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MEMORANDUM OF UNDERSTANDING

DETAILS SUMMARY	
Document Type	Amendment
OFS Number-Version	200933
County Contact Information	
Boulder County Legal Entity	Boulder County
Department	Parks and Open Space Department
Division/Program	Recreation and Facilities Project Design and Management
Mailing Address	Boulder County Parks and Open Space Department Attn: ADMIN-Contracts 5201 St. Vrain Road Longmont, CO 80503
MOU Contact – *Name, email*	Renee Bookless rbookless@bouldercounty.org 303-678-6200 Sharla Benjamin sbenjamin@bouldercounty.org 303-678-6200
Invoice Contact – *Name, email*	N/A
Contractor Contact Information	
Contractor Name	Longmont Supply Ditch Company
Mailing Address	N/A
Contact 1 – *Name, title, email*	Kevin Boden, President kevin.boden@longmontcolorado.gov
Contact 2 – *Name, title, email*	N/A
Contractor Contact Information	
Contractor Name	Chapman & McCaslin Ditch
Mailing Address	N/A
Contact 1 – *Name, title, email*	Larry Beck, Rider larrybeckbarh@gmail.com
Contact 2 – *Name, title, email*	N/A
MOU Term	
Start Date	4/7/2020
Expiration Date	5/9/2024
Brief Description of Work	
Amendment No. 1 to MOU executed 5/9/2019 between BOCO, Longmont Supply Ditch Company and the Chapman & McCaslin Ditch for the modification of a section of the St. Vrain Creek upstream and downstream of the Ditch's diversion structure. The Amendment grants access to the named ditches for the county and contractors and agents.	

MOU Documents
1. Exhibit B: Project Schedule 2. Exhibit C: Final Design Plans
MOU Notes *Additional information not included above*
The MOU Amendment No. 1 does not include any monetary funding. The original MOU is included in the Supporting Documents. Supporting Documents: Original Memorandum of Understanding executed 5/9/2019 between Boulder County and Longmont Supply Ditch Company; $0

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First Amendment to Memorandum of Understanding Between Boulder County, the Longmont Supply Ditch Company, and the Owners of the Chapman & McCaslin Ditch

This First Amendment to Memorandum of Understanding ("First Amendment") is made as of the 19 day of May, 2020, by and between Boulder County, the Longmont Supply Ditch Company, and the owners of the Chapman & McCaslin Ditch (collectively the "Parties"), and shall serve as an amendment to the Memorandum of Understanding (MOU) between Boulder County and Longmont Supply Ditch Company dated May 9, 2019. The owners of the Chapman & McCaslin Ditch agree to enter into the Memorandum of Understanding as it is amended by this First Amendment. The term "Ditches" in this First Amendment shall mean both the owners of the Chapman & McCaslin Ditch and the Longmont Supply Ditch Company. Terms defined in the MOU shall have the same meanings in this First Amendment.

The MOU is hereby amended to supplement the commitments made in Section III.b:

10. The County will provide engineering designs to the Ditches for review and approval. Execution of the First Amendment will constitute acceptance of the final schedule as set forth in Exhibit B and the final design plans as set forth in Exhibit C.
11. The County will act as project manager and fiscal agent for construction and ensure that the Project is built according to approved engineering plans.
12. The County will obtain all necessary permits required for construction of the Project or coordinate with the Ditches on permits if the Ditches must be the permittees.
13. The County will notify the Ditches at least 5 days prior to commencement of Project construction. Construction of the Project shall proceed with reasonable diligence from the initiation of such construction to its completion. The County will update the Ditches bi-weekly about the construction schedule and any expected deviations. The Project construction window is anticipated to be July 13, 2020 to Oct. 31, 2020.
14. The construction shall not impair the Ditches' ability to deliver water to shareholders and contract water users between March 1 and Oct. 31, 2020. If the Ditches cannot deliver the full decreed amount of water requested to shareholders and contract water users between March 1 and Oct. 31, 2020 due to Project construction, the County shall provide wet water of a quality suitable for agricultural irrigation at the Ditches' Diversion Structures in an amount sufficient to fulfill the daily demand of said shareholders and contract water users.
15. Upon completion of the Project, the County will provide a complete set of as-built plans, certification that the construction was completed in conformity with the approved design plans, and an Operations and Maintenance manual for the upper bypass structure.
16. The County will procure any temporary legal rights of access with landowners as needed for construction of the Project.

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17. The Ditches hereby grant reasonable access to their facilities to allow the County and its contractors and agents for delivery of water and construction of the project in accordance with the plans and for activities related to monitoring, major repairs, replacement, modification and warranty-related activities.
18. The County will, in good faith, seek funds to assist the Longmont Supply Ditch Company with major repairs or modifications to the upper bypass structure.
19. The Ditches will operate and maintain the water delivery section of the upper bypass structure. The Ditches will notify the County within a reasonable time regarding any problems or concerns with performance of the Project and allow reasonable opportunity for the County to work with the Ditches to resolve the issue prior to action taken on the fish passage section of the upper bypass structure. The County will notify the Ditches within a reasonable time if maintenance needs are identified on the water delivery section of the upper bypass structure. The Ditches will not impair the designed function for fish passage as long as the Project is diverting decreed water rights to the Ditches.
20. During construction of the Project, and upon completion of the Project, the Ditches' engineer shall have the opportunity to inspect the Project and verify substantial compliance with Exhibit B and Exhibit C.

Except as expressly amended herein, the terms and provisions of the original MOU shall remain in full force and effect. This First Amendment shall be incorporated into the terms of the original MOU and, collectively, shall represent the entire agreement of the Parties.

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The undersigned Parties hereby agree to the terms and conditions in this MOU:

The County of Boulder, a body corporate and politic

By: Eric M. Lane

Signature: Eric M. Lane

Title: Director

Date: May 19, 2020

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Longmont Supply Ditch Company

By: Kevin Boden

Signature:

Title: President

Date: April 20, 2020

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Chapman & McCaslin Ditch
By: Larry Beck
Signature: Larry Beck
Title: President
Date: April 19, 2020

Chapman & McCaslin Ditch
By: Laura Lichter
Signature: Laura Lichter
Title: Shareholder
Date: May 14, 2020

Chapman & McCaslin Ditch
By: Matt Condon
Signature: Matt Condon
Title: Shareholder
Date: April 18, 2020

Chapman & McCaslin Ditch
By: Diane Dodge
Signature: Diane Dodge
Title: Shareholder
Date: April 21, 2020

Chapman & McCaslin Ditch
By: Lowell Dodge
Signature: Lowell Dodge
Title: Shareholder
Date: April 21, 2020

Chapman & McCaslin Ditch
By: James Hepp
Signature: James Hepp
Title: Shareholder
Date: April 20, 2020

Chapman & McCaslin Ditch
By: Alexandra Vorbeck
Signature: Alexandra Vorbeck
Title: Shareholder
Date: May 1, 2020

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Chapman & McCaslin Ditch
By: ROBERTA SADAR
Signature: Roberta Sadar
Title: _____
Date: 3/31/20

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Exhibit B
Project Schedule

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St. Vrain Creek Reach 3 Phase 2

Otak
Boulder County Parks and Open Space

Project Start: Wed, 6/10/2020
Display Week: 2

TASK	Duration	PROGRESS	START	END
Pre-Construction		**0%**	**6/10/20**	**7/31/20**
Pre-construction meeting	1 day	0%	6/10/20	6/10/20
Permitting	51 days	0%	6/10/20	7/31/20
Mobilization	10 days	0%	7/13/20	7/23/20
Bypass Structure		**0%**	**8/3/20**	**10/8/20**
Install Sheetpile for entire structure	14 days	0%	8/3/20	8/17/20
Install Supply-side structure	17 days	0%	9/4/20	9/21/20
Install Fish Passage-side Structure	10 days		8/17/20	8/27/20
Revegetation and erosion control fabric	7 days		10/1/20	10/8/20
Fish Passage Channel		**0%**	**8/3/20**	**10/21/20**
Clearing and Grubbing	7 days	0%	8/3/20	8/10/20
Grading and structures	25 days	0%	8/10/20	9/4/20
Stabilization seeding	4 days	0%	9/4/20	9/8/20
Irrigation of seed	27 days	0%	9/4/20	10/1/20
Revegetation and erosion control fabric/blai	20 days	0%	10/1/20	10/21/20
Floodplain Grading		**0%**	**8/11/20**	**10/15/20**
Clearing and Grubbing	2 days	0%	8/11/20	8/13/20
Grading, breach protection and erosion cont	20 days	0%	8/13/20	9/2/20
Stabilization seeding	2 days	0%	9/2/20	9/4/20
Irrigation of seed	29 days	0%	9/2/20	10/1/20
Revegetation and erosion control blanket	14 days	0%	10/1/20	10/15/20
Baker & Weese Ditch Overflows		**0%**	**8/10/20**	**10/6/20**
Clearing and Grubbing	1 days	0%	8/10/20	8/11/20
Grading and erosion control	2 days	0%	8/11/20	8/13/20
Stabilization seeding	1 days	0%	8/13/20	8/14/20
Irrigation of seed	49 days	0%	8/13/20	10/1/20
Revegetation and erosion control blanket	5 days	0%	10/1/20	10/6/20
Post-Construction		**0%**	**10/15/20**	**11/24/20**
Staging and Access Reclamation	7 days	0%	10/15/20	10/22/20
Punch-list	5 days	0%	10/22/20	10/27/20
Close Out	28 days	0%	10/27/20	11/24/20

Exhibit C
Final Design Plans

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BOULDER COUNTY PARKS & OPEN SPACE

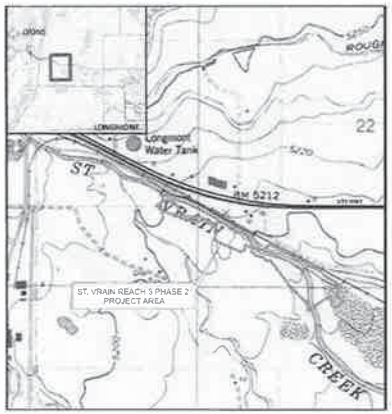
ST. VRAIN REACH 3 FLOOD REPAIR & STREAM RESTORATION - PHASE 2 PROJECT

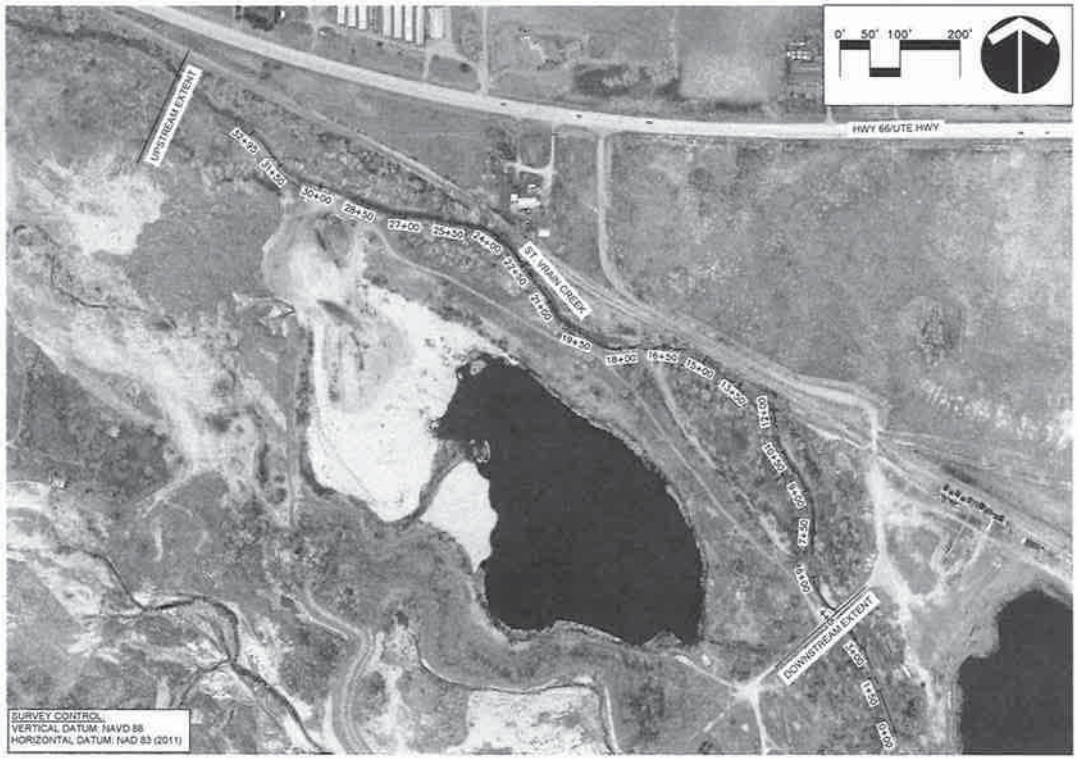
BOULDER COUNTY, CO

FINAL DESIGN PLANSET - ISSUED FOR BID

NOT FOR CONSTRUCTION

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





CLIENT CONTACT (OWNER):
SHARLA BENJAMIN (PROJECT MANAGER)
BOULDER COUNTY PARKS & OPEN SPACE
5201 ST. VRAIN ROAD
LONGMONT, CO 80503
SBENJAMIN@BOULDERCOUNTY.ORG
720.552.1410

PROJECT CONTACT:
TRACY EMMANUEL (PROJECT MANAGER)
OTAK, INC.
371 CENTENNIAL PARKWAY
LOUISVILLE, CO 80027
TRACY.EMMANUEL@OTAK.COM
720.758.7723

PROJECT PARTNERS:
ECOS
MICHAEL BAKER INTERNATIONAL
WRIGHT WATER ENGINEERS
KING SURVEYORS

NO	DATE	BY	REVISION COMMENTS
1	3/4/20	BM	FINAL DESIGN - ISSUED FOR BID

Design: BM
Draw: BM
Checked: TL

PREPARED FOR:
Boulder County Parks & Open Space

FINAL DESIGN PLANSET – ISSUED FOR BID

COVER
ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

371 Centennial Parkway
Suite 200
Louisville, Colorado 80027
Phone: 303-444-8073

19322
Project No. Drawing No.
G1
Sheet No.

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FOR INFORMATION ONLY:

VOLUMES	CUT (CY)	FILL (CY)	TOTAL (CY)	NET (CY)
MASS GRADING	7153	1363	8516	5790 CUT

ADDITIONAL SITE RELATED CONTACTS:

LONGMONT POWER & COMMUNICATION (LPC):
ADAM MILLER
LONGMONT POWER & COMMUNICATION
1100 S. SHERMAN ST.
LONGMONT, CO 80501
303.774.4530

BNSF RAILROAD:
AMBER STOFFELS,BNSF RAILWAY | MANAGER
PUBLIC PROJECTS – CO, NM, WY,
AMBER.STOFFELS@BNSF.COM, OFFICE (303)
480-6584, CELL (817) 565-8234

CDOT:
ALLYSON MATTSON
REGION 4
ASSISTANT ACCESS MANAGER, OUTDOOR
ADVERTISING INSPECTOR – TRAFFIC
P (970) 350-2148 C (970) 381-8995
10601 WEST 10TH ST, GREELY, CO 80634
ALLYSON.MATTSON@STATE.CO.US

LEGEND
PROPOSED FLOODPLAIN GRADING
PROPOSED OVERFLOW CHANNEL
PROPOSED BYPASS STRUCTURE
PROPOSED RIFFLE
PROPOSED POOLS
PROPOSED BREACH PROTECTION
EXISTING WETLAND
OPTIMAL PMJM HABITAT
GOOD PMJM HABITAT
FAIR PMJM HABITAT
POOR PMJM HABITAT
NON PMJM HABITAT
100-YR FLOODPLAIN
100-YR FLOODWAY
BNSF RIGHT OF WAY
FLOODPLAIN CROSS SECTION
EXISTING CONTOURS 1FT & 5FT
PROPOSED CONTOURS 1FT & 5FT
SECTION LINE
PROPOSED STAGING AREA
COIR FABRIC
STRAW/COCONUT BLANKET
DITCH
PERMITTED PROJECT AREA
LIMITS OF GRADING
EROSION LOG
LIMITS OF CONSTRUCTION /CONSTRUCTION FENCING
ROCK CHECK DAM
CREEK ACCESS
SITE ACCESS
TEMP STREAM CROSSING
LONGMONT POWER & COMMUNICATIONS INFRASTRUCTURE
PARCEL
PROPOSED ACCESS ROAD

NO.	DATE	BY	REVISION COMMENTS

Design	Drawn	Checked	Date
EW	EW	TC	Initial Issue Date

PREPARED FOR:

Boulder County
Parks & Open Space

FINAL DESIGN PLANSET – ISSUED FOR BID

TABLE OF CONTENTS AND LEGEND

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

Otak

5777 Central Avenue
Suite 220
Boulder, Colorado 80301
Phone: 303-546-0204
Fax: 303-546-9459

19322
Project No. Drawing No.
G2
Sheet No.

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GENERAL NOTES

SAFETY AND SECURITY

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ASPECTS OF SAFETY INCLUDING, BUT NOT LIMITED TO EXCAVATION, TRENCHING, SHORING, TRAFFIC CONTROL, AND SECURITY.
2. EXISTING FACILITIES NOT INDICATED TO BE REMOVED SHALL BE PROTECTED IN PLACE OR REMOVED IN KIND, AS APPROVED BY THE OWNER AND ENGINEER. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING STABLE EXCAVATIONS AND TEMPORARY SLOPES AND FOR SATISFYING ALL APPLICABLE OSHA, FEDERAL, STATE, AND LOCAL REGULATIONS. TEMPORARY EXCAVATIONS SHALL PROVIDE, AT A MINIMUM, THE TRENCH DIMENSIONS AND CLEARANCES SHOWN ON PLANS OR IN SPECIFICATIONS.
3. TEMPORARY CONSTRUCTION SLOPES SHALL BE SLOPED, SHORED, SHEETED, AND/OR BRACED IN ACCORDANCE WITH STABILITY REQUIREMENTS AND APPLICABLE REGULATIONS, AND SHALL BE NO STEEPER THAN THE SLOPES SHOWN OR SPECIFIED WITHOUT THE APPROVAL OF THE ENGINEER. ANY SUCH APPROVALS BY THE ENGINEER WILL NOT RELIEVE THE CONTRACTOR FROM SOLE RESPONSIBILITY FOR PROVIDING STABLE EXCAVATIONS AND TEMPORARY SLOPES.

CONTRACT DOCUMENTS AND REQUIREMENTS

1. EXCEPT WHERE OTHERWISE PROVIDED FOR IN THESE PLANS AND SPECIFICATIONS, THE MILE HIGH FLOOD DISTRICT (MHFD) STANDARD SPECIFICATIONS (2015), SHALL APPLY.
2. THE CONTRACTOR SHALL HAVE (1) SIGNED COPY OF THE APPROVED PLANS, ONE (1) COPY OF THE APPROPRIATE PROJECT SPECIFICATIONS, INCLUDING THE MHFD STANDARD SPECIFICATIONS, AND A COPY OF ANY REQUIRED PERMITS AT THE JOB SITE AT ALL TIMES.
3. IN THE EVENT OF A CONFLICT, THE ORDER OF PRECEDENCE SHALL BE AS FOLLOWS: (1) PERMIT CONDITIONS, (2) PROJECT SPECIFICATIONS, (3) CONSTRUCTION PLANSET.
4. THE CONTRACTOR SHALL REFER TO THE CONTRACT SPECIFICATIONS FOR DESCRIPTION OF MATERIALS REFERRED TO BY SIZE, CLASS, TYPE, DESCRIPTION, OR OTHERWISE SPECIFIED ON THE DRAWINGS.
5. NO FIELD FIT CHANGES SHALL BE MADE WITHOUT THE ENGINEER BEING PRESENT ON-SITE AND WITHOUT CONCURRENCE OF THE OWNER. OTAK DOES NOT TAKE RESPONSIBILITY FOR MODIFICATIONS OF THESE PLANS OR DESIGN CHANGES THAT OCCUR DURING CONSTRUCTION WITHOUT PRIOR APPROVAL OF THE ENGINEER.
6. THE CONTRACTOR SHALL CONFINE ALL WORK TO THE CONSTRUCTION LIMITS SHOWN ON THE PLANS AND DETAILED IN THE CONTRACT DOCUMENTS.
7. SCALES SHOWN ARE FOR FULL SIZE SHEETS (22" X 34") AND REQUIRES ADJUSTMENT FOR HALF (11" X 17") SIZE.
8. ALL GRADES SHOWN ARE FINISHED GRADES, UNLESS OTHERWISE NOTED ON THE DRAWINGS.
9. DIMENSION AND NOTATIONS SUPERSEDE SCALE OF THE DRAWINGS.
10. THE WORK WILL TAKE PLACE IN AND AROUND A STREAM, WHICH IS SUBJECT TO PERIODIC FLOODING. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONTROL OF SURFACE AND SUBSURFACE WATER DURING THE COURSE OF THE WORK. ANY DAMAGE TO THE WORK RESULTING FROM SURFACE FLOWS, BASE FLOWS, OR FLOOD FLOWS SHALL BE CORRECTED BY THE CONTRACTOR AT THE CONTRACTOR'S SOLE COST.
11. CONSTRUCTION OF THE PROPOSED WORK WILL TAKE PLACE WITHIN THE CHANNEL AND WATER CONTROL MEASURES WILL BE REQUIRED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ACCEPTANCE AND CONTROL OF DRAINAGE WATERS FROM AREAS ADJACENT TO THE CREEK AND ITS TRIBUTARIES INCLUDING STORMWATER OUTFALLS. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ESTABLISHING MEANS AND METHODS OF GROUND AND SURFACE WATER CONTROL APPROPRIATE FOR THIS CONSTRUCTION IN ACCORDANCE WITH THE REQUIREMENTS OF THE PROJECT DRAWINGS AND SPECIFICATIONS AND ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS AND ALL PERMITS.
12. UNAUTHORIZED CHANGES AND USES: THE ENGINEER WHO PREPARED THESE PLANS WILL NOT BE RESPONSIBLE OR LIABLE FOR UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS AND SPECIFICATIONS MUST BE IN WRITING AND MUST BE APPROVED BY THE OWNER AND THE PREPARER OF THESE PLANS.
13. A GROUT WASHOUT IS REQUIRED FOR ALL CONCRETE WORK. CONTRACTOR SHALL MEET THE REQUIREMENTS LAID OUT IN THE SPECIFICATIONS IN REGARD TO LOCATION, DISTANCE FROM THE STREAM AND NECESSARY CONTROL MEASURES.

STAGING, ACCESS, AND TRAFFIC CONTROL

1. THE CONTRACTOR SHALL SUBMIT AN ACCESS CONTROL PLAN, AND TRAFFIC (INCLUDING BICYCLES) CONTROL PLAN, AS NEEDED, FOR REVIEW AND APPROVAL BY THE LOCAL JURISDICTION PRIOR TO THE START OF CONSTRUCTION.
2. THE EXACT LIMITS OF THE CONTRACTOR'S PARKING AND STAGING AREA FOR MATERIAL STOCKPILING, OFFICE TRAILERS, AND PARKING SHALL BE SUBMITTED BY THE CONTRACTOR FOR THE REVIEW AND APPROVAL BY THE ENGINEER AND OWNER'S REPRESENTATIVE.
3. THE CONTRACTOR SHALL COORDINATE WITH MARTIN MARIETTA REGARDING CONSTRUCTION ACCESS, AND STAGING ON THEIR PROPERTY.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TRAFFIC CONTROL IN ACCORDANCE WITH MHFD STANDARD SPECIFICATIONS.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CLEAN-UP OF ANY TRASH OR MUD ON THE SITE OR ADJACENT STREETS AS A RESULT OF CONSTRUCTION. THE CONTRACTOR SHALL RESTORE ACCESS AREAS AND ACCESS ROADS TO THEIR ORIGINAL GRADES AND CONDITIONS, EXCEPT AS NOTED. THE COST TO RESTORE THESE AREAS SHALL NOT BE MEASURED AND PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE COST OF THE WORK.
6. INITIATE REHABILITATION OF ALL DISTURBED AREAS IN A MANNER THAT RESULTS IN SIMILAR OR BETTER THAN PRE-WORK CONDITIONS. WHEN REQUIRED BY ENGINEER, SCARIFY COMPACTED AREAS, SUCH AS TEMPORARY ACCESS AREAS, STREAM CROSSING, STAGING AND STOCKPILE AREAS.
7. THE CONTRACTOR SHALL REMOVE ALL TEMPORARY CONSTRUCTION FACILITIES SUCH AS TEMPORARY ACCESS ROADS, WORK AREAS, STRUCTURES, FOUNDATIONS OF TEMPORARY STRUCTURES, STOCKPILES OF EXCESS WASTE MATERIALS, OR ANY OTHER VESTIGES OF CONSTRUCTION AS DIRECTED BY THE ENGINEER. THE DISTURBED AREAS SHALL BE PREPARED AND SEEDED AS DESCRIBED IN THE STORMWATER MANAGEMENT PLAN (SWMP), OR AS APPROVED BY THE ENGINEER.

UTILITIES

1. LONGMONT POWER AND COMMUNICATION (LPC) OVERGROUND POLES/LINES ARE APPROXIMATE WHEN SHOWN ON THE DRAWINGS.
2. THE FOLLOWING TIER 1 MEMBER FACILITIES WERE CONTACTED AND CONFIRMED THAT NO UNDERGROUND UTILITIES ARE LOCATED WITHIN THE LIMITS OF CONSTRUCTION:
   - CENTURY LINK = FIBER, TELCO
   - LONG'S PEAK WATER DISTRICT = WATER
   - LONGMONT ELECTRIC/NEXTLIGHT/TRAFFIC = ELECTRIC AND FIBER
   - TOWN OF LYONS = ELECTRIC, SEWER, WATER
   - XCEL ENERGY = ELECTRIC AND GAS
   - XCEL ENERGY HI PRESSURE GAS = GAS PIPELINE
3. THE FOLLOWING TIER 2 MEMBER FACILITIES WERE CONTACTED AND CONFIRMED THAT NO UTILITIES ARE LOCATED WITHIN THE LIMITS OF CONSTRUCTION:
   - LONGMONT LOCATING
   - PALMERTON CONSOLIDATED DITCH COMPANY
4. THERE MAY BE PRIVATE FACILITIES WITHIN YOUR DIG AREA. PRIVATE FACILITIES ARE OWNED BY THE OWNER OF THE PROPERTY AND THEREFORE ARE NOT MARKED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE PRIVATE FACILITIES LOCATED.

PERMITTING

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL PERMITS, LICENSES, FEES, AND BONDS THAT ARE NECESSARY AS REQUIRED BY THE LOCAL JURISDICTION, BNSF OR OTHER AGENCIES REQUIRED TO CONSTRUCT THE PROJECT.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND SATISFYING THE REQUIREMENTS OF ANY APPLICABLE PERMITS PERTAINING TO WATER AND EROSION CONTROL.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLIANCE WITH ALL PERMIT CONDITIONS, LAWS, ORDINANCES, CODES AND/OR REGULATIONS APPLICABLE FOR PROJECT IMPLEMENTATION.
4. PERSONNEL OR ANY PIECE OF EQUIPMENT SHALL NOT ENTER THE BNSF RIGHT-OF-WAY (25-FT FROM THE CENTERLINE OF THE TRACKS). CONSTRUCTION FENCING SHALL BE INSTALLED WITH A 2-FT OFFSET FROM THE BNSF PROPERTY BOUNDARY AS INDICATED IN THE PLANS, FOR VISUAL IDENTIFICATION.
5. THE CONTRACTOR SHALL HANDLE AND DISPOSE OF SOLID WASTE IN SUCH A MANNER THAT WILL PREVENT CONTAMINATION OF THE ENVIRONMENT. PLACE SOLID WASTE IN CONTAINERS THAT ARE EMPTIED ON A REGULAR SCHEDULE. TRANSPORT ALL SOLID WASTE OFF SITE AND DISPOSE WASTE IN COMPLIANCE WITH FEDERAL, STATE, AND LOCAL REQUIREMENTS. STORE CHEMICAL WASTE AWAY FROM THE WORK AREAS IN CORROSION RESISTANT CONTAINERS AND DISPOSE OF WASTE IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL REQUIREMENTS.
6. ALL DEBRIS AND EXCESS MATERIAL SHALL BE DISPOSED OF OUTSIDE OF WATERBODIES, WETLAND, OR FLOODPLAIN AREAS.

SURVEYING, TOPOGRAPHIC DATA AND RIGHT-OF-WAY

1. PARCEL, RIGHT OF WAY AND EASEMENT INFORMATION IS APPROXIMATE AND SHOULD BE VERIFIED PRIOR TO WORK. CONSTRUCTION IS ONLY ALLOWED ON PARCELS WITH OWNERSHIP APPROVAL.
2. EXISTING GRADES, LINES, AND ANY EXISTING VERTICAL DATA ARE APPROVED AS THE BEST AVAILABLE INFORMATION. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING GRADES AND NOTIFY THE ENGINEER OF ANY SUBSTANTIAL VARIATIONS PRIOR TO INSTALLATION OF A STRUCTURE AND CONFORMANCE WITH THE GRADES/ELEVATIONS.
3. ACTUAL FEATURES COULD VARY AND THE CONTRACTOR SHALL VERIFY SITE CONDITIONS BEFORE THE START OF WORK. CONTRACTOR MUST VERIFY OR RE-ESTABLISH CONTROL PRIOR TO START OF CONSTRUCTION.
4. SURVEY WAS PERFORMED BY KING SURVEYORS IN JULY 2019. THE SURVEY COLLECTED WAS BASED ON STATE PLANE COORDINATES, COLORADO NORTH ZONE 501 (NAD83, 2011), ELEVATIONS ARE BASED ON NAVD88 WITH DIMENSIONS IN U.S. SURVEY FEET (AT GRID).
5. THE PROJECT BENCHMARK WAS CITY OF LONGMONT BENCHMARK #157 ELEVATION 5164.76. NORTH AMERICAN VERTICAL DATUM OF 1988 VERTICAL CONTROL WAS ESTABLISHED ON SITE VIA POST-PROCESSED STATIC SOLUTION ON CONTROL POINT #1001, "CP STREAM", ELEVATION 5178.295.
6. THE CONTRACTOR SHALL PRESERVE, AND IF DISTURBED, RELOCATE, OR REPLACE SURVEY POINTS, INCLUDING PROPERTY BOUNDARY CORNERS, LAND CORNERS, RANGE POINTS, AND SURVEY CONTROL MARKERS AND BENCHMARKS. IF REQUIRED, ALL PROPERTY BOUNDARY CORNERS SHALL BE PLACED BY A COLORADO PROFESSIONAL LAND SURVEYOR (PLS).
7. THE CONTRACTOR SHALL PROVIDE ALL CONSTRUCTION SURVEYING. IT IS RECOMMENDED THAT THE CONTRACTOR MAINTAIN A SURVEY GRADE GPS UNIT ONSITE WITH THE DESIGN GRADES, DESIGN CONTROL POINTS, AND FEATURE LOCATIONS LOADED FOR REFERENCE.
8. THE CONTRACTOR SHALL FIELD VERIFY THE LOCATION (HORIZONTAL AND VERTICAL) AT CONNECTIONS TO ALL EXISTING INFRASTRUCTURE. THIS INFORMATION SHALL BE COLLECTED AND SUBMITTED TO THE ENGINEER FOR REVIEW PRIOR TO FABRICATION AND/OR PRIOR TO INSTALLATION OF ANY NEW FACILITIES SHOWN ON THESE CONTRACT PLANS. THE ENGINEER SHALL DETERMINE IF ANY MINOR MODIFICATIONS TO THE NEW FACILITIES SHOWN ON THE CONTRACT PLANS ARE NECESSARY SUCH AS HORIZONTAL AND VERTICAL ADJUSTMENTS.

TREE PROTECTION AND PRESERVATION

1. THE WORK SHALL BE DONE IN A MANNER THAT PRESERVES EXISTING TREES (INCLUDING SEEDLINGS) AND SHRUBS IN THEIR PRESENT LOCATION TO THE MAXIMUM EXTENT POSSIBLE. OWNERS REPRESENTATIVE AND DESIGN ENGINEER WILL COORDINATE TO FLAG TREES FOR REMOVAL AND PROTECTION. TREES AND SHRUBS MARKED FOR PROTECTION SHALL HAVE ORANGE CONSTRUCTION FENCING INSTALLED AT DRIP LINE OF TREE BRANCHES. PRIOR TO BEGINNING CONSTRUCTION, THE CONTRACTOR WILL COMPLETE A SITE WALK WITH THE OWNERS REPRESENTATIVE AND DESIGN ENGINEER TO REVIEW TREES AND SHRUBS APPROVED FOR REMOVAL. ALL REMOVED TREES AND SHRUBS SHALL BE STOCKPILED FOR USE ON-SITE UNLESS OTHERWISE IDENTIFIED BY THE ENGINEER/OWNER FOR REMOVAL AND HAULED OFF-SITE. THE CONTRACTOR SHALL MAKE REASONABLE EFFORTS TO PRESERVE THE ROOTWAD ON TREES WITH A MINIMUM DIAMETER AT BREAST HEIGHT (DBH) OF 12 INCHES AND MINIMUM 20 FEET IN LENGTH WHICH WILL BE DESIGNATED FOR LARGE WOOD STRUCTURES.
2. BEFORE BEGINNING OPERATIONS NEAR TREES, PROTECT TREES (USING ORANGE CONSTRUCTION FENCE) THAT MAY POSSIBLY BE DEFACED, BRUISED, INJURED, OR OTHERWISE DAMAGED BY THE CONSTRUCTION EQUIPMENT, DUMPING, OR OTHER OPERATIONS. REPAIRING DAMAGE TO TREES, OR TREE REPLACEMENT, WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.
3. MATURE STANDS OF VEGETATION TO BE PROTECTED SHALL BE FENCED WITH ORANGE CONSTRUCTION FENCING. INDIVIDUAL MATURE TREES TO BE PROTECTED WILL BE FLAGGED BY ENGINEER/OWNER REPRESENTATIVE.
4. WHERE EQUIPMENT ACCESS RESULTS IN DAMAGE TO THE INTEGRITY OF INDIVIDUAL TREES OR STREAM SIDE WOODY VEGETATION, EFFORT SHALL BE MADE TO PRUNE ALL DAMAGED VEGETATION IN A MANNER MOST LIKELY TO ENSURE CONTINUED VIABILITY AND RECOVERY OF INDIVIDUAL PLANTS.
5. EXISTING BANKS NOT IDENTIFIED FOR GRADING (INCLUDING VERTICAL BANKS) SHALL BE PROTECTED AS IS FOR HABITAT PURPOSES.

ON-SITE MATERIALS AND SALVAGE

1. TOPSOIL PRESENT WITHIN THE GRADING EXTENTS SHALL BE STRIPPED AND STOCKPILED TO AN APPROVED ON-SITE AREA. IT SHALL BE REDISTRIBUTED IN THE GRADING AREA AT THE ENGINEER'S DIRECTION (WITH AMENDMENTS AS REQUIRED) TO THE FINAL GRADES SHOWN IN THE PLANS.
2. WHEN IT IS POSSIBLE TO SALVAGE TREES, SEEDLINGS, SHRUBS AND STREAM SIDE VEGETATION, THE CONTRACTOR SHALL REMOVE AND STOCKPILE THESE MATERIALS WITH AS MUCH ROOT AND EARTHEN MATERIAL AS POSSIBLE AND IN SUCH A WAY TO HELP KEEP THEM ALIVE UNTIL THEY CAN BE TRANSPLANTED (I.E. IN WATER).
3. TREES AND SHRUBS NOT DEEMED VIABLE FOR LIVE SALVAGE, SHALL BE STOCKPILED FOR USE ON-SITE UNLESS OTHERWISE IDENTIFIED BY THE ENGINEER/OWNER FOR REMOVAL AND HAULED OFF-SITE.
4. COARSE EXISTING STREAMBED SUBSTRATE (E.G. COBBLES) SALVAGED DURING EXCAVATION SHALL BE STOCKPILED FOR LATER REUSE.
5. BOULDERS ENCOUNTERED IN THE GRADING AREA SHALL BE HARVESTED AND STOCKPILED AND THEN REUSED IN CHANNEL STRUCTURES (I.E. STEPS AND RIFFLES) AND AS HABITAT BOULDERS PER ENGINEER'S DIRECTION.
6. SALVAGED ELM TREES SHALL BE STOCKPILED FOR A MINIMUM OF THREE WEEKS TO ALLOW TREE TO DRY OUT BEFORE BURYING.

FINISH WORK

1. WHERE ACCESS TO THE STREAM RESULTS IN DAMAGE TO EXISTING STREAM BANKS SUCH AS BANK SLUMPING OR CRACKING, REASONABLE EFFORTS WILL BE MADE, WITH THE DIRECTION OF THE ENGINEER, TO REPAIR THE DAMAGE FOLLOWING COMPLETION OF WORK AT THAT PARTICULAR SITE. REASONABLE EFFORT INCLUDES LOCAL RE-CONTOURING OF SLUMPED BANKS, AND PLACEMENT OF EROSION CONTROL BLANKET/FABRIC, AND PLANTING OF WILLOW STAKES.
2. IF THE CONTRACTOR DAMAGES ANY EXISTING SITE OR PUBLIC AMENITIES (PAVEMENTS, CURBS, CURB AND GUTTER, SOD, TREES, FENCES, ETC.) OUTSIDE OR WITHIN THE EASEMENTS OR CONSTRUCTION LIMITS, THE CONTRACTOR SHALL REMOVE AND REPAIR SUCH TO THE SATISFACTION OF THE INDIVIDUAL PROPERTY OWNERS.
3. FOR ALL SITE GRADING, SMOOTH, ROUNDED TRANSITIONS SHALL BE MADE BETWEEN CHANGES IN SLOPE, UNLESS OTHERWISE DIRECTED BY ENGINEER.
4. TO THE GREATEST EXTENT PRACTICAL, THE INSTREAM STRUCTURES SHALL BE CONSTRUCTED OF ROUNDED MATERIALS THAT ARE REPRESENTATIVE OF THE NATIVE MATERIAL.
5. IF DRILL SEEDING, GRADED FLOODPLAIN AREAS SHALL BE SCARIFIED WITH EXCAVATOR TEETH, REVEGETATED IN ACCORDANCE WITH THE REVEGETATION PLAN, THEN SCATTERED WITH SMALL BRANCHES AND DOWNED TREES (AS APPROPRIATE AND AVAILABLE).

REVIEW AND INSPECTIONS

1. ALL MATERIALS AND WORKMANSHIP SHALL BE SUBJECT TO INSPECTION BY THE OWNER, THE ENGINEER AND/OR THEIR REPRESENTATIVES. THE PROJECT OWNER RESERVES THE RIGHT TO ACCEPT OR REJECT ANY SUCH MATERIALS AND WORKMANSHIP THAT DOES NOT CONFORM TO ITS STANDARDS AND SPECIFICATIONS SHOWN IN THE CONTRACT DOCUMENTS.
2. ALL STRUCTURES SHALL BE CONSTRUCTED IN DEWATERED CONDITIONS UNLESS OTHERWISE NOTED IN THE CONTRACT DOCUMENTS. GROUNDWATER SHALL BE MAINTAINED A MINIMUM OF TWO (2) FEET BELOW THE LOWEST POINT OF EXCAVATION FOR ANY GIVEN STRUCTURE.
3. PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL MEET WITH THE OWNER'S REPRESENTATIVE AND RECORD NOTES OF EXISTING CONDITIONS OF THE SITE, ADJACENT PROPERTY, AND ACCESS ROADS. THIS IS TO DOCUMENT EXISTING CONDITIONS. PHOTO AND VIDEO LOGS ARE REQUIRED FOR PERMIT ISSUANCE PRIOR TO MOBILIZATION.

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RW RM SC

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NOTES

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

Otak
371 Centennial Parkway
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PROJECT CONTROL POINT TABLE				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
10163	1317610.510	3077754.903	5191.528	CP DAISY – SET 0.5X24" REBAR WITH 2" ALUMINUM CAP
10245	1317654.518	3077831.627	5186.866	CP RB3 – SET 0.5X24" REBAR
10183	1317580.640	3077917.797	5184.133	CP RB1 – SET 0.5X24" REBAR
10239	1317410.793	3078379.852	5186.775	CP RB2 – SET 0.5X24" REBAR
10241	1317332.521	3078541.293	5186.624	CP FALLS – SET 0.5X24" REBAR WITH 2" ALUMINUM CAP
10855	1317167.339	3078450.973	5178.724	WP 10855 – SET 60D NAIL
10853	1316853.886	3078443.984	5175.661	CP RB4 – SET 0.5X24" REBAR
10235	1316751.182	3078533.008	5175.366	CP MAG1 – SET MAGNAIL
10237	1316783.209	3078623.791	5179.277	CP LILLY – SET 0.5X24" REBAR WITH 2" ALUMINUM CAP
10001	1316444.608	3078220.873	5178.295	CP STREAM – SET 0.5X24" REBAR WITH 2" ALUMINUM CAP

VERTICAL DATUM:
NORTH AMERICAN VERTICAL DATUM OF 1988. VERTICAL CONTROL WAS ESTABLISHED ON SITE VIA POST-PROCESSED STATIC SOLUTION ON CONTROL POINT #10001, "CP STREAM", ELEVATION=5178.295', USING OBSERVATIONS GATHERED ON 7/25/2019 AND 7/26/2019. FROM THIS CONTROL POINT, ALL VERTICAL RELATIONSHIPS SHOWN HEREON WERE DETERMINED.

CITY OF LONGMONT BENCHMARK #157, ELEVATION=5164.76, IS IN AGREEMENT WITH THIS SOLUTION AND SHOULD BE USED TO RE-ESTABLISH
VERTICAL CONTROL IN THE EVENT OF CONTROL NETWORK DESTRUCTION.

HORIZONTAL DATUM:
COLORADO STATE PLANE NORTH ZONE COORDINATES NAD 83(2011) DATUM. HORIZONTAL CONTROL BASED UPON POST-PROCESSED STATIC SOLUTION (SEE ABOVE NOTE), FROM CONTROL POINT #10001, "CP STREAM", ALL HORIZONTAL RELATIONSHIPS SHOWN HEREON WERE DETERMINED.

NOTE:
1. THIS DRAWING IS AT TRUE STATE PLANE.

2. ALL PROPERTY PINS, INTERSECTION MONUMENTS, AND SECTION CORNERS DISTURBED DURING CONSTRUCTION MUST BE REFERENCED AND REPLACED UNDER THE SUPERVISION OF A LICENSED SURVEYOR.

3. THIS AUTOCAD DRAWING CONTAINS INFORMATION THAT IS NOT VISIBLE ON THE PLOTTED COPY. TO OBTAIN ALL THE INFORMATION THAT IS AVAILABLE IN THIS DRAWING, ALL THE AUTOCAD LAYERS MUST BE TURNED ON AND THAWED.

4. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE EXISTENCE OF ALL UNDERGROUND UTILITIES IN THE AREA OF THE WORK BEFORE COMMENCING NEW CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING ALL UNDERGROUND UTILITIES AND SHALL BE RESPONSIBLE FOR ALL UNKNOWN UNDERGROUND UTILITIES.

5. ALL PROJECT CONTROL LISTED HEREON IS PROVIDED AS A COURTESY. IT IS THE RESPONSIBILITY OF THE RECIPIENT TO VERIFY THE ACCURACY OF THE COORDINATES AND ELEVATIONS SHOWN PRIOR TO USING THEM FOR ANY PURPOSES.

