LICENSE AGREEMENT BETWEEN
LOWER CLEAR CREEK DITCH COMPANY, ADAMS COUNTY, URBAN DRAINAGE AND FLOOD CONTROL DISTRICT, AND REGIONAL RAIL PARTNERS, JOINT VENTURE

1. **PARTIES.** The Parties to this Agreement ("Agreement") are the Lower Clear Creek Ditch Company, a Colorado mutual ditch company (referred to as "the Ditch Company"); Adams County, a political subdivision of the State of Colorado ("County"); Urban Drainage and Flood Control District, a quasi-municipal corporation and political subdivision of the State of Colorado ("District"); and Regional Rail Partners, Joint Venture ("RRP"). The Ditch Company, the County, the District, and RRP are sometimes referred to collectively herein as the "Parties." The County, the District, and RRP are sometimes referred to collectively herein as "Licensees." The effective date of this Agreement is the date upon which all Parties have completely signed it ("Effective Date").

2. **RECITALS.**

2.1 The Ditch Company owns the existing Lower Clear Creek Ditch ("Ditch") and associated ditch easement and right of way ("Easement") for the purpose of exercising its decreed Colorado water rights and operating and maintaining the Ditch to divert, carry, and deliver water to its shareholders and other lawful users of the Ditch. The County owns land crossed by a drainage area known as the Hoffman Drainage, and has entered into an agreement with the District, who subsequently entered into an agreement with RRP, to construct improvements to the Hoffman Drainage, including improvements at the current location where the Hoffman Drainage crosses the Ditch. See section 6 for RRP's Installation warranty.

2.2 In connection with constructing the improvements at the current location where the Hoffman Drainage crosses the Ditch, the Licensees desire to obtain the permission of the Ditch Company (1) to convey the Ditch in a spanned concrete channel across the open channel Hoffman Drainageway and (2) to construct a temporary bypass ("Temporary Bypass") for the purpose of conveying such water and water rights of the Ditch Company and routing them around the Installation construction area during construction.

2.3 Upon expiration of RRP's warranty period following completion of the Installation, RRP will no longer be the owner of, and responsible for, the Installation. See section 6.

2.4 The Parties agree that RRP is and shall be solely responsible for any obligations that arise during construction of the Installation, and all obligations related to the construction of the Temporary Bypass.

2.5 The Hoffman channel is to be relocated approximately 70 feet south of its current alignment at the Ditch crossing. The existing Ditch structures just south of East 86th Avenue will remain in-place. The proposed concrete channel conveying the Ditch across the Hoffman Drainageway is a 43-foot long, 8-foot wide by 4-foot high three-sided

concrete span. This span is to be founded on steel H-piles. The design includes concrete wing walls and aprons on each end. The south end transitions from the existing ditch with grouted riprap. The north end of the span will tie into the existing trapezoidal concrete channel at the structure referred to as the Thornton diversion structure. The Hoffman channel will be concrete lined beneath the Ditch span. The constructed structure described in this section 2.5 is referred to herein as the "Installation." The general location of the affected portion of the Ditch, the Installation, and the Temporary Bypass is near the intersection of East 86th Avenue and Steele Street, Adams County, Colorado, as more specifically is described in **EXHIBIT A**.

2.6 The Ditch Company desires, and Licensees agree, to mitigate all Licensees' construction impacts to the Ditch and its Easement resulting from the Installation and the Temporary Bypass. The Ditch Company agrees to permit the proposed Installation and the Temporary Bypass subject to the terms, conditions, covenants and agreements set forth in this Agreement. Accordingly, in consideration of the mutual promises set forth in this Agreement, the Parties covenant and agree as follows:

3. CONSTRUCTION.

3.1 Pursuant to the terms of this Agreement, the Licensees are granted a license to construct the Installation and a Temporary Bypass, pursuant to plans and specifications that have been approved by the Ditch Company and that are included in the attached **EXHIBIT A**. Upon completion of the Installation and acceptance by the Ditch Company in accordance with section 3.10, the license granted herein shall be irrevocable, subject to the terms and conditions of this Agreement. The license includes the right to operate, use, inspect, maintain and repair the Installation and the Temporary Bypass subject to the terms and conditions of this Agreement. The Installation shall be capable of accommodating a flow rate of 150 cubic feet per second in such a manner that does not cause any pooling or backing-up of water anywhere along the Ditch.

3.2 All portions of the Ditch and all affected areas within the Easement which are disturbed by the Installation, by the maintenance, repair, or replacement of the Installation, or by the Temporary Bypass shall be restored to a condition that is comparable to that which existed before the disturbance, or shall be improved as shown on **EXHIBIT A**, such that the flow of water in the Ditch runs at or above its amount and velocity prior to the Installation and the Temporary Bypass. All backfill shall be compacted to at least 95% of the maximum dry density as determined by the Standard Proctor method. Any and all fencing and other improvements, or appurtenances, and facilities appurtenant to the Ditch Company's Easement shall be replaced in a condition that is comparable to the condition of such facilities, improvements and appurtenances prior to any construction, maintenance, repair, or replacement allowed hereunder.

3.3 It shall be the sole responsibility of RRP to perform all engineering and planning and to obtain all authorizations needed to perform the work contemplated by this Agreement. The Ditch Company's review of the plans and specifications is solely for its own benefit and creates no obligation on the Ditch Company.

3.4 It is not known whether any of Licensees' work on the Installation and/or related portions of the Ditch requires any local, state or federal permits or approvals. It is Licensees' obligation to investigate and determine the need for any such permits or approvals. Licensees are responsible, at their own expense, for obtaining all local, state and federal permits or approvals and for compliance with all local, state and federal laws and regulations, including but not limited to land use and environmental laws and regulations, and specifically including the Endangered Species Act, prior to beginning any such work. To the extent permitted by law, RRP shall indemnify the Ditch Company, the County, and the District for any and all costs, damages, fines, and fees, including reasonable attorneys' fees, incurred as a result of Licensees' failure to obtain such permits or approvals or failure to comply with all applicable laws and regulations.

3.5 The construction, operation, maintenance, repair, and replacement of the Installation and the Temporary Bypass shall not adversely affect the Ditch Company's Easement for access, operation, maintenance, repair, and replacement of the Ditch, the Installation, and the Temporary Bypass and shall not affect the capacity of the Ditch or the flow of water in the Ditch, including amount and velocity, and including the Ditch's ability to carry the water rights of the Ditch Company, its shareholders and/or other lawful users. Nor shall it adversely affect the quality of the water that has historically existed in the Ditch. In the event there is any such effect, such condition shall be fully corrected to the satisfaction of the Ditch Company. RRP agrees to take all necessary care in excavating around structures that support the Ditch, cross the Ditch, convey its water, or are otherwise part of the Easement, including but not limited to embankments, bridges, culverts, liners, and pipelines.

3.6 The Licensees shall take care to not spill any dirt, debris or other foreign material into the Ditch. In the event that dirt, debris or other foreign material is spilled into the Ditch, whether by Licensees or others employed by or working at the direction of Licensees, RRP agrees to completely clean the affected portions of the Ditch and remove all such dirt, debris or other foreign material from the Ditch. RRP shall provide appropriate erosion controls to protect the Ditch and any surrounding property that could be affected by the construction, either directly or indirectly.

3.7 RRP shall notify the Ditch Company at least five days preceding the date of commencing any work on or relating to the Installation permitted hereunder and at least five days preceding the date of commencing any work on or relating to the Temporary Bypass permitted hereunder. Along with each such notice, RRP shall provide the Ditch Company with a schedule of construction activities for review and approval prior to the start of work in the vicinity of the Ditch, which approval shall not be unreasonably withheld. The Ditch Company is permitted to inspect the Temporary Bypass, the Installation, and any maintenance, repair, or replacement work during construction and upon completion. The Ditch Company, at its option, may hire an engineer at RRP's expense to conduct reasonable inspections of the Temporary Bypass and the Installation (including maintenance, repair, and replacement of the Installation) during the construction thereof as it deems necessary to protect its interest. The Ditch Company's right to inspect the Temporary Bypass and the Installation (including maintenance, repair, and replacement of the Temporary Bypass and the Installation) in no way relieves the

Licensees of their liability for improper construction, maintenance, repair, or replacement. The Ditch Company's inspection is solely for the benefit of the Ditch Company and creates no obligation on the Ditch Company.

3.8 The Licensees agree that the construction permitted hereunder shall proceed with reasonable diligence from the initiation of such construction to its completion, except that construction that interrupts water flow in the Ditch will not be allowed during the period from March 15, 2017 through November 1, 2017. The Installation shall be completed by March 1, 2018. The Temporary Bypass and the Installation shall be constructed, operated, maintained, repaired, and replaced in such a manner so as not to interfere with the flow of water through the Ditch to water recipients. Licensees shall be responsible for the carriage of water across the land, including drainage water, while the Temporary Bypass and the Installation is being constructed, installed, maintained, repaired, or replaced. The Parties hereto recognize and agree that substantial damages may be suffered by the Ditch Company and its shareholders if the delivery of water is interrupted in any manner as a result of the Temporary Bypass or the Installation agreed to herein or other actions of the Licensees. The Parties further agree and acknowledge that damages resulting from such interruptions in the delivery of water are difficult to measure. In recognition of these facts, RRP agrees to pay as liquidated damages $10,000.00 per day for any day that the Ditch Company has a request for water from a shareholder and cannot deliver water to that shareholder or shareholders as a result of the Temporary Bypass or the Installation agreed to herein. In no event, however, shall the total amount paid by RRP to the Ditch Company as liquidated damages for interruption in delivery of water exceed Ten Thousand Dollars ($10,000.00) per day.

3.8.1 The Parties recognize that the Ditch Company customarily does not allow any construction that interrupts water flow in the Ditch during the period from March 15th through November lst of any given year. However, the Ditch Company is willing to make an exception to allow construction of the Temporary Bypass and the Installation during the period from March 15 through November 1, 2017, if and only if (1) the Ditch Company is able to verify that the applicable portion of the Ditch may be shut off during construction of the Temporary Bypass; (2) the Ditch Company provides written approval of the construction schedule for both the Temporary Bypass and the Installation; and (3) the Ditch Company inspects and provides written acceptance of the Temporary Bypass pursuant to section 3.10, below, prior to any work being commenced on the Installation.

3.8.2 If the Installation is completed during the period from March 15 through November 1, 2017, RRP may remove the Temporary Bypass during that same period if and only if (1) the Ditch Company inspects and provides written acceptance of the Installation pursuant to section 3.10, below; and (2) the Ditch Company is able to shut off the applicable portion of the Ditch, as necessary, to allow RRP to remove the Temporary Bypass to allow delivery of water through the Installation. If the Temporary Bypass is not so removed during the period from March 15 through November 1, 2017, then RRP shall coordinate with the

Ditch Company to remove it during the period from November 1, 2017 through March 1, 2018.

3.9 If the Licensees commence construction of the Installation but fail to complete said construction by March 1, 2018, then RRP shall pay a penalty to the Ditch Company in the amount of One Thousand Dollars ($1,000) per day until completion. The payment of such penalty shall be in addition to any sums owed as damages hereunder, including but not limited to damages pursuant to section 3.8.

3.10 Upon completion of the Installation, or completion of any maintenance, repair, or replacement, RRP shall notify the Ditch Company. The Ditch Company may inspect and shall accept or reject the Installation using reasonable standards within 14 days of notification, except that the Ditch Company shall not be required to accept or reject until and unless all fees billed have been paid pursuant to section 4. The Ditch Company shall be entitled, but not obligated, to test the affected portions of the Ditch by running water through it. If the Installation is completed during the non-irrigation season, the 14-day notification period shall not begin until it is feasible for the Ditch Company to run water in the Ditch. Acceptance or rejection shall be in writing. If the Installation is rejected, Ditch Company or its representative shall specify the reasons for rejection, and RRP shall correct the same, and the above process shall be repeated. Acceptance does not affect the provisions of section 6, below, regarding negotiations toward a Maintenance Agreement and/or seeking of a declaratory judgment.

3.11 RRP shall install 2 bollards per crossing that define the centerline of the Ditch in the vicinity of the Installation. RRP shall provide as-built drawings and a summary of QA/QC testing to the Ditch Company upon completion of the construction.

4. REIMBURSEMENT OF EXPENSES.

4.1 RRP agrees to reimburse the Ditch Company (or pay directly) for all reasonable engineering, legal, and administrative costs incurred by the Ditch Company in preparing, approving and enforcing this Agreement, costs associated with billing and collecting those amounts for the Ditch Company, and the costs of inspection allowed hereunder. For purposes of this Agreement, reimbursement shall be made by RRP at the actual hourly rate for labor and equipment incurred by the Ditch Company. The agreement to reimburse the Ditch Company shall not apply to the negotiation of a Maintenance Agreement referred to in section 6.2 below nor to a Declaratory Judgment action referred to in section 6.3 below.

4.2 RRP has paid a deposit to the Ditch Company in the amount of $5,000.00 toward payment of the Ditch Company's expenses. The Ditch Company may require additional deposits as needed to cover current and future expenses related to the Installation and Temporary Bypass, as set forth herein. The Ditch Company will provide copies of invoices to RRP, which invoices shall contain a reasonable description of the Ditch Company's expenses. All portions of the deposit that are not applied to expenses that are reimbursable hereunder shall be reimbursed to RRP within 45 days after acceptance of the Installation pursuant to section 3.10. If the deposit is depleted before acceptance of

the Installation, then the Ditch Company may require and RRP shall provide reasonable additional deposits as needed to cover current and future expenses.

4.3 In the event the Ditch Company's expenses exceed the amount of any deposit(s) paid to the Ditch Company, statements for costs chargeable to RRP hereunder will be forwarded to RRP. Such statements shall contain a reasonable description of the Ditch Company's expenses. RRP shall reimburse the Ditch Company within forty-five (45) days after the billing date. If the Ditch Company has not received payment within 45 days, RRP shall have breached this Agreement and the Ditch Company may institute legal proceedings to collect the amount due and owing. In such a proceeding, the prevailing party shall be entitled to its costs and reasonable attorneys' fees.

5. **LICENSE FEE.** RRP shall pay to the Ditch Company a license fee of $5,000.00. The license fee shall be paid prior to the commencement of any construction allowed hereunder. This license fee shall be in addition to any other costs for which the Licensees are responsible pursuant to this Agreement.

6. **MAINTENANCE, REPAIR, AND REPLACEMENT.**

6.1 Following the Ditch Company's acceptance of the Installation as described in section 3.10, above, a warranty period shall commence and the Installation shall become the property of RRP during the warranty period. The warranty period shall expire at such time as (1) the Installation has been operated for two years without any defects and (2) RRP provides notice to the County, the District, and the Ditch Company of such two-year operation, and neither the County, the District, nor the Ditch Company objects to such notice. Subject to the terms and conditions of this Agreement, RRP shall remain the owner of the Installation until expiration of the warranty period. Upon the expiration of the warranty period, neither the District nor RRP shall have any ownership interest in the Installation. During the warranty period, obligations for maintenance, repair,and replacement of the Installation shall be as follows:

6.1.1 On a daily basis during times when water is being conveyed through the Ditch, the Ditch Company shall be allowed to inspect and clean the interior of the Installation, including removal of debris. Such work that may be conducted by the Ditch Company includes both manual work and work that requires the use of reasonably necessary equipment. The Ditch Company shall be responsible for its own costs associated with such daily and other routine maintenance. No notice to the Licensees is required for such daily and other routine maintenance.

6.1.2 During the two year warranty period, RRP shall be solely responsible for repairing defects and performing required maintenance and replacement of the Installation that goes beyond daily and other routine maintenance.

6.2 For one year after the Effective Date of this Agreement, the County and the Ditch Company agree to negotiate in good faith to try and reach a written agreement regarding rights and obligations associated with ownership and responsibility for operation,

maintenance, and replacement of the Installation ("Maintenance Agreement") after expiration of the warranty period.

6.3 If no Maintenance Agreement has been reached by the one year anniversary of the Effective Date of this Agreement ("Negotiation Expiration Date"), then the County, the Ditch Company, or both may seek a declaratory judgment from the Adams County District Court in order to determine all rights and obligations associated with ownership and responsibility for operation, maintenance, and replacement of the Installation after expiration of the warranty period ("Declaratory Judgment"). Until the earlier of the date by which a Maintenance Agreement has been fully signed by both the County and the Ditch Company or the date by which a final, unappealable Declaratory Judgment has been entered by the Adams County District Court, the County and the Ditch Company agree to confer with one another regarding maintenance of the Installation. After such conferral (unless an emergency situation arises, in which case it may not be possible to confer), the County, the Ditch Company, or both may take any action deemed reasonably necessary to maintain the Installation. Each party shall pay its own attorneys fees and costs for the Declaratory Judgment contemplated by this section 6.3.

6.4 Nothing herein shall be construed as a waiver of any claim or as any admission with respect to ownership of and responsibility for operation, maintenance, and eventual replacement of the Installation. The County and the Ditch Company each reserve all its claims and defenses with respect to such ownership and responsibility.

6.5 The County and the Ditch Company each agree: that it shall not bring any claim with respect to such ownership and responsibility before the Negotiation Expiration Date; that the running of any statute of limitations concerning any such claim shall be tolled up to and including the Negotiation Expiration Date; and that the period of time between the date of this Agreement and the Negotiation Expiration Date shall not be asserted or relied upon in any way in advancing any arguments about the passage or computation of time under any statute of limitations or other time limitations.

7. **TERM.** This Agreement shall be in effect until it is modified in writing by the Parties or by a judicial order.

8. **LIABILITY AND INDEMNIFICATION.**

8.1 By virtue of entering into this Agreement, the Ditch Company: (1) assumes no liability for use, operation, or existence of the Licensees' engineering, preparation, installation, or construction of the Installation; and (2) assumes no additional responsibilities or obligations related to the Licensees' future or additional activities within the area described in **EXHIBIT A** which are required by this Agreement, except for those activities associated with the routine operation and maintenance of the Ditch and which the Ditch Company engaged in prior to the construction of the Installation.

8.2 To the fullest extent permitted by Colorado law, RRP agrees to indemnify, defend, and hold harmless the Ditch Company, the County, and the District, their trustees, directors, officers, agents, employees and contractors, from all claims and

liability for damage or injury to property or persons arising from or caused by: the acts or omissions of Licensees related to the engineering, preparation, or construction of the Installation; and the Licensees' use of the Installation. This obligation does not extend to any negligent act or omission of the Ditch Company, the County, or the District.

8.3 The Ditch Company shall not be responsible for any damage caused by seepage water or inadvertent damage to the Installation during the Term of this License Agreement.

8.4 Licensees are responsible for contacting the Ditch Company immediately upon notification of any damage to infrastructure or land owned by the Ditch Company or to which the Ditch Company enjoys easement rights.

9. **THIRD PARTY BENEFICIARIES.** This Agreement shall not confer any benefits to any person not a party to this Agreement except for the Ditch Company's shareholders. The Ditch Company's shareholders are third party beneficiaries of this Agreement.

10. **DEFAULT.** Time is of the essence of this Agreement, and if any payment or any other condition, obligation or duty is not timely made, tendered or performed by any party, then the non-defaulting party or parties shall have the right to an action for specific performance or damages or both.

11. **RECORDATION.** This Agreement shall be recorded at the expense of the Licensees. The failure to record all or portions of any exhibit that is part of this Agreement because of the size or quality of the documents shall affect neither the validity of this Agreement nor the obligations or benefits contained in the Agreement. The original of this Agreement shall be returned to the Secretary of the Ditch Company after it has been recorded.

12. **NOTICES.** Any notice required or permitted by this Agreement shall be in writing and shall be deemed to have been sufficiently given for all purposes if hand-delivered or if sent by certified or registered mail, postage and fees prepaid, addressed to the party to whom such notice is intended to be given at the address set forth below, or at such other address as has been previously furnished in writing to the other party or parties. Such notices shall be deemed to have been given when deposited in the United States Mail or, if hand-delivered, upon receipt.

LOWER CLEAR CREEK DITCH COMPANY:

Lower Clear Creek Ditch Company
c/o Matt Stockton, Secretary
12450 Washington Street
Thornton, CO 80241

Copy to:

Gilbert Y. Marchand, Jr., Esq.
2737 Mapleton Avenue, Suite 202
Boulder, Colorado 80304

ADAMS COUNTY:

Adams County
Transportation Department
4430 South Adams County Parkway
Brighton, Colorado 80601

Copy to:

Adams County
Attorney's Office
4430 South Adams County Parkway
Brighton, Colorado 80601

URBAN DRAINAGE AND FLOOD CONTROL DISTRICT:

Executive Director
Urban Drainage and Flood Control District
2480 W 26th Ave # 156B
Denver, CO 80211

Copy to:

Edward J. Krisor, Esq.
3900 S. Wadsworth Blvd., Suite 320
Lakewood, CO 80235-2220

REGIONAL RAIL PARTNERS, JOINT VENTURE:

Regional Rail Partners, Joint Venture
c/o David Trent, Project Director
1765 W 121st Avenue, Suite 400
Westminster, CO 80234

Copy to:

Regional Rail Partners, Joint Venture
c/o Kevin Lynch, Business Manager
1765 W 121st Avenue, Suite 400
Westminster, CO 80234

13. **WAIVER OF BREACH.** The waiver by any party to this Agreement of a breach of any term or provision of this Agreement shall not operate or be construed as a waiver of any subsequent breach by any party.

14. **EXHIBITS.** All exhibits referred to in this Agreement are, by reference, incorporated in this Agreement for all purposes.

15. **ATTORNEYS' FEES.** If any party breaches this Agreement, the non-prevailing party shall pay all of the prevailing party's reasonable attorneys' fees and costs in enforcing this Agreement through litigation, or otherwise.

16. **ASSIGNMENT.** This Agreement may not be assigned by either party, unless the other party consents, which consent shall not be unreasonably withheld.

17. **BINDING EFFECT.** This Agreement shall inure to the benefit of, and be binding upon, the parties, and their respective legal representatives, successors, and assigns and shall run with the property described in **EXHIBIT A**.

18. **COMPLETE AGREEMENT.** This document represents the complete agreement of the parties hereto and no oral modification shall be recognized. Any amendments or additions shall be made in writing signed by the parties.

19. **APPLICABLE LAW AND VENUE.** This Agreement shall be interpreted and enforced pursuant to the laws of the State of Colorado. In the event of litigation concerning this Agreement, the Parties agree that proper venue shall be the District Court, Adams County, Colorado.

20. **PARTIAL INVALIDITY.** If any one or more of the provisions of this Agreement should be ruled wholly or partly invalid or unenforceable by a court or other government body of competent jurisdiction: the validity and enforceability of all provisions of this Agreement not ruled to be invalid or unenforceable shall be unaffected; the provision(s) held wholly or partly invalid or unenforceable shall be deemed amended, and the court or other government body is authorized to reform the provision(s), to the minimum extent necessary to render them valid and enforceable in conformity with the parties' intent as manifested herein; and if the ruling, and/or the controlling principle of law or equity leading to the ruling, is subsequently overruled, modified, or amended by legislative, judicial, or administrative action, then the provision(s) in question as originally set forth in this Agreement shall be deemed valid and enforceable to the maximum extent permitted by the controlling principle of law or equity.

21. **COUNTERPARTS.** This Agreement may be executed in several counterparts, the signatures on which may be by facsimile or by scanned originals, and, as so executed, shall constitute one Agreement, binding on each party even though each party has not signed the same counterpart. Any counterpart of this Agreement which has attached to it separate signature pages, which altogether contain the signatures of each party, shall be deemed a fully executed instrument for all purposes.

DATED: 2/14/17, 20 17

LOWER CLEAR CREEK DITCH COMPANY,
a Colorado mutual ditch company

By: Josh Redman

Printed Name: Josh Redman

Title: President

Date: 2/14/17

ATTEST:

By: [signature]

Printed Name: Matthew J Stockton

Title: Corporate Secretary

Date: 2/14/17

BOARD OF COUNTY COMMISSIONERS,
ADAMS COUNTY, COLORADO

By: _____

Printed Name: _____

Title: _____

Date: _____

ATTEST:

By: _____

Printed Name: _____

Title: _____

Date: _____

APPROVED AS TO FORM:

By: _____

Printed Name: _____

Title: _____

Date: _____

URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

By: _____

Printed Name: Ken A. MacKenzie

Title: Executive Director

Date: 2/15/2017

REGIONAL RAIL PARTNERS, JOINT VENTURE

By: _____

Printed Name: DAN D TRENT

Title: PROJECT DIRECTOR

Date: 2/17/17

ATTEST:

By: _____

Printed Name: SHAWN M. PLICHTA

Title: DESIGN BUILD COORDINATION MGR

Date: 2/17/17

EXHIBIT A

LICENSE AGREEMENT BETWEEN THE COLORADO AGRICULTURAL DITCH COMPANY, ADAMS COUNTY, URBAN DRAINAGE AND FLOOD CONTROL DISTRICT, AND REGIONAL RAIL PARTNERS, JOINT VENTURE

1. LOCATION OF CROSSING AND PLANS

2. TEMPORARY BYPASS MEMORANDUM

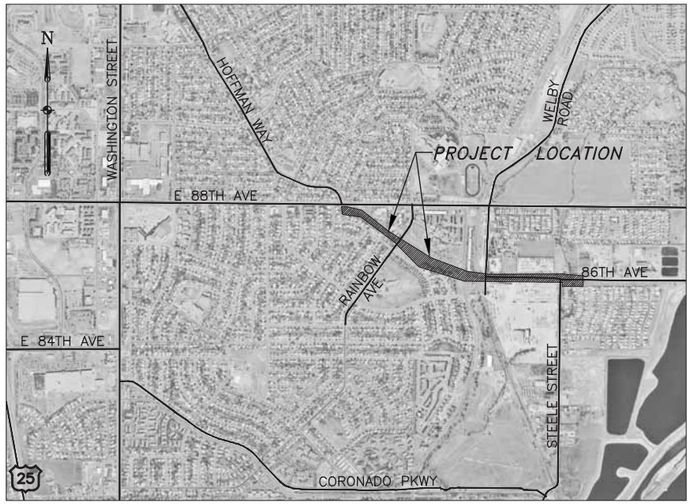
3. PRESCRIPTIVE EASEMENT DESCRIPTION (Sheet DS-11)

URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

ADAMS COUNTY, COLORADO

LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

UDFCD PROJECT NO. 106266

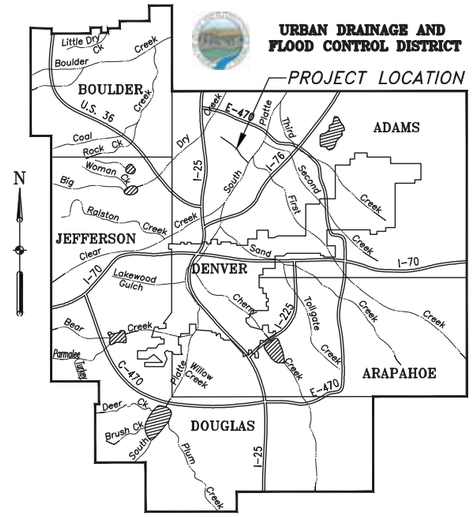


LOCATION MAP

PREPARED BY

Stantec
2000 South Colorado Boulevard Suite 2-300
Denver, CO U.S.A.
www.stantec.com

REGIONAL RAIL PARTNERS



VICINITY MAP

FEBRUARY , 2017
PHASE 1 ISSUED FOR CONSTRUCTION

URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

KEN MACKENZIE, PE – EXECUTIVE DIRECTOR — DATE

DAVID BENNETTS, PE – MANAGER
DESIGN, CONSTRUCTION, AND MAINTENANCE PROGRAM — DATE

DAVID SKUODAS, PE – PROJECT MANAGER
DESIGN, CONSTRUCTION, AND MAINTENANCE PROGRAM — DATE

ADAMS COUNTY

RENE VALDEZ – MANAGER
STORMWATER AND INFRASTRUCTURE, TRANSPORTATION DEPARTMENT — DATE

RUSSELL T. NELSON, PE – STORMWATER ENGINEER
STORMWATER AND INFRASTRUCTURE, TRANSPORTATION DEPARTMENT — DATE

STANTEC

COLIN HAGGERTY, P.E. – PROJECT MANAGER — DATE

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

GENERAL NOTES:

