, a substitute Erosion Control Blanket (coir blanket, ECTC Classification 3B) shall be provided in place of the seed. Cost of this Blanket will be paid for under the Seeding item #12 of the Bid Schedule.

4. Q. Are weep holes and drainage system required behind the wingwalls?

A. No.

5. Q. Does the City have any interest in trenchless for this project?

A. The City is not interested in a trenchless system for this project.

6. Q. Would RCP be an acceptable alternate?

A. The City is not interested in RCP for this project.

7. Q. Does the City have any designated staging areas for the project?

A. Establishing project staging area(s) shall be the responsibility of the Contractor.

8. Q. Who is responsible for surveying?

A. The contractor shall provide Construction Surveying per item #22 of the Bid Schedule.

9. Q. Who will be providing the QA and QC?

A. The City's consultant will provide the QA materials testing, and the contractor will provide the QC materials testing.

10. Q. What is to be done with the 12" AC pipe on the west side of 21.5 Road?

A. This will be addressed in the next addendum.

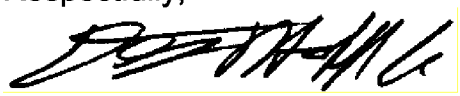
11. Q. Can we have the flow data for this project?

A. Yes, this will be included in this addendum. These flows are from 2017 and taken at the last culvert (72" RCP) before outfall into the Colorado River.

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

All other conditions of subject remain the same.

Respectfully,



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

Stream Gage Installation with GVDD
Site Visit: 2/5/17

Parties present: Hod, and Austin from GVDD and Maggie from SGM.

Pritchard (circular)			
Historical Flows	**Month**		**Flow (cfs)**
	July		15.62 measured in channel
	Sept.		18.3 measured in channel
	August		11.4 measured in channel
	February		1.73 (from culvert) and 1.33 from channel
Site Data	**Depth Verification at each side**		**Obstructions?**
	LB RB	equal on both sides since circuler	No observable backwater affects to Pritchard.
Data Verification	**Data Verification**		
		Variable	**Eqn**
	Depth (ft)	0.4	Measured on site
	n	0.013	From Manning n table. Smoother culvert conditions
	Radius (ft)	3	Measured on site
	Chord Length (ft)	2.99	Calculated from geometric equations
	Theta	1.04	Calculated from geometric equations
	Area (ft^2)	0.81	Calculated from geometric equations
	Slope (ft/ft)	0.00458	Calculated from previous flow measurements
	Wet Perimete. (ft)	3.13	Calculated from geometric equations
	Hyd. Rad (A/P) (ft)	0.26	Calculated
	Calc. Flow (cfs)	2.55	Q= (1.49/n)*(A)*(Hyd. Rad)^2/3*Slope^0.5
	Measured Flow (cfs)	1.73/1.33	Using area of flow multiplied by mean velocity in center of culvert/flow measured across channel downstream of culvert using Sontek flow tracker equipment
Site Summary	**How many were installed?**		2 staff lengths (6.67 ft total)
	Number of bolts installed?		All bolts with none on bottom in flow
	Concern for future measurements		Lined up with bottom of pipe using bubble level. Readings may be difficult in low flow periods as the depth on the staff gage is buried a bit in mud at low flows like observed in February.

Field Notes
Installed to left side of culvert when looking upstream. 6' of staff gage is installed. Right now flow is low so depth is hard to read because of mud on sides, but there is no mud in actual culvert. Hard to get good read on channel flows at all flow locations due to undercut banks, and thick vegetation causing of eddy interaction downstream of culvert.

CITY OF Grand Junction COLORADO

Purchasing Division

ADDENDUM NO. 2

DATE: December 9, 2020
FROM: City of Grand Junction Purchasing Division
TO: All Offerors
RE: GRJM 21.5-G.95 Culvert Replacement IFB-4853-21-DH

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

Please make note of the following clarifications:

1. Q. What is to be done with the 12" AC pipe on the west side of 21.5 Road?

A. See attached drawings to address this item. See attached updated Price Bid Schedule. Contractor shall utilize the Addendum 2 Price Bid Schedule when submitting their bid response.

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

All other conditions of subject remain the same.

Respectfully,

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

Bid Schedule: GRJM-21.5-G.95 Culvert Replacement (Addendum 2)

Item No.	CDOT, City Ref.	Description	Quantity	Units	Unit Price	Total Price
1	108.2	60" Culvert (HDPE)	100.	Lin. Ft.	$ _____	$ _____
2	108.2	10" Irrigation Pipe (SDR 35 PVC) (Includes all fittings)	20.	Lin. Ft.	$ _____	$ _____
3	201-00000	Clearing and Grubbing	450.	Sq. Yd.	$ _____	$ _____
4	202-00220	Removal of Asphalt Mat	122.	Sq. Yd.	$ _____	$ _____
5	202	Removal of Existing Pipe (CMP)	90.	Lin. Ft.	$ _____	$ _____
6	202	Removal of Existing Pipe Sleeve (12" AC) (Includes Disposal)	12.	Lin. Ft.	$ _____	$ _____
7	202	Removal of Fence (Barbed Wire, 36" High)	6.	Lin. Ft.	$ _____	$ _____
8	203-00000	Unclassified Excavation (Complete in Place)	Lump	Sum	- - -	$ _____
9	206-00065	Structural Backfill Material (Flow-fill, Complete in Place)	200.	Cubic Yd.	$ _____	$ _____
10	206-00100	Structural Backfill Material (Class 1, Complete in Place)	1,034.	Cubic Yd.	$ _____	$ _____
11	208-00070	Vehicle Track Pad	2.	Each	$ _____	$ _____
12	208-00011	Erosion Bales (Weed Free)	4.	Each	$ _____	$ _____
13	208-00045	Concrete Washout Structure	1.	Each	$ _____	$ _____
14	211-03005	Dewatering (To be used for Pritchard Wash Bypass if needed)	Lump	Sum	- - -	$ _____
15	212-00007	Seeding (Native) (Hydraulic)	450.	Sq. Yd.	$ _____	$ _____
16	304	Aggregate Base Course (Class 6) complete in place	56.	Cubic Yd.	$ _____	$ _____
17	403-34752	Hot Mix Asphalt (Patching) (Grading SX) (75)(PG 64-22) (4" Thick)	31.	Ton	$ _____	$ _____
18	420-00300	Geotextile (Mirafi 500x)	220.	Sq. Yd.	$ _____	$ _____

Bid Schedule: GRJM-21.5-G.95 Culvert Replacement (Addendum 2)

Item No.	CDOT, City Ref.	Description	Quantity	Units	Unit Price	Total Price
19	601	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 walls beneath 21.5 Road.) Work shall include Reinforcing Steel (Epoxy Coated), Structural Concrete Coating (Exterior of wall), and any necessary appurtenances to complete work.	15.	Cubic Yd.	$ _____	$ _____
20	606	Guardrail Type 3 (31 IN MGS). (Includes Installation)	37.5	Lin. Ft.	$ _____	$ _____
21	606	Transition Type 3J (31 IN MGS), R = 8'-6", 105° angle. (Includes Installation)	1.	Each	$ _____	$ _____
22	606	Transition Type 3J (31 IN MGS), R = 8'-6", 75° angle. (Includes Installation)	1.	Each	$ _____	$ _____
23	606	End Anchorage Type 3K (Includes Installation)	1.	Each	$ _____	$ _____
24	620-00020	Sanitary Facility	1.	Each	$ _____	$ _____
25	625-00000	Construction Surveying	Lump	Sum	---	$ _____
26	626-00000	Mobilization	Lump	Sum	---	$ _____
27	630	Traffic Control (Complete in Place, Road Closure)	Lump	Sum	---	$ _____
28	700-70170	F/A Pothole Utilities	---	---	---	$ 6,000.00
MCR		Minor Contract Revisions	---	---	---	$ 25,000.00
				Bid Amount:		**$** _____

Bid Amount:

_____ **dollars**

PROJECT NO. _____

Item No.	CDOT, City Ref.	Description	Quantity	Units
1	108.2	60" Culvert (HDPE)	100.	Lin. Ft.
2	108.2	10" Irrigation Pipe (SDR 35 PVC) (Includes all fittings)	20.	Lin. Ft.
3	201-00000	Clearing and Grubbing	450.	Sq. Yd.
4	202-00220	Removal of Asphalt Mat	122.	Sq. Yd.
5	202	Removal of Existing Pipe (CMP)	90.	Lin. Ft.
6	202	Removal of Existing Pipe Sleeve (12" AC) (Includes Disposal)	12.	Lin. Ft.
7	202	Removal of Fence (Barbed Wire, 36" High)	6.	Lin. Ft.
8	203-00000	Unclassified Excavation (Complete in Place)	Lump	Sum
9	206-00065	Structural Backfill Material (Flow-fill, Complete in Place)	200.	Cubic Yd.
10	206-00100	Structural Backfill Material (Class 1, Complete in Place)	1,034.	Cubic Yd.
11	208-00070	Vehicle Track Pad	2.	Each
12	208-00011	Erosion Bales (Weed Free)	4.	Each
13	208-00045	Concrete Washout Structure	1.	Each
14	211-03005	Dewatering (To be used for Pritchard Wash Bypass if needed)	Lump	Sum
15	212-00007	Seeding (Native) (Hydraulic)	450.	Sq. Yd.
16	304	Aggregate Base Course (Class 6) complete in place	56.	Cubic Yd.
17	403-34752	Hot Mix Asphalt (Patching) (Grading SX) (75)(PG 64-22) (4" Thick)	31.	Ton
18	420-00300	Geotextile (Mirafi 500x)	220.	Sq. Yd.
19	601	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 walls beneath 21.5 Road.) Work shall include Reinforcing Steel (Epoxy Coated), Structural Concrete Coating (Exterior of wall), and any necessary appurtenances to complete work.	15.	Cubic Yd.
20	606	Guardrail Type 3 (31 IN MGS). (Includes Installation)	37.5	Lin. Ft.
21	606	Transition Type 3J (31 IN MGS), R = 8'-6", 105° angle. (Includes Installation)	1.	Each
22	606	Transition Type 3J (31 IN MGS), R = 8'-6", 75° angle. (Includes Installation)	1.	Each
23	606	End Anchorage Type 3K (Includes Installation)	1.	Each
24	620-00020	Sanitary Facility	1.	Each
25	625-00000	Construction Surveying	Lump	Sum
26	626-00000	Mobilization	Lump	Sum
27	630	Traffic Control (Complete in Place, Road Closure)	Lump	Sum

1 Addendum #2 12/9/2020

EARTHWORKS	
CUT	861 Cubic Yd.
FILL	1034 Cubic Yd.

DESCRIPTION	DATE
REVISION 1 Addendum #2	12/9/2020
REVISION 2	
REVISION 3	
REVISION 4	

DRAWN BY KSO DATE 2020
DESIGNED BY KA DATE 2020
CHECKED BY XXX DATE 201X
APPROVED BY XXX DATE 201X

SCALES: PLAN & PROFILE

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

GRJM-21.5-G.95 CULVERT REPLACEMENT
SUMMARY OF APPROXIMATE QUANTITIES

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PROJECT NO. _____

CONSTRUCTION NOTES

(1) 202 – REMOVAL OF ASPHALT MAT. CUT AND REMOVE ASPHALT AS SHOWN. (INDICATED BY DOT HATCH PATTERN)

(3) 202 – REMOVAL OF CONCRETE. SAW CUT AND REMOVE CONCRETE AS SHOWN. (INDICATED BY CROSS HATCH PATTERN) INCLUDES BUT NOT LIMITED TO CURB, GUTTER, SIDEWALK, DRIVEWAY, SLABS, V–PAN, CURB RAMPS, INTERSECTION CORNERS, APRONS, AND LANDSCAPE BORDERS.

(12) 202 – REMOVAL OF FENCE (BARBED WIRE, 36" HIGH)

(15) 202 – REMOVAL OF PIPE SLEEVE (12" AC, INCLUDED DISPOSAL) PROTECT 10" PVC PIPE AND EXTEND PER PLAN

(26) 202 – REMOVAL OF EXISTING CULVERT. (SIZE AND TYPE AS SHOWN ON PLAN)

(103) 210 – REMOVE AND RESET SIGN – BY CITY

(828) 828 – PROTECT EXISTING UTILITIES IN PLACE. SEE TABLE BELOW FOR MORE INFORMATION ABOUT EACH UTILITY. ALSO SEE PROJECT SPECIFICATIONS – UTILITY SECTION FOR COORDINATION WITH UTILITY OWNERS.

PROTECT UTILITIES

	UTILITY	OWNER
A	PROTECT 2" GAS LINE	XCEL ENERGY
B	PROTECT 6" ELECTRIC LINE	XCEL ENERGY
C	PROTECT 6" ELECTRIC LINE	GRAND VALLEY POWER
D	PROTECT OVERHEAD POWER	GRAND VALLEY POWER
E	PROTECT OVERHEAD CABLE	CHARTER?
F	PROTECT 2 TELEPHONE LINES	CENTURY LINK
G	PROTECT OVERHEAD FIBER OPTIC	UNITED PRIVATE NETWORK
H	PROTECT 8" WATER LINE	UTE WATER
I	PROTECT 8" SANITARY SEWER	CITY OF GRAND JUNCTION
J	PROTECT 2" FIBER OPTIC	CENTURY LINK

54" DIA CMP

60" DIA CMP

LIMITS OF CONSTRUCTION

EASEMENT

DESCRIPTION	DATE
REVISION ADDENDUM #2	12/9/2020
REVISION	
REVISION	
REVISION	

DRAWN BY KSO DATE 2020
DESIGNED BY KA DATE 2020
CHECKED BY XXX DATE 201X
APPROVED BY XXX DATE 201X

SCALES: PLAN & PROFILE
HORIZONTAL: 1" = 10'
0 2.5 5 10

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

GRJM–21.5–G.95 CULVERT REPLACEMENT
DEMOLITION PLAN
STA 0+00 TO STA 1+15

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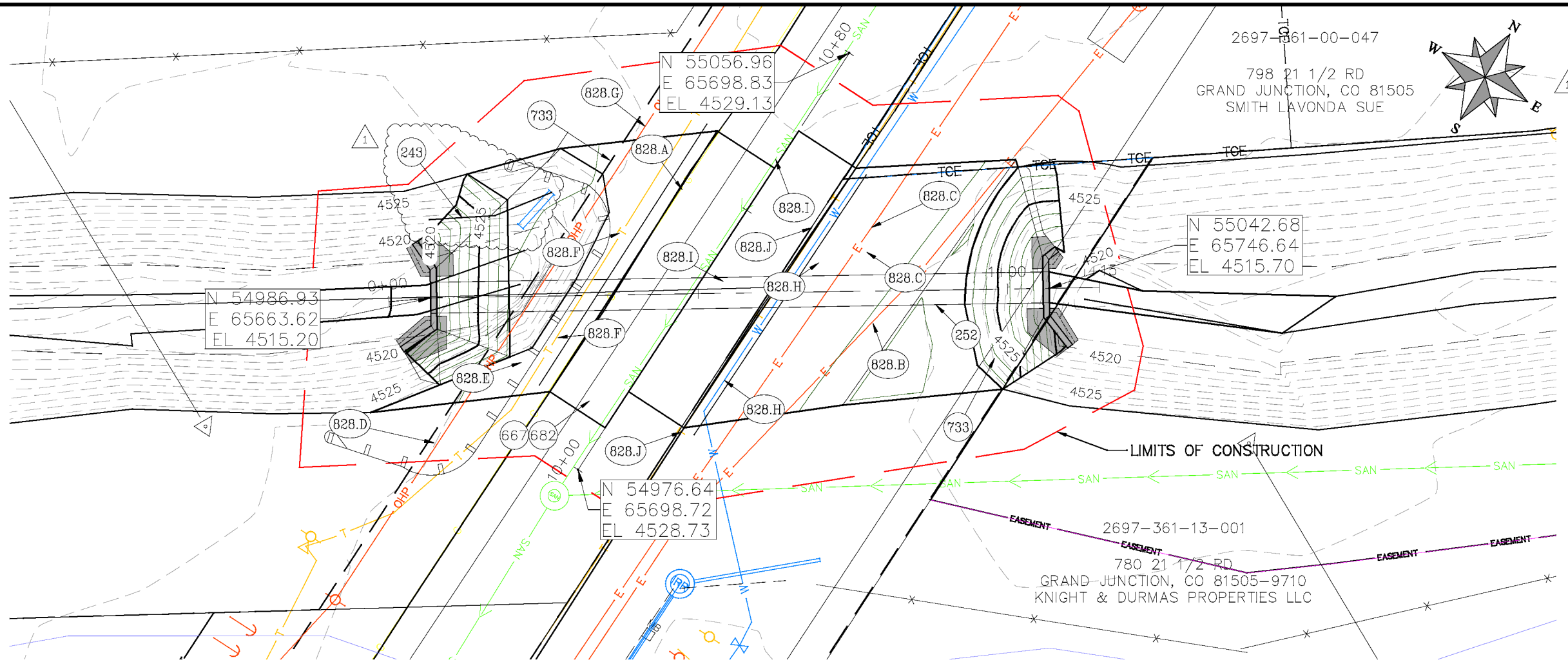
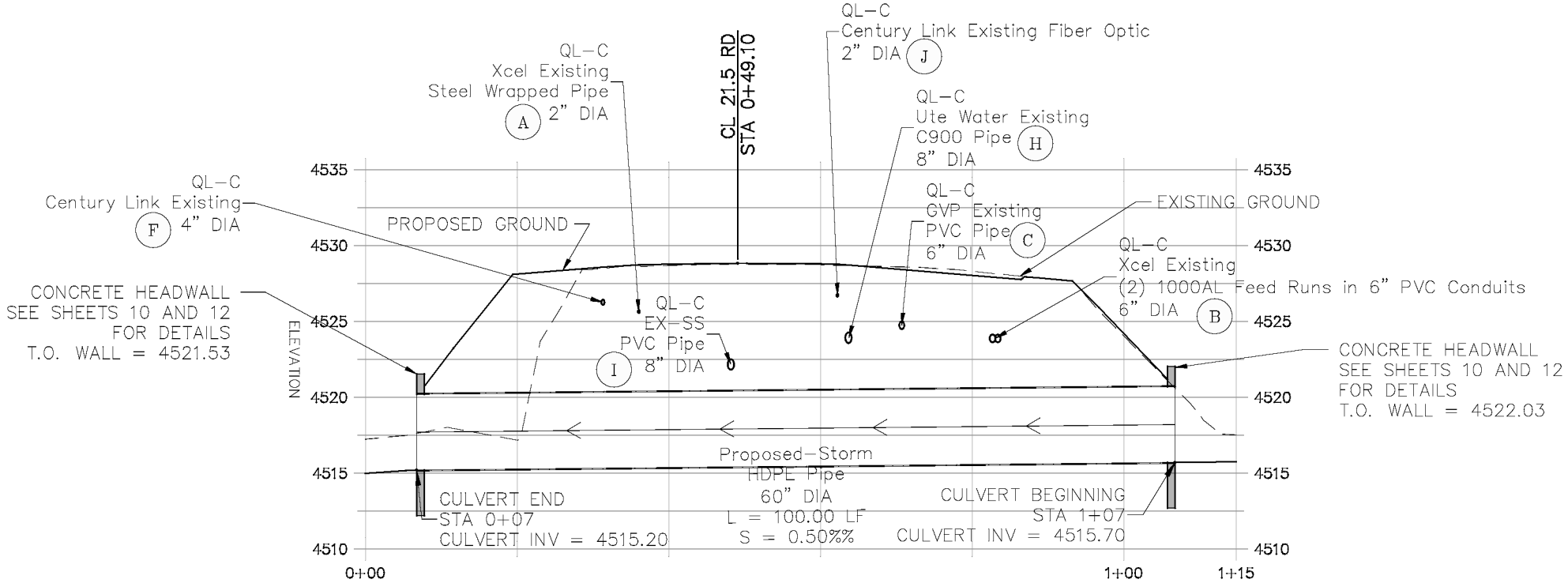


PLAN



PROFILE

PROJECT NO. _____

CONSTRUCTION NOTES

(243) 108.2 – 10" IRRIGATION PIPE (SDR 35 PVC) – EXTEND (2) 10 FT LENGTHS WITH (2) 22½ DEG. ELBOWS TO NEW DAYLIGHT BEYOND NEW WING WALL

(252) 108.2 – 60" CULVERT (HDPE)

(667) 304 – AGGREGATE BASE COURSE (CLASS 6) (6" THICK)

(682) 401.08 – HOT BITUMINOUS PAVEMENT (PATCHING) (4" THICK) (GRADING SX, PG 64-22, GYR.=75) (TWO 2" LIFT)

(733) 212 – HYDROSEED WITH NATIVE SEED MIX.

(828) PROTECT UTILITIES

NOTE:
ALL UTILITIES DEPICTED AT QUALITY LEVEL B (QL-B) UNLESS OTHERWISE NOTED.

PROTECT UTILITIES

	UTILITY	OWNER
A	PROTECT 2" GAS LINE	XCEL ENERGY
B	PROTECT 6" ELECTRIC LINE	XCEL ENERGY
C	PROTECT 6" ELECTRIC LINE	GRAND VALLEY POWER
D	PROTECT OVERHEAD POWER	GRAND VALLEY POWER
E	PROTECT OVERHEAD CABLE	CHARTER
F	PROTECT 2 TELEPHONE LINES	CENTURY LINK
G	PROTECT OVERHEAD FIBER OPTIC	UNITE PRIVATE NETWORKS
H	PROTECT 8" WATER LINE	UTE WATER
I	PROTECT 8" SANITARY SEWER	CITY OF GRAND JUNCTION
J	PROTECT 2" FIBER OPTIC	CENTURY LINK

DESCRIPTION	DATE
REVISION 1 ADDENDUM #2	12/9/2020
REVISION 2	
REVISION 3	
REVISION 4	

DRAWN BY KSO DATE 2020
DESIGNED BY KA DATE 2020
CHECKED BY XXX DATE 201X
APPROVED BY XXX DATE 201X

SCALES: PLAN & PROFILE
HORIZONTAL: 1" = 20'
0 5 10 20
VERTICAL: 1" = 10'
0 2.5 5 10

CITY OF Grand Junction COLORADO

PUBLIC WORKS
ENGINEERING DIVISION

GRJM-21.5-G.95 CULVERT REPLACEMENT
PLAN AND PROFILE
STA 0+00 TO STA 1+15

8

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CITY OF Grand Junction COLORADO

Purchasing Division

ADDENDUM NO. 3

DATE: December 14, 2020
FROM: City of Grand Junction Purchasing Division
TO: All Offerors
RE: GRJM 21.5-G.95 Culvert Replacement IFB-4853-21-DH

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

Please make note of the following clarifications:

1. Q. Can a seed mix be supplied?

A. Yes, we would like to use Applewood Seed Western Native Grass Seed mix (WSGR) mixed with Intermountain Native Wildflower Seed mix (IMNA) combined and distributed at a rate as recommended by Applewood Seed mix (www.applewoodseed.com). Contractor may substitute a similar seed mix as approved by the Engineer.

2. Q. Can a detail and specs. For the guardrail be supplied? As in state, county, or city specs.

A. See the attached Specifications (Section 606) and M-Standard Drawing (M-606-1) from CDOT to be used on this project.

3. Q. Details for the erosion control and tracking pad placement?

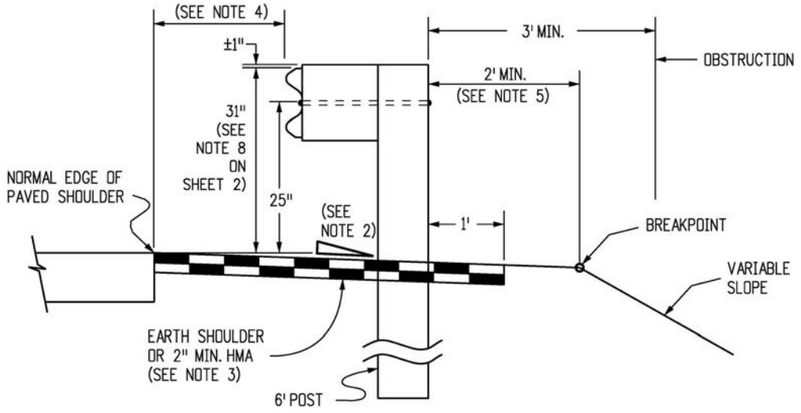
A. See the attached M-Standard Drawings (M-208-1) from CDOT for use on this project. Sheet 1 of 11 shows the Vehicle Tracking Pad, and sheet 10 of 11 shows the Erosion Bale Trenching and Staking details. Location of the tracking pad placement will depend upon the construction phasing, and if vehicles are driving between the disturbed areas and the 21 ½ Road pavement.

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

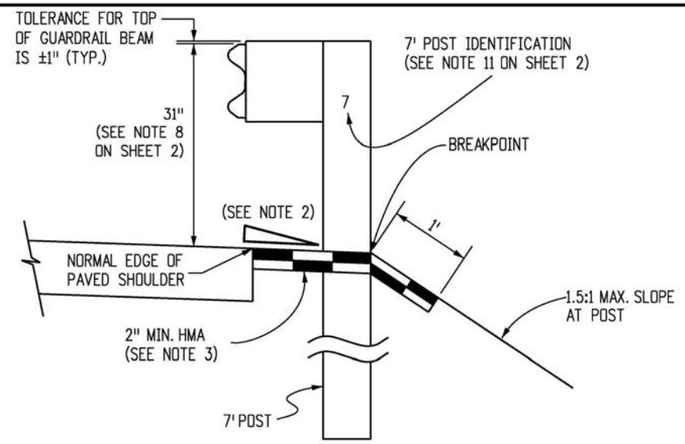
All other conditions of subject remain the same.

Respectfully,

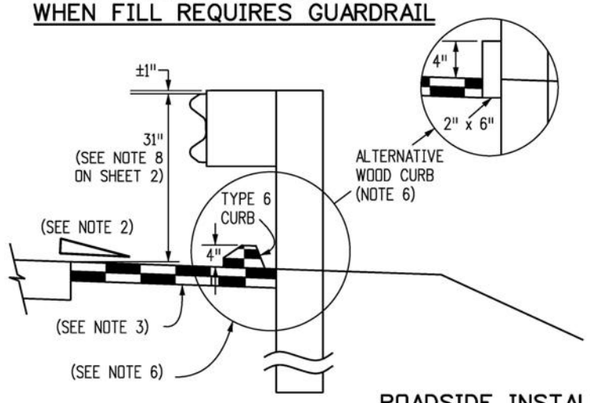
Duane Hoff Jr., Senior Buyer
City of Grand Junction, Colorado



NORMAL ROADSIDE INSTALLATION
WHEN FILL REQUIRES GUARDRAIL

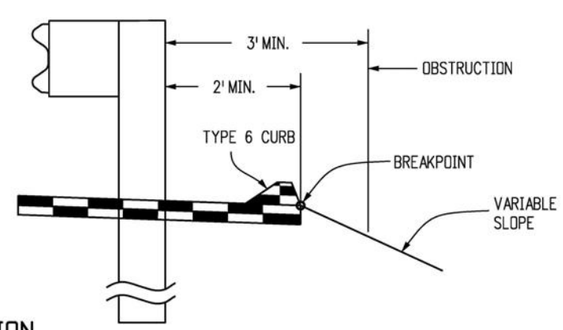


RESTRICTIVE ROADSIDE INSTALLATION
WITH 7 FOOT GUARDRAIL POSTS
(SEE NOTE 5)

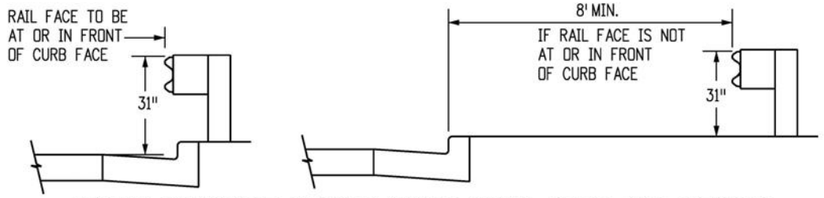


OPTION A

ROADSIDE INSTALLATION
WITH EROSION CONTROL CURB



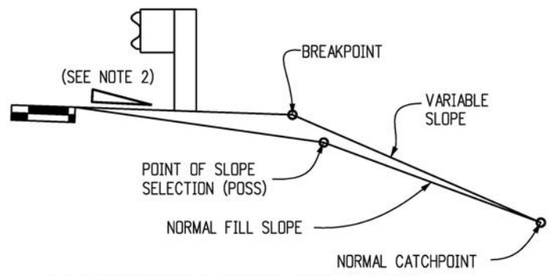
OPTION B (PREFERRED)



URBAN ROADSIDE INSTALLATION WITH CURB AND GUTTER

LOCATION	SPACING
ALL LOCATIONS EXCEPT BRIDGE RAIL LOCATIONS	6'-3"
BRIDGE OR STRUCTURE APPROACH	SEE SHEETS 11 & 19

NORMAL CENTER-TO-CENTER POST SPACING



EMBANKMENT WITH GUARDRAIL

(NOTE: THE CATCHPOINT REMAINS THE SAME AS THAT FOR "NORMAL" FILL SLOPE. FOR THE WIDER "Z" DISTANCES, THE VARIABLE SLOPE MAY "CATCH" AT THE POSS.)

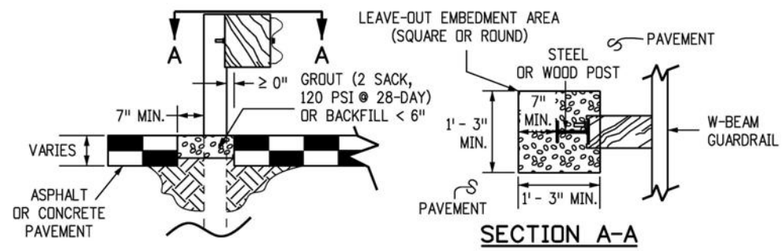
GENERAL NOTES (CONTINUE ON SHEET 2)

1. ALL GUARDRAILS SHOWN ARE MASH 2016 TL-3 COMPLIANT.
2. RATE OF SLOPE DEPENDS ON GUARDRAIL LOCATION:
   A. FOR GUARDRAIL FACE 2 FT. OR LESS FROM THE NORMAL EDGE OF PAVED SHOULDER, CONTINUE THE RATE OF SLOPE OF THE NORMAL PAVED SHOULDER TO THE BREAKPOINT.
   B. FOR GUARDRAIL FACE MORE THAN 2 FT. FROM THE NORMAL EDGE OF THE PAVED SHOULDER, THE SLOPE SHALL BE 10:1 OR FLATTER.
3. WHEN SPECIFIED ON THE PLANS, EXTEND A 2 IN. MINIMUM THICKNESS PAVED SURFACE TO 1 FT. BEHIND THE GUARDRAIL POSTS OR TO THE EROSION CONTROL CURB AS SHOWN ON PLANS. ASPHALT CUTTING & PATCHING OR OTHER APPROVED METHOD SHALL BE USED TO MINIMIZE DAMAGE TO ALL PAVED SURFACES UNDER GUARDRAIL INSTALLATIONS. ALL REPAIRS TO THE PAVED AREA WILL NOT BE MEASURED AND PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF THE WORK. A MINIMUM 3 IN. THICK FIBER REINFORCED CONCRETE PAVEMENT MAY ALSO BE USED FOR PAVING BENEATH THE GUARDRAIL. INSTALL THE POST IN A ½ IN. OVERSIZED FORMED HOLE FOR GUARDRAIL RUNS AND TERMINALS AS DIRECTED. PAYMENT FOR THIS PAVED SURFACE WILL BE MADE UNDER A PAVEMENT OR CONCRETE PAY ITEM WITH QUANTITIES SHOWN ON THE PLANS.
4. THE MINIMUM GUARDRAIL OFFSET FROM PAVED SHOULDER EDGE SHALL BE:
   0 FT. FOR SHOULDERS 8 FT. OR WIDER
   2 FT. FOR SHOULDERS 6 FT. OR LESS

   THE GUARDRAIL OFFSET FROM PAVED INSIDE SHOULDER EDGE OF A DIVIDED HIGHWAY SHALL BE;
   0 FT. MINIMUM FOR SHOULDERS 6 FT. OR WIDER
   2 FT. DESIRABLE FOR 4 FT. SHOULDERS

   THE ABOVE 2 FT. GUARDRAIL TO SHOULDER OFFSET IS DESIRABLE BUT NOT REQUIRED FOR:
   A. FOR AN EXISTING HIGHWAY WITH A DESIGN SPEED LESS THAN 50 MPH, THE MINIMUM OFFSET IS 4 FT. FROM THE TRAVELED WAY.
   B. FOR A ONE-WAY ONE-LANE RAMP, AND WHERE ONE OR MORE OF THE FOLLOWING ARE TRUE:
      (1) THE NON-OFFSET GUARDRAIL BEGINS AT LEAST 100 FT. BEYOND RAMP NOSE.
      (2) THE NON-OFFSET GUARDRAIL IS NOT LOCATED ON THE RAMP EXIT OR ENTRANCE CURVE CONNECTION TO THE MAJOR HIGHWAY.
      (3) THE RAMP SHOULDERS ARE 4 FT. OR WIDER.

   USE OF GREATER THAN MINIMUM OFFSET DIMENSIONS IS ENCOURAGED TO MEET THE DESIRABLE GOAL OF PLACING THE GUARDRAIL AS FAR AS POSSIBLE FROM THE TRAVEL WAY, EVEN FOR SHORT DISTANCES, WHILE PROVIDING A SMOOTH CHANGE IN GUARDRAIL ALIGNMENT.
5. IF 2 FT. CANNOT BE PROVIDED BETWEEN THE BACK OF THE GUARDRAIL POST AND THE BREAKPOINT, USE 7 FT. GUARDRAIL POSTS. REFER TO THE "RESTRICTIVE ROADSIDE INSTALLATION" DETAIL.
6. WHEN SPECIFIED ON THE PLANS, INSTALL 4 IN. HIGH TYPE 6 CURB WITH ITS FACE AT OR BEHIND THE RAIL FACE. AS AN ALTERNATIVE WHEN SPECIFIED ON THE PLANS, INSTALL A 2 IN. x 6 IN. TREATED (AASHTO M 133) WOOD CURB. FASTEN WITH A 4 IN. LAG BOLT AND WASHER AT EACH WOOD POST, OR WITH A 1#4 IN. DIA. BOLT WITH WASHER AND NUT AT EACH STEEL POST. IF THE 2 IN. x 6 IN. WOOD CURB IS SPECIFIED, IT WILL BE INCLUDED IN THE COST OF THE GUARDRAIL. IF APPROVED BY THE ENGINEER, A 2 IN. x 4 IN. TREATED WOOD CURB MAY BE SUBSTITUTED FOR THE 2 IN. x 6 IN. CURB AND SET ON TOP OF PAVEMENT SURFACE AND ATTACHED AS DESCRIBED ABOVE. NO SPLICING SHALL BE ALLOWED IN WOOD CURBS. ADJACENT BOARDS SHALL BE BUTTED TOGETHER AND BOLTED AT A POST LOCATION. JOINTS SHALL BE LOCATED AT THE POSTS.



SECTION A-A

LEAVE-OUT AREA FOR GUARDRAIL POSTS LOCATED IN PAVEMENT

NOTE: LEAVE-OUT AREAS SHALL BE PROVIDED FOR ALL GUARDRAIL POSTS LOCATED IN PAVEMENT TO ALLOW THE POSTS TO ROTATE IN THEIR EMBEDMENT SUCH THAT VEHICLE IMPACT LOADS ARE DISTRIBUTED THROUGH THE POST INTO THE EMBEDMENT MATERIAL PRIOR TO THE POSTS BREAKING PREMATURELY.

