

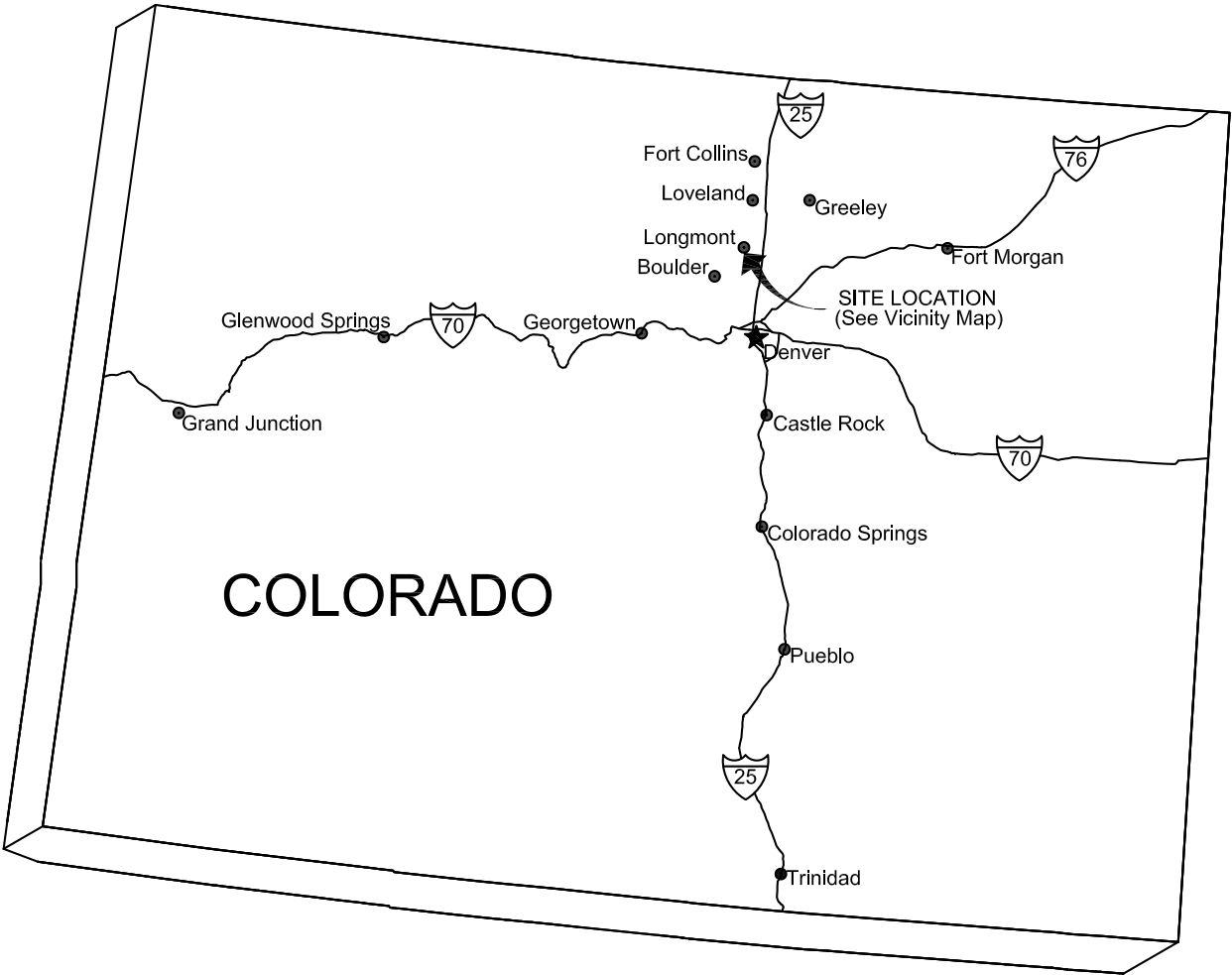
ST VRAIN CREEK REACH 3

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

PREPARED BY



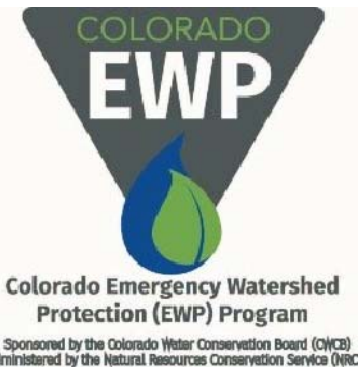
STATE MAP



NOT TO SCALE

PREPARED FOR

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



COLORADO
Colorado Water
Conservation Board
Department of Natural Resources



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

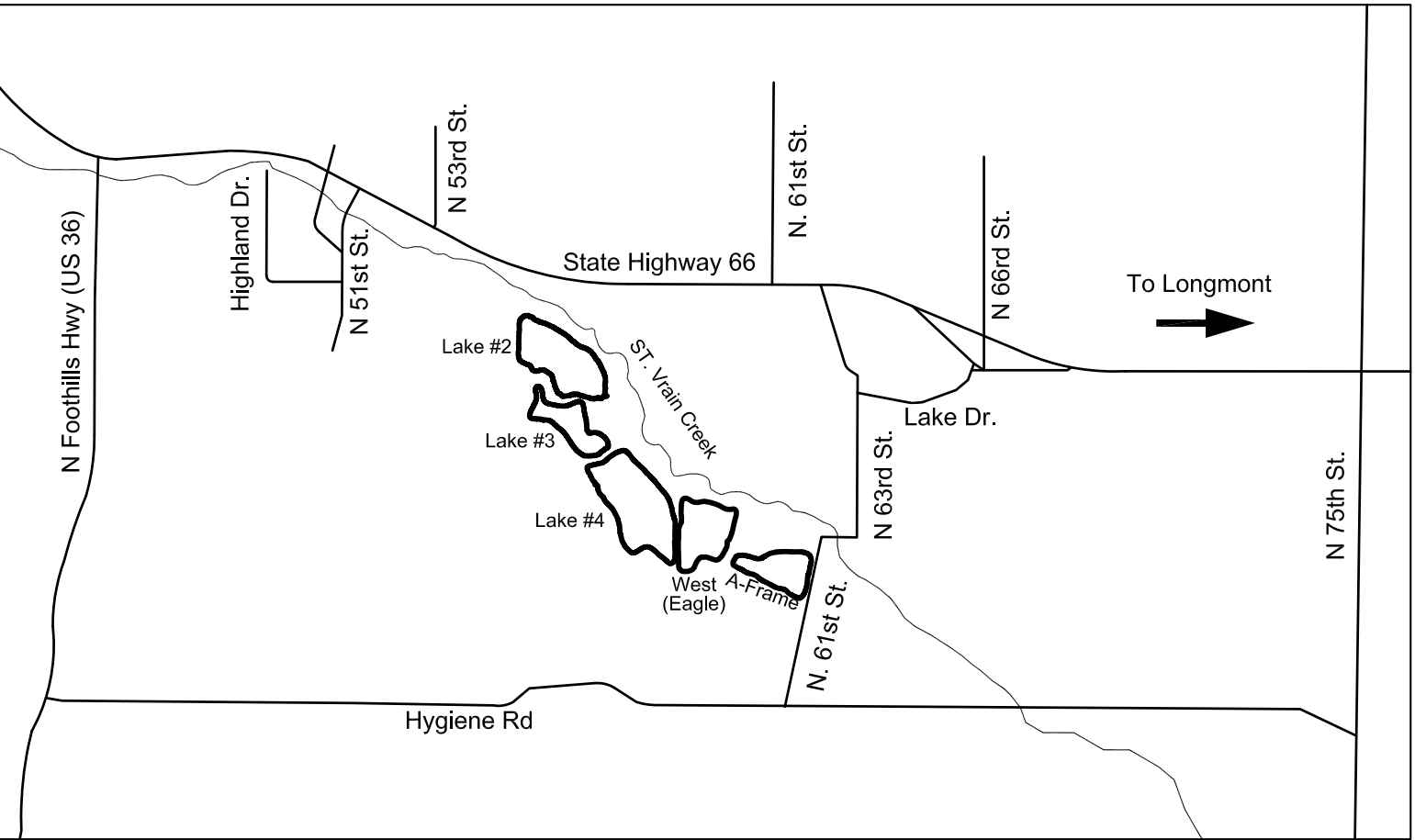
I, ERIC LANE, DIRECTOR OF BOULDER COUNTY PARKS AND OPEN
SPACE, OWNER, ON BEHALF OF THE OWNERS, HEREBY ACCEPT
THESE PLANS FOR ST VRAIN CREEK REACH 3.

DIRECTOR

VICINITY MAP



SCALE IN MILES
0 1/2



EA\\10666 - St. Vrain Breaches\\Cover Sheet.dwg SAVED:12/20/16 PRINTED:12/21/16

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 CLIENT.
4. PRIOR TO COMMENCING CONSTRUCTION ACTIVITIES, CONTRACTOR SHALL OBTAIN NECESSARY PERMIT(S) FOR STORM WATER DISCHARGE ASSOCIATED WITH CONSTRUCTION ACTIVITY (COR-030000) FROM THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT.
5. THE CONTRACTOR SHOULD USE APRIL 1 THROUGH JULY 31 AS A REASONABLE NESTING SEASON TO AVOID TREE CUTTING/ CLEARING WORK. POS BIOLOGISTS WILL CLEAR THE SITE FOR OWLS AND RAPTORS NEXT SPRING IF THE REMOVALS HAVE NOT BEEN ACCOMPLISHED BY THEN.
6. POS WILL WORK WITH THE TENANT TO IDENTIFY LOCAL STORAGE FOR SALVAGED ROOTWADS AND TREE BOLES. TARGET TREES WILL BE THOSE WITH A MINIMUM DIAMETER OF 16", 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.
7. CONSTRUCTION OBSERVATION IS TO BE PERFORMED BY AN (ECOLOGIST) ON BEHALF OF BOULDER COUNTY (BOCO OR CLIENT). HEREAFTER, THE GENERAL CONTRACTOR WILL BE REFERRED TO AS THE CONTRACTOR, THE LANDSCAPE SUBCONTRACTOR AS (SUBCONTRACTOR). THE PROJECT ENGINEER WILL BE REFERRED TO AS THE (ENGINEER).
8. 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.
9. RESTORATION AREAS ARE TO BE SEEDED AND PLANTED WITH THE SPECIES PROVIDED ON THE PLANT & SEED SCHEDULES. THE ECOLOGIST WILL LAY OUT AND FIELD FIT PLANT MATERIAL PRIOR TO INSTALLATION.
10. SEEDING SHALL OCCUR AS SOON AS PRACTICABLE UPON COMPLETION OF EARTHWORK OPERATIONS WITHIN THE TIME FRAMES INDICATED IN THE SEEDING NOTES. PLANTING OPERATIONS ARE TO BE PERFORMED IN THE SPRING AS SOON AS SOIL CONDITIONS ARE CONDUCTIVE FOR PROPER PLANTING (I.E., NOT FROZEN OR INUNDATED).
11. TO ENSURE AVAILABILITY, SEED AND PLANT MATERIALS MAY BE ACQUIRED FOR THE PROJECT BY THE CLIENT (REFER TO SEED & PLANT SCHEDULES). THE CONTRACTOR SHALL HAVE THE RIGHT TO INSPECT THE PLANT MATERIAL 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 CLIENT. THE ECOLOGIST SHALL HAVE THE RIGHT TO INSPECT THE PLANT MATERIAL 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 SUBCONTRACTOR'S RESPONSIBILITY TO ENSURE THAT THE NURSERY OR STORAGE FACILITY MAINTAINS THE PLANTS IN GOOD HEALTH UNTIL TIME OF DELIVERY; AND 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 SUBCONTRACTOR AT THE END OF THE PROJECT. AS-BULT 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/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 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:

• GENERAL LAND DEVELOPMENT PERMIT (STATE)

• STORMWATER DISCHARGE PERMIT (STATE)

• CONSTRUCTION DEWATERING PERMIT (STATE)

• GRADING PERMIT (CITY AND/ORCOUNTY)
15. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND 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 CLIENT 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 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. 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.
20. EROSION CONTROL MEASURES SHALL REMAIN IN FULL FORCE DURING CONSTRUCTION ACTIVITIES AND AS REQUIRED BY THE GOVERNING JURISDICTION(S).
21. PLANS, PERMITS AND CLARIFICATIONS - THE CONTRACTOR SHALL ENSURE ONE COPY OF THE FOLLOWING PLANS ARE ON SITE AT ALL TIMES:

A. CONSTRUCTION PLANS

B. STORMWATER MANAGEMENT PLAN (SWMP)/GRADING, EROSION & SEDIMENT CONTROL (GESCC) PLAN

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

D. ALL OTHER PERMITS REQUIRED FOR THE PROJECT
21. 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. THE CONTRACTOR SHALL CONTACT THE ECOLOGIST IN WRITING FOR CLARIFICATION OR DISCREPANCIES ON ANY INFORMATION SHOWN IN THE PLANS.
22. REFERENCE STANDARDS - EXCEPT WHERE OTHERWISE PROVIDED FOR IN THESE PLANS AND NOTES, BOULDER COUNTY STANDARDS SHALL APPLY.
23. ANY ESTIMATE OR QUANTITIES PROVIDE IN THE PLANS OR BID SCHEDULES SHALL BE VERIFIED BY THE CONTRACTOR/SUBCONTRACTOR, 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 CLIENT AND ECOLOGIST 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 DENIAL.
24. 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.

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).

DRAWING LEGEND

EXISTING GROUND SURFACE CONTOURS

PROPOSED GROUND SURFACE CONTOURS

111+00

ST. VRAIN CREEK WITH STATIONING

RAILROAD

PARCEL BOUNDARY

120321000046

PARCEL NUMBER

APPROXIMATE INUNDATION AREA - 2 YEAR EVENT
PEAK FLOW = 850 CFS

WETLAND DELINEATION BOUNDARY

+ TP E6 UPL

WETLAND DELINEATION TEST PIT LOCATION

EA-B5

APPROXIMATE GEOTECHNICAL BORING LOCATION

STRUCTURE

CROSS-SECTION CALL OUT

2
4

DETAIL CALL OUT

REVISIONS

Revision	Date	Description

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Fort Collins, CO 98525
(970) 488-3111



ST. VRAIN CREEK REACH 3

GENERAL NOTES

SCALE VERIFICATION:
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Checked by: LCB

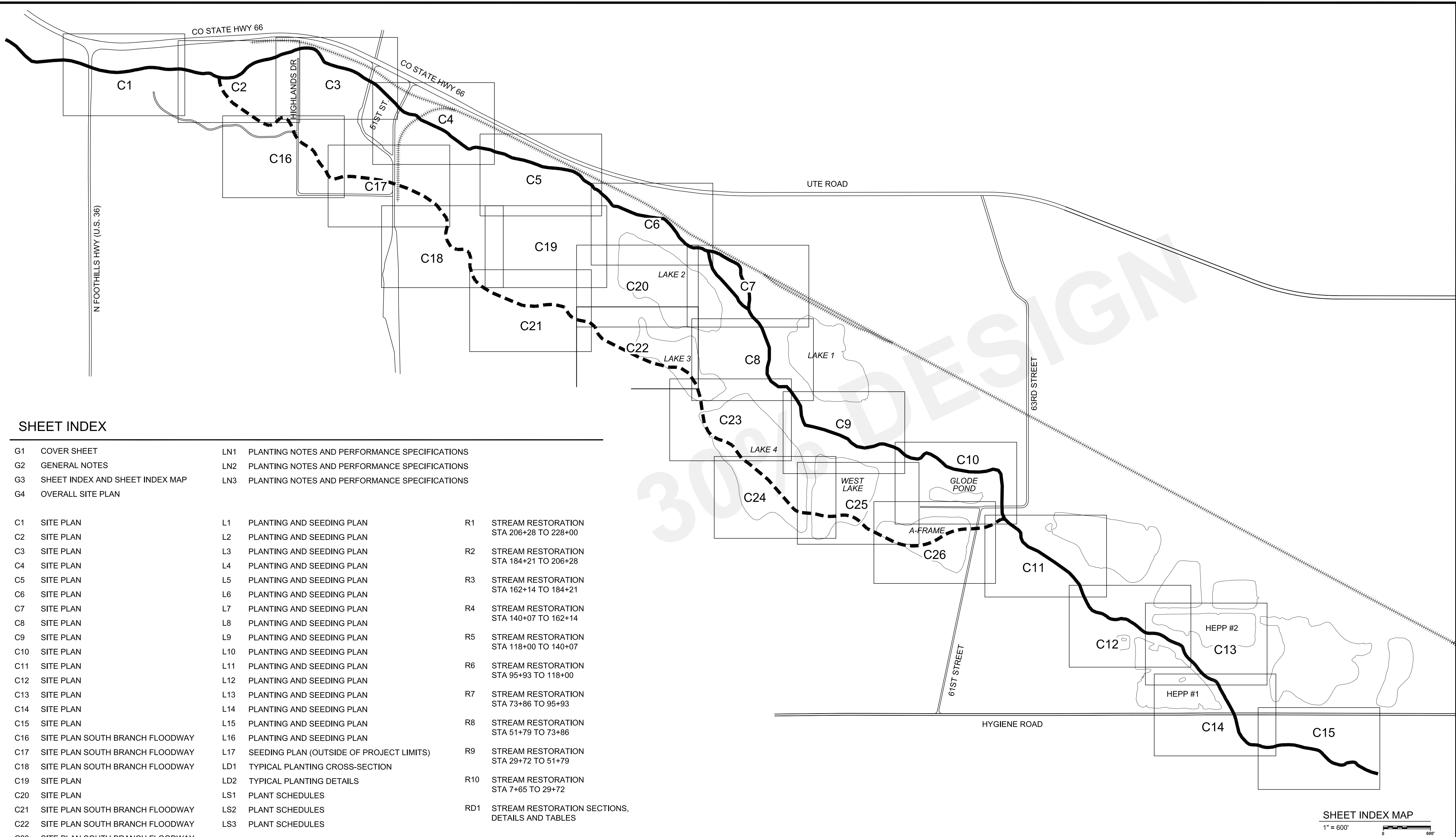
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Date: December 21, 2016

SHEET
G2

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SHEET INDEX

G1	COVER SHEET	LN1	PLANTING NOTES AND PERFORMANCE SPECIFICATIONS	R1	STREAM RESTORATION STA 206+28 TO 228+00
G2	GENERAL NOTES	LN2	PLANTING NOTES AND PERFORMANCE SPECIFICATIONS	R2	STREAM RESTORATION STA 184+21 TO 206+28
G3	SHEET INDEX AND SHEET INDEX MAP	LN3	PLANTING NOTES AND PERFORMANCE SPECIFICATIONS	R3	STREAM RESTORATION STA 162+14 TO 184+21
G4	OVERALL SITE PLAN			R4	STREAM RESTORATION STA 140+07 TO 162+14
C1	SITE PLAN	L1	PLANTING AND SEEDING PLAN	R5	STREAM RESTORATION STA 118+00 TO 140+07
C2	SITE PLAN	L2	PLANTING AND SEEDING PLAN	R6	STREAM RESTORATION STA 95+93 TO 118+00
C3	SITE PLAN	L3	PLANTING AND SEEDING PLAN	R7	STREAM RESTORATION STA 73+86 TO 95+93
C4	SITE PLAN	L4	PLANTING AND SEEDING PLAN	R8	STREAM RESTORATION STA 51+79 TO 73+86
C5	SITE PLAN	L5	PLANTING AND SEEDING PLAN	R9	STREAM RESTORATION STA 29+72 TO 51+79
C6	SITE PLAN	L6	PLANTING AND SEEDING PLAN	R10	STREAM RESTORATION STA 7+65 TO 29+72
C7	SITE PLAN	L7	PLANTING AND SEEDING PLAN	RD1	STREAM RESTORATION SECTIONS, DETAILS AND TABLES
C8	SITE PLAN	L8	PLANTING AND SEEDING PLAN		
C9	SITE PLAN	L9	PLANTING AND SEEDING PLAN		
C10	SITE PLAN	L10	PLANTING AND SEEDING PLAN		
C11	SITE PLAN	L11	PLANTING AND SEEDING PLAN		
C12	SITE PLAN	L12	PLANTING AND SEEDING PLAN		
C13	SITE PLAN	L13	PLANTING AND SEEDING PLAN		
C14	SITE PLAN	L14	PLANTING AND SEEDING PLAN		
C15	SITE PLAN	L15	PLANTING AND SEEDING PLAN		
C16	SITE PLAN SOUTH BRANCH FLOODWAY	L16	PLANTING AND SEEDING PLAN		
C17	SITE PLAN SOUTH BRANCH FLOODWAY	L17	SEEDING PLAN (OUTSIDE OF PROJECT LIMITS)		
C18	SITE PLAN SOUTH BRANCH FLOODWAY	LD1	TYPICAL PLANTING CROSS-SECTION		
C19	SITE PLAN	LD2	TYPICAL PLANTING DETAILS		
C20	SITE PLAN	LS1	PLANT SCHEDULES		
C21	SITE PLAN SOUTH BRANCH FLOODWAY	LS2	PLANT SCHEDULES		
C22	SITE PLAN SOUTH BRANCH FLOODWAY	LS3	PLANT SCHEDULES		
C23	SITE PLAN SOUTH BRANCH FLOODWAY				
C24	SITE PLAN SOUTH BRANCH FLOODWAY				
C25	SITE PLAN SOUTH BRANCH FLOODWAY				
C26	SITE PLAN SOUTH BRANCH FLOODWAY				
C27	BREACH AREA 1 GRADING PLAN				
C28	BREACH AREA 2 GRADING PLAN				
C29	BREACH AREA 5-9 GRADING PLAN				
C30	BREACH AREA 7b GRADING PLAN				
C31	CROSS SECTIONS				
C32	BIFURCATION STRUCTURE				

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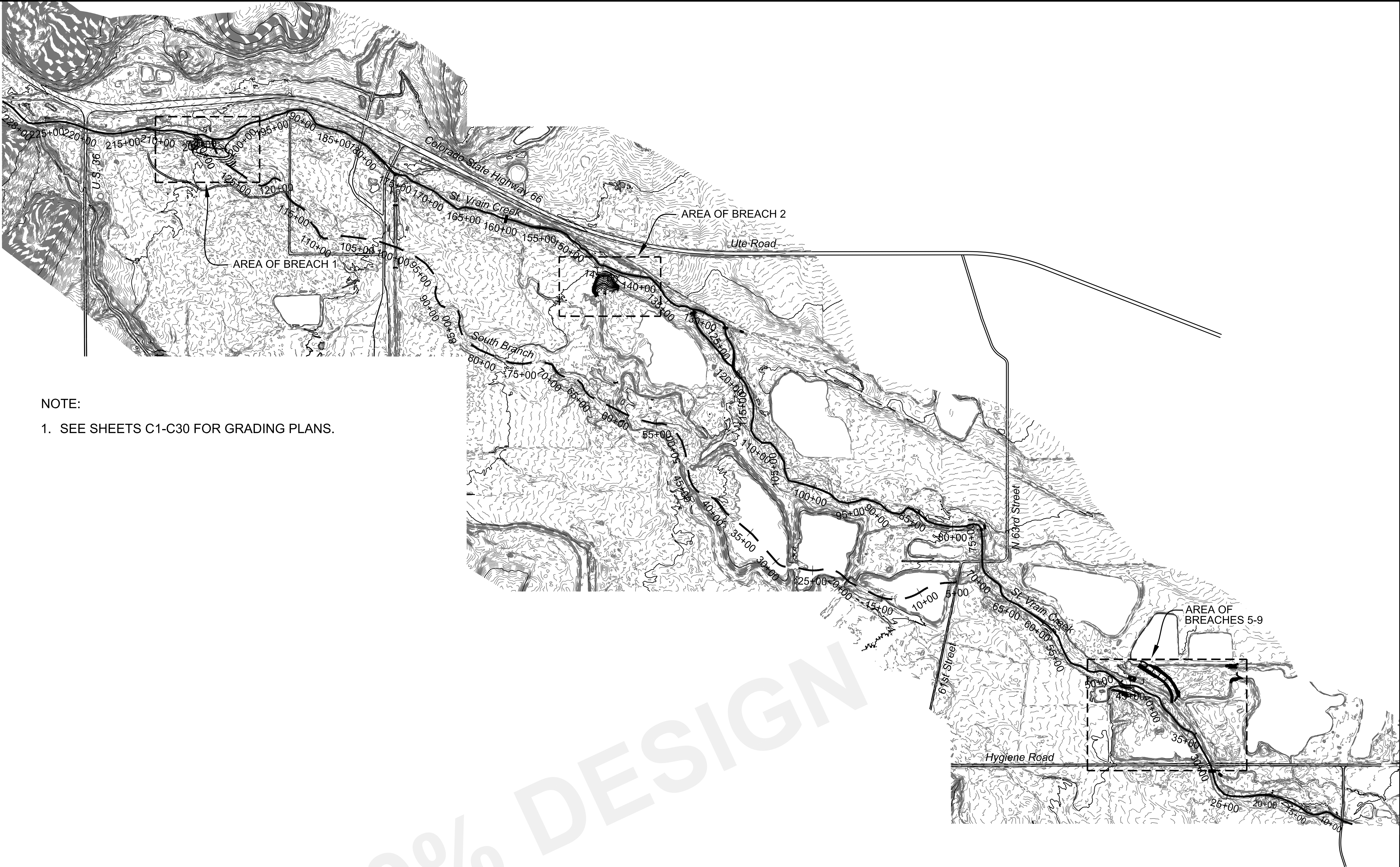
ST. VRAIN CREEK REACH 3

SHEET INDEX AND SHEET INDEX MAP

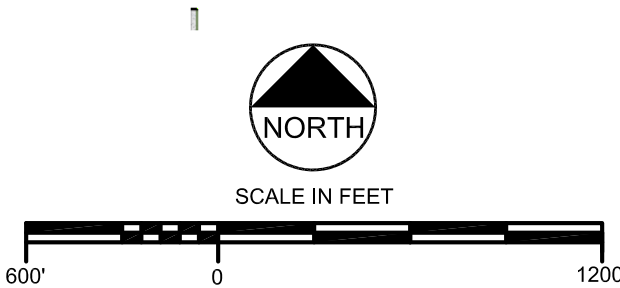
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SHEET G3


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NOTE:
1. SEE SHEETS C1-C30 FOR GRADING PLANS.



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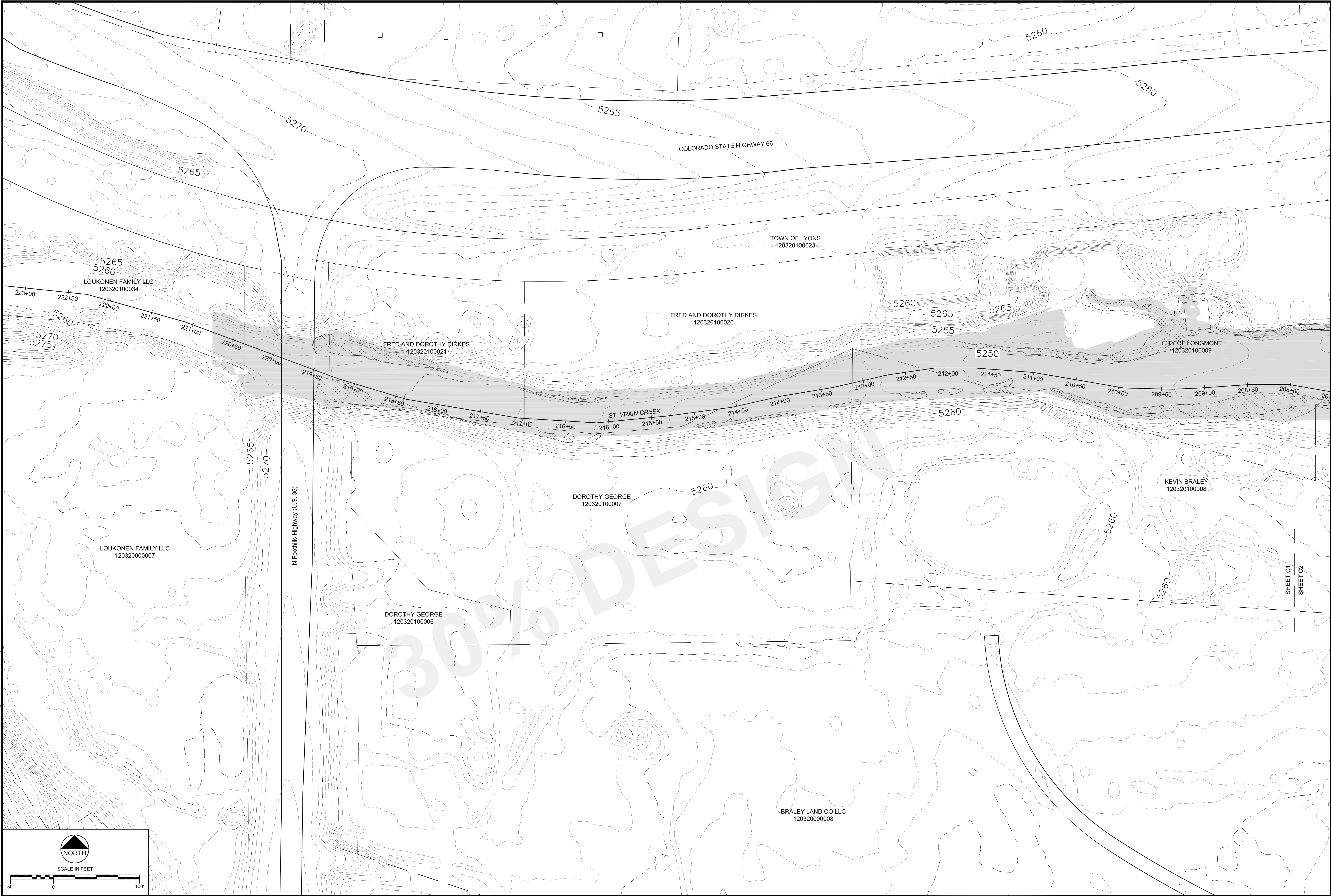
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**ST. VRAIN CREEK
REACH 3**

**OVERALL
SITE PLAN**

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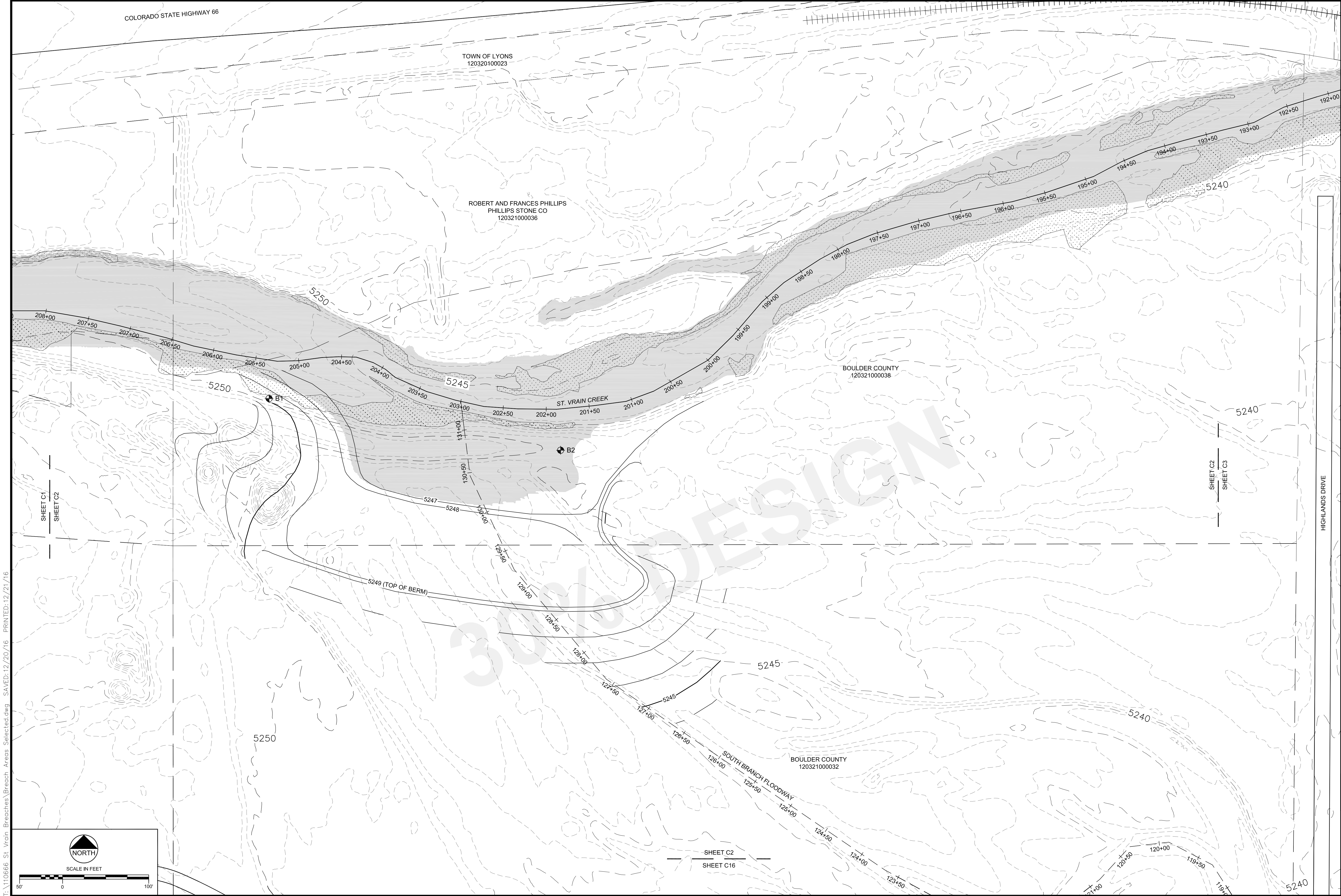
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Engineering Analytics, Inc. 1900 Speer East Plaza, Suite 209 Fort Collins, CO 80525 (970) 488-3111	ST. VRAIN CREEK REACH 3
	GRADING SITE PLAN

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SHEET	C1



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ST. VRAIN CREEK REACH 3

GRADING SITE PLAN

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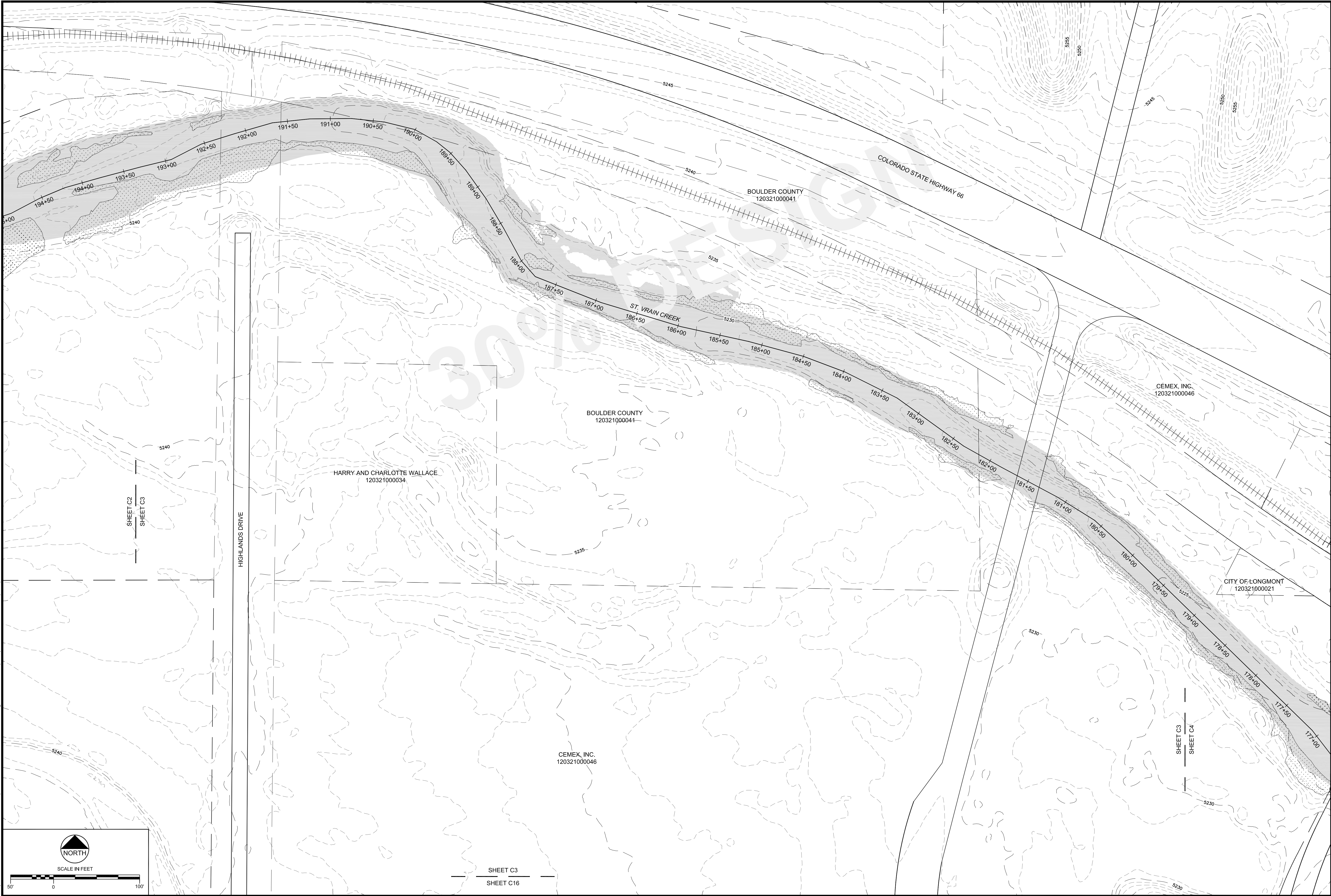
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SHEET C2