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SURVEY CONTROL
ST. VRAIN CREEK REACH 3 PHASE 2
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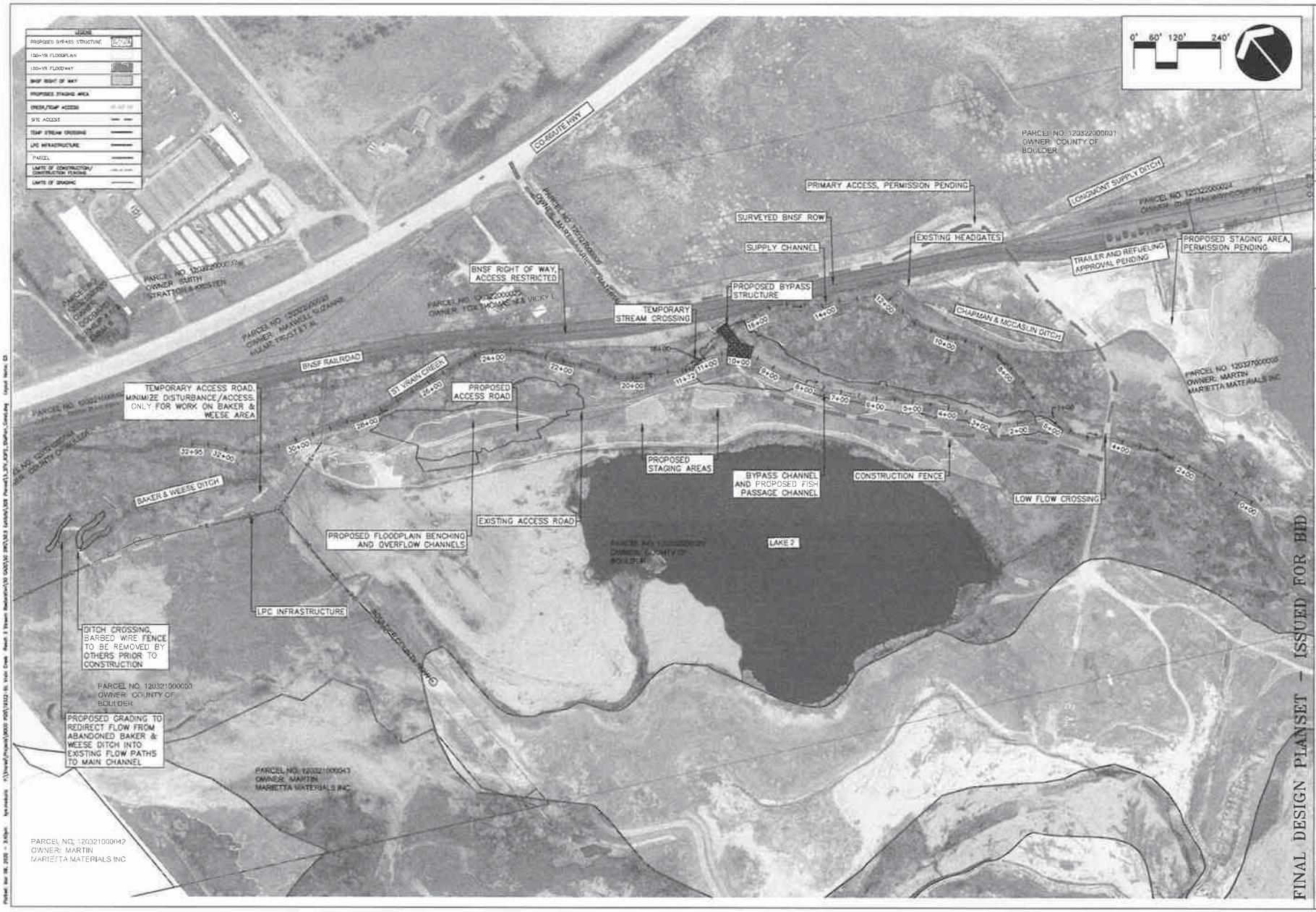

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ACCESS AND STAGING PLAN

SI. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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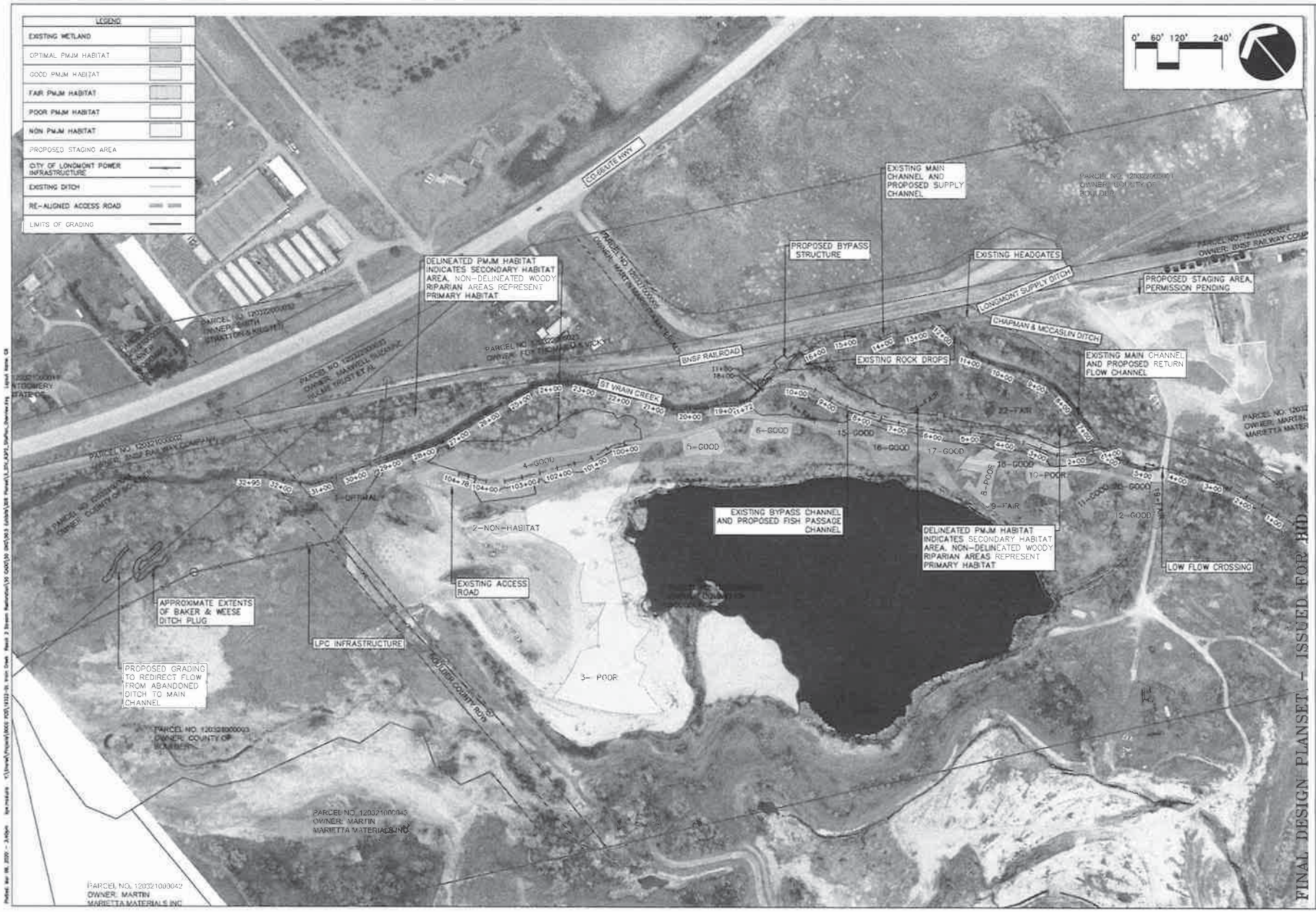

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EXISTING CONDITIONS PLAN

ST. VRAIN CREEK REACH 3 PHASE 2
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Plotted: Mar 09, 2020 - 3:41pm kyle.mazzola Y:\Shared\Projects\DOCO POS\18322-St Vrain Creek Reach 3 Stream Restoration\50 CADD\50 GRD\505 Exhibits\505 Plans\L_SVC_R3P2_FloodPlain Extents.dwg Layout Name: C7

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FLOODPLAIN EXTENTS

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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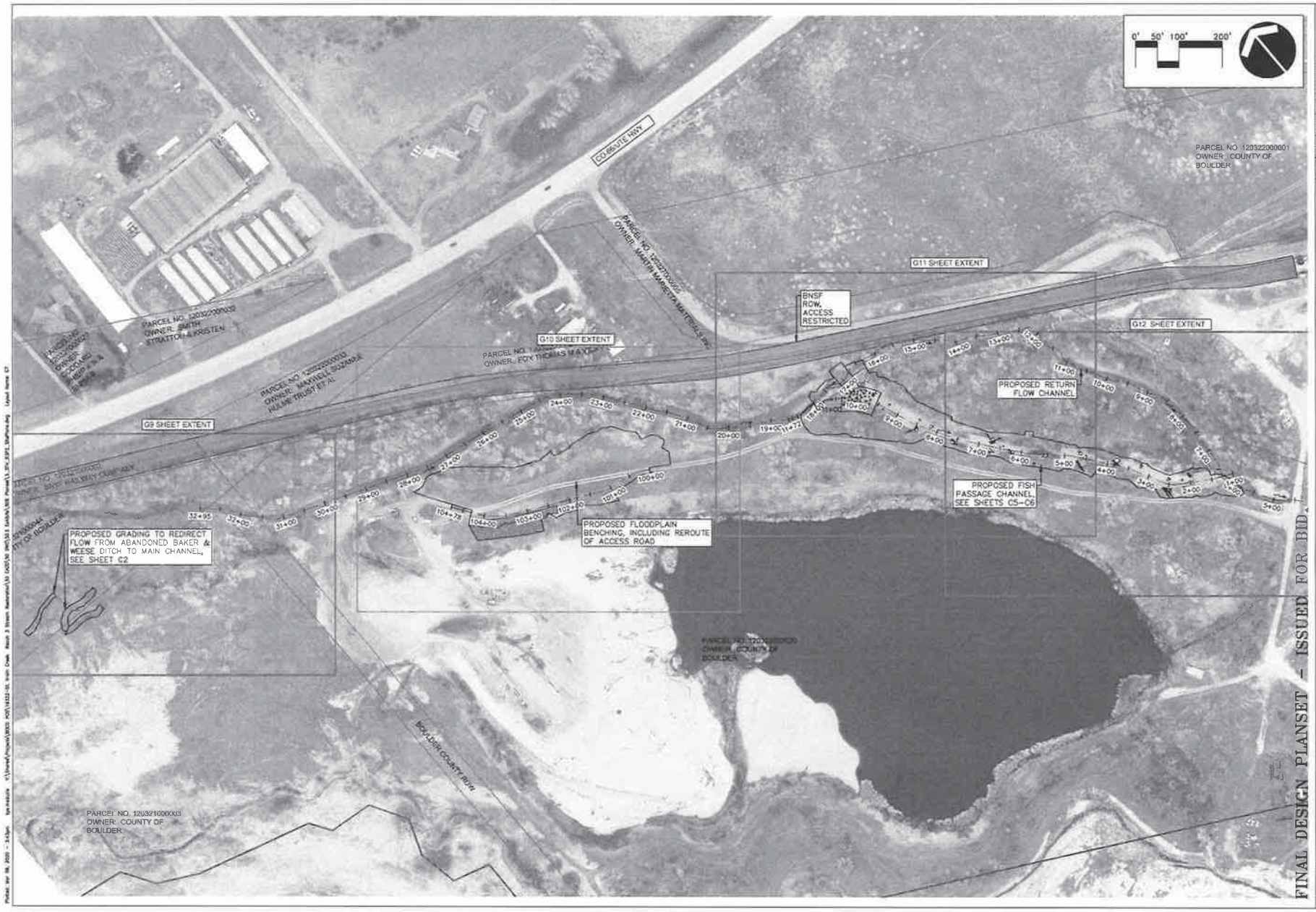

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DETAILED SITE PLAN 1

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DETAILED SITE PLAN 2

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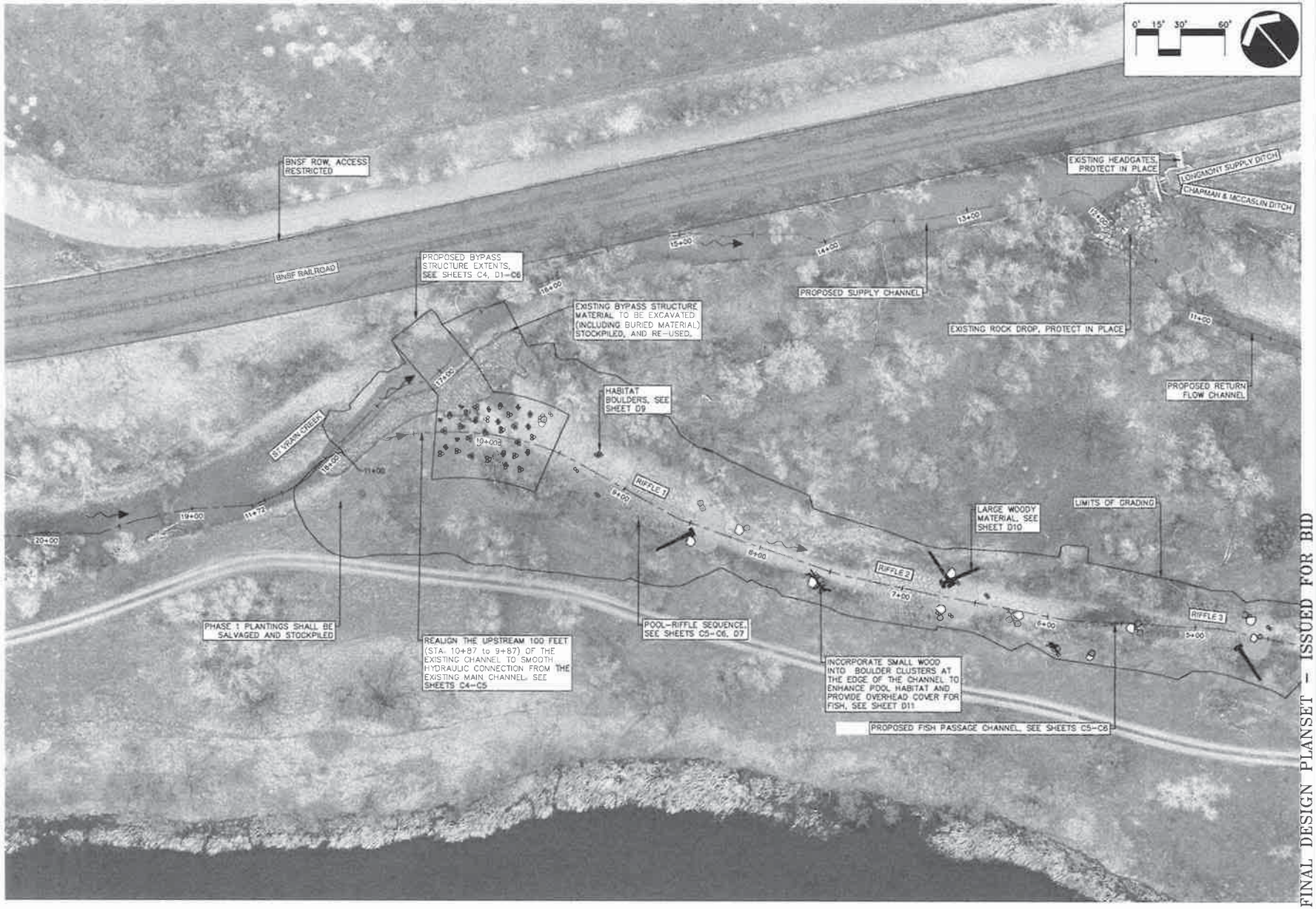

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DETAILED SITE PLAN 3

ST. VRAIN CREEK REACH 3 PHASE 2
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DETAILED SITE PLAN 4

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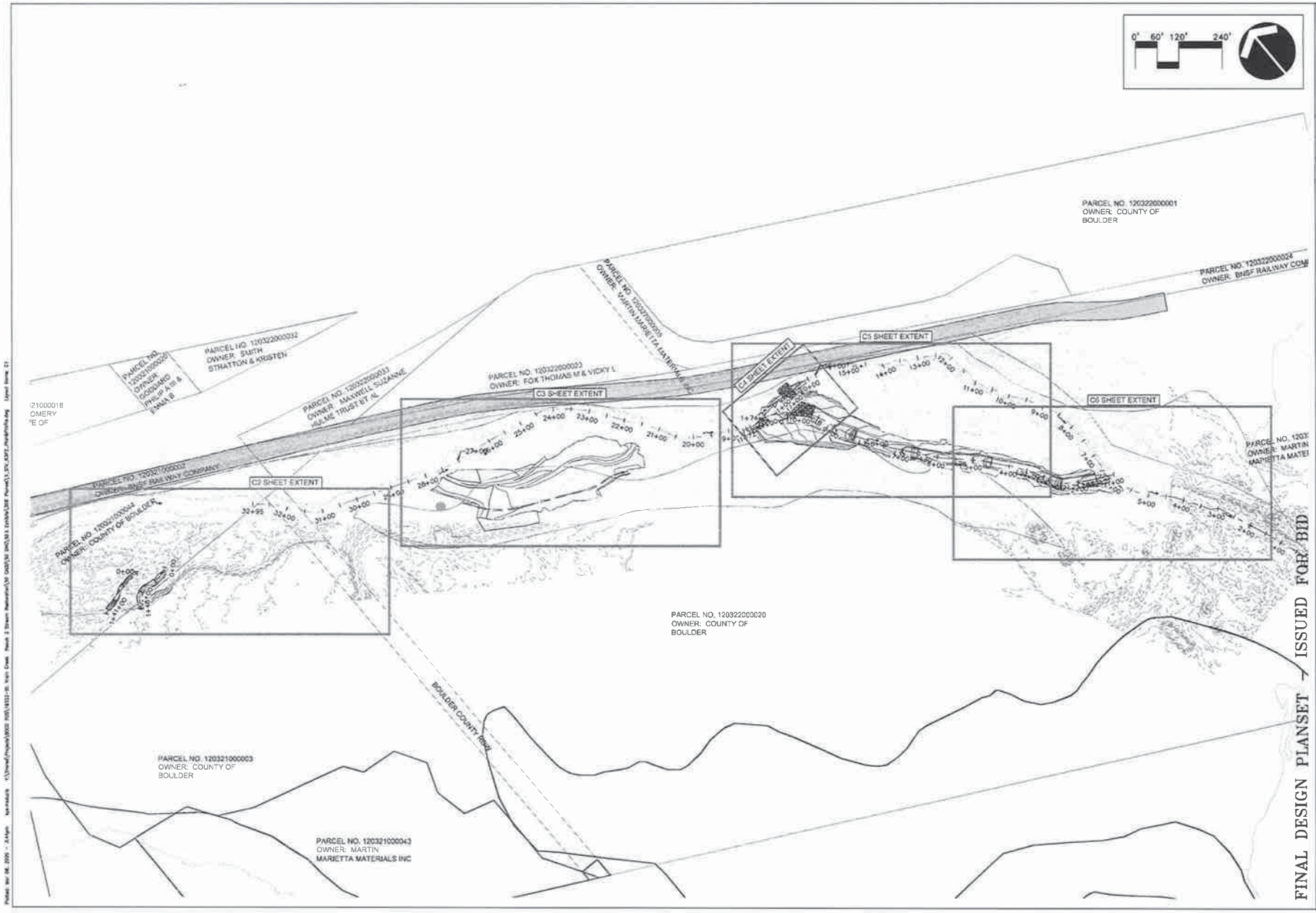

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GRADING PLAN OVERVIEW

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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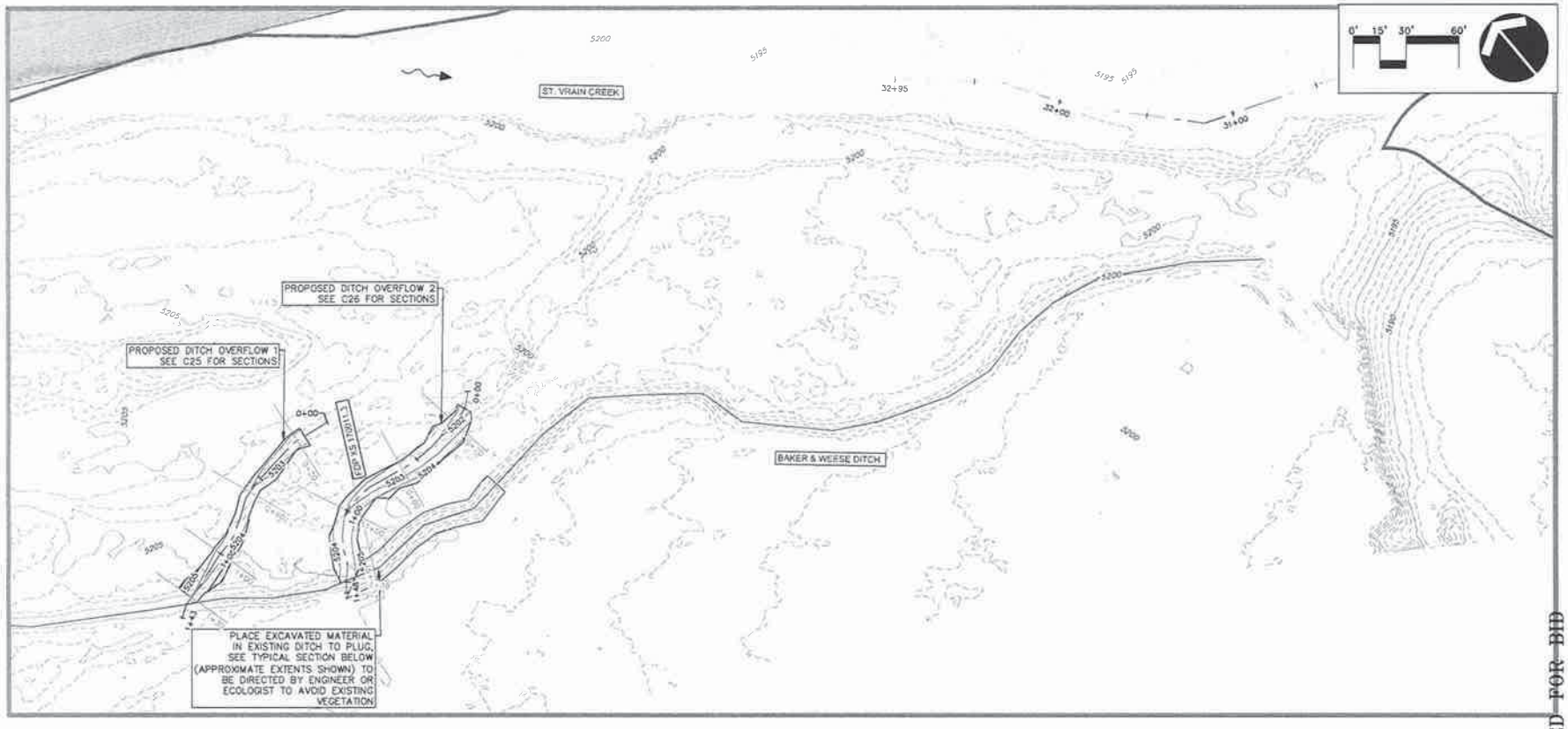
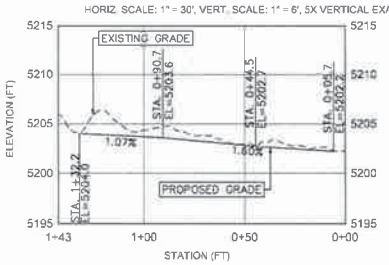
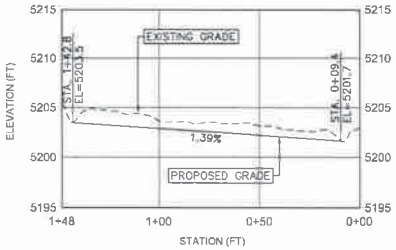


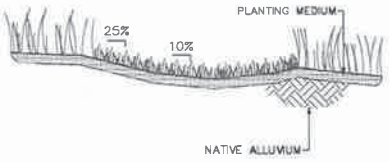
HORIZ. SCALE: 1" = 30', VERT. SCALE: 1" = 6', 5X VERTICAL EXAGGERATION



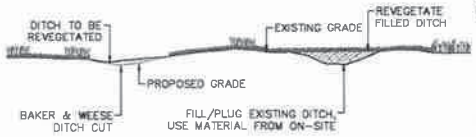
PROPOSED DITCH OVERFLOW 1



PROPOSED DITCH OVERFLOW 2



TYPICAL OVERFLOW DITCH GRADING SECTION
NOT TO SCALE



TYPICAL DITCH PLUG SECTION
NOT TO SCALE

PROPOSED CUT
PROPOSED FILL

FINAL DESIGN PLANSET - ~~ISSUED FOR BID~~

BAKER & WEESE GRADING PLAN

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

NO	DATE	BY	REVISION COMMENTS

Design: KW Drawn: KM Checked: SE

PREPARED FOR:
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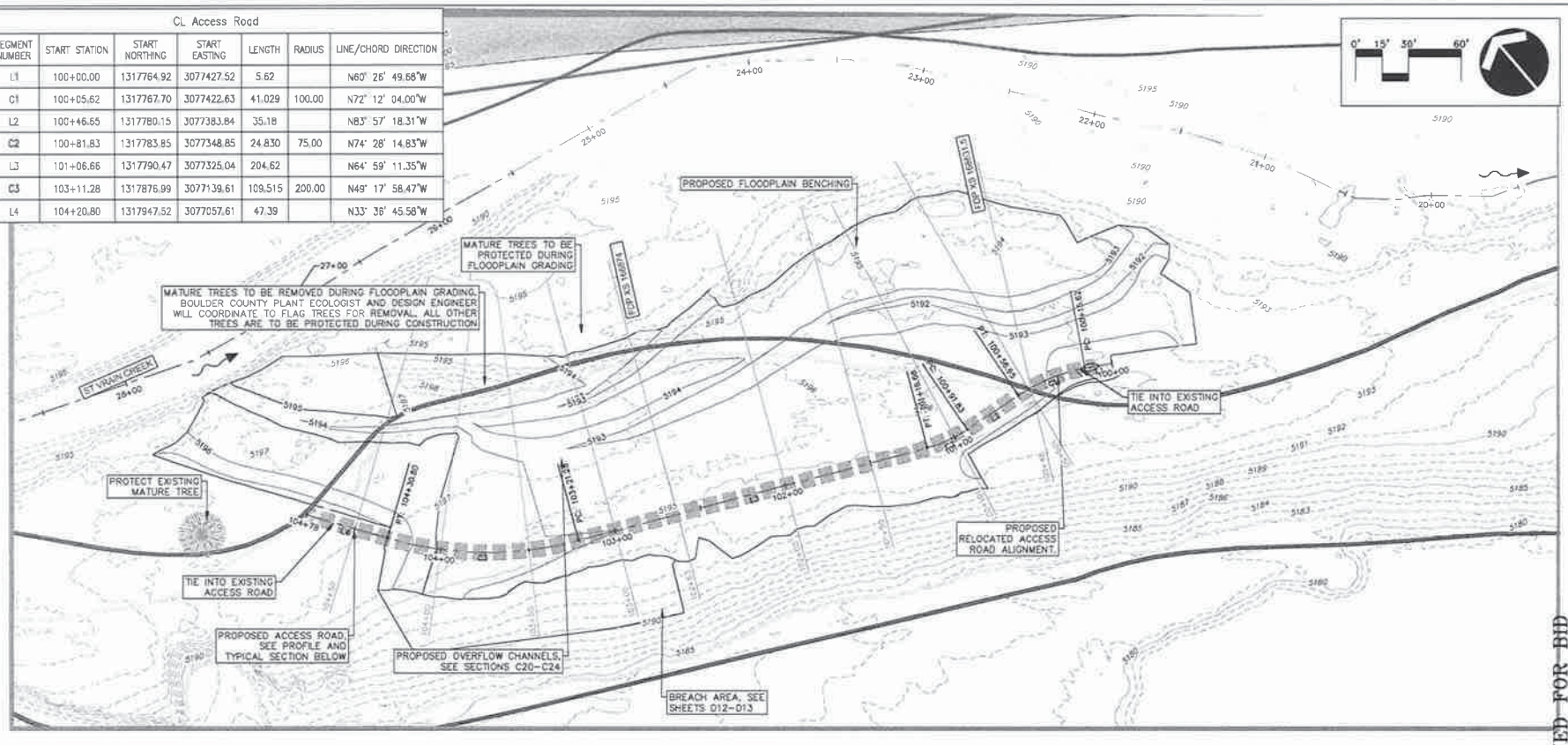
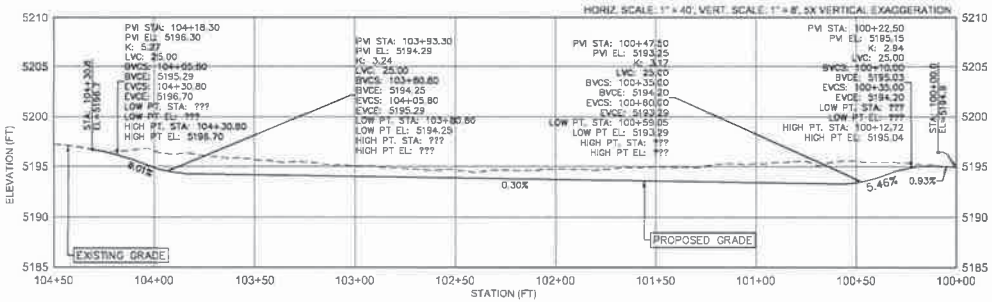
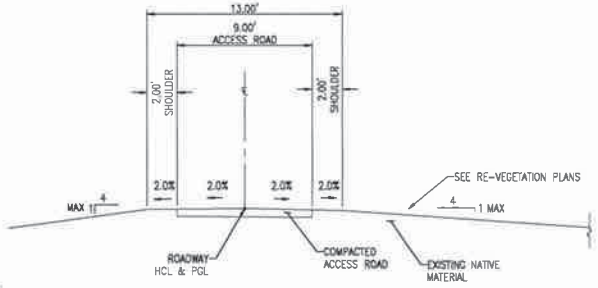
CL Access Road						
SEGMENT NUMBER	START STATION	START NORTHING	START EASTING	LENGTH	RADIUS	LINE/CHORD DIRECTION
L1	100+00.00	1317764.92	3077427.52	5.62		N60° 26' 49.68"W
C1	100+05.62	1317767.70	3077422.63	41.029	100.00	N72° 12' 04.00"W
L2	100+46.65	1317780.15	3077383.84	35.18		N83° 57' 18.31"W
C2	100+81.83	1317783.85	3077348.85	24.830	75.00	N74° 28' 14.83"W
L3	101+06.66	1317790.47	3077325.04	204.62		N64° 59' 11.35"W
C3	103+11.28	1317876.99	3077139.61	109.515	200.00	N49° 17' 58.47"W
L4	104+20.80	1317947.52	3077057.61	47.39		N33° 38' 45.58"W





ACCESS ROAD PROFILE



NOTE:
CONTRACTOR TO SUBMIT METHOD STATEMENT FOR COMPACTION OF ACCESS ROAD AND SHALL INCLUDE A PROOF ROLL.

ACCESS ROAD TYPICAL SECTION
(STA. 100+00.0 – STA. 104+25.4)
SCALE: 1"=4'
LOOKING UP ALIGNMENT

FINAL DESIGN PLANSET – ISSUED FOR BID

ACCESS ROAD & FLOODPLAIN GRADING PLAN

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

NO	DATE	BY	REVISION STATEMENTS	Date	Initial	Issue Date

Design: Drawn: Checked:

PREPARED FOR:

Boulder County Parks & Open Space

Otak

375 Centennial Parkway
Suite 220
Louisville, Colorado 80027
Phone: 303-444-8093

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Project No. Drawing No.
C3
Sheet No.

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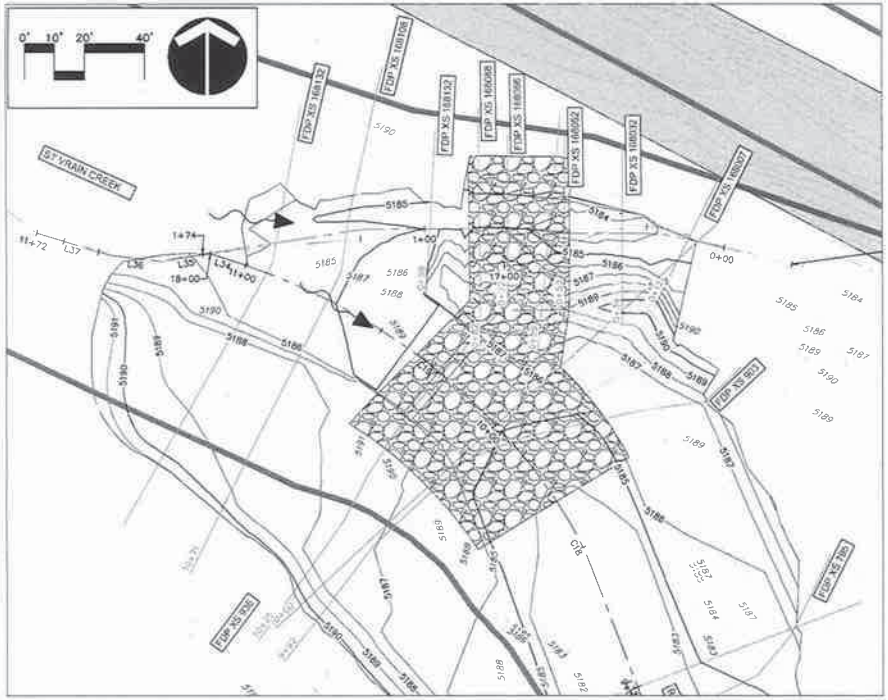

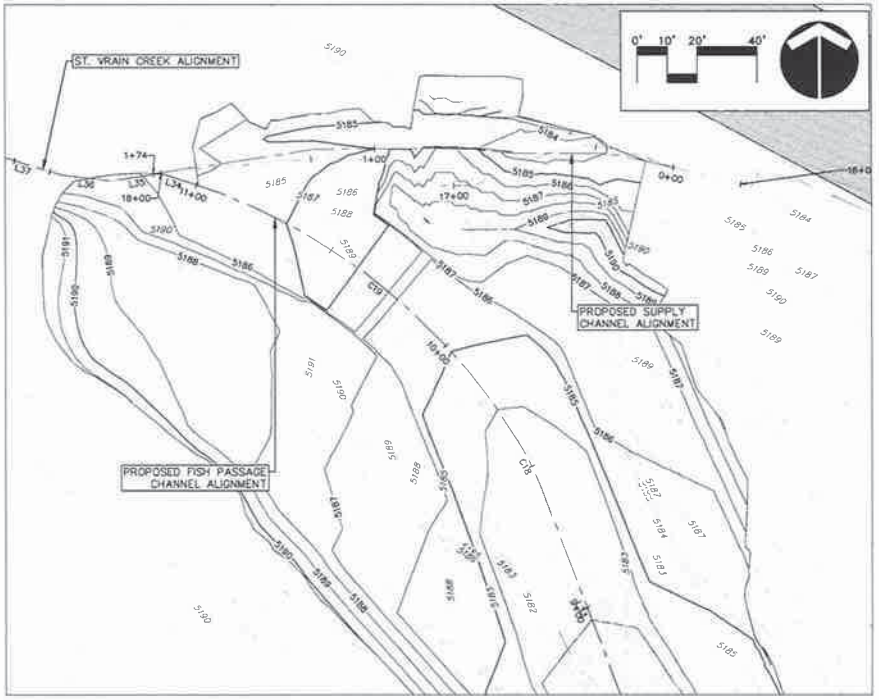

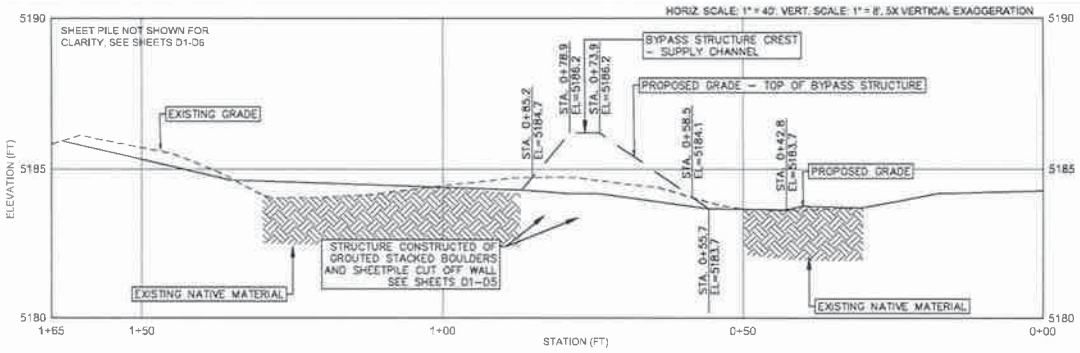

SUPPLY DITCH PROFILE

FINAL DESIGN PLANSET - ISSUED FOR BID

BYPASS STRUCTURE GRADING PLAN

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

NO.	DATE	BY	REVISION COMMENTS
1	9/21/11	BM	CONCEPTUAL SUBM
2	11/3/11	BM	30% SUBM
3	1/27/12	BM	DRAFT FINAL
4	1/26/12	BM	60% SUBM

Design: KM Drawn: BM Checked: TC Date: Initial Issue Date

PREPARED FOR:
Boulder County Parks & Open Space

Otak
371 Centennial Parkway
Suite 125
Louisville, Colorado 80027
Phone: 303-444-8073

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Project No. Drawing No.
C4
Sheet No.

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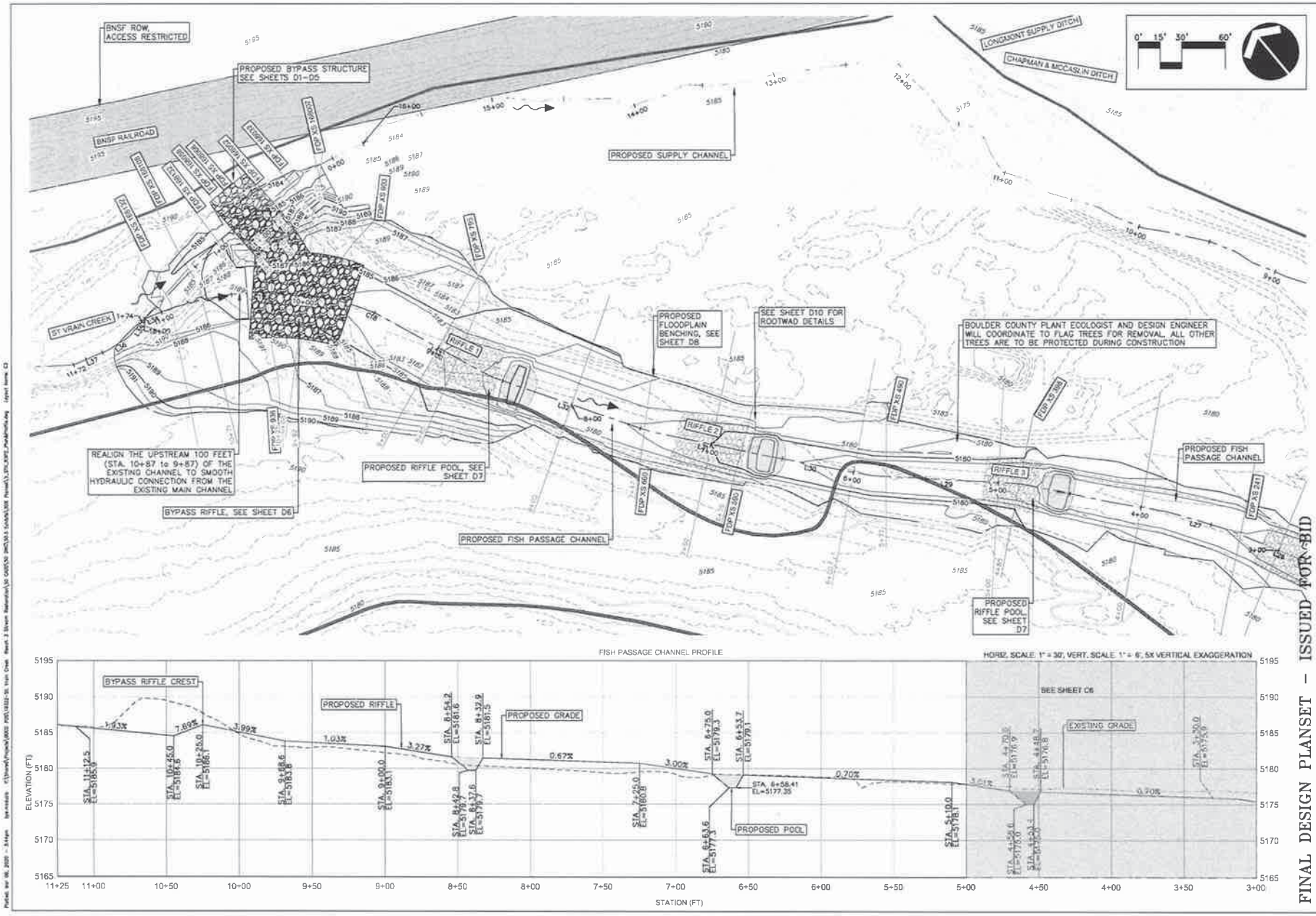

NO	DATE	BY	REVISION COMMENTS	Design	Drawn	Checked	Date	Initial Issue Date
				BB	KM	BC		

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FISH PASSAGE CHANNEL GRADING PLAN 1

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

FINAL DESIGN PLANSET – ISSUED FOR BID

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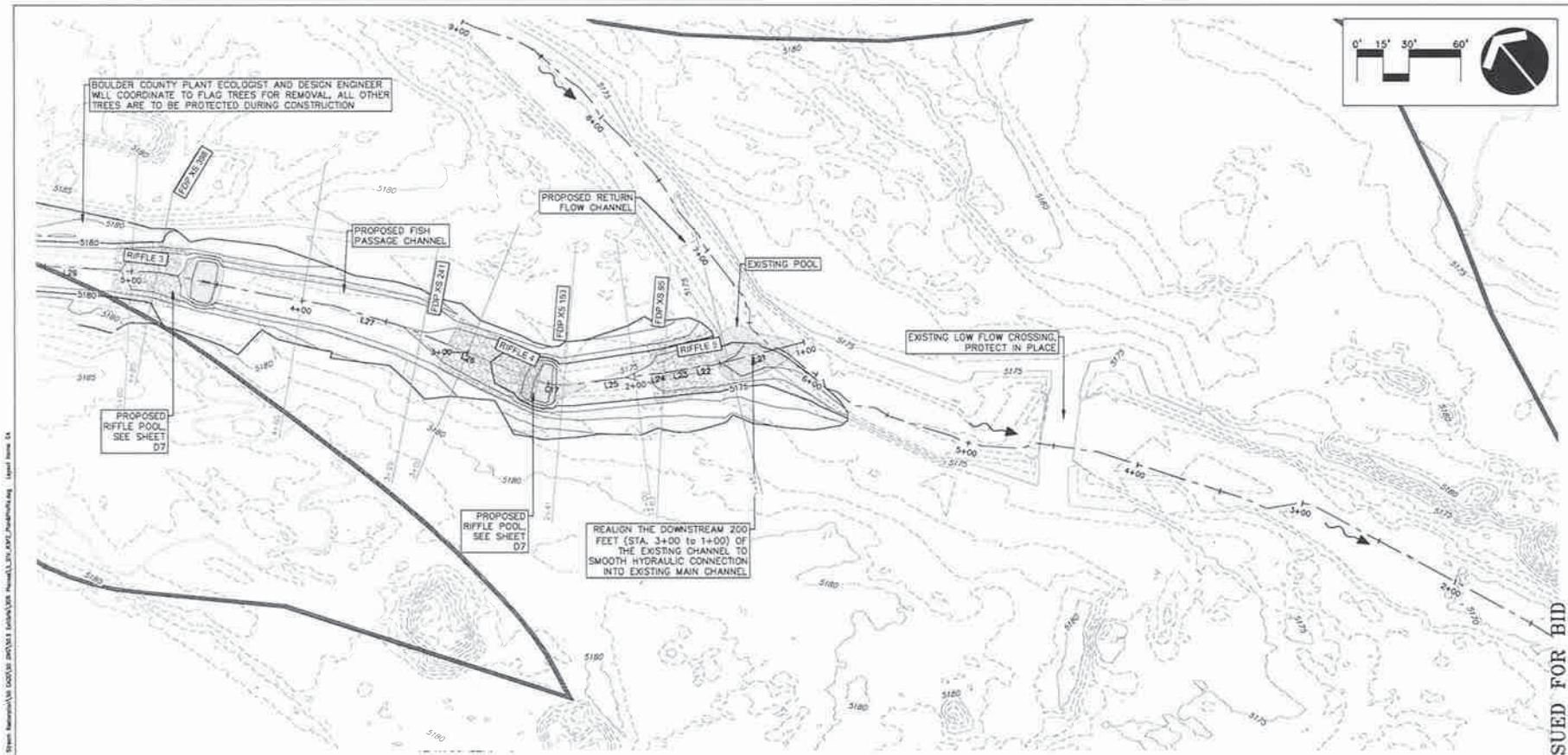

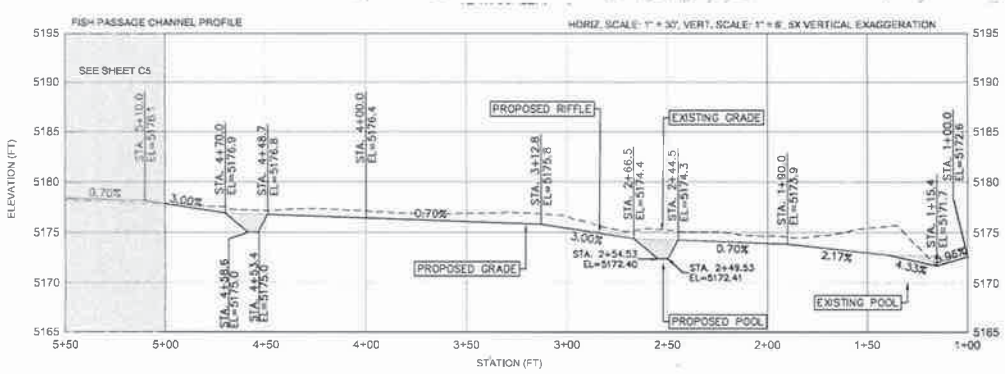

PROPOSED FISH PASSAGE CHANNEL							
SEGMENT NUMBER	START STATION	START NORTHING	START EASTING	SEGMENT NUMBER	START STATION	START NORTHING	START EASTING
L21	1+00.00	1316889.66	3078459.42	L30	5+86.86	1317229.82	3078125.69
L22	1+54.84	1316913.59	3078410.08	L31	6+72.37	1317296.05	3078071.62
L23	1+64.58	1316919.03	3078402.00	L32	7+46.46	1317354.57	3078026.17
L24	1+82.75	1316928.06	3078386.23	L33	8+58.18	1317450.55	3077968.99
L25	1+90.00	1316932.04	3078380.17	C18	9+42.06	1317528.90	3077939.05
C17	2+37.41	1316957.73	3078340.33	C19	9+59.46	1317544.54	3077931.46
L26	2+57.48	1316972.34	3078326.89	L34	11+01.81	1317631.35	3077822.52
L27	3+39.12	1317044.43	3078288.57	L35	11+12.51	1317634.65	3077812.34
L28	3+81.38	1317079.74	3078265.34	L36	11+28.84	1317632.10	3077796.20
L29	4+83.67	1317159.21	3078200.95	L37	11+45.56	1317634.02	3077779.59

FINAL DESIGN PLANSET – ISSUED FOR BID

FISH PASSAGE CHANNEL GRADING PLAN 2

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

NO.	DATE	BY	REVISION COMMENTS

Design EB
Drawn EB
Checked TC
Date
Initial Issue Date

PREPARED FOR:
Boulder County Parks & Open Space

Otak
371 Centennial Parkway
Suite 210
Louisville, Colorado 80027
Phone: 303-444-8299

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Project No.
Drawing No.
C6
Sheet No.

