CHERRY CREEK RESTORATION PROJECT – EAST ILIFF AVENUE TO QUEBEC STREET

Final Report

Prepared for:

Watershed/Stream Restoration Grant
Attn: Chris Sturm

December 2021

Grantee: City and County of Denver
Fiscal Agent: Mile High Flood District
Grant Amount: $500,000

Prepared by: Joe Juergensen & Melanie Chenard
Muller Engineering Company
Muller Project Number: 13-003.05

MILE HIGH FLOOD DISTRICT

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1 INTRODUCTION

The Cherry Creek Restoration Project restored a one-mile reach of the Cherry Creek corridor in City and County of Denver and Arapahoe County, Colorado. Prior to the project, this reach of Cherry Creek was experiencing severe degradation leaving a 10 to 20-foot deep eroded/incised channel with vertical banks that is not connected to the floodplain. This reach of Cherry Creek is also bound on both sides by development and extensive infrastructure and contains the Denver metro area's most heavily used regional trail that connects Douglas, Arapahoe, and Denver Counties to the South Platte River. As such, the degradation imposed a significant threat and safety concerns for people, property, and the environment. The ongoing degradation resulted in these impairments to the stream corridor:

Photo 1: Pre-Construction Bank Erosion

- Lack of floodplain connection
- Lowering groundwater table
- Loss of a riparian habitat
- Diminishing wetlands
- Diminishing aquatic and terrestrial habitat
- Diminishing water quality
- Eroding banks
- Potential loss of utilities and storm outfalls,
- Potential loss of residential lots, roads, and trails
- Unsafe open space and park for users.

In response to the degraded condition of the site, a corridor restoration project was initiated in March of 2017 by the City and County of Denver, Arapahoe County, Mile High Flood Control District (MHFD), Southeast Metro Stormwater Authority (SEMSWA), and Denver Water for this one-mile reach of Cherry Creek.

2 BACKGROUND

The project site is located approximately 2.5 miles northwest (downstream) of the Cherry Creek Dam, between East Iliff Avenue and Quebec Street. The upstream, southern portion of the project is located in unincorporated Arapahoe County, and the downstream, northern portion is located in the City and County of Denver. Prior to the project, a large portion of the project reach was owned by Denver Water. The project area is shown in Figures 1 and 2 below.

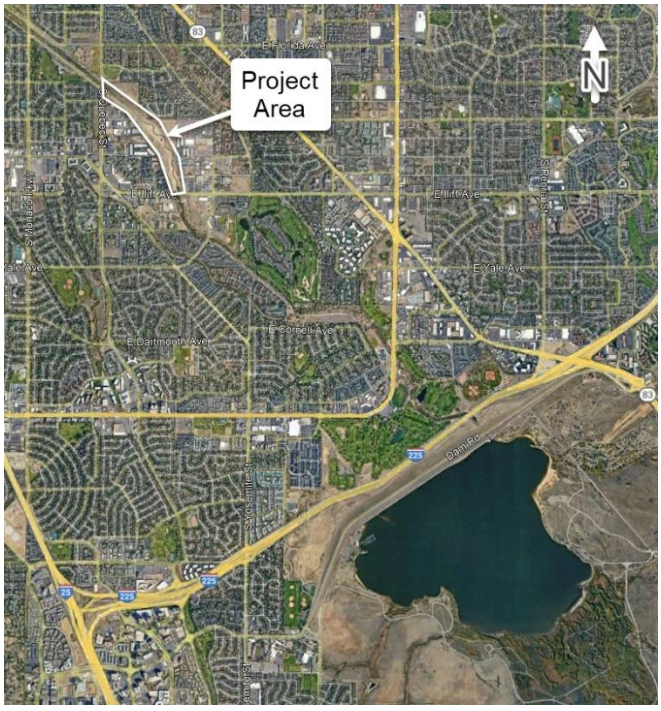


Figure 1: Project Vicinity Map

A design phase of work was initiated in March 2017. The design team consisted of the following partners:

- Muller Engineering, Engineer
- Stream Design, Landscape Architect
- Pinyon Environmental, Hazardous Materials Investigation
- Great Ecology, Revegetation
- Corvus Environmental, Environmental Permitting
- CTL Thompson, Geotechnical
- ERC, Geomorphology
- Hydrosystems KDI, Irrigation
- Topographic Land Surveyors, Survey
- Harris Kocher Smith, Utilities

As a first step of design, an assessment of the pre-project site conditions was completed, including the following actions:

- Site reconnaissance – completed by Muller, Stream, ERC to assess existing site and truth improvement plan.
- Topographic survey – Topographic Land Surveyors completed full survey of the entire open space corridor.
- Geotechnical investigation – several borings were completed by CTL Thompson to characterize soil conditions and define bedrock and groundwater elevations.
- Hazardous materials investigation – Pinyon Environmental completed several test pits throughout the project site. Asbestos and rubble was discovered in several locations. A materials management plan was developed to guide excavation/earthwork operations with support of Certified Asbestos Building Inspectors (CABIs) to ensure proper handling and disposal of any asbestos encountered.
- Utility investigation – Harris Kocher Smith provided SUE services to locate all potential utility conflicts.

Figure 2: Project Area Map

- Wetland and waters of the U.S. delineations and T&E/Cultural evaluation – completed by Corvus Environmental to determine impacts caused by the project and propose mitigation measures.
- Geomorphic evaluation – completed by Muller and ERC to define parameters for the proposed active channel planform and cross section geometry.
- Hydraulic modeling of existing conditions – completed by Muller to confirm the instability of the existing incised, sandy channel.
- Land transfer – Denver Water transferred 26 acres of their property along Cherry Creek to the City and County of Denver and Arapahoe County to be used as open space. (Portion of their property within the project limits, as shown in Figure 2.)

A series of photos showing pre-project conditions is presented in **Appendix A**.

The pre-project evaluation described above supported the need for corrective action in the form of a corridor restoration project. The purpose of the Cherry Creek Corridor Improvement Project was to improve aquatic, wetland, and riparian habitat, restore ecologic function and maintain flood conveyance. Following are the identified objectives of the project:

- Restore the stream health
- Restore ecologic process
- Connect the stream and its floodplain

- Protect people, property, and the environment from erosion and flood hazards
- Protect the downstream watershed
- Provide for local pedestrian connectivity from the adjacent community to the stream corridor
- Provide for regional pedestrian mobility between Denver, Arapahoe County, and Douglas County
- Enhance instream water quality and water quality for existing tributary areas
- Enhance water quality for proposed roadway project at Iliff
- Create an open space for passive and active recreation

3 METHODS

The first step in accomplishing the objectives listed in **Section 2** of this report was to design improvements to restore and stabilize the stream corridor. The design proposed to raise the active channel several feet from its degraded invert elevation. Floodplain benches were then graded adjacent to the active channel to restore floodplain connectivity, expand the riparian corridor, and improve flood capacity. See the example cross section in Figure 3 below. The raised active channel was stabilized with 16 riffle structures and 4 sculpted concrete drop structures. Other stabilization improvements included approximately 10,000 feet of bioengineered bank protection and 160,000 cubic yards of grading. The revegetation plan included planting of 287 trees, 95 cottonwood poles, 1928 willow stakes, 73,700 wetland plugs, and 40 acres of native seeding ranging from wetland to upland seed mixes. An irrigation system was also designed to help with vegetation establishment.

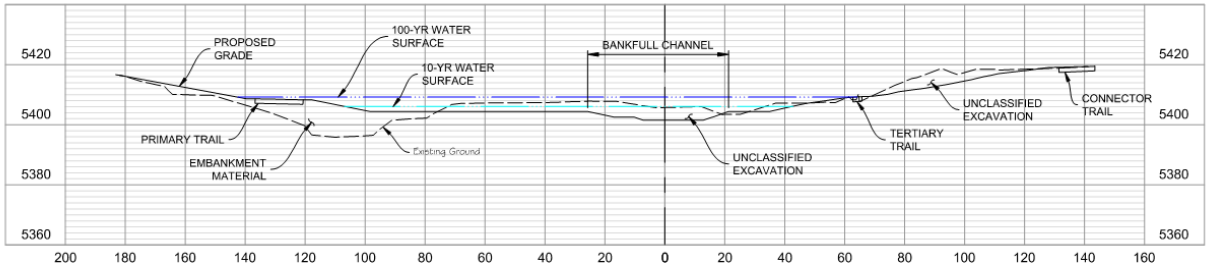


Figure 3: Example Cross Section

Nine storm sewer outfalls enter Cherry Creek within the project reach. Each outfall needed to be retrofitted to work with the new stream alignment and elevation. In addition, pretreatment swales and settling basins were designed downstream of most outfalls to enhance water quality prior to entering the creek. Infiltration areas were designed in the new floodplain benches at the upstream end of the project to provide formal water quality treatment for two of the storm sewer outfalls that are to drain upcoming roadway improvements along Iliff Avenue.

In addition to the stream stabilization and storm sewer design, extensive recreational improvements were designed as part of the project. These improvements included relocating the concrete regional Cherry Creek trail to be in closer proximity to the creek, as well as adding a soft surface shoulder adjacent the regional trail and a secondary soft surface trail on the opposite side of the creek from the regional trail. Three stream crossings were designed to provide access to both sides of the creek and access over an existing tributary channel and three rest areas were added along the regional trail.

The design phase of work is reflected in the following documents. These documents are not included in this report, but will be submitted separately to CWCB.

- Cherry Creek Corridor Improvements (Quebec to Iliff) Construction Drawings, prepared by Muller Engineering Company and Stream Landscape Design, September 2019.
- Cherry Creek Corridor Improvements (Quebec Street to East Iliff Avenue) Phase III Drainage Report, prepared by Muller Engineering Company, Revised September 2019
- Cherry Creek Corridor Improvements (Quebec Street to East Iliff Avenue) Contract Documents/Project Specifications, prepared by Muller Engineering, June 2019

As part of the design process, 404 Permitting was completed through the U.S. Army Corps of Engineers by Corvus Environmental from September 2018 to May 2019. Similarly, a Conditional Letter of Map Revision (CLOMR) was completed by Muller Engineering Company from July 2018 to July 2019. Ultimately, the design phase was completed in August 2019.

Through MHFD's Project Partners process, Concrete Express, Inc. (CEI) was selected to construct the designed improvements. CEI then hired Western States Reclamation to assist with revegetation efforts. CEI and Western States were brought on during the design phase to consult on the feasibility of the designed improvements, guide construction phasing, and assist with cost estimating. Once design was complete, CEI and Western States were contracted to start construction. The construction phase started in September of 2019 and was substantially completed in November 2021. A supplemental shrub planting phase is scheduled to take place in Fall of 2022.

A construction oversight team was formed by the project sponsors to oversee the construction operation and inspect construction of the proposed improvements. This team included:

- Muller Engineering – construction management and inspection
- City and County of Denver – inspection of civil and temporary erosion control measures
- CTL Thompson – soil testing, moisture/density testing, concrete and asphalt testing
- Pinyon Environmental – CABI oversight and hazardous materials inspection
- Stream Design and Great Ecology – soil preparation/testing, seeding, and planting inspection

Some of the more non-traditional construction highlights are listed below:

- CABIs were onsite for all earth work operations within known landfill areas to identify and help properly process and dispose of asbestos-containing debris found in the soil. Over the course of the project there were over 3,300 hours of CABI inspection and approximately 150 CY of asbestos disposed.
- The project reach is downstream of Cherry Creek Reservoir. The gates at the outlet works of the reservoir are flushed annually to clear out sediment. They rotate back and forth between large flushes (~1,300cfs) and small flushes (~250cfs) every other year. With the 2-year construction duration, this project site experienced one small flush and one large flush in the middle of construction. In addition, an unexpected 1,000 cfs release occurred. The site performed well during all reservoir release events with only minimal erosion and sedimentation occurring.
- The pre-project ground cover was in poor condition with little healthy vegetation, a high percentage of weeds and little to no reusable topsoil. To limit post-construction weed growth, existing topsoil was scalped and buried. Soil texture and nutrients were analyzed throughout the project site to fine tune the proposed mix of soil amendments, which ultimately included humate, weathered wood chips, compost, and elemental sulfur. Once the soil was prepped and amended, it was seeded and mulched and then biodegradable erosion control blanket was installed over the top in select locations.
- Stability of the improved project reach will be heavily reliant on successful vegetation establishment. During the design process, the project team considered a temporary irrigation

system to aid in vegetation establishment. Due to the size of the project area and anticipated heavy recreational use, maintenance requirements for an above-ground temporary irrigation system would be substantial. The project team determined that a permanently installed irrigation system would be more cost effective than a temporary system. While the intent is to use the system only through vegetation establishment, the system will provide flexibility for the City and County of Denver, who will take ownership of the system, to provide supplemental water as needed during dry years.

The total construction cost was approximately $12,500,000 and the total project cost was approximately $16,000,000. The CWCB grant funding of $500,000 was used for construction of a portion of the channel stabilization improvements ($350,000) and the revegetation improvements ($150,000). More detailed information regarding budget and funding is presented in **Section 6** of this report.

A summary sheet presenting the project team, site information, budget information, project schedule, project improvements, and construction highlights as well as pertinent design drawings can be found in **Appendix B**.

4 RESULTS

The benefits of the constructed finished product are already being realized. The stabilized channel has dramatically reduced erosion and sediment transport downstream. Adjacent infrastructure is protected and tall, unstable banks have been eliminated. The widened flood corridor with connected floodplain benches is providing a healthier stream system and more resilient flood corridor. Storm flows from storm sewers within the project reach are safely entering Cherry Creek with pre-treatment facilities reducing contaminants that enter the creek. The new recreational trail system is providing a safer, more scenic experience for trail users. Vegetation is already starting to establish.

Four groundwater monitoring wells installed in the channel overbanks prior to construction, and groundwater levels were monitored through the construction period. Data from one of these wells is plotted below in Figure 3. At this location, the depth to groundwater was in excess of 12 feet prior to construction. As construction progressed and the degraded channel invert was raised substantially, the groundwater depth raised accordingly with the channel invert. With the added impact of overbank excavation, the final depth to groundwater was reduced to approximately 4 feet, making the groundwater much more available to support robust vegetation growth along the stream corridor. Similar results were seen at the other three monitoring wells.

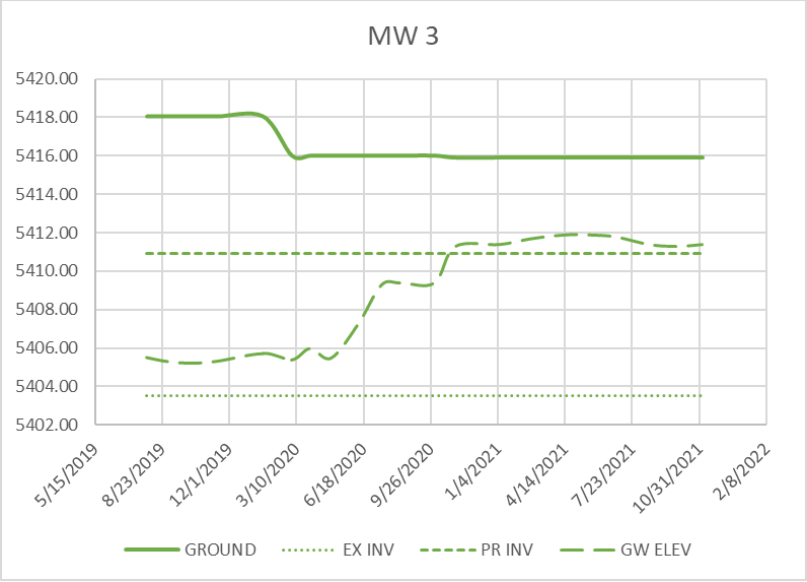


Figure 4: Groundwater Data at Monitoring Well #3

With healthier stands of vegetation that will result from the raised water table, the project will provide a much healthier and stronger flood corridor with improved conveyance that will enhance wildlife habitat. The stabilized channel and vegetative cover will improve water quality by reducing the heavy sediment loads being transported by the existing channel and by encouraging filtration and infiltration. Rich riparian ecosystem vegetation will also be achieved.

A series of photos showing the finished product are presented in **Appendix A**.

5 CONCLUSIONS AND DISCUSSION

Construction of the project improvements were completed as intended. The project was completed on time and under budget. With the exception of time needed for vegetation to establish during the next two or three growing seasons, the objectives listed in **Section 2** of this report are being achieved and the project is viewed as a success by all project stakeholders.

To help promote successful vegetation establishment, a post-construction contract has been set up with Habitat Management, Inc. to monitor vegetation, provide weed control, and complete supplemental seeding and mulching as necessary. This contract will be in place for approximately three growing seasons until vegetation is adequately established. In addition, funding is in place for a future shrub planting phase of work. This phase will be initiated once weeds are under control and spraying and mowing operations become less frequent.

As a condition of the Army Corps of Engineers Section 404 permit, annual monitoring will be conducted for a minimum of five years, or until wetland establishment is proven successful to mitigate the 0.53 acres of prior wetlands impacted by the project. While the required mitigation ratio is 1:1, the project team anticipates a much larger ratio to be realized.

An Operation and Maintenance (O&M) Plan has been developed to establish maintenance responsibilities for the various facilities within the project site. Maintenance responsibilities have been divided up between City and County of Denver, Arapahoe County, SEMSWA, and MHFD. This O&M plan will be in place for the foreseeable future to ensure the newly constructed improvements continue to function as intended. The O&M plan is provided in **Appendix C**.

This project was an extremely large and complicated effort. With it, came several key takeaways and lessons learned. Below are some examples:

- MHFD's Project Partners process was extremely valuable. This process allowed a contractor to be brought on board during design to help refine the design and plan for construction. The result was a smooth transition to construction, minimal surprises during construction, healthy working relationships, and completing the project on time and under budget.
- Installation of an irrigation system, so far, as proven to be very beneficial. With the lack of harvestable topsoil and existing sandy soils, establishing vegetation early and effectively will ensure a successful and valuable vegetative cover. The extremely dry conditions of summer 2021 would have been especially challenging without the irrigation system.
- With the presence of debris and history of construction material disposal throughout the site, the pre-construction hazardous materials investigation was a critical step to help plan for mitigation processes and cost implications during construction. The earthwork operation took more time and was more expensive than a typical stream restoration project due to the presence of debris and asbestos. The early investigation work allowed the sponsors, design and construction teams to be ready for it prior to construction.

6 ACTUAL EXPENSE BUDGET

As mentioned previously, this project was completed on time and under budget. The total construction cost, including land acquisition, was just under $13.5 Million. A breakdown of cost by task and funding source is shown in Table 1 below.

Task	Description	CWCB Grant	Stakeholder	Other Funding	Total
1	Denver Water Land Transfer	$0	$0	$1,000,000	$1,000,000
2	Channel Stabilization	$304,077	$5,175,418	$0	$5,479,495
3	Education / Recreation	$0	$2,435,040	$0	$2,435,040
4	Utility / Storm Sewer	$0	$3,564,227	$0	$3,564,227
5	Revegetation	$195,923	$776,997	$0	$972,920
TOTALS		**$500,000**	**$11,951,682**	**$1,000,000**	**$13,451,682**

Table 1: Total Construction and Land Acquisition Costs

Because this project included many elements not typical for a stream restoration project, Table 2 has been provided to reflect only the construction costs more closely associated with the stream restoration efforts.

Task	Description	CWCB Grant	Stakeholder	Other Funding	Total
1	Channel Stabilization	$304,077	$2,855,408	$0	$3,159,485
2	Education / Recreation	$0	$1,426,800	$0	$1,426,800
3	Utility / Storm Sewer	$0	$1,214,131	$0	$1,214,131
4	Revegetation	$195,923	$474,286	$0	$670,209
TOTALS		**$500,000**	**$5,970,624**	**$0**	**$6,470,624**

Table 2: Stream Restoration Construction Costs

The total project cost, including design, construction services, permitting, and post-construction monitoring is just under $17 Million. A breakdown of stakeholder funding for the overall project is shown in Table 3.

Stakeholder	Contribution
Denver	$ 4,425,000
Denver Water (cash and land)	$ 1,280,000
Arapahoe County	$ 2,090,000
SEMSWA	$ 1,300,000
UDFCD	$ 7,400,000
CWCB Grant	$ 500,000
Total	**$ 16,995,000**

Table 3: Stakeholder Funding Breakdown

A copy of the final construction pay item spreadsheet is provided in **Appendix D**.

7 REFERENCES

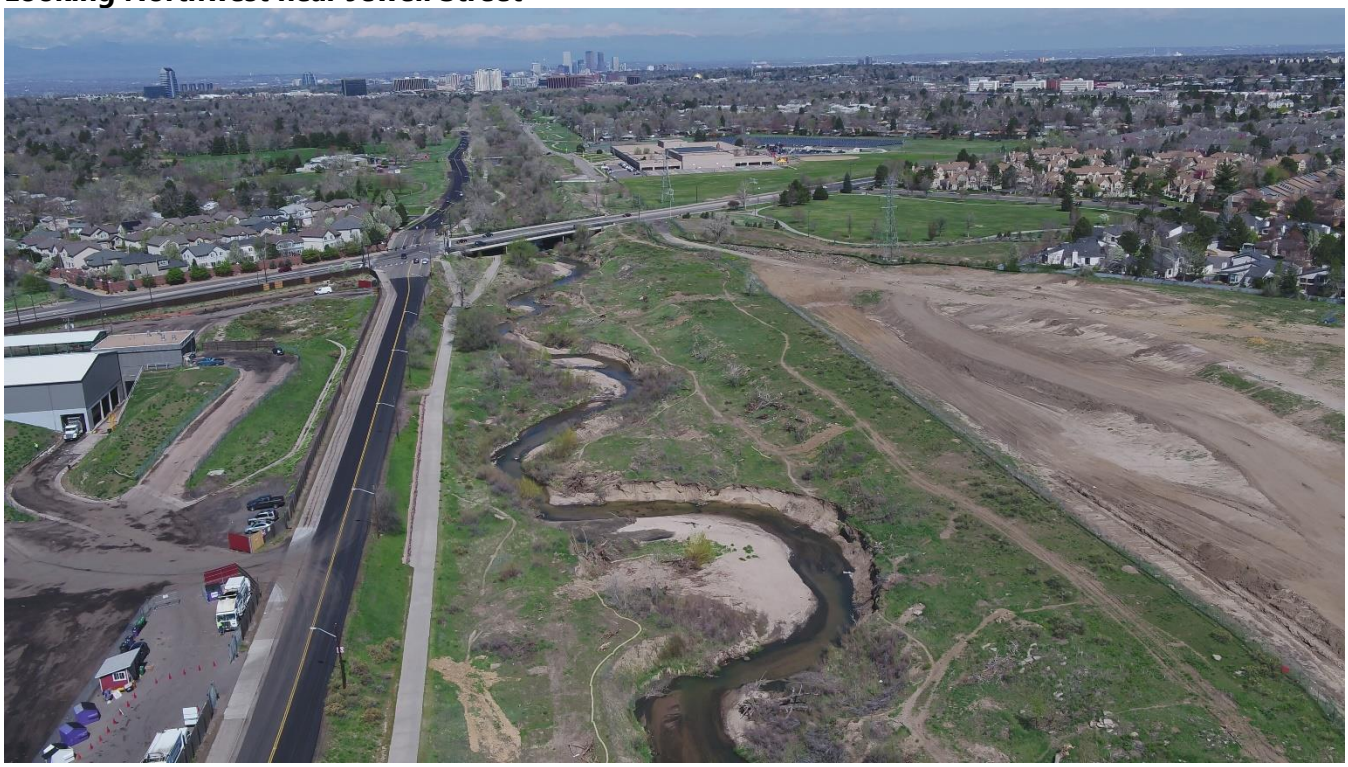
- Cherry Creek Corridor Improvements (Quebec to Iliff) Construction Drawings, prepared by Muller Engineering Company and Stream Landscape Design, September 2019.
- Cherry Creek Corridor Improvements (Quebec Street to East Iliff Avenue) Phase III Drainage Report, prepared by Muller Engineering Company, Revised September 2019
- Cherry Creek Corridor Improvements (Quebec Street to East Iliff Avenue) Contract Documents/Project Specifications, prepared by Muller Engineering, June 2019…

Appendix A

Project Photos

Looking Southeast near Jewell Street

Looking Northwest near Jewell Street



East Bank near Iliff Avenue

Looking North near Iliff Avenue

Looking Northwest to Quebec Street

Appendix B

Project Summary Sheet and Relevant Drawings

CHERRY CREEK (QUEBEC TO ILIFF) CORRIDOR IMPROVEMENT PROJECT - SUMMARY SHEET

Project Team

Sponsors:
- Mile High Flood District (MHFD)
- City and County of Denver
  - -Parks Department
  - -Dept of Transportation & Infrastructure (DOTI)
- Arapahoe County
- Southeast Metro Stormwater Authority (SEMSWA)
- Denver Water

	Company	Role
Designers:	Muller Engineering	Engineer
	Stream Design	Landscape Architect
	Pinyon Environmental	Hazardous Materials
	Great Ecology	Revegetation
	Corvus Environmental	Environmental Permitting
	CTL Thompson	Geotechnical
	ERC	Geomorphology
	Hydrosystems KDI	Irrigation
	Topographic Land Surveyors	Survey
	Harris Kocher Smith	Utilities
Constructors:	CEI	General
	Western States	Revegetation, Irrigation

Site Information

- Project Area: 40 acres
- Total Channel Length: 5,300 feet
- Total Vertical Drop: 28 feet
- 100-year Flow Rate: 5,000 cfs
- Cherry Creek Dam Big Flush: 1,300 cfs
- Cherry Creek Dam Small Flush: 250 cfs

Budget Information

- Total Construction Cost: **$12,500,000**
- Total Project Cost: **$16,000,000**

Project Schedule

- Preliminary and Final Design: March 2017 to August 2019
- Environmental Permitting: September 2018 to May 2019
- FEMA Floodplain CLOMR: July 2018 to July 2019
- Construction: August 2019 to November 2021
- Supplemental Planting: Spring/Fall 2022