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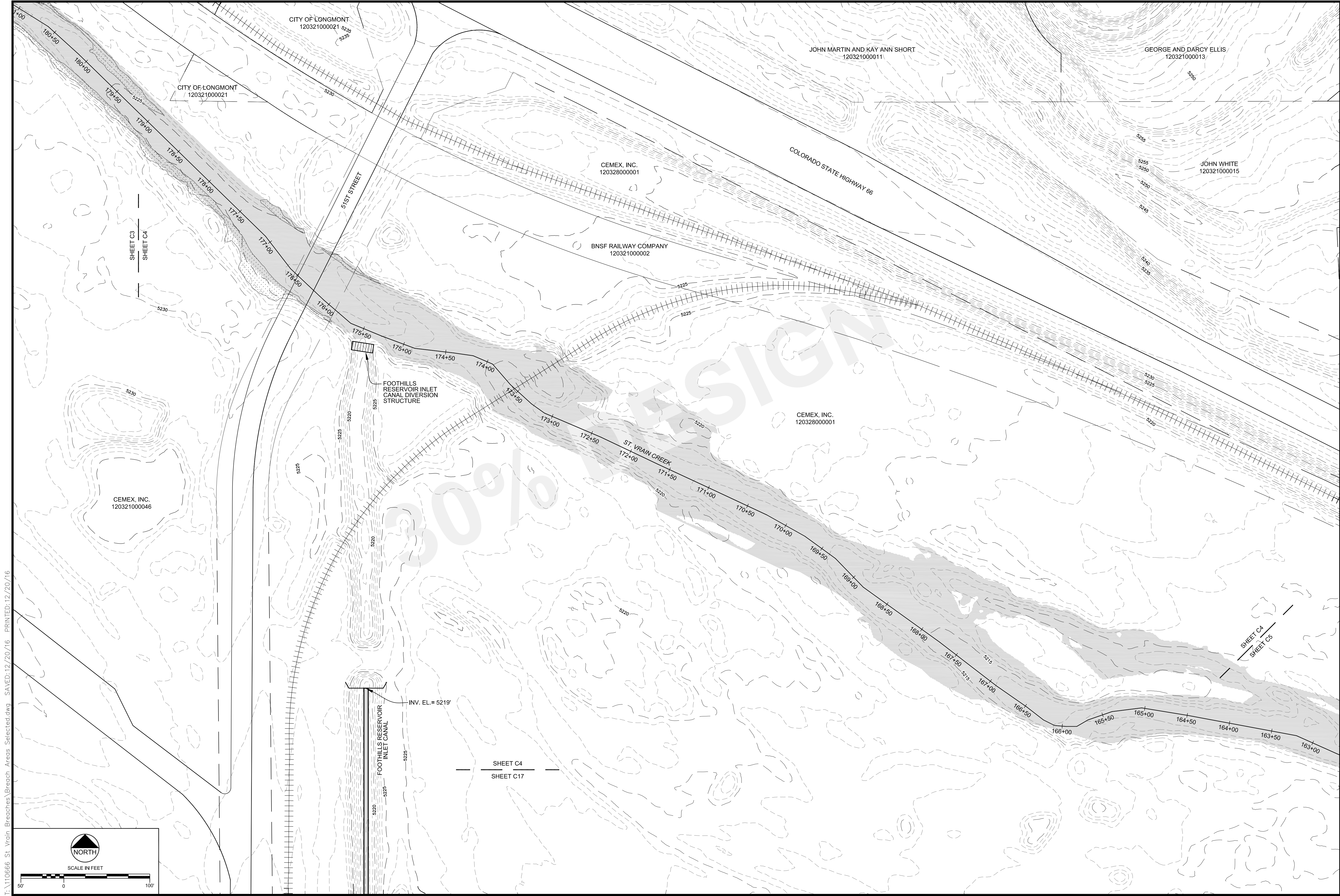


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ST. VRAIN CREEK REACH 3
GRADING SITE PLAN

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SHEET C3	



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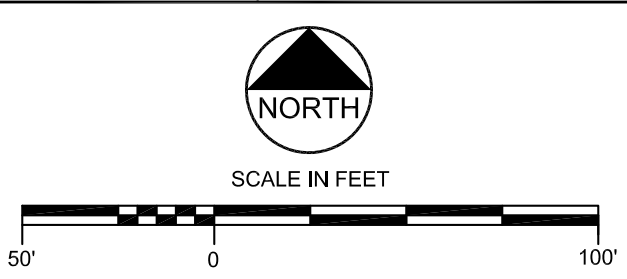
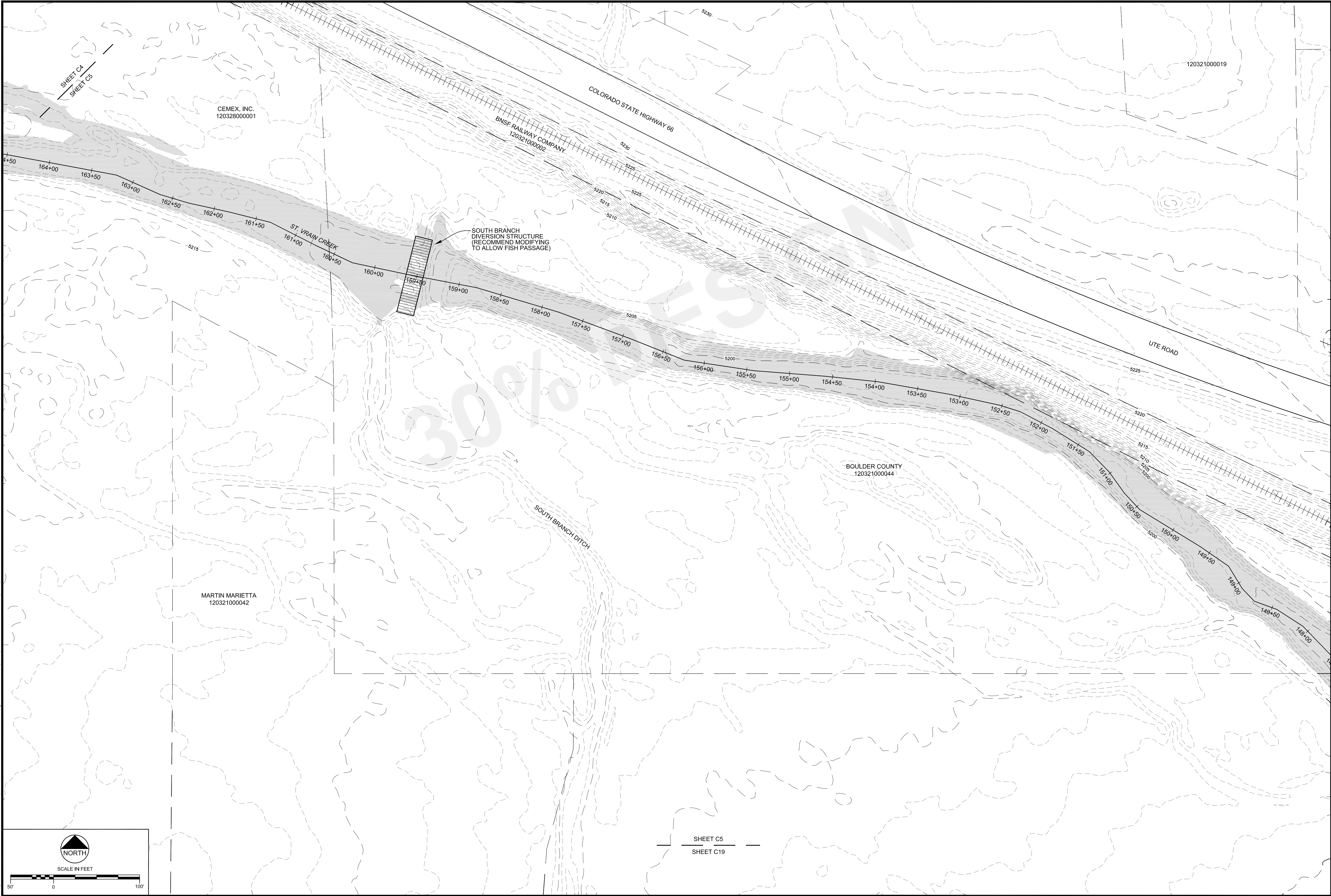
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GRADING SITE PLAN

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SHEET C4	

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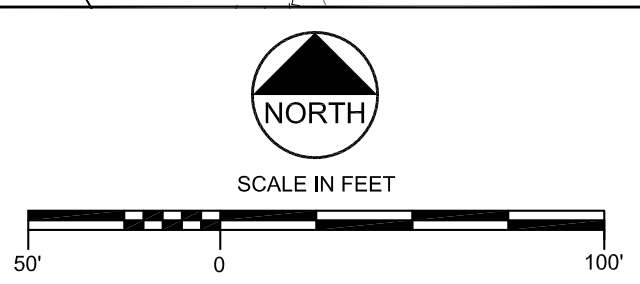
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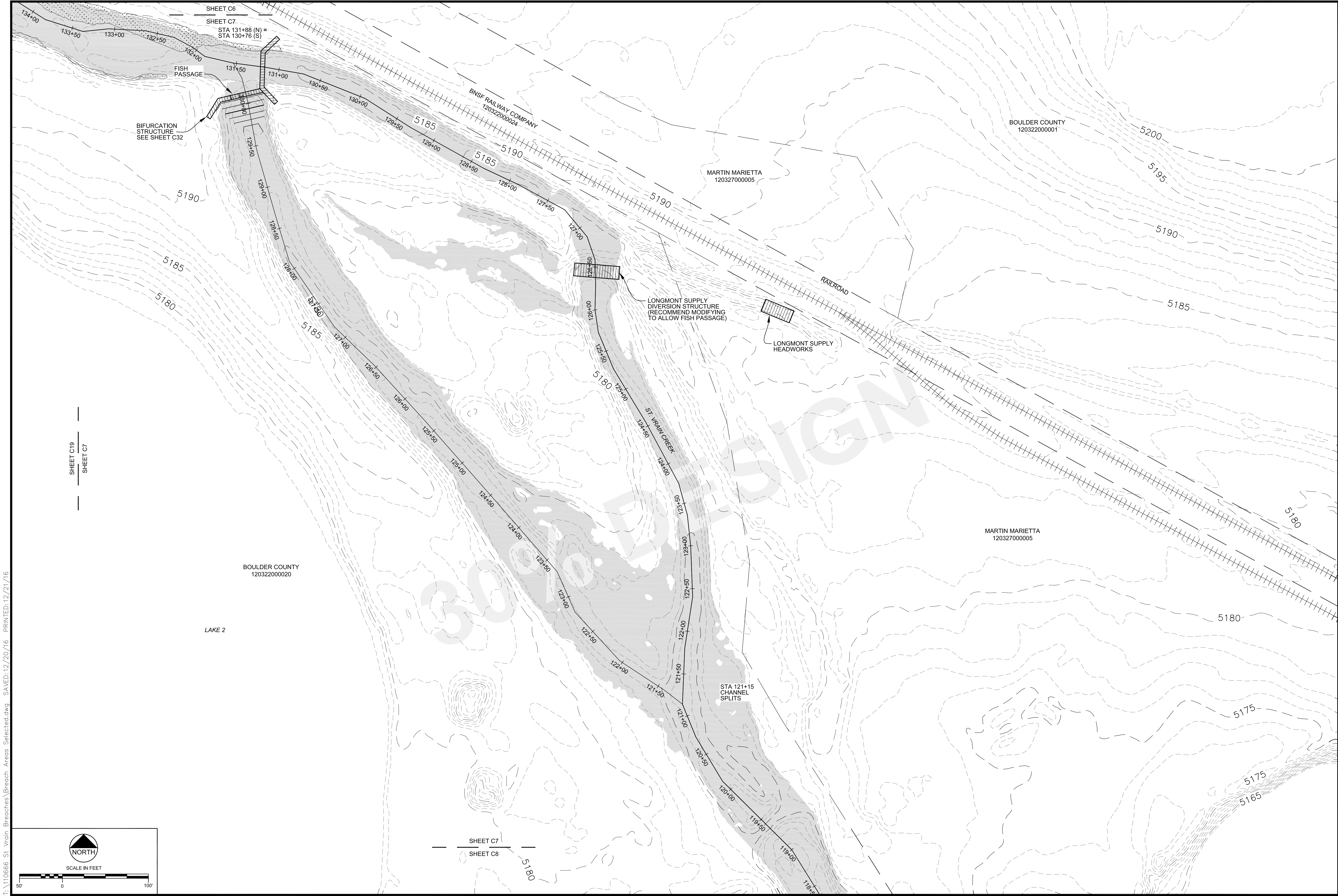
SHEET C5
SHEET C19

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ST. VRAIN CREEK REACH 3		
GRADING SITE PLAN		
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Date: December 21, 2016		
SHEET C5		

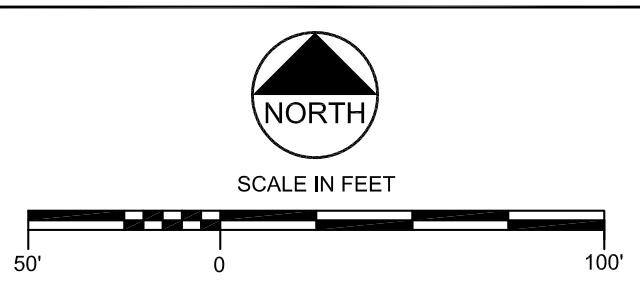
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Engineering Analytics, Inc.		
1900 Speer Post Road, Suite 209		
Fort Collins, CO 80525		
(970) 488-3111		
ST. VRAIN CREEK REACH 3		
GRADING SITE PLAN		
SCALE VERIFICATION: 0" = 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.		
Drawn by: RDP		
Designed by: LCB		
Checked by: LCB		
Scale: As Shown		
Project No. 110666		
Date: December 21, 2016		
SHEET C6		

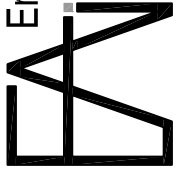


SHEET C19
SHEET C7



SHEET C7
SHEET C8

REVISIONS		
Revision	Date	Description

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Fort Collins, CO 98525
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ST. VRAIN CREEK REACH 3
GRADING SITE PLAN

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:	December 21, 2016
SHEET C7	

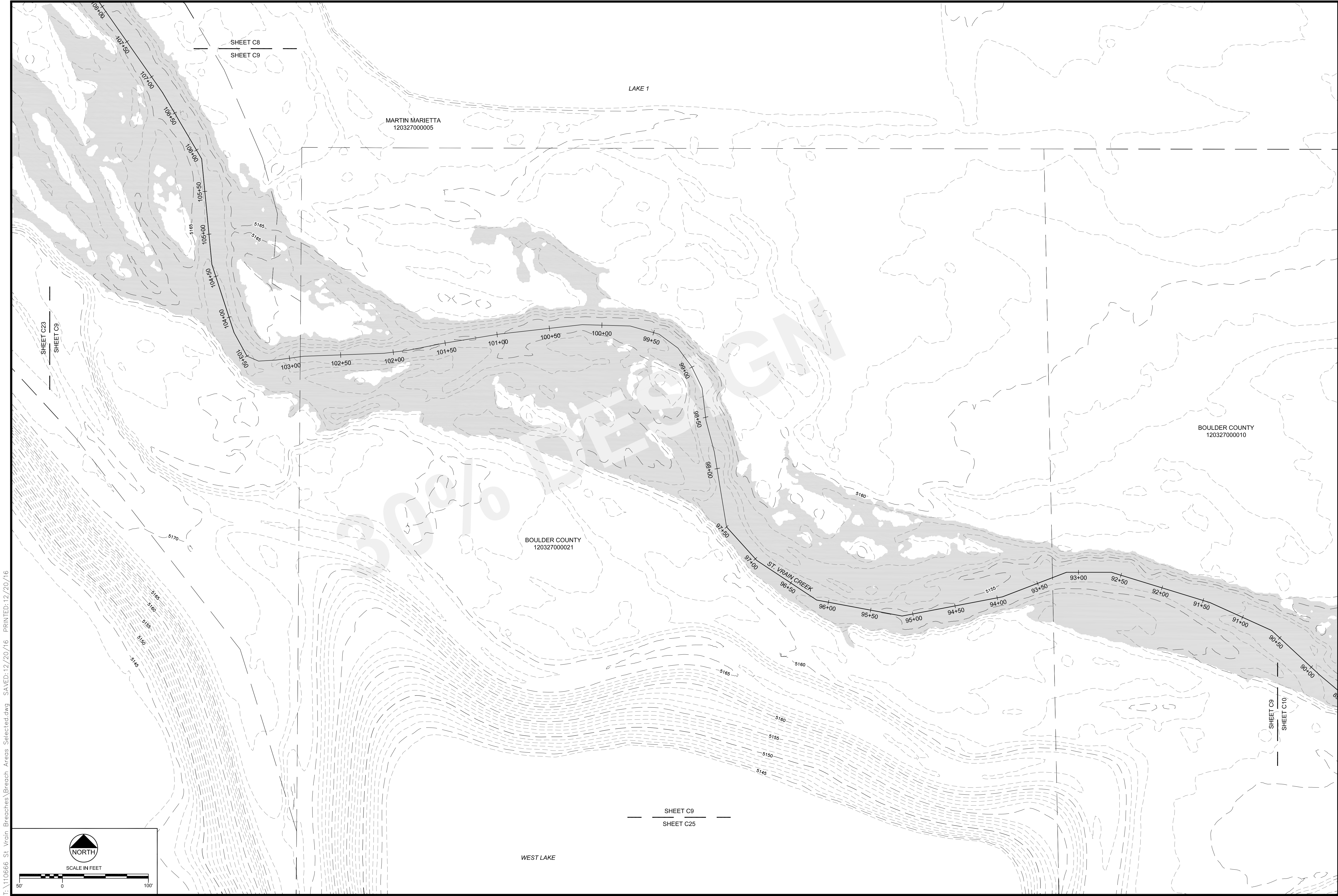
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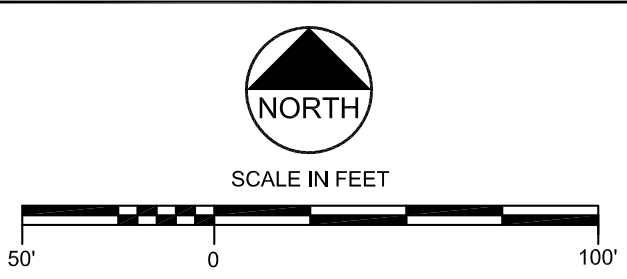
REVISIONS		
Revision	Date	Description

 Engineering Analytics, Inc. 1800 Speer East Blvd., Suite 209 Fort Collins, CO 80525 (970) 488-3111	ST. VRAIN CREEK REACH 3
	GRADING SITE PLAN

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:	December 21, 2016
SHEET C8	




T:\110666 St Vrain Breaches\Breaches Selected.dwg SAVED:12/20/16 PRINTED:12/20/16



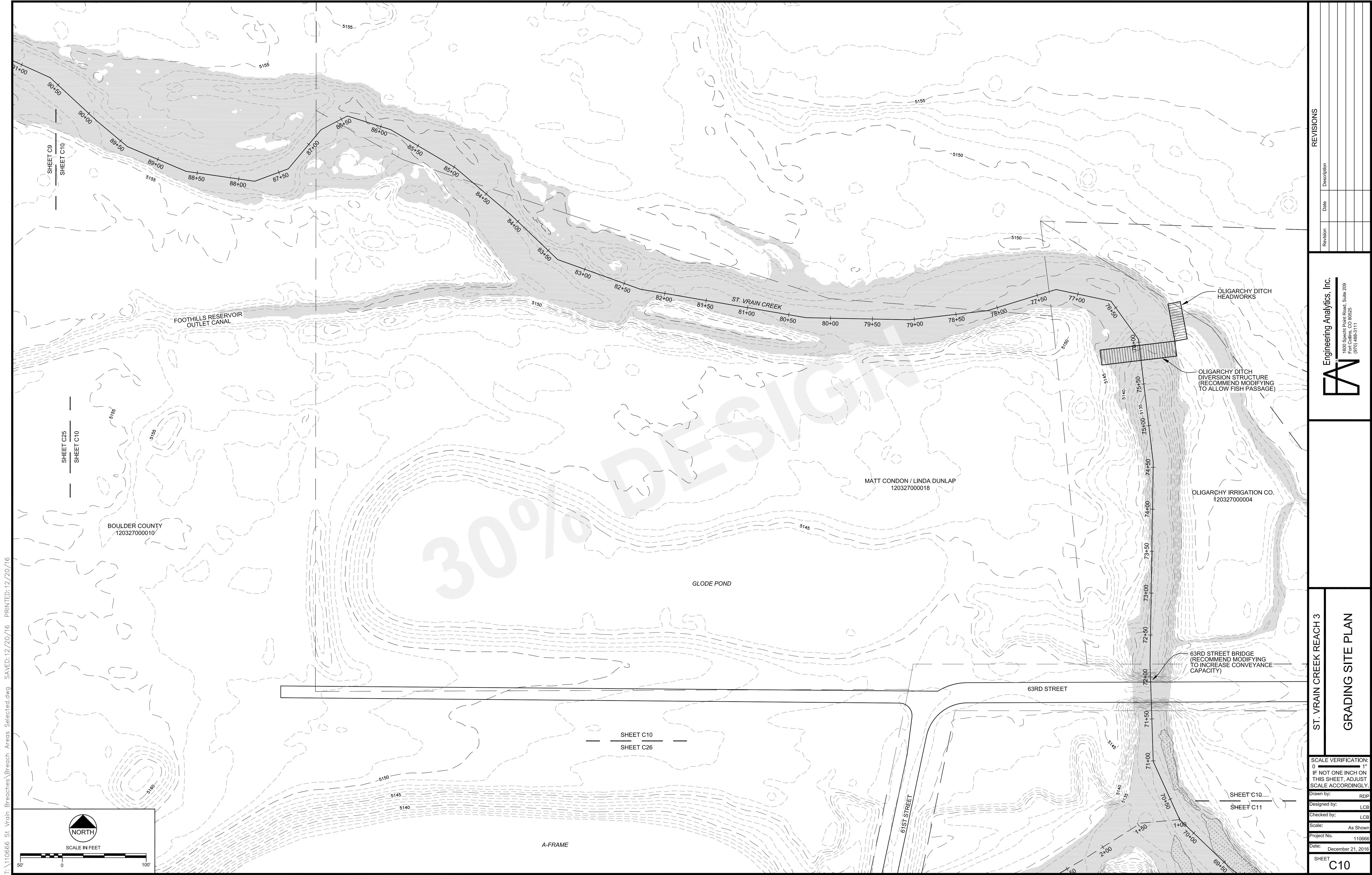
— SHEET C9 —
— SHEET C25 —

REVISIONS		
Revision	Date	Description

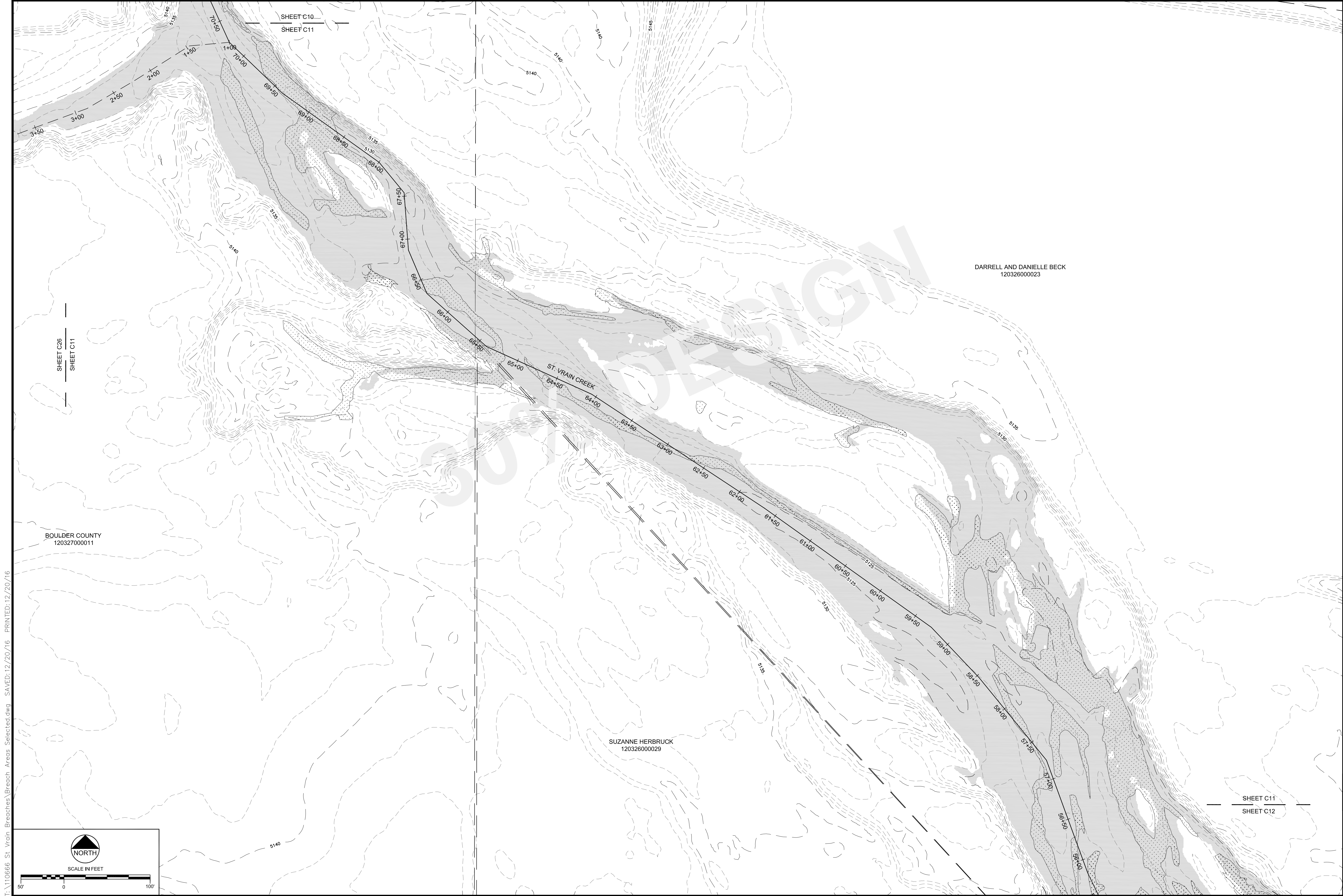
**Engineering Analytics, Inc.**
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Fort Collins, CO 80525
(970) 488-3111

ST. VRAIN CREEK REACH 3
GRADING SITE 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:	December 21, 2016
SHEET C9	



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Engineering Analytics, Inc.			
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ST. VRAIN CREEK REACH 3			
GRADING SITE 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: December 21, 2016			
SHEET C10			

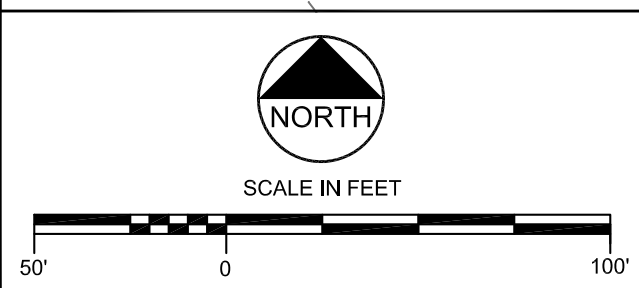


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BOULDER COUNTY
120327000011

SUZANNE HERBRUCK
120326000029

DARRELL AND DANIELLE BECK
120326000023



SHEET C26
SHEET C11

SHEET C10
SHEET C11

SHEET C11
SHEET C12

ST. VRAIN CREEK REACH 3

GRADING SITE 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: December 21, 2016

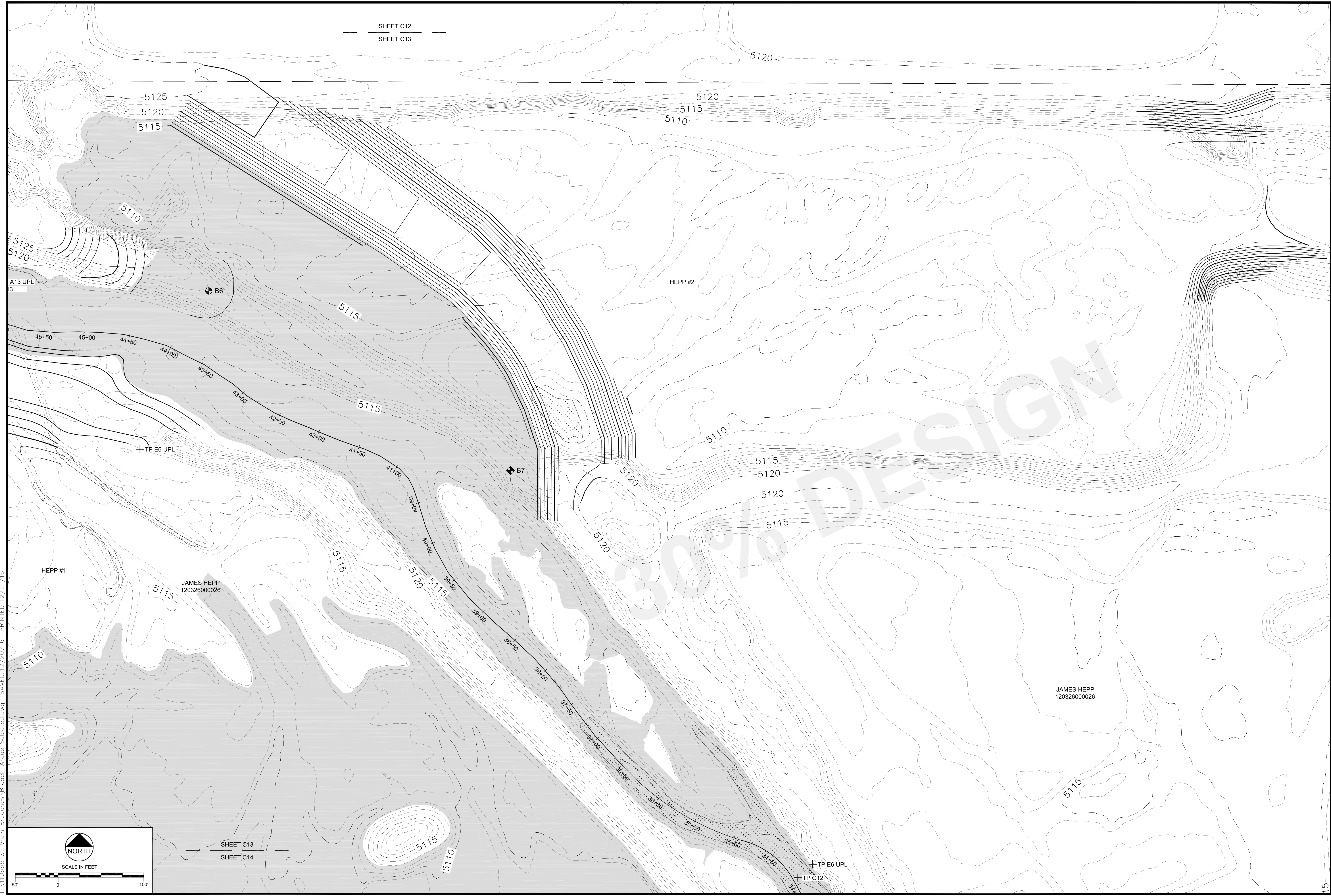
SHEET
C11

REVISIONS

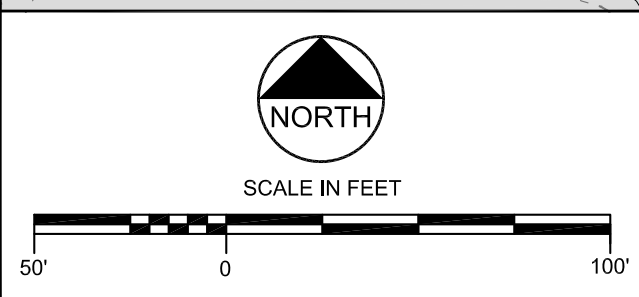
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SHEET C13
SHEET C14

SHEET C12
SHEET C13

ST. VRAIN CREEK REACH 3

GRADING SITE PLAN

REVISIONS

Revision	Date	Description

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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

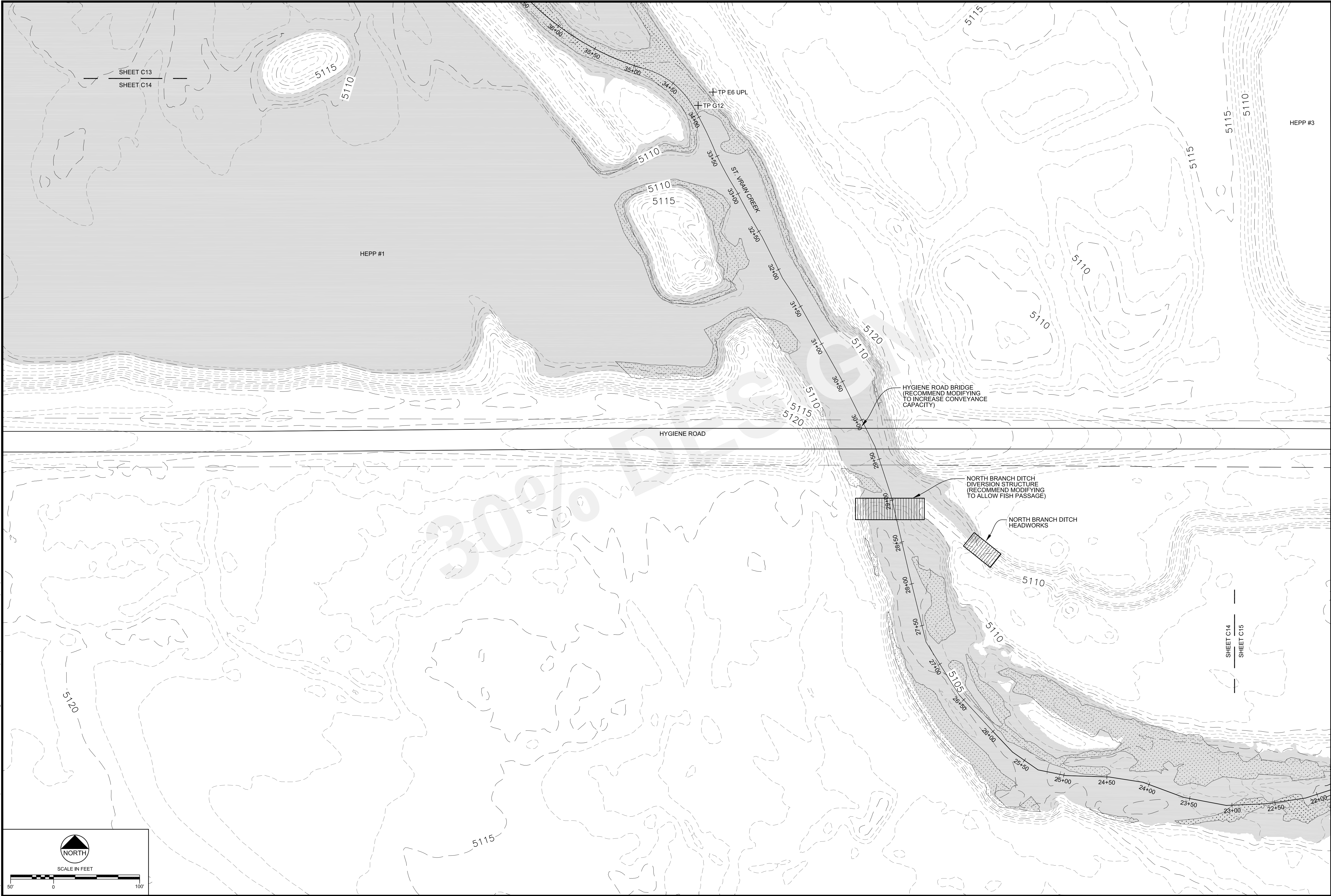
Project No. 110666

Date: December 21, 2016

SHEET

C13

T:\110666 St. Vrain Branches\Branch Areas Selected.dwg, SAV:12/20/16, PRINTED:12/21/16



REVISIONS		
Revision	Date	Description

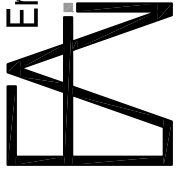
Engineering Analytics, Inc. 1900 Speer Post Road, Suite 209 Fort Collins, CO 80525 (970) 488-3111	ST. VRAIN CREEK REACH 3
	GRADING SITE PLAN

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:	December 21, 2016
SHEET C14	

T:\110666 St. Vrain Breaches\Breach Areas Selected.dwg SAVED: 12/20/16 PRINTED: 12/21/16



