

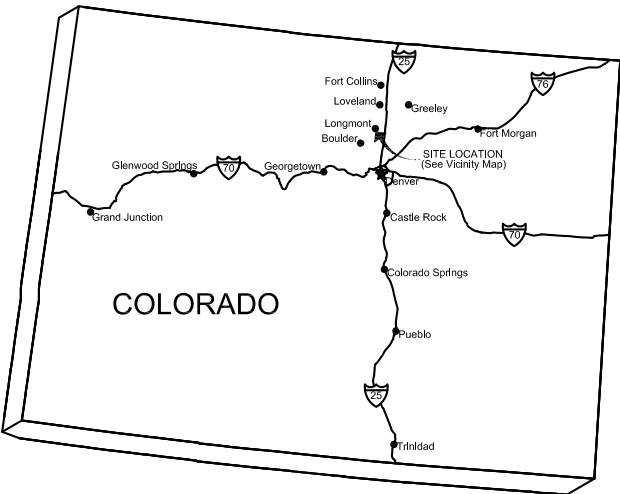
# ST VRAIN CREEK REACH 3

PREPARED FOR  
BOULDER COUNTY PARKS AND OPEN SPACE  
BOULDER COUNTY, COLORADO

PREPARED BY



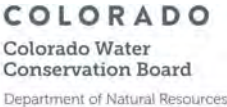
## STATE MAP



NOT TO SCALE

## PREPARED FOR

BOULDER COUNTY PARKS AND OPEN SPACE  
5201 SAINT VRAIN RD.  
LONGMONT, CO, 80503



## CERTIFICATES

I HEREBY CERTIFY THAT THESE PLANS FOR ST VRAIN CREEK REACH 3 WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION FOR THE OWNER THEREOF.

LESTER CLINTON BROWN, PE 40189

I, ERIC LANE, DIRECTOR OF BOULDER COUNTY PARKS AND OPEN SPACE, OWNER, ON BEHALF OF THE OWNERS, HEREBY ACCEPT THESE PLANS FOR ST VRAIN CREEK REACH 3.

DIRECTOR

I HEREBY CERTIFY TO THE BEST OF MY PROFESSIONAL KNOWLEDGE, JUDGEMENT AND BELIEF, THESE PLANS MEET APPLICABLE NRCS STANDARDS. NRCS-CO EWP PROJECT ENGINEERING GUIDANCE, 1/26/2016.



LESTER CLINTON BROWN, PE 40189

ALL WORK UNDER CONTRACT WAS INSTALLED ACCORDING TO THE AS-BUILT DRAWINGS AND SPECIFICATIONS, AND THE AS-BUILT DRWAINGS ARE A TRUE AND CORRECT RECORD.

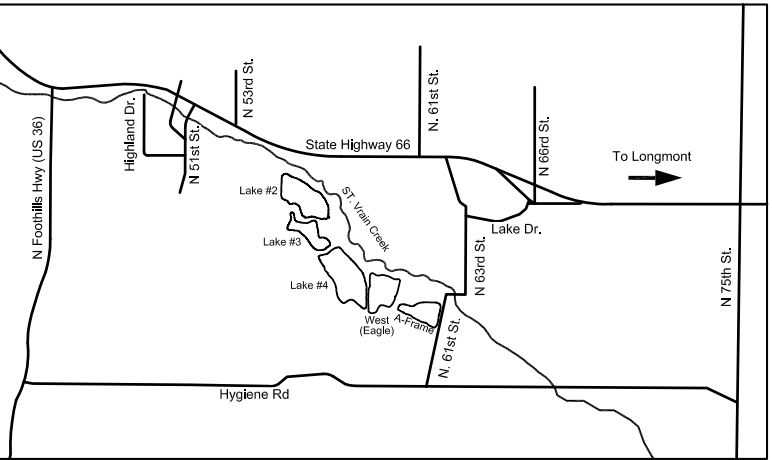


LESTER CLINTON BROWN, PE 40189

## VICINITY MAP



SCALE IN MILES  
0 1/2



CONTRACTOR: AMERICAN CIVIL CONTRACTORS  
CONTRACT NO.: 18-797  
CONTRACT DATE: AUGUST 1, 2017  
CONSTRUCTION COMPLETION DATE: MAY 25, 2018  
CONTRACT AMOUNT (FINAL): \$4,719,084.81  
Q.A. CONSULTANT: ENGINEERING ANALYTICS, INC.

**AS-BUILT**  
6/19/2018

GENERAL NOTES

1. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE UTILITIES PRIOR TO CONSTRUCTION. CALL COLORADO ONE CALL BEFORE YOU DIG (UTILITY LOCATES) 1-800-922-1987 OR 811.
2. CONTRACTOR MUST ENSURE THAT ALL EXISTING UTILITIES, ONSITE STRUCTURES, ADJACENT STRUCTURES AND SITES ARE PROTECTED DURING CONSTRUCTION. IT IS THE CONTRACTORS RESPONSIBILITY TO MAKE SURE ALL DAMAGE IS REPAIRED.
3. CONTRACTOR MUST ENSURE THAT ALL ENVIRONMENTAL CONDITIONS ARE PROTECTED THROUGHOUT CONSTRUCTION AND THE SITE IS RESTORED TO AN ACCEPTABLE STATE BY THE ENGINEER AND/OR COUNTY.
4. PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES, CONTRACTOR SHALL OBTAIN NECESSARY PERMIT(S) FOR STORM WATER DISCHARGE ASSOCIATED WITH CONSTRUCTION ACTIVITY (COR-030000) AND CONSTRUCTION DEWATERING FROM THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT.
5. IF NEEDED, THE COUNTY WILL WORK WITH THE CONTRACTOR TO IDENTIFY LOCAL STORAGE FOR SALVAGED ROOTWADS AND TREE BOLES. TARGET TREES WILL BE THOSE WITH A MINIMUM DIAMETER OF 12", WITH 8-12' LENGTH OF ADDITIONAL BOLE. ATTACHED ROOTWADS ARE DESIRED TO BE AS LARGE/FULL AS POSSIBLE, WITH THE DIRT ATTACHED (DO NOT TRIM OR CLEAN THE ROOTWAD). TREES SHOULD BE HANDLED LIGHTLY, USING THE THUMB OPTION ON THE EQUIPMENT TO MOVE/LIFT THE TREES.
6. CONSTRUCTION OBSERVATION IS TO BE PERFORMED BY AN AUTHORIZED REPRESENTATIVE OF BOULDER COUNTY. HEREAFTER, THE GENERAL CONTRACTOR WILL BE REFERRED TO AS THE CONTRACTOR. THE PROJECT ENGINEER WILL BE REFERRED TO AS THE (ENGINEER).
7. A COUNTY APPROVED ECOLOGIST WILL GUIDE AND INSPECT REVEGETATION WORK WITH THE SUBCONTRACTOR AS NEEDED WITHIN EACH REACH OF THE PROJECT. THE FOLLOWING ARE THE MAJOR MILESTONES:

- SOIL PREPARATION & FINISH GRADING

- SEEDING AND EROSION CONTROL BLANKET INSTALLATION

- PLANT DELIVERY INSPECTION, LAYOUT & PLANTING

- PUNCH LIST, SUBSTANTIAL COMPLETION & FINAL INSPECTIONS

- SITE CHECKS SHALL BE COORDINATED BETWEEN THE ECOLOGIST & SUBCONTRACTOR PRIOR TO INITIATING SUBSEQUENT TASKS.
8. RESTORATION AREAS ARE TO BE SEEDED AND PLANTED WITH THE SPECIES PROVIDED ON THE PLANT & SEED SCHEDULES. THE COUNTY APPROVED ECOLOGIST WILL LAY OUT AND FIELD FIT PLANT MATERIAL PRIOR TO INSTALLATION.
9. SEEDING AND PLANTING SHALL OCCUR AS SOON AS PRACTICAL UPON COMPLETION OF EARTHWORK OPERATIONS WITHIN THE TIMEFRAMES INDICATED IN THE SEEDING AND PLANTING SPECIFICATIONS. SEEDING AND PLANTING SHALL BE AVOIDED WHEN SOIL CONDITIONS ARE INUNDATED, WET OR FROZEN.
- 10.PLANT MATERIALS FOR THIS PROJECT HAVE BEEN ACQUIRED, AND WILL BE INSPECTED, BY THE COUNTY. THE NURSERY WILL BE RESPONSIBLE FOR DELIVERY OF THE ACQUIRED PLANT MATERIALS TO THE WORK SITE. THE DESIGNATED ECOLOGIST AND CONTRACTOR SHALL HAVE THE RIGHT TO INSPECT THE PLANT MATERIAL PRIOR TO OR UPON DELIVERY BY THE NUSERY AND REJECT NON-STANDARD OR DEFECTIVE MATERIAL. THEREAFTER, ALL MATERIALS SHALL BE CONSIDERED ACCEPTED AND THE RESPONSIBILITY OF THE CONTRACTOR. AFTER ACCEPTANCE, IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT THE PLANTS ARE MAINTAINED IN GOOD HEALTH UNTIL INSTALLATION AND FINAL ACCEPTANCE.
- 11.TO ENSURE AVAILABILITY, SEED MAY BE ACQUIRED FOR THE PROJECT BY THE CONTRACTOR (REFER TO SEED & PLANT SCHEDULES IN THE PLANS AND SPECIFICATIONS) EXCEPT IN CASES WITHIN THE SPECIFICATIONS WHEREIN THE COUNTY WILL PROVIDE SEED. THE CONTRACTOR SHALL HAVE THE RIGHT TO INSPECT THE SEED AT ITS SOURCE PRIOR TO DELIVERY TO REJECT ANY NON-STANDARD MATERIALS THAT EXHIBIT DEFECTS THAT WOULD PROHIBIT ESTABLISHMENT & GROWTH UNDER NORMAL CONDITIONS. REJECTED MATERIAL SHALL BE WARRANTED & REPLACED IN KIND BY THE SUPPLIER AT NO COST TO THE COUNTY. THE DESIGNATED ECOLOGIST SHALL HAVE THE RIGHT TO INSPECT THE SEED PRIOR TO OR UPON DELIVERY AND REJECT ANY NON-STANDARD OR DEFECTIVE MATERIAL. THEREAFTER, ALL MATERIALS SHALL BE CONSIDERED ACCEPTED. AFTER ACCEPTANCE IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT MATERIAL IS PROPERLY MAINTAINED AND CARED FOR ONCE DELIVERED.
- 12.CONSTRUCTION SURVEYING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY PLANTING AREA BOUNDARIES OR EXTENTS. AS-BUILT DRAWINGS SHOWING ANY DEVIATIONS OR CHANGES TO THE PLANS THAT WERE MADE IN THE FIELD SHALL BE PROVIDED BY THE CONTRACTOR/SUBCONTRACTOR AT THE END OF THE PROJECT. AS-BUILT PLANS, NOTES & PHOTOS SHALL BE PROVIDED IN DIGITAL AND HARD COPY FORM. FAILURE TO PROVIDE COMPLETE AND ACCURATE AS-BUILT INFORMATION MAY RESULT IN REDUCTION OF PAYMENT OR RETAINAGE EQUAL TO THE AMOUNT NECESSARY FOR THE CONTRACTOR TO PRODUCE ACCURATE AS-BUILT DATA.
- 13.CONTRACTOR SHALL NOT EXPAND OR WORK OUTSIDE OF THE DESIGNATED LIMITS OF CONSTRUCTION UNLESS OTHERWISE APPROVED BY THE DESIGNATED ECOLOGIST. ALL AREAS DISTURBED DURING THE COURSE OF WORK SHALL BE RESTORED TO ORIGINAL OR BETTER CONDITION BY THE CONTRACTOR IN ACCORDANCE WITH THE PLANS & PERFORMANCE CRITERIA. ANY UNAPPROVED IMPACTS BEYOND THE LIMITS OF DISTURBANCE SHALL BE RESTORED BY THE SUBCONTRACTOR AT THE CONTRACTOR'S EXPENSE.
- 14.SITE WORK SHALL NOT BEGIN UNTIL ALL APPLICABLE LICENSES AND CONSTRUCTION PERMITS HAVE BEEN OBTAINED BY THE CONTRACTOR, INCLUDING, BUT NOT LIMITED TO:

- CONSTRUCTION DEWATERING PERMIT (STATE)

- STORMWATER DISCHARGE PERMIT (STATE)

- STREAM RESTORATION PERMIT (COMBINED GRADING PERMIT AND FLOODPLAIN DEVELOPMENT PERMIT) IS ISSUED FOR THE PROJECT BY THE BOULDER COUNTY LAND USE DEPARTMENT. (COUNTY)
- 15.THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND/OR SATISFYING THE REQUIREMENTS OF ANY APPLICABLE PERMITS PERTAINING TO WETLANDS, WATERS (BOTH SURFACE AND SUBSURFACE), WATER QUALITY, WATER CONTROL DURING CONSTRUCTION ACTIVITIES, AND EROSION CONTROL.
- 16.THE COUNTY SHALL HAVE OBTAINED A CLEAN WATER ACT (CWA) SECTION 404 PERMIT & OTHER FEDERAL PERMITS/ CLEARANCES FOR THE PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLIANCE WITH SAID PERMITS.
- 17.THE CONTRACTOR SHALL NOT GO AROUND THE CLIENT, ENGINEER OR DESIGNATED ECOLOGIST TO MODIFY PERMITS THAT WERE ALREADY IN PLACE PRIOR TO CONSTRUCTION. IF NECESSARY, THE CONTRACTOR WILL SUBMIT DRAFT CONSTRUCTION RELATED PERMITS TO THE CLIENT & ENGINEER FOR REVIEW & APPROVAL PRIOR TO SUBMITTING TO ANY AGENCY AND THEN COPY THE CLIENT AND ENGINEER ON ANY FINAL PERMIT APPLICATIONS, RESULTS OR CORRESPONDENCE WITH AGENCIES RELATED TO SAID PERMITS.
- 18.THE CONTRACTOR SHALL GENERATE A STORM WATER MANAGEMENT PLAN & WILL BE RESPONSIBLE FOR DEVELOPING, INSTALLING AND ENSURING ALL APPLICABLE BMPS ARE INSTALLED AND PROPERLY MAINTAINED.
- 19.HOURS OF HAULING SHALL BE FROM 8:30AM TO 4:00 PM TO LIMIT IMPACTS ON REGULAR VEHICULAR TRAFFIC ESPECIALLY DURING PEAK COMMUTER PERIODS.
- 20.ANY WORK THAT WILL TAKE PLACE IN AND AROUND A WATER BODY MAY BE SUBJECT TO PERIODIC FLOODING. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONTROL OF SURFACE AND SUBSURFACE WATER AND EROSION DURING THE COURSE OF THE WORK ANY DAMAGE TO THE WORK RESULTING FROM SURFACE FLOWS, BASE FLOWS, OR FLOOD FLOWS, INCLUDING BUOYANCY FORCES, AS A RESULT OF THE CONTRACTOR NOT EFFECTIVELY PROTECTING THE WORK, SHALL BE CORRECTED BY THE CONTRACTOR AT THEIR EXPENSE.
- 21.EROSION CONTROL MEASURES SHALL REMAIN IN FULL FORCE DURING CONSTRUCTION ACTIVITIES AND AS REQUIRED BY THE GOVERNING JURISDICTION(S).
- 22.PLANS, PERMITS AND CLARIFICATIONS- THE CONTRACTOR SHALL ENSURE ONE COPY OF THE FOLLOWING PLANS ARE ON SITE AT ALL TIMES:

A. CONSTRUCTION PLANS AND SPECIFICATIONS

B. STORMWATER MANAGEMENT PLAN (SWMP)IGRADING, EROSION & SEDIMENT CONTROL (GESC) PLAN

C. CLEAN WATER ACT (CWA), SECTION 404 PERMIT

D. ALL OTHER PERMITS REQUIRED FOR THE PROJECT
- 23.THE CONTRACTOR IS RESPONSIBLE FOR SUPPLYING ALL SUBCONTRACTORS WITH THE APPROVED PLANS AND PERMITS AND VERIFYING THAT ALL CONSTRUCTION IS DONE IN ACCORDANCE WITH THE APPROVED PLANS AND PERMITS.
- 24.THE CONTRACTOR SHALL CONTACT THE ECOLOGIST IN WRITING FOR CLARIFICATION OR DISCREPANCIES ON ANY INFORMATION SHOWN IN THE PLANS.

GENERAL NOTES (CONTINUED)

25. REFERENCE STANDARDS- EXCEPT WHERE OTHERWISE PROVIDED FOR IN THESE PLANS AND NOTES, BOULDER COUNTY STANDARDS SHALL APPLY.
26. ANY ESTIMATE OR QUANTITIES PROVIDED IN THE PLANS OR BID SCHEDULES SHALL BE VERIFIED BY THE CONTRACTOR WHO SHALL BE RESPONSIBLE FOR DETERMINING ALL QUANTITIES AND PROVIDING WORK AND MATERIALS AS SHOWN ON THE PLANS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ON-SITE CONDITIONS AND PERFORM AN INDEPENDENT TAKE-OFF OF ALL QUANTITIES, TO NOTIFY THE ENGINEER OF ANY DISCREPANCIES (INCLUDING UNLISTED ITEMS), AND TO SUBMIT AN ADD-ALTERNATE BID IDENTIFYING THE DISCREPANCIES PRIOR TO FINAL EXECUTION OF THE CONSTRUCTION CONTRACT. AFTER CONTRACT AWARD, THE CONTRACTOR SHALL BE RESPONSIBLE FOR IDENTIFYING ANY DISCREPANCIES OR CHANGES THAT MAY BE REQUIRED AND SUBMIT CHANGE ORDERS TO THE ENGINEER FOR REVIEW, APPROVAL OR REASONABLE DENAL.
27. ALL PROPERTY PINS, INTERSECTION MONUMENTS, AND SECTION CORNERS DISTURBED BY THE CONTRACTOR DURING CONSTRUCTION MUST BE REFERENCED AND REPLACED UNDER SUPERVISION OF A LICENSED SURVEYOR AT THE CONTRACTOR'S COST.
28. ALL DESIGN-RELATED CHANGES MUST BE APPROVED BY THE DESIGN ENGINEER OR THE COUNTY.
29. ALL TOPSOIL IS 4" UNLESS OTHERWISE NOTED.

EROSION NOTES

1. THERE SHALL BE NO EARTH-DISTURBING ACTIVITY OUTSIDE THE LIMITS DESIGNATED ON THE ACCEPTED PLANS.
2. ALL REQUIRED PERIMETER SILT AND CONSTRUCTION FENCING SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITY STOCKPILING, STRIPPING, GRADING, ETC). ALL OTHER REQUIRED EROSION CONTROL MEASURES SHALL BE INSTALLED AT THE APPROPRIATE TIME IN THE CONSTRUCTION SEQUENCE AS INDICATED IN THE APPROVED PROJECT SCHEDULE, CONSTRUCTION PLANS, AND EROSION CONTROL REPORT.
3. AT ALL TIMES DURING CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PREVENTING AND CONTROLLING ON-SITE EROSION INCLUDING KEEPING THE PROPERTY SUFFICIENTLY WATERED SO AS TO MINIMIZE WINDBLOWN SEDIMENT. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR INSTALLING AND MAINTAINING ALL EROSION CONTROL FACILITIES SHOWN HEREIN.
4. IN ORDER TO MINIMIZE EROSION POTENTIAL, ALL TEMPORARY (STRUCTURAL) EROSION CONTROL MEASURES SHALL:

A. BE INSPECTED AT A MINIMUM OF ONCE EVERY TWO (2) WEEKS AND AFTER EACH SIGNIFICANT STORM EVENT AND REPAIRED OR RECONSTRUCTED AS NECESSARY IN ORDER TO ENSURE THE CONTINUED PERFORMANCE OF THEIR INTENDED FUNCTION.

B. REMAIN IN PLACE UNTIL SUCH TIME AS ALL THE SURROUNDING DISTURBED AREAS ARE SUFFICIENTLY STABILIZED AS DETERMINED BY THE ENGINEER.

C. BE REMOVED AFTER THE SITE HAS BEEN SUFFICIENTLY STABILIZED AS DETERMINED BY THE ENGINEER.
5. DO NOT DISTURB AREAS OUTSIDE CONSTRUCTION LIMITS.

SURVEY INFORMATION

- VERTICAL DATUM**

BENCHMARK: LONGMONT BENCHMARK #157, NAVD88 ELEVATION=5164.76
- HORIZONTAL DATUM**

COLORADO STATE PLANE COORDINATES NAD 83(2011) DATUM. HORIZONTAL CONTROL BASED UPON TRIMBLE VRS NETWORK.
- NOTES**

1. THIS DRAWING IS AT MODIFIED STATE PLANE. TO REDUCE TO STATE PLANE COORDINATES, SCALE AT 0.99973537 (1.00026470) ABOUT THE ORIGIN 0,0.

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. THE SIZE, TYPE AND LOCATION OF ALL KNOWN UNDERGROUND UTILITIES ARE APPROXIMATE WHEN SHOWN ON THESE DRAWINGS. 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.

6. ANY LOT LINES, RIGHT OF WAYS OR EASEMENTS SHOWN ARE APPROXIMATE AND ARE NOT TO BE RELIED UPON FOR FUTURE IMPROVEMENTS.

7. SURVEY WAS CONDUCTED ON AUGUST 15, 2016, BY KING SURVEYORS (WINDSOR, CO 970-686-5011).

OTHER INFORMATION

1. FOR BORING LOG INFORMATION, SEE GEOTECHNICAL INVESTIGATION, ST. VRAIN CREEK BREACHES RESTORATION, HIGHWAY 36 TO HYGIENE ROAD, BOULDER COUNTY, COLORADO DATED JULY 1, 2016.

DRAWING LEGEND

- EXISTING GROUND SURFACE CONTOURS (1'1/5' INTERVAL)
- =====

PROPOSED GROUND SURFACE CONTOURS (1'1/5' INTERVAL)
- ✕ 5250

PROPOSED SPOT ELEVATIONS
- 111+00

ST. VRAIN CREEK WITH STATIONING
- +++++

RAILROAD
- — —

PARCEL BOUNDARY
- 120321000046

PARCEL NUMBER
- APPROXIMATE INUNDATION AREA - 2 YEAR EVENT  
PEAK FLOW = 850 CFS
- ⊕ B5

APPROXIMATE GEOTECHNICAL BORING LOCATION  
(SEE "OTHER INFORMATION" NOTE 1)
- STRUCTURE
- ACCESS ROAD
- POLLINATION STUDY AREA
- ⬆  
D  
6

CROSS-SECTION CALL OUT
- ⤴  
2  
4

DETAIL CALL OUT

KEY TO ABBREVIATIONS

APPROX.	APPROXIMATE	MH	MANHOLE
CY	CUBIC YARD	NO	NUMBER
CJ	CONSTRUCTION JOINT	NTS	NOT TO SCALE
CMP	CORRUGATED METAL PIPE	OC	ON CENTER
CTD	CENTERED	OPNG	OPENING
DEMO	DEMOLISH	PL	PLATE (STEEL)
DTL	DETAIL	PZ	PIEZOMETER
DIA	DIAMETER	RCP	REINFORCED CONCRETE PIPE
DIP	DUCTILE IRON PIPE	REINF	REINFORCEMENT
D/S	DOWNSTREAM	REQD	REQUIRED
EA	EACH	REV	REVISION
EE	EACH END	ROW	RIGHT-OF-WAY
EF	EACH FACE	SCH	SCHEDULE
EJ	EXPANSION JOINT	SHT	SHEET
EL	ELEVATION	SQ	SQUARE
ELEV	ELEVATION	SS	STAINLESS STEEL
EQUIP	EQUIPMENT	STA	STATION
EW	EACH WAY	STD	STANDARD
EXP	EXPANSION	TBD	TO BE DETERMINED
FT	FEET	TOF	TOP OF FOOTING ELEVATION
GH	GAGE HEIGHT	TOW	TOP OF WALL ELEVATION
HORIZ	HORIZONTAL	TSE	TOP OF SLAB ELEVATION
IN	INCHES	TSE	TOP OF STEEL ELEVATION
JT	JOINT	TYP	TYPICAL
LF	LINEAR FEET	UNO	UNLESS NOTED OTHERWISE
MAX	MAXIMUM	U/S	UPSTREAM
MIN	MINIMUM	VERT	VERTICAL
		XS	CROSS SECTION



AS-BUILT  
6/19/2018

REVISIONS

Revision	Date	Description
1	9/19/2017	Issued for Construction
	6/19/2018	Issued for As-Built Conditions

Engineering Analytics, Inc.

1800 Spout Point Road, Suite 209  
Fort Collins, CO 80526  
(970) 488-3111

ST. VRAIN CREEK REACH 3

GENERAL NOTES

SCALE VERIFICATION:  
0 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

Drawn by: RDP

Designed by: LCB

Checked by: LCB

Scale: As Shown

Project No. 110666

Date: September 19, 2017

SHEET G2



BOULDER COUNTY STANDARD STORMWATER MANAGEMENT PLAN NOTES  
(REFER TO BOULDER COUNTY STORM DRAINAGE CRITERIA MANUAL)

BEST MANAGEMENT PRACTICES

- CONTRACTOR/PERMITTEE SHALL PERIODICALLY INSPECT ALL INSTALLED BMPS, PROVIDE MAINTENANCE, AND MAKE REPAIRS AS NECESSARY TO PREVENT THEIR FAILURE.
- SILT FENCE OR AN EQUIVALENT SHALL BE PLACED AS PERIMETER CONTROL ON ALL CONSTRUCTION ACTIVITIES THAT OCCUR ON LAND. UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS, OR OTHERWISE REQUESTED, REMOVE PERIMETER CONTROLS WITHIN 30 DAYS AFTER THE DATE OF WARRANTY PERFORMANCE OF THE WORK OR IN ACCORDANCE WITH BMPS.
- VEHICLE TRACKING CONTROLS SHALL BE USED AT ALL VEHICLE AND EQUIPMENT ACCESS POINTS TO THE SITE TO PREVENT SEDIMENT EXITING THE PROJECT SITE ONTO PAVED PUBLIC ROADS. ACCESS SHALL BE PROVIDED ONLY AT LOCATIONS APPROVED BY THE ENGINEER. VEHICLE TRACKING CONTROL LOCATIONS SHALL BE RECORDED ON THE SWMP SITE MAP.
- ALL INLETS AND CULVERTS SHALL BE PROTECTED DURING ONSITE CONSTRUCTION ACTIVITIES. INLET PROTECTION LOCATIONS SHALL BE RECORDED ON THE SWMP SITE MAP.
- CONCRETE WASTED IN DESIGNATED DEWATERING AREAS SHALL BE COLLECTED, REMOVED FROM THE PROJECT SITE, AND DISPOSED OF PROPERLY. WASTED CONCRETE ALSO INCLUDES EXCESS CONCRETE REMOVED FROM FORMS, SPILLS, SLOP, AND ALL OTHER UNUSED CONCRETE THAT ENDS UP ON THE GROUND.
- THE CONTRACTOR/PERMITTEE MUST MAINTAIN A SPILL KIT ON SITE WHEN WORKING AROUND SURFACE WATERS. IF POLLUTANTS ARE SPILLED INTO ANY SURFACE WATERS DURING THE COURSE OF CONSTRUCTION ACTIVITIES, THE CONTRACTOR/PERMITTEE MUST NOTIFY THE OWNER'S REPRESENTATIVE OR ENGINEER IMMEDIATELY.
- ALL EXISTING MATURE TREES WITHIN THE DESIGNATED PROJECT AREA ARE TO BE PROTECTED IN PLACE UNLESS OTHERWISE DIRECTED BY THE ENGINEER. PRIOR TO THE INITIATION OF WORK, THE ENGINEER SHALL MARK ANY TREES AND/OR LARGE SHRUBS TO BE REMOVED AS PART OF CONSTRUCTION ACTIVITIES. AREAS OF TREE REMOVAL SHALL BE DETERMINED AND MARKED IN COLLABORATION BETWEEN THE CONTRACTOR/PERMITTEE AND THE ENGINEER.
- ALL EXCAVATION ACTIVITIES OCCURRING WITHIN 10 FEET OF THE DRIPLINE SHALL BE PERFORMED BY HAND UNLESS OTHERWISE DIRECTED BY THE ENGINEER AND IF NECESSARY ROOTS SHALL BE CLEANLY CUT NOT TORN OR RIPPED. IF EXPOSED, TREE ROOTS SHALL BE BACKFILLED AND WATERED ON THE SAME DAY OF CUTTING AND APPROVED ROOT STIMULATOR SHALL BE APPLIED. SOILS SHALL NOT BE COMPACTED WITHIN THE DRIPLINE OF MATURE TREES UNLESS OTHERWISE APPROVED BY THE ENGINEER.

WASTE MANAGEMENT

- THE CONTRACTOR/PERMITTEE SHALL NOT BURN, BURY, OR OTHERWISE DISCHARGE CONSTRUCTION OR DEMOLITION WASTE ON THE SITE UNLESS SPECIFIED OTHERWISE.
- THE CONTRACTOR/PERMITTEE SHALL PROVIDE A PORTABLE TOILET AND ASSOCIATED MAINTENANCE SCHEDULE FOR THE CONSTRUCTION AREA SUFFICIENT TO ACCOMMODATE THE CONSTRUCTION CREW AND ALL OTHER AUTHORIZED PERSONS TO BE ONSITE DURING CONSTRUCTION ACTIVITIES.

HAZARDOUS MATERIALS

- THE CONTRACTOR/PERMITTEE SHALL TRANSPORT, USE, AND STORE HAZARDOUS MATERIALS IN ACCORDANCE WITH ALL REGULATORY REQUIREMENTS. SPILLED HAZARDOUS MATERIALS, INCLUDING HAZARDOUS LIQUID WASTES, SHALL BE REMOVED FROM THE SITE AND THE PROPERTY RESTORED TO ITS PRE SPILL STATE IN ACCORDANCE WITH REGULATORY REQUIREMENTS.
- THE CONTRACTOR/PERMITTEE SHALL IMMEDIATELY REPORT SPILLS TO THE PROPER REGULATORY AUTHORITY AND SHALL IMMEDIATELY NOTIFY THE ENGINEER.
- HANDLING OF CONSTRUCTION FUELS AND LUBRICANTS:
  - THE CONTRACTOR/PERMITTEE SHALL EMPLOY PERSONS QUALIFIED TO HANDLE CONSTRUCTION EQUIPMENT FUELS AND LUBRICANTS.
  - THE CONTRACTOR/PERMITTEE SHALL REFUEL AND SERVICE EQUIPMENT AWAY FROM FLOODPLAINS OF RIVERS, STREAMS AND OTHER BODIES OF WATER. THE CONTRACTOR/PERMITTEE SHALL ENSURE EQUIPMENT THAT ENTERS THE WATER IS FREE FROM EXTERNAL GREASE, OIL, AND MUD.
  - THE CONTRACTOR/PERMITTEE SHALL PREVENT HANDLING AND FUELING OPERATIONS FROM CONTAMINATING THE GROUND, SURFACE WATER, AND GROUND WATER. THE CONTRACTOR/PERMITTEE SHALL USE CONTAINMENT BERMS AND AN IMPERMEABLE BASE COURSE OR OTHER SYSTEM TO CONTAIN SPILLED FUEL.

GENERAL CARE OF WATER

- CARE OF WATER SHALL INCLUDE THE DESIGN OF ALL TEMPORARY CARE OF WATER PROVISIONS INCLUDING COFFER DAMS, SUMPS, PUMPING SYSTEMS, PIPELINES, CHANNELS, FLUMES, DRAINS, AND OTHER PROTECTIVE AND DEWATERING WORKS TO ALLOW FOR WORK TO BE PERFORMED UNDER DRY CONDITIONS.
- 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.
- 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.
- THE CONTRACTOR/PERMITTEE SHALL COMPLY WITH ALL USACE 404 PERMIT REQUIREMENTS INCLUDING ANY SPECIAL CARE REQUIREMENTS ISSUED FOR THIS PROJECT.
- WHEN REQUIRED THE CONTRACTOR/PERMITTEE SHALL DESIGN TEMPORARY STREAM DIVERSIONS TO FACILITATE UPSTREAM FISH PASSAGE. INSTREAM VELOCITIES SHALL BE LIMITED TO 7 FT/SEC WHEN THIS PROVISION IS REQUIRED.
- CARE OF WATER SHALL INCLUDE PROVISIONS FOR HANDLING GROUNDWATER, RAINSTORM RUNOFF, SNOW, SNOWMELT, AND ICE THAT MAY ENTER THE WORK AREA.
- 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.
- 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 OFF SITE WASTE DISPOSAL FACILITY.
- 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 RE COMMENCEMENT OF IN STREAM WORK.
- 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.
- 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

- 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.
- 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.
- 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.
- 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.
- ALL TEMPORARY FILLS MUST BE REMOVED IN THEIR ENTIRETY FOLLOWING CONSTRUCTION ACTIVITIES AND AFFECTED AREAS GRADED TO PROPOSED CONDITIONS.
- COFFER DAMS SHALL PROVIDE A BYPASS WATERWAY THAT IS ARMORED AND OF THE MINIMUM DIMENSIONS SHOWN IN THE TYPICAL WATER CONTROL CHANNEL DETAIL.
- 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

- 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.
- 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. 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.
- 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 PRIOR TO USE. ALL FUELING, OILING, OR MAINTENANCE OF EQUIPMENT SHALL BE PERFORMED IN DESIGNATED UPLAND LOCATIONS, WITH ADEQUATE BMPS TO CONTAIN POTENTIAL SPILLS.

REVISIONS			
Revision	Date	Description	
1	9/19/2017	Issued for Construction	
	6/19/2018	Issued by As-Built Conditions	

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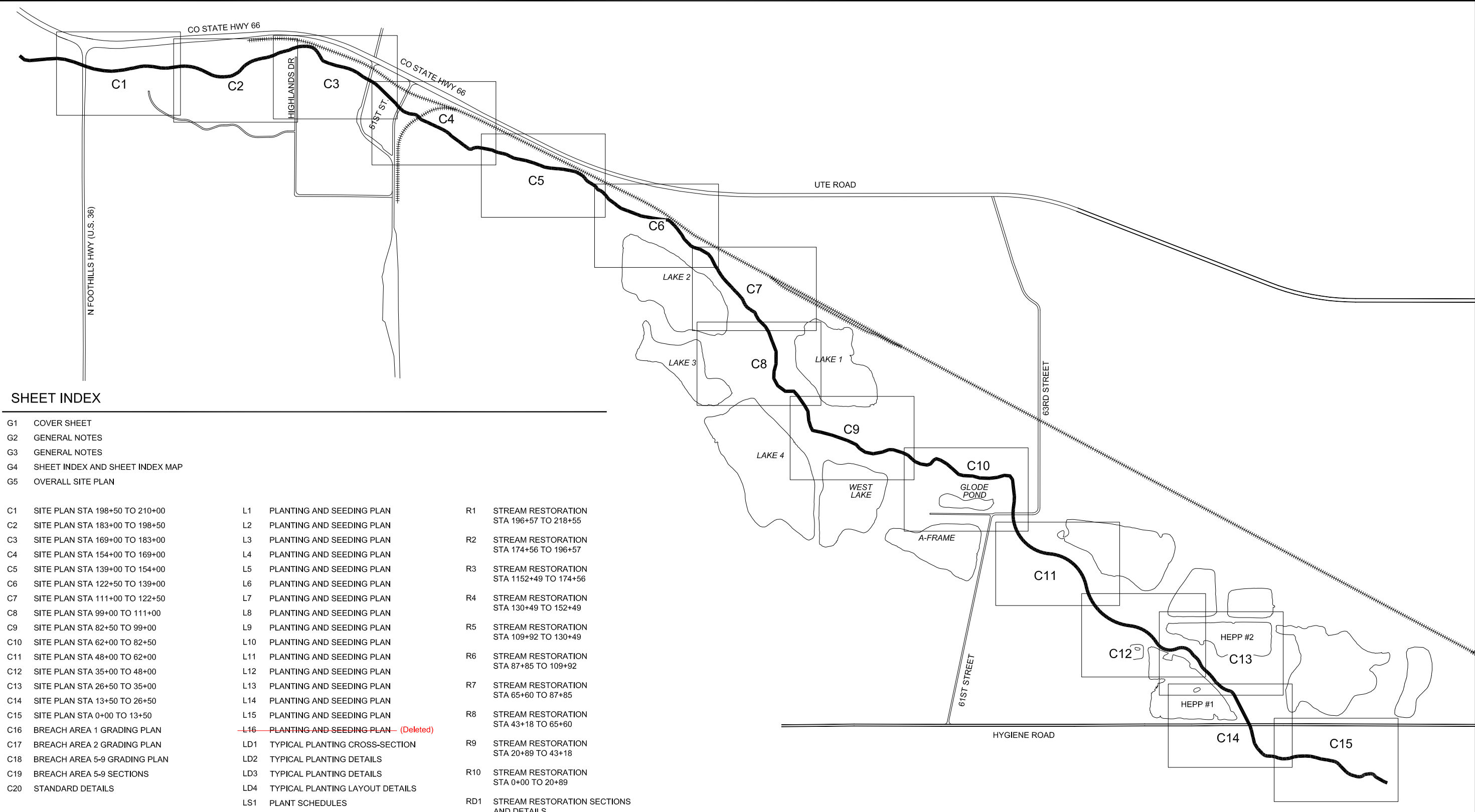
ST. VRAIN CREEK REACH 3

GENERAL NOTES



AS-BUILT  
6/19/2018

SCALE VERIFICATION: 0 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.	
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Scale:	As Shown
Project No.	110666
Date:	September 19, 2017
SHEET	G3



SHEET INDEX

G1	COVER SHEET		
G2	GENERAL NOTES		
G3	GENERAL NOTES		
G4	SHEET INDEX AND SHEET INDEX MAP		
G5	OVERALL SITE PLAN		
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C2	SITE PLAN STA 183+00 TO 198+50	L2	PLANTING AND SEEDING PLAN
C3	SITE PLAN STA 169+00 TO 183+00	L3	PLANTING AND SEEDING PLAN
C4	SITE PLAN STA 154+00 TO 169+00	L4	PLANTING AND SEEDING PLAN
C5	SITE PLAN STA 139+00 TO 154+00	L5	PLANTING AND SEEDING PLAN
C6	SITE PLAN STA 122+50 TO 139+00	L6	PLANTING AND SEEDING PLAN
C7	SITE PLAN STA 111+00 TO 122+50	L7	PLANTING AND SEEDING PLAN
C8	SITE PLAN STA 99+00 TO 111+00	L8	PLANTING AND SEEDING PLAN
C9	SITE PLAN STA 82+50 TO 99+00	L9	PLANTING AND SEEDING PLAN
C10	SITE PLAN STA 62+00 TO 82+50	L10	PLANTING AND SEEDING PLAN
C11	SITE PLAN STA 48+00 TO 62+00	L11	PLANTING AND SEEDING PLAN
C12	SITE PLAN STA 35+00 TO 48+00	L12	PLANTING AND SEEDING PLAN
C13	SITE PLAN STA 26+50 TO 35+00	L13	PLANTING AND SEEDING PLAN
C14	SITE PLAN STA 13+50 TO 26+50	L14	PLANTING AND SEEDING PLAN
C15	SITE PLAN STA 0+00 TO 13+50	L15	PLANTING AND SEEDING PLAN
C16	BREACH AREA 1 GRADING PLAN	L16	PLANTING AND SEEDING PLAN - (Deleted)
C17	BREACH AREA 2 GRADING PLAN	LD1	TYPICAL PLANTING CROSS-SECTION
C18	BREACH AREA 5-9 GRADING PLAN	LD2	TYPICAL PLANTING DETAILS
C19	BREACH AREA 5-9 SECTIONS	LD3	TYPICAL PLANTING DETAILS
C20	STANDARD DETAILS	LD4	TYPICAL PLANTING LAYOUT DETAILS
		LS1	PLANT SCHEDULES
		LS2	PLANT SCHEDULES
		LS3	PLANT SCHEDULES
R1	STREAM RESTORATION STA 196+57 TO 218+55	RD1	STREAM RESTORATION SECTIONS AND DETAILS
R2	STREAM RESTORATION STA 174+56 TO 196+57	RD2	STREAM RESTORATION SECTIONS AND DETAILS
R3	STREAM RESTORATION STA 1152+49 TO 174+56	RD3	STREAM RESTORATION SECTIONS AND DETAILS
R4	STREAM RESTORATION STA 130+49 TO 152+49	RD4	STREAM RESTORATION TABLES
R5	STREAM RESTORATION STA 109+92 TO 130+49	RD5	STREAM RESTORATION SECTIONS AND DETAILS
R6	STREAM RESTORATION STA 87+85 TO 109+92	RD6	STREAM RESTORATION CROSS SECTIONS (1 OF 2)
R7	STREAM RESTORATION STA 65+60 TO 87+85	RD7	STREAM RESTORATION CROSS SECTIONS (2 OF 2)
R8	STREAM RESTORATION STA 43+18 TO 65+60		
R9	STREAM RESTORATION STA 20+89 TO 43+18		
R10	STREAM RESTORATION STA 0+00 TO 20+89		

SHEET INDEX MAP  
1" = 600'



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1	9/19/2017	Issued for Construction
	6/19/2018	Issued for As-Built Conditions

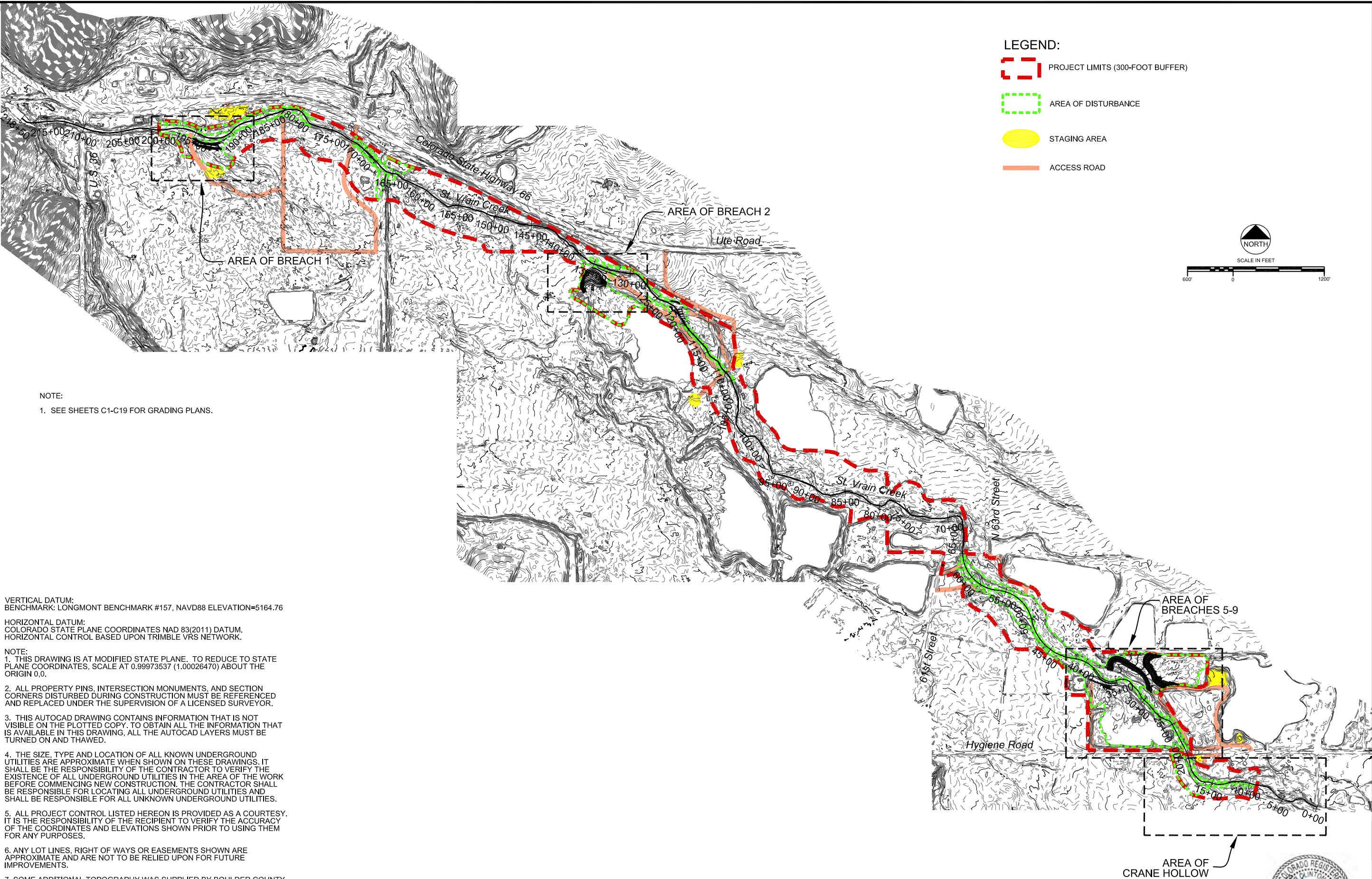
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ST. VRAIN CREEK REACH 3  
SHEET INDEX AND  
SHEET INDEX MAP

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Date:	September 19, 2017
SHEET	G4



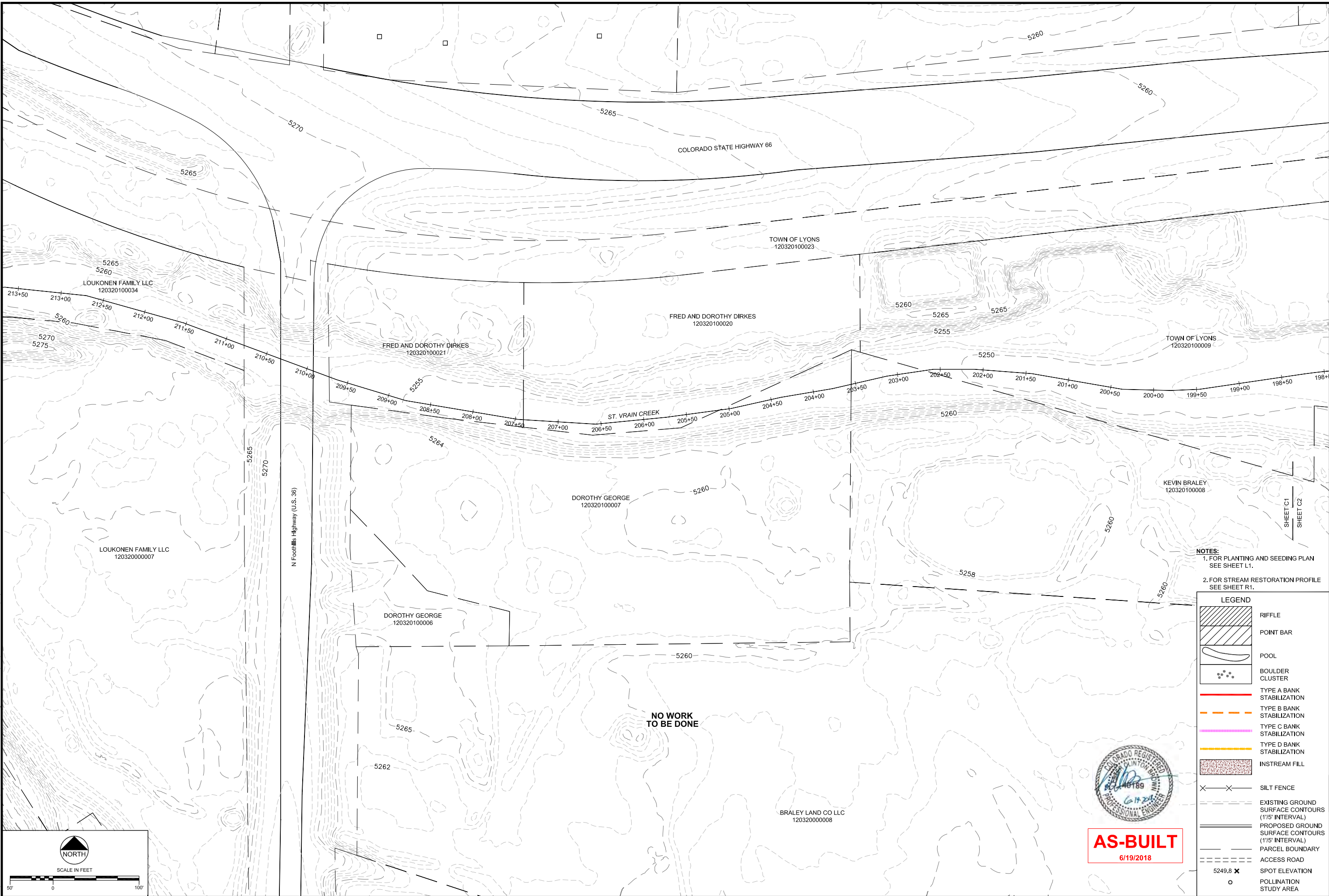
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<div>ST. VRAIN CREEK REACH 3</div> <div>OVERALL SITE PLAN</div>		<div>Engineering Analytics, Inc.</div> <div></div> <div>1600 Speight Point Road, Suite 209 Fort Collins, CO 80525 (970) 486-5111</div>		REVISIONS		
				Revision	Date	Description
				1	9/19/2017	Issued for Construction
				2	10/20/2017	Revised per LU comments
					6/19/2018	Revised per As-Built Conditions



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- NOTES:**
- 1. FOR PLANTING AND SEEDING PLAN  
SEE SHEET L1.
  - 2. FOR STREAM RESTORATION PROFILE  
SEE SHEET R1.