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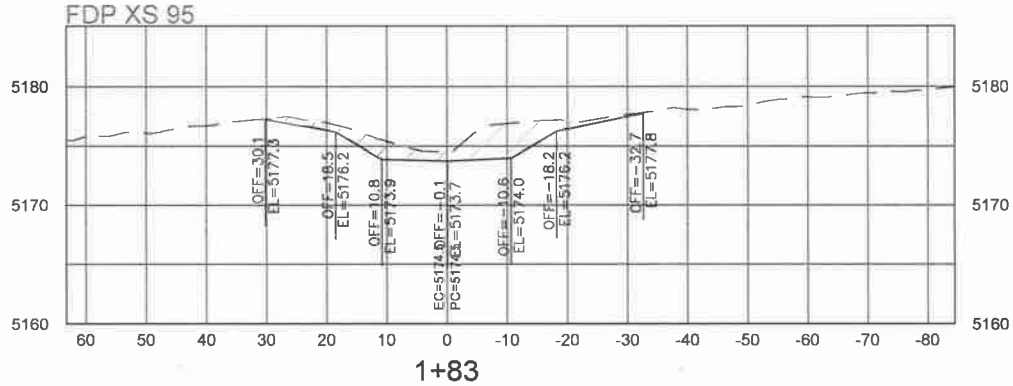
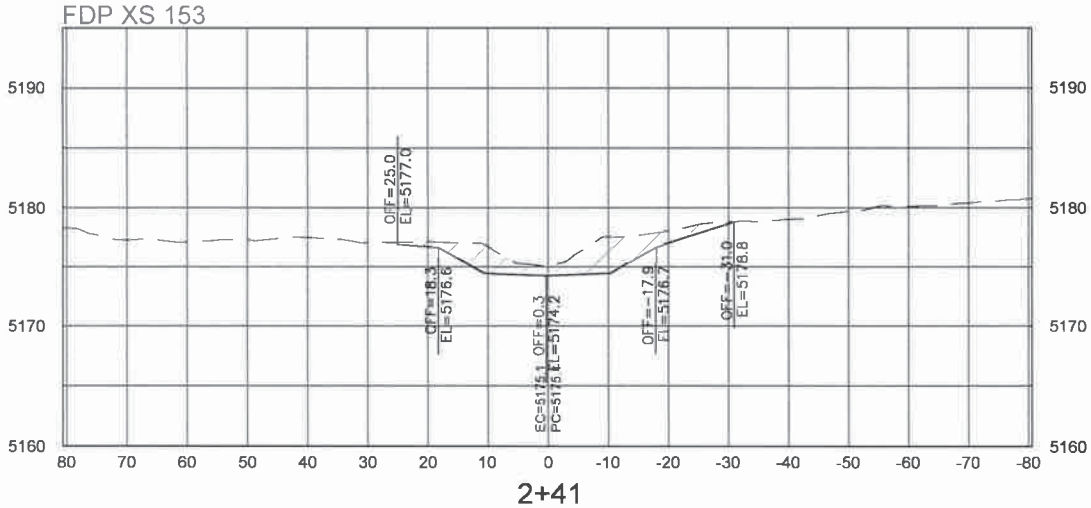
FISH PASSAGE CHANNEL FDP CROSS SECTIONS





SECTIONS LOOKING DOWNSTREAM

HORIZ. SCALE: 1"= 20'
VERT. SCALE: 1"=10'
2X VERTICAL EXAGGERATION

——— PROPOSED CONDITION (PC)
— — EXISTING CONDITION (EC)

PROPOSED CUT
PROPOSED FILL

FINAL DESIGN PLANSET – ISSUED FOR BID

FDP SECTION VIEW 1

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

PREPARED FOR:
Boulder County Parks & Open Space

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Project No. Drawing No.
C7
Sheet No.

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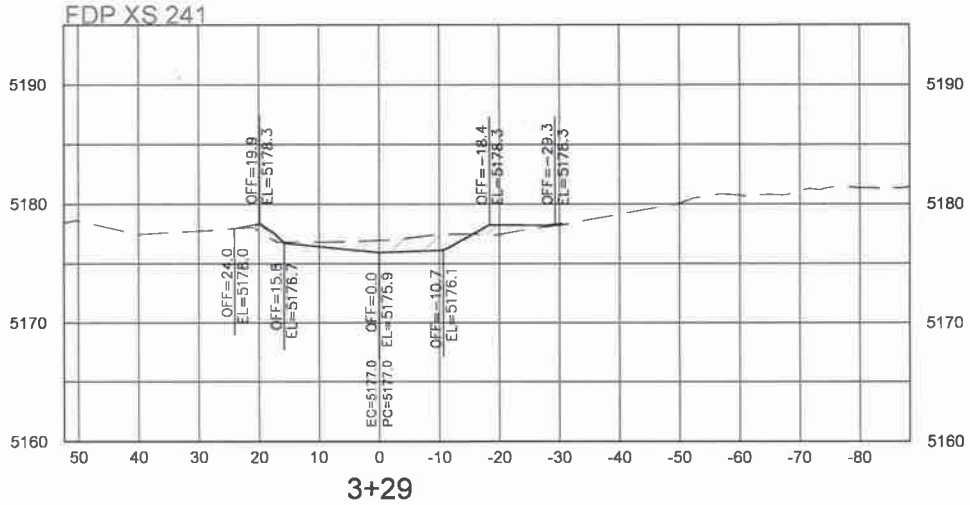
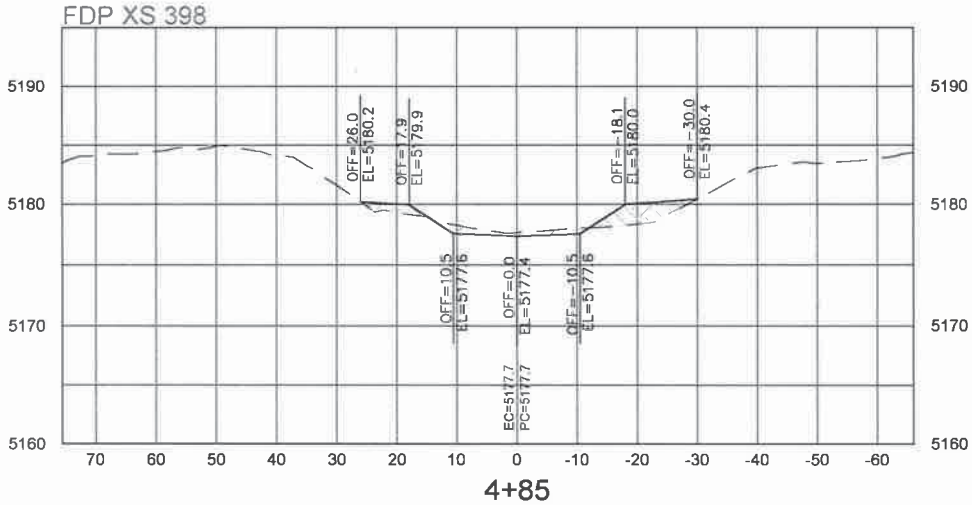
FISH PASSAGE CHANNEL FDP CROSS SECTIONS





SECTIONS LOOKING DOWNSTREAM

HORIZ. SCALE: 1"= 20'
VERT. SCALE: 1"=10'
2X VERTICAL EXAGGERATION

PROPOSED CONDITION (PC)
EXISTING CONDITION (EC)

PROPOSED CUT
PROPOSED FILL

FINAL DESIGN PLANSET – ISSUED FOR BID

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FDP SECTION VIEW 2

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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Sheet No.

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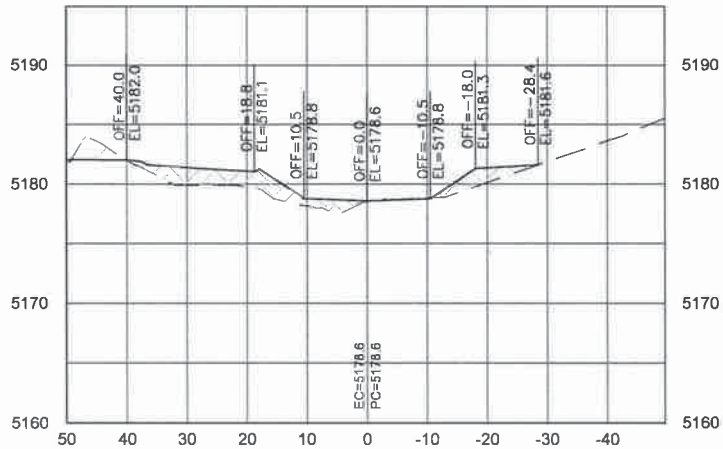
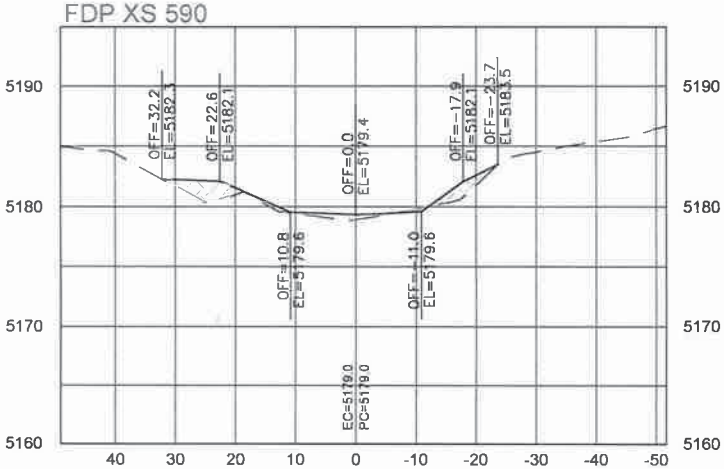
FISH PASSAGE CHANNEL FDP CROSS SECTIONS

FDP XS 490



5+77

FDP XS 590



6+79

SECTIONS LOOKING DOWNSTREAM

HORIZ. SCALE: 1"= 20'
VERT. SCALE: 1"=10'
2X VERTICAL EXAGGERATION

——— PROPOSED CONDITION (PC)
— — EXISTING CONDITION (EC)

PROPOSED CUT
PROPOSED FILL

FINAL DESIGN PLANSET – ISSUED FOR BID

No.	Date	By	Revision Comments

Design	Drawn	Reviewed	Date	Initial Issue Date			
RW	TJF	TC					

PREPARED FOR:

Boulder County
Parks & Open Space

FDP SECTION VIEW 3

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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C9
Sheet No.

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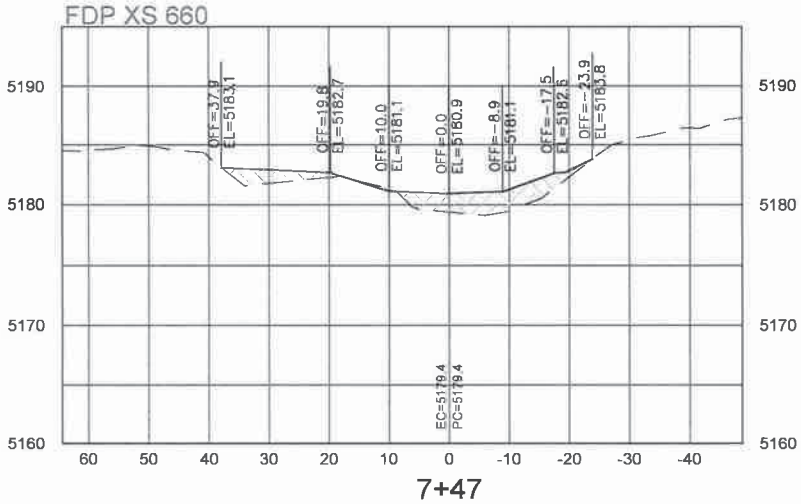
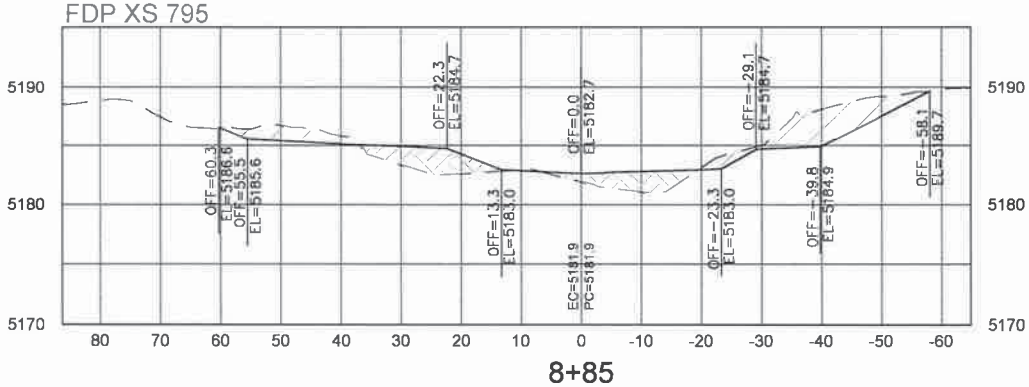
FISH PASSAGE CHANNEL FDP CROSS SECTIONS





SECTIONS LOOKING DOWNSTREAM

HORIZ. SCALE: 1"= 20'
VERT. SCALE: 1"=10'
2X VERTICAL EXAGGERATION

PROPOSED CONDITION (PC)
EXISTING CONDITION (EC)

PROPOSED CUT
PROPOSED FILL

FINAL DESIGN PLANSET - ISSUED FOR BID

PREPARED FOR:
Boulder County Parks & Open Space

FDP SECTION VIEW 4
ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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Drawing No. C10
Sheet No.

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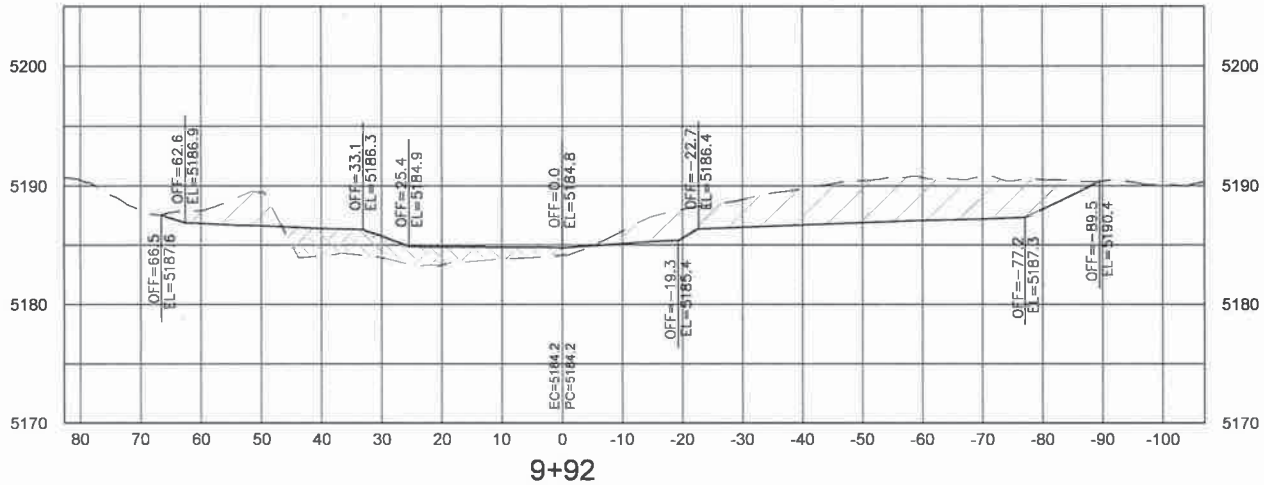
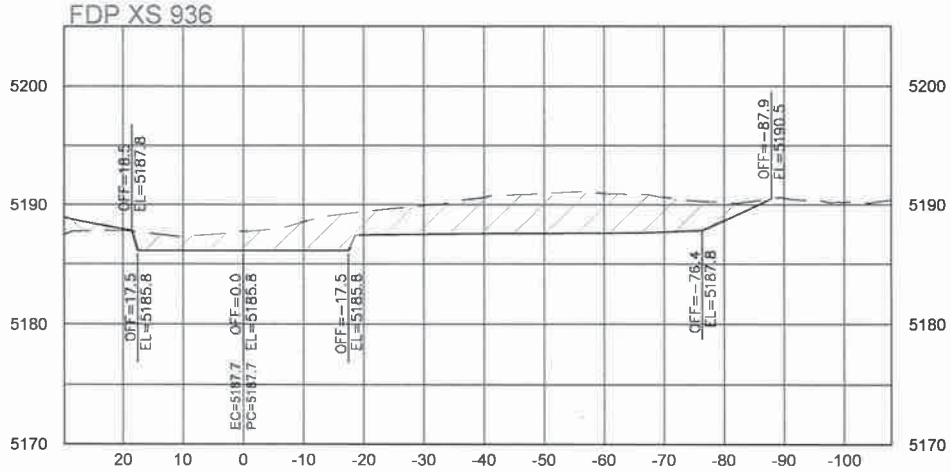
FISH PASSAGE CHANNEL FDP CROSS SECTIONS

FDP XS 903



9+92

FDP XS 936



10+25

SECTIONS LOOKING DOWNSTREAM

HORIZ. SCALE: 1"= 20'
VERT. SCALE: 1"=10'
2X VERTICAL EXAGGERATION

——— PROPOSED CONDITION (PC)
— — EXISTING CONDITION (EC)

PROPOSED CUT
PROPOSED FILL

FINAL DESIGN PLANSET - ISSUED FOR BID

FDP SECTION VIEW 5

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

PREPARED FOR:
Boulder County Parks & Open Space

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Phone: 303-444-2878

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Project No. Drawing No.
C11
Sheet No.

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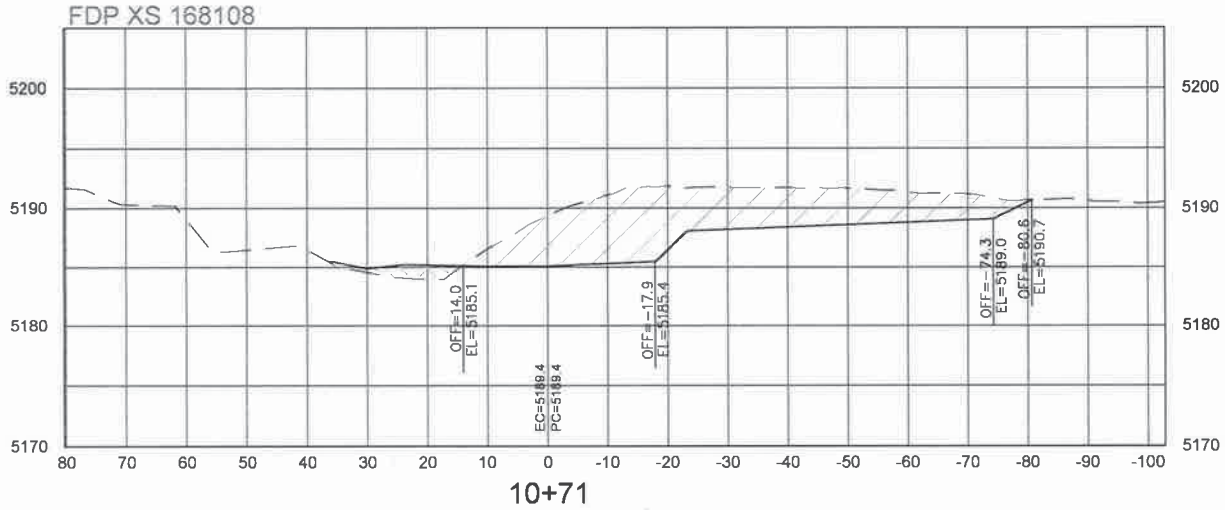
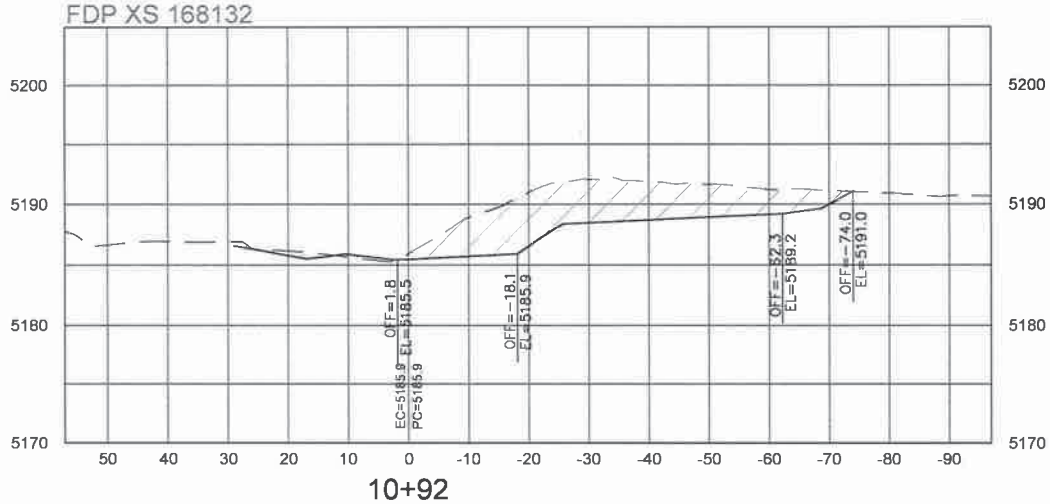
FISH PASSAGE CHANNEL FDP CROSS SECTIONS





SECTIONS LOOKING DOWNSTREAM

HORIZ. SCALE: 1"= 20'
VERT. SCALE: 1"=10'
2X VERTICAL EXAGGERATION

PROPOSED CONDITION (PC)
EXISTING CONDITION (EC)

PROPOSED CUT
PROPOSED FILL

NO.	DATE	BY	REVISION COMMENTS

PREPARED FOR:

Boulder County Parks & Open Space

FINAL DESIGN PLANSET – ISSUED FOR BID

FDP SECTION VIEW 6

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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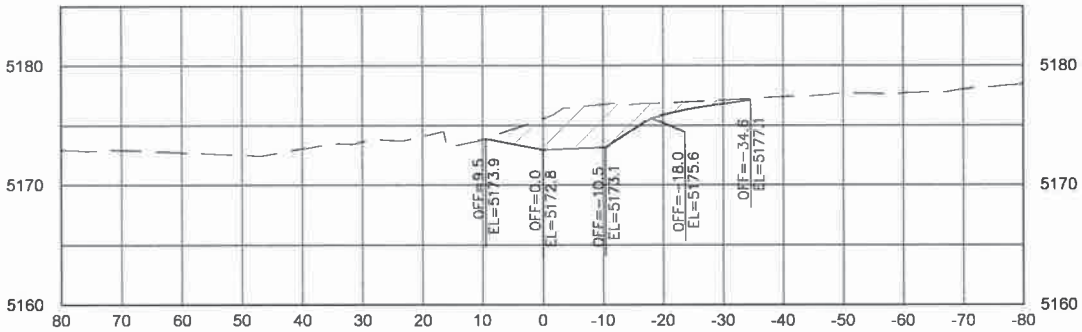
FISH PASSAGE CHANNEL SECTIONS



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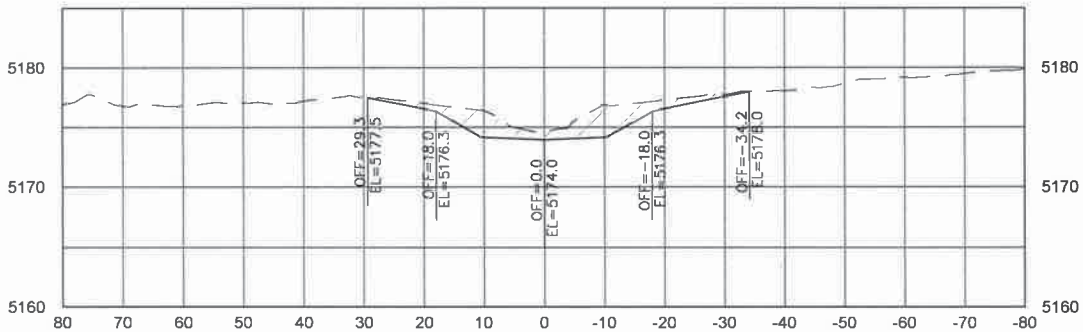

2+00

SECTIONS LOOKING DOWNSTREAM

HORIZ. SCALE: 1"= 20'
VERT. SCALE: 1"=10'
2X VERTICAL EXAGGERATION

PROPOSED CONDITION (PC)
EXISTING CONDITION (EC)

PROPOSED CUT
PROPOSED FILL

FINAL DESIGN PLANSET – ISSUED FOR BID

PREPARED FOR:

Boulder County Parks & Open Space

SECTION VIEW 7

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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C13
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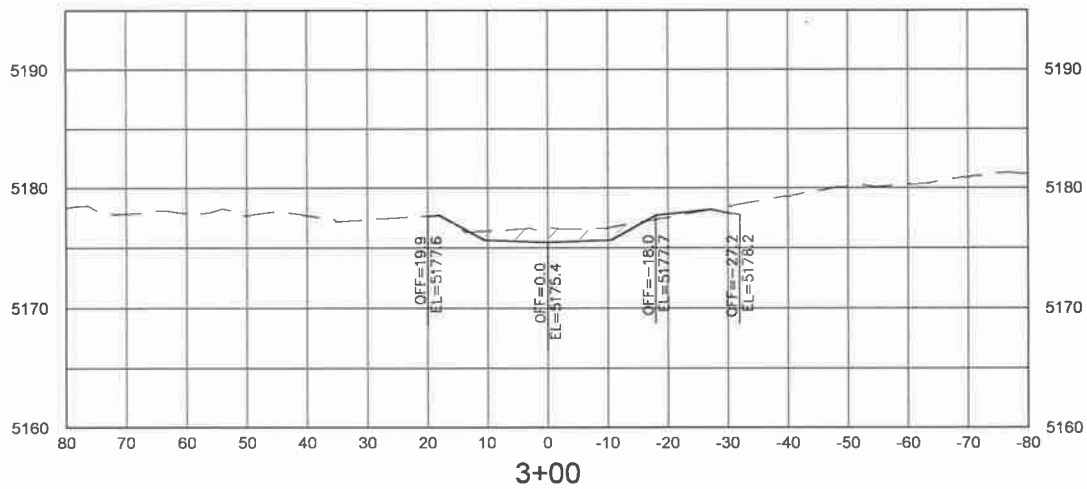
FISH PASSAGE CHANNEL SECTIONS



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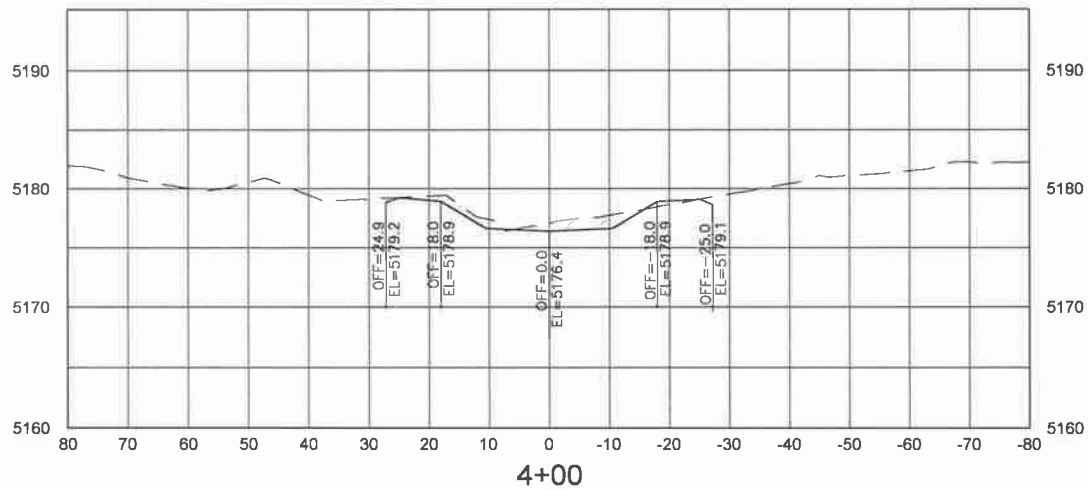

4+00

SECTIONS LOOKING DOWNSTREAM

HORIZ. SCALE: 1"= 20'
VERT. SCALE: 1"=10'
2X VERTICAL EXAGGERATION

PROPOSED CONDITION (PC)
EXISTING CONDITION (EC)

PROPOSED CUT
PROPOSED FILL

NO.	DATE	BY	REVISION COMMENTS

Design	Drawn	Checked	Date	Initial Issue Date
BW	EKW	TC		

PREPARED FOR:

Boulder County Parks & Open Space

FINAL DESIGN PLANSET – ISSUED FOR BID

SECTION VIEW 8

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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Louisville, Colorado 80027
Phone: 303-444-2870

19322
Project No.
Drawing No.
C14
Sheet No.

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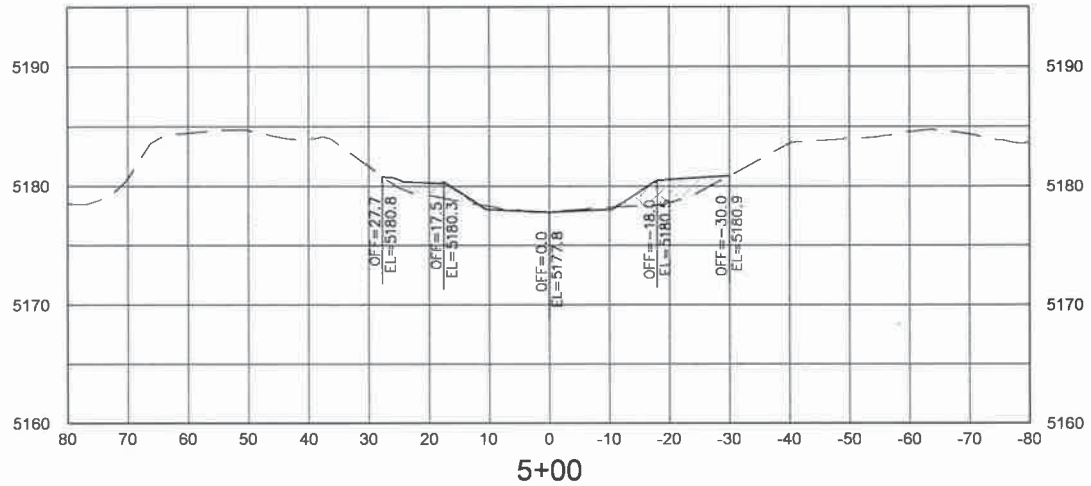
FISH PASSAGE CHANNEL SECTIONS



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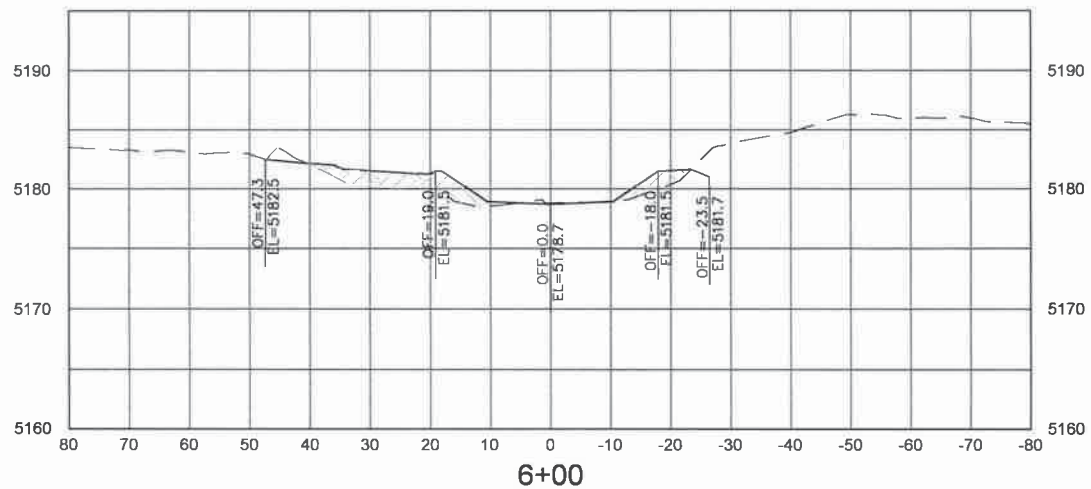

6+00

SECTIONS LOOKING DOWNSTREAM

HORIZ. SCALE: 1"= 20'
VERT. SCALE: 1"=10'
2X VERTICAL EXAGGERATION

PROPOSED CONDITION (PC)
EXISTING CONDITION (EC)

PROPOSED CUT
PROPOSED FILL

FINAL DESIGN PLANSET – ISSUED FOR BID

PREPARED FOR:

Boulder County Parks & Open Space

SECTION VIEW 9

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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Project No. 19322
Drawing No. C15
Sheet No.

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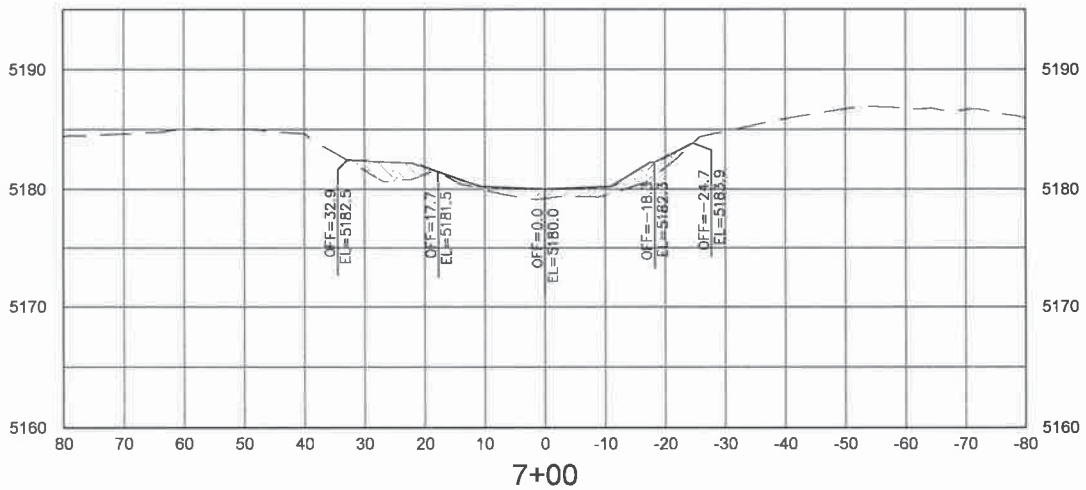
FISH PASSAGE CHANNEL SECTIONS



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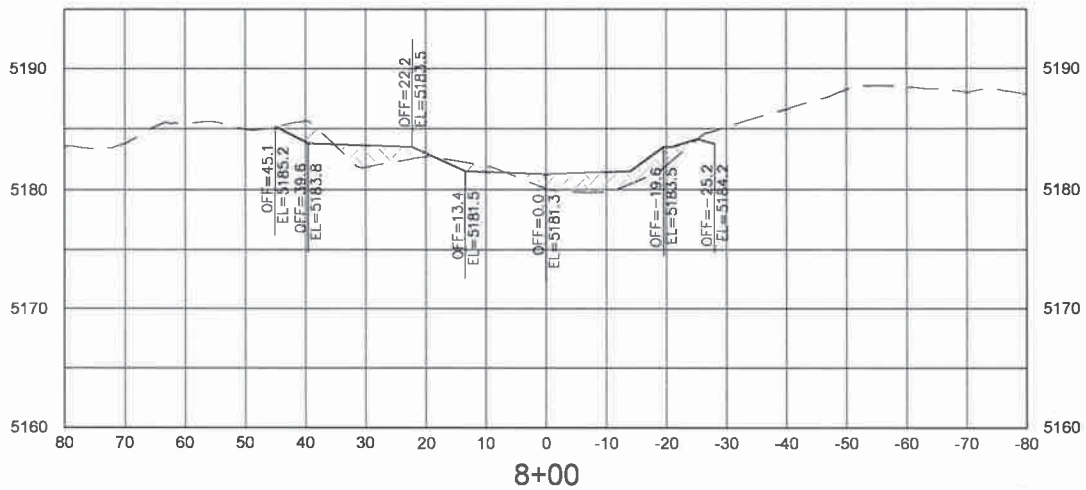

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SECTIONS LOOKING DOWNSTREAM

HORIZ. SCALE: 1"= 20'
VERT. SCALE: 1"=10'
2X VERTICAL EXAGGERATION

PROPOSED CONDITION (PC)
EXISTING CONDITION (EC)

PROPOSED CUT
PROPOSED FILL

FINAL DESIGN PLANSET - ISSUED FOR BID

PREPARED FOR:

Boulder County Parks & Open Space

SECTION VIEW 10

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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19322
Project No. Drawing No.
C16
Sheet No.

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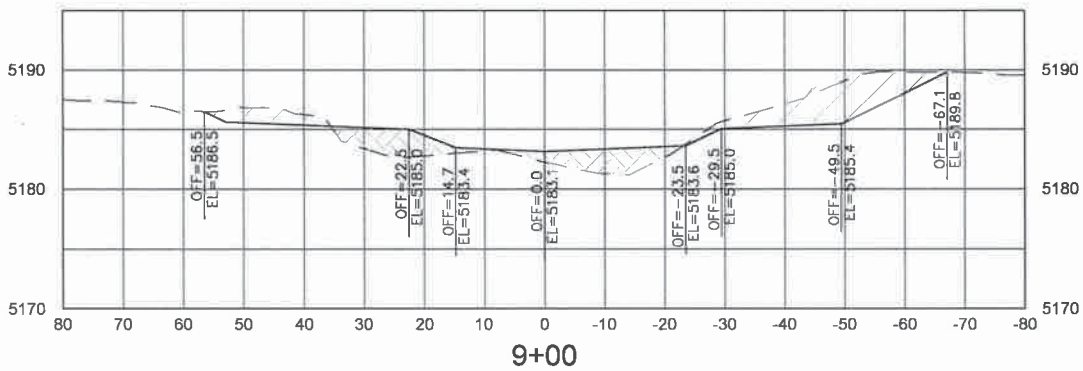
FISH PASSAGE CHANNEL SECTIONS



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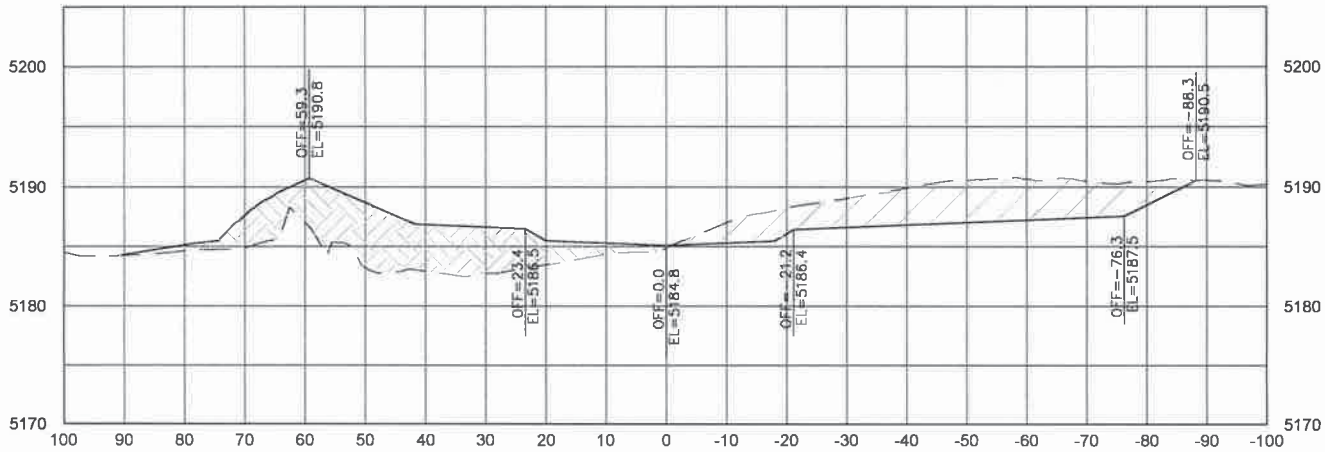

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SECTIONS LOOKING DOWNSTREAM

HORIZ. SCALE: 1"= 20'
VERT. SCALE: 1"=10'
2X VERTICAL EXAGGERATION

——— PROPOSED CONDITION (PC)
— — EXISTING CONDITION (EC)

PROPOSED CUT
PROPOSED FILL

No.	DATE	BY	REVISION COMMENTS

PREPARED FOR:

Boulder County Parks & Open Space

FINAL DESIGN PLANSET - ISSUED FOR BID

SECTION VIEW 11

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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19322
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C17
Sheet No.

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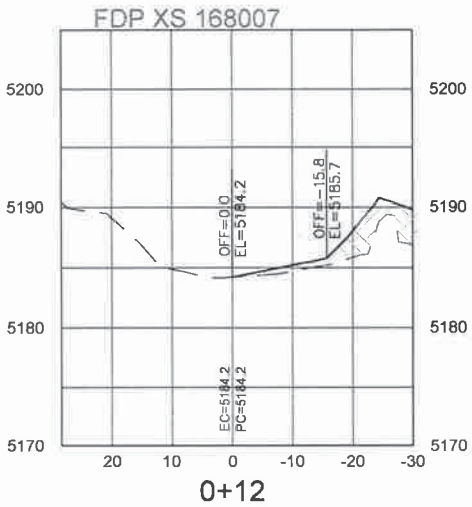
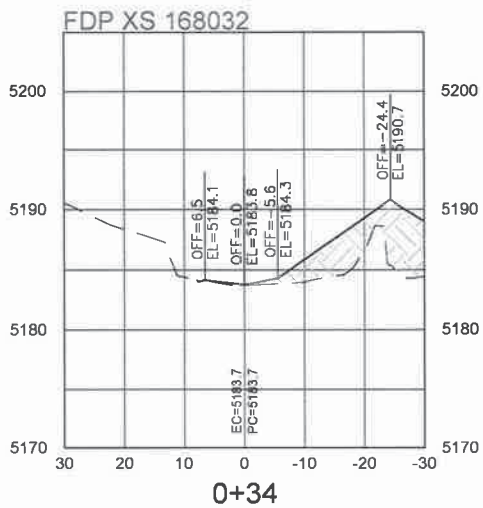
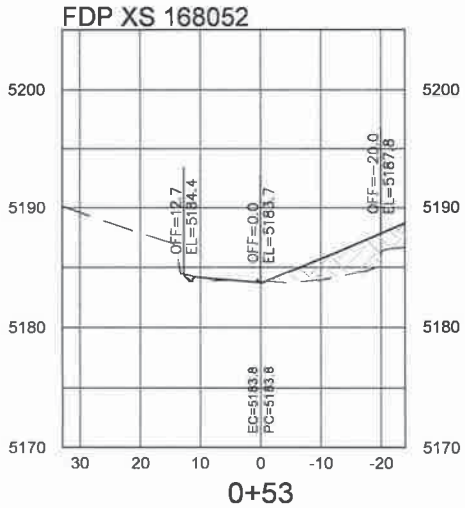
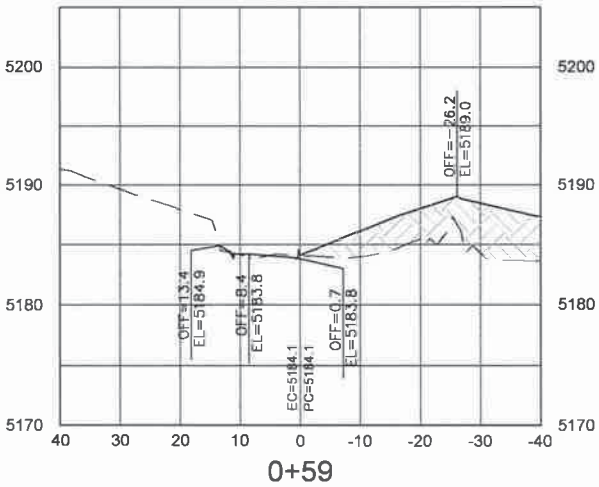
SUPPLY CHANNEL SECTIONS









SECTIONS LOOKING DOWNSTREAM

HORIZ. SCALE: 1"= 20'
VERT. SCALE: 1"=10'
2X VERTICAL EXAGGERATION

——— PROPOSED CONDITION (PC)
— — EXISTING CONDITION (EC)

PROPOSED CUT
PROPOSED FILL

FINAL DESIGN PLANSET – ISSUED FOR BID

SECTION VIEW 12

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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Sheet No.