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ST. VRAIN CREEK REACH 3

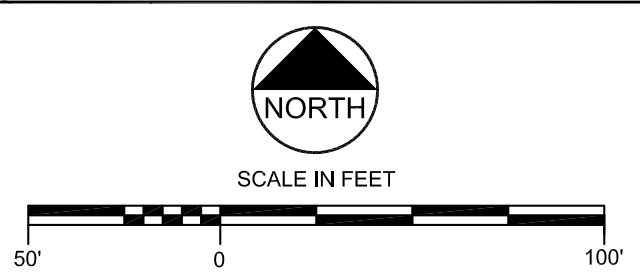
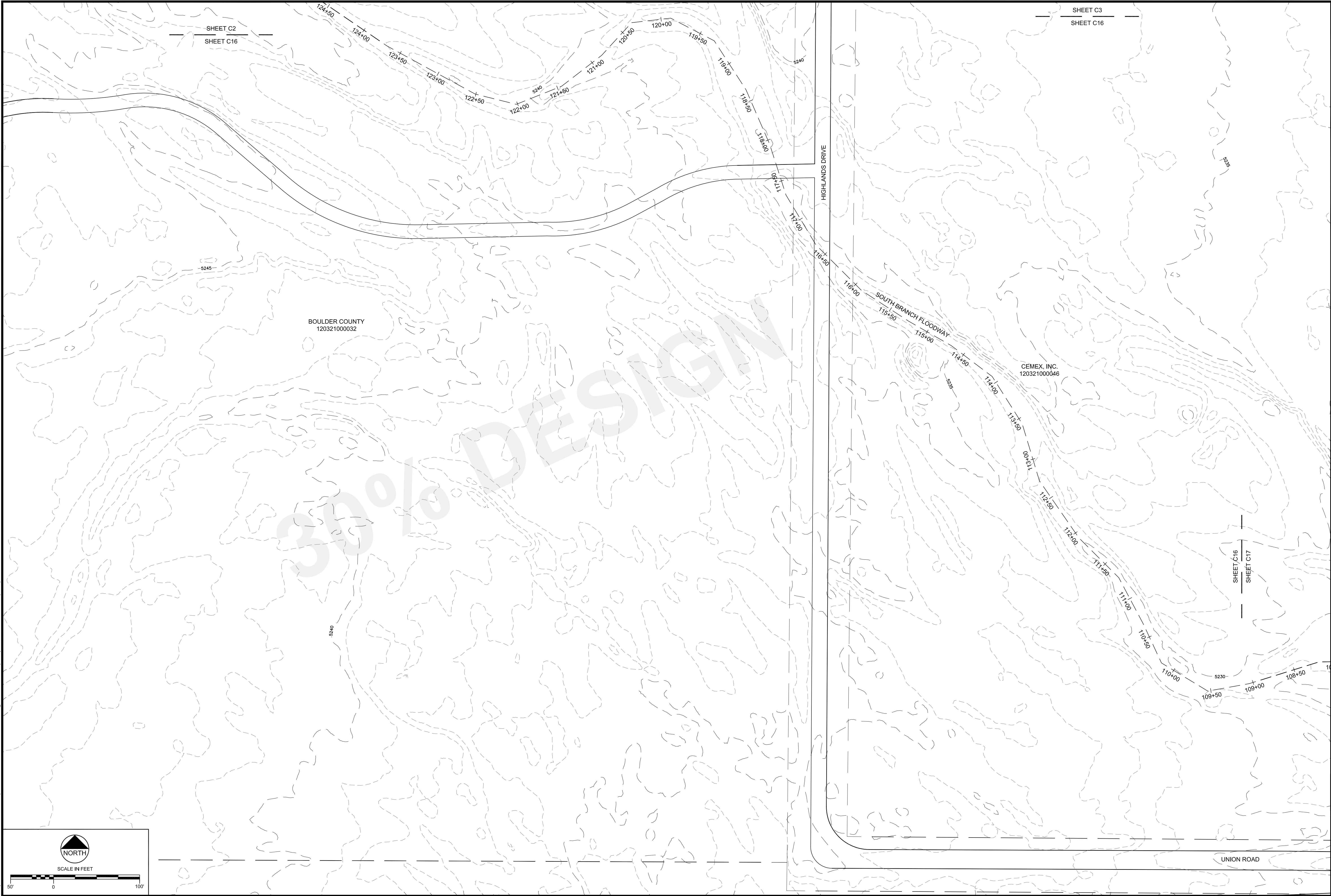
GRADING SITE PLAN

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: December 21, 2016

SHEET
C15

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ST. VRAIN CREEK REACH 3

GRADING SITE PLAN
SOUTH BRANCH FLOODWAY

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: December 21, 2016

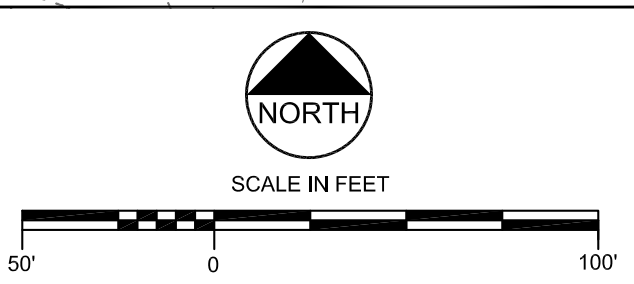
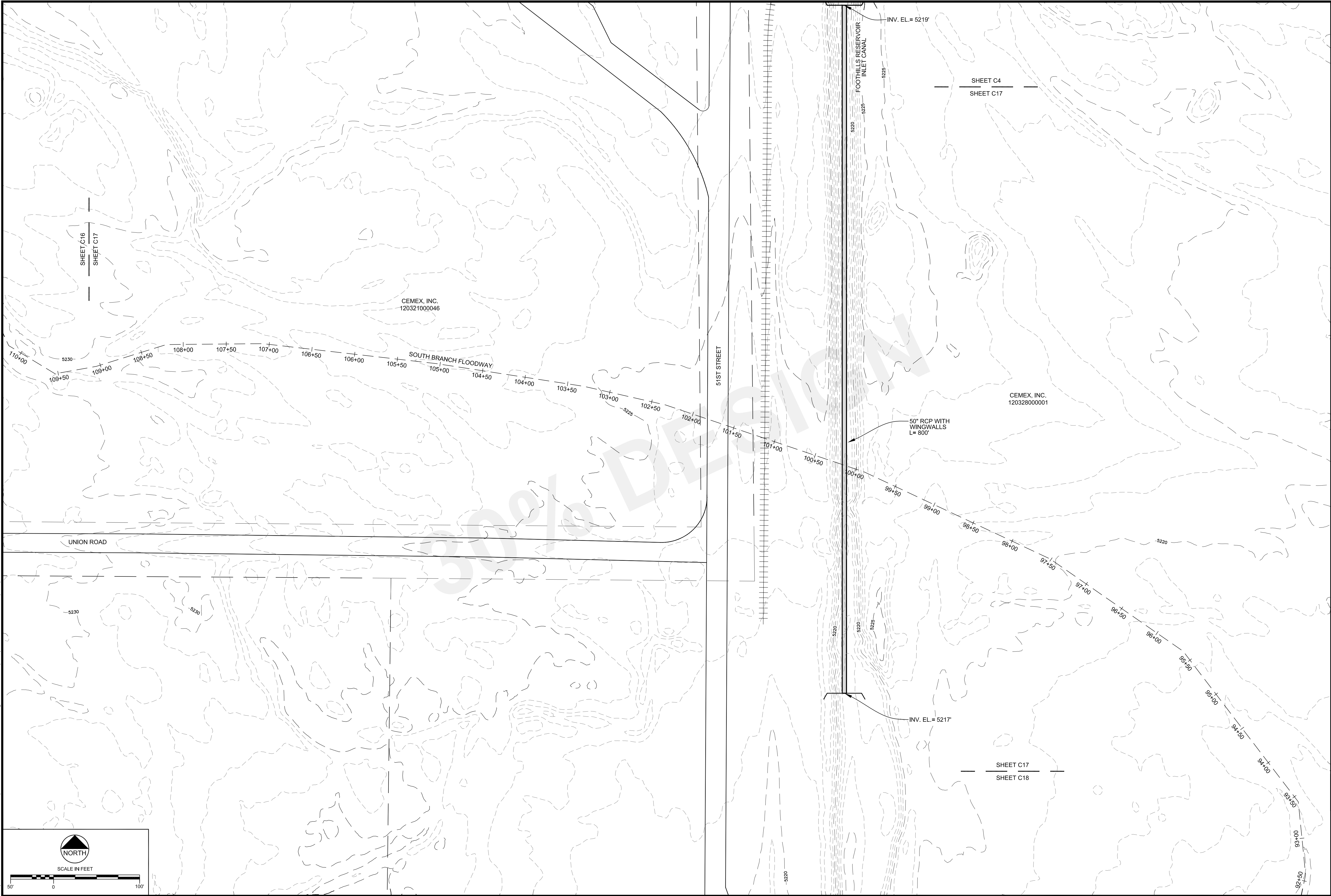
SHEET
C16

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Revision	Date	Description	


Engineering Analytics, Inc. 1900 Speer East Road, Suite 209 Fort Collins, CO 98525 (970) 488-3111	ST. VRAIN CREEK REACH 3
	GRADING SITE PLAN SOUTH BRANCH FLOODWAY

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:	December 21, 2016
SHEET	C17

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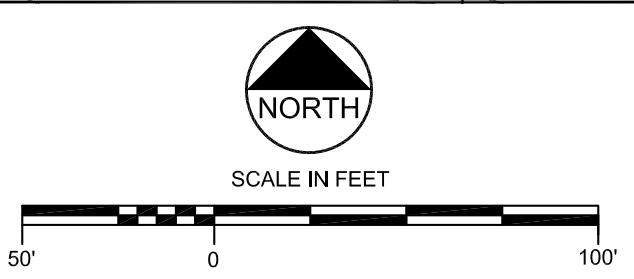


REVISIONS		
Revision	Date	Description


 Engineering Analytics, Inc. 1900 Speer East Road, Suite 209 Fort Collins, CO 98525 (970) 488-3111	ST. VRAIN CREEK REACH 3
	GRADING SITE PLAN SOUTH BRANCH FLOODWAY

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:	December 21, 2016
SHEET	C18

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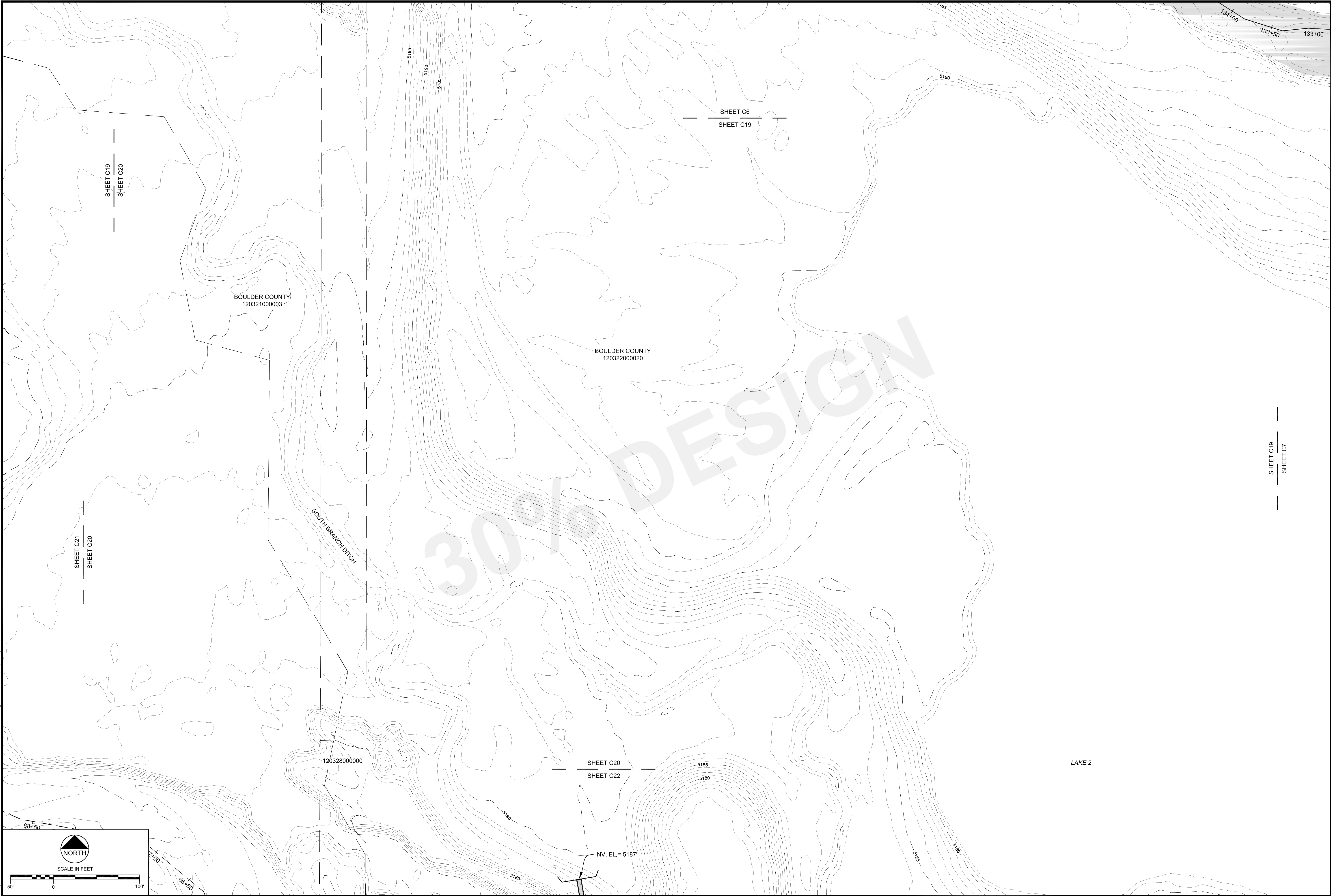


REVISIONS			
Revision	Date	Description	

 Engineering Analytics, Inc. 1900 Speer Post Road, Suite 209 Fort Collins, CO 80525 (970) 488-3111	ST. VRAIN CREEK REACH 3

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:	December 21, 2016
SHEET C19	

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ST. VRAIN CREEK REACH 3

GRADING SITE PLAN

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Revision	Date	Description

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

Drawn by: RDP

Designed by: LCB

Checked by: LCB

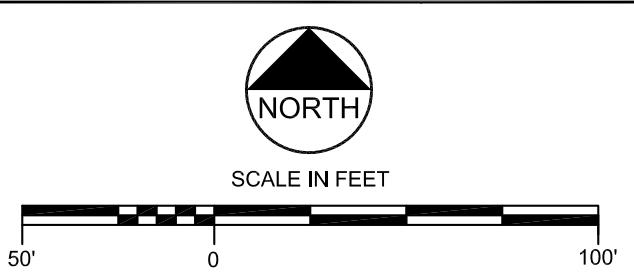
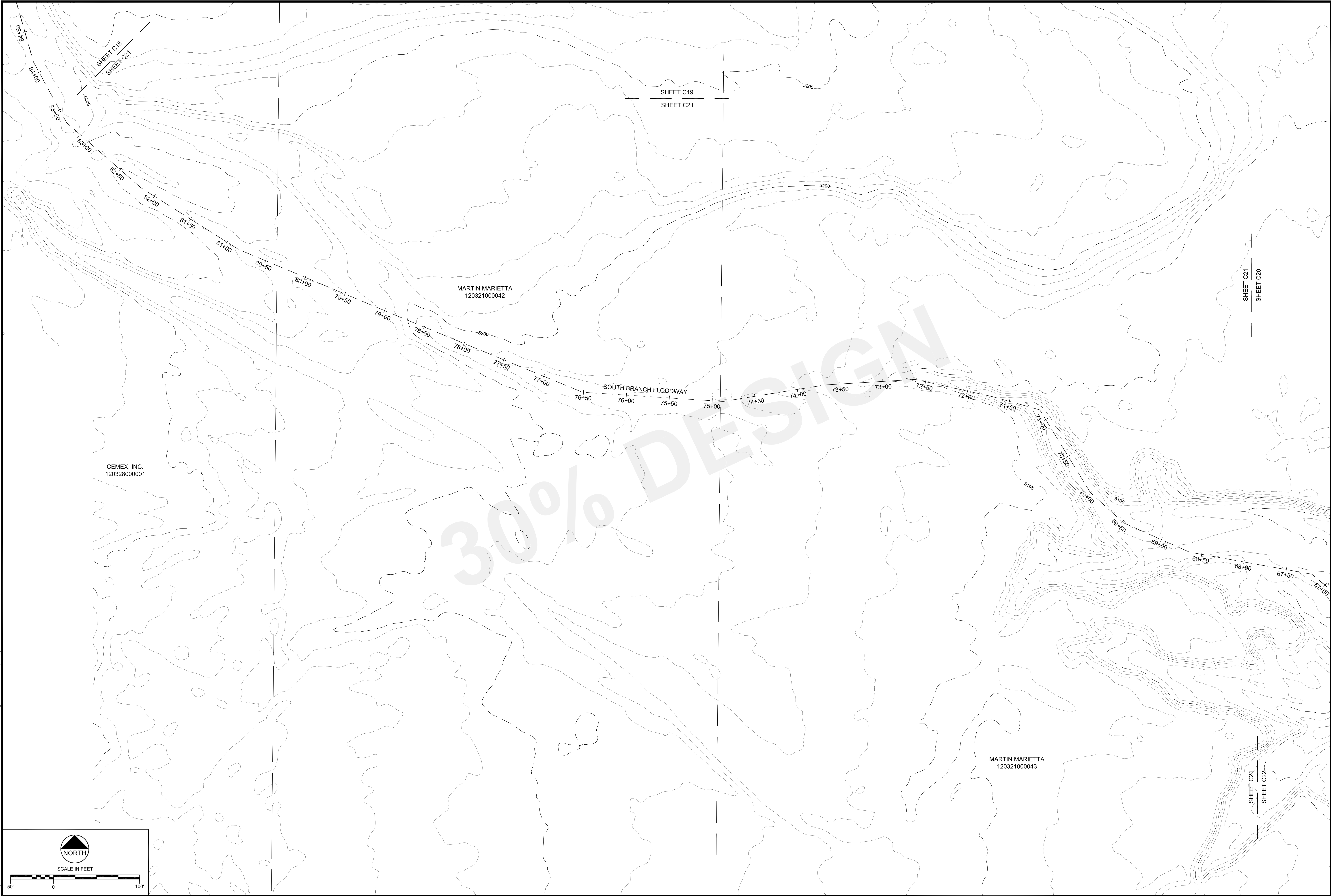
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Project No. 110666

Date: December 21, 2016

SHEET C20

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ST. VRAIN CREEK REACH 3

GRADING SITE PLAN
SOUTH BRANCH FLOODWAY

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: December 21, 2016
SHEET C21

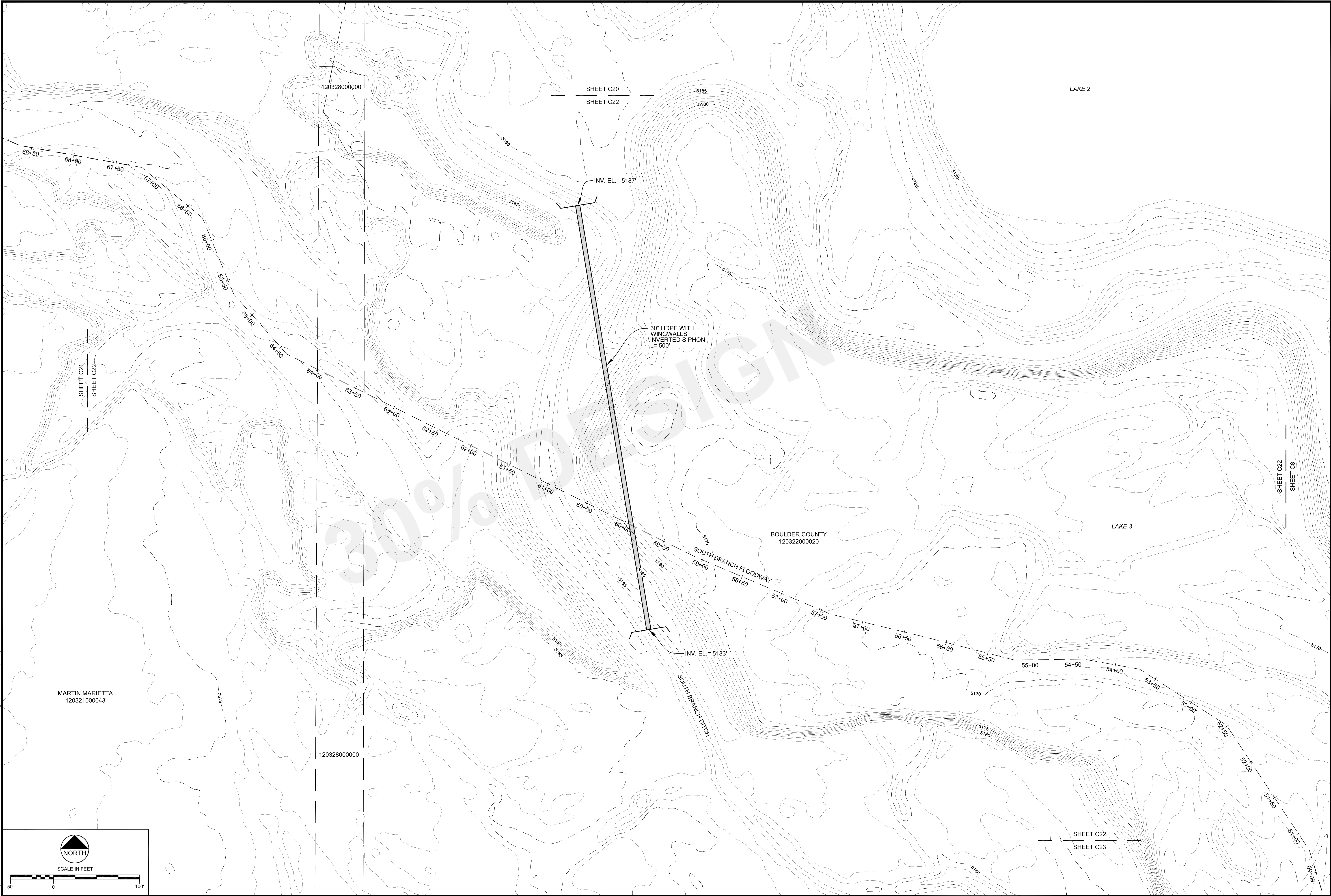
REVISIONS

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MARTIN MARIETTA
120321000043

120328000000

SHEET C20
SHEET C22

LAKE 2

30" HDPE WITH
WINGWALLS
INVERTED SIPHON
L=500'

INV. EL. = 5187'

BOULDER COUNTY
120322000020

SOUTH BRANCH FLOODWAY

LAKE 3

SOUTH BRANCH DITCH

INV. EL. = 5183'

SHEET C22
SHEET C23

SHEET C22
SHEET C3

ST. VRAIN CREEK REACH 3

GRADING SITE PLAN
SOUTH BRANCH FLOODWAY

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: December 21, 2016

SHEET
C22

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Revision	Date	Description

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NORTH

SCALE IN FEET

50'

0

100'

ST. VRAIN CREEK REACH 3

GRADING SITE PLAN

SOUTH BRANCH FLOODWAY

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Revision	Date	Description

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: December 21, 2016

SHEET C23



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ST. VRAIN CREEK REACH 3

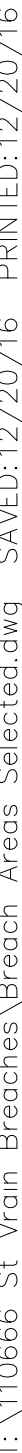
GRADING SITE PLAN
SOUTH BRANCH FLOODWAY

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: December 21, 2016
SHEET C24

Engineering Analytics, Inc.
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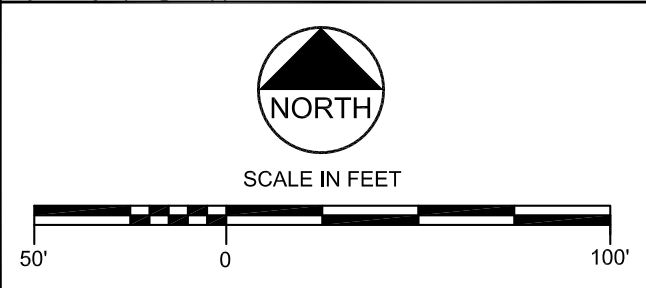
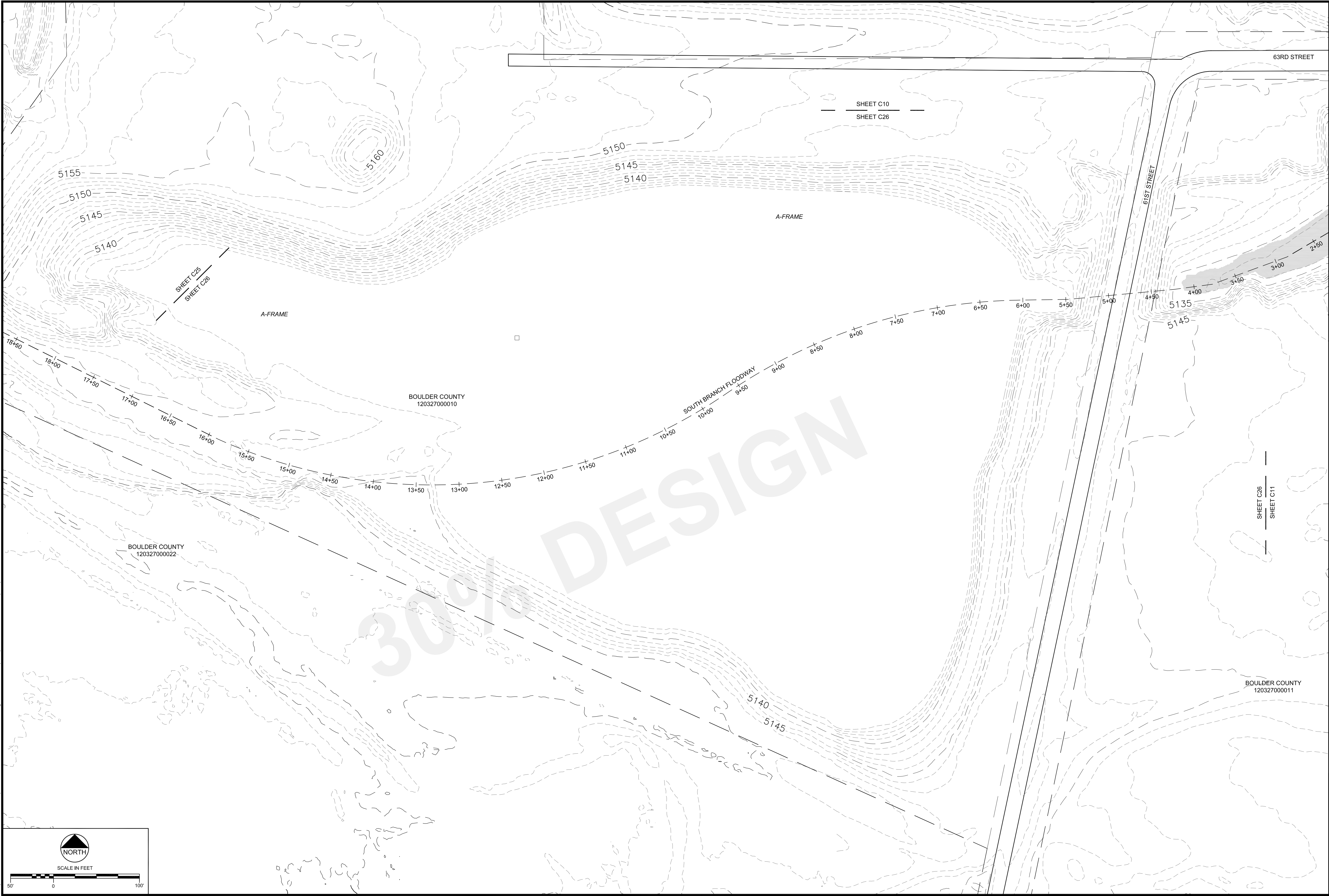
Revision	Date	Description

REVISIONS

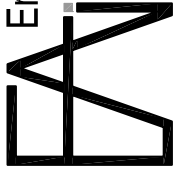


<div>ST. VRAIN CREEK REACH 3</div> <div>GRADING SITE PLAN</div> <div>SOUTH BRANCH FLOODWAY</div>	SCALE VERIFICATION: 0" = 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.	
	Drawn by:	RDP
	Designed by:	LCB
	Checked by:	LCB
	Scale:	As Shown
Project No.	110666	
Date:	December 21, 2016	
SHEET	C25	

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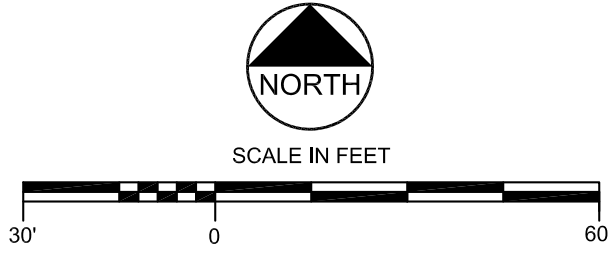
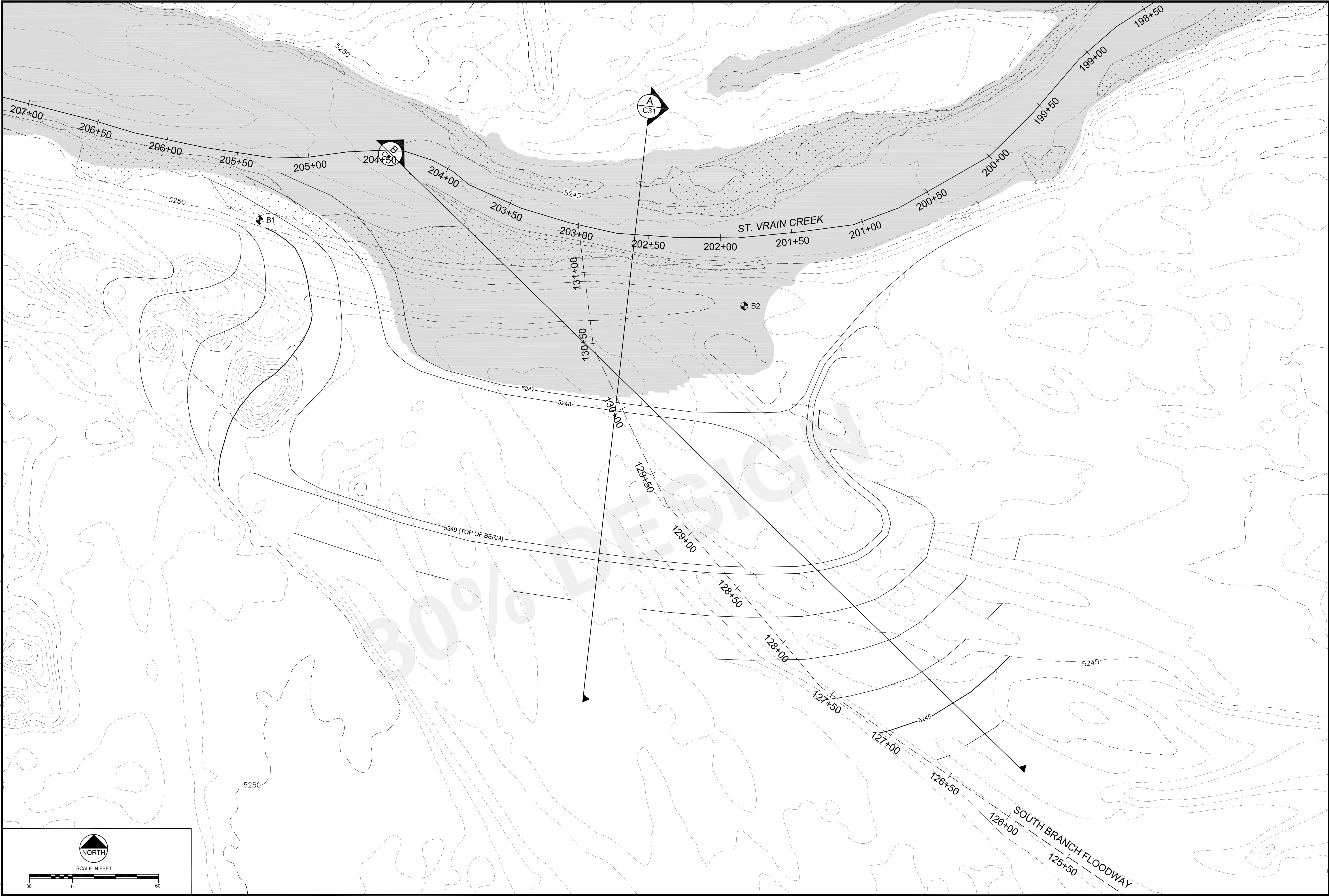


REVISIONS	
Revision	Description

Engineering Analytics, Inc.  1900 Speer East Road, Suite 205 Fort Collins, CO 98525 (970) 488-3111	ST. VRAIN CREEK REACH 3
	GRADING SITE PLAN SOUTH BRANCH FLOODWAY

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:	December 21, 2016
SHEET C26	

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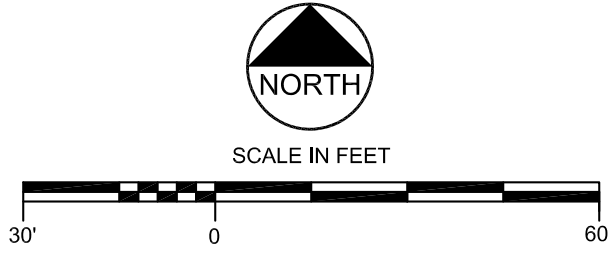
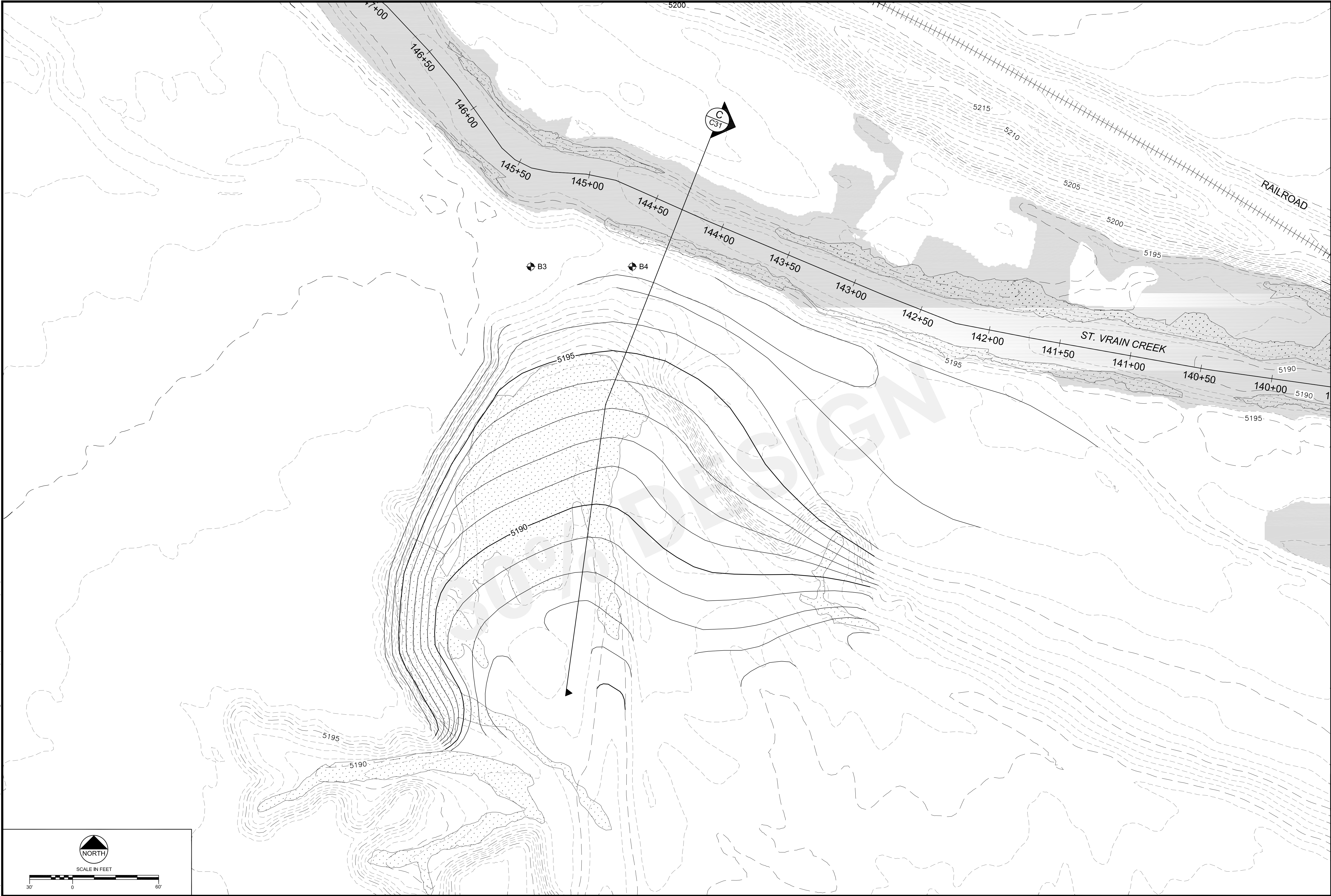
ST. VRAIN CREEK REACH 3

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:	December 21, 2016
SHEET	
C27	

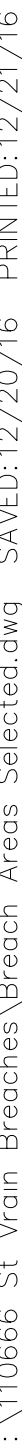
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Revision	Date	Description	