LEGEND	
	RIFFLE
	POINT BAR
	POOL
	BOULDER CLUSTER
	TYPE A BANK STABILIZATION
	TYPE B BANK STABILIZATION
	TYPE C BANK STABILIZATION
	TYPE D BANK STABILIZATION
	INSTREAM FILL
	SILT FENCE
	EXISTING GROUND SURFACE CONTOURS (1/5' INTERVAL)
	PROPOSED GROUND SURFACE CONTOURS (1/5' INTERVAL)
	PARCEL BOUNDARY
	ACCESS ROAD
	SPOT ELEVATION
	POLLINATION STUDY AREA



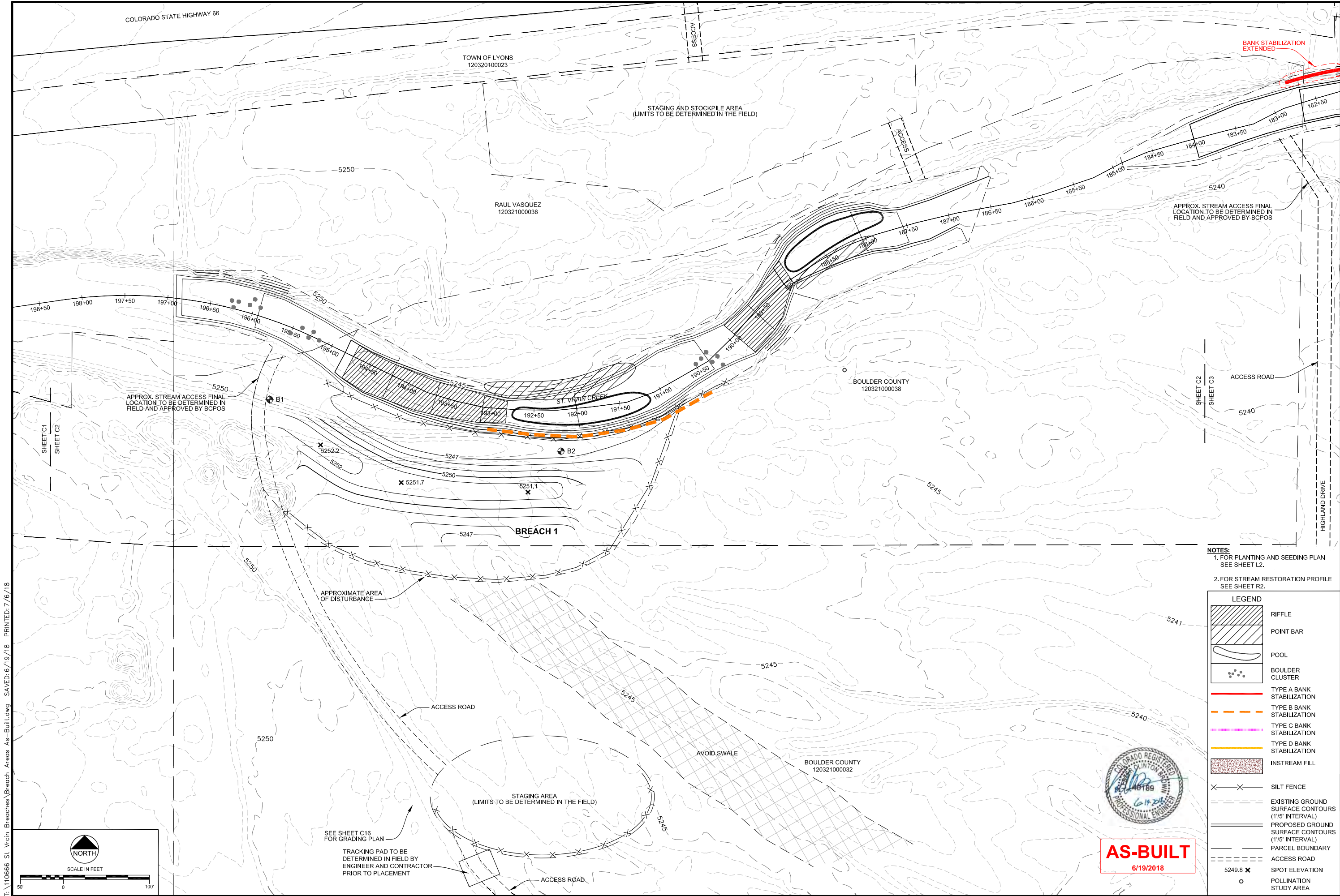
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6/19/2018

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ST. VRAIN CREEK REACH 3  
GRADING SITE PLAN  
STA 198+50 TO 210+00  
NO WORK PROPOSED

SCALE VERIFICATION: 0 1' IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.	
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Scale:	As Shown
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Date:	September 19, 2017
SHEET	C1



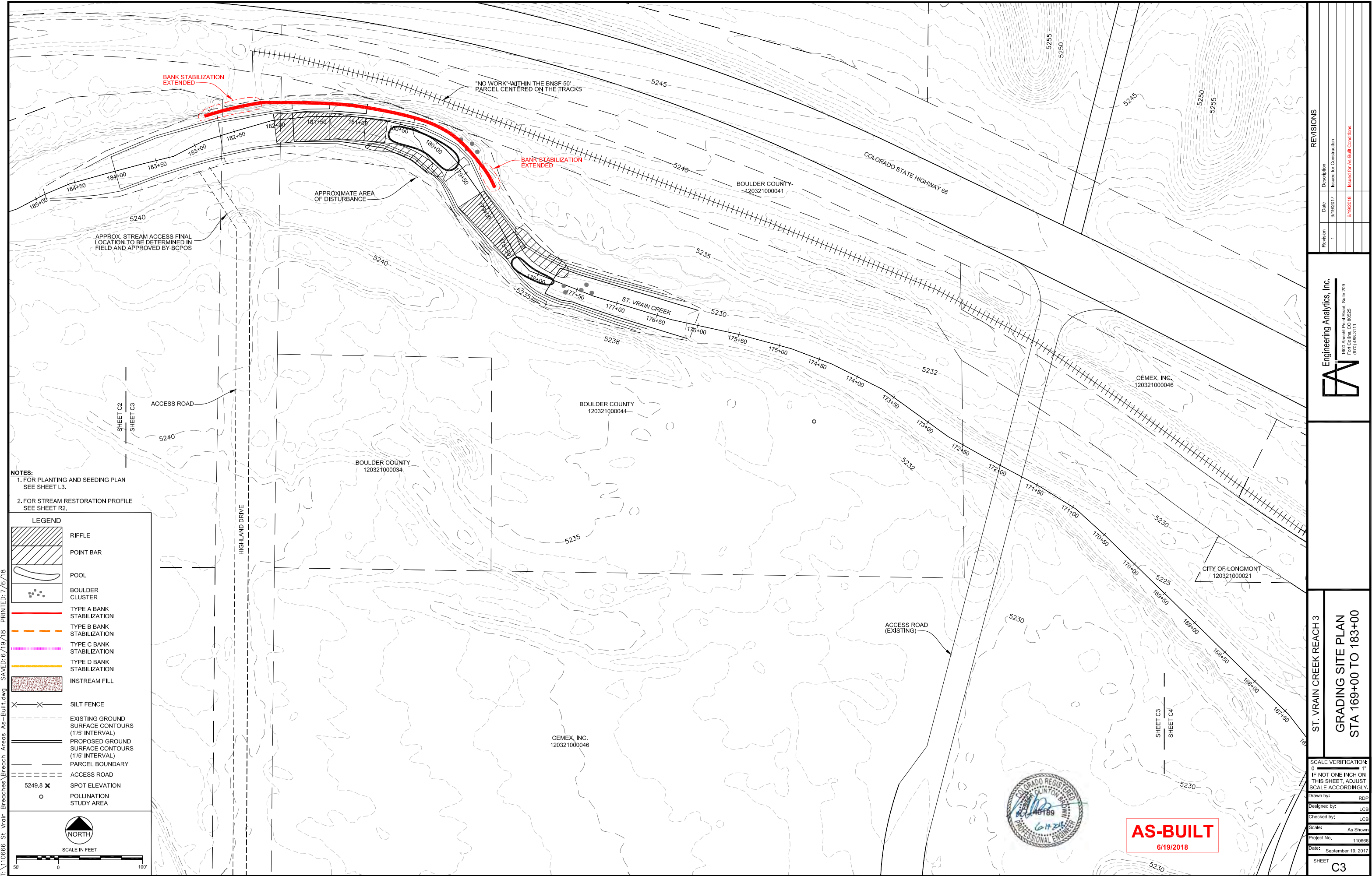
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1	9/19/2017		
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ST. VRAIN CREEK REACH 3	
GRADING SITE PLAN	
STA 183+00 TO 198+50	

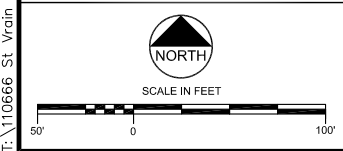
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Date:	September 19, 2017
SHEET	
C2	





**NOTES:**  
1. FOR PLANTING AND SEEDING PLAN  
SEE SHEET L3.  
2. FOR STREAM RESTORATION PROFILE  
SEE SHEET R2.

- LEGEND**
- RIFFLE
  - POINT BAR
  - POOL
  - BOULDER CLUSTER
  - TYPE A BANK STABILIZATION
  - TYPE B BANK STABILIZATION
  - TYPE C BANK STABILIZATION
  - TYPE D BANK STABILIZATION
  - INSTREAM FILL
  - SILT FENCE
  - EXISTING GROUND SURFACE CONTOURS (1/5' INTERVAL)
  - PROPOSED GROUND SURFACE CONTOURS (1/5' INTERVAL)
  - PARCEL BOUNDARY
  - ACCESS ROAD
  - SPOT ELEVATION
  - POLLINATION STUDY AREA



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**ST. VRAIN CREEK REACH 3**  
**GRADING SITE PLAN**  
**STA 169+00 TO 183+00**


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Scale:	As Shown
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Date:	September 19, 2017
SHEET <b>C3</b>	



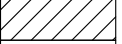
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- NOTES:**
1. FOR PLANTING AND SEEDING PLAN  
SEE SHEET L4.
  2. FOR STREAM RESTORATION PROFILE  
SEE SHEET R3.

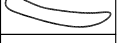
**LEGEND**




RIFFLE




POINT BAR




POOL




BOULDER CLUSTER



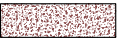
TYPE A BANK STABILIZATION



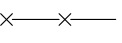
TYPE B BANK STABILIZATION




TYPE C BANK STABILIZATION



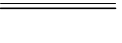
TYPE D BANK STABILIZATION




INSTREAM FILL



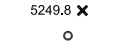
SILT FENCE



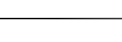
EXISTING GROUND SURFACE CONTOURS (1 1/5' INTERVAL)




PROPOSED GROUND SURFACE CONTOURS (1 1/5' INTERVAL)




PARCEL BOUNDARY




ACCESS ROAD




SPOT ELEVATION



POLLINATION STUDY AREA



NORTH



SCALE IN FEET



**AS-BUILT**  
6/19/2018

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ST. VRAIN CREEK REACH 3  
GRADING SITE PLAN  
STA 154+00 TO 169+00  
NO WORK PROPOSED

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Project No.	110666
Date:	September 19, 2017
SHEET	C4

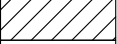
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- NOTES:
1. FOR PLANTING AND SEEDING PLAN  
SEE SHEET L5.
  2. FOR STREAM RESTORATION PROFILE  
SEE SHEET R4.

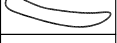
LEGEND




RIFFLE




POINT BAR




POOL




BOULDER CLUSTER




TYPE A BANK STABILIZATION




TYPE B BANK STABILIZATION




TYPE C BANK STABILIZATION




TYPE D BANK STABILIZATION




INSTREAM FILL




SILT FENCE




EXISTING GROUND SURFACE CONTOURS (1/5' INTERVAL)



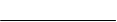
PROPOSED GROUND SURFACE CONTOURS (1/5' INTERVAL)




PARCEL BOUNDARY




ACCESS ROAD




SPOT ELEVATION



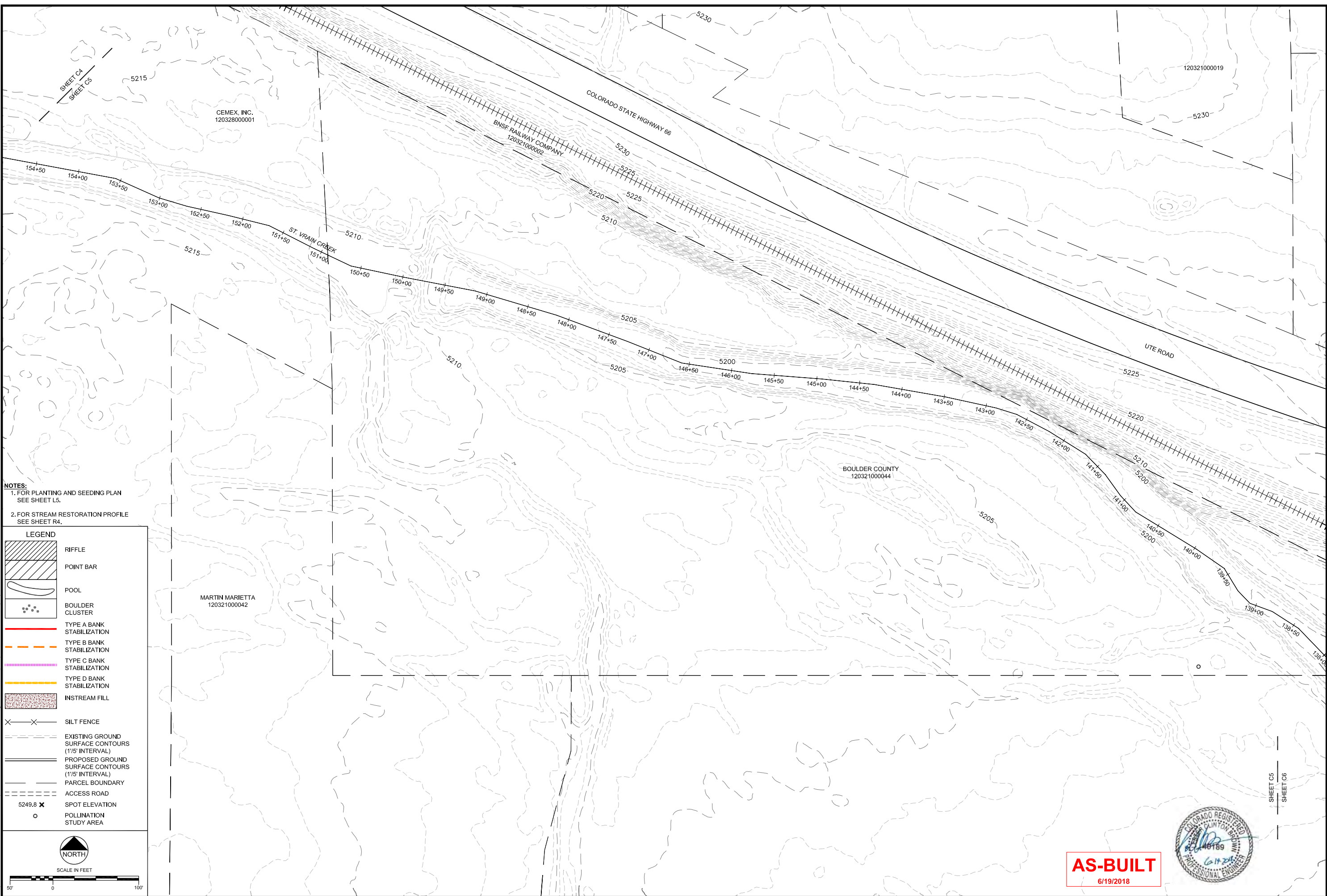
POLLINATION STUDY AREA



NORTH



SCALE IN FEET



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1	9/19/2017	Issued for Construction	
	6/19/2018	Revised for As-Built Conditions	

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ST. VRAIN CREEK REACH 3  
GRADING SITE PLAN  
STA 139+00 TO 154+00  
NO WORK PROPOSED

SCALE VERIFICATION:  
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IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

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Designed by: LCB

Checked by: LCB

Scale: As Shown

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Date: September 19, 2017

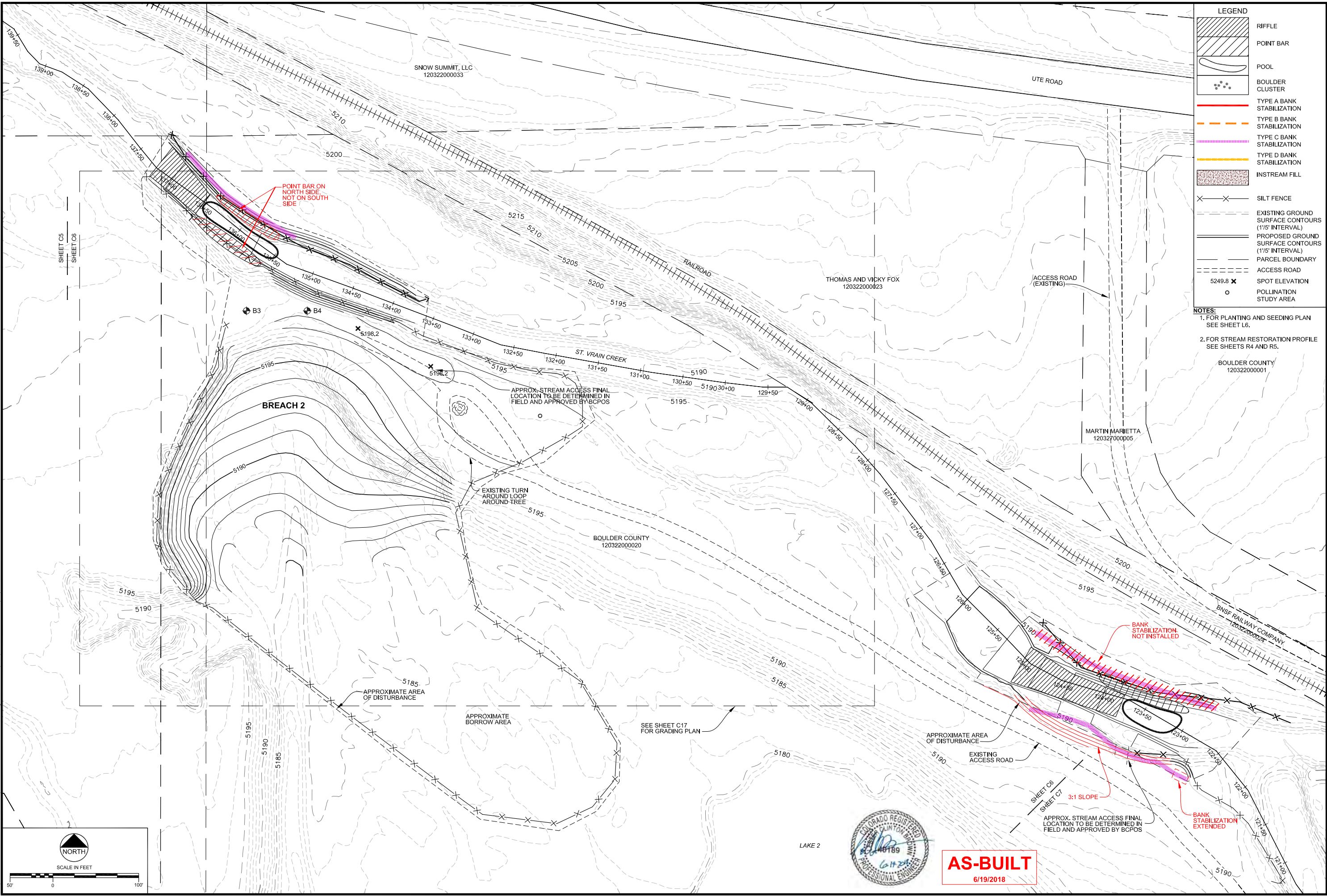
SHEET C5

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6/19/2018





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**LEGEND**

[Hatched Box]	RIFFLE
[Hatched Box]	POINT BAR
[Loop]	POOL
[Dotted Box]	BOULDER CLUSTER
[Solid Red Line]	TYPE A BANK STABILIZATION
[Dashed Orange Line]	TYPE B BANK STABILIZATION
[Dashed Pink Line]	TYPE C BANK STABILIZATION
[Dashed Yellow Line]	TYPE D BANK STABILIZATION
[Stippled Box]	INSTREAM FILL
[X-X]	SILT FENCE
[Dashed Line]	EXISTING GROUND SURFACE CONTOURS (1'/5' INTERVAL)
[Solid Line]	PROPOSED GROUND SURFACE CONTOURS (1'/5' INTERVAL)
[Dashed Line]	PARCEL BOUNDARY
[Dashed Line]	ACCESS ROAD
[5249.8 X]	SPOT ELEVATION
[O]	POLLINATION STUDY AREA

**NOTES:**

1. FOR PLANTING AND SEEDING PLAN SEE SHEET L6.
2. FOR STREAM RESTORATION PROFILE SEE SHEETS R4 AND R5.

BOULDER COUNTY 120322000001

REVISIONS	
Revision	Description
1	Issued for Construction
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**ST. VRAIN CREEK REACH 3**

**GRADING SITE PLAN**

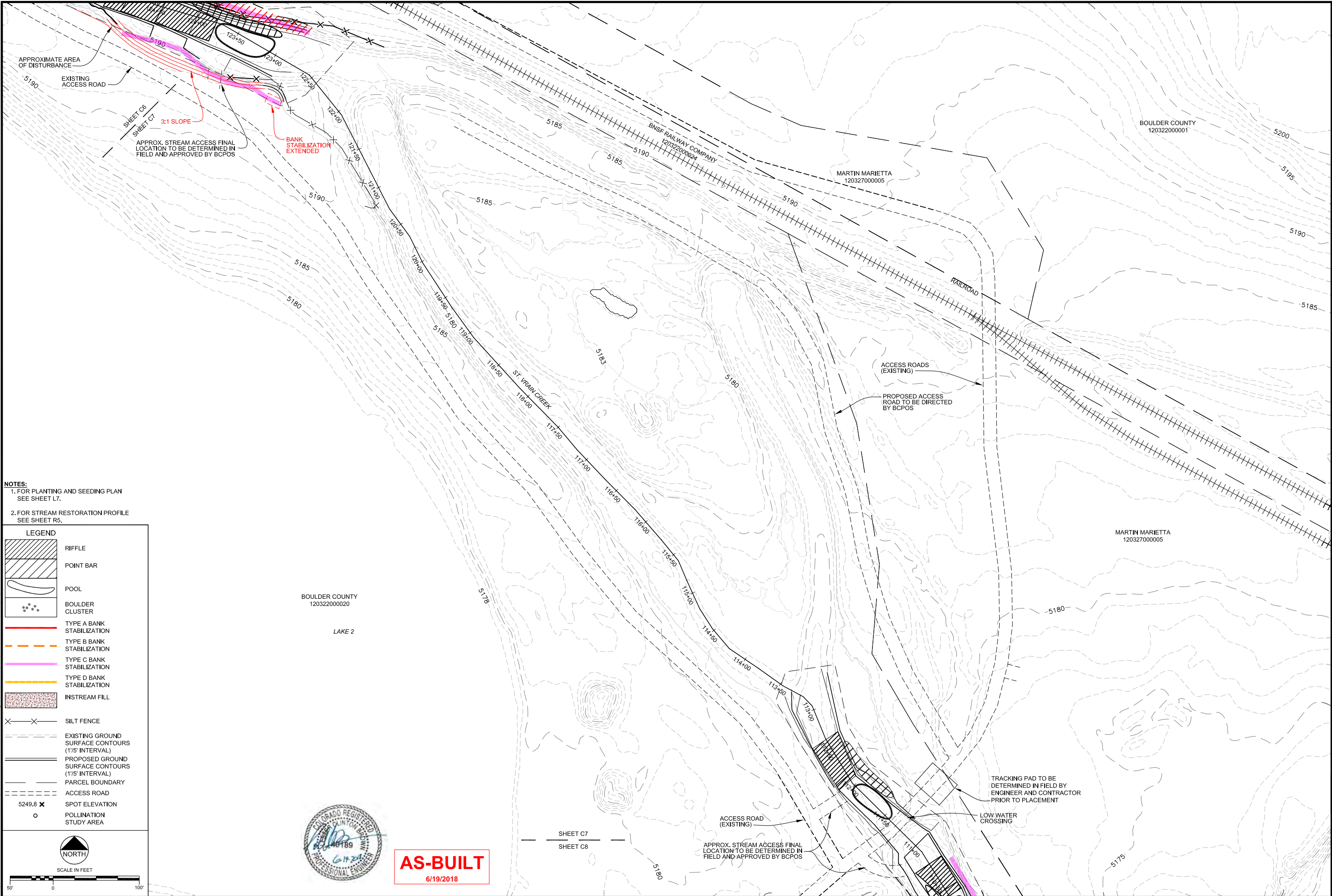
**STA 122+50 TO 139+00**

SCALE VERIFICATION:  
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**SHEET C6**





**NOTES:**  
1. FOR PLANTING AND SEEDING PLAN  
SEE SHEET L7.  
2. FOR STREAM RESTORATION PROFILE  
SEE SHEET R5.

**LEGEND**

RIFFLE

POINT BAR

POOL

BOULDER CLUSTER

TYPE A BANK STABILIZATION

TYPE B BANK STABILIZATION

TYPE C BANK STABILIZATION

TYPE D BANK STABILIZATION

INSTREAM FILL

SILT FENCE

EXISTING GROUND SURFACE CONTOURS (1'/5' INTERVAL)

PROPOSED GROUND SURFACE CONTOURS (1'/5' INTERVAL)

PARCEL BOUNDARY

ACCESS ROAD

5249.8 x SPOT ELEVATION

POLLINATION STUDY AREA

NORTH

SCALE IN FEET  
0 50' 100'



**AS-BUILT**  
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ST. VRAIN CREEK REACH 3

**GRADING SITE PLAN**

STA 111+00 TO 122+50

SCALE VERIFICATION:  
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Date: September 19, 2017

SHEET  
**C7**

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**LEGEND**

	RIFFLE
	POINT BAR
	POOL
	BOULDER CLUSTER
	TYPE A BANK STABILIZATION
	TYPE B BANK STABILIZATION
	TYPE C BANK STABILIZATION
	TYPE D BANK STABILIZATION
	INSTREAM FILL
	SILT FENCE
	EXISTING GROUND SURFACE CONTOURS (1'5' INTERVAL)
	PROPOSED GROUND SURFACE CONTOURS (1'5' INTERVAL)
	PARCEL BOUNDARY
	ACCESS ROAD
	SPOT ELEVATION
	POLLINATION STUDY AREA

**NOTES:**  
1. FOR PLANTING AND SEEDING PLAN SEE SHEET L8.  
2. FOR STREAM RESTORATION PROFILE SEE SHEET R6.



**AS-BUILT**  
6/19/2018

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**ST. VRAIN CREEK REACH 3**  
**GRADING SITE PLAN**  
**STA 99+00 TO 111+00**

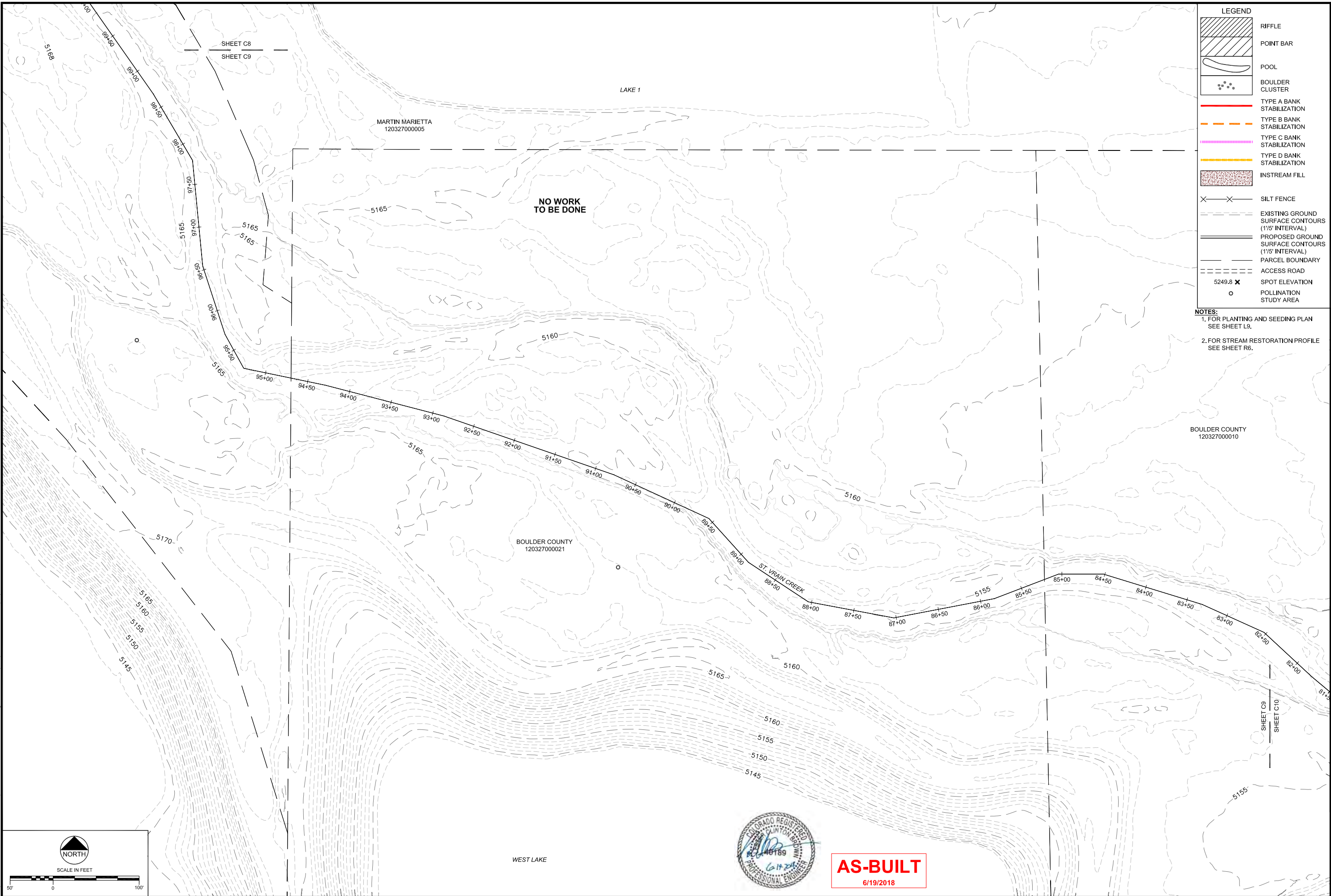
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**SHEET C8**



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LEGEND

RIFFLE

POINT BAR

POOL

BOULDER CLUSTER

TYPE A BANK STABILIZATION

TYPE B BANK STABILIZATION

TYPE C BANK STABILIZATION

TYPE D BANK STABILIZATION

INSTREAM FILL

SILT FENCE

EXISTING GROUND SURFACE CONTOURS (1'5" INTERVAL)

PROPOSED GROUND SURFACE CONTOURS (1'5" INTERVAL)

PARCEL BOUNDARY

ACCESS ROAD

SPOT ELEVATION

POLLINATION STUDY AREA

NOTES:  
1. FOR PLANTING AND SEEDING PLAN SEE SHEET L9.  
2. FOR STREAM RESTORATION PROFILE SEE SHEET R6.

REVISIONS

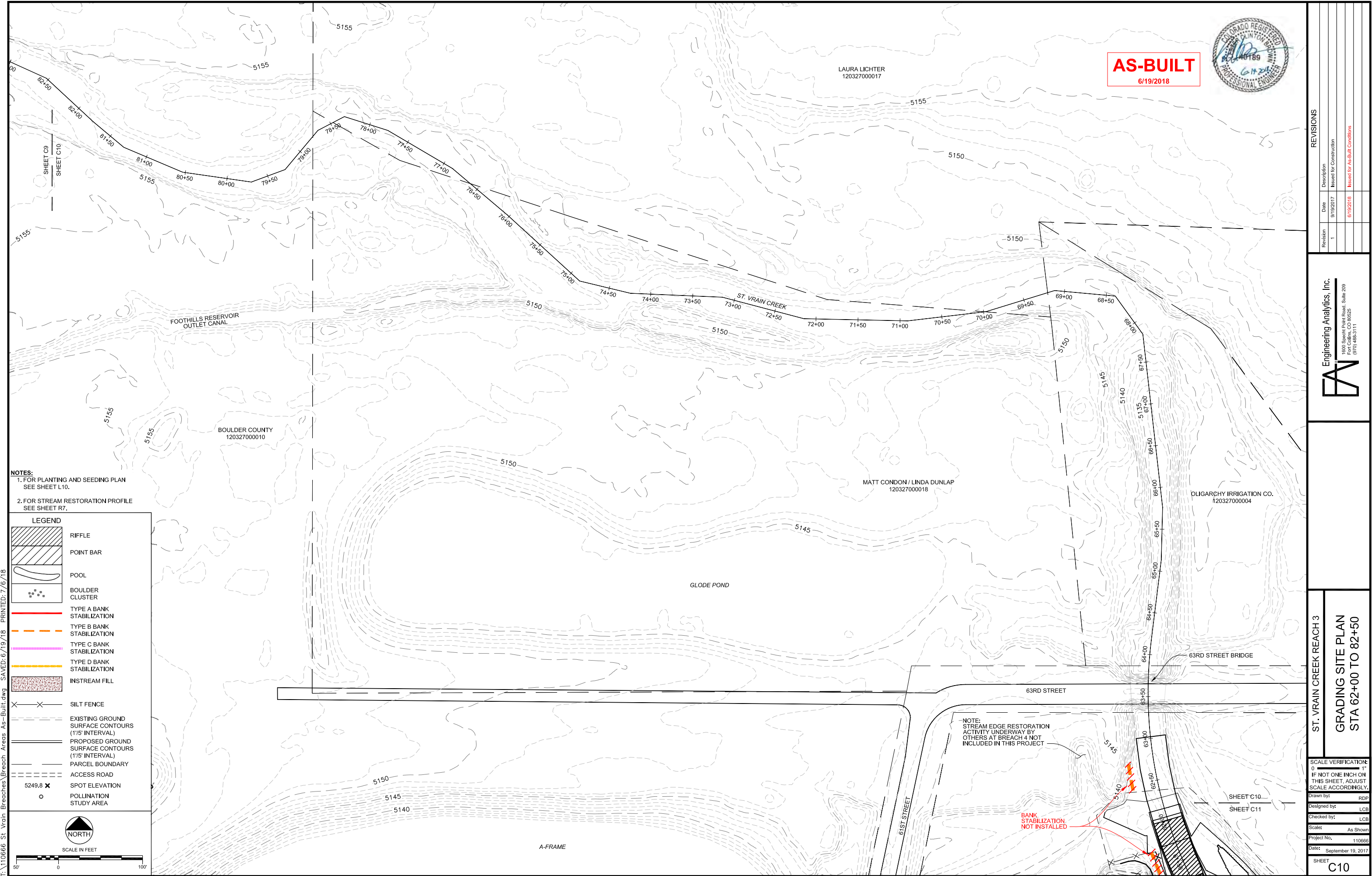
Revision	Date	Description
1	9/19/2017	Issued for Construction
	6/19/2018	As-Built Conditions

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1600 Speer Point Road, Suite 209  
Boulder, CO 80525  
(970) 488-3111

ST. VRAIN CREEK REACH 3  
GRADING SITE PLAN  
STA 82+50 TO 99+00  
NO WORK PROPOSED


SCALE VERIFICATION:  
0 1" = 100'  
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.  
Drawn by: RDP  
Designed by: LCB  
Checked by: LCB  
Scale: As Shown  
Project No. 110666  
Date: September 19, 2017  
SHEET C9



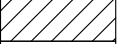


**NOTES:**  
1. FOR PLANTING AND SEEDING PLAN  
SEE SHEET L10.  
2. FOR STREAM RESTORATION PROFILE  
SEE SHEET R7.

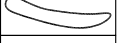
**LEGEND**




RIFFLE




POINT BAR




POOL




BOULDER CLUSTER



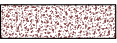
TYPE A BANK STABILIZATION



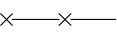
TYPE B BANK STABILIZATION




TYPE C BANK STABILIZATION



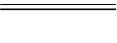
TYPE D BANK STABILIZATION




INSTREAM FILL



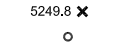
SILT FENCE



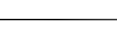
EXISTING GROUND SURFACE CONTOURS (1'/5' INTERVAL)




PROPOSED GROUND SURFACE CONTOURS (1'/5' INTERVAL)




PARCEL BOUNDARY




ACCESS ROAD




5249.8 X SPOT ELEVATION



O POLLINATION STUDY AREA



NORTH




SCALE IN FEET  
50' 0 100'



**AS-BUILT**  
6/19/2018

REVISIONS		
Revision	Date	Description
1	9/19/2017	Issued for Construction
	6/19/2018	Issued for As-Built Conditions



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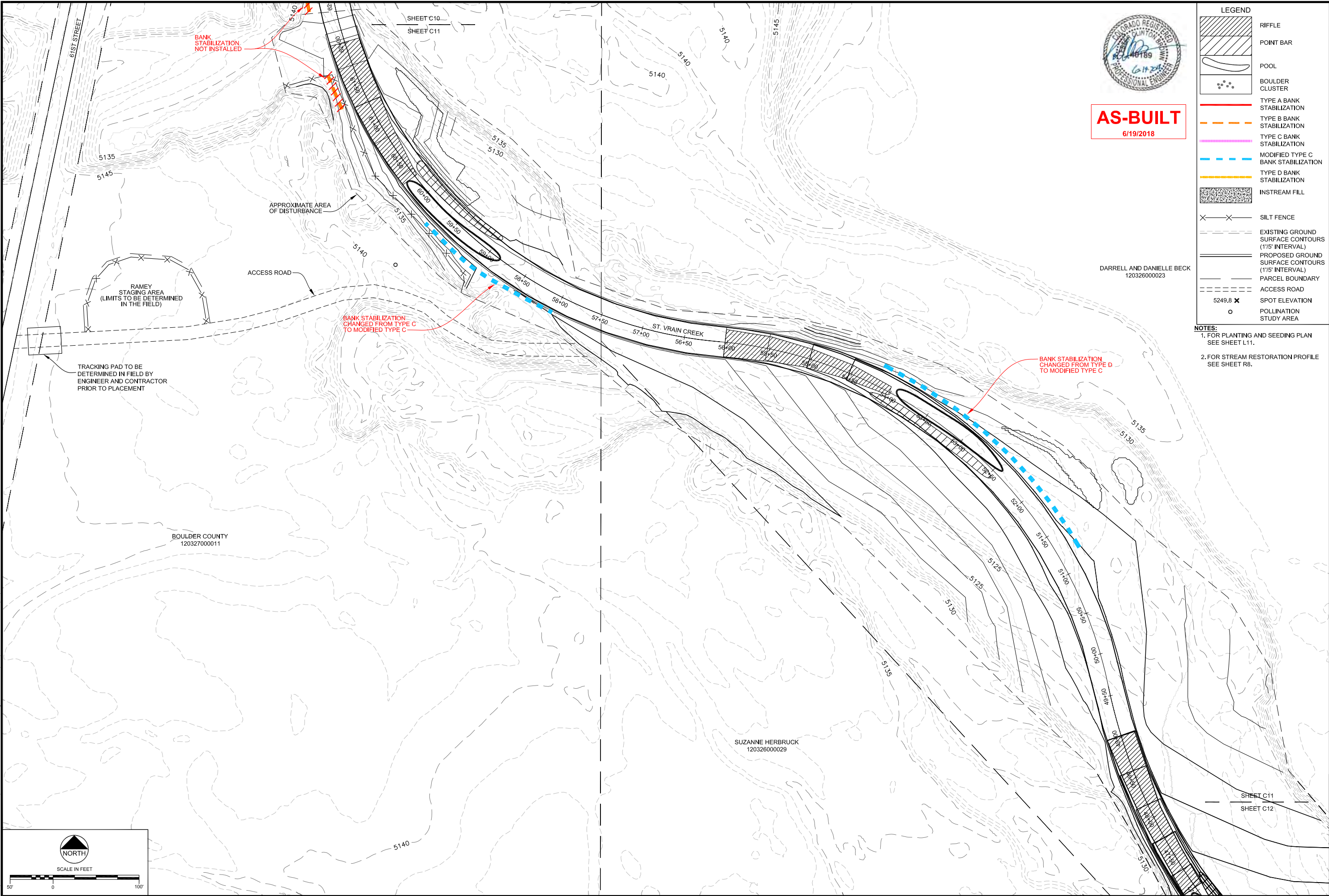
ST. VRAIN CREEK REACH 3  
**GRADING SITE PLAN**  
STA 62+00 TO 82+50

**SCALE VERIFICATION:**  
0 1"  
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

Drawn by: RDP  
Designed by: LCB  
Checked by: LCB  
Scale: As Shown  
Project No. 110666  
Date: September 19, 2017

SHEET  
**C10**

I:\110666 St. Vrain Breaches\Breaches As-Built.dwg   SAVED: 6/19/18   PRINTED: 7/6/18



**AS-BUILT**  
6/19/2018

DARRELL AND DANIELLE BECK  
120326000023

LEGEND		
	RIFFLE	
	POINT BAR	
	POOL	
	BOULDER CLUSTER	
	TYPE A BANK STABILIZATION	
	TYPE B BANK STABILIZATION	
	TYPE C BANK STABILIZATION	
	MODIFIED TYPE C BANK STABILIZATION	
	TYPE D BANK STABILIZATION	
	INSTREAM FILL	
	SILT FENCE	
	EXISTING GROUND SURFACE CONTOURS (1/5' INTERVAL)	
	PROPOSED GROUND SURFACE CONTOURS (1/5' INTERVAL)	
	PARCEL BOUNDARY	
	ACCESS ROAD	
	SPOT ELEVATION	
	POLLINATION STUDY AREA	

**NOTES:**  
1. FOR PLANTING AND SEEDING PLAN SEE SHEET L11.  
2. FOR STREAM RESTORATION PROFILE SEE SHEET R6.

REVISIONS		
Revision	Date	Description
1	9/19/2017	Issued for Construction
	6/19/2018	Issued for As-Built Conditions

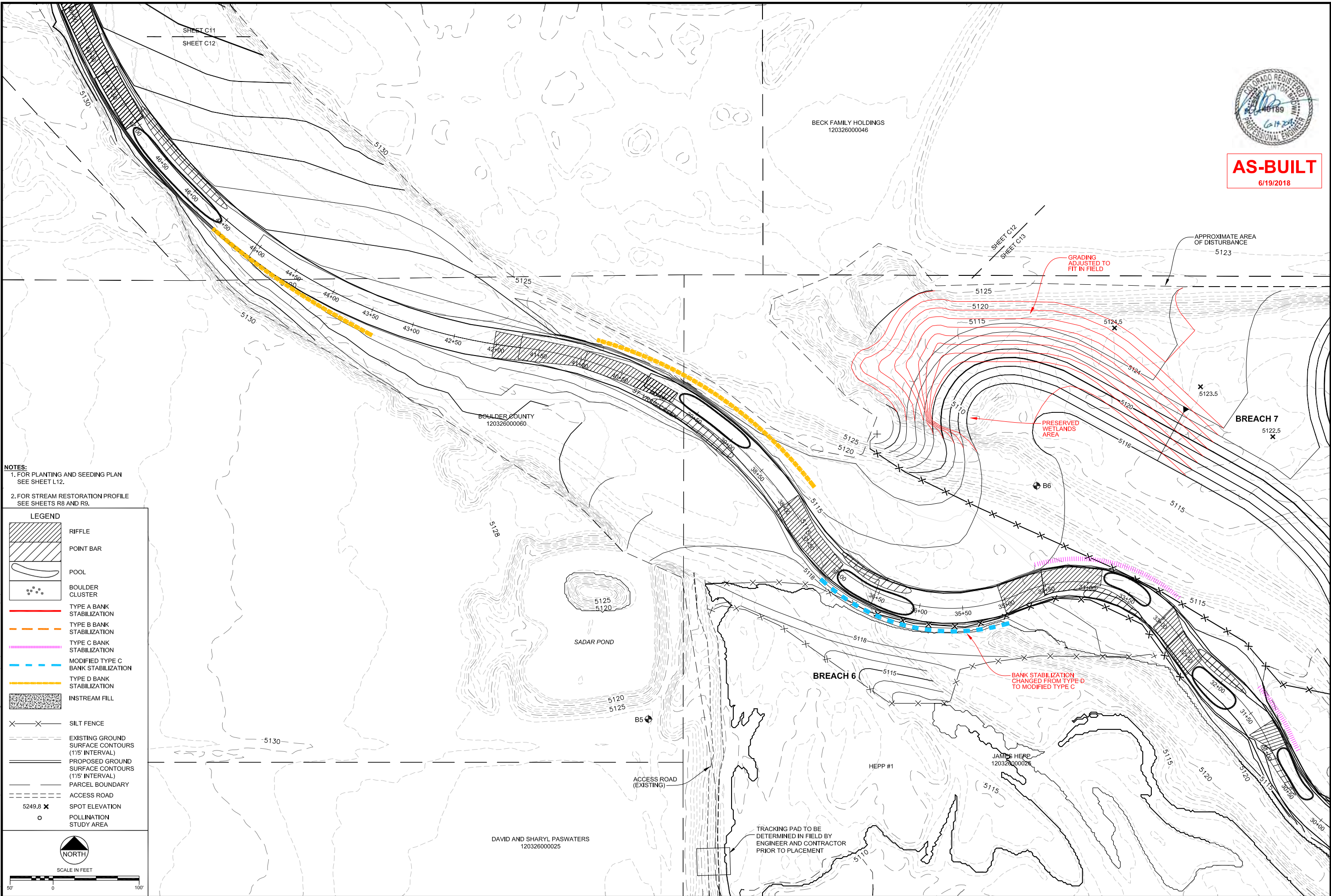
<div>EA</div> <div>Engineering Analytics, Inc.</div> <div>1600 Speer Point Road, Suite 209</div> <div>Fort Collins, CO 80525</div> <div>(970) 488-3111</div>	
--	--

ST. VRAIN CREEK REACH 3
GRADING SITE PLAN
STA 48+00 TO 62+00

SCALE VERIFICATION: 0' 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.	
Drawn by:	RDP
Designed by:	LCB
Checked by:	LCB
Scale:	As Shown
Project No.	110666
Date:	September 19, 2017

SHEET
C11





NOTES:  
1. FOR PLANTING AND SEEDING PLAN  
SEE SHEET L12.  
2. FOR STREAM RESTORATION PROFILE  
SEE SHEETS R8 AND R9.