Project Improvements

Civil
- 16 riffle structures
- 2 sculpted concrete trail crossing drop structures
- 1 modified grouted boulder drop structure
- 1 sculpted concrete boulder cascade tie-in drop structure
- 20,400 cubic yards of riprap (drop structures and bank protection)
- 4,420 square yards of sheet pile
- 160,000 cubic yards of earthwork
- 10,000 linear feet of bank protection
- 9 storm sewer outfall renovations with 1,650 linear feet of new or replaced reinforced concrete pipe, 10 new manholes, 3 new inlets, 9 new flared end sections
- 2 water quality diversion structures and benches

Recreation
- 3 trail crossings
- 5,300 linear feet of new primary concrete trail
- 1,900 linear feet of new secondary concrete trail
- 3,400 linear feet of new secondary soft surface trail
- 3 rest areas, 6 boulder seats, 4 trash cans, 8 dog waste stations

Revegetation
- 66,600 SY of erosion control blanket
- 287 trees, 95 cottonwood poles, 73,700 wetland plugs, 1,928 willow stakes
- 1,840 linear feet of willow logs, 40 acres of seed
- 9,200 linear feet of irrigation mainline
- 28,600 linear feet of irrigation laterals

Construction Highlights

- 24 drone flights
- 3,300 CABI hours
- 150 cubic yards of asbestos-contaminated material disposed
- 2 stabilized RACS areas (Regulated Asbestos Contaminated Soil)
- $100,000 worth of “rock” picking prior to final seeding (chunks of asphalt and concrete)
- Thousands of pounds of concrete debris
- 1 trailer, 1 couch, lots of tires, 1 perfectly preserved 1974 pocket calendar unearthed
- 1 unexpected release of 1000 cfs from Cherry Creek Dam
- 2 “mystery manholes” and 1 “mystery outfall” unearthed along 100-year-old Denver Water infiltration gallery

CONTRACT DRAWINGS FOR THE CONSTRUCTION OF:

CHERRY CREEK CORRIDOR IMPROVEMENTS
QUEBEC TO ILIFF

UDFCD PROJECT NUMBER: 100265
DENVER PROJECT NUMBER: 2018-PROJMSTR-0000023
DENVER CASDP NUMBER: 2018-EC-0000246
SEMSWA PROJECT NUMBER: CPR16-00005

SEPTEMBER 2019

- APPROVALS -

URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

SUITE #156 B
2480 W. 26TH AVE.
DENVER, COLORADO 80211
(303) 455-6277

KEN MACKENZIE, EXECUTIVE DIRECTOR — DATE

LAURA KROEGER, STREAM SERVICES PROGRAM MANAGER — DATE

BARBARA CHONGTOUA, STREAM SERVICES PROJECT MANAGER — DATE

DENVER PUBLIC WORKS

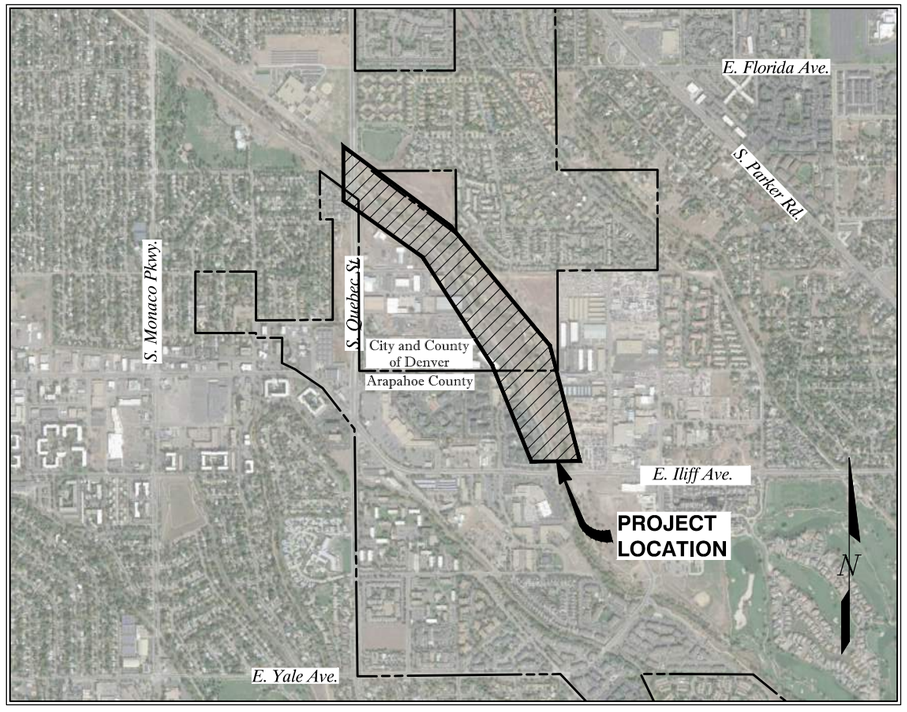
THOMAS BLACKMAN, P.E. — DATE
CITY PROJECT MANAGER

DENVER PARKS AND RECREATION

HAPPY HAYNES — DATE
EXECUTIVE DIRECTOR OF DENVER PARK AND RECREATION

ARAPAHOE COUNTY OPEN SPACE

SHANNON CARTER — DATE
OPEN SPACE AND INTERGOV. RELATIONS DIRECTOR



LOCATION MAP

0' 500' 1000'

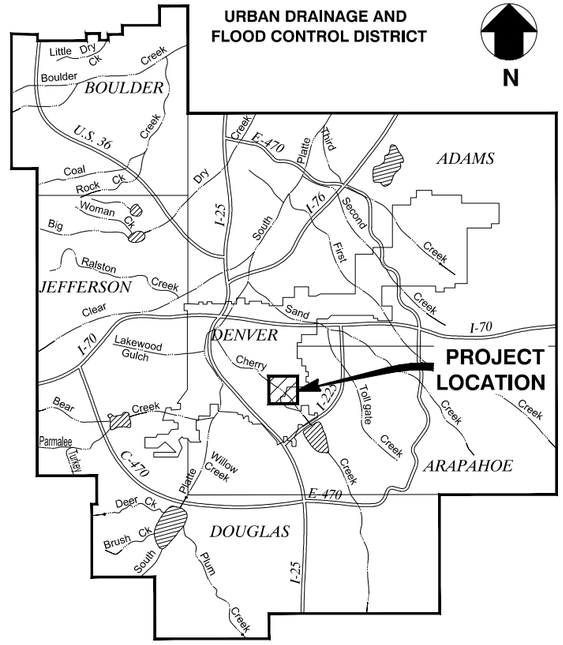
SOUTHEAST METRO STORMWATER AUTHORITY

PAUL DANLEY, P.E. — DATE
EXECUTIVE DIRECTOR

MULLER ENGINEERING

"I HEARBY AFFIRM THAT THESE FINAL CONSTRUCTION PLANS FOR THE CHERRY CREEK QUEBEC TO ILIFF IMPROVEMENTS WERE PREPARED BY ME (OR UNDER MY DIRECT SUPERVISION) IN ACCORDANCE WITH THE REQUIREMENTS OF THE ARAPAHOE COUNTY ROADWAY DESIGN AND CONSTRUCTION STANDARDS AND THE SEMSWA STORM WATER MANAGEMENT MANUAL AND THE STORM DRAINAGE AND SANITARY CONSTRUCTION DETAILS AND TECHNICAL SPECIFICATIONS AND THE STORM DESIGN AND TECHNICAL CRITERIA OF THE CITY AND COUNTY OF DENVER."

JOSEPH P. JUERGENSEN — DATE
REGISTERED PROFESSIONAL ENGINEER
COLORADO PROFESSIONAL ENGINEER NO. 35809



VICINITY MAP

ARAPAHOE COUNTY

DEPARTMENT OF PUBLIC WORKS AND DEVELOPMENT APPROVAL BLOCK

ARAPAHOE COUNTY ENGINEERING CASE NUMBER: E19-028

PREPARED UNDER THE SUPERVISION OF
COLORADO LICENSED — 35809 — 9/4/19 — PROFESSIONAL ENGINEER

DESIGNED: SDW
DRAWN: MAB
CHECKED: MDC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY

MULLER ENGINEERING COMPANY
stream landscape architecture + planning

CHERRY CREEK CORRIDOR IMPROVEMENTS

GENERAL

TITLE SHEET

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SHEET NO.: 1 OF 114

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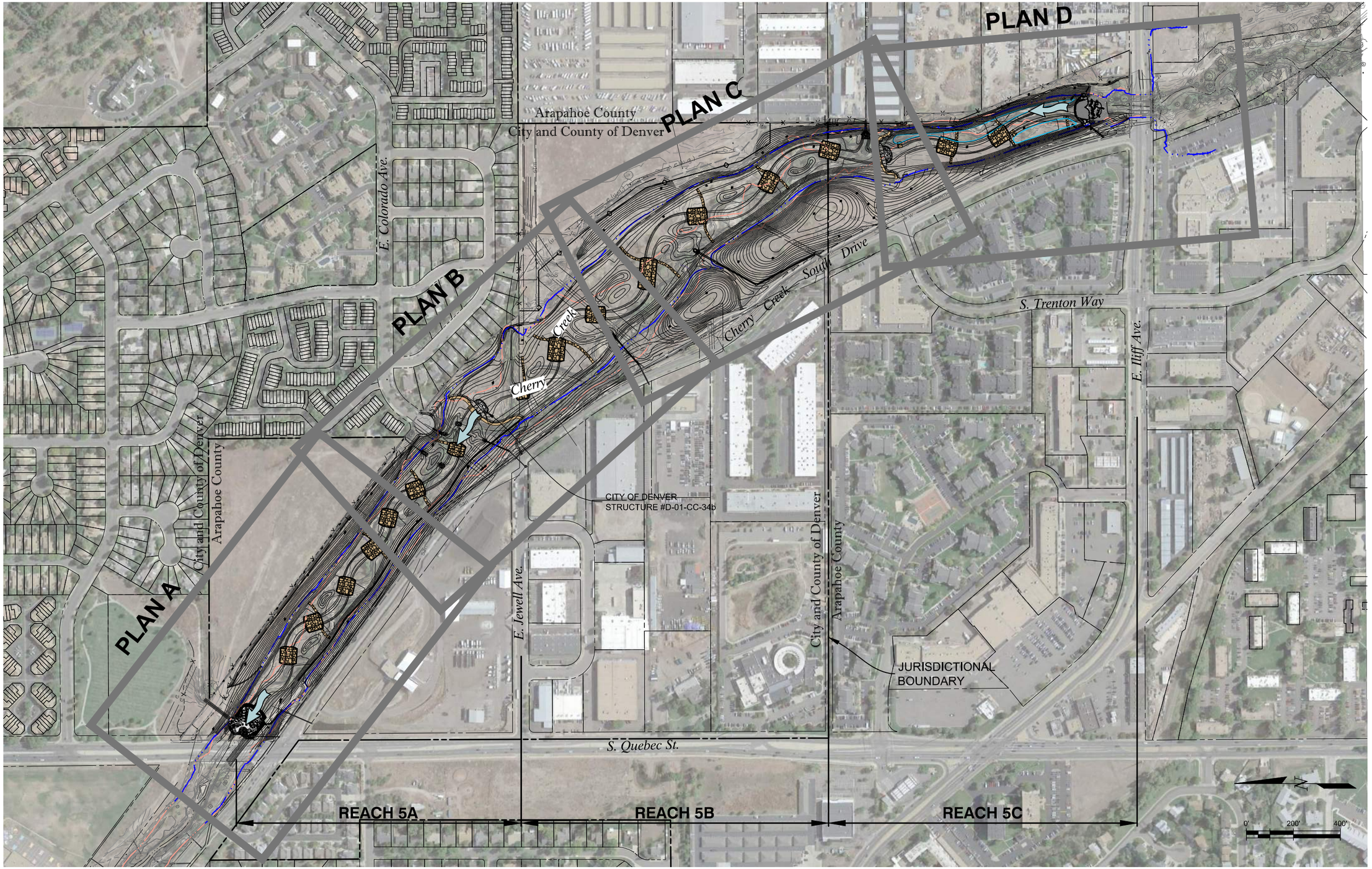

PREPARED UNDER THE SUPERVISION OF

COLORADO LICENSED
JESSE D. WARREN
35809
PROFESSIONAL ENGINEER
9/4/19

DESIGNED:	SDW
DRAWN:	MAB
CHECKED:	MDC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY

MULLER ENGINEERING COMPANY

stream landscape architecture + planning

CHERRY CREEK CORRIDOR IMPROVEMENTS

GENERAL

SITE PLAN

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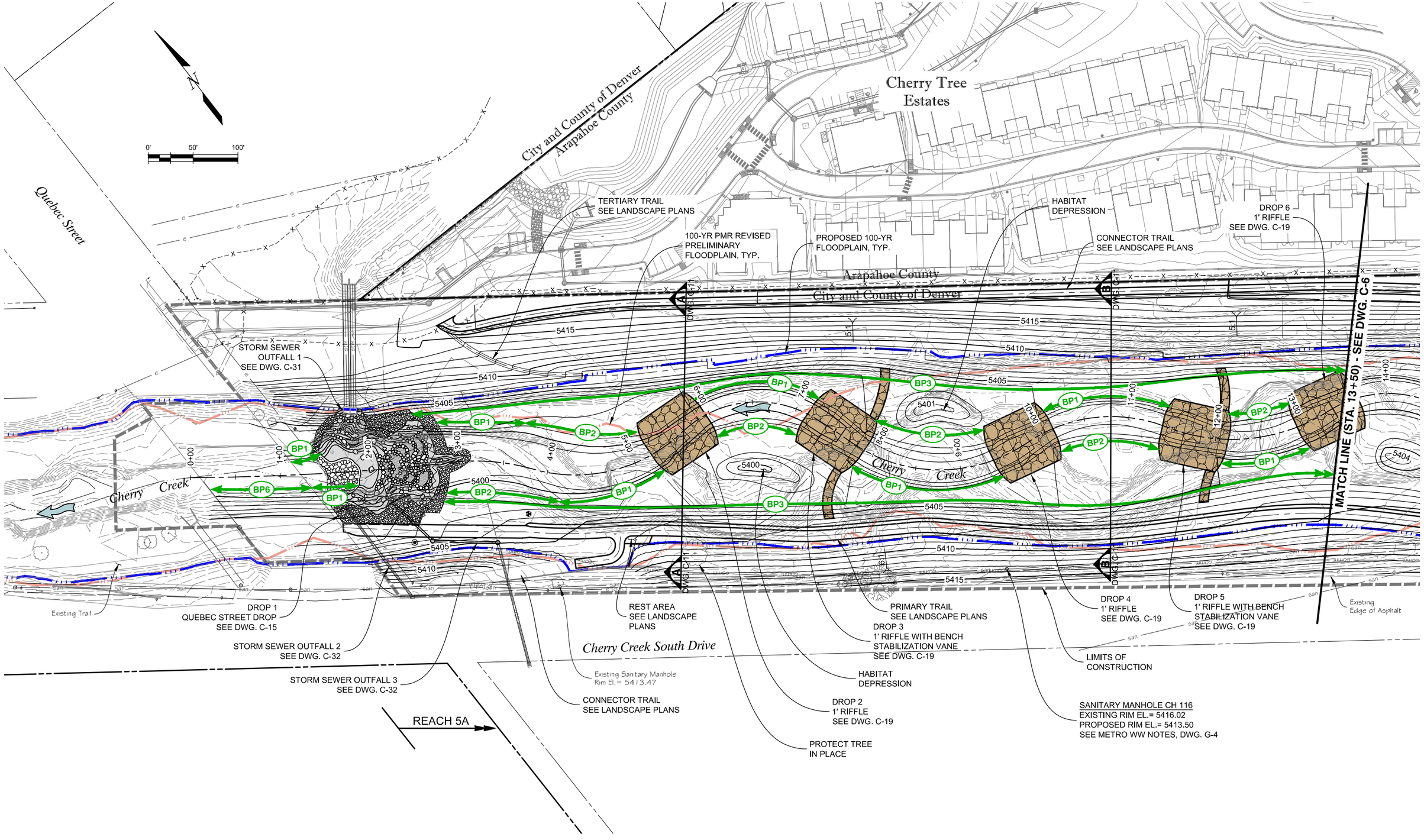

PREPARED UNDER THE SUPERVISION OF

COLORADO LICENSED
Jeffrey P. Jaeger
35809
9/4/19
PROFESSIONAL ENGINEER

DESIGNED:	DRAWN:	CHECKED:
SDW	MAB	MDC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY

MULLER ENGINEERING COMPANY

stream landscape architecture + planning

CHERRY CREEK CORRIDOR IMPROVEMENTS

CIVIL

GRADING PLAN A

DATE 9/4/2019

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City and County of Denver
Arapahoe County
Cherry Tree Estates
0' 50' 100'
S. Spruce St.
E. Colorado Ave.
Cherry Creek
Cherry Creek South Drive
E. Jewell Ave.
Denver Water
STORM SEWER OUTFALL 4 SEE DWG. C-33 CONSTRUCTION OF OUTFALL TO BE COORDINATED WITH CHERRY TREE ESTATES DEVELOPMENT
STORM SEWER OUTFALL 5 SEE DWG. C-33
PRE-TREATMENT/ HABITAT SWALE
8' CONCRETE TRAIL SEE LANDSCAPE PLANS
TERTIARY TRAIL SEE LANDSCAPE PLANS
CONNECTOR TRAIL SEE LANDSCAPE PLANS
PRE-TREATMENT/ HABITAT DEPRESSION
PROPOSED 100-YR FLOODPLAIN, TYP.
LOCATION OF TREES APPROXIMATE. FIELD MODIFY PROPOSED GRADES AS NECESSARY TO PROTECT IN PLACE
FILL INCISED CHANNEL. MINIMIZE DISTURBANCE TO EXISTING VEGETATION
SECONDARY TRAIL SEE LANDSCAPE PLANS
INSTALL 50LF WOOD FENCE BEHIND EXISTING HEADWALL. SEE LANDSCAPE PLANS
8' TWO-RAIL ORNAMENTAL STEEL FENCE, SEE LANDSCAPE PLANS
FIELD MODIFY PROPOSED GRADES AS NECESSARY TO PROTECT TREE IN PLACE.
FUTURE PROPERTY LINE
DROP 11 1' RIFFLE WITH BENCH STABILIZATION VANE SEE DWG. C-19
DROP 12 1' RIFFLE SEE DWG. C-19
HABITAT DEPRESSION
HABITAT DEPRESSION
PRE-TREATMENT/ HABITAT DEPRESSION
MATCH LINE (STA. 13+50) - SEE DWG. C-5
MATCH LINE (STA. 28+50) - SEE DWG. C-7
DWG. C-11
DWG. C-12
DWG. C-13
DWG. C-14
DWG. C-15
DWG. C-16
DWG. C-17
DWG. C-18
BP1
BP2
BP3
BP4
5420
5415
5410
5407
5405
5404
5409
5408
5414
ROCK RUNDOWN SEE DWG. C-38
4" IRRIGATION TAP AND METER. SEE IRRIGATION DRAWINGS
DROP 8 0.5' RIFFLE WITH BENCH STABILIZATION VANE SEE DWG. C-20
HABITAT DEPRESSION
100-YR PMR REVISED PRELIMINARY FLOODPLAIN, TYP.
DROP 7 1' RIFFLE WITH BENCH STABILIZATION VANE SEE DWG. C-19
SANITARY MANHOLE CH 118 EXISTING RIM EL.= 5419.57 PROPOSED RIM EL.= 5420.5 SEE METRO WW NOTES, DWG. G-4
SANITARY MANHOLE CH 117 EXISTING RIM EL.= 5416.95 PROPOSED RIM EL.= 5412.0 SEE METRO WW NOTES, DWG. G-4
SANITARY MANHOLE CHC 111 EXISTING RIM EL.= 5417.32 PROPOSED RIM EL.= 5415.5 SEE METRO WW NOTES, DWG. G-4
PRE-TREATMENT/ HABITAT SWALE
REACH 5A
REACH 5B
STORM SEWER OUTFALL 6 SEE DWG. C-34
DROP 10 0.5' RIFFLE WITH BENCH STABILIZATION VANE SEE DWG. C-20
REST AREA SEE LANDSCAPE PLANS
PRIMARY TRAIL SEE LANDSCAPE PLANS
PROTECT TREE IN PLACE
DROP 9 2' SCULPTED CONCRETE WITH BOX CULVERT TRAIL CROSSING SEE DWG. C-22
SANITARY MANHOLE CH 119 EXISTING RIM EL.= 5421.20 SEE METRO WW NOTES, DWG. G-4
SANITARY MANHOLE CHC 114 EXISTING RIM EL.= 5423.10 PROPOSED RIM EL.= 5422.5 SEE METRO WW NOTES, DWG. G-4
LIMITS OF CONSTRUCTION
PROTECT TREES IN PLACE
STORM SEWER OUTFALL 7 SEE DWG. C-34
Existing Trail TO REMAIN
Existing Edge of Asphalt

PLOTTED: 9/5/2019 9:59:06 AM
NAME: P:\13-003.04 CHERRY CREEK CORRIDOR - UDFCD\CAD\DRAWINGS\13-003.04_GRADING PLAN.DWG

PREPARED UNDER THE SUPERVISION OF
COLORADO LICENSED
35809
PROFESSIONAL ENGINEER
9/4/19

DESIGNED: SDW
DRAWN: MAB
CHECKED: MDC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY

MULLER ENGINEERING COMPANY
stream landscape architecture + planning

UDFCD · DENVER THE MILE HIGH CITY · ARAPAHOE COUNTY COLORADO'S FIRST · Southeast Metro Stormwater Authority · DENVER WATER

CHERRY CREEK CORRIDOR IMPROVEMENTS

CIVIL

GRADING PLAN B

DATE 9/4/2019
DRAWING NO. C-6
SHEET NO. 15 OF 114

FUTURE PROPERTY LINE

8' TWO-RAIL ORNAMENTAL STEEL FENCE SEE LANDSCAPE PLANS

Denver Water

Arapahoe County

City and County of Denver

DROP 14
0.5' RIFFLE WITH BENCH STABILIZATION VANE
SEE DWG. C-20

DROP 15
0.5' RIFFLE WITH BENCH STABILIZATION VANE
SEE DWG. C-20

PRE-TREATMENT/ HABITAT DEPRESSION

100-YR PMR REVISED PRELIMINARY FLOODPLAIN, TYP.

SECONDARY TRAIL SEE LANDSCAPE PLANS

HABITAT DEPRESSION

DROP 16
0.5' RIFFLE
SEE DWG. C-20

STORM SEWER OUTFALL 9
SEE DWG. C-36

ROCK RUNDOWN
SEE DWG. C-38

HABITAT DEPRESSION

HABITAT DEPRESSION

Cherry Creek

PRIMARY TRAIL SEE LANDSCAPE PLANS

8' CONCRETE TRAIL SEE LANDSCAPE PLANS

City and County of Denver - Arapahoe County

REST AREA SEE LANDSCAPE PLANS

MATCH LINE (STA. 28+50) - SEE DWG. C-6

MATCH LINE (STA. 44+00) - SEE DWG. C-8

8' CONCRETE TRAIL SEE LANDSCAPE PLANS

10' CONCRETE TRAIL SEE LANDSCAPE PLANS

Existing Edge of Asphalt

Cherry Creek South Drive

REACH 5B

REACH 5C

DROP 17
2.5' SCULPTED CONCRETE WITH BOX CULVERT TRAIL CROSSING
SEE DWG. C-23

S. Trenton Way

PROPOSED 100-YR FLOODPLAIN, TYP.