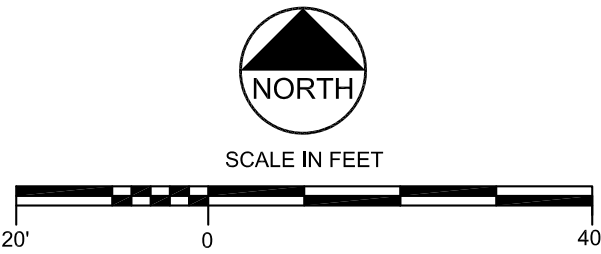
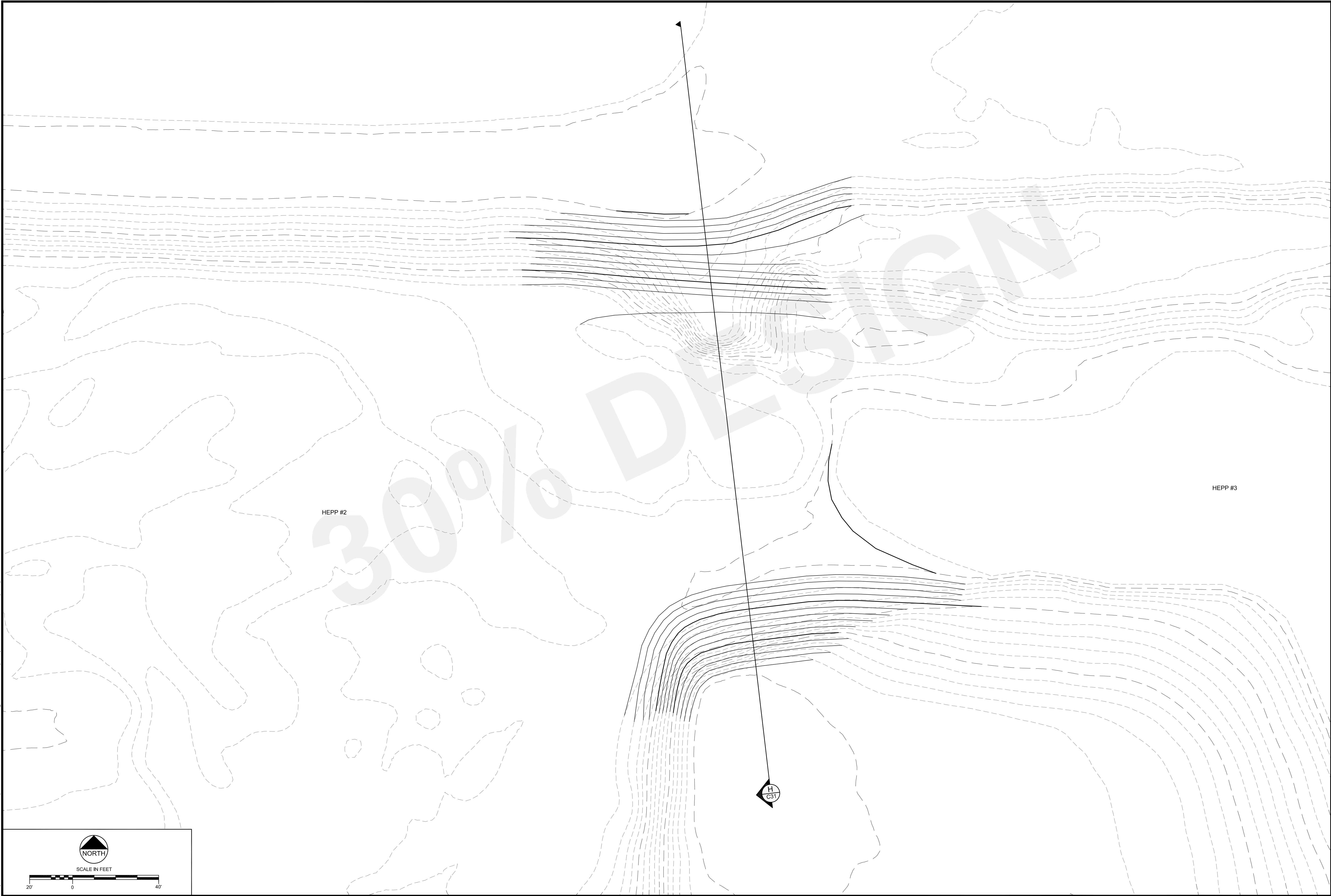
Engineering Analytics, Inc. 1900 Speer Post Road, Suite 209 Fort Collins, CO 80525 (970) 488-3111	ST. VRAIN CREEK REACH 3 BREACH AREA 2 GRADING PLAN

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:	December 21, 2016
SHEET	C28



<div><div><div>EA</div><div>Engineering Analytics, Inc.</div><div>1600 Specht Point Road, Suite 200 Fort Collins, CO 80525 (970) 488-3111</div></div></div>		REVISIONS	
		Revision	Date
ST. VRAIN CREEK REACH 3		<div>SCALE VERIFICATION: 0 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.</div> <div>Drawn by: RDP Designed by: LCB Checked by: LCB Scale: As Shown Project No. 110666 Date: December 21, 2016</div>	
BREACH AREA 5-9			
GRADING PLAN			
SHEET			
C29			

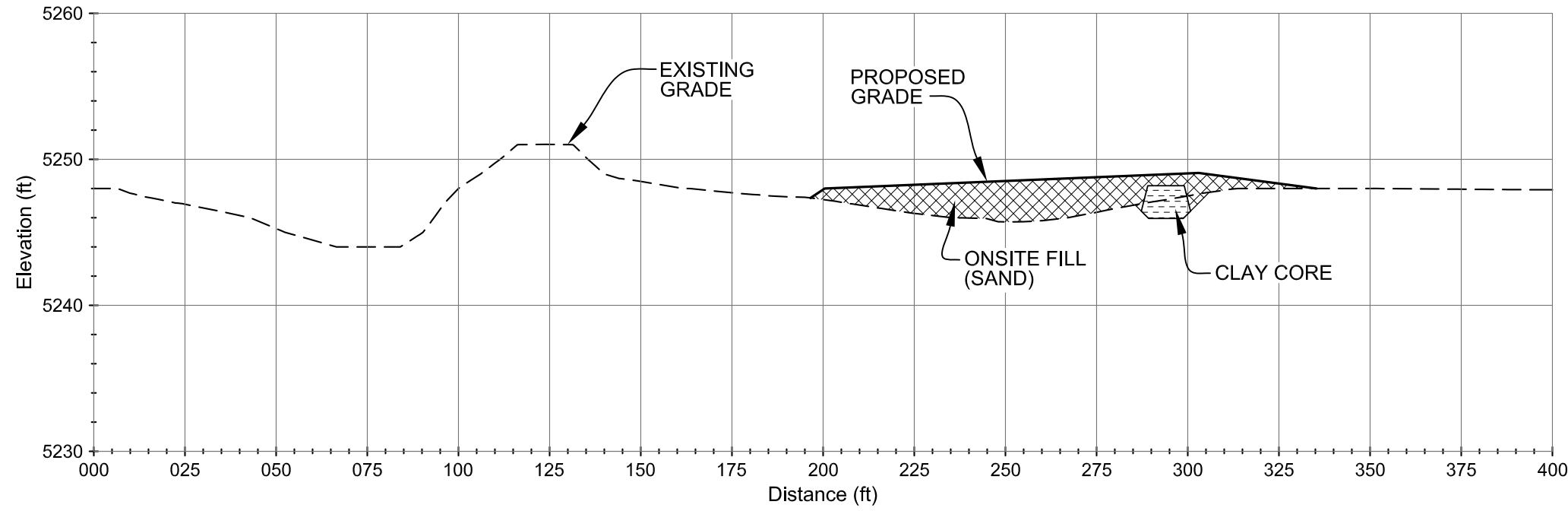
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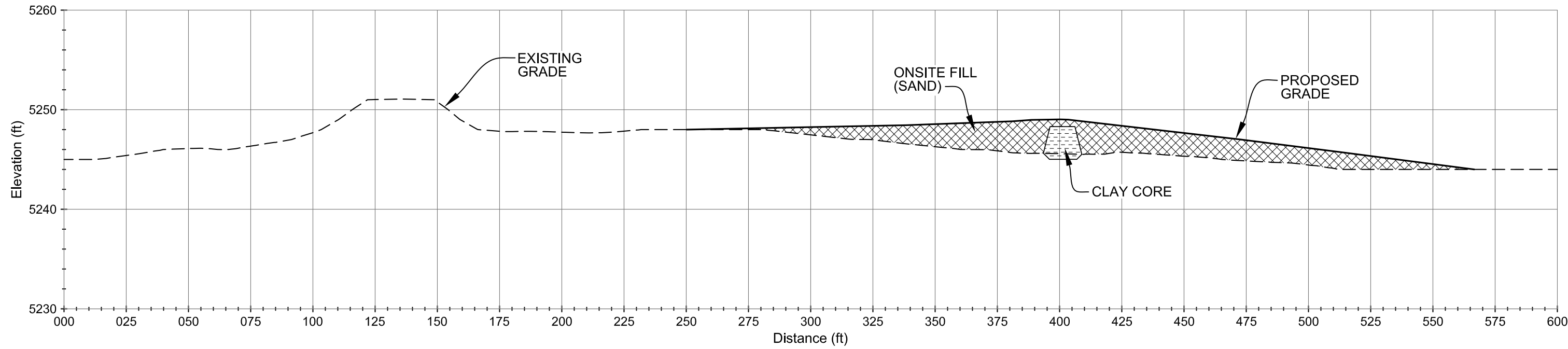
REVISIONS			
Revision	Date	Description	

EA Engineering Analytics, Inc. 1900 Speer Post Road, Suite 209 Fort Collins, CO 98525 (970) 488-3111	ST. VRAIN CREEK REACH 3
	BREACH AREA 7b GRADING PLAN

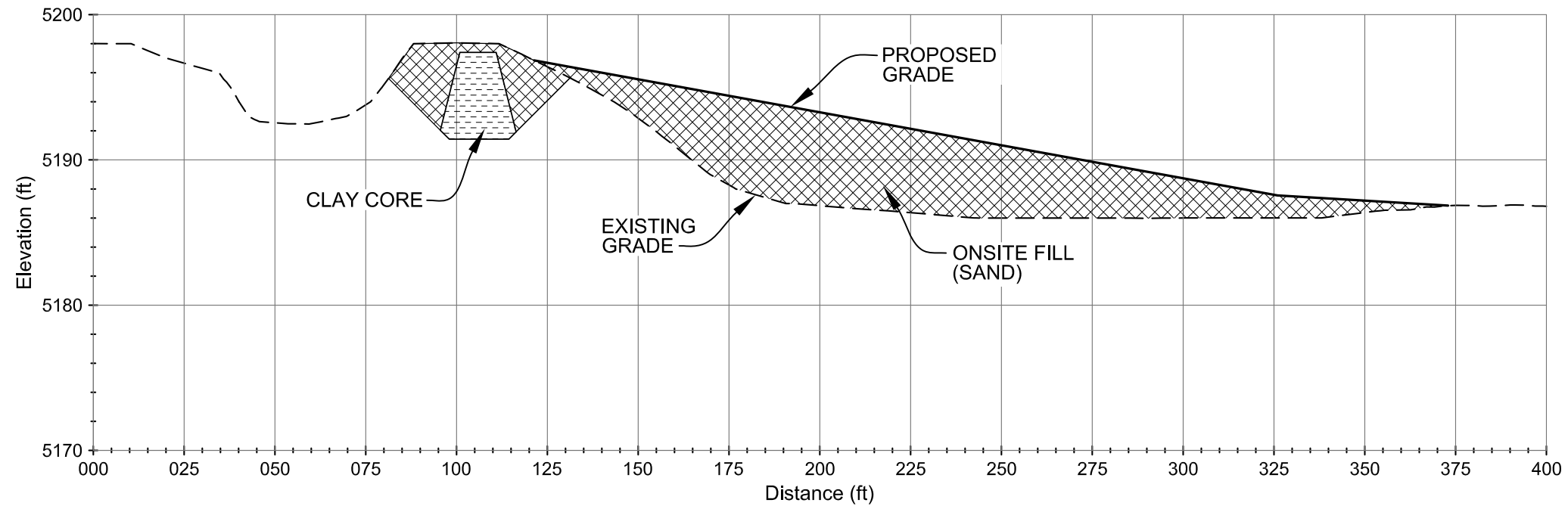
SCALE VERIFICATION: 0 = 1" IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDINGLY.	
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Designed by:	LCB
Checked by:	LCB
Scale:	As Shown
Project No.	110666
Date:	December 21, 2016
SHEET	C30



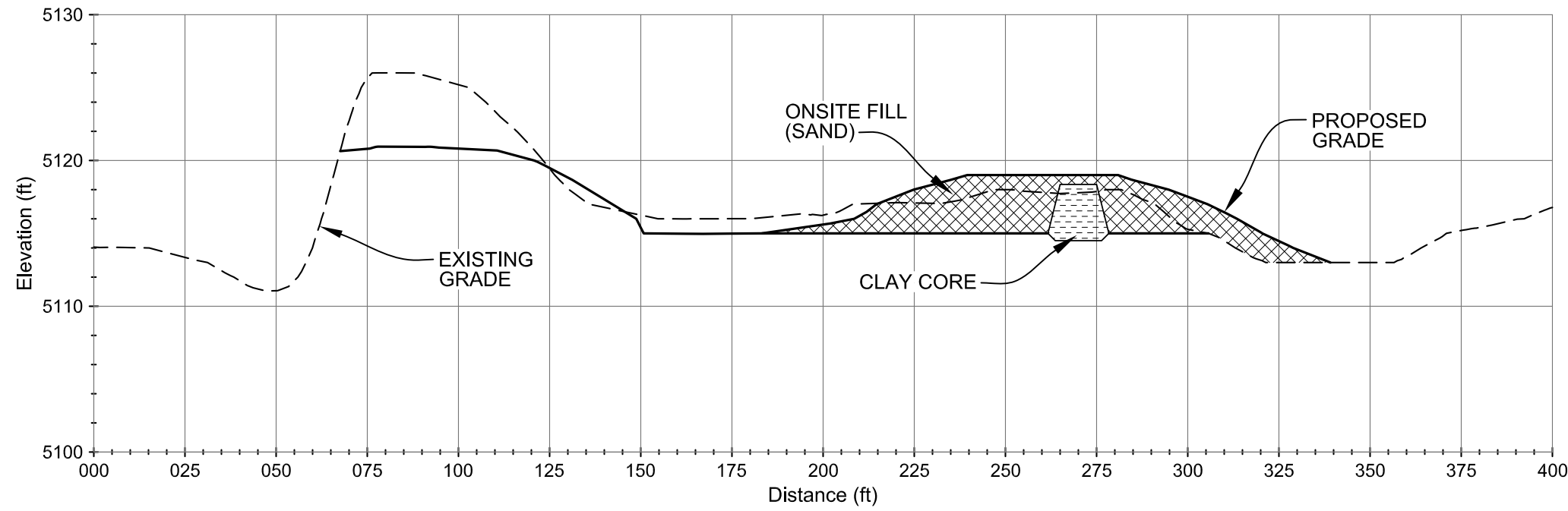
A BREACH 1 REPAIR BERM CROSS-SECTION 1
C27 SCALE: 1" = 40'



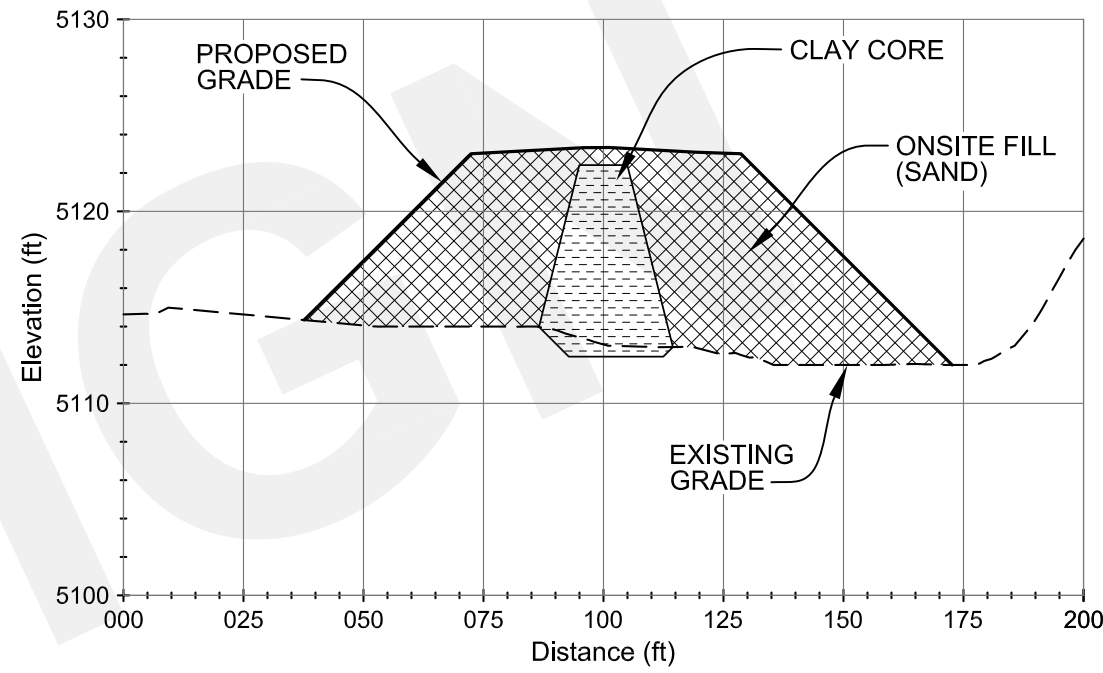
B BREACH 1 REPAIR BERM CROSS-SECTION 2
C27 SCALE: 1" = 40'



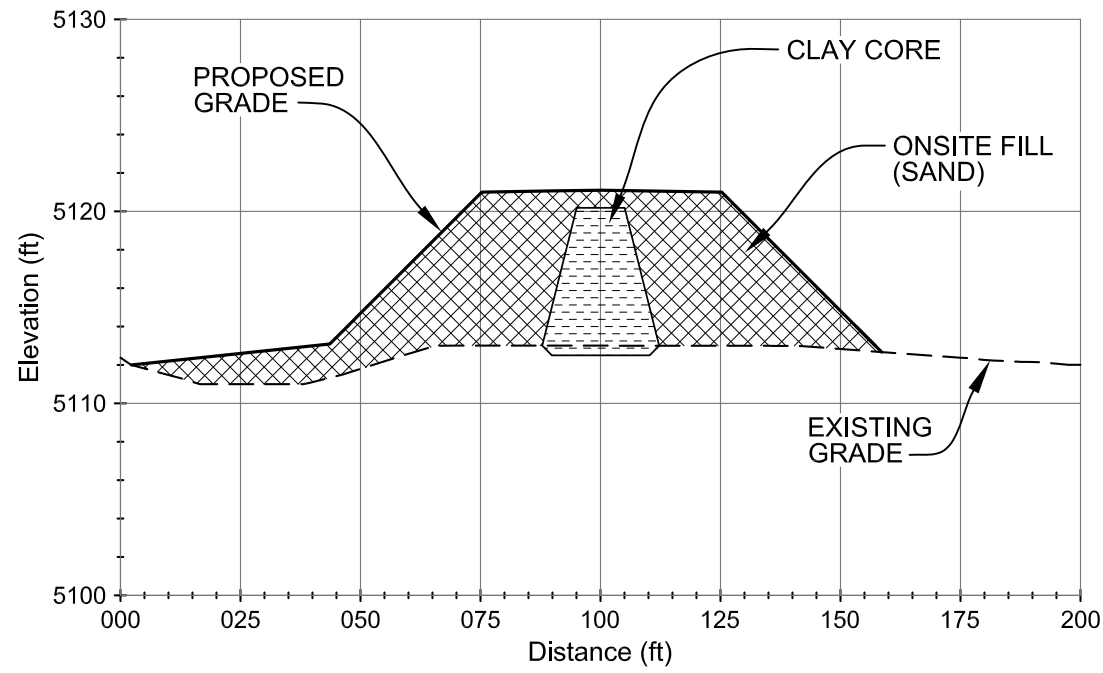
C BREACH 2 REPAIR BERM CROSS-SECTION
C28 SCALE: 1" = 40'



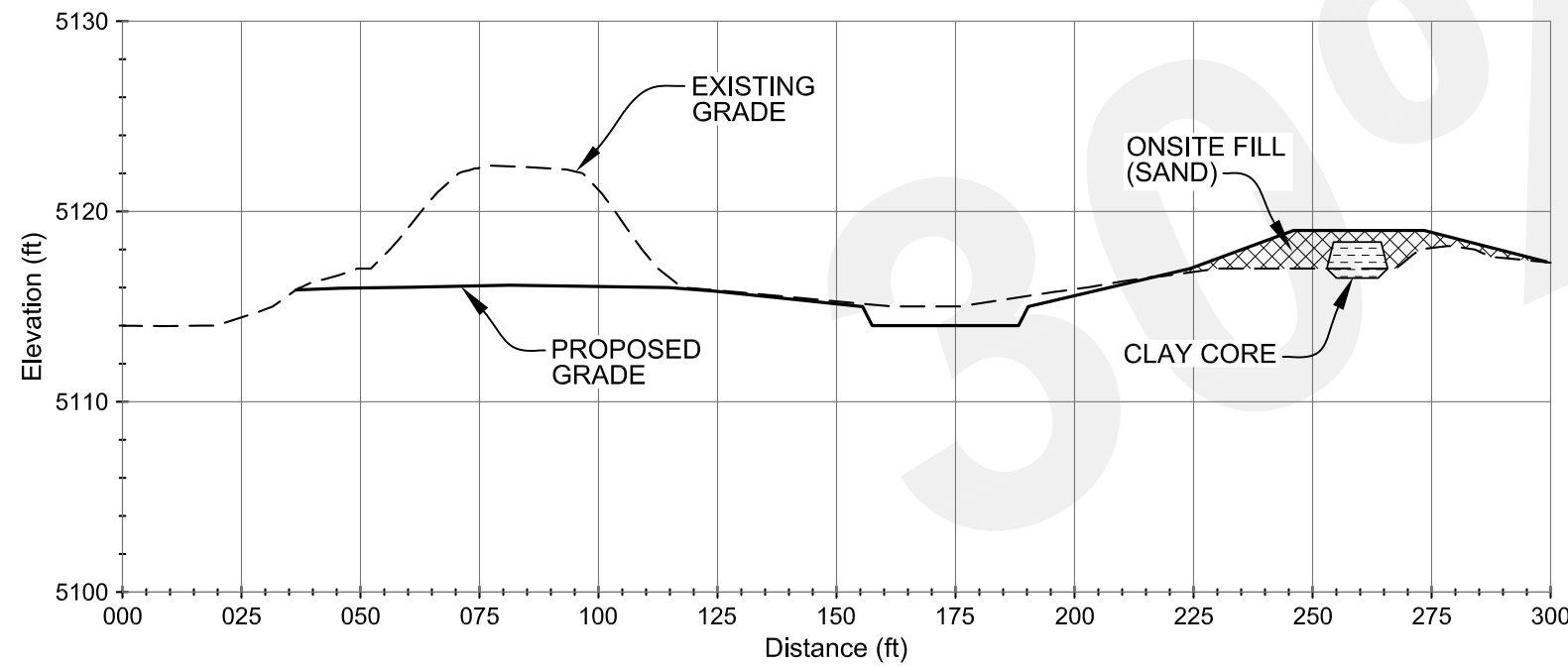
D BREACH 6 REPAIR BERM CROSS-SECTION 1
C29 SCALE: 1" = 40'



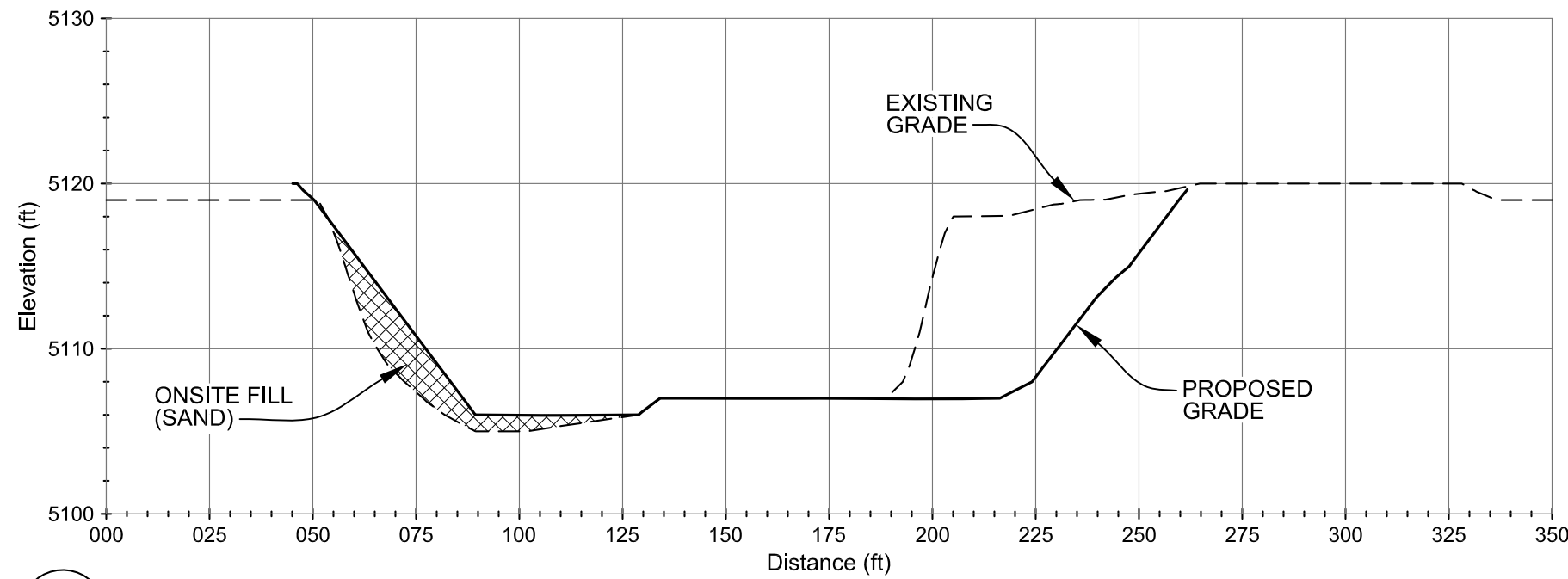
F BREACH 7 REPAIR BERM CROSS-SECTION 1
C29 SCALE: 1" = 40'



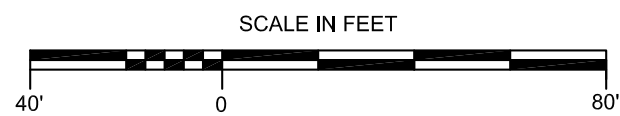
G BREACH 7 REPAIR BERM CROSS-SECTION 2
C29 SCALE: 1" = 40'



E BREACH 6 REPAIR BERM CROSS-SECTION 2
C29 SCALE: 1" = 40'



H BREACH 7b REPAIR CROSS-SECTION
C30 SCALE: 1" = 40'

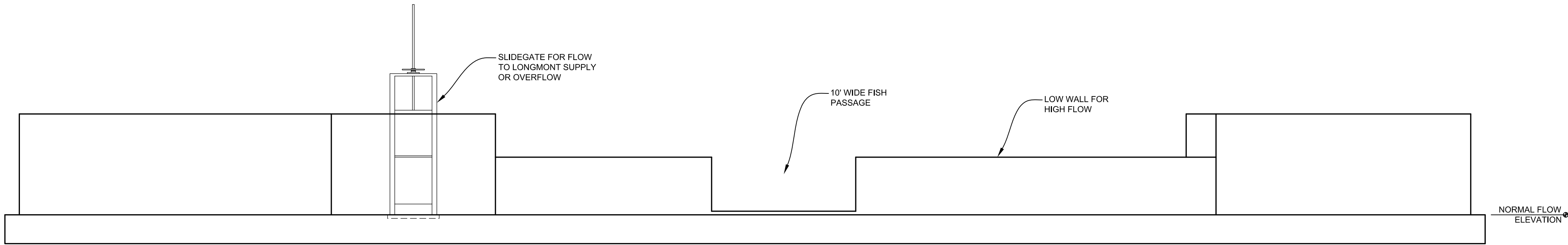


REVISIONS

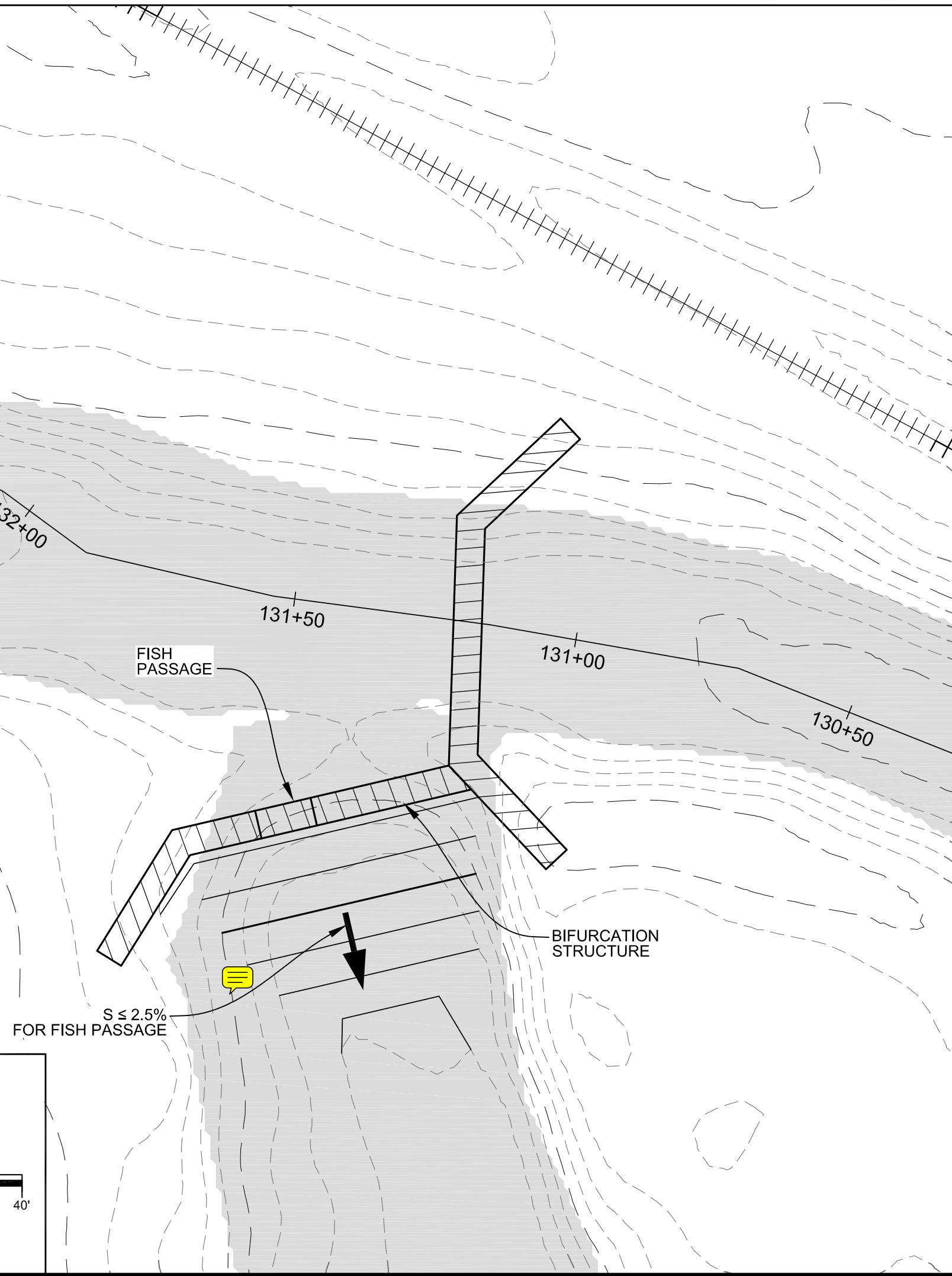
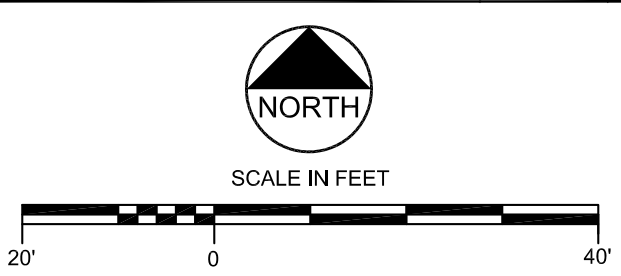
Revision	Date	Description

T:\110666 St. Vrain Branches\Branch Areas Selected.dwg, SAVED:12/20/16, PRINTED:12/20/16

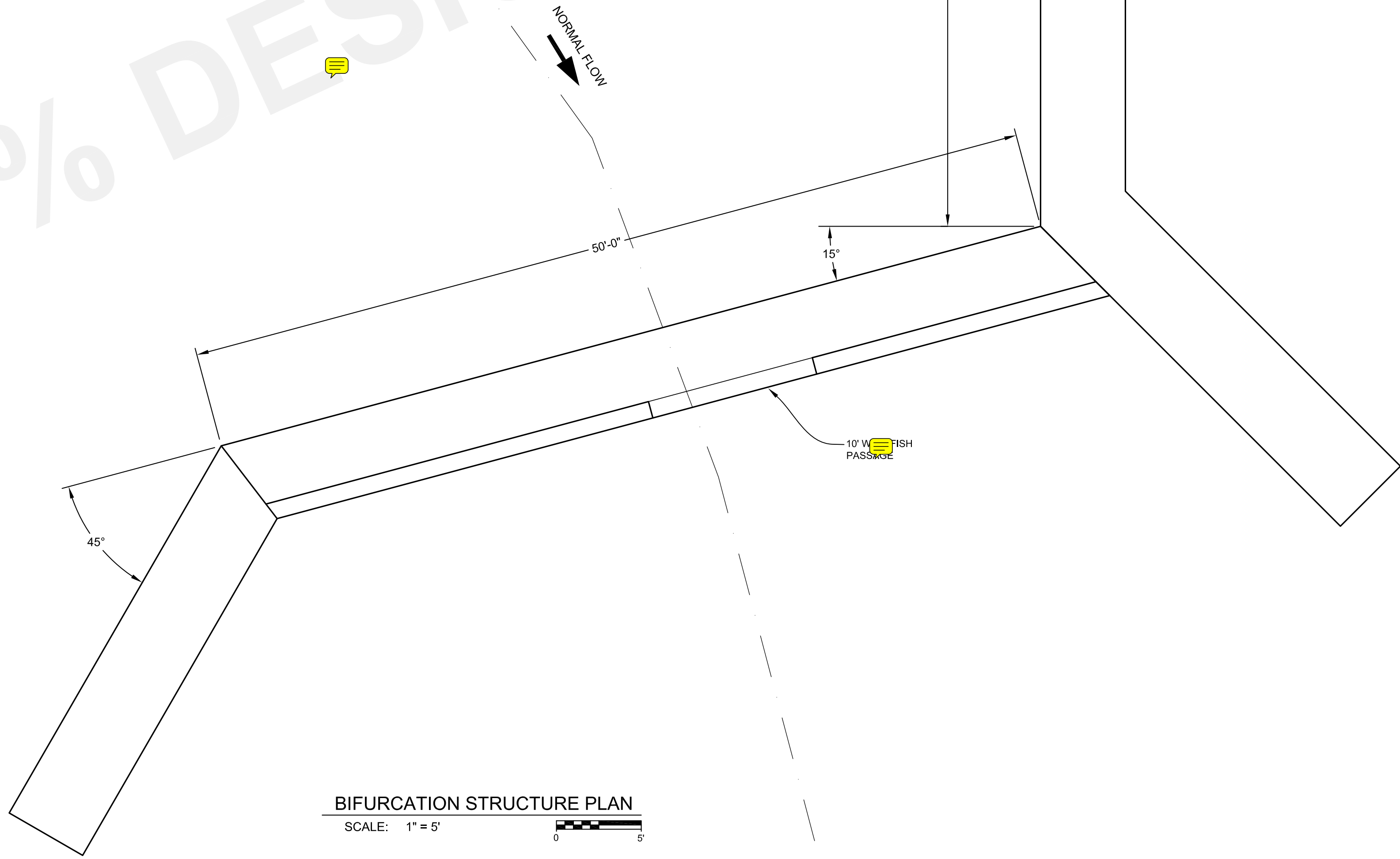
BIFURCATION STRUCTURE PROFILE
SCALE: 1" = 5'



STRUCTURE SITE PLAN



BIFURCATION STRUCTURE PLAN
SCALE: 1" = 5'



REVISIONS

Revision	Date	Description

Engineering Analytics, Inc.
1800 Speight Road East, Suite 209
Fort Collins, CO 80525
(970) 488-3111

ST. VRAIN CREEK REACH 3

BIFURCATION
STRUCTURE

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: December 21, 2016
SHEET C32

GENERAL NOTES:

1. CONSTRUCTION OBSERVATION IS TO BE PERFORMED BY AN (ECOLOGIST) ON BEHALF OF BOULDER COUNTY (BOCO OR CLIENT). HEREAFTER, THE GENERAL CONTRACTOR WILL BE REFERRED TO AS THE CONTRACTOR, THE LANDSCAPE SUBCONTRACTOR AS (SUBCONTRACTOR). THE PROJECT ENGINEER WILL BE REFERRED TO AS THE (ENGINEER).

2. 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.

3. RESTORATION AREAS ARE TO BE SEEDED AND PLANTED WITH THE SPECIES PROVIDED ON THE PLANT & SEED SCHEDULES. THE ECOLOGIST WILL LAY OUT AND FIELD FIT PLANT MATERIAL PRIOR TO INSTALLATION.