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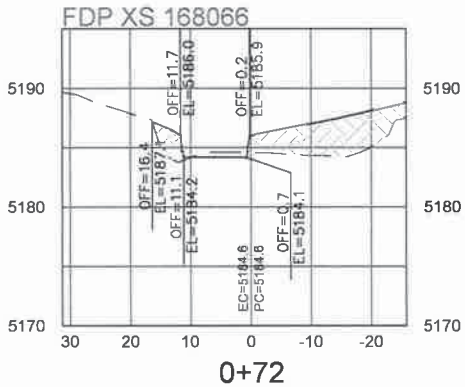

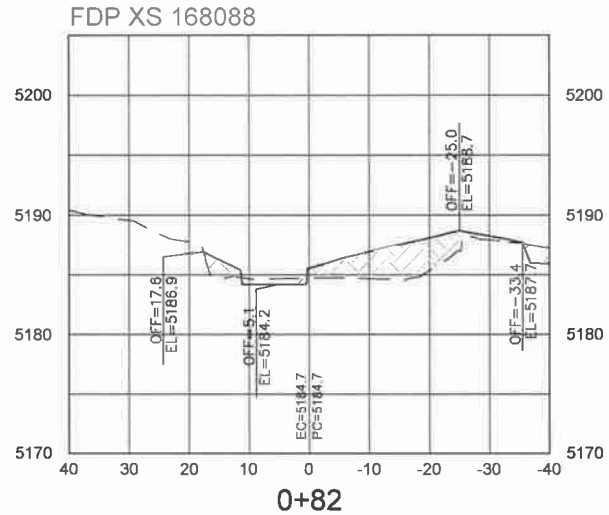

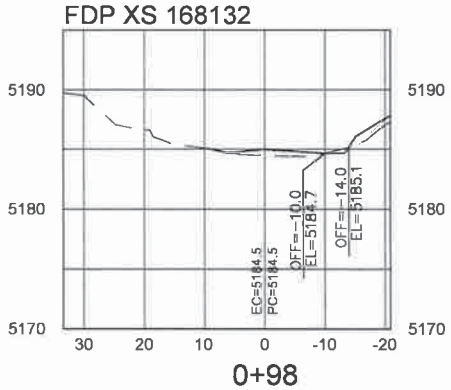

SECTIONS LOOKING DOWNSTREAM

HORIZ. SCALE: 1"= 20'
VERT. SCALE: 1"=10'
2X VERTICAL EXAGGERATION

PROPOSED CONDITION (PC)
EXISTING CONDITION (EC)
PROPOSED CUT
PROPOSED FILL

FINAL DESIGN PLANSET - ISSUED FOR BID

SECTION VIEW 13

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

PREPARED FOR:
Boulder County
Parks & Open Space

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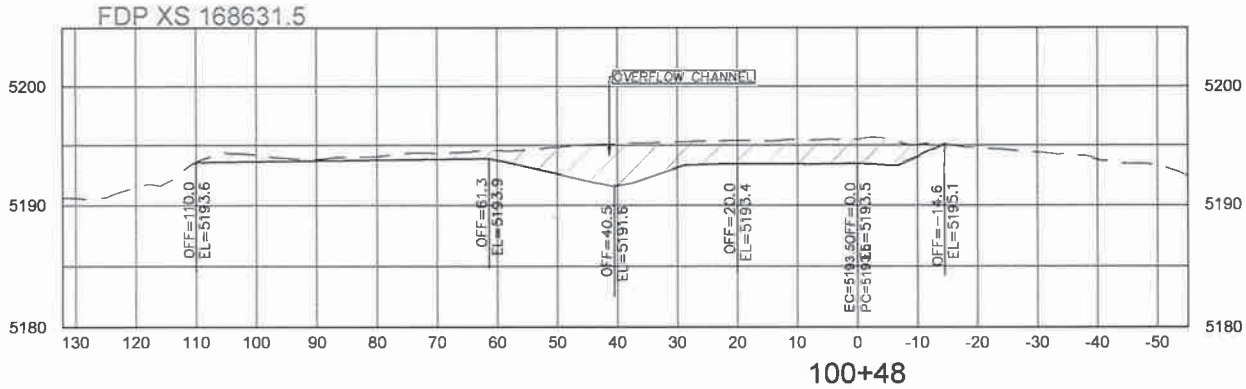
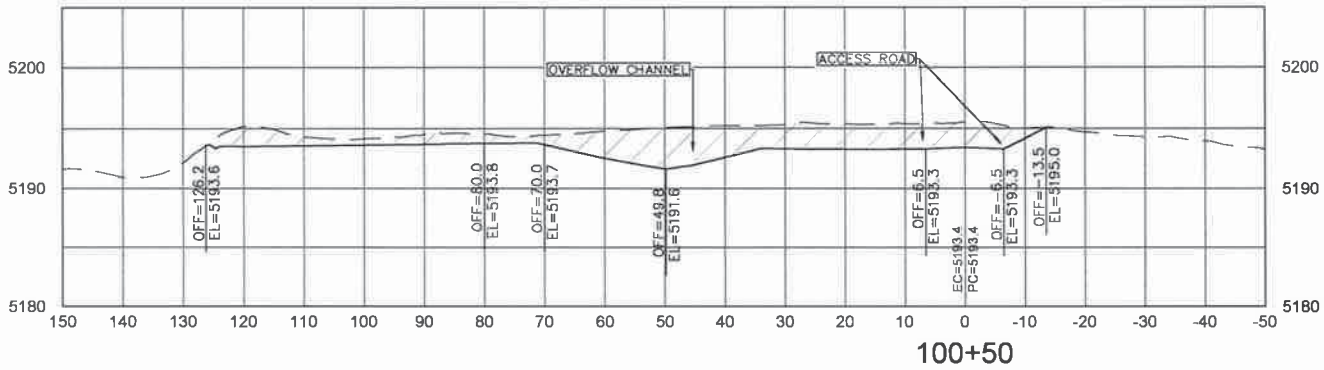
Project No. Drawing No.
C19
Sheet No.

DocuSign Envelope ID: DB0EDEAD-349A-42A6-842A-3D42CFB2A437

ACCESS ROAD AND FLOODPLAIN GRADING SECTIONS





SECTIONS LOOKING DOWNSTREAM

HORIZ. SCALE: 1"= 20'
VERT. SCALE: 1"=10'
2X VERTICAL EXAGGERATION

PROPOSED CONDITION (PC)
EXISTING CONDITION (EC)

PROPOSED CUT
PROPOSED FILL

FINAL DESIGN PLANSET - ISSUED FOR BID

PREPARED FOR:

Boulder County Parks & Open Space

SECTION VIEW 14

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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Project No. Drawing No.
C20
Sheet No.

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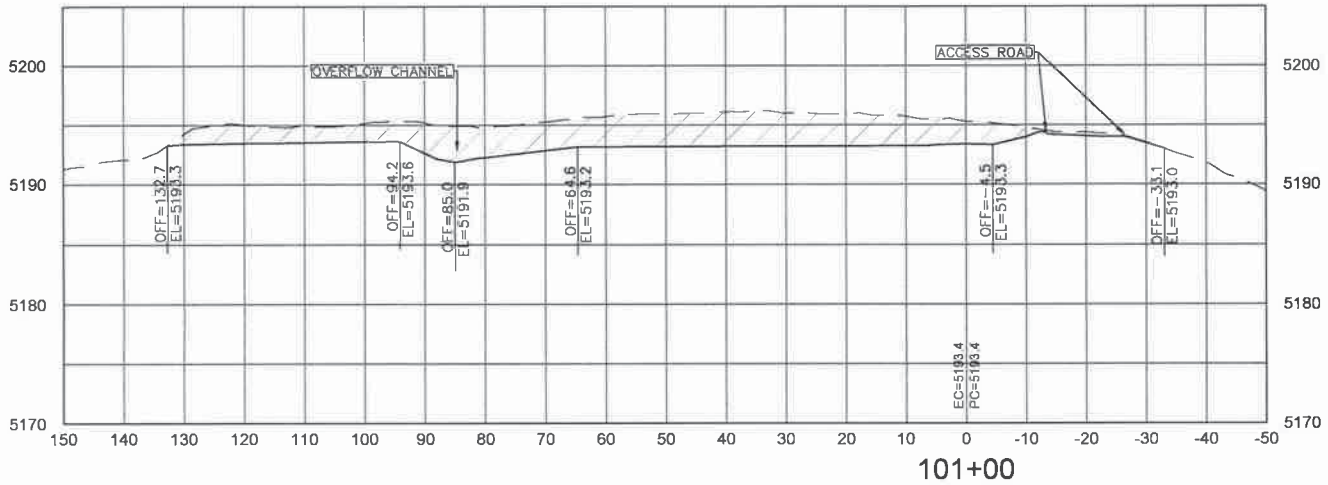
ACCESS ROAD AND FLOODPLAIN GRADING SECTIONS



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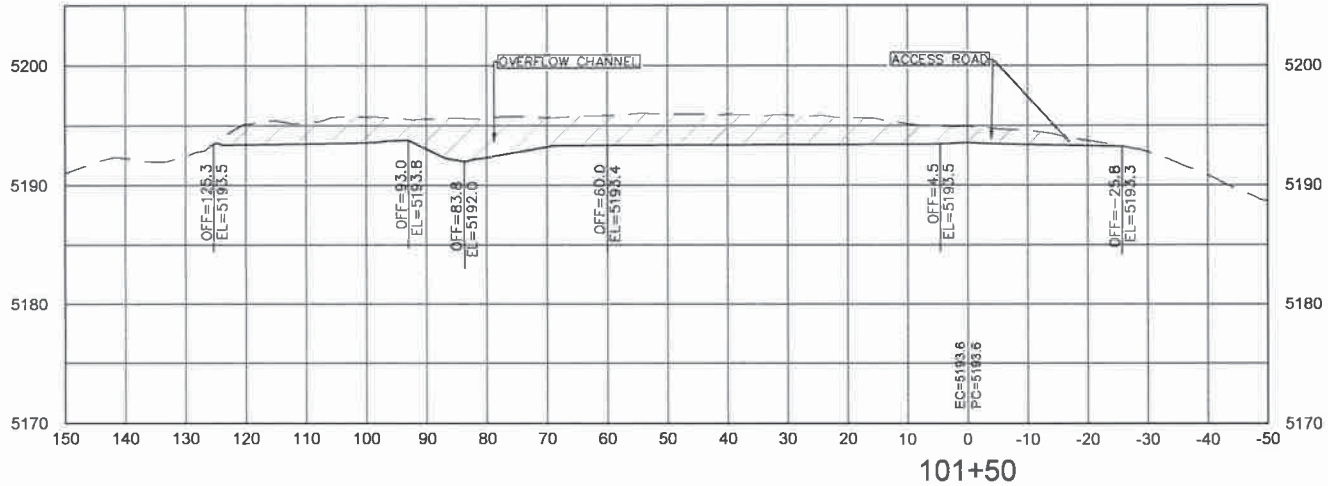

101+50

SECTIONS LOOKING DOWNSTREAM

HORIZ. SCALE: 1"= 20'
VERT. SCALE: 1"=10'
2X VERTICAL EXAGGERATION

PROPOSED CONDITION (PC)
EXISTING CONDITION (EC)

PROPOSED CUT
PROPOSED FILL

NO.	DATE	BY	REVISION COMMENTS	Design	Drawn	Checked	Date	Initial Issue Date

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Boulder County
Parks & Open Space

FINAL DESIGN PLANSET – ISSUED FOR BID

SECTION VIEW 15

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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371 Centennial Parkway
Suite 115
Louisville, Colorado 80027
Phone: 303-444-2075

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Project No. Drawing No.
C21
Sheet No.

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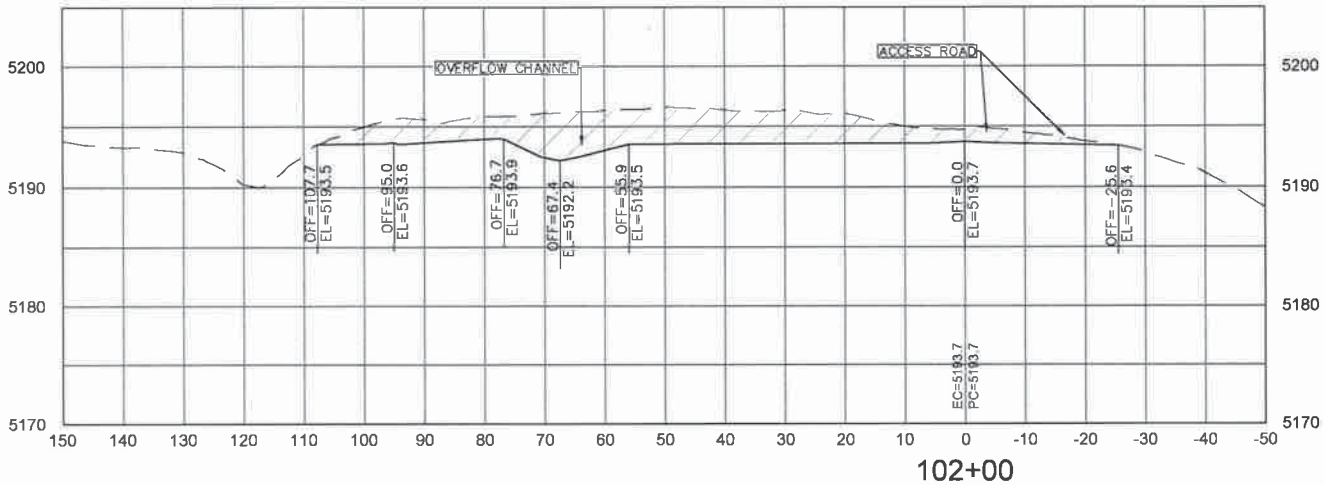
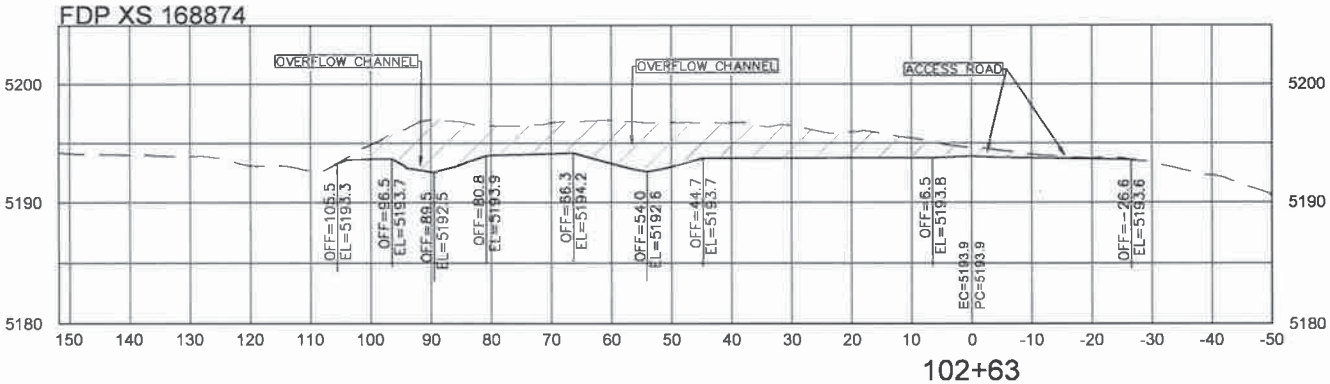
ACCESS ROAD AND FLOODPLAIN GRADING SECTIONS





SECTIONS LOOKING DOWNSTREAM

HORIZ. SCALE: 1"= 20'
VERT. SCALE: 1"=10'
2X VERTICAL EXAGGERATION

PROPOSED CONDITION (PC)
EXISTING CONDITION (EC)
PROPOSED CUT
PROPOSED FILL

NO.	DATE	BY	REVISION COMMENTS	Design	Drawn	Checked	Date	Initial Issue Date
				RW	TJ	TT		

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FINAL DESIGN PLANSET – ISSUED FOR BID

SECTION VIEW 16

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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Suite 210
Louisville, Colorado 80027
Phone: 303-444-3972

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Project No. Drawing No.
C22
Sheet No.

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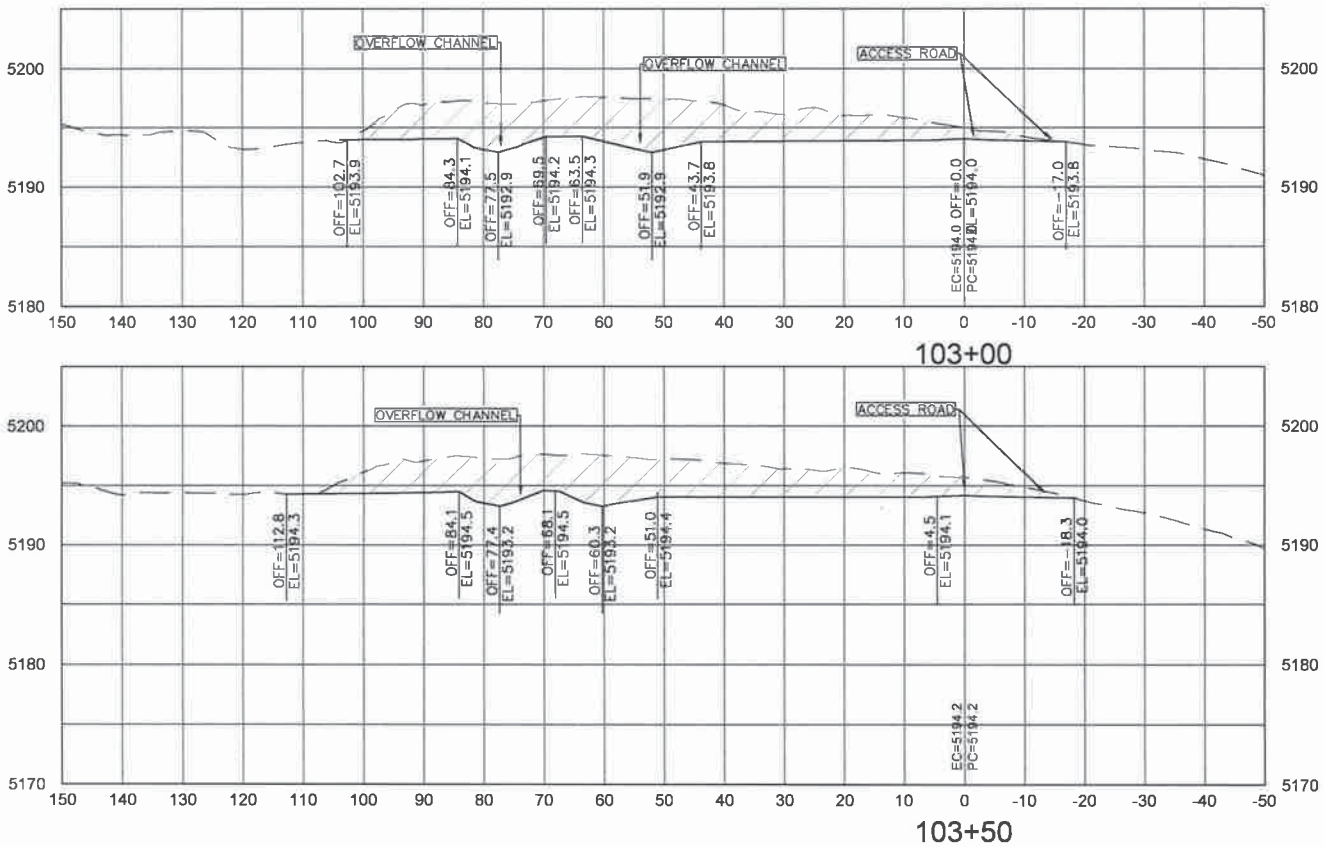
ACCESS ROAD AND FLOODPLAIN GRADING SECTIONS



SECTIONS LOOKING DOWNSTREAM

HORIZ. SCALE: 1"= 20'
VERT. SCALE: 1"=10'
2X VERTICAL EXAGGERATION

PROPOSED CONDITION (PC)
EXISTING CONDITION (EC)

PROPOSED CUT
PROPOSED FILL

NO.	DATE	BY	REVISION COMMENTS	Design	Drawn	Checked	Date	Submit	Issue Date
				EW	EM	TC			

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FINAL DESIGN PLANSET – ISSUED FOR BID

SECTION VIEW 17

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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Suite 210
Louisville, Colorado 80027
Phone: 303-444-8875

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Sheet No.

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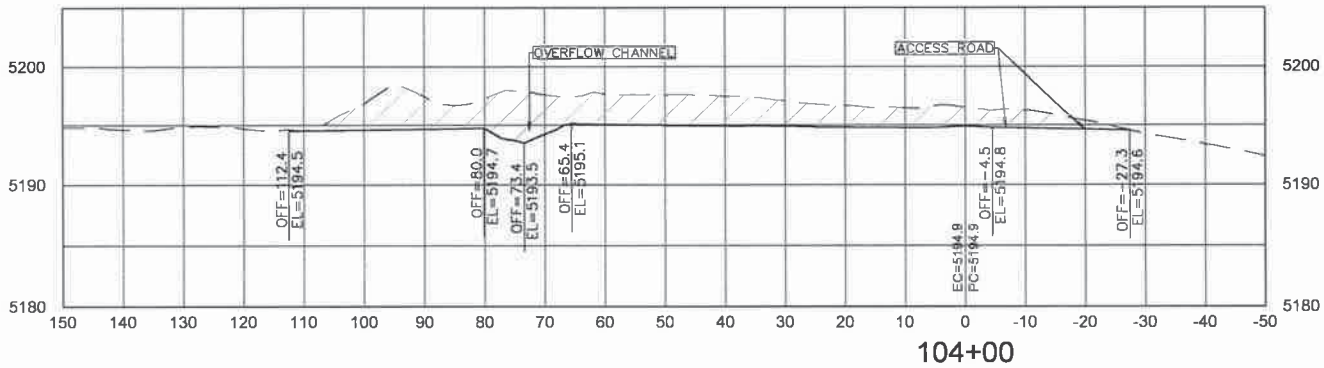
ACCESS ROAD AND FLOODPLAIN GRADING SECTIONS



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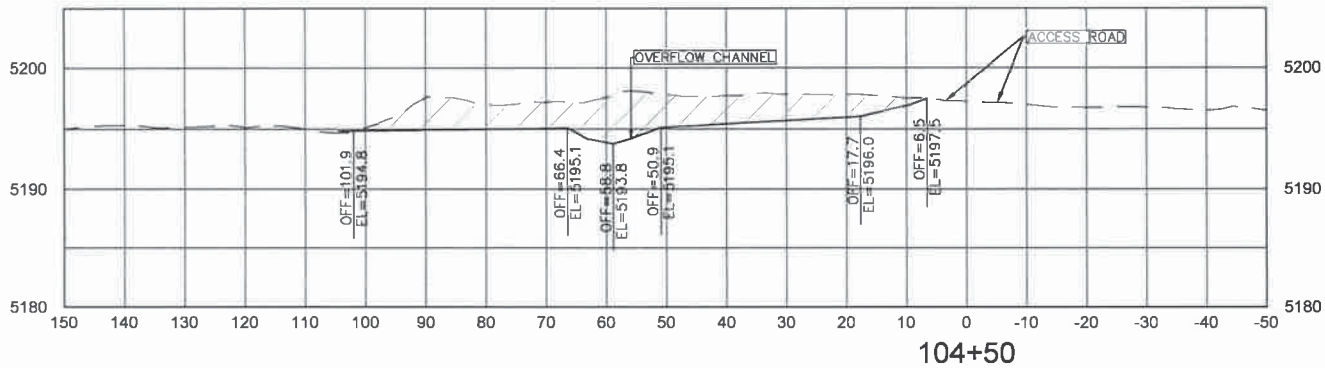

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SECTIONS LOOKING DOWNSTREAM

HORIZ. SCALE: 1"= 20'
VERT. SCALE: 1"=10'
2X VERTICAL EXAGGERATION

PROPOSED CONDITION (PC)
EXISTING CONDITION (EC)

PROPOSED CUT
PROPOSED FILL

FINAL DESIGN PLANSET – ISSUED FOR BID

SECTION VIEW 18

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

PREPARED FOR:

Boulder County
Parks & Open Space

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371 Centennial Parkway
Suite 210
Louisville, Colorado 80027
Phone: 303-444-2878

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Project No.
C24
Drawing No.
Sheet No.

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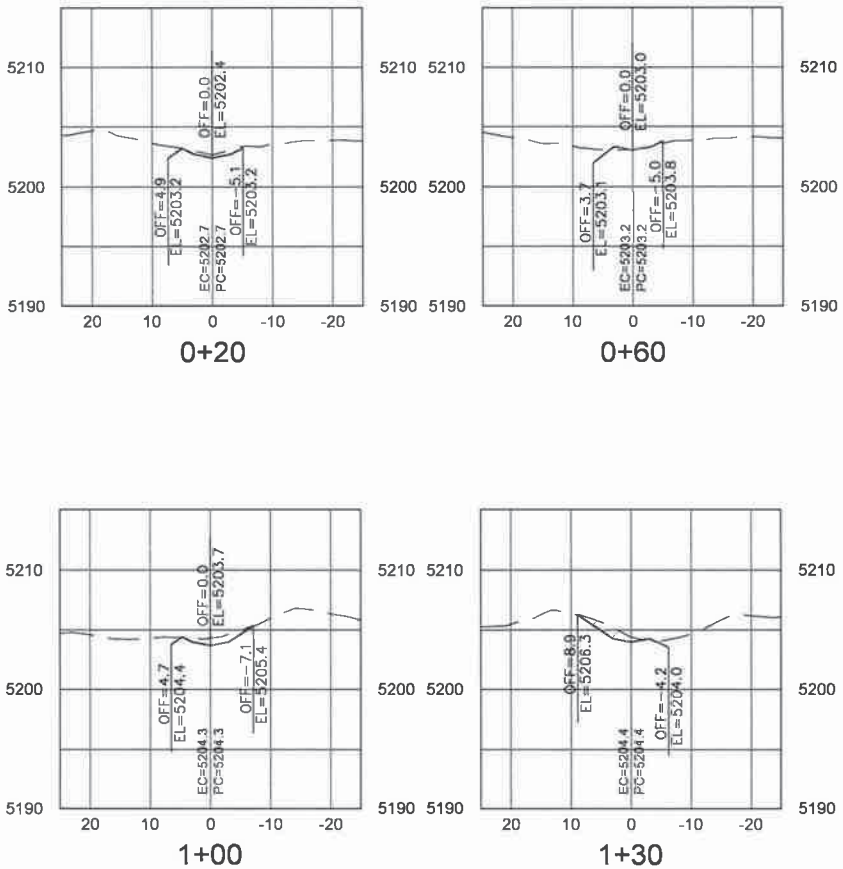
BAKER AND WEESE OVERFLOW DITCH 1 SECTIONS



SECTIONS LOOKING DOWNSTREAM

HORIZ. SCALE: 1"= 20'
VERT. SCALE: 1"=10'
2X VERTICAL EXAGGERATION

PROPOSED CONDITION (PC)
EXISTING CONDITION (EC)

PROPOSED CUT
PROPOSED FILL

FINAL DESIGN PLANSET – ISSUED FOR BID

SECTION VIEW 19

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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Project No. Drawing No.
C25
Sheet No.

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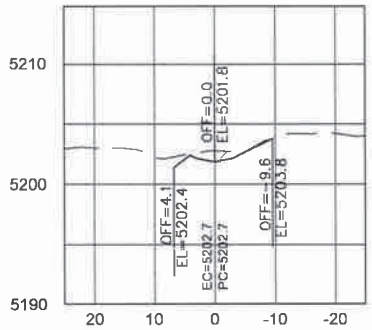
BAKER AND WEESE OVERFLOW DITCH 2 SECTIONS



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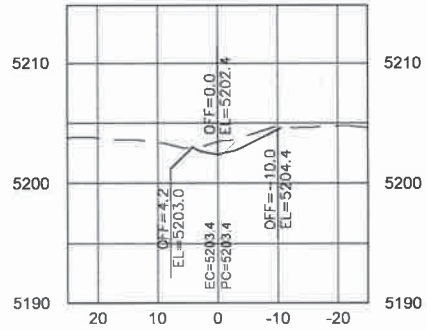

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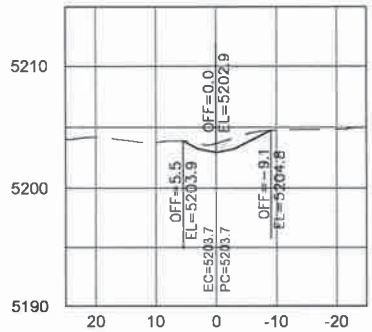

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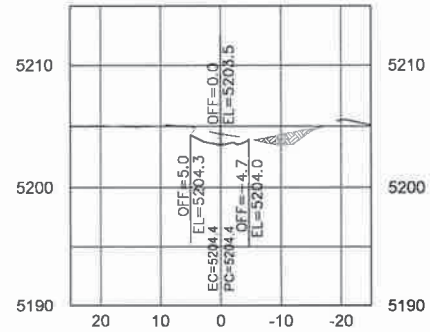

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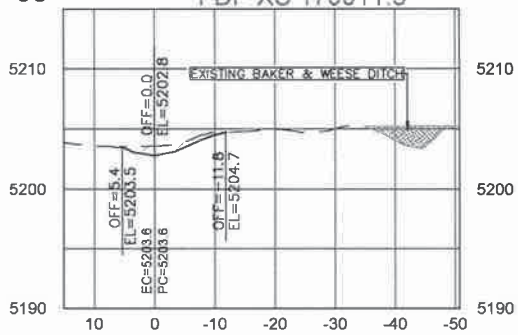

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SECTIONS LOOKING DOWNSTREAM

HORIZ. SCALE: 1"= 20'
VERT. SCALE: 1"=10'
2X VERTICAL EXAGGERATION

PROPOSED CONDITION (PC)
EXISTING CONDITION (EC)

PROPOSED CUT
PROPOSED FILL

FINAL DESIGN PLANSET – ISSUED FOR BID

SECTION VIEW 20

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

PREPARED FOR:
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Parks & Open Space

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Sheet No.

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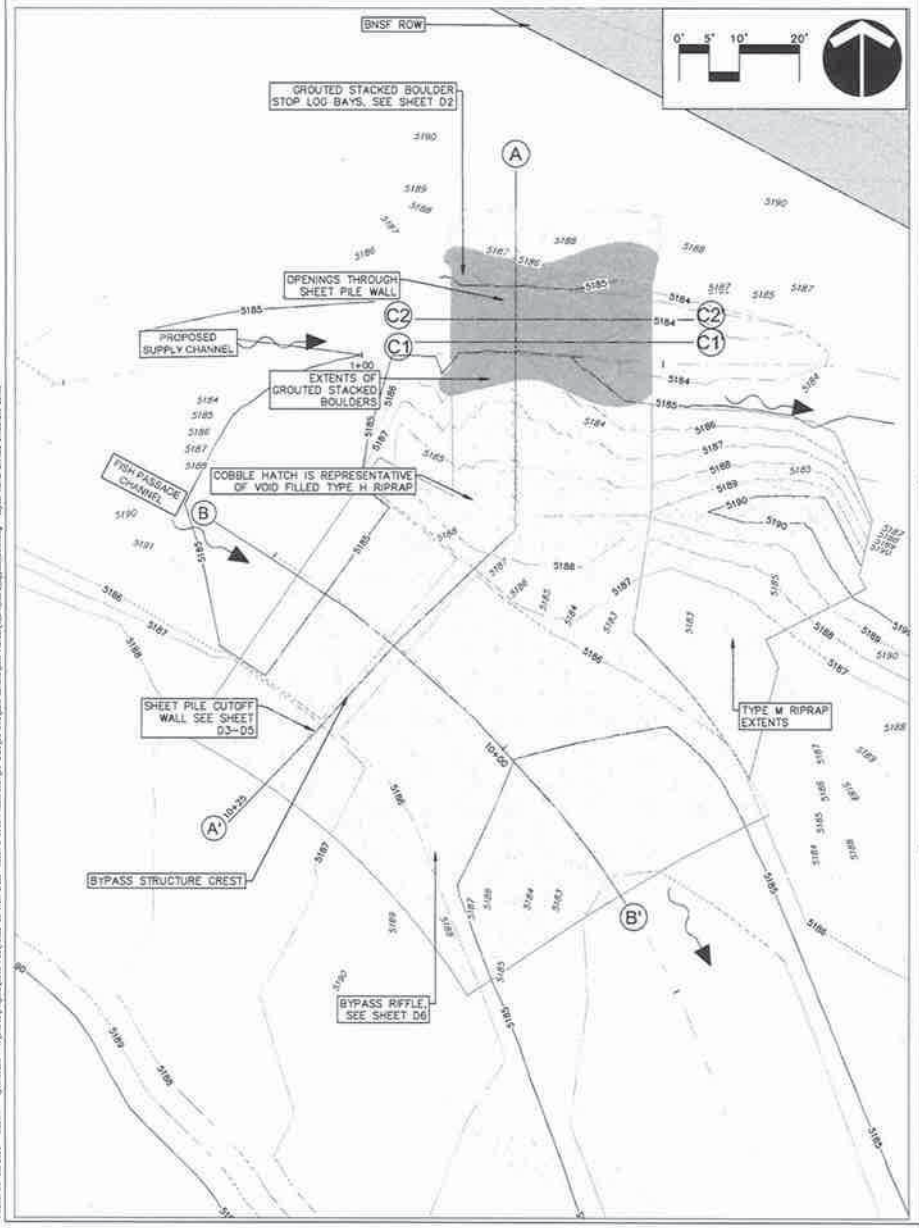

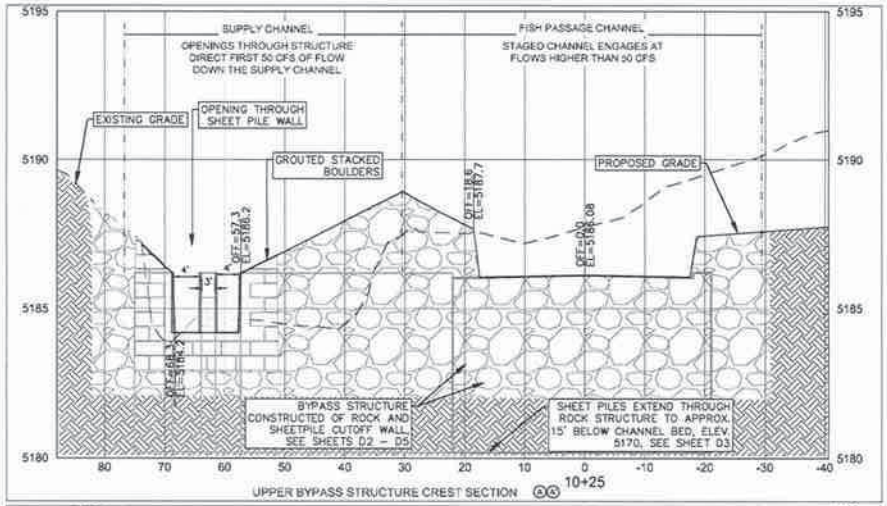

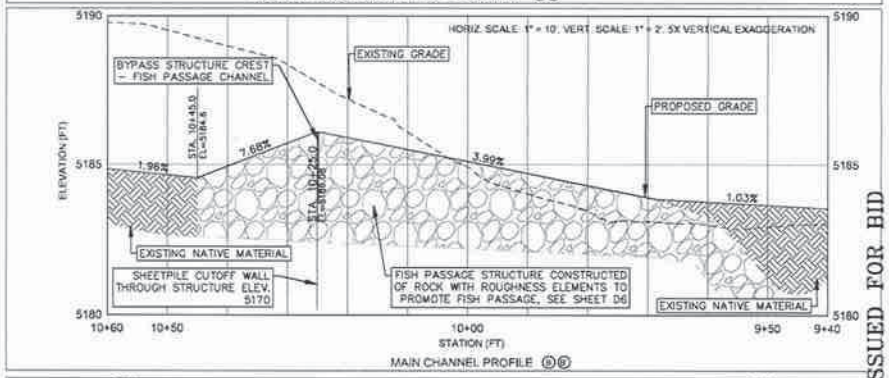

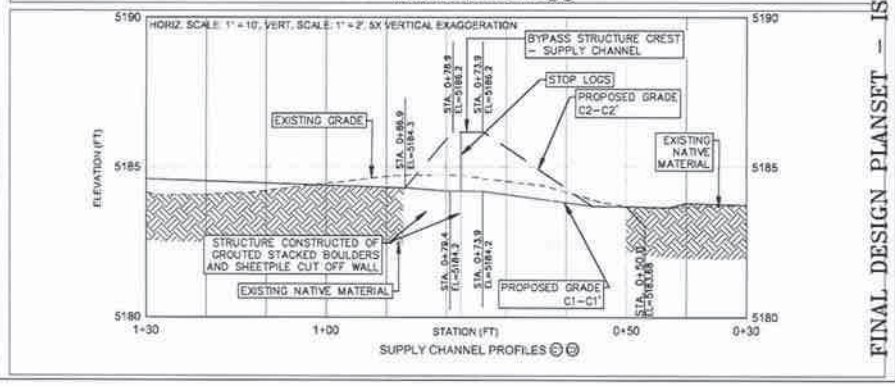

NO	DATE	BY	REVISION COMMENTS	Design	Drawn	Reviewed	Date	Initial Issue	Date

PREPARED FOR:

Boulder County Parks & Open Space

FINAL DESIGN PLANSET – ISSUED FOR BID

BYPASS STRUCTURE DETAIL

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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571 Centennial Parkway
Suite 210
Louisville, Colorado 80027
Phone: 303-444-8093

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D1
Sheet No.

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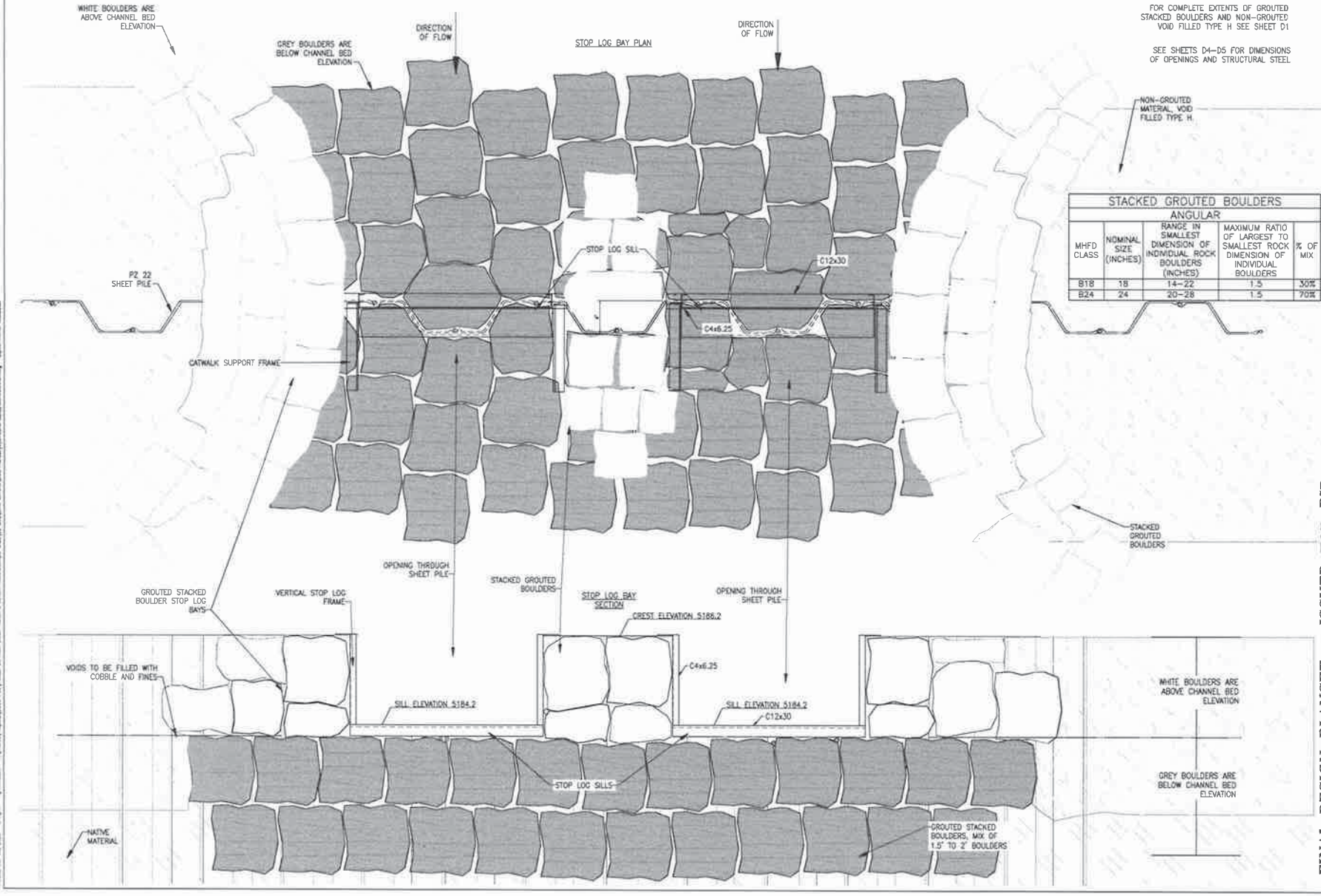

STACKED GROUTED BOULDERS

ANGULAR				
MHFD CLASS	NOMINAL SIZE (INCHES)	RANGE IN SMALLEST DIMENSION OF INDIVIDUAL ROCK BOULDERS (INCHES)	MAXIMUM RATIO OF LARGEST TO SMALLEST ROCK DIMENSION OF INDIVIDUAL BOULDERS	% OF MIX
B18	18	14-22	1.5	30%
B24	24	20-28	1.5	70%

No.	Date	By	Revision Comments

Drawn: BW
Checked: KB
Date: 12-12
Issue Date:

PREPARED FOR:

Boulder County Parks & Open Space

FINAL DESIGN PLANSET - ISSUED FOR BID

BYPASS ROCK DETAIL

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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571 Centennial Parkway
Suite 210
Louisville, Colorado 80027
Phone: 303-444-8072

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D2
Sheet No.

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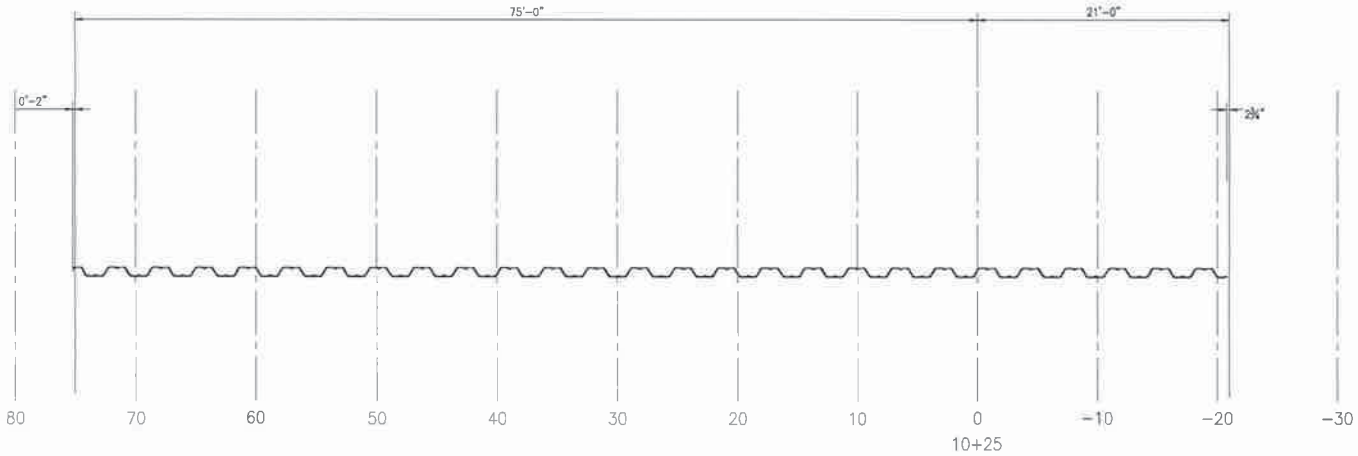
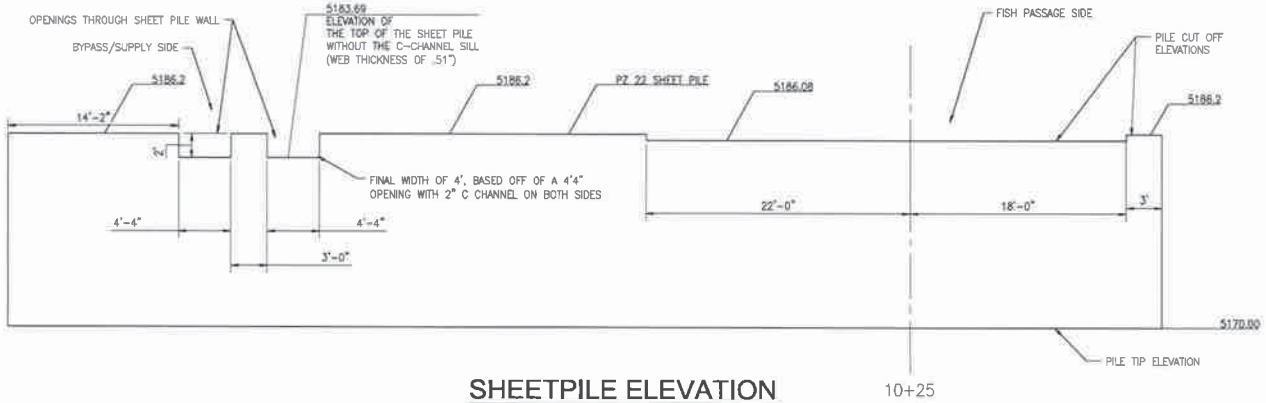


SHEETPILE PLAN LAYOUT
1" = 5' - 0"



SHEETPILE ELEVATION
1" = 5' - 0"

NO.	DATE	BY	REVISION COMMENTS	Design	Drawn	Reviewed	Date	Initial Issue	Date
				BW	KM	TC			

PREPARED FOR:

Boulder County
Parks & Open Space

FINAL DESIGN PLANSET – ISSUED FOR BID

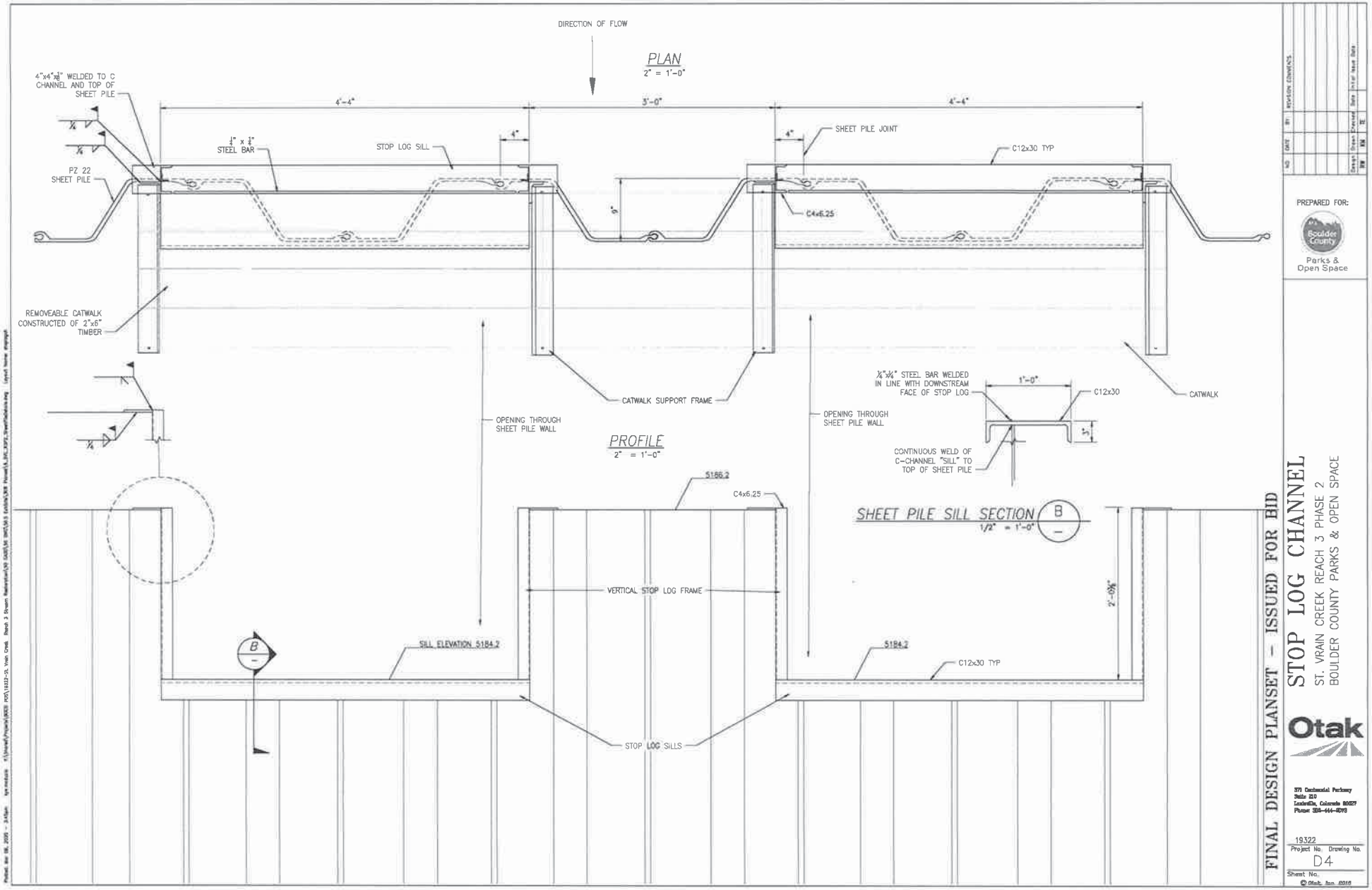
PLAN AND ELEVATION

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

Otak
5975 Centennial Parkway
Suite 210
Louisville, Colorado 80027
Phone: 303-444-3078

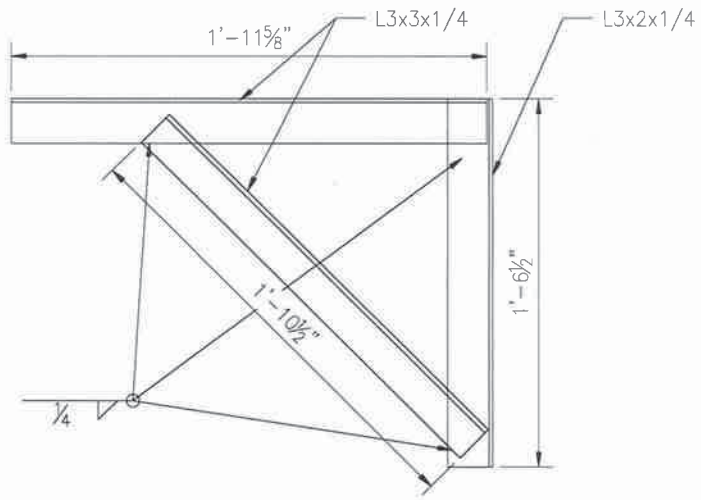
19322
Project No. Drawing No.
D3
Sheet No.