Existing Trail TO REMAIN

PROTECT TREE IN PLACE

DROP 13
1' RIFFLE WITH BENCH STABILIZATION VANE
SEE DWG. C-19

STORM SEWER OUTFALL 8
SEE DWG. C-35

PREPARED UNDER THE SUPERVISION OF

COLORADO LICENSED JOSEPH D. MULLER 35809 9/4/19 PROFESSIONAL ENGINEER

DESIGNED:	SDW
DRAWN:	MAB
CHECKED:	MDC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY

MULLER ENGINEERING COMPANY

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CHERRY CREEK CORRIDOR IMPROVEMENTS

CIVIL

GRADING PLAN C

DATE	9/4/2019
DRAWING NO.	C-7
SHEET NO.	16 OF 114

PLOTTED: 9/5/2019 9:59:14 AM
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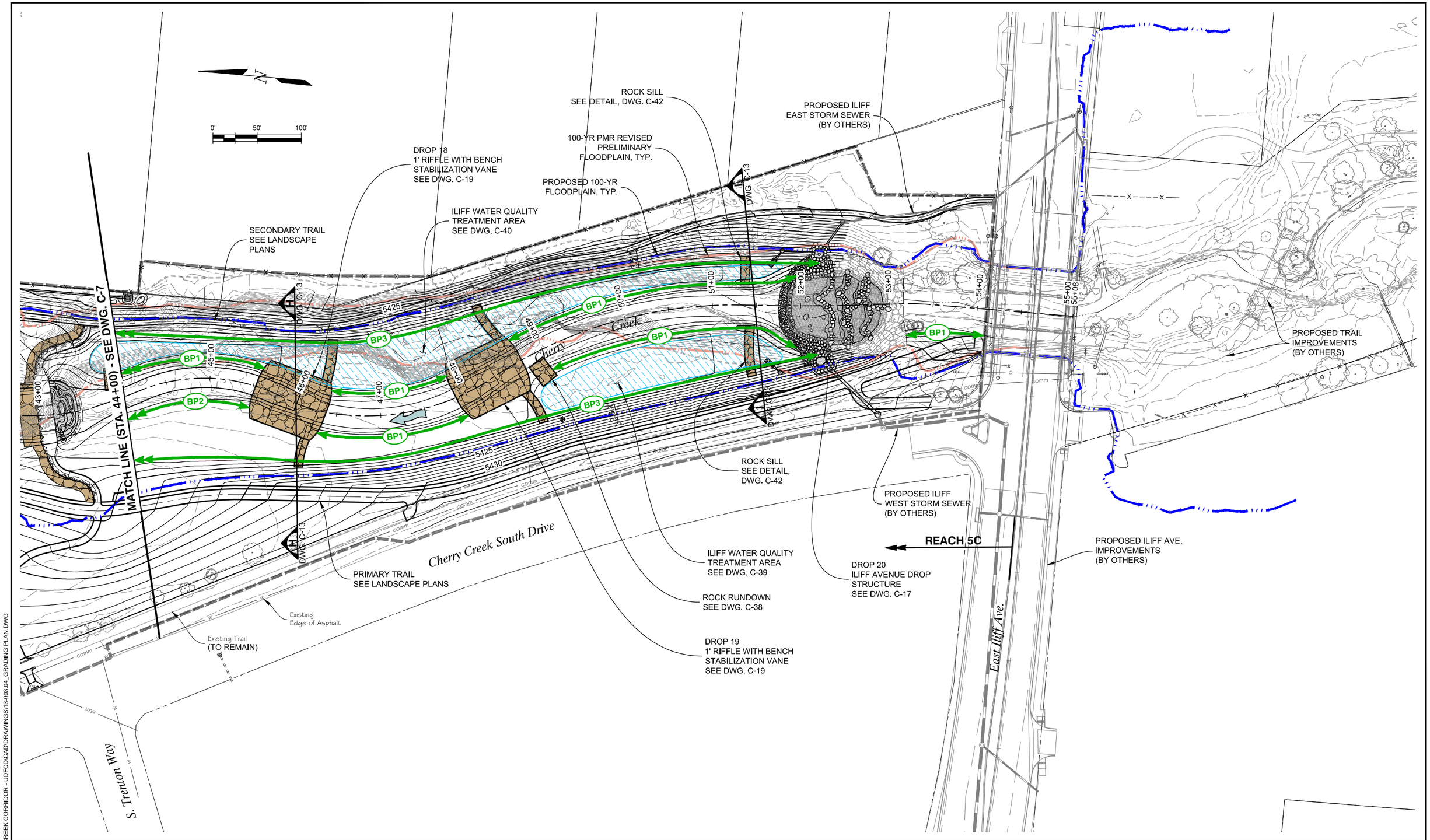

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PREPARED UNDER THE SUPERVISION OF

COLORADO LICENSED
JOSEPH D. BREEHEY
35809
9/4/19
PROFESSIONAL ENGINEER

DESIGNED:	DRAWN:	CHECKED:
SDW	MAB	MDC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

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NO.	DATE	DESCRIPTION	BY

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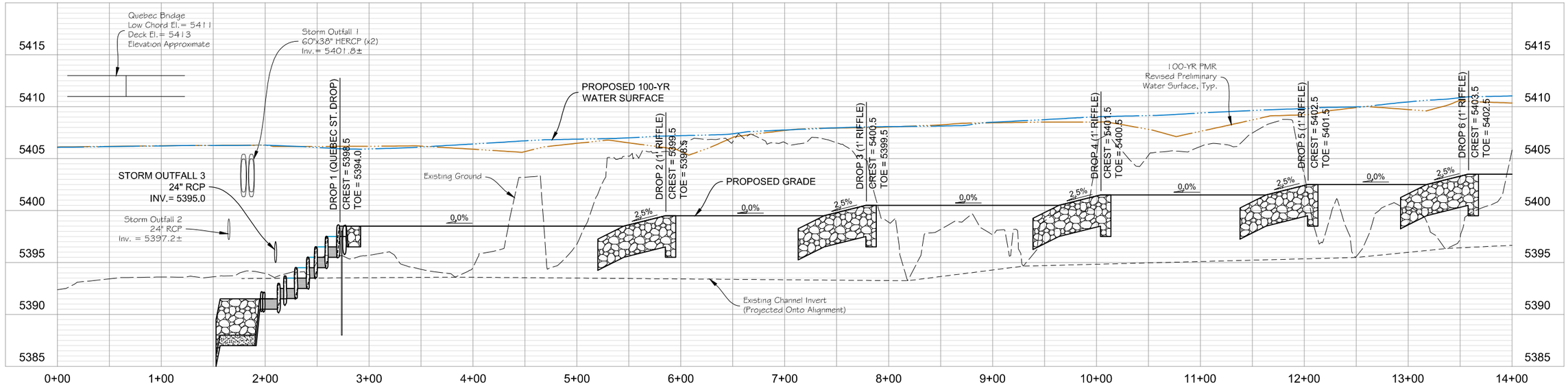
CHERRY CREEK CORRIDOR IMPROVEMENTS

CIVIL

GRADING PLAN D

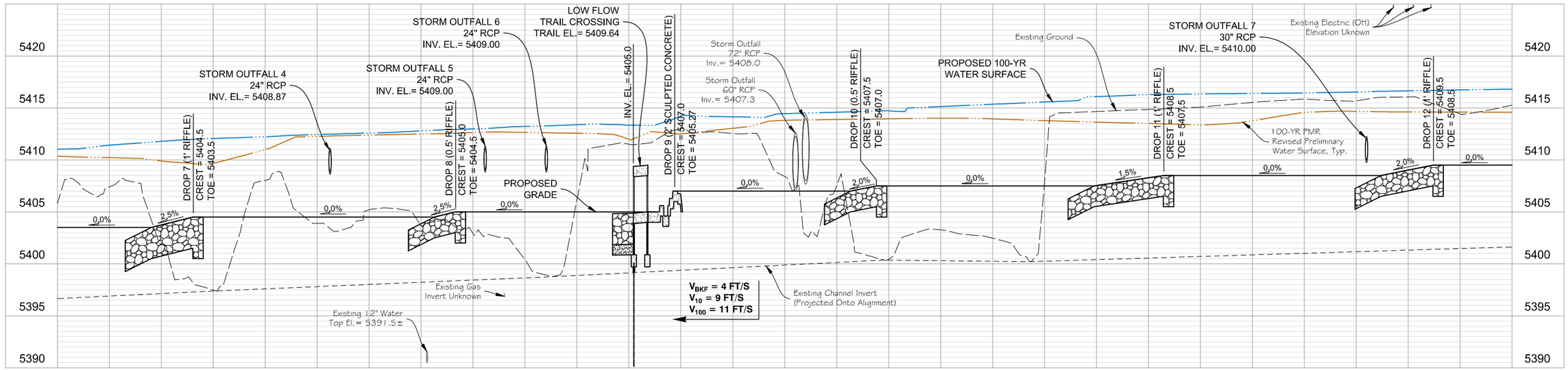
DATE	DRAWING NO.	SHEET NO.
9/4/2019	C-8	17 OF 114



CHERRY CREEK CHANNEL PROFILE

(STA. 0+00 TO 14+00)

SCALE: 1" = 100' (HORIZ.)
1" = 10' (VERT.)



CHERRY CREEK CHANNEL PROFILE

(STA. 14+00 TO 28+00)

SCALE: 1" = 100' (HORIZ.)
1" = 10' (VERT.)

HYDRAULIC INFORMATION:

Q_{10} = 1608 CFS	$Q_{BIG\ FLUSH}$ = 1300 CFS
Q_{100} = 5000 CFS	$Q_{SMALL\ FLUSH}$ = 250 CFS

PREPARED UNDER THE SUPERVISION OF
COLORADO LICENSED
STEVEN D. WHITE
35609
9/4/19
PROFESSIONAL ENGINEER

DESIGNED: SDW
DRAWN: MAB
CHECKED: MDC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY
1	5/7/19	DROP 9, 17, AND 20 ELEVS. UPDATED	MDC

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Southeast Metro Stormwater Authority
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CHERRY CREEK CORRIDOR IMPROVEMENTS

CIVIL

CHANNEL PROFILE

DATE: 9/4/2019
DRAWING NO.: C-9
SHEET NO.: 18 OF 114

PLOTTED: 9/5/2019 10:00:37 AM
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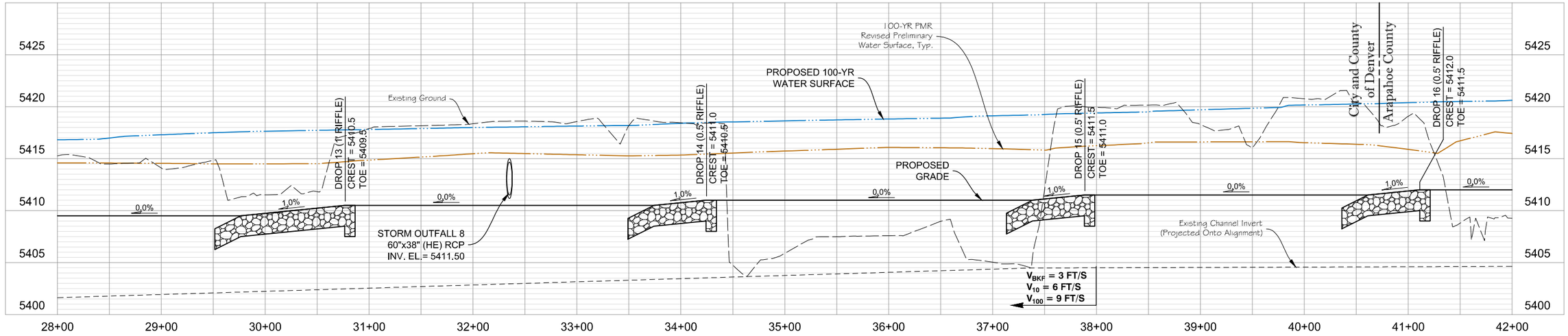
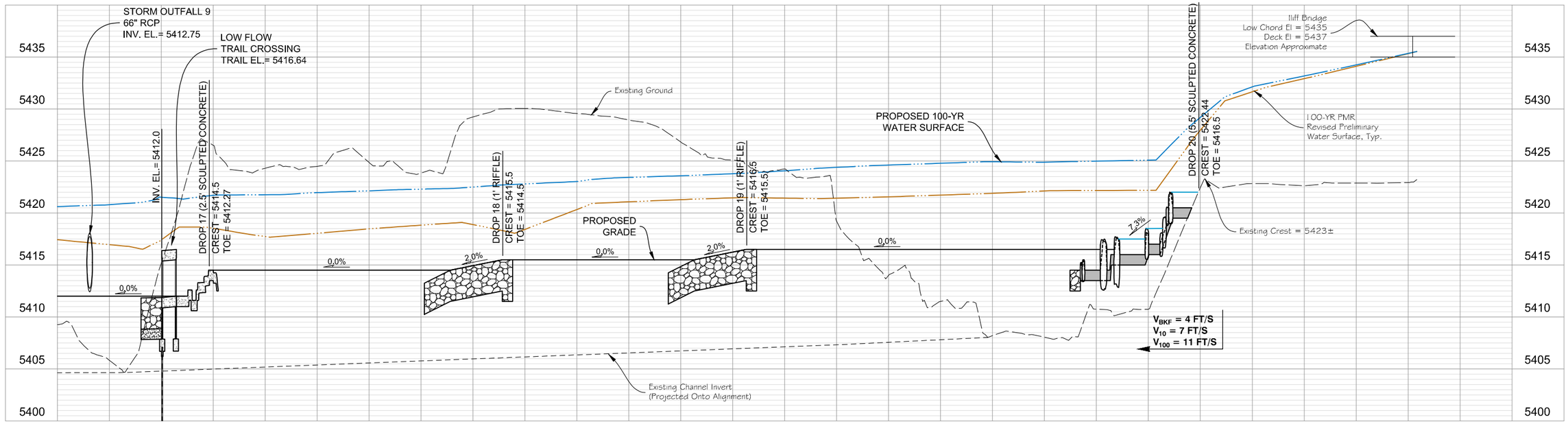


CHERRY CREEK CHANNEL PROFILE

(STA. 28+00 TO 42+00)

SCALE: 1" = 100' (HORIZ.)
1" = 10' (VERT.)



CHERRY CREEK CHANNEL PROFILE

(STA. 42+00 TO 56+00)

SCALE: 1" = 100' (HORIZ.)
1" = 10' (VERT.)

HYDRAULIC INFORMATION:

Q_{10} = 1608 CFS	$Q_{BIG\ FLUSH}$ = 1300 CFS
Q_{100} = 5000 CFS	$Q_{SMALL\ FLUSH}$ = 250 CFS

PREPARED UNDER THE SUPERVISION OF
COLORADO LICENSED
Mark D. Chase
35809
PROFESSIONAL ENGINEER
9/4/19

DESIGNED: SDW
DRAWN: MAB
CHECKED: MDC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY
1	5/7/19	DROP 9, 17, AND 20 ELEVS. UPDATED	MDC

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CHERRY CREEK CORRIDOR IMPROVEMENTS

CIVIL

CHANNEL PROFILE

DATE: 9/4/2019
DRAWING NO.: C-10
SHEET NO.: 19 OF 114

PLOTTED: 9/5/2019 10:00:40 AM
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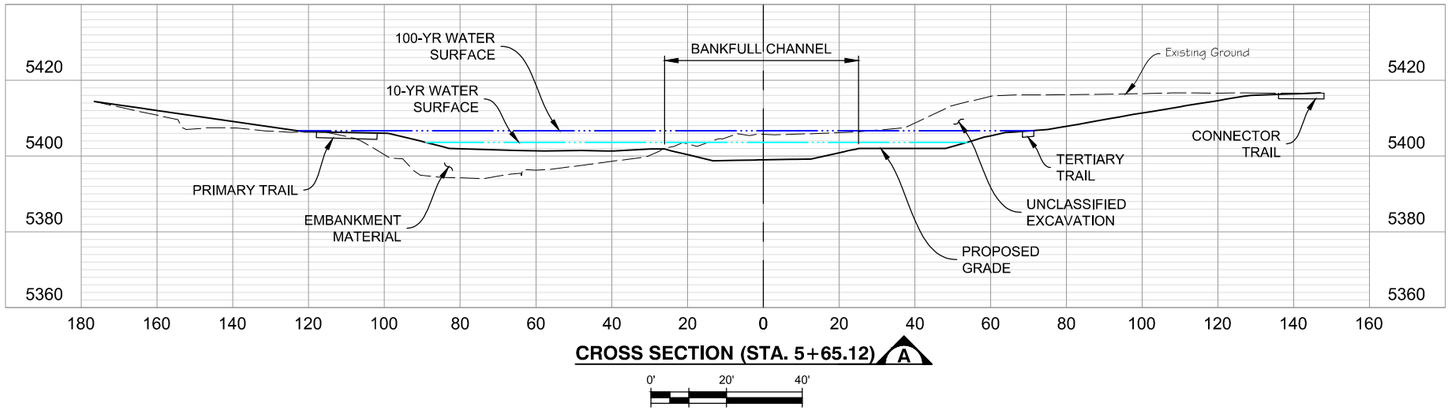
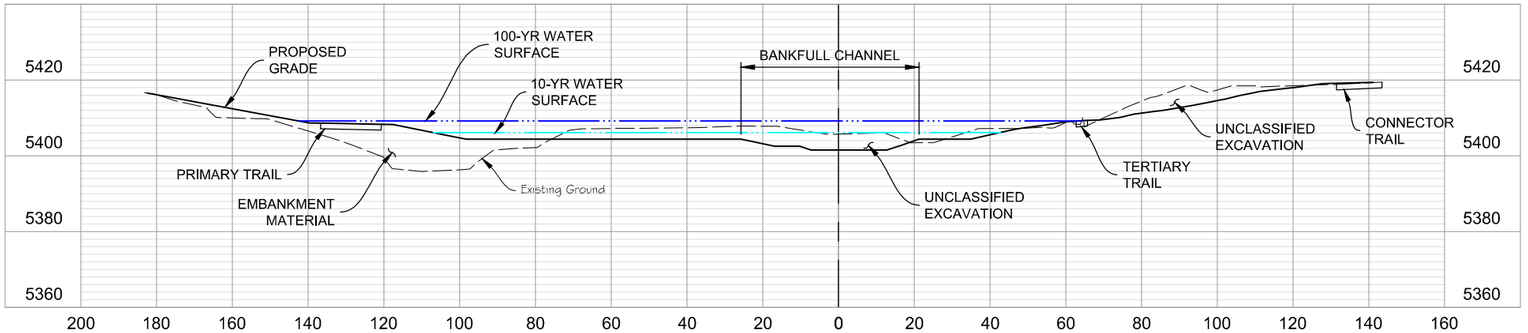


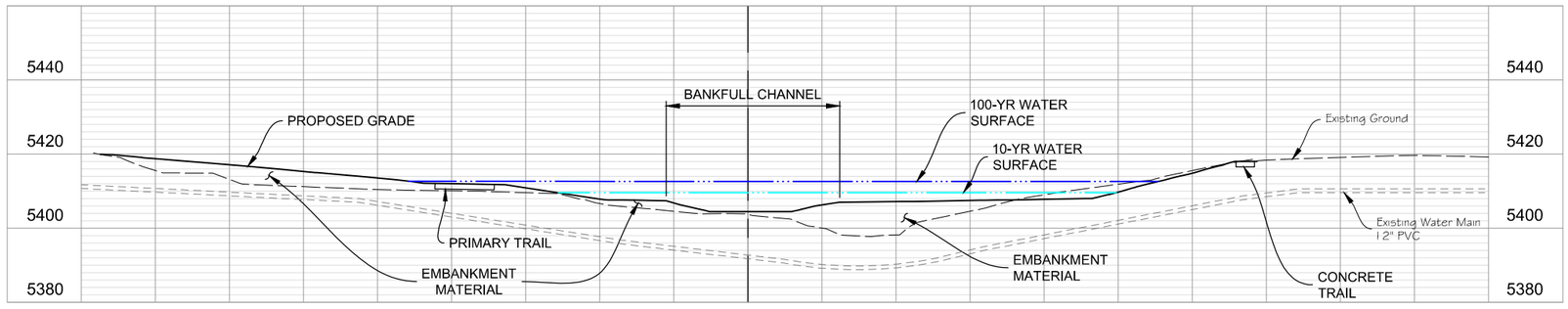
CROSS SECTION (STA. 5+65.12) A

0' 20' 40'



CROSS SECTION (STA. 10+79.87) B

0' 20' 40'



CROSS SECTION (STA. 17+53.08) C

0' 20' 40'

HYDRAULIC INFORMATION:

Q_{10} = 1608 CFS $Q_{BIG\ FLUSH}$ = 1300 CFS

Q_{100} = 5000 CFS $Q_{SMALL\ FLUSH}$ = 250 CFS

PREPARED UNDER THE SUPERVISION OF

COLORADO LICENSED — JEFFREY M. JOERGER — 35809 — 9/4/19 — PROFESSIONAL ENGINEER

DESIGNED: SDW

DRAWN: MAB

CHECKED: MDC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY

MULLER ENGINEERING COMPANY

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CHERRY CREEK CORRIDOR IMPROVEMENTS

CIVIL

CROSS SECTIONS

DATE 9/4/2019

DRAWING NO. C-11

SHEET NO. 20 OF 114

PLOTTED: 9/5/2019 10:01:52 AM
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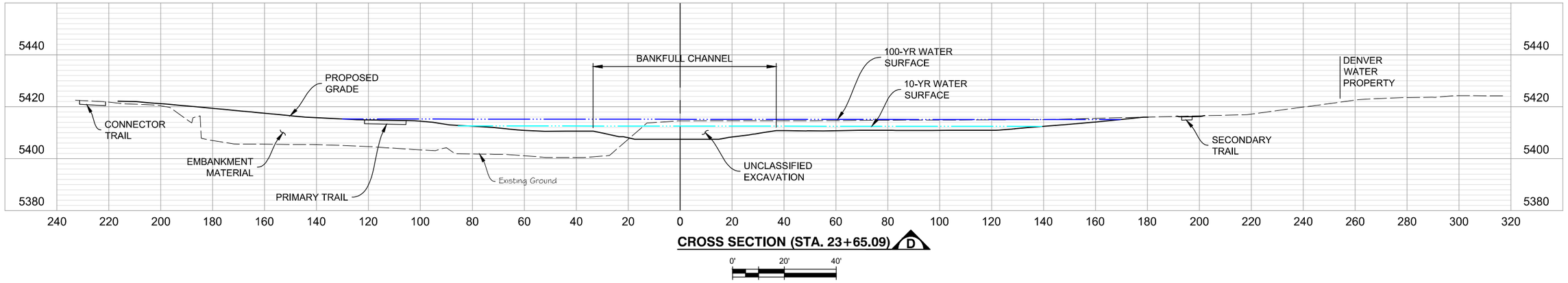
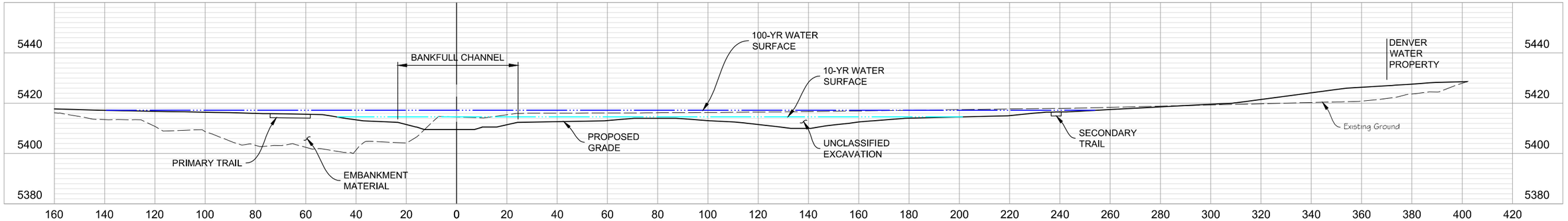
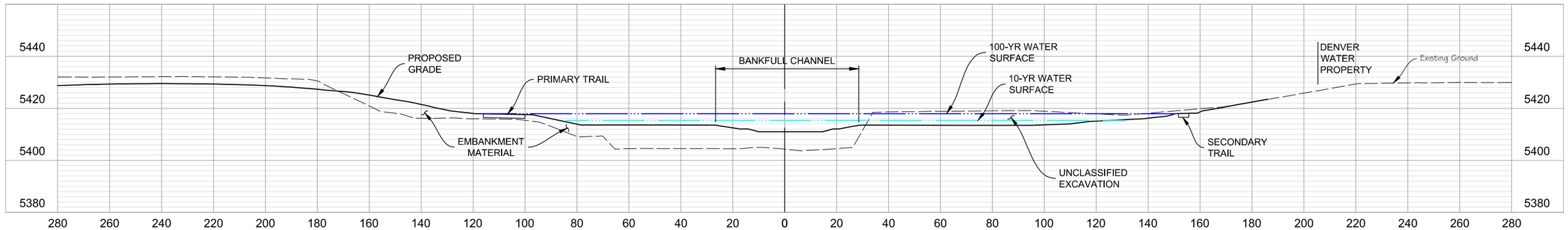


CROSS SECTION (STA. 23+65.09) D



CROSS SECTION (STA. 28+48.90) E



CROSS SECTION (STA. 34+68.62) F

HYDRAULIC INFORMATION:

Q_{10} = 1608 CFS	$Q_{BIG\ FLUSH}$ = 1300 CFS
Q_{100} = 5000 CFS	$Q_{SMALL\ FLUSH}$ = 250 CFS

PREPARED UNDER THE SUPERVISION OF
COLORADO LICENSED STEVEN D. WHITE 35809 9/4/19 PROFESSIONAL ENGINEER

DESIGNED: SDW
DRAWN: MAB
CHECKED: MDC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY

MULLER ENGINEERING COMPANY
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DENVER THE MILE HIGH CITY
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Southeast Metro Stormwater Authority
DENVER WATER

CHERRY CREEK CORRIDOR IMPROVEMENTS
CIVIL
CROSS SECTIONS

DATE 9/4/2019
DRAWING NO. C-12
SHEET NO. 21 OF 114

PLOTTED: 9/5/2019 10:01:56 AM
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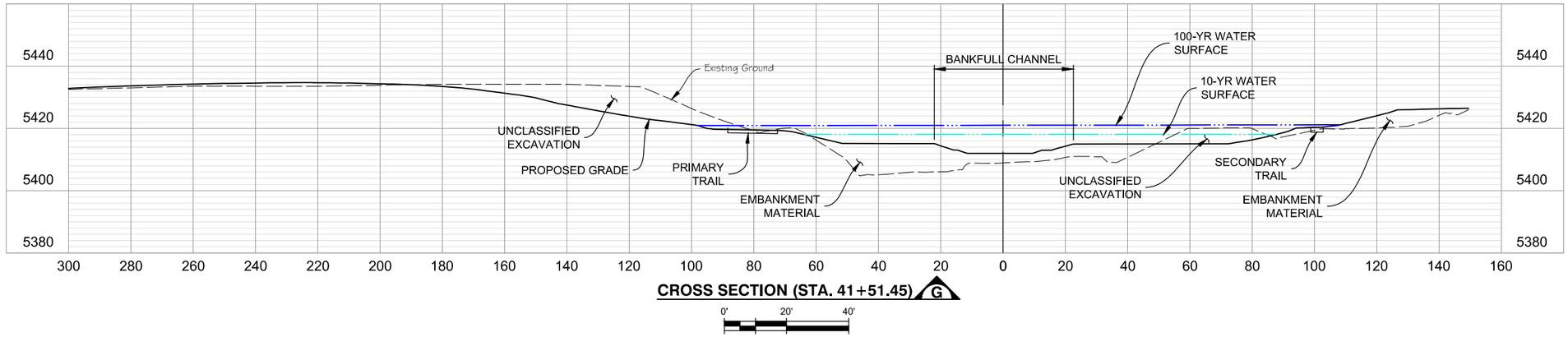
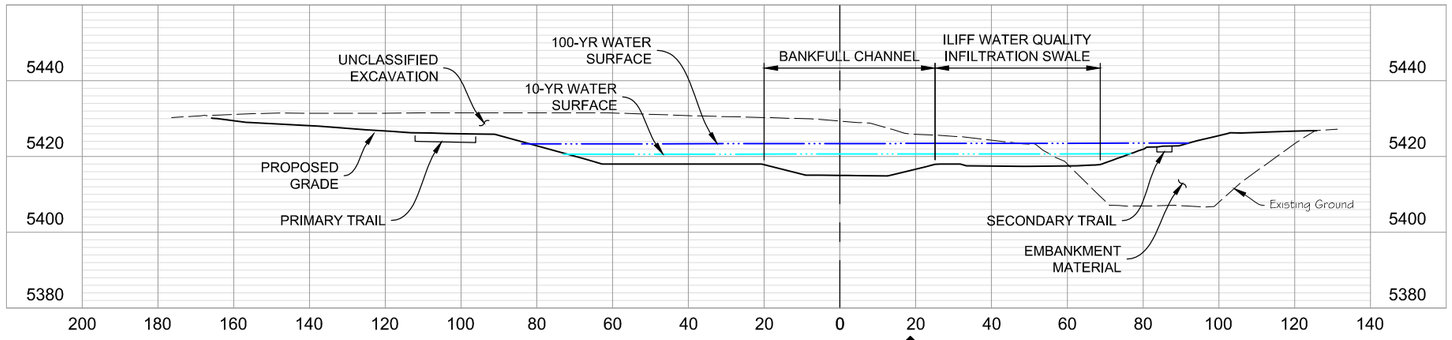