4. SEEDING SHALL OCCUR AS SOON AS PRACTICABLE UPON COMPLETION OF EARTHWORK OPERATIONS WITHIN THE TIME FRAMES INDICATED IN THE SEEDING NOTES. PLANTING OPERATIONS ARE TO BE PERFORMED IN THE SPRING AS SOON AS SOIL CONDITIONS ARE CONDUCIVE FOR PROPER PLANTING (I.E., NOT FROZEN OR UNDAUNED).

5. TO ENSURE AVAILABILITY, SEED AND PLANT MATERIALS MAY BE ACQUIRED FOR THE PROJECT BY THE CLIENT (REFER TO SEED & PLANT SCHEDULES). THE CONTRACTOR SHALL HAVE THE RIGHT TO INSPECT THE PLANT MATERIAL 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 CLIENT. THE ECOLOGIST SHALL HAVE THE RIGHT TO INSPECT THE PLANT MATERIAL 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 SUBCONTRACTOR'S RESPONSIBILITY TO ENSURE THAT THE NURSERY OR STORAGE FACILITY MAINTAINS THE PLANTS IN GOOD HEALTH UNTIL TIME OF DELIVERY; AND THAT MATERIAL IS PROPERLY MAINTAINED AND CARED FOR ONCE DELIVERED.

6. 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 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/RETAINAGE EQUAL TO THE AMOUNT NECESSARY FOR THE CONTRACTOR TO PRODUCE ACCURATE AS-BUILT DATA.

7. CONTRACTOR SHALL NOT EXPAND OR WORK OUTSIDE OF THE DESIGNATED LIMITS OF CONSTRUCTION UNLESS OTHERWISE APPROVED BY THE 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.

8. SITE WORK SHALL NOT BEGIN UNTIL ALL APPLICABLE LICENSES AND CONSTRUCTION PERMITS HAVE BEEN OBTAINED BY THE CONTRACTOR, INCLUDING, BUT NOT LIMITED TO:

- GENERAL LAND DEVELOPMENT PERMIT (STATE)
- STORMWATER DISCHARGE PERMIT (STATE)
- CONSTRUCTION DEWATERING PERMIT (STATE)
- GRADING PERMIT (CITY AND/ORCOUNTY)

THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND 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.

THE CLIENT SHALL HAVE OBTAINED A CLEAN WATER ACT (CWA) SECTION 404 PERMIT & OTHER FEDERAL PERMITS/CLEARNACES FOR THE PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLIANCE WITH SAID PERMITS.

THE CONTRACTOR SHALL NOT GO AROUND THE CLIENT, ENGINEER OR 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.

9. 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.

10. 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.

11. EROSION CONTROL MEASURES SHALL REMAIN IN FULL FORCE DURING CONSTRUCTION ACTIVITIES AND AS REQUIRED BY THE GOVERNING JURISDICTION(S).

EARTHWORK NOTES:

1. THE CONTRACTOR SHALL INSTALL AND MAINTAIN BMP's (AS NEEDED) TO PROTECT EXISTING WETLANDS, GRASSLANDS, TREES AND SHRUBS TO REMAIN. TREES & SHRUBS TO REMAIN THAT MAY BE AFFECTED BY GRADING SHALL BE PROTECTED TO AVOID EXCAVATION, COMPACTION OR DISTURBANCE WITHIN THEIR DRIP LINE. IF ANY EXCAVATION IS REQUIRED WITHIN THE DRIP LINE OF TREES AND SHRUBS TO REMAIN, IT WILL BE DONE IN A MANNER, WHICH WILL CAUSE MINIMUM DAMAGE TO THE ROOT SYSTEMS. INJURED ROOTS WILL BE PRUNED CLEANLY AND BACKFILLED AS SOON AS POSSIBLE.

2. THE PROJECT SITE SHALL BE CLEARED AND GRUBBED (WHERE APPLICABLE), PRESERVING AS MUCH TOPSOIL AS POSSIBLE. THEREAFTER, ALL EXCESS TOPSOIL SHALL BE STRIPPED FOR REUSE ON THE SITE FROM WHICH IT ORIGINATED. FOR THE PURPOSES OF THIS PROJECT, STRIPPED TOPSOIL SHALL CONSIST OF ALL ORGANIC SOIL, DUFF, AND OTHER SURFACE MATERIALS CAPABLE OF SUPPORTING VEGETATION AND MAY INCLUDE GRASS, PLANT BRANCHES AND ROOTS LESS THAN ½ INCH DIAMETER AND SIX INCHES IN LENGTH. STOCKPILED TOPSOIL SHALL BE PLACED IN THE DESIGNATED STORAGE/STAGING AREA. APPROXIMATELY **6" MIN. OF EXISTING &/OR IMPORTED TOPSOIL** SHALL BE PLACED TO FINAL GRADE OR AS DIRECTED BY THE ECOLOGIST. **IMPORTED TOPSOIL SHALL CONSIST OF ROUGHLY EQUAL PARTS SAND, CLAY & LOAM AND CAPABLE OF SUPPORTING PLANT LIFE.**

3. WHERE FEASIBLE, STOCKPILES SHALL BE PLACED NO CLOSER THAN 50' FROM ANY EXISTING WATER BODY, DRAINAGE OR WETLAND THAT COULD POTENTIALLY ERODE THE STOCKPILED MATERIALS INTO EXISTING WATERS OR WETLANDS DURING HIGH WATER. IF WITHIN 50', DOUBLE SILT FENCE (OR EFFECTIVE EQUIVALENT) SHALL BE INSTALLED BETWEEN THE STOCKPILE AND WATER/WETLAND.

4. EXCAVATION, GRADING AND DRAINAGE SHALL BE PERFORMED AS PER THE PLANS AND DIRECTIONS OF THE ENGINEER AND FIELD FIT AS NECESSARY TO ACHIEVE OPTIMAL GRADES AS INDICATED ON THE PLANS.

5. GRADED AREAS THAT WILL RECEIVE TOPOSOIL WILL BE EXCAVATED AND GRADED TO ACCOMMODATE PLACEMENT OF TOPSOIL THICKNESS. THE CONTRACTOR SHALL CHECK AND THE ENGINEER SHALL VERIFY GRADES PRIOR TO AND AFTER PLACEMENT OF TOPSOIL IN PREPARATION FOR SEEDING AND PLANTING.

6. GRADED AREAS SHALL TIE IN SMOOTH & NATURALLY WITH ADJACENT GRADES. LARGE CLODS, COBBLE AND OTHER DEBRIS SHALL BE REMOVED FROM THE WORK AREA AND DISPOSED OF IN AN APPROPRIATE LOCATION. NO MATERIAL SHALL BE DISPOSED OF OR DUMPED ILLEGALLY.

SUBMITTALS & SUBSTITUTIONS:

SUBMITTALS:

THE CONTRACTOR WILL PROVIDE THE ENGINEER WITH COPIES OF THE FOLLOWING SUBMITTALS A MINIMUM OF 10 WORKING DAYS PRIOR TO INSTALLATION UNLESS NOTED OTHERWISE BELOW:

1. TYPES OF FABRIC AND/OR BLANKET SPECIFIED BY THE ENGINEER OR ECOLOGIST. MANUFACTURER'S LITERATURE/MATERIAL DATA SHEETS THAT INCLUDE THE TYPE, PHYSICAL CHARACTERISTICS, APPLICATION AND RECOMMENDED INSTALLATION INSTRUCTIONS OF ALL EROSION CONTROL FABRIC, BLANKET, INCLUDING ANY HARDWARE SPECIFIED. COPIES OF EROSION CONTROL MATERIAL SHIPPING MANIFESTS ATTESTING TO THE SAME UPON DELIVERY TO THE SITE.

2. CERTIFICATION THAT THE REQUIRED SPECIES, QUANTITY, SIZE AND FORM OF PLANTS HAVE BEEN ORDERED/OBTAINED. CERTIFICATION OR ORDER DOCUMENTS SHALL INCLUDE PLANT SOURCE, INCLUDING BOTANICAL NAME, COMMON NAME, SIZE, AND QUANTITY OF SPECIES. COPIES OF PLANT SHIPPING MANIFESTS ATTESTING TO THE SAME UPON DELIVERY TO THE SITE.

3. PLANT DELIVERY SCHEDULE.

4. SEED CERTIFICATES THAT INCLUDE SUPPLIER, SOURCE, ORIGIN OF STOCK, BOTANICAL NAME, COMMON NAME, POUNDS AND PERCENTAGE OF PURE LIVE SEED FOR EACH SPECIES. COPIES OF SEED TAGS ATTESTING TO THE SAME UPON DELIVERY TO THE SITE.

5. WEED FREE STRAW/HAY MULCH CERTIFICATION.

6. AN AGRONOMIC SOIL NUTRIENT ANALYSES OF EXISTING AND IMPORTED SOIL WILL BE OBTAINED BY THE CONTRACTOR INDICATING ANY DEFICIENCIES OR EXCESSES, AND RECOMMENDED AMENDMENTS AND RATES. **THE CONTRACTOR SHALL PROVIDE AS MANY SAMPLES AND SOURCES AS NECESSARY UNTIL A SUITABLE TOPSOIL IS FOUND.**

7. LITERATURE ON THE TYPE AND COMPOSITION OF ANY RECOMMENDED SOIL AMENDMENT MATERIALS.

8. A LISTING OF EQUIPMENT TO BE USED FOR ALL OPERATIONS, INCLUDING PLANTING AND SEEDING.

10. MATERIAL DATA SHEET AND/OR A PHYSICAL SAMPLE OF WOOD PLANT MULCH.

11. A LIST OF ALL KEY EMPLOYEES (PROJECT MANAGERS, SUPERVISORS, EQUIPMENT OPERATORS) WHO WILL BE WORKING ON THE PROJECT, INCLUDING THEIR POSITIONS, ROLES AND RESPONSIBILITIES. THE CONTRACTOR SHALL PROVIDE THE KEY EMPLOYEES LISTED AND SHALL NOT MAKE SUBSTITUTIONS WITHOUT PRIOR APPROVAL (WRITTEN OR VERBAL) OF THE CLIENT. **THE ENGINEER RESERVES THE RIGHT TO WAIVE THIS REQUIREMENT.**

12. PRE- AND POST-CONSTRUCTION DIGITAL PHOTOS OF ANY STRUCTURE OR WORK AREA THAT IS TO BE REMOVED AND REPLACED OR DISTURBED AND RESTORED DURING THE COURSE OF THE PROJECT.

13. MAINTENANCE REPORTS & PHOTOS IF NECESSARY FOLLOWING EACH MAINTENANCE SITE VISIT THAT DOCUMENTS CONDITIONS, ACTIVITIES PERFORMED, AND ANY ISSUES OR INFORMATION THAT IS RELEVANT TO THE SUCCESS OF THE PROJECT.

14. PROPOSED MEANS, METHODS & MATERIALS FOR WATERING PLANTS AND SEEDED AREAS.

SUBSTITUTIONS:

1. EROSION CONTROL FABRIC, BLANKET,OR ASSOCIATED HARDWARE OR FASTENERS SUBSTITUTIONS SHALL BE EQUIVALENT OR BETTER THAN THOSE SPECIFIED. ANY SUBSTITUTIONS SHALL BE APPROVED BY THE ECOLOGIST PRIOR TO ORDERING AND DELIVERY TO THE SITE.

2. IF A PLANT OR SEED SUPPLIER IS UNABLE TO PROVIDE THE PLANTS OR SEED FOR THE PROJECT, THE CONTRACTOR SHALL CONTACT A MINIMUM OF THREE (3) SEED OR PLANT SUPPLIERS AND MAKE EVERY EFFORT TO OBTAIN THE SPECIFIED SPECIES AND QUANTITIES. THEREAFTER, ANY SUBSTITUTIONS WILL BE BROUGHT TO THE ATTENTION OF THE ECOLOGIST FOR APPROVAL PRIOR TO ACQUISITION. PLANT SUPPLIERS SHALL BE ESTABLISHED, QUALIFIED COMMERCIAL NURSERIES.

3. CONTRACTOR SHALL SUBMIT REQUESTS FOR SUBSTITUTIONS SUFFICIENTLY IN ADVANCE TO AVOID DELAY OF ANY WORK.

4. IN MAKING A REQUEST FOR SUBSTITUTIONS, OR IN USING AN APPROVED SUBSTITUTE ITEM, CONTRACTOR REPRESENTS:

A. CONTRACTOR HAS PERSONALLY INVESTIGATED PROPOSED PRODUCT OR METHOD, AND HAS DETERMINED THAT IT IS EQUAL OR SUPERIOR IN ALL RESPECTS TO THAT SPECIFIED AND THAT IT WILL PERFORM THE FUNCTION FOR WHICH IT IS INTENDED.

B. CONTRACTOR SHALL PROVIDE THE SAME GUARANTEE FOR THE SUBSTITUTE ITEM AS FOR THE PRODUCT OR METHOD SPECIFIED.

C. CONTRACTOR SHALL COORDINATE INSTALLATION OF THE APPROVED SUBSTITUTION INTO THE WORK.

D. CONTRACTOR WAIVES ALL CLAIMS FOR ADDITIONAL REIMBURSEMENT RELATED TO ANY EQUIVALENT SUBSTITUTIONS OR QUANTITIES, UNLESS OTHERWISE WAIVED BY THE CLIENT.

E. CONTRACTOR SHALL REIMBURSE THE CLIENT IF SMALLER OR FEWER PLANTS ARE PROVIDED THAT DIFFER FROM THOSE SPECIFIED IN THE PLANT SCHEDULES.

SEEDING NOTES:

1. SUBSOIL SHALL BE RIPPED TO MINIMUM DEPTH OF 12 INCHES PRIOR TO TOPSOIL PLACEMENT AND/OR SOIL AMENDMENT.

2. THE FINAL GRADED SURFACE/SEED BED SHALL BE PREPARED PRIOR TO SEEDING, CREATING A UNIFORM AND LIGHTLY COMPACTED SURFACE CONDUCIVE FOR SEED IMPREGNATION. ANY AREAS OVERLY LOOSE OR COMPACTED OR DISTURBED PRIOR TO SEEDING SHALL BE RE-PREPARED. ANY OVERLY COMPACTED SEEDING SURFACE SHALL BE COMPLETELY RIPPED IN 2 DIRECTIONS TO A MINIMUM DEPTH OF 12" PRIOR TO SEEDING. IF UPON INSPECTION, THE ECOLOGIST FINDS DEEPLY COMPACTED SOIL THAT MAY ULTIMATELY IMPACT SUSTAINED PLANT GROWTH AND ESTABLISHMENT, THE ECOLOGIST MAY REQUIRE DEEPER RIPPING.

3. ANY LARGE CLODS, COBBLE, ROCK, BRANCHES OR OTHER MATERIAL THAT WOULD PREVENT FLUSH INSTALLATION OF EROSION CONTROL FABRIC OR EFFECTIVE USE OF A DRILL SEEDER OR MOWERS SHALL BE REMOVED FROM THE AREA OR REDUCED IN SIZE TO LESS THAN 2" PRIOR TO SEEDING AND/OR FABRIC INSTALLATION. FAILURE TO PROPERLY PREPARE THE GROUND COULD RESULT IN COMPLETE REINSTALLATION OF SEED AND/OR EROSION CONTROL FABRIC.

4. NUTRIENT DEFICIENT OR EXCESSIVELY RICH TOPSOIL OR SURFACE MATERIAL SHALL BE AMENDED WITH MACRO- OR MICRO-NUTRIENTS AS DIRECTED BY THE ECOLOGIST UPON RECEIPT OF THE SOIL TEST.

5. REGARDLESS OF SOIL TEST ANALYSIS, SEEDING AREA SHALL BE AMENDED WITH **HUMATE AT A RATE OF MINIMUM 250 POUNDS PER ACRE**. HUMATES SHALL BE APPLIED TOPICALLY AND THEN TILLED IN TO THE TOPSOIL PRIOR TO SEEDING.

6. GRANULAR **ENDO MYCHORRIZAL INOCULUM SHALL BE APPLIED TO ALL SEEDING AREAS AT A MINIMUM RATE OF TWENTY (20) POUNDS PER ACRE**. ALTERNATIVELY, MYCHORRIZAL INOCULUM MAY BE POURED INTO SEED BAGS AT A RATE OF ONE (1) POUNS PER ACRE AND SHAKEN TO THOROUGHLY COAT SEEDS. SAID MYCHORRIZAL INOCULUM SHALL BE IN THE FORM OF MICRONIZED POWDER, SHALL CONTAIN THREE SPECIES OF ENDOMYCORRIZE, SHALL BE CERTIFIED WITH A MINIMUM COUNT OF 100,000 PROPAGULES PER POUND, AND SHALL MEET THE SPECIFICATIONS OF MYCOAPPLY MICRONIZED ENDO MYCHORRIZAL INOCULUM.

7. **CLASS 1 COMPOST SHALL BE APPLIED TO ALL SEEDING AREAS AT A MINIMUM RATE OF300 CUBIC YARDS PER ACRE**. COMPOST SHALL BE APPLIED EVENLY & THOROUGHLY TILLED IN TO THE SEEDING SURFACE TO A DEPTH OF 12" PRIOR TO SEEDING.

8. **CERTIFIED WEED FREE STRAW SHALL BE APPLIED TO ALL SEEDING AREAS AT A MINIMUM RATE OF 2000 POUNDS PER ACRE**. STRAW SHALL BE APPLIED EVENLY & THOROUGHLY TILLED IN TO THE SEEDING SURFACE TO A DEPTH OF 12" PRIOR TO SEEDING.

9. ALL SEED SHALL CONFORM TO CURRENT STATE AND FEDERAL REGULATIONS AND SHALL BE SUBJECT TO THE TESTING PROVISIONS OF THE ASSOCIATION OF OFFICIAL SEED ANALYSIS.

10. SEED WILL BE DELIVERED UNMIXED, IN INDIVIDUAL BAGS IN THE QUANTITIES SHOWN ON THE SEED SCHEDULES. THE SEED WILL BE MIXED ON SITE AND PLACED IN THE APPROPRIATE DRILL SEEDER HOPPERS OR BROADCASTER BY A QUALIFIED SEEDING CONTRACTOR PURSUANT TO THE SEED SCHEDULES.

11. DRILL SEEDING IS THE PREFERRED METHOD OF APPLICATION, FOLLOWED BY HYDRO-SEEDING, FOLLOWED BY HAND BROADCAST SEEDING AS FEASIBLE AND WHERE NECESSARY.

12. THE DRILL SEEDER SHALL BE EQUIPPED WITH: DISCS TO CUT FURROWS FOR THE SEED; DEPTH BANDS SET AT 1/2"; ROWS OR FURROWS A MAXIMUM OF 6" APART; TWO DIFFERENT TYPES OF SEED BOXES TO HANDLE SMALL AND LARGE SEED, WITH INDEPENDENT ADJUSTMENTS FOR EACH TYPE OF BOX; AGITATORS IN THE SEED BOXES TO MIX SEEDS; ABILITY TO METER SEED FLOW WITH PRECISION; AND REAR PACKER WHEELS TO COMPACT SOIL OVER PLANTED SEED. PRIOR TO COMMENCEMENT OF SEEDING, CALIBRATION TESTS SHALL BE CONDUCTED ON THE EQUIPMENT TO DETERMINE THAT THE SPECIFIED SEEDING RATE WILL BE MET.

13. SEED SHALL BE DRILLED 1/4 TO 1/2 INCH INTO THE SOIL SURFACE ON SLOPES WHERE MACHINERY CAN SAFELY OPERATE USING THE SEED RATES INDICATED ON THE SEED SCHEDULES. AREAS INACCESSIBLE BY DRILL SHALL BE HYDRO-SEEDED OR HAND SEEDED, DOUBLING THE DRILL SEEDING RATES INDICATED ON THE SEED SCHEDULES. HAND SEEDED AREAS SHALL BE COMBINED WITH SAND OR VERMICULITE FOR EASE OF SPREADING AND SEEDED IN TWO PERPENDICULAR PASSES TO ENSURE FULL COVERAGE. EVERY SQUARE FOOT OF DISTURBED SOIL, INCLUDING EXCAVATION FROM FABRIC KEY TRENCHES WILL BE SEEDED.

14. ALL SMALL/FINE SEED SHALL BE DRILLED AND BROADCAST SIMULTANEOUSLY VIA THE DRILL SEEDER. FILLERS (E.G., FINE SAND, VERMICULITE) SHALL BE USED FOR ALL SMALL/FINE SEED TO ENSURE ADEQUATE AND EVEN DISTRIBUTION.

15. THE DRILL SEEDER SHALL MAKE TWO PASSES: THE SECOND IN A DIRECTION THAT IS PERPENDICULAR TO THE FIRST, AS TOPOGRAPHY ALLOWS.

16. SHORTAGES OF SEED AND FAILURE TO COVER THE DESIGNATED AREA DUE TO INADEQUATE CALIBRATION WILL BE CORRECTED AND COMPENSATED AT THE CONTRACTOR'S EXPENSE.

17. ALL SEED SOWN BY HYDRO-SEEDING OR HAND BROADCASTING SHALL BE RAKED IN AND/OR HARROWED 1/4 TO 1/2 INCH INTO THE SOIL SURFACE, AND COMPACTED GENTLY TO ENSURE GOOD SEED-TO-SOIL CONTACT.

18. IF NECESSARY, BROADCAST SEEDING SHALL BE ACCOMPLISHED USING HAND-OPERATED "CYCLONE"-TYPE SEEDERS CONTAINING AGITATORS AND PICKER WHEELS TO DISTRIBUTE FLUFFY SEED. THE LARGER SEED SPECIES SHALL BE COMBINED AND SEEDED FIRST. SMALLER SEED SPECIES SHALL BE MIXED WITH A FILLER AND THEN APPLIED OVER THE LARGER SEED. SEED SHALL BE FREQUENTLY MIXED WITHIN THE HOPPER TO ENSURE EVEN DISTRIBUTION OF SPECIES.

19. SEEDING UNDER EROSION CONTROL FABRIC/BLANKET SHALL BE PERFORMED CONCURRENTLY WITH THE INSTALLATION OF THE FABRIC/BLANKET. ALL OTHER SEED SHALL BE INSTALLED PRIOR TO CONSISTENT GROUND FREEZE FROM APPROX. SEPT. 1 TO NOV. 31 FOR DORMANT SEEDING OR AFTER SPRING THAW FROM APPROX. APRIL 1 TO MAY 31 FOR ACTIVE SEEDING, UNLESS OTHERWISE APPROVED BY THE ENGINEER OR ECOLOGIST. SEEDING SHALL BE PERFORMED ONLY DURING SPECIFIED PERIODS OR WHEN SITE AND WEATHER CONDITIONS WILL PRODUCE BENEFICIAL RESULTS. IF THE CONTRACTOR PERFORMS SEEDING OUTSIDE OF THE SPECIFIED SEASONS OR WHEN UNSATISFACTORY SITE CONDITIONS SUCH AS EXCESSIVE MOISTURE, HIGH WIND VELOCITIES, OR WHEN THE SOIL IS IN A FROZEN OR CRUSTED STATE PREVENTING PROPER DISTRIBUTION AND IMPREGNATION OF SEED, THEN THE CONTRACTOR WILL INSURE ADEQUATE GERMINATION AND GROWTH CONDITIONS, RESEED, REMULCH, AND REPAIR ANY AREAS THAT FAIL TO PRODUCE.

20. ANY STRAW MULCH USED SHALL CONSIST OF CERTIFIED WEED FREE FIELD STRAW OF OATS, BARLEY, WHEAT, RYE, OR TRITICALE CERTIFIED UNDER THE COLORADO DEPT. OF AGRICULTURE WEED FREE FORAGE CERTIFICATION PROGRAM. STRAW IN AN ADVANCED STAGE OF DECOMPOSITION OR STRAW THAT BREAKS IN THE CRIMPING PROCESS WILL NOT BE ACCEPTED.

21.CERTIFIED WEED FREE **STRAW MULCH SHALL BE UNIFORMLY APPLIED AT A RATE OF 2 TONS PER ACRE** (4000#) AND ANCHORED INTO THE SOIL WITH EQUIPMENT HAVING FLAT, SERRATED DISKS WITH DULL EDGES AND DISKS SPACED NO MORE THAN 6 INCHES APART. MULCH SHALL BE ANCHORED TO A DEPTH OF AT LEAST 4 INCHES AND SHALL NOT BE COVERED WITH AN EXCESSIVE AMOUNT OF SOIL. ANCHORING OPERATIONS SHALL BE ACROSS THE SLOPES WHERE PRACTICAL WITH NO MORE THAN TWO PASSES OF THE ANCHORING EQUIPMENT. CRIMPING BY HAND SHOVEL OR OTHER MECHANICAL MEANS SHALL BE PERFORMED ON AREAS INACCESSIBLE TO LARGE CRIMPING EQUIPMENT. **MULCH SHALL BE TACKIFIED TO THE GROUND SURFACE AT A RATE OF 200# PER ACRE**. SEEDED AREAS SHALL BE MULCHED ON THE SAME DAY AS THEY ARE SEEDED.

22. SPRAY-ON OR **HYDROMULCH**, IF NECESSARY, **SHALL BE A HYDRAULICALLY APPLIED MATRIX** CONTAINING ORGANIC FIBERS, WATER SOLUBLE CROSS-LINKED TACKIFIER, AND REINFORCING NATURAL INTERLOCKING FIBERS **AT A RATE OF 3000 LBS/ACRE**. HYDROMULCHING SHALL BE A SECOND, SEPARATE OPERATION PERFORMED AFTER HYDROSEEDING, RAKING/HARROWING.


23. EROSION CONTROL FABRIC (ECF) AND/OR BLANKET (ECB) OR APPROVED EQUIVALENTS SHALL BE PROVIDED & INSTALLED AS DIRECTED BY THE ECOLOGIST.

REVISIONS

Revision	Date	Description

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ST. VRAIN CREEK REACH 3
PLANTING NOTES AND
PERFORMANCE
SPECIFICATIONS

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: December 21, 2016
SHEET LN1

C:\110666 St Vrain Branch\landscapes Detail\Ecogrow.dwg, Saved:12/20/16, PRINTED:12/21/16

PLANTING NOTES:

DELIVERY:

1. ALL PLANTS SHALL BE DELIVERED TO THE SITE PRIOR TO INSTALLATION TO ALLOW FOR INSPECTION AND ADVANCE STAGING OF PLANT MATERIALS.
2. PLANT MATERIAL WILL BE DELIVERED TO THE SITE IN THE SPECIES, SIZE/FORM, AND QUANTITIES SPECIFIED. PLANT MATERIAL WILL BE ACCOMPANIED BY A SHIPPING CERTIFICATE ATTESTING TO THE SAME. THE CONTRACTOR SHALL COUNT AND CONFIRM THE DELIVERY IS ACCURATE AND INSPECT PLANT MATERIAL TO ENSURE THE PLANT MATERIAL IS IN GOOD CONDITION AND HEALTH.
4. PLANT MATERIAL SHALL BE STAGED BY SPECIES IN SEPARATE AND IDENTIFIABLE GROUPS DURING UNLOADING.
5. PLANT MATERIAL SHALL BE IDENTIFIED WITH ATTACHED, DURABLE, WATERPROOF LABELS AND WEATHER RESISTANT INK, STATING THE CORRECT SCIENTIFIC AND COMMON NAME.
6. PLANT MATERIAL SHALL BE PROTECTED DURING DELIVERY TO PREVENT DESICCATION AND DAMAGE TO THE BRANCHES, TRUNK, ROOT SYSTEMS, OR EARTH/ROOTBALL. BRANCHES SHALL BE PROTECTED BY TYING-IN. EXPOSED BRANCHES SHALL BE COVERED DURING TRANSPORT.
7. PLANT MATERIAL SHALL BE KEPT SHADED, WATERED AND MAINTAINED IN GOOD HEALTH DURING TRANSPORT AND THEREAFTER UNTIL THE PROJECT IS APPROVED.

PLANT QUALITY:

1. ALL PLANTS WILL BE CHECKED AND APPROVED BY THE ECOLOGIST & CONTRACTOR PRIOR TO PLANTING TO ENSURE CONFORMITY OF SPECIES, QUALITY AND QUANTITY. PLANT MATERIAL SHALL:
- A. BE WELL SHAPED, VIGOROUS AND HEALTHY WITH A WELL BRANCHED ROOT SYSTEM, FREE FROM DISEASE, HARMFUL INSECTS AND INSECT EGGS, SUN-SCALD INJURY, DISFIGUREMENT OR ABRASION;
- B. BE CHECKED FOR UNAUTHORIZED SUBSTITUTION AND EXHIBIT TYPICAL FORM OF BRANCH TO HEIGHT RATIO;
- C. MEET THE CONTAINER, CALIPER AND HEIGHT MEASUREMENTS SPECIFIED AND NOT BE CROPPED;
- D. SHOW NEW FIBROUS ROOTS AND MAINTAIN ITS SHAPE WHEN REMOVED FROM THE CONTAINER AND NOT HAVE BROKEN OR CRACKED ROOTBALLS, OR BROKEN CONTAINERS;
- E. CONFORM TO THE AMERICAN ASSOCIATION OF NURSERYMEN'S STANDARDS FOR NURSERY STOCK.
2. IF WITHIN 24 HOURS OF DELIVERY THE ENGINEER OR ECOLOGIST DETERMINES THAT THE PLANT MATERIAL DOES NOT MEET THESE SPECIFICATIONS, THE UNACCEPTABLE MATERIAL SHALL BE REJECTED, REMOVED, AND REPLACED AT NO EXPENSE TO THE CLIENT.
3. IF OVER THE COURSE OF THE PROJECT THE ECOLOGIST DISCOVERS THE CONTRACTOR HAS FAILED TO PROPERLY STORE, INSTALL & MAINTAIN ANY PREVIOUSLY ACCEPTED PLANT MATERIAL, SAID MATERIAL WILL BE REMOVED AND REPLACED WITH ACCEPTABLE MATERIAL AT THE EXPENSE OF THE CONTRACTOR.

STORAGE:

1. PLANT MATERIALS SHALL BE STORED AND PROTECTED IN DESIGNATED TEMPORARY ON-SITE NURSERY AREA. PLANT MATERIAL SHALL BE PROTECTED FROM DIRECT EXPOSURE TO WIND AND SUN, KEPT SHADED AND MOIST BY WATERING, EITHER BY HAND OR A TEMPORARY IRRIGATION SYSTEM UNTIL INSTALLED.
- ONLY THE NUMBER OF WILLOW CUTTINGS (IF SPECIFIED) THAT CAN BE PLANTED IN ONE DAY WILL BE DELIVERED TO THE PLANTING SITE. IMMEDIATELY AFTER HARVESTING, WILLOW CUTTINGS OR POLES SHALL BE FULLY SUBMERGED AND STORED IN A COLD/COOL WATER (EITHER IN A TANK OR NATURAL WATER BODY) IN A DARK OR SHADED LOCATION FOR A MINIMUM OF 5 DAYS. FAILURE TO PROPERLY STORE AND HYDRATE WILLOW CUTTINGS OR IF CUTTINGS LINGER ON SITE MORE THAN 2 DAYS BEFORE PLANTING WILL BE REPLACED BY THE CONTRACTOR AT NO COST TO THE CLIENT IF SAID CUTTINGS FAIL TO THRIVE.

HANDLING:

PLANT MATERIAL SHALL NOT BE INJURED DURING HANDLING OR PLANTING. ROOTS OR WILLOW CUTTINGS OR POLES, IF SPECIFIED, SHALL NOT BE ALLOWED TO BECOME DRY.

MULCH:

1. ORGANIC MULCH USED TO HELP RETAIN SOIL MOSITURE IN PLANTING SAUCERS SHALL CONSIST OF SHREDDED WOOD FIBER (A.K.A., GORRILA HAIR) TO A DEPTH OF 4". MULCH SHALL BE FREE FROM WEEDS, MOLD, AND OTHER DELETERIOUS MATERIALS

TREE STAKING AND GUYING:

1. TREE STAKING WILL BE REQUIRED FOR TREES 2 INCHES IN CALIPER OR GREATER. ONE BRACING STAKE IS REQUIRED FOR TREES 4 TO 6 FEET HIGH. TWO BRACING STAKES ARE REQUIRED FOR TREES 6 TO 8 FEET HIGH. THREE BRACING OR GROUND STAKES ARE REQUIRED FOR TREES OVER 8 FEET HIGH OR GREATER THAN 6 CALIPER INCHES. AT LEAST ONE BRACING STAKE SHALL BE PLACED ON THE SIDE OF THE TREE FACING THE PREVAILING WIND WITH THE REMAINDER SPACED EQUIDISTANTLY AROUND. THE BRACING STAKE SHALL BE DRIVEN VERTICALLY INTO FIRM GROUND OUTSIDE OF THE ROOTBALL AND SHALL NOT INJURE THE BALL OR ROOT SYSTEM.

THE TREE SHALL BE HELD FIRMLY TO THE STAKE WITH A DOUBLE STRAND OF GUYING MATERIAL. GUYING MATERIAL SHALL BE ATTACHED TO A TREE STRAP (OR APPROVED EQUIVALENT) PLACED APPROXIMATELY ½ THE TREE HEIGHT OR ABOVE THE FIRST MAJOR BRANCH. ONE TURNBUCKLE SHALL BE CENTERED ON EACH GUY LINE FOR TREE STRAIGHTENING PURPOSES.

2. TREE STAKES SHALL BE T-POSTS (OR EQUIVALENT) AND A MINIMUM 6 FEET LONG WITH A PROTECTIVE END CAP. GUYING MATERIAL SHALL BE A MINIMUM 14-16 GAUGE WIRE. TURNBUCKLES SHALL BE GALVANIZED OR CADMIUM-PLATED STEEL, AND SHALL BE A MINIMUM 3 INCHES LONG WITH CLOSED SCREW EYES ON EACH END. TREE STRAPS SHALL BE USED TO PROTECT TREE TRUNK AND BRANCHES FROM GUYING MATERIAL. LENGTH SHALL BE 1.5 TIMES THE CIRCUMFERENCE OF THE PLANT TRUNK AT ITS BASE.

INSTALLATION:

1. UNLESS DIRECTED OTHERWISE OR THE HEIGHT OR SMALL STATURE OF THE PLANT DOES NOT ALLOW, ALL PLANTS CAPABLE OF DEEP BURIAL WILL BE DEEP PLANTED SO THAT THEIR ROOT BALL IS IN CONTACT WITH OR JUST ABOVE THE CAPILLARY FRINGE (I.E., LOW GROUNDWATER LEVEL). PLANTS NOT DESIGNATED FOR DEEP PLANTING (REFER TO PLANT SCHEDULES) SHALL BE DUG TO A DEPTH EQUAL TO THE HEIGHT OF THE ROOT BALL AS MEASURED FROM THE BASE OF THE BALL TO THE BASE OF THE PLANT TRUNK SO THAT THE TOP OF THE ROOT BALL IS LEVEL WITH THE FINAL GRADE. ALL PLANT PITS SHALL BE DUG A MINIMUM 2 TIMES THE WIDTH OF THE ROOT BALL TO ALLOW FOR ROOT EXPANSION. THE PIT SHALL BE EXCAVATED WITH ROUGHENED SIDES, SLOPING TOWARDS THE BASE AS A CONE. CYLINDRICAL PITS WITH VERTICAL SIDES, ESPECIALLY IN CLAY, SHALL NOT BE USED. (REFER TO PLANTING DETAILS). REFER TO PLANT SCHEDULES FOR THOSE PLANTS THAT CAN BE DEEP PLANTED.
2. PLANT MATERIAL SHALL BE INSERTED INTO THE CENTER OF THE PIT, SET PLUMB, AND HELD IN POSITION UNTIL SUFFICIENT NATIVE SOIL HAS BEEN FIRMLY PLACED AROUND THE ROOT SYSTEM.
3. ROOT BOUND PLANTS WILL BE SCORED OR RIPPED 1/4 TO 1/2 INCH DEEP AT 3 TO 4 LOCATIONS AROUND THE EDGES OF THE ROOT BALL.
4. BACKFILL SOIL SHALL BE COMPOSED OF 50 PERCENT NATIVE SOIL AND 50% TOPSOIL. IF NATIVE SOIL IS GREATER THAN 50 PERCENT ROCK THEN TOPSOIL SHALL BE USED.
5. PRIOR TO BACKFILLING, ALL BURLAP & WIRE BASKETS SHALL BE REMOVED FROM THE BALL OR ROOT SYSTEM AVOIDING DAMAGE TO THE ROOT SYSTEM.
6. BACKFILL SOIL SHALL BE CAREFULLY WORKED AROUND AND OVER THE PLANT ROOTS AND THOROUGHLY AND PROPERLY SETTLED BY FIRMING, HAND TAMPING AND "WATERING IN".
7. A 6" MINIMUM HIGH COMPACTED EARTH BERM OR SAUCER, CONSISTING OF BACKFILL EXCAVATED FROM THE PIT, SHALL BE FORMED AROUND THE EDGE OF THE PLANT PIT TO AID IN WATER RETENTION AND TO PROVIDE SOIL SETTLING ADJUSTMENTS. PLANTS SMALLER THAN 1 GAL. DO NOT REQUIRE A SAUCER.
8. SOIL EXCAVATED FROM THE PLANT PIT WILL BE HANDLED DELIBERATELY TO FORM THE PLANT SAUCER AND WILL NOT BE CARELESSLY SPREAD OUT OR COVER EXISTING VEGETATION OR SEEDED AREAS. WHEN INTER-PLANTING IN EXISTING, MATURE GRASSLAND OR WETLAND, EXCAVATED SOIL WILL BE PLACED ON A TARP OR SIMILAR TO AVOID INDISCRIMINATE SPOILS FROM BURYING SAID EXISTING VEGETATION. EXCESS SOIL EXCAVATED FROM THE PLANT PIT THAT IS NOT USED TO TO FORM THE SAUCER WILL BE HAULED AWAY FROM THE PROJECT SITE AND DISPOSED OF PROPERLY. THE PLANT SAUCER AND BASIN WILL BE SEEDED.
8. ALL PLANT MATERIAL SHALL BE WATERED IMMEDIATELY AFTER BACKFILLING UNTIL COMPLETELY SATURATED. SEE WATERING PARAMETERS.
9. WOOD MULCH SHALL BE PLACED WITHIN 48 HOURS AFTER PLANTING TO A MINIMUM DEPTH OF 4 UNIFORM INCHES.
10. PRUNING SHALL BE ACCOMPLISHED BY TRAINED AND EXPERIENCED PERSONNEL. ONLY DEAD OR BROKEN MATERIAL SHALL BE PRUNED FROM INSTALLED PLANTS. THE TYPICAL GROWTH HABIT OF INDIVIDUAL PLANT MATERIAL SHALL BE RETAINED.