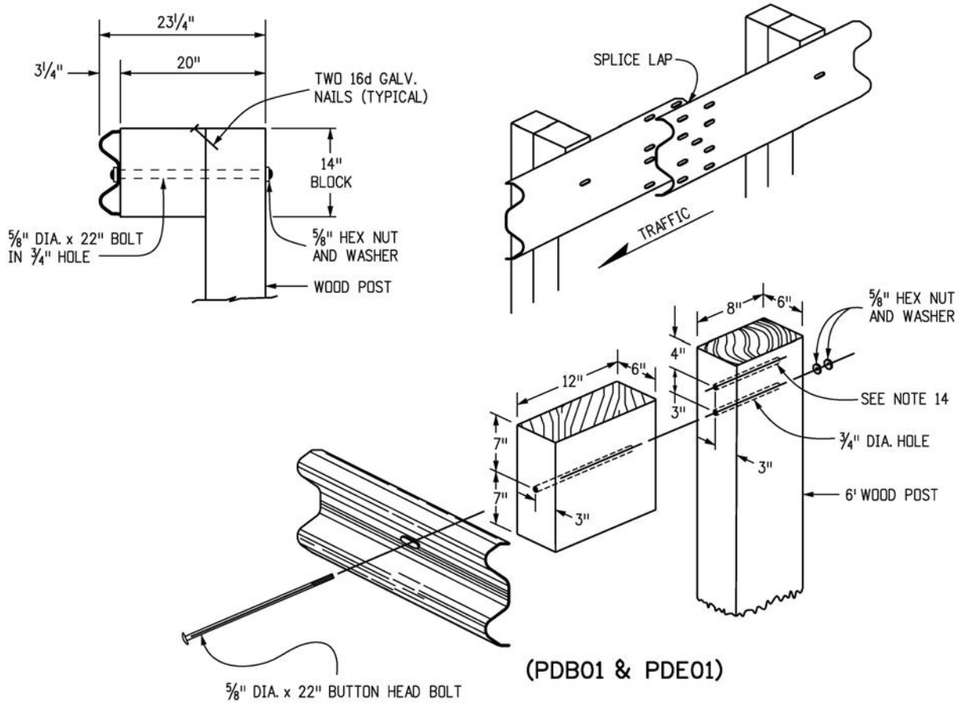
Computer File Information		Sheet Revisions	
Creation Date: 07/31/19		Date:	Comments
Designer Initials: JBK	(R-X)	03/05/20	Revised Gen. Note 1 to show MASH compliant.
Last Modification Date: 03/05/20	(R-X)		
Detailer Initials: LTA	(R-X)		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		

Colorado Department of Transportation
2829 West Howard Place
CDOT HQ, 3rd Floor
Denver, CO 80204
Phone: 303-757-9021 FAX: 303-757-9868
Project Development Branch JBK

MIDWEST GUARDRAIL SYSTEM (MGS)
TYPE 3 W-BEAM 31 INCHES

Issued by the Project Development Branch: July 31, 2019

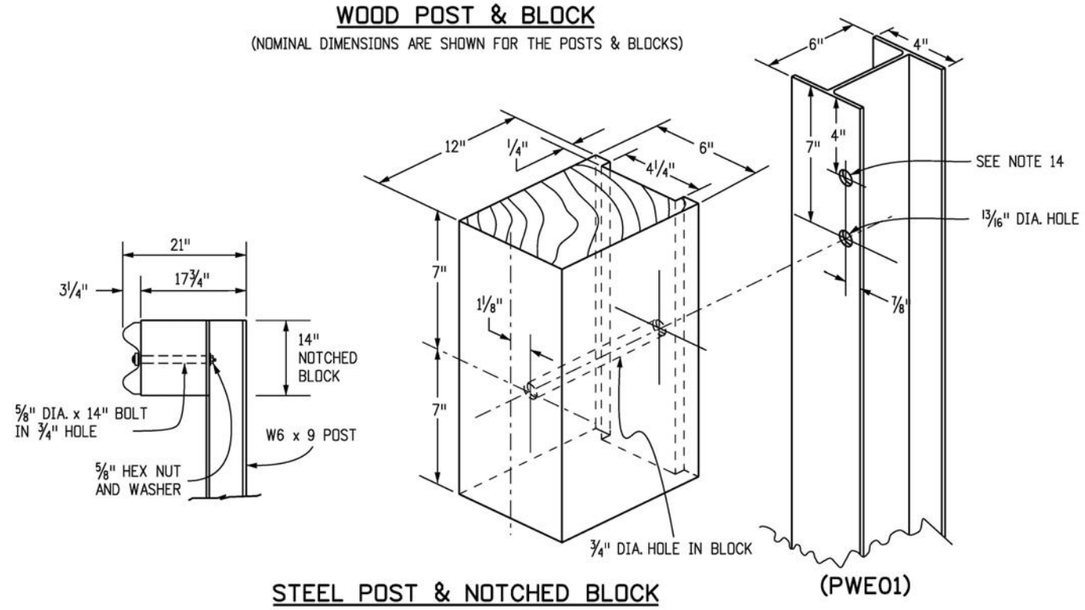
STANDARD PLAN NO.
M-606-1
Standard Sheet No. 1 of 19
Project Sheet Number:



(PDB01 & PDE01)

WOOD POST & BLOCK

(NOMINAL DIMENSIONS ARE SHOWN FOR THE POSTS & BLOCKS)



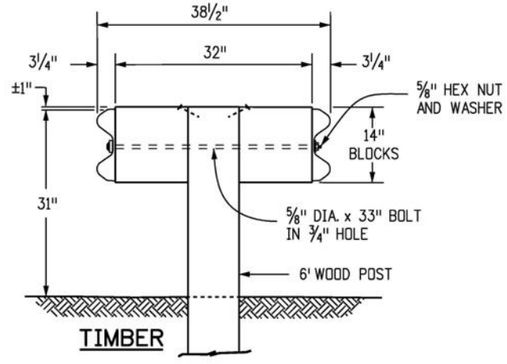
(PWE01)

STEEL POST & NOTCHED BLOCK

(NOMINAL DIMENSIONS ARE SHOWN FOR THE POSTS & BLOCKS)

GENERAL NOTES (CONTINUED FROM SHEET 1)

7. SEE SHEETS 7 AND 9 FOR CURB TREATMENTS AT GUARDRAIL TERMINALS.
8. IF THIS DIMENSION WILL BE LESS THAN 28 INCHES, RESET GUARDRAIL HEIGHT TO 28 INCHES OR ABOVE.
9. ALL W-BEAM SPLICES, AND SPLICES OF TERMINAL CONNECTORS TO W-BEAM SHALL BE LAPPED IN THE DIRECTION OF TRAFFIC UNLESS OTHERWISE NOTED IN THE PLANS OR BY THE MANUFACTURER.
10. MATERIAL TYPE AND SHAPE OF POSTS AND BLOCKS SHALL BE THE SAME THROUGHOUT THE PROJECT EXCEPT WHEN SPECIFIC POSTS AND BLOCKS ARE SPECIFIED, i.e. AT END ANCHORAGES AND BOX CULVERTS.
11. WHEN SPECIFIED IN THE CONTRACT, 7 FT. POSTS SHALL BE INSTALLED INSTEAD OF THE STANDARD 6 FT. POSTS. THE 7 FT. POSTS SHALL BE MARKED WITH THE NUMBER 7 TO ENSURE PERMANENT INDENTIFICATION. STEEL POSTS SHALL BE STAMPED PRIOR TO GALVANIZING. THE NUMBER 7 SHALL BE A MINIMUM 2 IN. TALL AND LOCATED AS SHOWN ON THE ELEVATION VIEW ON SHEET 1.
12. THE STANDARD 3 IN. X 1¾ IN. X 3/16 IN. RECTANGULAR WASHER USED UNDER POST BOLT HEADS IN THE PAST MAY REMAIN IN EXISTING INSTALLATIONS BUT SHALL NOT BE USED IN NEW CONSTRUCTION, REPAIRS, OR RESETTING OF RAIL, EXCEPT WHEN SPECIFICALLY IDENTIFIED ON THE STANDARD PLAN.
13. STANDARD GALVANIZED ROUND STEEL WASHERS SHALL BE USED UNDER ALL NUTS IN CONTACT WITH WOOD POSTS.
14. AN ADDITIONAL HOLE SHALL BE PROVIDED IN THE POSTS TO FACILITATE FUTURE RAISING OF THE RAIL ELEMENTS AND BLOCKS FOR OVERLAYS. POSTS PROVIDED MAY ALSO HAVE ADDITIONAL HOLES (UP TO 4 PER FLANGE) FOR MEDIAN GUARDRAIL APPLICATION.
15. RETROREFLECTOR TABS SHALL BE INSTALLED AT 25 FT. INTERVALS (SEE SHEETS 6 AND 8 FOR EXCEPTIONS). RETROREFLECTOR TABS WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK. THE TABS SHALL BE INSTALLED ON SPLICE BOLTS, NOT ON POST BOLTS AND SHALL BE MOUNTED SO THE BOLT SLOT FACES AWAY FROM TRAFFIC, AND THE RETROREFLECTOR SURFACE FACES THE APPROACHING TRAFFIC FOR ONE-WAY ROADS. FOR TWO-WAY ROADS, BOTH SIDES OF THE TABS SHALL BE RETROREFLECTIVE, SO THAT DELINEATION IS PROVIDED FOR BOTH DIRECTIONS OF TRAVEL. THE RETROREFLECTIVE SHEETING COLOR SHALL MATCH THE COLOR OF THE ADJACENT TRAVEL WAY EDGE LINE. SEE THE RETROREFLECTOR TAB DETAIL ON SHEET 3.
16. AT THE TIME OF INSTALLATION, WOOD POSTS OR BLOCKS WITH SEASONING CHECKS GREATER THAN ¼ IN. SHALL NOT BE USED WHEN THE CHECK EXTENDS THE FULL LENGTH OF THE PIECE.
17. WOOD BLOCKS SHALL BE CUT FROM THE SAME CROSS-SECTION, SPECIES, AND GRADE, AND SHALL RECEIVE THE SAME PRESERVATIVE TREATMENT AS THE POSTS WHEN WOOD POSTS ARE USED.
18. REFERENCES SUCH AS θθPDB01", θθPDE01", AND θθPWE01" IN THIS STANDARD PLAN SPECIFY HARDWARE DETAILS FROM θθA GUIDE TO STANDARDIZED HIGHWAY BARRIER HARDWARE" PREPARED BY THE AASHTO-AGC-ARTBA JOINT COOPERATIVE COMMITTEE.
19. RAIL BLOCKS MANUFACTURED FROM SYNTHETIC MATERIAL WILL BE ACCEPTED AS ALTERNATIVES TO WOOD BLOCKS FOR USE WITH STEEL POSTS PROVIDED THAT THE BLOCKS HAVE RECEIVED FHWA APPROVAL.
20. WOOD POSTS SHALL BE MADE OF TIMBER WITH AN EXTREME FIBER STRESS IN BENDING OF 1200 PSI STRESS GRADING AND POST DIMENSIONS SHALL CONFORM WITH THE RULES OF THE WEST COAST INSPECTION BUREAU, OR THE SOUTHERN PINE BUREAU, OR THE WESTERN WOOD PRODUCTS ASSOCIATION. TIMBER FOR POSTS SHALL BE EITHER ROUGH SAWN (UNPLANED) OR S4S (SURFACED FOUR SIDES) WITH NOMINAL DIMENSIONS INDICATED. ONLY ONE TYPE OF SURFACE FINISH SHALL BE USED FOR POSTS AND BLOCKS IN ANY ONE CONTINUOUS LENGTH OF GUARDRAIL.
21. GLULAM POSTS AND BLOCKS WILL BE ACCEPTED AS ALTERNATIVES PROVIDED THAT THE SUPPLIED MATERIALS HAVE RECEIVED FHWA APPROVAL AND ARE CERTIFIED AS IDENTICAL TO THE SPECIMENS USED FOR TESTING AND APPROVAL.
22. PRESSURE TREATMENT OF POSTS AND BLOCKS SHALL CONFORM TO AASHTO M 133 EXCEPT THAT BLOCKS NEED NOT BE INCISED. PRESERVATION ASSAY RETENTION REPORTS SHALL BE SUBMITTED TO THE ENGINEER. THE CONTRACTOR SHALL CERTIFY THAT THE SPECIES AND GRADE MEET THE REQUIREMENTS OF THE CONTRACT.
23. W-BEAM AND THRIE-BEAM GUARDRAIL POSTS SHALL BE MANUFACTURED USING AASHTO M 270 (ASTM A 709) GRADE 36 STEEL UNLESS CORROSION RESISTANT STEEL IS REQUIRED, IN WHICH CASE THE POST SHALL BE MANUFACTURED FROM AASHTO M 270 (ASTM A 709) GRADE 50W STEEL. THE DIMENSIONS OF THE CROSS-SECTION SHALL CONFORM TO A W6 X 9 SECTION AS DEFINED IN AASHTO M 160 (ASTM A 6). W6 X 8.5 WIDE FLANGE STEEL POSTS ARE AN ACCEPTABLE ALTERNATIVE TO THE W6 X 9.
24. AFTER THE SECTION IS CUT AND ALL HOLES ARE DRILLED OR PUNCHED THE COMPONENT SHALL BE ZINC-COATED CONFORMING TO AASHTO M 111 (ASTM A 123) UNLESS CORROSION-RESISTANT STEEL IS USED. WHEN CORROSION-RESISTANT STEEL IS USED THE PORTION OF THE POST TO BE EMBEDDED IN SOIL SHALL BE ZINC-COATED CONFORMING TO AASHTO M 111 (ASTM A 123) AND THE PORTION ABOVE THE SOIL SHALL NOT BE ZINC-COATED, PAINTED OR OTHERWISE TREATED.
25. FIELD MODIFICATION TO RAIL ELEMENTS IS ALLOWED PER MANUFACTURER'S RECOMMENDATIONS, OR WITH THE APPROVAL OF THE STANDARDS AND SPECIFICATIONS UNIT. POSTS SHALL NOT BE MODIFIED. COMPONENTS ON WHICH THE SPELTER COATING HAS BEEN DAMAGED SHALL BE EITHER REGALVANIZED OR RECOATED IN CONFORMANCE WITH AASHTO M 36, OR PAINTED WITH ONE FULL BRUSH COAT OF ZINC RICH PAINT CONFORMING TO MILITARY SPECIFICATION DOD-P-21035A.



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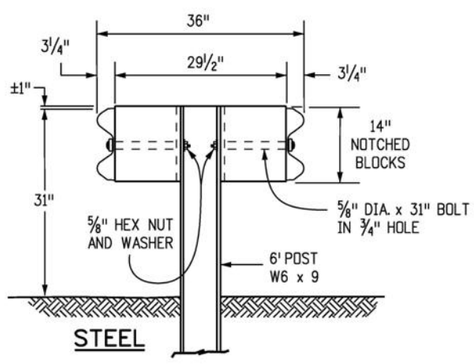

STEEL

DOUBLE BLOCK AND GUARDRAIL TYPE 3 (DOUBLE) FOR MEDIAN BARRIER

Computer File Information		Sheet Revisions	
		Date:	Comments
Creation Date: 07/31/19			
Designer Initials: JBK	(R-X)		
Last Modification Date: 03/05/20	(R-X)		
Detailer Initials: LTA	(R-X)		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		

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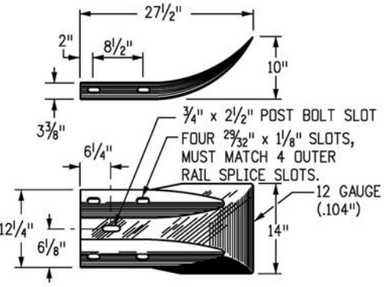
MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES

Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO. M-606-1

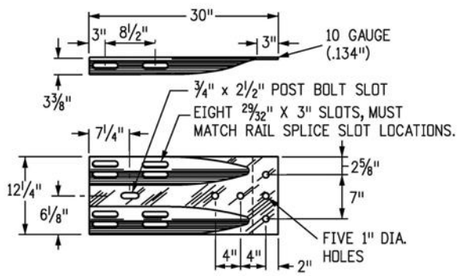
Standard Sheet No. 2 of 19

Project Sheet Number:

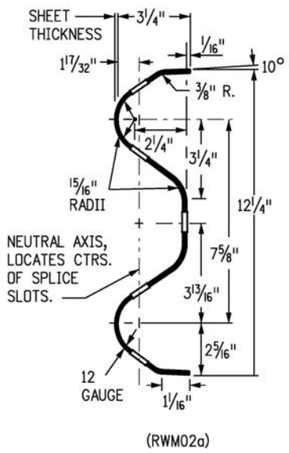


(RWE01a)

TERMINAL SECTION (FLARED)

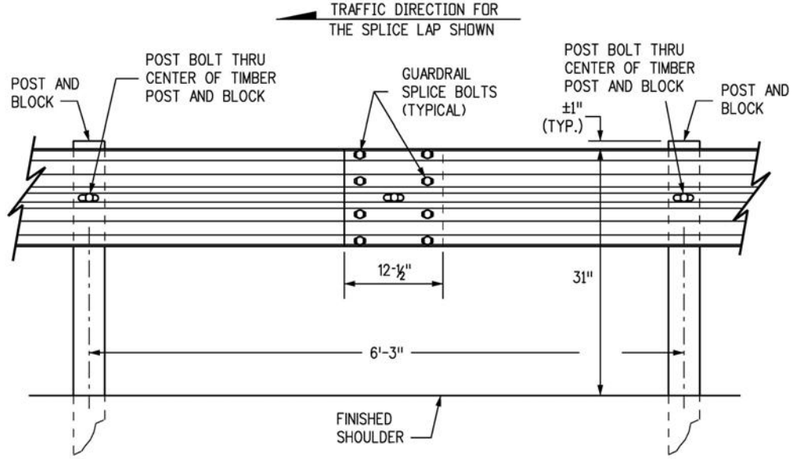


TERMINAL SECTION (CONNECTOR)



(RWM02a)

W-BEAM RAIL SECTION

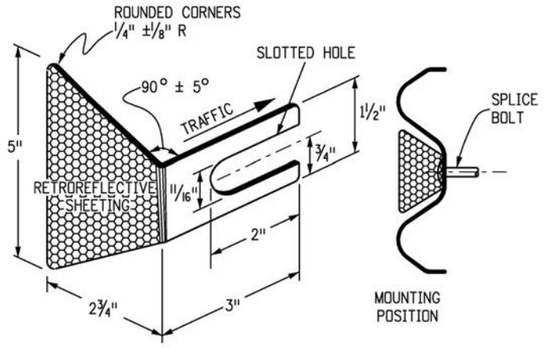


W-BEAM RAIL SPLICE

PART	MATERIAL SPEC.	GALVANIZING SPEC.	CORROSION-RESISTANT SPEC.
W-BEAM RAIL & TERMINAL SECTIONS	AASHTO M 180, CLASS A OR B	AASHTO M 180, TYPE 1 OR 2	AASHTO M 180, TYPE 4
BASE PLATE	ASTM A 36	AASHTO M 111	N.A.
NUTS, BOLTS & STUDS FOR GENERAL USE	ASTM A 307	AASHTO M 232, CLASS C OR ASTM B 695 CLASS 50 TYPE 1	
HIGH STRENGTH BOLTS & NUTS	ASTM A 325		
HIGH STRENGTH STUDS & NUTS	ASTM A 449		
ROUND STEEL WASHERS	ASTM F 436		
RECTANGULAR WASHERS	AASHTO M 180		
OTHER FITTINGS	ASTM A 36	AASHTO M 111	

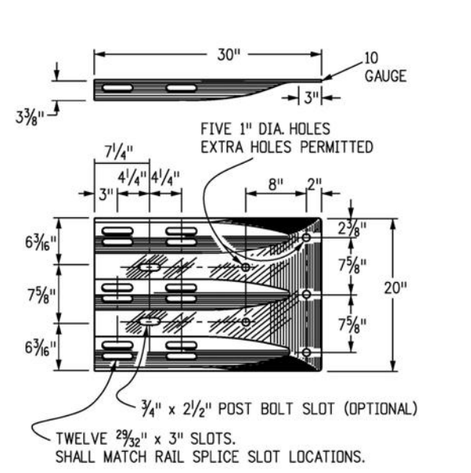
THE TABULATION OF GUARDRAIL WILL SPECIFY THE TYPE OF CORROSION PROTECTION: GALVANIZED OR CORROSION - RESISTANT STEEL.

STEEL POSTS SHALL HAVE THE SAME CORROSION PROTECTION AS SPECIFIED FOR THE METAL BEAM RAIL. PUNCHING, DRILLING, CUTTING, OR WELDING OF POSTS WILL NOT BE PERMITTED AFTER GALVANIZING.

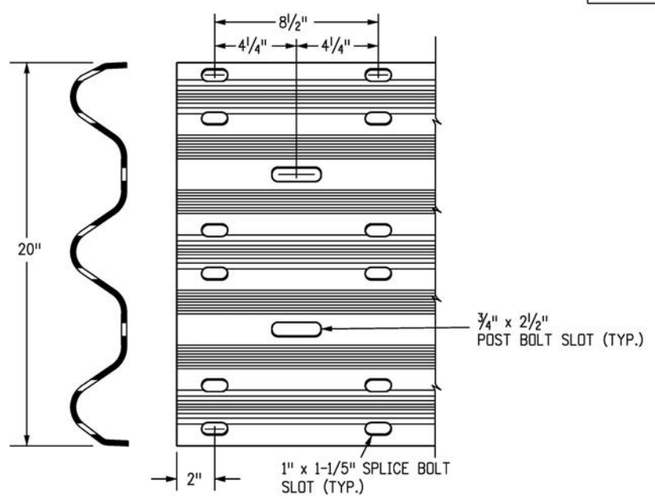


RETROREFLECTOR TAB

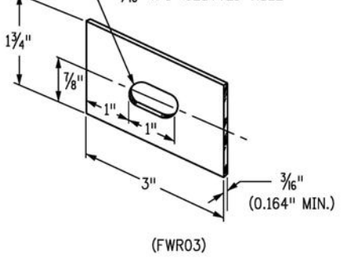
NOTE: RETROREFLECTOR TABS SHALL BE MANUFACTURED FROM 12 TO 14 GAUGE STEEL AND SHALL CONFORM TO THE REQUIREMENTS OF S STANDARD S-612-1.



THRIE BEAM TERMINAL SECTION (CONNECTOR)



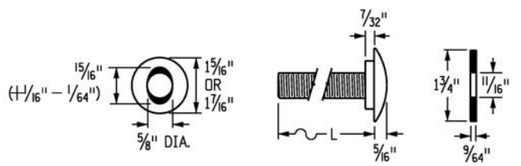
THRIE BEAM DETAIL



(FWR03)

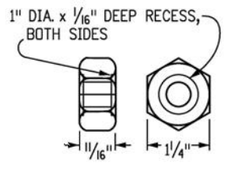
RECTANGULAR WASHER

(TO BE USED ONLY WHERE SPECIFIED.)



BUTTON HEAD BOLT WITH OVAL SHOULDER

WASHER



HEX NUT

DIAMETER & TYPE (INCHES)	12" BLOCKS L = LENGTH (INCHES)	THREAD LENGTH (INCHES)	INTENDED USE	AASHTO-AGC-ARTBA STANDARD NUMBER	NO. BOLTS, NUTS & WASHERS
⅝	1¼	FULL (1 1/32)	ALL RAIL SPLICES	FBB01	8 PER SPLICE*
BUTTONHEAD OVAL SHLDR.	22	MIN. 2½	SINGLE BLOCK & POST (TIMBER)	FBB04	1 PER POST
	33	MIN. 2	DOUBLE BLOCK & POST (TIMBER)	FBB05	1 PER POST
	14	MIN. 2	FASTEN NOTCHED BLOCK TO STEEL POST	FBB03	1 PER BLOCK
WASHERS NOT USED AT RAIL SPLICES					

Computer File Information		Sheet Revisions	
		Date:	Comments
Creation Date: 07/31/19			
Designer Initials: JBK	(R-X)		
Last Modification Date: 03/05/20	(R-X)		
Detailer Initials: LTA	(R-X)		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		

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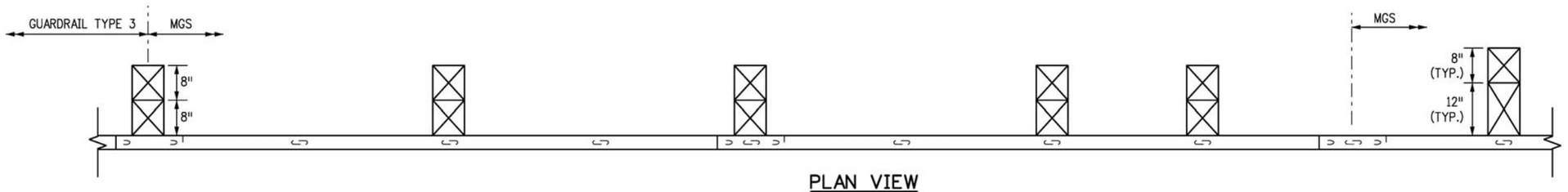
MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES

Issued by the Project Development Branch: July 31, 2019

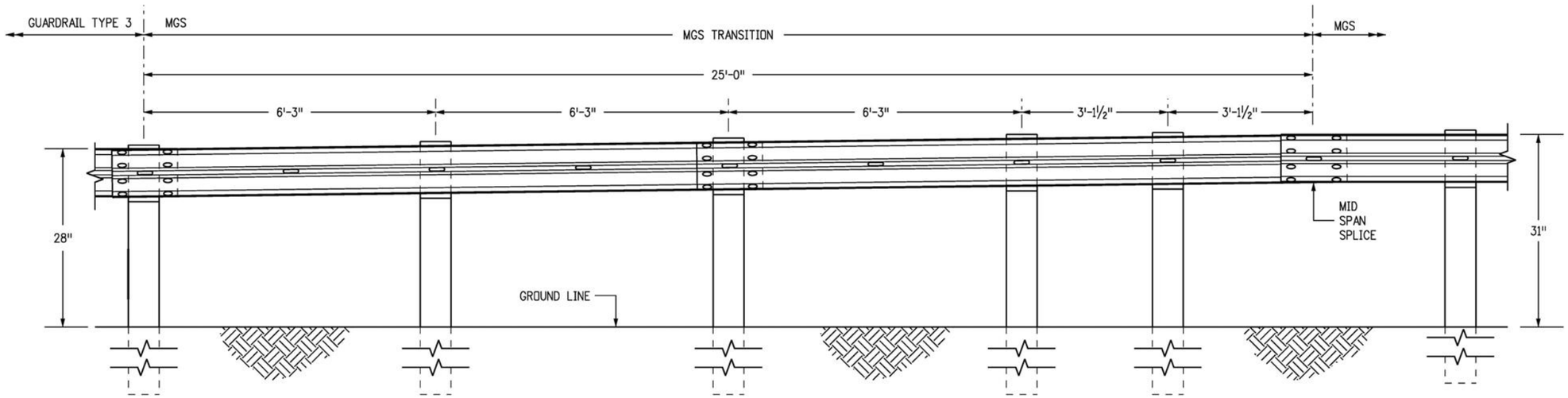
STANDARD PLAN NO.
M-606-1
Standard Sheet No. 3 of 19
Project Sheet Number:

NOTES

1. THE MGS TRANSITION FROM A TYPE 3 GUARDRAIL SHALL BE COMPLETED OUTSIDE THE MGS END ANCHORAGE LIMITS.

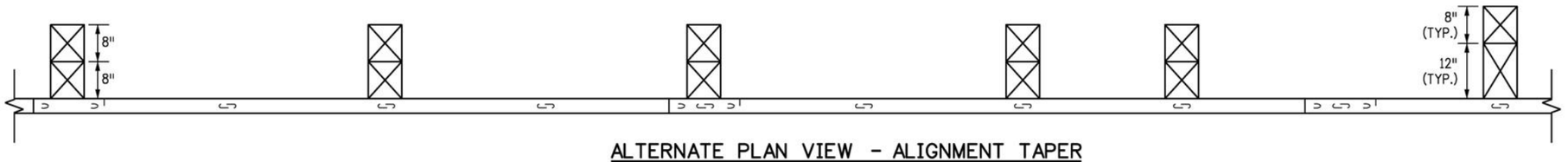


PLAN VIEW



ELEVATION VIEW

TRANSITION FROM 28 INCH GUARDRAIL TO 31 INCH MGS



ALTERNATE PLAN VIEW - ALIGNMENT TAPER

Computer File Information		Sheet Revisions	
		Date:	Comments
Creation Date: 07/31/19			
Designer Initials: JBK	(R-X)		
Last Modification Date: 03/05/20	(R-X)		
Detailer Initials: LTA	(R-X)		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		

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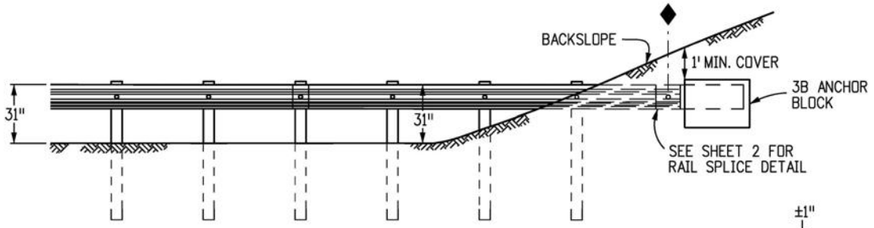
MIDWEST
GUARDRAIL SYSTEM (MGS)
TYPE 3 W-BEAM 31 INCHES

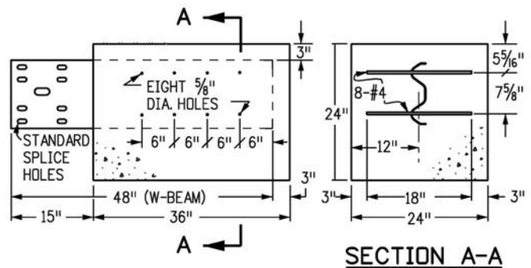
Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO.
M-606-1
Standard Sheet No. 4 of 19
Project Sheet Number:



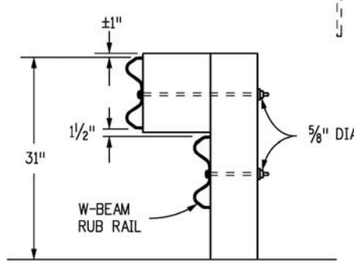
SEE TYPE 3B (RUB RAIL) PLAN VIEW FOR ALIGNMENT. THE 100 FT. FLARE LENGTH MAY BE SHORTENED IF THE SLOPE IS LESS THAN 8 FT. WIDE.

END ANCHORAGE TYPE 3B
(WITHOUT ROADSIDE DITCH AT GUARDRAIL)



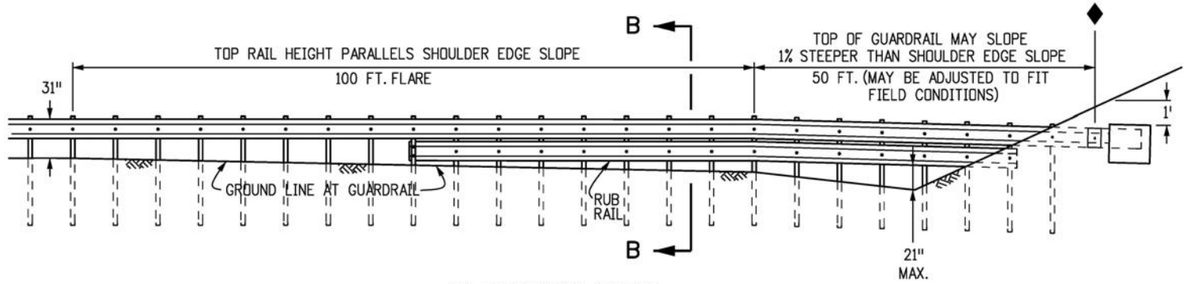
SECTION A-A

TYPE 3B ANCHOR BLOCK DETAIL

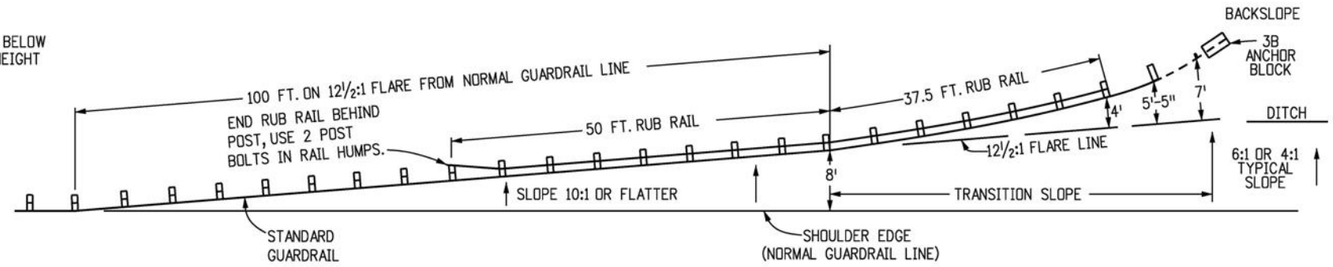


SECTION B-B

MOUNT A W-BEAM RUB RAIL 1-½ IN. BELOW THE TOP RAIL WHEN THE TOP RAIL HEIGHT EXCEEDS 33 IN. ABOVE THE GROUND



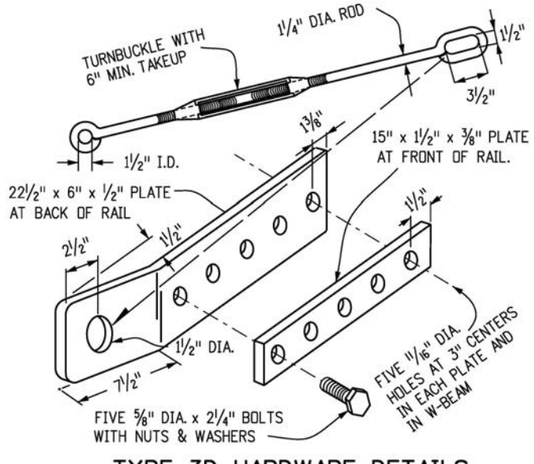
ELEVATION VIEW



PLAN VIEW

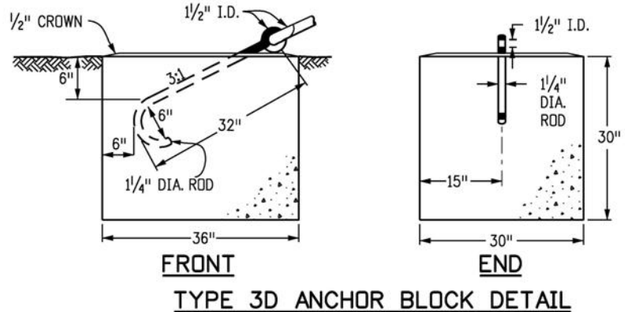
◆ END OF GUARDRAIL PAY LENGTH

END ANCHORAGE TYPE 3B (RUB RAIL)
(WITH ROADSIDE DITCH AT GUARDRAIL)



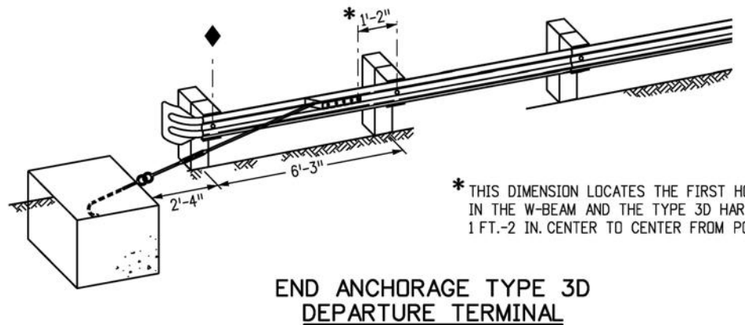
TYPE 3D HARDWARE DETAILS

NOTE: ALL PARTS SHALL BE GALVANIZED



FRONT END

TYPE 3D ANCHOR BLOCK DETAIL



* THIS DIMENSION LOCATES THE FIRST HOLE IN THE W-BEAM AND THE TYPE 3D HARDWARE. 1 FT.-2 IN. CENTER TO CENTER FROM POST BOLT HOLE.