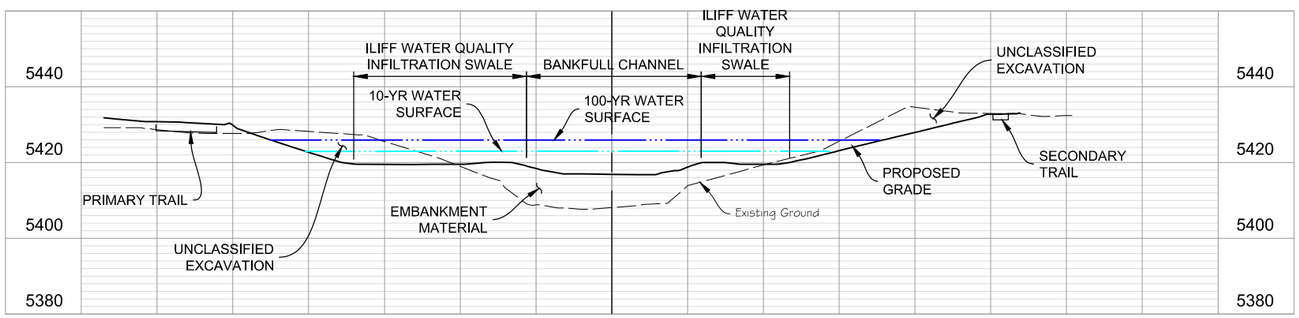
CROSS SECTION (STA. 41+51.45) G

0' 20' 40'



CROSS SECTION (STA. 46+02.27) H

0' 20' 40'



CROSS SECTION (STA. 51+47.89) I

0' 20' 40'

HYDRAULIC INFORMATION:

Q_{10} = 1608 CFS $Q_{BIG\ FLUSH}$ = 1300 CFS

Q_{100} = 5000 CFS $Q_{SMALL\ FLUSH}$ = 250 CFS

PREPARED UNDER THE SUPERVISION OF
JOSEPH D. JACOBSEN 35809 COLORADO LICENSED PROFESSIONAL ENGINEER 9/4/19

DESIGNED: SDW
DRAWN: MAB
CHECKED: MDC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY

MULLER ENGINEERING COMPANY
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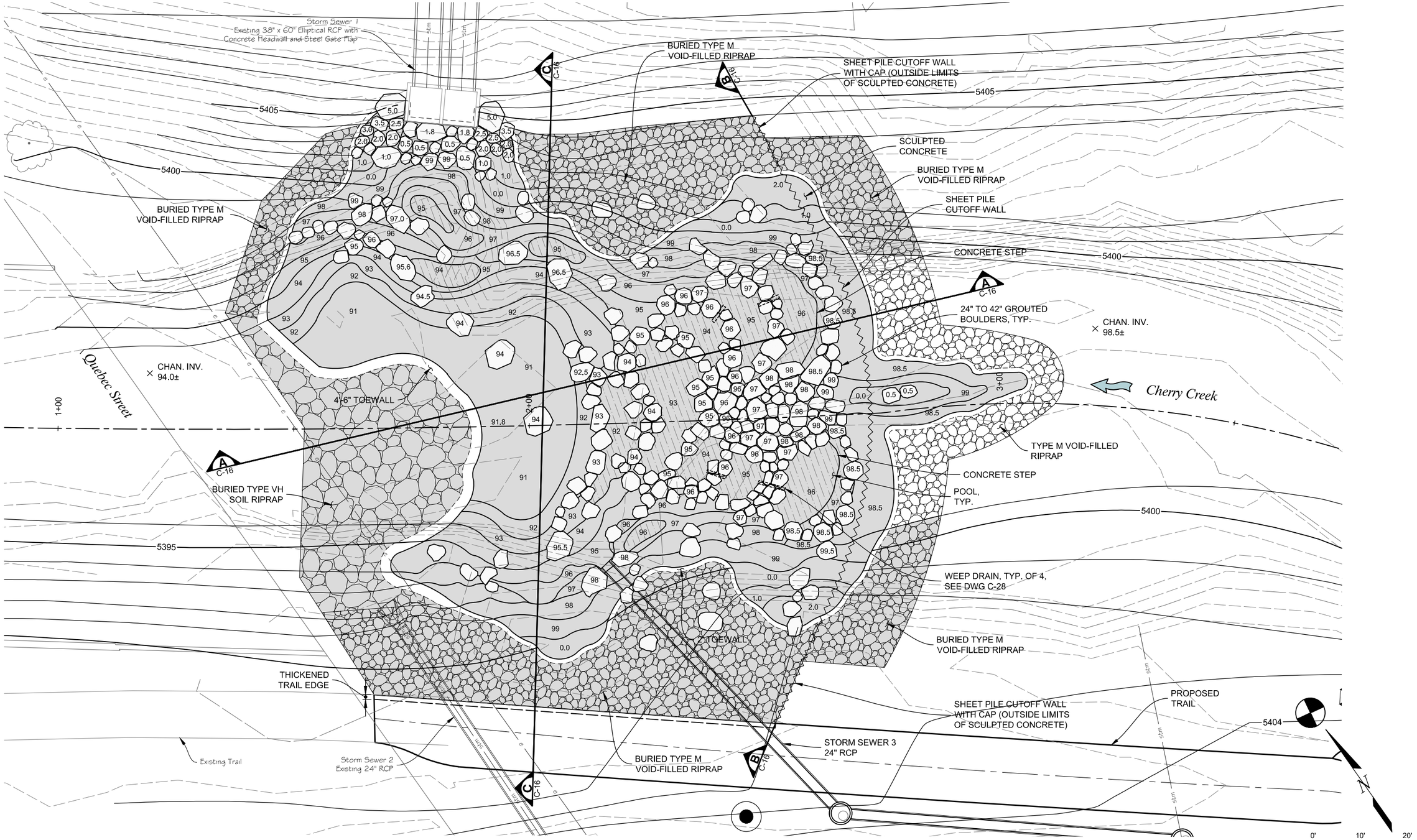
CHERRY CREEK CORRIDOR IMPROVEMENTS

CIVIL

CROSS SECTIONS

DATE 9/4/2019
DRAWING NO. C-13
SHEET NO. 22 OF 114

PLOTTED: 9/5/2019 10:02:00 AM
NAME: P:\13-003.04 CHERRY CREEK CORRIDOR - UDFCD\CAD\DRAWINGS\13-003.04_SECTIONS.DWG



NOTE:

SEE SCULPTED CONCRETE DETAILS ON DWG C-28

PREPARED UNDER THE SUPERVISION OF
JEFFREY S. INGEMANSEN 35809 COLORADO LICENSED PROFESSIONAL ENGINEER 9/4/19

DESIGNED:	KAC
DRAWN:	MAB
CHECKED:	MDC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY

MULLER ENGINEERING COMPANY
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CHERRY CREEK CORRIDOR IMPROVEMENTS

CIVIL

QUEBEC STREET DROP PLAN

DATE	9/4/2019
DRAWING NO.	C-15
SHEET NO.	24 OF 114

PLOTTED: 9/5/2019 10:02:38 AM
NAME: P:\13-003.04 CHERRY CREEK CORRIDOR - UDFCD\CAD\DRAWINGS\13-003.04_DET TIE-IN DROP DS.DWG

= POOL WATER LEVEL

NOTE:
ALL SCULPTED CONCRETE BELOW THE POOL WATER LEVEL CAN BE FINISHED WITH A BROOMED FINISH. NO STAINING OF CONCRETE BELOW THE POOL WATER LEVEL WILL BE REQUIRED.

ILIFF EAST OUTFALL AND WATER QUALITY DIVERSION SEE DWG. C-40 AND C-42

24" TO 42" GROUTED BOULDERS, TYP.

SCULPTED CONCRETE

CONCRETE STEP

BURIED TYPE M VOID-FILLED RIPRAP

48" GROUTED ANCHOR "A" BOULDERS, TYP.

CONCRETE STEP

CONCRETE STEP

CONCRETE STEP

WEEP DRAIN, TYP. OF 6 SEE DWG C-28

Existing Grouted Boulders

POOL, TYP

24" TO 42" GROUTED BOULDERS, TYP.

Cherry Creek

CHANNEL INVERT = 16.5

Existing Crest = 22.44

ILIFF WEST OUTFALL AND WATER QUALITY DIVERSION SEE DWG. C-39 AND C-42

PROPOSED TRAIL

0' 10' 20'

NOTE:
SEE SCULPTED CONCRETE DETAILS ON DWG C-28

PREPARED UNDER THE SUPERVISION OF

COLORADO LICENSED 35809 PROFESSIONAL ENGINEER 9/4/19

DESIGNED:	KAC
DRAWN:	MAB
CHECKED:	MDC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY

MULLER ENGINEERING COMPANY

stream landscape architecture + planning

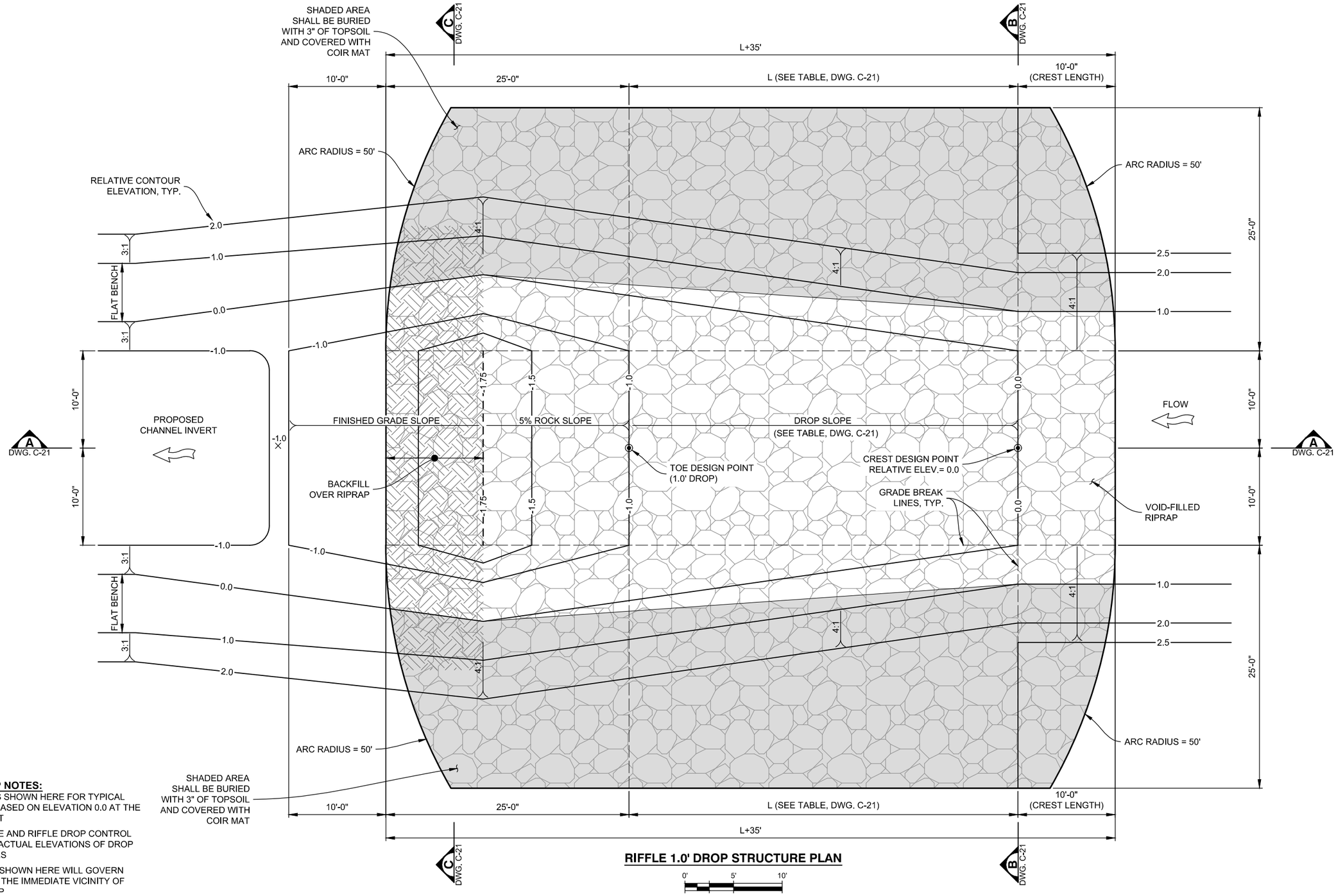
CHERRY CREEK CORRIDOR IMPROVEMENTS

CIVIL

ILIFF AVENUE DROP PLAN

DATE	9/4/2019
DRAWING NO.	C-17
SHEET NO.	26 OF 114

PLOTTED: 9/5/2019 10:03:09 AM
NAME: P:\13-003.04 CHERRY CREEK CORRIDOR - UDFCD\CAD\DRAWINGS\13-003.04_DET TIE-IN DROP US.DWG



RIFFLE DROP NOTES:

1. ELEVATIONS SHOWN HERE FOR TYPICAL DROP ARE BASED ON ELEVATION 0.0 AT THE DROP CREST
2. SEE PROFILE AND RIFFLE DROP CONTROL TABLE FOR ACTUAL ELEVATIONS OF DROP STRUCTURES
3. CONTOURS SHOWN HERE WILL GOVERN GRADING IN THE IMMEDIATE VICINITY OF RIFFLE DROP

RIFFLE 1.0' DROP STRUCTURE PLAN

0' 5' 10'

PLOTTED: 9/5/2019 10:03:25 AM
NAME: P:\13-003.04 CHERRY CREEK CORRIDOR - UDFCD\CAD\DRAWINGS\13-003.04_DET RIFFLE DROPS.DWG

PREPARED UNDER THE SUPERVISION OF
COLORADO LICENSED — SCOTT D. WEBER — 35809 — PROFESSIONAL ENGINEER — 9/4/19

DESIGNED: SDW
DRAWN: MAB
CHECKED: MDC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY

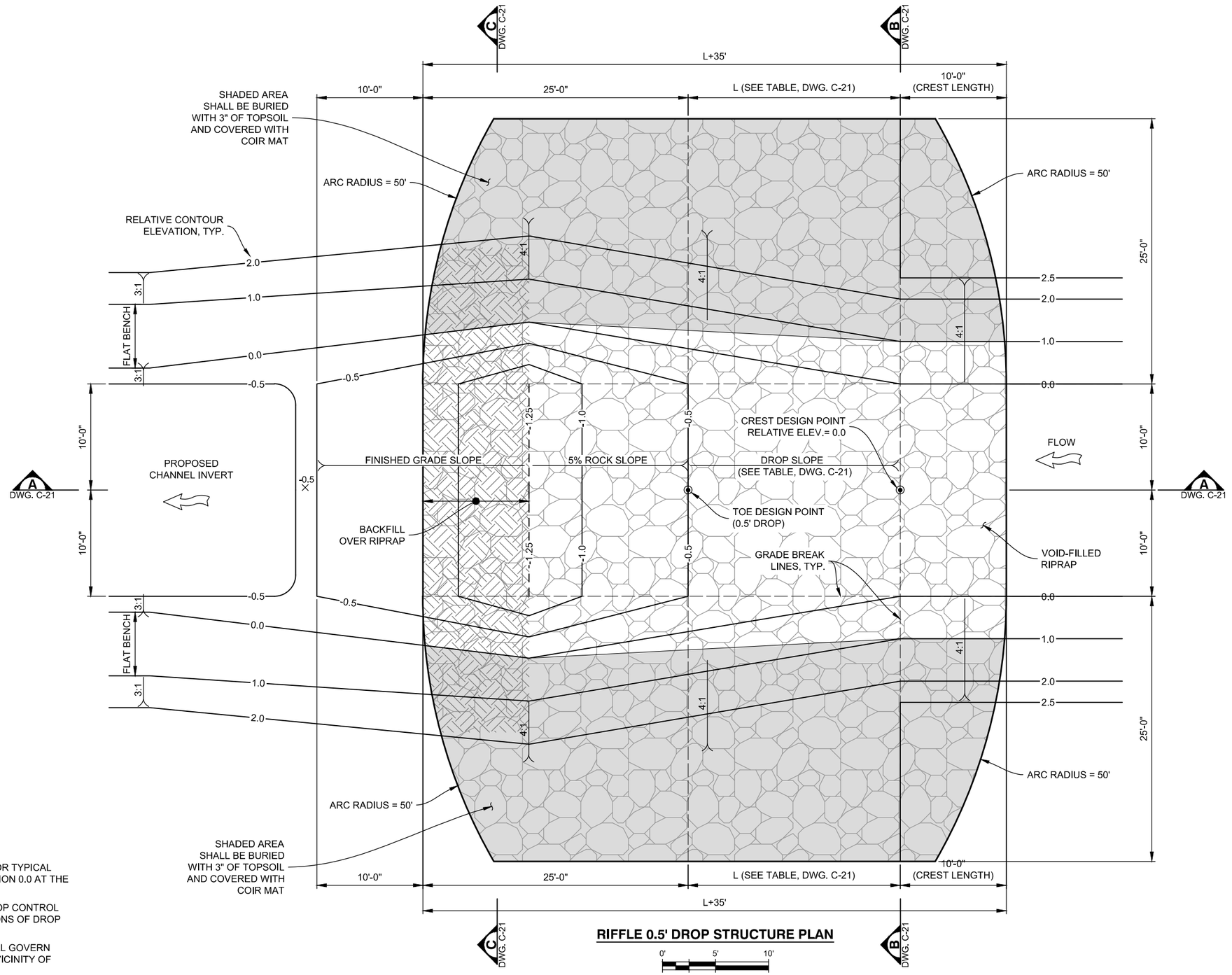
MULLER ENGINEERING COMPANY
stream landscape architecture + planning

CHERRY CREEK CORRIDOR IMPROVEMENTS

CIVIL

1.0' RIFFLE DROP PLAN

DATE 9/4/2019
DRAWING NO. C-19
SHEET NO. 28 OF 114



RIFFLE 0.5' DROP STRUCTURE PLAN

0' 5' 10'

RIFFLE DROP NOTES:

1. ELEVATIONS SHOWN HERE FOR TYPICAL DROP ARE BASED ON ELEVATION 0.0 AT THE DROP CREST
2. SEE PROFILE AND RIFFLE DROP CONTROL TABLE FOR ACTUAL ELEVATIONS OF DROP STRUCTURES
3. CONTOURS SHOWN HERE WILL GOVERN GRADING IN THE IMMEDIATE VICINITY OF RIFFLE DROP

PREPARED UNDER THE SUPERVISION OF
JEFFREY S. WEGENER
COLORADO LICENSED
35809
9/4/19
PROFESSIONAL ENGINEER

DESIGNED: SDW
DRAWN: MAB
CHECKED: MDC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

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DENVER THE MILE HIGH CITY
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Southeast Metro Stormwater Authority
DENVER WATER

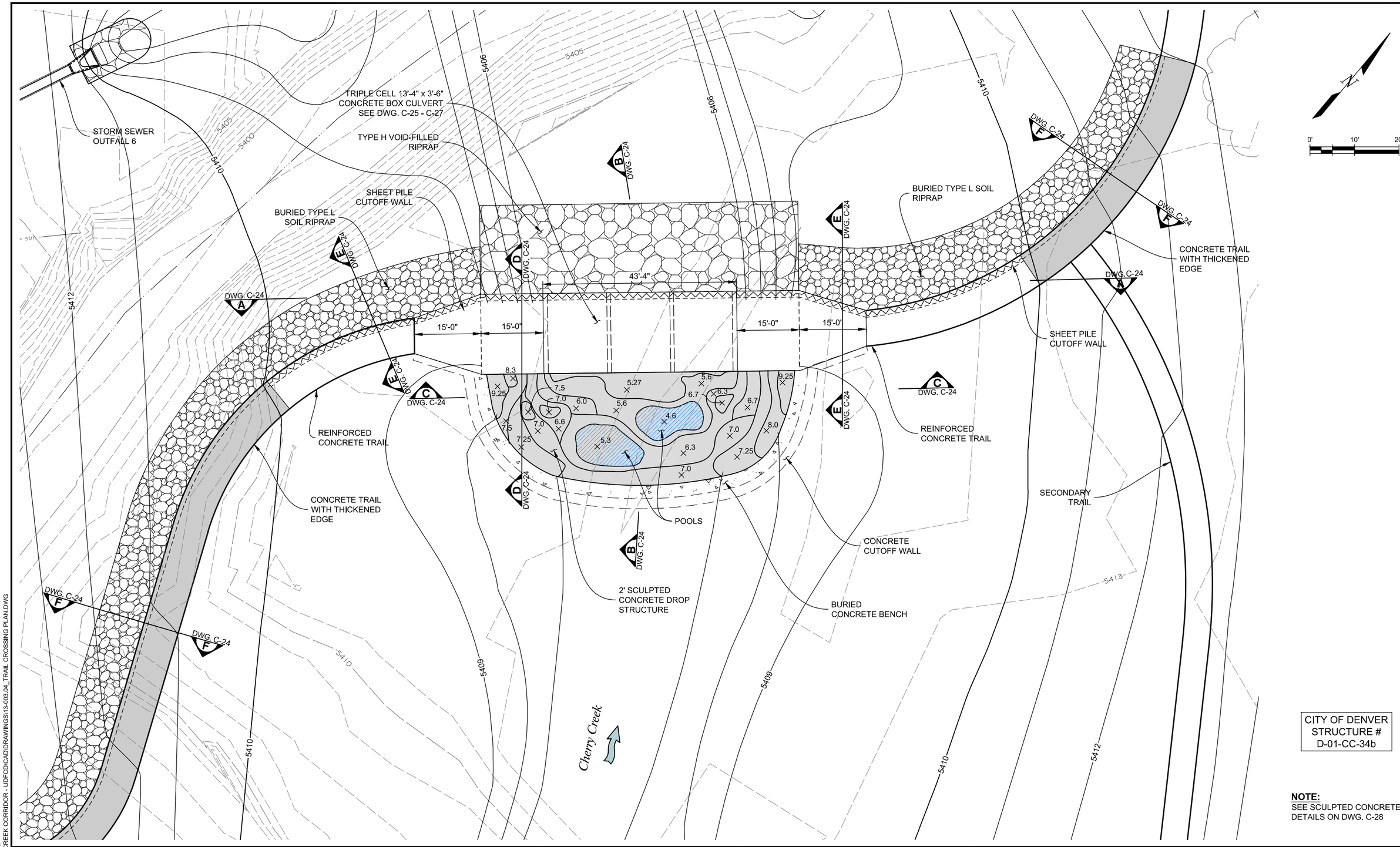
CHERRY CREEK CORRIDOR IMPROVEMENTS

CIVIL

0.5' RIFFLE DROP PLAN

DATE 9/4/2019
DRAWING NO. C-20
SHEET NO. 29 OF 114

PLOTTED: 9/5/2019 10:03:27 AM
NAME: P:\13-003.04 CHERRY CREEK CORRIDOR - UDFCD\CAD\DRAWINGS\13-003.04_DET RIFFLE DROPS.DWG



CITY OF DENVER
STRUCTURE #
D-01-CC-34b

NOTE:
SEE SCULPTED CONCRETE DETAILS ON DWG. C-28

PLOTTED: 9/5/2019 10:03:55 AM
NAME: P:\13-003.04 CHERRY CREEK CORRIDOR - UDFCD\CAD\DRAWINGS\13-003.04_TRAIL CROSSING PLAN.DWG

PREPARED UNDER THE SUPERVISION OF
JEFFREY D. WEGENER 35809 COLORADO LICENSED PROFESSIONAL ENGINEER 9/4/19

DESIGNED: SDW
DRAWN: MAB
CHECKED: MDC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY

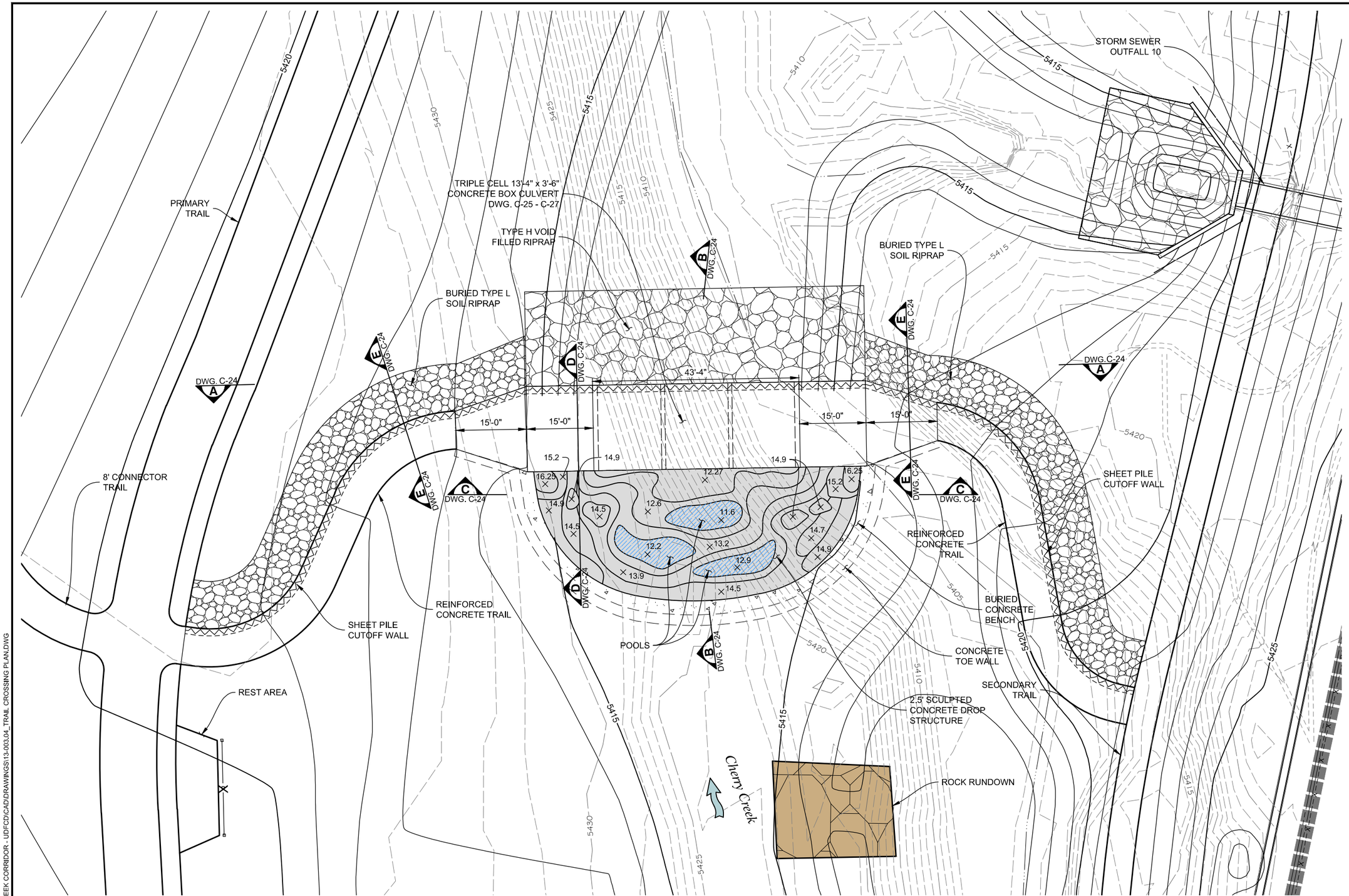
MULLER ENGINEERING COMPANY
stream landscape architecture + planning

CHERRY CREEK CORRIDOR IMPROVEMENTS

CIVIL

DROP 9 TRAIL CROSSING PLAN

DATE: 9/4/2019
DRAWING NO.: C-22
SHEET NO.: 31 OF 114



NOTE:
SEE SCULPTED CONCRETE DETAILS ON DWG. C-28

PREPARED UNDER THE SUPERVISION OF
COLORADO LICENSED
Joseph D. Merrill
35809
9/4/19
PROFESSIONAL ENGINEER

DESIGNED:	SDW
DRAWN:	MAB
CHECKED:	MDC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY

MULLER ENGINEERING COMPANY
stream landscape architecture + planning

CHERRY CREEK CORRIDOR IMPROVEMENTS

CIVIL

DROP 17 TRAIL CROSSING PLAN

DATE	9/4/2019
DRAWING NO.	C-23
SHEET NO.	32 OF 114

PLOTTED: 9/5/2019 10:04:04 AM
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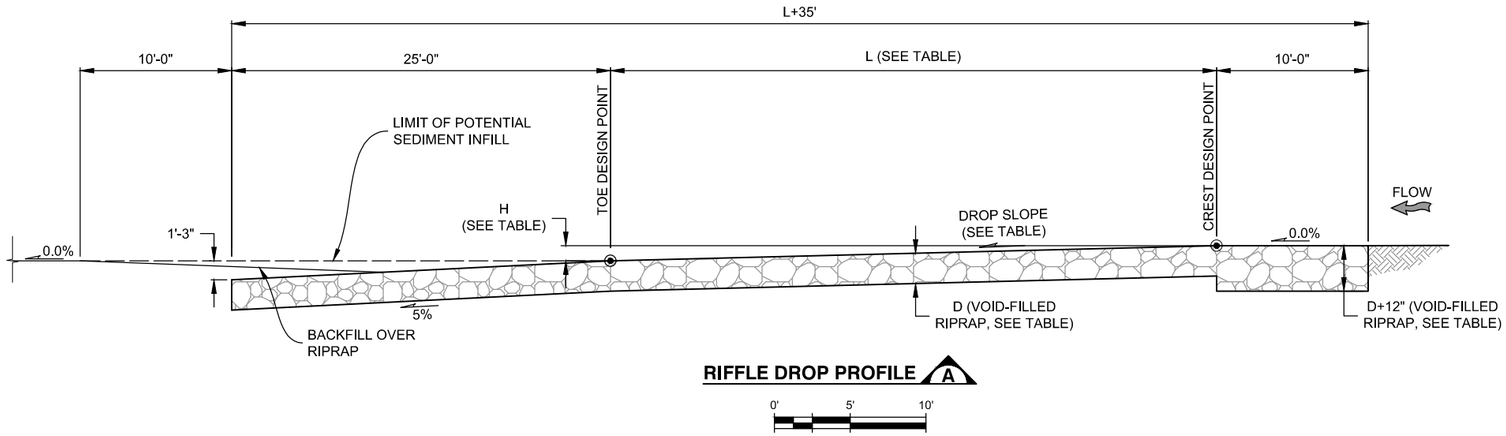
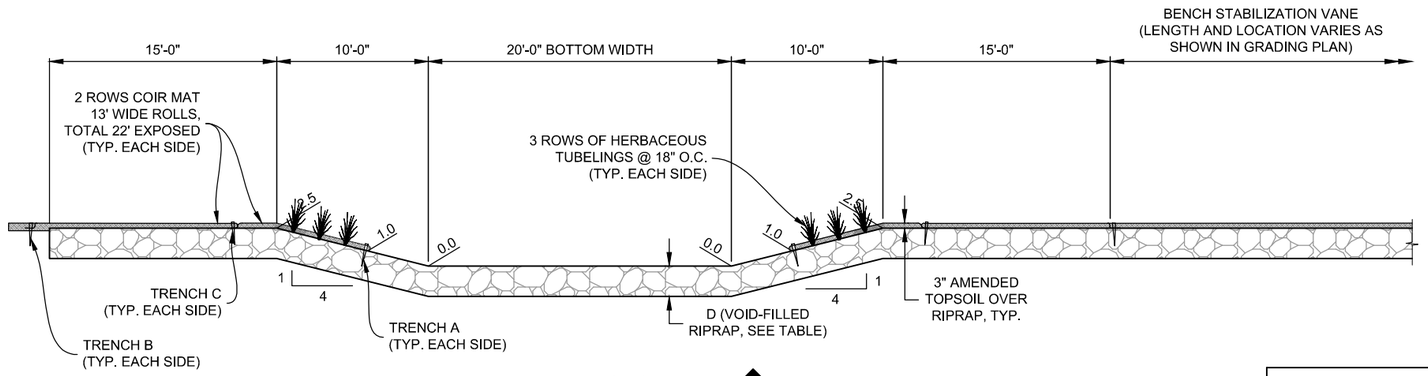


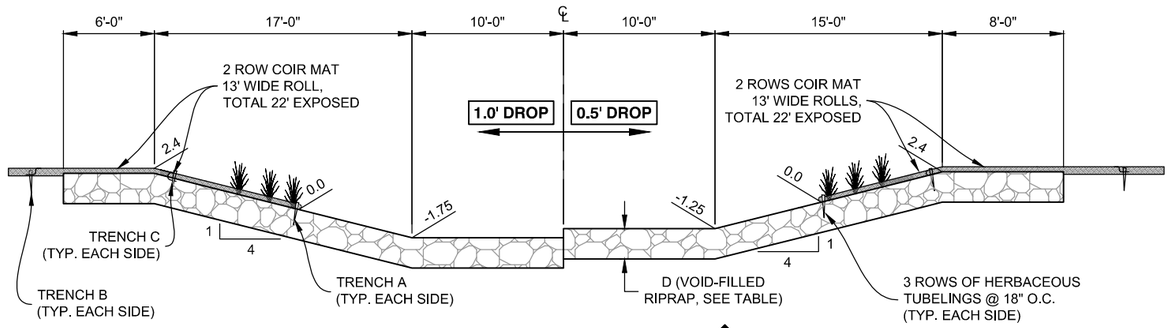
RIFFLE DROP PROFILE A

0' 5' 10'



RIFFLE DROP CREST SECTION B

0' 5' 10'



RIFFLE DROP TOE SECTION C

0' 5' 10'

RIFFLE DROP NOTES:
ELEVATIONS SHOWN HERE FOR TYPICAL DROP ARE BASED ON ELEVATION 0.0 AT THE DROP CREST

CHERRY CREEK RIFFLE DROPS

DROP #	ROCK PARAMETERS			DROP PARAMETERS			CREST DESIGN POINT			TOE DESIGN POINT		
	SIZE	TYPE	D (in)	L (ft)	H (ft)	SLOPE	NORTHING	EASTING	ELEVATION	NORTHING	EASTING	ELEVATION
2	H	VFR	36"	40	1.0	2.5%	1,675,317.85	3,169,166.62	5399.5	1,675,320.45	3,169,126.70	5398.5
3	H	VFR	36"	40	1.0	2.5%	1,675,186.30	3,169,288.63	5400.5	1,675,224.41	3,169,276.48	5399.5
4	H	VFR	36"	40	1.0	2.5%	1,675,068.39	3,169,462.58	5401.5	1,675,077.23	3,169,423.57	5400.5
5	H	VFR	36"	40	1.0	2.5%	1,674,941.43	3,169,609.74	5402.5	1,674,972.36	3,169,584.38	5401.5
6	H	VFR	36"	40	1.0	2.5%	1,674,887.28	3,169,751.87	5403.5	1,674,896.62	3,169,712.98	5402.5
7	H	VFR	36"	40	1.0	2.5%	1,674,752.58	3,169,855.75	5404.5	1,674,790.08	3,169,841.83	5403.5
8	M	VFR	24"	20	0.5	2.5%	1,674,599.34	3,170,033.21	5405.0	1,674,604.48	3,170,013.88	5404.5
10	M	VFR	24"	25	0.5	2.0%	1,674,305.21	3,170,269.96	5407.5	1,674,329.84	3,170,265.67	5407.0
11	M	VFR	24"	67	1.0	1.5%	1,674,174.32	3,170,483.54	5408.5	1,674,180.32	3,170,417.14	5407.5
12	M	VFR	24"	50	1.0	2.0%	1,673,979.49	3,170,590.26	5409.5	1,674,029.41	3,170,592.96	5408.5
13	M	VFR	24"	100	1.0	1.0%	1,673,785.05	3,170,822.32	5410.5	1,673,794.54	3,170,722.77	5409.5
14	M	VFR	24"	50	0.5	1.0%	1,673,546.78	3,171,013.20	5411.0	1,673,596.65	3,171,009.53	5410.5
15	M	VFR	24"	50	0.5	1.0%	1,673,259.41	3,171,185.18	5411.5	1,673,282.21	3,171,140.67	5411.0
16	M	VFR	24"	50	0.5	1.0%	1,672,983.60	3,171,282.25	5412.0	1,673,032.22	3,171,293.93	5411.5
18	H	VFR	36"	50	1.0	2.0%	1,672,483.32	3,171,298.42	5415.5	1,672,531.52	3,171,311.71	5414.5
19	H	VFR	36"	50	1.0	2.0%	1,672,266.72	3,171,369.69	5416.5	1,672,309.32	3,171,343.51	5415.5

PREPARED UNDER THE SUPERVISION OF
JOSEPH D. WILLIAMS
COLORADO LICENSED
35809
9/4/19
PROFESSIONAL ENGINEER

DESIGNED: SDW
DRAWN: MAB
CHECKED: MDC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY

MULLER ENGINEERING COMPANY
stream landscape architecture + planning

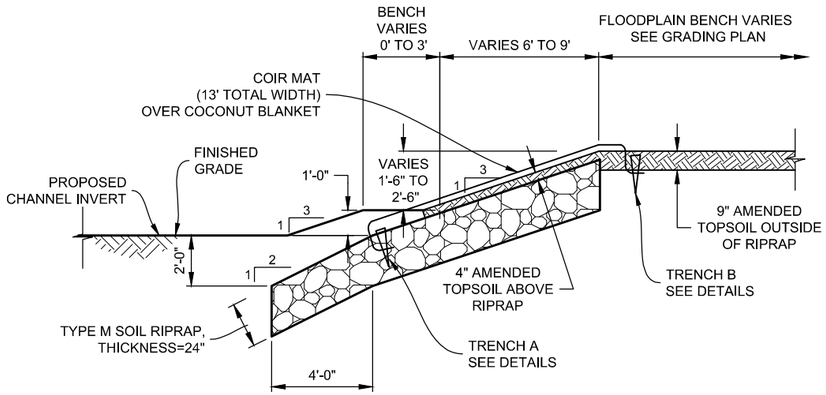
CHERRY CREEK CORRIDOR IMPROVEMENTS

CIVIL

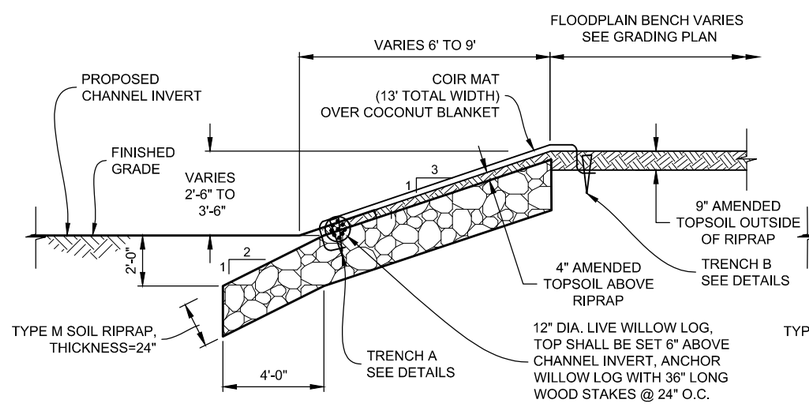
RIFFLE DROP SECTIONS

DATE 9/4/2019
DRAWING NO. C-21
SHEET NO. 30 OF 114

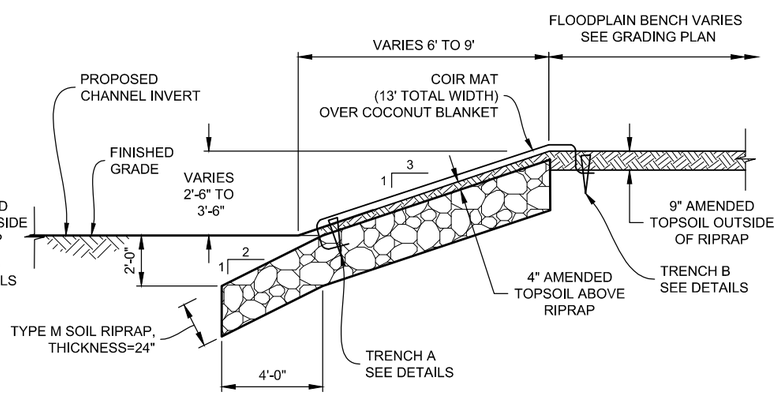
PLOTTED: 9/5/2019 10:03:29 AM
NAME: P:\13-003.04 CHERRY CREEK CORRIDOR - UDFCD\CAD\DRAWINGS\13-003.04_DET RIFFLE DROPS.DWG



NO WILLOW LOG, WITH BENCH



WILLOW LOG, WITHOUT BENCH

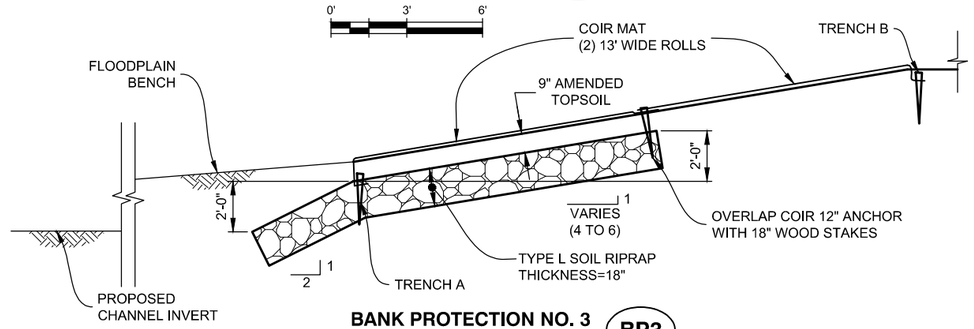


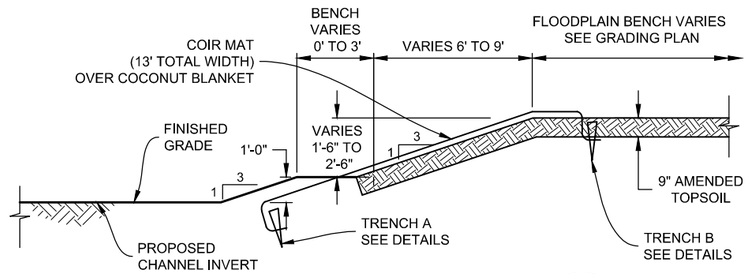
NO WILLOW LOG, WITHOUT BENCH

BANK PROTECTION NO. 1 — BP1

(MAIN CHANNEL - OUTSIDE BEND)

0' 3' 6'

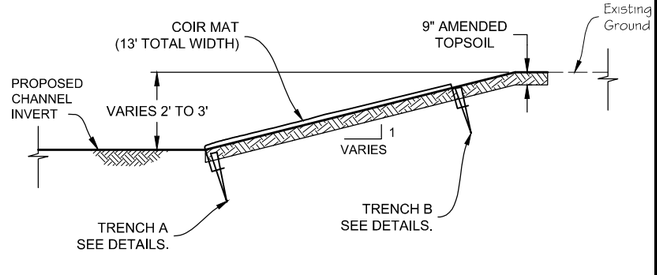




BANK PROTECTION NO. 2 — BP2

(MAIN CHANNEL-INSIDE BEND)

0' 3' 6'

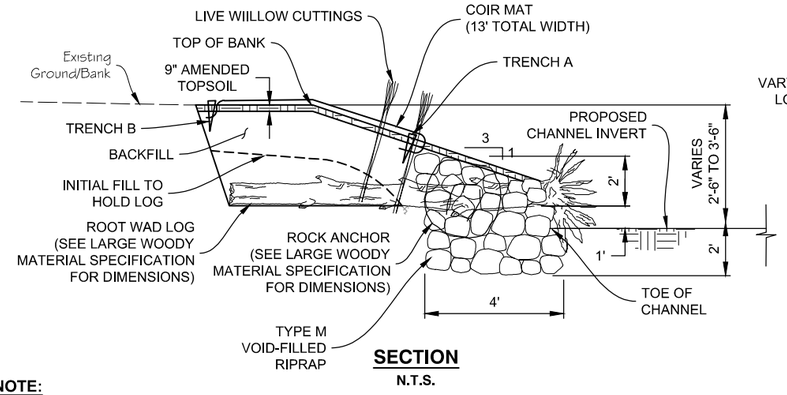


BANK PROTECTION NO. 4 — BP4

0' 3' 6'

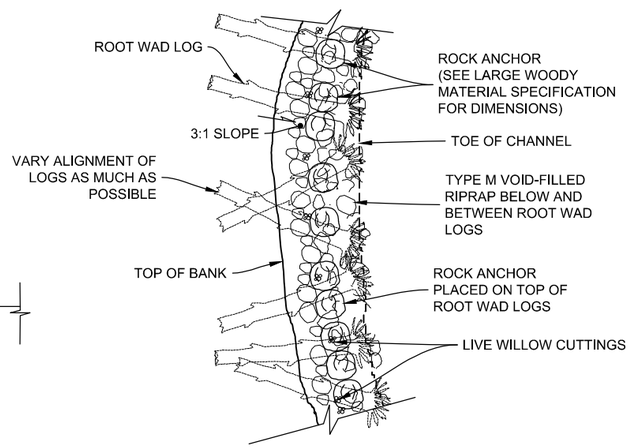
BANK PROTECTION NO. 3 — BP3

0' 3' 6'



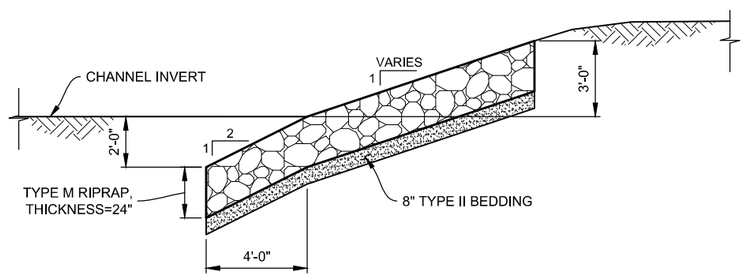
SECTION

N.T.S.



PLAN

N.T.S.



BANK PROTECTION NO. 6 — **BP6**

0' 3' 6'

NOTE:
SUBSTITUTE BP5 FOR 10% OF THE BP1 LENGTH AT LOCATIONS TO BE DETERMINED BY THE ENGINEER.

BANK PROTECTION NO. 5 - ROOT WAD REVETMENT — BP5

PREPARED UNDER THE SUPERVISION OF
COLORADO LICENSED
JOEL D. WISER
35809
9/4/19
PROFESSIONAL ENGINEER

DESIGNED: SDW
DRAWN: MAB
CHECKED: MDC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY

MULLER ENGINEERING COMPANY
stream landscape architecture + planning

DENVER THE MILE HIGH CITY
ARAPAHOE COUNTY COLORADO'S FIRST
Southeast Metro Stormwater Authority
DENVER WATER

CHERRY CREEK CORRIDOR IMPROVEMENTS

CIVIL

BANK PROTECTION DETAILS

DATE 9/4/2019
DRAWING NO. C-29
SHEET NO. 38 OF 114

PLOTTED: 9/5/2019 10:04:59 AM
NAME: P:\13-003.04 CHERRY CREEK CORRIDOR - UDFCD\CAD\DRAWINGS\13-003.04_DET BANK PROTECTION.DWG

PLANTING SCHEDULE

WOODY PLANTS

TREES						
ABBV.	SCIENTIFIC NAME	COMMON NAME	ZONE	SIZE	SPACING	COUNT
COC	*Celtis occidentalis*	WESTERN HACKBERRY	4	2" CAL B&B	see plan	27
CRI	*Crataegus rivularis*	RIVER HAWTHORN	1, 2	2" CAL B&B	see plan	73
GDI	*Gymnocladus dioicus*	SEEDLESS KENTUCKY COFFEETREE	4	2" CAL B&B	see plan	23
GTI	*Gleditsia triacanthos inermis 'Shademaster'*	SHADEMASTER HONEYLOCUST	4	2" CAL B&B	see plan	29
PDE	*Populus deltoides ssp. monilifera*	PLAINS COTTONWOOD	2	POLE	see plan	26
PDE	*Populus deltoides ssp. monilifera*	PLAINS COTTONWOOD	2	POLE DEEP BURY	see plan	69
PDE	*Populus deltoides ssp. monilifera*	PLAINS COTTONWOOD	2	2" CAL B&B	see plan	61
PDE	*Populus deltoides ssp. monilifera*	PLAINS COTTONWOOD	2	2" CAL B&B DEEP BURY	see plan	30
QMA	*Quercus macrocarpa*	BUR OAK	3	2" CAL B&B	see plan	17
SAM	*Salix amygdaloides*	PEACHLEAF WILLOW	2, 3	D-60	see plan	27
		TOTAL				**382**

SHRUBS						
ABBV.	SCIENTIFIC NAME	COMMON NAME	ZONE	SIZE	SPACING	COUNT
PA	*Prunus americanus*	AMERICAN PLUM	4	D-60		209
PP	*Prunus pumila var. besseyi*	SAND CHERRY	3,4	D-60		179
PV	*Prunus virginianus ssp. melanocarpa*	BLACK CHOKECHERRY	3	D-60		238
RA	*Ribes aureum*	GOLDEN CURRANT	3	D-60		425
SO	*Symphoricarpos occidentalis*	WESTERN SNOWBERRY	3, 4	D-60		463
		TOTAL				**1,514**

WETLAND AND CHANNEL EDGE CUTTINGS

ABBV.	SCIENTIFIC NAME		SIZE	SPACING	COUNT
	WILLOW CUTTINGS				
SE	*Salix exigua*	SANDBAR, NARROWLEAF, COYOTE WILLOW	stake	36"	1,928
		TOTAL			**1,928**

RIPARIAN PLUGS

ABBV.	SCIENTIFIC NAME	COMMON NAME	SIZE	COUNT
PLUGS				
BM	*Bolboschoenus maritimus*	ALKALI BULRUSH	10 ci	739
CE	*Carex emoryi*	EMORY SEDGE	10 ci	907
CN	*Carex nebrascensis*	NEBRASKA SEDGE	10 ci	8,152
CP	*Carex pellita*	WOOLY SEDGE	10 ci	20,529
CR	*Carex praegracilis*	CLUSTERED FIELD SEDGE	10 ci	1,034
DS	*Distichilis spicata*	INLAND SLATGRASS	10 ci	484
EP	*Eleocharis palustris*	CREEPING SPIKERUSH	10 ci	16,294
GS	*Glyceria striata*	FOWL MANNAGRASS	10 ci	584
JA	*Juncus arcticus ssp. littoralis*	MOUNTAIN RUSH	10 ci	7,583
JT	*Juncus torreyi*	TORREY RUSH	10 ci	1,182
SU	*Schoenoplectus pungens*	AMERICAN THREESQUARE	10 ci	528
ST	*Schoenoplectus tabermontani*	SOFTSTEM BULRUSH	10 ci	745
SM	*Scirpus microcarpus*	GREEN BULRUSH	10 ci	2,229
SP	*Spartina pectinata*	PRAIRIE CORDGRASS	10 ci	12,709
		TOTAL		**73,699**

NOTE:
RE: 3/L-24 FOR PLUG GROUP PLANTING (PGP) DETAILS AND SPECIES MIX.