1. TOPOGRAPHIC MAPPING OF THE LOWER HOFFMAN DRAINAGEWAY CORRIDOR WAS COMPLETED IN 2010 AND SUPPLEMENTED WITH 2008 LIDAR DATA OUTSIDE THE CORRIDOR AS WELL AS 2016 FIELD SURVEY. ACTUAL FEATURES AND TOPOGRAPHY ENCOUNTERED IN THE FIELD AT THE TIME OF CONSTRUCTION MAY VARY FROM WHAT IS SHOWN IN THESE PLANS. ALL ELEVATIONS ARE BASED ON NAVD88.
2. GEOTECHNICAL TEST BORINGS SHOWN IN THESE DRAWINGS WERE COLLECTED IN JULY 2010 AND NOVEMBER 2016. THE SUBSURFACE INFORMATION SHOWN IS SIMPLIFIED AND MAY NOT ACCURATELY REFLECT THE ACTUAL SUBSURFACE CONDITIONS.
3. EXISTING FACILITIES NOT INDICATED TO BE REMOVED SHALL BE PROTECTED IN PLACE OR REMOVED AND REPLACED IN KIND, AS APPROVED BY THE ENGINEER.
4. ALL MATERIALS AND WORKMANSHIP SHALL BE SUBJECT TO INSPECTION BY URBAN DRAINAGE AND FLOOD CONTROL DISTRICT (UDFCD) AND/OR ITS AUTHORIZED REPRESENTATIVES. UDFCD RESERVES THE RIGHT TO ACCEPT OR REJECT ANY MATERIALS AND WORKMANSHIP THAT DO NOT CONFORM TO ITS STANDARDS AND SPECIFICATIONS.
5. THE CONTRACTOR SHALL NOTIFY UDFCD 48 HOURS PRIOR TO STARTING CONSTRUCTION.
6. THE CONTRACTOR SHALL HAVE ONE (1) SIGNED COPY OF THE PLANS AND SPECIFICATIONS (ACCEPTED BY UDFCD), AND ONE (1) COPY OF ALL REQUIRED PERMITS AT THE JOB SITE AT ALL TIMES.
7. THE FINAL FILL AND EXCAVATION SLOPES, LINES AND GRADES SHOWN ON THE DRAWINGS ARE THE NEAT LINES FOR COST ESTIMATE PURPOSES AND ARE THE STEEPEST SLOPES PERMITTED UNLESS OTHERWISE APPROVED BY THE ENGINEER. FLATTER SLOPES MAY BE NECESSARY, AS DETERMINED BY THE CONTRACTOR. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING STABLE EXCAVATIONS AND TEMPORARY SLOPES AND FOR SATISFYING ALL APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS. TEMPORARY EXCAVATIONS SHALL PROVIDE AT A MINIMUM, THE TRENCH DIMENSIONS AND CLEARANCES SHOWN OR SPECIFIED. TEMPORARY CONSTRUCTION SLOPES SHALL BE SLOPED, SHORED, SHEETED, AND/OR BRACED IN ACCORDANCE WITH STABILITY REQUIREMENTS AND APPLICABLE REGULATIONS, AND SHALL BE NO STEEPER THAN THE MINIMUM SLOPES SHOWN OR SPECIFIED WITHOUT THE APPROVAL OF THE ENGINEER. ANY SUCH APPROVALS BY THE ENGINEER WILL NOT RELIEVE THE CONTRACTOR FROM SOLE RESPONSIBILITY FOR PROVIDING STABLE EXCAVATIONS AND TEMPORARY SLOPES.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ACCEPTANCE AND CONTROL OF DRAINAGE WATER FROM AREAS ADJACENT TO THE CHANNEL AND FOR STREAM FLOW WITHIN THE CHANNEL. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING METHODS BY WHICH CHANNEL FLOW, SURFACE RUNOFF, AND SUBSURFACE SEEPAGE WILL BE TEMPORARILY DIVERTED, DETAINED OR OTHERWISE CONTROLLED. WATER CONTROL SHALL BE PERFORMED IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS, AS WELL AS ALL APPLICABLE PERMIT CONDITIONS. TEMPORARY WATER CONTROL SYSTEMS SHALL NOT CAUSE INCREASED FLOODING OR AFFECT NORMAL FLOW CHARACTERISTICS DURING CONSTRUCTION. ANY DAMAGE TO THE WORK RESULTING FROM BASE FLOWS OR FLOOD FLOWS SHALL BE CORRECTED BY THE CONTRACTOR AT THE CONTRACTOR'S SOLE COST. UNLESS OTHERWISE SPECIFIED, WATER CONTROL SHALL BE INCIDENTAL TO THE WORK.
9. THE CONTRACTOR IS ADVISED THAT THE STOCKPILING AND USE OF MATERIAL AND/OR EQUIPMENT WITHIN THE CHANNEL CREATES POTENTIAL OBSTRUCTIONS TO THE FLOW OF THE STREAM. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CONDUCT THE WORK IN A MANNER THAT MINIMIZES THE REDUCTION IN CHANNEL CAPACITY AT ALL TIMES. THE CONTRACTOR IS ADVISED THAT THE STORAGE OF FUELS, CHEMICALS, TRASH DEBRIS, CONSTRUCTION MATERIAL, VEHICLES, AND EQUIPMENT SHALL BE PROHIBITED WITHIN THE CHANNEL AT ALL TIMES EXCEPT AS IS ESSENTIAL TO THE PROGRESS OF THE WORK. UNDER NO CIRCUMSTANCE SHALL ANY OF THE ABOVE MENTIONED MATERIALS BE STORED OVERNIGHT WITHIN THE CHANNEL.
10. CONTRACTOR SHALL PROVIDE PEDESTRIAN AND VEHICULAR SIGNAGE THAT CLEARLY IDENTIFIES THE CONSTRUCTION ZONE THROUGHOUT THE PROJECT. CONTRACTOR SHALL PROVIDE SIGNAGE AND SAFETY FENCING AS REQUIRED TO MAINTAIN A SAFE SITE.
11. EXCESS SOIL SHALL BE DISPOSED OFF SITE BY CONTRACTOR.
12. CONTRACTOR SHALL PROTECT ALL EXISTING CURB, GUTTER AND PAVEMENT AT ALL ACCESS POINTS FROM DAMAGE BY EQUIPMENT OR CONSTRUCTION OPERATIONS. ALL CURB, GUTTER AND PAVEMENT DAMAGED BY THE CONTRACTOR SHALL BE REMOVED AND REPLACED AT THE CONTRACTOR'S EXPENSE.
13. CONSTRUCTION STAKING AND SURVEY SHALL BE PROVIDED BY CONTRACTOR.
14. QUALITY CONTROL TESTING SHALL BE PROVIDED BY THE CONTRACTOR.
15. CONTRACTOR SHALL OBTAIN ALL REQUIRED PERMITS FOR THIS PROJECT, INCLUDING PERMITS REQUIRED BY ADAMS COUNTY. SEE UDFCD AND CDOT PROJECT SPECIFICATIONS FOR SPECIFIC REQUIREMENTS.
16. CONTRACTOR SHALL BE LICENSED TO PERFORM WORK IN ADAMS COUNTY.
17. EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO THE START OF CONSTRUCTION ACTIVITIES AS SHOWN ON THE EROSION AND SEDIMENT CONTROL PLANS.
18. SITE ACCESS AND STAGING SHALL BE PER THE CONSTRUCTION DOCUMENTS UNLESS ALTERNATIVE ACCESS AND STAGING IS APPROVED BY UDFCD AND ADAMS COUNTY.
19. CONTRACTOR SHALL RESTORE ACCESS AND STAGING AREAS TO ORIGINAL GRADE, OR PROPOSED GRADE AS SHOWN ON PLANS, AND REVEGETATE AS SHOWN ON THE EROSION AND SEDIMENT CONTROL PLANS.
20. ALL STORM DRAINAGE PIPE SHALL HAVE A MINIMUM COVER OF 24", UNLESS LOAD CALCULATIONS ARE PROVIDED. UNDER NO CIRCUMSTANCES WILL ANY PIPE HAVE LESS THAN 18" COVER FROM THE FINISH SURFACE TO THE OUTSIDE WALL OF THE PIPE.
21. ALL STORM DRAINAGE PIPE SHALL BE BEDDED IN ACCORDANCE WITH CDOT STANDARD DETAIL M-603-2.
22. ALL STORM DRAINAGE TRENCHES SHALL BE SLOPED OR BRACED AND SHEETED AS NECESSARY, FOR THE SAFETY OF THE WORKERS AND THE PROTECTION OF OTHER UTILITIES, AND IN COMPLIANCE WITH ALL APPLICABLE STATE AND FEDERAL REQUIREMENTS. ALL EXCAVATION OPERATION SAFETY IS THE RESPONSIBILITY OF THE CONTRACTOR.
23. ALL MANHOLE RIM ELEVATIONS GIVEN ON THESE PLANS ARE TO BE CONSIDERED APPROXIMATE. THE CONTRACTOR SHALL SET THE FINAL RIM ELEVATION BASED ON THE COMPLETED FINISH SURFACE.
24. ALL STORM DRAINAGE PIPES SHALL HAVE A MINIMUM HORIZONTAL SEPARATION OF 10' FROM ALL WATER LINES. WHERE LINES CROSS, THERE SHALL BE A MINIMUM OF 18" CLEAR VERTICAL SEPARATION OR AS APPROVED BY THE ENGINEER AND JURISDICTIONAL ENTITY.
25. ALL INVERT ELEVATIONS ARE CONSIDERED APPROXIMATE AND SHALL BE FIELD VERIFIED PRIOR TO PIPE OR STRUCTURE PLACEMENT. UNDER NO CIRCUMSTANCES SHALL A PIPE OR STRUCTURE BE CONSTRUCTED SUCH THAT IT DOES NOT TIE INTO ITS INTENDED CONNECTION.

UTILITY NOTES:

1. UTILITIES SHOWN ON THESE PLANS WERE MAPPED FROM INFORMATION PROVIDED BY THE UTILITY COMPANIES THAT WERE IDENTIFIED BY UTILITY NOTIFICATION CENTER OF COLORADO (UNCC) AT 811. THESE UTILITIES WERE INDEPENDENTLY VERIFIED AND DESIGN RELIES SUBSTANTIALLY ON THE ACCURACY OF THE INFORMATION PROVIDED BY THE UTILITY COMPANIES AND POTHOLE INFORMATION.
2. THE CONTRACTOR SHALL NOTIFY ALL AFFECTED UTILITIES AT LEAST THREE (3) BUSINESS DAYS, NOT INCLUDING THE ACTUAL DAY OF NOTICE, PRIOR TO COMMENCING SUCH OPERATIONS. THE CONTRACTOR SHALL CONTACT UNCC AT 811, TO HAVE LOCATIONS OF UNCC REGISTERED LINES MARKED BY MEMBER COMPANIES. ALL OTHER UNDERGROUND FACILITIES SHALL BE LOCATED BY CONTACTING THE RESPECTIVE OWNER. UTILITY SERVICE LATERALS SHALL ALSO BE LOCATED PRIOR TO BEGINNING EXCAVATION OR GRADING.
3. LOCATION AND NOTIFICATION OF BOTH UNCC MEMBER AND NON-MEMBER UTILITIES IS THE CONTRACTOR'S RESPONSIBILITY.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING THE LOCATION AND DEPTH OF ALL EXISTING UTILITIES AT PIPES, CULVERTS, CONCRETE BOX CULVERTS AND OTHER AREAS OF EXCAVATION AS NECESSARY TO INSURE THE UTILITIES WILL NOT BE IMPACTED.
5. THE CONTRACTOR SHALL CONDUCT WEEKLY UTILITY MEETINGS, SEPARATE FROM THE PROGRESS MEETINGS, FOR THE PURPOSE OF COORDINATING CONSTRUCTION ACTIVITIES WITH THE UTILITY OWNERS. FREQUENCY OF THE UTILITY MEETINGS MAY BE REVISED WITH THE PRIOR WRITTEN CONSENT OF THE PROJECT ENGINEER. THE CONTRACTOR SHALL PROVIDE MEETING MINUTES AND SHALL PROVIDE, AND PERIODICALLY UPDATE, AN ACCURATE CONSTRUCTION SCHEDULE THAT INCLUDES IDENTIFICATION OF CRITICAL UTILITY IMPACTS THAT COULD IMPACT THE SCHEDULE.
6. THE CONTRACTOR SHALL PROVIDE AT LEAST ONE WEEK NOTICE TO THE APPROPRIATE UTILITY OWNERS FOR ATTENDANCE AT THE NEXT UTILITY COORDINATION MEETING WHEN THE UTILITY OWNERS' FACILITIES MAY BE AFFECTED.
7. ADDITIONAL UTILITY POTHOLING MAY BE NEEDED FOR THIS PROJECT. POTHOLING WILL BE AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHALL CONTACT THE AFFECTED UTILITY COMPANY DIRECTLY AT LEAST THREE BUSINESS DAYS PRIOR TO POTHOLING.

SHEET INDEX

ABBREVIATIONS

@	AT
APPROX	APPROXIMATE
AVE	AVENUE
BLVD	BOULEVARD
℄	CENTERLINE
CSP	CORRUGATED STEEL PIPE
CT	COURT
D_{50}	AVERAGE DIAMETER
DIA, ø	DIAMETER
DR	DRIVE
DS	DOWNSTREAM
E	EAST
EA	EACH
ELEV, EL	ELEVATION
EST	ESTIMATED
EW	EACH WAY
EXIST, EX	EXISTING
FT	FEET
GSB	GROUTED SLOPING BOULDER
H, HORIZ	HORIZONTAL
HERCP	HORIZONTAL ELLIPTICAL REINFORCED PIPE
HGL	HYDRAULIC GRADE LINE
IN	INCHES
MAX	MAXIMUM
MIN	MINIMUM
N	NORTHING
NA	NOT APPLICABLE
NWSWSD	NORTH WASHINGTON STREET WATER AND SANITATION DISTRICT
PGL	PROFILE GRADE LINE
PKWY	PARKWAY
R	RADIUS
RCB	REINFORCED CONCRETE BOX
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
R.O.W.	RIGHT-OF-WAY
RTD	REGIONAL TRANSPORTATION DISTRICT
S	SLOPE, FT./FT.
SAN	SANITARY SEWER
SQ	SQUARE
ST	STREET
STA	STATION
T, TELE	TELEPHONE
TYP	TYPICAL
UPRR	UNION PACIFIC RAILROAD
US	UPSTREAM
V, VERT	VERTICAL
WL	WATER LEVEL

LEGEND

- EXISTING OVERHEAD POLE
- EXISTING SIGN
- CP-1 — EXISTING CONTROL POINT
- NEW TEMPORARY CONTROL POINT
- PROPOSED FENCE
- PROPOSED OVERHEAD UTILITIES
- PROPERTY LINE
- EXISTING FENCE
- SAN — EXISTING SANITARY SEWER
- ST — EXISTING STORM SEWER
- W — EXISTING WATER
- G — EXISTING GAS
- OH — EXISTING OVERHEAD UTILITIES
- FO — EXISTING UNDERGROUND FIBER OPTIC
- E — EXISTING UNDERGROUND ELECTRIC
- T — EXISTING UNDERGROUND TELEPHONE
- TV — EXISTING UNDERGROUND CABLE TV
- 920 — EXISTING INDEX CONTOUR LINE WITH CONTOUR DESIGNATION IN FEET
- EXISTING INTERMEDIATE CONTOUR LINE
- 920 — INDEX CONTOUR LINE WITH CONTOUR DESIGNATION IN FEET
- INTERMEDIATE CONTOUR LINE
- EXISTING FLOWLINE
- CLEARING LIMITS
- EXCAVATION IN EARTH/ROCK

A / C-2 — INDICATES CROSS SECTION LOCATION. "A" REFERS TO THE CROSS SECTION DESIGNATION. "C-2" REFERS TO THE SHEET NUMBER WHERE THE SECTION IS SHOWN. WHEN SHOWN ON THE SECTION, THIS NUMBER REFERS TO THE SHEET NUMBER WHERE THE SECTION IS CUT.

SEE DETAIL 1 / C-2 — INDICATES DETAIL LOCATION. "1" REFERS TO THE DETAIL DESIGNATION. "C-2" REFERS TO THE SHEET NUMBER WHERE THE DETAIL IS INDICATED. WHEN SHOWN ON THE DETAIL, THIS NUMBER REFERS TO THE SHEET NUMBER WHERE THE DETAIL IS SHOWN.

- RIPRAP
- CRUSHER FINES
- CONCRETE/GROUT
- COMPACTED OR UNDISTURBED MATERIAL

COLORADO LICENSED PROFESSIONAL ENGINEER — 41104 — 2/8/17

PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

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2017/02/10 4:44 PM By: Clark, Derek

DESIGNED: D.C. DATE: 2/10/17
DRAWN: S.L.H. DATE: 2/10/17
CHECKED: C.H. DATE: 2/10/17
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URBAN DRAINAGE AND FLOOD CONTROL DISTRICT
UDFCD PROJECT NO. 106266

ADAMS COUNTY COLORADO

LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

GENERAL NOTES, SHEET INDEX, LEGEND AND ABBREVIATIONS

DATE 02/03/2017

DRAWING NO. G-2

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COLORADO
DEPARTMENT OF TRANSPORTATION

M&S STANDARDS PLANS LIST

July 04, 2012

Revised on June 24, 2016

ALL OF THE M&S STANDARD PLANS, AS SUPPLEMENTED AND REVISED, APPLY TO THIS PROJECT WHEN USED BY DESIGNATED PAY ITEM OR SUBSIDIARY ITEM.

NEW OR REVISED STANDARD PLAN SHEETS APPLICABLE TO THIS PROJECT, INDICATED BY A MARKED BOX ■ WILL BE ATTACHED TO THE PLANS.

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PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

COLORADO REGISTERED PROFESSIONAL ENGINEER 41104 2/8/17

DESIGNED: D.C. DATE: 2/10/17
DRAWN: S.L.H. DATE: 2/10/17
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URBAN DRAINAGE AND FLOOD CONTROL DISTRICT
UDFCD PROJECT NO. 106266

ADAMS COUNTY COLORADO

LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

M STANDARDS

DATE 02/03/2017

DRAWING NO. G-3

UTILITY SCHEDULE

KEY NOTE NO.	DRAWING NO.	STATION	OVERHEAD / UNDERGROUND	UTILITY	SIZE	CONFLICT	ACTION	OWNER	CONTACT PERSON	PHONE NUMBER
1	DP-2	0+27	OH	ELECTRIC	THREE PHASE PRIMARY	NO	PROTECT IN PLACE	XCEL	BRANDA SLOAN	303-628-2276
1	DP-2	0+27	OH	TELEPHONE	UNKOWN	NO	PROTECT IN PLACE	CENTURY LINK	MARK IVERSON	303-458-2048
1	DP-2	0+27	OH	TELEVISION	UNKOWN	NO	PROTECT IN PLACE	COMCAST	GLEN NELSON	720-281-8488
2	DP-2, DP-3, DP-4, DP-5	0+27-10+00, 12+82-18+40 RT	OH	ELECTRIC	ONE PHASE PRIMARY, SECONDARY	NO	PROTECT IN PLACE	XCEL	BRANDA SLOAN	303-628-2276
2	DP-2, DP-3, DP-4, DP-5	0+27-10+00, 12+82-18+40 RT	OH	TELEPHONE	UNKOWN	NO	PROTECT IN PLACE	CENTURY LINK	MARK IVERSON	303-458-2048
2	DP-2, DP-3, DP-4, DP-5	0+27-10+00, 12+82-18+40 RT	OH	TELEVISION	UNKOWN	NO	PROTECT IN PLACE	COMCAST	GLEN NELSON	720-281-8488
3	DP-3, DP-4	10+00 TO 12+82	OH	ELECTRIC	THREE PHASE PRIMARY, SECONDARY	NO	PROTECT IN PLACE	XCEL	BRANDA SLOAN	303-628-2276
3	DP-3, DP-4	10+00 TO 12+82	OH	TELEPHONE	UNKOWN	NO	PROTECT IN PLACE	CENTURY LINK	MARK IVERSON	303-458-2048
3	DP-3, DP-4	10+00 TO 12+82	OH	TELEVISION	UNKOWN	NO	PROTECT IN PLACE	COMCAST	GLEN NELSON	720-281-8488
4	DP-4	12+48	UG	WATER	6" DIAM	NO	PROTECT IN PLACE	NORTH WASHINGTON STREET WATER AND SANITATION DISTRICT	JIM JAMSEY	303-288-664
5	DP-5, DP-6, DP-7	18+40 TO 23+98	OH	ELECTRIC	THREE PHASE PRIMARY, SECONDARY	NO	PROTECT IN PLACE	XCEL	BRANDA SLOAN	303-628-2276
5	DP-5, DP-6, DP-7	18+40 TO 23+98	OH	TELEPHONE	UNKOWN	NO	PROTECT IN PLACE	CENTURY LINK	MARK IVERSON	303-458-2048
5	DP-5, DP-6, DP-7	18+40 TO 23+98	OH	TELEVISION	UNKOWN	NO	PROTECT IN PLACE	COMCAST	GLEN NELSON	720-281-8488
6	DP-7, DS-2	25+21	UG	TELEPHONE	UNKOWN	YES	RELOCATE	CENTURY LINK	MARK IVERSON	303-458-2048
7	DP-7, DS-2	25+78	UG	SANITARY	8" DIAM	YES	RELOCATE AS SHOWN	NORTH WASHINGTON STREET WATER AND SANITATION DISTRICT	JIM JAMSEY	303-288-6664
8	DP-7, DS-2	25+62	UG	WATER	8" DIAM	YES	RELOCATE	NORTH WASHINGTON STREET WATER AND SANITATION DISTRICT	JIM JAMSEY	303-288-6664
9	DP-7, DS-2	26+13	UG	TELEPHONE	6 - 2" DIAM FIBER OPTICS	YES	PROTECT IN PLACE	AT&T	TOM JAKSE	720-289-5471
10	DP-7	26+33 TO 27+86, RT	OH	ELECTRIC	THREE PHASE PRIMARY	NO	PROTECT IN PLACE	XCEL	BRANDA SLOAN	303-628-2276
11	DP-7	27+77	OH	ELECTRIC	THREE PHASE PRIMARY, SECONDARY	NO - RTD ROW	PROTECT IN PLACE	XCEL	BRANDA SLOAN	303-628-2276
11	DP-7	27+77	OH	TELEPHONE	UNKOWN	NO - RTD ROW	PROTECT IN PLACE	CENTURY LINK	MARK IVERSON	303-458-2048
11	DP-7	27+77	OH	TELEVISION	UNKOWN	NO - RTD ROW	PROTECT IN PLACE	COMCAST	GLEN NELSON	720-281-8488
12	DP-7, DP-8, DP-9, DP-10, DP-11 DS-3 DS-4, DS-10	27+86 TO 43+13, RT	OH	ELECTRIC	THREE PHASE PRIMARY	YES	RELOCATE	XCEL	BRANDA SLOAN	303-628-2276
12	DP-7, DP-8, DP-9, DP-10, DP-11 DS-3 DS-4, DS-10	27+86 TO 43+13, RT	OH	TELEVISION	UNKOWN	YES	RELOCATE	COMCAST	GLEN NELSON	720-281-8488
13	DP-7	27+86 TO 29+93, RT	UG	TELEVISION	2" DIAM CONDUIT	NO - RTD ROW	PROTECT IN PLACE	COMCAST	GLEN NELSON	720-281-8488
14	DP-7	28+16	UG	TELEPHONE	UNKOWN	NO - RTD ROW	PROTECT IN PLACE	CENTURY LINK	MARK IVERSON	303-458-2048
15	DP-7, DS-3, DS-10	28+30 TO 30+00, RT	UG	TELEPHONE	UNKOWN	NO	PROTECT IN PLACE	CENTURY LINK	MARK IVERSON	303-458-2048
16	DP-7	28+67	UG	FIBER OPTICS	8 - 1.25" DIAM HDPE	NO - RTD ROW	PROTECT IN PLACE	ABOVENET	DANIEL FORD	480-252-6203
17	DP-7	28+86	UG	TELEPHONE	UNKOWN	NO - RTD ROW	PROTECT IN PLACE	CENTURY LINK	MARK IVERSON	303-458-2048
18	DP-7, DS-3, DS-10	27+86 TO 29+93, RT	UG	TELEVISION	2" DIAM CONDUIT	YES	RELOCATE	COMCAST	GLEN NELSON	720-281-8488
19	DP-7, DS-3, DS-10	29+60	UG	WATER	8" DIAM	YES	RELOCATE	NORTH WASHINGTON STREET WATER AND SANITATION DISTRICT	JIM JAMSEY	303-288-6664
20	DP-7	29+71	UG	GAS	6" DIAM	YES	RELOCATE	XCEL	BRANDA SLOAN	303-628-2276
21	DP-7, DP-8, DP-9, DP-10, DP011, DS-3 DS-4, DS-10	29+89 TO 48+14, LT	UG	SANITARY	8" DIAM	NO	PROTECT IN PLACE	CITY OF THORNTON	PETE BREZALL	720-977-6251
22	DP-7, DP-8, DP-9, DP-10, DP-11, DS-3 DS-4, DS-10	29+89 TO 48+14, LT	UG	WATER	12" DIAM	NO	PROTECT IN PLACE	CITY OF THORNTON	PETE BREZALL	720-977-6251
23	DP-8	30+62 RT	UG	ELECTRIC	SINGLE PHASE PRIMARY	YES	RELOCATE	XCEL	BRANDA SLOAN	303-628-2276
24	DP-8	31+18	UG	SANITARY	8" DIAM	YES	ENCASE EXISTING IN AN AERIAL CROSSING	CITY OF THORNTON	PETE BREZALL	720-977-6251
25	DP-8	31+97	UG	WATER	UNKOWN	YES	RELOCATE	CITY OF THORNTON	PETE BREZALL	720-977-6251
26	DP-9	35+33	UG	WATER	UNKOWN	YES	RELOCATE	CITY OF THORNTON	PETE BREZALL	720-977-6251
27	DP-9	36+41	UG	WATER	UNKOWN	YES	RELOCATE & REMOVE MANHOLE	CITY OF THORNTON	PETE BREZALL	720-977-6251
28	DP-9	36+59	UG	ELECTRIC	THREE PHASE PRIMARY	YES	RELOCATE	XCEL	BRANDA SLOAN	303-628-2276
29	DP-10, DS-4	42+91	UG	SANITARY	8" DIAM	YES	ENCASE EXISTING IN AN AERIAL CROSSING	CITY OF THORNTON	PETE BREZALL	720-977-6251
30	DP-10, DS-4	43+55	UG	TELEPHONE	UNKOWN	YES	RELOCATE	CENTURY LINK	MARK IVERSON	303-458-2048
31	DP-10, DP-11, DS-4	43+44 TO 48+14, LT	UG	GAS	16" DIAM	YES	PROTECT IN PLACE	XCEL	BRANDA SLOAN	303-628-2276
32	DP-10	43+66	UG	TELEPHONE	UNKOWN	YES	RELOCATE	CENTURY LINK	MARK IVERSON	303-458-2048
33	DP-11	46+81	UG	WATER	UNKOWN	YES	RELOCATE	CITY OF THORNTON	PETE BREZALL	720-977-6251
34	DP-11	46+97	UG	ELECTRIC	3 - SINGLE PHASE PRIMARY	NO	PROTECT IN PLACE	XCEL	BRANDA SLOAN	303-628-2276
35	DP-8	30+01	UG	SANITARY	4" FORCE MAIN	YES	RELOCATE	NORTH WASHINGTON STREET WATER AND SANITATION DISTRICT	JIM JAMSEY	303-288-6664

- IN PHASE 1

- IN PHASE 2 OR 3

PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

DESIGNED: D.C.	DATE: 2/10/17
DRAWN: S.L.H.	DATE: 2/10/17
CHECKED: C.H.	DATE: 2/10/17
REVISED:	DATE:
REVISED:	DATE:
REVISED:	DATE:

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URBAN DRAINAGE AND FLOOD CONTROL DISTRICT
UDFCD PROJECT NO. 106266

ADAMS COUNTY COLORADO

LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

UTILITY CONTACT INFORMATION

DATE 02/03/2017

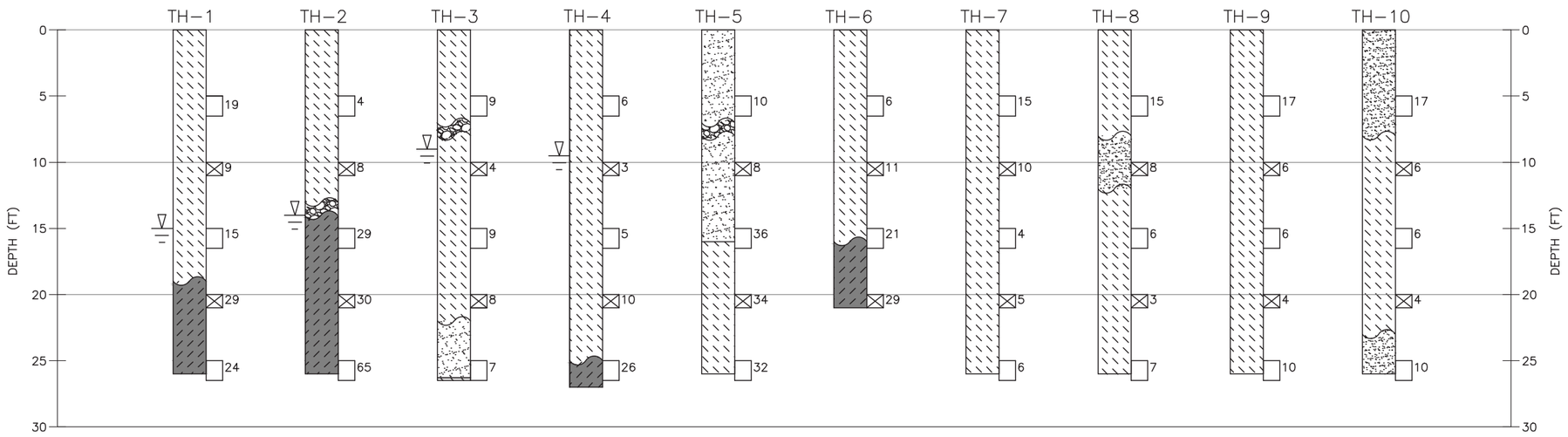
DRAWING NO. U-1

LEGEND

- CLAY, SOFT TO VERY STIFF, SLIGHTLY SANDY TO VERY SANDY, MEDIUM TO HIGH PLASTICITY, DRY TO WET, BROWN (CH, CL)
- GRAVEL (SEE NOTE 1)
- SANDY, CLAYEY, SILTY, VERY LOOSE TO MEDIUM DENSE, FINE TO MEDIUM, DRY TO WET, BROWN TO TAN, (SC)
- CLAYSTONE, VERY STIFF TO HARD, MODERATELY TO HIGHLY WEATHERED, DARK GRAY TO BROWN (BEDROCK)
- TH-1 — INDICATES TEST HOLE LOCATION AND NUMBER
- 9 — BLOW COUNT (BLOWS/ft) AND MODIFIED CALIFORNIA SAMPLE
- 19 — BLOW COUNT (BLOWS/ft) AND SPT SAMPLE
- APPROXIMATE GROUNDWATER LEVEL MEASURED AT THE TIME OF DRILLING
- INDICATES GRADUAL CHANGE IN MATERIALS, EXACT STRATA CHANGE NOT LOCATED

NOTES:

1. GRAVEL LAYERS ENCOUNTERED DURING DRILLING WERE IDENTIFIED FROM AUGER CUTTINGS AT THE SURFACE OF THE TEST HOLES. A DETAILED DESCRIPTION OF THE MATERIAL IS NOT AVAILABLE.
2. TEST HOLES TH–1, TH–3, AND TH–4 WERE DRILLED ON 06/10/10. TEST HOLES TH–2 AND TH–5 THROUGH TH–10 WERE DRILLED ON 06/30/10.
3. SUMMARY LOGS ARE SUBJECT TO LIMITATIONS, EXPLANATIONS, AND CONCLUSIONS OF STANDARD PRACTICES.
4. THESE TEST HOLES AND TEST PIT LOGS SUMMARIZE FINDINGS USED IN FORMULATING THE DESIGN THAT IS CURRENTLY BEING DEVELOPED. THE EXPLORATIONS WERE NOT MADE TO DEFINE CONDITIONS FOR CONSTRUCTION NOR IS THE INFORMATION PRESENTED HEREIN FOR THAT PURPOSE. ADDITIONAL BORING LOGS BY YEH WILL PROVIDE CONSTRUCTION INFORMATION.



PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

DESIGNED: D.C. DATE: 2/10/17
DRAWN: S.L.H. DATE: 2/10/17
CHECKED: C.H. DATE: 2/10/17
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UDFCD PROJECT NO. 106266

ADAMS COUNTY COLORADO

LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

PRELIMINARY BORING LOGS

DATE 02/03/2017

DRAWING NO. B-1

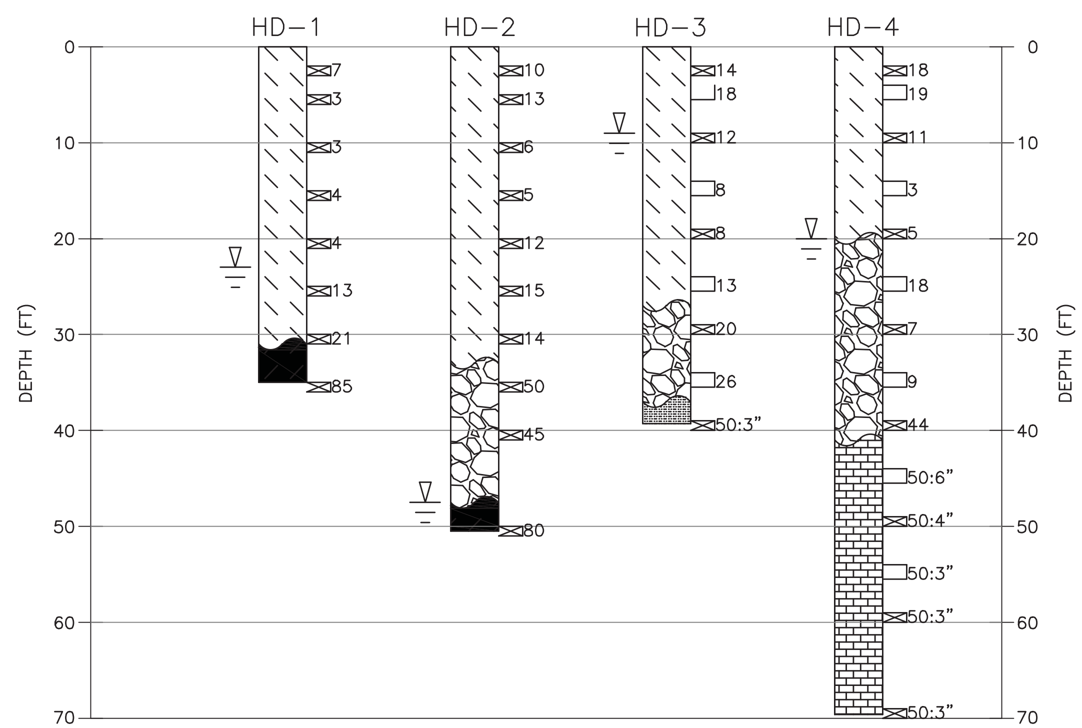
COLORADO REGISTERED PROFESSIONAL ENGINEER 41104 2/8/17

LEGEND

- SANDY CLAY WITH OCCASIONAL LAYERS OF SAND AND SILTY SAND, TAN TO BROWN, MOIST TO WET, MEDIUM STIFF TO STIFF. (CL, CH)
- GRAVELLY SAND WITH OCCASIONAL SANDY CLAY LAYERS, BROWN, DAMP TO WET, MEDIUM DENSE TO DENSE.
- SANDY, CLAYEY, SILTY, VERY LOOSE TO MEDIUM DENSE, FINE TO MEDIUM, DRY TO WET, BROWN TO TAN, (SC)
- SANDSTONE, BROWN, VERY HARD, POORLY CEMENTED.
- SANDY CLAYSTONE, GRAY AND BROWN WITH RUST, VERY HARD.
- WEATHERED CLAYSTONE, BLUE/GRAY TO BROWN, FIRM TO VERY HARD
- HD-1 INDICATES TEST HOLE LOCATION AND NUMBER
- 9 BLOW COUNT (BLOWS/ft) AND MODIFIED CALIFORNIA SAMPLE
- 19 BLOW COUNT (BLOWS/ft) AND SPT SAMPLE
- APPROXIMATE GROUNDWATER LEVEL MEASURED AT THE TIME OF DRILLING
- INDICATES GRADUAL CHANGE IN MATERIALS, EXACT STRATA CHANGE NOT LOCATED

NOTES:

1. GRAVEL LAYERS ENCOUNTERED DURING DRILLING WERE IDENTIFIED FROM AUGER CUTTINGS AT THE SURFACE OF THE TEST HOLES. A DETAILED DESCRIPTION OF THE MATERIAL IS NOT AVAILABLE.
2. SUMMARY LOGS ARE SUBJECT TO LIMITATIONS, EXPLANATIONS, AND CONCLUSIONS OF STANDARD PRACTICES.
3. THESE TEST HOLES AND TEST PIT LOGS SUMMARIZE FINDINGS USED IN FORMULATING THE DESIGN THAT IS CURRENTLY BEING DEVELOPED. THE EXPLORATIONS WERE NOT MADE TO DEFINE CONDITIONS FOR CONSTRUCTION NOR IS THE INFORMATION PRESENTED HEREIN FOR THAT PURPOSE. ADDITIONAL BORING LOGS BY YEH WILL PROVIDE CONSTRUCTION INFORMATION.



PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

DESIGNED: D.C.	DATE: 2/10/17		
DRAWN: S.L.H.	DATE: 2/10/17		
CHECKED: C.H.	DATE: 2/10/17		
REVISED:	DATE:		
REVISED:	DATE:		
REVISED:	DATE:		

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UDFCD PROJECT NO. 106266

ADAMS COUNTY COLORADO

LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

FINAL BORING LOGS

DATE 02/03/2017

DRAWING NO. B-2

COLORADO LICENSED PROFESSIONAL ENGINEER 41104 2/8/17

MONUMENT LEGEND

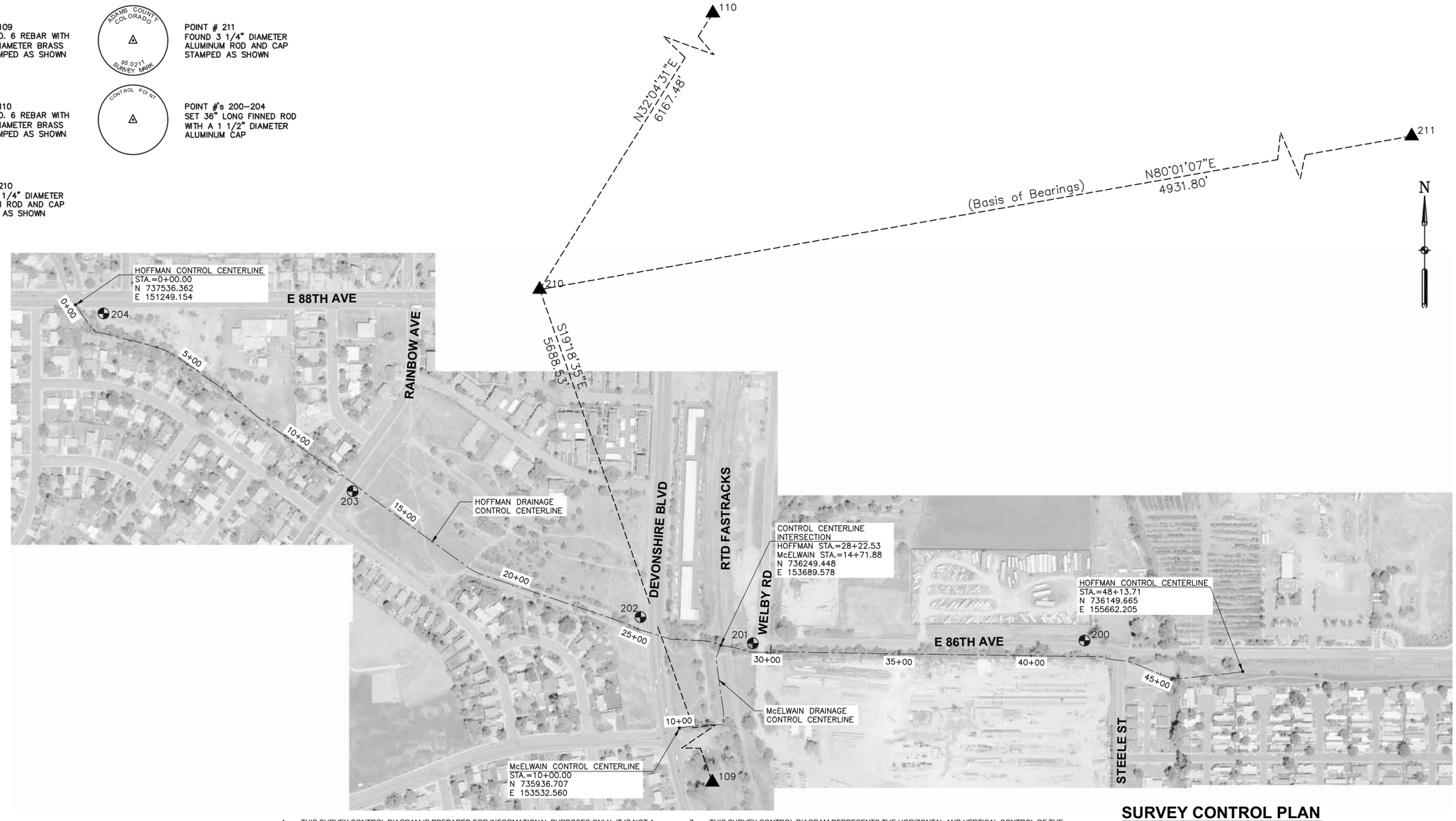
POINT # 109
FOUND NO. 6 REBAR WITH 3 1/4" DIAMETER BRASS CAP STAMPED AS SHOWN

POINT # 110
FOUND NO. 6 REBAR WITH 3 1/4" DIAMETER BRASS CAP STAMPED AS SHOWN

POINT # 210
FOUND 3 1/4" DIAMETER ALUMINUM ROD AND CAP STAMPED AS SHOWN

POINT # 211
FOUND 3 1/4" DIAMETER ALUMINUM ROD AND CAP STAMPED AS SHOWN

POINT #'s 200–204
SET 36" LONG FINNED ROD WITH A 1 1/2" DIAMETER ALUMINUM CAP



SURVEY CONTROL PLAN

0 200 400 600
SCALE IN FEET

NOTES:

1. BASIS OF BEARINGS: BEARINGS USED IN THE CALCULATION ARE BASED ON A GRID BEARING OF N 80°01'07" E BETWEEN THE ADAMS COUNTY CONTROL POINT NUMBERS 0210 AND 0211 AS SHOWN HEREON.
2. BASIS OF ELEVATION: PROJECT ELEVATIONS ARE BASED ON POINT NO. 109 OF THE RTD FASTRACKS GOLD LINE/NORTH METRO CORRIDORS PRIMARY CONTROL NETWORK ESTABLISHED BY JACOBS IN SEPTEMBER OF 2007. THE NAVD 88 ELEVATION OF POINT 109 IS 5120.56 FEET.
3. COORDINATE DATUM: COORDINATES ON THIS PROJECT ARE FOR THE EXCLUSIVE USE OF ADAMS COUNTY AND URBAN DRAINAGE FLOOD CONTROL DISTRICT AND ARE CONSIDERED PROJECT COORDINATES ONLY. THE PROJECT COORDINATES ARE BASED ON THE ADAMS COUNTY CONTROL NETWORK WHICH IS MODIFIED COLORADO STATE PLANE CENTRAL ZONE NAD '83, U.S. SURVEY FEET. THE PUBLISHED COMBINED FACTOR FOR THE ADAMS COUTNY CONTROL NETWORK IS 0.99979199. THE MODIFIED COORDINATES EQUALS STATE PLANE VALUES / COMBINED FACTOR THEN SUBTRACT 1,000000 FROM THE NORTHING AND 3,000,000 FROM THE EASTING.
4. THIS SURVEY CONTROL DIAGRAM IS PREPARED FOR INFORMATIONAL PURPOSES ONLY. IT IS NOT A BOUNDARY SURVEY, LAND SURVEY PLAT, OR RIGHT OF WAY PLAT. NO EVALUATION HAS BEEN DONE TO DETERMINE THE INTEGRITY OF THE POSITIONS OF THE FOUND MONUMENT. TITLE POLICY, TITLE COMMITMENT AND TITLE RESEARCH WERE NOT A PART OF THIS SURVEY, THEREFORE EASEMENTS, RIGHTS AND RESTRICTIONS OF RECORD WERE NOT RESEARCHED AND ARE NOT SHOWN ON THIS DIAGRAM.
5. NOTICE: ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT. IN NO EVENT MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF THE STATEMENT SHOWN HEREON.
6. NO GUARANTEE AS TO THE ACCURACY OF THE INFORMATION CONTAINED ON THE ATTACHED DRAWING IS EITHER STATED OR IMPLIED UNLESS THIS COPY BEARS AN ORIGINAL SIGNATURE OF THE PROFESSIONAL LAND SURVEYOR HEREON NAMED.
7. THIS SURVEY CONTROL DIAGRAM REPRESENTS THE HORIZONTAL AND VERTICAL CONTROL OF THE PROJECT ESTABLISHED BY URS DURING A FIELD SURVEY CONDUCTED IN MARCH OF 2010. IT IS POSSIBLE THAT SOME OF THE SURVEY CONTROL MONUMENTS LISTED HAVE BEEN DISTURBED OR OBLITERATED. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THE EXISTENCE AND STABILITY OF THE CONTROL MONUMENTS.
8. REFERENCE DRAWINGS DP-2 THROUGH DP-11 FOR DETAILED CONTROL CENTERLINE COORDINATES FOR THE HOFFMAN DRAINAGE AND DP-12 FOR DETAILED CONTROL CENTERLINE COORDINATES FOR McELWAIN DRAINAGE.

POINT #	NORTHING	EASTING	ELEVATION	LATITUDE	LONGITUDE	HEIGHT	SPC NORTHING	SPC EASTING
109	732225.379	154885.725	5120.56	39°50'29.40068"N	104°57'02.79359"W	5120.53	1731865.059	3154229.477
110	742819.917	156279.828	5186.48	39°52'13.99239"N	104°56'44.09678"W	5186.27	1742457.394	3155623.290
200	736266.935	155064.631	5132.53	39°51'09.32122"N	104°57'00.18698"W	5132.47	1735905.775	3154408.346
201	736256.531	153810.937	5153.84	39°51'09.29311"N	104°57'16.25883"W	5153.84	1735895.373	3153154.912
202	736355.313	153386.510	5163.18	39°51'10.29424"N	104°57'21.69195"W	5163.18	1735994.134	3152730.574
203	736831.463	152297.812	5176.10	39°51'15.06284"N	104°57'35.61169"W	5176.13	1736470.185	3151642.102
204	737503.752	151355.562	5195.97	39°51'21.76033"N	104°57'47.63970"W	5196.05	1737142.334	3150700.049
210	737593.905	153004.683	5189.92	39°51'22.55425"N	104°57'26.49176"W	5189.92	1737232.468	3152348.826
211	738448.733	157861.832	5096.57	39°51'30.70884"N	104°56'24.15743"W	5038.83	1738087.119	3157204.965

PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

DESIGNED: D.C. DATE: 2/10/17
DRAWN: S.L.H. DATE: 2/10/17
CHECKED: C.H. DATE: 2/10/17
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UDFCD PROJECT NO. 106266

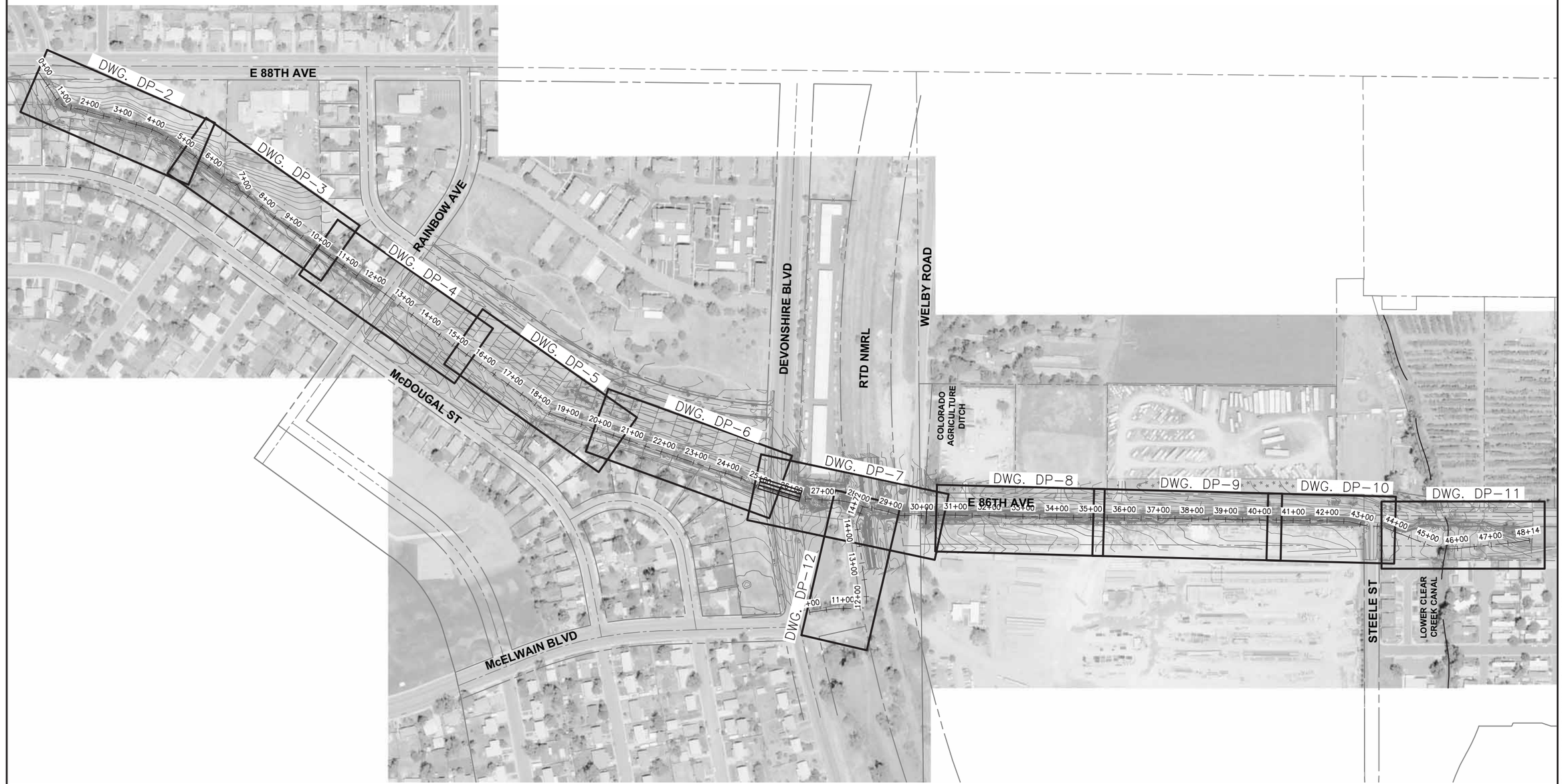
ADAMS COUNTY COLORADO

LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

SURVEY CONTROL PLAN

DATE 02/03/2017

DRAWING NO. V-5



PLAN AND PROFILE KEYMAP

0 150 300 450
SCALE IN FEET

N

PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

COLORADO LICENSED
Mark
41104
2/8/17
PROFESSIONAL ENGINEER

DESIGNED: D.C. DATE: 2/10/17
DRAWN: S.L.H. DATE: 2/10/17
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ADAMS COUNTY COLORADO

LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

PLAN AND PROFILE KEY MAP

DATE 02/03/2017

DRAWING NO. DP-1

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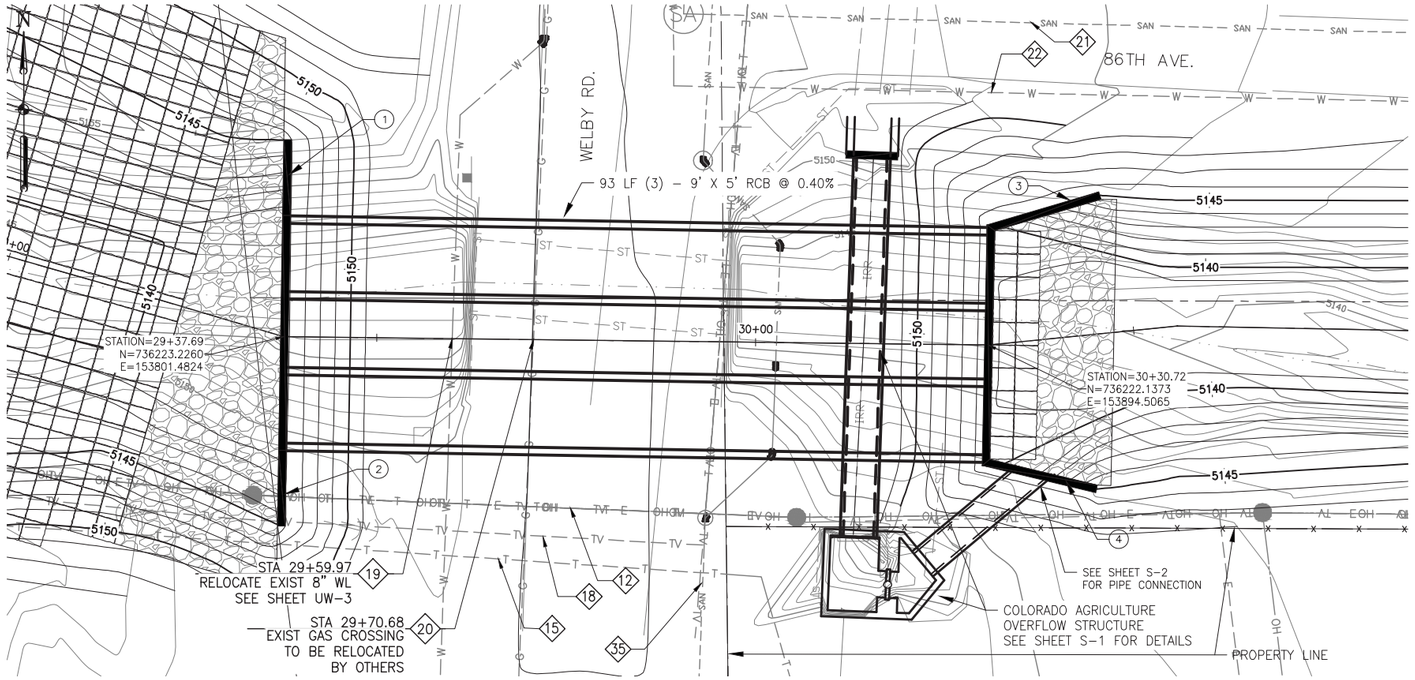
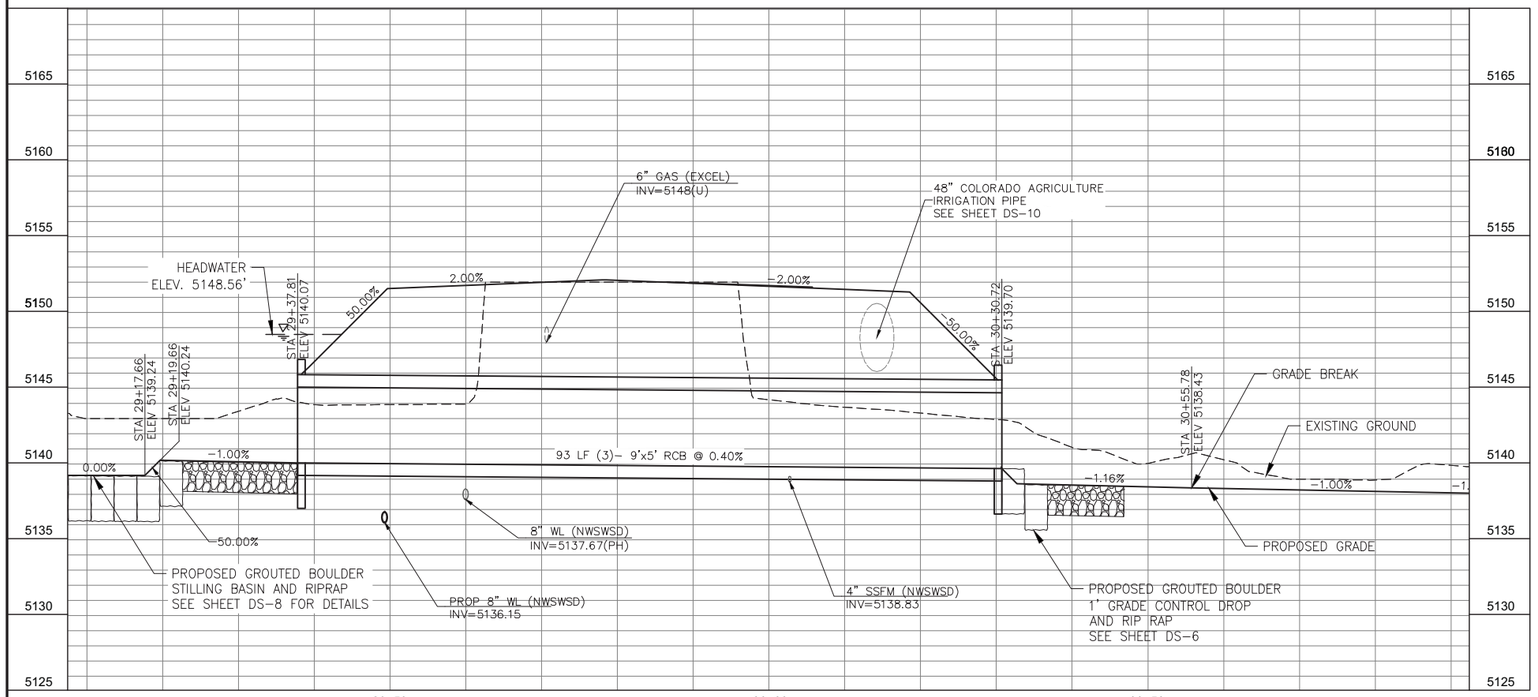
2017/02/10 1:45:4 PM By: Clark, Derek





GENERAL NOTES

1. LOCATION OF UTILITIES SHOWN ARE APPROXIMATE ONLY. CONTRACTOR TO VERIFY HORIZONTAL AND VERTICAL LOCATIONS OF ALL UTILITIES PRIOR TO CONSTRUCTION.
2. REMOVE EXISTING 10' X 7' CONCRETE BOX CULVERT.
3. BOX CULVERT DESIGN PER CURRENT CDOT M-603-3
4. BEDDING PER CDOT M-206-1
5. TOE WALL ON ALL WINGWALLS PER CDOT M-601-20.
6. WETLAND IMPACTS PER UASCE PERMIT NWO-2016-01763-DEN

SUBGRADE TREATMENT

1. SUBGRADE TREATMENT IS PER YEH AND ASSOCIATES PROJECT NO. 216-444 GEOTECHNICAL REPORT DATED DECEMBER 2, 2016.
2. THE CBCS AND SHALLOW FOUNDATIONS SHOULD BE PROTECTED FROM FROST ACTION. THE MINIMUM EMBEDMENT DEPTH BELOW ADJACENT EXTERIOR GRADE SHOULD BE AT LEAST 3 FEET.
3. FOUNDATION SOILS IN THE TREATMENT AREA BENEATH CBCS SHOULD BE FREE OF ALL ORGANICS, TOPSOIL, DEBRIS, AND LOOSE, SOFT, OR WET MATERIAL.
4. ANY PONDING WATER SHOULD BE DRAINED FROM THE AREA PRIOR TO CONSTRUCTION BEGINNING, TO ALLOW CONSTRUCTION IN A DRY ENVIRONMENT.
5. IF RUBBLE, CONCRETE, OR ASPHALT DEBRIS LARGER THAN 3 INCHES IN EQUIVALENT DIAMETER ARE ENCOUNTERED, THEY SHOULD BE REMOVED.
6. THE SUBGRADE TREATMENT MAY CONSIST OF:
   - A. AT A MINIMUM, EXCAVATING TO A DEPTH OF 12 INCHES AND SCARIFYING THE EXPOSED MATERIALS TO A DEPTH OF 6 INCHES. THE EXCAVATED AND SCARIFIED MATERIAL SHALL BE MOISTURE CONDITIONED AND COMPACTED. THE SCARIFIED MATERIAL AND THE REPLACED MATERIAL SHOULD BE COMPACTED TO 95 PERCENT OF STANDARD PROCTOR MAXIMUM DRY DENSITY (AASHTO T99) AT A MOISTURE CONTENT WITHIN 2 PERCENT OF OPTIMUM.
   - B. A 12 INCH, OR THICKER, STABILIZING LAYER OF CDOT CLASS 1 STRUCTURAL BACKFILL OR SIMILAR GRANULAR MATERIAL SHOULD BE PLACED BENEATH THE CBC, TO PROVIDE A STABILIZING LAYER OVER THE WEAKER FOUNDATION SOILS IF NECESSARY. THE MATERIALS SHOULD BE COMPACTED TO 95 PERCENT OF STANDARD PROCTOR MAXIMUM DRY DENSITY (AASHTO T99) AT A MOISTURE CONTENT WITHIN 2 PERCENT OF OPTIMUM.
   - C. A CDOT CLASS A SEPARATOR GEOTEXTILE LAYER SHOULD BE USED NEAR THE BOTTOM OF THE CDOT CLASS 1 STRUCTURE BACKFILL TO PROVIDE ADDITIONAL STABILIZING SUPPORT. IF ONE LAYER IS NOT ENOUGH, MULTIPLE LAYERS ARE RECOMMENDED TO BE USED, SPACED AT 4 INCHES AS NECESSARY.
   - D. A THICKER STABILIZING LAYER OF CDOT CLASS 1 STRUCTURAL BACKFILL OR SIMILAR GRANULAR MATERIAL CAN BE USED INSTEAD OF THE GEOSYNTHETIC REINFORCEMENT, IF IT IS MORE COST EFFECTIVE TO CONSTRUCT.
   - E. THE CONTRACTOR MAY ELECT TO USE OTHER METHODS TO PROVIDE SUBGRADE STABILIZATION, DEPENDING ON THE MEANS AND METHODS CHOSEN, PROVIDED THE SUBGRADE SOILS PASS THE PROOF ROLL SATISFACTORILY. (SEE NOTE 8)
7. THE SUBGRADE TREATMENT ZONE SHOULD EXTEND AT LEAST ONE (1) FOOT FROM THE EDGES OF THE FOUNDATION OR CBC.
8. THE SUBGRADE SOILS AT THE SURFACE OF THE TREATED ZONE SHOULD BE VISUALLY INSPECTED AND PROOF ROLLED. AREAS WHICH DEFORM NON-UNIFORMLY UNDER THE PROOF SHOULD BE REMOVED, REPLACED, AND RECOMPACTED PRIOR TO CBC CONSTRUCTION.