END ANCHORAGE TYPE 3D DEPARTURE TERMINAL

Computer File Information		Sheet Revisions	
Creation Date: 07/31/19		Date:	Comments
Designer Initials: JBK	(R-X)		
Last Modification Date: 03/05/20	(R-X)		
Detailer Initials: LTA	(R-X)		
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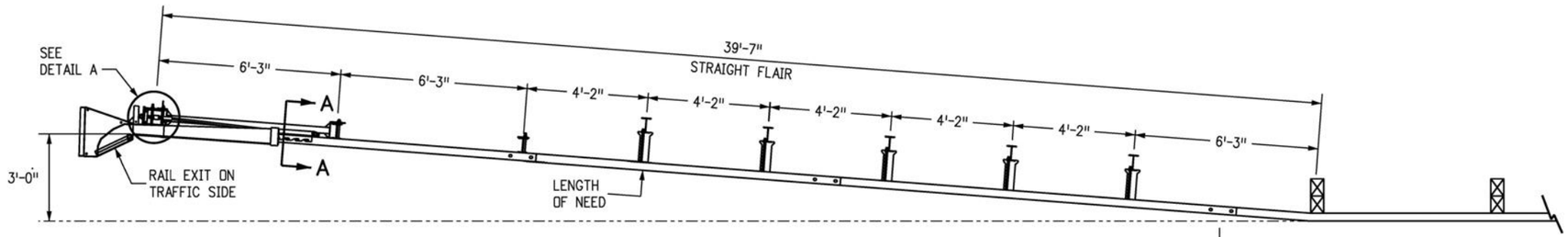
MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES

Issued by the Project Development Branch: July 31, 2019

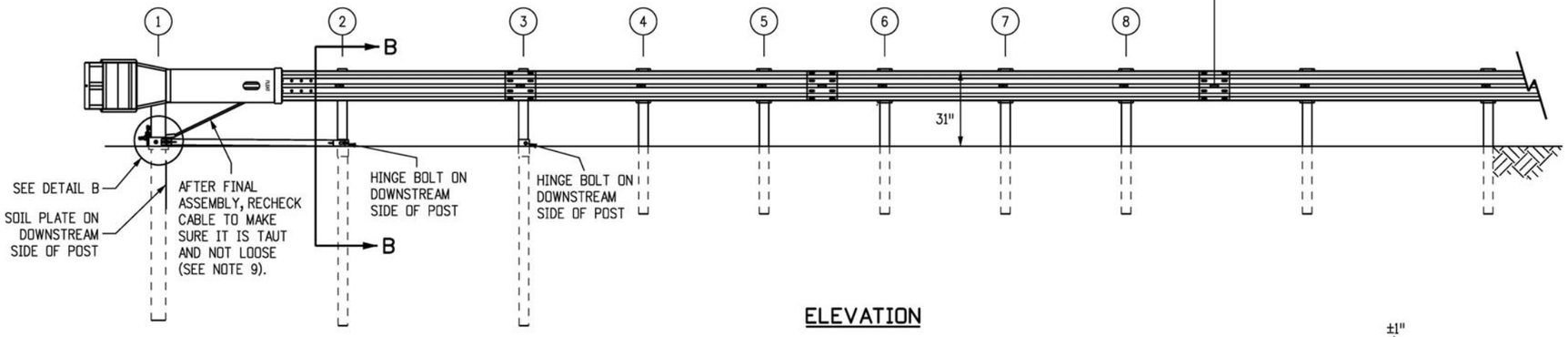
STANDARD PLAN NO.
M-606-1
Standard Sheet No. 5 of 19
Project Sheet Number:

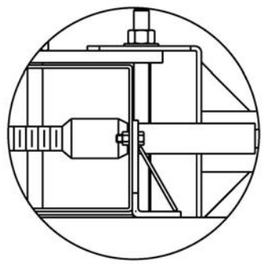
OFFSET NOTES

1. POST OFFSET DIMENSIONS ARE GIVEN TO THE CENTER OF THE TRAFFIC FACE OF POSTS.
2. THE GUARDRAIL BETWEEN POST (1) THRU (8) IS ON A STRAIGHT LINE FLARE.

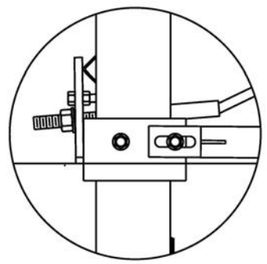


PLAN



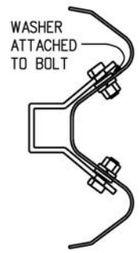


DETAIL A
IMPACT HEAD CONNETION

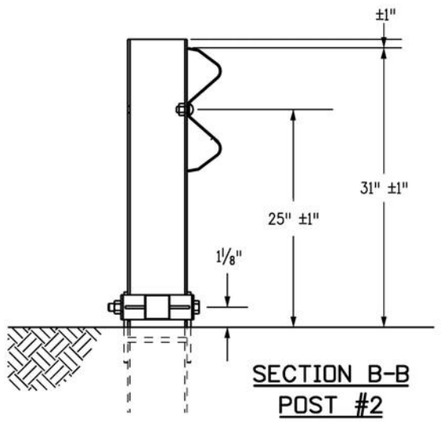


DETAIL B
POST #1 CONNECTION

ELEVATION



SECTION A-A
ANCHOR BRACKET



SECTION B-B
POST #2

NOTES

1. THE END ANCHORAGE (FLARED) SHALL BE THE MFLEAT TERMINAL, AS MANUFACTURED BY ROAD SYSTEMS INC. (TELEPHONE #: 432-263-2435). ONE END ANCHORAGE (FLARED) SHALL INCLUDE ALL POST, RAIL, AND ALL HARDWARE ITEMS REQUIRED FOR A COMPLETE UNIT. THE END ANCHORAGE (FLARED) SHALL BE INSTALLED CONFORMING TO THE MANUFACTURER'S RECOMMENDATIONS. THE CONTRACTOR SHALL PROVIDE A COPY OF THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND PARTS LIST TO THE ENGINEER PRIOR TO INSTALLATION OF THE DEVICE.
2. RETROREFLECTOR TABS SHALL NOT BE USED ON END ANCHORAGE POSTS.
3. DELINEATION SHALL BE APPLIED TO THE END PIECE, AND SHALL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.
4. AESTHETIC TREATMENT OPTIONS MAY BE AVAILABLE WITH PRIOR APPROVAL OF THE PROJECT ENGINEER. CONTACT THE MANUFACTURER FOR APPROVED AESTHETIC TREATMENT OPTIONS.
5. ALL BOLTS, NUTS, CABLE ASSEMBLIES, CABLE ANCHORS AND BEARING PLATES SHALL BE GALVANIZED.
6. THE LOWER SECTIONS OF THE POSTS 1, 2, AND 3 SHALL NOT PROTRUDE MORE THAN 4 INCHES ABOVE THE GROUND (MEASURED ALONG A 5 FOOT CORD). SITE GRADING MAY BE NECESSARY TO MEET THIS REQUIREMENT.
7. THE LOWER SECTIONS OF THE HINGED POSTS SHOULD NOT BE DRIVEN WITH THE UPPER POST ATTACHED. IF THE POST IS PLACED IN A DRILLED HOLE, THE BACKFILL MATERIAL MUST BE SATISFACTORILY COMPACTED TO PREVENT SETTLEMENT.
8. WHEN COMPETENT ROCK IS ENCOUNTERED, A 12 INCH DIA. POST HOLE, DRILLED 20 INCHES DEEP INTO THE ROCK SURFACE SHALL BE USED IF APPROVED BY THE ENGINEER FOR POSTS 1 AND/OR 2. GRANULAR MATERIAL SHALL BE PLACED IN THE BOTTOM OF THE HOLE, APPROXIMATELY 2.5 INCHES DEEP TO PROVIDE DRAINAGE. THE FIRST AND/OR SECOND POST SHALL BE FIELD CUT TO LENGTH, PLACED IN THE HOLE AND BACKFILLED WITH SUITABLE BACKFILL. THE SOIL PLATE MAY BE TRIMMED IF REQUIRED.
9. THE BREAKAWAY CABLE ASSEMBLY SHALL BE TAUT. A LOCKING DEVICE (VICE GRIPS OR CHANNEL LOCK PLIERS) SHOULD BE USED TO PREVENT THE CABLE FROM TWISTING WHEN TIGHTENING NUTS.

MFLEAT TERMINAL

(MASH CERTIFIED)

END ANCHORAGES (FLARED)

Computer File Information		Sheet Revisions	
Creation Date: 07/31/19		Date:	Comments
Designer Initials: JBK	(R-X)	03/05/20	Replaced the SRT-31 and FLEAT 350 flared terminals with the MFLEAT flared terminal to be MASH compliant.
Last Modification Date: 03/05/20	(R-X)		
Detailer Initials: LTA	(R-X)		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		

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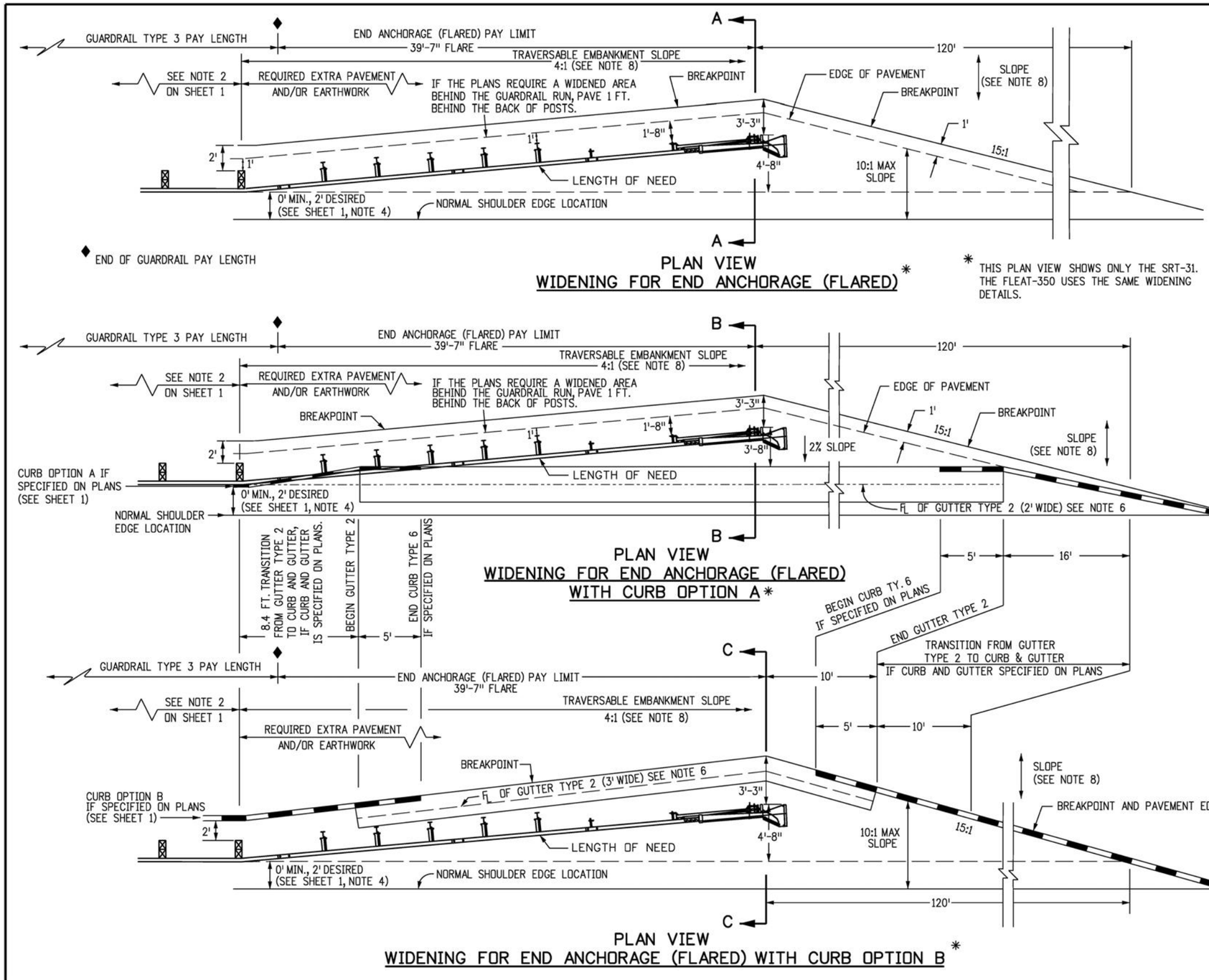
MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES

Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO. M-606-1

Project Sheet Number:



PLAN VIEW
WIDENING FOR END ANCHORAGE (FLARED) *

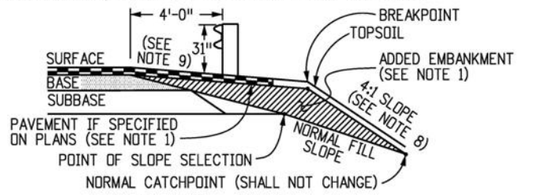
* THIS PLAN VIEW SHOWS ONLY THE SRT-31. THE FLEAT-350 USES THE SAME WIDENING DETAILS.

PLAN VIEW
WIDENING FOR END ANCHORAGE (FLARED)
WITH CURB OPTION A *

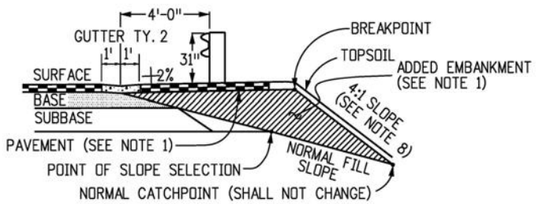
PLAN VIEW
WIDENING FOR END ANCHORAGE (FLARED) WITH CURB OPTION B *

NOTES

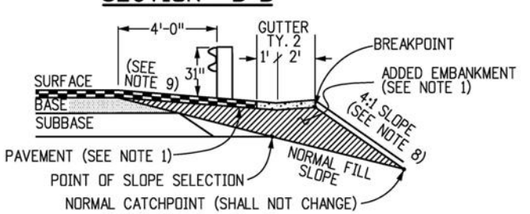
1. PAYMENT FOR THE ADDED EMBANKMENT (APPROXIMATELY 45 CU. YDS.) FOR THE FLARE SHALL BE AS FOLLOWS:
   A. UNDER PAY ITEM 203 WHEN THE CONTRACT PLAN INCLUDES PAY ITEM 203
   B. INCLUDED IN THE COST OF THE END ANCHORAGE (FLARED) WHEN THE CONTRACT PLANS DO NOT INCLUDE PAY ITEM 203. THE ADDED EMBANKMENT SHALL BE CONSTRUCTED IN ACCORDANCE WITH SUBSECTION 203.07, AASHTO T 99.
2. WHEN THE WIDENED AREA IS PAVED, PAYMENT FOR THE PAVEMENT (APPROX. 70 SQ. YDS.) SHALL BE AS FOLLOWS:
   A. UNDER PAY ITEM 403 OR 412 WHEN THE CONTRACT PLAN INCLUDES PAY ITEM 403 OR 412
   B. INCLUDED IN THE COST OF THE END ANCHORAGE (FLARED) WHEN THE CONTRACT PLAN DOES NOT INCLUDE PAY ITEM 403 OR 412 (SEE SHEET 1, NOTE 2 FOR PAVEMENT TYPES)
3. CONCRETE PAVED AREAS SHALL HAVE THEIR TAPERED ENDS SQUARED OFF AS DIRECTED BY THE ENGINEER.
4. WHEN OVERLAY PAVING, THE FINISHED SURFACE AT EACH POST SHALL NOT BE ABOVE THE TOP BREAKAWAY HOLE OR STRUT ASSEMBLY. THE WIDENED AREA AT THE FLARED END ANCHORAGE SHOULD NOT BE OVERLAYED UNLESS PAVEMENT CONDITIONS WARRANT IT BEING OVERLAYED. ANY OVERLAY PAVEMENT ABUTTING THE FLARED END ANCHORAGE SHALL BE TAPERED TO PREVENT A DROP IN THE PAVED SURFACE BELOW THE RAIL.
5. SEE SHEETS 1, 2, 3, AND 5 FOR STANDARD TYPE 3 GUARDRAIL INSTALLATION DETAILS.
6. THE COST OF THE GUTTER WILL BE PAID FOR AS "GUTTER TYPE 2 (2 FT.)" FOR A LENGTH OF 134 FT. OR "GUTTER TY. 2 (3 FT.)" FOR A LENGTH OF 40 FT.
7. INLETS OR RUNDOWNS MAY BE USED INSTEAD OF THE GUTTER IF SPECIFIED ON THE PLANS. NO ADDITIONAL CURB SHALL BE ADDED IN THE VICINITY OF THE END ANCHORAGE.
8. 4:1 OR FLATTER SLOPES IN THE TRAVERSABLE AREA SHALL BE USED BEHIND THE END ANCHORAGE, AND IN ADVANCE OF POST (1). IF THIS IS NOT POSSIBLE, A MINIMUM 3:1 SLOPE MAY BE USED IF APPROVED BY THE ENGINEER.
9. THE WIDENED AREA, EXCEPT FOR CURB OPTION A, SHALL HAVE THE SAME GRADING AS THE ADJACENT GUARDRAIL: 10:1 OR FLATTER IF MORE THAN 2 FT. FROM SHOULDER OR SLOPE EQUAL TO ROADWAY SLOPE IF 2 FT. OR LESS FROM SHOULDER.
10. WIDENING FOR END ANCHORAGES SHALL BE PAVED ON INTERSTATES AND FREEWAYS. FOR OTHER HIGHWAYS, PAVING SHALL BE AS SHOWN ON THE PLANS.



SECTION A-A



SECTION B-B



SECTION C-C

Computer File Information		Sheet Revisions	
Creation Date: 07/31/19		Date:	Comments
Designer Initials: JBK	(R-X)	03/05/20	Replaced the old end anchorage drawings with the new MELEAT end anchorage drawing.
Last Modification Date: 03/05/20	(R-X)		
Detailer Initials: LTA	(R-X)		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		

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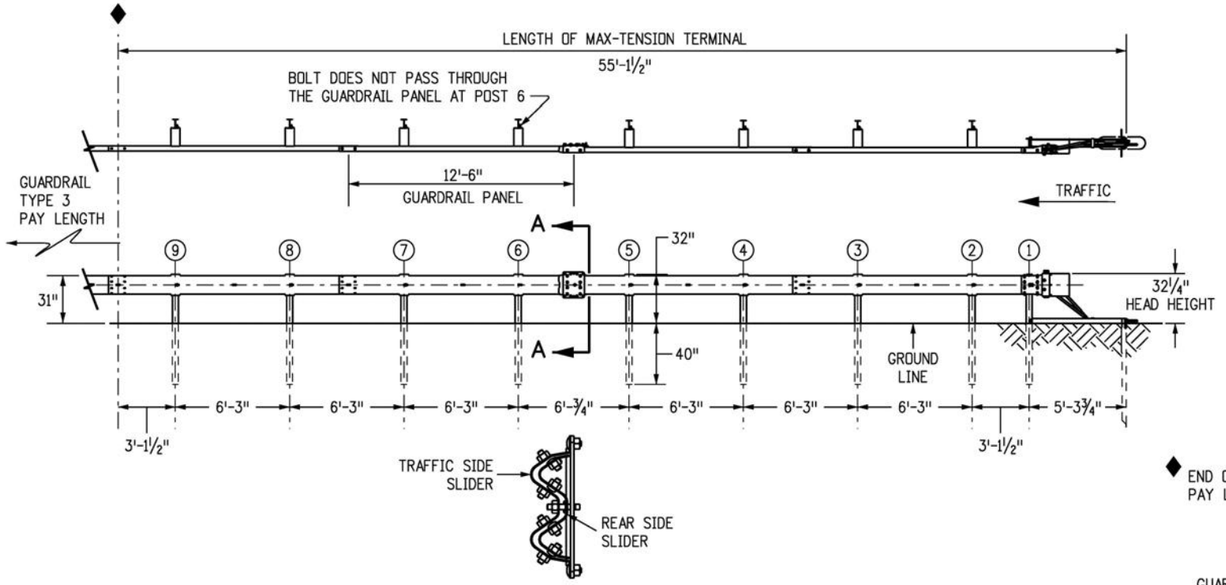
MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES

Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO.
M-606-1
Standard Sheet No. 7 of 19
Project Sheet Number:



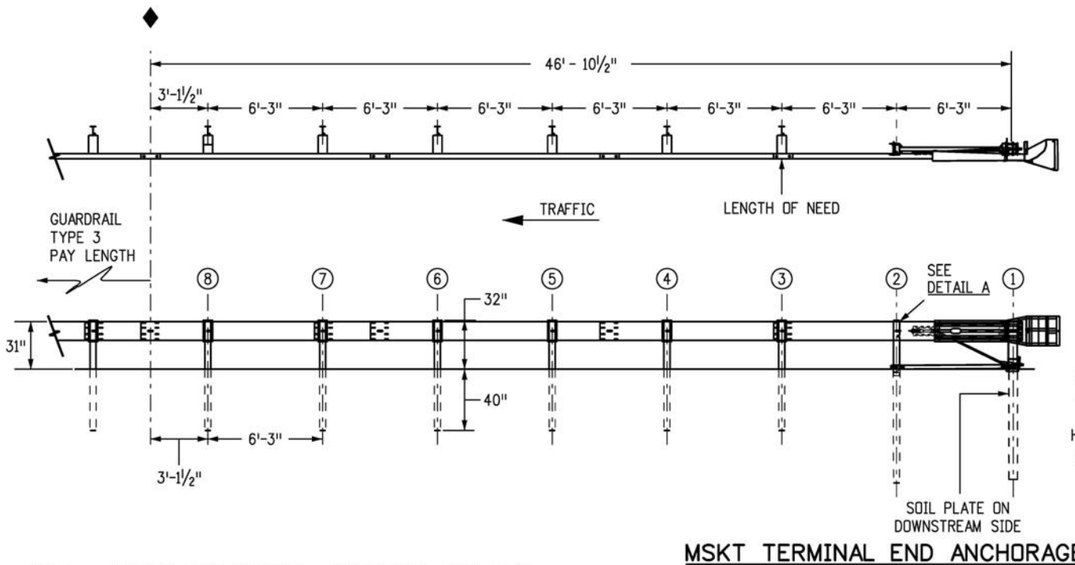
SECTION A-A

MAX-TENSION TERMINAL END ANCHORAGE (NONFLARED)

(MASH CERTIFIED)

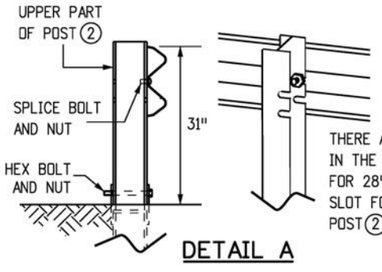
NOTES FOR NONFLARED

1. THE END ANCHORAGE (NONFLARED) SHALL EITHER BE THE SOFTSTOP AS MANUFACTURED BY TRINITY INDUSTRIES, INC. (TEL. #: 1-888-356-2363), OR THE MAX-TENSION AS MANUFACTURED BY LINDSAY TRANSPORTATION SOLUTIONS (TEL. #: 402-829-6800), OR THE MSKT AS MANUFACTURED BY ROAD SYSTEMS, INC. (TEL. #: 432-263-2435). THE END ANCHORAGE (NONFLARED) SHALL INCLUDE ALL POST, RAIL, AND HARDWARE ITEMS REQUIRED FOR A COMPLETE UNIT. THE END ANCHORAGE (NONFLARED) SHALL BE INSTALLED CONFORMING TO THE MANUFACTURER'S RECOMMENDATIONS. THE CONTRACTOR SHALL PROVIDE A COPY OF THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND PARTS LIST TO THE ENGINEER PRIOR TO THE INSTALLATION OF THE DEVICE.
2. DO NOT ATTACH THESE END ANCHORAGES DIRECTLY TO A RIGID BARRIER (EX. CONCRETE BARRIER, STEEL BARRIER, CONCRETE STRUCTURE) WITHOUT A PROPER TRANSITION.
3. CONNECTIONS TO W-BEAMS WHERE THE SPLICE IS NOT AT MID-SPAN BUT AT A POST CAN BE MADE USING A 3'-1½", 9'-4½", OR 15'-7½" W-BEAM PANEL DOWNSTREAM OF TRAFFIC.
4. FOR MSKT END ANCHORAGES (NONFLARED), USE THE MANUFACTURER'S SPECIFIED STEEL FOUNDATION TUBES FOR POSTS (1) AND (2).
5. RETROREFLECTOR TABS SHALL NOT BE USED ON END ANCHORAGE POSTS.
6. DELINEATION SHALL BE APPLIED TO THE END PIECE AND SHALL NOT BE PAID FOR SEPARATELY BUT BE INCLUDED IN THE COST OF THE WORK. SEE STANDARD PLAN S-612-1.



MSKT TERMINAL END ANCHORAGE (NONFLARED)

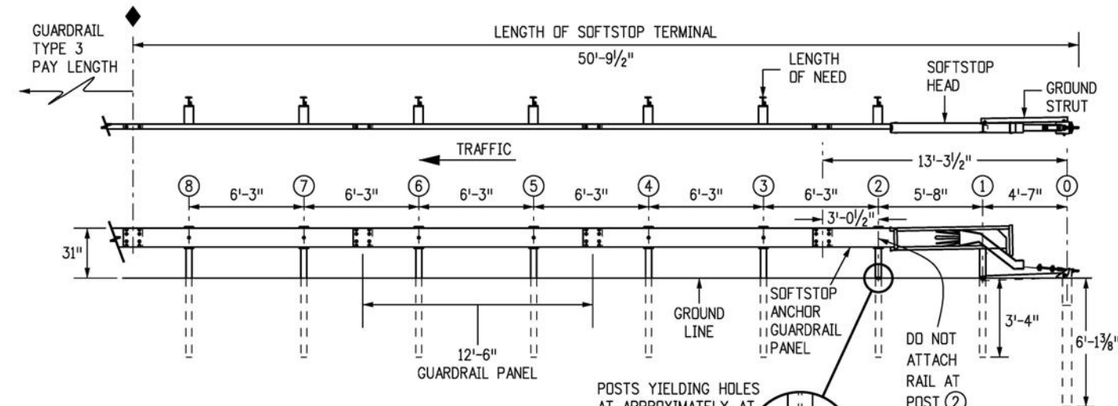
(MASH CERTIFIED)

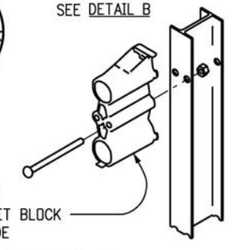


DETAIL A

THERE ARE TWO SETS OF OPEN-ENDED SLOTS IN THE UPPER PART OF POST (2). THESE ARE FOR 28" AND 31" RAIL HEIGHTS. USE THE TOP SLOT FOR THE 31" MSKT TERMINAL. INSTALL POST (2) WITH THE SLOTS FACING POST (1)

END OF GUARDRAIL PAY LENGTH





DETAIL B

SOFTSTOP TERMINAL END ANCHORAGE (NONFLARED)

(MASH CERTIFIED)

END ANCHORAGES (NONFLARED)

Computer File Information		Sheet Revisions	
Creation Date: 07/31/19		Date:	Comments
Designer Initials: JBK	(R-X)		
Last Modification Date: 03/05/20	(R-X)		
Detailer Initials: LTA	(R-X)		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		

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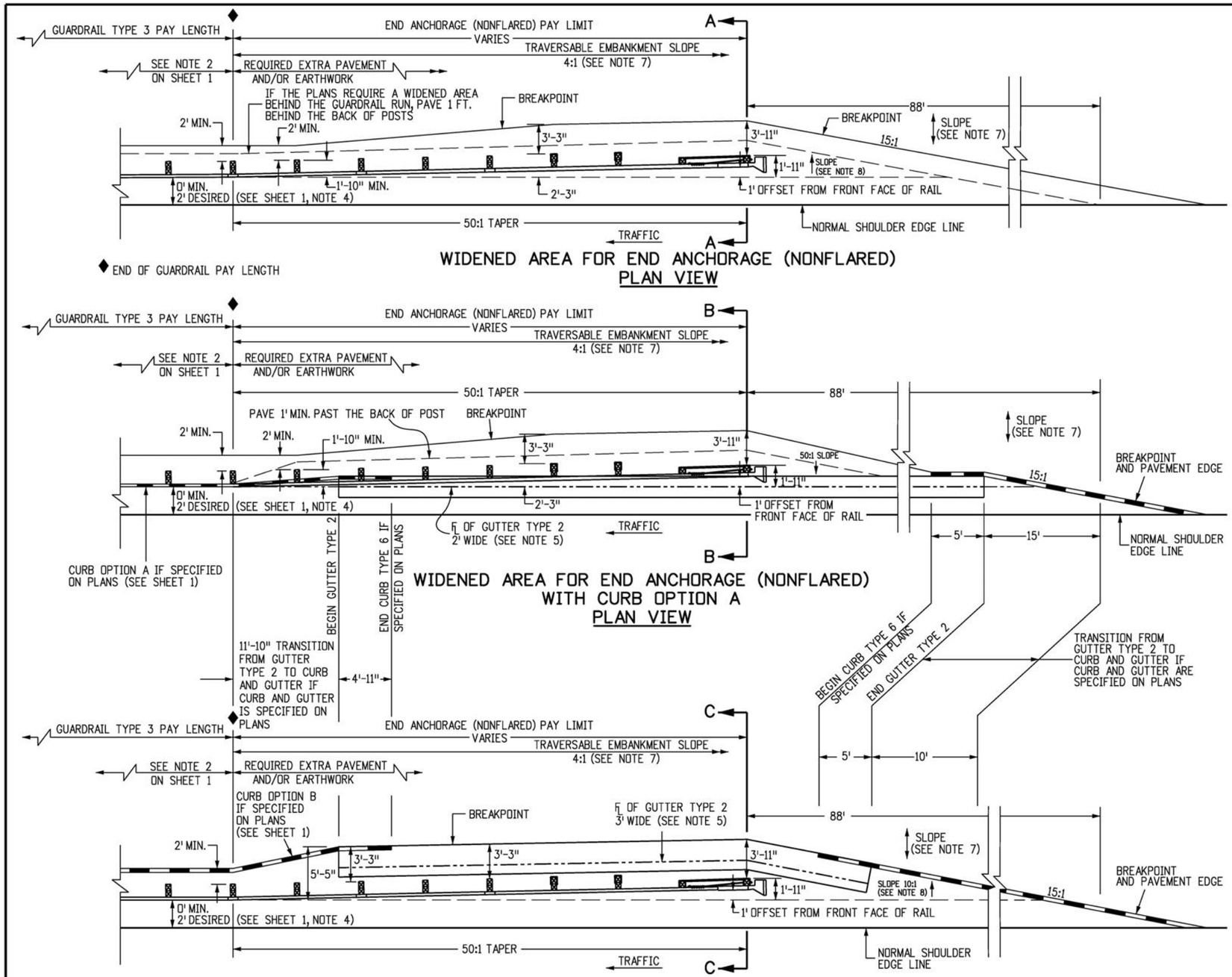
MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES

Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO. M-606-1

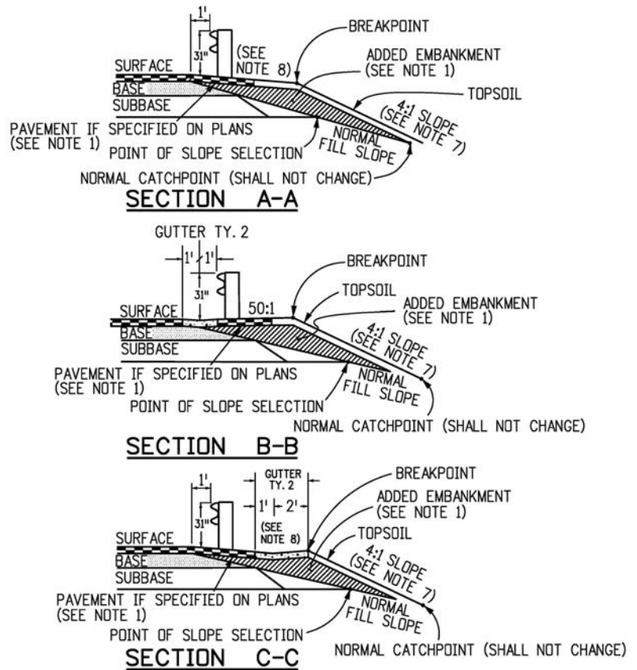
Standard Sheet No. 8 of 19

Project Sheet Number:



NOTES

1. PAYMENT FOR THE ADDED EMBANKMENT (APPROXIMATELY 25 CU. YDS.) FOR THE FLARE SHALL BE AS FOLLOWS:
   A. UNDER PAY ITEM 203 WHEN THE CONTRACT PLAN INCLUDES PAY ITEM 203.
   B. INCLUDED IN THE COST OF THE END ANCHORAGE (NONFLARED) WHEN THE CONTRACT PLANS DOES NOT INCLUDE PAY ITEM 203. THE ADDED EMBANKMENT SHALL BE BE CONSTRUCTED IN ACCORDANCE WITH SUBSECTION 203.07, AASHTO T 99.
2. WHEN THE WIDENED AREA IS PAVED, PAYMENT FOR THE PAVEMENT (APPROX. 39 SQ. YDS.) SHALL BE AS FOLLOWS:
   A. UNDER PAY ITEM 403 OR 412 WHEN THE CONTRACT PLAN INCLUDES PAY ITEM 403 OR 412.
   B. INCLUDED IN THE COST OF THE END ANCHORAGE (NONFLARED) WHEN THE CONTRACT PLAN DOES NOT INCLUDE PAY ITEM 403 OR 412, (SEE SHEET 1, NOTE 2 FOR PAYMENT TYPES).
3. WHEN OVERLAY PAVING, THE FINISHED SURFACE AT EACH POST SHALL NOT BE ABOVE THE TOP BREAKWAY HOLE OR STRUT ASSEMBLY. THE WIDENED AREA AT THE END ANCHORAGE (NONFLARED) SHALL NOT BE OVERLAYED UNLESS PAVEMENT CONDITIONS WARRANT IT BEING OVERLAYED. ANY OVERLAY PAVEMENT ABUTTING THE END ANCHORAGE (NONFLARED) SHALL BE TAPERED TO PREVENT A DROP IN THE PAVED SURFACE BELOW THE RAIL.
4. SEE SHEETS 1, 2, 3, AND 5 FOR STANDARD TYPE 3 GUARDRAIL INSTALLATION DETAILS.
5. THE COST OF THE GUTTER WILL BE PAID FOR AS "GUTTER TYPE 2 (2 FT.)" FOR A LENGTH OF 111 FT., OR "GUTTER TY. 2 (3 FT.)" FOR A LENGTH OF 50 FT.
6. INLETS OR RUNDOWNS MAY BE USED INSTEAD OF THE GUTTER IF SPECIFIED ON THE PLANS. NO ADDITIONAL CURB SHALL BE ADDED IN THE VICINITY OF THE END TREATMENT.
7. 4:1 OR FLATTER SLOPES IN THE TRAVERSABLE AREA SHALL BE USED BEHIND THE END ANCHORAGE AREA, AND IN ADVANCE OF POST (1). IF THIS IS NOT POSSIBLE A MINIMUM 3:1 SLOPE MAY BE USED IF APPROVED BY THE ENGINEER.
8. THE WIDENED AREA, EXCEPT FOR CURB OPTION A, SHALL HAVE THE SAME GRADING AS BENEATH THE ADJACENT GUARDRAIL: 10:1 OR FLATTER IF MORE THAN 2 FT. FROM SHOULDER, OR SLOPE EQUAL TO ROADWAY SLOPE IF 2 FT. OR LESS FROM SHOULDER.
9. WIDENING FOR END ANCHORAGES SHALL BE PAVED ON INTERSTATES AND FREEWAYS. FOR OTHER HIGHWAYS, PAVING SHALL BE AS SHOWN ON THE PLANS.