LEGEND

RIFFLE

POINT BAR

POOL

BOULDER CLUSTER

TYPE A BANK STABILIZATION

TYPE B BANK STABILIZATION

TYPE C BANK STABILIZATION

MODIFIED TYPE C BANK STABILIZATION

TYPE D BANK STABILIZATION

INSTREAM FILL

SILT FENCE

EXISTING GROUND SURFACE CONTOURS (1/5' INTERVAL)

PROPOSED GROUND SURFACE CONTOURS (1/5' INTERVAL)

PARCEL BOUNDARY

ACCESS ROAD

SPOT ELEVATION

POLLINATION STUDY AREA

NORTH

SCALE IN FEET

0

50

100



**AS-BUILT**  
6/19/2018

REVISIONS			
Revision	Date	Description	Issued for Construction
1	9/19/2017		
	6/19/2018		Based for As-Built Conditions

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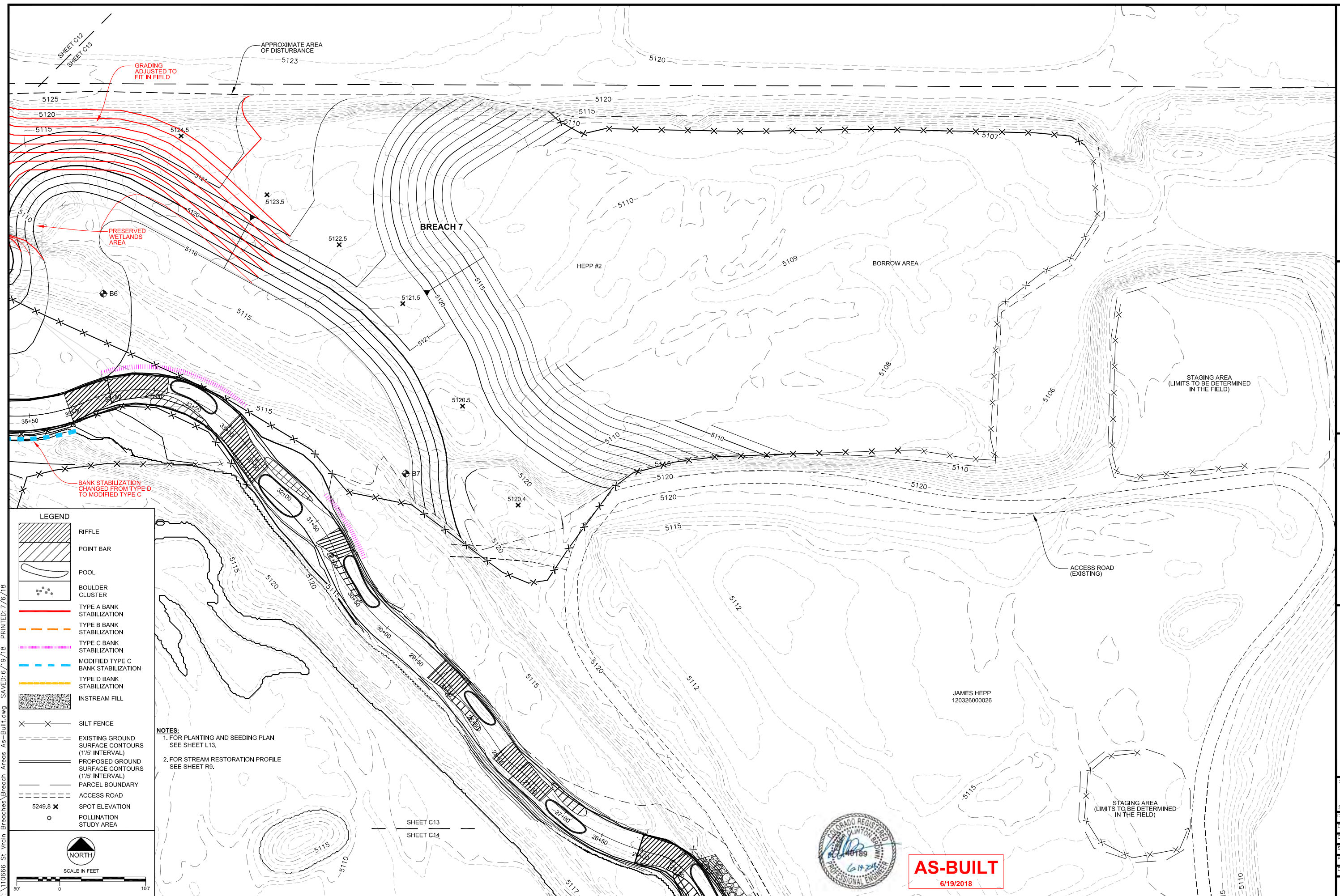
(970) 488-3111

ST. VRAIN CREEK REACH 3  
GRADING SITE PLAN  
STA 35+00 TO 48+00

SCALE VERIFICATION: 0 1" = 1'	
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.	
Drawn by:	RDP
Designed by:	LCB
Checked by:	LCB
Scale:	As Shown
Project No.	110666
Date:	September 19, 2017

SHEET  
C12

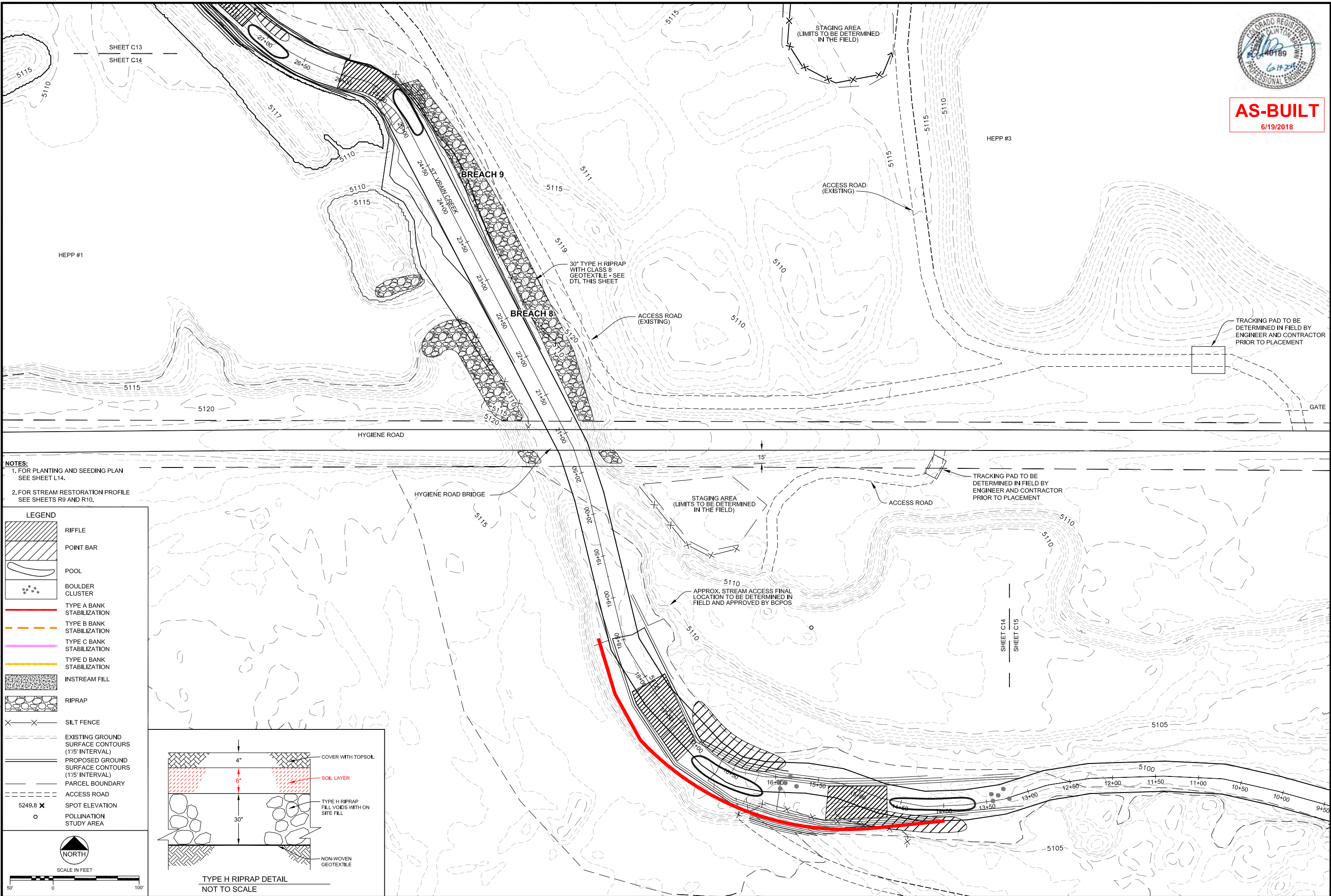




REVISIONS		
Revision	Date	Description
1	9/19/2017	Issued for Construction
	6/19/2018	Issued for As-Built Conditions

<b>ST. VRAIN CREEK REACH 3</b>	<b>GRADING SITE PLAN</b> <b>STA 26+50 TO 35+00</b>
SCALE VERIFICATION: 0" = 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.	
Drawn by:	RDP
Designed by:	LCB
Checked by:	LCB
Scaled:	As Shown
Project No.,	110666
Date:	September 19, 2017
SHEET <span style="font-size: 1.5em; font-weight: bold;">C13</span>	





**AS-BUILT**  
6/19/2018

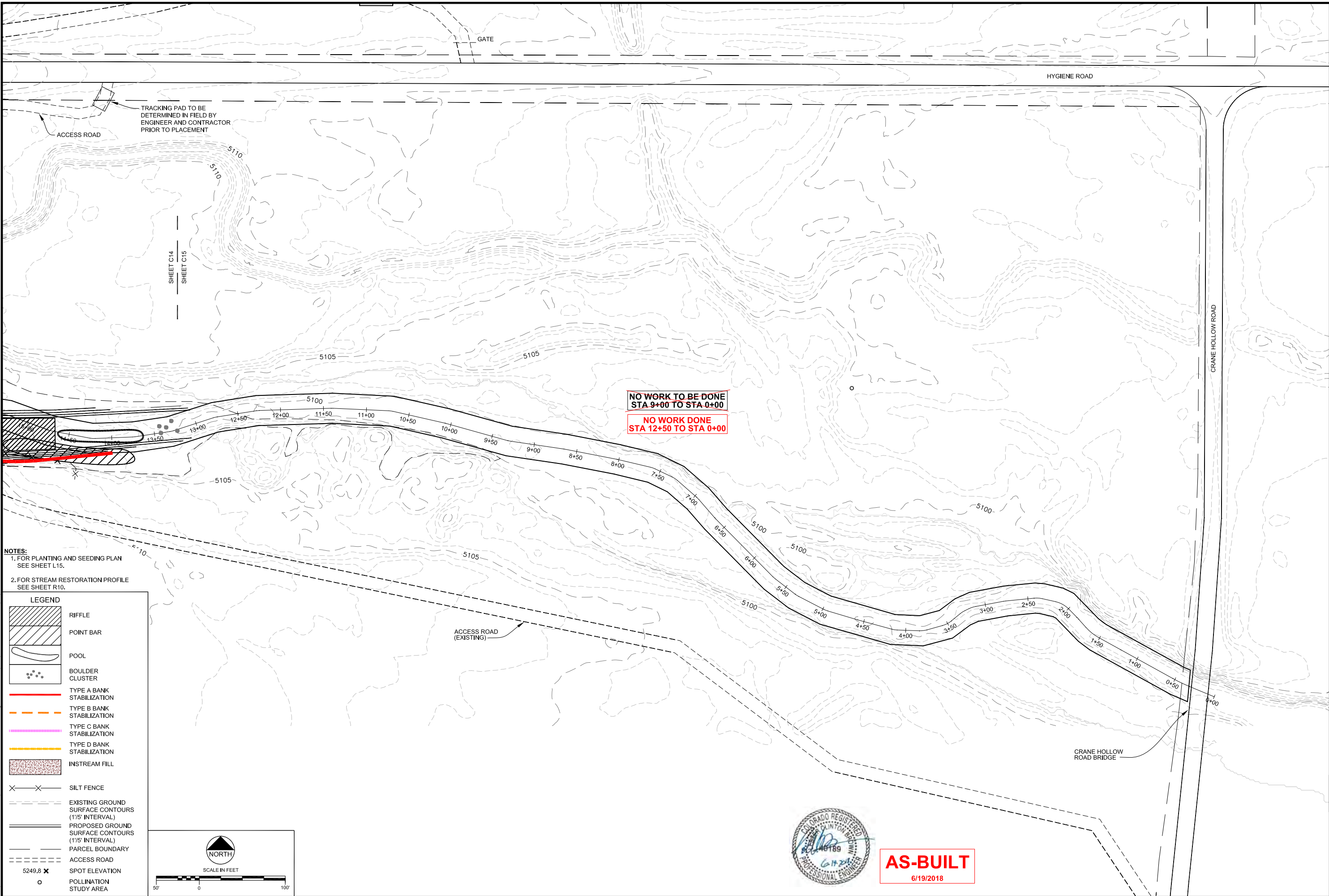
REVISIONS		
Revision	Date	Description
1	9/19/2017	Issued for Construction
2	10/20/2017	Revised per LU comments
	6/19/2018	Revised per As-Built Conditions

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**ST. VRAIN CREEK REACH 3**  
**GRADING SITE PLAN**  
13+50 TO 26+50

SCALE VERIFICATION: 0 1"	
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.	
Drawn by:	RDP
Designed by:	LCB
Checked by:	LCB
Scale:	As Shown
Project No.	110666
Date:	September 19, 2017

I:\10666 St. Vrain Breaches\Breach Areas As-Built.dwg, Saved: 6/19/18, PRINTED: 7/6/18



NOTES:  
1. FOR PLANTING AND SEEDING PLAN  
SEE SHEET L15.  
2. FOR STREAM RESTORATION PROFILE  
SEE SHEET R10.

**LEGEND**

	RIFFLE
	POINT BAR
	POOL
	BOULDER CLUSTER
	TYPE A BANK STABILIZATION
	TYPE B BANK STABILIZATION
	TYPE C BANK STABILIZATION
	TYPE D BANK STABILIZATION
	INSTREAM FILL
	SILT FENCE
	EXISTING GROUND SURFACE CONTOURS (1/5' INTERVAL)
	PROPOSED GROUND SURFACE CONTOURS (1/5' INTERVAL)
	PARCEL BOUNDARY
	ACCESS ROAD
	SPOT ELEVATION
	POLLINATION STUDY AREA

5249.8

REVISIONS		
Revision	Date	Description
1	9/19/2017	Based for Construction
2	10/20/2017	Revised per LU comments
	6/19/2018	Based for As-Built Conditions

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Boulder, CO 80525  
(970) 488-3111

**ST. VRAIN CREEK REACH 3**  
**GRADING SITE PLAN**  
**STA 0+00 TO 13+50**

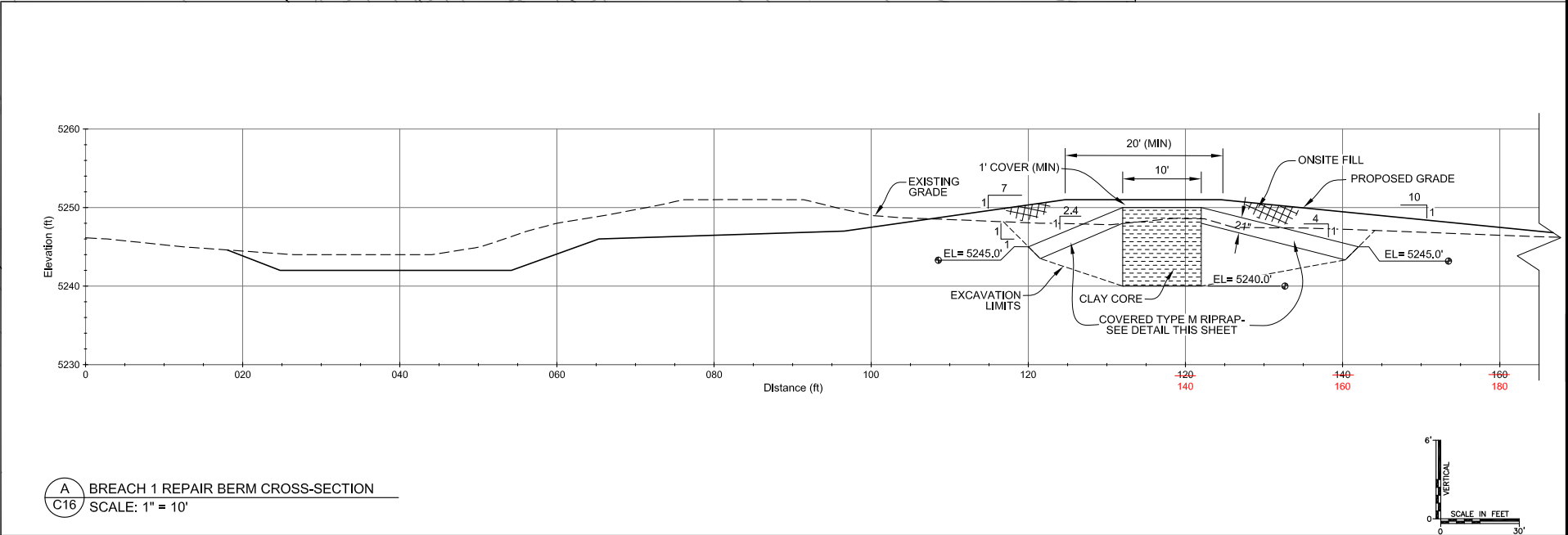
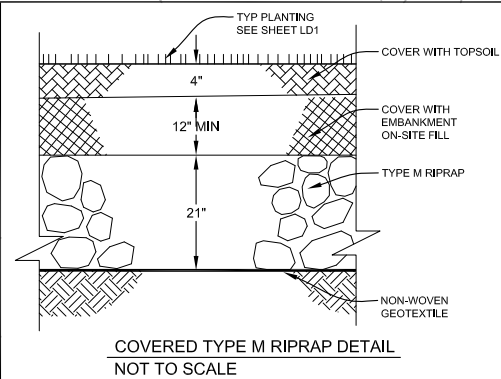
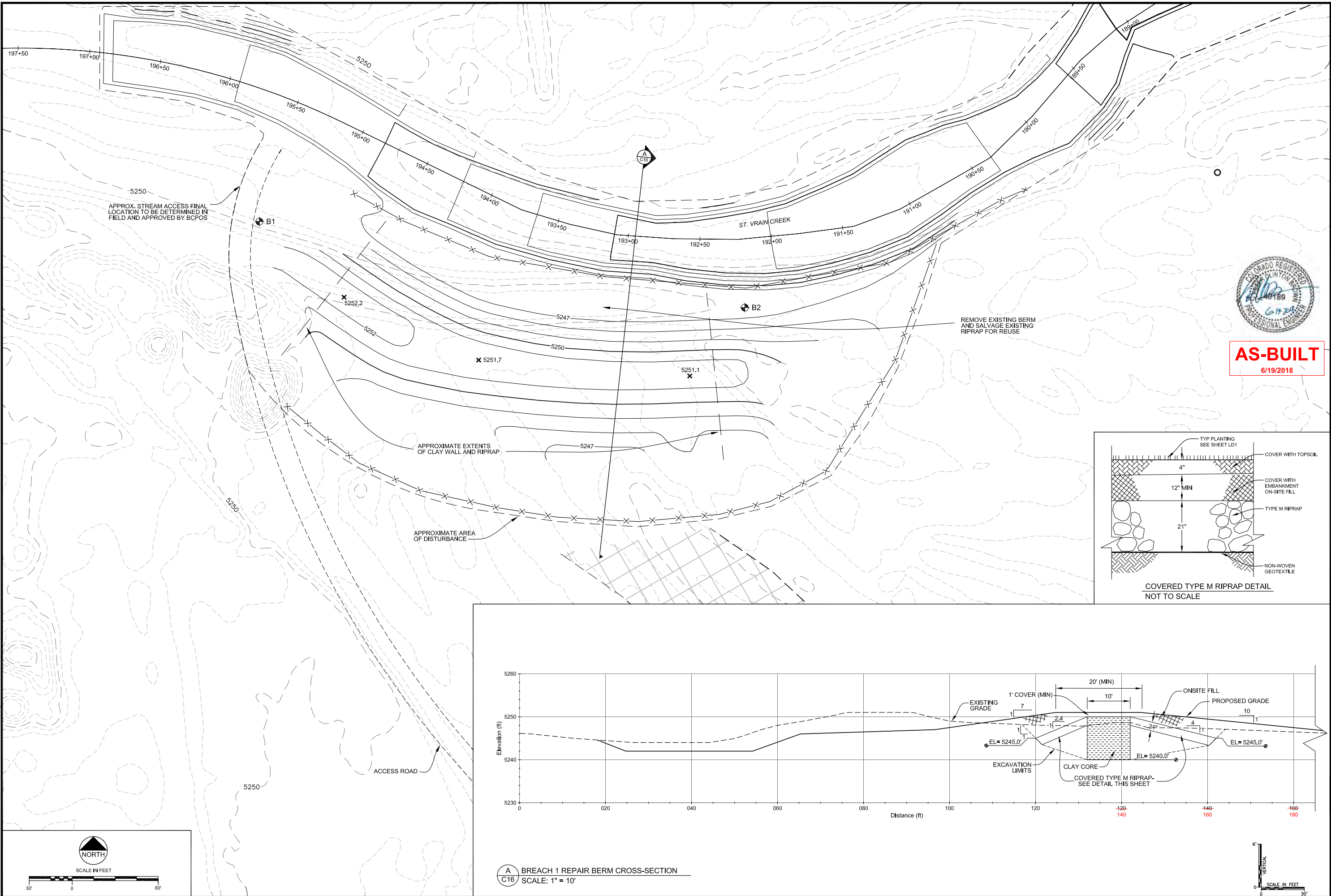
SCALE VERIFICATION:  
0 1" = 100'  
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

Drawn by: RDP  
Designed by: LCB  
Checked by: LCB  
Scale: As Shown  
Project No. 110666  
Date: September 19, 2017

SHEET **C15**



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**AS-BUILT**  
6/19/2018

REVISIONS			
Revision	Date	Description	Issued for Construction
1	9/19/2017		
	6/19/2018	Based for As-Built Conditions	

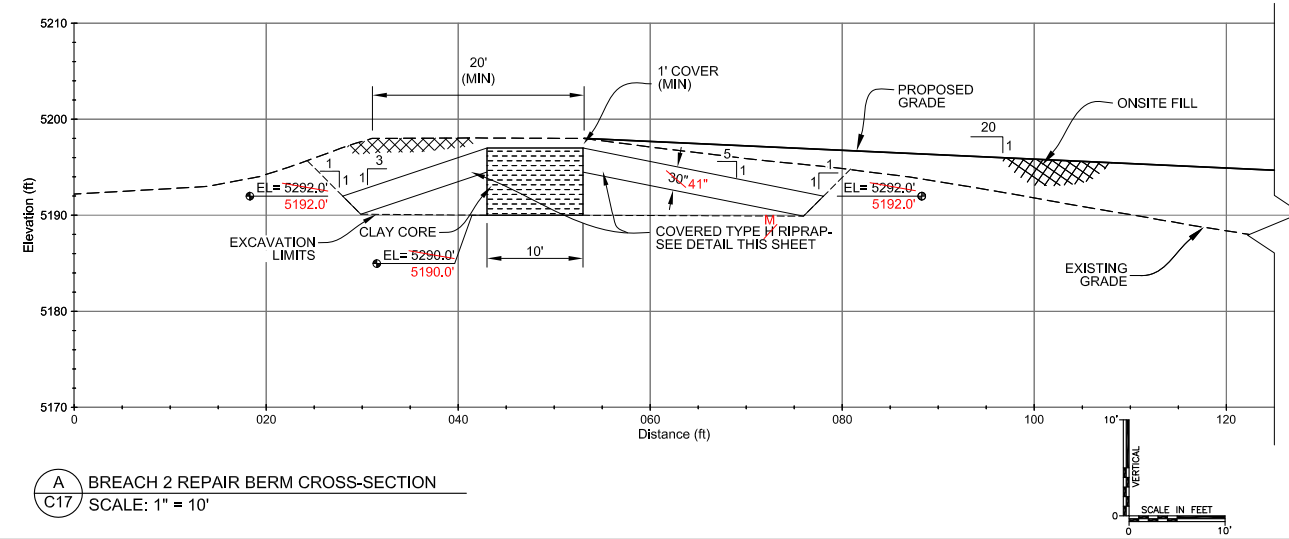
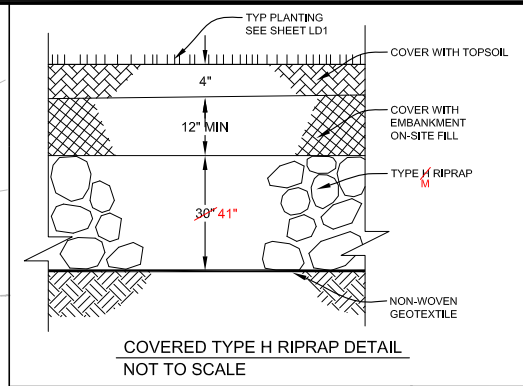
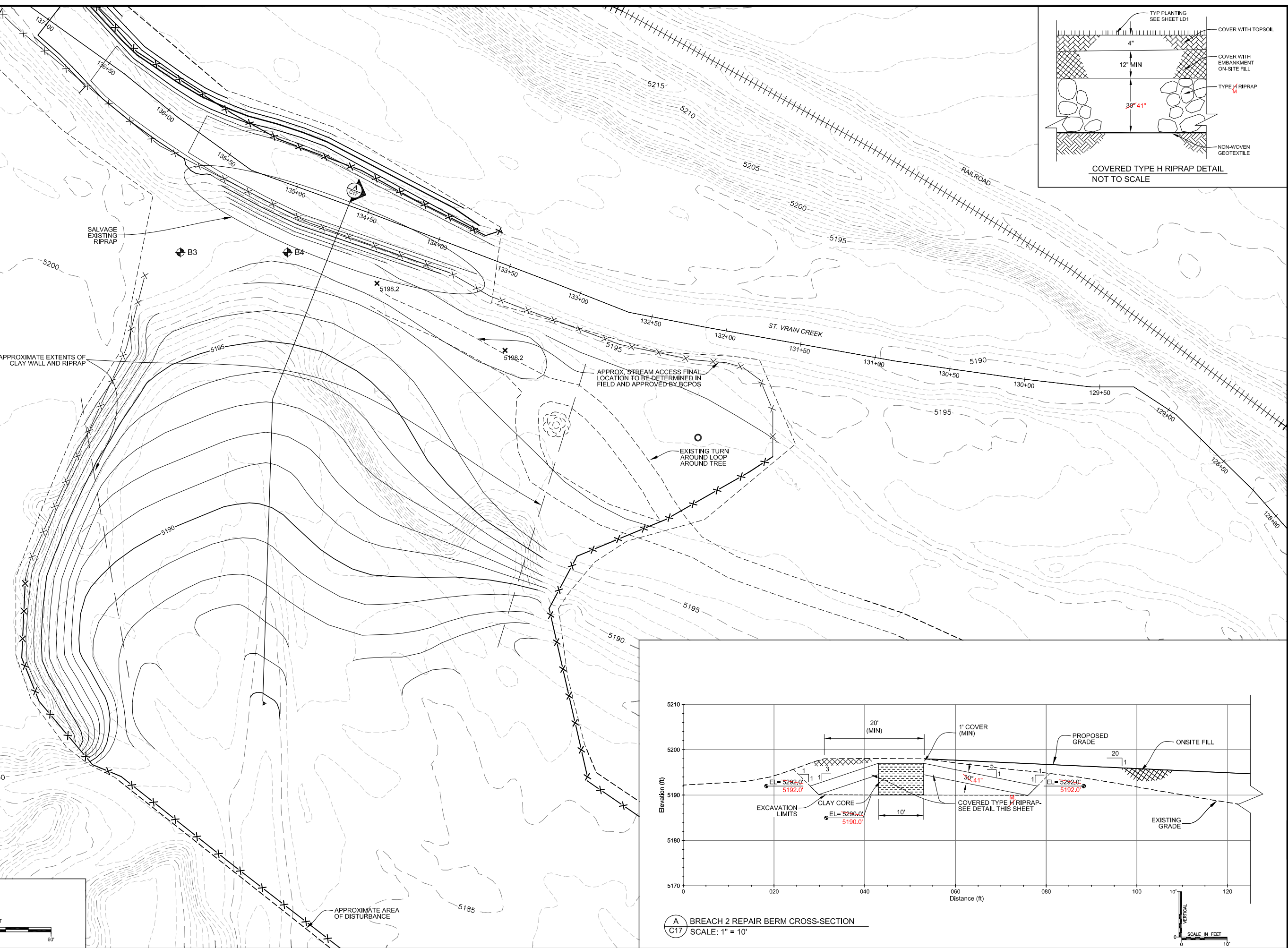
<b>EA</b> Engineering Analytics, Inc. 1600 Speer Point Road, Suite 209 Denver, CO 80202 (970) 488-3111	ST. VRAIN CREEK REACH 3 BREACH AREA 1 GRADING PLAN
	SCALE VERIFICATION: 0 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY. Drawn by: RDP Designed by: LCB Checked by: LCB Scale: As Shown Project No. 110666 Date: September 19, 2017 SHEET C16

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AS-BUILT  
6/19/2018



SCALE IN FEET



REVISIONS			
Revision	Date	Description	Issued for Construction
1	9/19/2017		
	6/19/2018		Based for As-Built Conditions

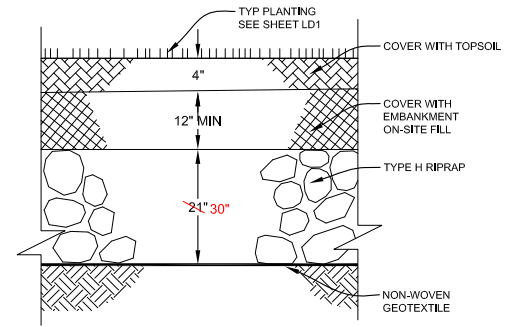
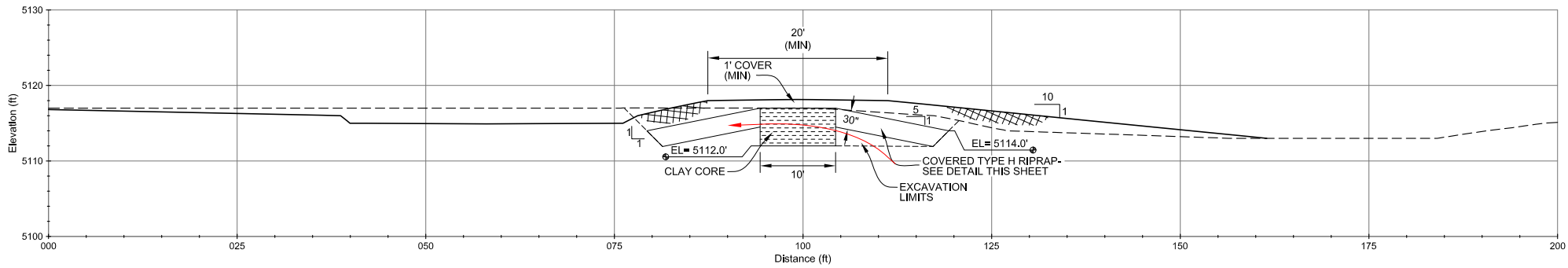
Engineering Analytics, Inc.  
1600 Speer Point Road, Suite 209  
Denver, CO 80202  
(970) 488-3111

ST. VRAIN CREEK REACH 3  
BREACH AREA 2  
GRADING PLAN

SCALE VERIFICATION: 0 = 1" = 1' IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.	
Drawn by:	RDP
Designed by:	LCB
Checked by:	LCB
Scale:	As Shown
Project No.	110666
Date:	September 19, 2017
SHEET C17	

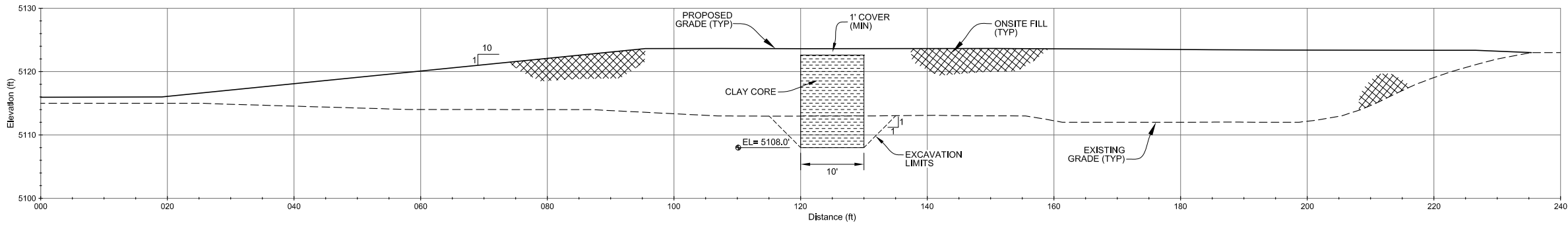




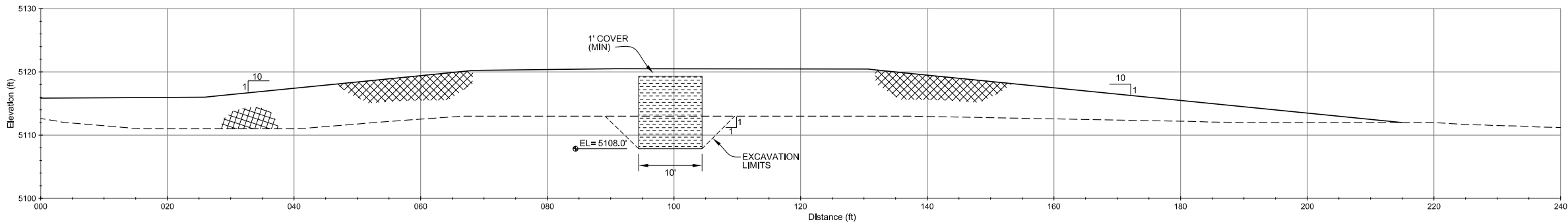


**A** BREACH 6 REPAIR BERM CROSS-SECTION  
C18 / SCALE: 1" = 10'

COVERED TYPE H RIPRAP DETAIL  
NOT TO SCALE



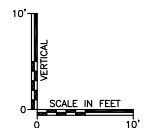
**B** BREACH 7 REPAIR BERM CROSS-SECTION 1  
C18 / SCALE: 1" = 10'



**C** BREACH 7 REPAIR BERM CROSS-SECTION 2  
C18 / SCALE: 1" = 40'



**AS-BUILT**  
6/19/2018



#### REVISIONS

Revision	Date	Description
1	9/19/2017	Issued for Construction
	6/19/2018	Based for As-Built Conditions

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ST. VRAIN CREEK REACH 3

BREACH AREA 5-9  
CROSS-SECTIONS

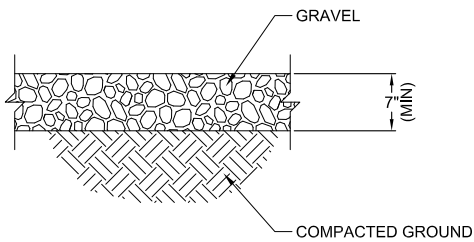
SCALE VERIFICATION:  
0 1" = 1"  
IF NOT ONE INCH ON  
THIS SHEET, ADJUST  
SCALE ACCORDINGLY.

Drawn by: RDP  
Designed by: LCB  
Checked by: LCB  
Scale: As Shown  
Project No. 110666  
Date: September 19, 2017

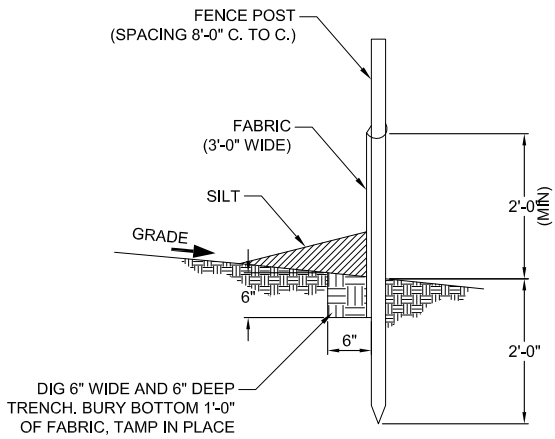
SHEET  
C19



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✓ TRACKING PAD DETAIL  
NTS



✓ SILT FENCE DETAIL  
NTS



**AS-BUILT**  
6/19/2018

REVISIONS		
Revision	Date	Description
1	9/19/2017	Issued for Construction
	6/19/2018	Revised for As-Built Conditions

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Denver, Colorado 80202  
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ST. VRAIN CREEK REACH 3

STANDARD DETAILS

SCALE VERIFICATION:  
0 1"  
IF NOT ONE INCH ON  
THIS SHEET, ADJUST  
SCALE ACCORDINGLY.

Drawn by: RDP

Designed by: LCB

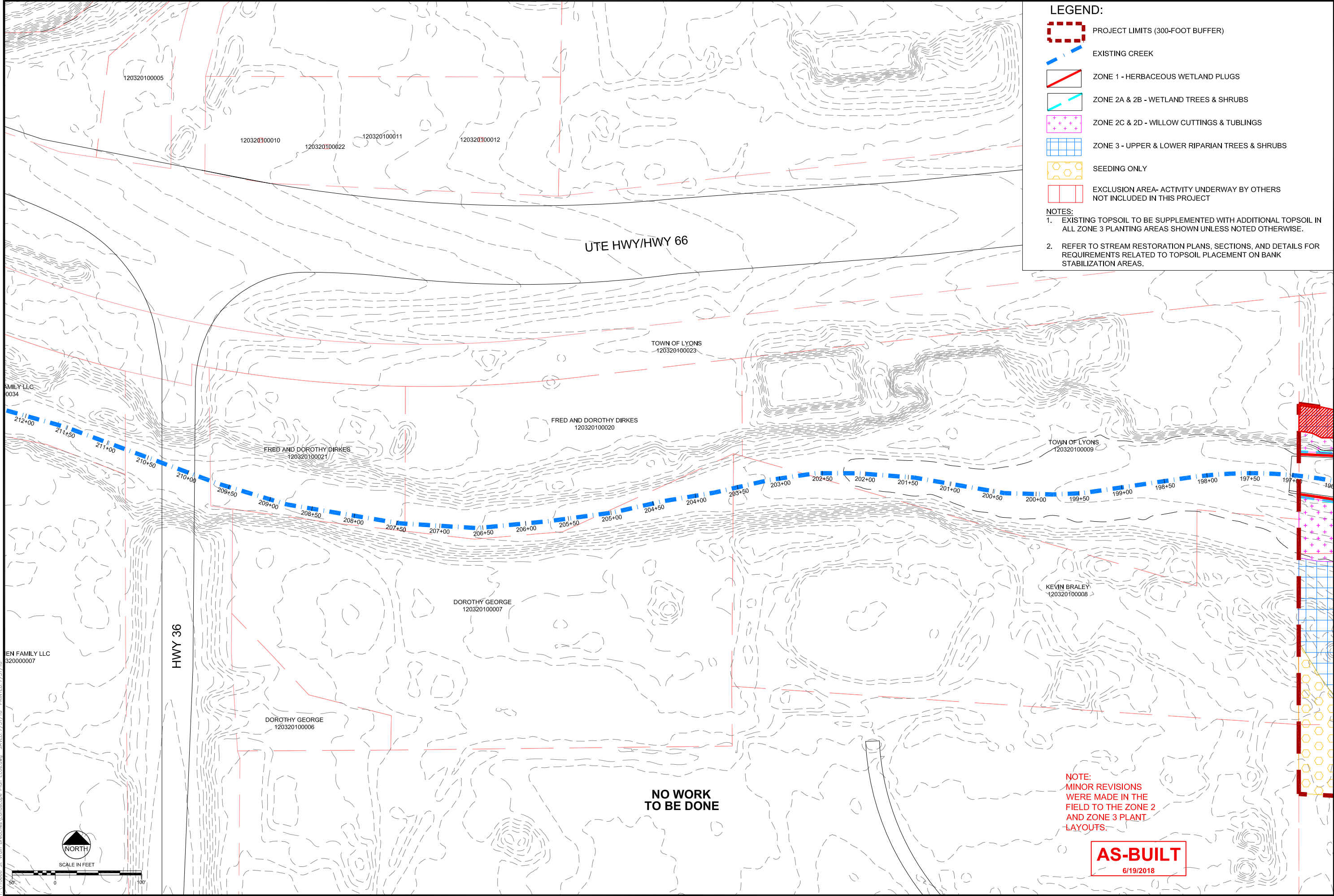
Checked by: LCB

Scale: As Shown

Project No. 110666

Date: September 19, 2017

SHEET C20



LEGEND:

- PROJECT LIMITS (300-FOOT BUFFER)
- EXISTING CREEK
- ZONE 1 - HERBACEOUS WETLAND PLUGS
- ZONE 2A & 2B - WETLAND TREES & SHRUBS
- ZONE 2C & 2D - WILLOW CUTTINGS & TUBLINGS
- ZONE 3 - UPPER & LOWER RIPARIAN TREES & SHRUBS
- SEEDING ONLY
- EXCLUSION AREA- ACTIVITY UNDERWAY BY OTHERS NOT INCLUDED IN THIS PROJECT

NOTES:

- EXISTING TOPSOIL TO BE SUPPLEMENTED WITH ADDITIONAL TOPSOIL IN ALL ZONE 3 PLANTING AREAS SHOWN UNLESS NOTED OTHERWISE.
- REFER TO STREAM RESTORATION PLANS, SECTIONS, AND DETAILS FOR REQUIREMENTS RELATED TO TOPSOIL PLACEMENT ON BANK STABILIZATION AREAS.

REVISIONS

Revision	Date	Description
1	9/19/2017	Issued for Construction
2	11/07/2017	Polygon Adjustments
3	6/19/2018	Issued for As-Built Conditions
4	7/12/2018	Comment Revisions

Engineering Analytics, Inc.

1455 WASHBURN STREET  
ERIE, COLORADO 80516  
(P) 970-612-3267

ecosystem services

ST. VRAN CREEK REACH 3

PLANTING AND SEEDING PLAN

SCALE VERIFICATION:  
0' = 1"  
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

Drawn by: JBD  
Designed by: ECOS  
Checked by: GEG  
Scale: As Shown  
Project No. 110666  
Date: September 19, 2017

SHEET

L1

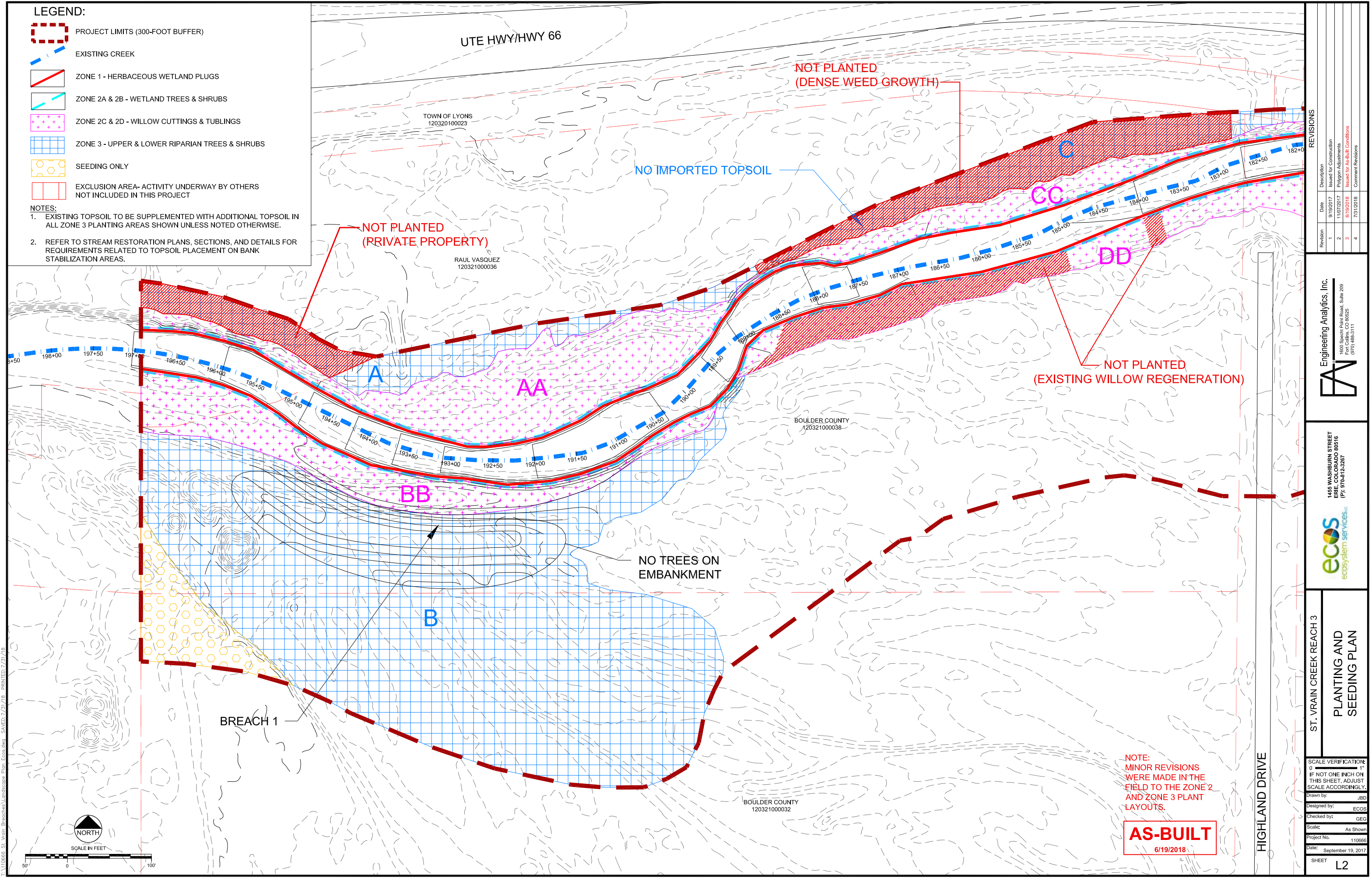
**AS-BUILT**  
6/19/2018

NOTE:  
MINOR REVISIONS  
WERE MADE IN THE  
FIELD TO THE ZONE 2  
AND ZONE 3 PLANT  
LAYOUTS.