HARVESTED/SALVAGED PLANTS (IF SPECIFIED):

1. PLANTS HARVESTED/SALVAGED FROM DESIGNATED ON-SITE SOURCES SHALL BE CAREFULLY REMOVED FROM THE SITE PRIOR TO ANY CLEARING OR GRUBBING ACTIVITIES.
2. THE ROOTBALL OF HARVESTED PLANTS SHALL BE PRESERVED, AND EITHER BALLED & BURLAPPED (B&B) OR PLACED IN APPROPRIATELY SIZED CONTAINERS. (SEE TREE & SHRUB SALVAGE SCHEDULE, IF SPECIFIED).

3. WILLOW ROOTBALLS (I.E., CLUMPS), IF SPECIFIED SHALL BE STOCKPILED, MAINTAINED AND KEPT MOIST UNTIL FINAL PLANTING. ALL OTHER PLANTS (POTTED OR B&B) SHALL BE MAINTAINED IN GOOD HEALTH UNTIL FINAL PLANTING.

4. WILLOW CUTTINGS WILL BE CLEANLY CUT AT THE BASE OF THE WILLOW SHRUB (APPROXIMATELY. 8" FROM THE GROUND SURFACE) PRIOR TO REMOVING WILLOW CLUMP.

5. ALL SALVAGED PLANTS WILL SHALL BE EQUIVALENT IN QUALITY AND HANDLED, PLANTED AND MAINTAINED WITH THE SAME CARE AS A NURSERY GROWN PLANT MATERIAL..

MAINTENANCE :

1. ALL PLANTED MATERIAL AND SEEDED AREAS SHALL BE WARRANTED AND MAINTAINED BY THE CONTRACTOR UNTIL FINAL ACCEPTANCE AND THEREAFTER UNTIL PERFORMANCE CRITERIA ARE MET OR A **PERIOD OF 2 FULL GROWING SEASONS** FOLLOWING INSTALLATION, WHICHEVER COMES FIRST. REFER TO PERFORMANCE CRITERIA (WARRANTY) NOTES.

2. MAINTENANCE TASKS WILL INCLUDE WEED CONTROL, SEEDING & MULCH REPAIR, PLANTING SAUCER REPAIR. **WATERING OF PLANTINGS AND PLANT REPLACEMENT MAY BE ADDED AS A CONTINGENCY (IF PROJECT FUNDING ALLOWS)**. SEE WATERING (CONTINGENCY) BELOW.

WEED CONTROL:

1. NOXIOUS & RESTRICTED WEEDS SHALL BE MONITORED & CONTROLLED BY A QUALIFIED WEED MANAGEMENT SPECIALIST WHERE WEEDS PREVENT THE ESTABLISHMENT OF NATIVE STANDS OF VEGETATION. THE AREA WHERE WEEDS SHALL BE MANAGED INCLUDES:
- THE ACTIVE FOOTPRINT OF THE PROJECT AS DEFINED BY THE LIMITS OF DISTURBANCE (LOD);
 - ANY AREAS DISTURBED BY THE CONTRACTOR OUTSIDE OF THE LOD;
 - ADJACENT, WEED INFESTED AREAS WITHIN 100 FEET OF THE LOD; AND
 - ANY AREAS SPECIFICALLY INDICATED ON THE PLANS.

POTENTIAL CONTROLS SHALL INCLUDE:

- A. MOWING ENTIRE SEEDED AREAS (TO CONTROL ANNUAL WEEDS PRIOR TO SEED SET).
- B. MOWING LOCALIZED INFESTATIONS WITH A STRING TRIMMER.
- C. HAND-DIGGING OR PULLING OF THE ROOTS.
- D. HERBICIDE APPLICATION OF WATER SAFE OR OTHER APPROVED HERBICIDES (DEPENDING ON WEED TYPE) INCLUDING, BUT NOT LIMITED TO CANADA THISTLE, TOADFLAX, KNAWEED, LEAFY SPURGE, AND LAMBS QUARTERS. A LICENSED HERBICIDE/PESTICIDE APPLICATOR MAY BE REQUIRED.

SEEDING MAINTENANCE:

1. BARREN AREAS GREATER THAN **FIVE (5) SQUARE FEET**, OR THOSE AREAS THAT FAIL TO PRODUCE A SATISFACTORY STAND OF NATIVE GRASSES OR GRASS-LIKE SPECIES SHALL BE RESEEDED AND MULCHED ACCORDING TO THESE SPECIFICATIONS.

2. GULLY, RILL AND EROSIONAL AREAS WILL BE REPAIRED AS NECESSARY UNTIL PLANTS HAVE ESTABLISHED AND EROSION PROBLEMS CEASE. EROSION CONTROL BLANKET AND/OR FABRIC MAY NEED TO BE INSTALLED, REINSTALLED OR REPAIRED.

PLANTING SAUCER MAINTENANCE:

1. TWICE PER YEAR (IN APRIL AND AUGUST), ALL PLANTING SAUCERS SHALL BE INSPECTED AND THE FOLLOWING COMPLETED:
- A. REMOVAL (BY PULLING OR STRING TRIMMER, DEPENDING ON CONDITIONS) OF ANY PLANTS THAT ARE NOT OF THE SPECIES PLANTED.
- B. RE-BUILDING OF SAUCERS AND REPAIR OF BLOW-OUTS, IF NEEDED, TO A MINIMUM HEIGHT OF 6 INCHES.
- C. APPLICATION OF ADDITIONAL WOOD MULCH UP TO THE 4 INCHES THAT MAY HAVE BLOWN AWAY OR BEEN DISPLACED.
- D. OBSERVATION OF THE HEALTH OF TREES AND REPORTING TO THE CLIENT AND ENGINEER IF ANY EVIDENCE OF DAMAGE IS NOTICED.

WATERING (CONTINGENCY):

EVERY EFFORT HAS BEEN MADE IN THE DEVELOPMENT OF THESE PLANTING PLANS TO SPECIFY SPECIES & LOCATE PLANTS IN ZONES THAT WILL BE NATURALLY SUSTAINED BY SURFACE & ALLUVIAL SUBSURFACE FLOW. HOWEVER, RUN-OFF AND PRECIPITATION, EITHER IN THE FORM OF RAIN OR SNOW, CAN NOT BE GUARANTEED. THEREFORE, THIS SECTION IS PROVIDED AS CONTINGENCY SHOULD ADDITIONAL FUNDING BE MADE AVAILABLE TO PROVIDE ON-GOING WATERING MAINTENANCE OF INSTALLED PLANTS.

ALL WOODY PLANT MATERIAL SPECIFIED, INCLUDING TREES, SHRUBS, CUTTINGS, AND POLES (IF SPECIFIED) SHALL BE WATERED BY THE CONTRACTOR BY HAND, HOSE, BUCKET, PORTABLE OR FIXED PUMP, WATER TANK OR TRUCK, TEMPORARY OR PERMANENT IRRIGATION SYSTEM (OVERHEAD SPRAY AND/OR DRIP), OR OTHER EFFECTIVE METHOD OR WATERING DEVICE AS DETERMINED BY THE CONTRACTOR, AS NEEDED.

NOTE: CLIENT WILL MAKE AVAILABLE AN ON-SITE WATER SOURCE OR WATER RIGHTS THAT CAN BE USED TO IRRIGATE AND MAINTAIN SEEDING AREAS AND PLANT MATERIAL.

THE CONTRACTOR SHALL CONTINUE TO WATER ALL PLANT MATERIALS ACCORDING TO THE FOLLOWING GENERAL PARAMETERS:

1. TREES & SHRUBS

YEAR 1 - WATERING WILL NEED TO OCCUR ON THE FOLLOWING SCHEDULE DURING THE FIRST GROWING SEASON:

- NOVEMBER - FEBRUARY: ONCE EVERY THREE WEEKS
- MARCH - MAY: ONCE EVERY TWO WEEKS
- JUNE - AUGUST: ONCE EVERY WEEK
- SEPTEMBER - OCTOBER: ONCE EVERY TWO WEEKS

YEAR 2 - WATERING WILL NEED TO OCCUR ON THE FOLLOWING SCHEDULE DURING THE SECOND GROWING SEASON:

- NOVEMBER - FEBRUARY: ONCE EVERY FOUR WEEKS
- MARCH - MAY: ONCE EVERY THREE WEEKS
- JUNE - AUGUST: ONCE EVERY TWO WEEKS
- SEPTEMBER - OCTOBER: ONCE EVERY THREE WEEKS

THE SUBCONTRACTOR SHALL DILIGENTLY MONITOR THE PLANTS, SOIL MOISTURE LEVELS AND THE AMOUNT OF NATURAL PRECIPITATION THEY ARE RECEIVING. IF TREES & SHRUBS NEED TO BE WATERED MORE OR LESS FREQUENTLY THAN OUTLINED ABOVE, THE CONTRACTOR SHALL MAKE ADJUSTMENTS TO THE SCHEDULE ACCORDINGLY TO ENSURE THAT THE PLANTS ARE WATERED APPROPRIATELY.

2. WILLOW CLUMPS, CUTTINGS & TUBLINGS

WILLOW CUTTINGS AND/OR TUBLINGS (IF SOIL IS NOT NATURALLY & PERSISTENTLY SATURATED) SHALL BE WATERED TO COMPLETELY SATURATE THE SOIL AT LEAST ONCE A WEEK IN ACCORDANCE WITH THE YEAR 1 AND 2 WATERING SCHEDULE FOR TREES & SHRUBS.

3. SEEDING AREAS

SEEDED AREAS SHALL BE ALLOWED TO ESTABLISH NATURALLY WITHOUT IRRIGATION IF A TEMPORARY OR PERMANENT OVERHEAD IRRIGATION AND WATER SOURCE IS NOT AVAILABLE.

WATER SHALL BE APPLIED USING A METHOD DETERMINED BY THE CONTRACTOR AT A FREQUENCY AND TIME OF DAY (EARLY MORNING OR LATE EVENING) TO ENSURE THAT SEEDLINGS THRIVE. THE DURATION OF EACH IRRIGATION SESSION SHALL NOT PRODUCE GULLIES, RILLS OR OTHERWISE ERODE THE SOIL.

WATERING PARAMETERS:

1. AT EACH WATERING, WOODY PLANTS SHALL RECEIVE THE FOLLOWING MINIMUM AMOUNTS OF WATER BASED ON CONTAINER SIZE OR AN AMOUNT SUFFICIENT TO SATURATE THE SOIL WITHIN THE PLANTING SAUCER TO A DEPTH OF 12 INCHES:

- A. QUART-SIZED CONTAINERS SHALL RECEIVE 1 GALLON
- B. ONE-GALLON SIZED CONTAINERS SHALL RECEIVE 2.5 GALLONS,
- C. FIVE-GALLON SIZED CONTAINERS SHALL RECEIVE 5 GALLONS
- D. SEVEN-GALLON-SIZED CONTAINERS SHALL RECEIVE 7.5 GALLONS
- E. TEN-GALLON SIZED CONTAINERS SHALL RECEIVE 10 GALLONS
- F. 2" CAL-SIZED TREES SHALL RECEIVE 20 GALLONS
- G. TWENTY-FIVE GALLON SIZED CONTAINERS SHALL RECEIVE 25 GALLONS

2. WATER SHALL BE DISTRIBUTED EVENLY WITHIN THE SAUCER AND NOT BREACH OR DAMAGE THE SAUCER. WATER SHALL BE DISTRIBUTED EVENLY OVER SEEDED AREAS. WATERING SHALL BE ACCOMPLISHED WITHOUT DAMAGE TO EXISTING OR RECENTLY PLANTED VEGETATION.

3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IDENTIFYING THE WATER SOURCE, OBTAINING ANY APPROVALS AND PERMITS FROM THE CLIENT THAT MAY BE REQUIRED TO USE SAID WATER SOURCE, AND DELIVERY OF THE WATER TO THE SITE/IRRIGATION SYSTEM.

4. WATERING TUBES SHALL BE INSTALLED ALONG WITH DEEP PLANTED NUSERY STOCK TO ALLOW FOR DEEP WATERING OF THE ROOTBALL DURING TIMES OF DROUGHT. DEEP PLANTED MATERIALS SHALL RECEIVE THE SAME AMOUNT OF WATER AS DESIGNATED ABOVE. (REFER TO DEEP PLANTING DETAIL).

REVISIONS

Revision	Date	Description

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ST. VRAIN CREEK REACH 3

PLANTING NOTES AND PERFORMANCE SPECIFICATIONS

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: December 21, 2016

SHEET LN2

T:\110666 St Vrain Breached Landscape Detail Ecoss.dwg Saved:12/20/16 PRINTED: 12/21/16

SPECIAL NOTES:

PERFORMANCE CRITERIA (PLANTING & SEEDING WARRANTY):

THE CONTRACTOR SHALL BE RESPONSIBLE FOR ACHIEVING THE FOLLOWING PERFORMANCE CRITERIA:

1. ALL VEGETATION (WOODY OR HERBACEOUS) WILL BE NATIVE TO THE SITE, WATERSHED (I.E., ECOTYPIC), COLORADO AND/OR THE ECO-REGION, TO EXTENT FEASIBLE DEPENDING ON THE NURSERY AND MARKET AVAILABILITY.
2. WOODY PLANT MATERIAL (2" CAL. TREES OR GREATER) SHALL BE MAINTAINED AND REPLACED UP TO A 100% MINIMUM SURVIVAL RATE.
3. WOODY PLANT MATERIAL (POTTED TREES AND SHRUBS) SHALL BE MAINTAINED AND REPLACED UP TO A 80% MINIMUM SURVIVAL RATE.
4. WOODY PLANT MATERIAL (WILLOW CLUMPS, CUTTINGS, OR TUBLINGS) SHALL BE MAINTAINED AND REPLACED UP TO A 80% MINIMUM SURVIVAL RATE.
5. HARVESTED/SALVAGED PLANT MATERIAL, IF SPECIFIED, SHALL BE MAINTAINED AND REPLACED UP TO A 80% MINIMUM SURVIVAL RATE. REPLACEMENTS CAN BE MADE WITH NURSERY GROWN STOCK. EQUIVALENCY SHALL BE MEASURED BY ROOT MASS (E.G. 1- 5 GALLON PLANT IS EQUIVALENT TO 5- 1 GALLON PLANTS).
6. INITIAL SEED GERMINATION OF ALL SEEDED AREAS SHALL PRODUCE A MINIMUM OF ONE (1) MATURE, VIABLE NATIVE PLANT PER SQUARE FOOT.
7. 80% OF THE WETLAND/RIPARIAN SEEDED AREAS (WHERE VEGETATION IS EVIDENTLY EFFECTED BY GREATER MOISTURE LEVELS) SHALL BE COMPRISED OF THE DESIGNED SEED MIX OR OTHER DESIRABLE SPECIES (I.E., NATIVE OR NATURALIZED COLONIZERS).
8. 80% OF UPLAND SEEDED AREAS SHALL BE COMPRISED OF THE DESIGNED SEED MIX OR OTHER DESIRABLE SPECIES (I.E., NATIVE OR NATURALIZED COLONIZERS).
9. NOXIOUS & RESTRICTED WEEDS (AS PER STATE STATUTE) SHALL NOT EXCEED A MEAN FOLIAR COVER OF 0% FOR THOSE ON THE A, B OR C LISTS. ANNUAL WEEDS (NOT LISTED) SHALL NOT EXCEED A MEAN FOLIAR COVER OF 5%
10. PERFORMANCE CRITERIA WILL BE ASSESSED BY THE ECOLOGIST ACCORDING TO MONITORING METHODOLOGIES AND PROTOCOLS DEVELOPED FOR THE PROJECT (UNDER SEPARATE COVER).

TREE REMOVAL:

1. NO TREE OR SHRUBS SHALL BE REMOVED THAT CONTAIN NESTS OR NEST CAVITIES OF BIRDS WHILE THEY ARE FLEDGING OR NESTING. TREES OR ARTIFICIAL NEST SITES THAT ARE ACTIVELY BEING USED BY RAPTORS SHALL NOT BE HARMED UNTIL FLEDGLINGS AND ADULTS HAVE LEFT THE NEST. NO BIRD SHALL BE HARASSED (INTENTIONAL OR UNINTENTIONAL) TO LEAVE OR ABANDON A NEST SITE AS SUCH ACTIONS ARE SUBJECT TO VIOLATION AND POSSIBLE FINES UNDER THE MIGRATORY BIRD TREATY ACT (MBTA)

ANY CIVIL, CRIMINAL PENALTIES OR FINES ASSESSED AS A RESULT OF CONTRACTOR NEGLIGENCE FOR FAILURE TO ABIDE BY THE MBTA SHALL BE BORN BY THE CONTRACTOR OR SUBCONTRACTOR RESPONSIBLE FOR THE VIOLATION.

NUISANCE AND INVASIVE SPECIES:

- 1.THE CONTRACTOR SHALL PREVENT THE SPREAD OF AQUATIC NUISANCE SPECIES AND NOXIOUS AND RESTRICTED WEEDS. THE CONTRACTOR SHALL CLEAN ALL EQUIPMENT PRIOR TO MOBILIZATION TO THE SITE TO REMOVE ALL AQUATIC NUISANCE SPECIES AND WEED SEED IN ACCORDANCE WITH STATE OF COLORADO AQUATIC NUISANCE SPECIES (ANS) REGULATIONS.
2. CONTRACTOR SHALL AVOID TRANSPORTING WEED SEEDS ON TO THE SITE WHICH MAY ADHERE TO EQUIPMENT, VEHICLES, CLOTHING, OR GEAR. IF WEED SEED IS DISCOVER ON ANY OF THE ABOVE, THE CONTRACTOR SHALL PLACE THE SEEDS IN A PLASTIC BAG OR SIMILAR CONTAINER AND DISPOSE OF PROPERLY.
3. CONTRACTOR SHALL AVOID DRIVING IN NOXIOUS WEED INFESTED AREAS PRIOR TO ENTERING THE SITE. INSPECT VEHICLES FOR WEED SEEDS STUCK IN TIRE TREADS OR MUD ON THE VEHICLE AND PREVENT THEM FROM BEING CARRIED TO UNAFFECTED AREAS. DON'T CLEAN INFESTED VEHICLES IN WEED FREE AREA.
4. CONTRACTOR SHALL USE HAY, STRAW, OR MULCH THAT HAS BEEN CERTIFIED WEED FREE.
5. ANY WEED FLOWERS OR SEEDS THAT ARE FOUND ON CONTRACTOR EQUIPMENT WHILE ON SITE SHALL BE PLACED IN A DISPOSABLE BAG OR SIMILAR CONTAINER AND DISPOSED OF PROPERLY.
6. CONTRACTOR SHALL RESTRICT TRAVEL TO ESTABLISHED ROADS AND TRAILS WHENEVER POSSIBLE AND NOT DRIVE THROUGH SENSITIVE AREAS.
7. CONTRACTOR SHALL AVOID LEAVING PILES OF EXPOSED SOIL IN CONSTRUCTION AREAS.
8. REFER TO PLANTING NOTES ON THE HANDLING, DISPOSAL, AND TREATMENT OF PLANT PIT SPOILS.

WILDLIFE DEPREDATION:

1. PROACTIVELY OR UPON SIGNS OF DAMAGE OR LOSS, THE SUBCONTRACTOR SHALL BE PREPARED TO INSTALL CAGING OR FENCING AROUND PLANTED MATERIAL, IMPLEMENT DETERRENTS, OR TAKE ALTERNATIVE MEASURES TO PREVENT FURTHER DAMAGE OR LOSS OF INSTALLED PLANTS DUE TO WILDLIFE DEPREDATION, INCLUDING, BUT NOT LIMITED TO BEAVER, PORCUPINE, DEER, ELK, GEESE AND WATERFOWL.
- A. BEAVER PROTECTION: BEAVER CAGING SHALL BE 48" HIGH (MIN.) 4" X 4" WIRE MESH (OR SMALLER). THE CAGE SHALL BE 12" IN DIAMETER AND FULLY ENIRCLE THE PLANT. THE CAGE SHALL BE SECURED/STAKED TO THE GROUND WITH A MINIMUM OF THREE (3) 6-FOOT (MIN.) RIGID, DURABLE RODS (REBAR, COATED STEEL TOMATO STAKES OR EQUIVALENT). THE RODS SHALL BE WOVEN THROUGH THE WIRE. THE CAGE SHALL BE ANCHORED TO GROUND WITH A MINIMUM OF THREE (3) - 12" LONG (MIN.) STAPLES OR EQUIVALENT TO PREVENT BEAVERS FROM LIFTING AND GETTING TO THE PLANTS FROM UNDER THE CAGE.
- B. ELK OR DEER PROTECTION: EACH PLANT OR SMALL GROUPS OF PLANTS SHALL BE PROTECTED FROM DEER OR ELK BROWSING WITH TEMPORARY WIRE FENCING. THE FENCE SHALL BE BUILT IN SUCH A WAY AS TO PREVENT ANIMALS FROM REACHING THE PLANT PARTS EITHER BY OUTSTRETCHED NECK OR JUMPING WITHIN THE ENCLOSURE. THE FENCE SHALL BE CONSTRUCTED WITH 48" HIGH (MIN.) 4" X 4" WIRE MESH (OR GREATER). THE ENCLOSURE SHALL BE SECURED/STAKED TO THE GROUND AND ATTACHED TO T-POSTS (OR APPROVED EQUIVALENT). OTHER DETERRENTS SUCH AS COYOTE OR PUMA URINE, BITTER SPRAY, RANDOMLY TIMED "SHOTGUN" BLASTS, GUARD DOGS, OR MOTION DETECTION SPRINKLERS, ETC. MAY ALSO BE USED.
- C. WATERFOWL PROTECTION: WATERFOWL ARE KNOWN TO PULL OUT NEWLY PLANTED HERBACEOUS WETLAND PLUGS BEFORE THEY HAVE HAD TIME TO ROOT. WATERFOWL DETERRENT SHALL CONSIST OF INSTALLING A GRID OF 4' TO 6' T-POSTS (OR EQUIVALENT) APPROXIMATELY 10 FEET ON CENTER WITH 2 LEVELS OF TAUGHT MASON TWINE SECURELY STRUNG TO EACH POST. REFLECTIVE BIRD "REPELLER" RIBBON SHALL THEN BE HUNG EVERY 10 FEET ON THE DOUBLE LAYER OF TWINE. ALTERNATIVELY, RANDOMLY TIMED "SHOTGUN" BLASTS OR GUARD DOGS MAY ALSO BE USED.

UTILITY LOCATIONS:

1. UTILITY LOCATIONS AND MARKING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. COLORADO LAW REQUIRES CONTRACTORS TO NOTIFY THE UTILITY NOTIFICATION CENTER OF COLORADO 2 BUSINESS DAYS PRIOR TO MAKING OR BEGINNING AN EXCAVATION. NOTIFICATION MAY BE MADE BY CALLING:**1-800-922-1987**
2. ANY UTILITIES THAT ARE STRUCK AND DAMAGED BY THE GENERAL CONTRACTOR OR CONTRACTOR AS A RESULT OF FAILING TO GET PROPER LOCATES SHALL BE REPLACED AT NO EXPENSE TO THE CLIENT.

CLEAN-UP:

1. ANY TRASH OR DEBRIS PRODUCED BY CONSTRUCTION CREWS SHALL BE CONTAINED, REMOVED FROM THE SITE AND DISPOSED OF PROPERLY ON A DAILY BASIS AND UPON COMPLETION OF THE PROJECT. WIND BLOWN TRASH WILL NOT BE TOLERATED.

ADDITIONAL GENERAL NOTES:

1. PLANS, PERMITS AND CLARIFICATIONS - THE CONTRACTOR SHALL ENSURE ONE COPY OF THE FOLLOWING PLANS ARE ON SITE AT ALL TIMES:
- A. CONSTRUCTION PLANS
- B. STORMWATER MANAGEMENT PLAN (SWMP)/GRADING, EROSION & SEDIMENT CONTROL (GESC) PLAN
- C. CLEAN WATER ACT (CWA), SECTION 404 PERMIT
- D. ALL OTHER PERMITS REQUIRED FOR THE PROJECT

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. THE CONTRACTOR SHALL CONTACT THE ECOLOGIST IN WRITING FOR CLARIFICATION OR DISCREPANCIES ON ANY INFORMATION SHOWN IN THE PLANS.

2. REFERENCE STANDARDS - EXCEPT WHERE OTHERWISE PROVIDED FOR IN THESE PLANS AND NOTES, BOULDER COUNTY STANDARDS SHALL APPLY.

3. ANY ESTIMATE OR QUANTITIES PROVIDE IN THE PLANS OR BID SCHEDULES SHALL BE VERIFIED BY THE CONTRACTOR/SUBCONTRACTOR, 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 CLIENT AND ECOLOGIST 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 DENIAL.

4. ALL PROPERTY PINS, INTERSECTION MONUMENTS, AND SECTION CORNERS DUSTURBED BY THE CONTRACTOR DURING CONSTRUCTION MUST BE REFERENCED AND REPLACED UNDER SUPERVISION OF A LICENSED SURVEYOR AT THE CONTRACTOR'S COST.

LEGEND:

- EXISTING DITCH (MAJOR & MINOR)
- EXISTING CREEK
- EXISTING POND/LAKE/RESERVOIR
- PROJECT LIMITS (300-FOOT BUFFER)
- ZONE 1A - WETLAND PLUGS (STREAMBANK)
- ZONE 1B - WETLAND PLUGS (BACKWATER)
- ZONE 2A & 2B - WETLAND TREES & SHRUBS
- ZONE 3A & 3B - WILLOW CUTTINGS
- ZONE 4 - LOWER RIPARIAN TREES & SHRUBS
- ZONE 5 - UPPER RIPARIAN TREES & SHRUBS
- ZONE 6 - SEEDING & WEED MGMT. (INSIDE PROJ. LIMITS)
- ZONE 7 - WEED MGMT. ONLY (INSIDE PROJ. LIMITS)
- ZONE 8 - SEEDING & WEED MGMT. (OUTSIDE PROJ. LIMITS)

- LANDSCAPE MAP NOTES:
1. REFER TO PLANT ZONE NOTES ON PLANT SCHEDULES, REFER TO PLANT AND SEED SCHEDULES FOR SPECIES, SIZE, SPACING AND QUANTITY.

- MAP DATA SOURCES:
1. PLANIMETRIC DATA, BOULDER COUNTY GIS, 2013 (UPDATED)
2. PARCEL LABELS, BOULDER COUNTY ASSESSOR DATA
3. BREACH DESIGN, ENGINEERING ANALYTICS (EA)
4. CREEK DESIGN, ECOLOGICAL RESOURCE CONSULTANTS (ERC)

REVISIONS

Revision	Date	Description

Engineering Analytics, Inc.

EA

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ST. VRAIN CREEK REACH 3

PLANTING NOTES AND PERFORMANCE SPECIFICATIONS

SCALE VERIFICATION:
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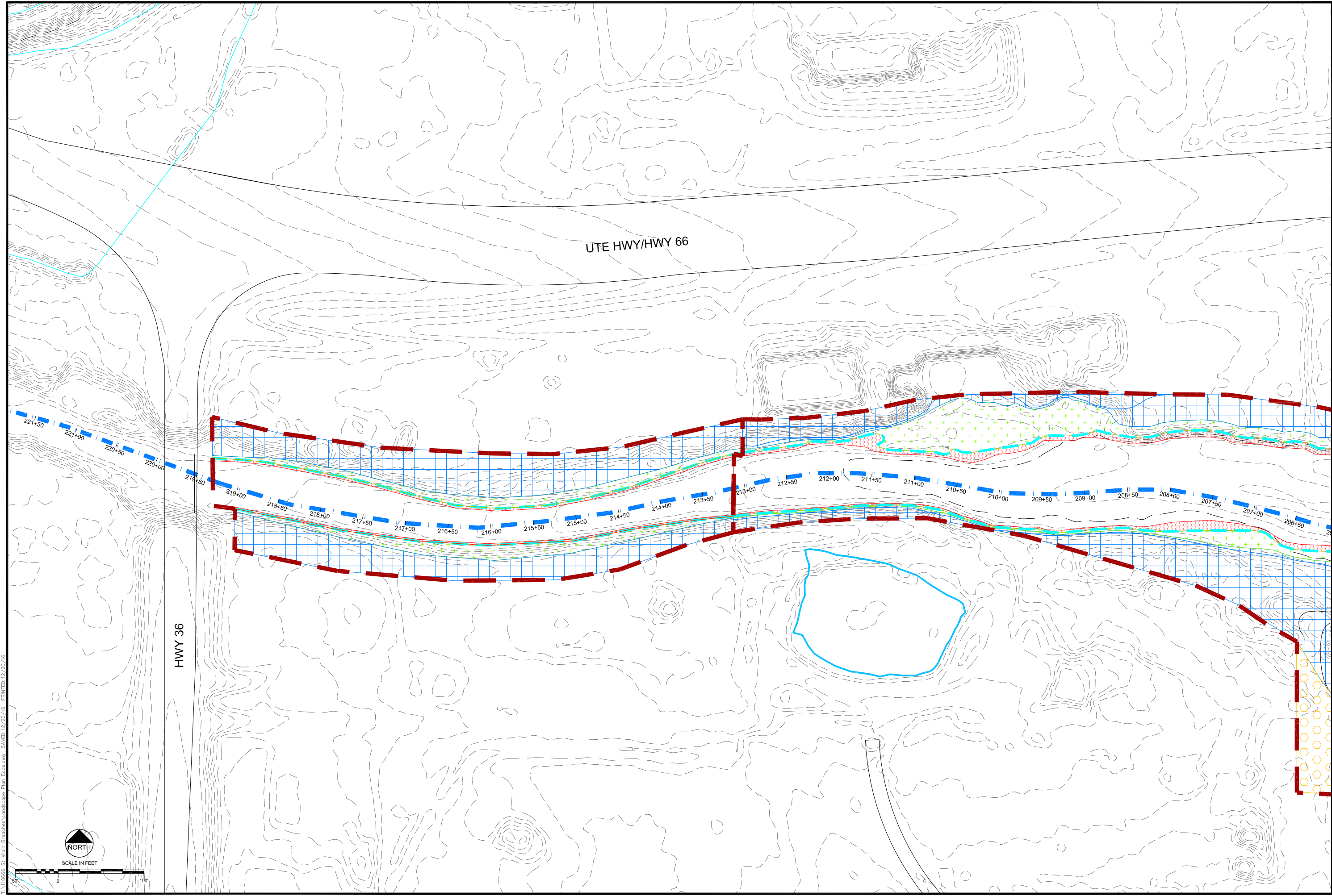
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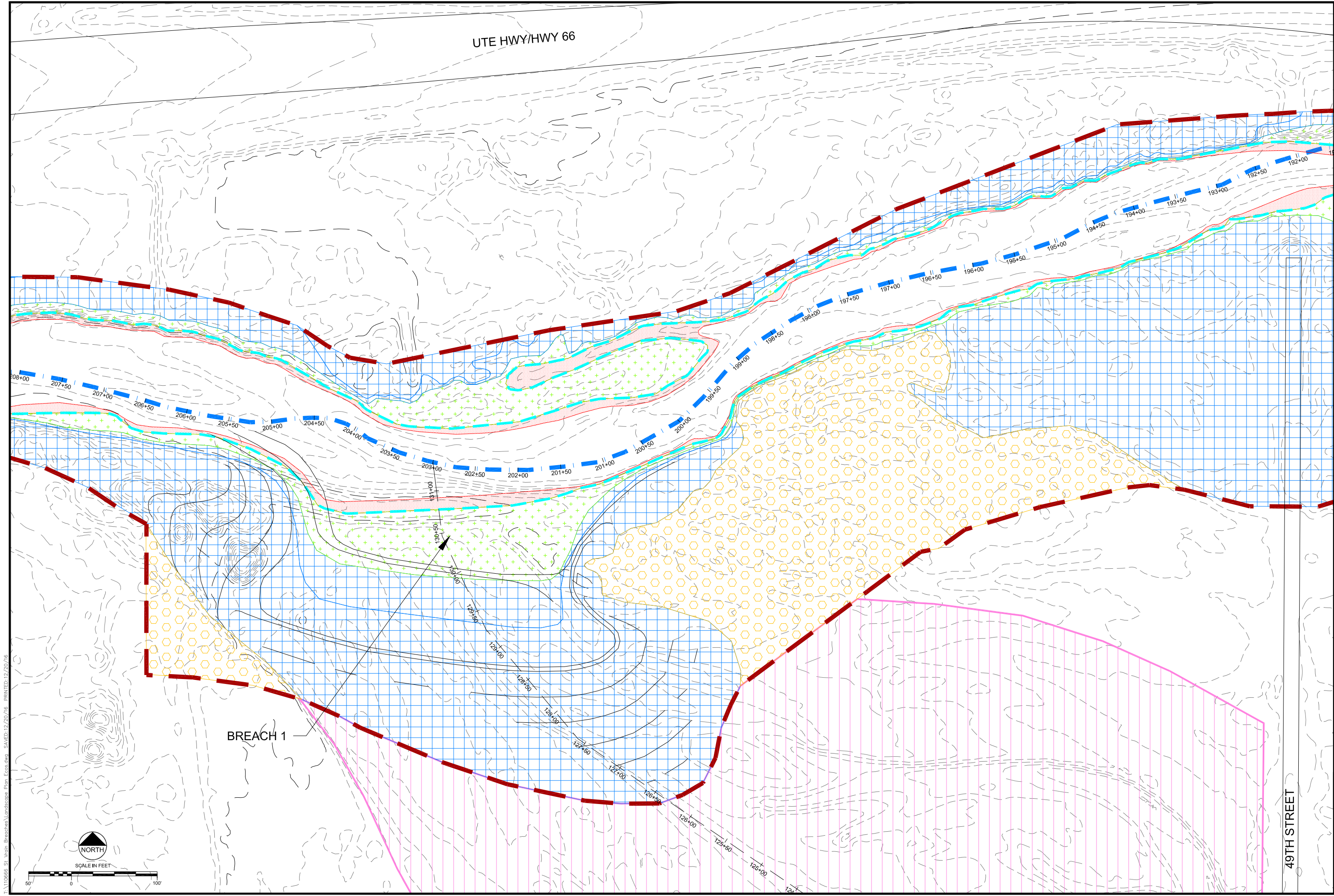
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PLANTING AND SEEDING PLAN

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SHEET L1



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UTE HWY/HWY 66

BREACH 1

49TH STREET

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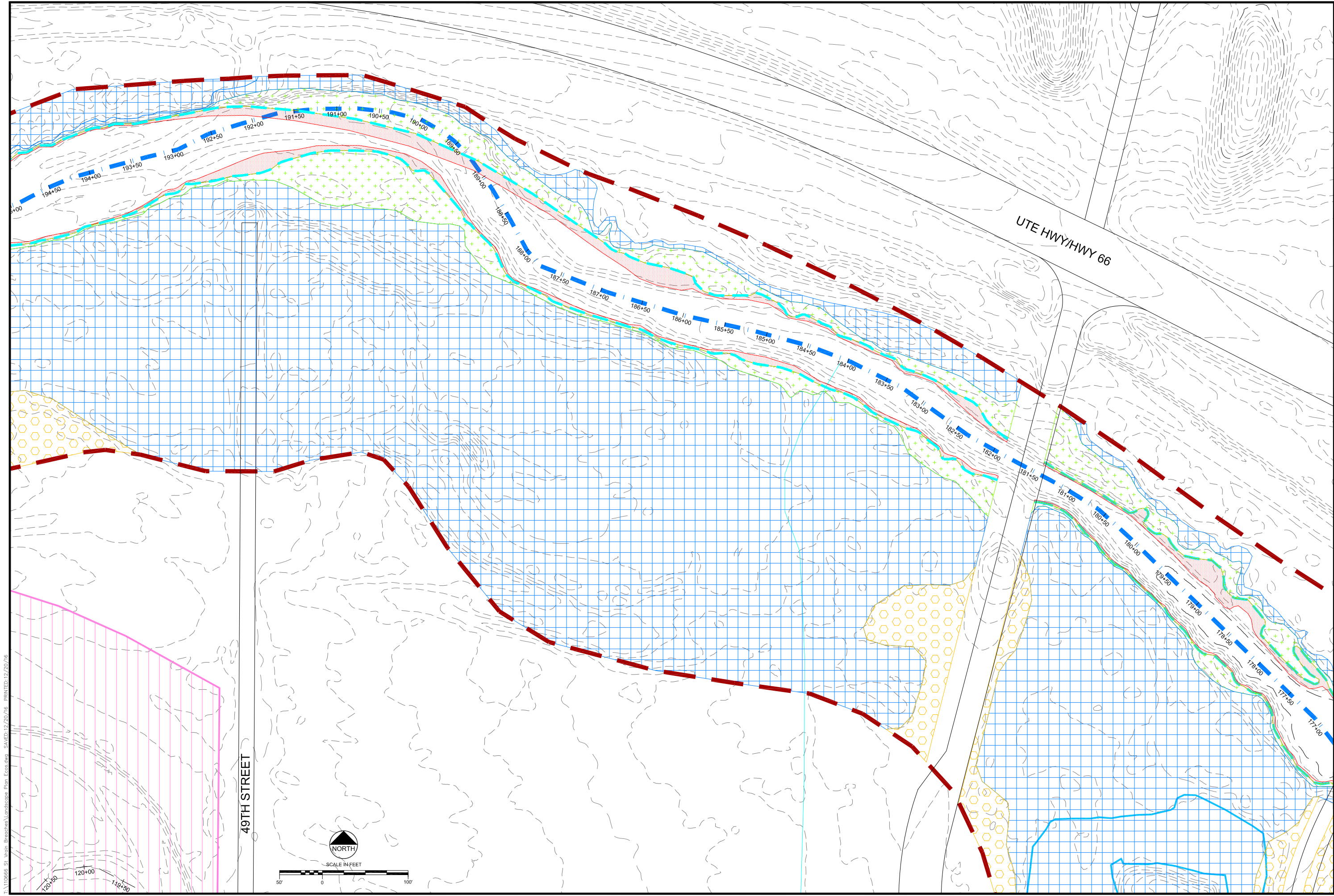
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ST. VRAIN CREEK REACH 3