DocuSign Envelope ID: DB0EDEAD-349A-42A6-842A-3D42CFB2A437



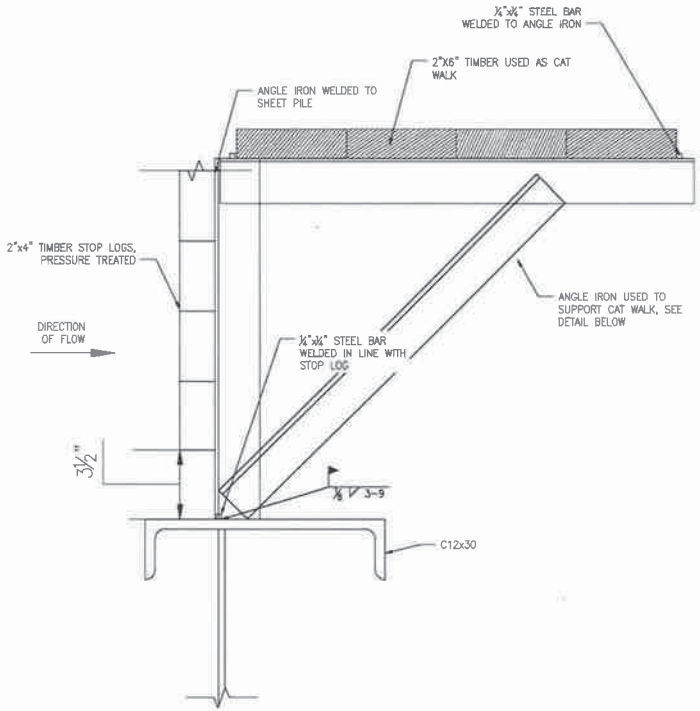
Sheet Pile Wall Notes

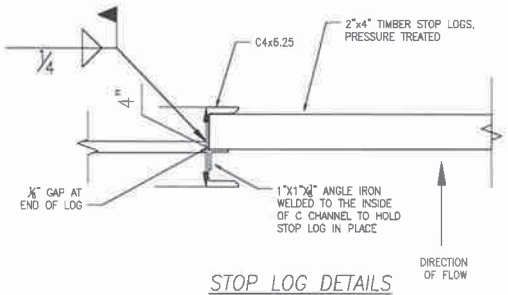
1. All work is to be in conformance with the Colorado Dept of Transportation's Standard Specifications for Road and Bridge Construction.
2. Structural steel to meet the requirements of ASTM A36.
3. Steel sheet pile to be hot rolled PZ 22 meeting the requirements of ASTM A328.
4. Sheet pile shall be provided with interlocking joints. Provide joint sealer that result in joints having a permeability of 1×10^{-5} cm/sec or less.
5. Environmentally safe joint sealer produced specifically for use in reducing permeability in pile joints. Joint sealer may be factory applied or field applied.
6. Provide new piling of type and length indicated. Piles must be driven in complete lengths; splices are not permitted.
7. Store piles in manner that maintains joint integrity, including preventing damage to joint sealers.
8. Install piling at locations shown on the drawings. Drawings indicate piling length and top and bottom elevation. Cleanly cut off tops of piles as necessary to achieve top elevation and joint integrity. Horizontal tolerance of the top of the piling is to be +/- .15 feet. Vertical tolerance for the cutoff elevation can be +0.05 feet but -0.00 feet. No piles can be lower than 5186.08 feet (NAVD 88) before being cut to elevation at stop log bays.
9. Utilize installation equipment using drop heads as necessary given site conditions and pile type. Provide and utilize mandrel, helmet or drive shoe as necessary to install piles. Vibratory pile driving equipment is not allowed.
10. Protect head of pile with cap or other devices as necessary. Piles with heads that are damaged above the elevation of the top of the pile will be rejected and require removal and re-installation of the pile.
11. Provide an installation guide or other device as necessary to assist in driving piles straight and plumb. Piling shall not be driven more than 1/8" per foot out of plumb in the planes both parallel and perpendicular to wall.
12. As an alternative to driving, an access trench, with width up to 3' wide at the bottom and equal to the depth of the pile may be excavated along alignment of piles. Trench shall be centered on alignment. Upon completion of pile installation, access trench shall be backfilled with granular material and compacted.
13. Piles shall be installed so that all joints are interlocking. Joints that do not interlock will be rejected and require removal and re-installation of the pile.
14. Soil boring logs to be collected prior to construction, if deemed necessary.
15. Openings cut through sheet pile wall for stop log bays have vertical tolerance for the final sill elevation of +/- 0.05 feet.
16. Stop log C-channel sills are to be installed on a level plane and perpendicular to the vertical stop log frames. Stop log sills are to be welded along the entire length of the openings cut through sheet pile wall to eliminate flow under the sill and over the sheet pile.
17. Stop log frames are to be installed vertically plumb and welded to the sides of the openings cut through the sheet pile wall. Stop log frames are to be welded in such a way as to eliminate seepage between the frame and the sheet pile.



CATWALK SUPPORT FRAMEWORK DETAILS

CATWALK AND STOP LOG SUPPORT DETAIL





STOP LOG DETAILS
4" = 1'-0"

NO.	DATE	BY	REVISION COMMENTS	Date	Initial Issue Date

Design: BW Drawn: KW Reviewed: TC

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Boulder County Parks & Open Space

FINAL DESIGN PLANSET - ISSUED FOR BID

STOP LOG DETAILS

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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371 Centennial Parkway
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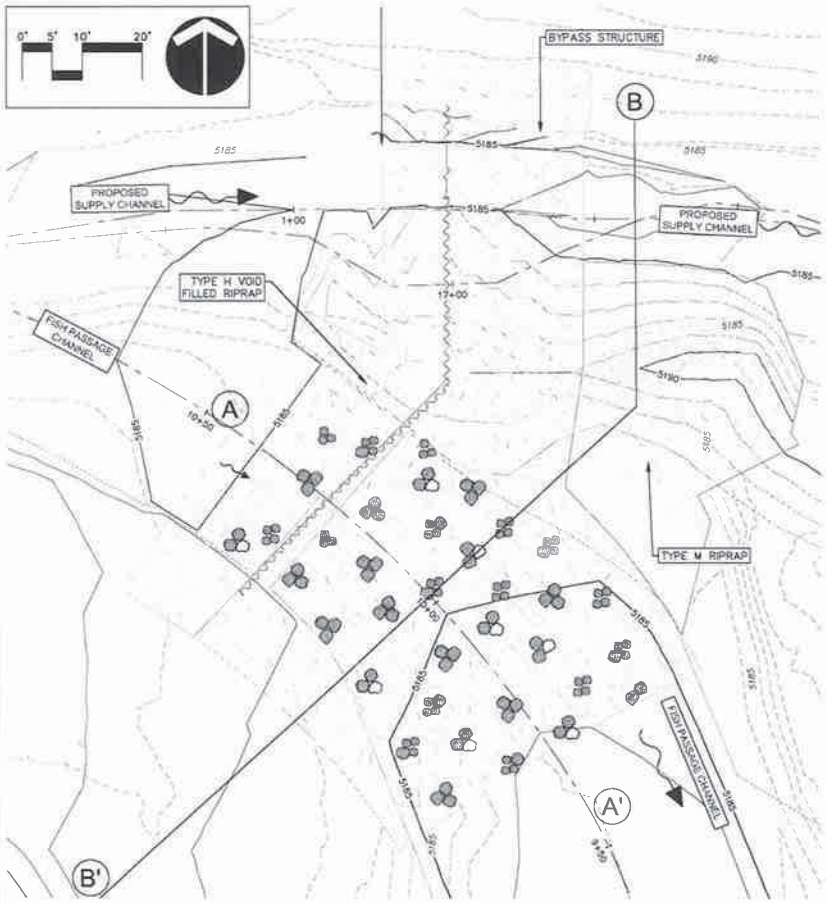
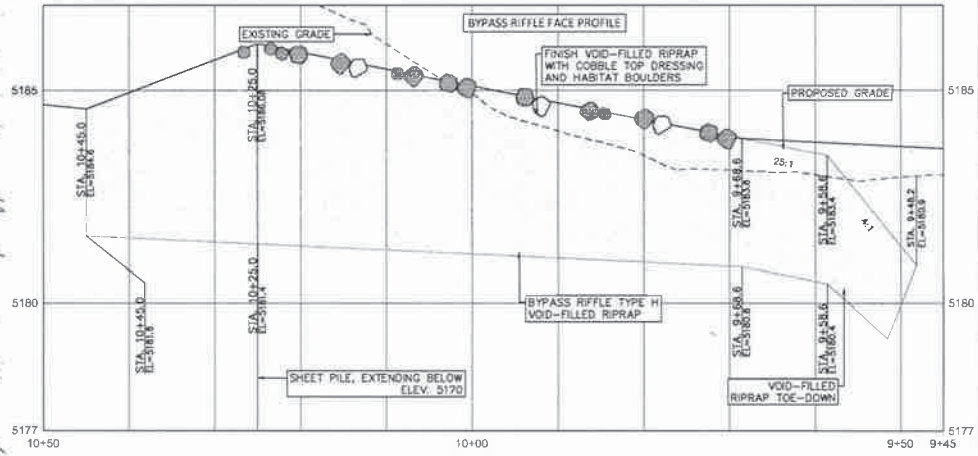




BYPASS RIFFLE PROFILE Ⓐ Ⓐ

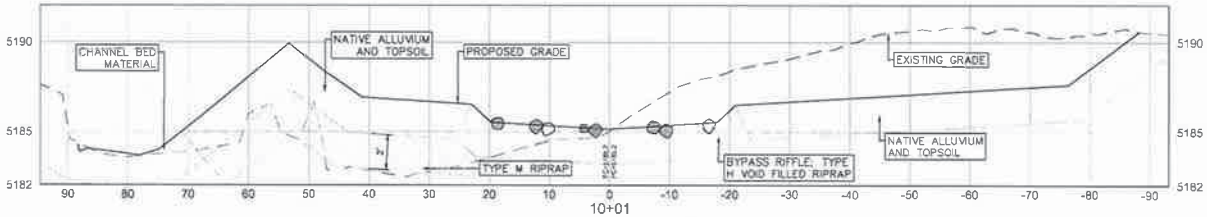
NOTES:

1. THE BYPASS RIFFLE WILL BE CONSTRUCTED OF TYPE H VOID-FILLED RIPRAP AND FINISHED WITH A TOP DRESSING OF COBBLE PER MHFD MIXING SPECIFICATIONS.
2. CONTRACTOR SHALL POTHOLE TO DETERMINE THE NEED FOR BEDDING PRIOR TO BEGINNING VOID-FILLED CONSTRUCTION.
3. ENGINEER AND/OR CONSTRUCTION INSPECTOR WILL OBSERVE THE MATERIAL MIXING AND WILL APPROVE OF THE MIX BEFORE IT IS PLACED.
4. MATERIAL WILL BE PLACED IN A SINGLE LIFT UP TO PROPOSED GRADES AND FINISHED WITH HABITAT BOULDER PLACEMENT AND COBBLE TOP LAYER.
5. FISH PASSAGE ACROSS THE BYPASS RIFFLE WILL BE FACILITATED WITH EXTENSIVE HABITAT BOULDER CLUSTERS ACROSS THE FACE OF THE RIFFLE.
6. HABITAT BOULDER CONFIGURATIONS WILL BE PRIMARILY THREE AND FOUR BOULDER CONFIGURATIONS THAT CREATE THE MAXIMUM DISTURBANCE IN FLOW PATHS.
7. THE CLUSTERS WILL BE PLACED PER ENGINEER DIRECTION IN THE FIELD TO CREATE OVERLAPPING DISTURBANCES (I.E. LOWER VELOCITY AREAS) IN FLOW PATHS AND BOULDERS WILL HAVE VARIABLE HEIGHTS TO ENGAGE AT A RANGE OF DESIGN FLOWS FROM LOW FLOW TO BANKFULL FLOW.
8. CLUSTERS WILL BE TOED DOWN INTO THE VOID-FILLED RIPRAP FOR STABILITY.
9. TYPE M VOID FILLED RIPRAP SHALL BE PLACED IN AREAS OF FILL WITHIN THE EXTENTS SHOWN, ALLOWING FOR 2 FT OF NATIVE ALLUVIUM AND/OR TOPSOIL COVER, PER THE REVEGETATION PLANS.
10. TYPE M RIPRAP SHALL BE PLACED TO MINIMIZE VOIDS AND ENSURE GOOD CONTACT BETWEEN ALL RIPRAP. VOIDS ON THE SURFACE SHALL BE FILLED WITH NATIVE ALLUVIUM.
11. RIPRAP AND BOULDERS IN EXISTING BYPASS STRUCTURE SHALL BE REMOVED AND STOCKPILED FOR USE IN RIFFLE CREST FOOTERS BEFORE INSTALLING TYPE M RIPRAP OR TYPE VOID FILLED RIPRAP.
12. TYPE M RIPRAP SHALL HAVE A MINIMUM DEPTH OF 2 FT (2*D50), WHICH MAY REQUIRE EXCAVATION OF EXISTING MATERIAL IN SOME AREAS.

TYPE M RIPRAP GRADATION			
RIPRAP DESIGNATION	% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSION (INCHES)	D50* (INCHES)
TYPE M	70–100	21	12
	50–70	18	12
	35–50	12	12
	2–10	4	12
D50 = MEAN ROCK SIZE			

HABITAT BOULDERS ROUNDED TO SUBROUNDED				
MHFD CLASS	NOMINAL SIZE (INCHES)	RANGE IN SMALLEST DIMENSION OF INDIVIDUAL ROCK BOULDERS (INCHES)	MAXIMUM RATIO OF LARGEST TO SMALLEST ROCK DIMENSION OF INDIVIDUAL BOULDERS	% OF MIX
B18	18	14–22	1.5	30%
B24	24	20–28	1.5	70%

BYPASS VOID-FILLED RIPRAP TYPE H	
D50	1.50 Ft
VOID FILLED RIPRAP SHALL FOLLOW THE MIXING GUIDELINES SET OUT BY MHFD FOR TYPE H	



BYPASS RIFFLE PROFILE Ⓑ Ⓑ'

FINAL DESIGN PLANSET – ISSUED FOR BID

BYPASS RIFFLE DETAIL

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

NO	DATE	BY	REVISION COMMENTS	Design	Drawn	Reviewed	Date	Initial Issue	Date
				RW	KM	TC			

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Otak
371 Centennial Parkway
Suite 200
Louisville, Colorado 80027
Phone: 303-444-8073

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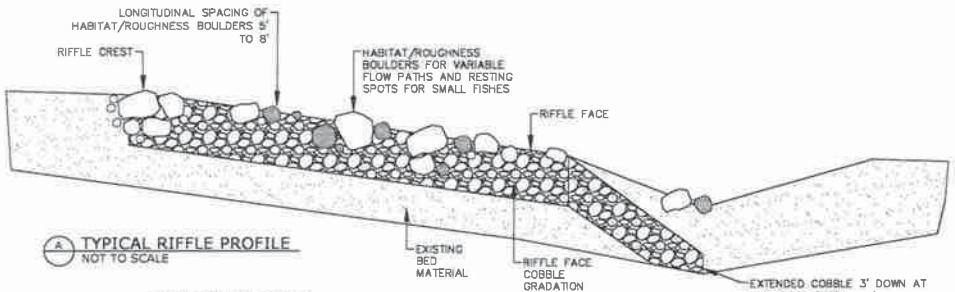
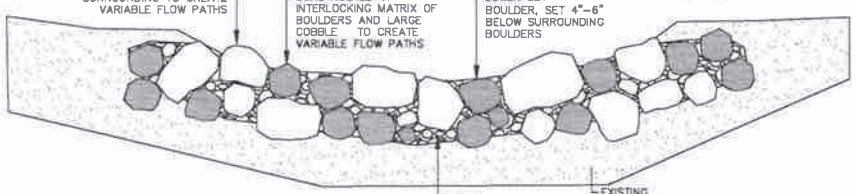
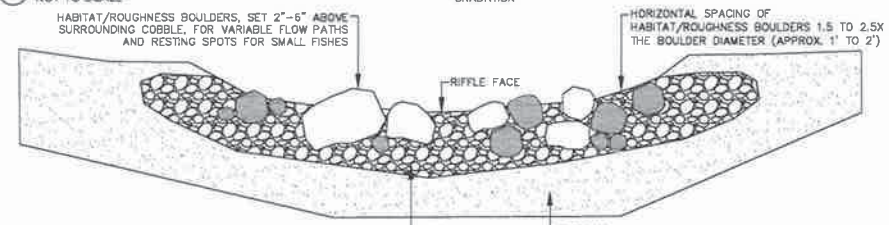


A TYPICAL RIFFLE PROFILE
NOT TO SCALE



B TYPICAL RIFFLE CREST CROSS SECTION
NOT TO SCALE



C TYPICAL RIFFLE CROSS SECTION
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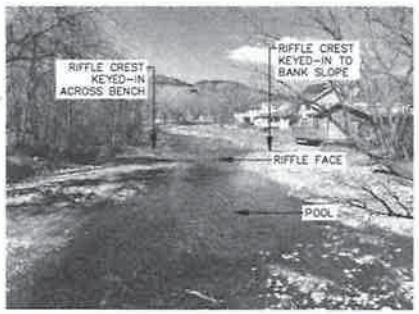
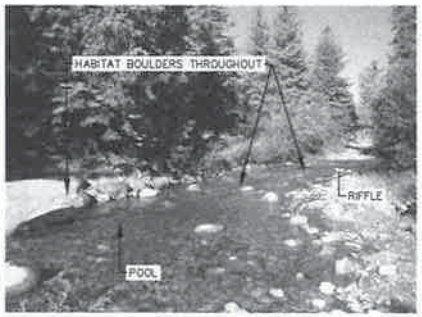


EXAMPLE PHOTO 1: CONSTRUCTED POOL-RIFFLE SEQUENCE, LOOKING UPSTREAM.



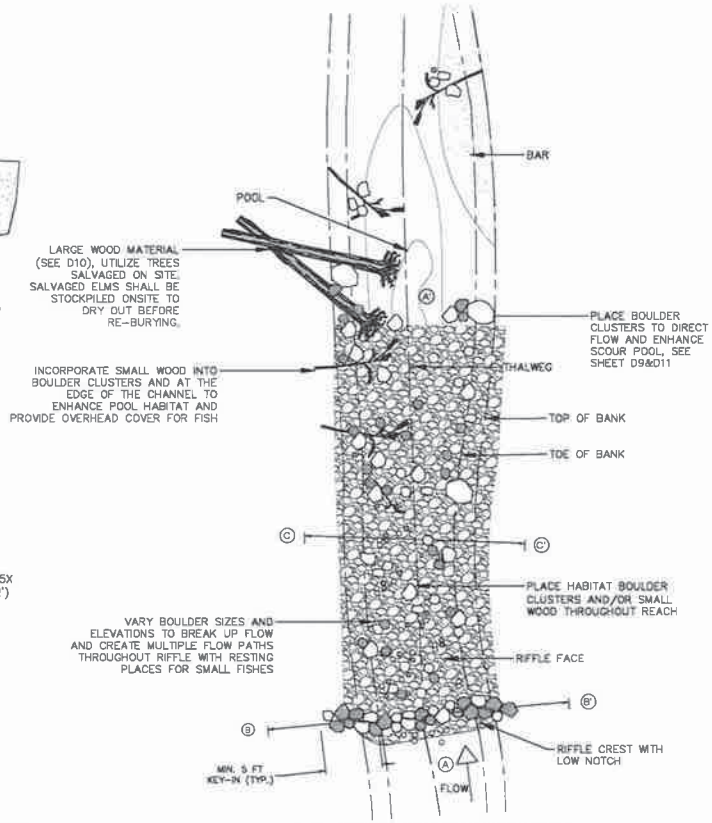
EXAMPLE PHOTO 2: CONSTRUCTED POOL-RIFFLE SEQUENCE, LOOKING UPSTREAM.

RIFFLE ROCK GRADATIONS

RIFFLE FACE: VOID-FILLED RIPRAP TYPE VL, RIVER COBBLE	
D50	6 IN
VOID FILLED RIPRAP SHALL FOLLOW THE MIXING GUIDELINES SET OUT BY MHFD FOR TYPE VL WITH RIVER COBBLE VARIATION	

RIFFLE CREST TYPE M COBBLE	
% SMALLER THAN GIVEN SIZE BY WEIGHT	INTERMEDIATE ROCK DIMENSION (INCHES)
2-10	4"
35-50	12"
50-70	18"
70-100	21"

HABITAT/ROUGHNESS BOULDERS ROUNDED TO SUBROUNDED				
MHFD CLASS	NOMINAL SIZE (INCHES)	RANGE IN SMALLEST DIMENSION OF INDIVIDUAL ROCK BOULDERS (INCHES)	MAXIMUM RATIO OF LARGEST TO SMALLEST ROCK DIMENSION OF INDIVIDUAL BOULDERS	% OF MIX
B18	18	14-22	1.5	30%
B24	24	20-28	1.5	70%



D TYPICAL POOL-RIFFLE PLAN
NOT TO SCALE

NOTES:

1. DURING EXCAVATION, STOCKPILE EXISTING COBBLE FOR USE IN THE RIFFLE STRUCTURES. LARGER ROUGHNESS MATERIAL AND ADDITIONAL COBBLE WILL LIKELY NEED TO BE IMPORTED TO COMPLETE THE RIFFLE CONSTRUCTION.
2. OVEREXCAVATE RIFFLE AREA TO THE SUB-GRADE ELEVATION FOR BEDDING AND INSTALL BEDDING IF REQUIRED.
3. INSTALL RIFFLE CREST ENSURING ROCKS ARE CHINKED TOGETHER AND THERE ARE VARIABLE ROCK ELEVATIONS TO SUPPORT FISH PASSAGE. THE CREST SHOULD BE KEYED IN A MINIMUM OF 5 FT ON EACH SIDE, WITH THE EDGES SLIGHTLY SUPER ELEVATED.
4. BURY HABITAT/ROUGHNESS BOULDERS $\frac{1}{2}$ TO $\frac{3}{4}$ OF THEIR DIAMETER TO CREATE VARIABLE ROUGHNESS ACROSS RIFFLE FACE.
5. FILL IN THE RIFFLE FACE WITH THE SPECIFIED VOID-FILLED RIPRAP, RIVER COBBLE.
6. PLACE THE REMAINDER OF THE ROUGHNESS BOULDERS THAT WILL HAVE HIGHER ELEVATIONS, BY REMOVING THE COBBLE, PLACING THE ROCK TO THE TARGET ELEVATION, THEN REPLACING THE COBBLE.
7. IF POTHOLING SHOWS THERE TO BE SUFFICIENT CHANNEL BED MATERIAL AVAILABLE FOR EXCAVATION WITHIN AREAS PROPOSED FOR DISTURBANCE, AN ALTERNATIVE MATERIAL MAY BE USED FOR RIFFLE FACE MATERIAL WITH ENGINEER APPROVAL. A MIX OF CHANNEL BED MATERIAL MEETING THE GRADATION ON SHEET D8 MAY BE MIXED WITH IMPORTED 6" D50 COBBLE. IN THIS CASE, A MIX PLAN MUST BE PROVIDED AND APPROVED BY THE ENGINEER PRIOR TO WORK.

FINAL DESIGN PLANSET - ISSUED FOR BID

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				Drawn	KB
				Checked	TC

PREPARED FOR:
Boulder County Parks & Open Space

RIFFLE DETAIL

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

Otak
371 Centennial Parkway
Suite 210
Louisville, Colorado 80027
Phone: 303-444-8073

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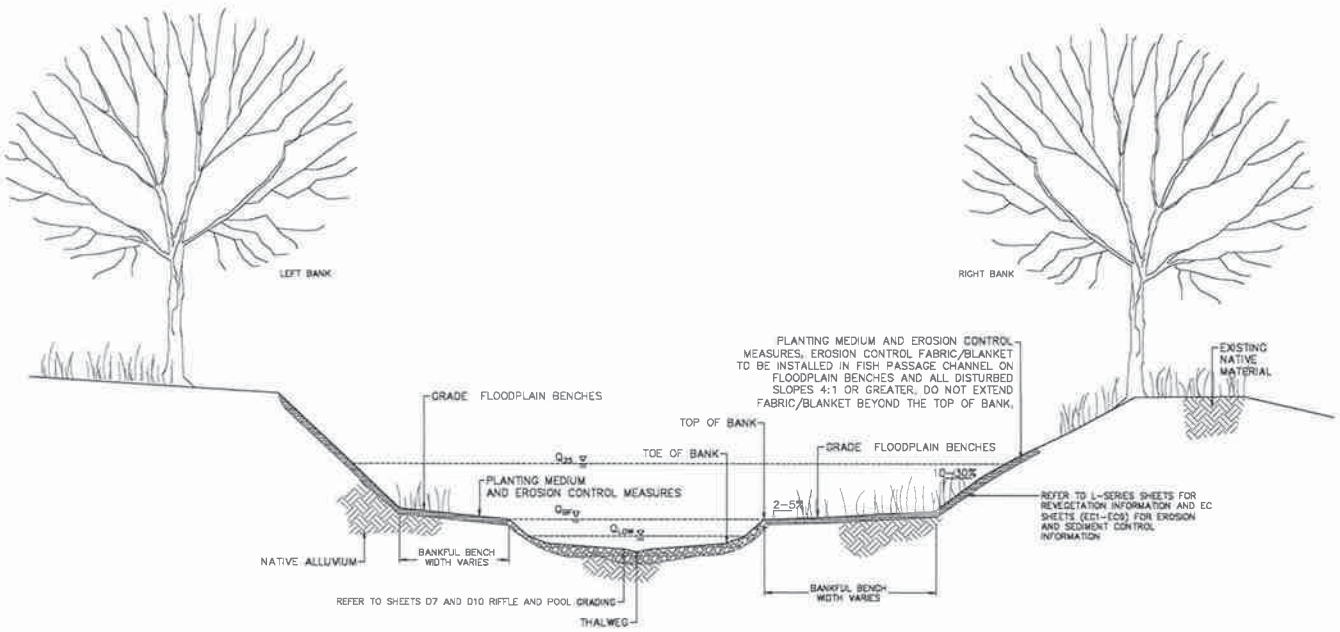

TYPICAL FLOODPLAIN AND CHANNEL GRADING CROSS SECTION

NOT TO SCALE

NOTES:

1. THIS TYPICAL SECTION CONVEYS GENERAL SPATIAL RELATIONSHIPS OF PRIMARY FEATURES IN A MULTI-STAGE CHANNEL. THE DIMENSIONS AND CONFIGURATION OF SITE SPECIFIC LANDSCAPE FEATURES AND CHANNEL ARE SHOWN ON THE PLAN AND PROFILE SHEET (C1-C6) AND THE SECTION VIEWS (C7-C26).
2. CHANNEL BED MATERIAL WILL BE REMOVED STOCKPILED AND REPLACED WITHIN A 36' WIDE X 0.5' DEEP X 950' LONG SECTION OF THE FISH PASSAGE CHANNEL EXTENTS THAT WILL BE DISTURBED AS PART OF THE PROPOSED DESIGN. THE MATERIAL SHALL HAVE A D50 OF 3"-4" AND AREAS WITH A SMALLER D50 SHALL BE AVOIDED TO THE EXTENT PRACTICAL OR ADDITIONAL MATERIAL MAY BE REMOVED FROM AREAS PROPOSED TO BE DISTURBED TO MEET ADDITIONAL ON SITE MATERIAL NEEDS.
3. THE CHANNEL BED MATERIAL SHALL BE PLACED IN THE PROPOSED FISH PASSAGE CHANNEL TO A DEPTH OF 0.8' FEET IN POOLS AND RUNS (I.E. WHERE RIFFLE MATERIAL IS NOT SPECIFIED). THE PLACED MATERIAL SHALL HAVE A D50 OF 3"-4" AND MEET THE GRADATION SPECIFIED IN THE TABLE ON THIS SHEET.
6. THE ENGINEER WILL DIRECT THE CREATION OF MICRO-TOPOGRAPHY TO CREATE SMALL SCALE STREAM CHANNEL AND LANDSCAPE FEATURES NOT SHOWN ON THE PLAN SET PROVIDED THEY ARE IN-LINE WITH THE VISION OF THE PROJECT AND NOT TIME INTENSIVE.
7. STOCKPILE ANY SALVAGEABLE SOIL IN EXCAVATION AREAS FOR REUSE ON PLANTING BENCHES.
8. ALL DISTURBED SECTIONS OF THE FLOODPLAIN AND CHANNEL MARGIN REQUIRE REVEGETATION IN ACCORDANCE WITH PLANTING PLANS DETAILED IN L-SERIES SHEETS.
9. REFER TO THE EROSION CONTROL MEASURES SHEETS FOR EXTENTS OF EROSION CONTROL BLANKET AND EROSION CONTROL FABRIC. IN THE FISH PASSAGE CHANNEL, ALL LOW BENCHES AND DISTURBED SLOPES 4:1 OR GREATER SHALL HAVE EROSION CONTROL BLANKET OR FABRIC INSTALLED. ON BENCHES, THE BLANKET/FABRIC SHALL BE INSTALLED UP TO THE TOP OF BANK.
10. ALL GRADING SHALL AVOID MATURE VEGETATION EXCEPT WHERE NOTED BY THE ENGINEER OR VEGETATION SPECIALIST. THE CONTRACTOR SHALL REVIEW VEGETATION FOR REMOVAL WITH THE ENGINEER OR VEGETATION SPECIALIST PRIOR TO BEGINNING GRADING.
11. DESIGN DISCHARGES OBTAINED FROM EFFECTIVE FEMA HYDRAULIC MODEL, WITH THE 2-YR DISCHARGE COMING FROM PHASE 1 DATA.

CHANNEL BED MATERIAL	
D_{min}	SAND
D_{15}	0.5"
D_{50}	3"
D_{84}	4"
D_{max}	12"

TABLE OF DESIGN DISCHARGES	
LOW FLOW	40 - 300 CFS
2-YR	434 CFS
10-YR	2292 CFS
25-YR	4544 CFS
50-YR	5167 CFS
100-YR	7419 CFS

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TYPICAL CHANNEL DETAIL

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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Phone: 303-444-3073

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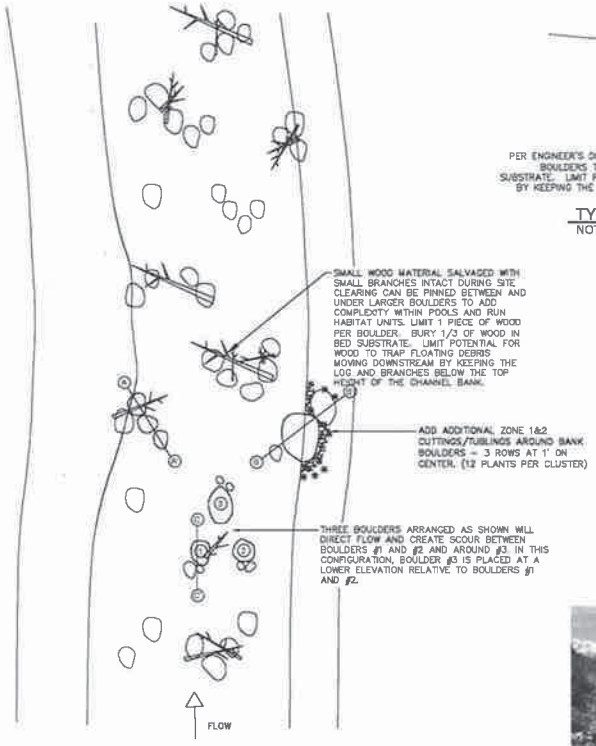
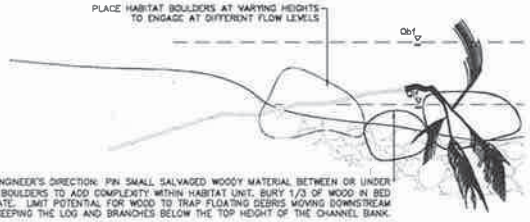


TYPICAL HABITAT BOULDER PLAN LAYOUT
NOT TO SCALE

GENERAL NOTES:
1. THE PURPOSE OF THE HABITAT BOULDERS IS TO ALTERNATELY CONVERGE AND DIVERGE FLOW, WHILE PROVIDING IN-CHANNEL COVER AND REFUGE FOR FISHES. THE CLUSTERS AND PATTERNS DEPICTED ABOVE CAN BE MIXED AND MATCHED, PER THE DIRECTION OF THE ENGINEER TO ACHIEVE THESE GOALS.
2. PLACE HABITAT BOULDERS PER GUIDANCE ON THIS SHEET UNLESS OTHERWISE DIRECTED BY ENGINEER IN THE FIELD.
3. SALVAGE BOULDERS FOR USE IN RESTORED CHANNEL.
4. BOULDERS USED FOR HABITAT SHALL BE ROUNDED OR SUBROUNDED.
5. BOULDERS TO BE PLACED AT VARYING ELEVATIONS CORRESPONDING TO LOW-FLOW WATER SURFACE AND BANKFULL WATER SURFACE AS SHOWN IN TYPICAL CHANNEL DETAIL ON SHEET D8.
6. BOULDERS PLACED AT LOW FLOW ELEVATION SHALL BE PLACED SO CREST (HIGHEST PART) IS WITHIN 2 TO 4 INCHES OF THE WATER SURFACE.
7. LIMIT SIZE OF INDIVIDUAL BOULDER CLUSTER IN RIFFLE UNITS TO A MAXIMUM OF 3 ROCKS.
8. PAID UNDER PAY ITEMS RW-06-001 AND RW-06-002



TYPE A HABITAT BOULDER FEATURE CROSS SECTION (A-A')
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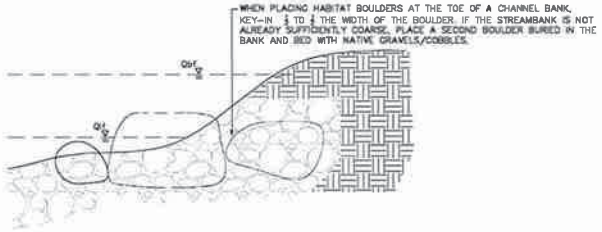
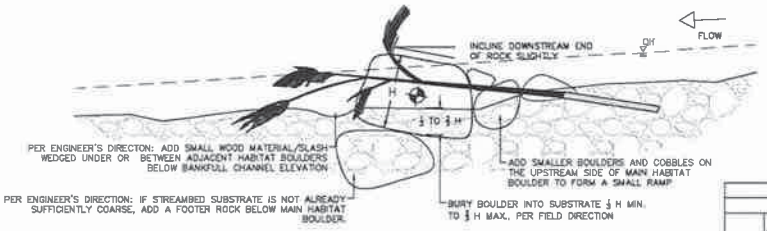


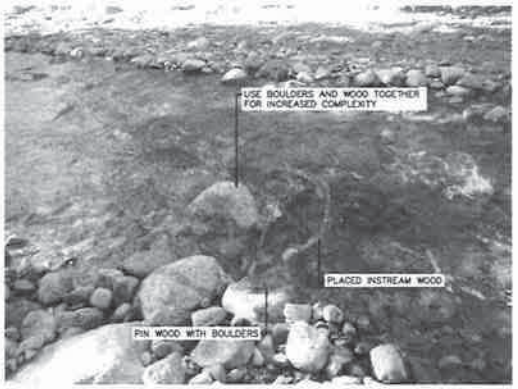
TYPE B HABITAT BOULDER FEATURE CROSS SECTION (B-B')
NOT TO SCALE



TYPE C HABITAT BOULDER FEATURE PROFILE (C-C')
NOT TO SCALE

HABITAT BOULDERS ROUNDED TO SUBROUNDED				
MHFD CLASS	NOMINAL SIZE (INCHES)	RANGE IN SMALLEST DIMENSION OF INDIVIDUAL ROCK BOULDERS (INCHES)	MAXIMUM RATIO OF LARGEST TO SMALLEST ROCK DIMENSION OF INDIVIDUAL BOULDERS	% OF MIX
B18	18	14–22	1.5	30%
B24	24	20–28	1.5	70%

EXAMPLE PHOTO: HABITAT BOULDERS



EXAMPLE PHOTO: HABITAT BOULDERS WITH SMALL WOOD

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HABITAT BOULDER DETAIL

ST. VRAIN CREEK REACH 3 PHASE 2
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Otak

5777 Central Avenue
Suite 105
Boulder, Colorado 80301
Phone: 303-535-9254
Fax: 303-530-3889

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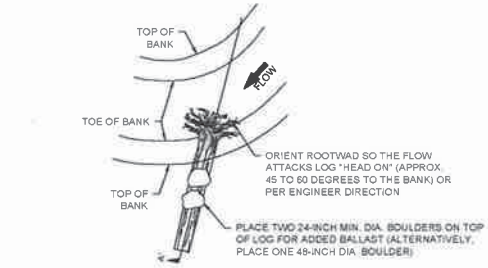
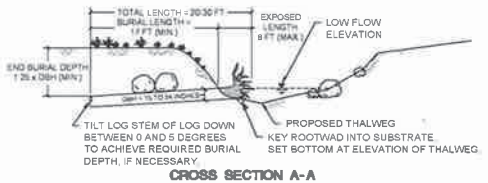


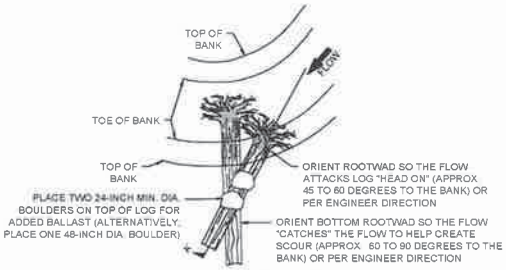
PLAN VIEW



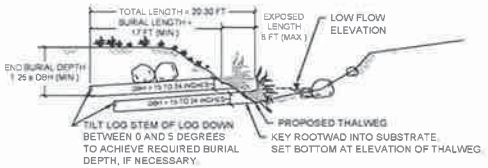
CROSS SECTION A-A

TYPICAL SINGLE ROOTWAD DETAIL

NOT TO SCALE



PLAN VIEW



CROSS SECTION A-A

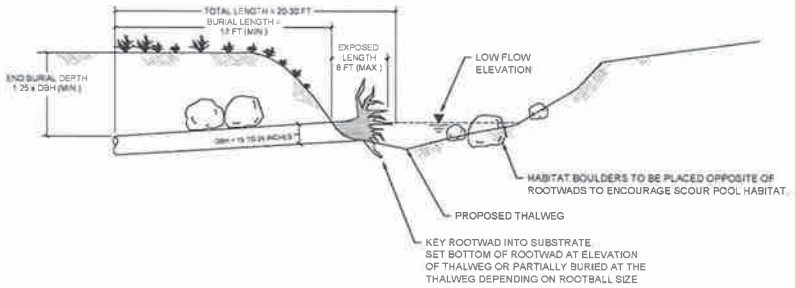
TYPICAL DOUBLE ROOTWAD DETAIL

NOT TO SCALE

SUMMARY OF LARGE WOOD LOGS				
Station	Single or Double	DBH (in.)	Length (ft)	Bank Side
8+50	Single	15 to 24	20 to 30	RR
6+75	Double	15 to 24	20 to 30	RL
4+75	Single	15 to 24	20 to 30	RR
2+45	Double	15 to 24	20 to 30	RR

GENERAL NOTES:

1. ALL WOOD STRUCTURES WILL BE INSTALLED WITH THE OVERSIGHT OF THE ENGINEER. CONTRACTOR WILL PROVIDE 3 DAYS ADVANCE NOTICE BEFORE WOOD INSTALLATION WITH A SUMMARY OF AVAILABLE LOG DIAMETERS, LENGTHS AND SPECIES.
2. PLACE ROOTWAD TOE PROTECTION ACCORDING TO STATIONS LISTED IN THE TABLE ABOVE.
3. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE TRUCKS AND OPERATORS TO HAUL LARGE WOOD MATERIAL TO THE INSTALLATION SITE. LARGE WOOD MATERIAL FOR STRUCTURES SHALL BE SECURED FROM THE FOLLOWING SOURCES:
   - SALVAGED TREES REMOVED DURING CONSTRUCTION GRADING ACTIVITIES.
4. THE CONTRACTOR SHALL TAKE CARE TO PROTECT THE ROOTWADS FROM DAMAGE DURING HANDLING OF LARGE WOOD MATERIAL.
5. CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER IF A SPECIFIED LOG SIZE IS NOT AVAILABLE.
6. THE LOCATION AND CONFIGURATION OF LARGE WOOD STRUCTURES MAY VARY IN FIELD DUE TO SITE CONDITIONS.
7. SPECIFIED DIAMETER OF LOGS SHALL BE MEASURED AT BREAST HEIGHT (DBH). LENGTHS OF LOGS SHALL INCLUDE THE ROOTWAD PORTIONS OF THE LOG IF THE ROOTWAD IS PRESENT. LOG SIZE SHALL BE WITHIN 3 INCHES OF THE SPECIFIED DIAMETER.
8. FINAL BURIAL DEPTHS AND LENGTH SHALL BE SPECIFIED BY THE ENGINEER DURING CONSTRUCTION ONCE THE FINAL LENGTHS AND DIAMETERS ARE PROVIDED BY THE CONTRACTOR. BURIAL DEPTH AND BURIAL LENGTH SHALL MATCH OR EXCEED SPECIFIED DIMENSIONS. THE TILT ANGLE OF THE LOG IS PROVIDED ONLY AS A RECOMMENDATION. FINAL TILT ANGLES MAY VARY FROM PLANS PROVIDED THE LOGS HAVE THE REQUIRED BURIAL DEPTHS AND BURIAL LENGTHS.
9. LOG ORIENTATION ANGLES ARE MEASURED BETWEEN THE LOG AND THE BANK. A LOG WITH AN ORIENTATION ANGLE OF 0 DEGREES SHALL BE PLACED PARALLEL TO THE BANK, AND A LOG WITH A 90 DEGREE ORIENTATION ANGLE SHALL BE PLACED PERPENDICULAR TO THE BANK.
10. LOG ORIENTATION ANGLES WILL BE SPECIFIED DURING CONSTRUCTION ONCE THE FINAL LOG LENGTHS AND DIAMETERS ARE PROVIDED BY THE CONTRACTOR, OR SPECIFIED BY THE ENGINEER IN THE FIELD.
11. LIMIT TRENCH WIDTHS ASSOCIATED WITH LOG INSTALLATION IN CUT TO THE LOG DIAMETER PLUS 2 FEET AND MINIMIZE BANK DISTURBANCE. FOLLOWING CONSTRUCTION THE CONTRACTORS SHALL STABILIZE THE DISTURBED BANKS BY METHODS NOTED ON THESE PLANS.
12. BACKFILL LOG TRENCHES WITH NATIVE ALLUVIUM, MACHINE PACKING BY TRACKING OVER THE LOGS AND PATTING THE SOILS WITH THE BUCKET OF THE EXCAVATOR.
13. WHERE MULTIPLE ROOTWADS ARE INSTALLED TO PROTECT A BANK FROM EROSION, POSITION THE LOGS SO THE ROOTWADS OVERLAP SLIGHTLY TO AVOID WATER JETTING BETWEEN LOGS.