WINGWALL LAYOUT TABLE

WINGWALL ID	e	k (FT.)	m (FT.)	L (FT.)
①	0'	6.5	6.5	10
②	0'	6.5	6.5	10
③	75'	6.5	6.5	15
④	75'	6.5	6.5	15

CULVERT HYDRAULIC CALCULATIONS

FLOW (Q)	1252 CFS
VELOCITY (V)	9.27 FT/SEC

0 10' 20'
HORIZONTAL SCALE IN FEET
1' CONTOUR INTERVAL
0 5' 10'
VERTICAL SCALE IN FEET

COLORADO LICENSED 41104 2/8/17 PROFESSIONAL ENGINEER

PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

DESIGNED: D.C. DATE: 2/10/17
DRAWN: SLH DATE: 2/10/17
CHECKED: C.H. DATE: 2/10/17
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UDFCD PROJECT NO. 106266

ADAMS COUNTY COLORADO

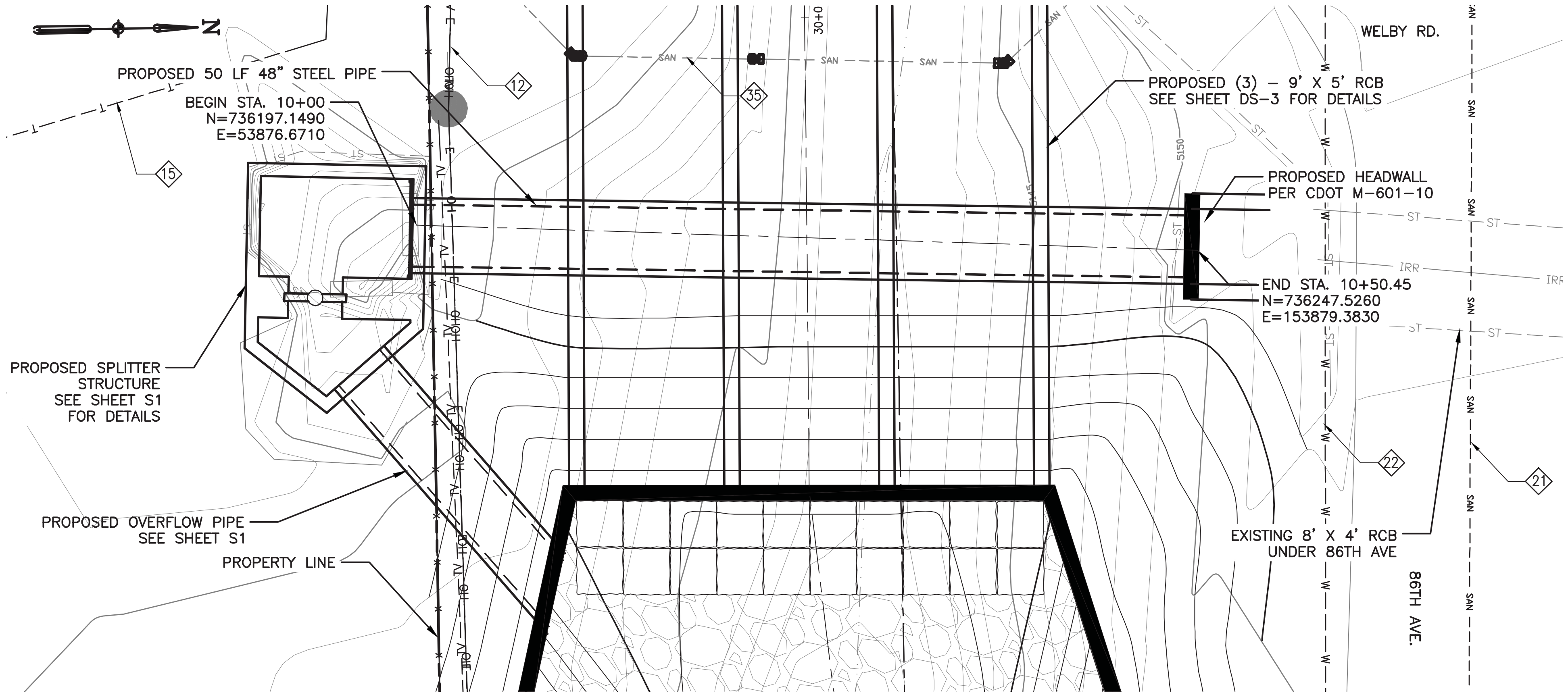
LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

WELBY BOX CULVERT PLAN AND PROFILE

DATE 02/03/2017

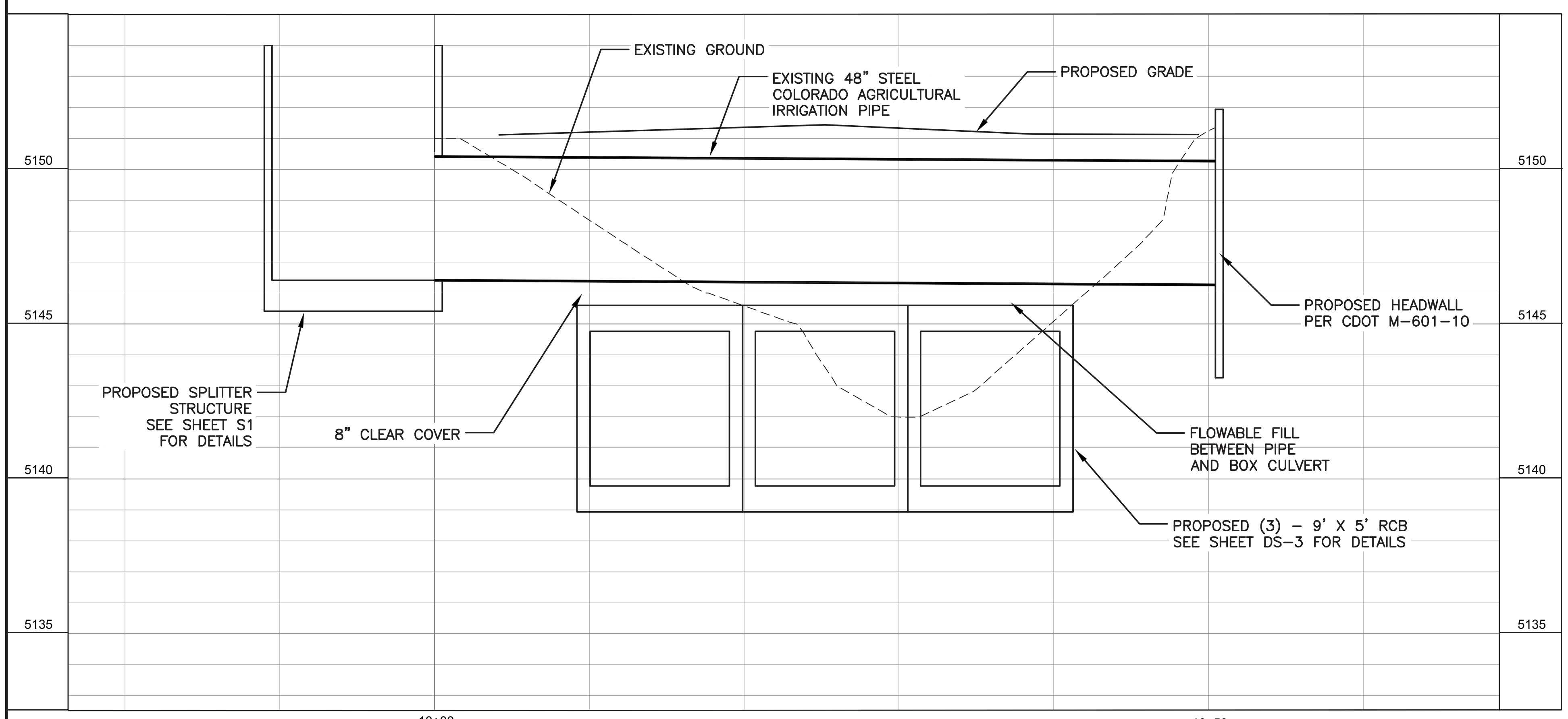
DRAWING NO. DS-3

U:\1876\8719-Hoffman_Design\drawings\Current\civil\4-8719-DS-1-3-4-boxculverts.dwg
2017/02/10 5:10 PM By: Clark, Derek



GENERAL NOTES

1. IMPROVEMENTS SHOWN FOR THE COLORADO AGRICULTURE DITCH STRUCTURE ARE ONLY REQUIRED IF EXISTING STRUCTURE CANNOT BE MAINTAINED DURING CONSTRUCTION OF THE WELBY ROAD BOX CULVERT.
2. IF NEEDED, REMOVE EXISTING 48" STEEL PIPE AND HEADWALLS.
3. LOCATIONS OF UTILITIES SHOWN ARE APPROXIMATE ONLY. CONTRACTOR TO VERIFY HORIZONTAL AND VERTICAL LOCATIONS OF ALL UTILITIES PRIOR TO CONSTRUCTION.



0 5' 10'
HORIZONTAL SCALE IN FEET
1' CONTOUR INTERVAL
0 2.5' 5'
VERTICAL SCALE IN FEET

PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

DESIGNED: D.C.	DATE: 2/10/17
DRAWN: S.L.H.	DATE: 2/10/17
CHECKED: C.H.	DATE: 2/10/17
REVISED:	DATE:
REVISED:	DATE:
REVISED:	DATE:

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URBAN DRAINAGE AND FLOOD CONTROL DISTRICT
UDFCD PROJECT NO. 106266

ADAMS COUNTY COLORADO

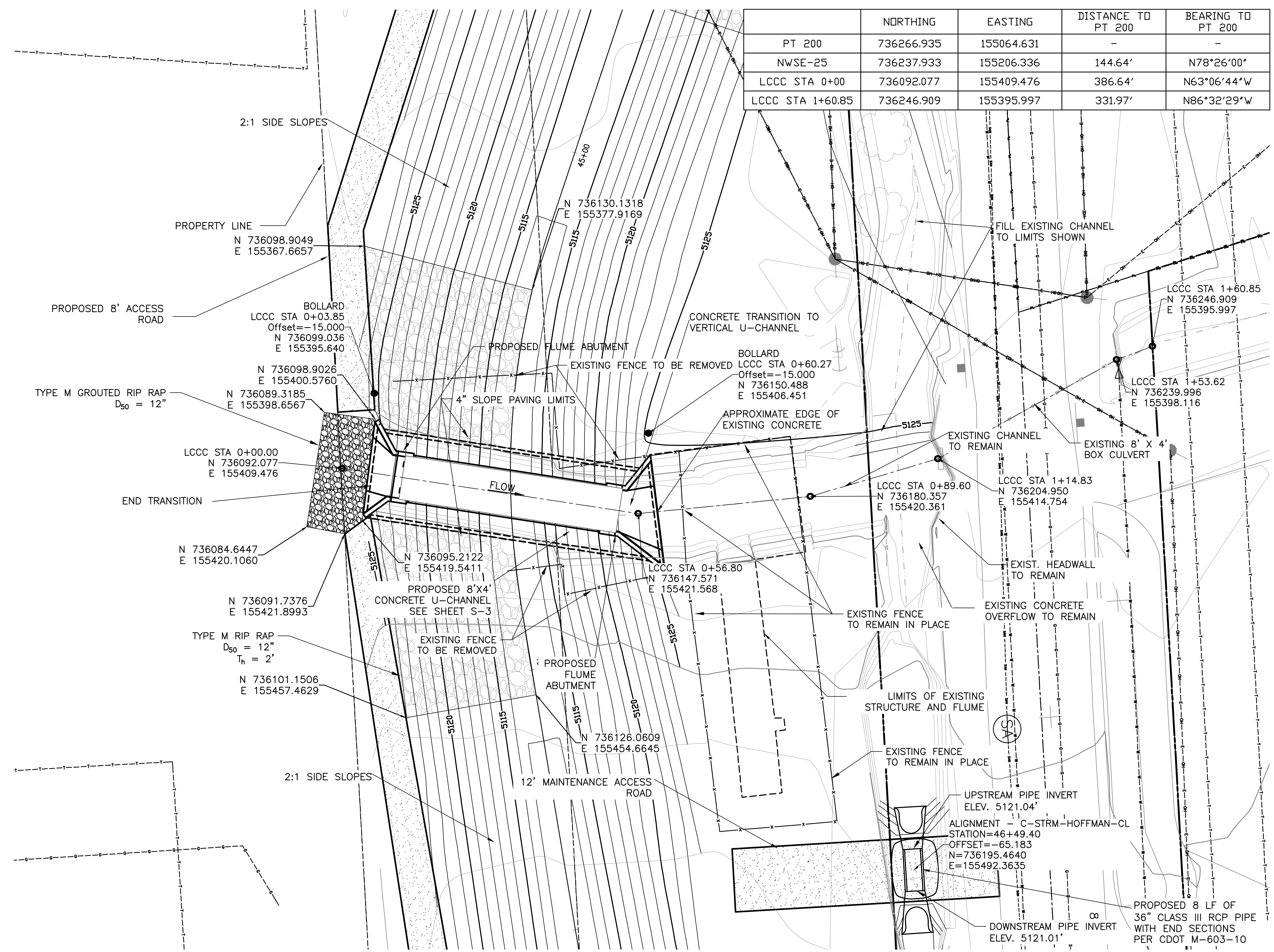
LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

COLORADO AGRICULTURAL DITCH OVERFLOW STRUCTURE PLAN AND PROFILE

DATE 02/03/2017

DRAWING NO. DS-10

	NORTHING	EASTING	DISTANCE TO PT 200	BEARING TO PT 200
PT 200	736266.935	155064.631	-	-
NWSE-25	736237.933	155206.336	144.64'	N78°26'00"
LCCC STA 0+00	736092.077	155409.476	386.64'	N63°06'44"W
LCCC STA 1+60.85	736246.909	155395.997	331.97'	N86°32'29"W



OPEN CHANNEL PLAN – LOWER CLEAR CREEK CANAL

0 10 20 30
SCALE IN FEET

GENERAL NOTES

1. IMPROVEMENTS SHOWN FOR THE COLORADO AGRICULTURE DITCH STRUCTURE ARE ONLY REQUIRED IF EXISTING STRUCTURE CANNOT BE MAINTAINED DURING CONSTRUCTION OF THE WELBY ROAD BOX CULVERT.
2. IF NEEDED, REMOVE EXISTING 48" STEEL PIPE AND HEADWALLS.
3. LOCATIONS OF UTILITIES SHOWN ARE APPROXIMATE ONLY. CONTRACTOR TO VERIFY HORIZONTAL AND VERTICAL LOCATIONS OF ALL UTILITIES PRIOR TO CONSTRUCTION.
4. REFERENCE SHEET V-5 FOR PT 200 CONTROL POINT INFORMATION

DESCRIPTION OF CENTERLINE(S) BY/FOR INSTALLATION OF DRAINAGE

AN EASEMENT(S) BY/FOR INSTALLATION AND MAINTENANCE OF SURFACE AND UNDERGROUND DRAINAGE IMPROVEMENTS/STRUCTURES, AS THEY PERTAIN TO LOWER CLEAR CREEK CANAL, AS FOLLOWS:

LOWER CLEAR CREEK CANAL:

BEING THAT/THOSE PORTIONS OF THE NORTHWEST QUARTER OF THE SOUTHEAST QUARTER AND THE SOUTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 25, TOWNSHIP 2 SOUTH, RANGE 68 WEST OF THE 6TH P.M., COUNTY OF ADAMS, STATE OF COLORADO, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

CONSIDERING THE SOUTH LINE OF THE NORTHWEST QUARTER OF SAID SECTION 25 AS BEARING AN ASSUMED SOUTH 89°39'23" EAST, AND WITH ALL BEARINGS CONTAINED HEREIN LYING RELATIVE THERETO:

COMMENCING FROM THE NORTHWEST CORNER OF THE SOUTHEAST QUARTER OF SAID SECTION 25; THENCE SOUTH 54°19'17" EAST, A DISTANCE OF 250.08 FEET TO THE TRUE POINT OF BEGINNING; THENCE NORTH 12°17'33" EAST, A DISTANCE OF 56.80 FEET; THENCE NORTH 02°06'30" WEST, A DISTANCE OF 32.81 FEET; THENCE NORTH 12°50'36" WEST, A DISTANCE OF 25.22 FEET; THENCE NORTH 25°23'45" WEST, A DISTANCE OF 38.79 FEET; THENCE NORTH 17°02'30" WEST, A DISTANCE OF 7.23 FEET TO THE POINT OF TERMINUS.

COLORADO LICENSED PROFESSIONAL ENGINEER 41104 3/9/17

PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

DESIGNED: D.C.	DATE: 2/10/17		
DRAWN: S.L.H.	DATE: 2/10/17		
CHECKED: C.H.	DATE: 2/10/17		
REVISED:	DATE:		
REVISED:	DATE:		
REVISED:	DATE:		

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UDFCD PROJECT NO. 106266

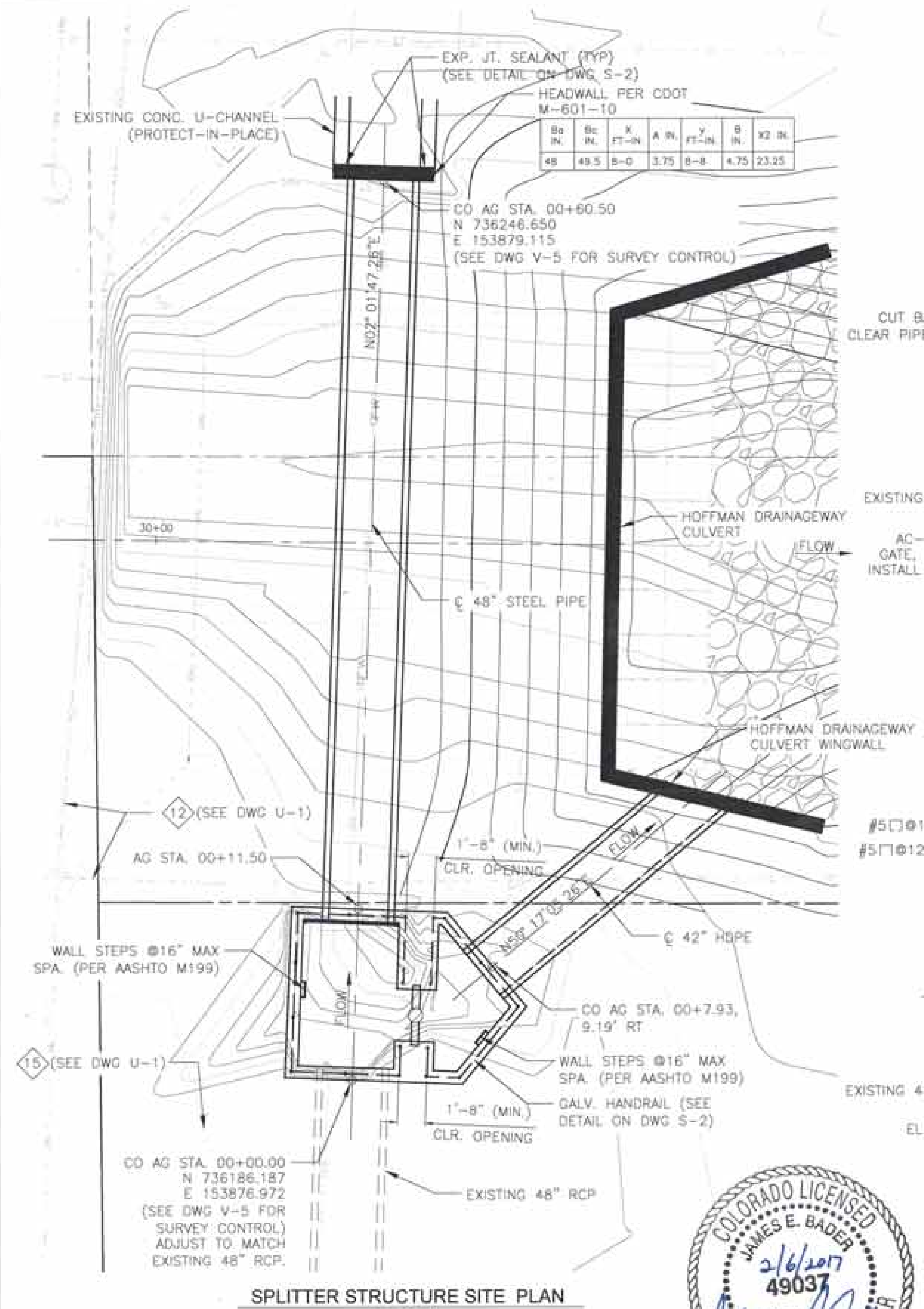
ADAMS COUNTY COLORADO

LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

LOWER CLEAR CREEK CANAL STRUCTURE PLAN

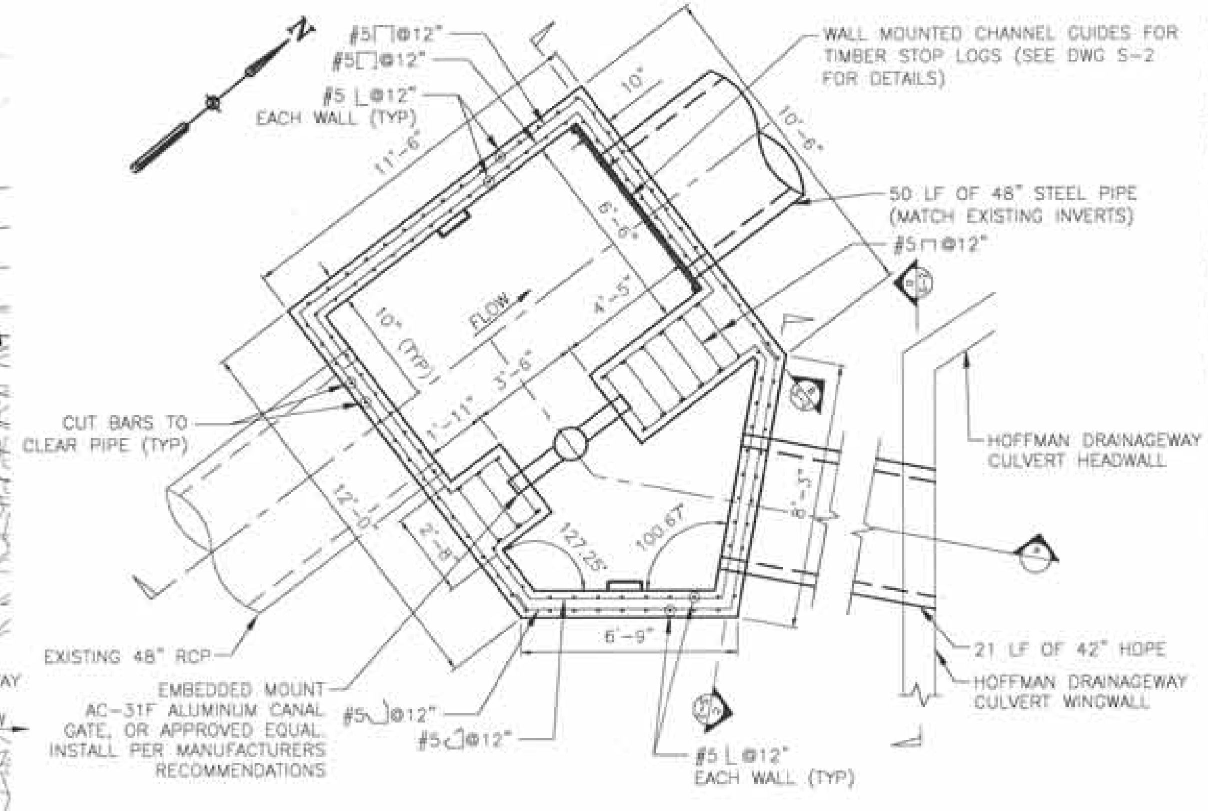
DATE 02/03/2017

DRAWING NO. DS-11



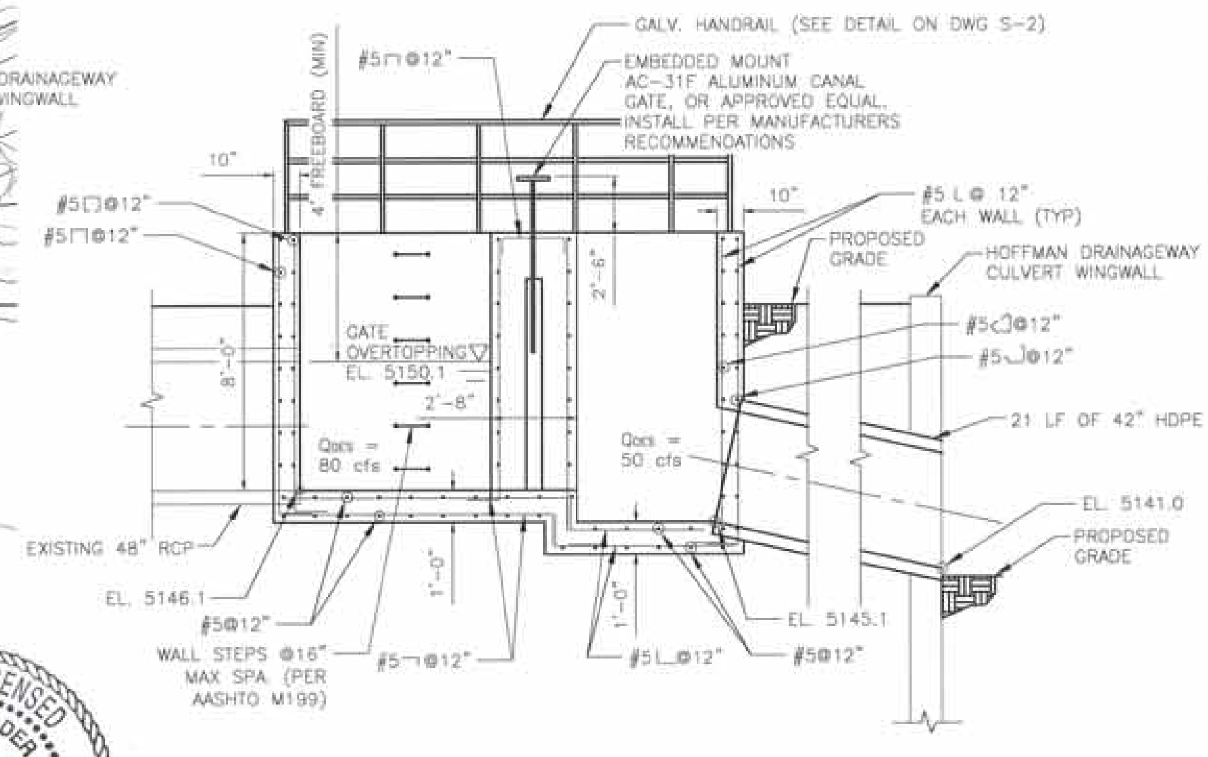
SPLITTER STRUCTURE SITE PLAN

1" = 10'-0"



SPLITTER STRUCTURE PLAN

1" = 6'-0"



(A) SPLITTER STRUCTURE SECTION

1" = 6'-0"

GENERAL NOTES:

THE DETAILS SHOWN ON DWG S-1 AND S-2 ARE OPTIONAL DESIGNS INTENDED FOR USE IF EXISTING FACILITIES CANNOT BE PROTECTED IN PLACE DURING CONSTRUCTION.