PLANTING AND SEEDING PLAN

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SHEET **L2**



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49TH STREET




SCALE IN FEET

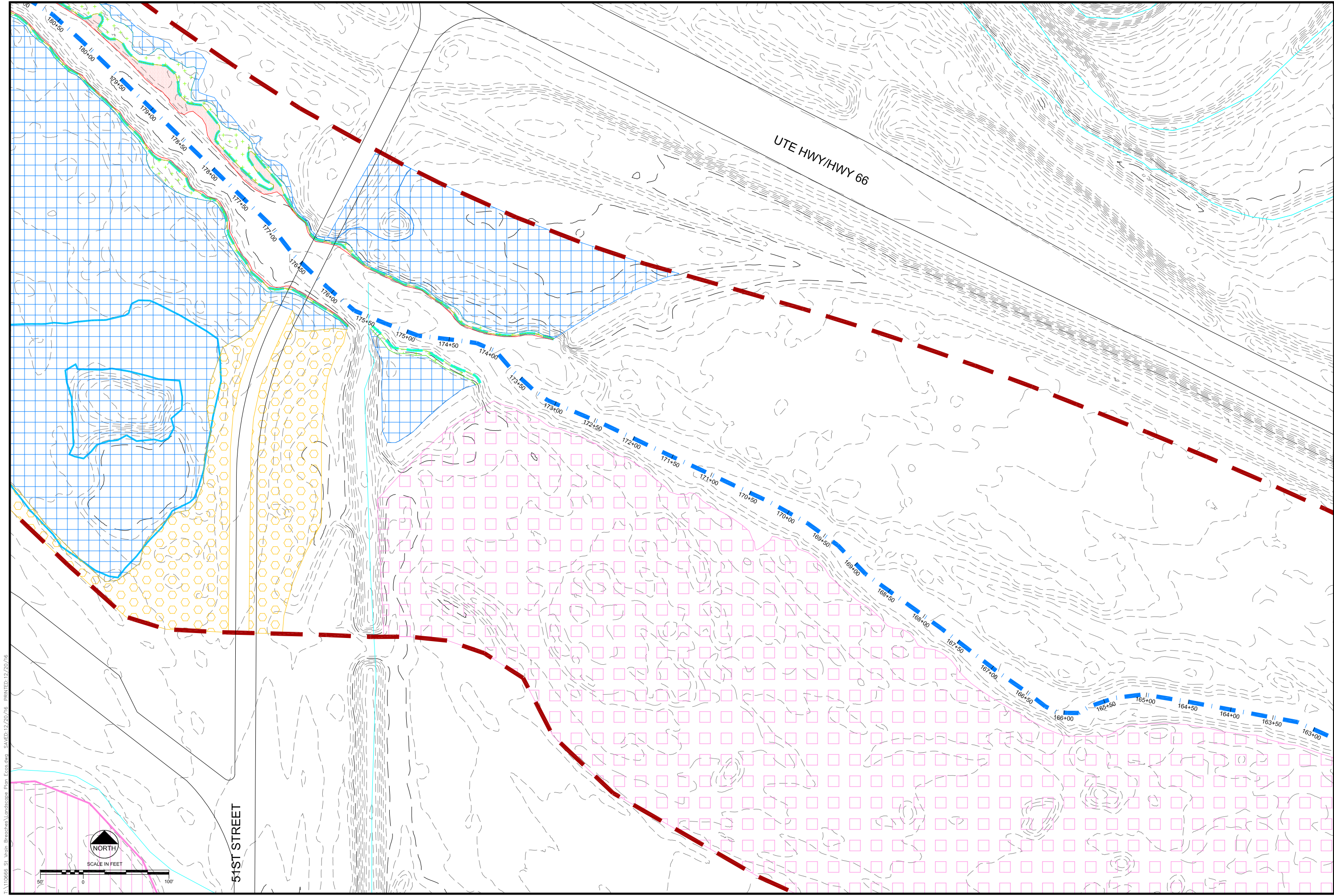


UTE HWY/HWY 66

REVISIONS		
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		PLANTING AND SEEDING PLAN

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SHEET	L3



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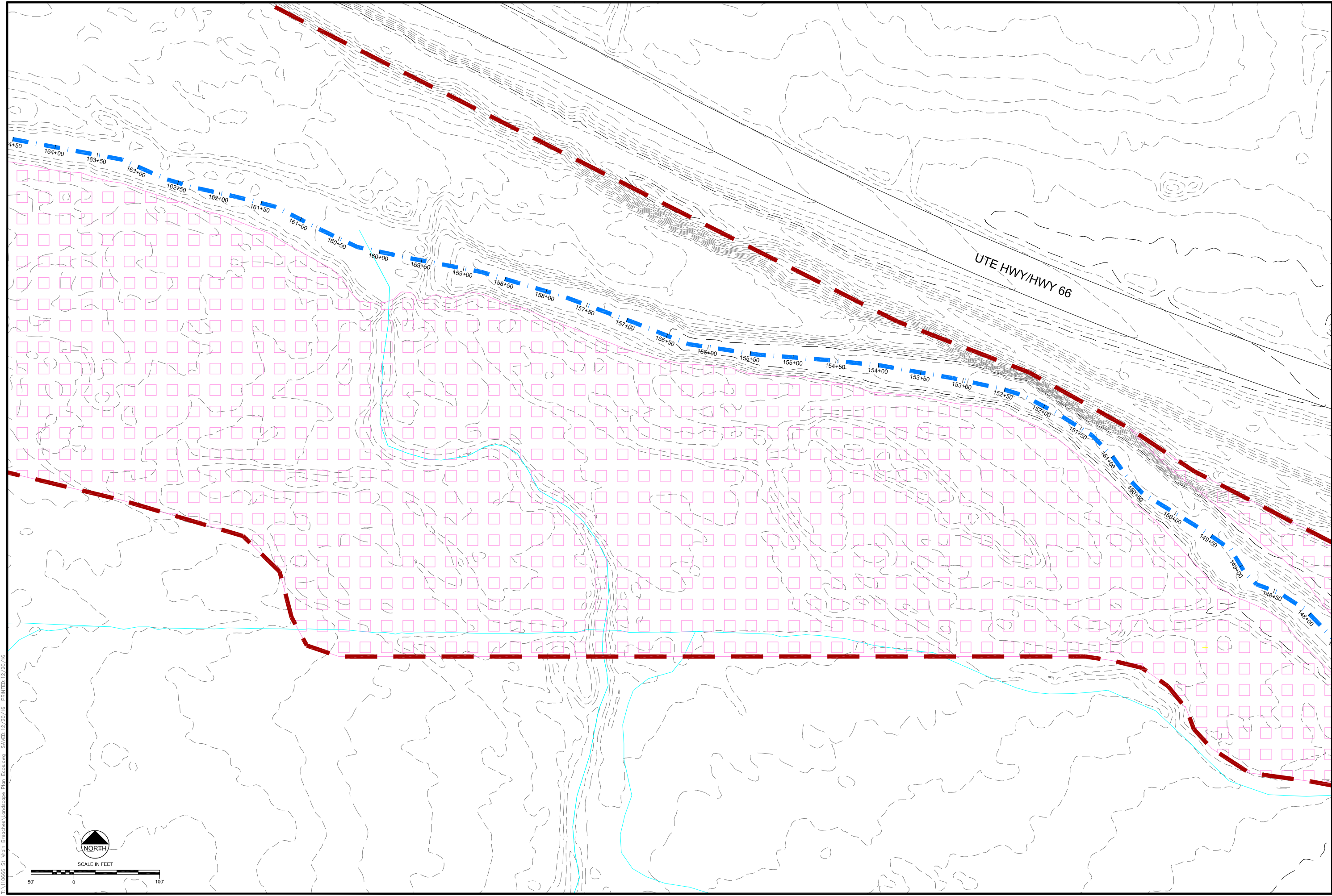
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PLANTING AND SEEDING PLAN

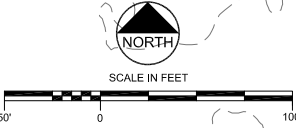
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SHEET L4



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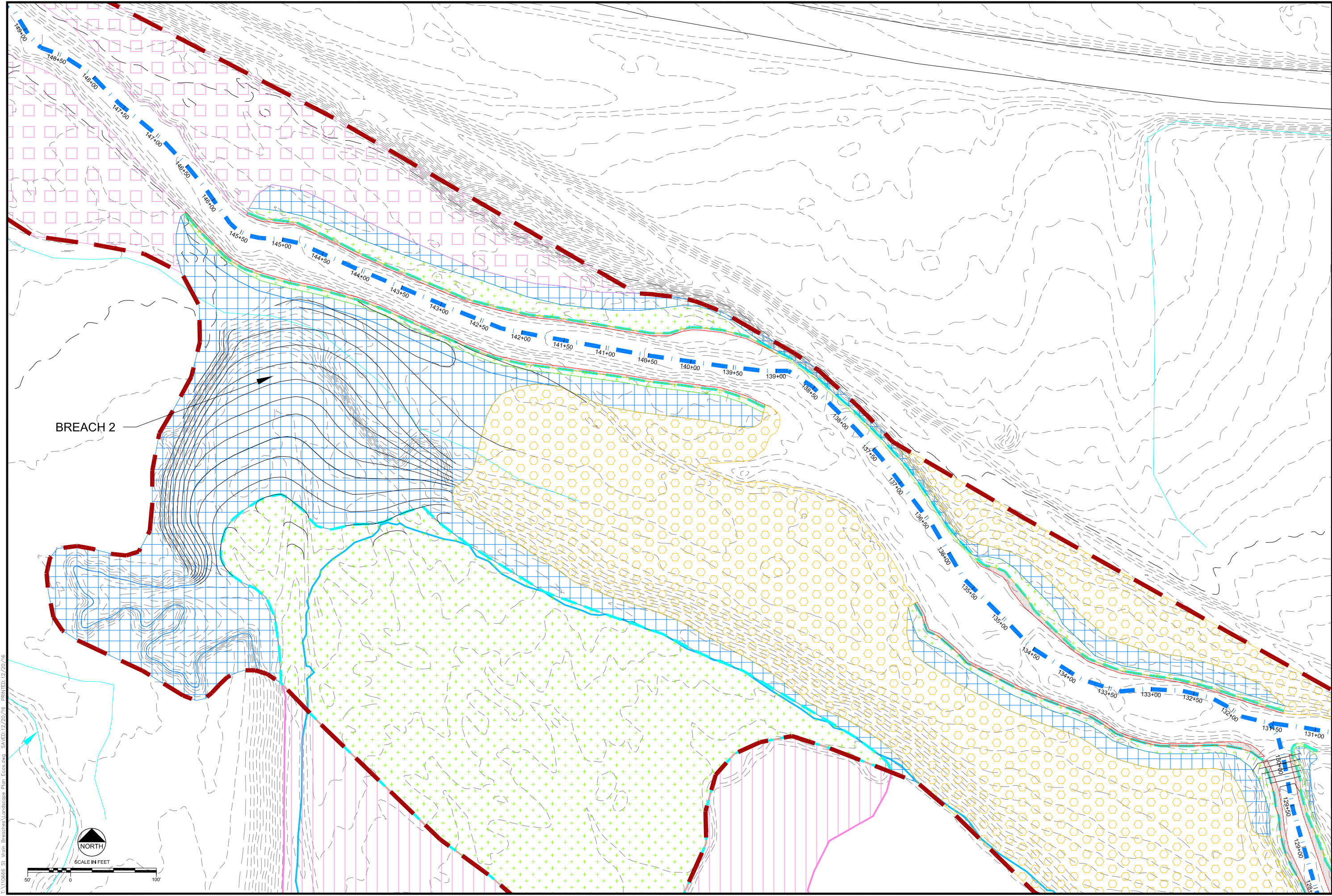
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PLANTING AND SEEDING PLAN

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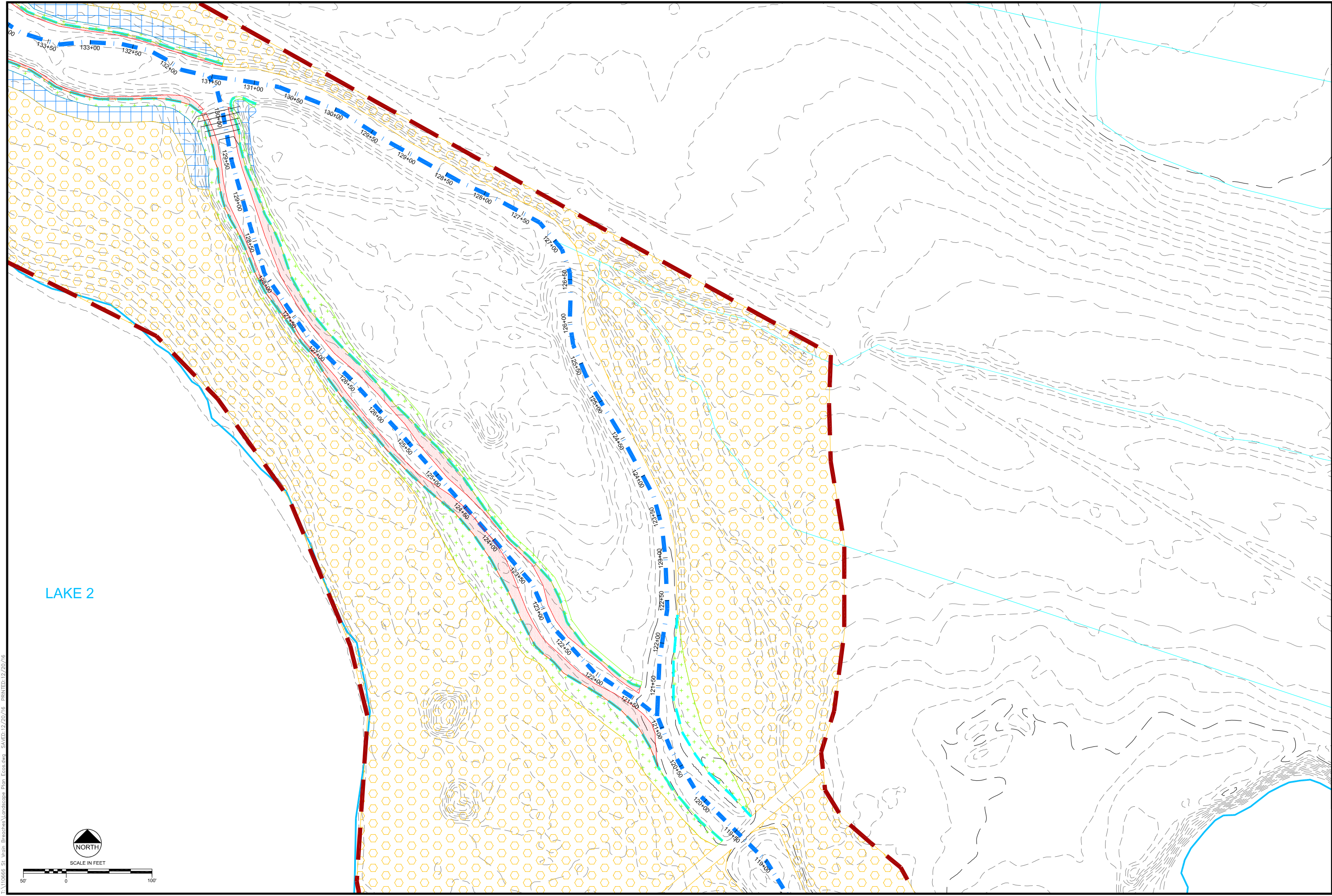
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PLANTING AND SEEDING PLAN

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SHEET L6



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LAKE 2



SCALE IN FEET



ST. VRAIN CREEK REACH 3

PLANTING AND SEEDING PLAN

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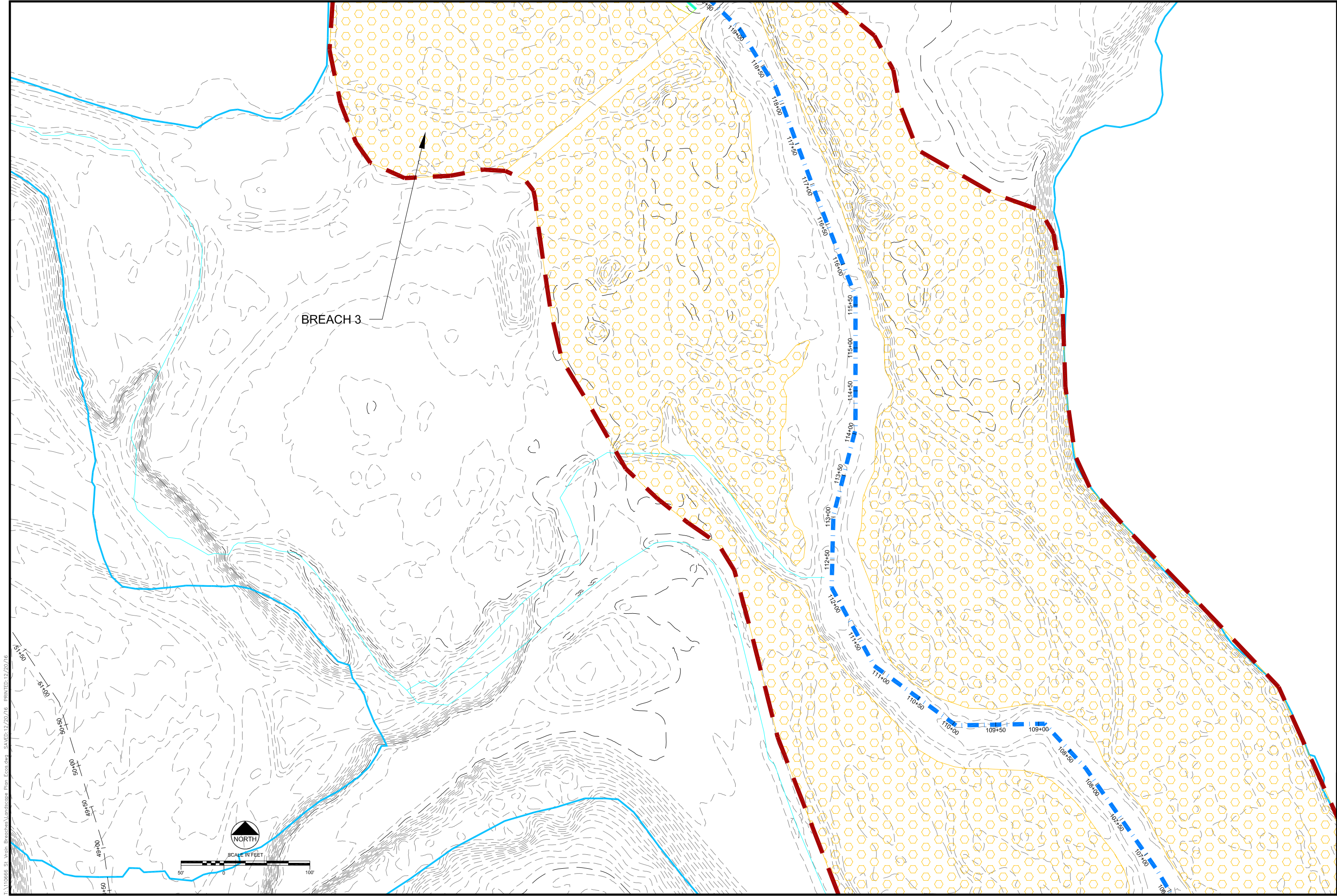
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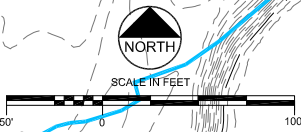
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ST. VRAIN CREEK REACH 3

PLANTING AND SEEDING PLAN

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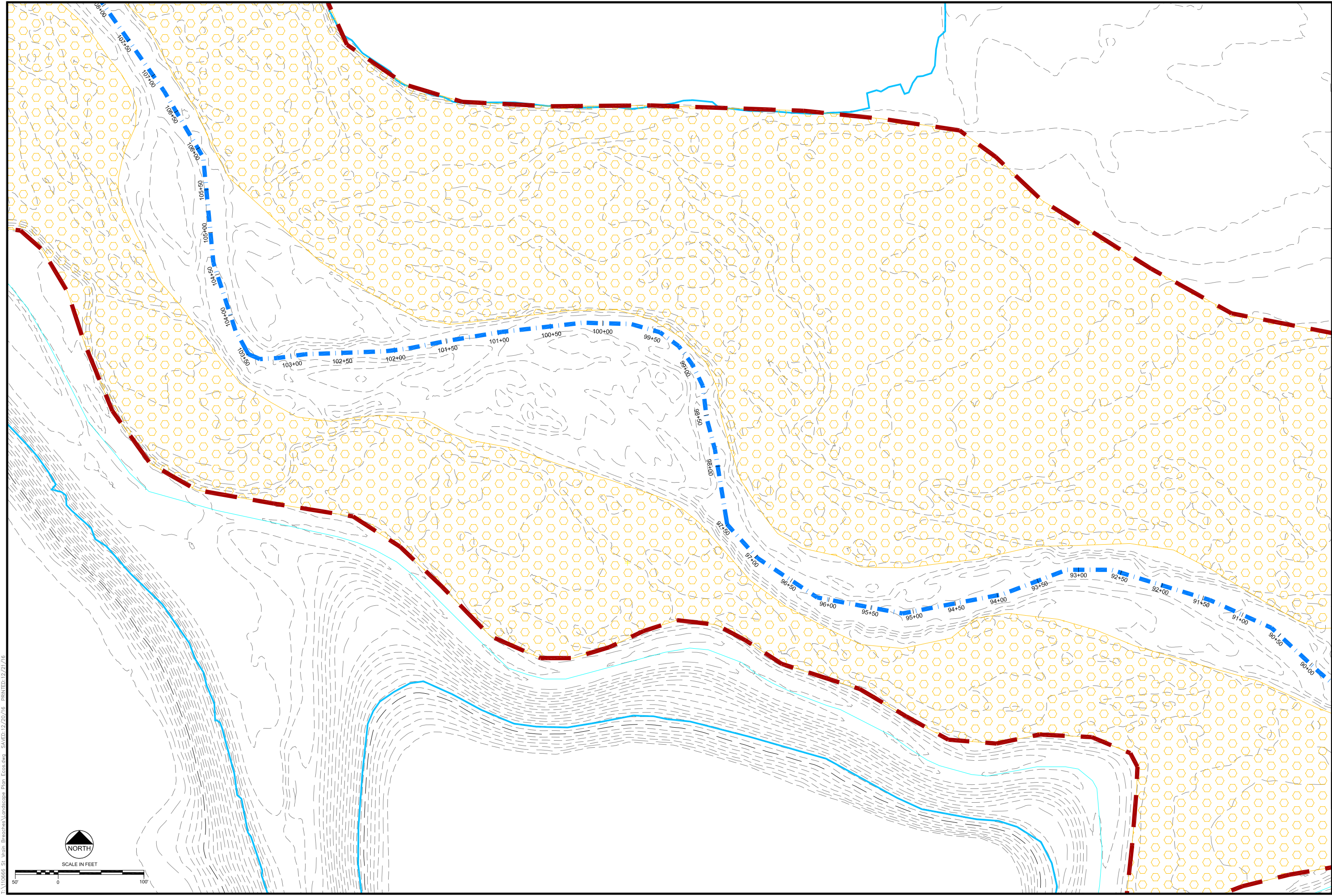
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SHEET L8



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SCALE IN FEET

50' 0 100'

ST. VRAIN CREEK REACH 3

PLANTING AND SEEDING PLAN

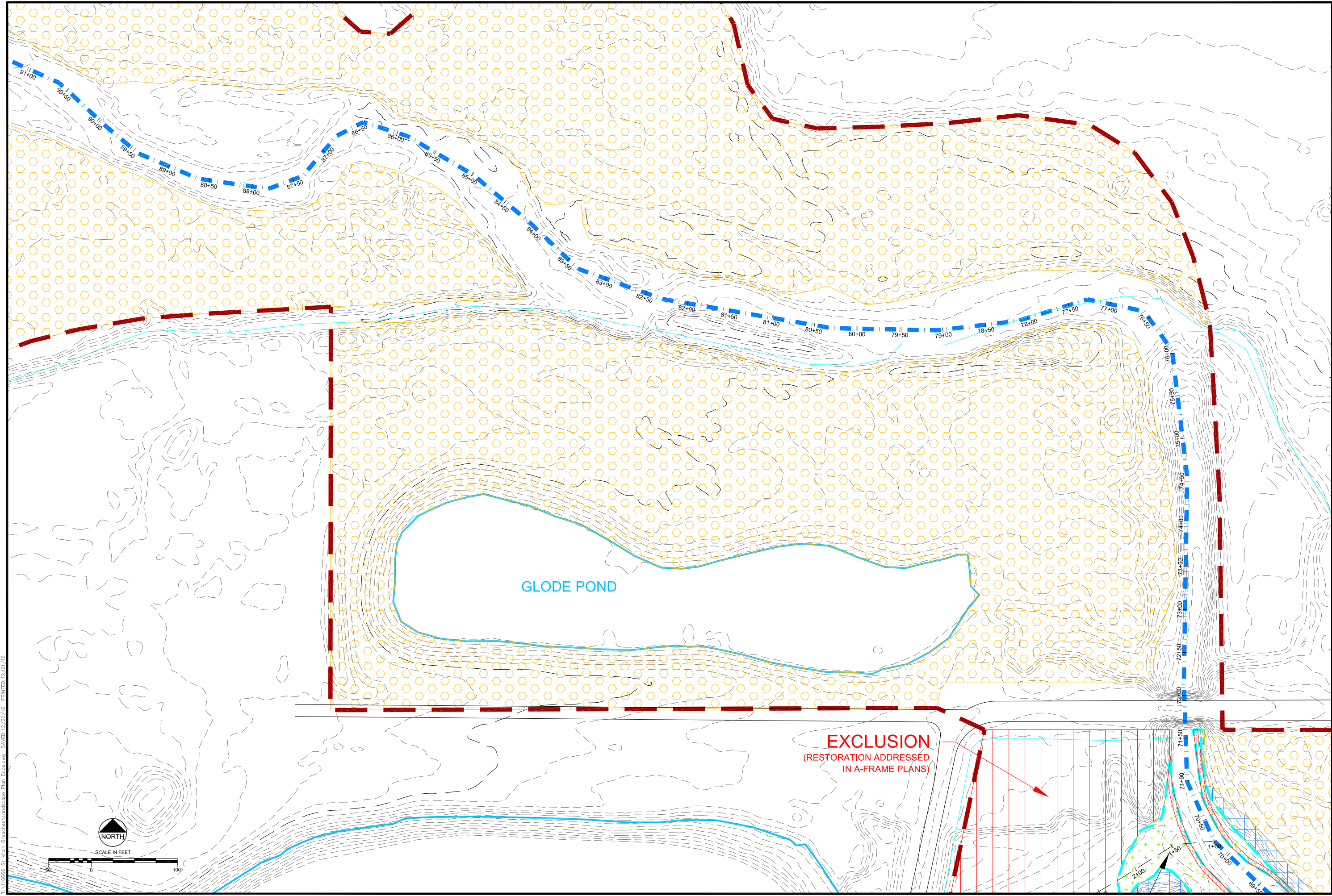
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SHEET L9

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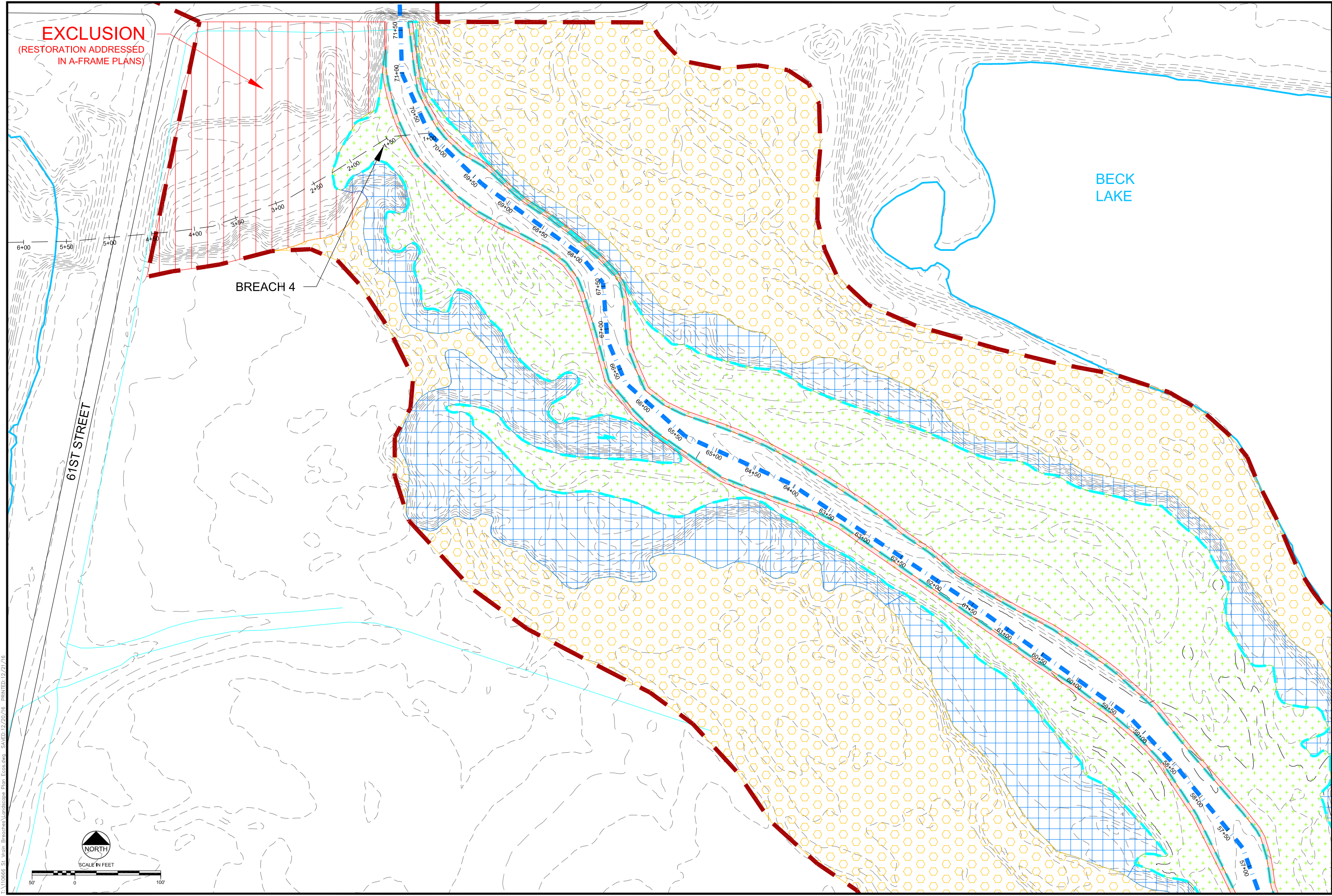


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		PLANTING AND SEEDING PLAN

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SHEET	L10



EXCLUSION
(RESTORATION ADDRESSED
IN A-FRAME PLANS)

BREACH 4

BECK
LAKE

61ST STREET

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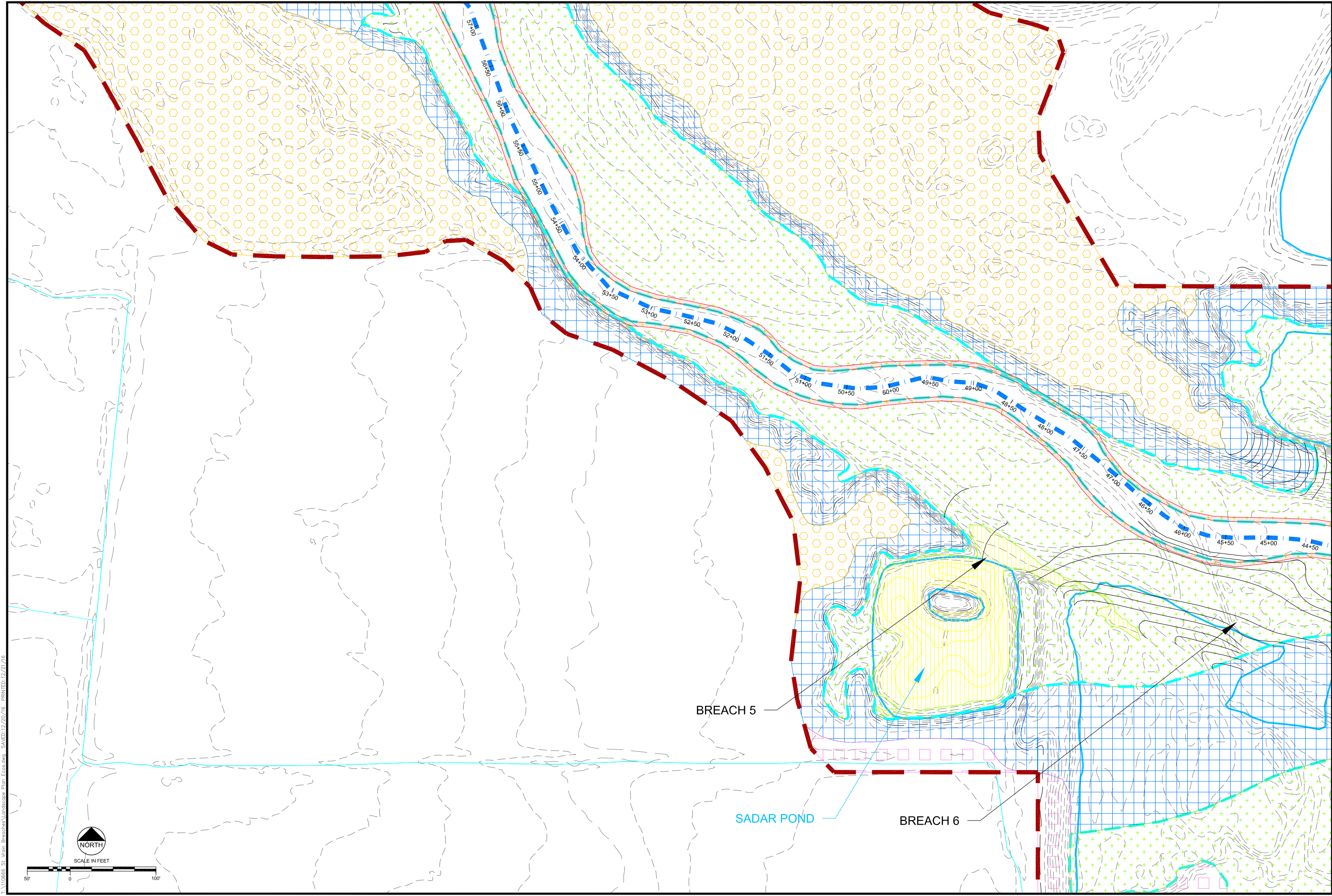