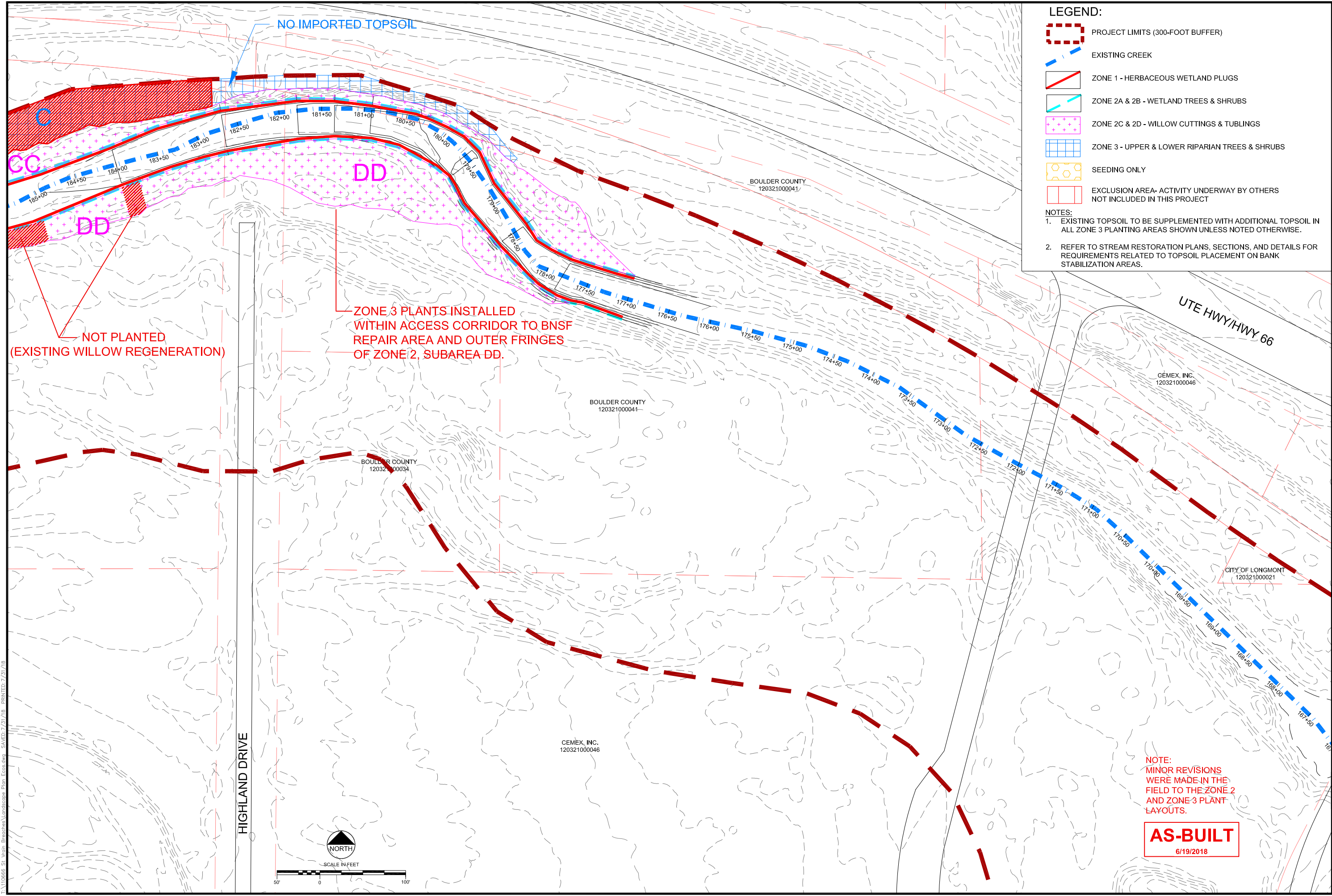
NO WORK  
TO BE DONE











- LEGEND:**
- PROJECT LIMITS (300-FOOT BUFFER)
  - EXISTING CREEK
  - ZONE 1 - HERBACEOUS WETLAND PLUGS
  - ZONE 2A & 2B - WETLAND TREES & SHRUBS
  - ZONE 2C & 2D - WILLOW CUTTINGS & TUBLINGS
  - ZONE 3 - UPPER & LOWER RIPARIAN TREES & SHRUBS
  - SEEDING ONLY
  - EXCLUSION AREA- ACTIVITY UNDERWAY BY OTHERS NOT INCLUDED IN THIS PROJECT

- NOTES:**
- EXISTING TOPSOIL TO BE SUPPLEMENTED WITH ADDITIONAL TOPSOIL IN ALL ZONE 3 PLANTING AREAS SHOWN UNLESS NOTED OTHERWISE.
  - REFER TO STREAM RESTORATION PLANS, SECTIONS, AND DETAILS FOR REQUIREMENTS RELATED TO TOPSOIL PLACEMENT ON BANK STABILIZATION AREAS.

NOT PLANTED  
(EXISTING WILLOW REGENERATION)

ZONE 3 PLANTS INSTALLED  
WITHIN ACCESS CORRIDOR TO BNSF  
REPAIR AREA AND OUTER FRINGES  
OF ZONE 2, SUBAREA DD.

NOTE:  
MINOR REVISIONS  
WERE MADE IN THE  
FIELD TO THE ZONE 2  
AND ZONE 3 PLANT  
LAYOUTS.

**AS-BUILT**  
6/19/2018

REVISIONS			
Revision	Date	Description	
1	9/19/2017	Issued for Construction	
2	11/07/2017	Polygon Adjustments	
3	6/19/2018	Issued for As-Built Conditions	
4	7/12/2018	Comment Revisions	

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ERIE, COLORADO 80516  
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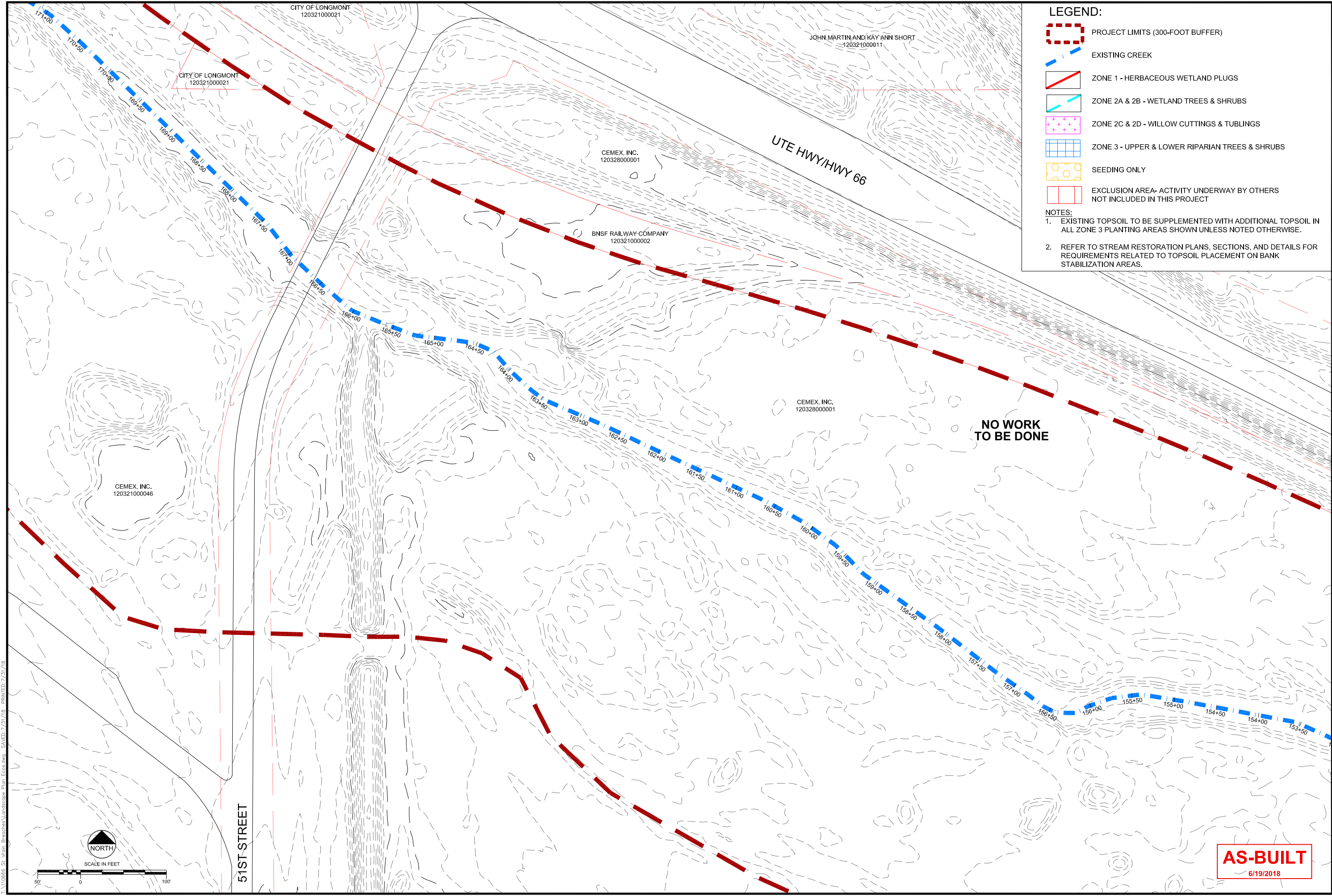
ST. VRAIN CREEK REACH 3

PLANTING AND SEEDING PLAN

SCALE VERIFICATION:  
0" = 1"  
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

Drawn by: JBD  
Designed by: ECOS  
Checked by: GEG  
Scale: As Shown  
Project No. 110666  
Date: September 19, 2017  
SHEET L3





- LEGEND:**
- PROJECT LIMITS (300-FOOT BUFFER)
  - EXISTING CREEK
  - ZONE 1 - HERBACEOUS WETLAND PLUGS
  - ZONE 2A & 2B - WETLAND TREES & SHRUBS
  - ZONE 2C & 2D - WILLOW CUTTINGS & TUBLINGS
  - ZONE 3 - UPPER & LOWER RIPARIAN TREES & SHRUBS
  - SEEDING ONLY
  - EXCLUSION AREA- ACTIVITY UNDERWAY BY OTHERS NOT INCLUDED IN THIS PROJECT

- NOTES:**
- EXISTING TOPSOIL TO BE SUPPLEMENTED WITH ADDITIONAL TOPSOIL IN ALL ZONE 3 PLANTING AREAS SHOWN UNLESS NOTED OTHERWISE.
  - REFER TO STREAM RESTORATION PLANS, SECTIONS, AND DETAILS FOR REQUIREMENTS RELATED TO TOPSOIL PLACEMENT ON BANK STABILIZATION AREAS.

REVISIONS

Revision	Date	Description
1	9/19/2017	Issued for Construction
2	11/07/2017	Polygon Adjustments
3	6/19/2018	Issued for AS-Built Conditions
4	7/31/2018	Comment Revisions

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(P) 970-912-3267

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ST. VRAN CREEK REACH 3  
PLANTING AND SEEDING PLAN

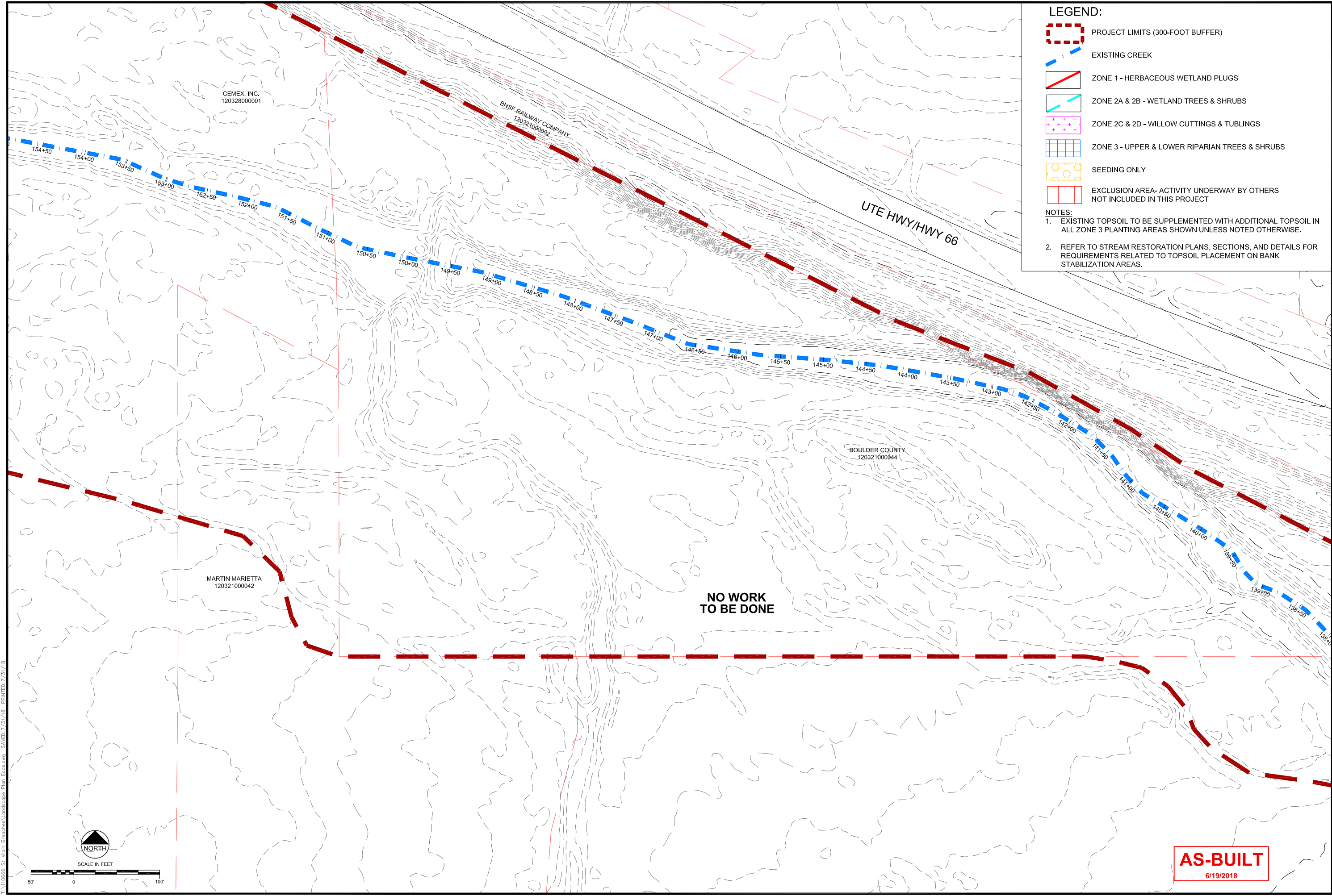
SCALE VERIFICATION:  
0 1"  
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

Drawn by: JBD  
Designed by: ECOS  
Checked by: GEG  
Scale: As Shown  
Project No. 110666  
Date: September 19, 2017

SHEET L4

**AS-BUILT**  
6/19/2018

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- LEGEND:**
- PROJECT LIMITS (300-FOOT BUFFER)
  - EXISTING CREEK
  - ZONE 1 - HERBACEOUS WETLAND PLUGS
  - ZONE 2A & 2B - WETLAND TREES & SHRUBS
  - ZONE 2C & 2D - WILLOW CUTTINGS & TUBLINGS
  - ZONE 3 - UPPER & LOWER RIPARIAN TREES & SHRUBS
  - SEEDING ONLY
  - EXCLUSION AREA- ACTIVITY UNDERWAY BY OTHERS NOT INCLUDED IN THIS PROJECT

- NOTES:**
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  - REFER TO STREAM RESTORATION PLANS, SECTIONS, AND DETAILS FOR REQUIREMENTS RELATED TO TOPSOIL PLACEMENT ON BANK STABILIZATION AREAS.

ST. VRAIN CREEK REACH 3

PLANTING AND SEEDING PLAN

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Fort Collins, CO 80525  
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ecosystem services

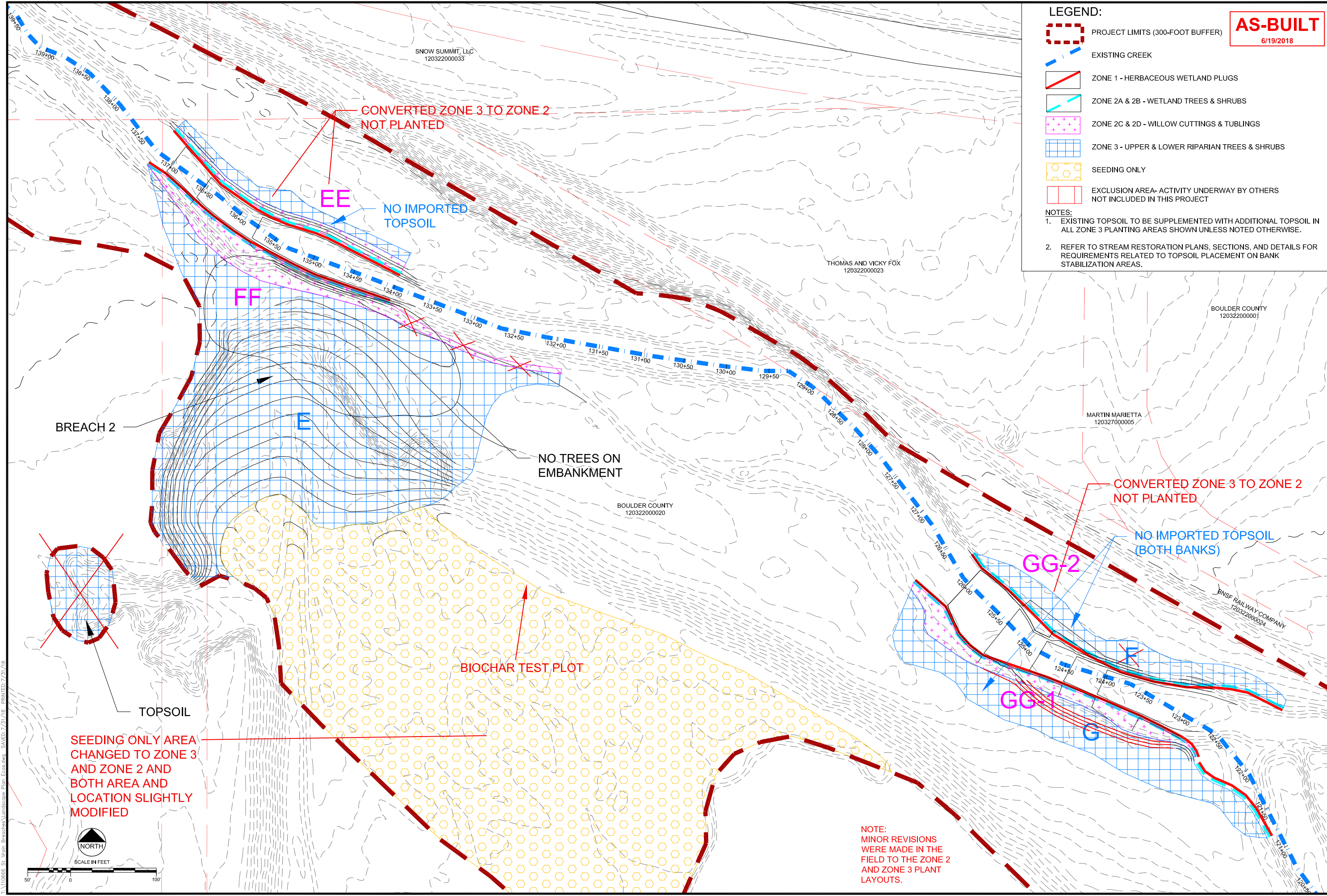
Revision	Date	Description
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2	11/07/2017	Polygon Adjustments
3	6/19/2018	Issued for AS-Built Conditions
4	7/31/2018	Comment Revisions

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Project No. 110666  
Date: September 19, 2017  
SHEET L5

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**LEGEND:**

- PROJECT LIMITS (300-FOOT BUFFER)
- EXISTING CREEK
- ZONE 1 - HERBACEOUS WETLAND PLUGS
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**AS-BUILT**  
6/19/2018

**REVISIONS**

Revision	Date	Description
1	9/19/2017	Issued for Construction
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3	6/19/2018	Issued for As-Built Conditions
4	7/12/2018	Comment Revisions

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(970) 488-3111

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**ST. VRAIN CREEK REACH 3**

**PLANTING AND SEEDING PLAN**

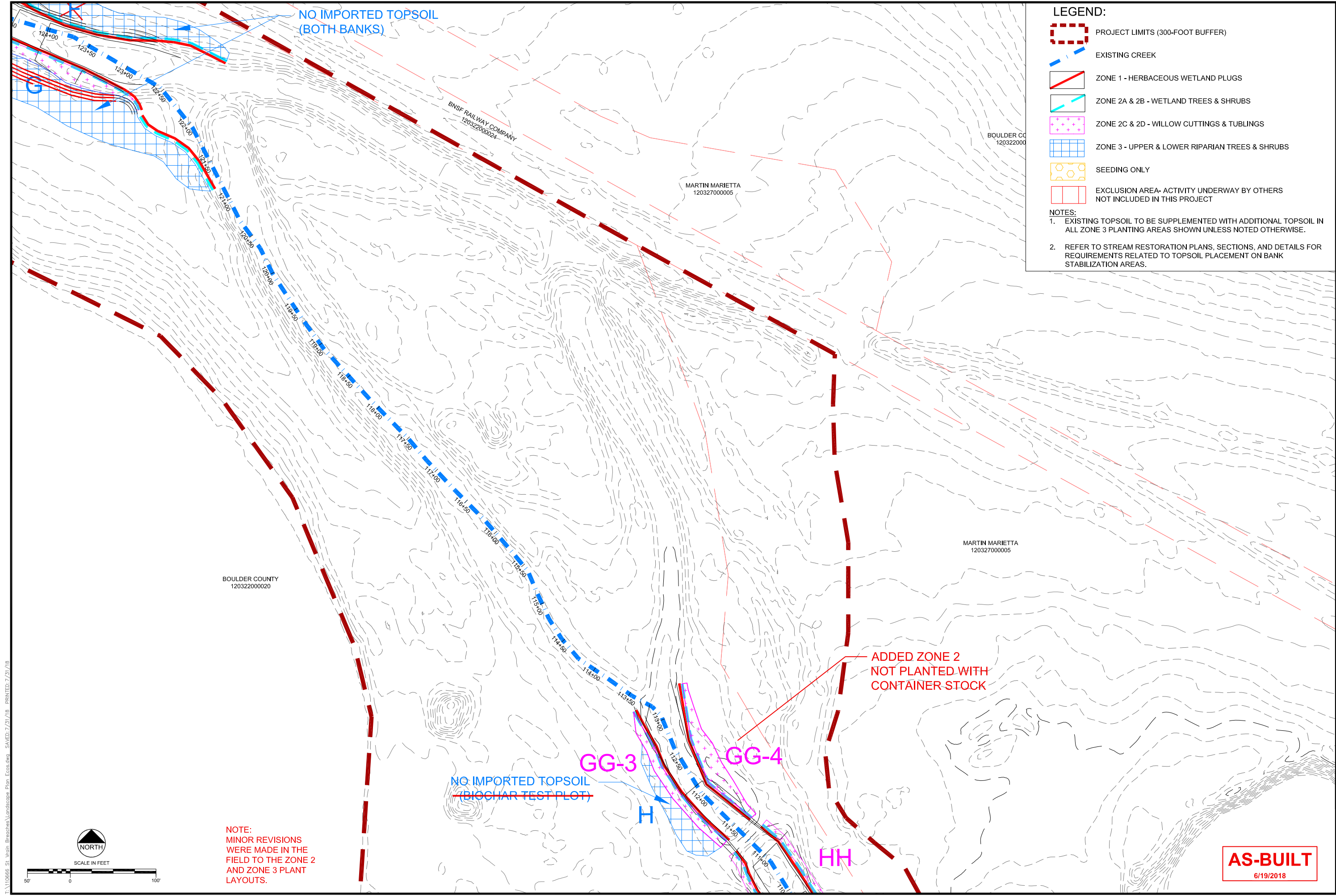
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Scale: As Shown  
Project No. 110666  
Date: September 19, 2017

**SHEET L6**

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**LEGEND:**

- PROJECT LIMITS (300-FOOT BUFFER)
- EXISTING CREEK
- ZONE 1 - HERBACEOUS WETLAND PLUGS
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REVISIONS	
Revision	Description
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4	7/12/2018 Comment Revisions

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ST. VRAIN CREEK REACH 3

**PLANTING AND SEEDING PLAN**

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Project No. 110666  
Date: September 19, 2017  
SHEET L7



LEGEND:

PROJECT LIMITS (300-FOOT BUFFER)

EXISTING CREEK

ZONE 1 - HERBACEOUS WETLAND PLUGS

ZONE 2A & 2B - WETLAND TREES & SHRUBS

ZONE 2C & 2D - WILLOW CUTTINGS & TUBLINGS

ZONE 3 - UPPER & LOWER RIPARIAN TREES & SHRUBS

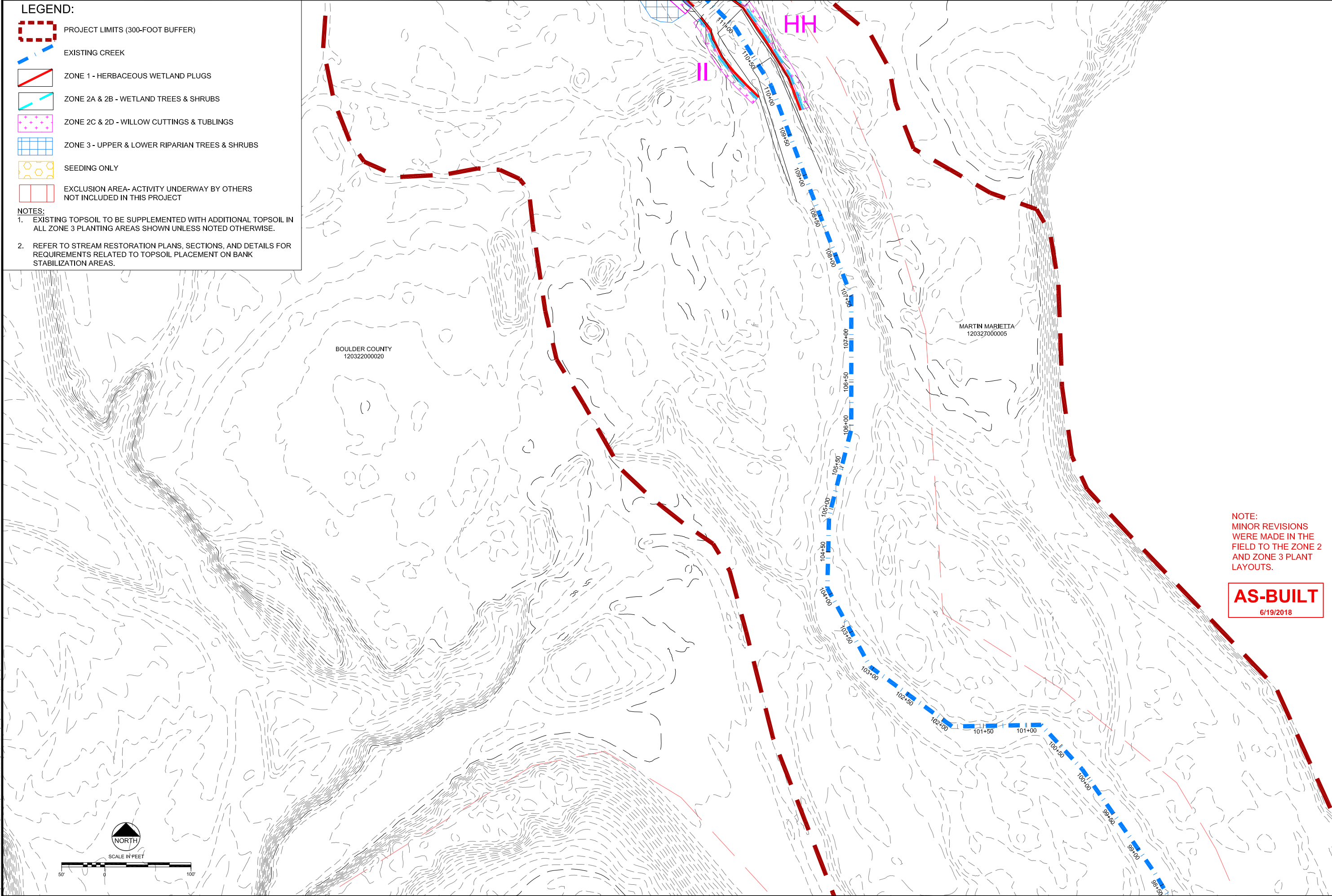
SEEDING ONLY

EXCLUSION AREA- ACTIVITY UNDERWAY BY OTHERS  
NOT INCLUDED IN THIS PROJECT

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2. REFER TO STREAM RESTORATION PLANS, SECTIONS, AND DETAILS FOR REQUIREMENTS RELATED TO TOPSOIL PLACEMENT ON BANK STABILIZATION AREAS.



NOTE:  
MINOR REVISIONS  
WERE MADE IN THE  
FIELD TO THE ZONE 2  
AND ZONE 3 PLANT  
LAYOUTS.

**AS-BUILT**  
6/19/2018

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ST. VRAIN CREEK REACH 3

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Scale: As Shown  
Project No. 110666  
Date: September 19, 2017

SHEET L8

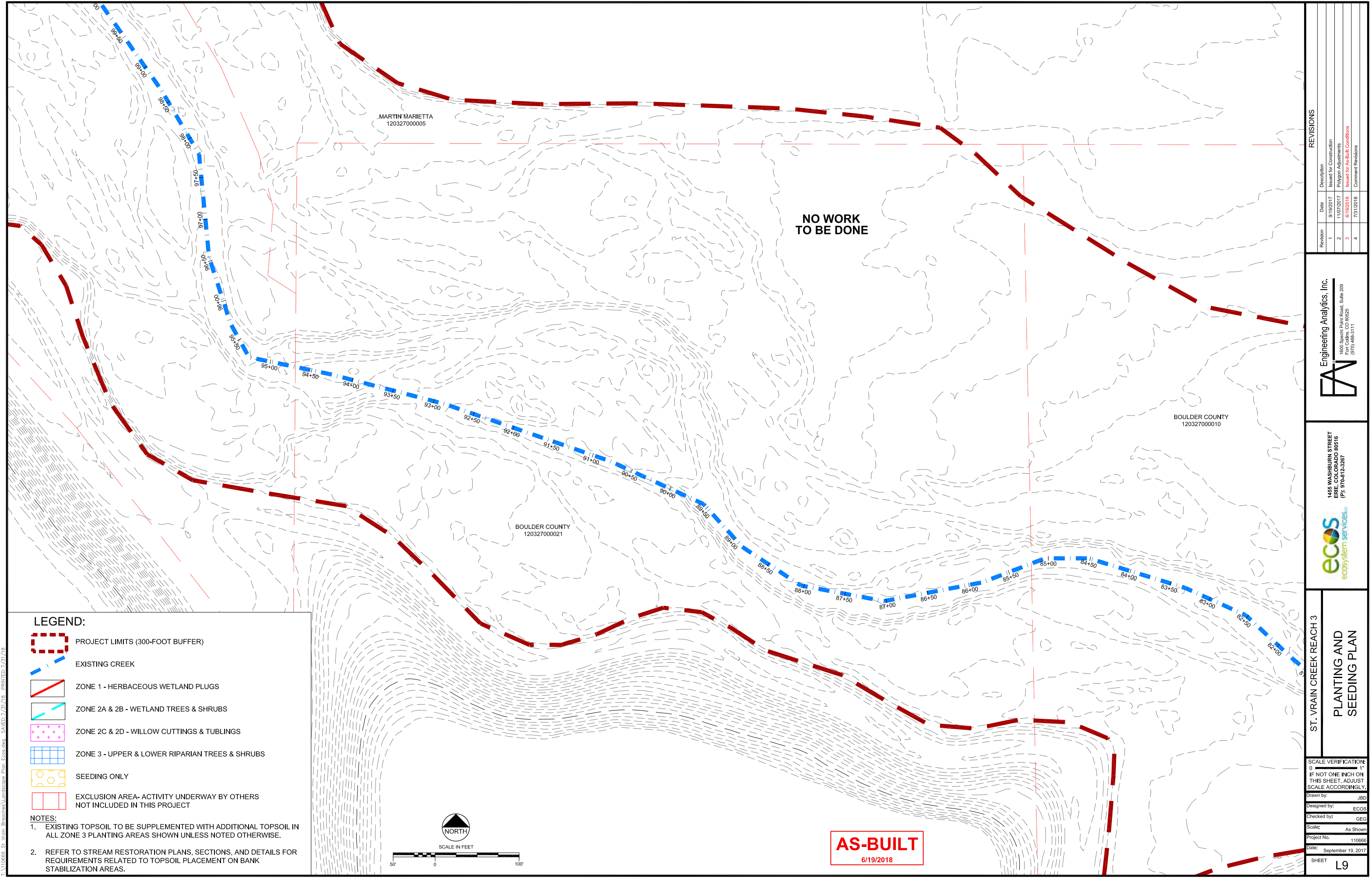
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REVISIONS

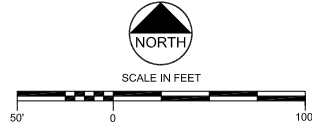
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- LEGEND:**
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**AS-BUILT**  
6/19/2018

ST. VRAIN CREEK REACH 3

PLANTING AND SEEDING PLAN

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(PT: 970-412-3267)

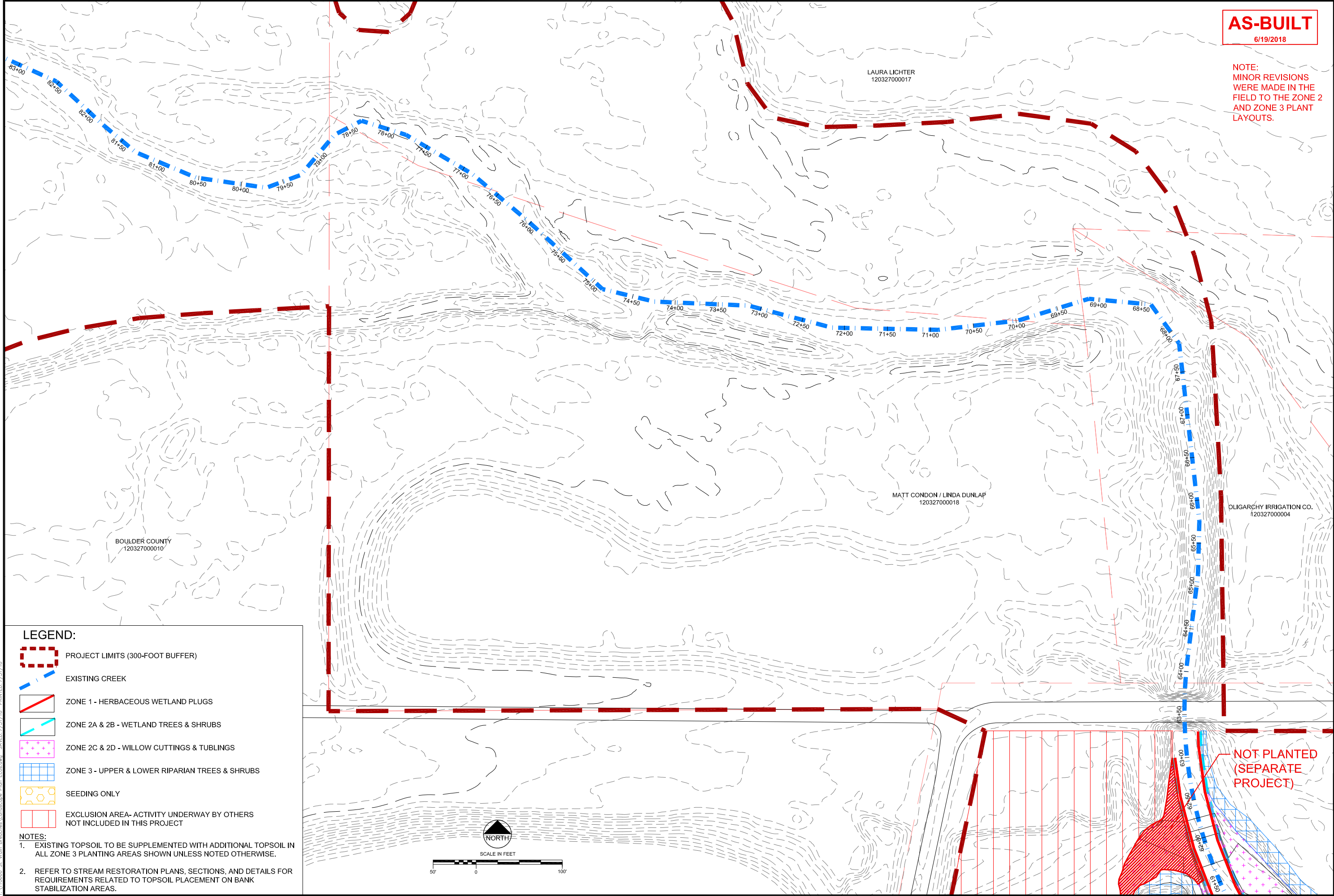
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(970) 488-3111

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Project No. 110666  
Date: September 19, 2017  
SHEET L9





AS-BUILT  
6/19/2018

NOTE:  
MINOR REVISIONS  
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LAYOUTS.

REVISIONS			
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ST. VRAIN CREEK REACH 3

PLANTING AND SEEDING PLAN

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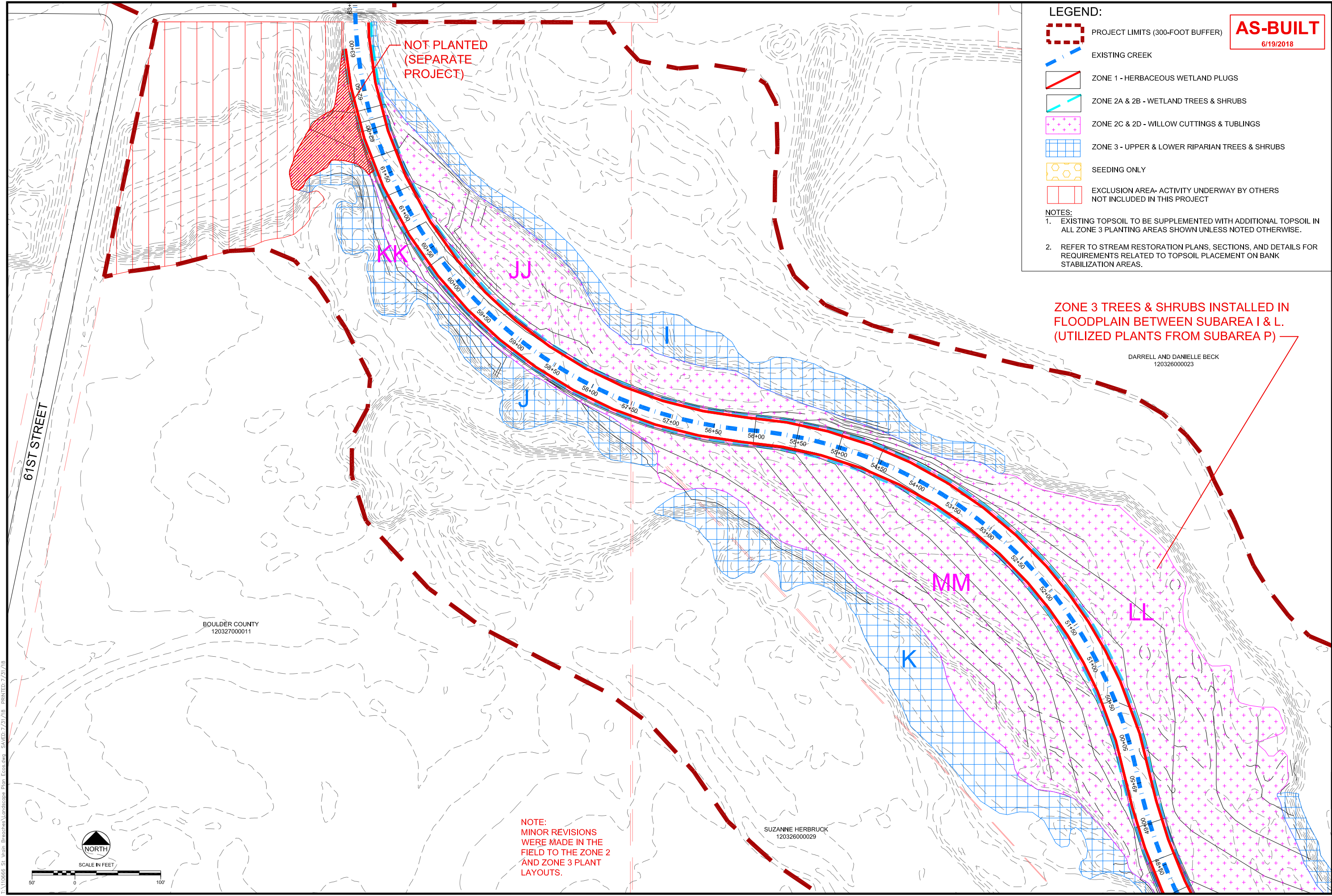
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Checked by: GEG  
Scale: As Shown  
Project No. 110666  
Date: September 19, 2017  
SHEET L10

LEGEND:

- PROJECT LIMITS (300-FOOT BUFFER)
- EXISTING CREEK
- ZONE 1 - HERBACEOUS WETLAND PLUGS
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**LEGEND:**

PROJECT LIMITS (300-FOOT BUFFER)

EXISTING CREEK

**NOTES:**

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**AS-BUILT**

6/19/2018

ZONE 3 TREES & SHRUBS INSTALLED IN FLOODPLAIN BETWEEN SUBAREA I & L. (UTILIZED PLANTS FROM SUBAREA P)

DARRELL AND DANIELLE BECK  
120326000023

NOTE:  
MINOR REVISIONS  
WERE MADE IN THE  
FIELD TO THE ZONE 2  
AND ZONE 3 PLANT  
LAYOUTS.

SUZANNE HERBRUCK  
120326000029

SCALE IN FEET

ST. VRAIN CREEK REACH 3

PLANTING AND SEEDING PLAN

SHEET L11

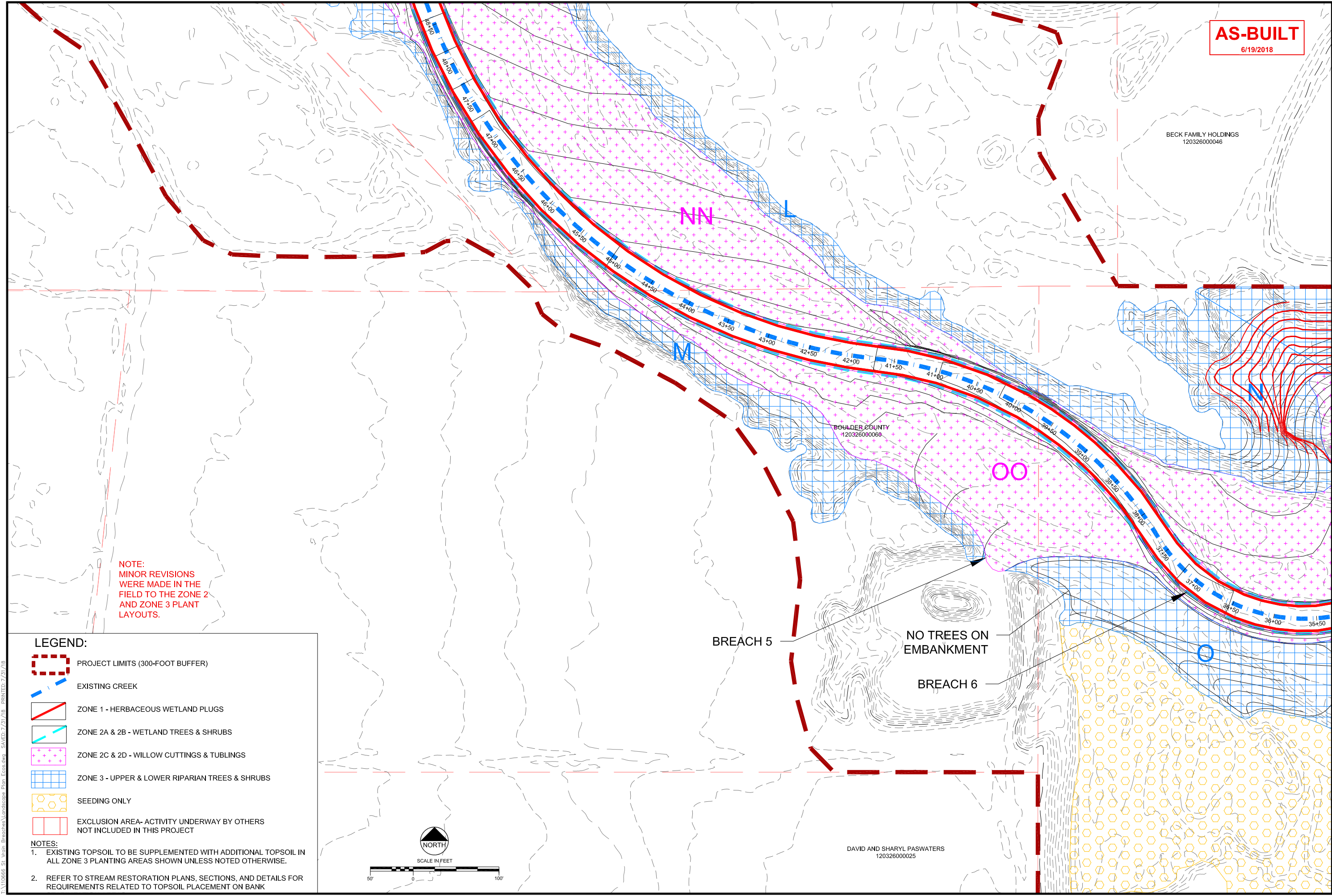
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ERIE, COLORADO 80516  
(P) 970-912-3267

Revision	Date	Description
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3	6/19/2018	Issued for As-Built Conditions
4	7/12/2018	Comment Revisions

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6/19/2018

NOTE:  
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FIELD TO THE ZONE 2  
AND ZONE 3 PLANT  
LAYOUTS.