SPECIFICATIONS:

DESIGN IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS 7TH ED. 2016

TECHNICAL SPECIFICATIONS IN ACCORDANCE WITH COLORADO DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION

DESIGN METHOD:

LOAD AND RESISTANCE FACTOR DESIGN

GEOTECHNICAL:

SEE FINAL GEOTECHNICAL ENGINEERING REPORT TITLED "LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS" FOR FOUNDATION DESIGN AND INSTALLATION PARAMETERS, LABORATORY DATA AND SOIL CHARACTERISTICS.

WORKMANSHIP:

ALL WORK REQUIREMENTS SHOWN ON THESE DRAWINGS SHALL BE ACCOMPLISHED AS SPECIFIED IN THE PROJECT SPECIFICATIONS WITH ASSOCIATED SPECIAL PROVISIONS.

THE INFORMATION SHOWN ON THESE PLANS CONCERNING THE TYPE AND LOCATION OF EXISTING UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UNDERGROUND UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. THE CONTRACTOR SHALL CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO AT 1-800-922-1987 AT LEAST 3 DAYS (NOT INCLUDING THE DAY OF NOTIFICATION) PRIOR TO ANY EXCAVATION OR OTHER EARTHWORK.

STATIONS, EXISTING ELEVATIONS AND DIMENSIONS CONTAINED IN THESE PLANS ARE CALCULATED FROM A RECENT FIELD SURVEY. THE CONTRACTOR SHALL VERIFY ALL DEPENDENT DIMENSIONS IN THE FIELD BEFORE ORDERING OR FABRICATING ANY MATERIAL.

ALL PLAN DIMENSIONS ARE TRUE HORIZONTAL. THE CONTRACTOR AND/OR FABRICATOR IS RESPONSIBLE FOR INCORPORATING OTHER EFFECTS THAT MAY IMPACT THE FINAL DIMENSIONS AND/OR DETAILING.

PIPE

48" STEEL PIPE SHALL CONFORM TO ASTM A139, GRADE B W/ ¾" MIN. WALL THICKNESS. Fy=36KSI. LINE THE INTERIOR OF THE STEEL PIPE WITH 16-20 MILS SHERPLATE PW EPOXY OR APPROVED EQUAL. COAT THE EXTERIOR OF THE STEEL PIPE WITH TWO COATS OF 5-10 MILS MACROPOXY 646 FAST CURE EPOXY OR APPROVED EQUAL.

42" HDPE SHALL CONFORM TO AASHTO M294, TYPE S, CORRUGATED EXTERIOR AND SMOOTH INTERIOR.

CAST-IN-PLACE CONCRETE:

ALL STRUCTURAL CONCRETE SHALL BE CLASS D (f'c = 4500 PSI).

PROVIDE STRUCTURAL CONCRETE WITH CEMENTITIOUS MATERIALS MEETING THE SULFATE RESISTANCE REQUIREMENTS OF CLASS 2 AS DESCRIBED IN THE PROJECT SPECIFICATIONS WITH ASSOCIATED SPECIAL PROVISIONS.

CHAMFER ALL EXPOSED EDGES OF CONCRETE 3/4" UNLESS NOTED OTHERWISE.

ALL CONSTRUCTION JOINTS SHALL BE INTENTIONALLY ROUGHENED TO 1/4" AMPLITUDE UNLESS NOTED OTHERWISE.

REINFORCING STEEL:

REINFORCING DIMENSIONS SHOWN IN THESE PLANS INDICATE CENTER-TO-CENTER SPACING DIMENSIONS UNLESS NOTED OTHERWISE

REINFORCING STEEL SHALL BE DEFORMED, NEW BILLET BARS PER CURRENT ASTM A615 SPECIFICATIONS. GRADE 60 REINFORCING STEEL IS REQUIRED.

ALL REINFORCING SHALL BE BLACK (UNCOATED) UNLESS OTHERWISE NOTED.

BAR BENDING DIAGRAMS WHERE SHOWN ON THESE PLANS INDICATE OUT-TO-OUT DIMENSIONS OF THE NOMINAL BAR DIAMETER.

ALL REINFORCING SHALL HAVE A CLEAR COVERAGE OF 2 INCHES UNLESS SHOWN OTHERWISE ON THE PLANS. CLEAR COVERAGE IS MEASURED FROM THE CONCRETE SURFACE TO THE OUTSIDE OF THE REINFORCEMENT.

REINFORCING BAR LAP SPLICES SHALL BE AS DETAILED ON THE PLANS.

FIELD BENDING OF REINFORCING STEEL SHALL BE PER CDOT SPECIFICATIONS SECTION 602.05.

MISCELLANEOUS:

THE CONTRACTOR IS RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION.

EXCAVATION/BACKFILL:

EXCAVATION AND BACKFILL SHALL MEET THE REQUIREMENTS FOR CULVERTS SPECIFIED IN CDOT SPEC 206. BACKFILL MATERIAL SHALL BE STRUCTURE BACKFILL CLASS 1.

PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

DESIGNED: JEB	DATE: 01/09/2017
DRAWN: ZAB	DATE: 01/09/2017
CHECKED: OBD	DATE: 01/09/2017
REVISED:	DATE:
REVISED:	DATE:
REVISED:	DATE:

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URBAN DRAINAGE AND FLOOD CONTROL DISTRICT
UDFCD PROJECT NO. 106266

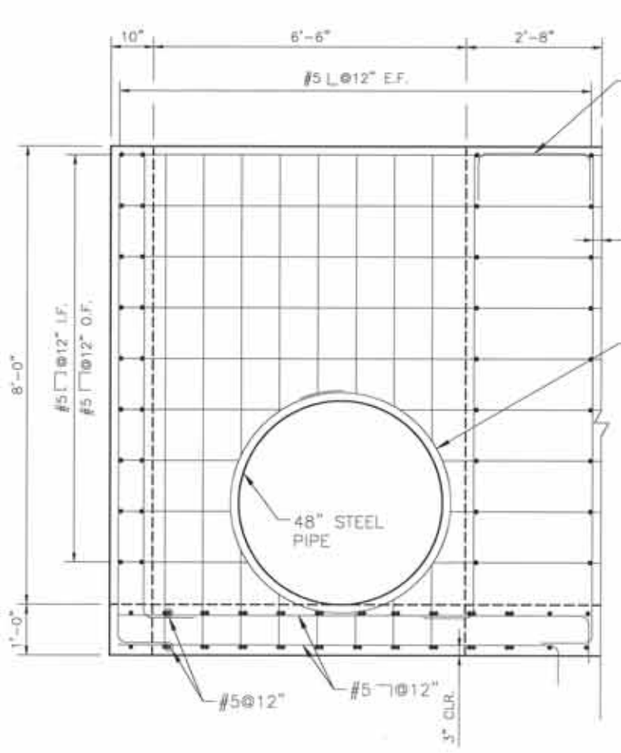
ADAMS COUNTY COLORADO

LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

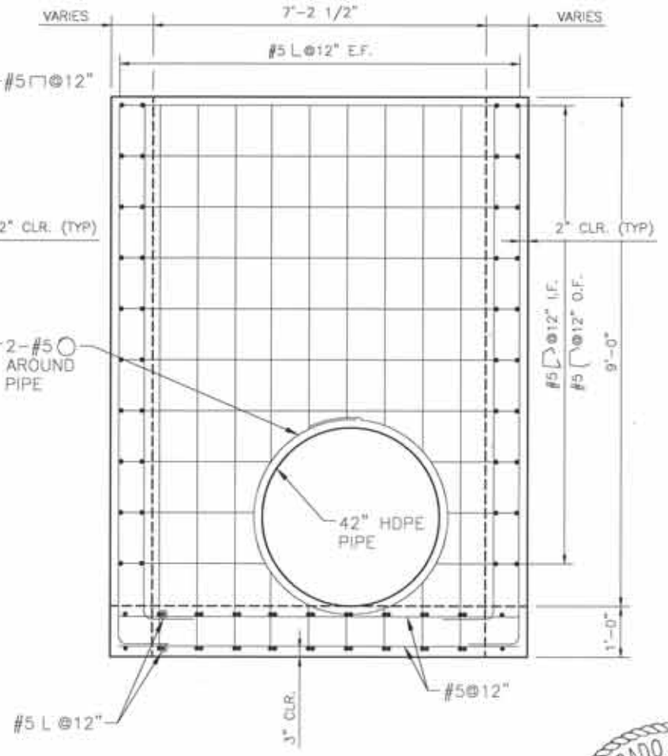
COLORADO AGRICULTURAL DITCH SPLITTER STRUCTURE PLAN AND DETAILS

DATE 02/03/2017

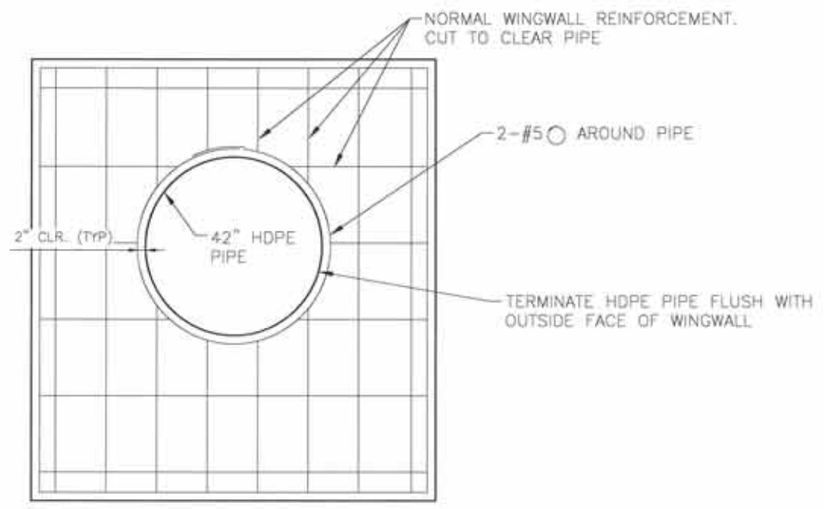
DRAWING NO. S-1



B WALL SECTION THRU 48" PIPE
1"=3'-0"

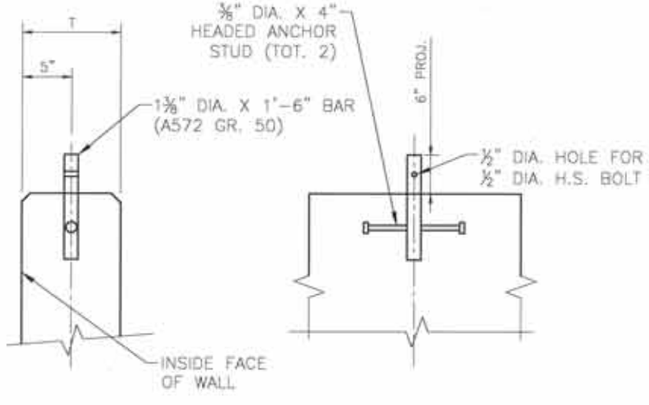


C WALL SECTION THRU 42" PIPE
1"=3'-0"

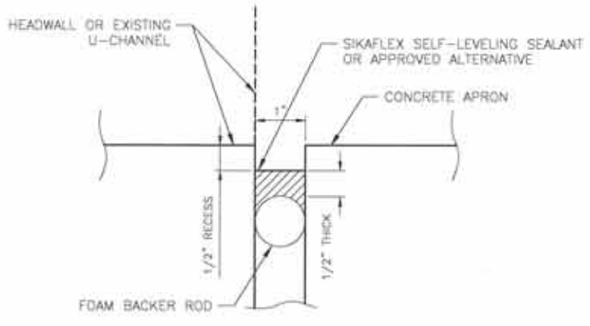


D WINGWALL SECTION THRU 42" PIPE
1"=3'-0"

COLORADO LICENSED
JAMES E. BADER
2/6/2017
49037
PROFESSIONAL ENGINEER

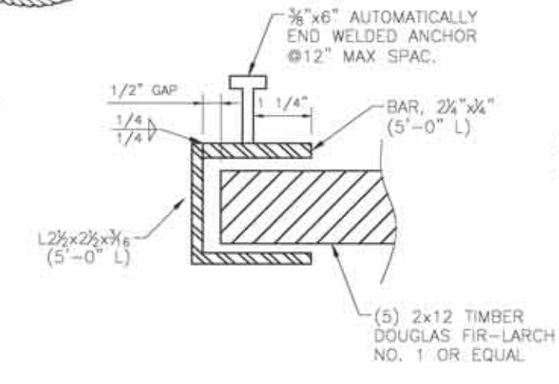


HANDRAIL ANCHORAGE DETAIL
NTS



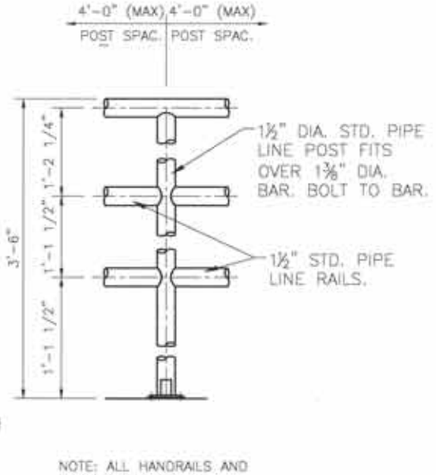
NOTE: PROVIDE CONTINUOUS SEALANT ALONG FULL HEIGHT OF EXISTING U-CHANNEL SIDEWALLS AND INVERT SLAB (INTERIOR FACES).

EXPANSION JOINT DETAIL
NTS



NOTE: STEEL FOR STOP LOG CHANNELS SHALL BE A709 GRADE 36, GALVANIZED.

STOP LOG CHANNEL DETAIL
NTS



NOTE: ALL HANDRAILS AND HARDWARE SHALL BE GALVANIZED.

HANDRAIL ELEVATION
NTS

PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

DESIGNED: JEB	DATE: 01/09/2017		
DRAWN: ZAB	DATE: 01/09/2017		
CHECKED: CBO	DATE: 01/09/2017		
REVISED:	DATE:		
REVISED:	DATE:		
REVISED:	DATE:		

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URBAN DRAINAGE AND FLOOD CONTROL DISTRICT
UDFCD PROJECT NO. 106266

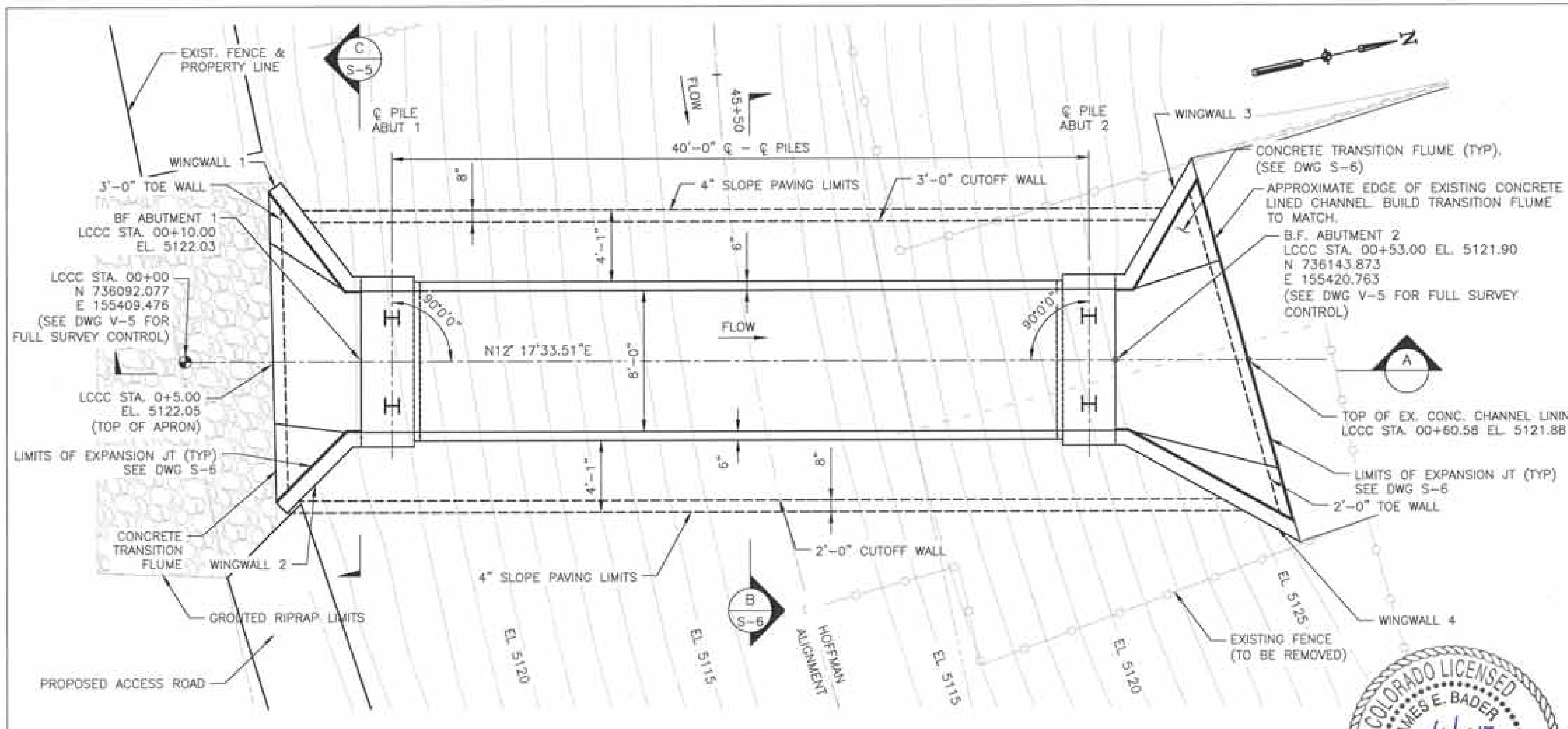
ADAMS COUNTY COLORADO

LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

COLORADO AGRICULTURAL DITCH SPLITTER STRUCTURE DETAILS

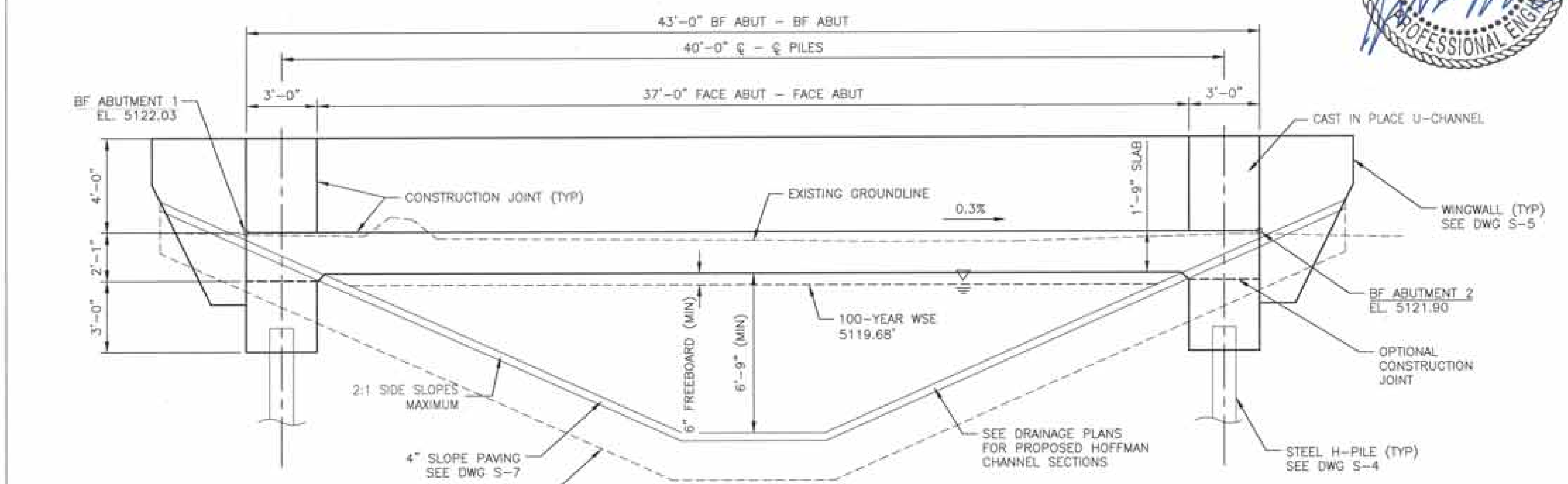
DATE 02/03/2017

DRAWING NO. S-2



CONCRETE U-CHANNEL PLAN - LOWER CLEAR CREEK CANAL
1" = 4'-0"

COLORADO LICENSED JAMES E. BADER 2/6/2017 49037 PROFESSIONAL ENGINEER



A SECTION
1" = 3'-0"

GENERAL NOTES:

SPECIFICATIONS:

DESIGN IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS 7TH ED. 2016

TECHNICAL SPECIFICATIONS IN ACCORDANCE WITH COLORADO DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION

DESIGN METHOD:

LOAD AND RESISTANCE FACTOR DESIGN

GEOTECHNICAL:

SEE FINAL GEOTECHNICAL ENGINEERING REPORT TITLED "LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS" FOR FOUNDATION DESIGN AND INSTALLATION PARAMETERS, LABORATORY DATA AND SOIL CHARACTERISTICS.

WORKMANSHIP:

ALL WORK REQUIREMENTS SHOWN ON THESE DRAWINGS SHALL BE ACCOMPLISHED AS SPECIFIED IN THE PROJECT SPECIFICATIONS WITH ASSOCIATED SPECIAL PROVISIONS.

THE INFORMATION SHOWN ON THESE PLANS CONCERNING THE TYPE AND LOCATION OF EXISTING UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UNDERGROUND UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. THE CONTRACTOR SHALL CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO AT 1-800-922-1987 AT LEAST 3 DAYS (NOT INCLUDING THE DAY OF NOTIFICATION) PRIOR TO ANY EXCAVATION OR OTHER EARTHWORK.

STATIONS, EXISTING ELEVATIONS AND DIMENSIONS CONTAINED IN THESE PLANS ARE CALCULATED FROM A RECENT FIELD SURVEY. THE CONTRACTOR SHALL VERIFY ALL DEPENDENT DIMENSIONS IN THE FIELD BEFORE ORDERING OR FABRICATING ANY MATERIAL.

ALL PLAN DIMENSIONS ARE TRUE HORIZONTAL. THE CONTRACTOR AND/OR FABRICATOR IS RESPONSIBLE FOR INCORPORATING OTHER EFFECTS THAT MAY IMPACT THE FINAL DIMENSIONS AND/OR DETAILING.

STRUCTURAL STEEL PILING:

PILING SHALL CONFORM TO ASTM A709 GRADE 50.

CAST-IN-PLACE CONCRETE:

ALL STRUCTURAL CONCRETE SHALL BE CLASS D (f'c = 4500 PSI)

PROVIDE STRUCTURAL CONCRETE WITH CEMENTITIOUS MATERIALS MEETING THE SULFATE RESISTANCE REQUIREMENTS OF CLASS 2 AS DESCRIBED IN THE PROJECT SPECIFICATIONS WITH ASSOCIATED SPECIAL PROVISIONS.

BEFORE CONCRETE SURFACES AT ABUTMENTS AND PIERS ARE BACKFILLED WITH SOIL, DAMPPROOFING SHALL BE PROVIDED. DAMPPROOFING SHALL BE AN ASPHALTIC PRIMER MEETING THE REQUIREMENTS OF ASTM D41 OR A COAL TAR PRIMER (FOR USE WITH COAL-TAR PITCH) MEETING THE REQUIREMENTS OF ASTM D43.

CHAMFER ALL EXPOSED EDGES OF CONCRETE 3/4" UNLESS NOTED OTHERWISE.

ALL CONSTRUCTION JOINTS SHALL BE INTENTIONALLY ROUGHENED TO 1/4" AMPLITUDE UNLESS NOTED OTHERWISE.

REINFORCING STEEL:

REINFORCING DIMENSIONS SHOWN IN THESE PLANS INDICATE CENTER-TO-CENTER SPACING DIMENSIONS UNLESS NOTED OTHERWISE

REINFORCING STEEL SHALL BE DEFORMED, NEW BILLET BARS PER CURRENT ASTM A615 SPECIFICATIONS. GRADE 60 REINFORCING STEEL IS REQUIRED.

ALL REINFORCING SHALL BE BLACK (UNCOATED) UNLESS OTHERWISE NOTED.

BAR BENDING DIAGRAMS WHERE SHOWN ON THESE PLANS INDICATE OUT-TO-OUT DIMENSIONS OF THE NOMINAL BAR DIAMETER.

ALL REINFORCING SHALL HAVE A CLEAR COVERAGE OF 2 INCHES UNLESS SHOWN OTHERWISE ON THE PLANS. CLEAR COVERAGE IS MEASURED FROM THE CONCRETE SURFACE TO THE OUTSIDE OF THE REINFORCEMENT.

REINFORCING BAR LAP SPLICES SHALL BE AS DETAILED ON THE PLANS.

FIELD BENDING OF REINFORCING STEEL SHALL BE PER CDOT SPECIFICATIONS SECTION 602.05.

MISCELLANEOUS:

THE CONTRACTOR IS RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION.

WATERSTOPS SHALL BE PER CDOT SPECIFICATIONS SECTION 518.02.

EXCAVATION/BACKFILL:

EXCAVATION AND BACKFILL SHALL MEET THE REQUIREMENTS FOR CULVERTS SPECIFIED IN CDOT SPEC 206. BACKFILL MATERIAL SHALL BE STRUCTURE BACKFILL CLASS 1.

GROUTED RIPRAP:

GROUTED RIPRAP SHALL BE 24" THICK, TYPE M PER UDFCD SPECIFICATIONS.

PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

DESIGNED: JEB	DATE: 12/16/2016
DRAWN: ZAB	DATE: 12/16/2016
CHECKED: GBO	DATE: 12/16/2016
REVISED:	DATE:
REVISED:	DATE:
REVISED:	DATE:

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UDFCD PROJECT NO. 106266

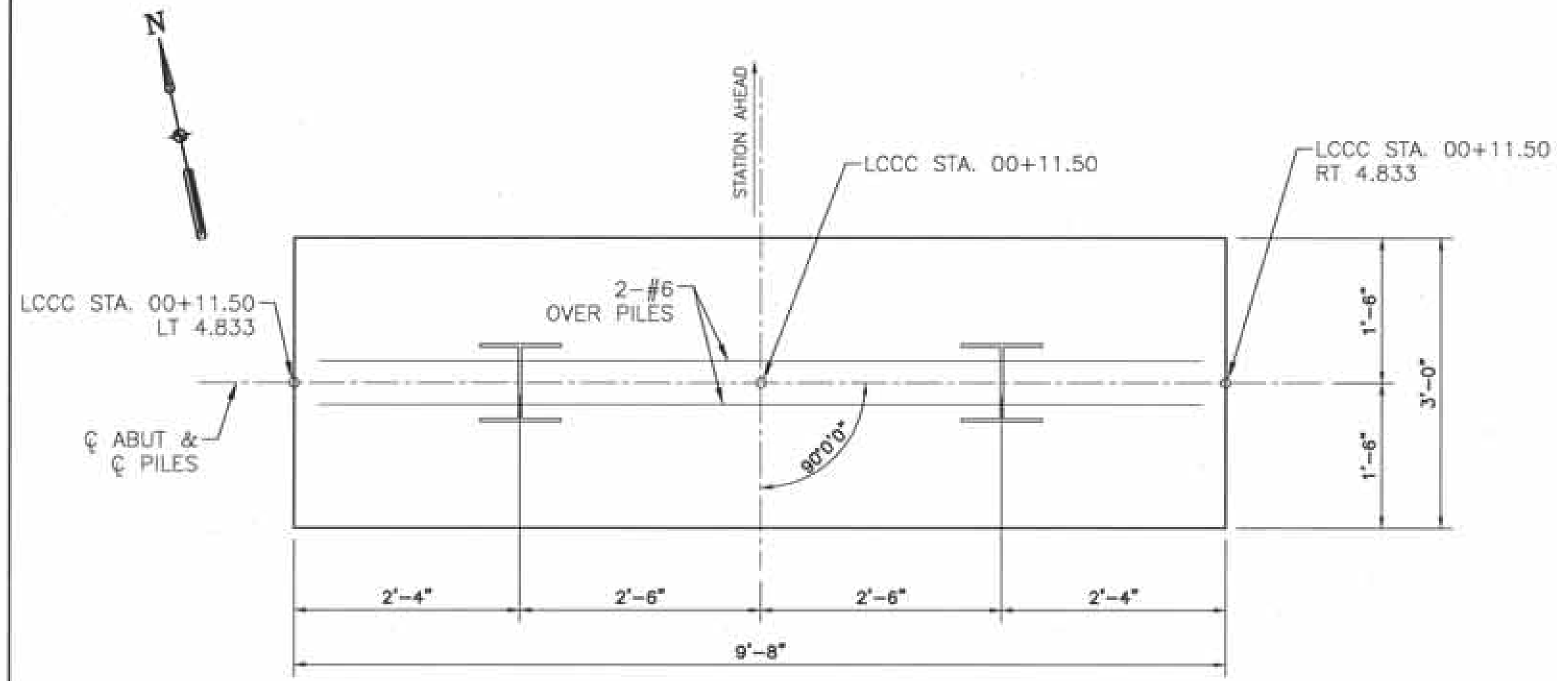
ADAMS COUNTY COLORADO

LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

LOWER CLEAR CREEK CANAL GENERAL LAYOUT/TYPICAL SECTION

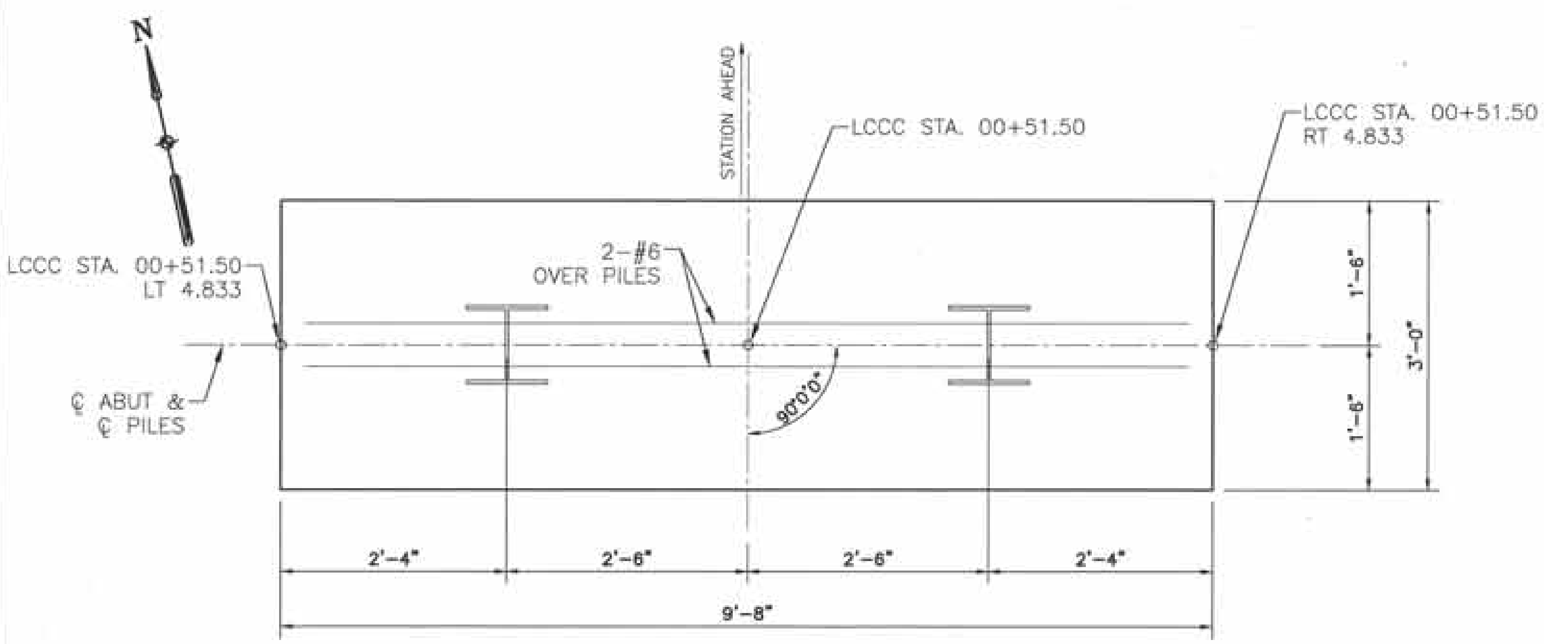
DATE 02/03/2017

DRAWING NO. S-3



PILE PLAN - ABUTMENT 1

1" = 2'-0"



PILE PLAN - ABUTMENT 2

1" = 2'-0"

PILE LEGEND:

⌶ DENOTES PLUMB PILE

PILE NOTES:

1. ALL PILES SHALL BE HP12x74 WITH A FACTORED DESIGN RESISTANCE OF 100 KIPS AT THE STRENGTH LIMIT STATE. THE MINIMUM NOMINAL RESISTANCE TO WHICH PILES SHALL BE DRIVEN IS 250 KIPS.
2. SHOP PLANS SHALL SHOW HOW REINFORCING IS TO BE TIED AS WELL AS HOW THEY WILL BE HELD IN PLACE ABOVE PILING WHILE POUR IS BEING MADE.
3. THE PRODUCTION PILES SHALL BE DRIVEN TO REFUSAL.
4. THE MINIMUM TIP ELEVATION SHOWN ON THESE PLANS MUST BE ACHIEVED FOR EACH PILE. IF THE MINIMUM TIP ELEVATION IS NOT REACHED BEFORE ENCOUNTERING REFUSAL, THE ENGINEER SHALL BE NOTIFIED TO DETERMINE IF PRE-DRILLING IS REQUIRED.

PILE TIP DATA						
SUBSTRUCTURE UNIT	DESIGN DATA		ACTUAL FIELD DATA			
	MINIMUM TIP ELEVATION	ESTIMATED TIP ELEVATION	ACTUAL PILE TIP ELEVATION			
			P1	P2	P3	P4
ABUTMENT 1	5086.00	5081.00				
ABUTMENT 2	5086.00	5081.00				

PILE DRIVING INFORMATION	
PILE SIZE AND TYPE:	HP12x74
ACTUAL BEARING OBTAINED:	
HAMMER TYPE:	
ACTUAL AVERAGE BLOWS/FT:	
PILE HAMMER ENERGY:	
SPECIAL DRIVING CONDITIONS AND COMMENTS:	

COLORADO LICENSED
JAMES E. BADER
2/6/2017
49037
PROFESSIONAL ENGINEER

PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

DESIGNED: JEB	DATE: 12/16/2016
DRAWN: ZAB	DATE: 12/16/2016
CHECKED: GBO	DATE: 12/16/2016
REVISED:	DATE:
REVISED:	DATE:
REVISED:	DATE:

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URBAN DRAINAGE AND FLOOD CONTROL DISTRICT
UDFCD PROJECT NO. 106266

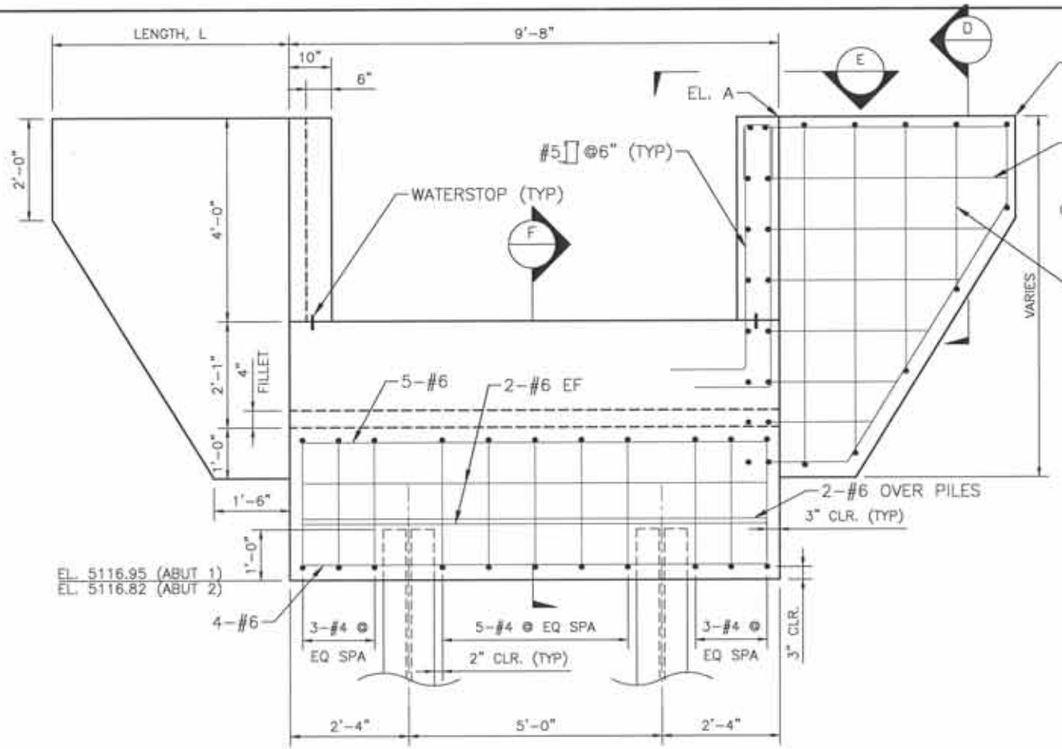
ADAMS COUNTY COLORADO

LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

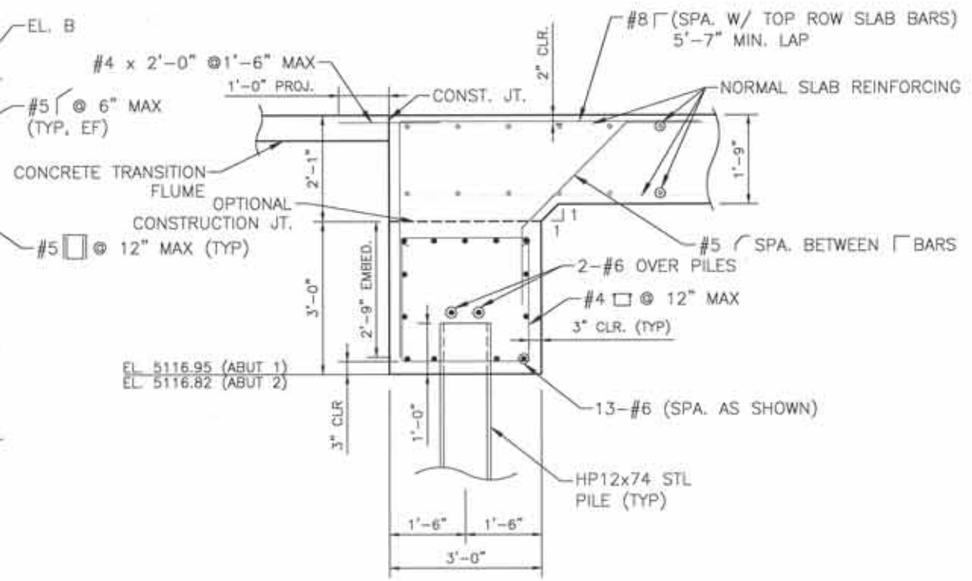
LOWER CLEAR CREEK CANAL ABUTMENTS 1 AND 2 - PILE PLAN

DATE 02/03/2017

DRAWING NO. S-4



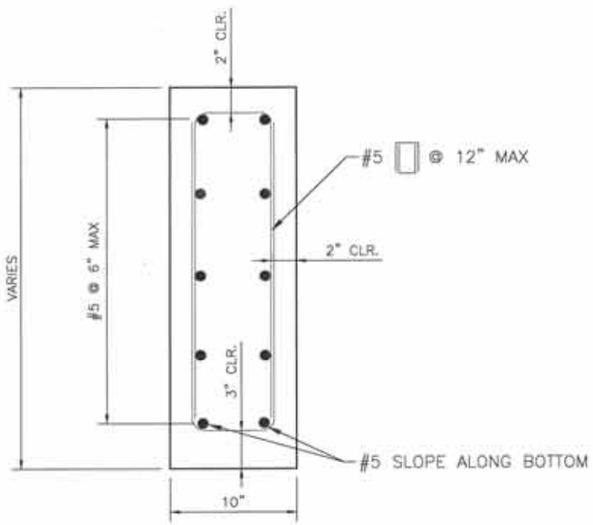
C ABUTMENT FLUME SECTION
1"=3'-0"



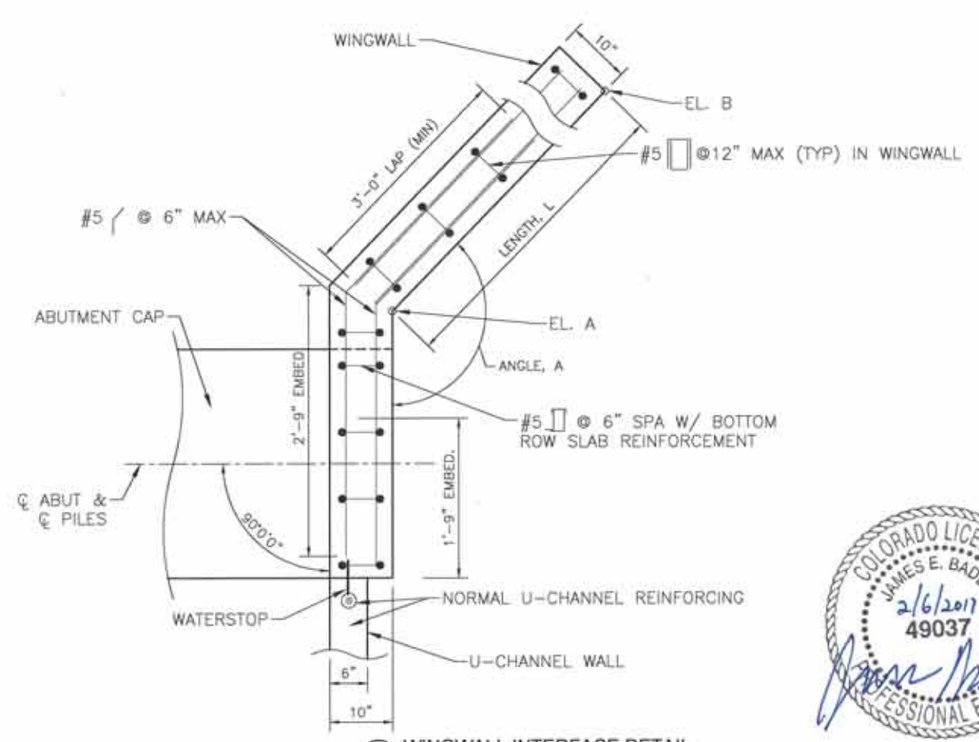
F ABUTMENT SECTION
1"=3'-0"

WINGWALL TABLE				
WALL	LENGTH, L	ANGLE, A	EL. A	EL. B
1 (SW)	6'-8"	127.33	5126.03	5126.05
2 (SE)	5'-3"	135.09	5126.03	5126.05
3 (NW)	7'-8"	120.28	5125.90	5125.88
4 (NE)	11'-5"	151.16	5125.90	5125.88

NOTE: WINGWALL TABLE DATA MEASURED ALONG OUTSIDE FACE OF WINGWALL.



D WINGWALL SECTION
1"=1'-0"



E WINGWALL INTERFACE DETAIL
1"=1'-6"

COLORADO LICENSED
JAMES E. BADER
2/6/2017
49037
PROFESSIONAL ENGINEER

PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

DESIGNED: JEB DATE: 12/16/2016
DRAWN: ZAB DATE: 12/16/2016
CHECKED: CBO DATE: 12/16/2016
REVISED: DATE:
REVISED: DATE:
REVISED: DATE:

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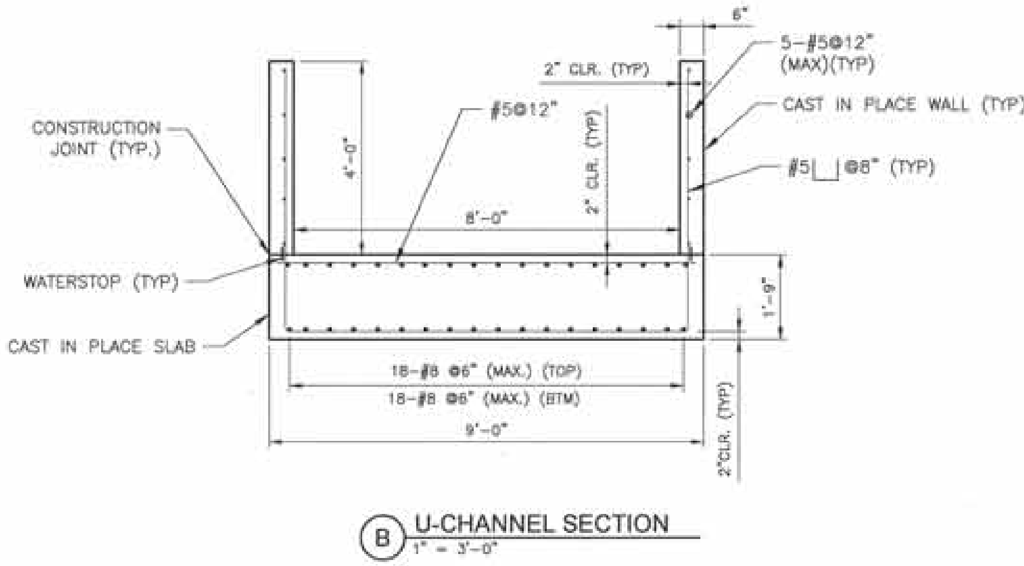
URBAN DRAINAGE AND FLOOD CONTROL DISTRICT
UDFCD PROJECT NO. 106266

ADAMS COUNTY COLORADO

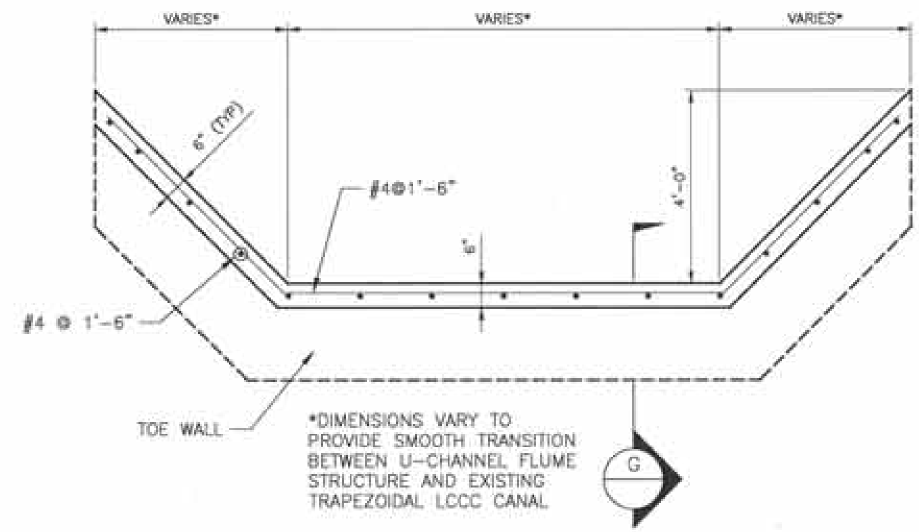
LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

LOWER CLEAR CREEK CANAL ABUTMENT AND WINGWALL DETAILS

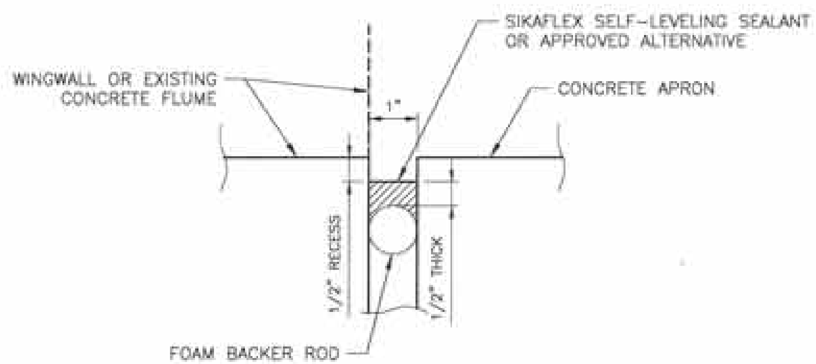
DATE 02/03/2017
DRAWING NO. S-5



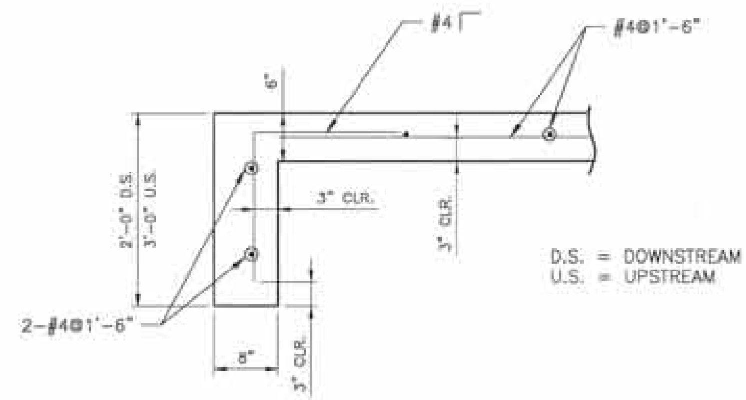
B U-CHANNEL SECTION
1" = 3'-0"



TRANSITION FLUME SECTION
1" = 3'-0"



EXPANSION JOINT DETAIL
NTS



G TRANSITION FLUME TOE WALL
1" = 1'-6"

COLORADO LICENSED JAMES E. BADER 49037 PROFESSIONAL ENGINEER 2/6/2017

PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

DESIGNED: JEB	DATE: 12/16/2016	
DRAWN: ZAB	DATE: 12/16/2016	
CHECKED: GBO	DATE: 12/16/2016	
REVISED:	DATE:	
REVISED:	DATE:	
REVISED:	DATE:	

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ADAMS COUNTY COLORADO

LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

LOWER CLEAR CREEK CANAL FLUME STRUCTURE DETAILS

DATE 02/03/2017

DRAWING NO. S-6

NOTES:

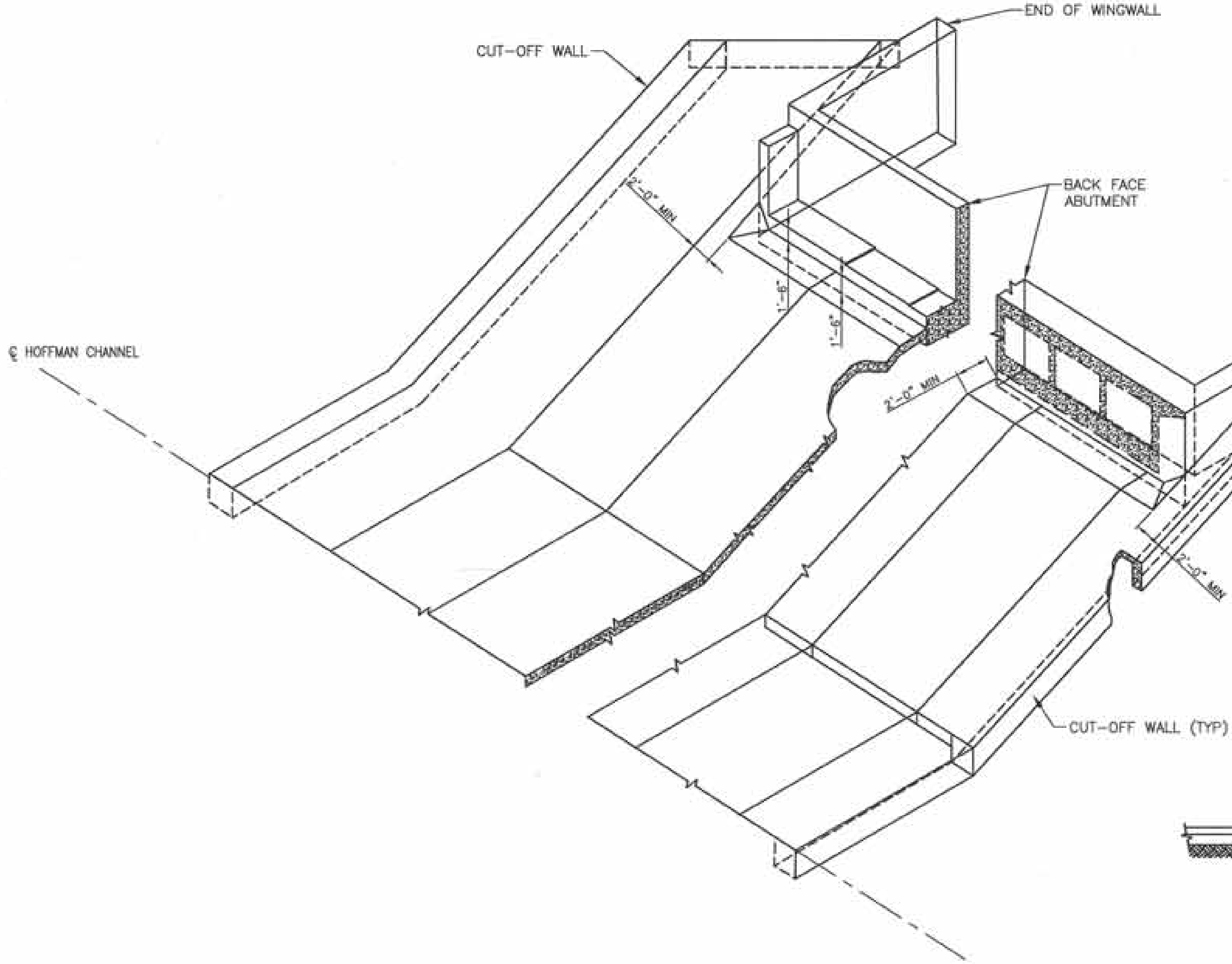
SLOPE PAVING SHALL BE POURED IN 10FT (MAX) TRANSVERSE SECTIONS WITH A TOOLED CONSTRUCTION JOINT AT EACH SECTION. WIRE FABRIC SHALL BE 2IN FROM THE END OF JOINTS AND SHALL LAP 8IN AT SPLICES.

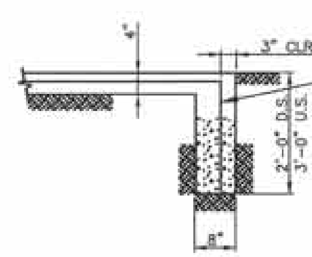
WHERE SLOPE OR BERM PAVING BUTTS AGAINST STRUCTURAL CONCRETE, SEPARATE WITH 1IN EXPANSION JOINT MATERIAL.

STRUCTURE EXCAVATION FOR CONCRETE SLOPE AND DITCH PAVING SHALL BE LIMITED TO THE ACTUAL VOLUME OCCUPIED BY THE SLOPE PAVING CONCRETE.

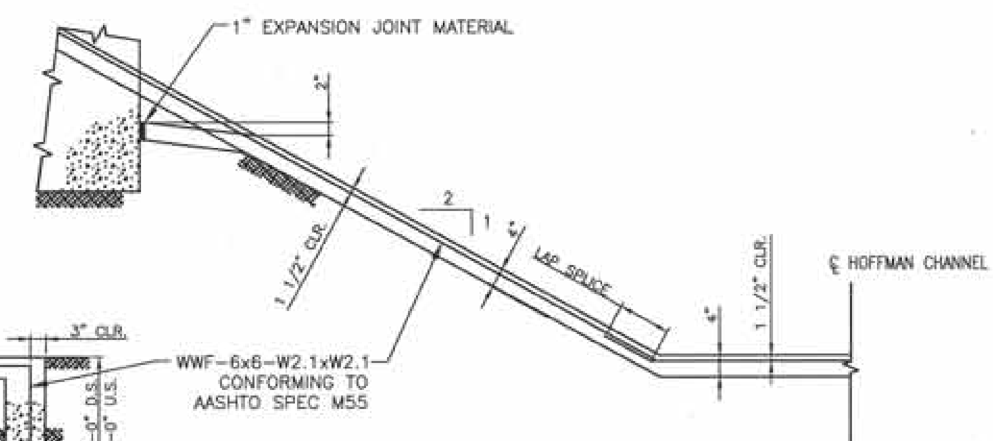
D.S. = DOWNSTREAM
U.S. = UPSTREAM

THESE DRAWINGS SHOW GENERAL DETAILS ONLY. FOR LIMITS OF SLOPE PAVING SEE GENERAL LAYOUT.