DEPRESSION SEED MIX (ZONE 1)

SCIENTIFIC NAME AND VARIETY	COMMON NAME	PLS lbs/ac	% of Seed Mix by Wgt	PLS/sq ft	% of PLS/sq ft
GRAMINOIDS					
Carex nebrascensis	NEBRASKA SEDGE	0.49	1	5	3
Carex pellita	WOOLY SEDGE	0.63	2	4	2
Distichilis spicata	INLAND SALTGRASS	0.70	2	8	4
Eleocharis palustris	CREEPING SPIKERUSH	0.21	1	3	2
Elymus lanceolatus ssp. lanceolatus 'Sodar'	THICKSPIKE WHEATGRASS	6.20	17	22	12
Glyceria striata	FOWL MANNAGRASS	5.60	16	22	12
Juncus arcticus ssp. littoralis	MOUNTAIN RUSH	0.03	0	4	2
Juncus ensifolius	THREESTAMEN RUSH	0.01	0	4	2
Juncus torreyi	TORREY'S RUSH	0.01	0	4	2
Pascopyron smithii 'Arriba'	WESTERN WHEATGRASS	7.20	20	22	12
Poa palustris	FOWL BLUESTEM	0.53	1	25	13
Schoenoplectus pungens	AMERICAN THREESQUARE	0.63	2	5	3
Scirpus microcarpus	GREEN BULRUSH	0.05	0	7	3
Spartina pectinata	PRAIRIE CORDGRASS	5.00	14	18	9
	GRAMINOID TOTAL	**27.29**	**76**	**153**	**81**
FORBS					
Asclepias incarnata	MARSH MILKWEED	3.00	8	5	2
Asclepias speciosa	SHOWY MILKWEED	3.00	8	4	2
Helianthus nuttallii	NUTTALL SUNFLOWER	2.00	6	10	5
Monarda fistulosa	WILD BERGAMOT	0.25	1	7	4
Verbena hastata	BLUE VERBENA	0.25	1	10	5
	FORB TOTAL	**8.50**	**24**	**37**	**19**
	MIX TOTAL	**35.79**	**100**	**190**	**100**

OVERBANK FLOODPLAIN TRANSITION SEED MIX (ZONE 2)

SCIENTIFIC NAME AND VARIETY	COMMON NAME	PLS lbs/ac	% of Seed Mix by Wgt	PLS/sq ft	% of PLS/sq ft
GRAMINOIDS					
Carex pellita	WOOLY SEDGE	1.50	4	9	5
Distichilis spicata	INLAND SALTGRASS	1.00	3	12	6
Elymus canadensis 'Mandan'	CANADA WILDRYE	6.80	18	16	8
Elymus lanceolatus ssp. lanceolatus 'Critana'	THICKSPIKE WHEATGRASS	4.20	11	15	7
Elymus trachycaulus ssp. trachycaulus 'San Luis'	SLENDER WHEATGRASS	4.80	13	19	9
Juncus arcticus ssp. littoralis	MOUNTAIN RUSH	0.05	0	8	4
Juncus torreyi	TORREY'S RUSH	0.03	0	8	4
Panicum virgatum 'Blackwell, Dacotah, or Forestburg'	SWITCHGRASS	1.00	3	9	4
Pascopyron smithii 'Arriba'	WESTERN WHEATGRASS	5.60	15	17	8
Poa palustris	FOWL MANNAGRASS	0.36	1	17	9
Spartina pectinata	PRAIRIE CORDGRASS	2.70	7	10	5
Sporobolus airoides	ALKALI SACATON	0.60	2	20	10
	GRAMINOID TOTAL	**28.64**	**75**	**160**	**79**
FORBS					
Asclepias speciosa	SHOWY MILKWEED	4.50	12	7	3
Helianthus nuttallii	NUTTALL SUNFLOWER	2.90	8	14	7
Monarda fistulosa	WILD BERGAMOT	0.55	1	16	8
Tradescantia occidentalis	PRAIRIE SPIDERWORT	1.50	4	4	2
	FORB TOTAL	**9.45**	**25**	**41**	**21**
	MIX TOTAL	**38.09**	**100**	**201**	**100**

UPLAND - TALL SEED MIX (ZONE 3)

SCIENTIFIC NAME AND VARIETY	COMMON NAME	PLS lbs/ac	% of Seed Mix by Wgt	PLS/sq ft	% of PLS/sq ft
GRAMINOIDS					
Achnatherum hymenoides 'Rimrock'	INDIAN RICEGRASS	4.40	11	18	8
Andropogon hallii	SAND BLUESTEM	4.00	10	14	6
Aristida purpurea	PURPLE THREEAWN	2.00	5	11	5
Bouteloua curtipendula 'Butte, Vaughn, Pierre'	SIDEOATS GRAMA	2.00	5	9	4
Elymus trachycaulus ssp. trachycaulus 'San Luis'	SLENDER WHEATGRASS	3.50	9	14	6
Koeleria macrantha	PRAIRIE JUNEGRASS	0.20	1	9	4
Muhlenbergia pungens	SANDHILL MUHLY	0.60	2	10	5
Nasella viridula 'Lodorm'	GREEN NEEDLEGRASS	2.74	7	10	4
Pascopyron smithii 'Arriba'	WESTERN WHEATGRASS	7.00	18	21	9
Poa secunda 'Sherman'	BIG BLUEGRASS	0.50	1	10	5
Schizachyrium scoparium	LITTLE BLUESTEM	3.20	8	14	6
Sporobolus airoides	ALKALI SACATON	0.50	1	17	7
Sprorobolus cryptandrus	SAND DROPSEED	0.12	0	15	7
	GRAMINOID TOTAL	**30.76**	**78**	**174**	**76**
FORBS					
Dalea purpurea	PURPLE PRAIRIE CLOVER	0.80	2	5	2
Gaillardia aristata	BLANKETFLOWER	1.00	3	5	2
Heterotheca villosa	HAIRY GOLDENASTER	0.25	1	4	2
Liatris punctata	DOTTED BLAZING STAR	1.10	3	4	2
Ratibida columnifera	UPRIGHT PRAIRIE CONEFLOWER	0.15	0	4	2
	FORB TOTAL	**3.30**	**9**	**22**	**10**
SUB-SHRUB					
Artemisia frigida	FRINGED SAGE	0.06	0	6	3
Artemisia ludoviciana	LOUISIANA SAGEWORT	0.08	0	6	3
	SUB-SHRUB TOTAL	**0.14**	**0**	**12**	**6**
SHRUB					
Artemisia filifolia	SAND SAGE	0.15	0	7	3
Ericameria nauseosa	RUBBER RABBITBRUSH	0.40	1	6	3
Krascheninnikovia lanata	WINTERFAT	1.20	4	3	2
Rosa woodsii	WOODS' ROSE	3.00	8	3	1
	SHRUB TOTAL	**4.75**	**13**	**19**	**9**
	MIX TOTAL	**38.95**	**100**	**227**	**100**
QUICK GUARD		**8 lbs/ac**			

UPLAND - SHORT SEED MIX (ZONE 4)

SCIENTIFIC NAME AND VARIETY	COMMON NAME	PLS lbs/ac	% of Seed Mix by Wgt	PLS/sq ft	% of PLS/sq ft
GRAMINOIDS					
Aristida purpurea	PURPLE THREEAWN	1.80	11	10	7
Bouteloua dactyloides 'Bison, Cody, Plains or Bismark ecotype'	BUFFALOGRASS	3.40	21	22	14
Bouteloua gracilis 'Hachita, Lovington or Bad River'	BLUE GRAMA	1.50	9	27	17
Koeleria macrantha	PRAIRIE JUNEGRASS	0.20	1	9	6
Muhlenbergia pungens	SANDHILL MUHLY	0.60	4	10	7
Pascopyron smithii 'Arriba'	WESTERN WHEATGRASS	6.20	39	19	12
Sprorobolus cryptandrus	SAND DROPSEED	0.16	1	20	13
	GRAMINOID TOTAL	**13.86**	**88**	**118**	**75**
FORBS					
Achillea millefolium var. occidentalis	WESTERN YARROW	0.07	0	7	4
Antennaria parviflora	ROSY PUSSYTOES	0.12	1	3	2
Dalea purpurea	PURPLE PRAIRIE CLOVER	0.70	4	5	3
Erigeron pumilus	LOW FLEABANE	0.05	0	3	2
Gaillardia aristata	BLANKETFLOWER	0.85	5	4	3
	FORB TOTAL	**1.79**	**11**	**22**	**14**
SUB-SHRUB					
Artemisia frigida	FRINGED SAGE	0.12	1	12	7
Artemisia ludoviciana	LOUISIANA SAGEWORT	0.06	0	4	3
	SUB-SHRUB TOTAL	**0.18**	**1**	**16**	**10**
	MIX TOTAL	**15.83**	**100**	**156**	**100**

PREPARED UNDER THE SUPERVISION OF

JESSE M. CLARK
REG. NO. 38,992
STATE OF COLORADO
REGISTERED LANDSCAPE ARCHITECT

DESIGNED: JMC
DRAWN: CBG/NGP
CHECKED: JMC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY

MULLER ENGINEERING COMPANY
stream landscape architecture + planning

URBAN DRAINAGE AND FLOOD CONTROL DISTRICT
DENVER THE MILE HIGH CITY
ARAPAHOE COUNTY COLORADO'S FIRST
Southeast Metro Stormwater Authority
DENVER WATER

CHERRY CREEK CORRIDOR IMPROVEMENTS

LANDSCAPE

PLANTING SCHEDULE

DATE 06/04/2019
DRAWING NO. L-14
SHEET NO. 65 OF 114

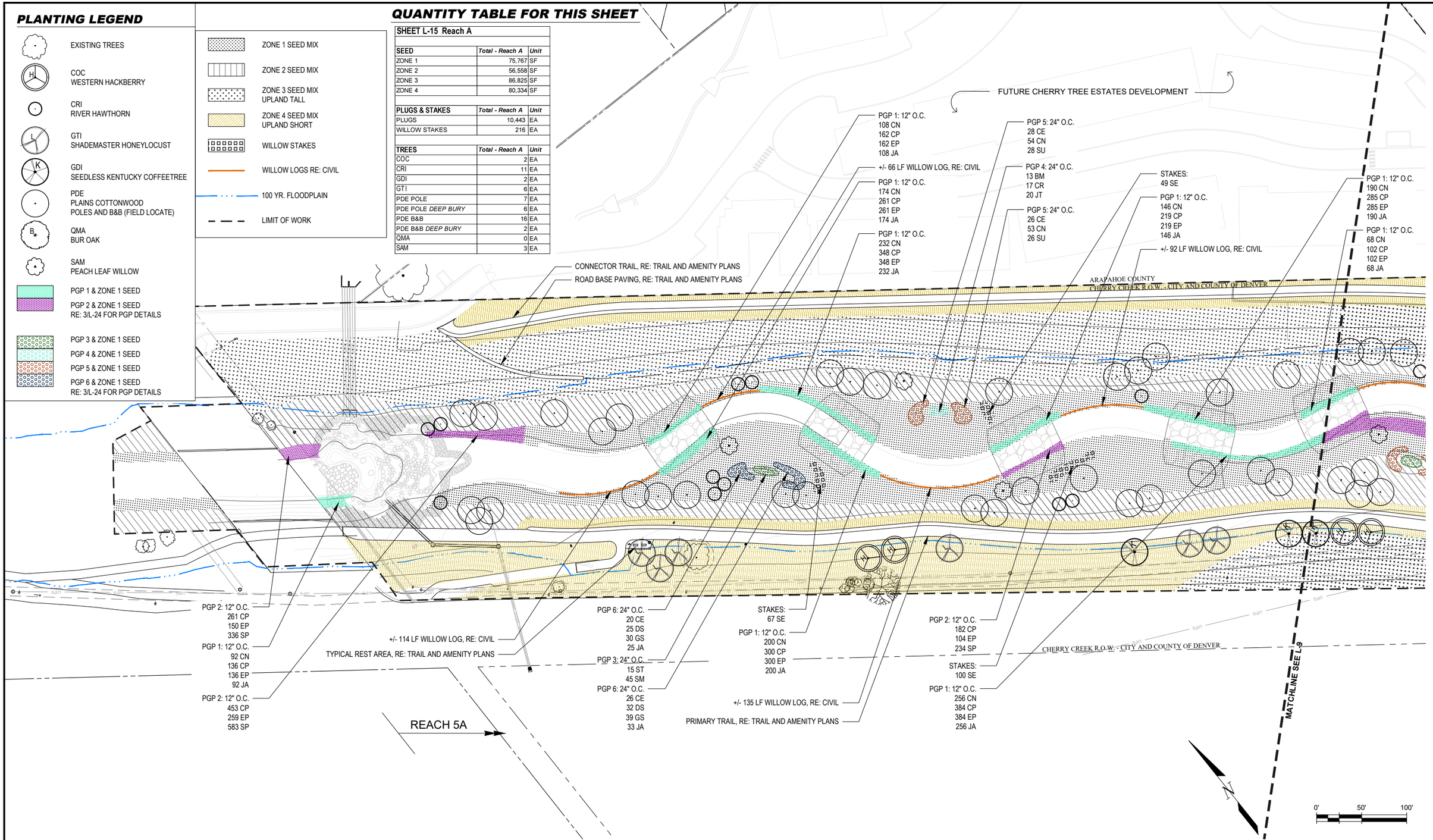
PLANTING LEGEND

- EXISTING TREES
- COC — WESTERN HACKBERRY
- CRI — RIVER HAWTHORN
- GTI — SHADEMASTER HONEYLOCUST
- GDI — SEEDLESS KENTUCKY COFFEETREE
- PDE — PLAINS COTTONWOOD — POLES AND B&B (FIELD LOCATE)
- QMA — BUR OAK
- SAM — PEACH LEAF WILLOW
- PGP 1 & ZONE 1 SEED
- PGP 2 & ZONE 1 SEED — RE: 3/L-24 FOR PGP DETAILS
- PGP 3 & ZONE 1 SEED
- PGP 4 & ZONE 1 SEED
- PGP 5 & ZONE 1 SEED
- PGP 6 & ZONE 1 SEED — RE: 3/L-24 FOR PGP DETAILS

- ZONE 1 SEED MIX
- ZONE 2 SEED MIX
- ZONE 3 SEED MIX — UPLAND TALL
- ZONE 4 SEED MIX — UPLAND SHORT
- WILLOW STAKES
- WILLOW LOGS RE: CIVIL
- 100 YR. FLOODPLAIN
- LIMIT OF WORK

QUANTITY TABLE FOR THIS SHEET

SHEET L-15 Reach A		
SEED	***Total - Reach A***	***Unit***
ZONE 1	75,767	SF
ZONE 2	56,558	SF
ZONE 3	86,825	SF
ZONE 4	80,334	SF
PLUGS & STAKES	***Total - Reach A***	***Unit***
PLUGS	10,443	EA
WILLOW STAKES	216	EA
TREES	***Total - Reach A***	***Unit***
COC	2	EA
CRI	11	EA
GDI	2	EA
GTI	6	EA
PDE POLE	7	EA
PDE POLE *DEEP BURY*	6	EA
PDE B&B	16	EA
PDE B&B *DEEP BURY*	2	EA
QMA	0	EA
SAM	3	EA



PREPARED UNDER THE SUPERVISION OF
JESSE M. CLARK, PE 36578, REGISTERED PROFESSIONAL ENGINEER, STATE OF COLORADO, AMERICAN INTERESTS INCORPORATED

DESIGNED: JMC
DRAWN: CBG/NGP
CHECKED: JMC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY

MULLER ENGINEERING COMPANY
stream landscape architecture + planning

UDFCD — DENVER THE MILE HIGH CITY — ARAPAHOE COUNTY COLORADO'S FIRST — Southeast Metro Stormwater Authority — DENVER WATER

CHERRY CREEK CORRIDOR IMPROVEMENTS

LANDSCAPE

PLANTING PLAN A

DATE 06/04/2019
DRAWING NO. L-15
SHEET NO. 66 OF 114

PLANTING LEGEND

- EXISTING TREES
- COC — WESTERN HACKBERRY
- CRI — RIVER HAWTHORN
- GTI — SHADEMASTER HONEYLOCUST
- GDI — SEEDLESS KENTUCKY COFFEETREE
- PDE — PLAINS COTTONWOOD POLES AND B&B (FIELD LOCATE)
- QMA — BUR OAK
- SAM — PEACH LEAF WILLOW
- PGP 1 & ZONE 1 SEED
- PGP 2 & ZONE 1 SEED RE: 3/L-24 FOR PGP DETAILS
- PGP 3 & ZONE 1 SEED
- PGP 4 & ZONE 1 SEED
- PGP 5 & ZONE 1 SEED
- PGP 6 & ZONE 1 SEED RE: 3/L-24 FOR PGP DETAILS
- ZONE 1 SEED MIX
- ZONE 2 SEED MIX
- ZONE 3 SEED MIX UPLAND TALL
- ZONE 4 SEED MIX UPLAND SHORT
- WILLOW STAKES
- WILLOW LOGS RE: CIVIL
- 100 YR. FLOODPLAIN
- LIMIT OF WORK

FUTURE CHERRY TREE ESTATES DEVELOPMENT

WILLOW STAKES AND RIPARIAN PLUGS INTEGRATED IN RIFFLE STRUCTURE (TYP)

PGP 2: 12" O.C.
686 CP
392 EP
882 SP

+/- 115 LF WILLOW LOG, RE: CIVIL

STAKES:
45 SE

STAKES:
37 SE

+/- 55 LF WILLOW LOG, RE: CIVIL

PGP 2: 12" O.C.
315 CP
180 EP
405 SP

STAKES:
124 SE

PGP 5: 24" O.C.
40 CE
80 CN
40 SU

PGP 4: 24" O.C.
144 BM
201 CR
230 JT

PGP 5: 24" O.C.
60 CE
137 CN
69 SU

STAKES:
58 SE

STAKES: 35 SE

STAKES: 82 SE

PGP 1: 12" O.C.
60 CN
90 CP
90 EP
60 JA

PGP 2: 12" O.C.
1428 CP
816 EP
1836 SP

PGP 5: 24" O.C.
16 CE
33 CN
16 SU

PGP 3: 24" O.C.
16 ST
48 SM

PGP 5: 24" O.C.
22 CE
46 CN
22 SU

PGP 1: 12" O.C.
320 CN
480 CP
480 EP
320 JA

+/- 115 LF WILLOW LOG, RE: CIVIL

STAKES:
52 SE

REACH 5A

REACH 5B

PGP 4: 24" O.C.
156 BM
219 CR
250 JT

STAKES:
22 SE

+/- 48 LF WILLOW LOG, RE: CIVIL

PGP 1:12" O.C.
54 CN
81 CP
81 EP
54 JA

PGP 1: 12" O.C.
800 CN
1200 CP
1200 EP
800 JA

PGP 6: 24" O.C.
7 CE
9 DS
11 GS
9 JA

PGP 3: 24" O.C.
55 ST
165 SM

PGP 6: 24" O.C.
15 CE
19 DS
22 GS
19 JA

PGP 5: 24" O.C.
100 CE
200 CN
100 SU

PGP 3: 24" O.C.
88 ST
262 SM

PGP 5: 24" O.C.
94 CE
187 CN
94 SU

STAKES:
52 SE

PGP 5: 24" O.C.
41 CE
83 CN
41 SU

PGP 4: 24" O.C.
26 BM
37 CR
42 JT

SECONDARY TRAIL (TYP), RE: TRAIL AND AMENITY PLANS

PGP 5: 24" O.C.
39 CE
77 CN
39 SU

STAKES:
147 SE

RIFFLE STRUCTURE (TYP), RE: CIVIL

PGP 2:12" O.C.
1050 CP
600 EP
1350 SP

PGP 2: 12" O.C.
357 CP
204 EP
459 SP

DENVER WATER - TO BE TRANSFERRED TO CITY AND COUNTY OF DENVER

STAKES:
71 SE

PGP 2: 12" O.C.
364 CP
208 EP
468 SP

PGP 1: 12" O.C.
234 CN
351 CP
351 EP
234 JA

PGP 6: 24" O.C.
53 CE
66 DS
80 GS
66 JA

PGP 3: 24" O.C.
58 ST
172 SM

PGP 6: 24" O.C.
41 CE
51 DS
62 GS
51 JA

DENVER WATER - TO BE TRANSFERRED TO CITY AND COUNTY OF DENVER

CHERRY CREEK R.O.W. - CITY AND COUNTY OF DENVER

NEW TRAIL

EXISTING TRAIL

+/- 133 LF WILLOW LOG, RE: CIVIL

PGP 2: 12" O.C.
217 CP
124 EP
279 SP

PGP 1: 12" O.C.
380 CN
570 CP
570 EP
380 JA

TYPICAL REST AREA, RE: TRAIL AND AMENITY PLANS

PRIMARY TRAIL, RE: TRAIL AND AMENITY PLANS

WILLOW STAKES AND RIPARIAN PLUGS INTEGRATED IN DEPRESSIONS AND PIPE OUTFALL AREAS (TYP)

STAKES:
75 SE

PGP 4: 24" O.C.
400 BM
560 CR
640 JT

STAKES:
44 SE

MATCHLINE SEE L-8

MATCHLINE SEE L-10

0' 50' 100'

QUANTITY TABLE FOR THIS SHEET

SHEET L-16 Reach A & B				
SEED	*Reach A*	*Reach B*	*Sheet Total*	*Unit*
ZONE 1	75,607	76,783	152,390	SF
ZONE 2	48,475	47,644	96,119	SF
ZONE 3	81,660	131,980	213,640	SF
ZONE 4	48,482	41,857	90,339	SF
PLUGS & STAKES	*Reach A*	*Reach B*	*Sheet Total*	*Unit*
PLUGS	16,411	11,475	27,886	EA
WILLOW STAKES	507	337	844	EA

TREES	*Reach A*	*Reach B*	*Sheet Total*	*Unit*
COC	5	3	8	EA
CRI	13	10	23	EA
GDI	2	5	7	EA
GTI	4	5	9	EA
PDE POLE	5	4	9	EA
PDE POLE *DEEP BURY*	21	15	36	EA
PDE B&B	12	9	21	EA
PDE B&B *DEEP BURY*	9	6	15	EA
QMA	3	1	4	EA
SAM	13	3	16	EA

PREPARED UNDER THE SUPERVISION OF

JESSE M. CLARK, PLA, 2601, REGISTERED LANDSCAPE ARCHITECT, STATE OF COLORADO

DESIGNED: JMC

DRAWN: CBG/NGP

CHECKED: JMC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY

MULLER ENGINEERING COMPANY

stream landscape architecture + planning

URBAN DRAINAGE AND FLOOD CONTROL DISTRICT

DENVER THE MILE HIGH CITY

ARAPAHOE COUNTY COLORADO'S FIRST

Southeast Metro Stormwater Authority

DENVER WATER

CHERRY CREEK CORRIDOR IMPROVEMENTS

LANDSCAPE

PLANTING PLAN B

DATE 06/04/2019

DRAWING NO. L-16

SHEET NO. 67 OF 114

PLANTING LEGEND

- EXISTING TREES
- COC — WESTERN HACKBERRY
- CRI — RIVER HAWTHORN
- GTI — SHADEMASTER HONEYLOCUST
- GDI — SEEDLESS KENTUCKY COFFEETREE
- PDE — PLAINS COTTONWOOD POLES AND B&B (FIELD LOCATE)
- QMA — BUR OAK
- SAM — PEACH LEAF WILLOW
- PGP 1 & ZONE 1 SEED
- PGP 2 & ZONE 1 SEED RE: 3/L-24 FOR PGP DETAILS
- PGP 3 & ZONE 1 SEED
- PGP 4 & ZONE 1 SEED
- PGP 5 & ZONE 1 SEED
- PGP 6 & ZONE 1 SEED RE: 3/L-24 FOR PGP DETAILS
- ZONE 1 SEED MIX
- ZONE 2 SEED MIX
- ZONE 3 SEED MIX UPLAND TALL
- ZONE 4 SEED MIX UPLAND SHORT
- WILLOW STAKES
- WILLOW LOGS RE: CIVIL
- 100 YR. FLOODPLAIN
- LIMIT OF WORK

SECONDARY TRAIL (TYP), RE: TRAIL AND AMENITY PLANS

WILLOW STAKES AND RIPARIAN PLUGS INTEGRATED IN RIFFLE STRUCTURE (TYP)

+/- 117 LF WILLOW LOG, RE: CIVIL

STAKES: 179 SE

PGP 3: 24" O.C. 173 ST 517 SM

STAKES: 57 SE

PGP 2: 12" O.C. 707 CP 404 EP 909 SP

PGP 6: 24" O.C. 71 CE 89 DS 106 GS 89 JA

PGP 3: 24" O.C. 38 ST 112 SM

PGP 6: 24" O.C. 30 CE 37 DS 46 GS 37 JA

STAKES: 63 SE

PGP 1: 12" O.C. 192 CN 288 CP 288 EP 192 JA

PGP 3: 24" O.C. 130 ST 390 SM

PGP 5: 24" O.C. 30 CE 60 CN 30 SU

PGP 3: 24" O.C. 20 ST 60 SM

PGP 5: 24" O.C. 23 CE 44 CN 23 SU

PGP 3: 24" O.C. 152 ST 458 SM

STAKES: 61 SE

STAKES: 81 SE

STAKES: 35 SE

PGP 6: 24" O.C. 50 CE 62 DS 76 GS 62 JA

STAKES: 76 SE

DENVER WATER - TO BE TRANSFERRED TO CITY AND COUNTY OF DENVER

DENVER WATER - TO BE TRANSFERRED TO CITY AND COUNTY OF DENVER

+/- 115 LF WILLOW LOG, RE: CIVIL

+/- 108 LF WILLOW LOG, RE: CIVIL

WILLOW STAKES AND RIPARIAN PLUGS INTEGRATED IN DROP STRUCTURE

PGP 1: 12" O.C. 1360 CN 2040 CP 2040 EP 1360 JA

PGP 1: 12" O.C. 404 CN 606 CP 606 EP 404 JA

PGP 1: 12" O.C. 400 CN 600 CP 600 EP 400 JA

PGP 2: 12" O.C. 581 CP 332 EP 747 SP

STAKES: 108 SE

STAKES: 35 SE

STAKES: 75 SE

+/- 154 LF WILLOW LOG, RE: CIVIL

PGP 6: 24" O.C. 40 CE 50 DS 60 GS 50 JA

PGP 2: 12" O.C. 1407 CP 804 EP 1809 SP

PGP 2: 12" O.C. 1141 CP 652 EP 1467 SP

+/- 85 LF WILLOW LOG, RE: CIVIL

WILLOW STAKES AND RIPARIAN PLUGS INTEGRATED IN DEPRESSIONS AND PIPE OUTFALL AREAS (TYP)