LEGEND:

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- EXISTING CREEK
- ZONE 1 - HERBACEOUS WETLAND PLUGS
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ST. VRAIN CREEK REACH 3

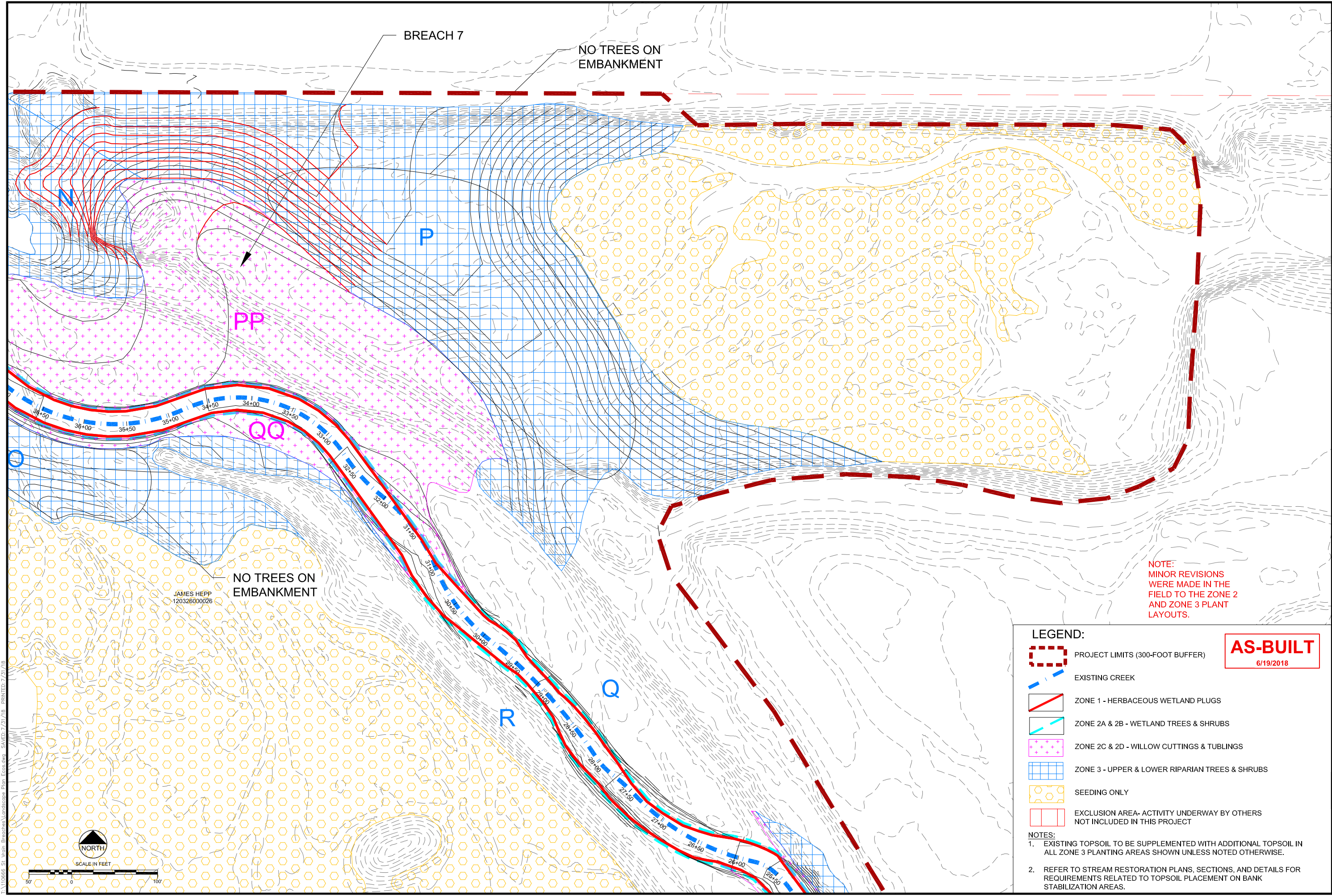
PLANTING AND  
SEEDING PLAN

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Scale: As Shown  
Project No. 110666  
Date: September 19, 2017

SHEET  
L12





**LEGEND:**

- PROJECT LIMITS (300-FOOT BUFFER)
- EXISTING CREEK
- ZONE 1 - HERBACEOUS WETLAND PLUGS
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**AS-BUILT**  
6/19/2018

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**ST. VRAIN CREEK REACH 3**  
**PLANTING AND SEEDING PLAN**

**REVISIONS**

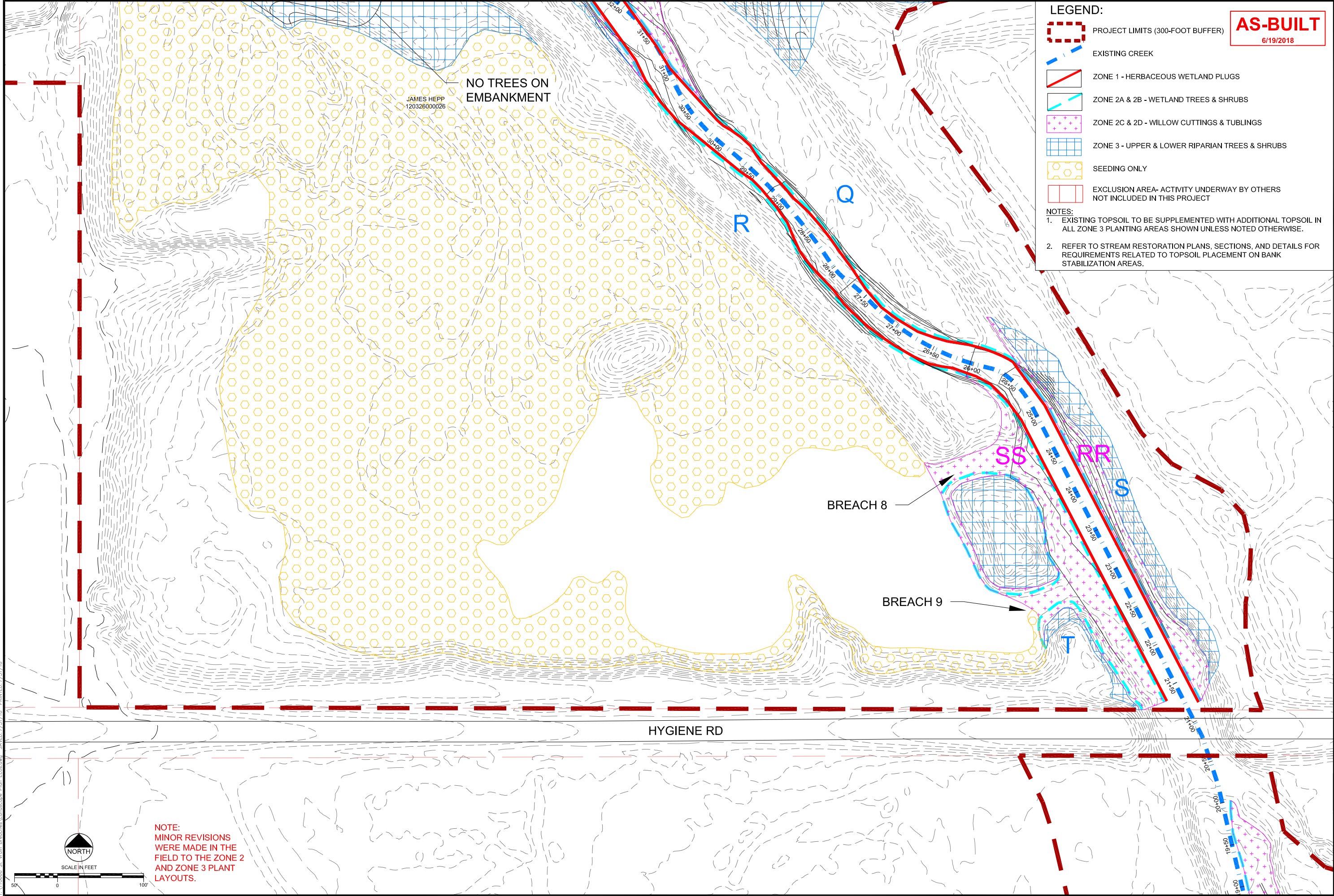
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Project No. 110666  
Date: September 19, 2017  
SHEET **L13**





LEGEND:

PROJECT LIMITS (300-FOOT BUFFER)

EXISTING CREEK

ZONE 1 - HERBACEOUS WETLAND PLUGS

ZONE 2A & 2B - WETLAND TREES & SHRUBS

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ZONE 3 - UPPER & LOWER RIPARIAN TREES & SHRUBS

SEEDING ONLY

EXCLUSION AREA- ACTIVITY UNDERWAY BY OTHERS NOT INCLUDED IN THIS PROJECT

AS-BUILT

6/19/2018

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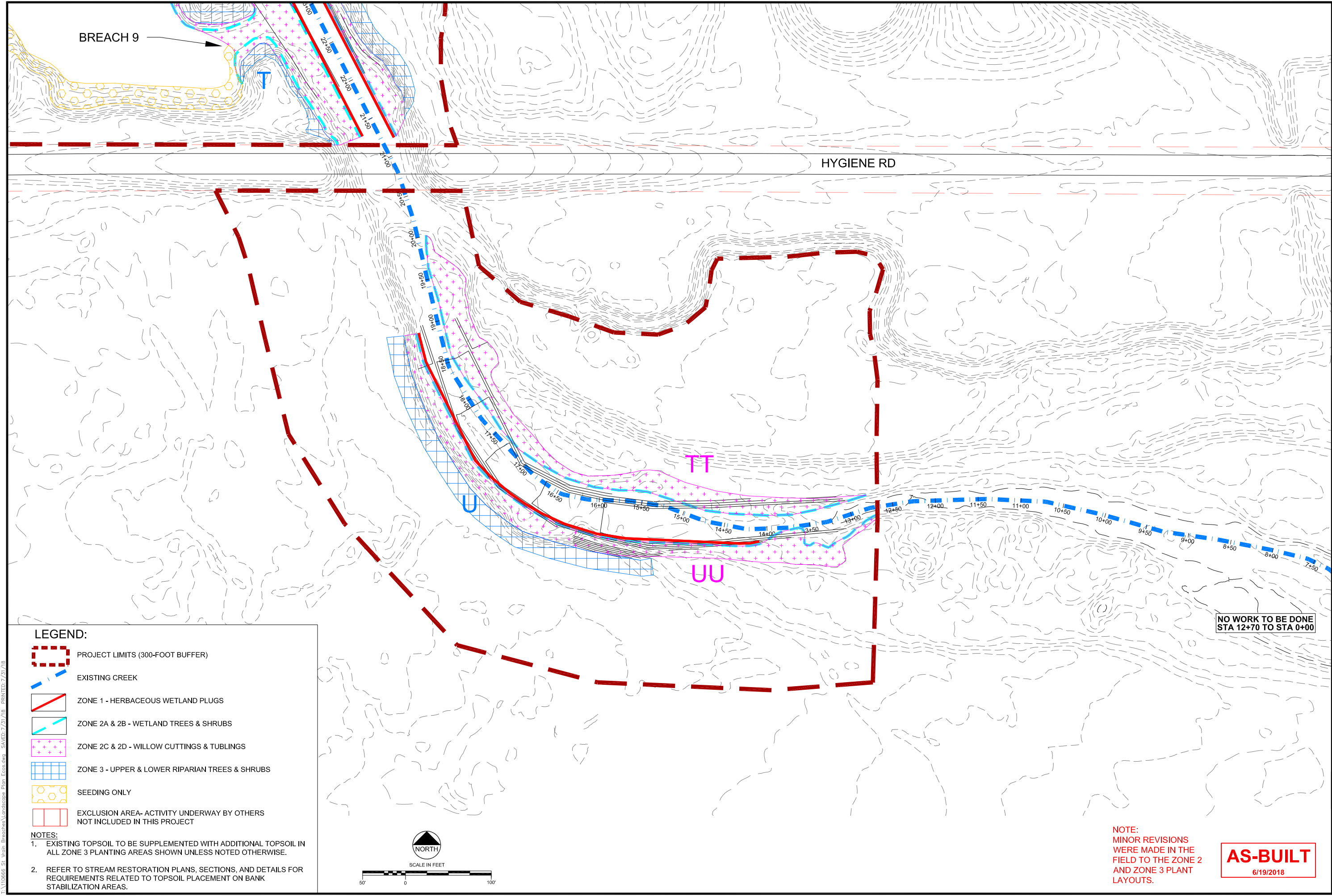
ST. VRAN CREEK REACH 3

PLANTING AND SEEDING PLAN

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Designed by: ECOS  
Checked by: GEG  
Scale: As Shown  
Project No. 110666  
Date: September 19, 2017

SHEET L14



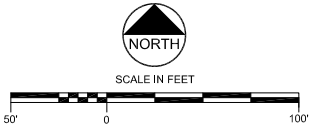
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LEGEND:

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- EXISTING CREEK
- ZONE 1 - HERBACEOUS WETLAND PLUGS
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NOTE:  
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AND ZONE 3 PLANT  
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**AS-BUILT**  
6/19/2018

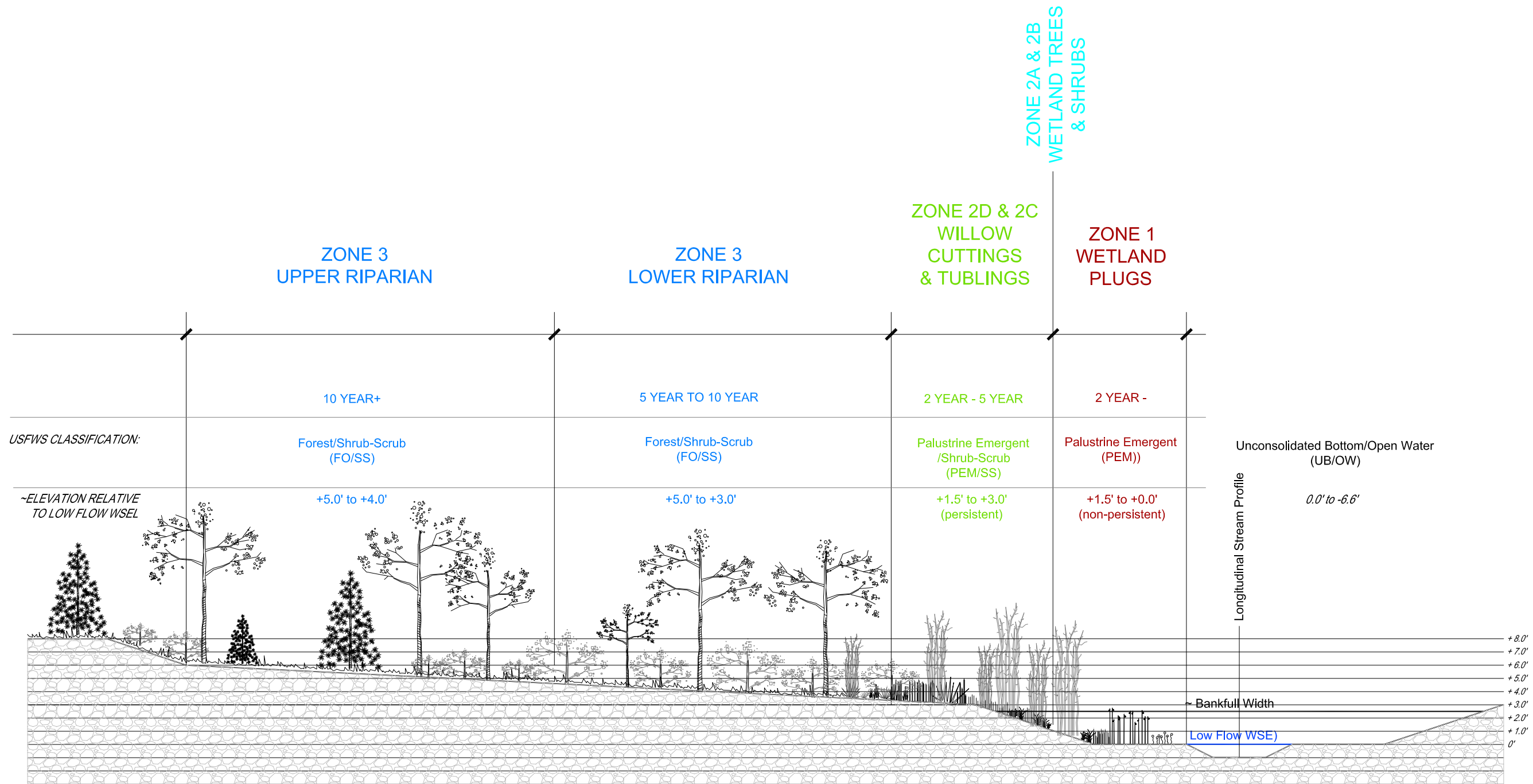
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ST. VRAIN CREEK REACH 3	<b>PLANTING AND SEEDING PLAN</b>

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Drawn by:	JBD
Designed by:	ECOS
Checked by:	GEG
Scale:	As Shown
Project No.	110666
Date:	September 19, 2017
SHEET	L15





- NOTES:
- CROSS-REFERENCE ABOVE TYPICAL CROSS-SECTION WITH PLANTING AND SEEDING SCHEDULES.
  - TRANSITION OR EXTENSION OF SPECIES BETWEEN ZONES MAY VARY DEPENDING ON ACTUAL FIELD CONDITIONS, SLOPE, HYDROLOGY, MICRO-HABITAT, SOIL TEXTURE & MOISTURE CONDITIONS.
  - THE ECOLOGIST OVERSEEING PLANTING OPERATIONS WILL MAKE DISCRETIONARY CALLS ON PLANT LOCATIONS BASED ON IN-FIELD CONDITIONS.
  - ALL PLANTING AND SEEDING EFFORTS IN ALL ZONES ARE INTENDED TO INCREASE SOIL COHESION, REDUCE EROSION POTENTIAL, STABILIZE SEDIMENT AND ENHANCE THE RESILIENCY OF THE STREAMBANKS AND RIPARIAN CORRIDOR WITHIN THE PROJECT LIMITS.

# TYPICAL RIPARIAN PLANT COMMUNITY CROSS-SECTION

CROSS-SECTION NTS

**AS-BUILT**  
6/19/2018

REVISIONS

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1	9/19/2017	Issued for Construction
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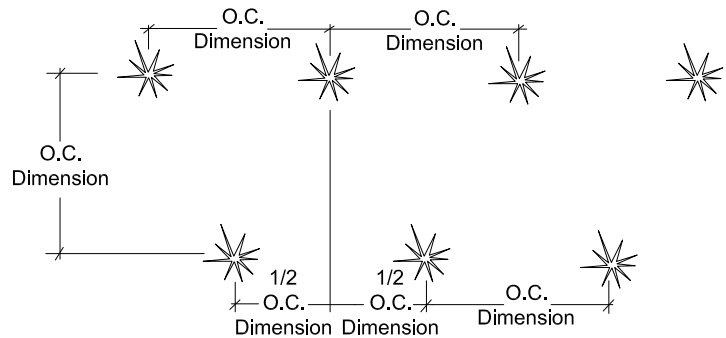
ST. VRAIN CREEK REACH 3

TYPICAL PLANTING CROSS-SECTION

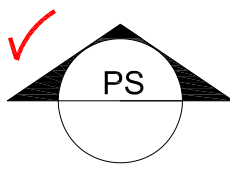
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Project No. 110666  
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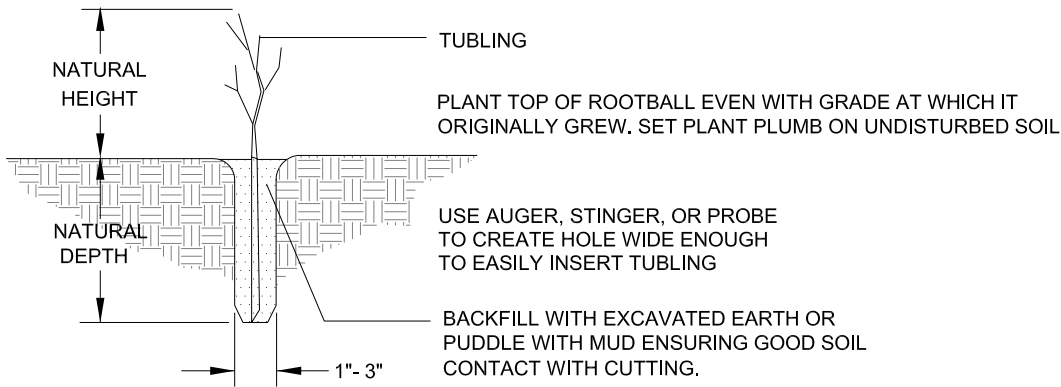


NOTES:  
1. REFER TO PLANT SCHEDULES FOR SPACING REQUIREMENTS.

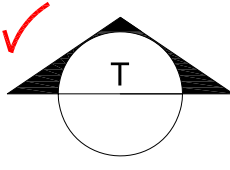


# PLANT SPACING DETAIL

PLAN: NTS

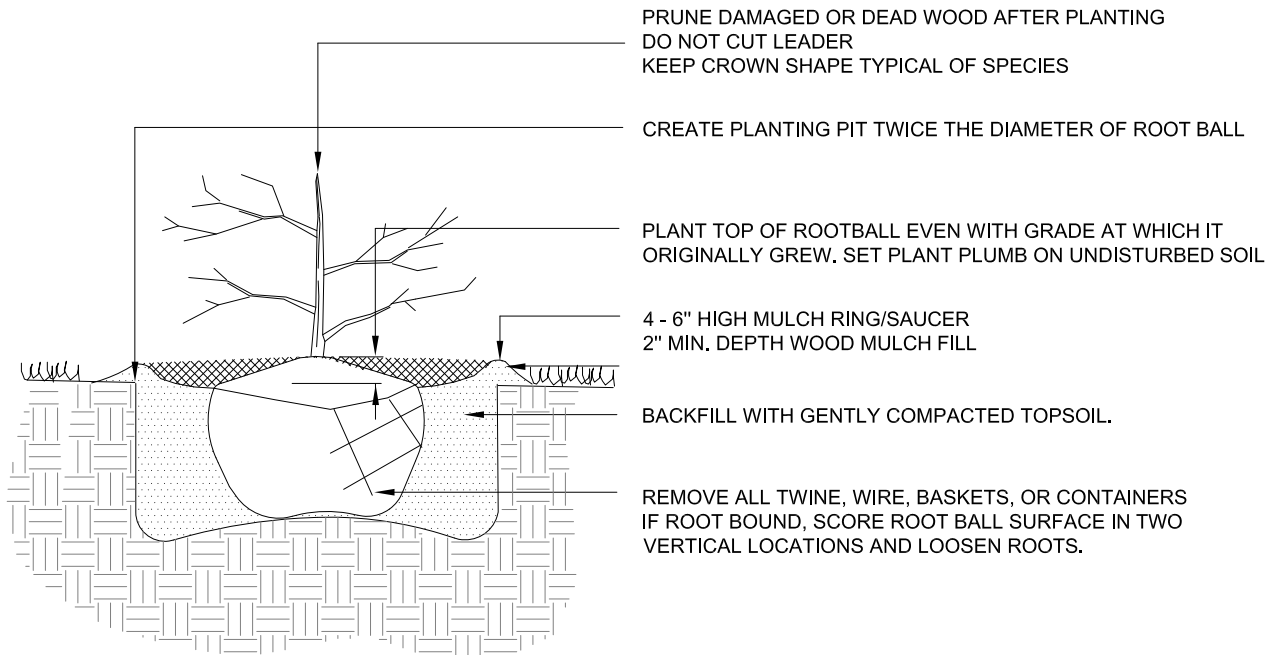


NOTES:  
1. REFER TO PLANT SCHEDULES FOR SPECIES SIZE AND QUANTITY.

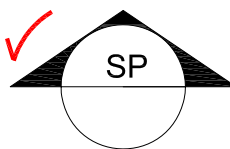


# TUBLING PLANTING DETAIL

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. REFER TO PLANT SCHEDULES.



# TREE & SHRUB PLANTING DETAIL

CROSS-SECTION NTS

**AS-BUILT**  
6/19/2018

ST. VRAIN CREEK REACH 3		TYPICAL PLANTING DETAILS	
SCALE VERIFICATION: 0 1' IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.			
Drawn by: JBD		Designed by: ECOS	
Checked by: GEG		Scale: As Shown	
Project No. 110666		Date: September 19, 2017	
SHEET LD2		REVISIONS	
Revision	Date	Description	
1	9/19/2017	Issued for Construction	
2	11/07/2017	Polygon Adjustments	
3	6/19/2018	Issued for As-Built Conditions	
4	7/12/2018	Comment Revisions	

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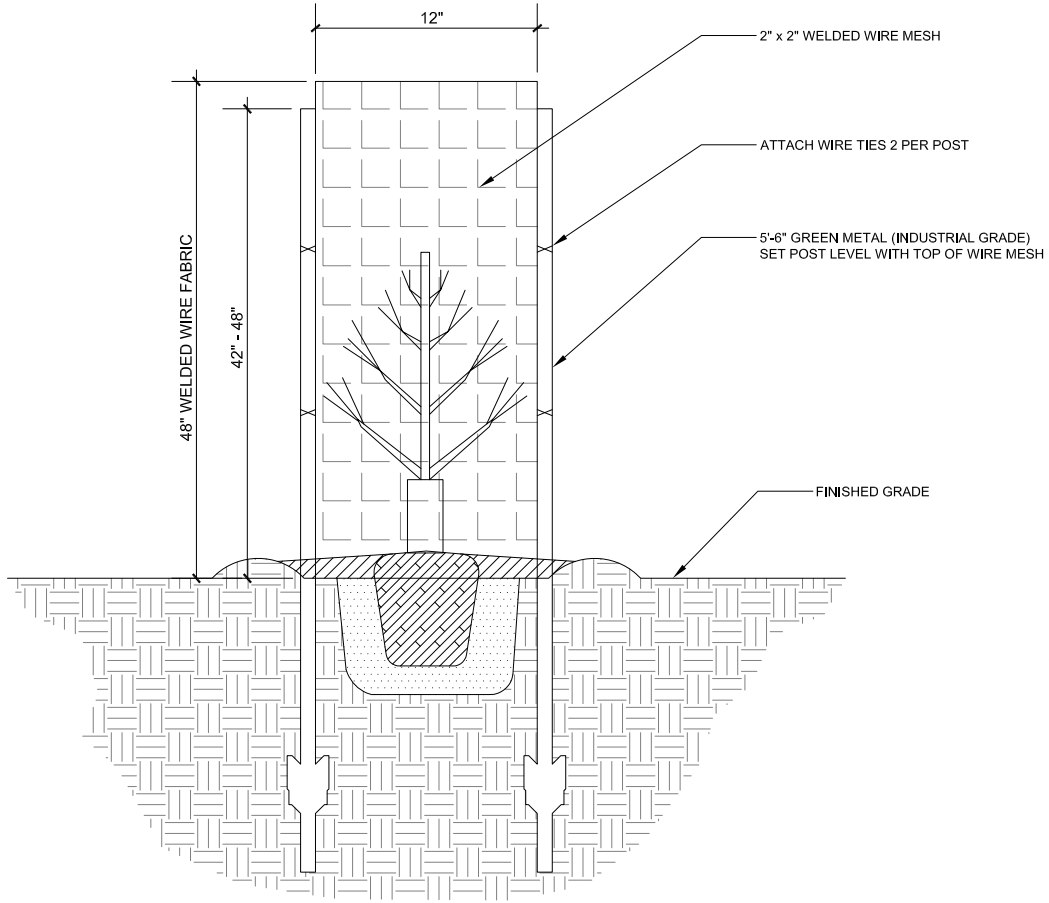
1600 South Pearl Road, Suite 209  
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1455 WASHBURN STREET  
ERIE, COLORADO 80516  
(P) 970-412-3267

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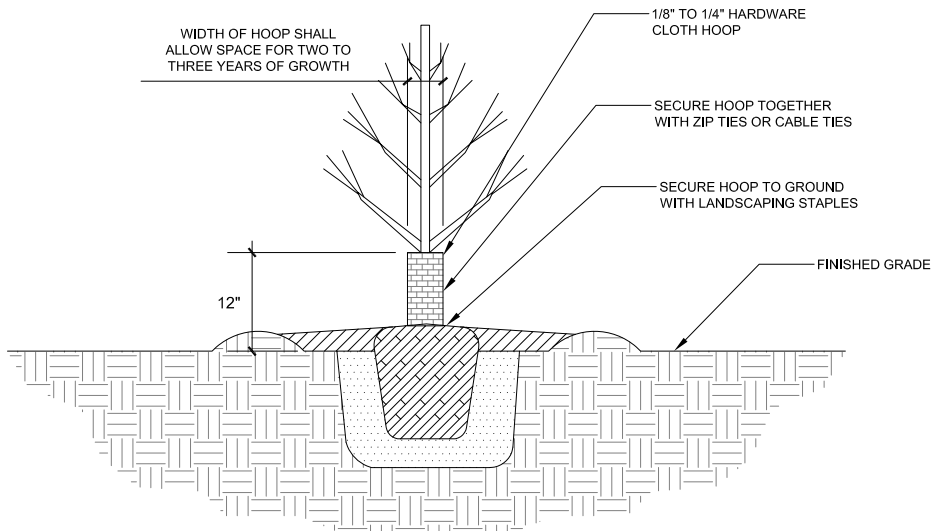
7/11/2018 St. Vrain Breasted Landscaping Details - Ecos As-Built.dwg SANVED/23/16 PRINTED:7/11/18



BP

## BEAVER PROTECTION FENCE

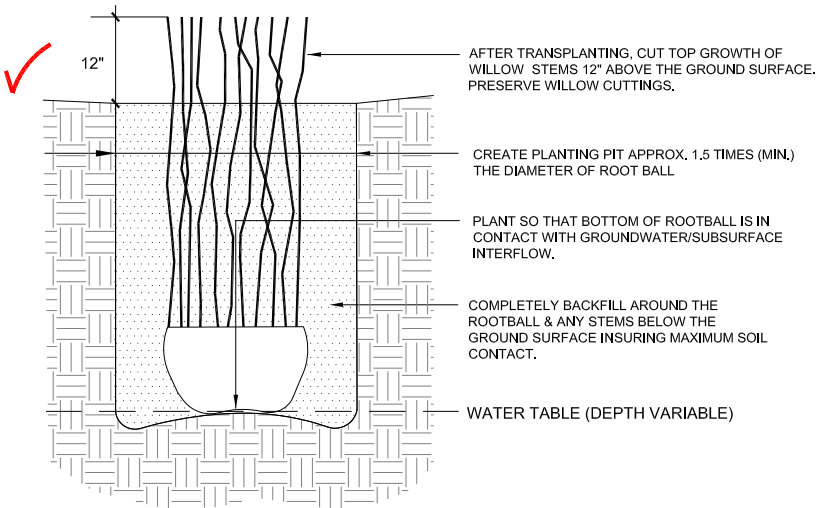
SCALE NTS



VP

## VOLE PROTECTION FENCE

SCALE NTS

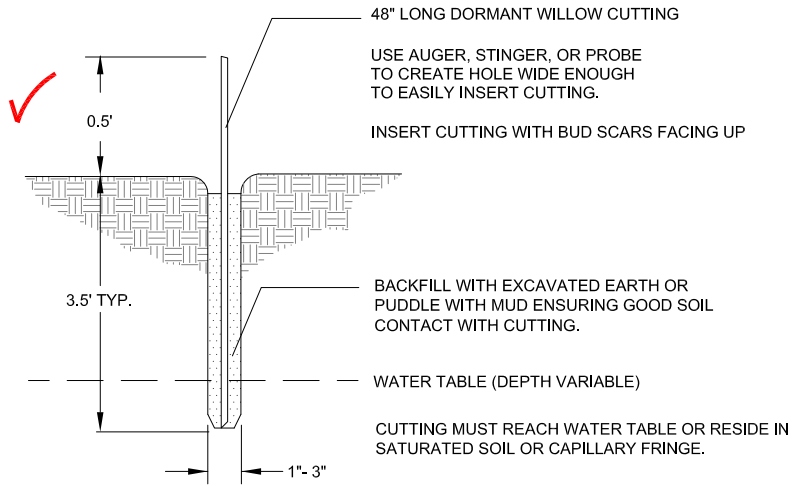


### NOTES:

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.

## WILLOW CLUMP HARVEST & 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, PENETRATION INTO PERISTENTLY SATURATED SOIL ARE MAJOR CAUSES OF CUTTINGS FAILURE.
4. 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 6 TO 8 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. DIP THE TOP 6" OF CUTTINGS IN NATURALLY COLORED LATEX PAINT, LET DRY, THEN WRAP CUTTINGS IN MOIST/SATURATED FABRIC, BURLAP OR SIMILAR MATERIAL.
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 8 MONTHS UNTIL TIME OF PLANTING. CUTTINGS SHALL BE PROTECTED FROM SUN, FREEZING AND DRYING DURING TRANSPORTATION 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 AND SOAK CUTTINGS BETWEEN 3 AND 7 DAYS TO FULLY HYDRATE IMMEDIATELY PRIOR TO PLANTING.
9. OPTIMALLY, PLANTING OF CUTTINGS SHOULD OCCUR IN EARLY SPRING WHEN WATER IS AT NORMAL LOW FLOW LEVELS (APPROX. APRIL 15 TO MAY 15). IF PROJECT TIMING DICTATES, CUTTINGS MAY HAVE TO BE PLANTED IN THE FALL AFTER LEAF-DROP (APPROX. OCT. 1 TO DEC. 31). 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/PUDDLE PLANTING PIT WITH MUD IN SEPARATE "LIFTS" AS NECESSARY TO AVOID AIR POCKETS. 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. THE TOPS OF CUTTINGS SHALL BE TRIMMED SQUARE, NOT ANGLED. THIS DOES NOT ELIMINATE THE NEED TO PLANT CUTTINGS TO THEIR SPECIFIED DEPTH.

WC

## WILLOW CUTTING DETAIL

CROSS-SECTION NTS

AS-BUILT

6/19/2018

### REVISIONS

Revision	Date	Description
1	9/19/2017	Issued for Construction
2	11/07/2017	Polygon Adjustments
3	6/19/2018	Issued for As-Built Conditions
4	7/12/2018	Comment Revisions

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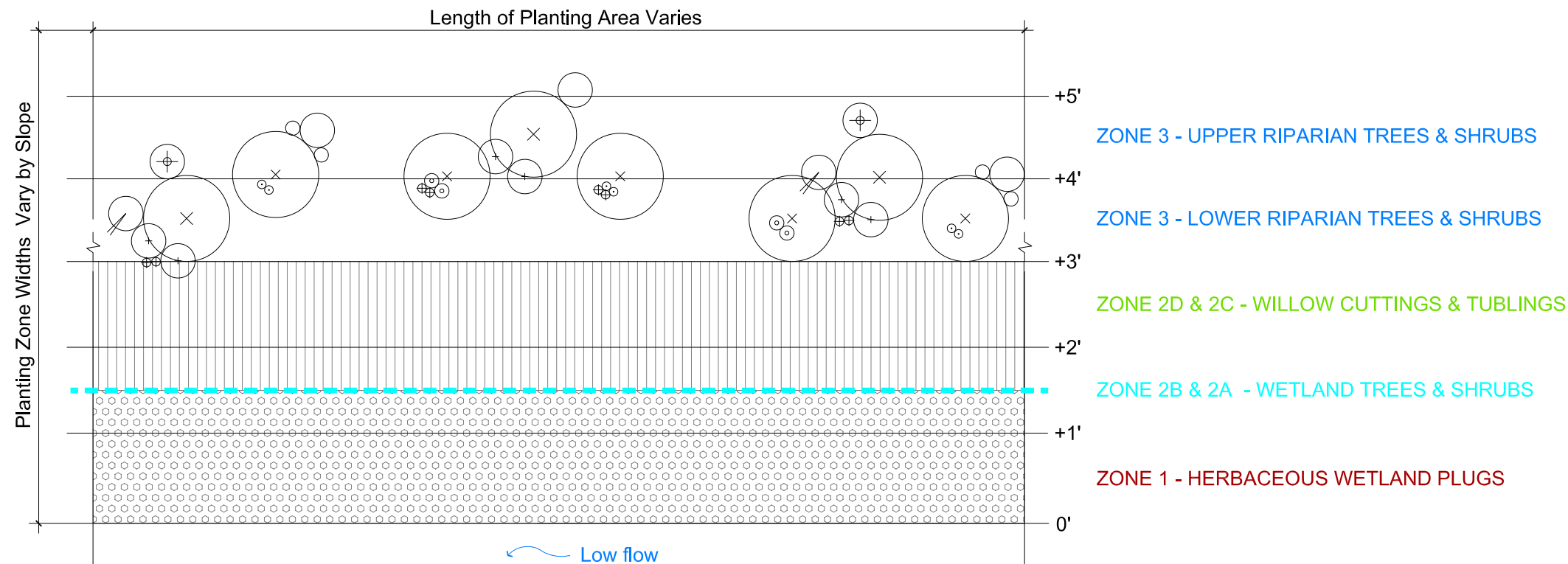
ecosystem services

ST. VRAIN CREEK REACH 3

TYPICAL PLANTING  
DETAILS

SCALE VERIFICATION:  
0 1'  
IF NOT ONE INCH ON  
THIS SHEET, ADJUST  
SCALE ACCORDINGLY.

Drawn by: JBD  
Designed by: ECOS  
Checked by: GEG  
Scale: As Shown  
Project No. 110666  
Date: September 19, 2017  
SHEET LD3



KEY:

- ⊕ ZONE 3 - UPPER RIPARIAN TREE (CEL RET)
- ZONE 3 - UPPER RIPARIAN TREE (PRU AME)
- ZONE 3 - UPPER RIPARIAN SHRUB (RIB CER)
- ⊕ ZONE 3 - LOWER RIPARIAN SHRUB (SYM OCC)
- ⊕ ZONE 3 - LOWER RIPARIAN - (CRA ERY)
- ⊕ ZONE 3 - LOWER RIPARIAN - (POP DEL)
- ⊕ ZONE 3 - LOWER RIPARIAN (PRU VIR)
- ZONE 3 - LOWER RIPARIAN (ROS WOO)
- ⊕ ZONE 3 - LOWER RIPARIAN (RIB AUR)
- ▨ ZONE 2D & 2C - WILLOW CUTTINGS & TUBLINGS (SAL EXI & SAL IRR)
- ZONE 2B & 2A - WETLAND TREES & SHRUBS (VARIOUS SPECIES)
- ZONE 1 - WETLAND HERBS (VARIOUS SPECIES)

REFER TO PLANT SCHEDULES FOR PLANT SPECIES SYMBOLOGY & SPACING

NOTES:

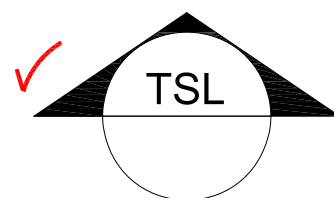
1. REFER TO PLANT SCHEDULES FOR PLANT SYMBOLOGY, QUANTITY & SPACING

2. FOR EVERY 1 POP DEL PLANT, GROUP THE FOLLOWING PLANTS:

- A. 1 - CEL RET EVERY 7TH GROUP
- B. 1 - PRU AME EVERY 3RD & 4TH GROUP
- C. 2 - RIB CER EVERY 7TH GROUP
- D. 1 - CRA ERY EVERY 7TH GROUP
- E. 2 - PRU VIR EVERY 3RD GROUP
- F. 2 - ROS WOO EVERY 3RD GROUP
- G. 2 - RIB AUR EVERY 3RD GROUP
- H. 2 - SYM OCC EVERY 2ND GROUP

2. REPEAT PATTERN SHOWN WITHIN PLANTING AREAS SHOWN ON THE PLANS.

3. WIDTH OF PLANTING ZONES MAY VARY (COMPRESS OR EXPAND) DEPENDING BANK SLOPE, WIDTH OF FLOODPLAIN, PROPERTY OWNERSHIP, PROJECT BOUNDARY & LIMITS OF DISTURBANCE.



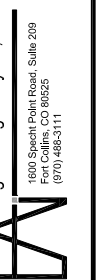
TREE AND SHRUB LAYOUT PATTERN & ZONATION DETAIL

PLAN NTS

AS-BUILT

6/19/2018

REVISIONS			
Revision	Date	Description	
1	9/19/2017	Issued for Construction	
2	11/07/2017	Polygon Adjustments	
3	6/19/2018	Issued for AS-Built Conditions	
4	7/12/2018	Comment Revisions	



ST. VRAIN CREEK REACH 3

TYPICAL PLANTING LAYOUT DETAILS

SCALE VERIFICATION:	
0" 1"	
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.	
Drawn by:	JBD
Designed by:	ECOS
Checked by:	GEG
Scale:	As Shown
Project No.	110666
Date:	September 19, 2017
SHEET	LD4



ST. VRAIN RIVER - REACH 3 RESTORATION (80% DESIGN)

Seeds per SF:		50	1	2A & 2B	ACRES (BY PLANTING ZONE):	
TOTAL ACRES:		41.7	-	-	2C & 2D	3 SEED ONLY
					-	21.0 20.7

UPPER RIPARIAN SEED SCHEDULE

4/13/2017

Scientific Name	Common Name	Variety	Region 5 Indicator Status	Seasonality	* Percent of Mix	Seeds per SF	Seeds per AC	* Seeds per LB	* LBS/PLS per AC	Drill Seeding Total LBS	Broadcast Seeding Total LBS
<i>Bouteloua curtipendula</i>	side-oats grama	TBD	UPL	W	5.0%	2.5	108900	191,000	0.57	23.78	47.55
<i>Bouteloua gracilis</i>	blue grama	TBD	UPL	W	15.0%	7.5	326700	825,000	0.40	16.51	33.03
<i>Koeleria macrantha</i>	Prairie Junegrass	TBD	UPL	C	5.0%	2.5	108900	2,315,400	0.05	1.96	3.92
<i>Hesperostipa comata</i>	needle-and-thread	TBD	UPL	C	5.0%	2.5	108900	115,000	0.95	39.49	78.98
<i>Nassella viridula</i>	green needlegrass	TBD	UPL	C	5.0%	2.5	108900	181,000	0.60	25.09	50.18
<i>Achnatherum hymenoides</i>	indian ricegrass	TBD	FACU	C	5.0%	2.5	108900	141,000	0.77	32.21	64.41
<i>Elymus canadensis</i>	Canada wildrye	TBD	FACU	C	7.5%	3.8	163350	115,000	1.42	59.23	118.46
<i>Elymus trachycaulus</i>	slender wheatgrass	TBD	FACU	C	5.0%	2.5	108900	159,000	0.68	28.56	57.12
<i>Pascopyrum smithii</i>	western wheatgrass	TBD	FACU	C	15.0%	7.5	326700	110,000	2.97	123.85	247.70
<i>Schizachyrium scoparium</i>	little bluestem	TBD	FACU	W	5.0%	2.5	108900	260,000	0.42	17.47	34.93
<i>Elymus elymoides</i>	bottlebrush squirmetail	TBD	FACU	W	5.0%	2.5	108900	192,000	0.57	23.65	47.30
<i>Sporobolus cryptandrus</i>	sand dropseed	TBD	FACU	W	5.0%	2.5	108900	5,298,000	0.02	0.96	1.71
<i>Elymus lanceolatus psammophilus</i>	streambank wheatgrass	TBD	FACU	C	5.0%	2.5	108900	156,000	0.70	29.11	58.22
<i>Panicum virgatum</i>	switchgrass	TBD	FAC	W	7.5%	3.8	163350	389,000	0.42	17.51	35.02
<i>Sporobolus airoides</i>	alkali sacaton	TBD	FAC	W	5.0%	2.5	108900	1,758,000	0.06	2.58	5.17
					100.0%	50.0			10.60	441.85	883.71

NOTES:  
All planting areas are to be seeded in addition to the those areas designated as "Seeding Only. (Refer to seed schedules)  
Upper riparian seeding areas include planting Zone 3 and Seed Only areas.  
All planting and seeding efforts shown on the plans in all zones are intended to increase soil cohesion, reduce erosion potential, stabilize sediment and enhance the resiliency of the streambanks and riparian corridor within the project limits.  
Seed shall be delivered individually bagged, not pre-mixed.  
Species listed above sorted by indicator status first, then alphabetical.  
Indicator Status derived from national List of Plant Species That Occur in Wetlands (Region 5 - Great Plains).