TYPICAL SECTION THRU CUT-OFF WALL



TYPICAL SECTION THRU SLOPE PAVING

COLORADO LICENSED PROFESSIONAL ENGINEER JAMES E. BADER 49037 2/6/2017

DESIGNED: JEB	DATE: 12/16/2016		
DRAWN: ZAB	DATE: 12/16/2016		
CHECKED: GBD	DATE: 12/16/2016		
REVISED:	DATE:		
REVISED:	DATE:		
REVISED:	DATE:		

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ADAMS COUNTY COLORADO

LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

LOWER CLEAR CREEK CANAL SLOPE PAVING DETAILS

DATE 02/03/2017

DRAWING NO. S-7

PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

GENERAL NOTES:

1. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF ADAMS COUNTY AND/OR THE COLORADO DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, LATEST EDITION, AND REVISIONS THERETO, EXCEPT WHERE OTHERWISE NOTED ON THE PROJECT PLANS AND THE PROJECT SPECIAL PROVISIONS.

SITE PREPARATION

2. CONTRACTOR SHALL FIELD VERIFY PROFILE GRADES AND WILL NOTIFY FIELD ENGINEER IF AND WHEN ADJUSTMENT ARE NEEDED.

3. IF FIELD CONDITIONS ARE FOUND TO BE DIFFERENT THAN SHOWN ON THE PLANS, THE CONTRACTOR SHALL NOTIFY THE FIELD ENGINEER IMMEDIATELY SO THAT APPROPRIATE ACTION CAN BE TAKEN BY THE OWNER.

4. THE CONTRACTOR SHALL NOT REMOVE ANY EXISTING SIGNS OR PAVEMENT MARKINGS DURING PROJECT WITHOUT SIGNED AUTHORIZATION OF THE ADAMS COUNTY REPRESENTATIVE.

5. TRAFFIC CONTROL DURING CONSTRUCTION SHALL BE IN ACCORDANCE WITH COLORADO DEPARTMENT OF TRANSPORTATION M & S STANDARD 630, ADAMS COUNTY AND THE MUTCD. ALL ACCESSES, BOTH PRIVATE AND COMMERCIAL ARE TO BE MAINTAINED AND REMAIN OPERATIONAL DURING CONSTRUCTION. CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL PLAN TO COUNTY BEFORE BEGINNING WORK AND PRIOR TO BEGINNING A NEW PHASE OF CONSTRUCTION. THE CONTRACTOR SHALL NOT USE TRAILS AS A STAGING AREA.

6. EXISTING TREES SHALL BE PROTECTED FROM DAMAGE DURING CONSTRUCTION. TREES SHALL NOT BE REMOVED UNLESS AUTHORIZED BY THE OWNER / FIELD ENGINEER.

7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPERLY DISPOSING OF ALL REMOVALS OFF THE PROJECT SITE AS SPECIFIED WITHIN THE CONTRACT.

UTILITY

8. THE SIZE AND LOCATION OF ALL EXISTING UTILITIES AS KNOWN TO THE ENGINEER HAVE BEEN NOTED ON THE PLANS FOR INFORMATION AND GUIDANCE OF THE CONTRACTOR. UTILITY LOCATIONS ARE ONLY APPROXIMATE AS PROVIDED BY THE VARIOUS UTILITY COMPANIES. ALL UTILITIES MAY NOT BE SHOWN ON THESE PLANS. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL UTILITIES, BOTH HORIZONTALLY AND VERTICALLY, PRIOR TO BEGINNING CONSTRUCTION. ANY DISCREPANCIES OR VARIATION IN UTILITY LOCATION FROM THAT SHOWN ON THESE PLANS SHALL BE BROUGHT TO THE ATTENTION OF THE FIELD ENGINEER AND RESOLVED PRIOR TO BEGINNING CONSTRUCTION IN ANY AREA. UTILITY LOCATIONS CAN BE COORDINATED THROUGH CENTRAL LOCATING AT 1-800-922-1987. THE CONTRACTOR SHALL PROTECT ALL EXISTING AND NEW UTILITIES IN THE VICINITY OF HIS WORK. IF ANY DAMAGE OCCURS TO THESE UTILITIES DURING CONSTRUCTION, IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REPAIR OR REPLACE THE UTILITY. THE CONTRACTOR IS RESPONSIBLE FOR ANY UTILITIES DISRUPTED BY THE CONSTRUCTION AND ALL EXPENSES INCURRED FOR REPAIR.

9. THE CONTRACTOR SHALL ADJUST ANY VALVES OR MANHOLES OF EXISTING UTILITIES NOT TO BE RELOCATED TO THE PROPOSED GRADE. THE COST SHALL BE INCLUDED IN THE PRICE OF THE WORK.

EARTHWORK

10. COMPACTION OF SUBGRADE SHALL MEET THE REQUIREMENT OF 95% MAXIMUM DRY DENSITY AS DETERMINED BY AASHTO T-99. SUB-GRADE SHALL BE PROOF ROLLED IN ACCORDANCE WITH SECTION 203 OF THE STANDARD SPECIFICATIONS.

11. PRIOR TO PLACING NEW PAVEMENT SECTIONS, THE SUBGRADE SHALL BE RECONDITIONED IN ACCORDANCE WITH SECTION 306 OF THE CDOT STANDARD SPECIFICATIONS. THE RECONDITIONED SURFACE SHALL BE PROOF-ROLLED WITH A HEAVY LOADED PNEUMATIC-TIRED VEHICLE HAVING A SINGLE AXLE WEIGHT OF AT LEAST 18 KIPS. AREAS WHICH DEFORM UNDER HEAVY WHEEL LOADS SHALL BE REMOVED AND REPLACED TO ACHIEVE A STABLE SUBGRADE PRIOR TO PAVING.

12. DEPTH OF MOISTURE-DENSITY CONTROL FOR THIS PROJECT SHALL BE AS FOLLOWS:
    - FULL DEPTH OF ALL EMBANKMENTS
    - BASES OF CUTS AND FILL - 1.00 FOOT

PAVING

13. ANY LIFT OF HOT MIX ASPHALT PAVEMENT THAT IS TO HAVE A SUCCEEDING LIFT PLACED THEREON SHALL BE COMPLETED BEFORE THE SUCCEEDING LAYER IS PLACED.

14. WHERE IT IS REQUIRED TO SAW CUT EXISTING PAVEMENT AS SHOWN ON PLANS, THE CUTTING SHALL BE DONE TO A NEAT WORK LINE WITH A CUTTING WHEEL ATTACHED TO A BLADE OR OTHER METHOD AS APPROVED BY THE FIELD ENGINEER.

15. WHERE ASPHALT PAVEMENT JOINS EXISTING PAVEMENT, THE EXISTING PAVEMENT SHALL BE SAW CUT SQUARE AND COATED WITH ONE COAT OF UNDILUTED EMULSIFIED ASPHALT IMMEDIATELY PRIOR TO PLACEMENT OF FRESH ASPHALT PAVEMENT.

16. BEFORE PLACEMENT OF THE TACK COAT, THE CONTRACTOR SHALL CLEAN THE EXISTING PAVEMENT SURFACE BY MEANS OF A POWER BROOM VACUUM SYSTEM (PICK-UP BROOM) OR OTHER APPROVED METHOD.

17. A TACK COAT OF EMULSIFIED ASPHALT (SLOW-SETTING) IS TO BE APPLIED BETWEEN PAVEMENT COURSES TO IMPROVE THE BOND. DILUTED EMULSIFIED ASPHALT FOR TACK COAT SHALL CONSIST OF 1 PART EMULSIFIED ASPHALT AND 1 PART WATER.

18. THE CONTRACTOR MAY USE AN EXPOSED LONGITUDINAL JOINT FOR A MAXIMUM OF ONE DAY. THE JOINT SHALL CONSIST OF A VERTICAL FACE 1 INCH DEEP AND AT THE BOTTOM OF THE VERTICAL FACE, A 3:1 SLOPE TO THE EXISTING PAVEMENT (OR SUBGRADE). THE MAXIMUM DEPTH OF THE 3:1 SHALL BE 2 INCHES. AT THE END OF ONE DAY, LONGITUDINAL JOINTS SHALL BE ON LANE LINES AND OUT OF WHEEL PATHS.

SIGNING AND STRIPING

19. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL NEW, TEMPORARY, AND EXISTING TRAFFIC SIGNS FROM THE START OF THE CONSTRUCTION PROJECT UNTIL ACCEPTANCE BY THE OWNER.

20. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL PAVEMENT MARKINGS INCLUDING REMOVAL OF EXISTING PAVEMENT MARKINGS (SCARRING OF EXISTING ASPHALT IS NOT PERMITTED) AND INSTALLATION OF NEW PAVEMENT MARKINGS AND TEMPORARY PAVEMENT MARKINGS. AT NO TIME WILL IT BE ACCEPTABLE TO PAINT OVER EXISTING PAVEMENT MARKINGS.

21. ALL PERMANENT PAVEMENT MARKING SYMBOLS AND WORDS SHALL BE THE PREFORMED THERMOPLASTIC TYPE. ALL OTHER MARKINGS SHALL BE EPOXY, OR AS DIRECTED BY EACH COMMUNITY.

22. ALL SIGNAGE AND STRIPING IN PUBLIC AREAS SHALL CONFORM TO THE CURRENT SPECIFICATIONS AND PRACTICES OF THE LOCAL JURISDICTIONS AND THE MUTCD AS SUPPLEMENTED BY THE STATE OF COLORADO.

ROADWAY CONSTRUCTION NOTES

10. REMOVAL OF ASPHALT MAT
11. SAWCUT
12. ADJUST TO GRADE
13. MATCH EXISTING
14. LIMITS OF CUTS & FILLS
15. LIMITS OF DISTURBANCE
16. LIMITS OF WORK
17. RELOCATION LUMINAIRES
18. CONSTRUCTION ASPHALT PAVEMENT
19. CONSTRUCTION GRAVEL ROADWAY
20. CONSTRUCTION ASHPHATL OVERLAY
21. RETAINING WALL
22. CONSTRUCT CURB & GUTTER TYPE 1 SECTION IB
23. CONSTRUCT CURB & GUTTER TYPE 1 SECTION IIB
24. CONSTRUCT CURB & GUTTER TYPE 2 SECTION IB (MODIFIED)
25. CONSTRUCT CURB & GUTTER TYPE 2 SECTION IIB (MODIFIED)
26. CONSTRUCT GUTTER TYPE 2 (6 FOOT)
27. CONSTRUCT CURB TRANSITION
28. CONSTRUCT 5' ASPHALT CURB TRANSITION
29. CONSTRUCT CURB & GUTTER TYPE 2 SECTION IB
30. CONSTRUCT CURB & GUTTER TYPE 2 SECTION IIB
31. CONSTRUCT CURB TRANSITION-BARRIER TO MOUNTABLE
32. CONSTRUCT CONCRETE CURB RAMP TYPE 1A
33. CONSTRUCT CONCRETE CURB RAMP TYPE 2A
34. CONSTRUCT CONCRETE CURB RAMP TYPE 2B
35. CONSTRUCT CONCRETE CURB RAMP TYPE 1B
36. CONSTRUCT CONCRETE DRIVEWAY ENTRANCE TYPE 1
37. CONSTRUCT CONCRETE DRIVEWAY ENTRANCE TYPE 3
38. CONSTRUCT 4" THICK CONCRETE SIDEWALK
39. CONSTRUCT GUARDRAIL TYPE 3 W-BEAM MEDIAN TERMINAL (CAT OPTION)
40. CONSTRUCT GUARDRAIL TYPE 3 W-BEAM TRANSITION TYPE 3G
41. CONSTRUCT LOW SPEED TERMAINAL - TYPE 3K
42. CONSTRUCT GUARDRAIL TYPE 3 (6-3 POST SPACING)
43. CONSTRUCT TRANSITION TYPE 3H
44. CONSTRUCT TRANSITION TYPE 3G
45. CONSTRUCT 10' TRANSITION FROM CURB TO SHOULDER
46. CONSTRUCT TYPE IIB INTEGRAL CURB AND GUTTER/SIDEWALK
47. CONSTRUCT TYPE III SIDEWALK RAMP (TEE)

COLORADO REGISTERED ROBERT EDWARD PRATT 32964 2-14-17 PROFESSIONAL ENGINEER

PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

U:\1876287\9-Hoffman_Design\drawings\Current\Civil\01-087119-GC-1GEN-NOTES.dwg
2017/02/14 11:19 AM By: Durham, Charlene

DESIGNED: CD DATE: 08/17/16
DRAWN: PF DATE: 08/17/16
CHECKED: RP DATE: 01/23/17
REVISED: DATE:
REVISED: DATE:
REVISED: DATE:

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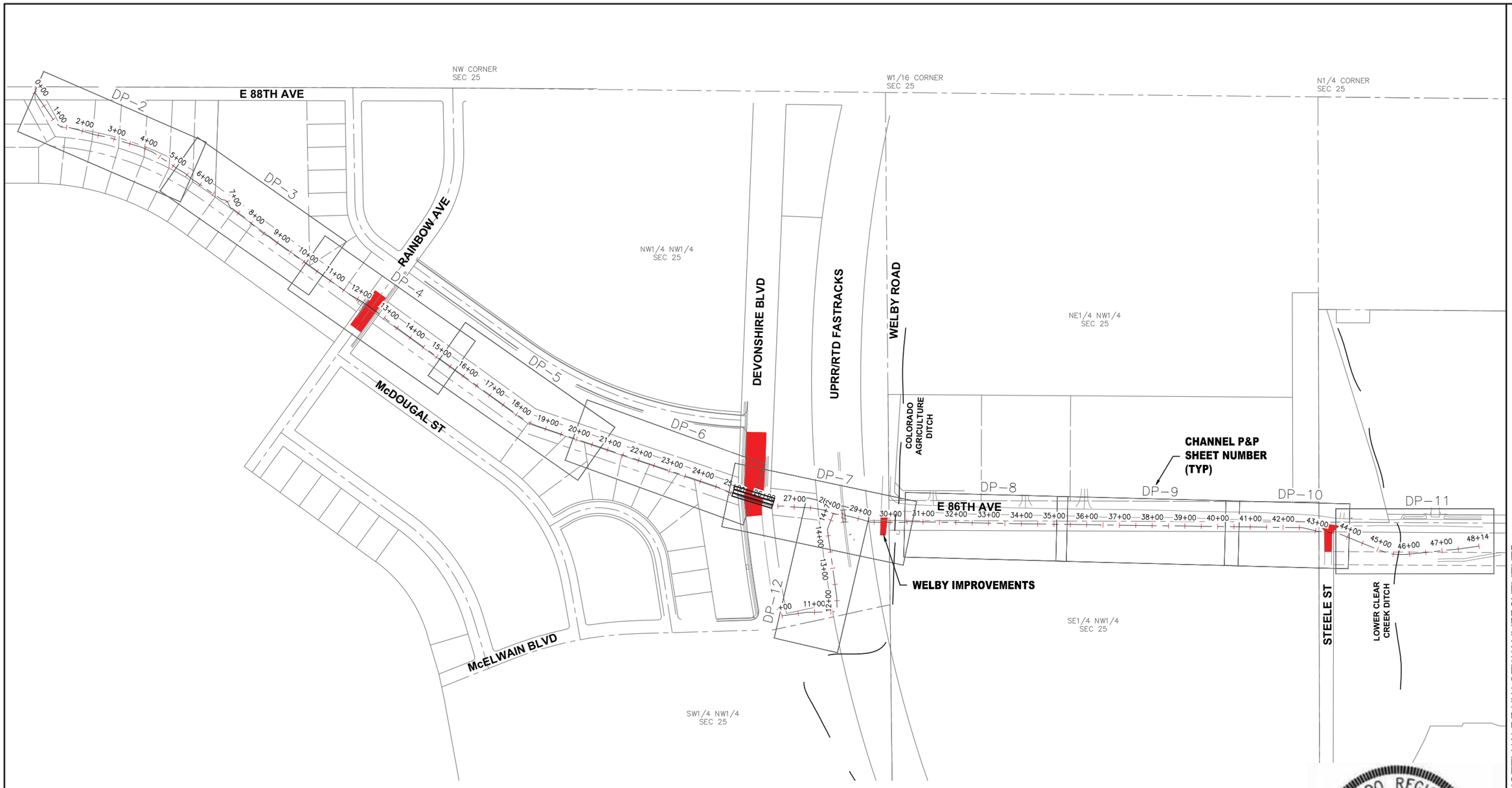
ADAMS COUNTY COLORADO

LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

CIVIL GENERAL NOTES

DATE 02/03/2017

DRAWING NO. GC-1



ROADWAY KEYMAP

0 150 300 450

SCALE IN FEET

N

COLORADO REGISTERED PROFESSIONAL ENGINEER
ROBERT EDWARD PRATT
32964
2-14-17

PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

DESIGNED: C.D. DATE: 08/17/16
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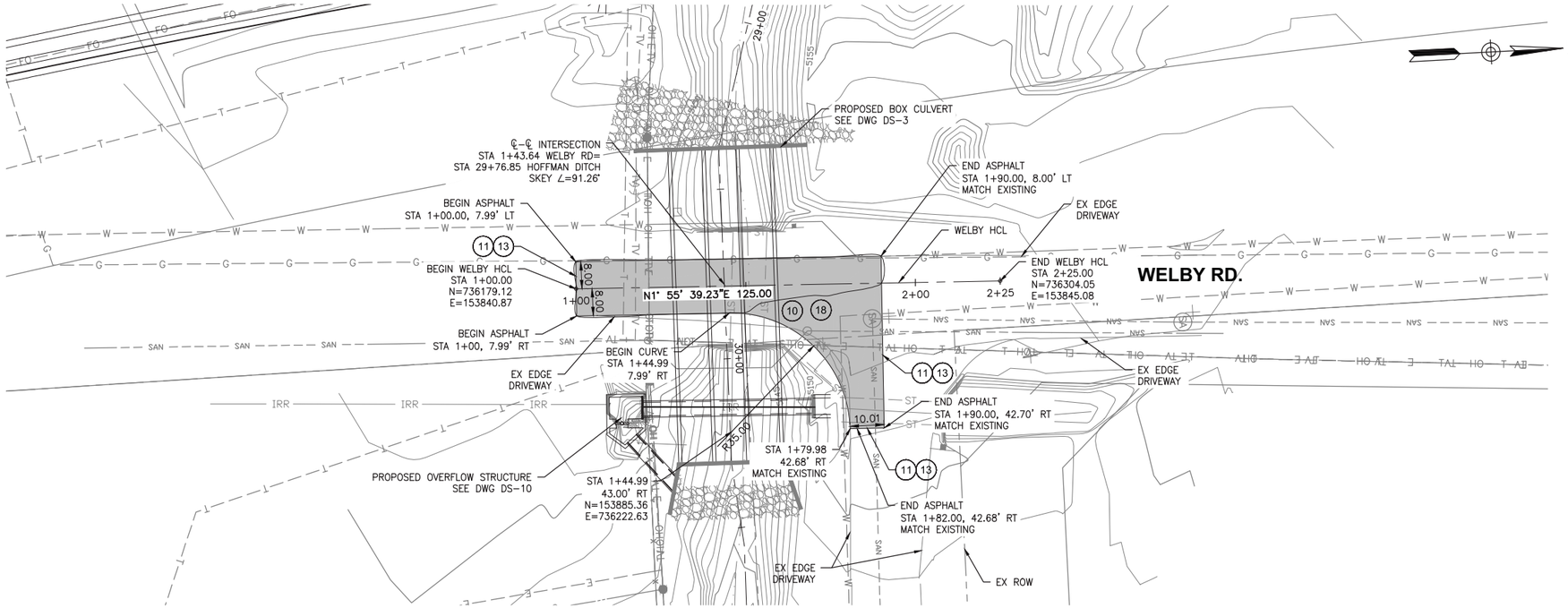
ADAMS COUNTY COLORADO

LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

ROADWAY KEY MAP

DATE 02/03/2017

DRAWING NO. KM-1

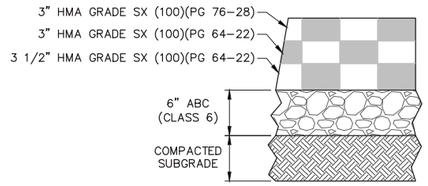


ROADWAY CONSTRUCTION NOTES

10	REMOVAL OF ASPHALT MAT
11	SAWCUT
13	MATCH EXISTING
18	CONSTRUCTION ASPHALT PAVEMENT

LEGEND

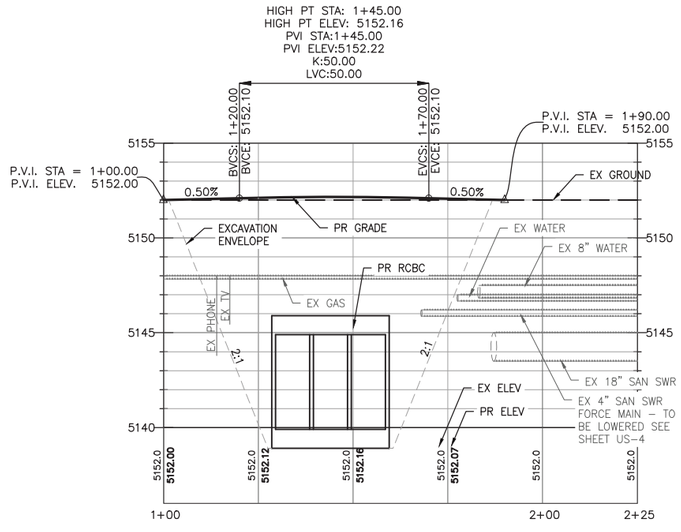
FULL DEPTH PAVEMENT



PAVEMENT SECTION
N.T.S.

NOTES:

1. EXISTING UTILITIES ARE ONLY APPROXIMATIONS. CONTRACTOR TO VERIFY HORIZONTAL AND VERTICAL LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.



0 20' 40'
HORIZONTAL SCALE IN FEET

0 1' 2'
VERTICAL SCALE IN FEET

COLORADO REGISTERED
ROBERT EDWARD PRATT
32964
2-14-17
PROFESSIONAL ENGINEER

PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

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ADAMS COUNTY COLORADO

LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

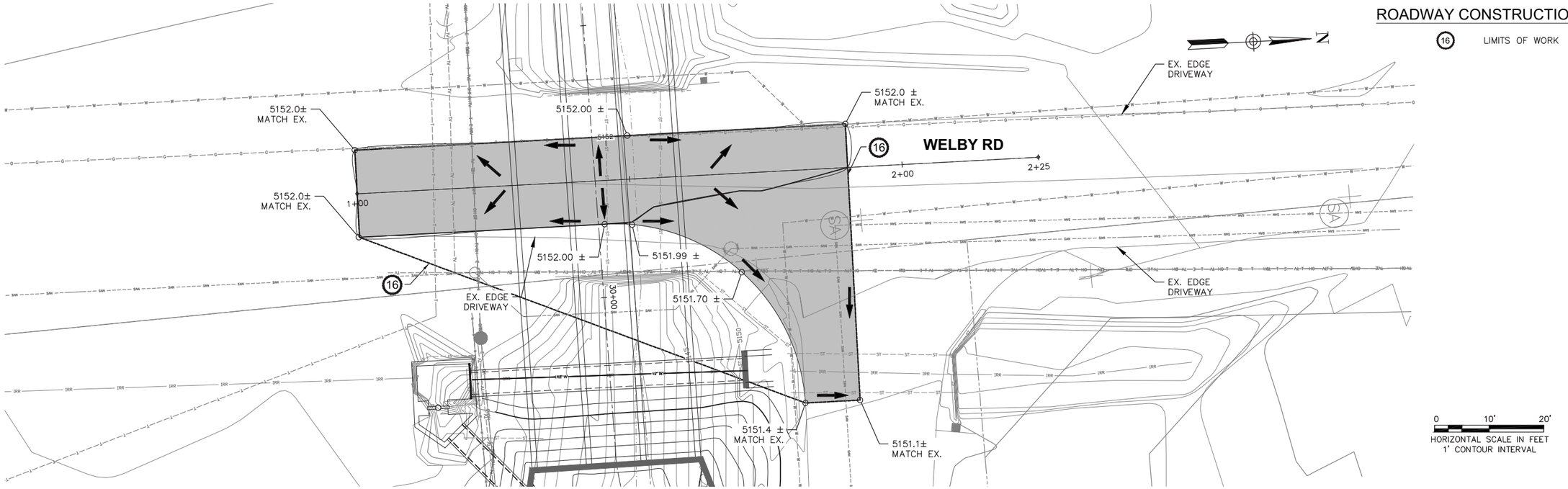
ROADWAY
PLAN AND PROFILE
WELBY ROAD

DATE
02/03/2017

DRAWING NO.
CP-3

ROADWAY CONSTRUCTION NOTES

16 LIMITS OF WORK



NOTES:

1. ELEVATION CALLOUTS SHOWN ARE AT THE 50' STATIONS, POINT OF CURVATURES, CURVE MIDPOINTS, AND POINT OF TANGENTS.

LEGEND

FULL DEPTH PAVEMENT

DIRECTION OF FLOW

COLORADO REGISTERED PROFESSIONAL ENGINEER
ROBERT EDWARD PRATT
32964
2-14-17

PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

DESIGNED: C.D. DATE: 08/17/16
DRAWN: M.W. DATE: 08/17/16
CHECKED: R.P. DATE: 01/23/17
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ADAMS COUNTY COLORADO

LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

ROADWAY GRADING
WELBY ROAD

DATE
02/03/2017

DRAWING NO.
CG-3

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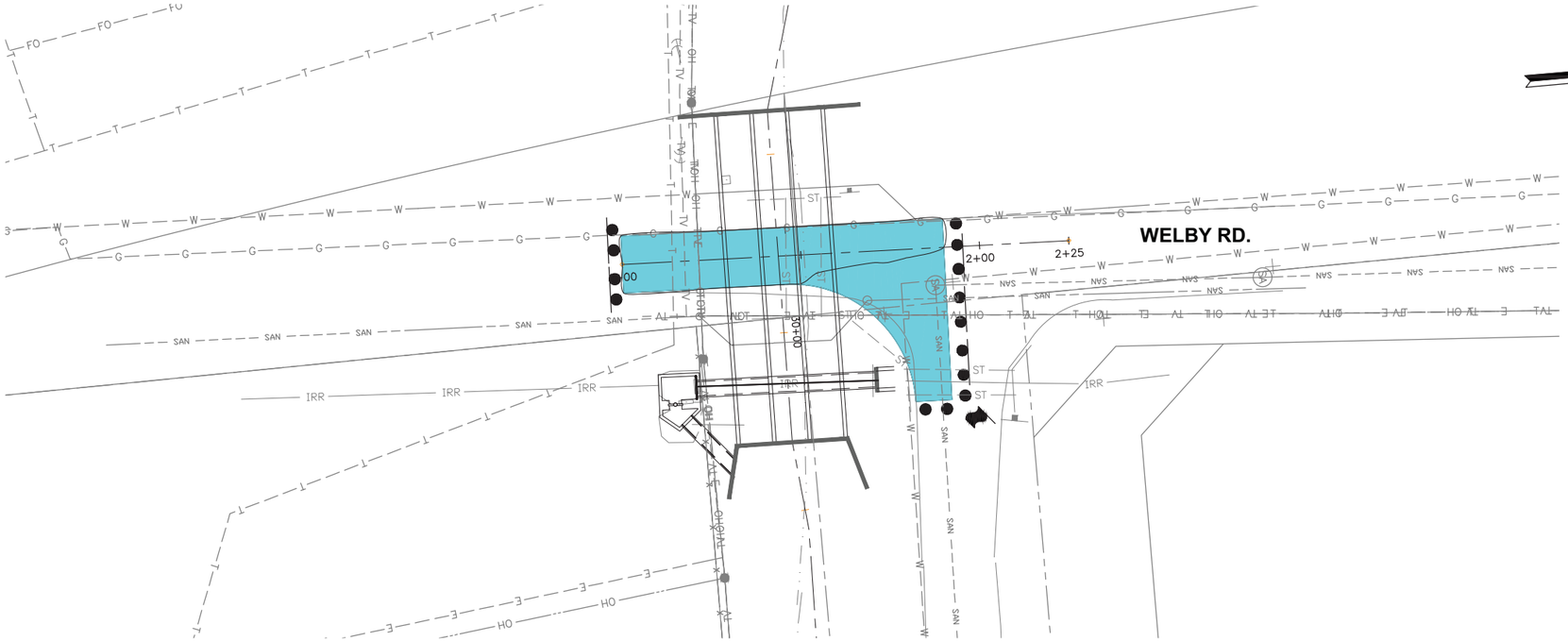
2017/02/14 1:12:24 PM by Robert.Pratt



N

0 20' 40'
HORIZONTAL SCALE IN FEET

NOTES:

1. PRIOR TO BEGINNING WORK, THE CONTRACTOR SHALL CREATE A SITE SPECIFIC AND DETAILED CONSTRUCTION TRAFFIC CONTROL PLAN WHICH COVERS ALL PHASES AND DAY/NIGHT SIGNAGE CONDITIONS OF WORK, INCLUDING FINAL SIGNING AND STRIPING.
2. THE CONSTRUCTION TRAFFIC CONTROL PLAN SHALL BE REVIEWED AND ACCEPTED BY THE APPLICABLE AGENCY PRIOR TO COMMENCING ANY WORK.
3. CONTRACTOR SHALL DESIGNATE A TRAFFIC CONTROL SUPERVISOR AS DESCRIBED IN THE CONTRACT DOCUMENTS. THE TRAFFIC CONTROL SUPERVISOR MUST BE AVAILABLE 24 HOURS A DAY THROUGHOUT THE DURATION OF CONSTRUCTION.
4. CONTRACTOR SHALL FOLLOW CDOT SECTION 630 AND STANDARD PLANS S–630–1 AS THE BASELINE FOR ALL TRAFFIC CONTROL OPERATIONS.
5. PHASING DOES NOT NEED TO BE SEQUENTIAL.
6. CROSS OVER LOCATION WILL BE DEFINED BY CONTRACTOR/COUNTY.
7. CONTRACTOR TO IMPLEMENT PHASING AS NEEDED.