PGP 6: 24" O.C. 35 CE 44 DS 52 GS 44 JA

DENVER WATER - TO BE TRANSFERRED TO CITY AND COUNTY OF DENVER

CHERRY CREEK R.O.W. - CITY AND COUNTY OF DENVER

DENVER WATER - TO BE TRANSFERRED TO ARAPAHOE COUNTY R.O.W. - ARAPAHOE COUNTY

R.O.W. - ARAPAHOE COUNTY

PGP 1: 12" O.C. 260 CN 390 CP 390 EP 260 JA

PGP 1: 12" O.C. 328 CN 492 CP 492 EP 328 JA

STAKES: 98 SE

TYPICAL REST AREA, RE: TRAIL AND AMENITY PLANS

PRIMARY TRAIL (TYP), RE: TRAIL AND AMENITY PLANS

R.O.W. - ARAPAHOE COUNTY

MATCHLINE SEE L-9

MATCHLINE SEE L-11

REACH 5B

REACH 5C

EXISTING VEGETATION WEST OF TRAIL, OUTSIDE OF THE LOC SHALL BE EVALUATED AFTER CONSTRUCTION AND RECEIVE WEED CONTROL AND/OR OVERSEEDING AS DEEMED NECESSARY (TYP)

0' 50' 100'

QUANTITY TABLE FOR THIS SHEET

SHEET L-17 Reach B & C				
SEED	*Reach B*	*Reach C*	*Sheet Total*	*Unit*
ZONE 1	111,290	25,569	136,859	SF
ZONE 2	73,931	16,430	90,361	SF
ZONE 3	264,706	58,278	322,984	SF
ZONE 4	93,255	45,904	139,159	SF
PLUGS & STAKES	*Reach B*	*Reach C*	*Sheet Total*	*Unit*
PLUGS	25,520	3,550	29,070	EA
WILLOW STAKES	709	159	868	EA

TREES	*Reach B*	*Reach C*	*Sheet Total*	*Unit*
COC	8	3	11	EA
CRI	17	4	21	EA
GDI	6	4	10	EA
GTI	7	7	14	EA
PDE POLE	6	1	7	EA
PDE POLE *DEEP BURY*	11	11	22	EA
PDE B&B	14	2	16	EA
PDE B&B *DEEP BURY*	5	5	9	EA
QMA	7	6	13	EA
SAM	4	0	4	EA

PREPARED UNDER THE SUPERVISION OF

JESSE M. STARK — 36510 — REGISTERED LANDSCAPE ARCHITECT — STATE OF COLORADO

DESIGNED: JMC

DRAWN: CBG/NGP

CHECKED: JMC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY

MULLER ENGINEERING COMPANY

stream landscape architecture + planning

CHERRY CREEK CORRIDOR IMPROVEMENTS

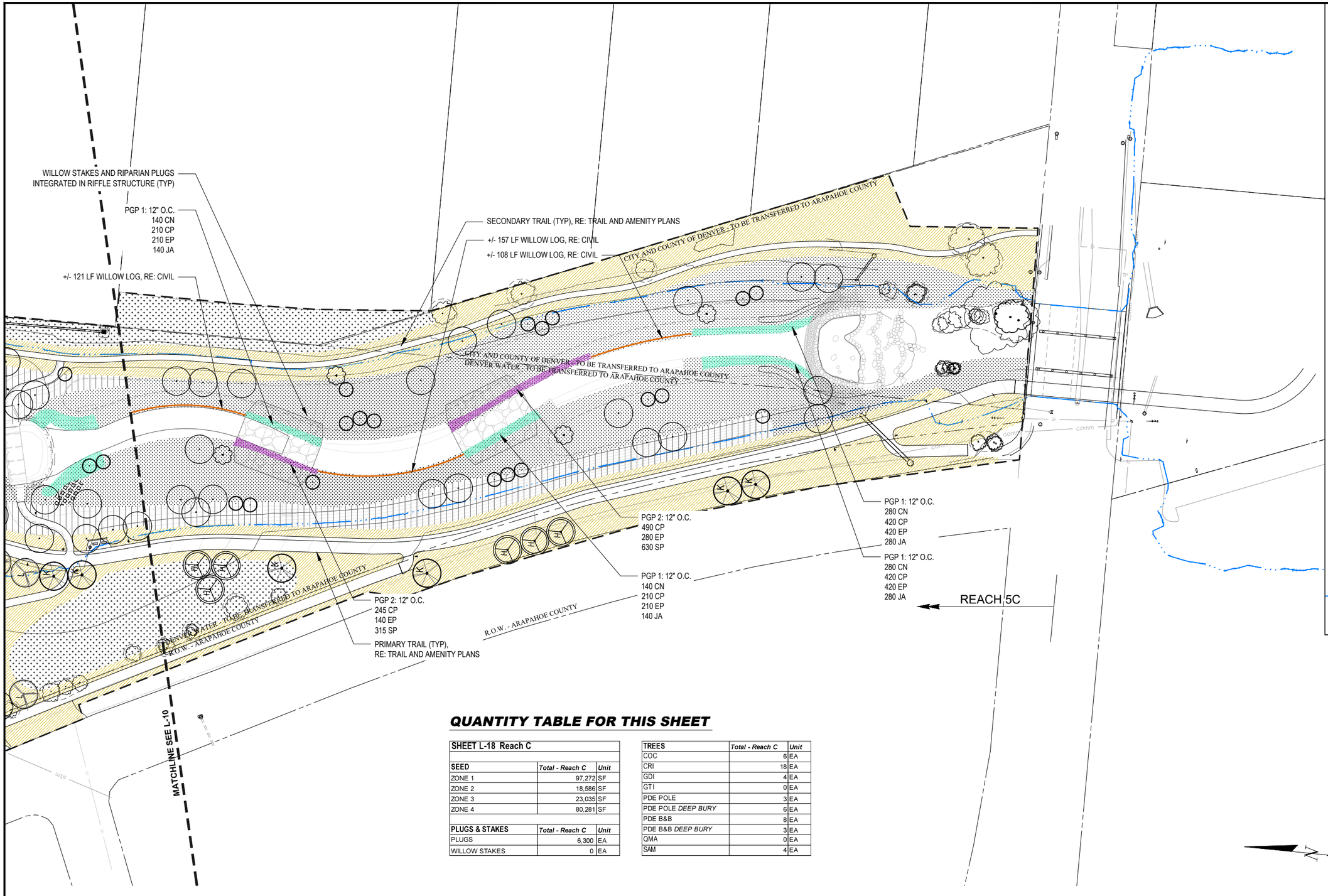
LANDSCAPE

PLANTING PLAN C

DATE 06/04/2019

DRAWING NO. L-17

SHEET NO. 68 OF 114



PLANTING LEGEND

- EXISTING TREES
- COC — WESTERN HACKBERRY
- CRI — RIVER HAWTHORN
- GTI — SHADEMASTER HONEYLOCUST
- GDI — SEEDLESS KENTUCKY COFFEETREE
- PDE — PLAINS COTTONWOOD — POLES AND B&B (FIELD LOCATE)
- QMA — BUR OAK
- SAM — PEACH LEAF WILLOW
- PGP 1 & ZONE 1 SEED
- PGP 2 & ZONE 1 SEED — RE: 3/L-24 FOR PGP DETAILS
- PGP 3 & ZONE 1 SEED
- PGP 4 & ZONE 1 SEED
- PGP 5 & ZONE 1 SEED
- PGP 6 & ZONE 1 SEED — RE: 3/L-24 FOR PGP DETAILS
- ZONE 1 SEED MIX
- ZONE 2 SEED MIX
- ZONE 3 SEED MIX — UPLAND TALL
- ZONE 4 SEED MIX — UPLAND SHORT
- WILLOW STAKES
- WILLOW LOGS RE: CIVIL
- 100 YR. FLOODPLAIN
- LIMIT OF WORK

QUANTITY TABLE FOR THIS SHEET

SHEET L-18 Reach C		
SEED	***Total - Reach C***	***Unit***
ZONE 1	97,272	SF
ZONE 2	18,586	SF
ZONE 3	23,035	SF
ZONE 4	80,281	SF
PLUGS & STAKES	***Total - Reach C***	***Unit***
PLUGS	6,300	EA
WILLOW STAKES	0	EA

TREES	*Total - Reach C*	*Unit*
COC	6	EA
CRI	18	EA
GDI	4	EA
GTI	0	EA
PDE POLE	3	EA
PDE POLE *DEEP BURY*	6	EA
PDE B&B	8	EA
PDE B&B *DEEP BURY*	3	EA
QMA	0	EA
SAM	4	EA

PREPARED UNDER THE SUPERVISION OF

JESSE M. CLARK, PE — PROFESSIONAL ENGINEER — STATE OF COLORADO — CIVIL ENGINEER

DESIGNED: JMC
DRAWN: CBG/NGP
CHECKED: JMC

FOR CONSTRUCTION

PROJECT NO. 13-003.04

SHEET REVISIONS

NO.	DATE	DESCRIPTION	BY

MULLER ENGINEERING COMPANY

stream landscape architecture + planning

CHERRY CREEK CORRIDOR IMPROVEMENTS

LANDSCAPE

PLANTING PLAN D

DATE 06/04/2019

DRAWING NO. L-18

SHEET NO. 69 OF 114

Appendix C

Operation and Maintenance Plan

OPERATIONS AND MAINTENANCE MATRIX
CHERRY CREEK - QUEBEC STREET TO ILIFF AVENUE

DRAFT - FOR REVIEW

Nov-21

PROJECT PARTNERS:	Contact:
DENVER PARKS AND RECREATION	Jessica Andersen (Jessica.Andersen@denvergov.org)
DENVER DEPARTMENT OF TRANSPORTATION AND INFRASTRUCTURE (DOTI)	Kevin Lewis (Donald.Lewis@denvergov.org)
ARAPAHOE COUNTY OPEN SPACE	Glen Poole (gpoole@arapahoegov.org)
SOUTHEAST METRO STORMWATER AUTHORITY (SEMSWA)	Dan Olson (dolson@semswa.org)
MILE HIGH FLOOD DISTRICT (MHFD)	Scott Dirschl (sdirschl@mhfd.org)

***ROUTINE* MAINTENANCE ACTIVITIES**

	MAINTENANCE ACTIVITY	MINIMUM FREQUENCY	LOOK FOR:	MAINTENANCE ACTION	RESPONSIBLE PARTY BY JURISDICTIONAL LOCATION	
					DENVER	ARAPAHOE COUNTY
	TRAILS AND UPLAND AREAS					
1.1	PLOW TRAILS	As needed	Snow	Plow hard surface trails	Denver Parks & Rec	
1.2	TRASH/DEBRIS REMOVAL	As needed - minimum monthly	Full trash cans, debris	Remove and dispose of trash and debris, replace bags in trash cans	Denver Parks & Rec	
1.3	MOWING - TRAIL RECOVERY ZONE	As needed - approximately monthly	Excessive grass height/presence of noxious weeds	Mow to 4-inch height (April through October)	Denver Parks & Rec	
1.4	GRAFFITI REMOVAL / VANDALISM	As needed	Graffiti, damage caused by vandalism	Remove graffiti by appropriate measures for surface type. Repair any damage caused by vandalism.	Denver Parks & Rec	
1.5	SOFT SURFACE TRAIL MAINTENANCE	As needed	Uneven trail surface, low areas that pond water, other minor damages	Supplement or repair with crusher fines or road base material	Denver Parks & Rec	
1.6	HARD SURFACE TRAIL MAINTENANCE	As needed	Cracks, chips, heaving or sinking panels, other minor damage	Seal chips or cracks, grind panels, or perform other appropriate repairs	Denver Parks & Rec	
1.7	TRAIL DETOURS	As needed	Flooding or safety hazards	Place appropriate detour signage, communicate trail closures	Denver Parks & Rec	Arapahoe County
1.8	SAFETY MONITORING	As needed	Trip hazards, misc. safety concerns	Remove hazard, warn against hazard	Denver Parks & Rec	Arapahoe County
1.9	WEED CONTROL	As needed	Noxious weeds and invasive plant species	Treat with EPA approved herbicide, hand pull, string trim or strategic mow; consult with Parks East District Superintendent/County Natural Resources Planner	Denver Parks & Rec*	Arapahoe County*
1.10	IRRIGATION SYSTEM	As needed - spring/summer and fall	Dry or dying vegetation, first freeze	Charge and operate irrigation system during extended dry conditions. Winterize and turn off irrigation system before first freeze.	Denver Parks & Rec[1,2,3]	
	STREAM CORRIDOR**					
1.11	GRAFFITI REMOVAL (CHANNEL STRUCTURES)	As needed	Graffiti	Remove graffiti by appropriate measures for surface type	Denver Parks & Rec	Arapahoe County
1.12	GRAFFITI REMOVAL (STORM OUTFALLS)	As needed	Graffiti	Remove graffiti by appropriate measures for surface type	Denver DOTI[4]	SEMSWA[4]
1.13	TRASH/DEBRIS REMOVAL (CHANNEL AND STORM OUTFALLS)	As needed	Trash & debris	Remove and dispose of trash/debris	Denver DOTI*[4]	SEMSWA*[4]
1.14	WEED CONTROL	As needed	Noxious weeds and invasive plant species	Treat with EPA approved herbicide, hand pull, string trim or strategic mow; consult with Parks East District Superintendent/County Natural Resources Planner	Denver Parks & Rec*	SEMSWA*

OPERATIONS AND MAINTENANCE MATRIX
CHERRY CREEK - QUEBEC STREET TO ILIFF AVENUE

DRAFT - FOR REVIEW

***MINOR* MAINTENANCE ACTIVITIES**

	MAINTENANCE ACTIVITY	MINIMUM FREQUENCY	LOOK FOR:	MAINTENANCE ACTION	RESPONSIBLE PARTY	
					DENVER	ARAPAHOE COUNTY
	TRAILS AND UPLAND AREAS					
2.1	RESEEDING/ REPLANTING	As needed; based upon inspection	Areas of sparse coverage or barren ground where vegetation was planned; dead or dying trees or shrubs	Reseed with specified zone seed mix; replant with similar species	Denver Parks & Rec*	Arapahoe County*
2.2	THINNING OF DENSE VEGETATION	As needed; based upon inspection	Large trees/woody vegetation in area affecting recreational access (trails, access to stream, etc.) or posing safety risk (sight lines, encampments, etc.)	Remove vegetation; restore grade and groundcover	Denver Parks & Rec*	Arapahoe County*
2.3	TREE STRAPS	As needed; based upon inspection	Damage or deterioration to tree straps; tree maturity/need for straps	Replace damaged tree straps or remove tree straps once no longer needed	Denver Parks & Rec*	Arapahoe County*
2.4	BEAVER PROTECTION	As needed; based upon inspection	Damage or deterioration to beaver protection in place; damage to trees as a result of beaver activity	Install protection, replace damaged beaver protection, or remove once no longer needed	Denver Parks & Rec	Arapahoe County[6]
2.5	IRRIGATION REPAIRS - CONTROLLER, LINES, & HEADS	As needed	Damage to controller, lines, or heads; undesirable spray patterns	Repair damaged controller, lines, or heads	Denver Parks & Rec[1,2]	
	STREAM CORRIDOR**					
2.6	MINOR EROSION (CHANNEL)	As needed; based upon inspection	Rills/gullies forming along channel banks	Repair & revegetate eroded areas; address cause	Denver DOTI*	SEMSWA*
2.7	MINOR EROSION/ SEDIMENTATION (STORM OUTFALLS)	As needed; based upon inspection	Erosion downstream of outfall; sediment/trash debris building and/or clogging	Repair & revegetate eroded areas; clean pipes/inlets/outlets; remove and dispose of sediment	Denver DOTI*[4]	SEMSWA*[4]
2.8	MINOR EROSION/ SEDIMENTATION (ILIFF WQ TREATMENT)	As needed; based upon inspection	Erosion at water quality outfalls; sediment buildup/clogging of infiltration swale causing reduction in infiltration capacity	Repair & revegetate eroded areas; clear accumulated sediment and revegetate	N/A	SEMSWA*
2.9	RESEEDING/ REPLANTING	As needed; based upon inspection	Areas of sparse coverage or barren ground where vegetation was planned; dead or dying trees or shrubs	Reseed with specified zone seed mix; replant with similar species	Denver Parks & Rec*	SEMSWA*
2.10	THINNING OF DENSE VEGETATION	As needed; based upon inspection	Large trees/woody vegetation in area affecting recreational access (trails, access to stream, etc.) or posing safety risk (sight lines, encampments, etc.)	Remove vegetation; restore grade and groundcover	Denver Parks & Rec*	SEMSWA*
2.11	TREE STRAPS	As needed; based upon inspection	Damage or deterioration to tree straps; tree maturity/need for straps	Replace damaged tree straps or remove tree straps once no longer needed	Denver Parks & Rec*	SEMSWA*
2.12	BEAVER PROTECTION	As needed; based upon inspection	Damage or deterioration to beaver protection in place; damage to trees as a result of beaver activity	Install protection, replace damaged beaver protection, or remove once no longer needed	Denver Parks & Rec	SEMSWA*

***MAJOR* MAINTENANCE ACTIVITIES**

	MAINTENANCE ACTIVITY	MINIMUM FREQUENCY	LOOK FOR:	MAINTENANCE ACTION	RESPONSIBLE PARTY	
					DENVER	ARAPAHOE COUNTY
	TRAILS AND UPLAND AREAS					
3.1	CONCRETE PAVING REPAIRS	As needed; based upon inspection	Deterioration and/or damage to concrete paving	Repair concrete paving	Denver Parks & Rec	Arapahoe County
3.2	REST AREA REPAIRS	As needed; based upon inspection	Deterioration and/or damage to rest areas	Repair rest area	Denver Parks & Rec	Arapahoe County
3.3	SIGN REPAIRS	As needed; based upon inspection	Deterioration and/or damage to signs	Repair or replace signs	Denver Parks & Rec	Arapahoe County
3.4	TRAIL CROSSING REPAIRS	As needed; based upon inspection	Deterioration and/or damage to trail crossings	Repair damages to trail crossing	Denver Parks & Rec	Arapahoe County
	STREAM CORRIDOR**					
3.5	MAJOR EROSION/ SEDIMENTATION	As needed; based upon inspection	Severe erosion including gullies, excessive soil displacement, areas of settlement and holes	Repair erosion - find cause of problem and address to avoid future erosion. Repair vegetation.	Denver DOTI*	SEMSWA*
3.6	ILIFF WQ TREATMENT REPAIRS	As needed; based upon inspection	Breach of berm separating infiltration swales from channel bottom, significant loss of infiltration capacity	Repair berm, investigate clogging to determine cause and develop solution. Repair vegetation.	N/A	SEMSWA*
3.7	DROP STRUCTURE REPAIRS	As needed; based upon inspection	Deterioration and/or damage to structural components - broken concrete, damaged or displaced boulders/riprap	Structural repair to restore structure to its original function and design. Repair vegetation.	Denver DOTI*	SEMSWA*
3.8	STRUCTURAL REPAIRS - END SECTION/OUTFALL	As needed; based upon inspection	Deterioration and/or damage to structural components - broken concrete, damaged pipes & outlet works	Structural repair to restore structure to its original function and design. Repair vegetation.	Denver DOTI*[4]	SEMSWA*[4]

OPERATIONS AND MAINTENANCE MATRIX
CHERRY CREEK - QUEBEC STREET TO ILIFF AVENUE

DRAFT - FOR REVIEW

***OTHER* MANAGEMENT ACTIVITIES**

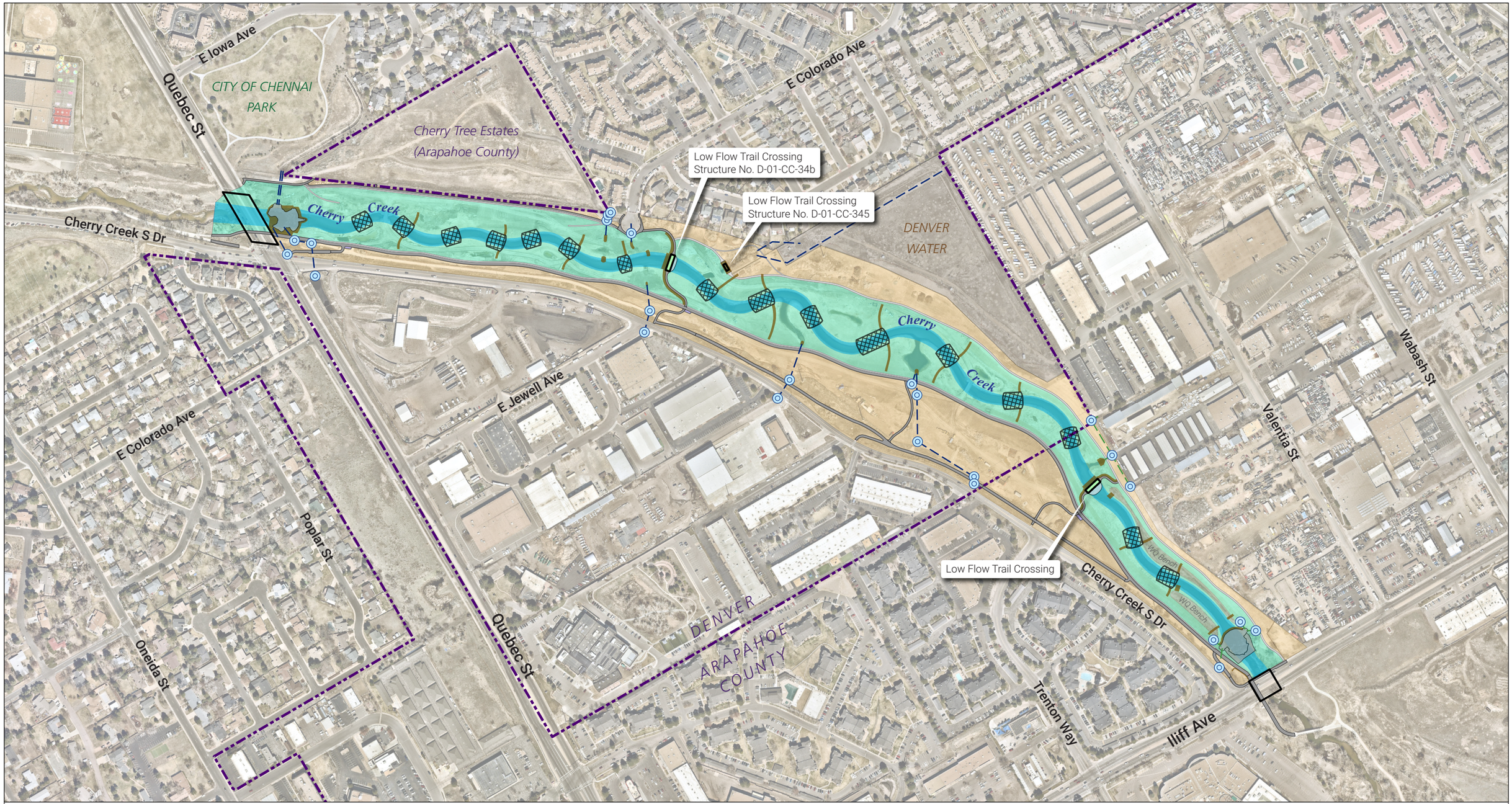
MANAGEMENT ISSUE		MINIMUM FREQUENCY	LOOK FOR:	ACTION	RESPONSIBLE PARTY	
					DENVER	ARAPAHOE COUNTY
4.1	ENCAMPMENTS	As needed	Encampments, abandoned materials	Work with local agency	Denver Parks & Rec	Arapahoe County
4.2	BEAVER	As needed	Beavers, beaver dams, downed trees	Work with local agency	Denver Parks & Rec	Arapahoe County/SEMSWA[5]
4.3	PRAIRIE DOGS	As needed	Prairie dogs, holes	Work with local agency	Denver Parks & Rec	Arapahoe County/SEMSWA[5]

Notes

1 Irrigation system is located both inside and outside the stream corridor.
2 If a new irrigation tap is added in Arapahoe County, Arapahoe County would be responsible for operation and maintenance of that section.
3 Denver Parks & Rec will be responsible for the cost of irrigation water (excluding any additional irrigation installed by Arapahoe County).
4 SEMSWA to maintain the following Arapahoe County Outfalls located in Denver: Left bank 60x38 @ Pacific Pl (outfall #8), Right bank 72" and 60" @ Jewell Ave
5 Coordinate wildlife management with Denver Parks & Rec.

* The City and County of Denver & SEMSWA may request Mile High Flood District to provide routine maintenance and facility repairs per Maintenance annual work requests.
** The stream corridor is defined from the inner boundary of the primary trail to the inner boundary of the secondary trail.

Ornamental fencing along Denver Water property boundary is responsibility of Denver Water. Contact: Bill Hascall, Trade Shop Supervisor, Construction & Grounds, 303-628-6719, bill.hascall@denverwater.org



Cherry Creek Stream Corridor

Project Location Map

Quebec St. to Iliff Ave.