ST. VRAIN RIVER - REACH 3 RESTORATION (80% DESIGN)

Seeds per SF:		50	1	2A & 2B	ACRES (BY PLANTING ZONE):	
TOTAL ACRES:		17.1	1.5	0.6	2C & 2D	3 SEED ONLY
					-	15.0 -

LOWER RIPARIAN SEED SCHEDULE

4/13/2017

Scientific Name	Common Name	Variety	Region 5 Indicator Status	Seasonality	* Percent of Mix	Seeds per SF	Seeds per AC	* Seeds per LB	* LBS/PLS per AC	Drill Seeding Total LBS	Broadcast Seeding Total LBS
<i>Panicum virgatum</i>	switchgrass	TBD	FAC	W	5.0%	2.5	108900	389,000	0.01	0.17	0.34
<i>Carex praegracilis</i>	meadow sedge	TBD	FACW	C	5.0%	2.5	108900	1,816,000	0.06	1.03	2.05
<i>Pascopyrum smithii</i>	western wheatgrass	TBD	FACU	C	10.0%	5.0	217800	110,000	1.98	33.86	67.72
<i>Distichlis spicata</i>	inland saltgrass	TBD	FACW	W	5.0%	2.5	108900	520,000	0.21	3.58	7.16
<i>Juncus tenuis</i>	Poverty rush	TBD	FACW	C	5.0%	2.5	108900	51,300,000	0.00	0.04	0.07
<i>Juncus torreyi</i>	Torrey rush	TBD	FACW	C	5.0%	2.5	108900	12,300,000	0.01	0.17	0.34
<i>Salix exigua</i>	Sandbar willow	TBD	FACW	C	15.0%	7.5	326700	10,000,000	0.03	0.56	1.12
<i>Spartina pectinata</i>	prairie cordgrass	TBD	FACW	W	5.0%	2.5	108900	197,000	0.55	9.45	18.91
<i>Carex emoryi</i>	Emory's sedge	TBD	OBL	C	10.0%	5.0	217800	485,000	0.45	7.68	15.36
<i>Carex nebrascensis</i>	Nebraska sedge	TBD	OBL	C	5.0%	2.5	108900	534,100	0.20	3.49	6.97
<i>Carex pellita</i>	woolly sedge	TBD	OBL	C	5.0%	2.5	108900	312,075	0.35	5.97	11.93
<i>Glyceria grandis</i>	American mannagrass	TBD	OBL	C	5.0%	2.5	108900	1,280,000	0.09	1.45	2.91
<i>Juncus balticus</i>	Baltic rush	TBD	OBL	C	10.0%	5.0	217800	8,000,000	0.03	0.47	0.93
<i>Schoenoplectus americanus</i>	three-square	TBD	OBL	C	5.0%	2.5	108900	400,000	0.27	4.65	9.31
<i>Scirpus microcarpus</i>	small fruit bulrush	TBD	OBL	C	5.0%	2.5	108900	4,500,000	0.02	0.41	0.83
					100.0%	50.0			4.27	72.98	145.95

NOTES:  
All planting areas are to be seeded in addition to the those areas designated as "Seeding Only. (Refer to seed schedules)  
Lower riparian seeding areas include planting Zones 1, 2A, 2B, 2C, and 2D.  
All planting and seeding efforts shown on the plans in all zones are intended to increase soil cohesion, reduce erosion potential, stabilize sediment and enhance the resiliency of the streambanks and riparian corridor within the project limits.  
Seed shall be delivered individually bagged, not pre-mixed.  
Species listed above sorted by indicator status first, then alphabetical.  
Indicator Status derived from national List of Plant Species That Occur in Wetlands (Region 5 - Great Plains).

ST. VRAIN RIVER - REACH 3 RESTORATION (80% DESIGN)

Seeds per SF:		25
TOTAL ACRES:		41.7

UPPER RIPARIAN FORB SEED SCHEDULE

4/13/2017

Scientific Name	Common Name	Variety	* Percent of Mix	Seeds per SF	Seeds per AC	* Seeds per LB	* LBS/PLS per AC	Drill Seeding Total LBS	Broadcast Seeding Total LBS
<i>Artemisia frigida</i>	silver sage	TBD	20.0%	5.0	217800	449,600	0.48	20.20	40.40
<i>Ericameria nauseosa</i>	rubber rabbitbrush	TBD	20.0%	5.0	217800	400,000	0.54	22.71	45.41
<i>Gaillardia aristata</i>	perennial gaillardia	TBD	20.0%	5.0	217800	132,000	1.65	68.81	137.61
<i>Linum lewisii</i>	blue flax	Maple grove	20.0%	5.0	217800	170,000	1.28	53.43	106.85
<i>Machaeranthera tanacetifolia</i>	prairie aster	TBD	20.0%	5.0	217800	408,000	0.53	22.26	44.52
			100.0%	25			4.49	187.40	374.79

NOTES:  
All planting areas are to be seeded in addition to the those areas designated as "Seeding Only. (Refer to seed schedules)  
Lower riparian seeding areas include planting Zones 1, 2A, 2B, 2C, and 2D.  
All planting and seeding efforts shown on the plans in all zones are intended to increase soil cohesion, reduce erosion potential, stabilize sediment and enhance the resiliency of the streambanks and riparian corridor within the project limits.  
Seed shall be delivered individually bagged, not pre-mixed.  
Species listed above sorted by indicator status first, then alphabetical.  
Indicator Status derived from national List of Plant Species That Occur in Wetlands (Region 5 - Great Plains).

ST. VRAIN RIVER - REACH 3 RESTORATION (80% DESIGN)

Seeds per SF:		25
TOTAL ACRES:		17.1

LOWER RIPARIAN FORB SEED SCHEDULE

4/13/2017

Scientific Name	Common Name	Variety	* Percent of Mix	Seeds per SF	Seeds per AC	* Seeds per LB	* LBS/PLS per AC	Drill Seeding Total LBS	Broadcast Seeding Total LBS
<i>Asclepias incarnata</i>	swamp milkweed	TBD	15.0%	3.8	163350	68,000	2.40	41.08	82.16
<i>Asclepias speciosa</i>	showy milkweed	TBD	15.0%	3.8	163350	58,000	2.82	48.16	96.32
<i>Glycyrrhiza lepidota</i>	wild licorice	TBD	10.0%	2.5	108900	58,000	1.88	32.11	64.21
<i>Helianthus nuttallii</i>	Nuttall's sunflower	TBD	15.0%	3.8	163350	216,800	0.75	12.88	25.77
<i>Monarda fistulosa</i>	wild bergamot/beebealm	TBD	15.0%	3.8	163350	1,272,500	0.13	2.20	4.39
<i>Solidago canadensis</i>	Canada goldenrod	TBD	15.0%	3.8	163350	1,950,400	0.08	1.43	2.86
<i>Verbena hastata</i>	blue vervain	TBD	15.0%	3.8	163350	1,792,800	0.09	1.56	3.12
			100.0%	25			8.15	139.41	278.83

NOTES:  
All planting areas are to be seeded in addition to the those areas designated as "Seeding Only. (Refer to seed schedules)  
Seed shall be delivered individually bagged, not pre-mixed.  
All planting and seeding efforts shown on the plans in all zones are intended to increase soil cohesion, reduce erosion potential, stabilize sediment and enhance the resiliency of the streambanks and riparian corridor within the project limits.  
Seed shall be delivered individually bagged, not pre-mixed.  
Species listed above sorted by indicator status first, then alphabetical.  
Indicator Status derived from national List of Plant Species That Occur in Wetlands (Region 5 - Great Plains).

AS-BUILT  
6/19/2018

REVISIONS

Revision	Date	Description
1	9/19/2017	Issued for Construction
2	11/07/2017	Polygon Adjustments
3	6/19/2018	Issued for As-Built Conditions
4	7/31/2018	Comment Revisions

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ERIE, COLORADO 80516  
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ecosystem services

ST. VRAIN CREEK REACH 3  
PLANT SCHEDULES

SCALE VERIFICATION:  
0" = 1"  
IF NOT ONE INCH ON  
THIS SHEET, ADJUST  
SCALE ACCORDINGLY.

Drawn by: JBD  
Designed by: ECOS  
Checked by: GEG  
Scale: As Shown  
Project No. 110666  
Date: September 19, 2017  
SHEET LS1



ST. VRAIN CRI	PLANT SC
SCALE VERIFICATION: 0" = 1"	
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.	
Drawn by:	JBD
Designed by:	ECOS
Checked by:	GEG
Scale:	As Shown
Project No.	110666
Date:	September 19, 2017
SHEET	
LS2	



ST. VRAIN RIVER - REACH 3 RESTORATION (AS-BUILT)  
STREAMBANK WETLAND SCHEDULE  
6/19/2018

Scientific Name	Common Name	Preferred Size / Form	Indicator Status	Zone (Relative to WSEL)	Plant Spacing (in feet)	Percent of Mix	Total Quantity (Delivered)								
Zone 1 - Herbaceous Wetland Plugs				Zone Cover =	100%			PLANTING AREA, SHEET # - LEFT OR RIGHT BANK, & PERCENT OF TOTAL PLANTS:							
				Lineal Feet =	15,828	(0.73 AC)	2 ROWS	L2-L	L2-R	L3-L	L3-R	L6-L	L6-R	L6-L (DS)	L6-R (DS)
				Average Spacing =	2			9.5%	9.5%	3.0%	3.0%	2.0%	2.0%	2.5%	3.5%
Bottom Row:															
Carex emoryi	Emory's sedge	10 cu. inch tubing	OBL	0 to 12"	2.0	14.6%	2053	180	180	57	57	38	38	47	66
Glyceria grandis	American mannagrass	10 cu. inch tubing	OBL	0 to 13"	2.0	3.2%	458	28	27	9	9	6	6	7	10
Carex pellita	woolly sedge	10 cu. inch tubing	OBL	0 to 12"	2.0	21.9%	3104	284	280	88	88	59	59	74	103
Carex nebrascensis	Nebraska sedge	10 cu. inch tubing	OBL	0 to 12"	2.0	9.8%	1384	110	107	34	34	22	22	28	39
Asclepias incarnata	swamp milkweed	10 cu. inch tubing	FACW	6" to 18"	2.0	3.9%	548	47	48	15	15	10	10	13	18
Juncus torreyi	Torrey rush	10 cu. inch tubing	FACW	6" to 18"	2.0	2.4%	341	32	32	10	10	7	7	8	12
Carex praegracilis	clustered field sedge	10 cu. inch tubing	FACW	6" to 18"	2.0	3.3%	468	34	38	12	12	8	8	10	14
Top Row:															
Helianthus nuttalli	Nuttall's sunflower	10 cu. inch tubing	FACW	6" to 18"	2.0	2.3%	324	27	23	7	7	5	5	6	9
Juncus balticus	Baltic rush	10 cu. inch tubing	FACW	6" to 18"	2.0	10.6%	1506	116	115	36	36	24	24	30	42
Spartina pectinata	prairie cordgrass	10 cu. inch tubing	FACW	6" to 18"	2.0	12.8%	1819	158	159	50	50	34	34	42	59
Verbena hastata	blue vervain	10 cu. inch tubing	FACW	6" to 18"	2.0	2.0%	287	17	17	5	5	4	4	4	6
Asclepias speciosa	showy milkweed	10 cu. inch tubing	FAC	12" to 36"	2.0	1.8%	249	28	24	7	7	5	5	6	9
Panicum virgatum	switchgrass	10 cu. inch tubing	FAC	12" to 36"	2.0	10.7%	1517	126	127	40	40	27	27	33	47
Pascopyrum smithii	western wheatgrass	10 cu. inch tubing	UPL	12" to 36"	2.0	0.8%	109	4	3	1	1	1	1	1	1
					TOTAL	100.0%	14,167	1,189	1,180	371	371	250	250	309	435

TOTAL PLANTS DELIVERED 14,167  
SHORT OF ORIGINAL PLANS: 2,488

														Total Quantity (Installed)	Scientific Name	Common Name	Indicator Status
L7-L	L7-R	L8-L	L8-R	L11-L	L11-R	L12-L	L12-R	L13-L	L13-R	L14-L	L14-R	L15-L	L15-R	CHECK:	Zone 1 - Herbaceous Wetland Plugs		
1.0%	1.0%	1.0%	1.0%	9.0%	9.0%	7.5%	7.5%	5.0%	5.0%	5.0%	5.0%	4.5%	3.5%	100%			
														Bottom Row:			
19	19	19	19	170	170	142	142	95	95	95	95	85	66	1,894	Carex emoryi	Emory's sedge	OBL
3	3	3	3	26	26	22	22	14	14	14	14	13	10	289	Glyceria grandis	American mannagrass	OBL
29	29	29	29	265	265	221	221	147	147	147	147	133	103	2,947	Carex pellita	woolly sedge	OBL
11	11	11	11	101	101	84	84	56	56	56	56	51	39	1,124	Carex nebrascensis	Nebraska sedge	OBL
5	5	5	5	45	45	38	38	25	25	25	25	23	18	503	Asclepias incarnata	swamp milkweed	FACW
3	3	3	3	30	30	25	25	17	17	17	17	15	12	335	Juncus torreyi	Torrey rush	FACW
4	4	4	4	36	36	30	30	20	20	20	20	18	14	396	Carex praegracilis	clustered field sedge	FACW
														Top Row:			
2	2	2	2	22	22	19	19	12	12	12	12	11	9	247	Helianthus nuttallii	Nuttall's sunflower	FACW
12	12	12	12	109	109	91	91	61	61	61	61	55	42	1,212	Juncus balticus	Baltic rush	FACW
17	17	17	17	151	151	126	126	84	84	84	84	75	59	1,676	Spartina pectinata	prairie cordgrass	FACW
2	2	2	2	16	16	13	13	9	9	9	9	8	6	178	Verbena hastata	blue vervain	FACW
2	2	2	2	22	22	19	19	12	12	12	12	11	9	249	Asclepias speciosa	showy milkweed	FAC
13	13	13	13	120	120	100	100	67	67	67	67	60	47	1,334	Panicum virgatum	switchgrass	FAC
-	-	-	-	2	2	2	2	1	1	1	1	1	1	27	Pascopyrum smithii	western wheatgrass	FAC
122	122	122	122	1,115	1,115	932	932	620	620	620	620	559	435	12,411			

TOTAL PLANTS INSTALLED: 12,411  
TOTAL PLANTS INSTALLED BY BOULDER COUNTY: 1,756

AS-BUILT NOTES:

General Notes:

As-built changes to the plant schedules and locations in the field are provided to the best of the consultants's knowledge based on information provided by BCPOS and ACC.  
Final plant quantities, species, size and form, data provided to ECOS by BCPOS is incorporated without audit.  
CDI as-built data was not provide and is therefore an estimate of final quantities and locations based on progress on the final day of planting (5-25-18).  
Refer/cross-reference these plant schedules with theas-built planting plans which show how the site was divided into subareas.  
Final seeding area tracking performed by BCPOS.

Plant Distribution Schedule History:

Initial plant distribution schedules issued on 3/21/18, breaking master plant schedule in to subareas (smaller planting projects).  
Plant schedules changed on 4/16/18 to reflect BCPOS best estimate of final plants delivered.  
Received revised plant delivery schedule from BCPOS on 4/25/18. Any changes on plant quantities or species resulting from variations or discrepancies between 4/17/18 and 4/25/18 schedules will be adjusted once ACC/CDI install the last planting subareas.

Plant Species, Quantity and Location Changes:

Items in red type indicate the addition of new species t to the schedules or changes of plant quantities based on BCPOS plant delviery schedules.  
1756 plants delivered to the site were not planted or found to be dead due to poor handling as per BCPOS data (Reach 3 Unplanted Numbers spreadsheet), provided on 5/30/18.  
As-built plant quantities per subarea are subject to ACC/CDI verification.  
Items highlighted in yellow indicate changes in total quantities as a result of certain species not being planted when CDI ran out of time.

AS-BUILT  
6/19/2018

REVISIONS

Revision	Date	Description
1	9/19/2017	Issued for Construction
2	11/07/2017	Polygon Adjustments
3	6/19/2018	Issued for As-Built Conditions
4	7/12/2018	Comment Revisions

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1600 Specht Road, Suite 200  
Fort Collins, CO 80525  
(970) 488-3111

1455 WASHBURN STREET  
ERIE, COLORADO 80516  
(970) 970-412-3267

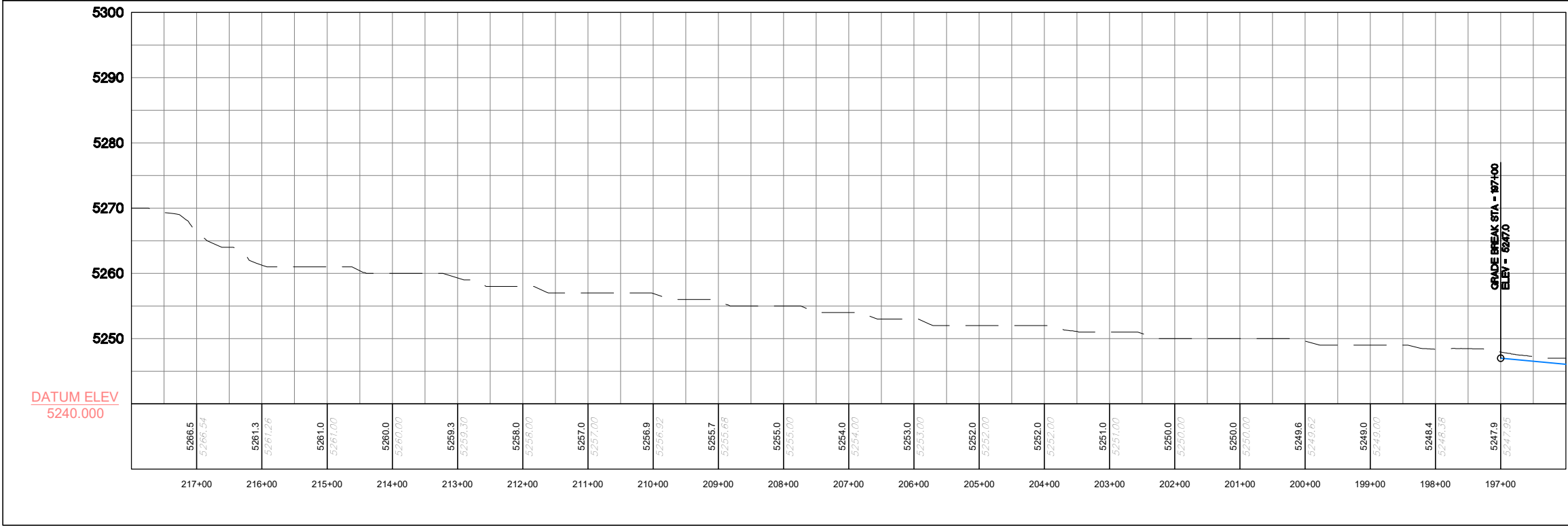
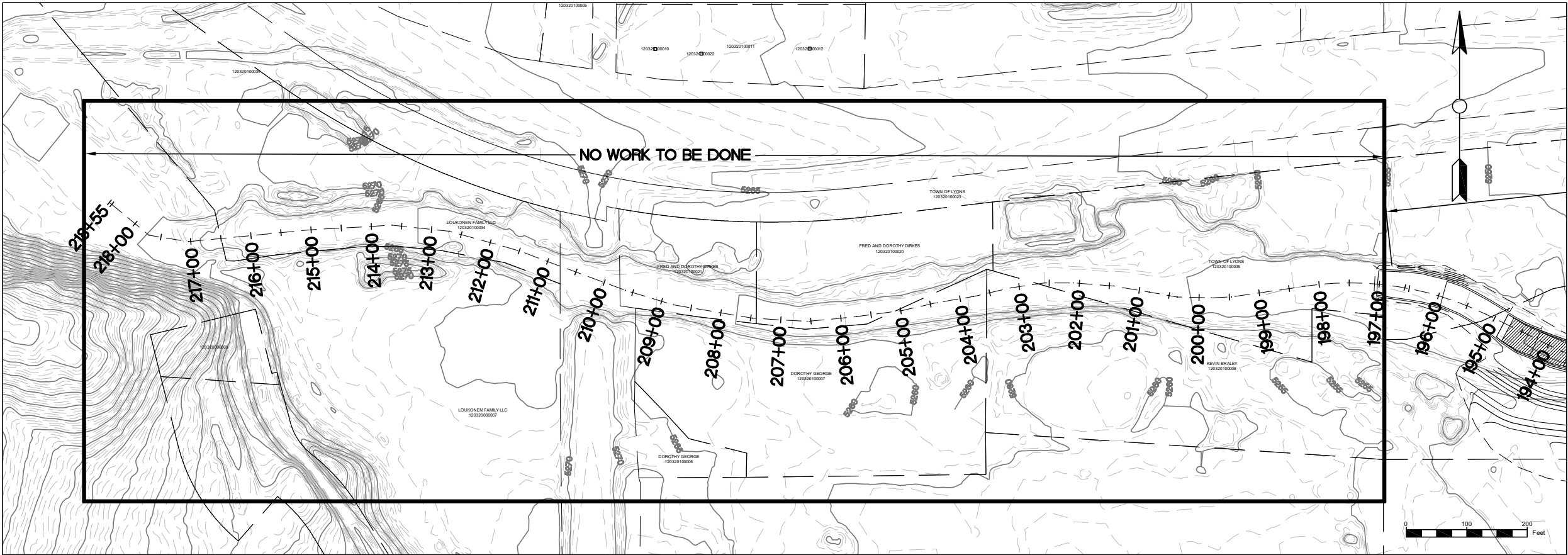
ecosystem services

ST. VRAIN CREEK REACH 3

PLANT SCHEDULES

SCALE VERIFICATION:  
0" = 1"  
IF NOT ONE INCH ON  
THIS SHEET, ADJUST  
SCALE ACCORDINGLY.  
Drawn by: JBD  
Designed by: ECOS  
Checked by: GEG  
Scale: As Shown  
Project No. 110566  
Date: September 19, 2017  
SHEET LS3





LEGEND

RIFFLE

POINT BAR

POOL

BOULDER CLUSTER

TYPE A BANK STABILIZATION

TYPE B BANK STABILIZATION

TYPE C BANK STABILIZATION

TYPE D BANK STABILIZATION

PROPERTY BOUNDARY

NOTE: GRADING WITHIN THE STREAM AND ADJACENT AREAS MAY VARY DEPENDING ON ACTUAL FIELD CONDITIONS AND SHALL BE PERFORMED IN A MANNER THAT PROTECTS TREES OR OTHER FEATURES AS DIRECTED IN THE FIELD.

AS-BUILT  
6/19/2018

REVISIONS			
Revision	Date	Description	
1	09/19/2017	ISSUED FOR CONSTRUCTION	

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ECOLOGICAL RESOURCES CONSULTANTS, INC.  
35715 US HIGHWAY 40, SUITE D204  
EVERGREEN, CO 80439

ST. VRAIN CREEK REACH 3  
STREAM RESTORATION  
STA 196+57 TO 218+55

SCALE VERIFICATION:  
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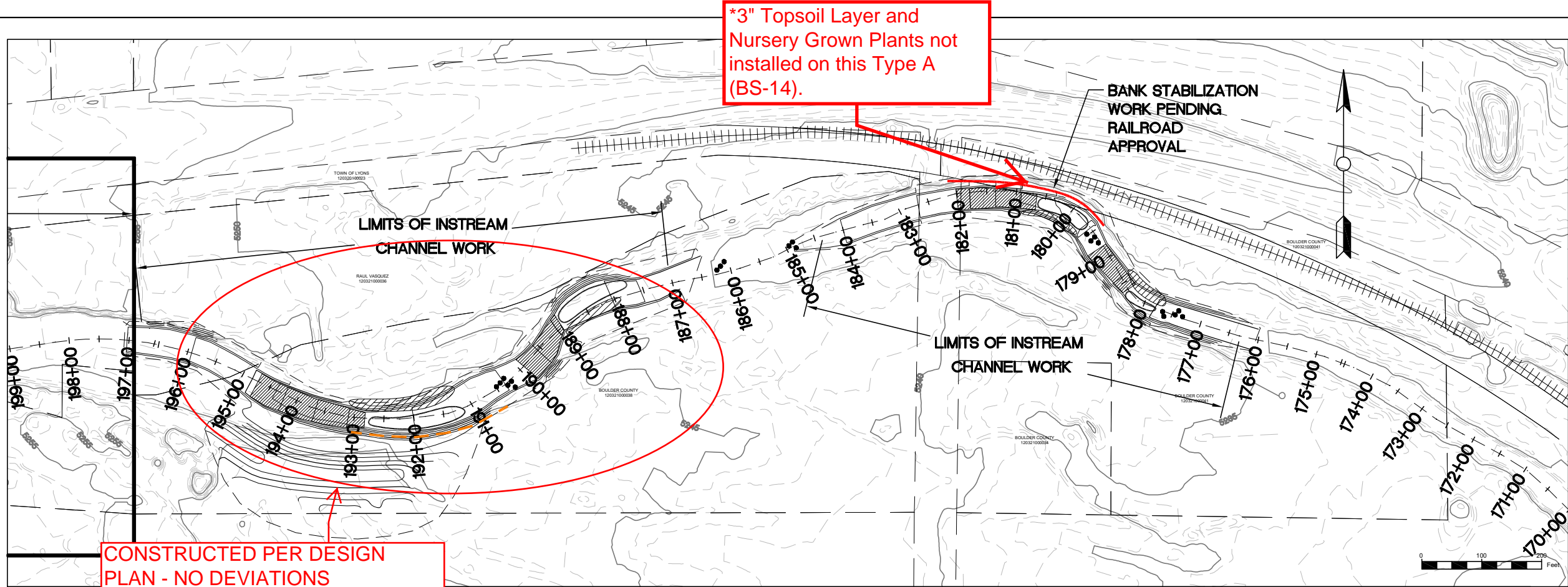
Drawn by: LJS  
Designed by: TJT  
Checked by: TJT

Scale: As Shown  
Project No. 110666  
Date: April 13, 2017

SHEET R1







**AS-BUILT**  
**6/19/2018**

REVISIONS		
Revision	Date	Description
1	09/19/2017	ISSUED FOR CONSTRUCTION

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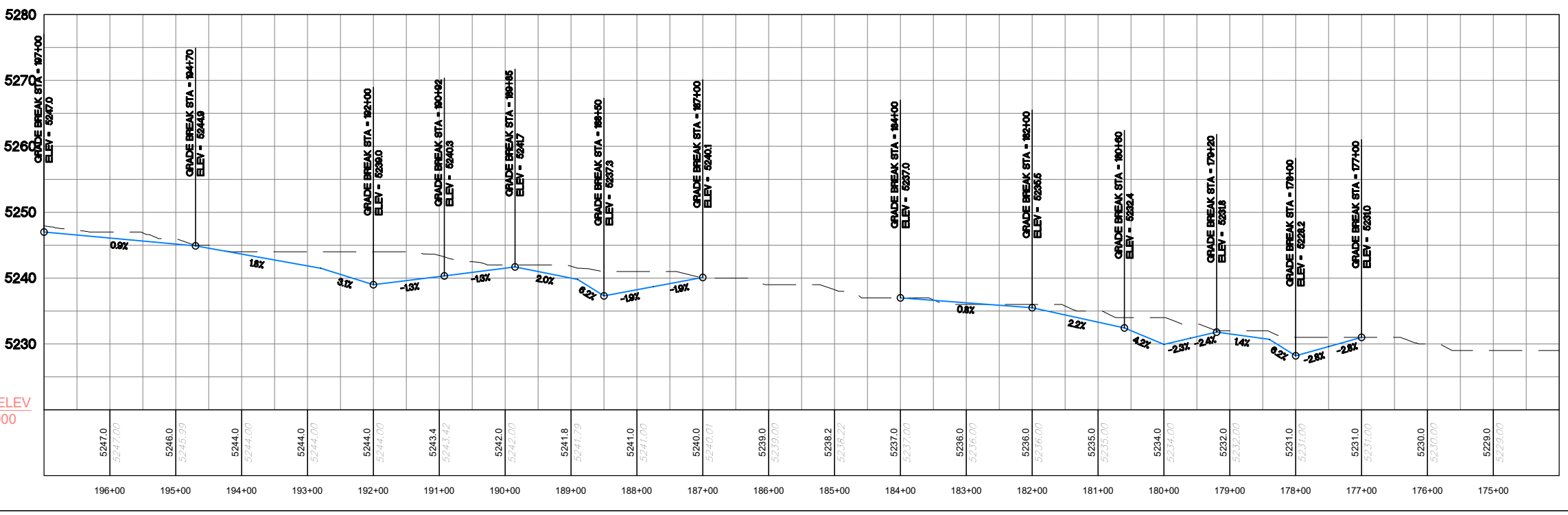
**ST. VRAIN CREEK REACH 3**  
**STREAM RESTORATION**  
**STA 174+56 TO 197+57**

SCALE VERIFICATION:  
0" = 1"  
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

Drawn by: ERC  
Designed by: ERC  
Checked by: ERC  
Scale: As Shown  
Project No. 110668  
Date: April 13, 2017

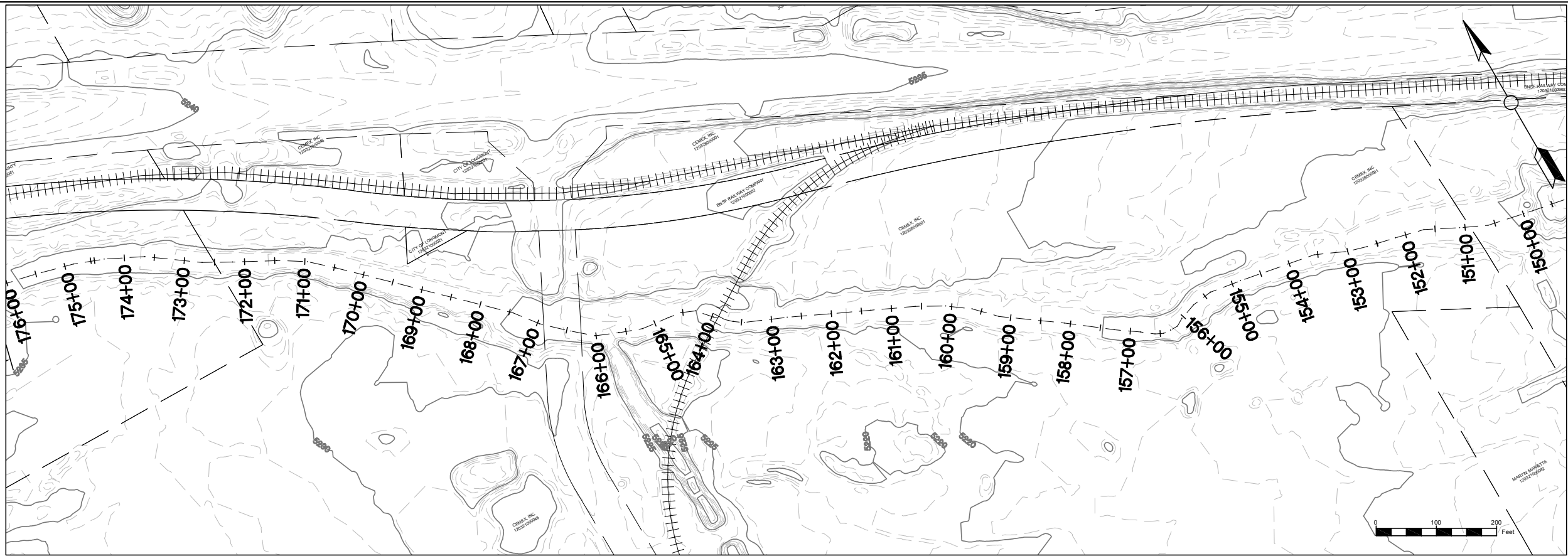
SHEET **R2**

**CONSTRUCTED PER DESIGN PLAN - NO DEVIATIONS**



**\*Type A bank stabilization was constructed in this area without a planting bench (3" topsoil layer and nursery grown plants) due to concerns from the contractor, project time constraints, and location on BNSF railroad property. ALL OTHER ELEMENTS OF TYPE A BANK STABILIZATION INSTALLED PER DESIGN PLAN.**

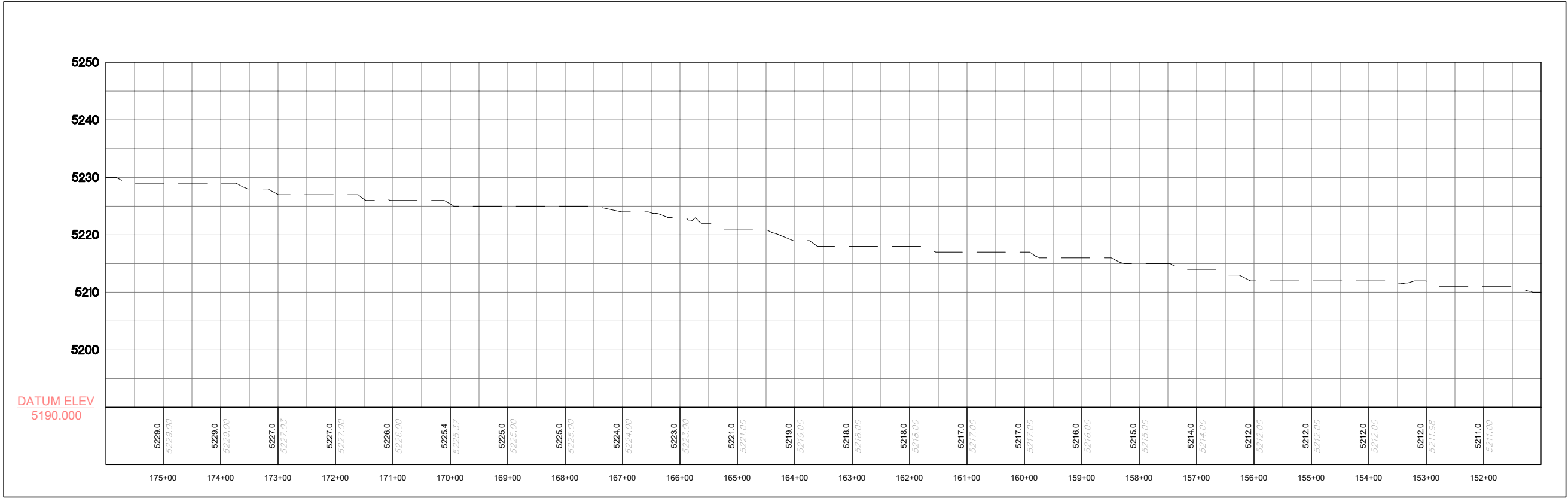




LEGEND

- RIFFLE
- POINT BAR
- POOL
- BOULDER CLUSTER
- TYPE A BANK STABILIZATION
- TYPE B BANK STABILIZATION
- TYPE C BANK STABILIZATION
- TYPE D BANK STABILIZATION
- PROPERTY BOUNDARY

NOTE: GRADING WITHIN THE STREAM AND ADJACENT AREAS MAY VARY DEPENDING ON ACTUAL FIELD CONDITIONS AND SHALL BE PERFORMED IN A MANNER THAT PROTECTS TREES OR OTHER FEATURES AS DIRECTED IN THE FIELD.



DATUM ELEV  
5190.000



AS-BUILT  
6/19/2018

REVISIONS		
Revision	Date	Description
1	09/19/2017	ISSUED FOR CONSTRUCTION

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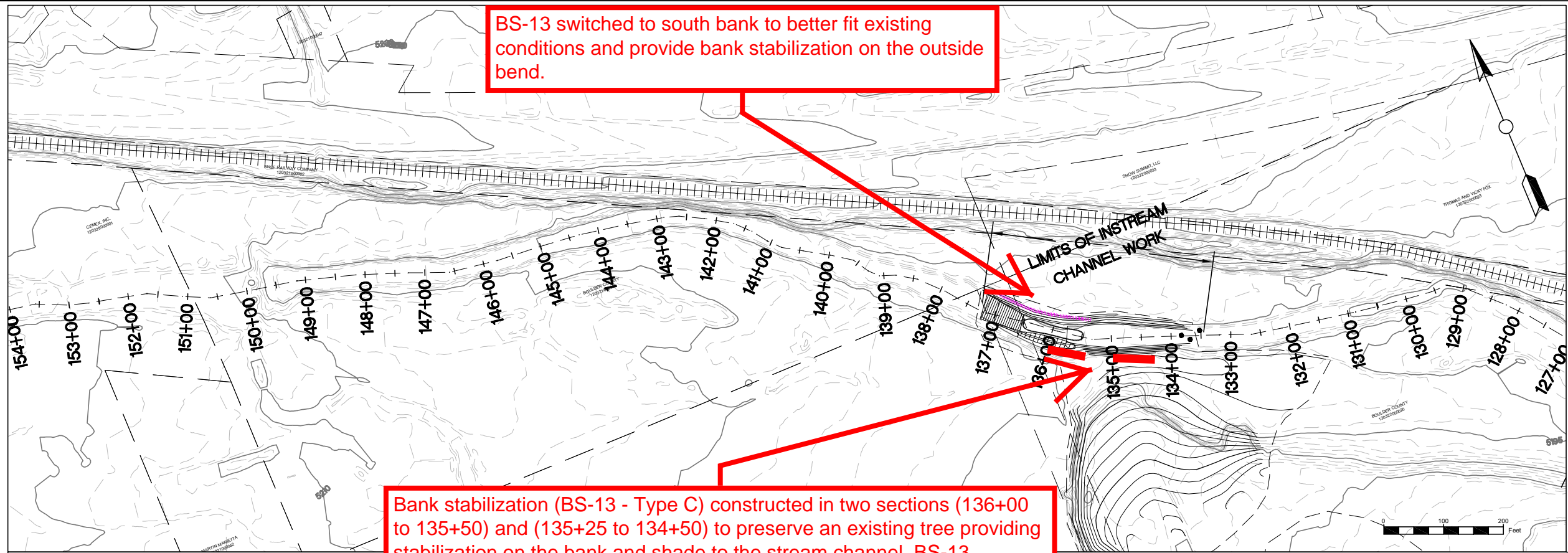
ECOLOGICAL RESOURCES CONSULTANTS, INC.  
35715 US HIGHWAY 40, SUITE D204  
EVERGREEN, CO 80439

ST. VRAIN CREEK REACH 3  
STREAM RESTORATION  
STA 152+49 TO 174+56

SCALE VERIFICATION: 0" = 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.	
Drawn by:	ERC
Designed by:	ERC
Checked by:	ERC
Scale:	As Shown
Project No.	110666
Date:	April 13, 2017

SHEET  
R3





LEGEND

RIFFLE

POINT BAR

POOL

BOULDER CLUSTER

TYPE A BANK STABILIZATION

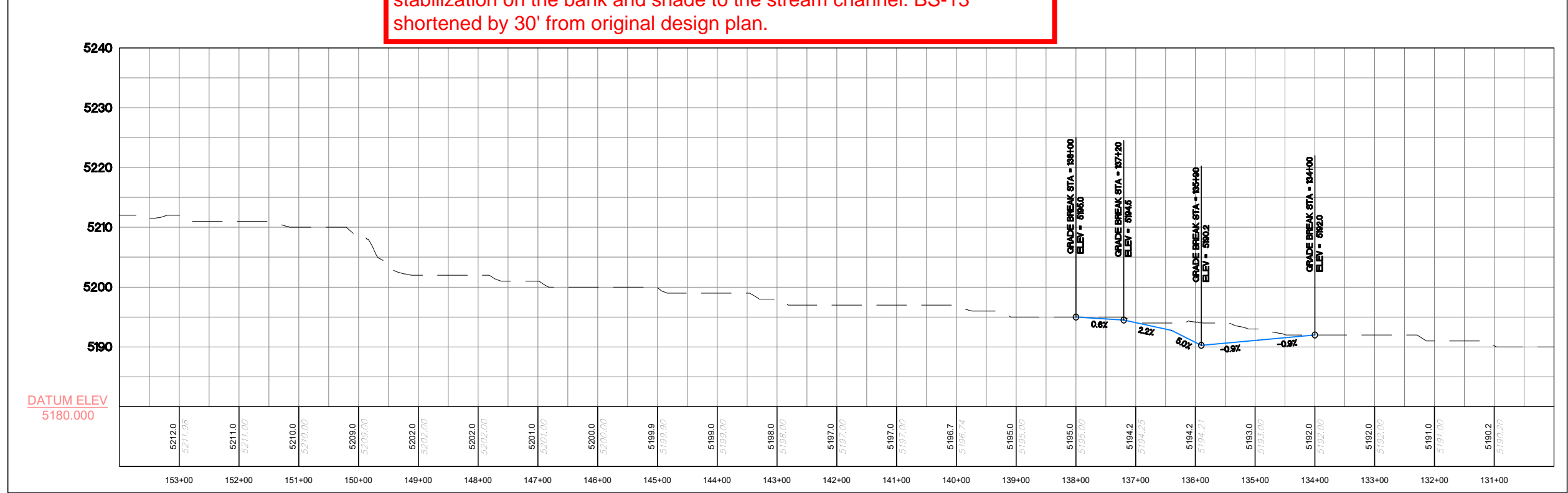
TYPE B BANK STABILIZATION

TYPE C BANK STABILIZATION

TYPE D BANK STABILIZATION

PROPERTY BOUNDARY

NOTE: GRADING WITHIN THE STREAM AND ADJACENT AREAS MAY VARY DEPENDING ON ACTUAL FIELD CONDITIONS AND SHALL BE PERFORMED IN A MANNER THAT PROTECTS TREES OR OTHER FEATURES AS DIRECTED IN THE FIELD.



AS-BUILT  
6/19/2018

REVISIONS	
Revision	Description
1	ISSUED FOR CONSTRUCTION

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ST. VRAIN CREEK REACH 3  
STREAM RESTORATION  
STA 130+49 TO 152+49

SCALE VERIFICATION:  
0" = 1"  
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.  
Drawn by: ERC  
Designed by: ERC  
Checked by: ERC  
Scale: As Shown  
Project No. 110666  
Date: April 13, 2017  
SHEET R4

Bank Stabilization (BS-11) removed due to removal of bifurcation structure construction from the project scope.

See Below - Sheet R6 for modifications.

AS-BUILT  
6/19/2018

**LEGEND**

	RIFFLE
	POINT BAR
	POOL
	BOULDER CLUSTER
	TYPE A BANK STABILIZATION
	TYPE B BANK STABILIZATION
	TYPE C BANK STABILIZATION
	TYPE D BANK STABILIZATION
	PROPERTY BOUNDARY

NOTE: GRADING WITHIN THE STREAM AND ADJACENT AREAS MAY VARY DEPENDING ON ACTUAL FIELD CONDITIONS AND SHALL BE PERFORMED IN A MANNER THAT PROTECTS TREES OR OTHER FEATURES AS DIRECTED IN THE FIELD.

REVISIONS		
Revision	Date	Description
1	09/19/2017	ISSUED FOR CONSTRUCTION

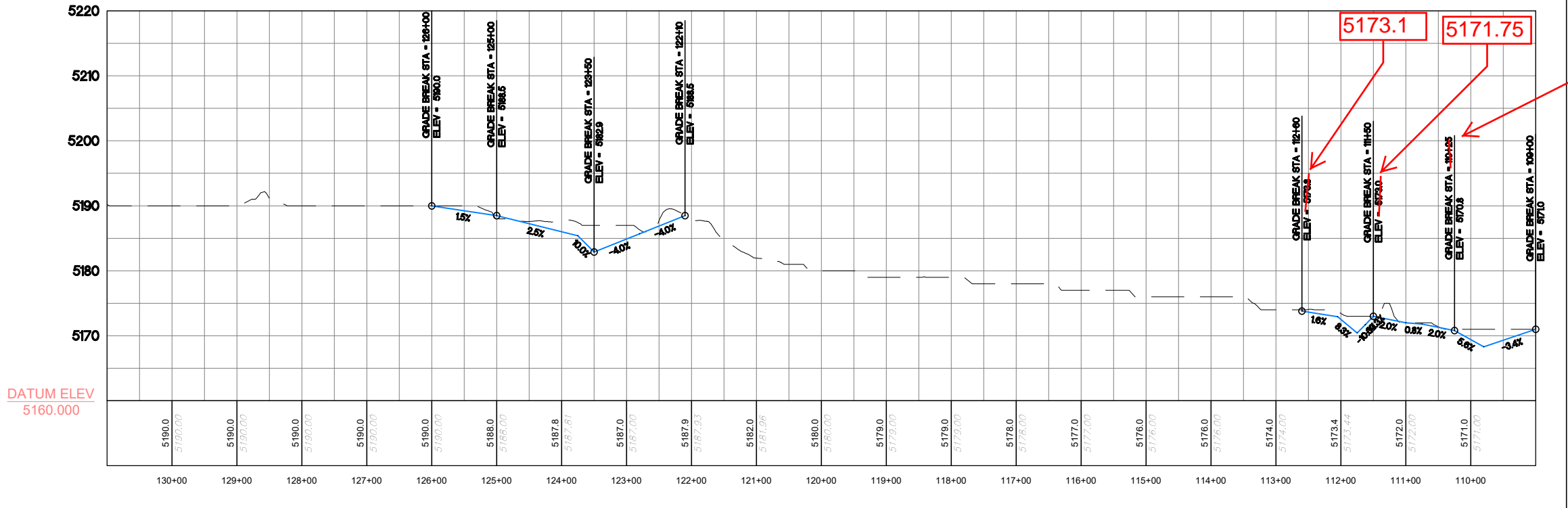
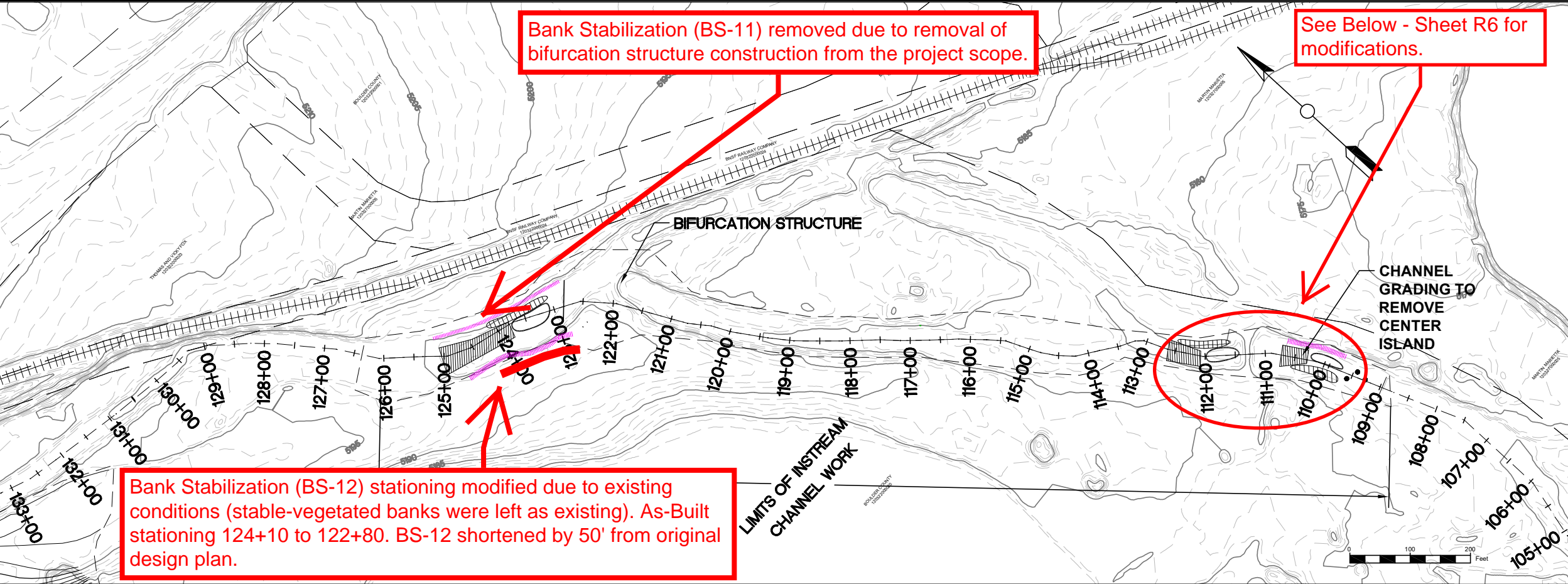
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ST. VRAIN CREEK REACH 3  
STREAM RESTORATION  
STA 109+92 TO 130+49

SCALE VERIFICATION: 0" = 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.	
Drawn by:	ERC
Designed by:	ERC
Checked by:	ERC
Scale:	As Shown
Project No.	110666
Date:	April 13, 2017
SHEET	

R5

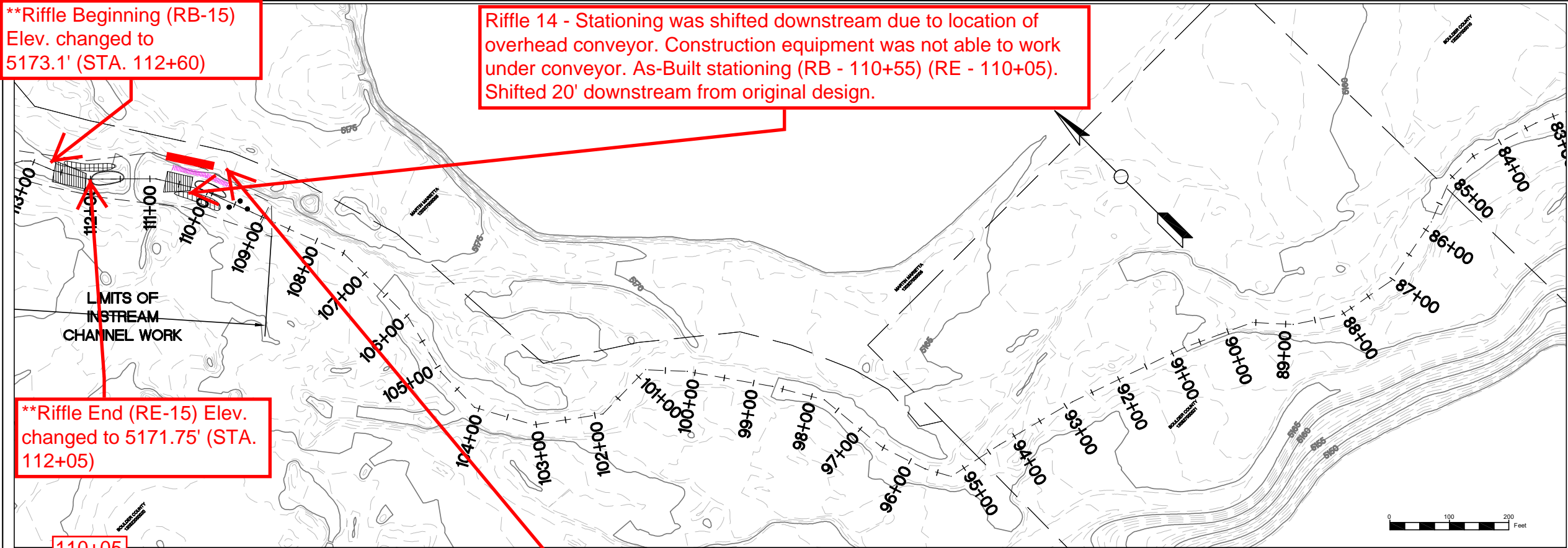




\*\*Riffle Beginning (RB-15)  
Elev. changed to  
5173.1' (STA. 112+60)

Riffle 14 - Stationing was shifted downstream due to location of  
overhead conveyor. Construction equipment was not able to work  
under conveyor. As-Built stationing (RB - 110+55) (RE - 110+05).  
Shifted 20' downstream from original design.