Computer File Information		Sheet Revisions	
		Date:	Comments
Creation Date: 07/31/19			
Designer Initials: JBK	(R-X)		
Last Modification Date: 03/05/20	(R-X)		
Detailer Initials: LTA	(R-X)		
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MIDWEST
GUARDRAIL SYSTEM (MGS)
TYPE 3 W-BEAM 31 INCHES

Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO.
M-606-1
Standard Sheet No. 9 of 19
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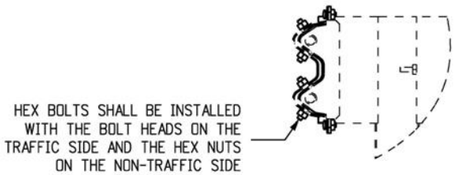
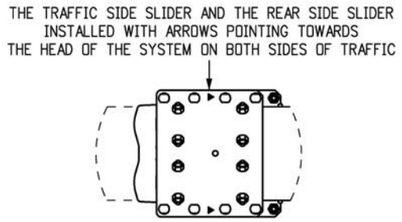


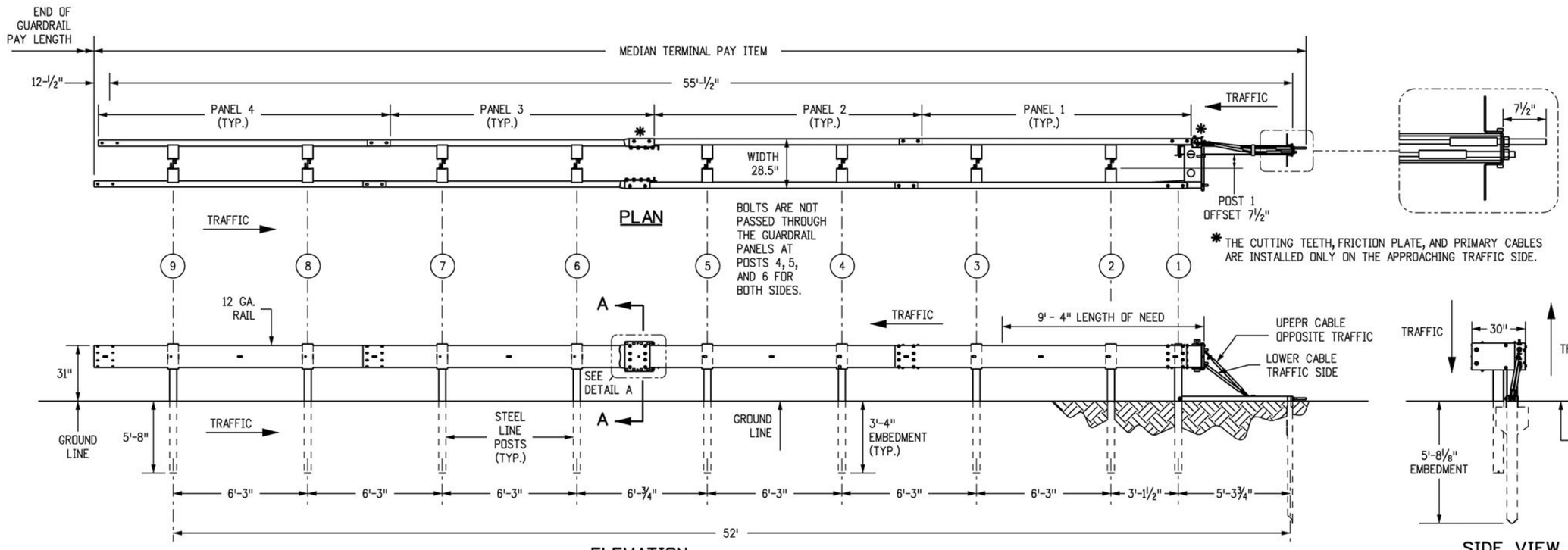
SECTION A-A



DETAIL A

MEDIAN TERMINAL NOTES

1. THE MEDIAN TERMINAL SHALL BE THE MAX-TENSION MEDIAN AS MANUFACTURED BY BY BARRIER SYSTEM BY LINDSAY (LINDSAY TRANSPORTATION SOLUTIONS) (TEL #: 888 800-3691).
2. THE MAX-TENSION SHALL BE APPLIED DIRECTLY TO W-BEAM GUARDRAIL SYSTEMS AT, OR TRANSITIONED TO, 31 INCH WITH PANELS AND POST SPACING CONFIGURED AT MID-SPAN SPLICE. TRANSITIONS TO STRONG POST W-BEAM GUARDRAIL SYSTEMS OR OTHER BARRIERS WHERE THE SPLICE IS NOT MID-SPAN SHALL BE ACCOMPLISHED USING A 3 FT. 1-1/2 INCH, 9 FT. 4-1/2 INCH OR 15 FT. 7-1/2 INCH PANELS AFTER THE MAX-TENSION SYSTEM (MIN. OF 50 FT. DOWNSTREAM OF THE FIRST POST). TRANSITIONS TO OTHER BARRIER SYSTEMS SHALL ALSO BE AT A MIN. OF 50 FT. DOWNSTREAM FROM THE FIRST POST. SEE SHEET 4.
3. THE MAX-TENSION SHALL NOT BE ATTACHED DIRECTLY TO RIGID BARRIERS SUCH AS CONCRETE BARRIERS, STEEL BARRIERS OR CONCRETE STRUCTURES WITHOUT PROPER TRANSITION. IF ROCK OR STIFF SOIL IS ENCOUNTERED, THE POSTS AND SOIL ANCHOR MAY BE INSTALLED BY AUGURING AND BACKFILLING THE HOLE.
4. EITHER 8 INCH OR 12 INCH COMPOSITE OR TIMBER BLOCKOUTS SHALL BE USED PER MANUFACTURE'S RECOMMENDATIONS.
5. EITHER 12 FT.-6 INCH OR 25 FOOT PANELS SHALL BE USED DEPENDING ON SITE CONDITIONS OR CONNECTED BARRIER SYSTEMS.
6. RAIL PANELS SHALL BE LAPPED PER MANUFACTURER'S INSTALLATION MANUAL, REGARDLESS OF AN UPSTREAM OR DOWNSTREAM END SYSTEM POSITION.
7. ALL STEEL COMPONENTS SHALL BE GALVANIZED PER ASTM A123 OR EQUIVALENT UNLESS OTHERWISE STATED.
8. ONE MEDIAN TERMINAL SHALL INCLUDE ALL POSTS, RAIL, AND HARDWARE ITEMS REQUIRED FOR A COMPLETE UNIT. THE DEVICE SHALL BE INSTALLED IN CONFORMANCE WITH THE MANUFACTURER'S INSTRUCTIONS. THE CONTRACTOR SHALL PROVIDE A COPY OF THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AND PARTS LISTS TO THE ENGINEER PRIOR TO THE INSTALLATION OF THE DEVICE.
9. UNLESS OTHERWISE SPECIFIED ON THE PLANS, THE MEDIAN TERMINAL SHALL BE INSTALLED FOR BIDIRECTIONAL TRAFFIC APPLICATION.
10. EACH INSTALLATION SHALL BE SUPERVISED AND CERTIFIED AS CORRECT UPON COMPLETION BY A REPRESENTATIVE OF THE DEVICE MANUFACTURER OR BY AN EMPLOYEE OF THE CONTRACTOR WHO IS A CERTIFIED INSTALLER. THE CERTIFIED INSTALLER SHALL HAVE COMPLETED DEVICE TRAINING AND SHALL BE REGISTERED WITH THE MANUFACTURER AS A CERTIFIED INSTALLER.
11. DELINEATION, IF REQUIRED, SHALL BE APPLIED TO THE END PIECE AND WILL NOT BE PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF THE WORK. SEE STANDARD PLAN S-612-1.



MAX-TENSION MEDIAN

(MASH CERTIFIED)

Computer File Information		Sheet Revisions	
Creation Date: 07/31/19		Date:	Comments
Designer Initials: JBK	(R-X)		
Last Modification Date: 03/05/20	(R-X)		
Detailer Initials: LTA	(R-X)		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		

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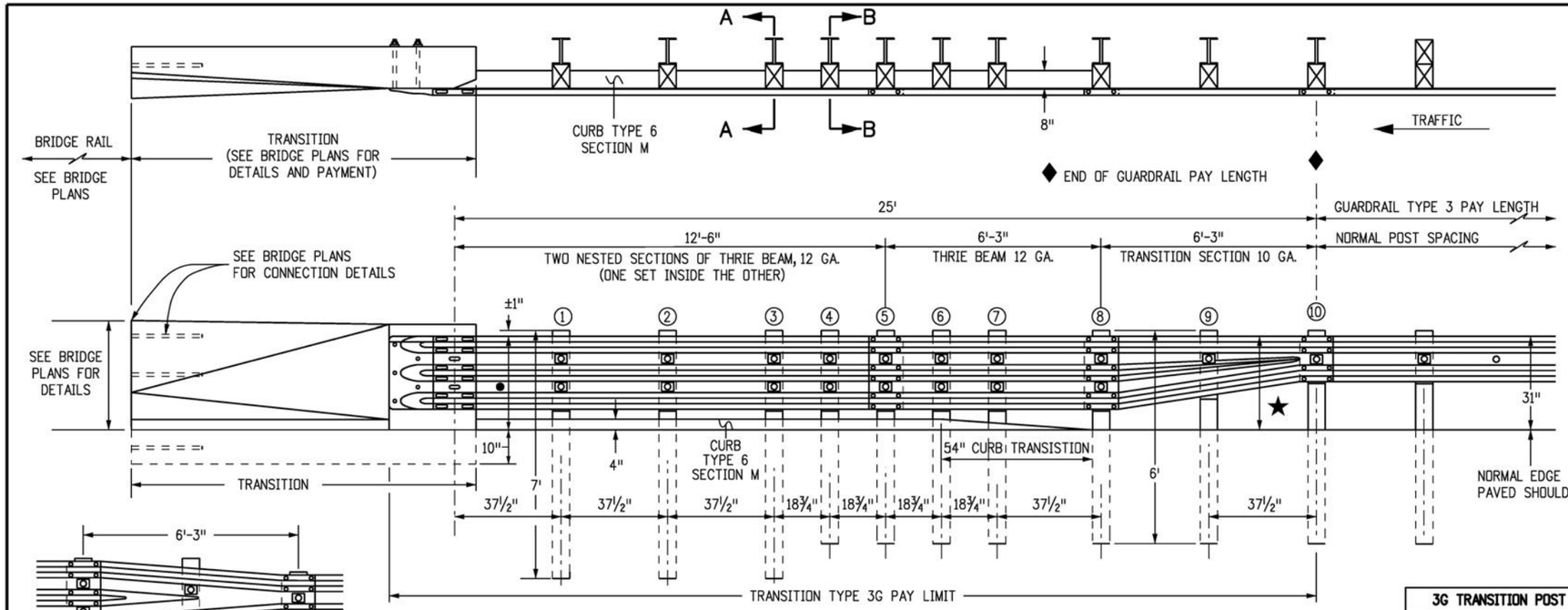
MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES

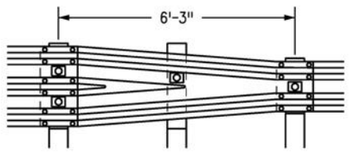
Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO. M-606-1

Standard Sheet No. 10 of 19

Project Sheet Number:





SYMMETRICAL TRANSITION SECTION

TRANSITION TYPE 3G

ALL POSTS SHALL BE STEEL

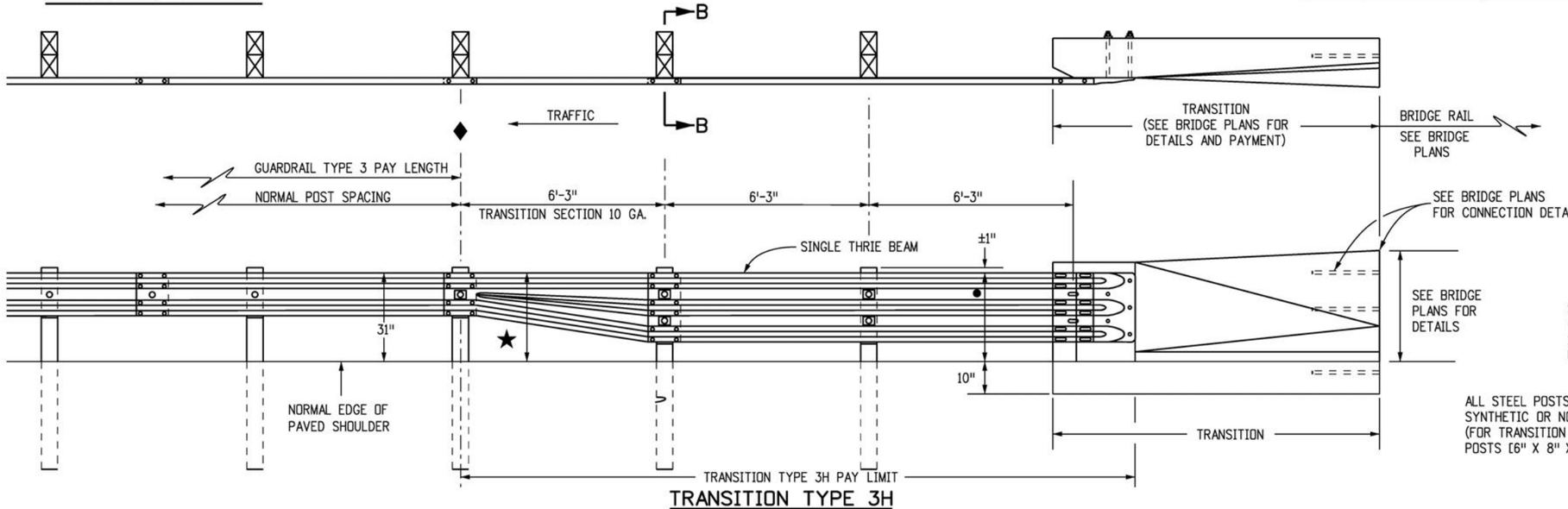
★ IF THE HEIGHT OF THE TRANSITION TYPES 3G OR 3H IS MORE THAN 31", THEN A SYMMETRICAL TRANSITION SECTION SHALL BE USED HERE.

● 31" FOR ASPHALT BRIDGE OVERLAY. 33.25" FOR POLYMER CONCRETE BRIDGE OVERLAY.

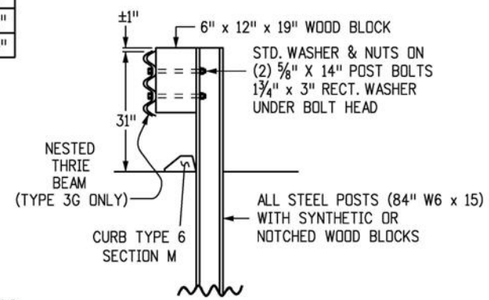
NOTES

1. TRANSITION TYPE 3G IS FOR USE AT BOTH ENDS OF BRIDGES ON TWO-WAY HIGHWAYS AND AT THE APPROACH END OF BRIDGES ON ONE-WAY HIGHWAYS.
2. TRANSITION TYPE 3H IS FOR USE AT THE TRAILING END OF BRIDGES ON ONE-WAY HIGHWAYS.
3. THE THRIE BEAM SECTION IN TRANSITION TYPES 3G AND 3H MAY BE SHOP BENT TO FIT CORRESPONDING RADIUS CURVES. HOWEVER, THE 6 FT.-3 IN. TRANSITION SECTION SHALL NOT BE BENT.
4. A TRANSITION SHALL BE REQUIRED BETWEEN TYPES 3G OR 3H AND THE BRIDGE RAILS. SEE STANDARD PLAN M-606-15 FOR THE TRANSITION TO TYPE 9 GUARDRAIL BARRIER.
5. TRANSITION TYPES 3G AND 3H ARE BOTH MASH COMPLIANT.
6. BACKUP PLATE IS NOT REQUIRED AT POSTS ON TYPE 3G AND 3H.
7. ⊡ THIS SYMBOL IN THE ELEVATION DRAWINGS SHOWS THE LOCATIONS WHERE A RECTANGULAR WASHER IS REQUIRED UNDER THE POST BOLT HEAD.
8. CURB TYPE 6 SECTION M, MAY BE ASPHALT OR CONCRETE. THE COST OF CURB IS INCLUDED IN THE WORK, UNLESS A SEPARATE PAY ITEM IS INCLUDED IN THE BID SCHEDULE.
9. FOR TYPE 3G, POSTS ① THRU ③ ARE 7 FT. LONG. ALL OTHER POSTS SHALL BE A STANDARD 6 FT. LONG UNLESS OTHERWISE SPECIFIED IN THE CONTRACT.
10. NOTCHED RAIL BLOCKS MANUFACTURED FROM SYNTHETIC MATERIAL WILL BE ACCEPTED AS ALTERNATIVES TO WOOD NOTCHED BLOCKS FOR USE WITH STEEL POSTS PROVIDED THAT THE BLOCKS HAVE RECEIVED FHWA APPROVAL AND ARE CERTIFIED AS IDENTICAL TO THE SPECIMENS USED FOR TESTING AND APPROVAL. STEEL BLOCKS ARE NOT ALLOWED.

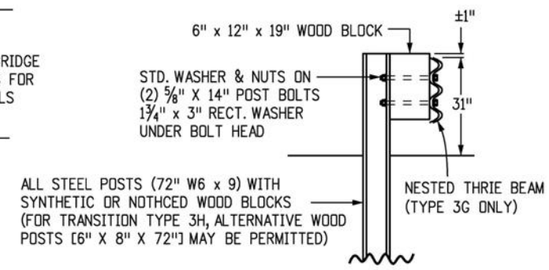
3G TRANSITION POST / BLOCK SIZING		
POST #	STEEL POST SIZE	BLOCKOUT SIZE
1 - 3	84" W6 X 15	6" X 12" X 19"
4 - 9	72" W6 X 9	6" X 12" X 19"
10	72" W6 X 9	6" X 12" X 14"



TRANSITION TYPE 3H



SECTION A-A



SECTION B-B

Computer File Information	
Creation Date: 07/31/19	
Designer Initials: JBK	(R-X)
Last Modification Date: 03/05/20	(R-X)
Detailer Initials: LTA	(R-X)
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)

Sheet Revisions	
Date:	Comments
03/05/20	Revised Gen. Notes 3 & 5. Revised transition sections notes to see the "Bridge Plans" and deleted their x-sections details. Revised the ★ note.

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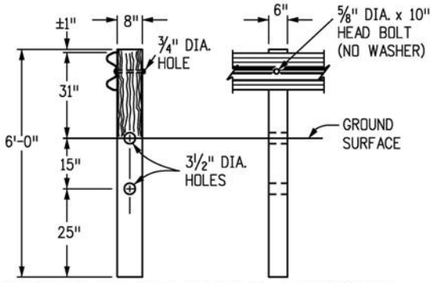
MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES

Issued by the Project Development Branch: July 31, 2019

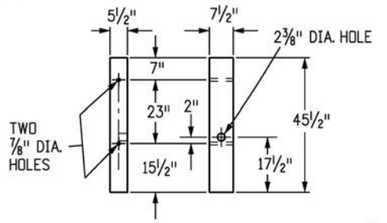
STANDARD PLAN NO. M-606-1

Standard Sheet No. 11 of 19

Project Sheet Number:



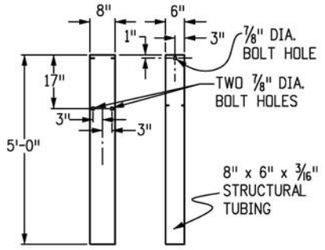
CONTROLLED RELEASING TERMINAL (CRT) POST ①



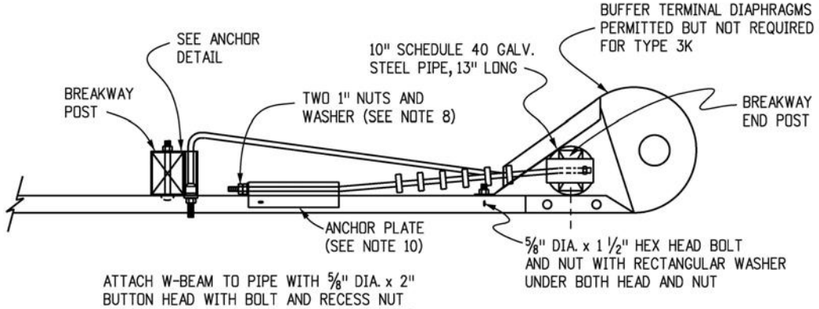
WOOD BREAKAWAY POST ②

POST	DIMENSIONS	TYPE
①	6" x 8" x 6'	CRT
②	5 1/2" x 7 1/2" x 45 1/2"	BREAKAWAY

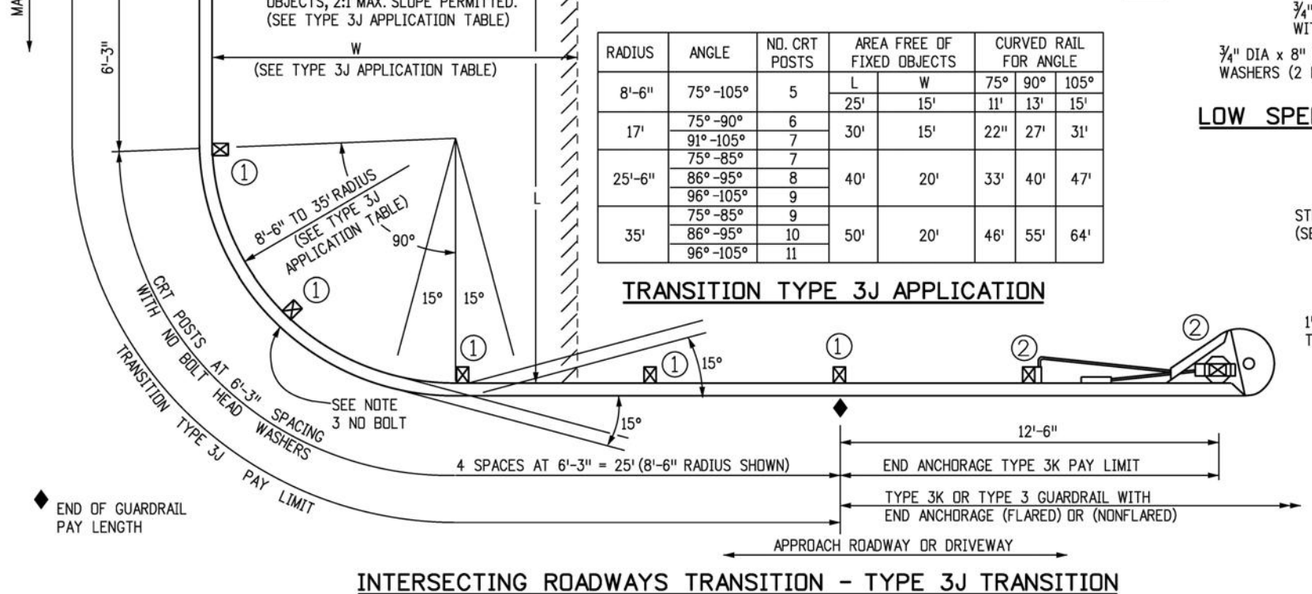
POSTS



STEEL TUBE



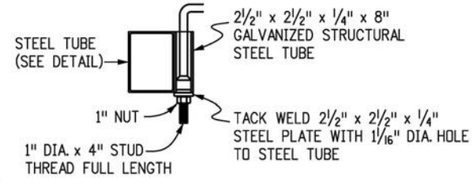
LOW SPEED END ANCHORAGE - TYPE 3K



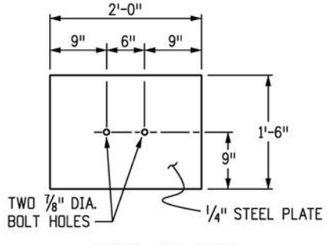
RADIUS	ANGLE	NO. CRT POSTS	AREA FREE OF FIXED OBJECTS		CURVED RAIL FOR ANGLE		
			L	W	75°	90°	105°
8'-6"	75°-105°	5	25'	15'	11'	13'	15'
17'	75°-90°	6	30'	15'	22"	27'	31'
	91°-105°	7					
25'-6"	75°-85°	7	40'	20'	33'	40'	47'
	86°-95°	8					
	96°-105°	9					
35'	75°-85°	9	50'	20'	46'	55'	64'
	86°-95°	10					
	96°-105°	11					

TRANSITION TYPE 3J APPLICATION

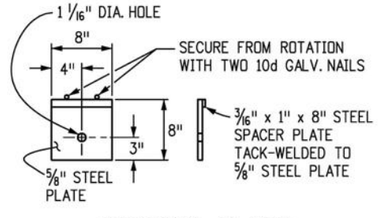
INTERSECTING ROADWAYS TRANSITION - TYPE 3J TRANSITION



ANCHOR DETAIL



SOIL PLATE



BEARING PLATE FOR STEEL TUBE

NOTES

1. APPLICATION: THE TRANSITION TYPE 3J MAY BE USED TO SHIELD HAZARDS AT THE INTERSECTION OF TWO ROADWAYS. TYPICAL APPLICATIONS INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
   A. CANAL SERVICE ROADS AT BRIDGE ENDS.
   B. INTERRUPTIONS IN GUARDRAIL RUNS BY INTERSECTING ROADWAYS, ETC..

   THE LOW SPEED (<45 MPH) END ANCHORAGE TYPE 3K SHALL BE USED ONLY ON DRIVEWAYS AND LOW SPEED SERVICE ROADS. WHEN AN APPROVED CRASH-TESTED END TREATMENT IS REQUIRED USE THE END ANCHORAGE (FLARED) OR (NONFLARED) WITH 37 FT.-6 IN. LENGTH.
2. GRADING AND PAVING FOR THE 3J & 3K SHALL MATCH THE GRADING AND PAVING OF THE GUARDRAIL TO WHICH THEY ARE ATTACHED, AND SHALL BE IN ACCORDANCE WITH SHEET ONE OF THIS STANDARD. MAXIMUM FILL SLOPE SHALL BE 2:1.
3. THE RAIL IS NOT BOLTED TO THE CRT POST AT THE CENTER OF THE CURVE FOR THE 8 FT.-6 IN., 17 FT., AND 25 FT.-6 IN. RADII. PLATES SHALL CONFORM TO ASTM A 36, AND THE STRUCTURAL TUBING TO ASTM A 500.
4. THE 3/4IN. GALVANIZED WIRE ROPE (CABLE) SHALL CONFORM TO AASHTO M 30 TYPE II.
5. PLATES SHALL CONFORM TO ASTM A 36, AND STRUCTURAL TUBING TO ASTM A 500. WELDING SHALL MEET ALL REQUIREMENTS OF THE AMERICAN WELDING SOCIETY.
6. ALL STRUCTURAL STEEL SHALL BE GALVANIZED IN CONFORMANCE WITH ASTM A 123. POSTS SHALL NOT BE PUNCHED, DRILLED, CUT, OR WELDED AFTER GALVANIZING.
7. WHEN THE SOIL PLATE WELDED OPTION IS SELECTED, SOIL PLATE CONNECTION BOLT HOLES ARE NOT REQUIRED.
8. OUTSIDE NUT SHALL BE TORQUED AGAINST INSIDE NUT WITH THE CABLE INSTALLED TAUT BETWEEN THE ANCHOR PLATE AND FIRST POST.
9. ALL CURVED GUARDRAIL SHALL BE SHOP BENT.
10. SEE SHEET 5 FOR ANCHOR PLATE AND OTHER DETAILS.
11. THE STEEL TUBE MAY BE DRIVEN WITH WOOD POST INSERTED IF NO DAMAGE OCCURS TO THE POST OR BOLTS.

Computer File Information		Sheet Revisions	
Creation Date: 07/31/19		Date:	Comments
Designer Initials: JBK	(R-X)		
Last Modification Date: 03/05/20	(R-X)		
Detailer Initials: LTA	(R-X)		
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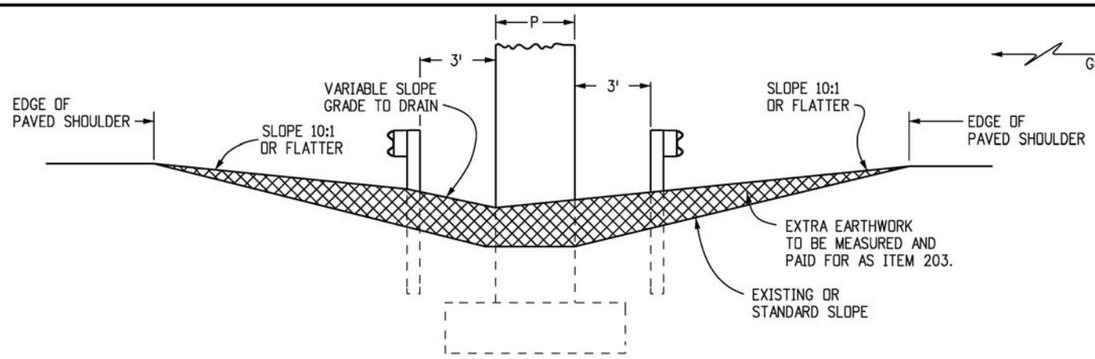
MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES

Issued by the Project Development Branch: July 31, 2019

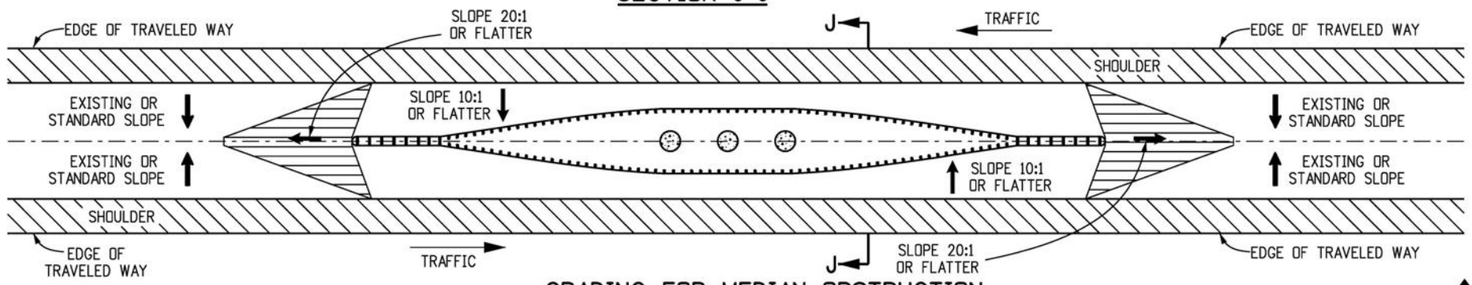
STANDARD PLAN NO. M-606-1

Standard Sheet No. 12 of 19

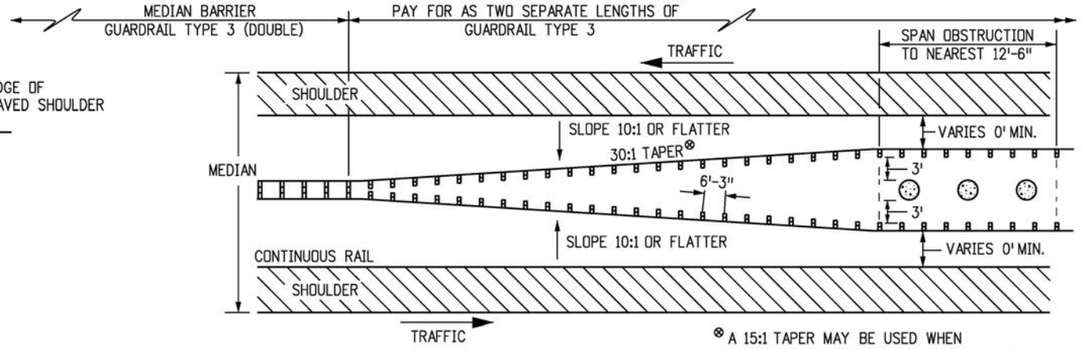
Project Sheet Number:



SECTION J-J

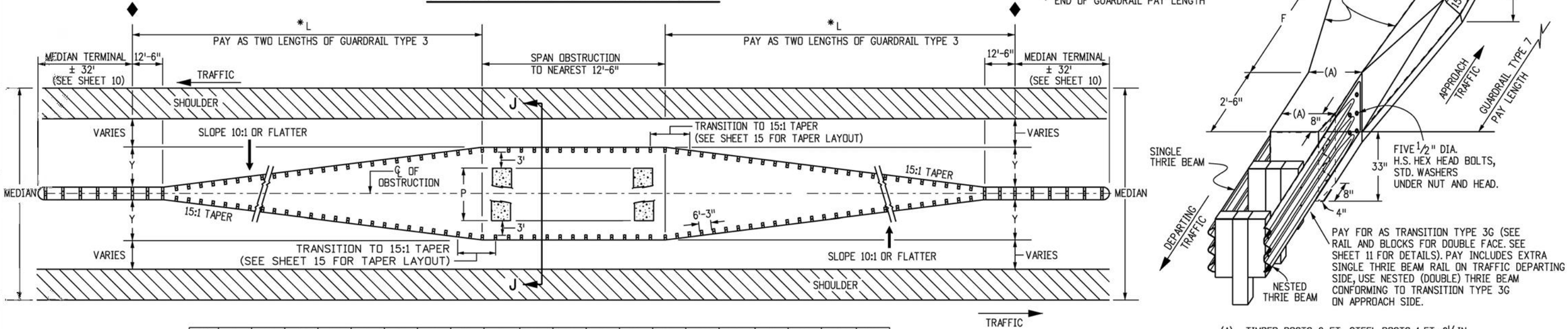


GRADING FOR MEDIAN OBSTRUCTION



⊗ A 15:1 TAPER MAY BE USED WHEN THE BARRIER ENDS IN THE MEDIAN TERMINAL

OBSTRUCTION IN MEDIAN 30 FT. WIDE OR LESS



◆ END OF GUARDRAIL PAY LENGTH

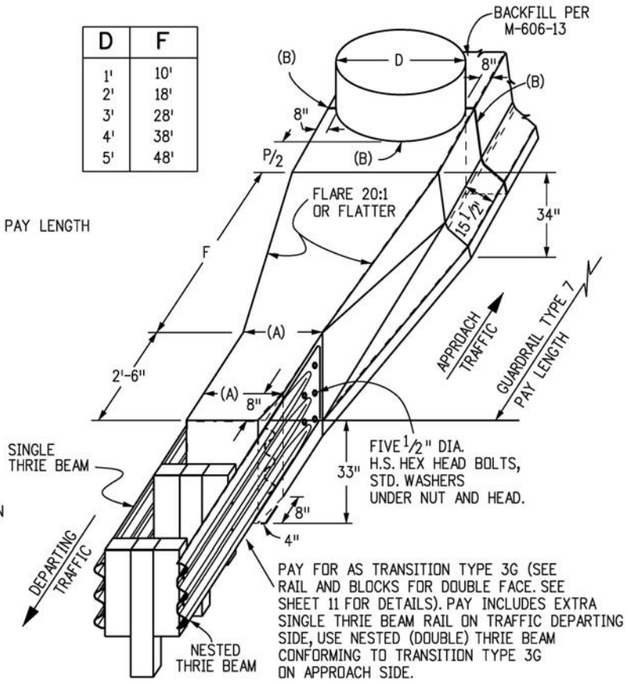
P	1'	2'	3'	4'	5'	6'	7'	8'	9'	10'	11'	12'	13'	14'	15'	16'	17'	18'	19'	20'
Y	4'-1"	4'-7"	5'-1"	5'-7"	6'-1"	6'-7"	7'-1"	7'-7"	8'-1"	8'-7"	9'-1"	9'-7"	10'-1"	10'-7"	11'-1"	11'-7"	12'-1"	12'-7"	13'-1"	13'-7"
L	75'	87'-6"		100'	112'-6"		125'		137'-6"	150'		162'-6"		175'		187'-6"	200'		212'-6"	225'

*L IS MEASURED ALONG FACE OF GUARDRAIL

GUARDRAIL FOR OBSTRUCTION IN MEDIANS WIDER THAN 30 FT.

NOTE: FOR OBSTRUCTIONS (P) THAT ARE WIDER THAN 20 FT. IN MEDIANS USE SHEET 16.

D	F
1'	10'
2'	18'
3'	28'
4'	38'
5'	48'



(A). TIMBER POSTS 2 FT., STEEL POSTS 1 FT.-9½IN.