TYPICAL POOL CROSS SECTION

NOT TO SCALE

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ROODWAD DETAIL

ST. VRAIN CREEK REACH 3 PHASE 2
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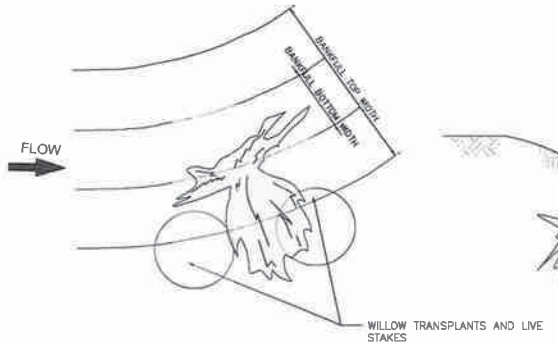
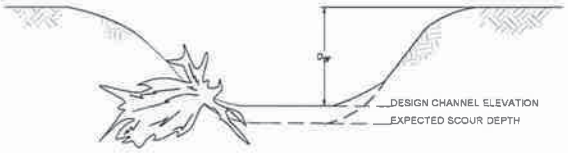


A/XX BRUSH HABITAT PLAN VIEW A
NOT TO SCALE



A/XX BRUSH HABITAT CROSS SECTION VIEW A
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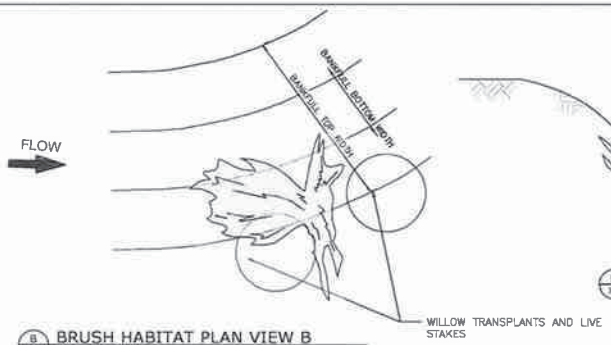

B/XX BRUSH HABITAT PLAN VIEW B
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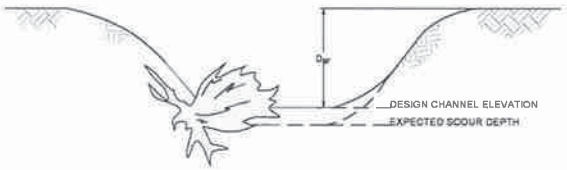

B/XX BRUSH HABITAT CROSS SECTION VIEW B
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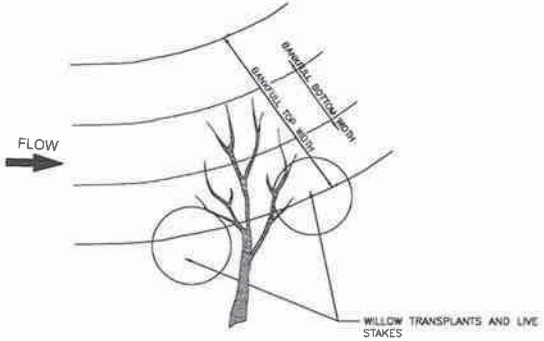
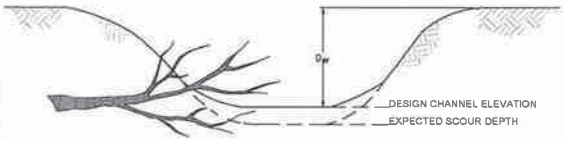
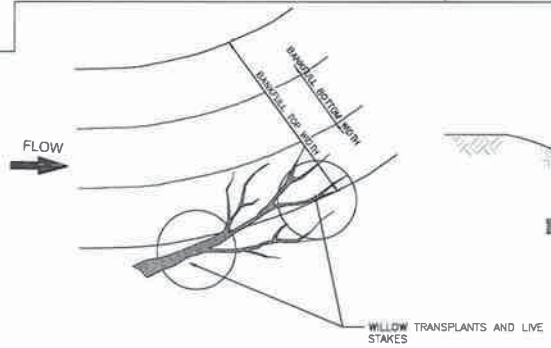


C/XX SMALL WOOD HABITAT PLAN VIEW A
NOT TO SCALE

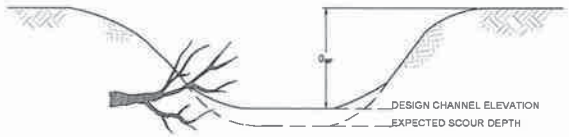


C/XX SMALL WOOD HABITAT CROSS SECTION VIEW A
NOT TO SCALE

NOTES:
1. SHRUBS AND SMALL BRANCHES THAT ARE DAMAGED OR DEAD WILL BE INCORPORATED INTO THE CHANNEL TO CREATE TEMPORARY OVERHEAD COVER PER ENGINEER DIRECTION. POSSIBLE CONFIGURATIONS ARE PRESENTED.
2. SMALL WOOD WILL CREATE COVER & HABITAT FOR FISH AND ADD CHANNEL COMPLEXITY.
3. SMALL WOOD TO BE FIELD FIT WITH ENGINEER.
4. PREFERRED USE OF SMALL WOOD THAT IS DEAD OR CANNOT BE TRANSPLANTED.
5. THE SMALL WOOD SHOULD BE AT LEAST HALF BURIED IN NATIVE ALLUVIUM.
6. MULTIPLE SMALL WOOD MAY BE USED IN ONE LOCATION WITH DIFFERENT CONFIGURATIONS
7. PLACEMENT WILL TAKE INTO ACCOUNT EXPECTED SCOUR AROUND THE SMALL WOOD.
8. LOCATION AND QUANTITY BASED ON AVAILABILITY IN THE FIELD.
9. SHRUB MATERIAL CAN BE 3 FT AND 5FT TALL AND WIDE.
10. SMALL BRANCHES CAN BE 3FT – 8FT LONG WITH A DIAMETER OF 3IN TO 6IN, AS MEASURED AT THE CUT END OF THE BRANCH.



D/XX SMALL WOOD POOL PLAN VIEW B
NOT TO SCALE



D/XX SMALL WOOD CROSS SECTION VIEW B
NOT TO SCALE

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SMALL WOOD HABITAT DETAIL

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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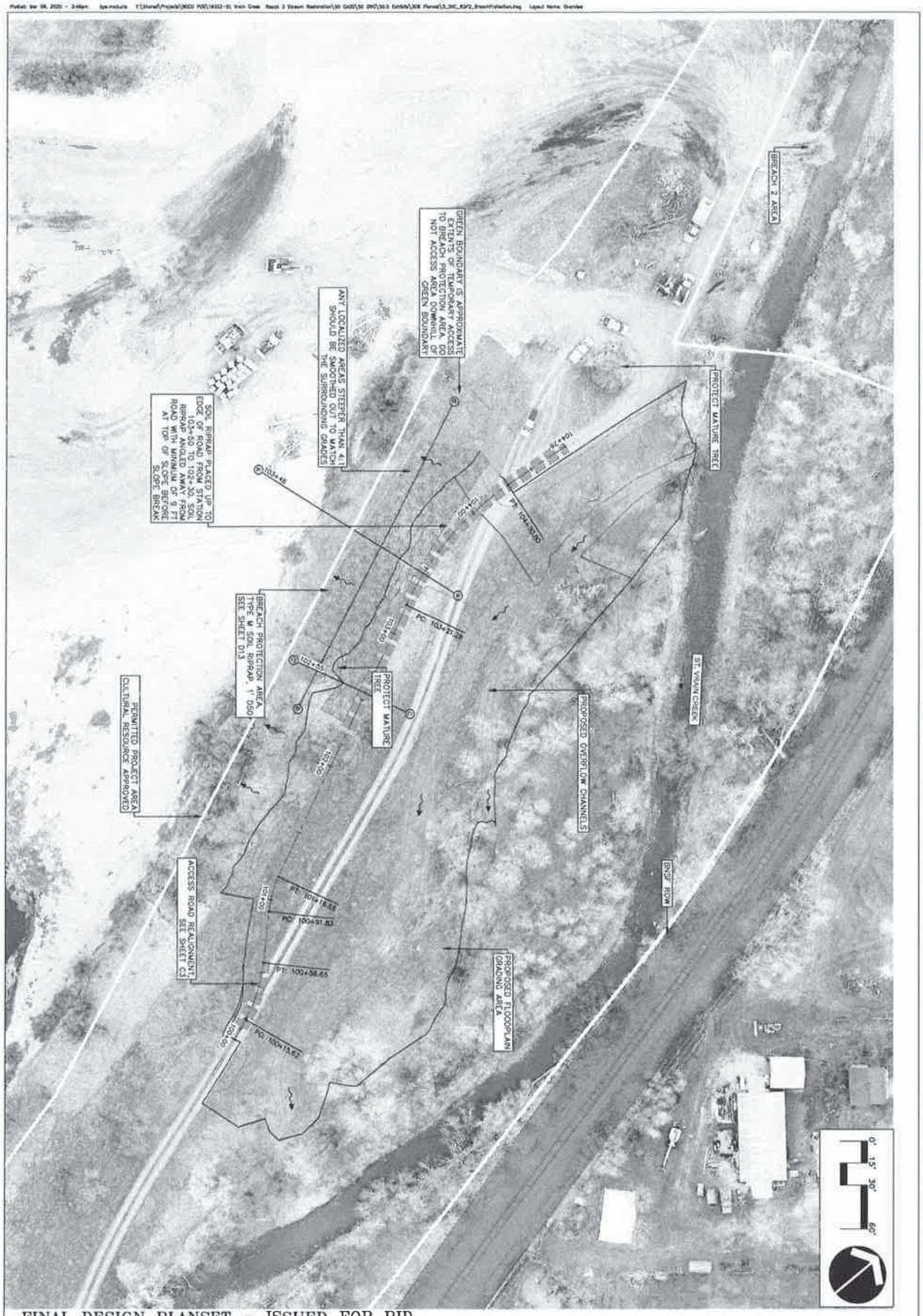

FINAL DESIGN PLANSET – ISSUED FOR BID

BREACH PROTECTION AREA OVERVIEW

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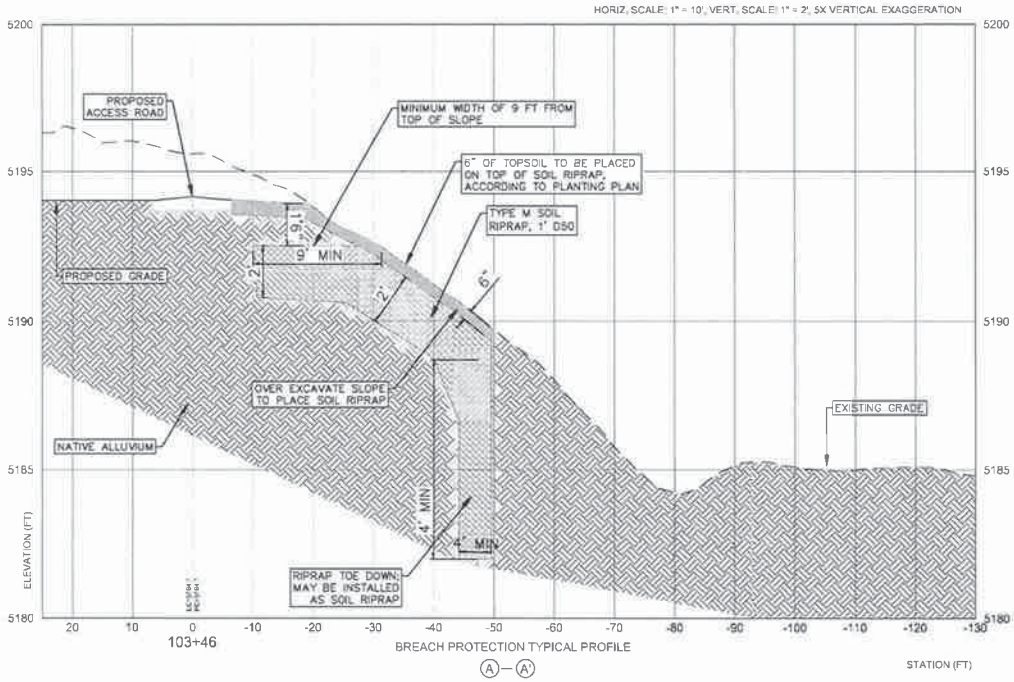
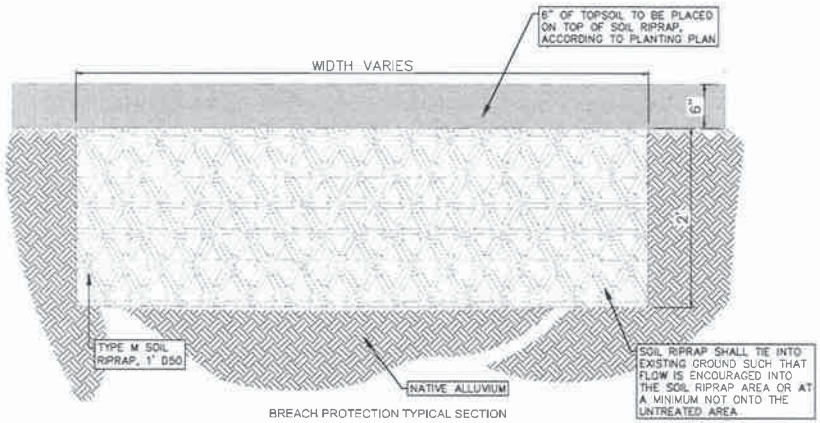


BREACH PROTECTION TYPICAL PROFILE

Ⓐ—Ⓐ'

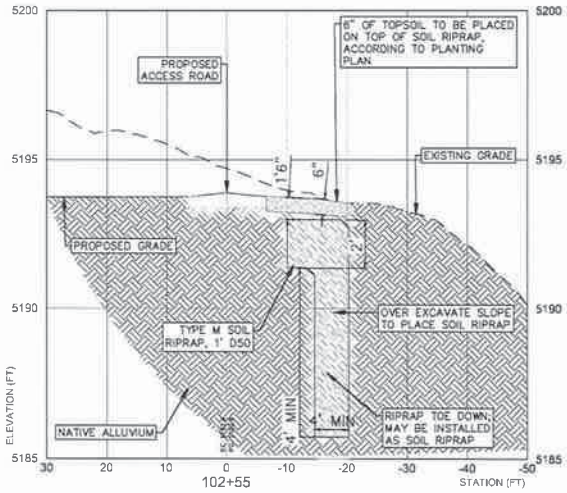
NOTES:

1. CONTRACTOR SHALL POTHOLE IN THE PROPOSED SOIL RIPRAP AREA WITH ENGINEER PRESENT PRIOR TO BEGINNING THE PLACEMENT OF MATERIAL TO CONFIRM SUB GRADE MATERIALS.
2. IF SUB GRADE MATERIALS HAVE BEEN MINED OF COBBLE & GRAVEL OR OTHERWISE NOT A WELL GRADED MIX OF NATIVE ALLUVIUM, THE CONTRACTOR WILL BE REQUIRED TO PLACE BEDDING PRIOR TO SOIL RIPRAP INSTALLATION.
3. APPROXIMATELY 4" OF TOP EXISTING MATERIAL SHALL BE STOCKPILED SEPARATELY FOR RE-USE IN THE SOIL RIPRAP.
4. ALL CONNECTIONS WITH EXISTING GROUND ON THE EDGE OF TREATMENT AREA SHALL CONNECT SMOOTHLY WITH THE SURROUNDING SURFACE AND SHALL NOT ENCOURAGE CONCENTRATED FLOW AT THE EDGES OF THE TREATED AREAS.



BREACH PROTECTION TYPICAL SECTION

Ⓑ—Ⓑ'



BREACH PROTECTION TYPICAL PROFILE

Ⓒ—Ⓒ'

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BREACH PROTECTION DETAIL

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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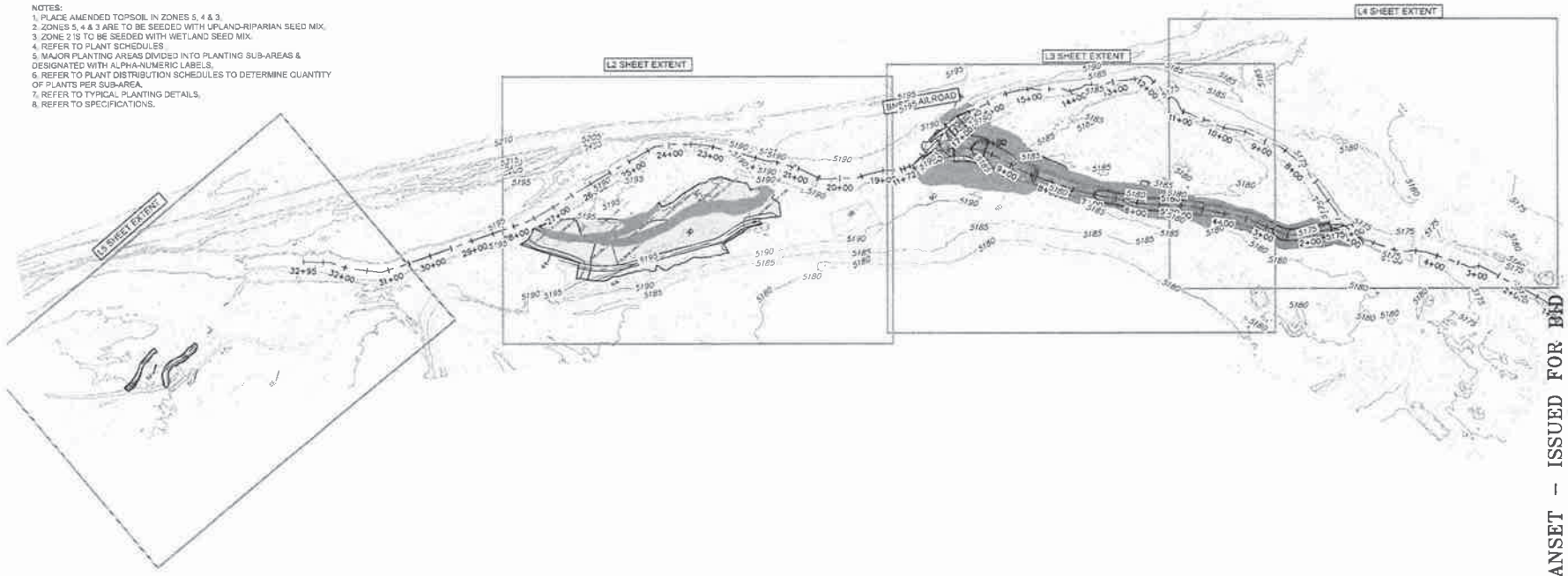
LEGEND:

- ZONE 5 - UPLAND SEEDING
- ZONE 4 - UPLAND SEEDING & PLANTING
- ZONE 3 - RIPARIAN SEEDING & PLANTING
- ZONE 2 - WILLOW CUTTINGS & WETLAND SEEDING
- ZONE 1 - AQUATIC HABITAT (NO REVEGETATION)
- SOIL RIPRAP AREA
- STRAW/COCONUT BLANKET
- COIR FABRIC
- 3A PLANTING SUB-AREA LABEL

NOTES:
1. PLACE AMENDED TOPSOIL IN ZONES 5, 4 & 3.
2. ZONES 5, 4 & 3 ARE TO BE SEEDED WITH UPLAND-RIPARIAN SEED MIX.
3. ZONE 2 IS TO BE SEEDED WITH WETLAND SEED MIX.
4. REFER TO PLANT SCHEDULES.
5. MAJOR PLANTING AREAS DIVIDED INTO PLANTING SUB-AREAS & DESIGNATED WITH ALPHA-NUMERIC LABELS.
6. REFER TO PLANT DISTRIBUTION SCHEDULES TO DETERMINE QUANTITY OF PLANTS PER SUB-AREA.
7. REFER TO TYPICAL PLANTING DETAILS.
8. REFER TO SPECIFICATIONS.



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PLANTING PLAN OVERVIEW

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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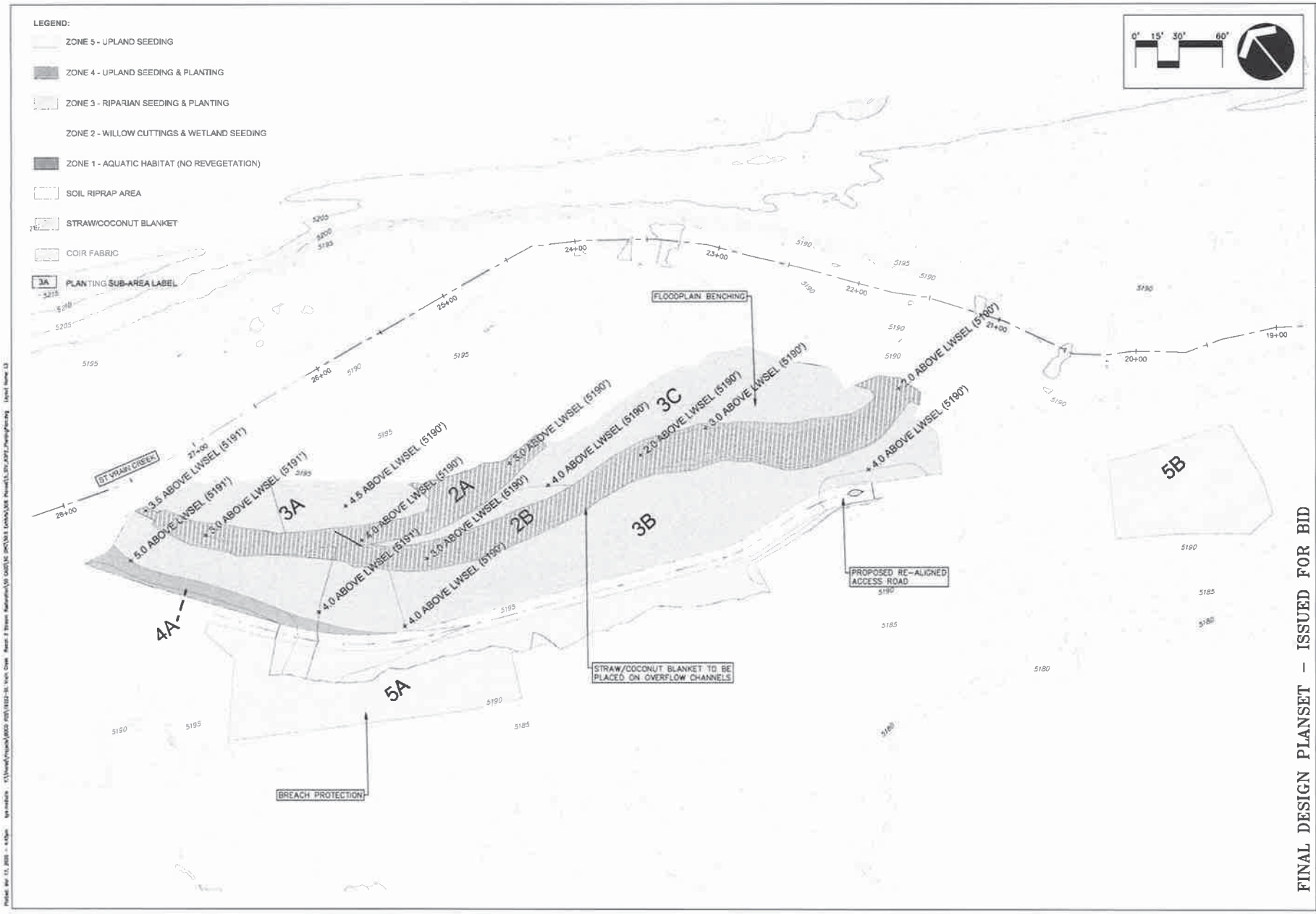

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LANDSCAPE EXTENTS 1

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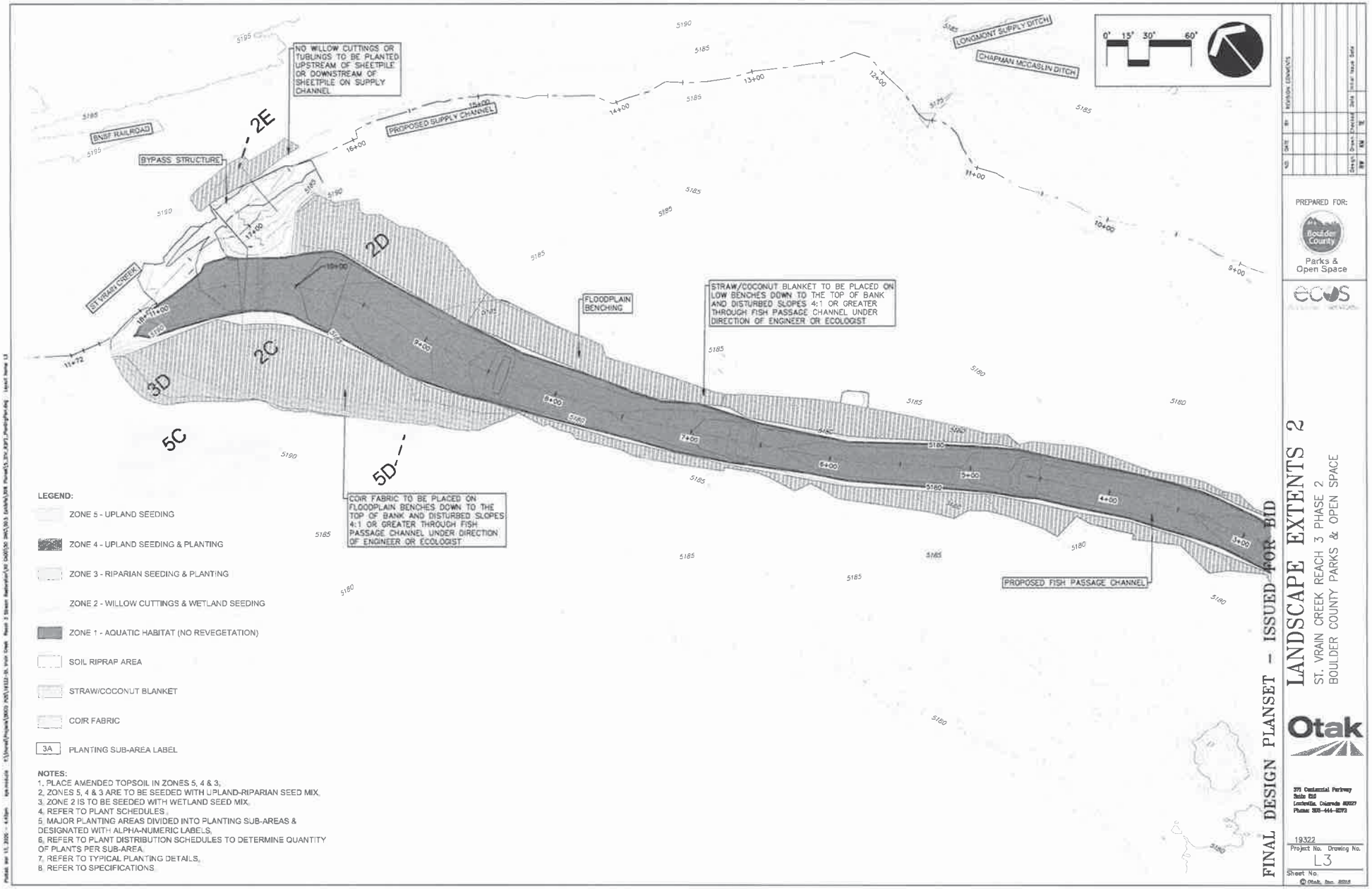

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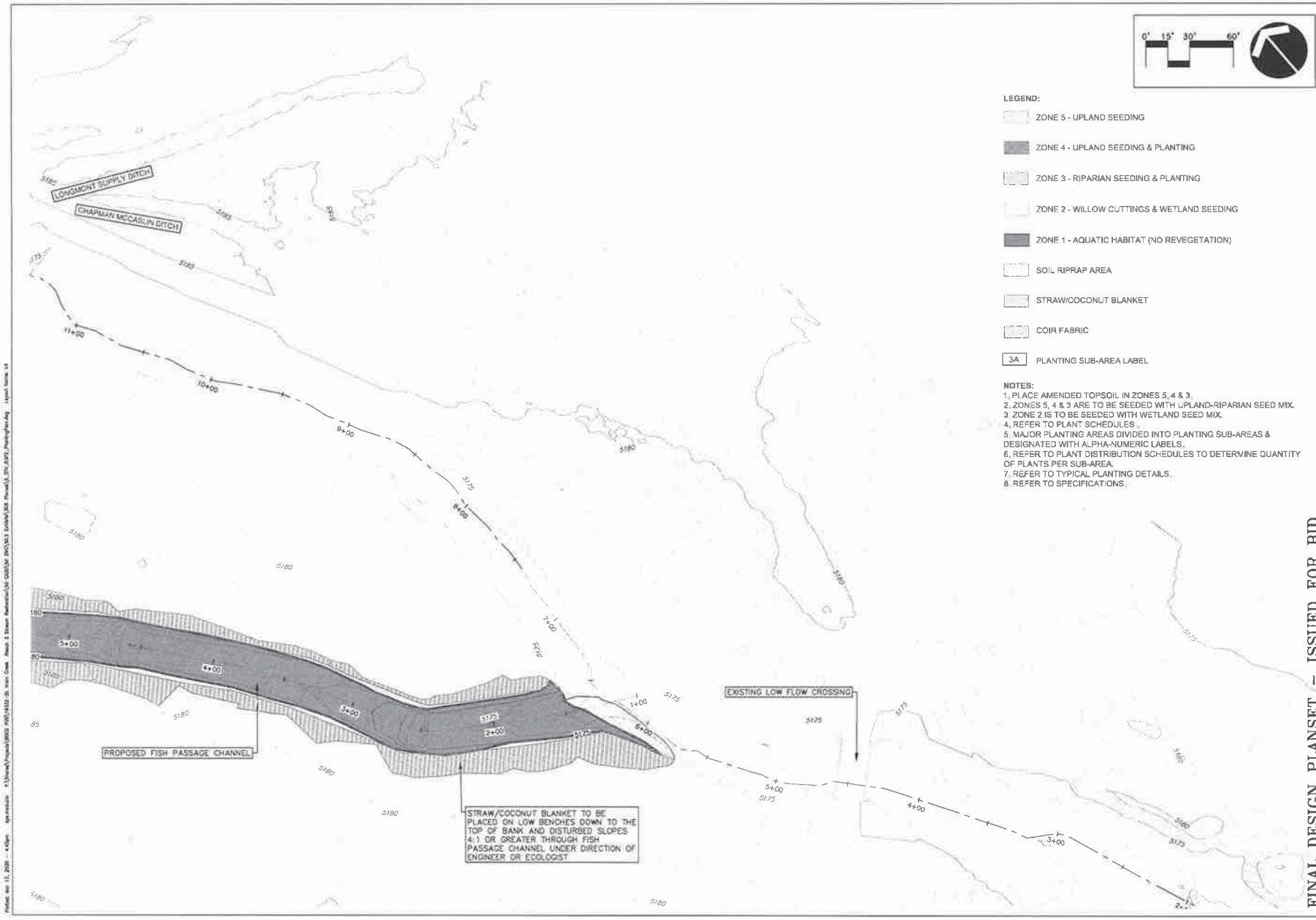

LEGEND:

- ZONE 5 - UPLAND SEEDING
- ZONE 4 - UPLAND SEEDING & PLANTING
- ZONE 3 - RIPARIAN SEEDING & PLANTING
- ZONE 2 - WILLOW CUTTINGS & WETLAND SEEDING
- ZONE 1 - AQUATIC HABITAT (NO REVEGETATION)
- SOIL RIPRAP AREA
- STRAW/COCONUT BLANKET
- COIR FABRIC
- 3A PLANTING SUB-AREA LABEL

NOTES:

1. PLACE AMENDED TOPSOIL IN ZONES 5, 4 & 3.
2. ZONES 5, 4 & 3 ARE TO BE SEEDED WITH UPLAND-RIPARIAN SEED MIX.
3. ZONE 2 IS TO BE SEEDED WITH WETLAND SEED MIX.
4. REFER TO PLANT SCHEDULES.
5. MAJOR PLANTING AREAS DIVIDED INTO PLANTING SUB-AREAS & DESIGNATED WITH ALPHA-NUMERIC LABELS.
6. REFER TO PLANT DISTRIBUTION SCHEDULES TO DETERMINE QUANTITY OF PLANTS PER SUB-AREA.
7. REFER TO TYPICAL PLANTING DETAILS.
8. REFER TO SPECIFICATIONS.

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LANDSCAPE EXTENTS 3

ST. VRAIN CREEK REACH 3 PHASE 2
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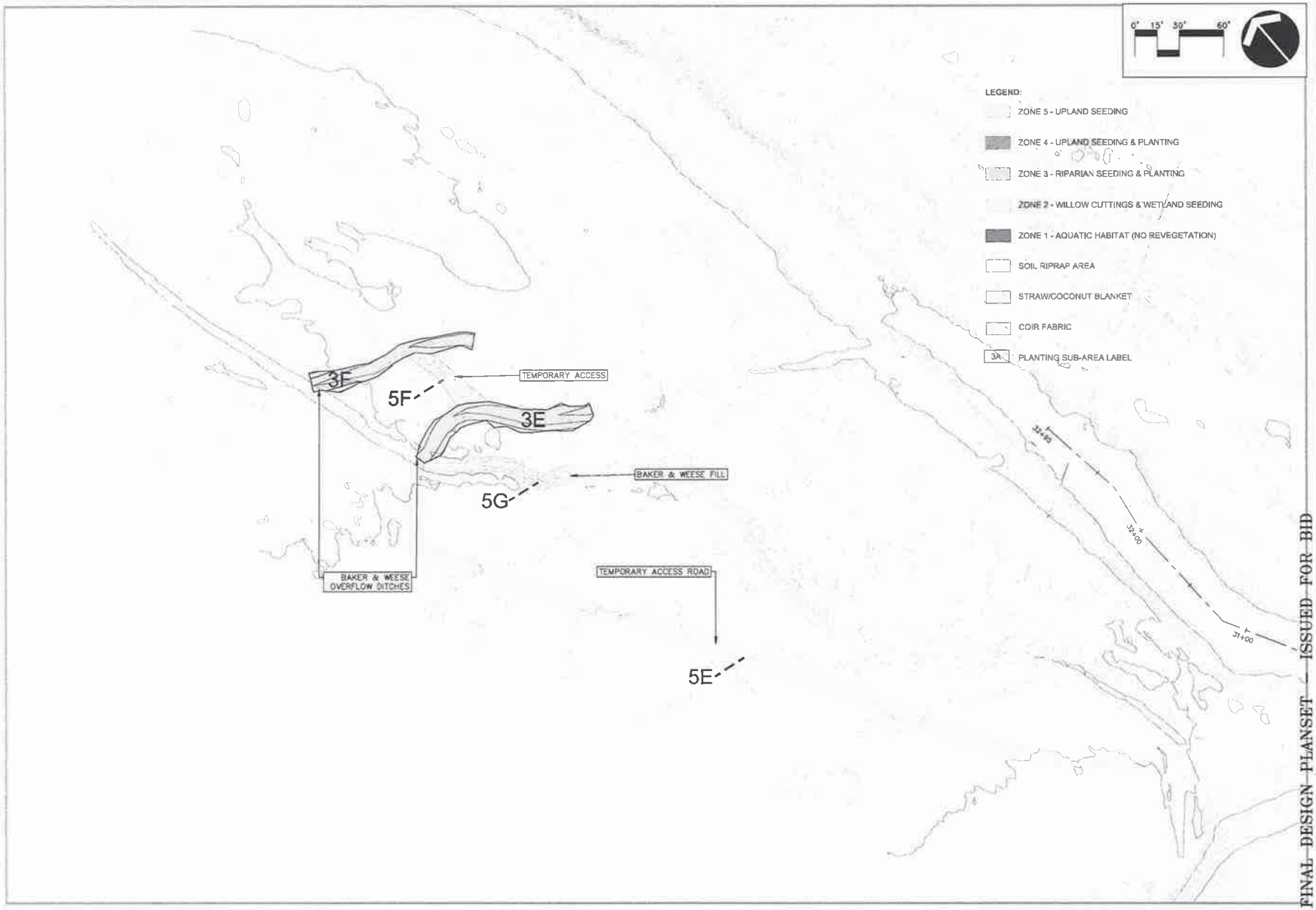

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LANDSCAPE EXTENTS 4

ST. VRAIN CREEK REACH 3 PHASE 2
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ST VRAIN CREEK - PHASE 2
100% DESIGN
PLANT SCHEDULES
3/9/2020

Scientific Name	Common Name	Plant Symbol	Indicator Status	Height at 20 years (in feet)	Spread (in feet)	Preferred Size / Form	Plant Spacing	Percent of Mix	Total Quantity
ZONE 4 - UPLAND TREES & SHRUBS						**Cover =**	**40%**		
						Acres =	**0.05**		
						Average Spacing =	**3**		
Chrysothamnus nauseosus	Rabbitbrush	CHRNAU	NI	3	3	14" tall 1-gal.	3.0	30%	21
Krascheninnikovia lanata	Winterfat	KRALAN	NI	3	3	14" tall 1-gal.	3.0	10%	6
Pentaphylloides floribunda	Shrubby cinquefoil	PENFLO	NI	3	3	14" tall 1-gal.	3.0	10%	6
Prunus americana	American Plum	PRUAME	UPL	24	24	14" tall 1-gal.	12.0	10%	6
Ribes cereum	Wax currant	RIBCER	UPL	3	3	14" tall 1-gal.	3.0	10%	6
Symphoricarpos occidentalis	Snowberry	SYMOCC	UPL	3	3	14" tall 1-gal.	3.0	30%	21
							TOTAL	**100.0%**	**66**
ZONE 3 - RIPARIAN TREES & SHRUBS						**Cover =**	**50%**		
						Acres =	**1.1**		
						Average Spacing (Trees) =	**30**		
						Average Spacing (Shrubs) =	**4**		
Symphoricarpos occidentalis	Snowberry	SYMOCC	UPL	3	3	14" tall 1-gal.	3.0	30%	340
*Populus deltoides var. monilifera	Plains cottonwood	POPDEL	FAC	80	40	14" tall 1-gal.	30.0	50%	17
Prunus virginiana var. melanocarpa	Chokecherry	PRUVIR	FACU	15	15	14" tall 1-gal.	7.5	10%	102
Rosa woodsii	Wood's rose	ROSWOO	FACU	3	3	14" tall 1-gal.	3.0	30%	340
Ribes aureum	Golden currant	RIBAUR	FACU	5	5	14" tall 1-gal.	3.0	30%	340
*Populus angustifolia	Narrowleaf cottonwood	POPANG	FACW	60	30	14" tall 1-gal.	30.0	50%	17
							TOTAL	**200.0%**	**1,156**
* Indicates overhead canopy strata									
ZONE 2 - WETLAND TREES & SHRUBS						**Cover =**	**80%**		
						Acres =	**1.5**		
						Average Spacing =	**3**		
Alnus incana	Alder	ALNINC	FACW	15	15	14" tall 1-gal.	3.0	5%	292
Salix amygdaloides	Peachleaf willow	SALAMY	FACW	45	60	14" tall 1-gal.	3.0	5%	292
Salix exigua	Coyote willow	SALEXI	FACW	5	5	48" cutting	3.0	90%	5,260
							TOTAL	**100.0%**	**5,844**

NOTES:
1. ZONE 4 & ZONE 3 TREES AND SHRUBS WILL BE DIVIDED INTO GROUPS CONTAINING EACH OF THE SPECIES LISTED ABOVE.
2. PLANT GROUPS WILL BE LOCATED IN THE FIELD BY THE ECOLOGIST USING COLOR CODED PIN FLAGS.
3. EACH PLANTING ZONE WILL BE SEEDED USING A CORRESPONDING UPLAND AND WETLAND SEED MIX. (REFER TO SEED SCHEDULES)
4. PLACE VOLE CAGES ON POPDEL, POPANG, PRUAME & PURUVIR, PART OF BID ALTERNATIVE.

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FINAL DESIGN PLANSET – ISSUED FOR BID

PLANTING SCHEDULE
ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

Otak

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Suite 200
Boulder, Colorado 80301
Phone: 303-296-1384
Fax: 303-296-3699

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ST VRAIN CREEK - PHASE 2
100% DESIGN
SEED SCHEDULES

1/24/2020

		ZONE	ZONE	ZONE
Seeds per SF:	50	5	4	3
TOTAL ACRES:	2.0	0.83	0.05	1.1

UPLAND SEED SCHEDULE (ZONES 5 & 4)
RIPARIAN SEED SCHEDULE (ZONE 3)

Scientific Name	Common Name	Region 5 Indicator Status	Seasonality	* Percent of Mix	* LBS/PLS per AC	Drill Seeding Total LBS	Broadcast Seeding Total LBS
Achnatherum hymenoides	Indian ricegrass	FACU	C	5.0%	0.77	1.53	3.06
Andropogon hallii	Sand bluestem	NI	W	5.0%	0.96	1.91	3.82
Andropogon gerardi	Big bluestem	FACU	W	5.0%	0.84	1.66	3.32
Bouteloua curtipendula	side-oats grama	UPL	W	5.0%	0.57	1.13	2.26
Bouteloua gracilis	blue grama	UPL	W	10.0%	0.26	0.52	1.05
Buchloe dactyloides	Buffalograss	FACU	W	5.0%	1.94	3.85	7.71
Calamovilfa longifolia	Prairie sandreed	NI	C	5.0%	0.40	0.79	1.58
Elymus canadensis	Canada wildrye	FACU	C	5.0%	0.95	1.88	3.75
Elymus lanceolatus	Streambank wheatgrass	FACU	C	5.0%	0.71	1.40	2.80
Elymus trachycaulus	slender wheatgrass	FACU	C	5.0%	0.68	1.36	2.72
Hesperostipa comata	needle-and-thread	UPL	C	5.0%	0.95	1.88	3.75
Koeleria macrantha	Prairie Junegrass	UPL	C	5.0%	0.05	0.09	0.19
Panicum virgatum	switchgrass	FAC	W	5.0%	0.28	0.55	1.11
Pascopyrum smithii	western wheatgrass	FACU	C	10.0%	1.98	3.92	7.85
Schizachryrium scoparium	little bluestem	FACU	W	5.0%	0.42	0.83	1.66
Sorghastrum avenaceum (nutans)	Indian grass	FACU	C	5.0%	0.64	1.27	2.54
Sporobolus airoides	Alkali sacaton	FAC	C	5.0%	0.06	0.12	0.25
Sporobolus cryptandrus	sand dropseed	FACU	W	5.0%	0.02	0.04	0.08
				100.0%	**12.49**	**24.75**	**49.50**

NOTES:
1. PLANTING ZONES 5, 4, AND 3 ARE TO BE SEEDED WITH THE ABOVE MIX.
2. SEED SHALL BE OBTAINED AND DELIVERED TO CONTRACTOR BY OWNER.
3. SEEDS PER SQUARE FOOT SHOWN AT DRILL SEEDING RATE. BROADCAST SEEDING RATE IS TWICE THE DRILL SEEDING RATE.

FINAL DESIGN PLANSET - ISSUED FOR BID

NO.	DATE	BY	REVISION COMMENTS

Design: BW Drawn: EM Checked: TC Date: Initial Issue Date

PREPARED FOR:
Boulder County Parks & Open Space

ecos

SEED SCHEDULE 1
ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

Otak

5777 Central Avenue
Suite 225
Boulder, Colorado 80301
Phone: 303-684-6304
Fax: 303-966-3609

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ST VRAIN CREEK - PHASE 2
100% DESIGN
SEED SCHEDULES

1/24/2020

		ZONE
Seeds per SF:	50	2
TOTAL ACRES:	1.1	1.1

WETLAND SEED SCHEDULE (ZONE 2)

Scientific Name	Common Name	Region 5 Indicator Status	Seasonality	* Percent of Mix	* LBS/PLS per AC	Drill Seeding Total LBS	Broadcast Seeding Total LBS
Panicum virgatum	Switchgrass	FAC	W	5.0%	0.28	0.32	0.64
Poa palustris	Fowl bluegrass	FAC	C	7.5%	0.05	0.06	0.12
Pascopyrum smithii	Western wheatgrass	FACU	C	10.0%	1.98	2.25	4.50
Asclepias incarnata	Swamp milkweed	FACW		2.5%	0.35	0.40	0.80
Asclepias speciosa	Showy milkweed	FACW		2.5%	0.76	0.86	1.72
Carex praegracilis	Meadow sedge	FACW	C	5.0%	0.06	0.07	0.14
Distichlis spicata	inland saltgrass	FACW	W	5.0%	0.21	0.24	0.48
Juncus ensifolius	Swordleaf rush	FACW	C	2.5%	0.02	0.02	0.04
Juncus tenuis	Poverty rush	FACW	C	5.0%	0.01	0.01	0.02
Juncus torreyi	Torrey rush	FACW	C	5.0%	0.01	0.01	0.02
Salix exigua	Sandbar willow	FACW	C	5.0%	0.01	0.01	0.02
Spartina pectinata	Prairie cordgrass	FACW	W	5.0%	0.55	0.63	1.26
Sparganium eurycarpum	Burreed	OBL	C	2.5%	2.40	2.72	5.45
Carex emoryi	Emory's sedge	OBL	C	10.0%	0.45	0.51	1.02
Carex nebrascensis	Nebraska sedge	OBL	C	5.0%	0.20	0.23	0.46
Carex pellita	Woolly sedge	OBL		5.0%	0.34	0.38	0.77
Eleocharis palustris	Spikerush	OBL	C	5.0%	0.18	0.20	0.40
Juncus balticus	Baltic rush	OBL	C	5.0%	0.01	0.02	0.03
Scirpus pallidus	Pale bulrush	OBL	C	2.5%	0.01	0.01	0.02
Schoenoplectus americanus	Three-square	OBL	C	5.0%	0.27	0.31	0.62
				100.0%	**8.15**	**9.26**	**18.51**

NOTES:
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SEED SCHEDULE 2

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

PREPARED FOR:
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Otak

6777 Central Avenue
Suite 208
Boulder, Colorado 80301
Phone: 303-998-6304
Fax: 303-996-3600

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TREATMENTS PER ZONE:				
DECOMPACTION:	[illegible]	[illegible]		COMPACT & ROUGH
TOPSOIL:	[illegible]	[illegible]		NONE
SOIL AMENDEMENT:	[illegible]	[illegible]		NONE
SEEDING:	[illegible]	[illegible]		NONE
MULCH:	[illegible]	[illegible]		NONE
PLANTING: (FORM)	[illegible]	[illegible]		NONE
WILDLIFE CAGES:	[illegible]	[illegible]		NONE
	ZONE 4 UPLAND (XERIC)	ZONE 3 RIPARIAN (MESIC)		ZONE 1 AQUATIC BED (LOTIC)
INDICATOR STATUS:	[illegible]	[illegible]		-
INUNDATION BOUNDARY:	[illegible]	[illegible]		LOW FLOW
CLASSIFICATION:	[illegible]	[illegible]		Unconsolidated Bottom/Open Water (UB/OW)
~ELEVATION RELATIVE TO LOW FLOW WSEL:	[illegible]	[illegible]		0.0' to 4.0'

NOTES:
1. CROSS-REFERENCE ABOVE TYPICAL CROSS-SECTION WITH PLANTING AND SEEDING SCHEDULES & SPECIFICATION.
2. TRANSITION OR EXTENSION OF SPECIES BETWEEN ZONES MAY VARY DEPENDING ON ACTUAL FIELD CONDITIONS, SLOPE, HYDROLOGY, MICRO-HABITAT, SOIL TEXTURE & MOISTURE CONDITIONS.
3. THE ECOLOGIST OVERSEEING PLANTING OPERATIONS WILL MAKE DISCRETIONARY CALLS ON PLANT LOCATIONS BASED ON IN-FIELD CONDITIONS.
4. RIPARIAN/WETLAND TRANSPLANT CLUMPS WILL BE LOCATED IN THE FIELD.