AS-BUILT  
6/19/2018

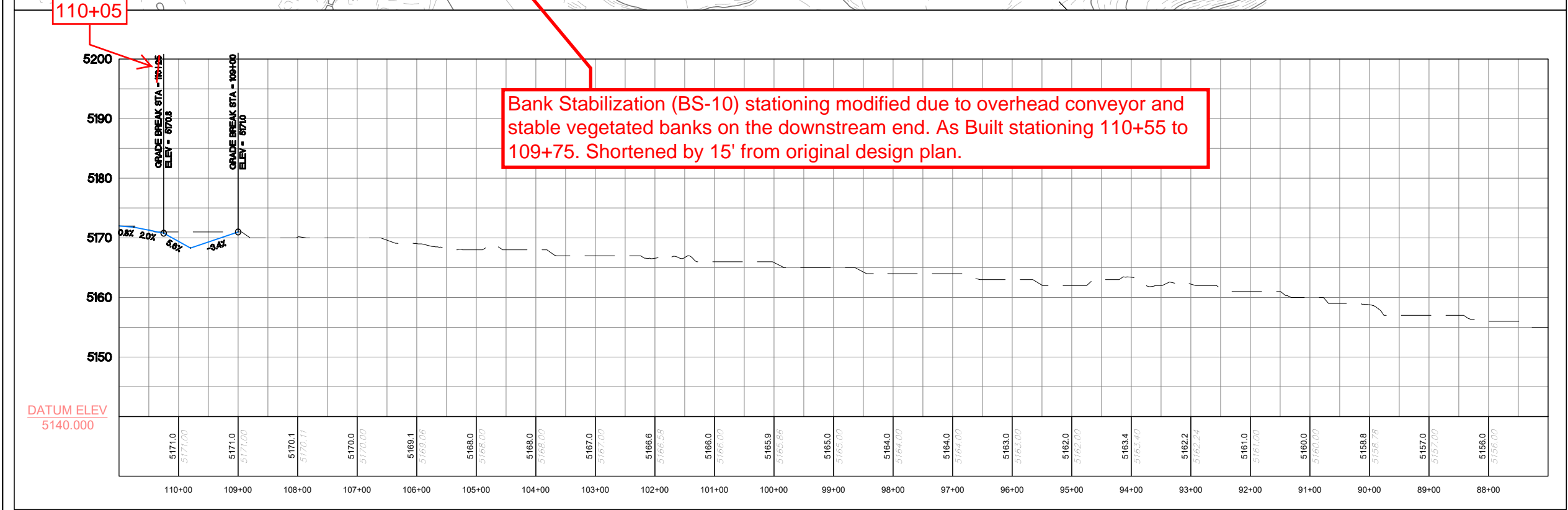


\*\*Riffle End (RE-15) Elev.  
changed to 5171.75' (STA.  
112+05)

- LEGEND
- RIFFLE
  - POINT BAR
  - POOL
  - BOULDER CLUSTER
  - TYPE A BANK STABILIZATION
  - TYPE B BANK STABILIZATION
  - TYPE C BANK STABILIZATION
  - TYPE D BANK STABILIZATION
  - PROPERTY BOUNDARY

NOTE: GRADING WITHIN THE STREAM AND ADJACENT AREAS MAY VARY DEPENDING ON ACTUAL FIELD CONDITIONS AND SHALL BE PERFORMED IN A MANNER THAT PROTECTS TREES OR OTHER FEATURES AS DIRECTED IN THE FIELD.

Bank Stabilization (BS-10) stationing modified due to overhead conveyor and stable vegetated banks on the downstream end. As Built stationing 110+55 to 109+75. Shortened by 15' from original design plan.



\*\* Riffle Beginning and End Elevations were changed due to elevation of the invert of an existing concrete box culvert so that flows were not restricted and to maintain riffle slope and proper riffle/pool sequence function.

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ST. VRAIN CREEK REACH 3  
STREAM RESTORATION  
STA 87+85 TO 109+92

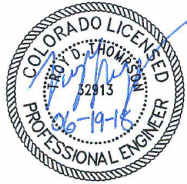
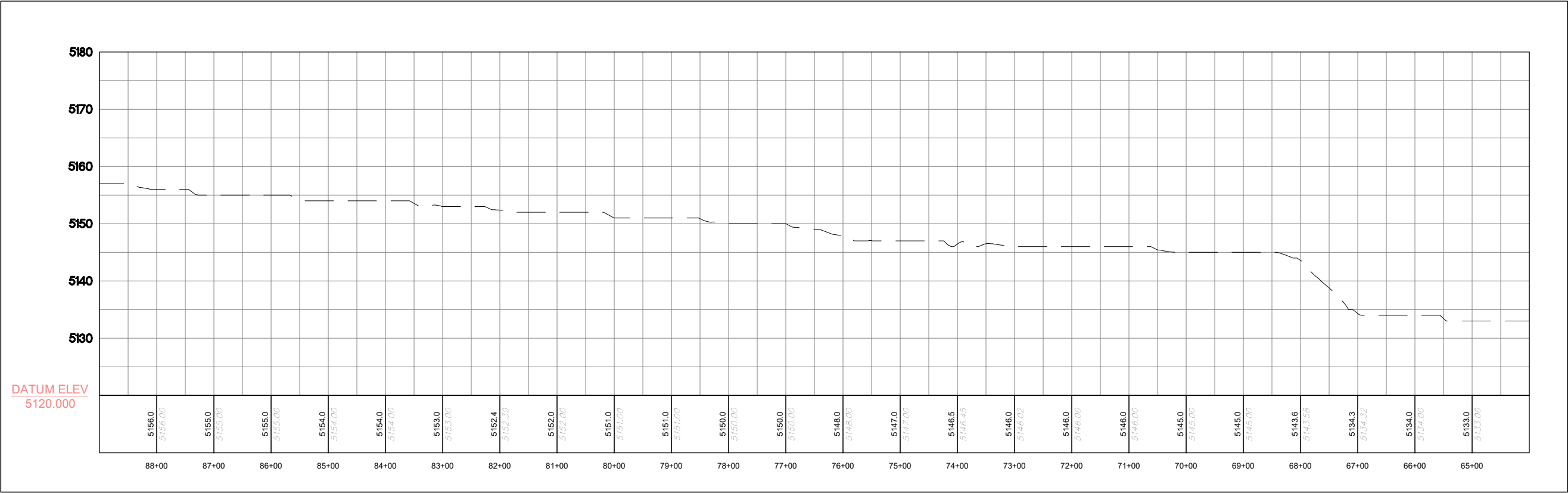
SCALE VERIFICATION:  
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THIS SHEET, ADJUST  
SCALE ACCORDINGLY.  
Drawn by: ERC  
Designed by: ERC  
Checked by: ERC  
Scale: As Shown  
Project No. 110666  
Date: April 13, 2017  
SHEET R6





- LEGEND**
- RIFFLE
  - POINT BAR
  - POOL
  - BOULDER CLUSTER
  - TYPE A BANK STABILIZATION
  - TYPE B BANK STABILIZATION
  - TYPE C BANK STABILIZATION
  - TYPE D BANK STABILIZATION
  - PROPERTY BOUNDARY

NOTE: GRADING WITHIN THE STREAM AND ADJACENT AREAS MAY VARY DEPENDING ON ACTUAL FIELD CONDITIONS AND SHALL BE PERFORMED IN A MANNER THAT PROTECTS TREES OR OTHER FEATURES AS DIRECTED IN THE FIELD.



AS-BUILT  
6/19/2018

REVISIONS	
Revision	Description
1	ISSUED FOR CONSTRUCTION

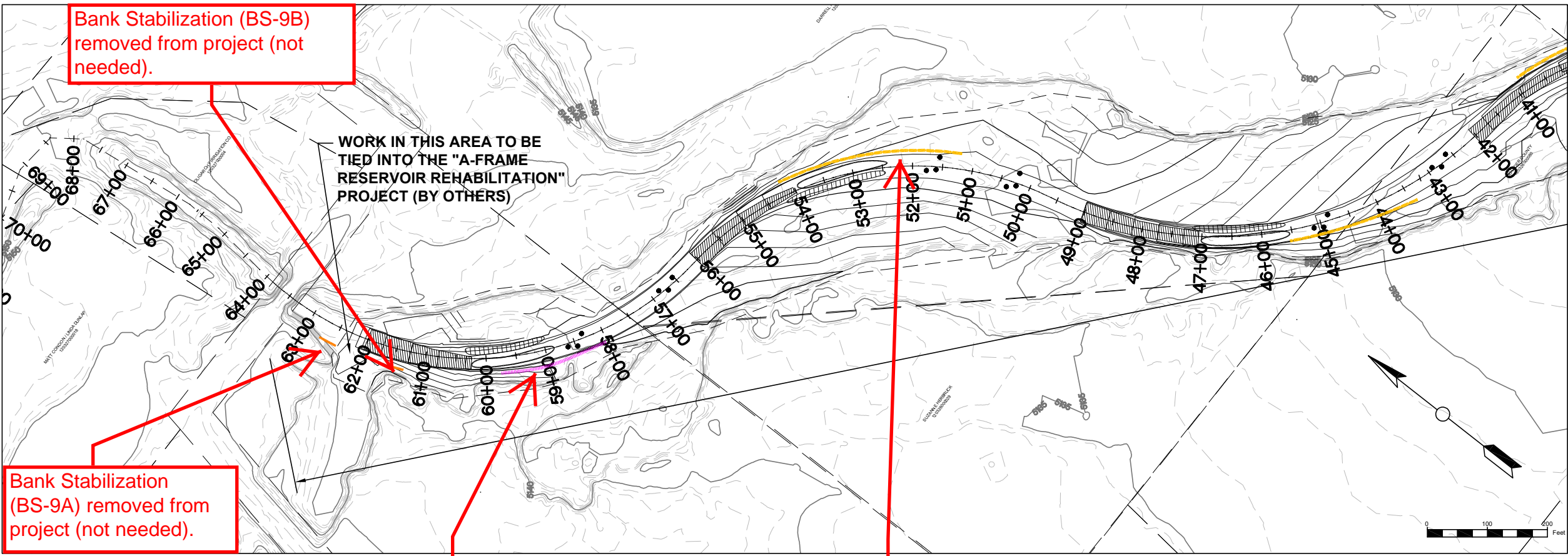
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Fort Collins, CO 80525  
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ST. VRAIN CREEK REACH 3  
STREAM RESTORATION  
STA 65+60 TO 87+85

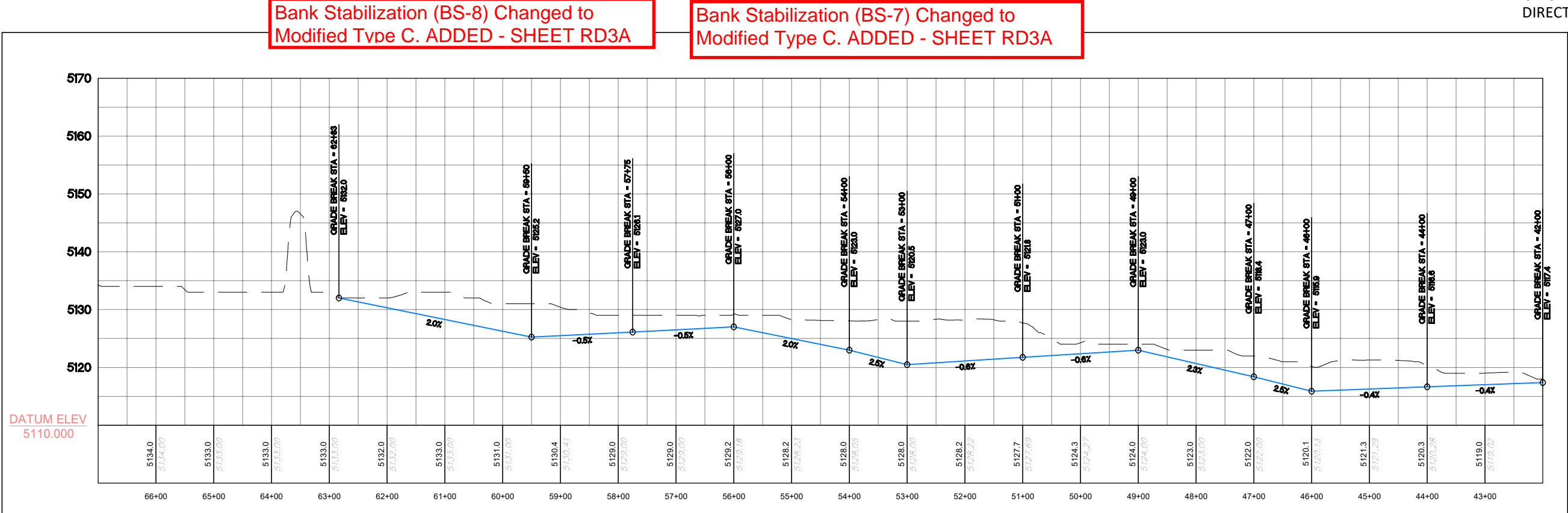
SCALE VERIFICATION:  
0" = 1"  
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.  
Drawn by: ERC  
Designed by: ERC  
Checked by: ERC  
Scale: As Shown  
Project No. 110666  
Date: April 13, 2017  
SHEET R7





- LEGEND**
- RIFFLE
  - POINT BAR
  - POOL
  - BOULDER CLUSTER
  - TYPE A BANK STABILIZATION
  - TYPE B BANK STABILIZATION
  - TYPE C BANK STABILIZATION
  - TYPE D BANK STABILIZATION
  - PROPERTY BOUNDARY

NOTE: GRADING WITHIN THE STREAM AND ADJACENT AREAS MAY VARY DEPENDING ON ACTUAL FIELD CONDITIONS AND SHALL BE PERFORMED IN A MANNER THAT PROTECTS TREES OR OTHER FEATURES AS DIRECTED IN THE FIELD.



**AS-BUILT**  
6/19/2018

REVISIONS	
Revision	Description
1	ISSUED FOR CONSTRUCTION

Engineering Analytics, Inc.

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ECOLOGICAL RESOURCES CONSULTANTS, INC.

35715 US HIGHWAY 40, SUITE D204  
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ST. VRAIN CREEK REACH 3

**STREAM RESTORATION**

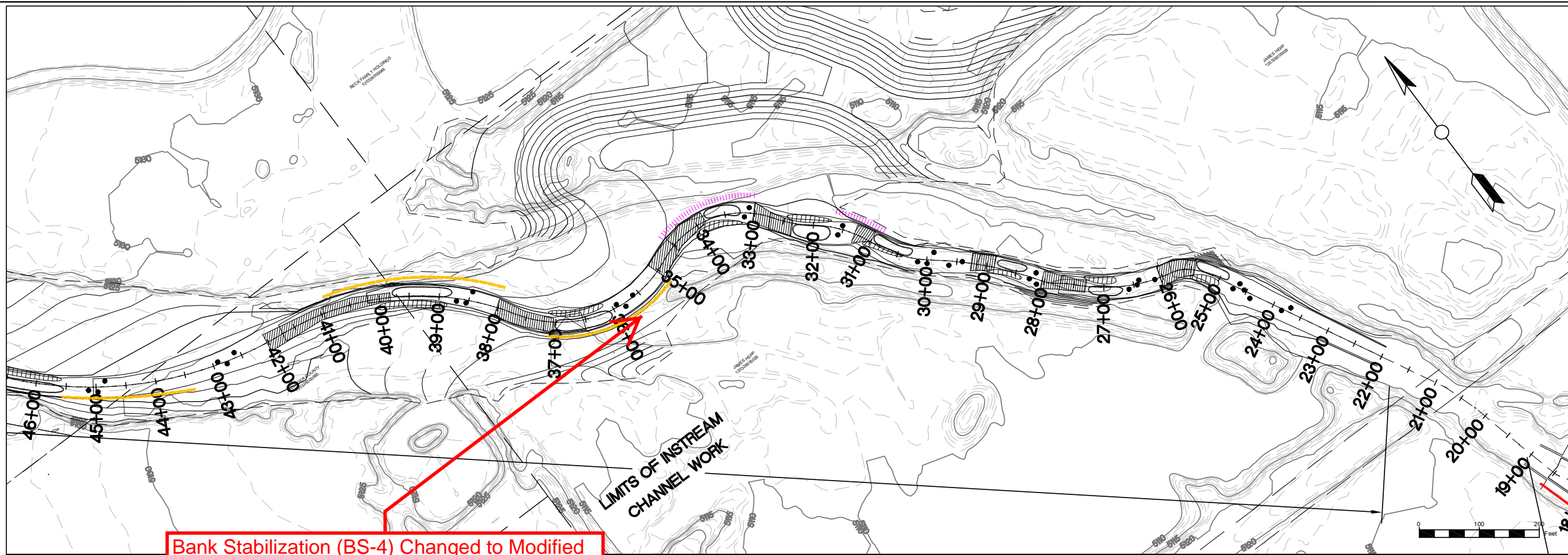
STA 43+18 TO 65+60

SCALE VERIFICATION:  
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IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.

Drawn by: ERC  
Designed by: ERC  
Checked by: ERC  
Scale: As Shown  
Project No. 110666  
Date: April 13, 2017

SHEET

**R8**



LEGEND

RIFFLE

POINT BAR

POOL

BOULDER CLUSTER

TYPE A BANK STABILIZATION

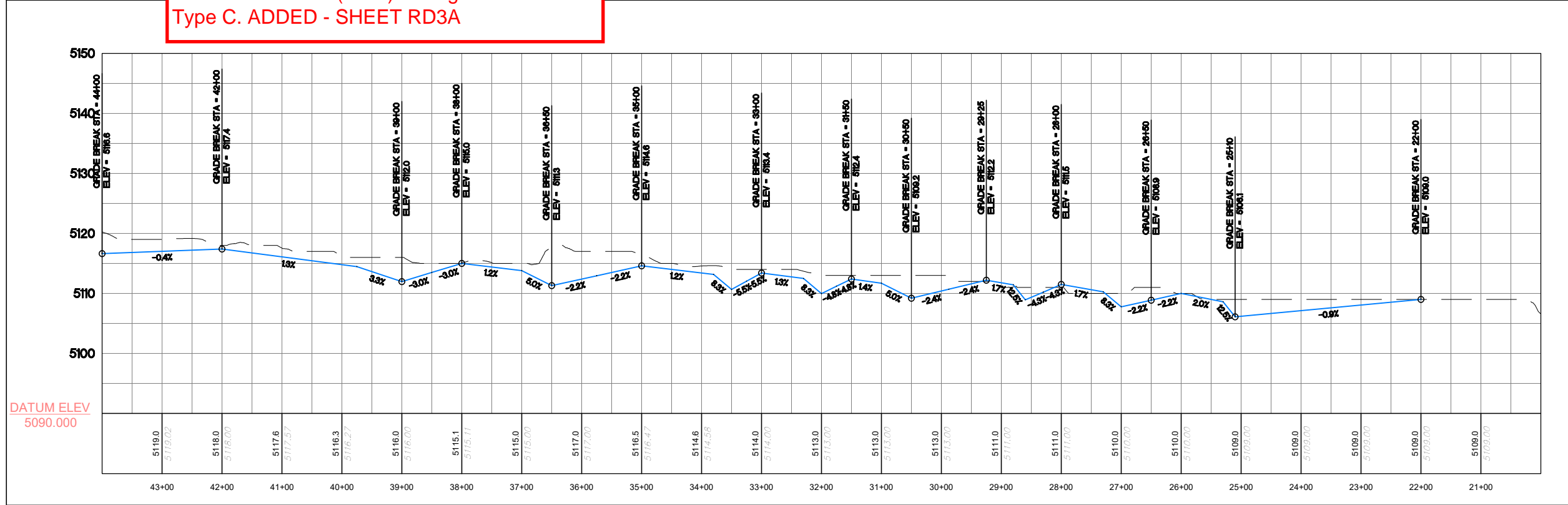
TYPE B BANK STABILIZATION

TYPE C BANK STABILIZATION

TYPE D BANK STABILIZATION

PROPERTY BOUNDARY

NOTE: GRADING WITHIN THE STREAM AND ADJACENT AREAS MAY VARY DEPENDING ON ACTUAL FIELD CONDITIONS AND SHALL BE PERFORMED IN A MANNER THAT PROTECTS TREES OR OTHER FEATURES AS DIRECTED IN THE FIELD.



DATUM ELEV  
5090.000

32913

6-19-18

PROFESSIONAL ENGINEER

32913

PROFESSIONAL ENGINEER

AS-BUILT  
6/19/2018

REVISIONS		
Revision	Date	Description
1	09/19/2017	ISSUED FOR CONSTRUCTION

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ST. VRAIN CREEK REACH 3  
STREAM RESTORATION  
STA 20+89 TO 43+18

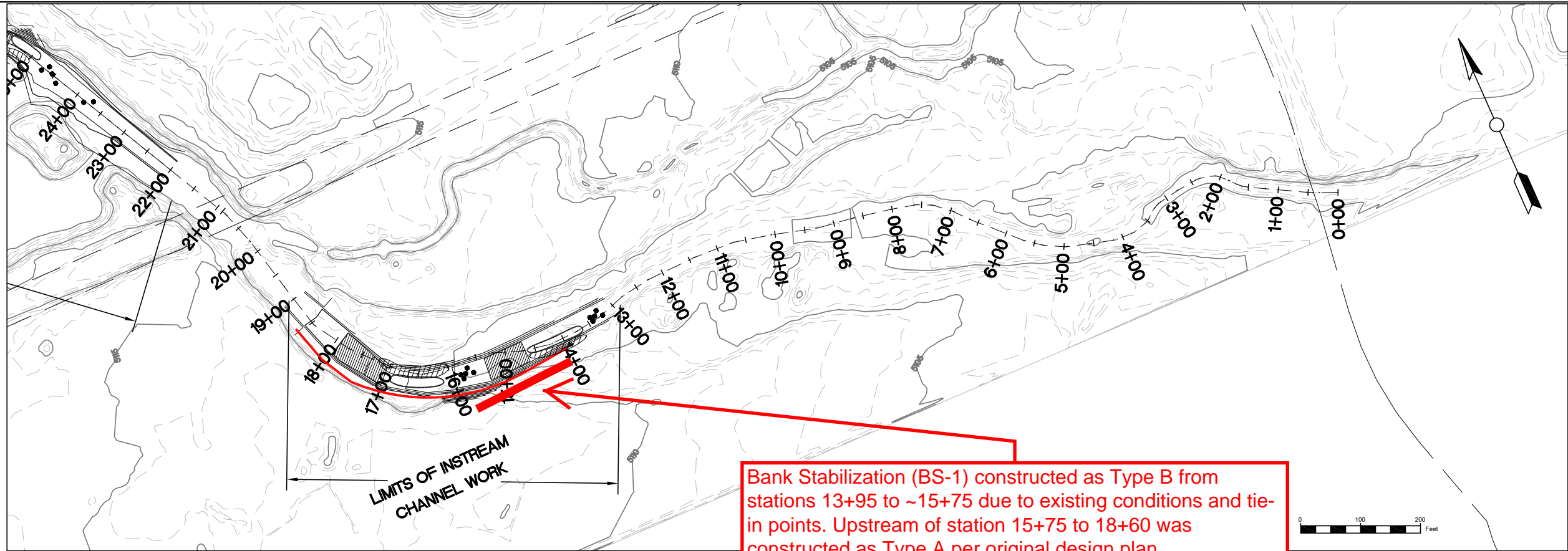
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IF NOT ONE INCH ON  
THIS SHEET, ADJUST  
SCALE ACCORDINGLY.

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Designed by: ERC  
Checked by: ERC

Scale: As Shown  
Project No. 110666  
Date: April 13, 2017

SHEET  
R9

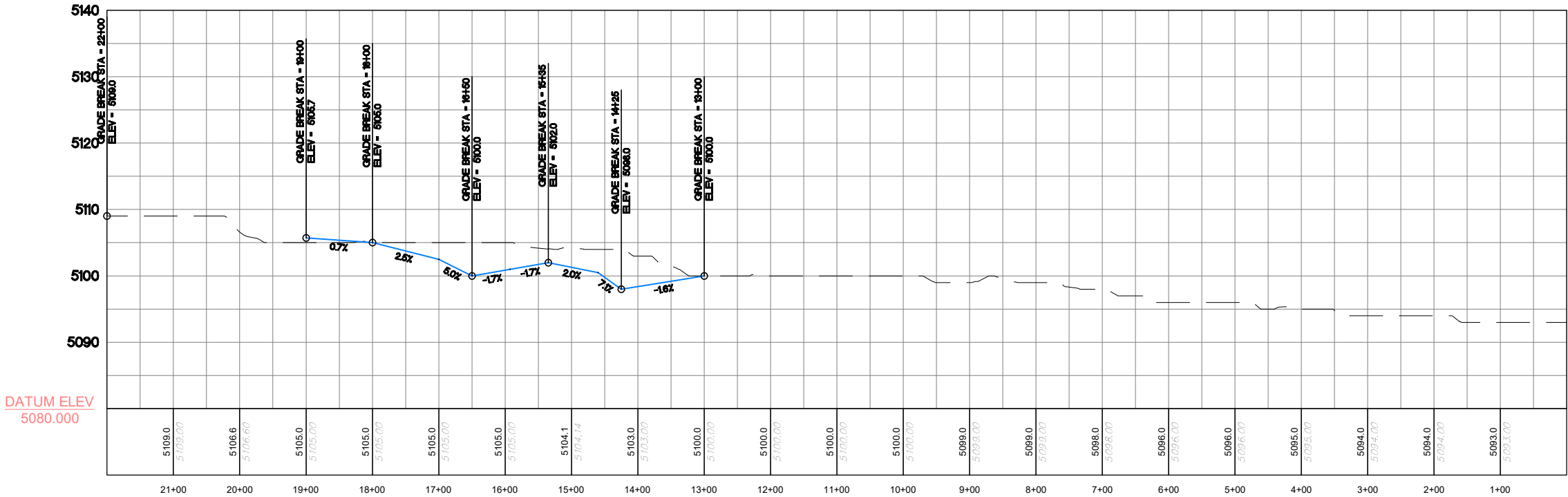




Bank Stabilization (BS-1) constructed as Type B from stations 13+95 to ~15+75 due to existing conditions and tie-in points. Upstream of station 15+75 to 18+60 was constructed as Type A per original design plan.

- LEGEND**
- RIFFLE
  - POINT BAR
  - POOL
  - BOULDER CLUSTER
  - TYPE A BANK STABILIZATION
  - TYPE B BANK STABILIZATION
  - TYPE C BANK STABILIZATION
  - TYPE D BANK STABILIZATION
  - PROPERTY BOUNDARY

NOTE: GRADING WITHIN THE STREAM AND ADJACENT AREAS MAY VARY DEPENDING ON ACTUAL FIELD CONDITIONS AND SHALL BE PERFORMED IN A MANNER THAT PROTECTS TREES OR OTHER FEATURES AS DIRECTED IN THE FIELD.



DATUM ELEV  
5080.000



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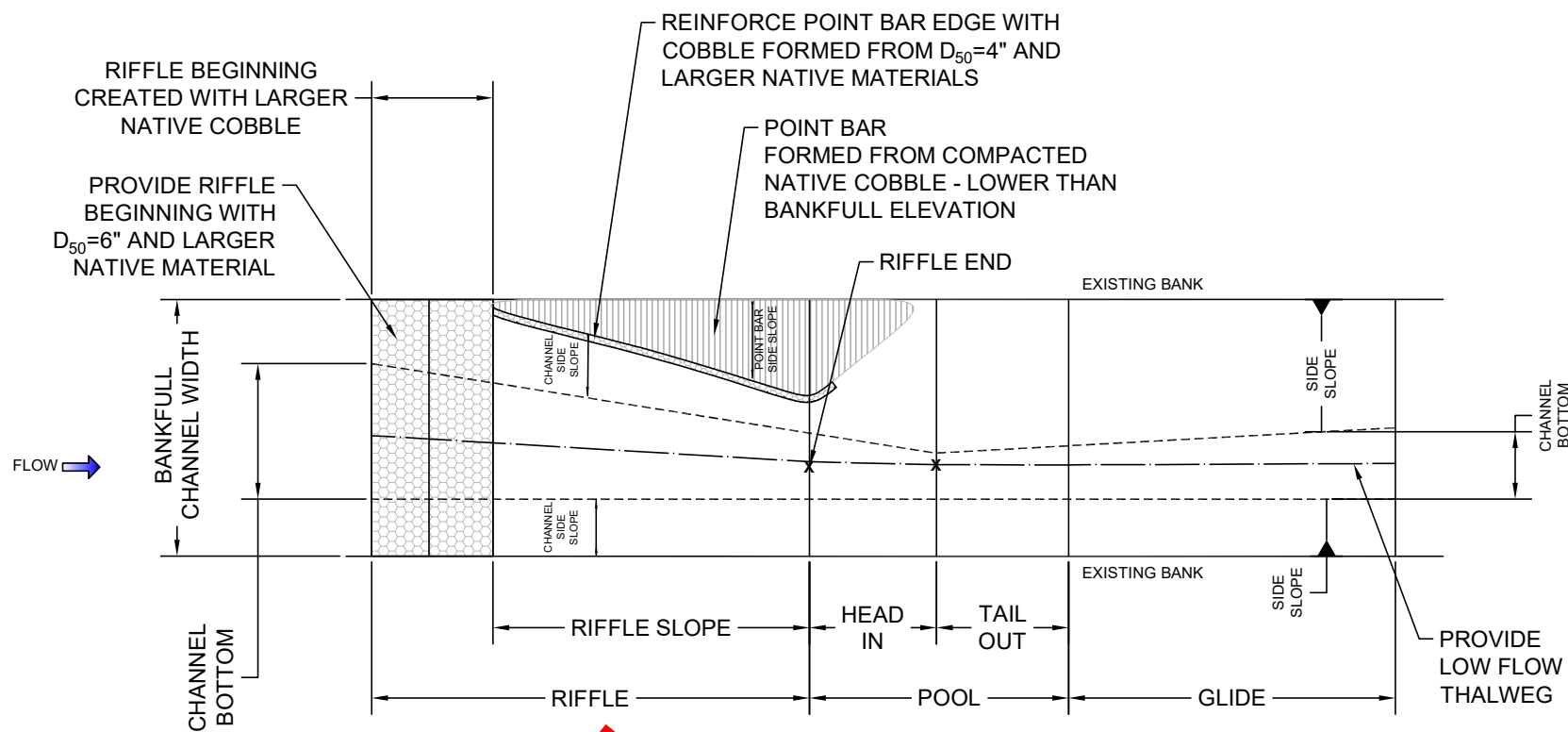
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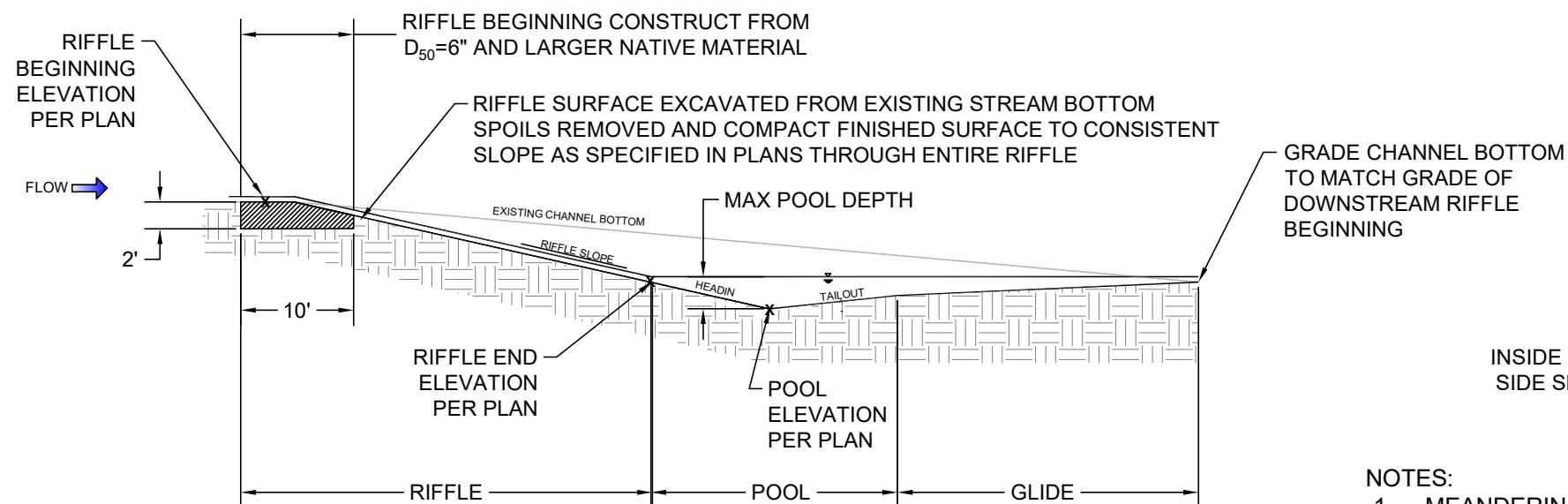
ST. VRAIN CREEK REACH 3  
STREAM RESTORATION  
STA 0+00 TO 20+89

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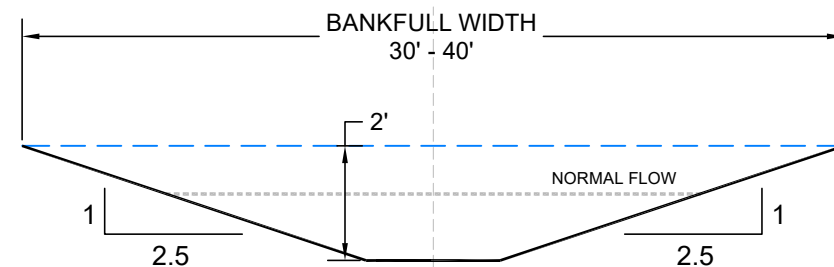
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Project No. 110666  
Date: April 13, 2017  
SHEET R10



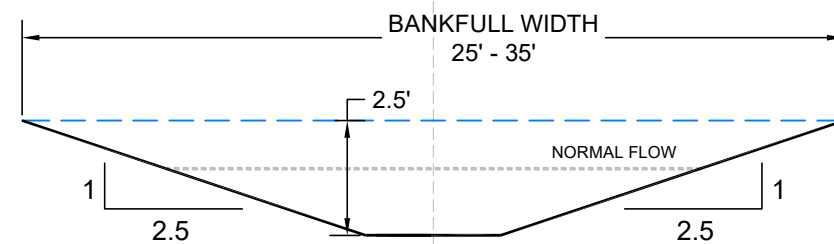
✓ RIFFLE-POOL SEQUENCE TYPICAL PLANVIEW  
Scale: NTS



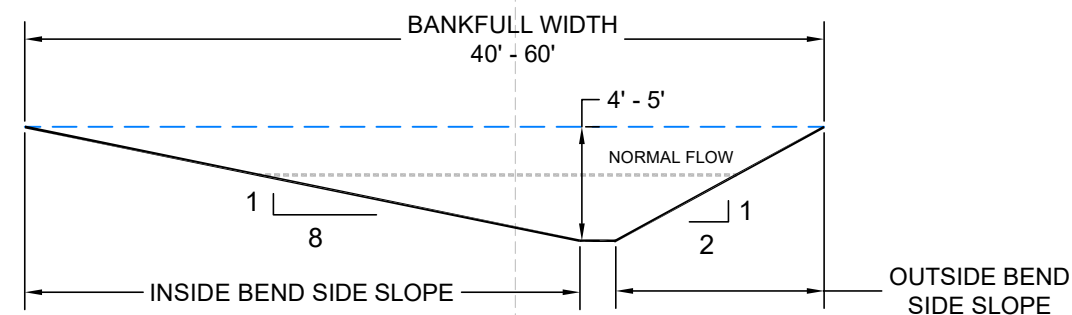
✓ RIFFLE-POOL SEQUENCE TYPICAL PROFILE  
Scale: NTS



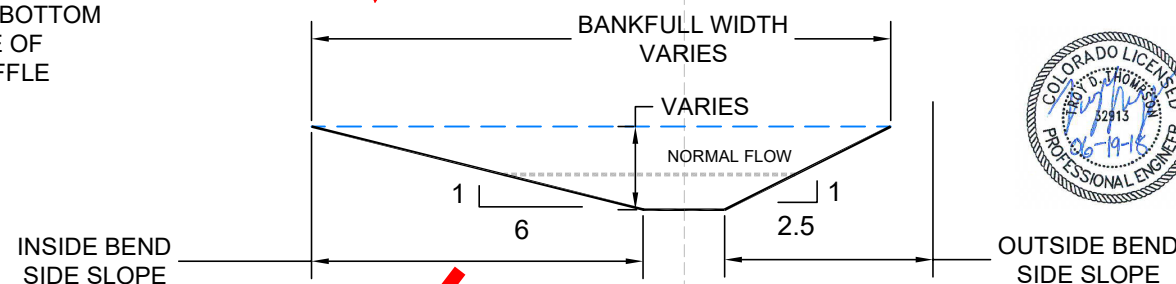
✓ TYPICAL CHANNEL RIFFLE BEGINNING SECTION



✓ TYPICAL CHANNEL RIFFLE END SECTION



✓ TYPICAL CHANNEL - POOL SECTION



✓ TYPICAL CHANNEL - MIDDLE OF GLIDE

- NOTES:
- MEANDERING LOW FLOW THALWEG UP TO 8 FEET WIDE BY APPROXIMATELY 6 INCHES DEEP TO BE CONSTRUCTED IN ALL AREAS WHERE STREAM IMPROVEMENTS OCCUR. THALWEG TO BE FIELD LOCATED BY OWNER'S STREAM RESTORATION SPECIALIST.
  - CHANNEL GRADING TO TIE-IN TO EXISTING VEGETATION LINE AND/OR BANKFULL CHANNEL WIDTH.