(B). ½ IN. PREFORMED JOINT MATERIAL

NARROW MEDIAN DETAIL

USUALLY LESS THAN 30 FT. WIDE MEDIAN
WITH ALL PAVED SURFACE

OBSTRUCTIONS IN MEDIANS

Computer File Information		Sheet Revisions	
Creation Date: 07/31/19		Date:	Comments
Designer Initials: JBK	(R-X)		
Last Modification Date: 03/05/20	(R-X)		
Detailer Initials: LTA	(R-X)		
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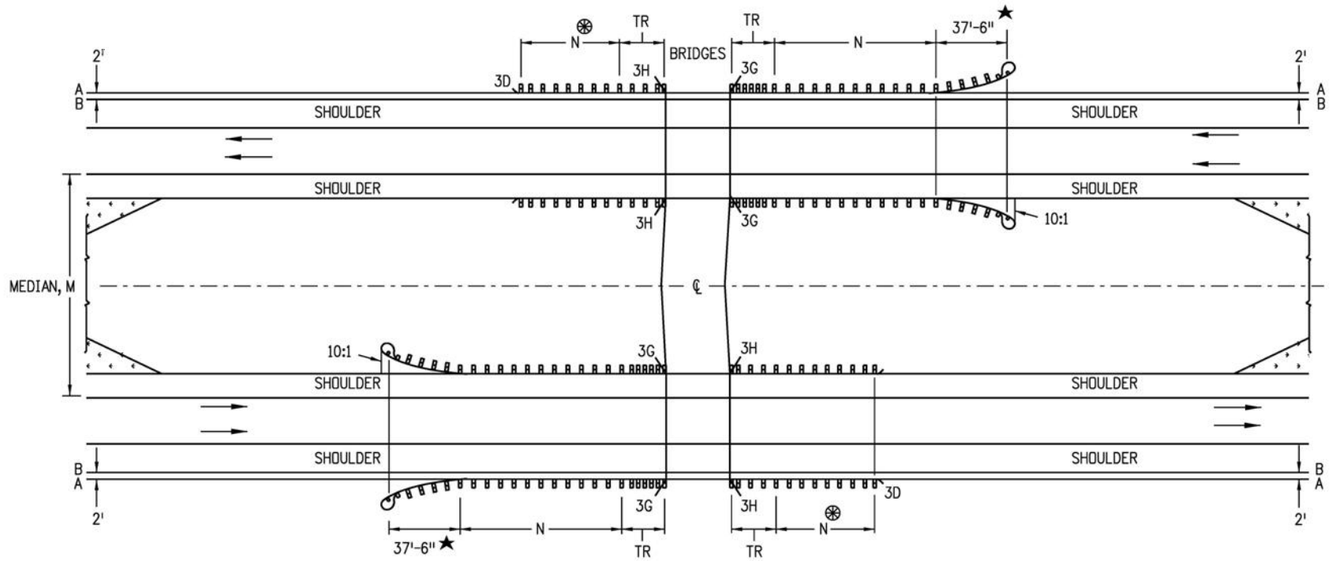
MIDWEST
GUARDRAIL SYSTEM (MGS)
TYPE 3 W-BEAM 31 INCHES

Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO.
M-606-1
Standard Sheet No. 13 of 19
Project Sheet Number:



MULTILANE DIVIDED HIGHWAYS FOR STEEP EMBANKMENTS IN MEDIAN

NOTES

1. MEDIAN BARRIERS TANGENT TO THE ROADWAY MAY BE USED WHERE THE SHOULDER SLOPES IN THE MEDIAN ARE STEEP.
2. BARRIER LENGTHS SHALL BE INCREASED TO ACCOUNT FOR STEEP EMBANKMENTS OR OTHER HAZARDS WITHIN CLOSE PROXIMITY OF BRIDGES.

⊛ — DO NOT CONSTRUCT THE TR AND GUARDRAIL ON THE TRAILING BRIDGE ENDS IF SITE CONDITIONS DO NOT WARRANT THE USE OF GUARDRAIL.

N — SHOWN ON PLANS. LENGTH TO SHIELD ALL HAZARDS IS BASED ON GUARDRAIL'S LENGTH OF NEED COMPUTATION. SEE AASHTO ROADWAY DESIGN GUIDE. THE MINIMUM SHALL BE 12 FT. - 6 IN., WHERE SITE CONDITIONS ALLOW. THE TOTAL LENGTH OF NEED WILL INCLUDE THE LENGTH OF TRANSITION, THE LENGTH OF RAIL (N), AND ANY REDIRECTIVE LENGTH IN THE RAIL END TREATMENT.

TR — 25 FEET FOR TRANSITION TYPES 3G AND 3H.

A — EDGE OF 8 FT. OR 10 FT. SHOULDER.

B — EDGE OF 6 FT. OR LESS SHOULDER.

★ — END ANCHORAGE CAN BE FLARED OR NONFLARED.

Computer File Information		Sheet Revisions	
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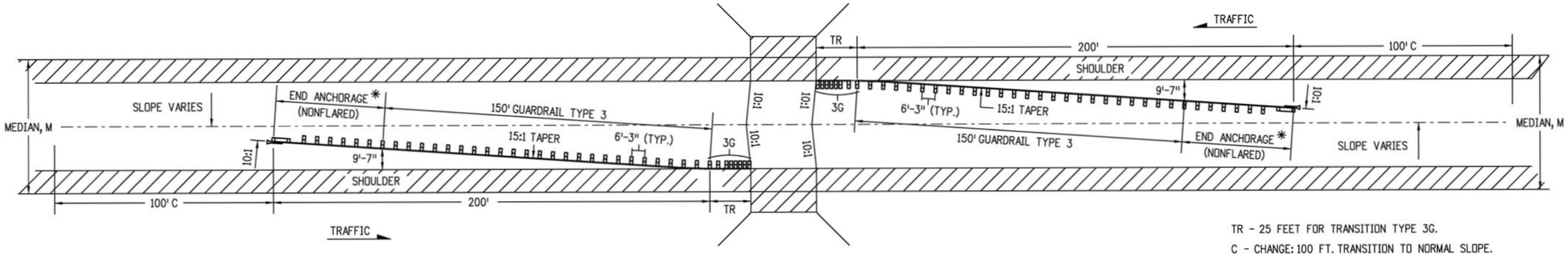
MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES

Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO. M-606-1

Standard Sheet No. 14 of 19

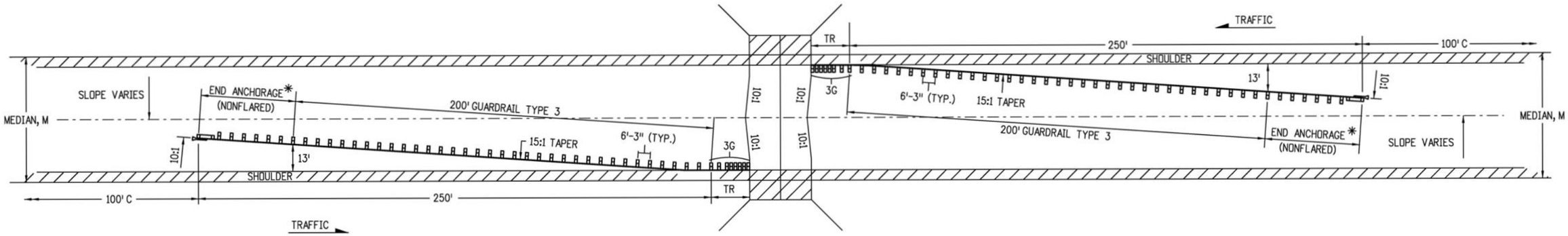
Project Sheet Number:



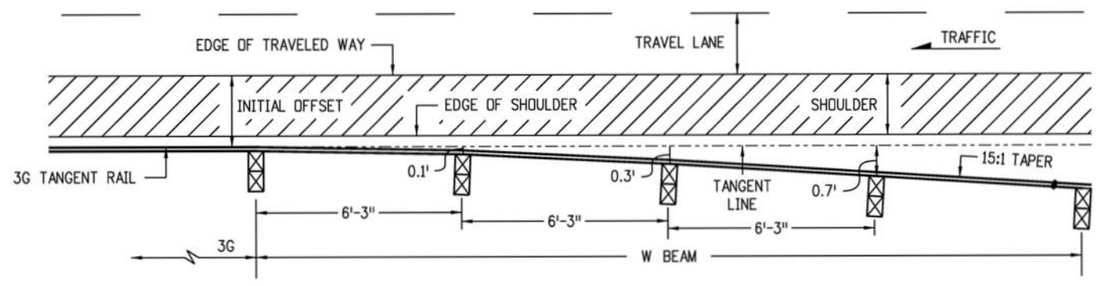
TR - 25 FEET FOR TRANSITION TYPE 3G.
C - CHANGE: 100 FT. TRANSITION TO NORMAL SLOPE.
M - WIDTH OF MEDIAN.

MEDIANS 60 FT. AND OVER WITH 10 FT. OR WIDER SHOULDERS.

* END ANCHORAGE LENGTH AND FLARE RATES VARY BY DEVICE.
SEE MANUFACTUERER/SUPPLIER FOR INSTALLATION REQUIREMENTS.



MEDIANS 60 FT. AND OVER WITH 4 to 8 FT. SHOULDERS.



TRANSITION TO TYPICAL 15:1 TAPER

NOTES

1. GUARDRAIL TRANSITIONS FROM PARALLEL TO ROADWAY SHOULDER AT 3G SEGMENT TO 15:1 TAPER WITHIN 25 FEET BASED ON POST OFFSET DIMENSIONS SHOWN.
2. SEE SHEET 14 FOR THE RIGHT SHOULDER GUARDRAIL LAYOUT.

MULTILANE DIVIDED HIGHWAYS - (DEPRESSED MEDIANS, 60 FT. AND OVER WITH OPEN HAZARDS OR OBSTRUCTIONS)

Computer File Information		Sheet Revisions	
Creation Date: 07/31/19		Date:	Comments
Designer Initials: JBK	(R-X)		
Last Modification Date: 03/05/20	(R-X)		
Detailer Initials: LTA	(R-X)		
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MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES

Issued by the Project Development Branch: July 31, 2019

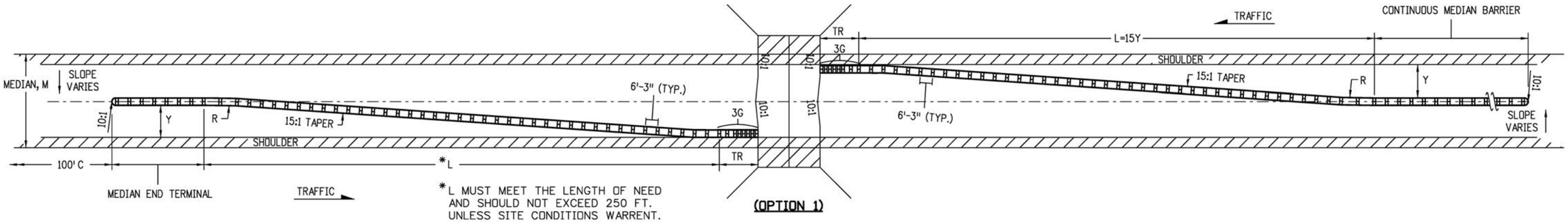
STANDARD PLAN NO. M-606-1

Standard Sheet No. 15 of 19

Project Sheet Number:

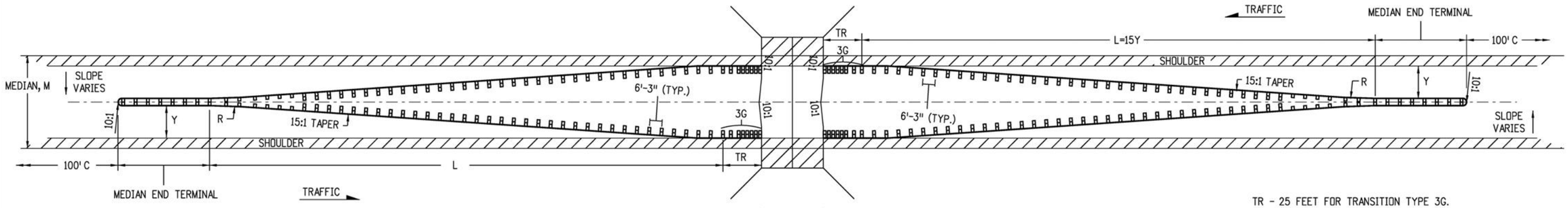
NOTES

1. GUARDRAIL TRANSITIONS FROM PARALLEL TO ROADWAY SHOULDER AT 3G SEGMENT TO 15:1 TAPER WITHIN 25 FEET BASED ON POST OFFSET DIMENSIONS SHOWN.
2. THE OPTION 1 LAYOUT SHALL BE USED WHEN "Y" EXCEEDS 16 FEET OR WHEN MEDIAN BARRIER IS CONTINUOUS.
3. THE OPTION 2 LAYOUT SHALL BE USED WHEN "Y" IS 16 FEET OR LESS.
4. SEE SHEET 14 FOR RIGHT SHOULDER GUARDRAIL LAYOUT.



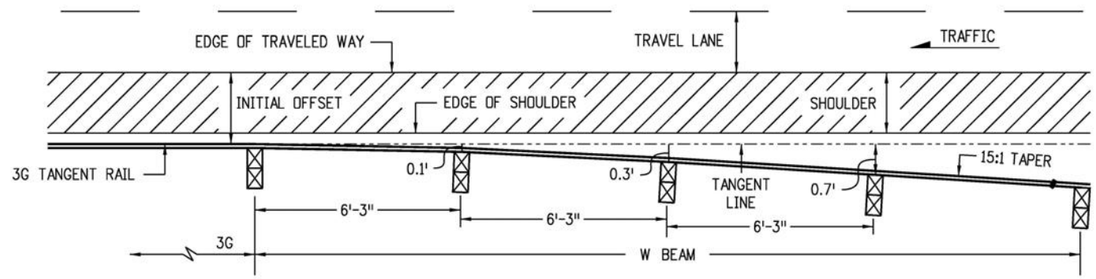
*L MUST MEET THE LENGTH OF NEED AND SHOULD NOT EXCEED 250 FT. UNLESS SITE CONDITIONS WARRENT.

(OPTION 1)



(OPTION 2)

TR - 25 FEET FOR TRANSITION TYPE 3G.
C - CHANGE: 100 FT. TRANSITION TO NORMAL SLOPE.
M - WIDTH OF MEDIAN.
L - TOTAL LENGTH PAID AS GUARDRAIL TYPE 3.
Y - FINAL OFFSET AT END.



TRANSITION TO TYPICAL 15:1 TAPER

MULTILANE DIVIDED HIGHWAYS - (DEPRESSED MEDIANS, 21 - 59 FT. WITH OPEN HAZARDS OR OBSTRUCTIONS)

Computer File Information		Sheet Revisions	
		Date:	Comments
Creation Date: 07/31/19			
Designer Initials: JBK	(R-X)		
Last Modification Date: 03/05/20	(R-X)		
Detailer Initials: LTA	(R-X)		
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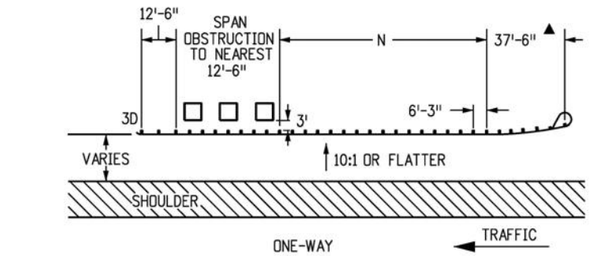
MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES

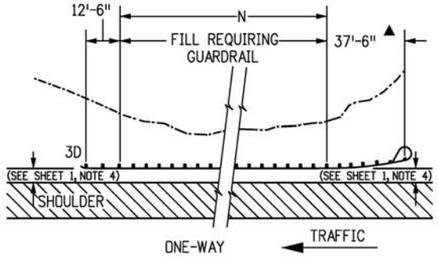
Issued by the Project Development Branch: July 31, 2019

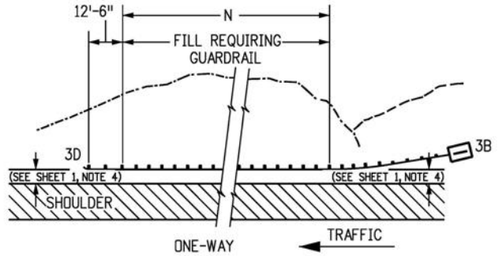
STANDARD PLAN NO. M-606-1

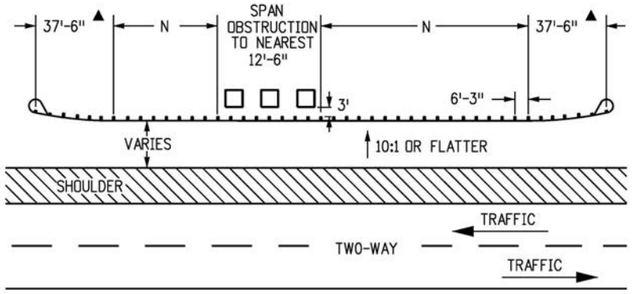
Standard Sheet No. 16 of 19

Project Sheet Number:

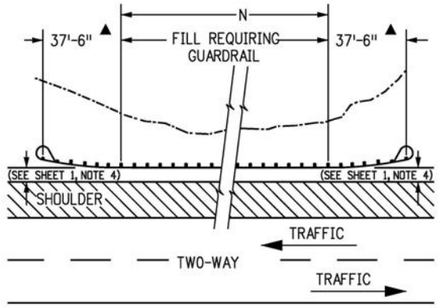




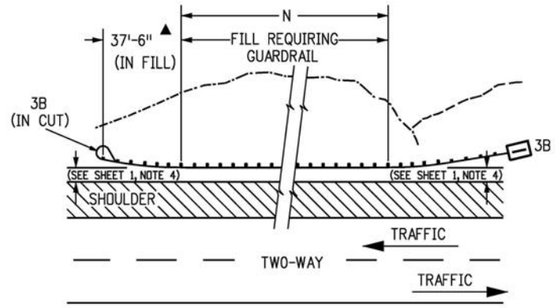




GUARDRAIL FOR ROADSIDE OBSTRUCTIONS



GUARDRAIL FOR ROADSIDE FILL CONSTRUCTION

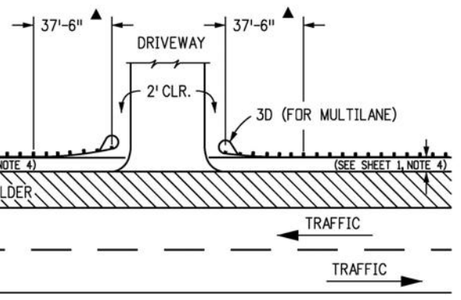


GUARDRAIL FOR ROADSIDE CUT-TO-FILL CONDITION

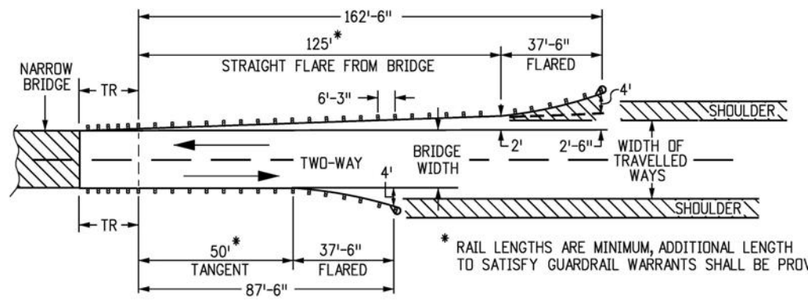
NOTES

1. A TYPE 3G OR 3H TRANSITION (SEE SHEET 11) SHALL BE USED TO CONNECT THE TYPE 3 W-BEAM TO A TYPE 9 CONCRETE BARRIER (SEE M-606-15) OR TO A TYPE 8 OR 10 BRIDGE RAIL.
2. "TR" SHALL BE 25 FEET FOR THE TRANSITION TYPES 3G AND 3H.
3. THE GUARDRAIL LENGTH DIMENSION "N" IS THE LENGTH AS DETERMINED BY THE LENGTH OF NEED COMPUTATION AND IS SHOWN ON THE PLANS. THE MINIMUM IS 12 FT.-6 IN. WHERE SITE CONDITIONS ALLOW. THE OVERALL REQUIRED LENGTH OF NEED CAN INCLUDE THE LENGTH OF TRANSITION, THE LENGTH OF RAIL (N), AND ANY REDIRECTIVE LENGTH IN THE RAIL END TREATMENT. A TRAVERSABLE SLOPE SHALL BE PROVIDED BEHIND THE TERMINAL TO DIMENSION "N" PRIOR TO THE OBSTRUCTION UNLESS OTHERWISE APPROVED BY THE ENGINEER.

▲ END ANCHORAGE CAN BE FLARED OR NONFLARED

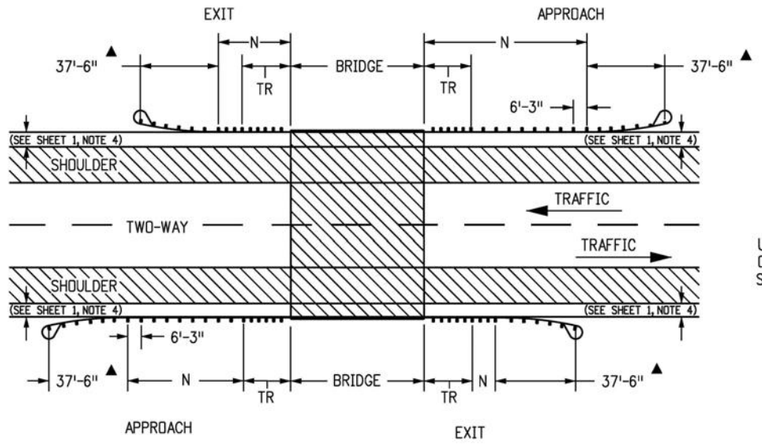


LAYOUT FOR DRIVEWAY APPROACH

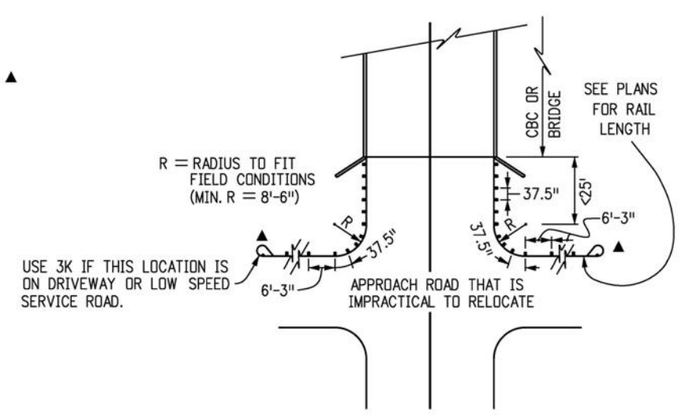


* RAIL LENGTHS ARE MINIMUM, ADDITIONAL LENGTH TO SATISFY GUARDRAIL WARRANTS SHALL BE PROVIDED

2-WAY NARROW APPLICATION



2-WAY NORMAL BRIDGE APPLICATION



GUARDRAIL TYPE 3 WITH BLOCKED OUT POSTS SPACED AT 3'-1½" FROM STRUCTURE AROUND CURVE.

INTERRUPTED
STRUCTURE APPROACH

(USE TYPE 3J ON SHEET 12 WHEN PRACTICAL)

Computer File Information		Sheet Revisions	
Creation Date: 07/31/19		Date:	Comments
Designer Initials: JBK	(R-X)		
Last Modification Date: 03/05/20	(R-X)		
Detailer Initials: LTA	(R-X)		
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MIDWEST
GUARDRAIL SYSTEM (MGS)
TYPE 3 W-BEAM 31 INCHES

Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO.
M-606-1
Standard Sheet No. 17 of 19
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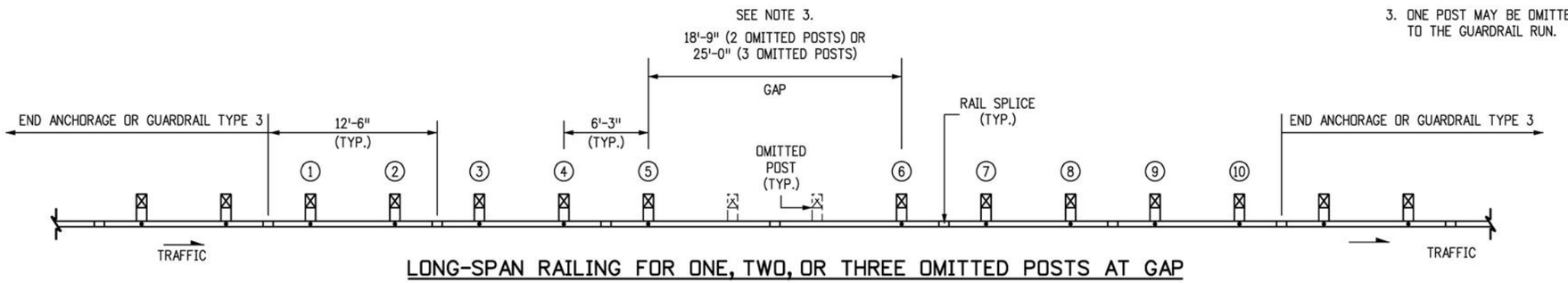
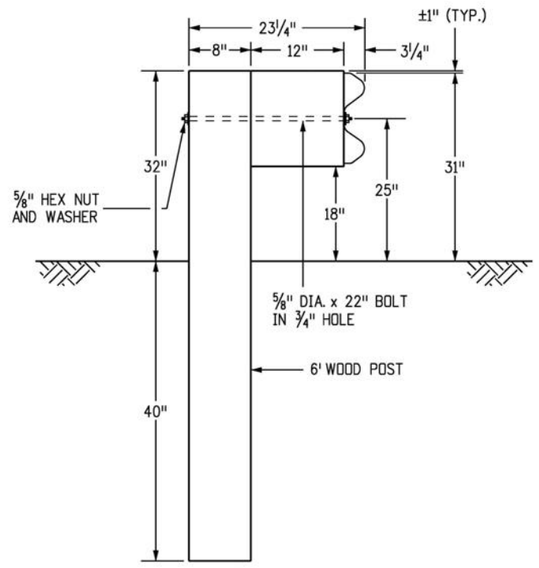
NOTES

1. POSTS ①, ②, ⑨, and ⑩ MAY BE TIMBER OR STEEL.
2. THE NUMBER OF OMITTED POSTS IS DEPENDENT ON THE LENGTH OF THE GAP.
3. ONE POST MAY BE OMITTED WITHOUT ANY MODIFICATION TO THE GUARDRAIL RUN.

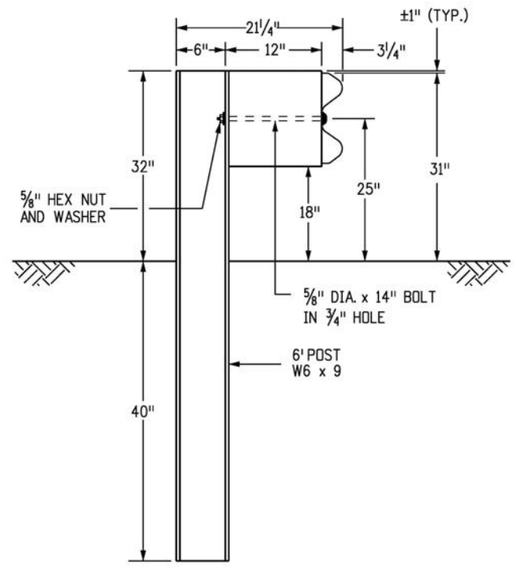


LONG-SPAN RAILING FOR ONE, TWO, OR THREE OMITTED POSTS AT GAP



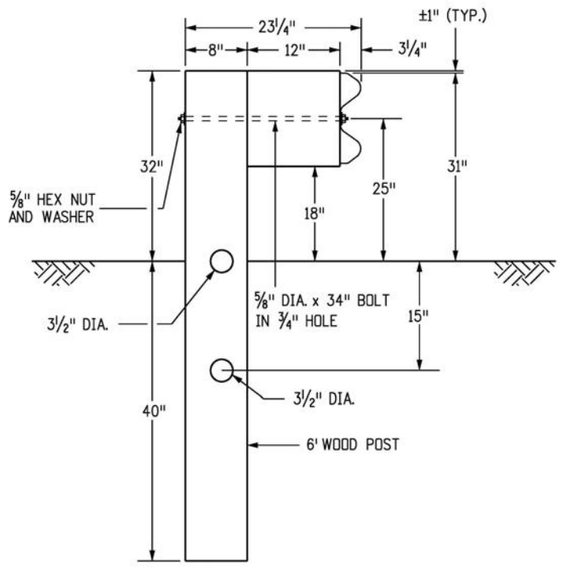
TIMBER POST

POSTS ①-② AND ⑨-⑩
(SEE NOTE 1)



STEEL POST

POSTS ①-② AND ⑨-⑩
(SEE NOTE 1)



BREAKWAY TIMBER POST

POSTS ③ - ⑧

Computer File Information		Sheet Revisions	
Creation Date: 07/31/19		Date:	Comments
Designer Initials: JBK	(R-X)		
Last Modification Date: 03/05/20	(R-X)		
Detailer Initials: LTA	(R-X)		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		

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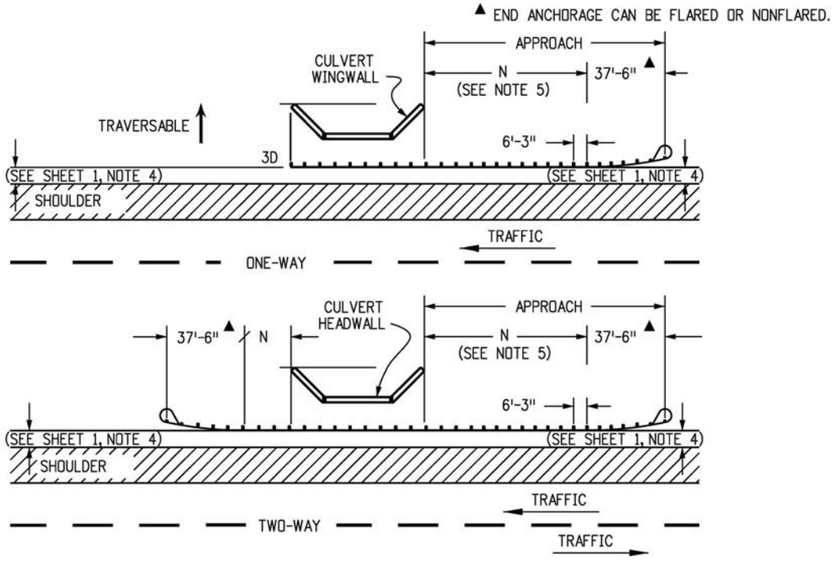
Project Development Branch JBK

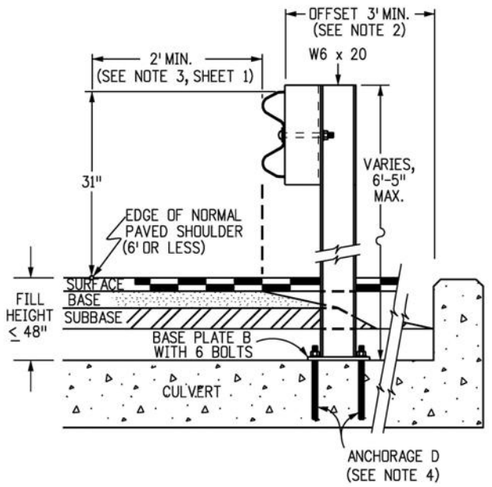
MIDWEST
GUARDRAIL SYSTEM (MGS)
TYPE 3 W-BEAM 31 INCHES

Issued by the Project Development Branch: July 31, 2019

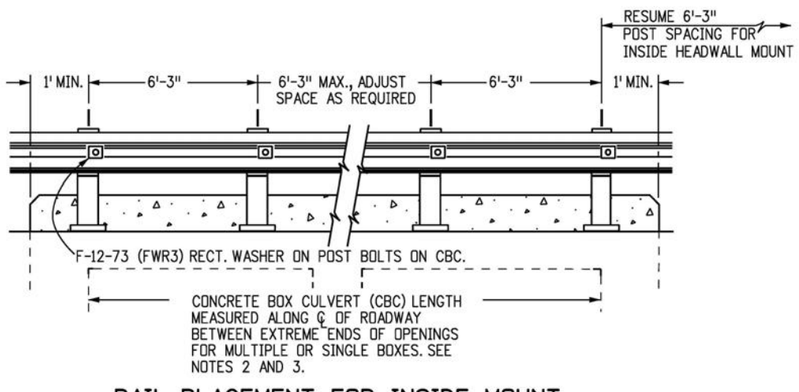
STANDARD PLAN NO.
M-606-1
Standard Sheet No. 18 of 19
Project Sheet Number:



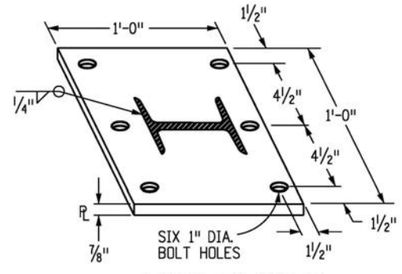
GUARDRAIL FOR CULVERTS



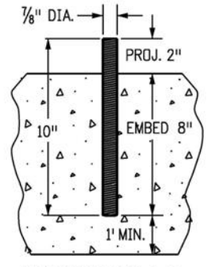
INSIDE MOUNT ON CBC



RAIL PLACEMENT FOR INSIDE MOUNT



BASE PLATE B
(FOR INSIDE MOUNT)



ANCHORAGE D
(FOR INSIDE MOUNT)

NOTES

1. LOCATION AND LENGTH OF MEDIAN GUARDRAIL APPROACHES TO CULVERTS WITH FULL HEADWALL AND WINGWALLS SHALL BE AS SHOWN FOR BRIDGES ON SHEET 15. THE GUARDRAIL TYPE 3 SHALL CONTINUE ACROSS THE CULVERT AS SHOWN ON THIS SHEET.
2. RIGHT SHOULDER BOX CULVERT TREATMENT IS SHOWN ON THIS SHEET FOR CULVERTS 20 FT. OR LESS IN LENGTH.
3. CONSTRUCTION AND PAYMENT FOR FILL HEIGHTS SHALL BE INCLUDED IN THE COST OF THE GUARDRAIL TYPE 3.
4. ANCHORAGE D: SIX BOLTS FOR BASE PLATE "B" WITH INSIDE MOUNT. THE BOLTS SHALL BE 7/8 IN. DIA X 10 IN. HIGH STRENGTH RODS THREADED FULL LENGTH AND ALL GALVANIZED. RODS SHALL BE CAST-IN-PLACE FOR NEW STRUCTURES. FOR EXISTING STRUCTURES, THE RODS SHALL BE INSTALLED IN 1-1/4 IN. DIA HOLES WITH NON-SHRINK GROUT OR EPOXY CONFORMING TO ASTM C 881. IF THE THICKNESS OF A CULVERT'S TOP PANEL REQUIRES BOLTS TO BE LESS THAN 10 IN. HIGH, THE BOLTS SHALL BE APPROVED BY THE ENGINEER.
5. THE GUARDRAIL LENGTH DIMENSION "N" IS THE LENGTH AS DETERMINED BY THE LENGTH OF NEED COMPUTATION AND IS SHOWN ON THE PLANS. THE MINIMUM IS 12 FT.-6 IN. WHERE SITE CONDITIONS ALLOW. THE OVERALL REQUIRED LENGTH OF NEED CAN INCLUDE THE LENGTH OF TRANSITION, THE LENGTH OF RAIL (N), AND ANY REDIRECTIVE LENGTH IN THE RAIL END TREATMENT.
6. ALL POSTS, BASE PLATES, AND ANCHOR BOLTS SHALL BE FABRICATED FROM ASTM A 36 STEEL. THE ABOVE MATERIAL, W-BEAM, AND ALL ANCHOR BOLTS AND MISCELLANEOUS BOLTS, NUTS,AND WASHERS SHALL BE GALVANIZED AFTER FABRICATION INACCORDANCE WITH SECTION 509. CONCRETE, REINFORCING STEEL, AND STRUCTURAL STEEL ELEMENTS SHALL BE IN ACCORDANCE WITH SECTIONS 601, 602, AND 509, RESPECTIVELY.
7. POST ANCHORS, ENCASED IN CONCRETE, SHALL BE ASTM A 36 STEEL, AND NEED NOT BE GALVANIZED.
8. PRIOR TO INSTALLATION OF GUARDRAIL ON CULVERTS, THREE SETS OF WORKING DRAWINGS WHICH COMPLY WITH THE REQUIREMENTS OF SECTION 105 SHALL BE SUBMITTED TO THE ENGINEER FOR INFORMATION ONLY.

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MIDWEST GUARDRAIL SYSTEM (MGS) TYPE 3 W-BEAM 31 INCHES

Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO.
M-606-1
Standard Sheet No. 19 of 19
Project Sheet Number:

SECTION 606
GUARDRAIL

DESCRIPTION

606.01 This work consists of the construction of guardrail in accordance with these specifications and in conformity with the lines and grades shown on the plans or established.

The construction of the various types of guardrail shall include the assembly and erection of all component parts and materials complete at the locations shown on the plans or as directed.