PXS

TYPICAL RIPARIAN PLANT COMMUNITY CROSS-SECTION

CROSS-SECTION NTS

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Design: BW
Drawn: BW
Checked: TC

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FINAL DESIGN PLANSET – ISSUED FOR BID

TYPICAL PLANTING CROSS SECTION

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

Otak

5777 Central Avenue
Suite 230
Boulder, Colorado 80301
Phone: 303-996-9004
Fax: 303-996-9009

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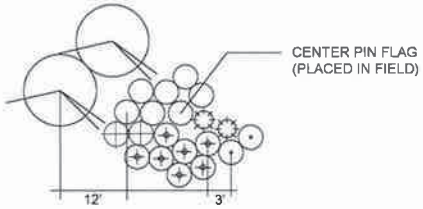
ZONE 4 PLANT GROUPINGS

TYPICAL GROUP OF PLANTS WITH INDICATOR STATUS OF NI & UPL

- WINTERFAT (KRA LAN) - 2 PER GROUP AT 3' SPACING
- RABBITBRUSH (CHR NAU) - 7 PER GROUP AT 3' SPACING
- WAX CURRANT (RIB CER) - 2 PER GROUP AT 3' SPACING
- AMERICAN PLUM (PRU AME) - 2 PER GROUP AT 12' SPACING
- CINQUEFOIL (PEN FLO) - 2 PER GROUP AT 3' SPACING
- SNOWBERRY (SYM OCC) - 7 PER GROUP AT 3' SPACING

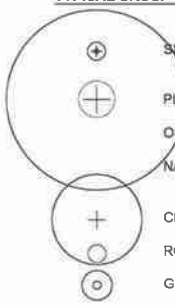
22 TOTAL PLANTS PER GROUP
(3 GROUPS BASED ON SPECIES QUANTITIES IN PLANT SCHEDULES)



PINK GROUP LAYOUT

ZONE 3 PLANT GROUPINGS

TYPICAL GROUP OF PLANTS WITH INDICATOR STATUS OF UPL - FACU

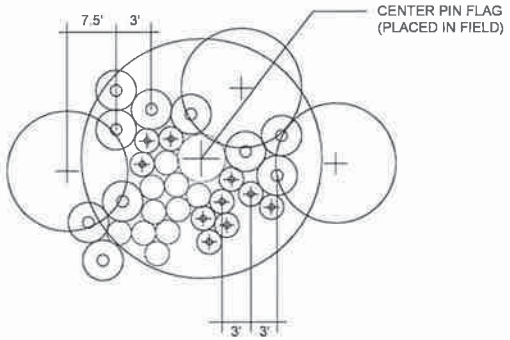


- SNOWBERRY (SYM OCC) - 10 PER GROUP AT 3' SPACING
- PLAINS COTTONWOOD (POP DEL) - 1 PER GROUP AT 30' SPACING

OR

- NARROWLEAF COTTONWOOD (POP ANG) - 1 PER GROUP AT 30' SPACING
- CHOKECHERY (PRU VIR) - 3 PER GROUP AT 7.5' SPACING
- ROSE (ROS WOO) - 10 PER GROUP AT 3' SPACING
- GOLDEN CURRANT (RIB AUR) - 10 PER GROUP AT 3' SPACING

34 TOTAL PLANTS PER GROUP
(34 GROUPS BASED ON SPECIES QUANTITIES IN PLANT SCHEDULES)



YELLOW GROUP LAYOUT

NOTES:

1. REFER TO PLANT SCHEDULES.
2. EACH PLANT GROUP LOCATED IN THE FIELD WILL BE REPRESENTED BY ONE (1) COLOR-CODED PIN FLAG (I.E., PINK & YELLOW)

PG

TYPICAL PLANT GROUPING DETAIL
PLAN VIEW NTS

FINAL DESIGN PLANSET – ISSUED FOR BID

NO	DATE	BY	REVISION COMMENTS
1	9/26	RKW	(1)-NORTH MAINTENANCE & WATER SOURCE

Design	Drawn	Checked	Date	Initial Issue Date
RW	KM	TE		

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TYPICAL PLANTING GROUPS

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

Otak

5977 Central Avenue
Suite 100
Boulder, Colorado 80301
Phone: 303-494-5004
Fax: 303-546-0889

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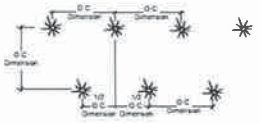
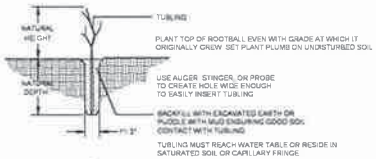


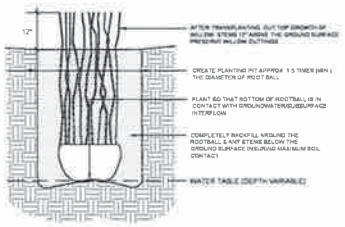
NOTES
1 REFER TO PLANT SCHEDULES FOR SPACING REQUIREMENTS

PS PLANT SPACING DETAIL
PLAN: NTS



NOTES
1 REFER TO PLANT SCHEDULES FOR SPECIES SIZE AND QUANTITY

T TUBLING PLANTING DETAIL
CROSS-SECTION NTS



NOTES

1 PRESERVE SOIL AROUND ROOTBALL TO THE MAXIMUM EXTENT POSSIBLE

2 TRANSPLANT WILLOW CLUMPS DIRECTLY TO FINAL LOCATION OR STOCKPILE FOR LATER USE (NOT TO EXCEED 1 MONTH OF STORAGE)

3 IF STOCKPILED, WRAP AND TIE-UP ROOTBALL WITH BURLAP CONCURRENTLY WITH LOADING AND TRANSPORT TO STORAGE SITE

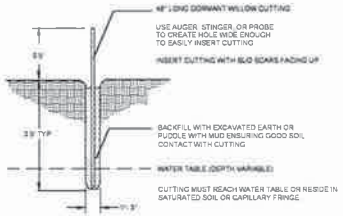
4 STOCKPILE PLANTS IN ROWS FILLING AND COVERING ALL EXPOSED EDGES OF ROOTBALLS WITH STRAW OR WOOD MULCH TO PRESERVE SOIL MOISTURE UNTIL TIME OF PLANTING WATER AS NECESSARY TO MAINTAIN SOIL MOISTURE OF ROOTBALL

5 LIMIT THE NUMBER OF TIMES THE WILLOW CLUMPS WILL BE HANDLED TAKING CARE TO LIMIT SOIL LOSS OF ROOTBALL

6 AFTER PLANTING GENTLY COMPACT SOIL AROUND ROOTBALL ELIMINATING AIR POCKETS WATER IN WILLOW CLUMP THE SAME DAY AS PLANTING ADD ADDITIONAL SOIL AS NECESSARY TO FILL ANY AIR POCKETS THAT MAY FORM

7 TREE TRANSPLANTS (IF AVAILABLE) SHALL BE INSTALLED AS PER TREE DETAIL, NOT DEEP PLANTED

WC RIPARIAN & WETLAND TREE/SHRUB CLUMP TRANSPLANT DETAIL
CROSS-SECTION NTS



NOTES

1 REFER TO PLANT SCHEDULES FOR SPECIES SIZE, QUANTITY AND SPACING

2 REFER TO PLANTING PLANS FOR LOCATIONS

3 UNDERSIZED CUTTINGS LACK OF COMPLETE SOIL CONTACT, LACK OF PENETRATION INTO PERSISTENTLY SATURATED SOIL ARE MAJOR CAUSES OF CUTTINGS FAILURE

4 ZONE 2 CUTTINGS MUST BE PLANTED IN CAPILLARY FRINGE (SATURATED SOIL) OR LOCATED ON BANK IN ORDER TO REACH WATER TABLE

5 HARVESTING HARVEST DORMANT CUTTINGS IN EARLY SPRING (APPROX MARCH 1 TO APRIL 15) PRIOR TO LEAFING OUT, OR LATE FALL (APPROX OCT 1 - NOV 30) AFTER LEAF DROP CUT STEMS AT THE "ROOT" END OF EACH CUTTINGS AT A 45-DEGREE ANGLE USING LOPPERS BRUSH CUTTERS OR PRUNERS CUTTINGS SHALL BE CUT CLEAN AVOIDING BARK STRIPPING AND STEM SPLITTING STRIP ALL SIDE BRANCHES AND DEAD WOOD CUTS SHALL BE MADE 5 TO 6 INCHES FROM THE GROUND THE HARVESTING SITE MUST BE LEFT CLEAN EXCESS WOODY DEBRIS SHALL BE PILED NEATLY AND/OR EVENLY DISTRIBUTED AROUND THE HARVEST SITE

6 BINDING CUTTINGS SHALL BE BOUND TOGETHER SECURELY WITH TWINE AT THE COLLECTION SITE IN GROUPS OF 10, 25, OR 50 FOR EASE OF HANDLING COUNTING AND PROTECTION DURING TRANSPORT WRAP CUTTINGS IN MOIST/SATURATED FABRIC, BURLAP OR SIMILAR MATERIAL DURING TRANSPORT & STORAGE

7 STORAGE AND TRANSPORTATION IF NOT PLANTED IMMEDIATELY, STORE AND MAINTAIN CUTTINGS IN A MOIST, DARK CELLAR, CAVE, OR REFRIGERATOR BETWEEN 32 AND 40 DEGREES (F) FOR NO LONGER THAN 9 MONTHS UNTIL TIME OF PLANTING CUTTINGS SHALL BE KEPT HYDRATED & PROTECTED FROM SUN, FREEZING AND DRYING DURING TRANSPORATION AND AT ALL TIMES

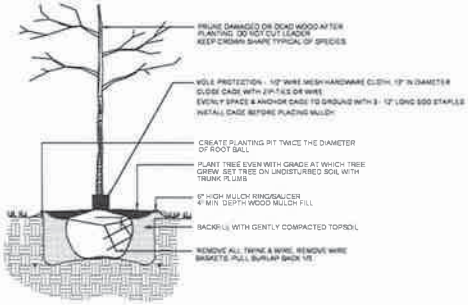
8 DELIVERY AND PLANTING CUTTINGS SHALL BE PLANTED ON THE SAME DAY AS DELIVERY TO THE SITE CUTTINGS THAT CAN NOT BE PLANTED ON THE SAME DAY SHALL BE PLACED BACK IN DARK/COLD STORAGE UNTIL THEY CAN BE PLANTED CUTTINGS SHALL BE INSPECTED AND APPROVED UPON DELIVERY, AT THE STORAGE FACILITY, OR THEIR SOURCE COMPLETELY SUBMERGE & SOAK CUTTINGS BETWEEN 3 AND 7 DAYS TO FULLY HYDRATE IMMEDIATELY PRIOR TO PLANTING & EXPOSURE TO SUN & HEAT

9 UNLESS DIRECTED OTHERWISE PLANTING OF CUTTINGS SHALL OCCUR IN EARLY SPRING WHEN WATER IS AT NORMAL LOW FLOW LEVELS (APPROX APRIL 15 TO MAY 15 OR JUNE 15) NOVEMBER 15) RUN OFF CONDITIONS WILL VARY FROM YEAR TO YEAR MONTH TO MONTH AND MUST BE MONITORED BY THE CONTRACTOR

10 CUTTINGS SHALL BE PLANTED IN ROWS STARTING APPROX 0.5 FEET ABOVE THE NORMAL WATER SURFACE ELEVATION IN THE CAPILLARY FRINGE (MOIST SOIL) OR UP TO AN ELEVATION IN WHICH THE BOTTOM OF THE CUTTINGS WILL REACH THE LOCAL WATER TABLE ONCE INSTALLED MECHANICAL OR HAND DRIVEN STINGERS SHALL BE USED TO CREATE A HOLE WIDE ENOUGH TO EASILY INSERT CUTTINGS TO THE DEPTH INDICATED ON THE DETAIL INSERT CUTTINGS SO THAT BUDS POINT SKYWARD BACK FILL PLANTING PIT WITH MUD OR IN SOIL LIFTS WATER BETWEEN EACH LIFT, AND TAMP TO ELIMINATE VOIDS TO ENSURE SOIL IS IN CONTACT WITH CUTTINGS TAMPING SHOULD CREATE A SLIGHT SAUCER AROUND EACH CUTTING TO CAPTURE AND HOLD NATURAL PRECIPITATION

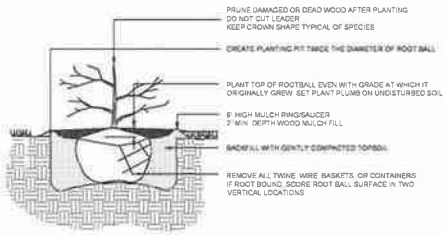
11 CUTTINGS SHALL BE INSERTED SO THAT NO GREATER THAN 6 INCHES ARE ABOVE THE GROUND THIS DOES NOT ELIMINATE THE NEED TO PLANT CUTTINGS TO THEIR SPECIFIED DEPTH

WC WILLOW CUTTING DETAIL
CROSS-SECTION NTS



NOTES
1 T-POSTS & GUY WIRES (IF SHOWN) ARE NOT REQUIRED FOR 5 GAL. STOCK OF SMALLER
2 WHERE APPLICABLE CUT EROSION CONTROL FABRIC IN A "+" PATTERN AND LAY BACK PRIOR TO INSTALLING PLANTS RETURN/CLOSE FABRIC TO ORIGINAL POSITION AND STAPLE/STAKE TO THE GROUND
3 MAINTAIN AS DIRECTED IN NOTES & SPECIFICATIONS
4 REFER TO PLANT SCHEDULES

TP TREE PLANTING DETAIL
CROSS-SECTION NTS



NOTES
1 WHERE APPLICABLE CUT EROSION CONTROL FABRIC IN A "+" PATTERN AND LAY BACK PRIOR TO INSTALLING PLANTS RETURN/CLOSE FABRIC TO ORIGINAL POSITION AND STAPLE/STAKE TO THE GROUND
2 MAINTAIN AS DIRECTED IN NOTES & SPECIFICATIONS
3 FOR SHRUB SPECIES THAT REQUIRE VOLE PROTECTION, REFER TO TREE PLANTING DETAIL
4 REFER TO PLANT SCHEDULES

SP SHRUB PLANTING DETAIL
CROSS-SECTION NTS

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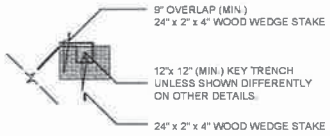
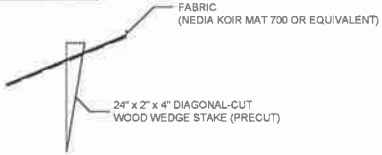


TOP & TERMINAL SIDE TRENCHES
SECTION: NTS

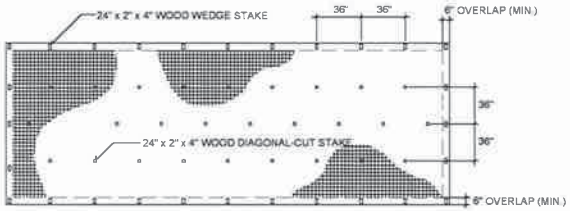
SEAM OVERLAP
SECTION: NTS

TOE TRENCHES
SECTION: NTS

TYPICAL TRENCH DETAIL
CROSS-SECTION: NTS



STAKE DETAIL
CROSS-SECTION: NTS



NOTES:
1. WHERE FEASIBLE, FABRIC WILL BE ROLLED OUT AND INSTALLED PARALLEL WITH THE STREAM.
2. UPSTREAM PIECES WILL OVERLAP DOWNSTREAM PIECES AND UPSLOPE PIECES WILL OVERLAP DOWNSLOPE PIECES.
3. FOLD OVERLAPPING SEAMS AT LEAST TWICE AND THEN STAKE.
4. AFTER INITIAL STAKING, STAKE FABRIC AS NECESSARY SO THAT IT IS COMPLETELY FLUSH WITH THE GROUND SURFACE.
5. SEED, RAKE & INSTALL STRAW MULCH AT SPECIFICED RATED PRIOR TO LAYING FABRIC.
6. SEED, RAKE & MULCH ALL KEY TRENCHES PRIOR TO CLOSING FABRIC.
7. AT THE FISH PASSAGE CHANNEL, THE FABRIC ON THE FLOODPLAIN BENCHES SHALL EXTEND TO THE TOP OF BANK AND ALL DISTURBED SLOPES 4:1 SHALL HAVE FABRIC.
8. SEE THE EROSION CONTROL MEASURE PLANS FOR THE LOCATIONS OF COIR AND STRAW/COCONUT BLANKET.

ECF

EROSION CONTROL FABRIC DETAIL

PLAN & CROSS-SECTION NTS

NO	DATE	BY	REVISION COMMENTS

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FINAL DESIGN PLANSET – ISSUED FOR BID

EROSION CONTROL FABRIC DETAILS

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

Otak

5777 Central Avenue
Suite 200
Boulder, Colorado 80301
Phone: 303-495-6204
Fax: 303-499-3689

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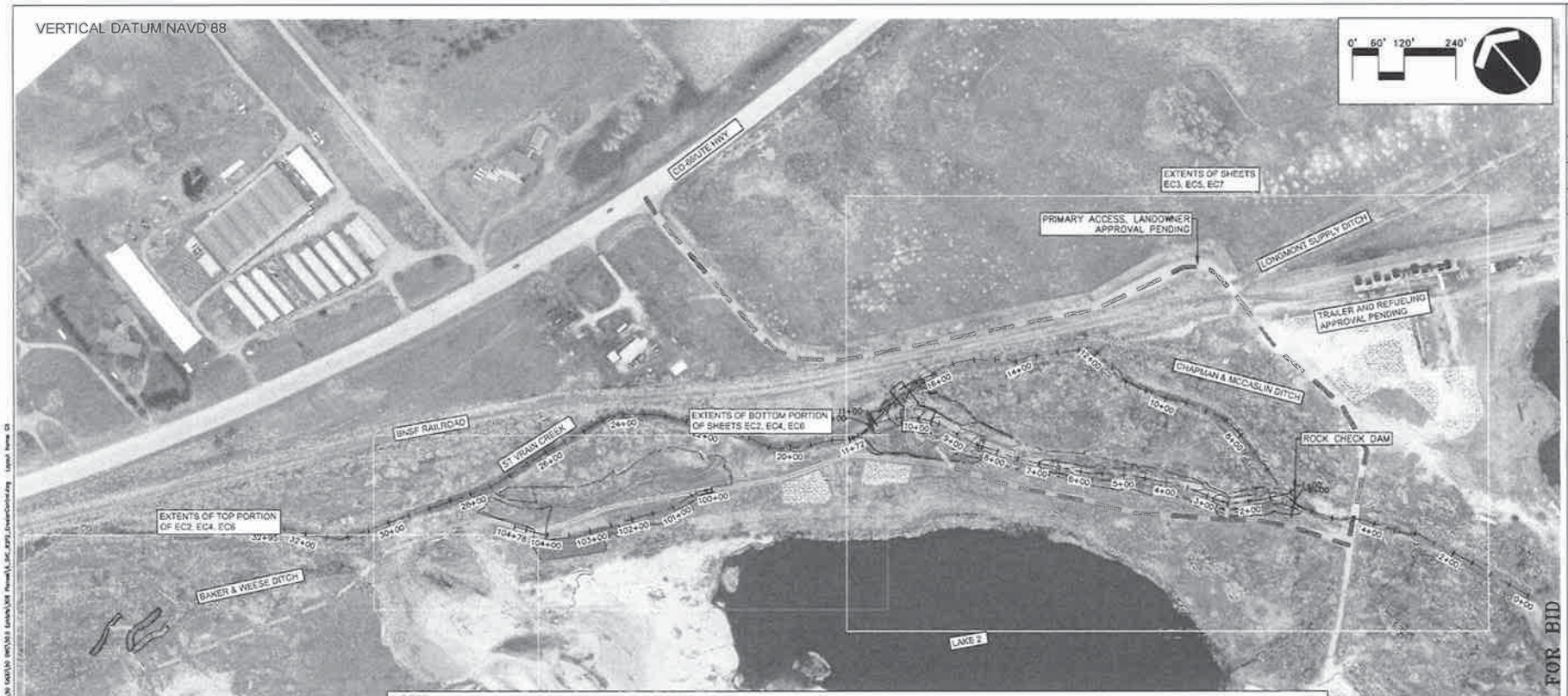

LEGEND	
SEDIMENT CONTROL LOG	
ROCK CHECK DAM	
LIMITS OF CONSTRUCTION/ CONSTRUCTION FENCING	
LIMITS OF CONSTRUCTION AND LIMITS OF DISTURBANCE ARE ONE IN THE SAME	
LIMITS OF GRADING	
CREEK/TEMP ACCESS	
TEMP STREAM CROSSING	
STABILIZED STAGING AREA	
COCONUT/STRAW BLANKET	
COIR FABRIC	
PROPOSED BREACH PROTECTION/ SOIL RIPRAP	

NOTES:

1. CONTRACTOR SHALL FOLLOW ALL COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT STORMWATER AND WATER CONTROL REGULATIONS, BOULDER COUNTY STORMWATER QUALITY PERMIT (SWQP) GUIDANCE FOR CONSTRUCTION PROJECTS NEAR WATERWAYS AS WELL AS REQUIREMENTS IN VOLUME 3, CHAPTER 7 OF THE URBAN STORM DRAINAGE CRITERIA MANUAL (UDFCD, 2010).
2. AS CALLED FOR IN THE COUNTY'S 2016 STORM DRAINAGE CRITERIA MANUAL, BIODEGRADABLE HYDRAULIC FLUIDS MUST BE USED IN ALL EQUIPMENT AND MACHINERY USED BELOW EXISTING WATER SURFACE.
3. PRIOR TO TRANSPORTING EQUIPMENT TO THE SITE, ALL MACHINERY MUST BE CLEANED AND REMOVE AQUATIC NUISANCE SPECIES (ANS) AND WEED SEEDS IN ACCORDANCE WITH STATE OF COLORADO ANS REGULATIONS. THIS INVOLVES EITHER STEAM (HEAT) OR CHEMICAL CLEANING, NOT JUST POWER WASHING, AS WELL AS A 5-DAY WAITING PERIOD BEFORE EQUIPMENT IS BROUGHT ON SITE.
4. "SPILL KITS" FOR EMERGENCY POLLUTANT ISOLATION, AND WRITTEN CLEAN-UP PROCEDURES, MUST BE ONSITE AT ALL TIMES DURING CONSTRUCTION ACTIVITY, AND NEAR ALL AREAS OF OPERATION.
5. WHEN POSSIBLE, LARGE DOWNED WOODY MATERIAL SHALL REMAIN, PARTICULARLY IF EMBEDDED IN STREAM DEPOSITS.
6. WHEN POSSIBLE, STANDING DEAD TREES (SNAGS) SHALL REMAIN IN PLACE.
7. ALL TREE REMOVAL SHALL OCCUR BETWEEN SEPTEMBER 1 AND MARCH 31 (MBTA NON-NESTING SEASON FOR MIGRATORY BIRDS), OR OTHERWISE CLEARED BY MBTA 3RD PARTY SPECIALIST.
8. ALL NATIVE VEGETATION SHALL BE CONSIDERED FOR PROTECTION OR RELOCATION.

GENERAL PRINCIPLES FROM BOULDER COUNTY STORM DRAINAGE CRITERIA MANUAL FOR WORK IN WATERWAYS (SECTION 1302.1; BOULDER COUNTY, 2016):

1. EVERY EFFORT SHALL BE MADE TO BALANCE THE PROTECTION OF RIPARIAN HABITAT AND PROTECTION OF THE STREAM BED/WATERWAY ITSELF.
2. NO CONSTRUCTION EQUIPMENT SHALL BE OPERATED WITHIN THE WATERWAY OR BELOW THE EXISTING WATER SURFACE UNLESS SPECIFICALLY AUTHORIZED BY THE STORMWATER QUALITY PERMIT ISSUED BY BOULDER COUNTY, AND ANY OTHER APPLICABLE STATE OR FEDERAL LICENSE OR PERMIT. APPLICANTS ARE ENCOURAGED TO CREATE A DRY WORK SURFACE UNLESS THIS WOULD RESULT IN DRYING OUT A LARGE SECTION OF THE WATERWAY AND MAKING IT UNINHABITABLE BY AQUATIC LIFE.
3. WHEN WORK TAKES PLACE WITHIN A CHANNEL, A TEMPORARY WATER DIVERSION TO BYPASS THE WORK AREA IS GENERALLY REQUIRED TO STABILIZE THE WORK AREA AND CONTROL EROSION DURING CONSTRUCTION. DIVERSIONS TYPICALLY REQUIRE AN IMPERVIOUS LINER TO MINIMIZE SEEPAGE INTO THE WORK AREA.
4. DEWATERING OPERATIONS WILL BE REQUIRED AFTER THE DIVERSION IS IN PLACE TO MANAGE SEEPAGE AND ESTABLISH A DRY WORK SURFACE. THE WATER LEVEL AT THE WORK SITE SHOULD BE BELOW THE SUBGRADE AN AMOUNT SUFFICIENT TO PROVIDE A SOLID WORK SURFACE THAT RESISTS DEFORMATION DURING SUBGRADE COMPACTION.
5. ACCESS MUST BE PLANNED AND OBTAINED TO MINIMIZE ENTRY INTO THE WATERWAY AND DISTURBANCE TO THE CHANNEL. AN ENGINEERED TEMPORARY STREAM CROSSING MAY BE CONSTRUCTED ONLY WITH COUNTY APPROVAL WHEN AN ACTIVELY FLOWING WATERWAY NEEDS TO BE CROSSED REGULARLY BY CONSTRUCTION VEHICLES. DESIGN CONSIDERATIONS ARE INCLUDED IN VOLUME 3 OF THE USDCM.
6. CONSIDER HISTORICAL FLOW RECORDS FOR THE SUBJECT WATERWAY AND OTHER LOW-FLOW PERIODS THAT MAY BE CREATED BY DIVERSIONS/WATER DELIVERIES.
7. DURING CUT AND FILL OPERATIONS, AVOID LETTING WASTE OR EXCESS MATERIAL ENTER WATERWAYS OR PLACING IT ON UNSTABLE AREAS. EXCAVATED MATERIAL SHOULD BE CAREFULLY MOVED TO AREAS NEEDING FILL OR TO A STOCKPILE LOCATED OUTSIDE THE 100-YEAR FLOODPLAIN.

FINAL DESIGN PLANSET – ISSUED FOR BID

NO	DATE	BY	REVISION COMMENTS

Drawn EW | Checked EE | Date | Initial Issue Date

PREPARED FOR:

Boulder County Parks & Open Space

EROSION CONTROL PLAN OVERVIEW

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

Otak

371 Centennial Parkway
Suite 210
Louisville, Colorado 80027
Phone: 303-444-2273

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Project No. Drawing No.
EC1
Sheet No.

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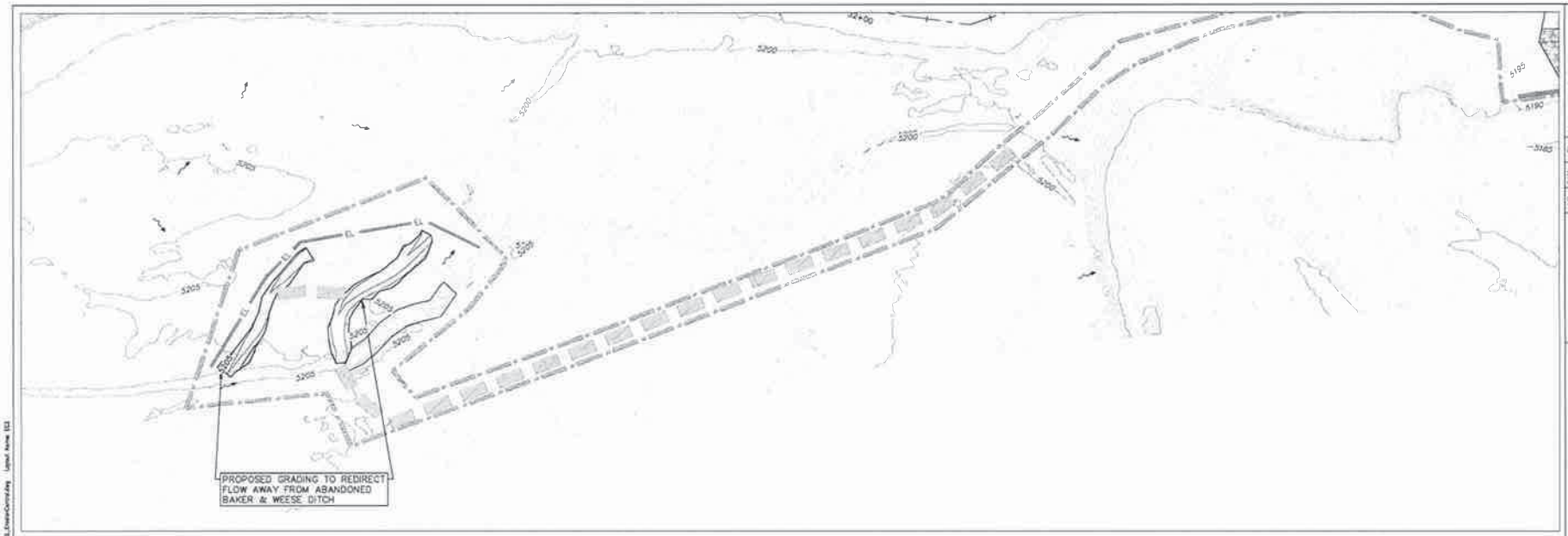

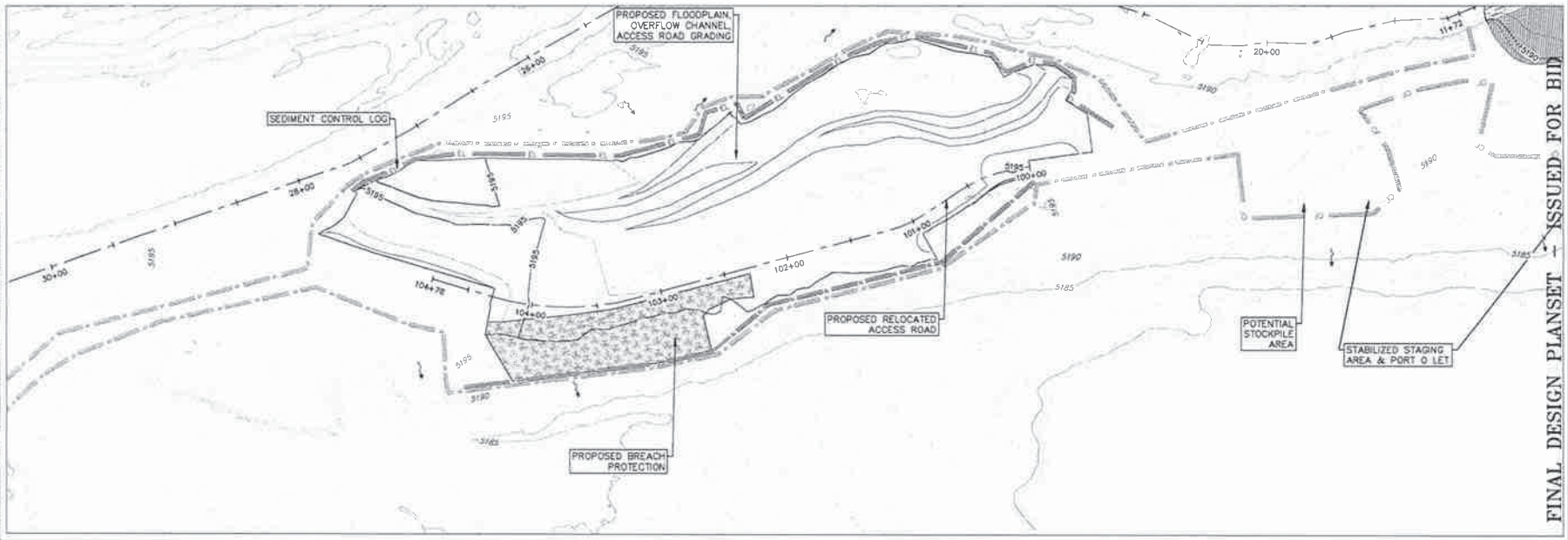

No	Date	By	Revision Comments

Design: RM
Drawn: AM
Reviewed: EL

PREPARED FOR:

Boulder County
Parks & Open Space

PRE-CONSTRUCTION CONTROL MEASURES 1

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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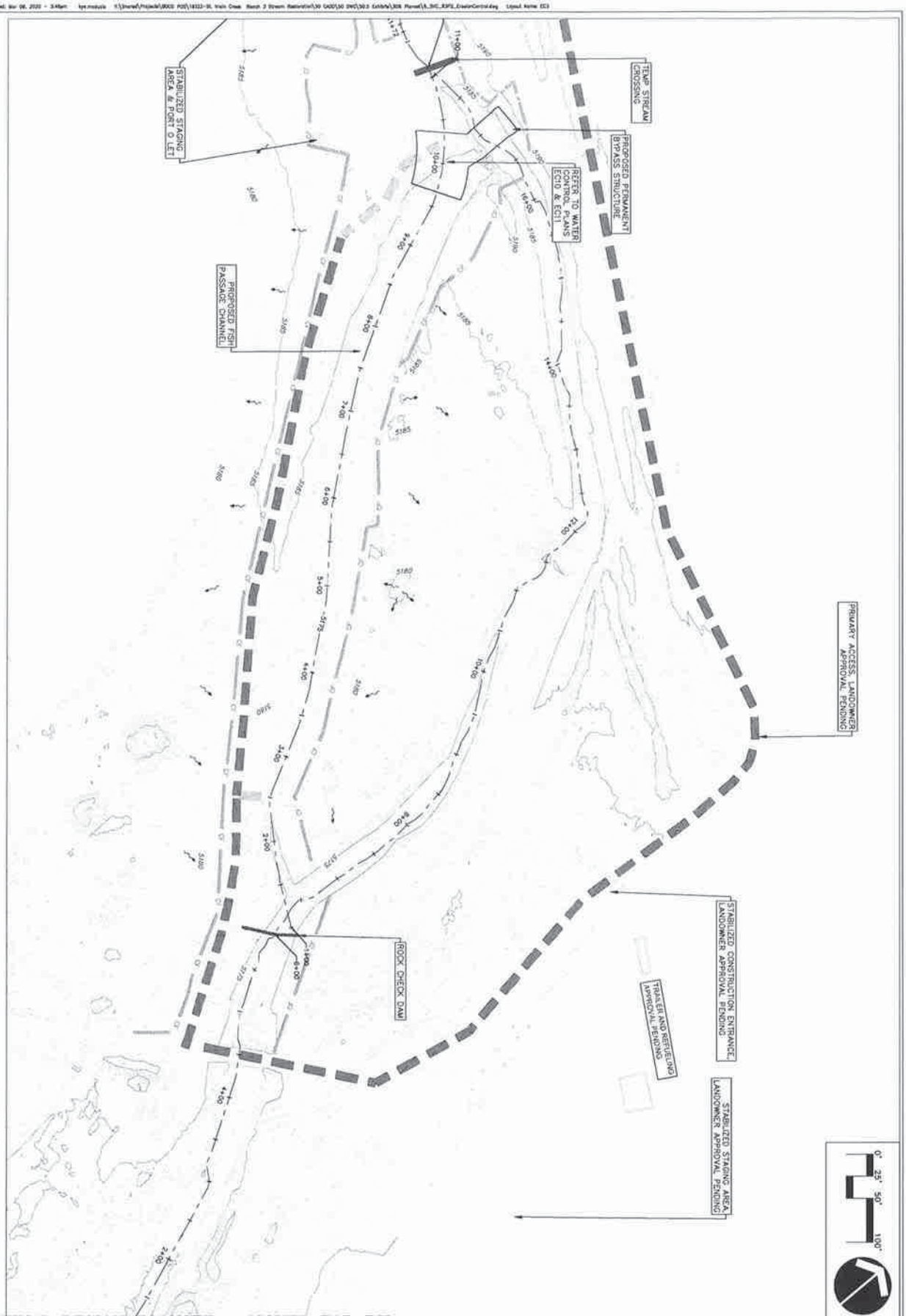

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PRE-CONSTRUCTION CONTROL MEASURES 2

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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2121 Continental Parkway
Suite 200
Louisville, Colorado 80027
Phone: 720-944-8215

PREPARED FOR: Boulder County Parks & Open Space

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RW	KW	TC		

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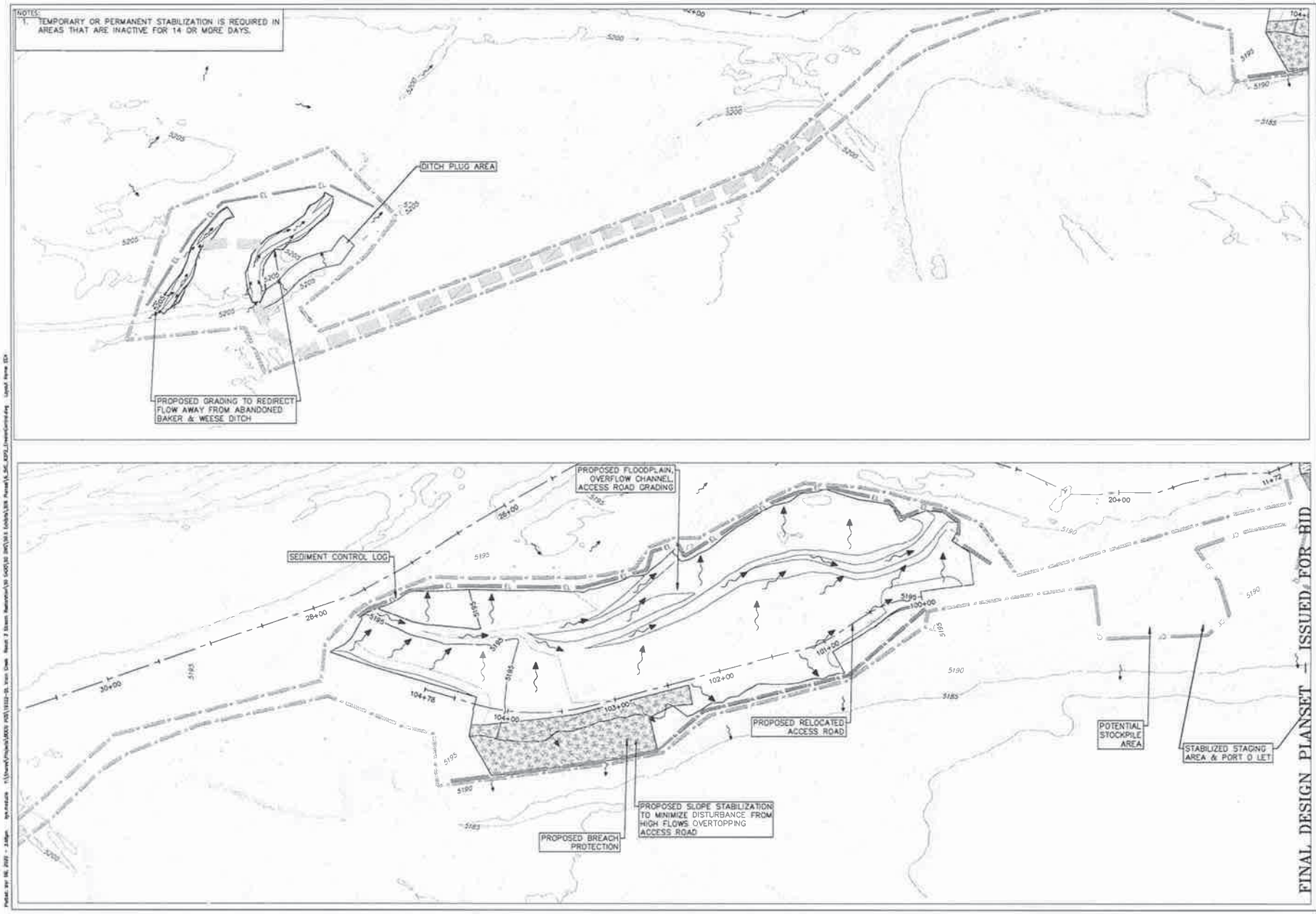
NOTES:
1. TEMPORARY OR PERMANENT STABILIZATION IS REQUIRED IN AREAS THAT ARE INACTIVE FOR 14 OR MORE DAYS.



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BW	KM	TE		

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CONTROL MEASURES DURING CONSTRUCTION 1

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

FINAL DESIGN PLANSET – ISSUED FOR BID

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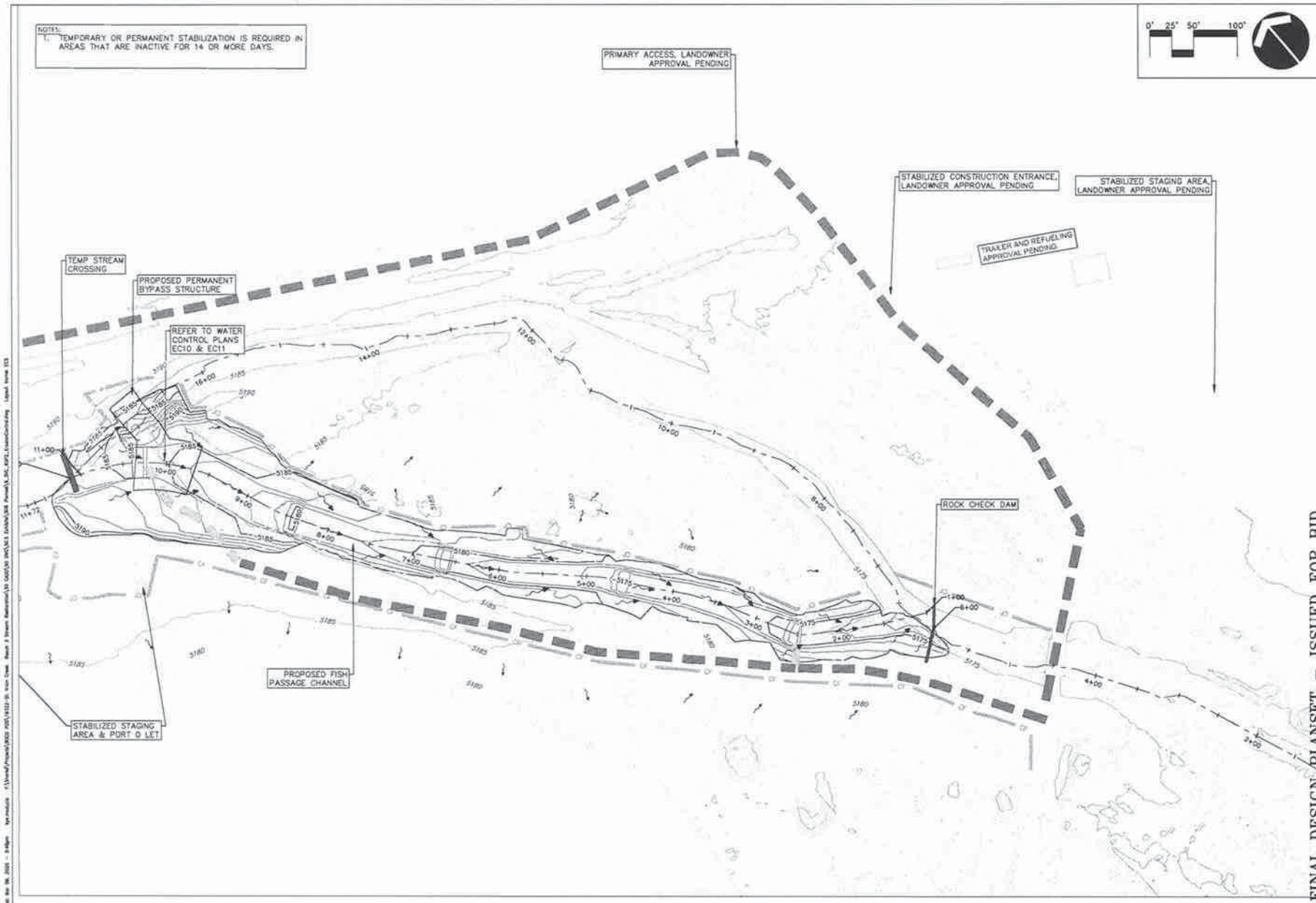
NOTES:
1. TEMPORARY OR PERMANENT STABILIZATION IS REQUIRED IN AREAS THAT ARE INACTIVE FOR 14 OR MORE DAYS.