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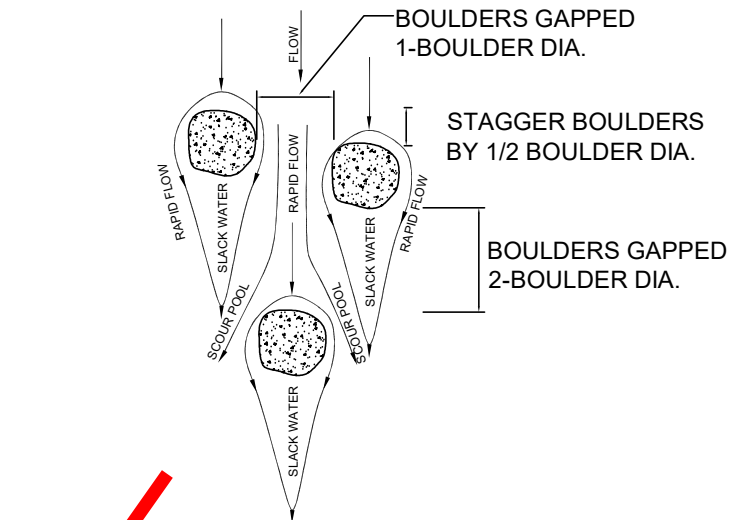
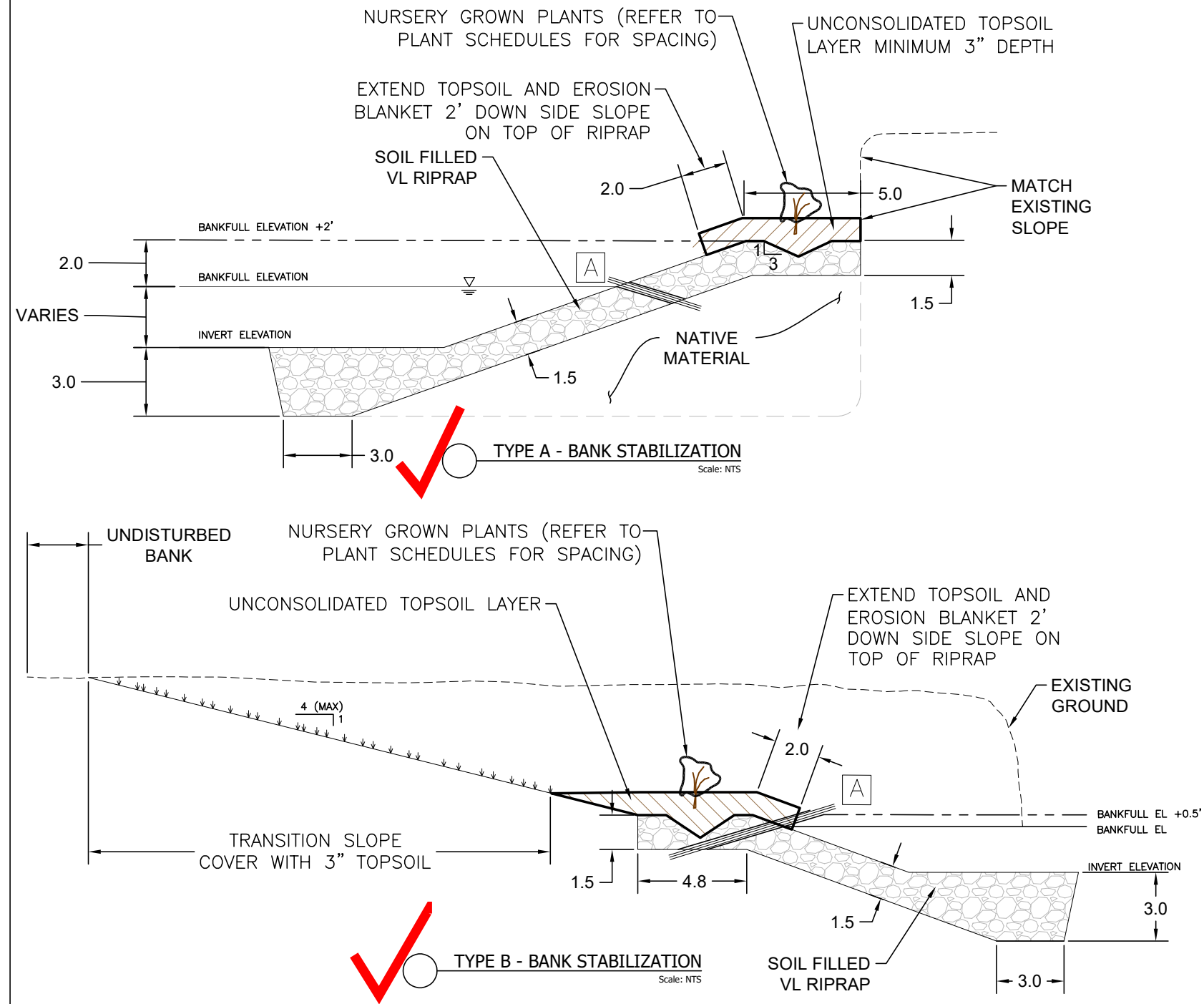
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EVERGREEN, CO 80439

ST. VRAIN CREEK REACH 3  
STREAM RESTORATION  
SECTIONS AND DETAILS

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Designed by: TJT	Checked by: TJT
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Date: April 13, 2017	SHEET RD1







**BOULDER CLUSTERS (BC)**

**BC NOTES:**

1. NATIVE BOULDERS SALVAGED INSTREAM, 1 TO 1 1/2 DIA.
2. TOP OF ALL BOULDERS WILL BE SET BELOW THE BANKFULL FLOW ELEVATION
3. CREATE SCOUR HOLE IN RAPID FLOW PATH AREAS
4. BOULDERS SHOULD BE SET TOWARDS STREAM CENTER MAINTAINING 5' SPACE FROM BANK EDGE

**WILLOW STAKING**

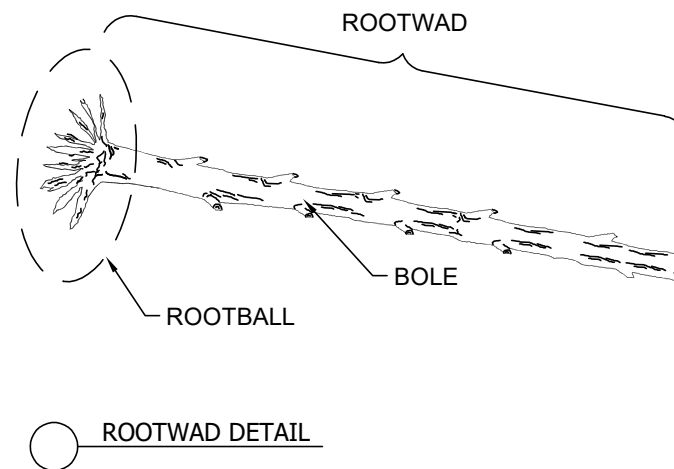
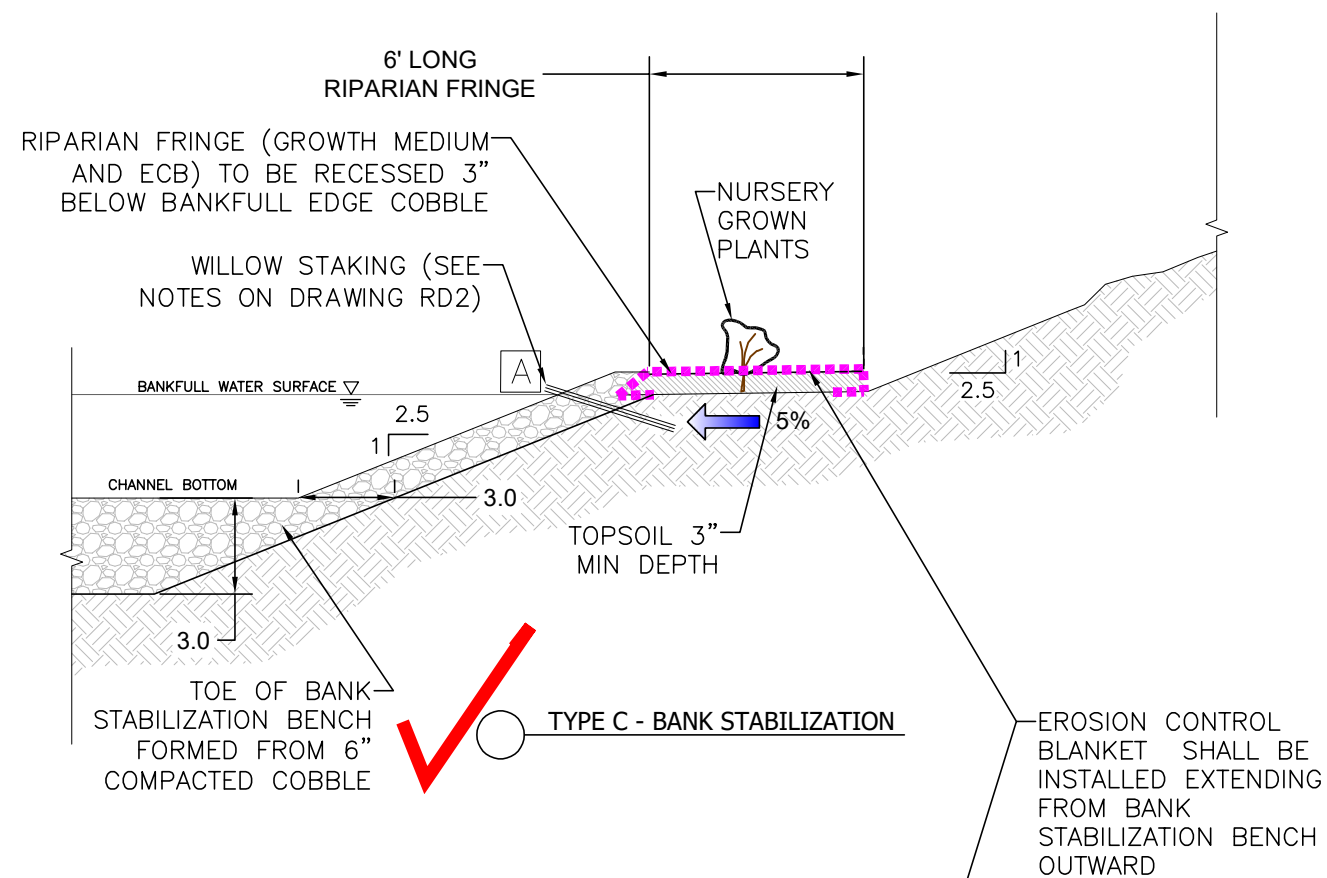
1. INSTALL A CONTINUOUS LAYER OF WILLOW CUTTINGS DURING PLACEMENT OF SOIL FILLED RIPRAP
2. APPROXIMATELY 3 WILLOW CUTTINGS SHALL BE PLACED SIDE BY SIDE PER LINEAR FOOT
3. MINIMUM 3" LAYER OF NATIVE SAND OR TOPSOIL REQUIRED
4. WILLOW STAKING SHALL BE INSTALLED AT BANKFULL ELEVATION
5. WILLOW CUTTINGS SHALL EXTEND BEYOND RIPRAP INTO NATIVE MATERIAL
6. WILLOW CUTTINGS SHALL BE HARVESTED FROM APPROVED LOCATIONS
7. CUTTINGS SHALL BE A MINIMUM LENGTH OF 4'



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(970) 488-3111	

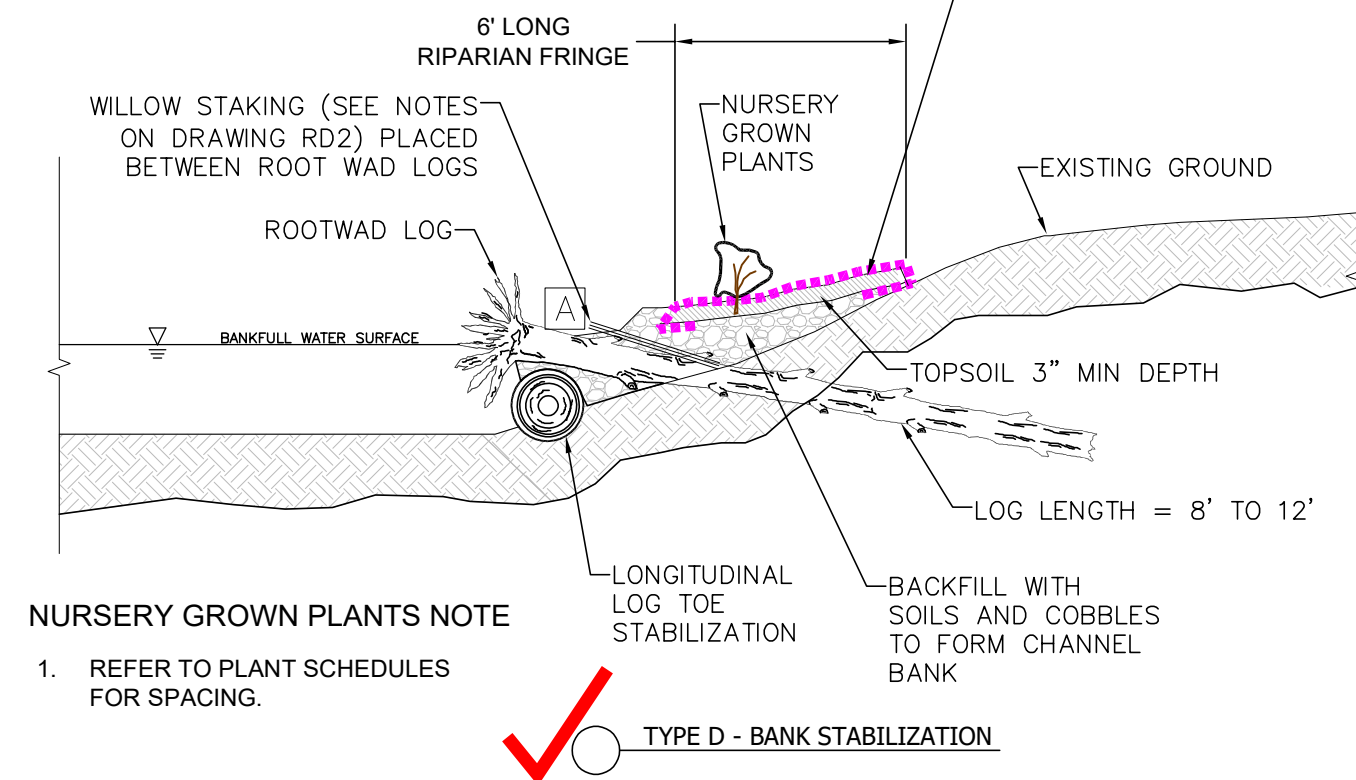
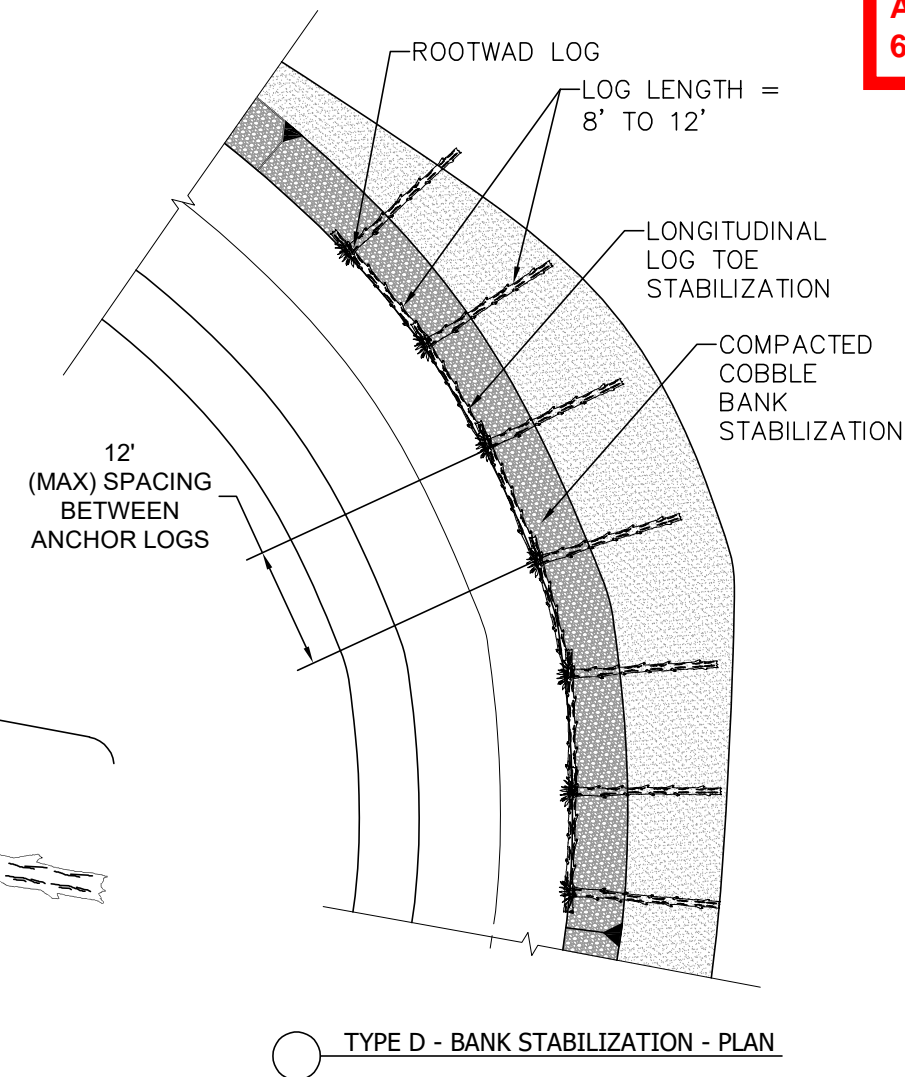
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STREAM RESTORATION SECTIONS AND DETAILS	Drawn by: LJS
	Designed by: TJT
	Checked by: TJT
	Scale: As Shown
	Project No. 110666
	Date: April 13, 2017
	SHEET
	RD2



ROOTWAD NOTES:

GENERAL "ROOTWAD" CHARACTERISTICS:

1. TREES MUST BE NATIVE, NON-INVASIVE, SPECIES AND CAN SPECIFICALLY NOT INCLUDE "CRACK WILLOW."
2. TREES SHALL BE HEALTHY WITHOUT HOLLOW OR ROTTEN FEATURES AND WITHOUT SPLIT TRUNKS. BARK SHALL NOT BE REMOVED.
3. TREES MUST INCLUDE A BOLE WITH ATTACHED ROOT BALL.
4. TREE BOLE DIAMETER MUST BE 12 INCHES IN DIAMETER OR LARGER AS MEASURED FOUR AND A HALF FEET ABOVE THE TOP OF THE ROOT BALL.
5. TREE BOLE LENGTH MUST BE 8 TO 12 FEET MEASURED ABOVE THE TOP OF THE ROOT BALL, AS LONG AS IT CAN BE REASONABLY HANDLED/TRANSPORTED.
6. ROOT BALLS SHALL BE AS LARGE AND FULL AS POSSIBLE WITH ROOTS LEFT CONNECTED. THE MINIMUM ROOT BALL DIAMETER IS 6 FEET. ROOT BALL SHALL NOT BE TRIMMED OR CLEANED.
7. BRANCHES ATTACHED TO THE BOLE SHALL BE LEFT CONNECTED AND MAY BE TRIMMED TO A MINIMUM LENGTH OF TWO FEET AS MEASURED FROM THE OUTSIDE DIAMETER OF THE ATTRIBUTED BOLE.



NURSERY GROWN PLANTS NOTE

1. REFER TO PLANT SCHEDULES FOR SPACING.



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ST. VRAIN CREEK REACH 3  
STREAM RESTORATION  
SECTIONS AND DETAILS

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Checked by: TJT  
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Date: April 13, 2017  
SHEET RD3

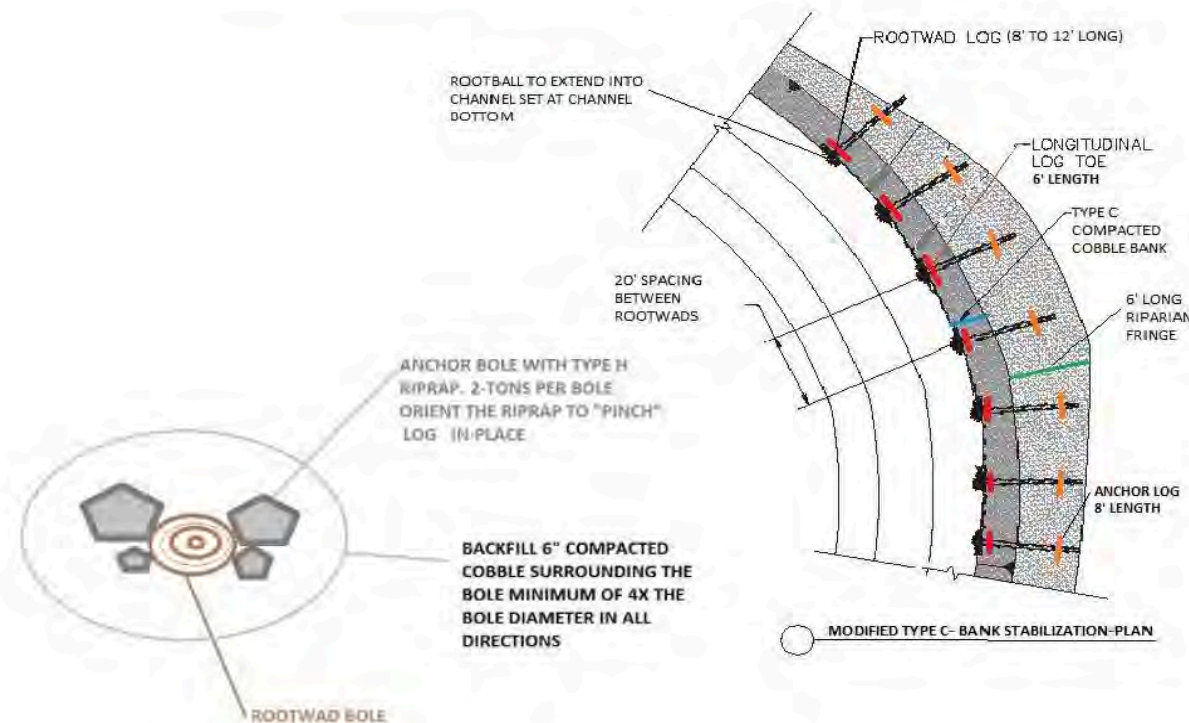
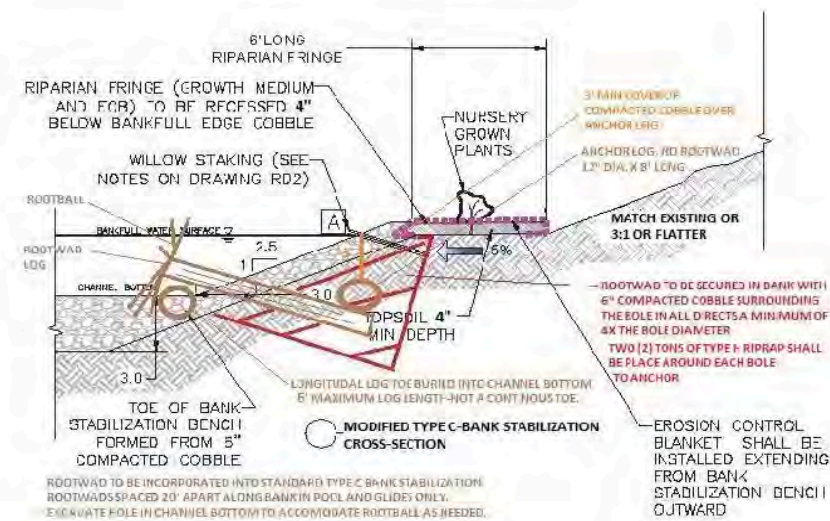


ADDED

SHEET RD3A  
Modified Type C Bank  
Stabilization - Typical Detail

### MODIFIED TYPE C BANK STABILIZATION (2-26-18)

- STANDARD TYPE C BANK STABILIZATION TO BE USED ALONG ENTIRE STABILIZATION AREA.
- ROOTWADS TO BE INCORPORATED INTO CONSTRUCTED BANK ON 20' INTERVALS IN POOL AND GLIDE AREAS AS IDENTIFIED IN THE FIELD. RANDOM VARIATION IN SPACING IS ENCOURAGED.
- ROOTWADS TO BE SECURED INTO BANK WITH 6" COMPACTED COBBLE AND 2 TONS OF TYPE H RIPRAP.



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STREAM RESTORATION  
SECTIONS AND DETAILS

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SHEET



80% Design Feature Layout					
Feature	#	Station	Thalweg El. (ft)	Riffle Slope	Bankfull El. (ft)
Match		1300	5100.0		Match
Pool	1	1425	5098.0		Match
Riffle End	1	1460	5100.5		Match
Riffle Beginning	1	1535	5102.0	2.00%	Match
Middle Glide	2	1592.5	5101.0		Match
Pool	2	1650	5100.0		Match
Riffle End	2	1700	5102.5		Match
Riffle Beginning	2	1800	5105.0	2.50%	Match
Match		1900	5105.7		Match
Match		2200	5109.0		Match
Pool	3	2510	5106.1		Match
Riffle End	3	2530	5108.6		Match
Riffle Beginning	3	2600	5110.0	2.00%	Match
Middle Glide	3	2650	5108.9		Match
Pool	4	2700	5107.8		Match
Riffle End	4	2730	5110.3		Match
Riffle Beginning	4	2800	5111.5	1.75%	Match
Middle Glide	4	2830	5110.2		Match
Pool	5	2860	5108.9		Match
Riffle End	5	2880	5111.4		Match
Riffle Beginning	5	2925	5112.2	1.70%	Match
Middle Glide	5	2987.5	5110.7		Match
Pool	6	3050	5109.2		Match
Riffle End	6	3100	5111.7		5114
Riffle Beginning	6	3150	5112.4	1.40%	5114.4
Middle Glide	6	3175	5111.2		5114.6
Pool	7	3200	5110.0		5114.7
Riffle End	7	3230	5112.5		5114.9
Riffle Beginning	7	3300	5113.4	1.30%	5115.4
Middle Glide	7	3325	5112.0		5115.6
Pool	8	3350	5110.7		5115.7
Riffle End	8	3380	5113.2		5115.9
Riffle Beginning	8	3500	5114.6	1.20%	5116.6
Middle Glide	8	3575	5113.0		5116.7
Pool	9	3650	5111.3		5116.8
Riffle End	9	3700	5113.8		5116.9
Riffle Beginning	9	3800	5115.0	1.20%	5117.0
Middle Glide	9	3850	5113.5		5117.3
Pool	10	3900	5112.0		5117.6
Riffle End	10	3975	5114.5		5118.1
Riffle Beginning	10	4200	5117.4	1.30%	5119.4
Middle Glide	10	4400	5116.7		5121.0
Pool	11	4600	5115.9		5122.6
Riffle End	11	4700	5118.4		5123.4
Riffle Beginning	11	4900	5123.0	2.30%	5125.0
Middle Glide	11	5100	5121.8		5126.1
Pool	12	5300	5120.5		5127.3
Riffle End	12	5400	5123.0		5127.9
Riffle Beginning	12	5600	5127.0	2.00%	5129.0
Middle Glide	12	5775	5126.1		5130.3
Pool	13	5950	5125.3		5131.7
Riffle End	13	6025	5127.8		5132.3
Riffle Beginning	13	6200	5131.6	2.20%	5133.6
Match		6300	0.0		Match

80% Design Feature Layout					
Match		10900	5171.0		Match
Pool	14	10980	5168.3		Match
Riffle End	14	11025	5170.8		Match
Riffle Beginning	14	11075	5171.8	2.00%	Match
Match		11100	5172.0		Match
Match		11150	5173.0		Match
Middle Glide	15	11162.5	5171.7		Match
Pool	15	11175	5170.4		Match
Riffle End	15	11205	5172.9		Match
Riffle Beginning	15	11260	5173.8	1.60%	Match
Pool	21	12350	5182.9		Match
Riffle End	21	12375	5185.4		Match
Riffle Beginning	21	12500	5188.5	2.50%	Match
Match		12600	5190.0		Match
Match		13400	5192.0		Match
Middle Glide	22	13495	5191.1		Match
Pool	22	13590	5190.2		Match
Riffle End	22	13640	5192.7		Match
Riffle Beginning	22	13720	5194.5	2.20%	Match
Match		13800	5195.0		Match
Match		17700	5231.0		Match
Middle Glide	23	17750	5229.6		Match
Pool	23	17800	5228.2		Match
Riffle End	23	17840	5230.7		Match
Riffle Beginning	23	17920	5231.8	1.40%	Match
Middle Glide	24	17960	5230.9		Match
Pool	24	18000	5229.9		Match
Riffle End	24	18060	5232.4		Match
Riffle Beginning	24	18200	5235.5	2.20%	Match
Match		18400	5237.0		Match
Match		18700	5240.1		Match
Middle Glide	25	18775	5238.7		Match
Pool	25	18850	5237.3		Match
Riffle End	25	18890	5239.8		Match
Riffle Beginning	25	18985	5241.7	2.00%	5243.7
Middle Glide	26	19092.5	5240.3		5244.4
Pool	26	19200	5239.0		5245.1
Riffle End	26	19280	5241.5		5245.6
Riffle Beginning	26	19470	5244.9	1.80%	5246.9
Match		19700	5247.0		Match

80% Bank Stabilization Table					
Bank Stabilization ID	Type	Upstream End		Downstream End	
		Station	Top El. (ft)	Station	Top El. (ft)
BS-1	Type A	18+60	5110	13+95	5105
BS-2	Type C	31+70	5115	30+80	5114
BS-3	Type C	34+60	5116	33+00	5116
BS-4	Type C	37+10	5117	35+00	5117
BS-5	Type D	40+85	5117	38+00	5117
BS-6	Type D	45+55	5121	43+40	5119
BS-7	Type D	54+20	5126	51+20	5124
BS-8	Type C	59+75	5130	58+00	5130
BS-9A	Type B	61+60	5122.5	61+30	5132.5
BS-9B	Type B	62+75	5135.5	62+45	5135.5
BS-10	Type C	110+65	5174	109+70	5173
BS-11	Type C	124+50	5190	122+50	5189
BS-12	Type C	124+80	5191	123+00	5187
BS-13	Type C	137+00	5198	135+45	5195
BS-14	Type A	182+70	5241	179+20	5236
BS-15	Type B	193+00	5242	190+50	5241

NOTE: ELEVATIONS MAY BE ADJUSTED IN THE FIELD BASED ON ACTUAL CONDITIONS,

REVISED 80% Bank Stabilization Table

Bank Stabilization Table - Revised February 20, 2018

Bank Stabilization ID	Type	Upstream End		Downstream End	
		Station	Top El. (ft)	Station	Top El. (ft)
BS-1	Type A	18+60	5110	15+75	5105
BS-1 continued	Type B	15+75	5103	13+95	5103
BS-2	Type C	31+70	5114.5	30+80	5114.0
BS-3	Type C	34+60	5116.3	33+00	5115.5
BS-4	Modified Type C	37+10	5116.4	35+00	5116.6
BS-5	Type D	40+85	5118.2	38+00	5117.0
BS-6	Type D	45+55	5120.5	43+40	5119.8
BS-7	Modified Type C	54+20	5125.6	51+20	5125.2
BS-8	Modified Type C	59+75	5130.1	58+00	5129.6
BS-9A	Type B	61+60	Removed	61+30	Removed
BS-9B	Type B	62+75	Removed	62+45	Removed
BS-10	Type C	110+55	5173.7	109+75	5173.0
BS-11	Type C	124+50	Removed	122+50	Removed
BS-12	Type C	124+10	5188.0	122+80	5188.0
BS-13	Type C	136+00	5196.4	135+50	5194.5
BS-13 continued	Type C	135+25	5194.5	134+50	5194.5
BS-14	Type A	182+70	5239.9	179+20	5235.8
BS-15	Type B	193+00	5244.9	190+50	5244.3



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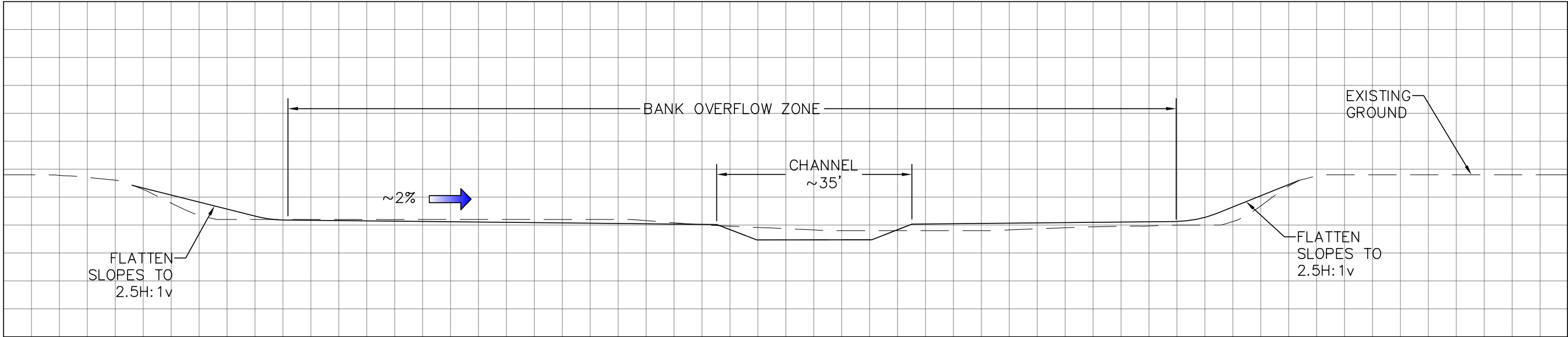
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ST. VRAIN CREEK REACH 3  
STREAM RESTORATION TABLES

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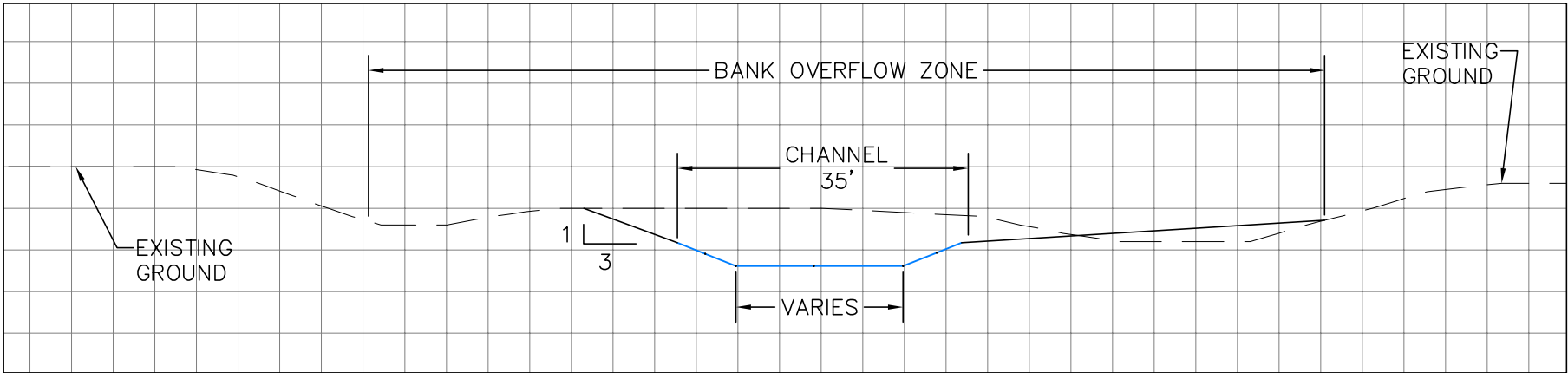
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AS-BUILT  
6/19/2018





○ TYPICAL CROSS SECTION THRU WIDE OVERBANK ZONE  
Scale: NTS



○ TYPICAL CROSS SECTION THRU NARROW OVERBANK ZONE  
Scale: NTS



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SECTIONS AND DETAILS

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SHEET RD5

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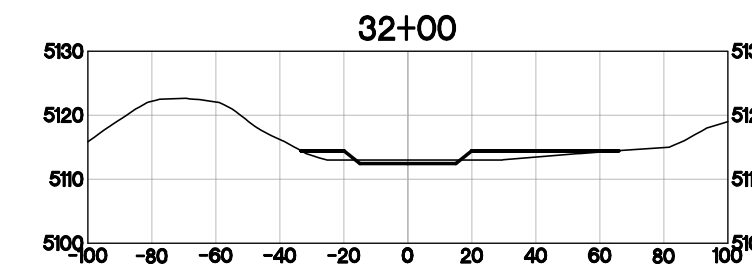
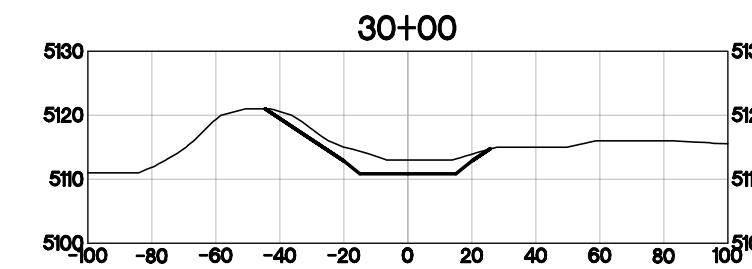
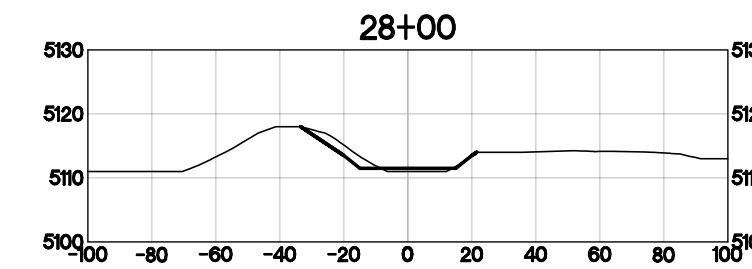
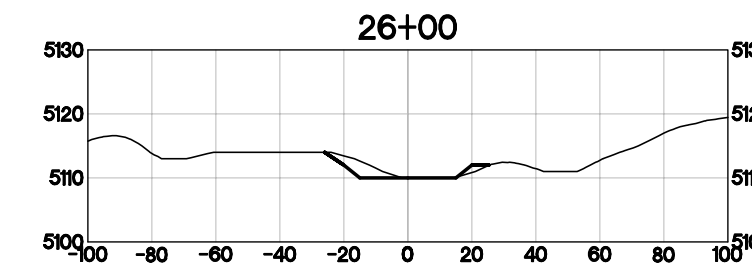
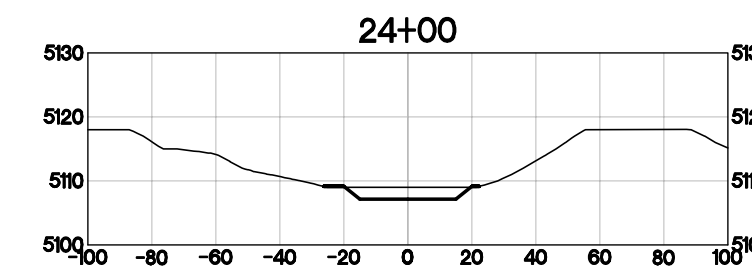
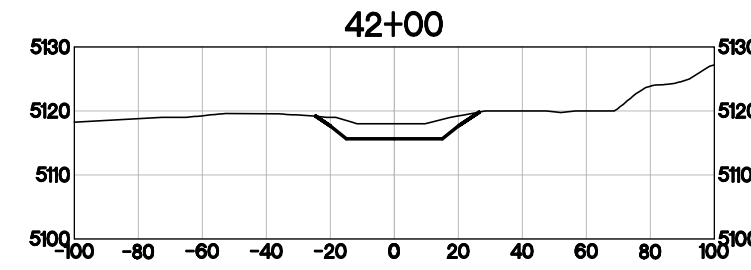
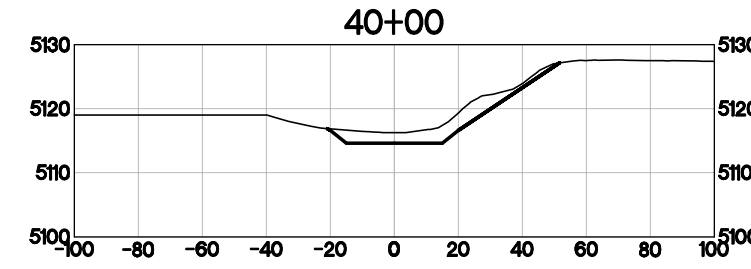
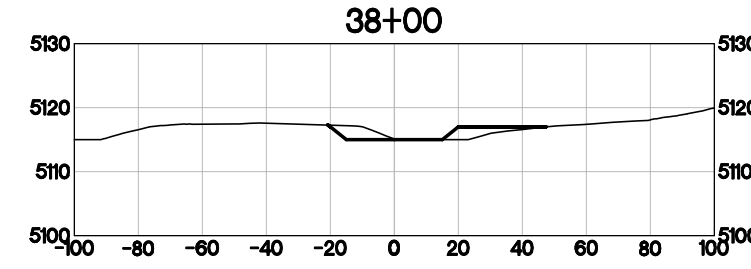
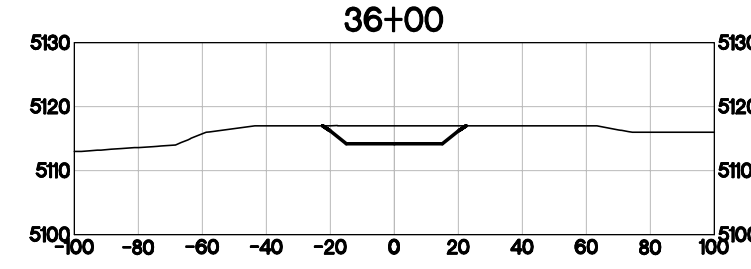
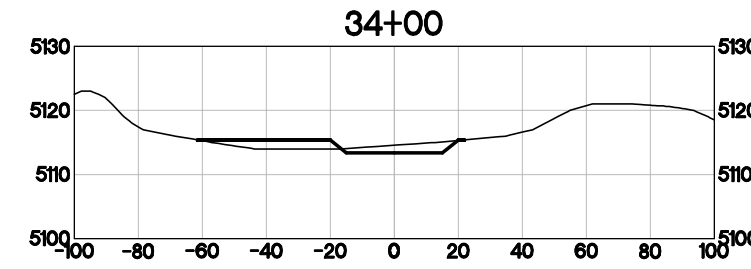
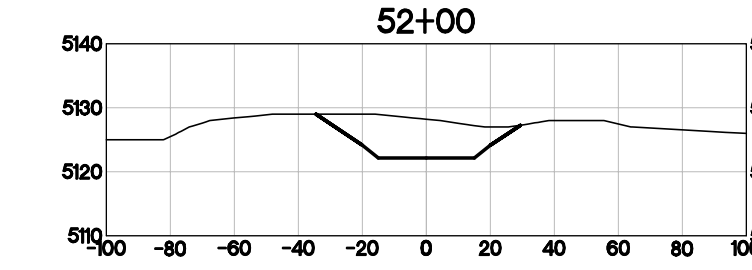
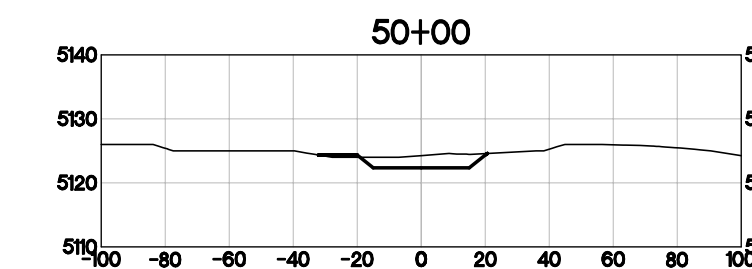
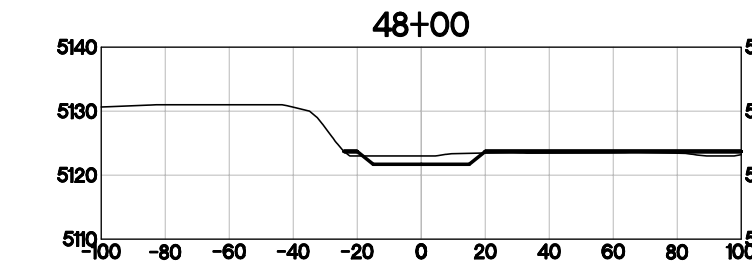
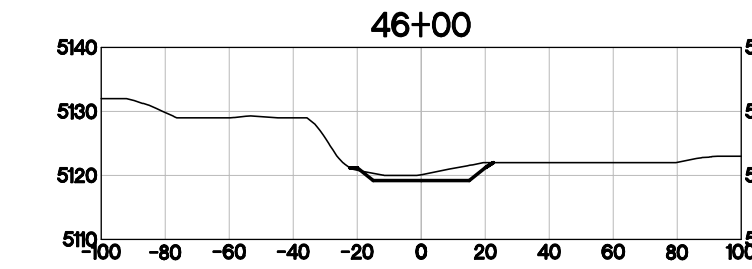
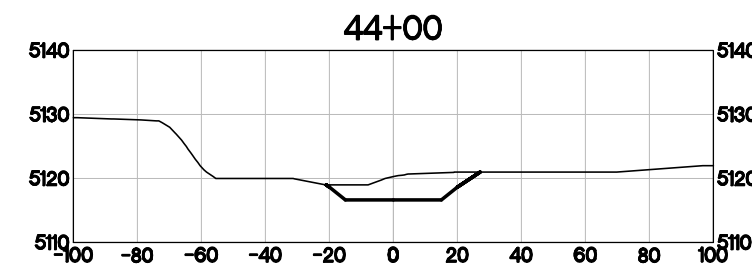
1600 South Platt Road, Suite 209  
Fort Collins, CO 80525  
(970) 486-3111

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EVERGREEN, CO 80439

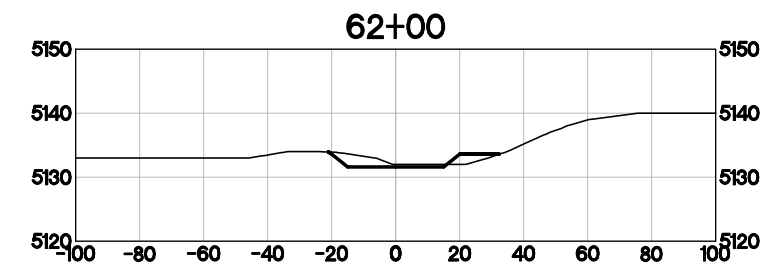
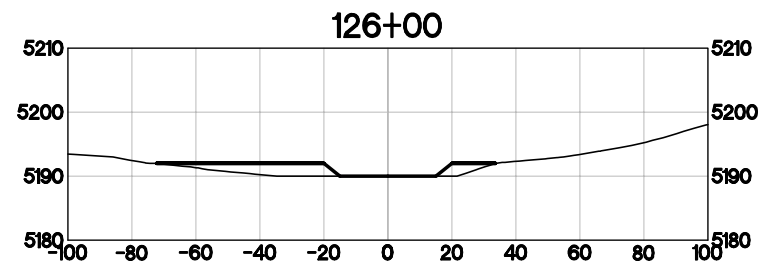
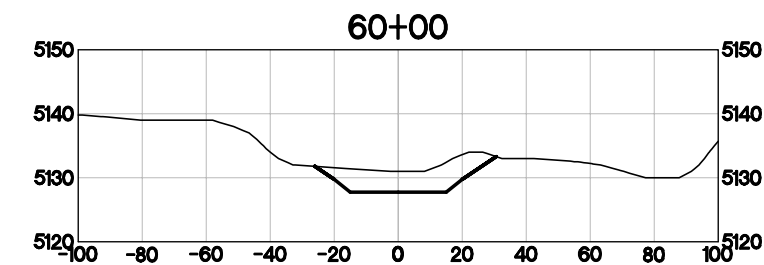
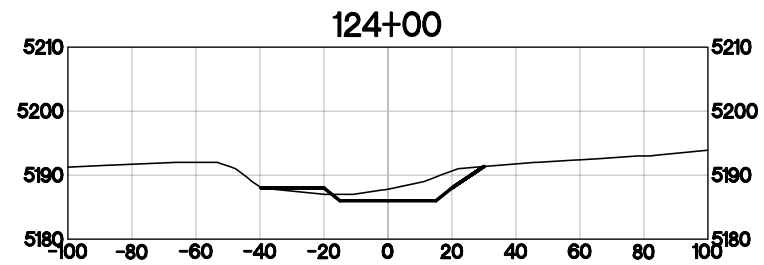
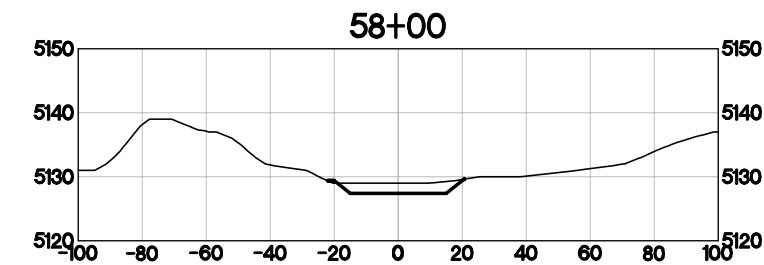
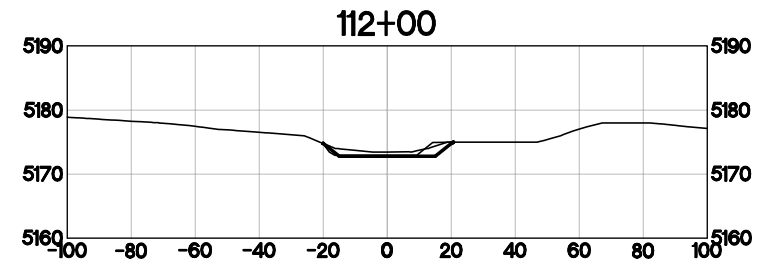
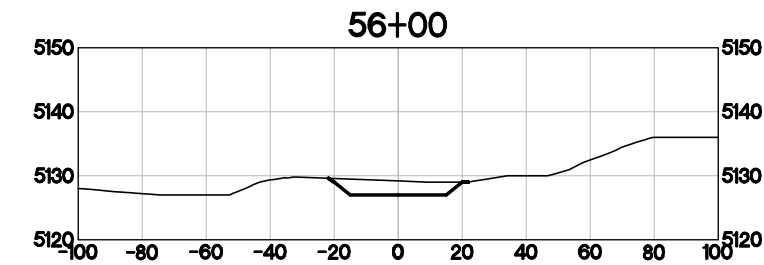
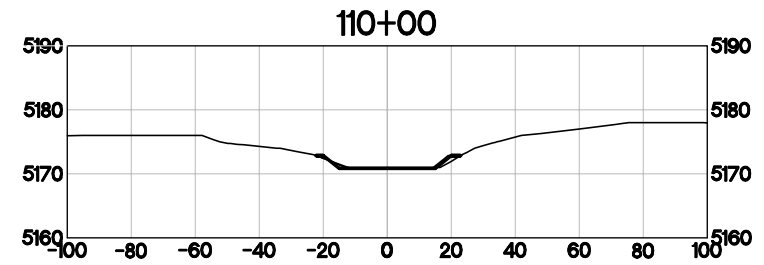
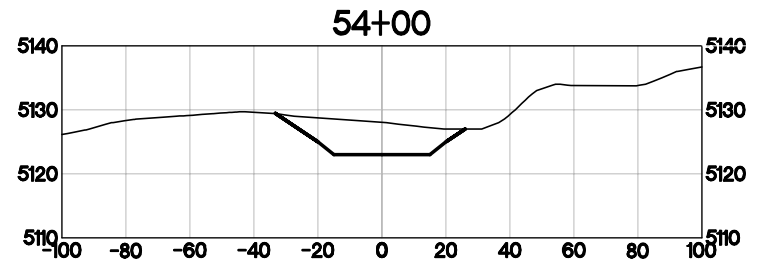
ST. VRAIN CREEK REACH 3  
STREAM RESTORATION  
CROSS SECTIONS (1 OF 2)

SCALE VERIFICATION: 0" = 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.	
Drawn by:	LJS
Designed by:	TJT
Checked by:	TJT
Scale:	As Shown
Project No.	110666
Date:	April 13, 2017
SHEET RD6	

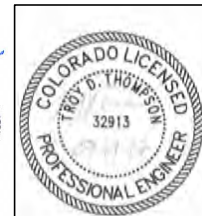


ALL SECTIONS ARE TAKEN IN THE UPSTREAM DIRECTION.





ALL SECTIONS ARE TAKEN IN THE UPSTREAM  
DIRECTION.



REVISIONS		
Revision	Date	Description
1	09/19/2017	ISSUED FOR CONSTRUCTION



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ST. VRAIN CREEK REACH 3  
STREAM RESTORATION  
CROSS SECTIONS (2 OF 2)

SCALE VERIFICATION: 0" = 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.	
Drawn by:	LJS
Designed by:	TJT
Checked by:	TJT
Scale:	As Shown
Project No.	110666
Date:	April 13, 2017
SHEET	RD7