The types of guardrail are designated as follows:

Type 3 Guardrail – Midwest Guardrail System (MGS) W Beam 31 Inches

Type 6 Guardrail – Thrie Beam

Type 7 Guardrail – F-Shape Concrete Barrier (Precast) (Temporary)

Type 9 Guardrail – Single Slope Concrete Barrier

Use of Type 4 Precast Concrete Barrier is not permitted.

MATERIALS

606.02 Materials shall meet the requirements specified in the following subsections:

"W" Beam Rail and Thrie Beam Rail	710.05
Guardrail Hardware	710.09
Guardrail Posts	710.08

Paint for field painting of guardrail shall conform to subsection 708.03, Structural Steel Bridge Paint.

Concrete for precast or cast-in-place barrier shall conform to the requirements of Section 601. Reinforcing steel, unless otherwise noted, shall conform to the requirements of Section 602.

Concrete for bridge rail shall be Macro Fiber-Reinforced Class D Concrete and conform to the requirements of Section 601.

The Contractor may furnish either wood or steel posts and wood or FHWA approved synthetic material blocks for guardrail as shown on the plans. Except as designated on the plans, only one type of posts and blocks shall be furnished for the project.

Components on which the spelter coating has been burned by welding or otherwise damaged shall be regalvanized, recoated in accordance with AASHTO M 36, or painted with one full brush coat of zinc rich paint meeting Military Specification DOD-P-21035A.

CONSTRUCTION REQUIREMENTS

606.03 Post and Rail Elements.

(a) *Posts.* Posts shall be set firm and aligned with a tolerance of plus or minus ¼ inch from plumb, grades and lines as staked. All fittings and metal plates shall be placed securely in position to conform to designated dimensions and requirements.

Posts shall be set by one of the following methods:

(1) Driven in place.

(2) Set in dug holes.

(3) Set in concrete base.

(4) Posts on bridges shall be as shown on the plans.

Driving of posts shall be accomplished by methods and equipment that will leave the posts in their final position free from any distortion, burring or any other damage.

Excavated post holes shall have a firm bottom and be backfilled with acceptable material placed in layers and thoroughly compacted.

Dissimilar metal-to-metal or aluminum-to-concrete post or rail installations shall have contact surfaces separated by an approved protective coating.

Wood posts cut in the field shall have the cut surfaces protected with two coats of an approved preservative. When the cut surface is above ground, the treating solution to be used shall be the same type as was used in the original treatment.

(b) *Rail.* Rail elements shall be erected in a manner resulting in a smooth, continuous installation. All bolts in the finished rail shall be drawn tight. Bolts shall be of sufficient length to extend beyond the nuts. Rail shall be shop bent for installations on horizontal curves having a radius of 150 feet or less.

(c) *Temporary End Treatment.* In construction zones not closed to traffic, installation of rail element shall closely follow the setting of posts to keep the number of posts without rail at a minimum. When necessary to minimize potential hazards, the Engineer will specify the direction in which the rail installation is to advance and the number of posts installed ahead of rail installation. At the end of the Contractor's work day, the Contractor shall treat the ends of installed guardrail as follows:

(1) If the end is at the location of a planned end section, install the end section.

(2) If the end is not at the location of a planned end section, the last rail section shall be installed with one end attached to the rail already in place and the free end resting on the ground. The free end on the ground shall be restrained by tying the rail to the posts by ropes or cables. Guardrail shall not be left in this configuration for more than 24 hours unless protected by an approved attenuating device.

606.04 Concrete. Where paving is removed or damaged due to the Contractor's operations, the Contractor shall furnish an approved mix and shall repair the paving as required, at the Contractor's expense.

In construction zones not closed to traffic, the Contractor shall treat the ends of installed concrete guardrail at the end of the work day as follows:

(1) If the end is at the location of a planned end section, install the end section.

(2) If the end is not at the location of a planned end section, install a temporary impact attenuator or provide treatment as shown in the Contract.

(a) *Permanent Concrete Barrier.* Permanent concrete barrier shall be Type 9 constructed by cast-in-place or slipform methods. The trench for the base of the cast-in-place reinforced barrier end anchorages shall be excavated to the lines and grades shown on the plans or established. The bottom of the trench shall be compacted to the density specified in subsection 203.07(a). The compacted trench bottom shall be watered and approved before placing concrete.

Concrete finish for all cast-in-place barriers shall be Class 1 in accordance with subsection 601.14. Slipform barriers shall not receive additional finishing unless permitted by the Engineer. Exposed vertical surfaces of slipformed barrier shall receive a vertical broom finish. When hand finishing is allowed, it shall be performed in conformance with subsection 601.12(a).

The Engineer may determine that the exposed surfaces of the guardrail shall be tested with a 10 foot straightedge laid along the exposed surface in a longitudinal direction. The Contractor shall furnish an approved 10 foot straightedge and provide an operator to aid the Engineer in testing the exposed surfaces. All surface tolerances shall be measured in a longitudinal direction. Deviation of any exposed surface in excess of the tolerance specified shall be corrected at the Contractor's expense.

Longitudinal surface tolerances for the top of the barrier and the sides of the barrier from the top to a line 7 inches below the top of the barrier are:

(1) On tangent roadway alignments and curves with radius greater than 1000 feet: 0.25 inch from the edge of the straightedge.

(2) On sharp vertical curves and horizontal curves with radius of 1000 feet or less: 0.25 inch from the edge of the straightedge with allowance made for curve deflection.

Longitudinal surface tolerances for the remaining surfaces of the barrier are:

(1) On tangent roadway alignments and curves with radius greater than 1000 feet: 0.75 inch from the edge of the straightedge.

(2) On sharp vertical curves and horizontal curves with radius of 1000 feet or less: 0.75 inch from the edge of the straightedge with allowance made for curve deflection.

The Contractor will be allowed a maximum of three days of slipform production if barrier being placed does not meet the

specified tolerances. After the third day of placement of out of tolerance slipform barrier the Contractor shall stop production. The Contractor shall submit a corrective action plan to the Engineer for review. The plan shall address corrective actions to the equipment and materials and a time frame for completion of the corrective actions. The plan shall address methods and materials to be used to correct out of tolerance barrier. Patching will not be allowed to correct out of tolerance barrier. Further placement of barrier will not be allowed until all previously placed barrier which failed to meet tolerances is corrected or removed. Each occurrence of out of tolerance slipform barrier shall be subject to the same corrective cycle.

(b) *Temporary Precast Type 7 Concrete Barrier.* Precast Type 7 Concrete Barrier (conforming to Standard Plan M-606-14) may be formed upside down to minimize air pockets and improve surface finish. Concrete finish for precast barriers shall be Class 1 in accordance with subsection 601.14. Each segment of the precast barrier shall not have spalls, corner breaks, and bottom spalls totaling more than 5 square feet of surface area which includes the base. All required hand finishing shall be performed in conformance with subsection 601.12(a).

Connecting loops shall not be frayed, stretched, or deformed. Gaps between units shall not exceed the dimensions shown on the plans. Precast barrier units shall not be lifted or stressed in any way before they have developed the strength of the concrete specified. Units shall be supported at designated pickup points. Connecting loops shall not be used as pickup points. Care shall be taken during fabrication, storage, handling and transporting to prevent cracking, twisting, or other damage. Minor chips on edges may be patched with the approval of the Engineer. Breakage and chipping may be cause for rejection. Units damaged in such a way as to impair their appearance or suitability, in the opinion of the Engineer, shall be replaced at the Contractor's expense. Units rejected by the Engineer shall be marked on both sides with an orange painted "R" approximately 12 inches high and 6 inches wide.

The base for placing precast barrier shall be prepared to the lines and grades shown on the plans or established. When it becomes necessary to connect cast-in-place barrier sections to precast barrier installations during construction, the cast-in-place sections shall be constructed complete with connecting hardware in accordance with Standard Plan M-606-14 to join the cast-in-place sections to the abutting precast sections. A fifteen-foot transition section shall be provided when attaching barriers of differing shapes.

METHOD OF MEASUREMENT

606.05 Guardrail will be measured by the linear foot along the centerline of the rail from end to end of completed and accepted rail as shown on the plans, excluding end anchorages, median terminals, and transitions.

End anchorages, median terminals and transitions will be measured by the actual number placed and accepted. Each end anchorage, median terminal, or transition shall include all concrete, reinforcing steel, anchor bolts, cable, rods, turnbuckles, backing rail, plates, bolts, nuts, washers and all other work and material necessary to complete the item.

Posts will be included in the quantities of guardrail of the specified type and not measured separately. Additional posts required for guardrail adjacent to bridges and obstructions, as shown on the plans, will not be measured and paid for separately but shall be included in the work.

BASIS OF PAYMENT

606.06 The accepted quantities of guardrail will be paid for at the contract unit price for the type specified.

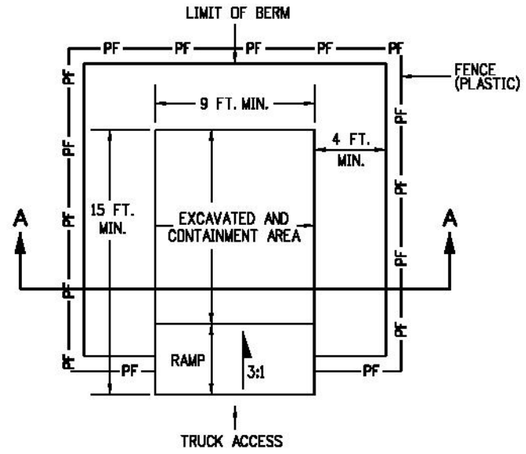
Payment will be made under:

Pay Item	**Pay Unit**
Guardrail, Type___	Linear Foot
End Anchorage, Type___	Each
Guardrail, Type___ (____Post Spacing)	Linear Foot
Median Terminal	Each
End Anchorage (_____)	Each
Transition, Type _____	Each

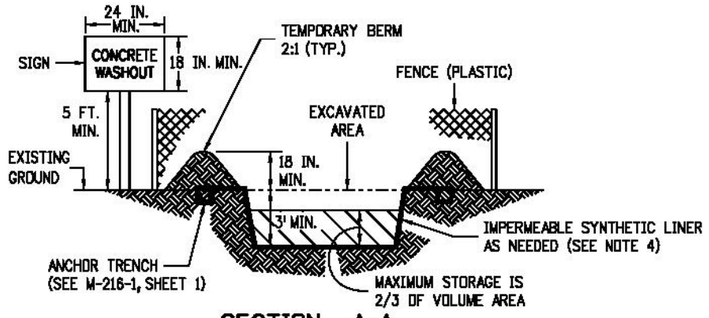
All work and materials necessary and incidental to the temporary treatment of guardrail ends will not be measured and paid for separately but shall be included in the work.

Partial payments will not be made for partially completed guardrail runs that do not conform to the end treatments specified in subsections 606.03(c) or 606.04.

Polyolefin fiber reinforcement will not be measured and paid for separately, but shall be included in the work.



PLAN VIEW

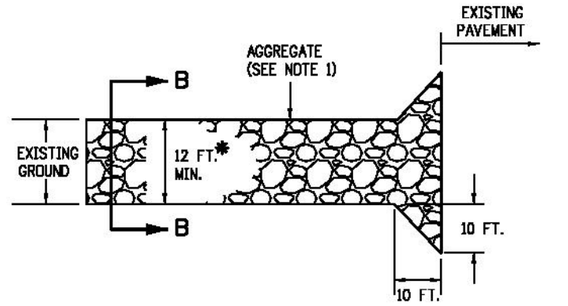


SECTION A-A

NOTES:

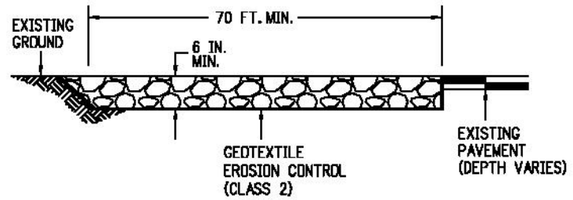
1. A FENCE (PLASTIC) CONFORMING TO SECTION 607 SHALL BE INSTALLED AROUND THE CONCRETE WASHOUT AREA, EXCEPT AT THE OPENING.
2. THE CONCRETE WASHOUT SIGN SHALL HAVE LETTERS AT LEAST 3 INCHES HIGH AND CONFORM TO SUBSECTION 630.02.
3. ALL MATERIALS AND LABOR TO COMPLETE THE CONCRETE WASHOUT STRUCTURE SHALL BE INCLUDED IN THE COST OF WORK AND NOT PAID FOR SEPARATELY.
4. THE BOTTOM OF EXCAVATION SHALL BE A MINIMUM OF FIVE FEET ABOVE GROUND WATER. IF NOT, THE BOTTOM OF EXCAVATION SHALL BE IN ACCORDANCE WITH 208.02 (j).
5. THE PAY ITEM NUMBER FOR CONCRETE WASHOUT STRUCTURE (EACH) IS 208-00045.

CONCRETE WASHOUT STRUCTURE



PLAN VIEW

* SHALL EXTEND FULL WIDTH OF INGRESS AND EGRESS OPERATION.



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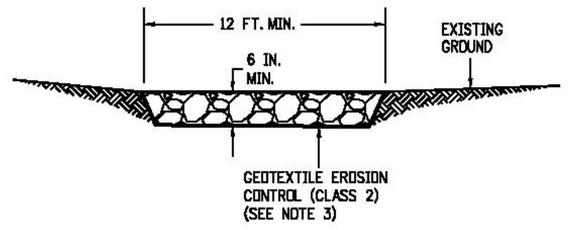

SECTION B-B

NOTES:

1. AGGREGATE SHALL CONFORM TO SUBSECTION 208.02 (1).
2. THE CONTRACTOR SHALL PROTECT CURB AND GUTTER THAT CROSSES THE ENTRANCE FROM DAMAGE, WHILE NOT BLOCKING FLOW OF WATER THRU STRUCTURE. PROTECTION OF THE CURB AND GUTTER SHALL BE INCLUDED IN THE COST OF WORK AND NOT PAID FOR SEPARATELY.
3. GEOTEXTILE SHALL CONFORM TO SUBSECTION 712.08.
4. ALL MATERIALS AND LABOR TO COMPLETE THE VEHICLE TRACKING PAD SHALL BE INCLUDED IN THE COST OF WORK AND NOT PAID FOR SEPARATELY.
5. THE PAY ITEM NUMBER FOR VEHICLE TRACKING PAD (EACH) IS 208-00070.

VEHICLE TRACKING PAD

Computer File Information		Sheet Revisions	
Creation Date: 07/31/19		Date:	Comments
Designer Initials: JBK	(R-X)		
Last Modification Date: 07/31/19	(R-X)		
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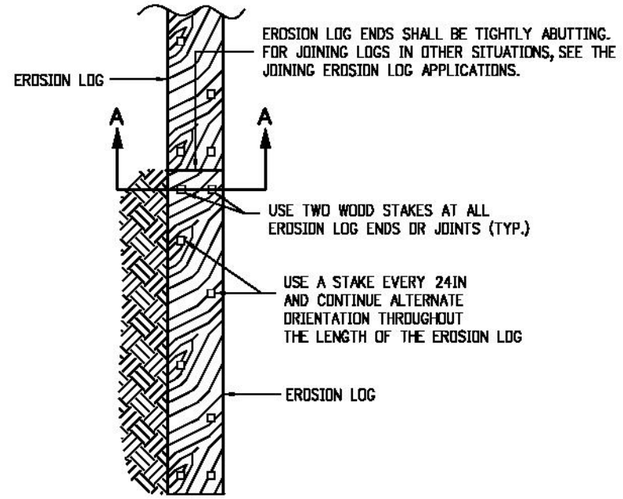
TEMPORARY EROSION CONTROL

Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO.
M-208-1
Standard Sheet No. 1 of 11
Project Sheet Number:



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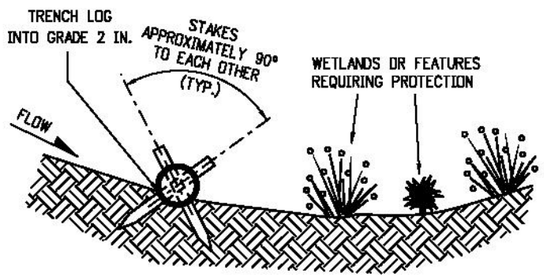
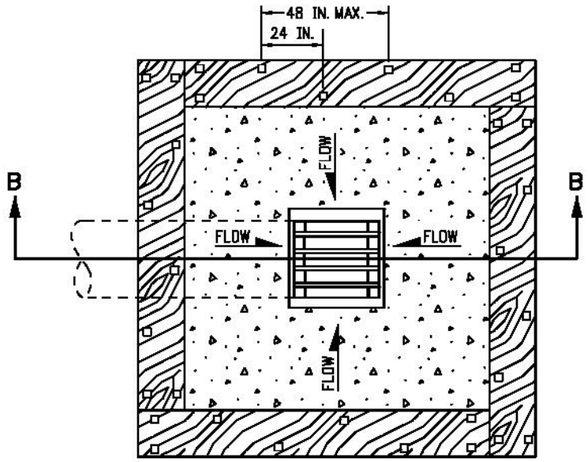


SECTION A-A

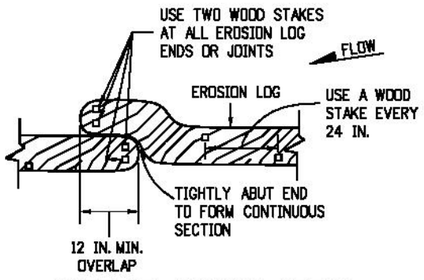
TYPICAL STAKE INSTALLATION

EROSION LOGS PAY ITEMS	
NUMBER	DESCRIPTION
208-00012	TYPE 1 (9 IN.)
208-00002	TYPE 1 (12 IN.)
208-00013	TYPE 1 (20 IN.)
208-00007	TYPE 2 (8 IN.)
208-00008	TYPE 2 (12 IN.)
208-00009	TYPE 2 (18 IN.)
208-00022	TYPE 3 (9 IN.)
208-00023	TYPE 3 (12 IN.)
208-00024	TYPE 3 (20 IN.)

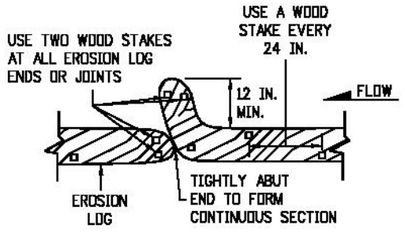


PLAN VIEW

NOTE: THE TOPS OF ALL STAKES SHALL NOT EXTEND MORE THAN 2 INCHES ABOVE THE TOPS OF EROSION LOGS.

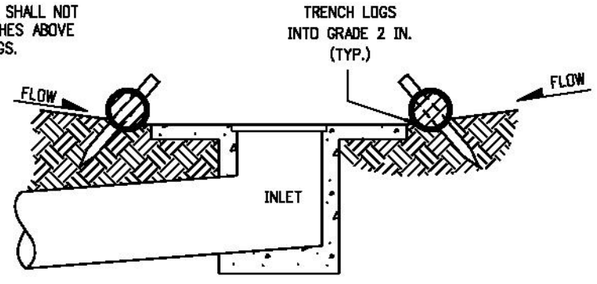


OVERLAP JOINING DETAIL



J-HOOK JOINING DETAIL

JOINING EROSION LOG APPLICATIONS



SECTION B-B

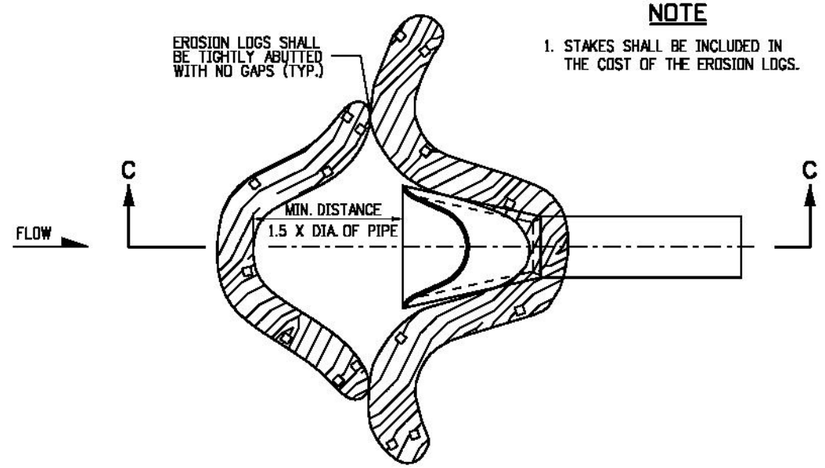
NOTE: LOCATE EROSION LOGS AT THE OUTSIDE EDGE OF THE CONCRETE APRON.

EROSION LOG FILTER AT DROP INLET

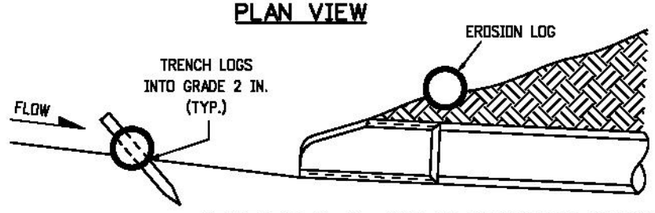
EROSION LOG APPLICATIONS

NOTE

1. STAKES SHALL BE INCLUDED IN THE COST OF THE EROSION LOGS.



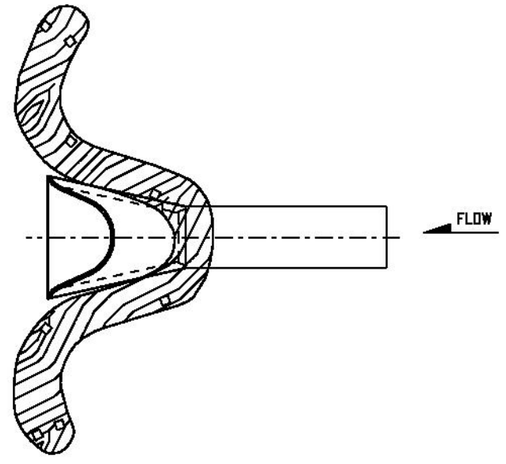
PLAN VIEW



SECTION C-C
(NOT ALL LOGS SHOWN)

NOTE: TOP OF STAKE SHALL NOT EXTEND PAST TOP OF EROSION LOG MORE THAN 2 IN.

EROSION LOG CULVERT INLET PROTECTION



EROSION LOG CULVERT OUTLET PROTECTION

Computer File Information		Sheet Revisions	
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Creation Date: 07/31/19			
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TEMPORARY EROSION CONTROL

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STANDARD PLAN NO.
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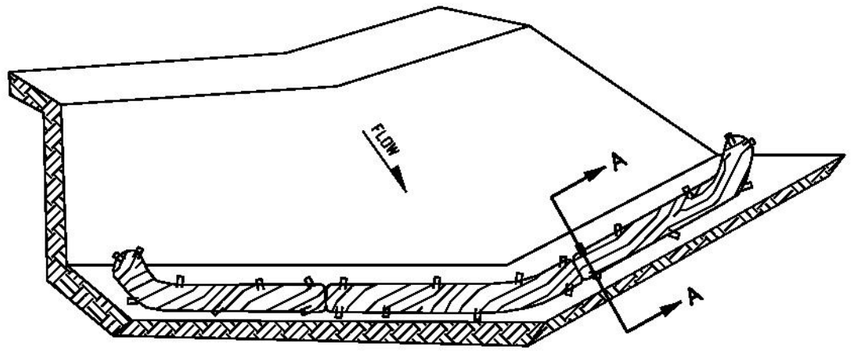
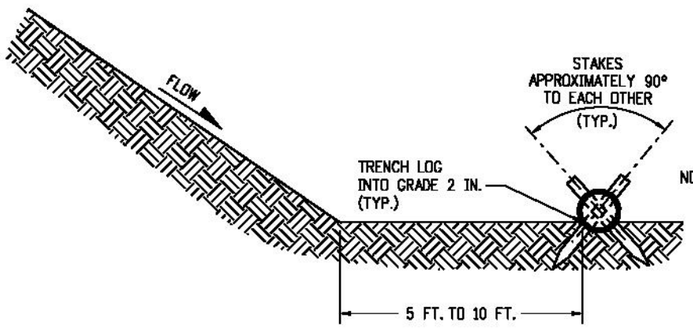
Standard Sheet No. 2 of 11
Project Sheet Number:



ISOMETRIC VIEW



NOTE: THE TOPS OF ALL STAKES SHALL NOT EXTEND MORE THAN 2 INCHES ABOVE THE TOPS OF EROSION LOGS.

SECTION A-A

NOTES:

1. EROSION LOGS USED AT TOE OF SLOPE SHALL BE PLACED 5 TO 10 FEET BEYOND TOE OF SLOPE TO PROVIDE STORAGE CAPACITY.
2. EROSION LOGS SHALL BE PLACED ON THE CONTOUR WITH ENDS FLARED UP SLOPE.
3. SEE SHEET 2 OF 11 FOR JOINING LOGS DETAIL.

EROSION LOGS PAY ITEMS	
NUMBER	DESCRIPTION
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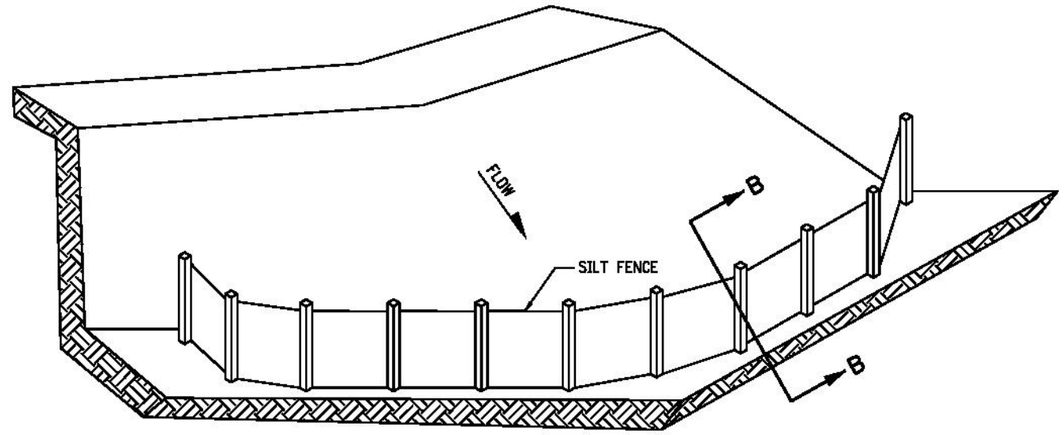
208-00002	TYPE 1 (12 IN.)
208-00013	TYPE 1 (20 IN.)
208-00007	TYPE 2 (8 IN.)
208-00008	TYPE 2 (12 IN.)
208-00009	TYPE 2 (18 IN.)
208-00022	TYPE 3 (9 IN.)
208-00023	TYPE 3 (12 IN.)
208-00024	TYPE 3 (20 IN.)

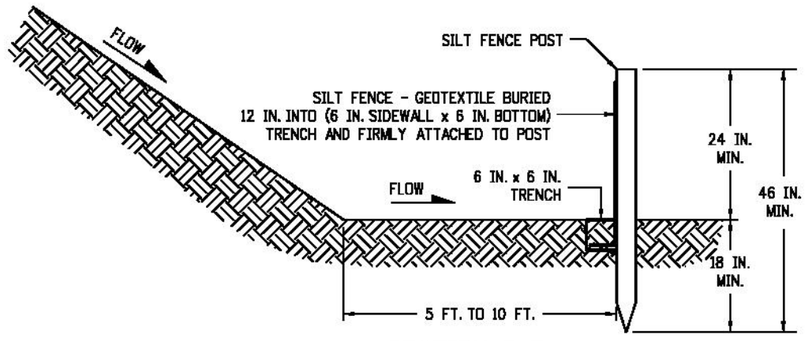
EROSION LOG TOE OF SLOPE PROTECTION

NOTES

1. SILT FENCE SHALL HAVE A MAXIMUM DRAINAGE AREA OF ONE-QUARTER ACRE PER 100 FEET OF SILT FENCE LENGTH; MAXIMUM SLOPE LENGTH BEHIND BARRIER IS 100 FEET.
2. SILT FENCE USED AT TOE OF SLOPE SHALL BE PLACED 5 TO 10 FEET BEYOND TOE OF SLOPE TO PROVIDE STORAGE CAPACITY.
3. SILT FENCE SHALL BE PLACED PARALLEL TO THE CONTOUR WITH ENDS FLARED UP SLOPE.
4. THE MAXIMUM LENGTH OF EROSION LOGS OR SILT FENCES WITHOUT A FLARED END TURNING UPSLOPE IS 150 FEET.



ISOMETRIC VIEW



SECTION B-B

SILT FENCE TOE OF SLOPE PROTECTION

NOTE: THE PAY ITEM NUMBER FOR SILT FENCE (LF) IS 208-00020.

TOE OF SLOPE PROTECTION APPLICATIONS

Computer File Information		Sheet Revisions	
		Date:	Comments
Creation Date: 07/31/19			
Designer Initials: JBK	(R-X)		
Last Modification Date: 07/31/19	(R-X)		
Detailer Initials: LTA	(R-X)		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		

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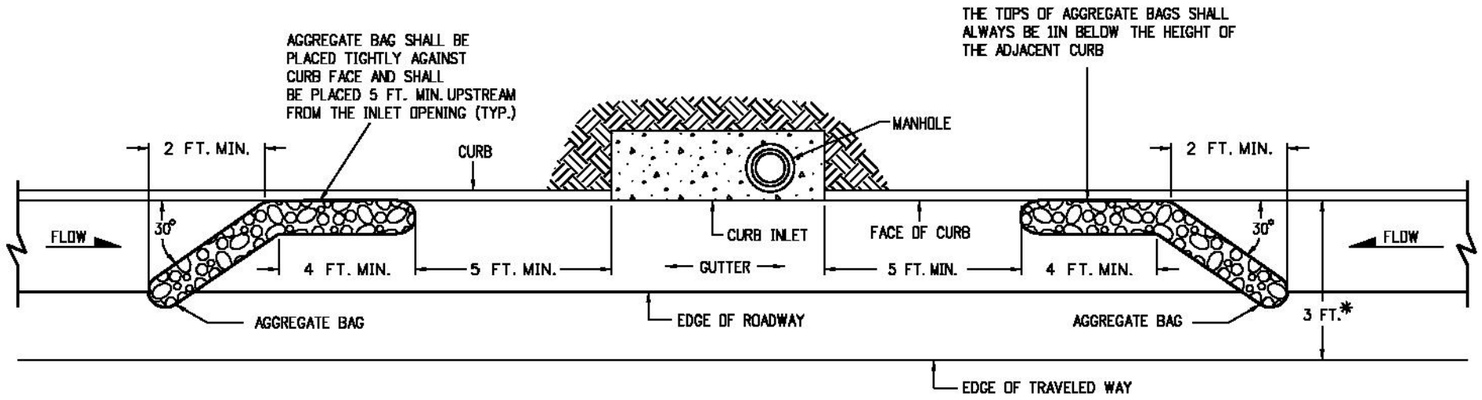
TEMPORARY EROSION CONTROL

Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO.
M-208-1
Standard Sheet No. 3 of 11
Project Sheet Number:

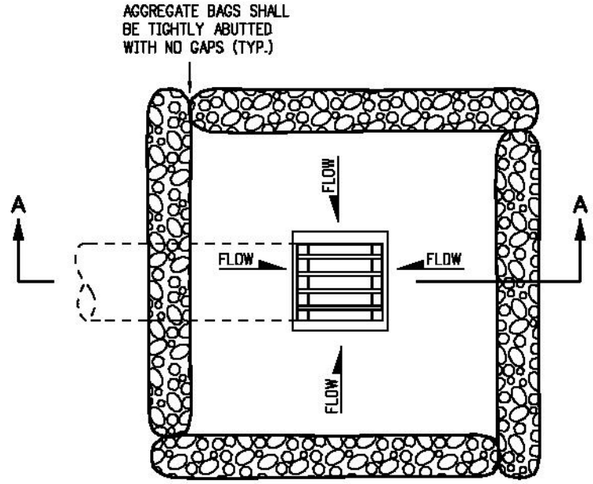


PLAN VIEW

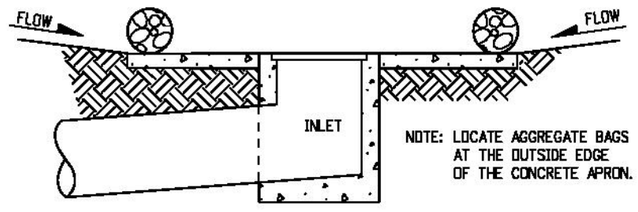
* NOTE: USE AGGREGATE BAGS ONLY WHEN THERE IS A MINIMUM CLEARANCE OF 3 FEET FROM THE EDGE OF THE TRAVELED WAY (INCLUDING CONDITIONS DURING DETOURS) TO THE FACE OF CURB.

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

AGGREGATE BAGS AT STORM DRAIN INLET (TYPE I)



PLAN VIEW



SECTION A-A

AGGREGATE BAGS AT DROP INLET

AGGREGATE BAG APPLICATIONS

NOTE: THE PAY ITEM NUMBER FOR AGGREGATE BAG (LF) IS 208-00035

Computer File Information		Sheet Revisions	
Creation Date: 07/31/19		Date:	Comments
Designer Initials: JBK	(R-X)		
Last Modification Date: 07/31/19	(R-X)		
Detailer Initials: LTA	(R-X)		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		

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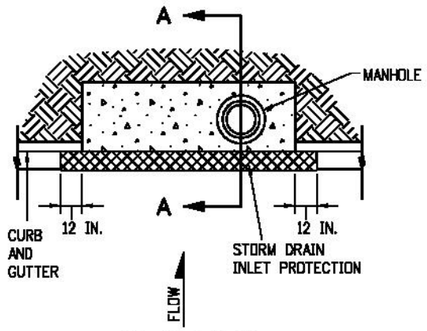
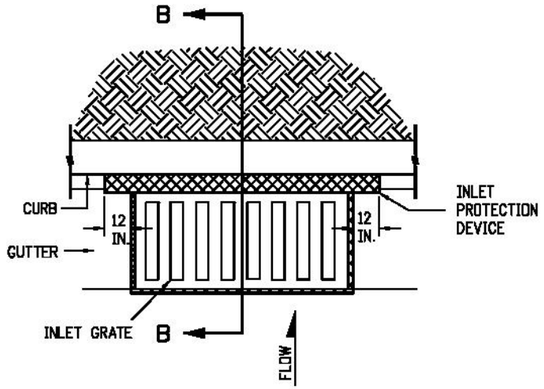
Issued by the Project Development Branch: July 31, 2019

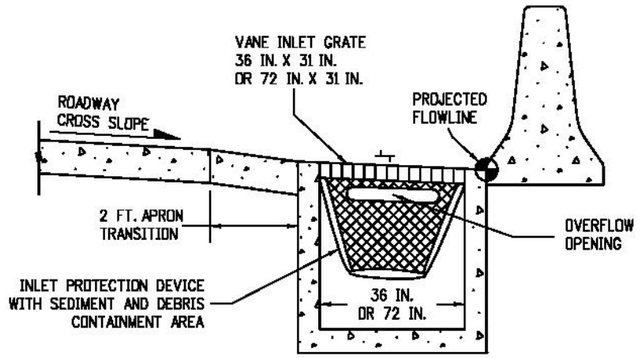
STANDARD PLAN NO.
M-208-1
Standard Sheet No. 4 of 11
Project Sheet Number:



PLAN VIEW

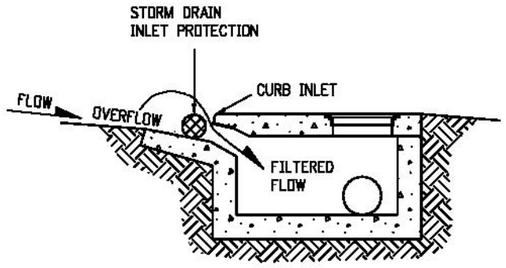


PLAN VIEW



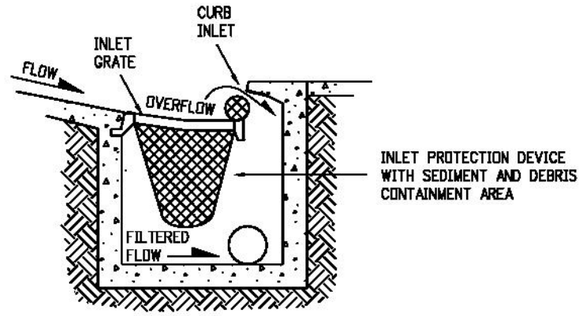
OPTION A

STORM DRAIN INLET PROTECTION (TYPE III)



SECTION A-A

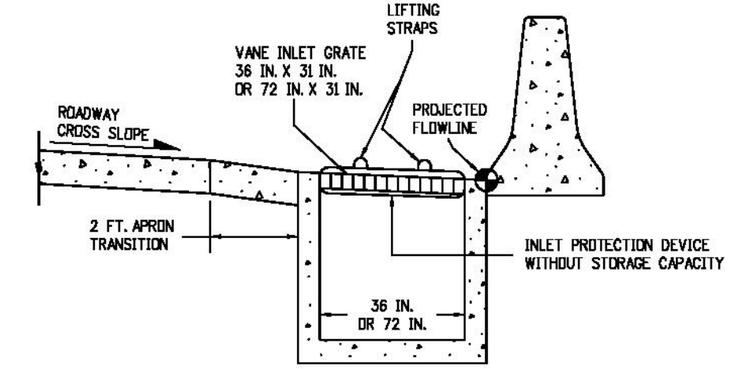
STORM DRAIN INLET PROTECTION (TYPE I)



SECTION B-B

OPTION A

STORM DRAIN INLET PROTECTION (TYPE II)



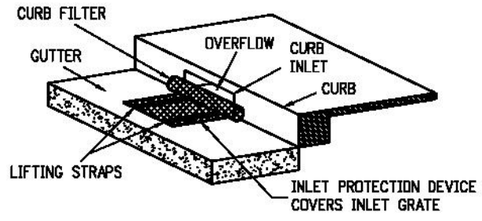
OPTION B

STORM DRAIN INLET PROTECTION (TYPE III)

NOTE: THE PAY ITEM NUMBER FOR STORM DRAIN INLET PROTECTION (TYPE III) (EACH) IS 208-00056.