Operations and Mainteance Project Components

0 400 800

feet

1" = 400'

Drop Structures

- Sculpted Boulder Drop
- Sculpted Concrete Drop
- Riffle Drop
- Riprap Areas

Other Infrastructure

Storm Sewer Lines

- Denver Maintenance
- SEMSWA Maintenance
- Storm Sewer Manholes & Inlets
- Bridges and Culverts
- Concrete Trails
- Road Base Paving & Crusher Fines Trails

Project Areas

- Channel
- Stream Corridor
- Iliff Water Quality Benches
- Uplands

MHFD
MILE HIGH FLOOD DISTRICT

MULLER ENGINEERING COMPANY

Appendix D

Pay Item Cost Summary

CHERRY CREEK RESTORATION PROJECT PAY ITEM COST SUMMARY	UNIT	UNIT PRICE	TOTAL QUANTITY	TOTAL COST
General Construction				
Bid Item 1. Water Control	LS	$ 710,000.00	1.00	$ 710,000.00
Bid Item 2. Traffic Control	LS	$ 75,000.00	1.00	$ 75,000.00
Bid Item 3. Mobilization	LS	$ 1,133,000.00	1.00	$ 1,133,000.00
Bid Item 4. Permit Fees	ALL	$ 10,000.00	0.38	$ 3,790.00
Bid Item 5. Project Sign	EA	$ 1,050.00	4.00	$ 4,200.00
Bid Item 6. Surveying	LS	$ 135,000.00	1.00	$ 135,000.00
Demolition				
Bid Item 7. Clearing and Grubbing	AC	$ 2,340.00	35.80	$ 83,772.00
Bid Item 8. General Construction Debris, Landfill Material Disposal	CY	$ 43.00	4,299.00	$ 184,857.00
Bid Item 9. Asbestos-Contaminated Material Disposal	CY	$ 55.00	302.00	$ 16,610.00
Bid Item 10. Remove Concrete Sidewalk / Trail	SY	$ 4.55	3,834.00	$ 17,444.70
Bid Item 11. Remove Pipe	LF	$ 15.00	236.00	$ 3,540.00
Bid Item 12. Remove Inlet	EA	$ 380.00	1.00	$ 380.00
Bid Item 13. Remove Curb and Gutter	LF	$ 3.00	185.00	$ 555.00
Bid Item 14. Remove Asphalt Pavement	SY	$ 4.60	710.00	$ 3,266.00
Bid Item 15. Remove Fence	LF	$ 5.00	3,010.00	$ 15,050.00
Bid Item 16. Abandoned Pipe, Fill with Approved Material	CY	$ 168.00	93.00	$ 15,624.00
Bid Item 17. Abandoned Monitoring Well	EA	$ 590.00	-	$ -
Bid Item 18. Sanitary Sewer Manhole, Adjust	VF	$ 650.00	10.20	$ 6,630.00
Bid Item 19. Remove Structures and Obstructions (failing block wall)	LS	$ 2,800.00	1.00	$ 2,800.00
Bid Item 20. Remove Structures and Obstructions (failing block wall)	LS	$ 985.00	1.00	$ 985.00
Temporary Erosion Control				
Bid Item 21. Vehicle Tracking Control	SY	$ 28.00	360.00	$ 10,080.00
Bid Item 22. Fence, Construction	LF	$ 2.40	17,500.00	$ 42,000.00
Bid Item 23. Silt Fence	LF	$ 2.00	7,750.00	$ 15,500.00
Bid Item 24. Sediment Control Log	LF	$ 5.40	2,050.00	$ 11,070.00
Bid Item 25. Check Dam	CY	$ 100.00	240.00	$ 24,000.00
Bid Item 26. Concrete Washout Area	EA	$ 1,300.00	2.00	$ 2,600.00
Bid Item 27. Stream Crossing, Temporary, with Culvert	EA	$ 15,000.00	4.00	$ 60,000.00
Bid Item 28. Inlet Protection	EA	$ 550.00	15.00	$ 8,250.00
Bid Item 29. General BMP Maintenance	MO	$ 5,500.00	30.00	$ 165,000.00
Bid Item 29.1. Temporary Tackifier Stabilization	AC	$ 1,350.00	24.00	$ 32,400.00
Earthwork				
Bid Item 30. Topsoil Scalping	CY	$ 7.85	17,329.00	$ 136,032.65
Bid Item 31. Topsoil, Excavate, Stockpile, and Replace (6" below 50% of the scalped area)	CY	$ 10.00	5,300.00	$ 53,000.00
Bid Item 32. Earthwork, Excavation and Fill On-Site	CY	$ 9.80	166,300.00	$ 1,629,740.00
Bid Item 32.5. Earthwork, Excavation and Haul Offsite	CY	$ -	-	$ -
Bid Item 33. Earthwork, Imported Fill	CY	$ 19.50	-	$ -
Bid Item 34. Sorting and Stockpiling Debris Removal	CY	$ 4.50	14,068.00	$ 63,306.00
Bid Item 35. Excavation, Muck, Replace with Approved Material	CY	$ 58.00	1,915.00	$ 111,070.00
Drop Structures				
Bid Item 36. Riprap, Void-Filled, Type M (Riffle Drops)	CY	$ 96.00	1,534.00	$ 147,264.00
Bid Item 37. Riprap, Void-Filled, Type H (Riffle Drops)	CY	$ 96.00	7,634.00	$ 732,864.00
Bid Item 38. Riprap, Void-Filled, Type M (Bench Stabilization Vanes)	CY	$ 96.00	953.00	$ 91,488.00
Bid Item 39. Riprap, Void-Filled, Type M (Iliff WQ Stabilization Vanes)	CY	$ 96.00	136.00	$ 13,056.00
Bid Item 40. Sculpted Concrete Drop Structure (Trail Crossings)	SF	$ 29.50	3,563.00	$ 105,108.50
Bid Item 41. Riprap, Void-Filled, Type L (Trail Crossings)	CY	$ 96.00	279.00	$ 26,784.00
Bid Item 42. Riprap, Void-Filled, Type H (Trail Crossings)	CY	$ 96.00	318.00	$ 30,528.00
Bid Item 43. Sculpted Concrete Drop Structure (Iliff Drop)	SF	$ 29.50	4,980.00	$ 146,910.00
Bid Item 44. Boulders, Grouted, 30-Inch (Iliff Drop)	SY	$ 395.00	234.00	$ 92,430.00
Bid Item 45. Boulders, Grouted, 36-Inch (Iliff Drop)	SY	$ 490.00	101.00	$ 49,490.00
Bid Item 46. Riprap, Void-Filled, Type M (Iliff Drop)	CY	$ 96.00	106.00	$ 10,176.00
Bid Item 47. Sculpted Concrete (Iliff WQ)	SF	$ 29.50	235.00	$ 6,932.50
Bid Item 48. Boulders, Grouted, 30-Inch (Iliff WQ)	SY	$ 395.00	22.00	$ 8,690.00
Bid Item 49. Boulders, Grouted, 36-Inch (Iliff WQ)	SY	$ 490.00	15.00	$ 7,350.00

CHERRY CREEK RESTORATION PROJECT PAY ITEM COST SUMMARY	UNIT	UNIT PRICE	TOTAL QUANTITY	TOTAL COST
Bid Item 50. Boulders, Grouted, 48-Inch (Iliff WQ)	SY	$ 570.00	11.00	$ 6,270.00
Bid Item 51. Sculpted Concrete Drop Structure (Quebec Drop)	SF	$ 29.50	7,749.00	$ 228,595.50
Bid Item 52. Boulders, Grouted, 30-Inch (Quebec Drop)	SY	$ 360.00	222.00	$ 79,920.00
Bid Item 53. Boulders, Grouted, 36-Inch (Quebec Drop)	SY	$ 450.00	64.00	$ 28,800.00
Bid Item 54. Sheet Pile, Steel, Light (Quebec Drop)	SF	$ 30.80	1,400.00	$ 43,120.00
Bid Item 55. Sheet Pile Cap, Steel (Quebec Drop)	LF	$ 55.00	40.00	$ 2,200.00
Bid Item 56. Riprap, Void-Filled, Type M (Quebec Drop)	CY	$ 96.00	377.00	$ 36,192.00
Bid Item 57. Soil Riprap, Type VH (Quebec Drop)	CY	$ 99.00	203.00	$ 20,097.00
Bid Item 58. Bedding, Granular, Type II (Quebec Drop)	CY	$ 79.00	58.00	$ 4,582.00
Bank Protection				
Bid Item 59. Soil Riprap, Type L (Bank Protection 1)	CY	$ 84.00	-	$ -
Bid Item 59.1. Soil Riprap, Type M (Bank Protection 1)	CY	$ 84.00	4,691.00	$ 394,044.00
Bid Item 60. Soil Riprap, Type L (Bank Protection 3)	CY	$ 84.00	6,605.00	$ 554,820.00
Bid Item 61. Soil Riprap, Type M (Iliff WQ, adjacent to Bank Protection 1)	CY	$ 84.00	411.00	$ 34,524.00
Bid Item 62. Riprap, Void-Filled, Type M (Bank Protection 5)	CY	$ 96.00	-	$ -
Bid Item 63. Riprap with Bedding, Type M (Bank Protection 6)	CY	$ 96.00	133.00	$ 12,768.00
Bid Item 64. Large Woody Material (Bank Protection 5)	EA	$ 760.00	-	$ -
Bid Item 65. Erosion Control Blanket, Coir Mat over Coconut Blanket	SY	$ 12.95	-	$ -
Bid Item 65.1. Erosion Control Blanket, Coir Mat over Coconut Blanket	SY	$ 14.72	11,002.00	$ 161,949.44
Bid Item 66. Erosion Control Blanket, Coir Mat	SY	$ 9.70	-	$ -
Bid Item 66.1. Erosion Control Blanket, Coir Mat	SY	$ 10.98	28,945.00	$ 317,816.10
Bid Item 67. Erosion Control Blanket, Coir Mat (Iliff WQ, adjacent to Bank Protection 1)	SY	$ 9.70	-	$ -
Bid Item 67.1. Erosion Control Blanket, Coir Mat (Iliff WQ, adjacent to Bank Protection 1)	SY	$ 10.98	821.00	$ 9,014.58
Bid Item 68. Erosion Control Blanket, Coconut	SY	$ 6.40	20,209.00	$ 129,337.59
Storm Sewer Outfall Modifications				
Bid Item 69. Reinforced Concrete Pipe (RCP), Class III, 12-Inch Diameter (Iliff WQ)	LF	$ 79.00	105.00	$ 8,295.00
Bid Item 70. Reinforced Concrete Pipe (RCP), Class III, 18-Inch Diameter	LF	$ 85.00	164.00	$ 13,940.00
Bid Item 71. Reinforced Concrete Pipe (RCP), Class III, 18-Inch Diameter (Iliff WQ)	LF	$ 85.00	39.00	$ 3,315.00
Bid Item 72. Reinforced Concrete Pipe (RCP), Class III, 24-Inch Diameter	LF	$ 105.00	461.00	$ 48,405.00
Bid Item 73. Reinforced Concrete Pipe (RCP), Class III, 30-Inch Diameter	LF	$ 145.00	162.00	$ 23,490.00
Bid Item 74. Reinforced Concrete Pipe (RCP), Class III, 36-Inch Diameter (Iliff WQ)	LF	$ 160.00	81.00	$ 12,960.00
Bid Item 75. Reinforced Concrete Pipe (RCP), Class III, 42-Inch Diameter	LF	$ 202.00	-	$ -
Bid Item 75.1. Reinforced Concrete Pipe (RCP), Class III, 48 Inch	LF	$ 228.00	468.00	$ 106,704.00
Bid Item 75.2. Reinforced Concrete Pipe (RCP), Elliptical, 38-Inch by 60-Inch	LF	$ 273.00	89.00	$ 24,297.00
Bid Item 76. Reinforced Concrete Pipe (RCP), Class III, 66-Inch Diameter	LF	$ 560.00	35.00	$ 19,600.00
Bid Item 77. Slab Manhole, 4-Foot Diameter, <5 Foot Depth (Iliff WQ)	EA	$ 5,500.00	2.00	$ 11,000.00
Bid Item 78. Slab Manhole, 4-Foot Diameter, 5-10 Foot Depth	EA	$ 5,500.00	3.00	$ 16,500.00
Bid Item 79. Slab Manhole, 5-Foot Diameter, 5-10 Foot Depth	EA	$ 6,000.00	2.00	$ 12,000.00
Bid Item 80. Slab Manhole, 6-Foot Diameter, 5-10 Foot Depth	EA	$ 7,500.00	1.00	$ 7,500.00
Bid Item 80.1. Slab Manhole, 7-Foot Diameter, 5-10 Foot Depth	EA	$ 7,900.00	2.00	$ 15,800.00
Bid Item 81. Box Base Manhole	EA	$ 11,600.00	1.00	$ 11,600.00
Bid Item 82. Storm Inlet, Denver No. 16 Combination, Single, 5-10 Foot Depth	EA	$ 5,800.00	1.00	$ 5,800.00
Bid Item 83. Storm Inlet, Type C, Single, 5-10 Foot Depth	EA	$ 5,600.00	1.00	$ 5,600.00
Bid Item 84. Storm Inlet, Type D, Single, <5 Foot Depth	EA	$ 6,000.00	-	$ -
Bid Item 85. Flared End Section, Reinforced Concrete Pipe (RCP), with Toe Wall, 12-Inch Diameter (Iliff WQ)	EA	$ 1,800.00	2.00	$ 3,600.00
Bid Item 86. Flared End Section, Reinforced Concrete Pipe (RCP), with Toe Wall, 18-Inch Diameter	EA	$ 2,200.00	1.00	$ 2,200.00
Bid Item 87. Flared End Section, Reinforced Concrete Pipe (RCP), with Toe Wall, 18-Inch Diameter (Iliff WQ)	EA	$ 2,200.00	1.00	$ 2,200.00
Bid Item 88. Flared End Section, Reinforced Concrete Pipe (RCP), with Toe Wall, 24-Inch Diameter	EA	$ 2,700.00	2.00	$ 5,400.00
Bid Item 89. Flared End Section, Reinforced Concrete Pipe (RCP), with Toe Wall, 30-Inch Diameter	EA	$ 3,200.00	1.00	$ 3,200.00
Bid Item 90. Flared End Section, Reinforced Concrete Pipe (RCP), with Toe Wall, 36-Inch Diameter (Iliff WQ)	EA	$ 3,750.00	1.00	$ 3,750.00

CHERRY CREEK RESTORATION PROJECT PAY ITEM COST SUMMARY	UNIT	UNIT PRICE	TOTAL QUANTITY	TOTAL COST
Bid Item 91. Flared End Section, Reinforced Concrete Pipe (RCP), with Toe Wall, 42-Inch Diameter	EA	$ 4,200.00	-	$ -
Bid Item 90.1. Flared End Section, Reinforced Concrete Pipe (RCP), with Toe Wall, 38-Inch by 60-Inch	EA	$ 4,700.00	1.00	$ 4,700.00
Bid Item 92. Concrete, Structural, Footing/Headwall/Wingwall (66-inch Diameter Outfall)	CY	$ 800.00	45.00	$ 36,000.00
Bid Item 93. Fence, Timber Rail (Outfalls)	LF	$ 42.00	255.00	$ 10,710.00
Bid Item 94. Fence, Timber Rail (Iliff WQ)	LF	$ 42.00	75.00	$ 3,150.00
Bid Item 95. Soil Riprap, Type L (Iliff WQ)	CY	$ 84.00	6.00	$ 504.00
Bid Item 96. Riprap, Void-Filled, Type M (Storm Sewer Outfalls)	CY	$ 96.00	172.00	$ 16,512.00
Bid Item 97. Riprap, Void-Filled, Type M (Rock Rundowns)	CY	$ 96.00	65.00	$ 6,240.00
Bid Item 98. Riprap, Void-Filled, Type M (Iliff WQ)	CY	$ 96.00	75.00	$ 7,200.00
Bid Item 99. Bedding, Granular, Type II (Storm Sewer Outfalls)	CY	$ 79.00	85.00	$ 6,715.00
Bid Item 99.5. Plastic Pipe, PVC, 12-Inch Diameter	LF	$ 73.00	47.00	$ 3,431.00
Bid Item 99.6. Drain Basin, 24-Inch Diameter	EA	$ 2,830.00	1.00	$ 2,830.00
Recreation				
Bid Item 100. Sheet Pile, Steel, Light (Trail Crossings)	SF	$ 30.80	3,020.00	$ 93,016.00
Bid Item 101. Concrete Box Culvert, Cast-in-Place, 100 to 150 Sq Ft Open Area (Trail Crossings)	CY	$ 935.00	270.00	$ 252,450.00
Bid Item 102. Sign: Low Flow Crossing	EA	$ 250.00	4.00	$ 1,000.00
Bid Item 103. Sign: Trail Intersection Ahead	EA	$ 250.00	10.00	$ 2,500.00
Bid Item 104. Sign: Stop	EA	$ 250.00	8.00	$ 2,000.00
Bid Item 105. Concrete Sidewalk / Trail, 6-Inch Thick to 8-Inch Thick (Regional Trail)	SY	$ 52.00	6,902.00	$ 358,904.00
Bid Item 106. Concrete Sidewalk / Trail, 6-Inch Thick to 8-Inch Thick (Connector Concrete Trail)	SY	$ 61.00	2,925.00	$ 178,425.00
Bid Item 107. Concrete Sidewalk / Trail, 6-Inch Thick to 8-Inch Thick (Connector Concrete Trail - Thickened Edge)	SY	$ 69.00	173.00	$ 11,937.00
Bid Item 108. Concrete Sidewalk / Trail, 6-Inch Thick to 8-Inch Thick (Connector Concrete Trail - Thickened Edge and Reinforced Concrete)	SY	$ 80.00	293.00	$ 23,440.00
Bid Item 109. Trail, Crusher Fines, 6-Inch Thick (Regional Trail - Attached)	SY	$ 13.00	1,969.00	$ 25,597.00
Bid Item 110. Trail, Crusher Fines, 6-Inch Thick (Secondary Trail - Attached)	SY	$ 13.00	601.00	$ 7,813.00
Bid Item 111. Trail, Aggregate Base Course (Class 6), 6-Inch Thick (Secondary Trail)	SY	$ 12.00	2,350.00	$ 28,200.00
Bid Item 112. Trail, Aggregate Base Course (Class 6), 6-inch Thick (Tertiary Trail)	SY	$ 12.00	143.00	$ 1,716.00
Bid Item 113. Concrete Sidewalk / Trail, 6-Inch Thick to 8-Inch Thick (Rest Areas)	SY	$ 13.00	89.00	$ 1,157.00
Bid Item 114. Curb and Gutter	LF	$ 26.60	171.00	$ 4,548.60
Bid Item 115. Curb Ramp - Type 2	EA	$ 1,400.00	4.00	$ 5,600.00
Bid Item 116. Asphalt, 6-inch Thick *** or 9"**	SY	$ 80.00	710.00	$ 56,800.00
Bid Item 117. Boulder, Feature, 42-inch (Rest Area Seat Boulder)	EA	$ 1,800.00	6.00	$ 10,800.00
Bid Item 118. Trash Receptacle (Rest Area)	EA	$ 1,650.00	3.00	$ 4,950.00
Bid Item 119. Fence, Timber Rail (Rest Areas)	LF	$ 42.00	135.00	$ 5,670.00
Bid Item 120. Fence, Ornamental (Denver Water Fence)	LF	$ 150.00	-	$ -
Bid Item 120.1. Fence, Ornamental (Denver Water Fence)	LF	$ 143.75	1,490.00	$ 214,187.50
Bid Item 120.2. Fence, Gate, Ornamental	EA	$ 10,462.50	1.00	$ 10,462.50
Bid Item 120.5. Remove, Store, and Reset Sign (Mile Marker Bollard)	EA	$ 550.00	2.00	$ 1,100.00
Bid Item 120.6. Remove, Store, and Reset Sign (Large Park ID Sign)	EA	$ 930.00	1.00	$ 930.00
Bid Item 120.7. Remove, Store, and Reset Sign (Map Sign)	EA	$ 550.00	1.00	$ 550.00
Revegetation				
Bid Item 121. Soil Preparation and Fine Grading	AC	$ 8,450.00	40.04	$ 338,338.00
Bid Item 121.1. Additional Soil Amendments	AC	$ 3,122.25	0.83	$ 2,591.47
Bid Item 122. Seeding, Wetlands, Broadcast (Zone 1)	AC	$ 9,465.00	11.73	$ 111,024.45
Bid Item 123. Seeding, Riparian, Drilled (Zone 2)	AC	$ 7,200.00	6.84	$ 49,248.00
Bid Item 124. Seeding, Riparian, Drilled (Zone 3)	AC	$ 2,500.00	14.84	$ 37,100.00
Bid Item 125. Seeding, Upland, Drilled (Zone 4)	AC	$ 1,700.00	8.74	$ 14,858.00
Bid Item 126. Mulch, Hydromulch (Zones 1-4)	AC	$ 2,240.00	40.04	$ 89,689.60
Bid Item 127. Plug, Wetland	EA	$ 3.25	73,699.00	$ 239,521.75
Bid Item 128. Tree, Deciduous, 2-inch Diameter (Cottonwood B&B)	EA	$ 860.00	61.00	$ 52,460.00
Bid Item 129. Tree, Deciduous, 2-inch Diameter (Riparian B&B)	EA	$ 955.00	100.00	$ 95,500.00

CHERRY CREEK RESTORATION PROJECT PAY ITEM COST SUMMARY	UNIT	UNIT PRICE	TOTAL QUANTITY	TOTAL COST
Bid Item 130. Tree, Deciduous, 2-inch Diameter (Cottonwood B&B, Deep Bury)	EA	$ 1,220.00	30.00	$ 36,600.00
Bid Item 131. Tree, Deciduous, 2.5-inch Diameter (Upland B&B)	EA	$ 1,050.00	96.00	$ 100,800.00
Bid Item 132. Cottonwood Poles	EA	$ 161.00	26.00	$ 4,186.00
Bid Item 133. Cottonwood Poles, Deep Bury	EA	$ 161.00	69.00	$ 11,109.00
Bid Item 133.5. Shrub / Planting, D-60	EA	$ 10.15	-	$ -
Bid Item 134. Willow Log	LF	$ 32.00	1,838.00	$ 58,816.00
Bid Item 135. Willow Stakes	EA	$ 7.45	1,928.00	$ 14,363.60
Bid Item 136. Beaver Protection	EA	$ 60.00	382.00	$ 22,920.00
Bid Item 137. Weed Control During Construction	LS	$ 13,500.00	3.20	$ 43,200.00
Bid Item 138. Irrigation system	LS	$ 485,000.00	-	$ -
Bid Item 138.1. Irrigation system	LS	$ 506,000.00	1.00	$ 506,000.00
Bid Item 139. Irrigation Tap & Meter Installation	EA	$ 62,500.00	1.00	$ 62,500.00
Construction Contingency				
Bid Item 140. Pedestrian Detours Hard Surfacing	FA	$ 25,000.00		$ 25,000.00
Bid Item 141. Repair contingency for damage from high flows, prior to landscape establishment	FA	$ 75,000.00		$ 12,500.00
Bid Item 142. Quantity/Design Changes Contingency	FA	$ 100,000.00		
Rumble Strip Modifications on Drop 17				$ *6,850*
Debris cleanup / regrading at east bank near Iliff and along Denver Water fence				$ *13,328*
Reset forms at Drop 17 thickened edge connection				$ *600*
Add crusher fines @ Sta 52+00 by Iliff west outfall				$ *1,100*
Additional grading adjacent to Mattox property				$ *2,910*
Clear & grub / debris cleanup on east bank near Sta 40+00				$ *320*
Rumble Strip Modifications on Drop 9				$ *6,850*
Retaining Wall at Colorado Avenue				$ *16,000*
Iliff swale regrading (FO#19)				$ *1,965*
Storm Outfall #1 modifications (FO#23) (partial)				$ *5,916.56*
Irrigation Mainline Changes @ Pedestrian Bridge				$ *16,586.00*
Irrigation Mainline changes @ Bridge (Remaining Costs)				$ *10,832.30*
Add swale and area inlet at Iliff (FO#14)				$ *3,400*
Grade swale along trail STA 128+00 to 137+00 (FO#20)				$ *3,150*
Subgrade cut/shape at Colorado Ave (FO#30)				$ *3,500*
Storm Outfall #1 modifications (FO#23) (remainder)				$ *2,875*
Dog waste stations & park rules signage (FO#31)				$ *2,800*
Cobble & crusher fines @ Colo Ave wall				$ *1,637.50*
Post & rope reveg areas (estimated - 3500 LF @ $2/LF)				$ *7,000*
Trail changes at Quebec - non-bid items (FO#35)				$ *19,620*
Bid Item 143. Construction Contingency for unforeseen changes	FA	$ 150,000.00		
RACS material in East Bank, Reach 5A				$ *32,917.2*
Mystery MH Investigation & closure				$ *6,210*
Debris picking during seeding				$ *8,299*
Cold storage for plant material				$ *6,767*
Rock Picking WSR June				$ *5,985.00*
Rock Picking WSR July				$ *28,609.00*
Rock Picking CEI July				$ *6,614.00*
Import Irrigation Squeegee (135.84 Ton)				$ *3,218.00*
Import Irrigation Squeegee				$ *926.87*
August WSR/CEI T&M Rock Picking				$ *21,861*
Denver Water Manhole Abandonment (FO#32)				$ *3,350*
Sep's unbilled WSR/CEI T&M Rock Picking				$ *38,528*
OCT's WSRI/CEI T&M Rock Picking				$ *1,733*
November Rock Picking				$ *15,056.75*
Bid Item 144. Temporary irrigation for early landscape establishment	FA	$ 50,000.00		
Bid Item 145. Pedestrian Bridge Crossing	FA	$ 90,000.00		$ 137,466.00
Bid Item 146. Revised Soil Amendments	FA	$ 75,000.00		$ -
			TOTAL	**$ 12,451,681.96**