PHASE I

CHANNELIZING DEVICE

TYPE III BARRICADE – ROAD CLOSED

FLAGGER

TRAFFIC FLOW

PHASE I

– CLOSE EXISTING ROADWAY AT 86TH AVE
– FLAGGER NEEDED WHEN WORKING IN THE NORTHEAST PART OF THE INTERSECTION

COLORADO REGISTERED
ROBERT EDWARD PRATT
32964
2-14-17
PROFESSIONAL ENGINEER

PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

DESIGNED: C.D. DATE: 11/08/16
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ADAMS COUNTY COLORADO

LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

PHASING PLAN (PHASE I) WELBY ROAD

DATE 02/03/2017

DRAWING NO. PH-3

Stantec Consulting Inc.
2000 South Colorado Boulevard Suite 2-300
Denver CO 80222
Tel: (303) 758-4058
Fax: (303) 758-4828

Stantec

March 8, 2017

File: 187608719

Colby J. Hayden, PE
Principal
Deere & Ault Consulting
600 S. Airport Road, Suite 205
Longmont, CO 80503

Reference: Lower Hoffman Drainageway Improvement Project, Phase 1, Lower Clear Creek Canal (LCCC) Temporary Bypass Review; D&A Job No. CG-0199-040.00

Dear Mr. Hayden:

In response to your review letter dated March 2, 2017 regarding the Lower Hoffman Drainageway Improvement Project Design Review, we have addressed your comment as follows:

1. *The main concern with the temporary bypass is a potential to impact the properties along the LCC upstream of the bypass. The hydraulic analysis presented calculate a normal depth of 4 feet in the pipe at a design flow rate of 50 cfs. Adding entrance loss at the upstream end of the culvert and losses through the approach channel upstream of the culvert, the depth of flow through the neighborhood may be somewhat greater than 4 feet. This may prove problematic as the grading plan provided labels the ditch invert at 5122.05 feet and the top of bank contour is 5126.0 feet. The hydraulic analysis should be expanded to include a determination of the hydraulic grade line in the existing LCC channel upstream of the temporary bypass. The hydraulic grade line should then be compared to the top of bank elevation and the available freeboard in the ditch calculated. We recommend that the RRP team develop this analysis and present it for review.*

   A full backwater analysis has been completed for the LCCC between the existing channel downstream of the temporary bypass and the existing open channel portion of the LCCC south of the proposed improvements. Based on this HEC-RAS analysis, the max water surface is approximately 5125.43 feet resulting in an available freeboard of nearly 7-inches. See Appendix A for the results of the analysis.

2. *The LCC Board should consider including language in the agreement regarding liability for damage to upstream properties due to the temporary bypass installation. The need for RRP to monitor the bypass for blockage or erosion, and provide on-going cleaning and maintenance should also be addressed.*

   Noted. RRP has accepted liability for damage by signing the License Agreement. Per Section 8 (Liability and Idemnification) of the agreement, RRP agrees to indemnify, defend, and hold harmless the Ditch Company, the County, and the District, their trustees, directors, officers, agents, employees and contractors, from all claims and liability for damage or injury to property or persons arising from or caused by: the acts or omissions of Licensees related to the engineering, preparation, or construction of the Installation; and the Licensees' use of the Installation. This obligation does not extend to any negligent act or omission of the Ditch Company, the County, or the District.

3. *It appears a temporary coffer dam will need to be added between the north end of the LCC span construction and the City of Thornton's diversion structure. Water diverted into Thornton's flume would need to be conveyed from the Hoffman channel north of the diversion. The LCC and/or the City of Thornton should consult with the Water Commissioner regarding any special water accounting which may be needed to divert LCC water through Thornton's diversion after it has been comingled with water in the Hoffman drainage.*

Agreed. A temporary dam has been included on the north end of the temporary diversion to direct ditch flow to the diversion structure. Because the existing condition allows for comingling of Hoffman Drainage there should not be any change in the accounting as discussed with the LCC.

4. *The estimated timeframe that the diversion will remain in-place should be provided for discussion.*

   The proposed temporary bypass will be in place for approximately four (4) months during construction of the flume structure. A coordinated effort will be required to close the bypass and tie into the constructed flume.

Thank you for your review of the Temporary Bypass of the Lower Clear Creek Canal. We believe this completes the review at this location. If there are any questions or any additional data requirements, please contact me at (303) 285-4594. We will issue the plans for construction.

Sincerely,

STANTEC CONSULTING INC.

Colin Haggerty, PE
Tel: (303) 285-4594
Colin.Haggerty@Stantec.com

c. Matt Stockton; Lower Clear Creek Ditch Company
Russ Nelson, PE; Adams County
David Skoudas, PE, LEED AP; UDFCD
Jim Kaiser, PE CFM; City of Thornton
Shawn Plichta, Regional Rail Partners
John Griffith, PE; Stantec

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TO: LOWER CLEAR CREEK CANAL COMPANY; RRP; UDFCD; ADAMS COUNTY

FROM: COLIN HAGGERTY, RRP/STANTEC

SUBJECT: DESIGN MEMORANDUM – HOFFMAN DRAINAGEWAY PROJECT
LOWER CLEAR CREEK CANAL TEMPORARY BYPASS

1.0 Introduction

The Hoffman Drainageway Project is proposed to remove homes and businesses from the 100-year floodplain between Steele Street and 88th Avenue in Adams County, Colorado. Residents living along the drainageway have reported several instances of flooding. As a result, the Urban Drainage and Flood Control District (UDFCD) and Adams County initiated this project of improving the Lower Hoffman Drainageway following recommendations made with the 2010 Master Plan. The project will improve the channel to convey the full 100-year flood flow, which will eliminate the large overland flow area upstream of the Lower Clear Creek Canal (LCCC) currently shown on the FIRM.

The Hoffman Drainageway crosses the LCCC south of 86th Avenue east of Steele Street. Currently, the Hoffman Drainageway discharges directly into the LCCC at the south side of 86th Avenue. Overflows are diverted back to the Hoffman drainageway and ultimately the improved channel east of the canal. This project will construct an open channel section below the grade of the LCCC for conveyance of the 100-year flood. An 8' x 4' concrete flume structure 43' in length is proposed to convey the decreed flow of 150 cfs in the LCCC over the improved Hoffman Channel.

At the location of the crossing, the existing LCCC facility consists of an open trapezoidal channel approximately 3.5-feet deep with a bottom width approximately 10-feet across and a top width of approximately 17-feet wide flowing from south to north. The intent of this report is to summarize and document the design criteria, technical analyses, design components, and construction considerations that were developed during the design process for the LCCC improvements over the Lower Hoffman Drainageway.

This memo will summarize the proposed improvements needed in the interim condition to construct the concrete flume. The temporary bypass will allow ditch flows to continue offline while construction occurs online. To convey temporary flows, a 60" Corrugated Metal Pipe (CMP) is proposed to provide conveyance.

2.0 Design

2.1 Hydraulics

The longitudinal grade of the temporary culvert was set to match the inverts for the proposed flume. Based on these points, the slope of the pipe will be 0.19% over 88 LF. The lower slope is due to the additional length of pipe to get flows north to the existing channel. In order to fully assess the impact of the temporary facility on the adjacent properties, a backwater calculation was completed. The US Army Corps of Engineers HEC-RAS program was utilized to model the temporary configuration. Per the LCCC, a

flow rate of 50 cfs was modeled and the water surface elevations were compared to the existing top of bank south of the improvements. Based on the proposed analysis, the maximum water surface elevation between the temporary bypass and the culvert under 85th Ave. Based on this analysis, the proposed temporary culvert is sufficient for the temporary condition of this bypass facility.

Upstream of the proposed flume will be plugged with sand bags or compacted clay material on the side exposed to water. The downstream side will tie into the existing channel. The existing concrete channel, spill structure, and Thornton's bifurcation structure will be left in place during construction to allow for flows to be discharged if needed. A secondary berm will be provided on the north side of the flume construction to prevent flow from backflow from impacting the work site.

3.0 Summary

The proposed temporary CMP for the Lower Clear Creek Canal will sufficiently convey the current available flow of approximately 50 cfs from the existing open trapezoidal channel on the south to the existing Hoffman Drainageway on the north.

Attachment 1

By: Colin Haggerty **Date:** 3/8/17
Checked By: Andy Stone **Date:** 3/8/17

Contents:

- **HEC-RAS output, 5 pages**
- **Bypass Plan, 1 page**

HEC-RAS Plan: Temp River: LCCC Reach: Temp Profile: Temp

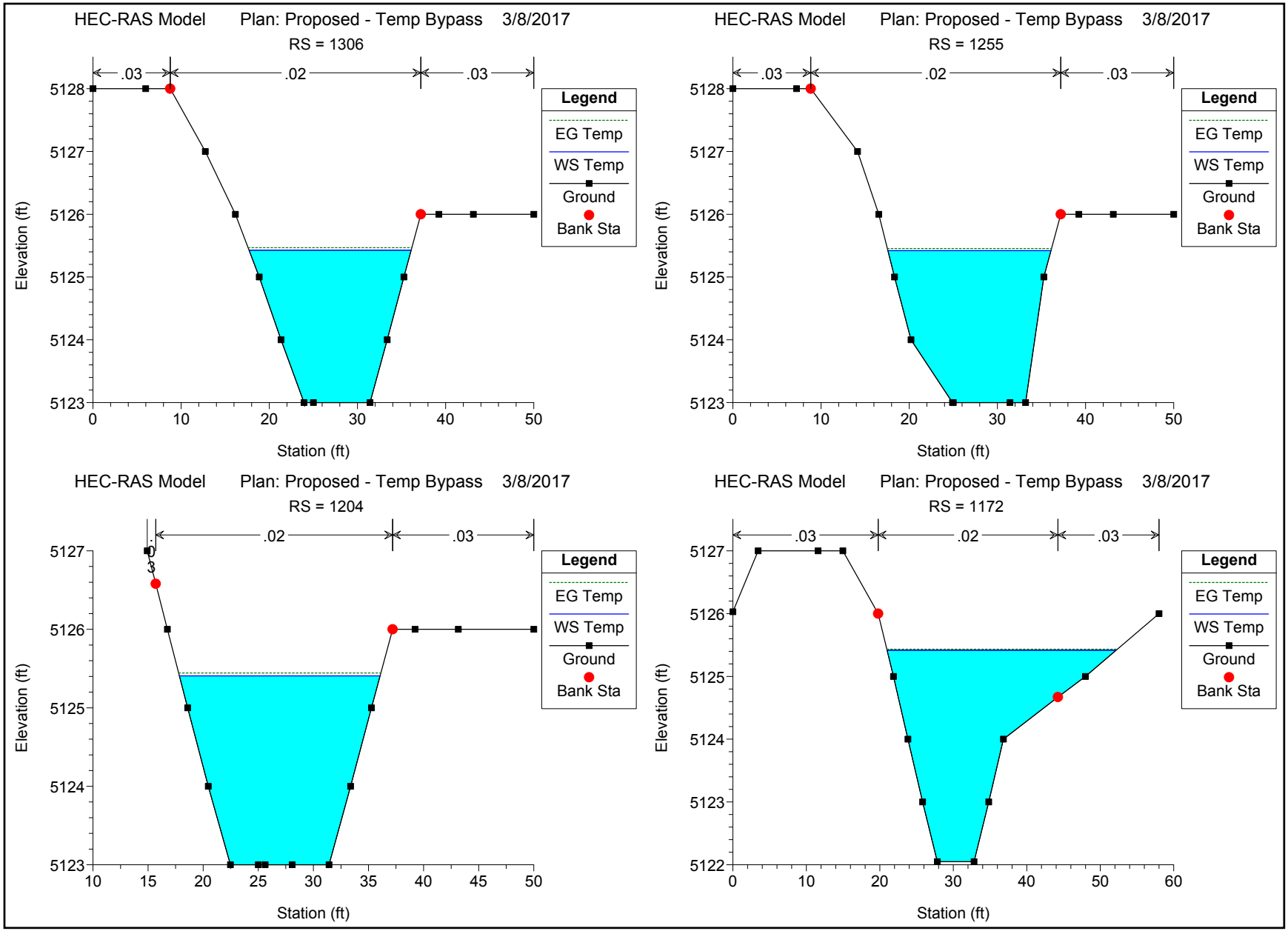
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Temp	1306	Temp	50.00	5123.00	5125.43		5125.47	0.000242	1.59	31.42	18.39	0.21
Temp	1255	Temp	50.00	5123.00	5125.42		5125.45	0.000190	1.47	34.10	18.50	0.19
Temp	1204	Temp	50.00	5123.00	5125.41		5125.44	0.000208	1.52	32.83	18.21	0.20
Temp	1172	Temp	50.00	5122.05	5125.42		5125.43	0.000089	1.07	49.08	31.15	0.13
Temp	1153	Temp	50.00	5122.05	5125.37	5123.37	5125.42	0.000242	1.79	27.92	11.74	0.20
Temp	1149		Culvert									
Temp	1102	Temp	50.00	5121.88	5123.92		5124.12	0.001601	3.58	13.98	8.83	0.50
Temp	1051	Temp	50.00	5121.80	5124.01	5122.64	5124.06	0.000253	1.68	29.86	16.44	0.22
Temp	1038		Culvert									
Temp	1000	Temp	50.00	5122.50	5123.52	5123.44	5123.86	0.005003	4.72	10.60	11.81	0.88

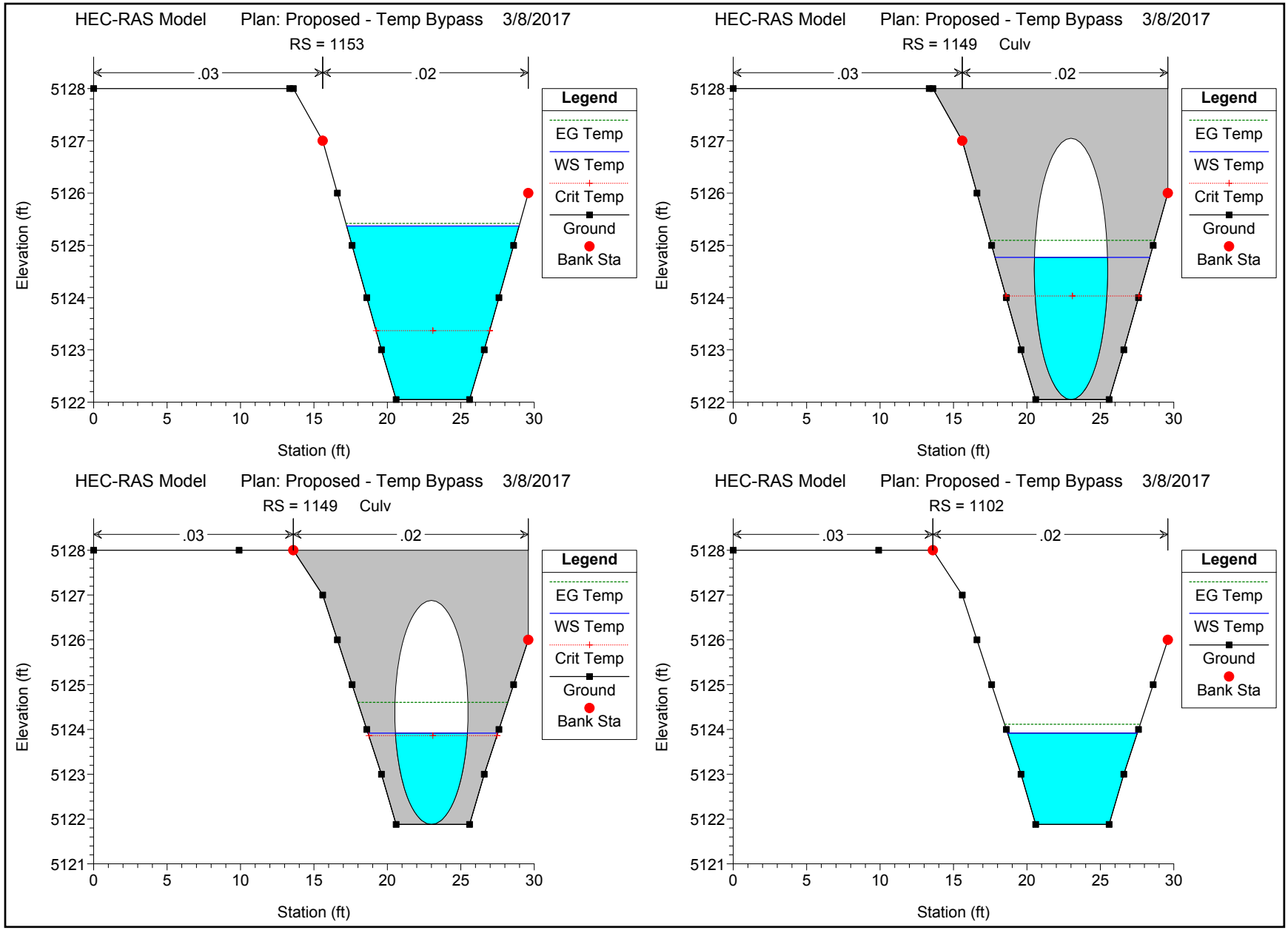
Plan: Temp LCCC Temp RS: 1149 Culv Group: Culvert #1 Profile: Temp

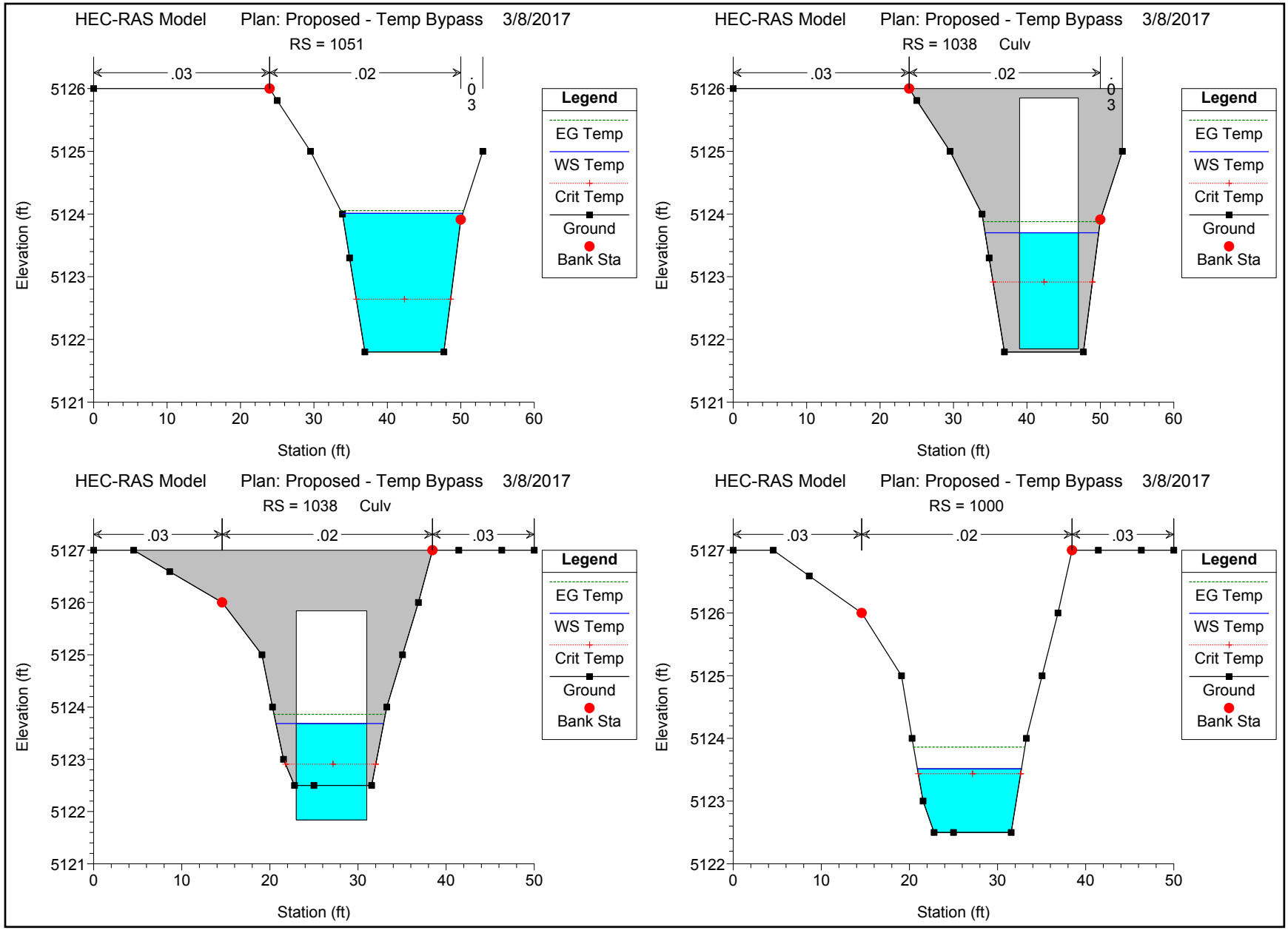
Q Culv Group (cfs)	50.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	4.58
Q Barrel (cfs)	50.00	Culv Vel DS (ft/s)	6.65
E.G. US. (ft)	5125.42	Culv Inv El Up (ft)	5122.05
W.S. US. (ft)	5125.37	Culv Inv El Dn (ft)	5121.88
E.G. DS (ft)	5124.12	Culv Frctn Ls (ft)	0.49
W.S. DS (ft)	5123.92	Culv Exit Loss (ft)	0.49
Delta EG (ft)	1.31	Culv Entr Loss (ft)	0.33
Delta WS (ft)	1.45	Q Weir (cfs)	
E.G. IC (ft)	5124.97	Weir Sta Lft (ft)	
E.G. OC (ft)	5125.42	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	5124.77	Weir Max Depth (ft)	
Culv WS Outlet (ft)	5123.92	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	3.51	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.98	Min El Weir Flow (ft)	5128.01

Plan: Temp LCCC Temp RS: 1038 Culv Group: Culvert #1 Profile: Temp

Q Culv Group (cfs)	50.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	3.38
Q Barrel (cfs)	50.00	Culv Vel DS (ft/s)	3.39
E.G. US. (ft)	5124.06	Culv Inv El Up (ft)	5121.85
W.S. US. (ft)	5124.01	Culv Inv El Dn (ft)	5121.84
E.G. DS (ft)	5123.86	Culv Frctn Ls (ft)	0.02
W.S. DS (ft)	5123.52	Culv Exit Loss (ft)	0.00
Delta EG (ft)	0.19	Culv Entr Loss (ft)	0.18
Delta WS (ft)	0.50	Q Weir (cfs)	
E.G. IC (ft)	5123.70	Weir Sta Lft (ft)	
E.G. OC (ft)	5124.06	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	5123.70	Weir Max Depth (ft)	
Culv WS Outlet (ft)	5123.68	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.21	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	1.07	Min El Weir Flow (ft)	5127.01


HEC-RAS Model Plan: Proposed - Temp Bypass 3/8/2017
RS = 1306
.03
.02
.03
Elevation (ft)
Station (ft)
Legend
EG Temp
WS Temp
Ground
Bank Sta
HEC-RAS Model Plan: Proposed - Temp Bypass 3/8/2017
RS = 1255
.03
.02
.03
Elevation (ft)
Station (ft)
Legend
EG Temp
WS Temp
Ground
Bank Sta
HEC-RAS Model Plan: Proposed - Temp Bypass 3/8/2017
RS = 1204
.02
.03
Elevation (ft)
Station (ft)
Legend
EG Temp
WS Temp
Ground
Bank Sta
HEC-RAS Model Plan: Proposed - Temp Bypass 3/8/2017
RS = 1172
.03
.02
.03
Elevation (ft)
Station (ft)
Legend
EG Temp
WS Temp
Ground
Bank Sta


HEC-RAS Model Plan: Proposed - Temp Bypass 3/8/2017
RS = 1153
.03
.02
Elevation (ft)
Station (ft)
Legend
EG Temp
WS Temp
Crit Temp
Ground
Bank Sta
HEC-RAS Model Plan: Proposed - Temp Bypass 3/8/2017
RS = 1149 Culv
.03
.02
Elevation (ft)
Station (ft)
Legend
EG Temp
WS Temp
Crit Temp
Ground
Bank Sta
HEC-RAS Model Plan: Proposed - Temp Bypass 3/8/2017
RS = 1149 Culv
.03
.02
Elevation (ft)
Station (ft)
Legend
EG Temp
WS Temp
Crit Temp
Ground
Bank Sta
HEC-RAS Model Plan: Proposed - Temp Bypass 3/8/2017
RS = 1102
.03
.02
Elevation (ft)
Station (ft)
Legend
EG Temp
WS Temp
Ground
Bank Sta


HEC-RAS Model Plan: Proposed - Temp Bypass 3/8/2017
RS = 1051
.03
.02
.03
Elevation (ft)
Station (ft)
Legend
EG Temp
WS Temp
Crit Temp
Ground
Bank Sta
HEC-RAS Model Plan: Proposed - Temp Bypass 3/8/2017
RS = 1038 Culv
.03
.02
.03
Elevation (ft)
Station (ft)
Legend
EG Temp
WS Temp
Crit Temp
Ground
Bank Sta
HEC-RAS Model Plan: Proposed - Temp Bypass 3/8/2017
RS = 1038 Culv
.03
.02
.03
Elevation (ft)
Station (ft)
Legend
EG Temp
WS Temp
Crit Temp
Ground
Bank Sta
HEC-RAS Model Plan: Proposed - Temp Bypass 3/8/2017
RS = 1000
.03
.02
.03
Elevation (ft)
Station (ft)
Legend
EG Temp
WS Temp
Crit Temp
Ground
Bank Sta

GENERAL NOTES:
1. LOCATIONS OF UTILITIES ARE APPROXIMATE ONLY. CONTRACTOR TO VERIFY HORIZONTAL AND VERTICAL LOCATIONS OF ALL UTILITIES PRIOR TO CONSTRUCTION.
2. CMP SHALL BE INSTALLED PER CDOT M STANDARD M-206-1 AND PROJECT SPECIFICATIONS. BACKFILL SHALL BE SCREENED NATIVE MATERIAL.
3. TEMPORARY DITCH PLUG SHALL BE LINED WITH SAND BAGS OR COMPACTED CLAY MATERIAL ON SIDE EXPOSED TO WATER.

N

PROPERTY LINE

HOFFMAN CHANNEL CL

45+00

ALIGNMENT=C-STRM-LCCC-BYPASS
Station=10+00.00
N=736107.1465
E=155392.6896
INV. 5122.05'

CHECK DAM

TIE IN TO EXISTING CHANNEL SIDE SLOPE

10+00

88 LF OF 60" CMP @ 0.19%

10+88

5' BOTTOM WIDTH
1:1 SIDE SLOPES
TEMPORARY CHANNEL

WINGWALL NOT TO BE CONSTRUCTED UNTIL AFTER BYPASS IS REMOVED

EXISTING FENCE TO BE REMOVED

EXISTING HOFFMAN CHANNEL

EXISTING OVERHEAD ELECTRIC

ALIGNMENT=C-STRM-LCCC-BYPASS
Station=10+87.74
N=736194.0923
E=155404.5037
INV. 5121.88'

EXISTING 8' X 4' BOX CULVERT

EXISTING CHANNEL TO REMAIN

EXISTING LCCC OPEN CHANNEL

CONTRACTOR TO BERM EXISTING CHANNEL SEE NOTE 3

EXIST. HEADWALL TO REMAIN

SEDIMENT CONTROL LOG

PROPOSED 8'X4' CONCRETE U-CHANNEL SEE SHEET S-3

CONTRACTOR TO BERM EXISTING CHANNEL SEE NOTE 3

EXISTING FENCE TO REMAIN IN PLACE

EXISTING CONCRETE OVERFLOW TO REMAIN

46+00

EXISTING FENCE TO BE REMOVED

LIMITS OF EXISTING STRUCTURE AND FLUME

SA

EXISTING FENCE TO REMAIN IN PLACE

HOFFMAN CHANNEL CL

86TH

BYPASS PLAN – LOWER CLEAR CREEK CANAL

0 10 20 30
SCALE IN FEET

PROJECT NAME: LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS

DESIGNED: D.C.	DATE: 2/10/17		
DRAWN: S.L.H.	DATE: 2/10/17		
CHECKED: C.H.	DATE: 2/10/17		
REVISED:	DATE:		
REVISED:	DATE:		
REVISED:	DATE:		

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URBAN DRAINAGE AND FLOOD CONTROL DISTRICT
UDFCD PROJECT NO. 106266

ADAMS COUNTY COLORADO

LOWER HOFFMAN DRAINAGEWAY IMPROVEMENTS PROJECT

LOWER CLEAR CREEK CANAL BYPASS PLAN

DATE 02/03/2017

DRAWING NO. DS-12