NOTES:

1. INLET PROTECTION DEVICE SHALL EXTEND 12 INCHES PAST EACH END OF THE INLET.
2. THE PAY ITEM NUMBERS FOR STORM DRAIN INLET PROTECTION (TYPE I) ARE 208-00051 (LF), 208-00053 84 INCHES (EACH), 208-00057 144 INCHES (EACH), AND 208-00058 204 INCHES (EACH).
3. FOR STORM DRAIN INLET TYPES I AND II, IF THERE IS A MINIMUM CLEARANCE OF 3 FEET FROM THE EDGE OF THE TRAVELED WAY TO THE FACE OF CURB, USE THE AGGREGATE BAGS AT STORM DRAIN INLET (TYPE I) DETAIL ON SHEET 4 INSTEAD.



ISOMETRIC VIEW

OPTION B

STORM DRAIN INLET PROTECTION (TYPE II)

NOTE: THE PAY ITEM NUMBERS FOR STORM DRAIN INLET PROTECTION (TYPE II) ARE 208-00054 (EACH).

STORM DRAIN INLET PROTECTION TYPES

Computer File Information		Sheet Revisions	
Creation Date: 07/31/19		Date:	Comments
Designer Initials: JBK	(R-X)		
Last Modification Date: 07/31/19	(R-X)		
Detailer Initials: LTA	(R-X)		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		

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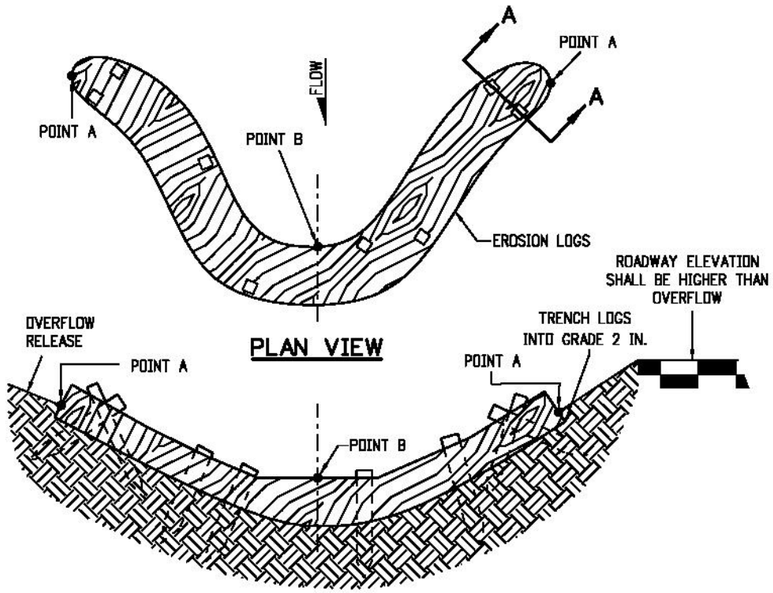
Issued by the Project Development Branch: July 31, 2019

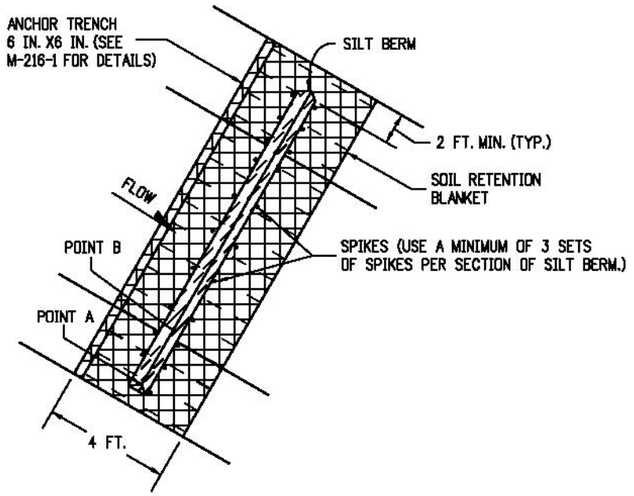
STANDARD PLAN NO.
M-208-1
Standard Sheet No. 5 of 11
Project Sheet Number:



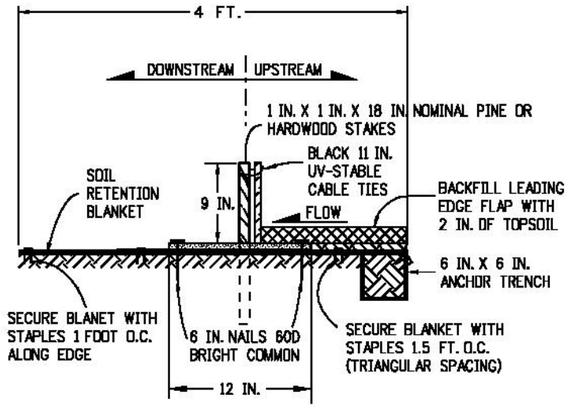
PLAN VIEW

NOTE: POINTS "A" SHALL BE A MINIMUM 4 IN. HIGHER THAN POINT "B".

ELEVATION

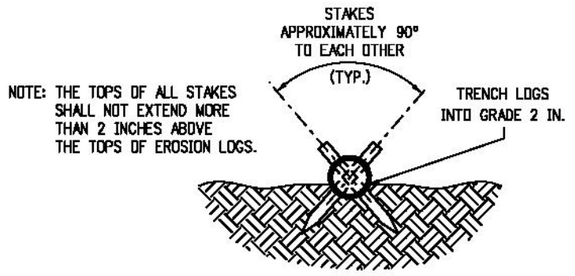


PLAN VIEW



NOTES:
1. MINIMUM 4 NAILS PER SEGMENT (UPSTREAM).
2. MINIMUM 2 NAILS PER SEGMENT (DOWNSTREAM).
3. MINIMUM 2 WOOD STAKES PER SEGMENT.

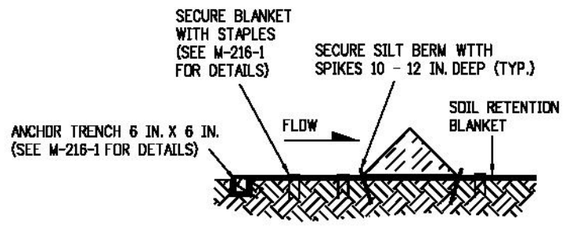
SILT BERM (2) SECTION VIEW



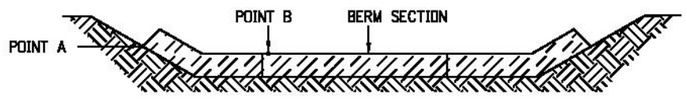
SECTION A-A

NOTES:
1. EROSION LOGS SHALL BE EMBEDDED 2 INCHES INTO THE SOIL.
2. EROSION LOGS SHALL BE TIGHTLY ABUTTED WITH NO GAPS.
3. V-SHAPED TEMPORARY DITCHES SHALL NOT BE USED. DITCHES SHAL BE GRADED IN A PARABOLIC OR TRAPEZOIDAL SHAPE.

EROSION LOG INSTALLATION



SILT BERM (1) SECTION VIEW



POINT "A" SHALL BE HIGHER THAN POINT "B" TO ENSURE THAT WATER FLOWS OVER THE BERM AND NOT AROUND THE ENDS.

FRONT VIEW

NOTES
1. ANCHOR SOIL RETENTION BLANKET INTO TRENCH WITH 8 INCHES MIN. STAPLES PLACED AT 1 FOOT INTERVALS ALONG EDGE.
2. FILL AND COMPACT TRENCH.
3. SECTIONS OF THE SILT BERM SHALL BE OVERLAPPED WITH NO GAPS.
4. FOR SLOPE AND CHANNEL SPACING SEE THE "SECTION VIEW ALONG DITCH FLOWLINE" DETAIL ON SHEET 11 OF 11.
5. SOIL RETENTION BLANKET SHALL ALWAYS BE REQUIRED.
6. THE PAY ITEM NUMBER FOR SILT BERM (LF) IS 208-00004.

SILT BERM INSTALLATION

DRAINAGE DITCH APPLICATIONS

Computer File Information		Sheet Revisions	
Creation Date: 07/31/19		Date:	Comments
Designer Initials: JBK	(R-X)		
Last Modification Date: 07/31/19	(R-X)		
Detailer Initials: LTA	(R-X)		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		

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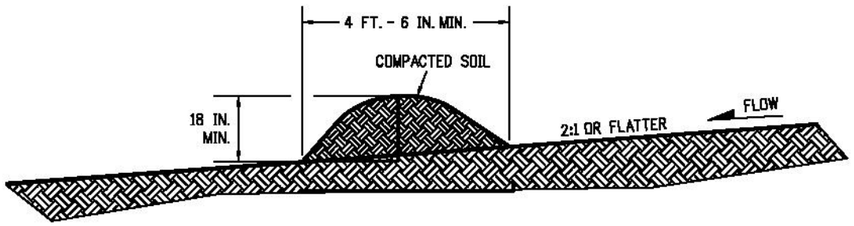
TEMPORARY EROSION CONTROL

Issued by the Project Development Branch: July 31, 2019

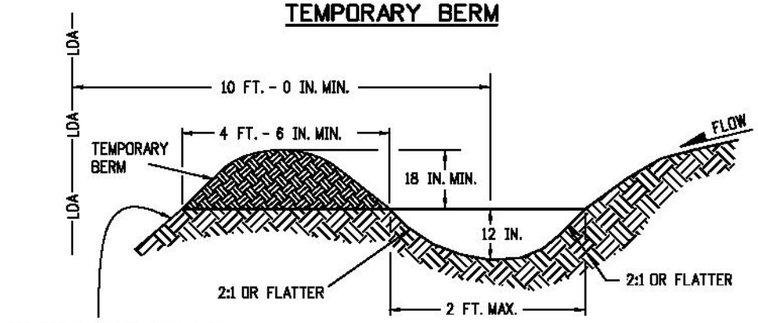
STANDARD PLAN NO.
M-208-1
Standard Sheet No. 6 of 11
Project Sheet Number:



NOTES:

1. BERMS SHALL HAVE A HEIGHT OF 18 INCHES, SIDE SLOPES OF 2:1 OR FLATTER AND A MINIMUM BASE WIDTH OF 4 FT. -6 IN.
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 ACCEPTABLE MATERIAL THAT CAN BE COMPACTED AND RECEIVE AT A MINIMUM HEAVY EQUIPMENT WHEEL ROLLED COMPACTION.
5. TEMPORARY BERMS SHALL BE CONSTRUCTED OUT OF EMBANKMENT (SUBSOIL) AND IN NO CIRCUMSTANCE CONSTRUCTED OUT OF SALVAGED TOPSOIL.
6. THE PAY ITEM NUMBER FOR TEMPORARY BERM (LF) IS 208-00300.

TEMPORARY BERM

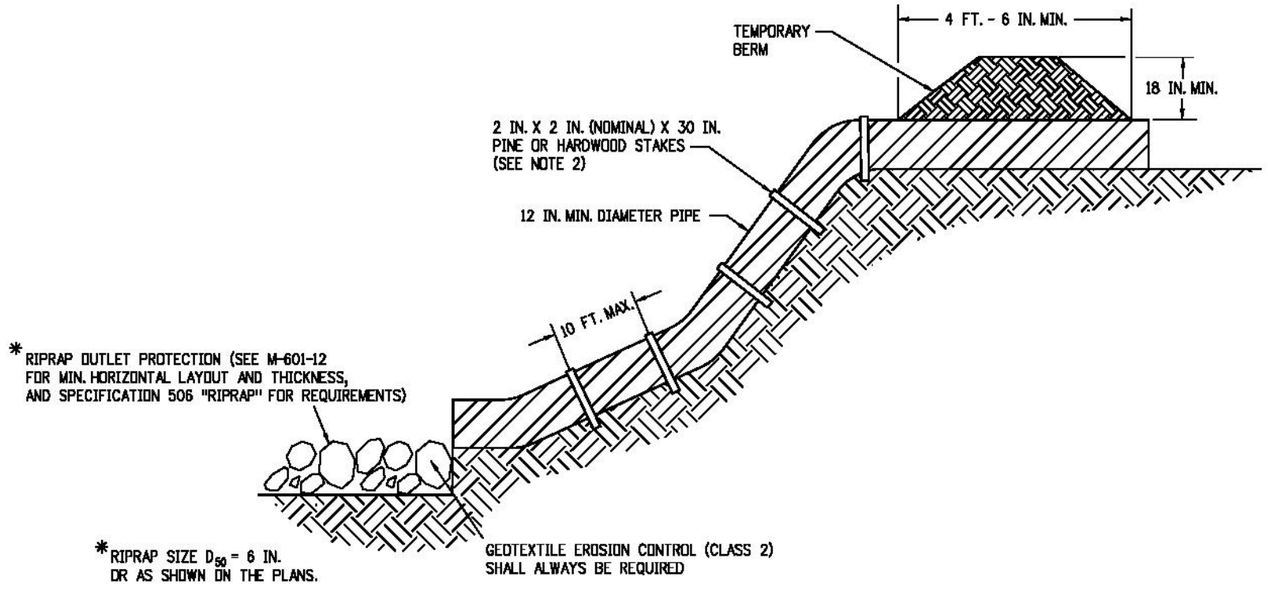


FOR BERMS TALLER THAN 2 FT.,
INSTALL TOE OF SLOPE CONTOL MEASURES.
SEE SHEET 3 OF 11 FOR DETAILS.

NOTES:

1. TEMPORARY DIVERSION DITCHES SHALL BE CONSTRUCTED ACROSS THE SLOPE TO INTERCEPT RUNOFF AND DIRECT IT TO A STABLE OUTLET OR SEDIMENT TRAP.
2. USE THE TEMPORARY DIVERSION DITCH IMMEDIATELY ABOVE A NEW CUT, FILL SLOPE, OR AROUND THE PERIMETER OF A DISTURBED AREA.
3. THE GRADIENT ALONG THE FLOW PATH SHALL HAVE A POSITIVE GRADE TO ASSURE DRAINAGE, BUT SHALL NOT BE SO STEEP AS TO RESULT IN EROSION DUE TO HIGH VELOCITY.
4. THE DIVERSION FLOWLINE SHALL ALWAYS BE LOCATED A MINIMUM 10 FEET FROM THE OUTSIDE LIMITS OF DISTURBED AREA BOUNDARY.
6. DIVERSION BERMS SHALL BE CONSTRUCTED OUT OF EMBANKMENT (SUBSOIL) AND IN NO CIRCUMSTANCE CONSTRUCTED OUT OF SALVAGED TOPSOIL.
5. THE PAY ITEM NUMBER FOR TEMPORARY DIVERSION (LF) IS 208-00301.

TEMPORARY DIVERSION



NOTES:

1. ANCHOR SIZE VARIES ACCORDING TO PIPE SIZE
2. TO SECURE THE PIPE, DRIVE STAKES INTO GROUND, THEN TIE A 12 GUAGE WIRE BETWEEN THEM ABOVE AND ACROSS THE PIPE'S WIDTH.
3. THE OUTLET SHALL BE ALIGNED WITH THE FLOW DIRECTION OF THE EXISTING GRADE. PERPENDICULAR DISCHARGE TO A CHANNEL SHALL NOT BE ACCEPTABLE.
4. THE GRADE AROUND THE INLET TO THE PIPE SHALL BE COMPACTED.
5. THE PAY ITEM NUMBER FOR TEMPORARY SLOPE DRAINS (LF) IS 208-00060.

TEMPORARY SLOPE DRAINS

GRADING APPLICATIONS

Computer File Information		Sheet Revisions	
Creation Date: 07/31/19		Date:	Comments
Designer Initials: JBK	(R-X)		
Last Modification Date: 07/31/19	(R-X)		
Detailer Initials: LTA	(R-X)		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		

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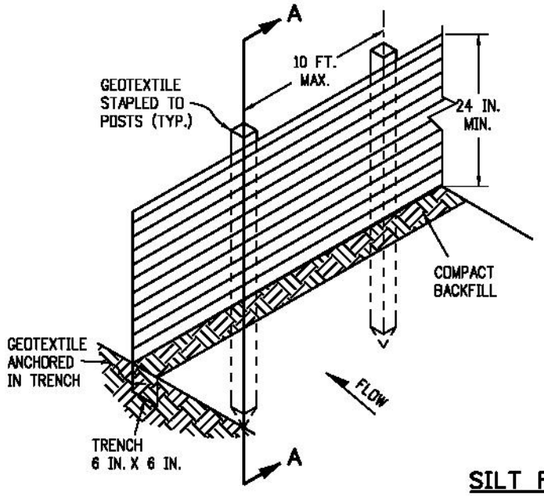
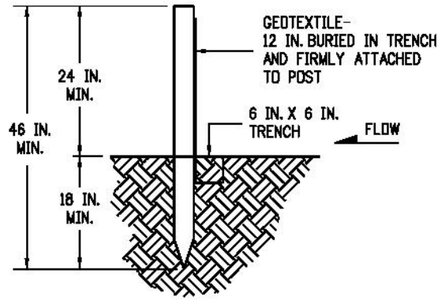
Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO.
M-208-1
Standard Sheet No. 7 of 11
Project Sheet Number:



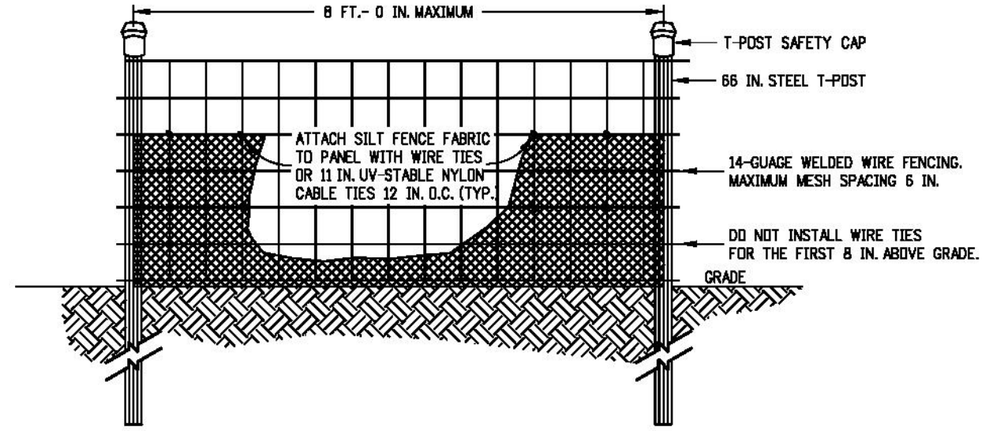


SECTION A-A

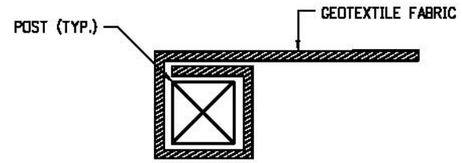
SILT FENCE

NOTES:

1. GEOTEXTILE SHALL BE ATTACHED TO WOOD POSTS WITH THREE OR MORE STAPLES PER POST. STAPLES SHALL BE HEAVY DUTY WIRE AND AT LEAST 1 INCH LONG.
2. WOOD POST SHALL BE 1 IN. X 1 IN. NOMINAL.
3. THE PAY ITEM NUMBER FOR SILT FENCE (LF) IS 208-00020.
4. THE SILT FENCE SHALL BE PLACED ON THE CONTOUR (AT THE SAME ELEVATION ±6 IN.). THE ENDS SHALL BE FLARED UP SLOPE (MINIMUM ELEVATION GAIN OF 18 IN.).



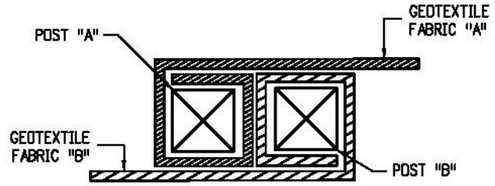
ELEVATION VIEW



END SECTION DETAIL (PLAN VIEW)

NOTE:

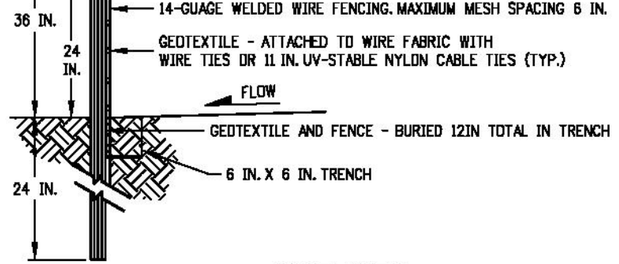
1. THE END OF THE SILT FENCE FABRIC SHALL BE WRAPPED APPROX. 6 INCHES AROUND A WOODEN POST ONE FULL TURN, THEN SECURED ALONG THE POST WITH 6 HEAVY DUTY WIRE STAPLES AT LEAST 1 INCH LONG.



JOINING SECTION DETAIL (PLAN VIEW)

NOTES:

1. THE ENDS OF THE SILT FENCE FABRIC SHALL BE JOINED TOGETHER BY WRAPPING APPROX. 6 INCHES OF EACH END AROUND A WOODEN POST ONE FULL TURN, THEN SECURED ALONG THE POST WITH 6 HEAVY DUTY WIRE STAPLES AT LEAST 1 INCH LONG.
2. POSTS SHALL BE TIGHTLY ABUTTED WITH NO GAPS TO PREVENT POTENTIAL FLOW-THROUGH OF SEDIMENT AT JOINT.



SIDE VIEW

NOTES:

1. THE ENDS OF THE SILT FENCE FABRIC SHALL BE JOINED TOGETHER BY WRAPPING APPROX. 6 INCHES OF EACH END AROUND A STEEL T-POST, THEN SECURED ALONG THE POST WITH WIRE TIES (MINIMUM 3 PER POST).
2. POSTS SHALL BE TIGHTLY ABUTTED WITH NO GAPS TO PREVENT POTENTIAL FLOW-THROUGH OF SEDIMENT AT JOINT.
3. SILT FENCES SHALL NOT BE USED FOR CHECK DAMS.
4. THE PAY ITEM NUMBER FOR SILT FENCE (REINFORCED) (LF) IS 208-00021.

SILT FENCE (REINFORCED)

SILT FENCE APPLICATIONS

Computer File Information		Sheet Revisions	
Creation Date: 07/31/19		Date:	Comments
Designer Initials: JBK	(R-X)		
Last Modification Date: 07/31/19	(R-X)		
Detailer Initials: LTA	(R-X)		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		

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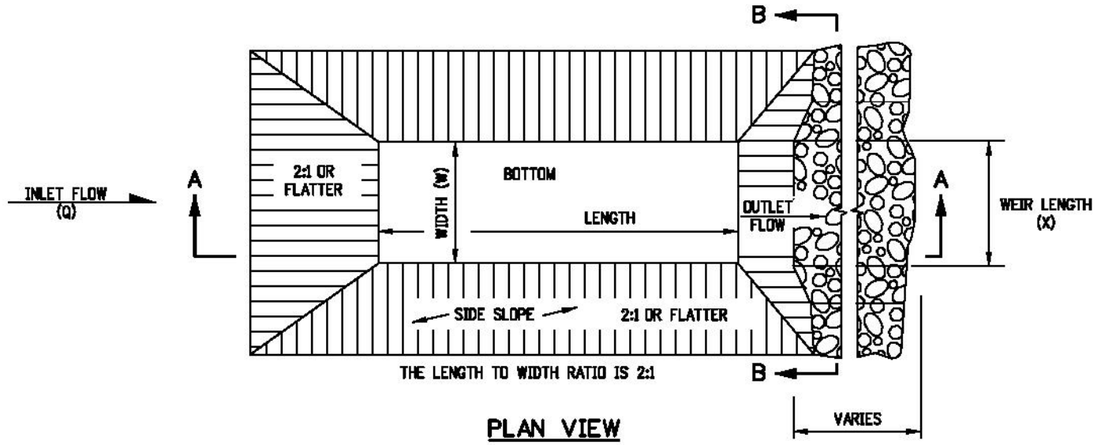
TEMPORARY EROSION CONTROL

Issued by the Project Development Branch: July 31, 2019

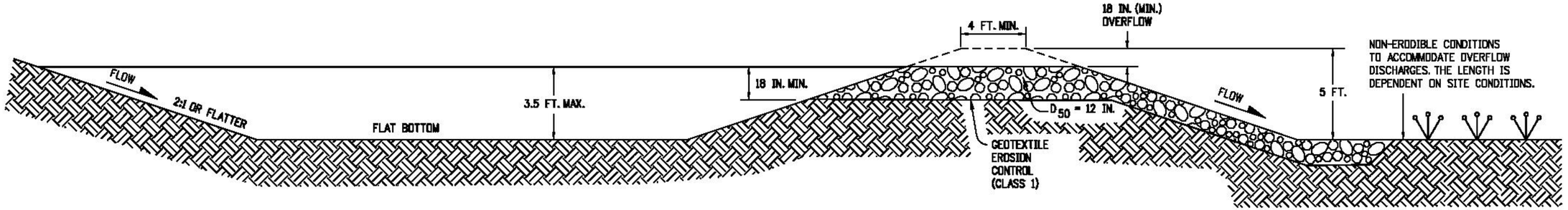
STANDARD PLAN NO.
M-208-1
Standard Sheet No. 8 of 11
Project Sheet Number:



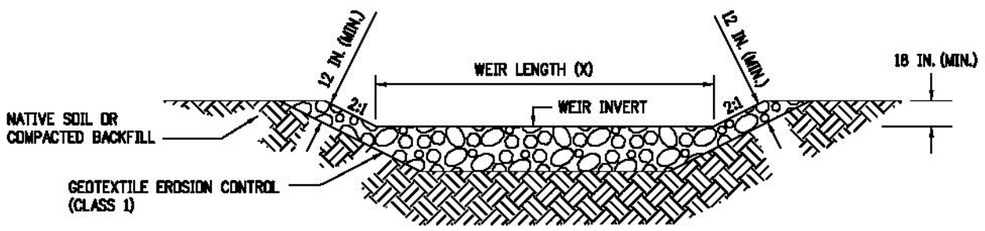
PLAN VIEW

NOTES

1. THE MAXIMUM DRAINAGE AREA IS 5 ACRES.
2. THE MAXIMUM STRUCTURE LIFE IS 2 YEARS.
3. THE STORAGE AREA IS 1800 CUBIC FEET PER ACRE.
4. THE MAXIMUM EMBANKMENT HEIGHT SHALL BE 5 FT. MEASURED ON THE DOWNSTREAM SIDE.
5. THE LENGTH/WIDTH RATIO MAY BE ADJUSTED TO MEET SITE CONDITIONS WHEN APPROVED BY THE ENGINEER.
6. WIDTH (W) OF SEDIMENT TRAP IS APPROXIMATELY EQUAL TO THE WEIR LENGTH (X).
7. SEDIMENT TRAP DESIGN SHALL BE APPROVED BY THE ENGINEER.
8. THE DOWN GRADE FROM WEIR SHALL BE STABLE AND NON-ERODIABLE.
9. THE PAY ITEM NUMBER FOR SEDIMENT TRAP (LF) IS 208-00033.



SECTION A-A



SECTION B-B

DRAINAGE AREA (ACRES)	WEIR LENGTH (FEET)
1	4
2	6
3	8
4	10
5	12

WEIR LENGTH TABLE

SEDIMENT TRAP

Computer File Information		Sheet Revisions	
Creation Date: 07/31/19		Date:	Comments
Designer Initials: JBK	(R-X)		
Last Modification Date: 07/31/19	(R-X)		
Detailer Initials: LTA	(R-X)		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		

Colorado Department of Transportation
2829 West Howard Place
CDOT HQ, 3rd Floor
Denver, CO 80204
Phone: 303-757-9021 FAX: 303-757-9868
Project Development Branch JBK

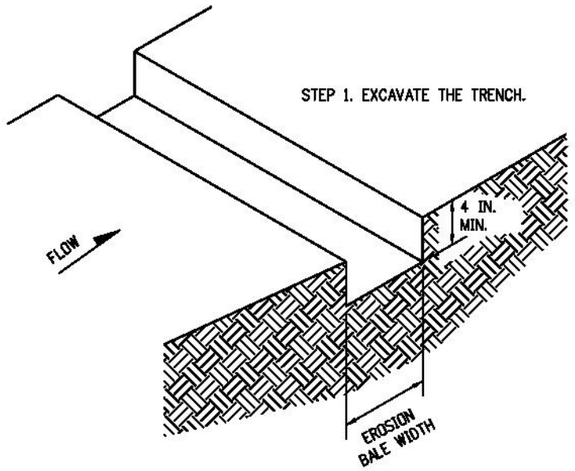
TEMPORARY EROSION CONTROL

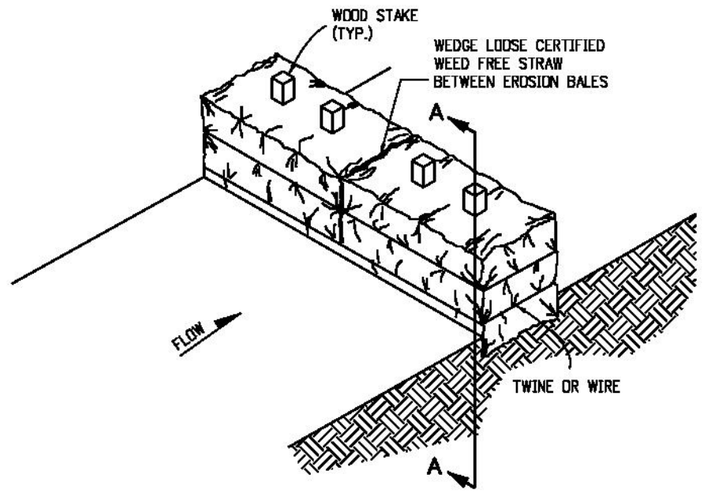
Issued by the Project Development Branch: July 31, 2019

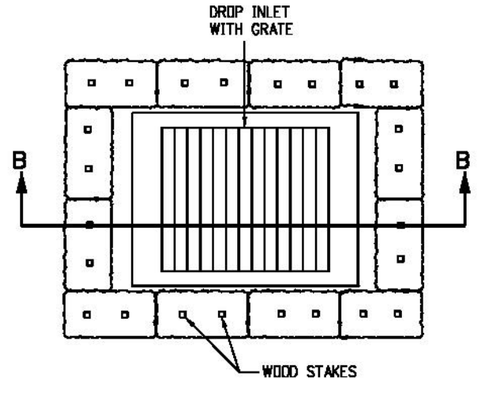
STANDARD PLAN NO.
M-208-1
Standard Sheet No. 9 of 11
Project Sheet Number:

NOTES

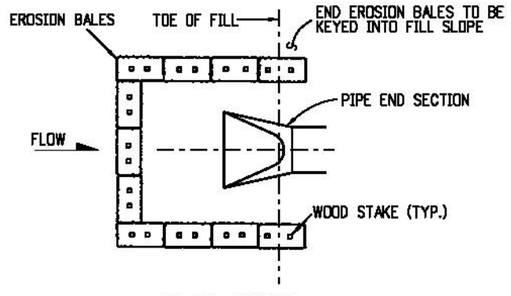
1. STAKES SHALL BE WOOD AND SHALL BE 2 IN. X 2 IN. X 30 IN. NOMINAL.
2. EROSION BALES SHALL BE 18 IN. X 18 IN. X 36 IN.
3. EROSION BALES SHALL BE ENTRENCHED 4 IN. MINIMUM INTO THE SOIL, THIGHTLY ABUTTED WITH NO GAPS, STAKED, AND BACKFILLED AROUND THE ENTIRE OUTSIDE PERIMETER.
4. EROSION BALES CANNOT BE USED FOR CHECK DAMS.
5. EROSION BALE FILTER SHALL BE LOWER THAN BERM ELEVATION OR USED IN A SUMP CONDITION.
6. THE PAY ITEM NUMBER FOR EROSION BALES (WEED FREE) (EA) IS 208-00011.





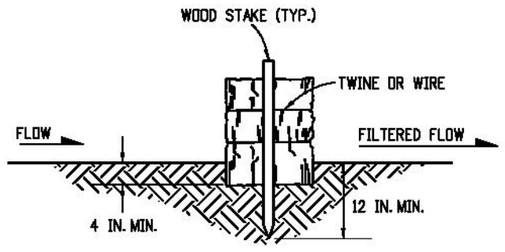


PLAN VIEW



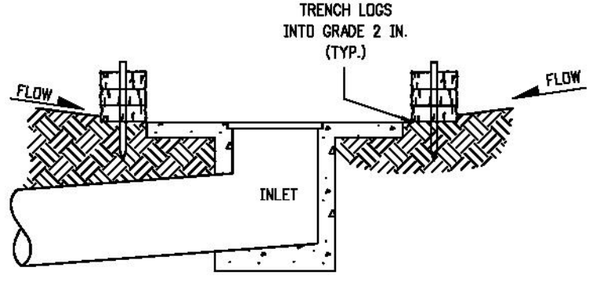
PLAN VIEW

EROSION BALE CULVERT INLET PROTECTION



SECTION A-A

EROSION BALE TRENCHING AND STAKING



SECTION B-B

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

EROSION LOG FILTER AT DROP INLET

EROSION BALE APPLICATIONS

Computer File Information		Sheet Revisions	
		Date:	Comments
Creation Date: 07/31/19			
Designer Initials: JBK	(R-X)		
Last Modification Date: 07/31/19	(R-X)		
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CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		

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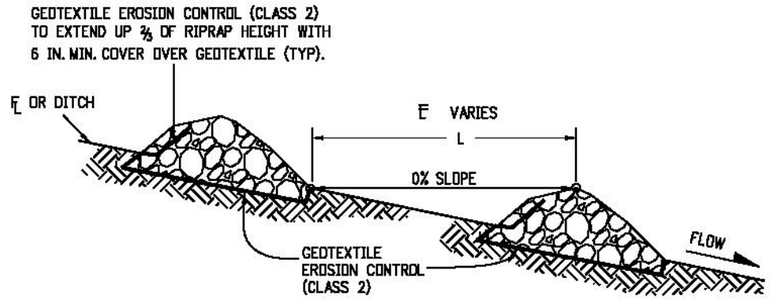
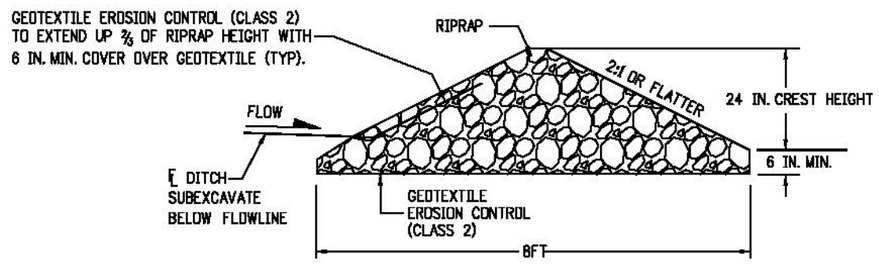
TEMPORARY EROSION CONTROL

Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO.
M-208-1
Standard Sheet No. 10 of 11
Project Sheet Number:



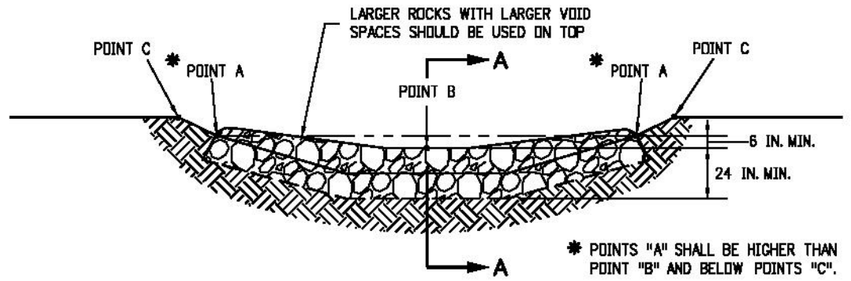
SECTION VIEW ALONG DITCH FLOWLINE



SECTION A-A

NOTES:

1. RIPRAP SIZE D_{50} = 6IN OR AS SHOWN ON THE PLANS.
2. THE GEOTEXTILE EROSION CONTROL SHALL BE CLASS 2 AND CONFORM TO THE REQUIREMENTS OF SUBSECTION 712.08.
3. THE ENDS OF RIPRAP CHECK DAM SHALL BE A MINIMUM OF 6 IN. HIGHER THAN CENTER OF CHECK DAM.
4. FOR USE AS TEMPORARY CHECK DAMS ONLY AND NOT FOR PERMANENT INSTALLATIONS.
5. THE PAY ITEM NUMBER FOR ROCK CHECK DAM (EA) IS 208-00041.