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CONTROL MEASURES DURING CONSTRUCTION 2

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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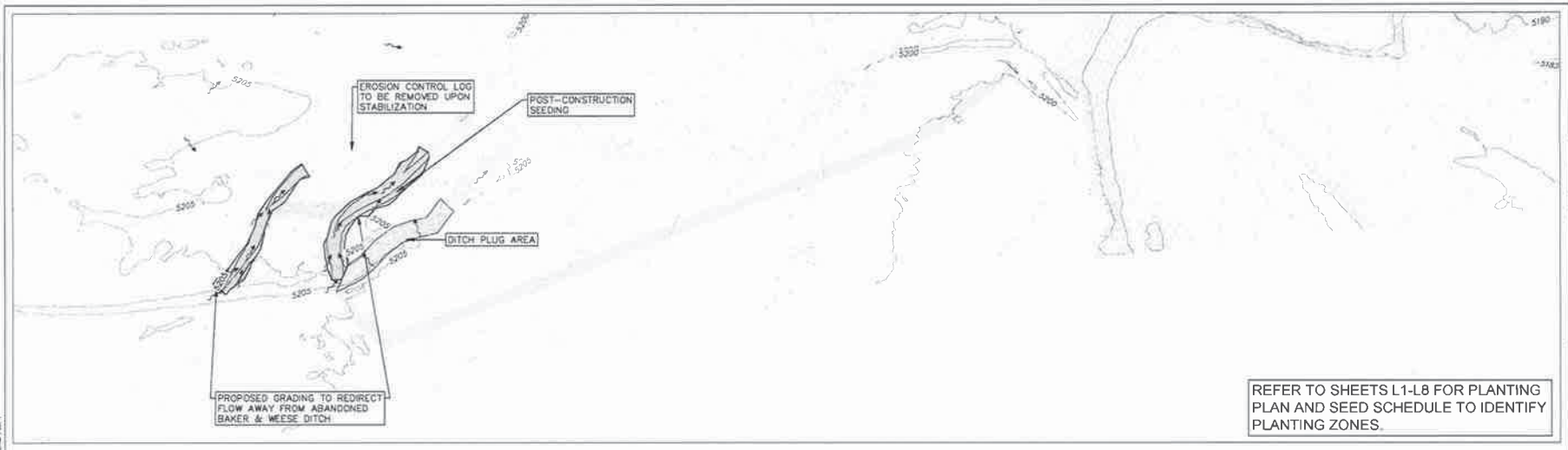

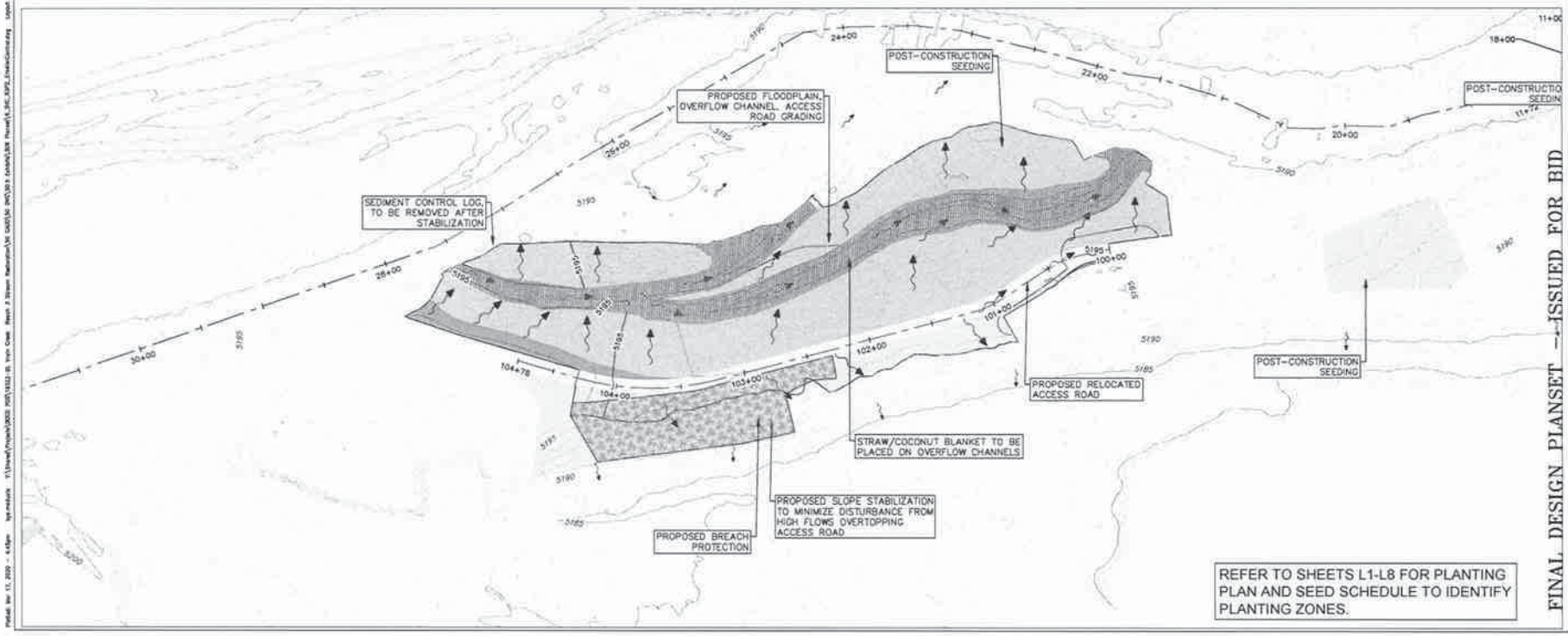

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CONTROL MEASURES POST-CONSTRUCTION PRE-STABILIZATION 1

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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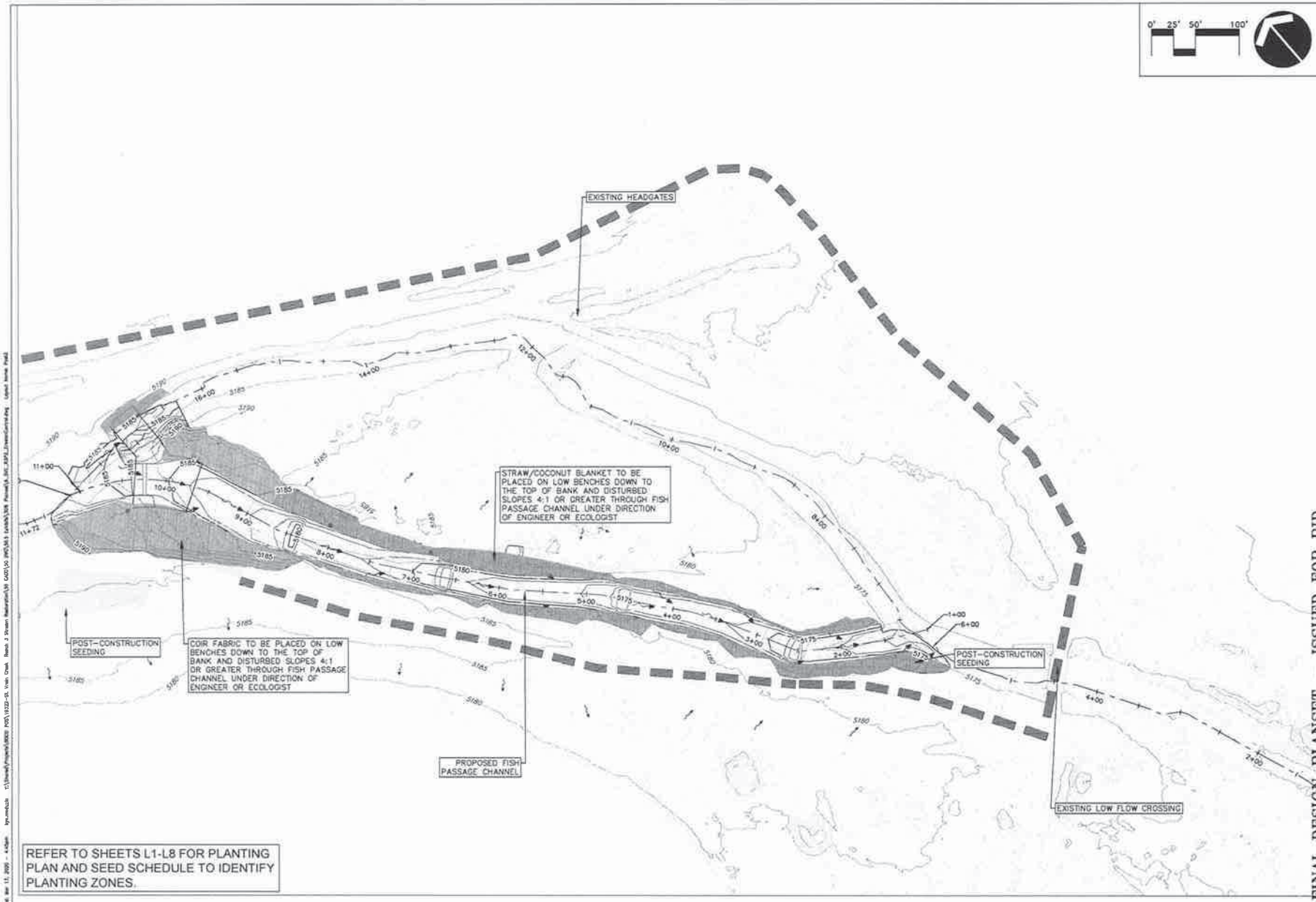

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FINAL DESIGN PLANSET – ISSUED FOR BID

CONTROL MEASURES POST-CONSTRUCTION PRE-STABILIZATION 2

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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General Care of Water Standard Notes

1. No construction equipment shall be operated below the existing water surface unless specifically authorized by the stormwater quality permit issued by Boulder County, and any other applicable local, state or federal license or permit.

2. The Contractor/permittee is responsible for all Care of Water including but not limited to designing, supplying, constructing, operating, and removing all care of water provision including coffer dams and sediment removal systems; designing, supplying, installing, maintaining, and removing protective works for winter operations of care of water systems.

3. The Contractor/permittee shall comply with all USACE 404 permit requirements including any special care requirements issued for this project.

4. When required the Contractor/permittee shall design temporary stream diversions to facilitate upstream fish passage. Instream velocities shall be limited to 2 ft/sec when this provision is required.

5. Care of water shall include provisions for handling groundwater, rainstorm runoff, snow, snowmelt, and ice that may enter the work area.

6. Protective works shall be designed by the Contractor/permittee as necessary to include enclosures, insulation, and heating systems to ensure that dewatering systems operate continuously and do not become frozen during cold weather.

7. The Contractor/permittee shall provide and maintain sediment ponds or other means, remove sediment from waters collected within active construction areas prior to allowing it to enter or return into the watercourse. Contractor/permittee shall dispose of sediments in a suitable offsite waste disposal facility.

8. The Contractor/permittee shall monitor water turbidity during construction activities and shall shut down works at times of excess turbidity in order to allow the water to clear prior to recommencement of in-stream work.

9. Turbidity is expected during placement and removal of water control. If waters become noticeably turbid, Contractor/permittees should promptly halt operations to allow waters to clear prior to resuming operations. Furthermore, shutdowns for silty or turbid water may be specified by the Engineer or the Owner's Representative, at their discretion.

10. In the event of unscheduled construction activity that results in a visually conspicuous plume of sediment, Contractor/permittee shall immediately notify the Engineer and undertake mitigation actions necessary to comply with the specified clean water criteria.

Coffer Dams Standard Notes

1. The Contractor/permittee is responsible for the final layout, configuration, maintenance, and removal in their entirety of all coffer dams to be constructed within the project site.

2. The Contractor/permittee is responsible for the reclamation, to original or better condition, of all areas impacted by the construction of coffer dams. Reclamation may include but is not limited to the restoration of stable slopes typically equal to or less than 3H:1V, installation of approved erosion control fabric, and installation of an approved native seed mix.

3. Cofferdams located in the waterway shall be placed in a manner to prevent their erosion from normal or expected high flows. Furthermore, they should be placed to a sufficient elevation to prevent their overtopping during reasonably anticipated flood events that may compromise the design and performance of the cofferdam.

4. The use of riprap or other protection measures on the surfaces of the cofferdam, including the toe of cofferdam slopes exposed to high velocities, is required.

5. All temporary fills must be removed in their entirety following construction activities and affected areas graded to proposed conditions.

6. Coffer dams shall provide a bypass waterway that is armored and of the minimum dimensions shown in the typical water control channel detail.

7. Any coffer dam failures or other works efforts that cause a plume of turbid water to flow downstream shall be reported to the Engineer.

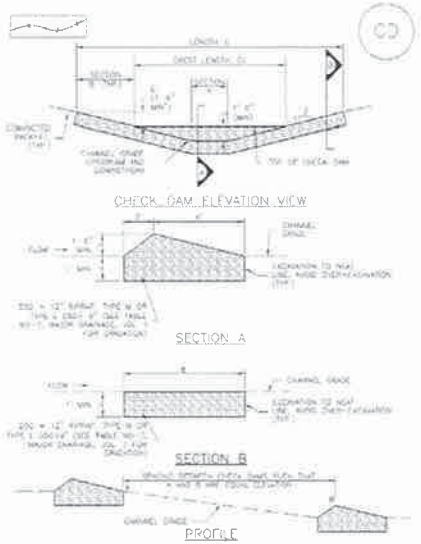
Heavy Equipment Operations and Maintenance Standard Notes

1. Equipment operated below the ordinary high water mark of the river channel, must be inspected and clean of fuel, lubricant leaks, and invasive aquatic species.

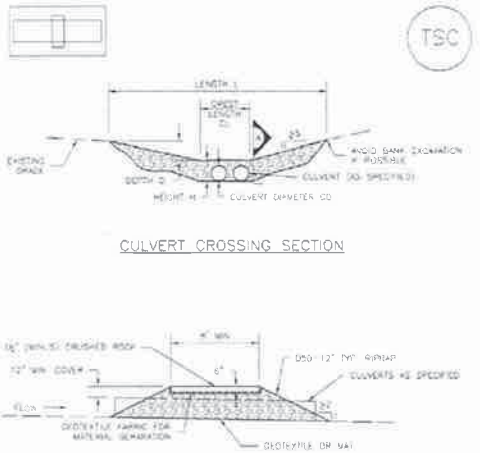
2. To minimize the spread of invasive species, all equipment shall be power-washed and free of weeds prior to its delivery to the project area 5 days prior to use. If equipment was used in another wet area within 10 days of initiating work, decontamination practices should be employed to minimize the spread of didymosphenia, New Zealand mud snails, whirling disease, zebra mussels, and other aquatic hitchhikers.

3. Equipment operating within or adjacent to any surface waters shall be free of fluid leaks.

Biodegradable hydraulic fluids shall be utilized for all equipment operating in surface waters. The Contractor/permittee shall submit a list of equipment operating with certified non-toxic, biodegradable hydraulic fluids to the engineer for approval prior to use. All fueling, oiling, or maintenance of equipment shall be performed in designated upland locations, with adequate CMs to contain potential spills.

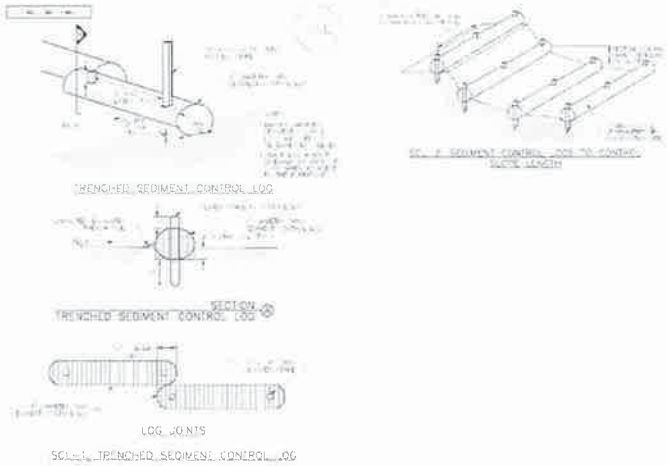


CD-1 CHECK DAM



TO BE SIZED AND SUBMITTED TO COUNTY ENGINEER (MIKE THOMAS, PUBLIC WORKS) FOR APPROVAL

TSC-1 CULVERT CROSSING



SC-1 TRENCHED SEDIMENT CONTROL LOG

SEDIMENT CONTROL LOG INSTALLATION NOTES

1. SEE PLAN VIEW FOR LOCATION AND LENGTH OF SEDIMENT CONTROL LOGS.

2. SEDIMENT CONTROL LOGS THAT ACT AS A PERIMETER CONTROL SHALL BE INSTALLED PRIOR TO ANY UPGRADIENT LAND-DISTURBING ACTIVITIES.

3. SEDIMENT CONTROL LOGS SHALL CONSIST OF STRAW, COMPOST, EXCELSIOR OR COCONUT FIBER, AND SHALL BE FREE OF ANY NOXIOUS WEED SEEDS OR DEBRIS INCLUDING WIRE, NAILS AND GRAVEL.

4. SEDIMENT CONTROL LOGS MAY BE USED AS SMALL CHECK DAMS IN DITCHES AND SWALES; HOWEVER, THEY SHOULD NOT BE USED IN PERENNIAL STREAMS.

5. IT IS RECOMMENDED THAT SEDIMENT CONTROL LOGS BE TRENCHED INTO THE GROUND TO A DEPTH OF APPROXIMATELY 1/3 OF THE DIAMETER OF THE LOG. IF TRENCHING TO THIS DEPTH IS NOT FEASIBLE AND ON DESIRABLE (SHORT TERM) INSTALLATION WITH LESSER NOT TO DAMAGE LANDSCAPE) A LESSER TRENCHING DEPTH MAY BE ACCEPTABLE WITH MORE ROBUST STAKING. COMPOST LOGS THAT ARE 9 LB/FT OR MORE NEED TO BE TRENCHED.

6. THE UPHILL SIDE OF THE SEDIMENT CONTROL LOG SHALL BE BACKFILLED WITH SOIL OR FILTER MATERIAL THAT IS FREE OF ROCKS AND DEBRIS. THE SOIL SHALL BE LIGHTLY COMPACTED INTO THE SHAPE OF A RIGHT TRIANGLE USING A SHOVEL OR WEIGHTED LAWN ROLLER OR BLOWN IN PLACE.

7. FOLLOW MANUFACTURER GUIDANCE FOR INSTALL. IF MANUFACTURER INSTRUCTIONS DO NOT SPECIFY STAKING, STAKES SHALL BE PLACED ON 4' CENTERS AND EMBEDDED A MINIMUM OF 6" INTO THE GROUND. 3" OF THE STAKE SHALL PROTRUDE FROM THE TOP OF THE LOG. STAKES THAT ARE BROKEN DURING INSTALLATION SHALL BE REPLACED. COMPOST LOGS SHOULD BE STAKED 10" ON CENTER.

SEDIMENT CONTROL LOG MAINTENANCE NOTES

1. INSPECT BMPS EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPS SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPS AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.

2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPS IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.

3. WHERE BMPS HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.

4. SEDIMENT ACCUMULATED UPSTREAM OF SEDIMENT CONTROL LOG SHALL BE REMOVED AS NEEDED TO MAINTAIN FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY 1/2 OF THE HEIGHT OF THE SEDIMENT CONTROL LOG.

5. SEDIMENT CONTROL LOG SHALL BE REMOVED AT THE END OF CONSTRUCTION. COMPOST FROM COMPOST LOGS MAY BE LEFT IN PLACE AS LONG AS BARE AND REMOVED AND THE AREA SEEDED IF DISTURBED AREAS EXIST AFTER REMOVAL. THEY SHALL BE COVERED WITH TOP SOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

[illegible] FROM [illegible] COUNTY, COLORADO, BRIGHTON COUNTY, COLORADO, BOULDER COUNTY, COLORADO AND CITY OF AURORA, COLORADO, NOT AVAILABLE IN AUTOCAD.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM LOCATION STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

NOTE: TERMS BMP AND CM ARE INTERCHANGEABLE

NO.	DATE	BY	REVISION COMMENTS

Design: [illegible] Drawn: [illegible] Checked: [illegible] Date: [illegible] Issue Date:

PREPARED FOR:

Boulder County Parks & Open Space

CONTROL MEASURE DETAILS

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

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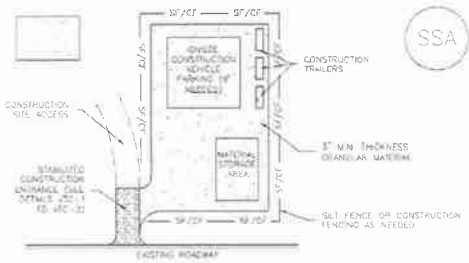


SSA-1. STABILIZED STAGING AREA

STABILIZED STAGING AREA INSTALLATION NOTES

1. SEE PLAN VIEW FOR
   - LOCATION OF STAGING AREA(S)
   - CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM THE LOCAL JURISDICTION
2. STABILIZED STAGING AREA SHOULD BE APPROPRIATE FOR THE NEEDS OF THE SITE. OVERSIZING RESULTS IN A LARGER AREA TO STABILIZE FOLLOWING CONSTRUCTION
3. STAGING AREA SHALL BE STABILIZED PRIOR TO OTHER OPERATIONS ON THE SITE.
4. THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM 3" THICK GRANULAR MATERIAL
5. UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT SECT #703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK
6. ADDITIONAL PERIMETER BMPs MAY BE REQUIRED INCLUDING BUT NOT LIMITED TO SILT FENCE AND CONSTRUCTION FENCING

STABILIZED STAGING AREA MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. ROCK SHALL BE REAPPLIED OR REGRADED AS NECESSARY IF RUTTING OCCURS OR UNDERLYING SUBGRADE BECOMES EXPOSED.

STABILIZED STAGING AREA MAINTENANCE NOTES

5. STABILIZED STAGING AREA SHALL BE ENLARGED IF NECESSARY TO CONTAIN PARKING, STORAGE, AND UNLOADING/LOADING OPERATIONS.
6. THE STABILIZED STAGING AREA SHALL BE REMOVED AT THE END OF CONSTRUCTION. THE GRANULAR MATERIAL SHALL BE REMOVED OR, IF APPROVED BY THE LOCAL JURISDICTION, USED ON SITE, AND THE AREA COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY LOCAL JURISDICTION.

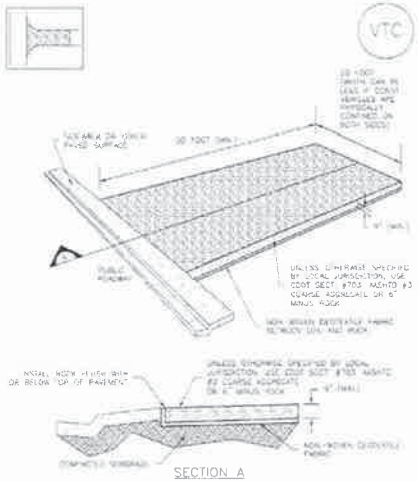
NOTE: MANY MUNICIPALITIES PROHIBIT THE USE OF RECYCLED CONCRETE AS GRANULAR MATERIAL FOR STABILIZED STAGING AREAS DUE TO DIFFICULTIES WITH RE-ESTABLISHMENT OF VEGETATION IN AREAS WHERE RECYCLED CONCRETE WAS PLACED.

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

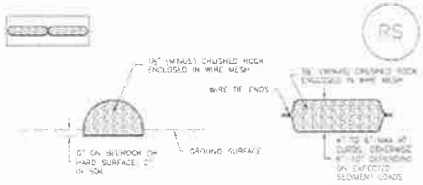
DETAILS ADAPTED FROM BOULDER COUNTY, COLORADO; NOT AVAILABLE IN AUTOCAD

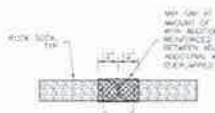
DETAIL SSA-1 ONLY APPLIES TO LARGE STAGING AREA AT NORTHEAST AREA OF PROJECT SITE

STABILIZATION OF THE STAGING AREAS NEAR THE BYPASS STRUCTURE (MODIFIED STABILIZED STAGING AREAS) SHALL INCLUDE STOCKPILE STABILIZATION AND PERIMETER SILT FENCING ONLY



VTC-1. AGGREGATE VEHICLE TRACKING CONTROL





GRADATION TABLE	
SIEVE SIZE	WEIGHT PERCENT PASSING SQUARE MESH SIEVES
	AS 1
3"	100
1½"	90 - 100
1"	20 - 55
¾"	0 - 15
⅜"	0 - 5
MATCHES SPECIFICATIONS FOR NO. 4 COARSE AGGREGATE FOR CONCRETE PER AASHTO. MAT ALL ROCK SHALL BE FRACTURED FACE. ALL SIDES	

ROCK SOCK INSTALLATION NOTES

1. SEE PLAN VIEW FOR LOCATION(S) OF ROCK SOCKS
2. CRUSHED ROCK SHALL BE 1½" (MINUS) IN SIZE WITH A FRACTURED FACE (ALL SIDES) AND SHALL COMPLY WITH GRADATION SHOWN ON THIS SHEET (1½" MINUS).
3. WIRE MESH SHALL BE FABRICATED OF 16 GAGE POULTRY MESH OR EQUIVALENT WITH A MAXIMUM OPENING OF ½". RECOMMENDED MINIMUM ROLL WIDTH OF 48".
4. WIRE MESH SHALL BE SECURED USING TWO WIRES OR WIRE TIES AT 6" CENTERS ALONG ALL JOINTS AND AT 2" CENTERS ON ENDS OF SOCKS.
5. SOME MUNICIPALITIES MAY ALLOW THE USE OF FILTER FABRIC AS AN ALTERNATIVE TO WIRE MESH FOR THE ROCK ENCLOSURE.

RS-1. ROCK SOCK PERIMETER CONTROL

ROCK SOCK MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. ROCK SOCKS SHALL BE REPLACED IF THEY BECOME HEAVILY SOILED, OR DAMAGED BEYOND REPAIR.
5. SEDIMENT ACCUMULATED UPSTREAM OF ROCK SOCKS SHALL BE REMOVED AS NEEDED TO MAINTAIN FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY ½ OF THE HEIGHT OF THE ROCK SOCK.
6. ROCK SOCKS ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION.
7. WHEN ROCK SOCKS ARE REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.

DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO AND CITY OF AURORA, COLORADO; NOT AVAILABLE IN AUTOCAD

NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

NOTE: THE DETAILS INCLUDED WITH THIS FACT SHEET SHOW COMMONLY USED, CONVENTIONAL METHODS OF ROCK SOCK INSTALLATION IN THE DENVER METROPOLITAN AREA. THERE ARE MANY OTHER SIMILAR PROPRIETARY PRODUCTS ON THE MARKET. UDFCD NEITHER NOMINATES NOR DISCOURAGES USE OF PROPRIETARY PROTECTION PRODUCTS. HOWEVER, IN THE EVENT PROPRIETARY METHODS ARE USED, THE APPROPRIATE DETAIL FROM THE MANUFACTURER MUST BE INCLUDED IN THE SWMP AND THE BMP MUST BE INSTALLED AND MAINTAINED AS SHOWN IN THE MANUFACTURER'S DETAILS.

NO.	DATE	BY	REVISION COMMENTS
1	8/31/18	BM	CONCEPTUAL DESIGN
2	9/21/18	BM	30% DESIGN
3	12/21/18	BM	DRAFT FINAL
4	1/16/19	BM	BID DESIGN
Design	Drawn	Checked	Date / Initial / Issue Date
BM	KM	TE	

PREPARED FOR:

Boulder County Parks & Open Space

FINAL DESIGN PLANSET – ISSUED FOR BID

CONTROL MEASURE DETAILS

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

Otak

371 Centennial Parkway
Suite 200
Louisville, Colorado 80027
Phone: 720-444-8010

19322
Project No. Drawing No.
EC9
Sheet No.

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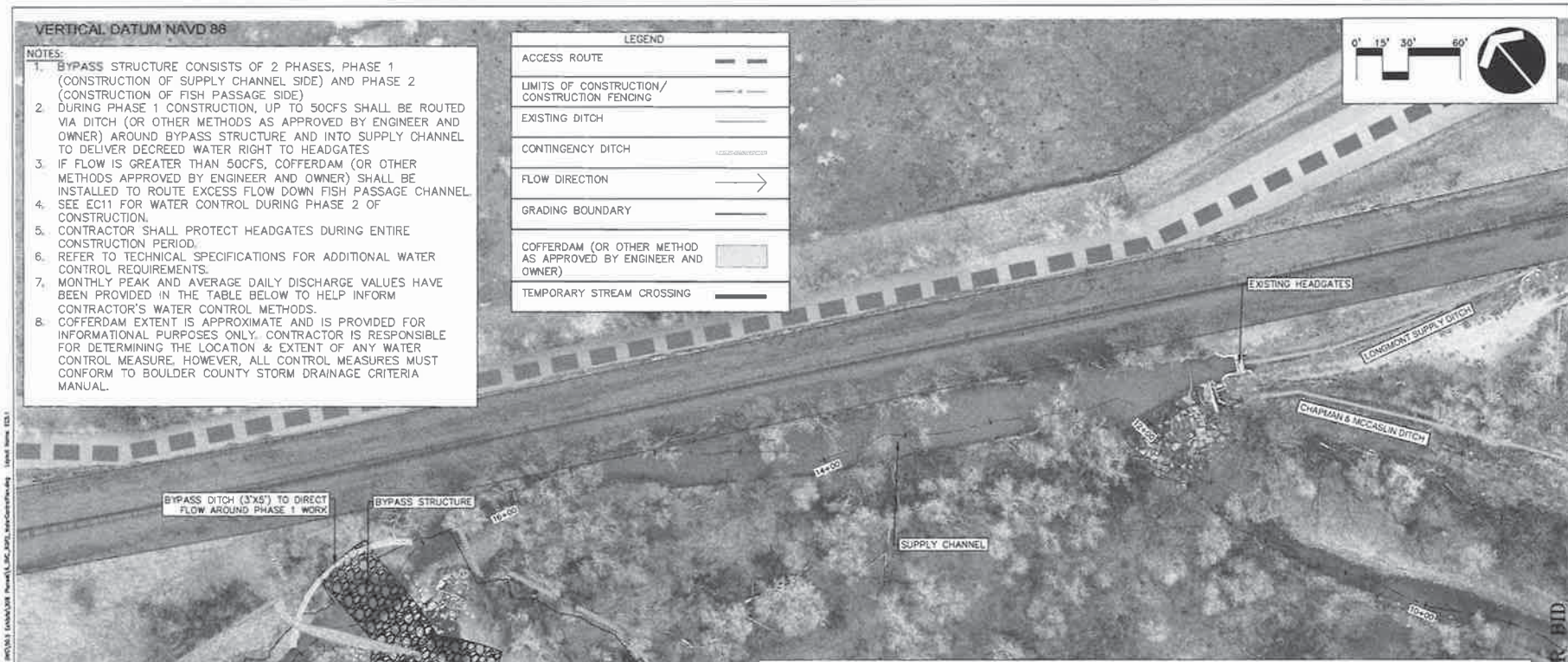
VERTICAL DATUM NAVD 88

NOTES:
1. BYPASS STRUCTURE CONSISTS OF 2 PHASES, PHASE 1 (CONSTRUCTION OF SUPPLY CHANNEL SIDE) AND PHASE 2 (CONSTRUCTION OF FISH PASSAGE SIDE)
2. DURING PHASE 1 CONSTRUCTION, UP TO 50CFS SHALL BE ROUTED VIA DITCH (OR OTHER METHODS AS APPROVED BY ENGINEER AND OWNER) AROUND BYPASS STRUCTURE AND INTO SUPPLY CHANNEL TO DELIVER DECREED WATER RIGHT TO HEADGATES
3. IF FLOW IS GREATER THAN 50CFS, COFFERDAM (OR OTHER METHODS APPROVED BY ENGINEER AND OWNER) SHALL BE INSTALLED TO ROUTE EXCESS FLOW DOWN FISH PASSAGE CHANNEL.
4. SEE EC11 FOR WATER CONTROL DURING PHASE 2 OF CONSTRUCTION.
5. CONTRACTOR SHALL PROTECT HEADGATES DURING ENTIRE CONSTRUCTION PERIOD.
6. REFER TO TECHNICAL SPECIFICATIONS FOR ADDITIONAL WATER CONTROL REQUIREMENTS.
7. MONTHLY PEAK AND AVERAGE DAILY DISCHARGE VALUES HAVE BEEN PROVIDED IN THE TABLE BELOW TO HELP INFORM CONTRACTOR'S WATER CONTROL METHODS.
8. COFFERDAM EXTENT IS APPROXIMATE AND IS PROVIDED FOR INFORMATIONAL PURPOSES ONLY. CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION & EXTENT OF ANY WATER CONTROL MEASURE, HOWEVER, ALL CONTROL MEASURES MUST CONFORM TO BOULDER COUNTY STORM DRAINAGE CRITERIA MANUAL.

LEGEND
- ACCESS ROUTE
- LIMITS OF CONSTRUCTION/ CONSTRUCTION FENCING
- EXISTING DITCH
- CONTINGENCY DITCH
- FLOW DIRECTION
- GRADING BOUNDARY
- COFFERDAM (OR OTHER METHOD AS APPROVED BY ENGINEER AND OWNER)
- TEMPORARY STREAM CROSSING



Flows at SAINT VRAIN CREEK AT LYONS, CO, DWR gauge station (in CFS)

Year	January		February		March		April		May		June	
	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg
2011	22	18	21	17	29	22	76	42	516	217	960	658
2012	25	23	24	20	39	28	135	70	142	111	293	163
2013	24	18	20	16	32	23	156	48	432	302	618	374
2014	35	31	35	30	53	41	376	148	1240	448	1320	761
2015	18	14	18	14	35	26	306	116	1150	655	1380	927
2016	23	21	25	22	63	32	229	107	395	275	872	551
2017	26	22	27	20	68	39	119	88	874	366	923	658
2018	20	17	18	12	22	12	95	47	533	308	530	294
2019	33	23	32	18	35	24	153	69	156	141	974	500

	July		August		September		October		November		December	
	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg	Peak	Avg
2011	1050	722	361	195	129	81	48	34	46	37	40	24
2012	303	142	106	51	63	26	43	30	20	13	20	17
2013	326	191	92	59	450	89	257	155	92	60	50	45
2014	460	335	422	166	100	76	86	57	33	24	21	18
2015	694	331	142	107	47	28	41	35	37	26	24	24
2016	281	165	86	73	72	36	23	21	22	20	23	21
2017	406	318	210	135	73	50	73	45	45	33	31	21
2018	143	110	59	43	55	26	39	31	28	21	26	22
2019	988	506	199	133	98	52	37	28	-	-	-	-

NO.	DATE	BY	REVISION COMMENTS	Drawn	Drawn	Checked	Date	Initial Issue Date
				RW	RW	RE		

PREPARED FOR:
Boulder County Parks & Open Space

FINAL DESIGN PLANSET – ISSUED FOR BID

PHASE 1 WATER CONTROL PLAN

ST. VRAIN CREEK REACH 3 PHASE 2
BOULDER COUNTY PARKS & OPEN SPACE

Otak
371 Centennial Parkway
Suite 210
Louisville, Colorado 80027
Phone: 303-444-8373

19322
Project No. Drawing No.
EC10
Sheet No.

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VERTICAL DATUM NAVD 88

NOTES:
1. BYPASS STRUCTURE CONSISTS OF 2 PHASES, PHASE 1 (CONSTRUCTION OF SUPPLY CHANNEL SIDE) AND PHASE 2 (CONSTRUCTION OF FISH PASSAGE SIDE)
2. DURING PHASE 2 FLOW SHALL BE ROUTED INTO THE SUPPLY CHANNEL TO ENABLE CONSTRUCTION OF THE FISH PASSAGE CHANNEL IN THE DRY.
3. CONTRACTOR SHALL PROTECT HEADGATES DURING ENTIRE CONSTRUCTION PERIOD.
4. SEE EC10 FOR WATER CONTROL DURING PHASE 1 OF CONSTRUCTION
5. REFER TO TECHNICAL SPECIFICATIONS FOR ADDITIONAL WATER CONTROL REQUIREMENTS.
6. MONTHLY PEAK AND AVERAGE DAILY DISCHARGE VALUES HAVE BEEN PROVIDED IN THE TABLE BELOW TO HELP INFORM CONTRACTOR'S WATER CONTROL METHODS.
7. COFFERDAM EXTENT IS APPROXIMATE AND IS PROVIDED FOR INFORMATIONAL PURPOSES ONLY. CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE LOCATION & EXTENT OF ANY WATER CONTROL MEASURE. HOWEVER, ALL CONTROL MEASURES MUST CONFORM TO BOULDER COUNTY STORM DRAINAGE CRITERIA MANUAL.

LEGEND
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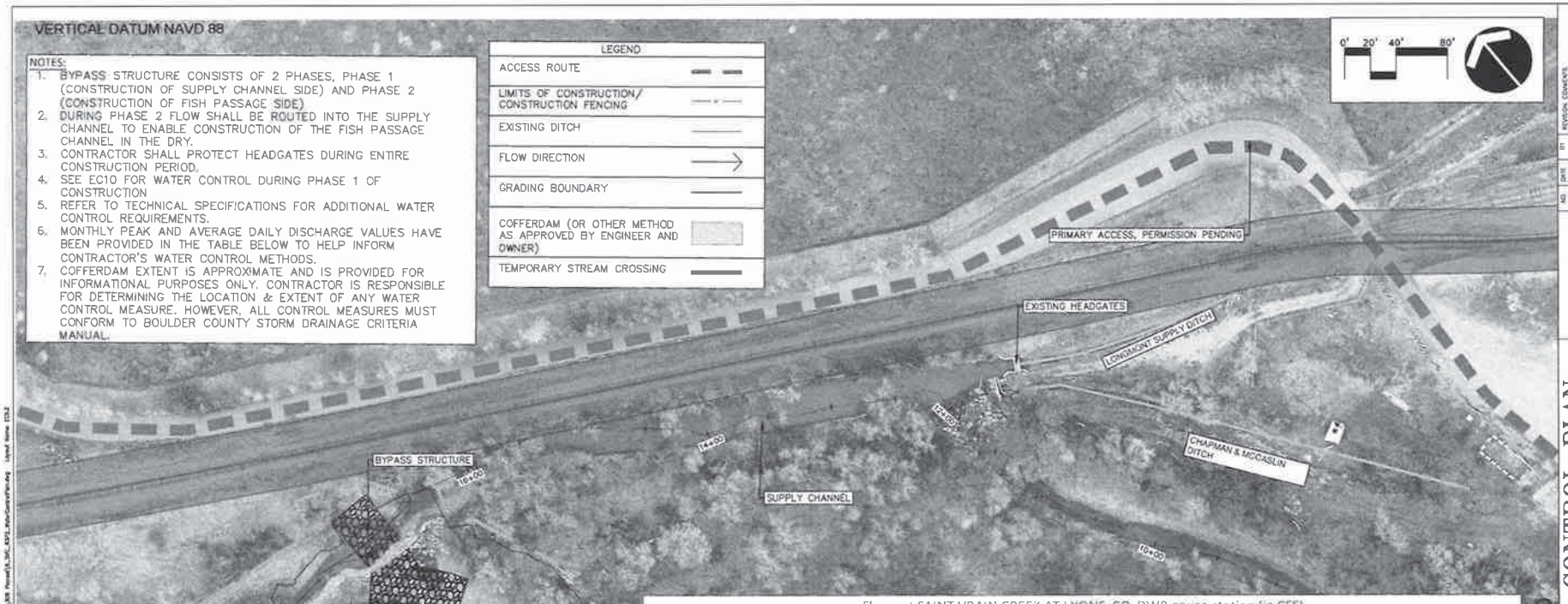
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PRIMARY ACCESS, PERMISSION PENDING
EXISTING HEADGATES
LONGMONT SUPPLY DITCH
CHAPMAN & MCCASLIN DITCH
BYPASS STRUCTURE
SUPPLY CHANNEL
FISH PASSAGE CHANNEL
14+00
16+00
18+00
20+00
18+00
18+00
18

Certificate Of Completion

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Subject: OFS# 200933 MOU AMD 1 Longmont Supply Ditch Company and Chapman & McCaslin Ditch $0

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Department/Office: Oracle

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Certificate Pages: 6 | Initials: 0 | Renee Bookless

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Signer Events	Signature	Timestamp
Alexandra Vorbeck alexvorbeck@gmail.com Shareholder Alexandra vorbeck Security Level: Email, Account Authentication (None)	Alexandra Vorbeck Signature Adoption: Pre-selected Style Using IP Address: 67.44.160.83	Sent: 4/18/2020 3:27:00 PM Resent: 4/20/2020 1:52:00 PM Resent: 4/28/2020 5:39:52 PM Viewed: 5/1/2020 11:15:15 AM Signed: 5/1/2020 11:16:55 AM
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Diane Dodge dianedodge27@gmail.com Shareholder Security Level: Email, Account Authentication (None)	Diane Dodge Signature Adoption: Pre-selected Style Using IP Address: 64.234.252.38	Sent: 4/18/2020 3:27:00 PM Resent: 4/20/2020 1:52:01 PM Viewed: 4/21/2020 1:21:00 PM Signed: 4/21/2020 1:21:51 PM
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James Hepp jim@blackfoxllc.com Shareholder Security Level: Email, Account Authentication (None)	James Hepp Signature Adoption: Pre-selected Style Using IP Address: 72.19.133.227	Sent: 4/18/2020 3:27:00 PM Resent: 4/20/2020 1:52:01 PM Viewed: 4/20/2020 2:45:40 PM Signed: 4/20/2020 3:33:53 PM
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Signer Events	Signature	Timestamp
Kevin Boden kevin.boden@longmontcolorado.gov President Security Level: Email, Account Authentication (None)	Signature Adoption: Drawn on Device Using IP Address: 161.97.234.5 Signed using mobile	Sent: 4/18/2020 3:27:00 PM Viewed: 4/20/2020 11:08:38 AM Signed: 4/20/2020 11:13:05 AM
Electronic Record and Signature Disclosure: Accepted: 4/20/2020 11:08:38 AM ID: fef4c808-9fcd-4cdb-aacb-98da1a4468ad Company Name: Boulder County		
Larry Beck larrybeckbarh@gmail.com President Security Level: Email, Account Authentication (None)	Signature Adoption: Pre-selected Style Using IP Address: 72.168.176.255	Sent: 4/18/2020 3:27:00 PM Viewed: 4/19/2020 12:23:54 PM Signed: 4/19/2020 12:41:08 PM
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Laura Lichter llichter@lichterimmigration.com Shareholder Lichter & Associates, PC, d/b/a Lichter Immigration Security Level: Email, Account Authentication (None)	Signature Adoption: Pre-selected Style Using IP Address: 64.234.252.229	Sent: 4/18/2020 3:27:00 PM Resent: 4/20/2020 1:52:01 PM Resent: 4/28/2020 5:39:52 PM Viewed: 5/14/2020 8:45:23 PM Signed: 5/14/2020 8:46:24 PM
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Lowell Dodge goodwoods@aol.com Shareholder Security Level: Email, Account Authentication (None)	Signature Adoption: Pre-selected Style Using IP Address: 64.234.252.38	Sent: 4/18/2020 3:27:00 PM Resent: 4/20/2020 1:52:01 PM Viewed: 4/21/2020 1:18:11 PM Signed: 4/21/2020 1:20:05 PM
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Matt Condon tracku@gmail.com Shareholder Security Level: Email, Account Authentication (None)	Signature Adoption: Pre-selected Style Using IP Address: 185.9.18.83	Sent: 4/18/2020 3:27:01 PM Viewed: 4/18/2020 7:05:38 PM Signed: 4/18/2020 7:12:12 PM
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Eric M. Lane elane@bouldercounty.org Director Boulder County Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Accepted: 5/16/2019 12:54:52 PM ID: 0f210aa3-d448-4d0f-bcae-2fcca02d7fd2 Company Name: Boulder County	Eric M. Lane Signature Adoption: Pre-selected Style Using IP Address: 161.97.236.107	Sent: 5/19/2020 4:53:03 PM Viewed: 5/19/2020 4:57:11 PM Signed: 5/19/2020 4:58:56 PM

In Person Signer Events	Signature	Timestamp

Editor Delivery Events	Status	Timestamp

Agent Delivery Events	Status	Timestamp

Intermediary Delivery Events	Status	Timestamp

Certified Delivery Events	Status	Timestamp

Carbon Copy Events	Status	Timestamp
Sharla Benjamin sbenjamin@bouldercounty.org Boulder County Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Accepted: 11/25/2019 5:47:09 PM ID: 501a0d25-d038-405d-b22e-d926f92136c2 Company Name: Boulder County	COPIED	Sent: 5/19/2020 4:59:00 PM Viewed: 5/19/2020 5:00:22 PM

Witness Events	Signature	Timestamp

Notary Events	Signature	Timestamp

Envelope Summary Events	Status	Timestamps
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Certified Delivered	Security Checked	5/19/2020 4:59:00 PM
Signing Complete	Security Checked	5/19/2020 4:59:00 PM
Completed	Security Checked	5/19/2020 4:59:00 PM

Payment Events	Status	Timestamps

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- Until or unless you notify Boulder County as described above, you consent to receive exclusively through electronic means all notices, disclosures, authorizations, acknowledgements, and other documents that are required to be provided or made available to you by Boulder County during the course of your relationship with Boulder County.