TYPICAL SECTION VIEW

NOTE: ALL MATERIALS AND LABOR TO COMPLETE THE ROCK CHECK DAM SHALL BE INCLUDED IN THE COST OF WORK.

ROCK CHECK DAM

Computer File Information		Sheet Revisions	
Creation Date: 07/31/19		Date:	Comments
Designer Initials: JBK	(R-X)		
Last Modification Date: 07/31/19	(R-X)		
Detailer Initials: LTA	(R-X)		
CAD Ver.: MicroStation V8 Scale: Not to Scale Units: English	(R-X)		

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TEMPORARY EROSION CONTROL

Issued by the Project Development Branch: July 31, 2019

STANDARD PLAN NO.
M-208-1
Standard Sheet No. 11 of 11
Project Sheet Number:

4. Contractor's Bid Form

Bid Date: 12-17-20

Project: IFB-4853-21-DH "GRJM 21.5-G.95 Culvert Replacement"

Bidding Company: M.A. Concrete Construction, Inc

Name of Authorized Agent: Andy Azcarraga

Email andy.maconcrete@gmail.com

Telephone 243-3221 **Address** 2323 Rivers Rd

City G.J. **State** CO **Zip** 81505

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 N/A percent of the net dollar will be offered to the Owner if the invoice is paid within N/A days after the receipt of the invoice. The Owner reserves the right to take into account any such discounts when determining the bid award.

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

State number of Addenda received: 1,2,3

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: M.A. Concrete Construction, Inc.

Authorized Signature: Andy Azcarraga

Title: Vice President

Bid Schedule: GRJM-21.5-G.95 Culvert Replacement (Addendum 2)

Item No.	CDOT, City Ref.	Description	Quantity	Units	Unit Price	Total Price
1	108.2	60" Culvert (HDPE)	100.	Lin. Ft.	$ 130.50	$ 13,050.00
2	108.2	10" Irrigation Pipe (SDR 35 PVC) (Includes all fittings)	20.	Lin. Ft.	$ 89.50	$ 1,790.00
3	201-00000	Clearing and Grubbing	450.	Sq. Yd.	$ 5.50	$ 2,475.00
4	202-00220	Removal of Asphalt Mat	122.	Sq. Yd.	$ 9.00	$ 1,098.00
5	202	Removal of Existing Pipe (CMP)	90.	Lin. Ft.	$ 14.50	$ 1,305.00
6	202	Removal of Existing Pipe Sleeve (12" AC) (Includes Disposal)	12.	Lin. Ft.	$ 28.00	$ 336.00
7	202	Removal of Fence (Barbed Wire, 36" High)	6.	Lin. Ft.	$ 30.00	$ 180.00
8	203-00000	Unclassified Excavation (Complete in Place)	Lump	Sum	---	$ 13,025.00
9	206-00065	Structural Backfill Material (Flow-fill, Complete in Place)	200.	Cubic Yd.	$ 96.25	$ 19,250.00
10	206-00100	Structural Backfill Material (Class 1, Complete in Place)	1,034.	Cubic Yd.	$ 38.50	$ 39,809.00
11	208-00070	Vehicle Track Pad	2.	Each	$ 570.00	$ 1,140.00
12	208-00011	Erosion Bales (Weed Free)	4.	Each	$ 45.00	$ 180.00
13	208-00045	Concrete Washout Structure	1.	Each	$ 645.00	$ 645.00
14	211-03005	Dewatering (To be used for Pritchard Wash Bypass if needed)	Lump	Sum	---	$ 5500.00
15	212-00007	Seeding (Native) (Hydraulic)	450.	Sq. Yd.	$ 2.50	$ 1,125.00
16	304	Aggregate Base Course (Class 6) complete in place	56.	Cubic Yd.	$ 55.75	$ 3,122.00
17	403-34752	Hot Mix Asphalt (Patching) (Grading SX) (75)(PG 64-22) (4" Thick)	31.	Ton	$ 176.00	$ 5,456.00
18	420-00300	Geotextile (Mirafi 500x)	220.	Sq. Yd.	$ 5.50	$ 1,210.00

Bid Schedule: GRJM-21.5-G.95 Culvert Replacement (Addendum 2)

Item No.	CDOT, City Ref.	Description	Quantity	Units	Unit Price	Total Price
19	601	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 walls beneath 21.5 Road.) Work shall include Reinforcing Steel (Epoxy Coated), Structural Concrete Coating (Exterior of wall), and any necessary appurtenances to complete work.	15.	Cubic Yd.	$ 1905.00	$ 28,575.00
20	606	Guardrail Type 3 (31 IN MGS). (Includes Installation)	37.5	Lin. Ft.	$ 59.00	$ 2212.50
21	606	Transition Type 3J (31 IN MGS), R = 8'-6", 105° angle. (Includes Installation)	1.	Each	$ 3355.00	$ 3355.00
22	606	Transition Type 3J (31 IN MGS), R = 8'-6", 75° angle. (Includes Installation)	1.	Each	$ 3355.00	$ 3355.00
23	606	End Anchorage Type 3K (Includes Installation)	1.	Each	$ 2805.00	$ 2805.00
24	620-00020	Sanitary Facility	1.	Each	$ 187.00	$ 187.00
25	625-00000	Construction Surveying	Lump	Sum	---	$ 3630.00
26	626-00000	Mobilization	Lump	Sum	---	$ 16,400.00
27	630	Traffic Control (Complete in Place, Road Closure)	Lump	Sum	---	$ 10,100.00
28	700-70170	F/A Pothole Utilities	---	---	---	$ 6,000.00
MCR		Minor Contract Revisions	---	---	---	$ 25,000.00
				Bid Amount:		$ 212,315.50

Bid Amount:

Two hundred twelve thousand three hundred fifteen + 50/100 **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
Asphalt Specialties	G.J., CO	Asphalt	2.78
CC Enterprises	G.J., CO	Traffic Control	4.3
Mays Concrete	G.J., CO	Concrete	11
High Desert	G.J., CO	Surveying	1.6

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.

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 12/16/2020

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER Moody-Valley Insurance Agency, Inc. 760 Horizon Drive, Suite 302 Grand Junction CO 81506	CONTACT NAME: Tina Post PHONE (A/C, No, Ext): (970) 248-8300 FAX (A/C, No): (970) 242-1894 E-MAIL ADDRESS: tina.post@moodyins.com
INSURED M. A. Concrete Construction, Inc. P. O. Box 1968 Grand Junction CO 81502	INSURER(S) AFFORDING COVERAGE — NAIC # INSURER A: BITCO National Insurance Company — 20109 INSURER B: BITCO General Insurance Corporation — 20095 INSURER C: Pinnacol Assurance — 41190 INSURER D: Continental Insurance Company — 35289 INSURER E: INSURER F:

COVERAGES **CERTIFICATE NUMBER:** 20/21 Master **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	[X] COMMERCIAL GENERAL LIABILITY [ ] CLAIMS-MADE [X] OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: [X] POLICY [X] PRO-JECT [ ] LOC [ ] OTHER:			CLP3700397	12/01/2020	12/01/2021	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG Employee Benefits	$ 1,000,000 $ 300,000 $ 10,000 $ 1,000,000 $ 2,000,000 $ 2,000,000 $ 1,000,000
B	AUTOMOBILE LIABILITY [X] ANY AUTO [ ] OWNED AUTOS ONLY [ ] SCHEDULED AUTOS [ ] HIRED AUTOS ONLY [ ] NON-OWNED AUTOS ONLY			CAP3700398	12/01/2020	12/01/2021	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident) Medical payments	$ 1,000,000 $ $ $ $ 5,000
B	[X] UMBRELLA LIAB [X] OCCUR [ ] EXCESS LIAB [ ] CLAIMS-MADE [ ] DED [X] RETENTION $ 10,000			CUP2820350	12/01/2020	12/01/2021	EACH OCCURRENCE AGGREGATE	$ 2,000,000 $ 2,000,000 $
C	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y/N: Y If yes, describe under DESCRIPTION OF OPERATIONS below	N/A		4195192	09/01/2020	09/01/2021	[X] PER STATUTE [ ] OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	$ 1,000,000 $ 1,000,000 $ 1,000,000
D	Excess Liability			6045636010	12/01/2020	12/01/2021	Limit	3,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Bid Bond: IFB-4853-21-DH GRJM 21.5-G.95 Culvert Replacement

CERTIFICATE HOLDER

City of Grand Junction
250 N 5th St
Grand Junction CO 81501

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Moody-Valley Insurance Agency

AGENCY CUSTOMER ID: 00022370

LOC #:

ADDITIONAL REMARKS SCHEDULE

Page ____ of ____

AGENCY	NAMED INSURED
Moody-Valley Insurance Agency, Inc.	M. A. Concrete Construction, Inc.
POLICY NUMBER	
CARRIER / NAIC CODE	EFFECTIVE DATE:

ADDITIONAL REMARKS

THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM,

FORM NUMBER: 25 FORM TITLE: Certificate of Liability Insurance: Notes

CONTRACTUAL LIABILITY APPLIES PER POLICY TERMS AND CONDITIONS

General Liability:
Blanket Additional Insured status applies only to the extent provided in form GL3085 09/11 when required by written contract.
Blanket Waiver of Subrogation applies only to the extent provided in form GL3085 09/11 when required by written contract.
Primary and Non-Contributory status only to the extent provided in form GL3085 09/11 when required by written contract.
Designated Project General Aggregate applies only to the extent provided in form GL3085 09/11 when required by written contract.

Auto Liability:
Blanket Additional Insured status applies only to the extent provided in form AP0401 10/17 when required by written contract.
Blanket Waiver of Subrogation applies only to the extent provided in form AP0401 10/17 when required by written contract.
Primary and Non-Contributory status only to the extent provided in form AP0401 10/17 when required by written contract.

Umbrella Liability:
Excess Liability policy is on a follow form basis for the following underlying insurance coverages: General Liability, Automobile Liability, and Employers Liability. Additional insured status will follow when required by written contract.

Excess Liability:
Excess Liability policy is on a follow form basis for the following underlying insurance coverages: Umbrella Liability. Additional insured status will follow when required by written contract.

Worker's Compensation:
359-B From Attached Includes Blanket Waiver of Subrogation. Status applies when required by written contract.

IMPORTANT:
The policy forms referenced will be sent via email only. To obtain copies, please send your request with the email address to certrequestgl@moodyins.com

BID BOND

KNOW ALL MEN BY THESE PRESENTS,

that we, M.A. Concrete Construction, Inc. (____ an individual, ___ a partnership, X a corporation incorporated in the State of CO) as Principal, and Western Surety Company (incorporated in the State of SD) as Surety, are held and firmly bound unto the City of Grand Junction, Colorado, (hereinafter called "City") in the penal sum of Five Percent of Amount Bid dollars ($ 5%), lawful money of the United States, for the payment of which sum we bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, that WHEREAS the Principal has submitted the accompanying Bid dated December 17, 2020 for construction of GRJM21.5-G.95 Culvert Replacement - IFB-4853-21-DH (the Project) for the City and

WHEREAS, the City has required as a condition for receiving said Bid that the Principal deposit with the City either a cashier's check or a certified check equivalent to not less than five percent of the amount of said Bid or in lieu thereof furnish a Bid Bond for said amount conditioned that in event of a failure to execute the proposed Contract for such construction and to provide the required Performance and Payment Bonds and Insurance Certificates if the Contract be awarded to the Bidder, that said sum be paid immediately to the City as Liquidated Damages and not as a penalty for the Principal's failure to perform.

NOW, THEREFORE, if the Principal shall, within the period specified therefore, on the attached prescribed forms presented to the Bidder for signature, enter into a written Contract with the City in accordance with said Bid as accepted, and give Performance and Payment Bonds with good and sufficient Surety, or Sureties, as may be required upon the forms prescribed by the City, for the faithful performance and the proper fulfillment of said Contract, provide Certificates of Insurance as required by said Contract, and provide all other information and documentation required by the Contract Documents, then this obligation shall be void and of no effect, otherwise to remain in full force and effect. In the event suit is brought upon this bond by the City and the City prevails, the principal and surety shall pay all costs incurred by the City in such suit, including reasonable attorneys' fees and costs to be fixed by the Court.

IN WITNESS WHEREOF, the above bound parties have executed this instrument under their several seals the name and corporate seal of each corporate party being hereto affixed and duly signed by its undersigned representative pursuant to authority of its governing board.

Dated this 17th day of December, 2020.

Principal: M.A. Concrete Construction, Inc.

Address: 2323 River Road

Grand Junction, CO 81505

Signed: By: Andy Provenzano (seal)

Title: Vice President

Surety: Western Surety Company

Address: 151 N. Franklin Street

Chicago, IL 60606

Signed: By: Jody L. Anderson (seal)

Title: Jody L. Anderson Attorney-in-Fact

INSTRUCTIONS FOR COMPLETING BID BOND

1. The full legal name and residence of each individual executing this Bond as Principal must be inserted in the first paragraph.

2. If the Principal is a partnership, the full name of the partnership and all individuals must be inserted in the first paragraph which must recite that individuals are partners composing the partnership, and all partners must execute the Bond as individuals.

3. The State of incorporation of each corporate Principal or Surety to the Bond must be inserted in the first paragraph and the Bond must be executed under the corporate seal of said party attested by its secretary or other appropriate officer.

4. Attach a copy of the power-of-attorney for the Surety's agent.

Western Surety Company

POWER OF ATTORNEY APPOINTING INDIVIDUAL ATTORNEY-IN-FACT

Know All Men By These Presents, That WESTERN SURETY COMPANY, a South Dakota corporation, is a duly organized and existing corporation having its principal office in the City of Sioux Falls, and State of South Dakota, and that it does by virtue of the signature and seal herein affixed hereby make, constitute and appoint

Jody L. Anderson , **Individually**

of Denver, CO its true and lawful Attorney(s)-in-Fact with full power and authority hereby conferred to sign, seal and execute for and on its behalf bonds, undertakings and other obligatory instruments of similar nature

- In Unlimited Amounts -

Surety Bond No.: Bid Bond
Principal: M.A. Concrete Construction, Inc.
Obligee: City of Grand Junction

and to bind it thereby as fully and to the same extent as if such instruments were signed by a duly authorized officer of the corporation and all the acts of said Attorney, pursuant to the authority hereby given, are hereby ratified and confirmed.

This Power of Attorney is made and executed pursuant to and by authority of the By-Law printed on the reverse hereof, duly adopted, as indicated, by the shareholders of the corporation.

In Witness Whereof, WESTERN SURETY COMPANY has caused these presents to be signed by its Vice President and its corporate seal to be hereto affixed on this 27th day of February, 2018.

WESTERN SURETY COMPANY

Paul T. Bruflat, Vice President

State of South Dakota
County of Minnehaha } ss

On this 27th day of February, 2018, before me personally came Paul T. Bruflat, to me known, who, being by me duly sworn, did depose and say: that he resides in the City of Sioux Falls, State of South Dakota; that he is the Vice President of WESTERN SURETY COMPANY described in and which executed the above instrument; that he knows the seal of said corporation; that the seal affixed to the said instrument is such corporate seal; that it was so affixed pursuant to authority given by the Board of Directors of said corporation and that he signed his name thereto pursuant to like authority, and acknowledges same to be the act and deed of said corporation.

My commission expires
June 23, 2021

J. MOHR
NOTARY PUBLIC
SOUTH DAKOTA

J. Mohr, Notary Public

CERTIFICATE

I, L. Nelson, Assistant Secretary of WESTERN SURETY COMPANY do hereby certify that the Power of Attorney hereinabove set forth is still in force, and further certify that the By-Law of the corporation printed on the reverse hereof is still in force. In testimony whereof I have hereunto subscribed my name and affixed the seal of the said corporation this 17th day of December, 2020.

WESTERN SURETY COMPANY

L. Nelson, Assistant Secretary

Form F4280-7-2012

Go to www.cnasurety.com > Owner / Obligee Services > Validate Bond Coverage, if you want to verify bond authenticity.

Authorizing By-Law

ADOPTED BY THE SHAREHOLDERS OF WESTERN SURETY COMPANY

This Power of Attorney is made and executed pursuant to and by authority of the following By-Law duly adopted by the shareholders of the Company.

Section 7. All bonds, policies, undertakings, Powers of Attorney, or other obligations of the corporation shall be executed in the corporate name of the Company by the President, Secretary, and Assistant Secretary, Treasurer, or any Vice President, or by such other officers as the Board of Directors may authorize. The President, any Vice President, Secretary, any Assistant Secretary, or the Treasurer may appoint Attorneys in Fact or agents who shall have authority to issue bonds, policies, or undertakings in the name of the Company. The corporate seal is not necessary for the validity of any bonds, policies, undertakings, Powers of Attorney or other obligations of the corporation. The signature of any such officer and the corporate seal may be printed by facsimile.

Construction References - 2020

Company/Entity	Name of Contact	Title	Phone Number
Mesa County Public Works	Connie Hahn	Operations Manager	(970) 244-1765
Clifton Water District	David Reinertsen	Assistant Manager	(970) 434-7328
City of Grand Junction	Lee Cooper	Project Engineer	(970) 256-4155
Ute Water Conservancy District	David Piske	Manager/Engineer	(970) 242-7491
City of Fruita	Chris Dehmel	Public Works Director	(970) 858-8377
Clifton Sanitation District	Brian Wood	Manager	(970) 434-7422

EXHIBIT E
ADDENDUM A

NOTIFICATION OF IMMIGRATION COMPLIANCE REQUIREMENTS AND CERTIFICATION BY SELLER

Seller acknowledges that Seller has been notified of the immigration compliance requirements of C.R.S. § 8-17.5-101, *et.seq.* (House Bill 06-1343), and hereby **CERTIFIES** that:

1. The Seller shall not knowingly employ or contract with an illegal alien to perform work under the public contract for services; or

2. Enter into a contract with a subSeller that fails to certify to the Seller that the subSeller shall not knowingly employ or contract with an illegal alien to perform work under the public contract for services;

3. The Seller has verified or attempted to verify through participation in the Employment Verification Program administered by the Social Security Administration and Department of Homeland Security or any employment verification program established by the Colorado Department of Labor and Employment ("Verification Programs") pursuant to C.R.S. 8-17.5-102(5)(c)(I) that the Seller does not employ any illegal aliens and, if the Seller is not accepted into the Verification Programs prior to entering into a public contract for services, that the Seller shall apply to participate in the Verification Programs every three months until the Seller is accepted or the public contract for services has been completed, whichever is earlier;

4. The Seller acknowledges that the Seller is prohibited from using the Verification Programs to undertake pre-employment screening of job applicants while the public contract for services is being performed;

5. If the Seller obtains actual knowledge that a subSeller performing work under the public contract for services knowingly employs or contracts with an illegal alien, the Seller shall be required to:

   A. Notify the subSeller and the contracting state agency or political subdivision within three days that the Seller has actual knowledge that the subSeller is employing or contracting with an illegal alien; and

   B. Terminate the subcontract with the subSeller if within three days of receiving the notice required pursuant to subparagraph (A) of this Section 5 the subSeller does not stop employing or contracting with the illegal alien; except that the Seller shall not terminate the contract with the subSeller if during such three days the subSeller provides information to establish that the subSeller has not knowingly employed or contracted with an illegal alien.

6. Seller is required to comply with any reasonable request by the State Department of Labor and Employment ("Department" herein) made in the course of an investigation that the Department is undertaking pursuant to the authority established in C.R.S. § 8-17.5-102(5).

7. If Seller violates a provision of the public contract for services required herein, the County may terminate the contract for a breach of the contract. If the contract is so terminated, the Seller shall be liable for actual and consequential damages to the County.

8. The County is obligated to notify the office of the secretary of state if a Seller violates a provision of this Addendum and the County terminates the contract for such breach. Based on this notification, the secretary of state shall maintain a list that includes the name of the Seller, the state agency or political subdivision that terminated the public contract for services, and the date of the termination. A Seller shall be removed from the list if two years have passed since the date the contract was terminated, or if a court of competent jurisdiction determines that there has not been a violation of the provisions of the public contract for services required pursuant to C.R.S. 8-17.5-102(2). An agency or political subdivision shall notify the office of the secretary of state if a court has made such a determination. The list shall be available for public inspection at the office of the secretary of state and shall be published on the internet on the website maintained by the office of the secretary of state.

9. The Department may investigate whether a Seller is complying with the provisions of a public contract for services required pursuant to C.R.S. 8-17.5-102(2). The Department may conduct on-site inspections where a public contract for services is being performed, request and review documentation that proves the citizenship of any person performing work on a public contract for services, or take any other reasonable steps that are necessary to determine whether a Seller is complying with the provisions of a public contract for services required pursuant to C.R.S. 8-17.5-102(2). The Department shall receive complaints of suspected violations of a provision of a public contract for services (this Addendum) and shall have discretion to determine which complaints, if any, are to be investigated. The results of any investigation shall not constitute final agency action. The Seller is hereby notified that the Department is authorized to promulgate rules in accordance with article 4 of title 24, C.R.S., to implement the provisions of C.R.S. § 8-17.5-101, *et. seq.*

Dated this 17th day of December, 2020.

SELLER:

By: Andy Azcarraga
Signature

Andy Azcarraga Vice President
Name and Title

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 01/11/2021

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
Moody-Valley Insurance Agency, Inc.
760 Horizon Drive, Suite 302
Grand Junction CO 81506

CONTACT NAME: Tina Post
PHONE (A/C, No, Ext): (970) 248-8300 **FAX (A/C, No):** (970) 242-1894
E-MAIL ADDRESS: tina.post@moodyins.com

INSURER(S) AFFORDING COVERAGE		NAIC #
INSURER A :	BITCO National Insurance Company	20109
INSURER B :	BITCO General Insurance Corporation	20095
INSURER C :	Pinnacol Assurance	41190
INSURER D :	Continental Insurance Company	35289
INSURER E :		
INSURER F :		

INSURED
M. A. Concrete Construction, Inc.
P. O. Box 1968
Grand Junction CO 81502

COVERAGES **CERTIFICATE NUMBER:** 20/21 Master **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	[X] COMMERCIAL GENERAL LIABILITY [ ] CLAIMS-MADE [X] OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: [X] POLICY [X] PRO-JECT [ ] LOC [ ] OTHER:	Y		CLP3700397	12/01/2020	12/01/2021	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG Employee Benefits	$ 1,000,000 $ 300,000 $ 10,000 $ 1,000,000 $ 2,000,000 $ 2,000,000 $ 1,000,000
B	AUTOMOBILE LIABILITY [X] ANY AUTO [ ] OWNED AUTOS ONLY [ ] SCHEDULED AUTOS [ ] HIRED AUTOS ONLY [ ] NON-OWNED AUTOS ONLY			CAP3700398	12/01/2020	12/01/2021	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident) Medical payments	$ 1,000,000 $ $ $ $ 5,000
B	[X] UMBRELLA LIAB [X] OCCUR [ ] EXCESS LIAB [ ] CLAIMS-MADE [ ] DED [X] RETENTION $ 10,000			CUP2820350	12/01/2020	12/01/2021	EACH OCCURRENCE AGGREGATE 	$ 2,000,000 $ 2,000,000 $
C	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y/N [Y] If yes, describe under DESCRIPTION OF OPERATIONS below	N/A		4195192	09/01/2020	09/01/2021	[X] PER STATUTE [ ] OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 $ 1,000,000 $ 1,000,000 $ 1,000,000
D	Excess Liability			6045636010	12/01/2020	12/01/2021	Limit	3,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

RE Project: IFB-4853-21-DH GRJM 21.5-G.95 Culvert Replacement

CERTIFICATE HOLDER

City of Grand Junction
250 N 5th St
Grand Junction CO 81501

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Moody-Valley Insurance Agency

AGENCY CUSTOMER ID: 00022370

LOC #:

ADDITIONAL REMARKS SCHEDULE

Page ____ of ____

AGENCY	NAMED INSURED
Moody-Valley Insurance Agency, Inc.	M. A. Concrete Construction, Inc.
POLICY NUMBER	
CARRIER / NAIC CODE	EFFECTIVE DATE:

ADDITIONAL REMARKS

THIS ADDITIONAL REMARKS FORM IS A SCHEDULE TO ACORD FORM,

FORM NUMBER: 25 **FORM TITLE:** Certificate of Liability Insurance: Notes

CONTRACTUAL LIABILITY APPLIES PER POLICY TERMS AND CONDITIONS

General Liability:
Blanket Additional Insured status applies only to the extent provided in form GL3085 09/11 when required by written contract.
Blanket Waiver of Subrogation applies only to the extent provided in form GL3085 09/11 when required by written contract.
Primary and Non-Contributory status only to the extent provided in form GL3085 09/11 when required by written contract.
Designated Project General Aggregate applies only to the extent provided in form GL3085 09/11 when required by written contract.

Auto Liability:
Blanket Additional Insured status applies only to the extent provided in form AP0401 10/17 when required by written contract.
Blanket Waiver of Subrogation applies only to the extent provided in form AP0401 10/17 when required by written contract.
Primary and Non-Contributory status only to the extent provided in form AP0401 10/17 when required by written contract.

Umbrella Liability:
Excess Liability policy is on a follow form basis for the following underlying insurance coverages: General Liability, Automobile Liability, and Employers Liability. Additional insured status will follow when required by written contract.

Excess Liability:
Excess Liability policy is on a follow form basis for the following underlying insurance coverages: Umbrella Liability. Additional insured status will follow when required by written contract.

Worker's Compensation:
359-B From Attached Includes Blanket Waiver of Subrogation. Status applies when required by written contract.

IMPORTANT:
The policy forms referenced will be sent via email only. To obtain copies, please send your request with the email address to certrequestgj@moodyins.com

Bond #30111729

PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned M.A. Concrete Construction, Inc., a Corporation organized under the laws of the State of CO, hereinafter referred to as the "Contractor" and Western Surety Company, a corporation organized under the laws of the State of SD, and authorized and licensed to transact business in the State of Colorado, hereinafter referred to as the "Surety," are held and firmly bound unto the City of Grand Junction, Colorado, hereinafter referred to as the "City", in the penal sum of Two Hundred Twelve Thousand Three Hundred Fifteen Dollars and 50/100 dollars ($212,315.50), lawful money of the United States of America, for the payment of which sum the Contractor and Surety bind themselves and their heirs, executors, administrators, successors and assigns, jointly and severally by these presents.

WHEREAS, the above Contractor has on the 7th day of January, 2021, entered into a written contract with the City for furnishing all labor, materials, equipment, tools, superintendence, and other facilities and accessories for the construction of GRJM 21.5-G.95 Culvert Replacement (the "Project") and Contract No. IFB-4853-21-DH, if appropriate, in accordance with the Contract, Special Conditions, Special Provisions, General Contract Conditions, Contract Drawings, Specifications and all other Contract Documents therefor which are incorporated herein by reference and made a part hereof, and are herein referred to as the "Contract".

NOW, THEREFORE, the conditions of this performance bond are such that if the Contractor:

1. Promptly and faithfully observes, abides by and performs each and every covenant, condition and part of said Contract, including, but not limited to, its warranty provisions, in the time and manner prescribed in the Contract, and

2. Pays the City all losses, damages (liquidated or actual, including, but not limited to, damages caused by delays in performance of the Contract), expenses, costs and attorneys' fees, that the City sustains resulting from
3. any breach or default by the Contractor under the Contract,

then this bond is void; otherwise, it shall remain in full force and effect.

IN ADDITION, if said Contractor fails to duly pay for any labor, materials, team hire, sustenance, provisions, provender, or any other supplies used or consumed by said Contractor or its subcontractors in its performance of the Work contracted to be done or fails to pay any person who supplies rental machinery, tools, or equipment, all amounts due as the result of the use of such machinery, tools or equipment in the prosecution of the work, the Surety shall pay the same in an amount not exceeding the amount of this obligation, together with interest at the rate of eight percent per annum.

PROVIDED FURTHER, that the said Surety, for value received, hereby stipulates and agrees that any and all changes in the Contract or compliance or noncompliance with the formalities in the Contract for making such changes shall not affect the Surety's obligations under this bond and the Surety hereby waives notice of any such changes. Further, Contractor and Surety acknowledge that the penal sum of this bond shall increase in accordance with approved changes to the Contract Documents without obtaining the Surety's consent up to a maximum of 20 percent of the penal sum. Any additional increases in the penal sum shall require the Surety's consent.

IN WITNESS WHEREOF, said Contractor and said Surety have executed these presents as of this 8th day of January, 2021.

CONTRACTOR: M.A. Concrete Construction, Inc.

By: Martin Azarcoya

Title: President

ATTEST: Donna Azarcoya
Secretary

SURETY: Western Surety Company

By: Tina Marie Post

Title: Tina Marie Post Attorney-in-Fact

(Accompany this Bond with the attorney-in-fact's authority from the surety to execute this Bond, certified to include the date of the Bond.)

Bond #30111729

PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned M.A. Concrete Construction, Inc., a Corporation organized under the laws of the State of CO, hereinafter referred to as the "Contractor" and Western Surety Company, a corporation organized under the laws of the State of SD, and authorized and licensed to transact business in the State of Colorado, hereinafter referred to as the "Surety," are held and firmly bound unto the City of Grand Junction, Colorado, hereinafter referred to as the "City," In the penal sum of Two Hundred Twelve Thousand Three Hundred Fifteen Dollars and 50/100 dollars ($212,315.50), lawful money of the United States of America, for the payment of which sum the Contractor and Surety bind themselves and their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the above Contractor has on the 7th day of January, 2021, entered into a written contract with the City for furnishing all labor, materials, equipment, tools, superintendence, and other facilities and accessories for the construction of GRJM 21.5-G.95 Culvert Replacement (the "Project") and Contract No. IFB-4853-21-DH, if appropriate, in accordance with the Contract, Special Conditions, Special Provisions, General Contract Conditions, Contract Drawings, Specifications and all other Contract Documents therefor which are incorporated herein by reference and made a part hereof, and are herein referred to as the "Contract".

NOW, THEREFORE, the condition of this payment bond obligation is such that if the Contractor shall at all times promptly make payments of all amounts lawfully due to all persons supplying or furnishing it or its subcontractors with labor, materials, rental machinery, tools or equipment, used or performed in the prosecution of work provided for in the above Contract and shall indemnify and save harmless the City to the extent of any and all payments in connection with the carrying our of such Contract which the City may be required to make under the law, and for all losses, damages, expenses, costs, and attorneys' fees incurred by the City resulting from the failure of the Contractor to make the payments discussed above, then this obligation shall be null and void, otherwise, it shall remain in full force and effect.

PROVIDE FURTHER, that the said Surety, for value received, hereby stipulates and agrees that any and all changes in the Contract Documents, or compliance or noncompliance with the formalities in the Contract for making such changes shall not affect the Surety's obligations under this bond and the Surety hereby waives notice of any such changes. Further, Contractor and Surety acknowledge that the penal sum of this bond shall increase or decrease in accordance with approved changes to the Contract Documents without obtaining the Surety's consent up to a maximum of 20 percent of the penal sum. Any additional increases in the penal sum shall require the Surety's consent.

IN WITNESS WHEREOF, said Contractor and said Surety have executed these presents as of this 8th day of January, 2021.

CONTRACTOR: M.A. Concrete Construction, Inc.

By: Martin Azcarraga

Title: President

ATTEST: Donna Azcarraga
Secretary

SURETY: Western Surety Company

By: Tina Marie Post

Title: Tina Marie Post Attorney-in-Fact

(Accompany this Bond with the attorney-in-fact's authority from the surety to execute this Bond, certified to include the date of the Bond.)

Western Surety Company

POWER OF ATTORNEY APPOINTING INDIVIDUAL ATTORNEY-IN-FACT

Know All Men By These Presents, That WESTERN SURETY COMPANY, a South Dakota corporation, is a duly organized and existing corporation having its principal office in the City of Sioux Falls, and State of South Dakota, and that it does by virtue of the signature and seal herein affixed hereby make, constitute and appoint

Jody L Anderson, Evan E Moody, Karen A Feggestad, Bradley J Moody, Tina Marie Post, Elizabeth Ostblom, Individually

of Denver, CO, its true and lawful Attorney(s)-in-Fact with full power and authority hereby conferred to sign, seal and execute for and on its behalf bonds, undertakings and other obligatory instruments of similar nature

- In Unlimited Amounts -

and to bind it thereby as fully and to the same extent as if such instruments were signed by a duly authorized officer of the corporation and all the acts of said Attorney, pursuant to the authority hereby given, are hereby ratified and confirmed.

This Power of Attorney is made and executed pursuant to and by authority of the By-Law printed on the reverse hereof, duly adopted, as indicated, by the shareholders of the corporation.

In Witness Whereof, WESTERN SURETY COMPANY has caused these presents to be signed by its Vice President and its corporate seal to be hereto affixed on this 28th day of March, 2020.

WESTERN SURETY COMPANY

Paul T. Bruflat, Vice President

State of South Dakota
County of Minnehaha } ss

On this 28th day of March, 2020, before me personally came Paul T. Bruflat, to me known, who, being by me duly sworn, did depose and say: that he resides in the City of Sioux Falls, State of South Dakota; that he is the Vice President of WESTERN SURETY COMPANY described in and which executed the above instrument; that he knows the seal of said corporation; that the seal affixed to the said instrument is such corporate seal; that it was so affixed pursuant to authority given by the Board of Directors of said corporation and that he signed his name thereto pursuant to like authority, and acknowledges same to be the act and deed of said corporation.

My commission expires
June 23, 2021

J. MOHR
NOTARY PUBLIC SOUTH DAKOTA

J. Mohr, Notary Public

CERTIFICATE

I, L. Nelson, Assistant Secretary of WESTERN SURETY COMPANY do hereby certify that the Power of Attorney hereinabove set forth is still in force, and further certify that the By-Law of the corporation printed on the reverse hereof is still in force. In testimony whereof I have hereunto subscribed my name and affixed the seal of the said corporation this 8th day of January, 2021.

WESTERN SURETY COMPANY

L. Nelson, Assistant Secretary

Form F4280-7-2012

Go to www.cnasurety.com > Owner / Obligee Services > Validate Bond Coverage, if you want to verify bond authenticity.

Authorizing By-Law

ADOPTED BY THE SHAREHOLDERS OF WESTERN SURETY COMPANY

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