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ST. VRAIN CREEK REACH 3	PLANTING AND SEEDING PLAN

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SHEET	L11



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PLANTING AND SEEDING PLAN

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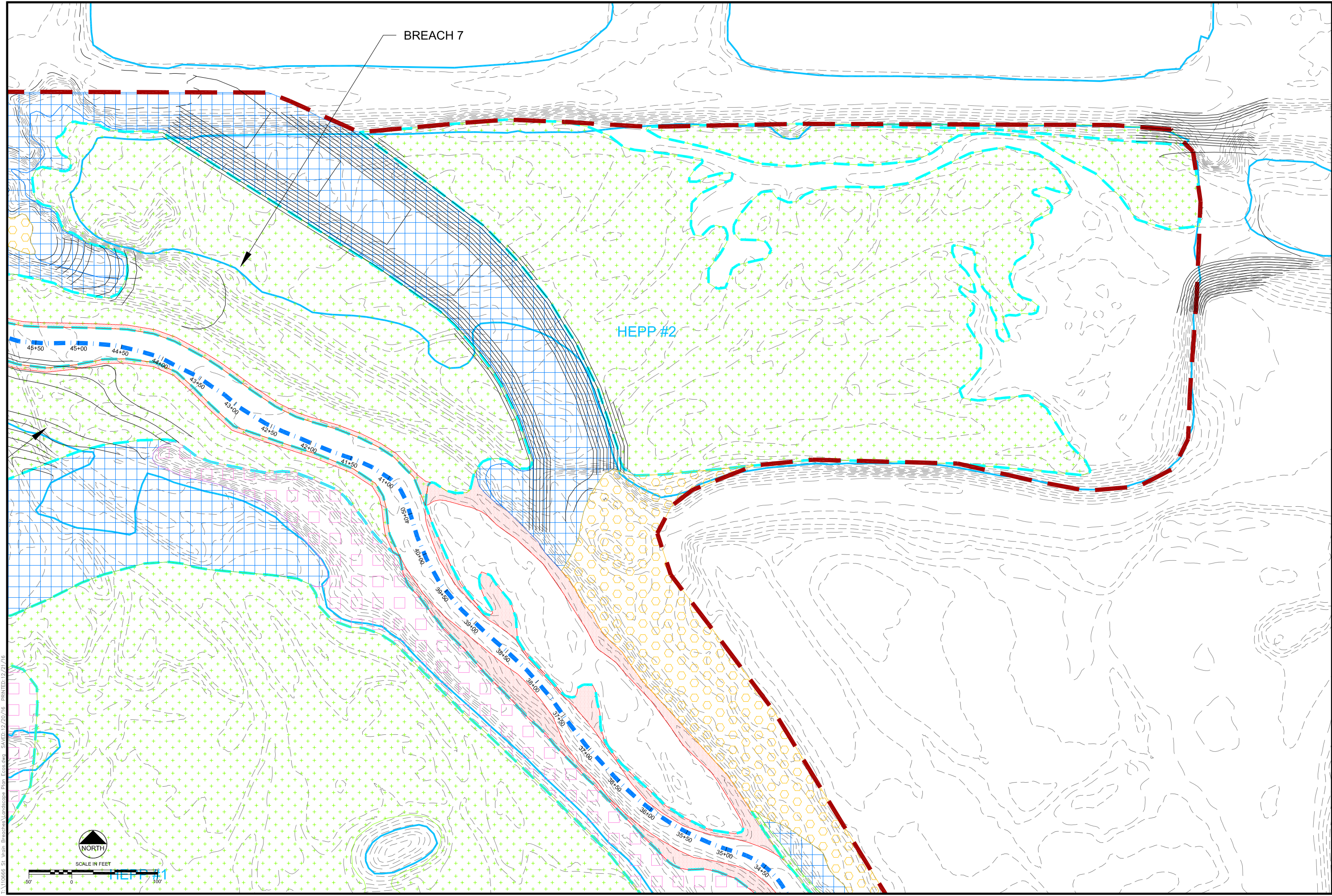
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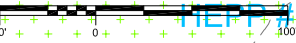
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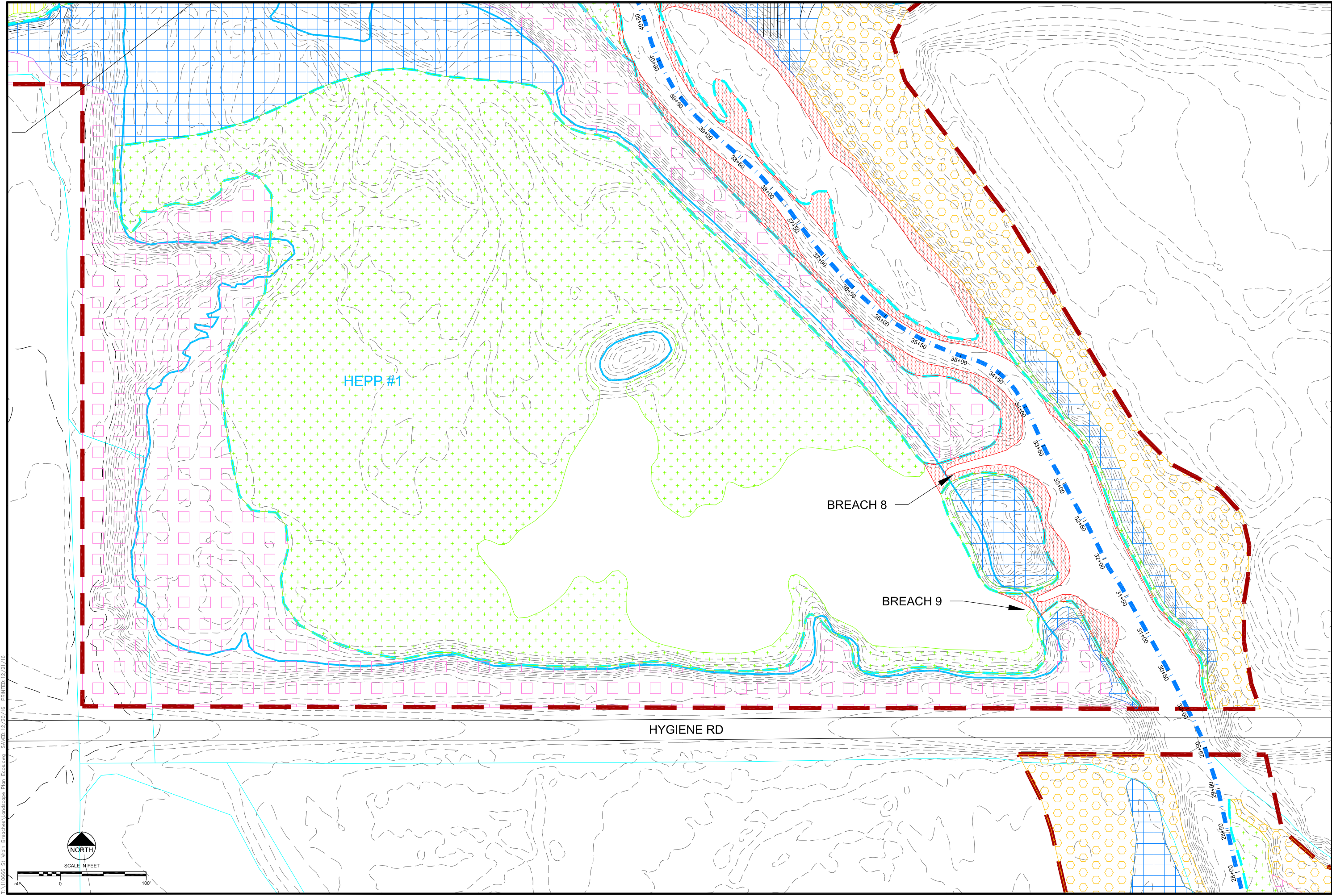
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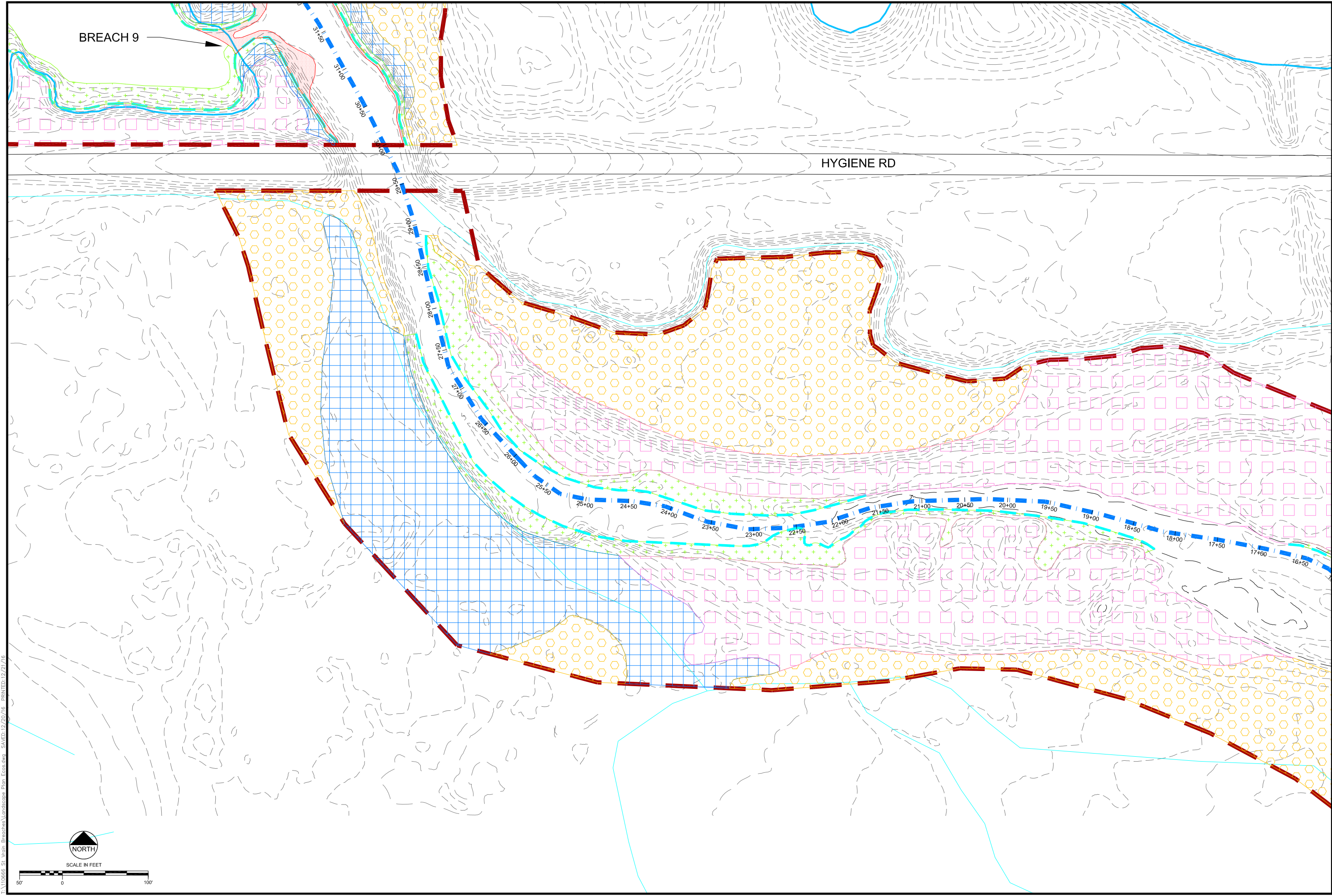
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50' 0 100'

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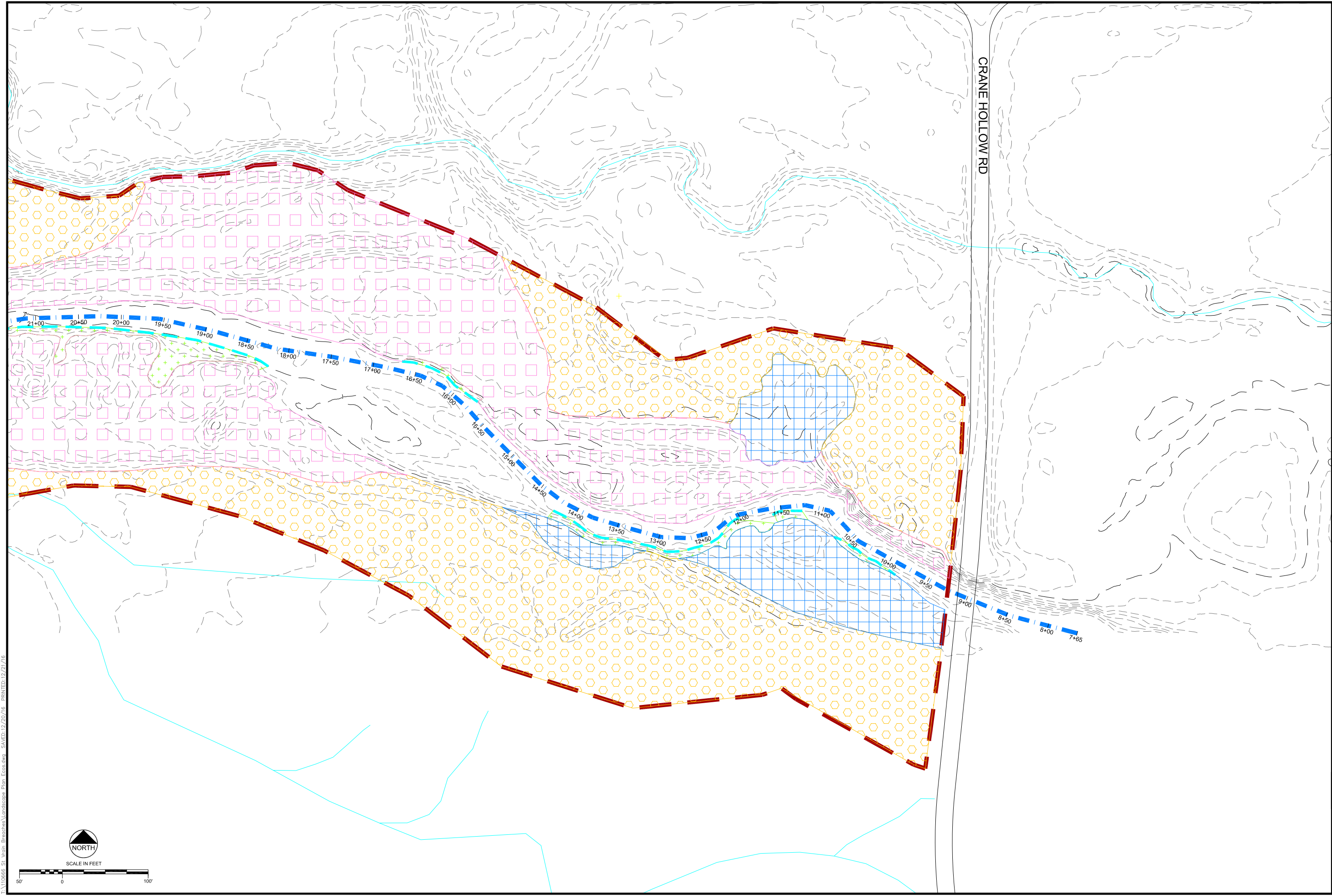
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PLANTING AND SEEDING PLAN

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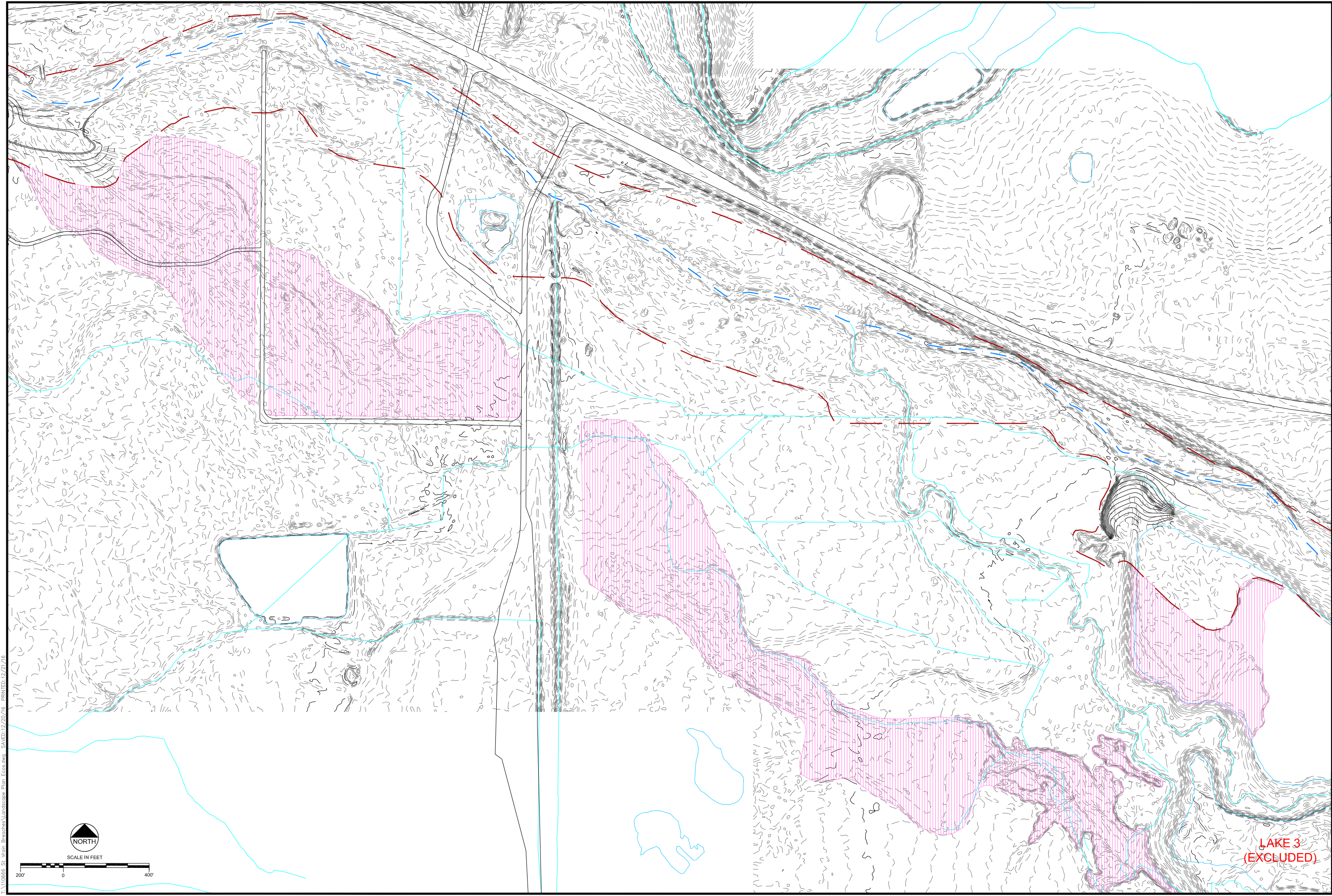
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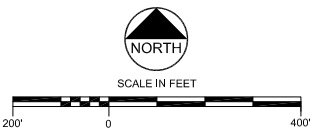
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PLANTING AND SEEDING PLAN		
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SHEET L16		
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ST. VRAIN CREEK REACH 3
SEEDING PLAN (OUTSIDE
OF PROJECT LIMITS)

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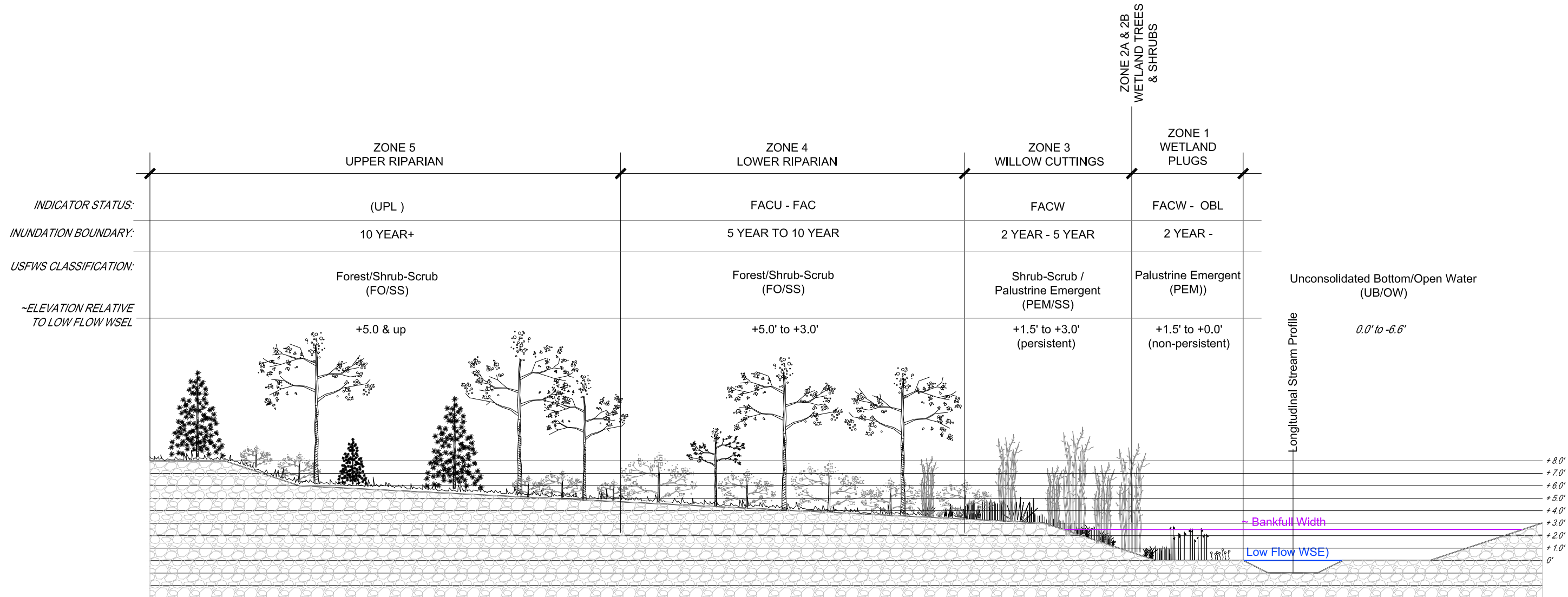
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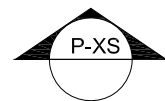
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- NOTES:
1. CROSS-REFERENCE ABOVE TYPICAL CROSS-SECTION WITH PLANTING AND SEEDING SCHEDULES.
 2. TRANSITION OR EXTENSION OF SPECIES BETWEEN ZONES MAY VARY DEPENDING ON ACTUAL FIELD CONDITIONS, SLOPE, HYDROLOGY, MICRO-HABITAT, SOIL TEXTURE & MOISTURE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

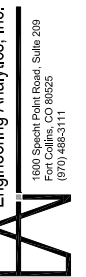


TYPICAL RIPARIAN PLANT COMMUNITY CROSS-SECTION

CROSS-SECTION NTS

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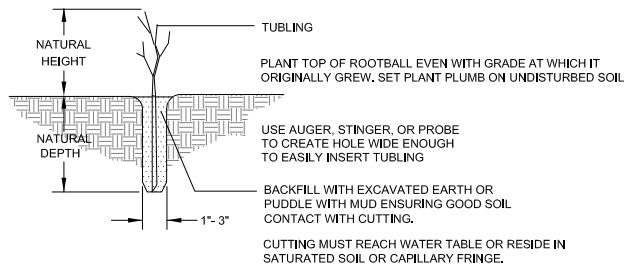
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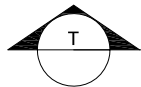
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TYPICAL PLANTING
CROSS-SECTION

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:	December 21, 2016
SHEET	LD1

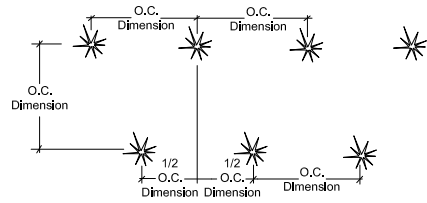


NOTES:
1. REFER TO PLANT SCHEDULES FOR SPECIES SIZE AND QUANTITY.

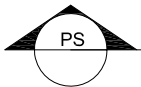


TUBLING PLANTING DETAIL

CROSS-SECTION NTS

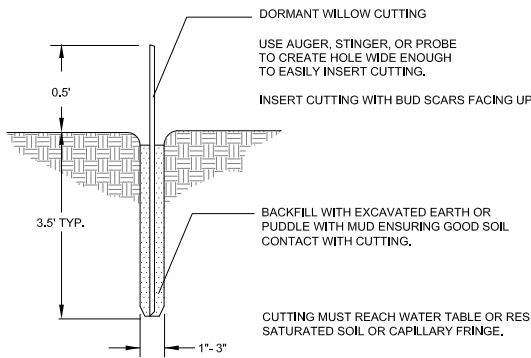


NOTES:
1. REFER TO PLANT SCHEDULES FOR SPACING REQUIREMENTS.

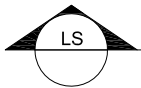


PLANT SPACING DETAIL

PLAN: NTS

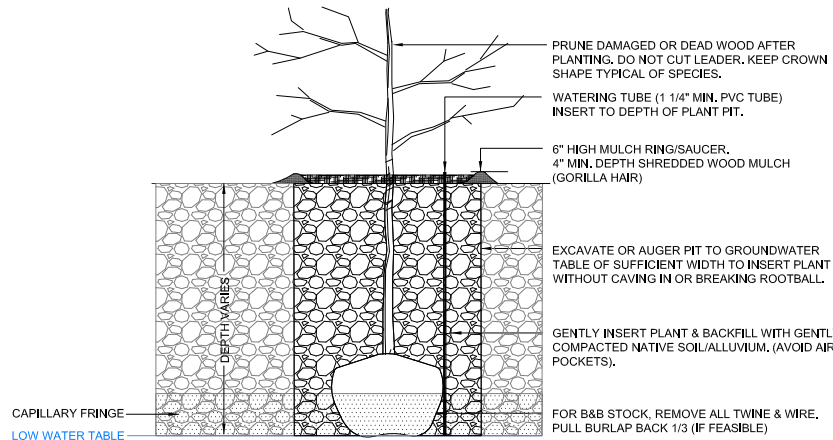


NOTES:
1. REFER TO PLANT SCHEDULES FOR SPECIE SIZE AND QUANTITY.
2. REFER TO PLANTING NOTES/SPECIFICATIONS FOR HARVESTING, STORAGE, & HANDLING REQUIREMENTS.

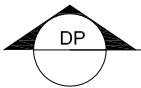


LIVE STAKE PLANTING DETAIL

CROSS-SECTION NTS

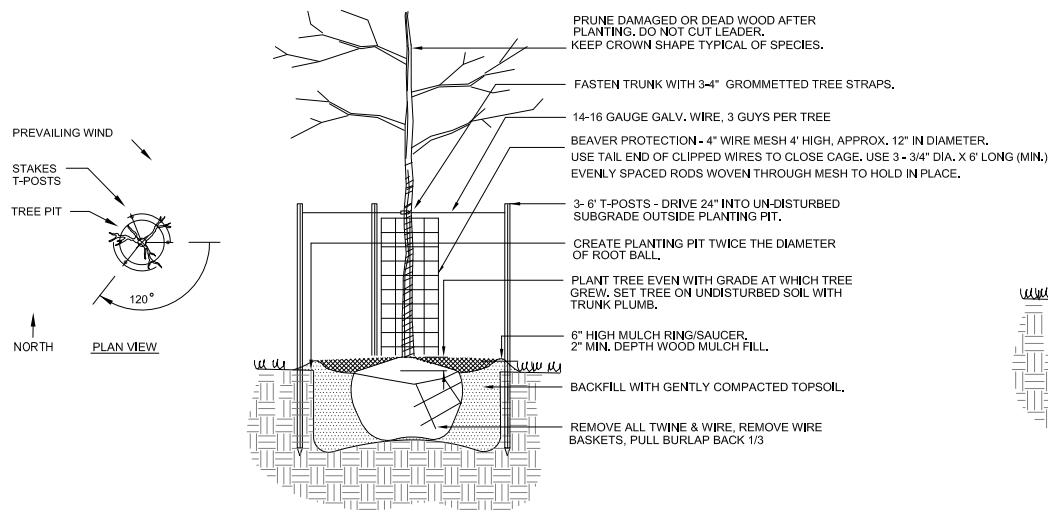


NOTES:
1. REFER TO PLANT SCHEDULES TO DETERMINE SPECIES THAT CAN TOLERATE DEEP PLANTING.
2. PLANTING DEPTH WILL VARY DEPENDING ON BANK/OVERBANK HEIGHT AND PROXIMITY TO GROUND WATER (ALLUVIAL INTERFLOW), SOME PLANTS MAY WARRANT SURFACE PLANTING (SEE DETAILS TP & SP)
3. SURVEY ADJACENT SURFACE WATER ELEVATION AS A PROXY FOR PLANTING DEPTH, ADJUST DEPTH AS NECESSARY DURING PIT EXCAVATION.
4. INSTALL WATER TUBE IF PLANTING PIT DEPTH DOES NOT REACH WATER TABLE.
5. WATER PLANT IMMEDIATELY AFTER PLANTING. SEE WATERING NOTES.

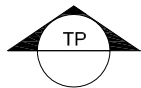


DEEP PLANTING DETAIL

CROSS-SECTION NTS

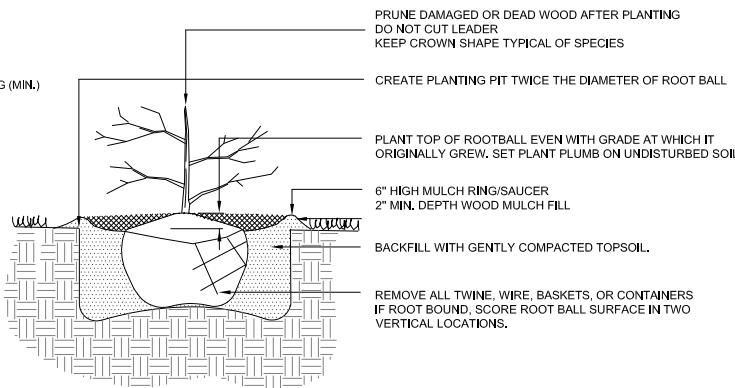


NOTES:
1. T-POSTS & GUY WIRES ARE NOT REQUIRED FOR 5 GAL. STOCK OF SMALLER.
2. WHERE APPLICABLE, CUT EROSION CONTROL FABRIC IN A "+" PATTERN AND LAY BACK PRIOR TO INSTALLING PLANTS, RETURN/CLOSE FABRIC TO ORIGINAL POSITION AND STAPLE/STAKE TO THE GROUND
3. MAINTAIN AS DIRECTED IN NOTES & SPECIFICATIONS.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

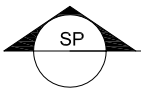


SURFACE TREE PLANTING DETAIL

CROSS-SECTION NTS

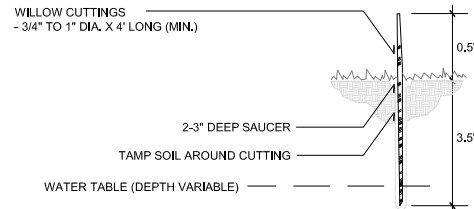


NOTES:
1. WHERE APPLICABLE, CUT EROSION CONTROL FABRIC IN A "+" PATTERN AND LAY BACK PRIOR TO INSTALLING PLANTS, RETURN/CLOSE FABRIC TO ORIGINAL POSITION AND STAPLE/STAKE TO THE GROUND.
2. MAINTAIN AS DIRECTED IN NOTES & SPECIFICATIONS.
3. REFER TO PLANT SCHEDULES.



SURFACE SHRUB PLANTING DETAIL

CROSS-SECTION NTS



NOTES:

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

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

HARVESTING: DURING HARVEST IN EARLY SPRING (APPROX. MARCH 1 TO APRIL 15) PRIOR TO LEAFING OUT, CUT STEMS AT THE "ROOT" END OF EACH CUTTINGS AT A 45-DEGREE ANGLE USING LOPPERS, BRUSH CUTTERS OR PRUNERS. CUTTINGS SHALL BE CUT CLEAN, AVOIDING BARK STRIPPING AND STEM SPLITTING. STRIP ALL SIDE BRANCHES AND DEAD WOOD. CUTS SHALL BE MADE 5 TO 8 INCHES FROM THE GROUND. NO MORE THAN 30% OF AVAILABLE BRANCHES SHALL BE HARVESTED AT THE HARVEST SITE. THE HARVESTING SITE MUST BE LEFT CLEAN, EXCESS WOODY DEBRIS SHALL BE PILED NEATLY AND EVENLY DISTRIBUTED AROUND THE HARVEST SITE.

BINDING, STORAGE AND TRANSPORTATION: CUTTINGS SHALL BE BOUND TOGETHER SECURELY WITH TWINE AT THE COLLECTION SITE. IN GROUPS OF 10, 25, OR 50 FOR EASE OF HANDLING, COUNTING, AND PROTECTION DURING TRANSPORT. WRAP CUTTINGS IN MOIST/SATURATED FABRIC, BURLAP OR SIMILAR MATERIAL, IF NOT PLANTED IMMEDIATELY. STORE AND MAINTAIN MOIST IN A DARK CELLAR 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 AT ALL TIMES.

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 THEM IMMEDIATELY PRIOR TO PLANTING.

PLANTING OF CUTTINGS SHALL OCCUR IN EARLY SPRING BEFORE OR AFTER HIGH WATER WHEN WATER IS AT NORMAL LOW FLOW LEVELS (APPROX. APRIL 15 TO MAY 15 OR JUNE 15 - JULY 15). RUN-OFF CONDITIONS WILL VARY FROM YEAR TO YEAR, MONTH TO MONTH AND MUST BE MONITORED BY THE CONTRACTOR.

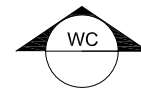
CUTTINGS SHALL BE PLANTED IN ROWS STARTING APPROX. 0.5 FEET ABOVE THE NORMAL WATER SURFACE ELEVATION IN THE CAPILLARY FRINGE (MOIST SOIL) OR UP TO AN ELEVATION IN WHICH THE BOTTOM OF THE CUTTINGS WILL REACH THE LOCAL WATER TABLE ONCE INSTALLED. MECHANICAL OR HAND DRIVEN STINGERS SHALL BE USED TO CREATE A HOLE WIDE ENOUGH TO EASILY INSERT CUTTINGS TO AT LEAST 30" (MIN.) OF THEIR LENGTH INTO THE WATER TABLE OR CAPILLARY FRINGE. INSERT CUTTINGS SO THAT BUDS POINT SKYWARD. BACK FILL PLANTING PIT WITH MUD OR IN SOIL LIFTS. WATER BETWEEN EACH LIFT, AND TAMP TO ELIMINATE VOIDS TO ENSURE SOIL IS IN CONTACT WITH CUTTINGS. TAMPING SHOULD CREATE A SLIGHT SAUCER AROUND EACH CUTTING TO CAPTURE AND HOLD PRECIPITATION.

CUTTINGS SHALL BE INSERTED SO THAT NO GREATER THAN 6 INCHES ARE ABOVE THE GROUND. THIS DOES NOT ELIMINATE THE NEED TO PLANT CUTTINGS 30 INCHES OF THEIR LENGTH.

THE ABOVE DETAIL SHOWS A TYPICAL INSTALLATION IN BARE GROUND.

REFER TO PLANTING SCHEDULES FOR SPECIES, QUANTITIES AND PLANT SPACING.

REFER TO PLANTING PLANS OR A PROJECT PROPONENT FOR LOCATIONS.



WILLOW STAKE DETAIL

CROSS-SECTION NTS

REVISIONS

Revision	Date	Description

Engineering Analytics, Inc.
1600 Speight Point Road, Suite 209
Fort Collins, CO 80525
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1455 WASHBURN STREET
ERIE, COLORADO 80516
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ecos
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: December 21, 2016

SHEET
LD2

7/11/2016 St. Vrain Breaches Landscape Details - Ecos.dwg, Saved: 12/21/16, PRINTED: 12/21/16

PLANTING ZONE NOTES:

- Zone 8 - Seeding & Weed Management (Outside the Project Limits):** includes low-lying riparian/wetland areas outside of Project Limits (budget depending).
- Zone 7 - Weed Management Only:** includes weed management and exotic plant removal within the Project Limits.
- Zone 6 - Seeding & Weed Management (Inside the Project Limits):** includes Zones 1-5 and Seeding only areas within the Project Limits.
- Zone 5 - Upper Riparian Trees & Shrubs:** includes breach repair & barren/scoured areas from 10-year inundation boundary upwards to the Project Limits.
- Zone 4 - Lower Riparian Trees & Shrubs:** includes the area between the 5-year inundation boundary to the 10-year inundation boundary.
- Zone 3A - Willow Cuttings:** includes the streambank, gravel bars, open floodplain, and reservoir bottom areas between the 2-year and 5-year inundation boundary.
- Zone 3B - Willow Cuttings:** includes Bank Stabilization Types A, B & C proposed by Ecological Resource Consultants (ERC). Refer to ERC plans and details.
- Zone 2A - Wetland Trees & Shrubs:** includes wetted edge of the 2-year inundation boundary or ordinary high water mark (OHWM).
- Zone 2B - Wetland Trees & Shrubs:** includes Bank Stabilization Types B & C proposed by Ecological Resource Consultants (ERC). Refer to ERC plans and details.
- Zone 1A - Wetland Plugs (Streambanks):** includes the stream edge areaa between the 1-year and 2-year inundation boundary
- Zone 1B - Wetland Plugs (Backwater Wetlands):** includes emergent and submergent wetlands within Sadar Pond.

GENERAL NOTES:

- Species listed above are sorted by indicator status.
- Indicator Status derived from national List of Plant Species That Occur in Wetlands (Region 5 - Great Plains).
- Height at 20 years data is derived from USDA Plants Database.
- Spread data derived from literature and professional judgement of species form and habit.
- Plant spacing for Zones 5 & 4 trees is ~1/2 spread of trees and assumes canopy closure in approximately 10 years.
- Plant spacing for Zones 5 & 4 riparian shrubs is mature spread.
- Plant spacing for Zone 3A willow cuttings is set at 5' to be intermittently intermixed with Zone 4 wetland shrubs at 10' average spacing.
- Plant spacing for Zone 3B willow cuttings for Bank Stabilization is set as per ERC details . Refer to ERC Bank Stabilization Details.
- Plant spacing for Zone 2 wetland trees and shrubs is set at average spacing for all Zone 2 plants.
- Zone 4 plants are to be placed along wetted perimeter of creek below Zone 3A willow cuttings due to having a short rootmass.
- Canopy closure for Zones 2 and 3 is expected in approximately 5 years.
- All planting areas are to be seeded and controlled for weeds and invasive species. (Refer to seed schedules)
- All planting areas are to be seeded. (Refer to seed schedules)

ST. VRAIN RIVER - BREACHES RESTORATION (30% DESIGN)

TREE & SHRUB SCHEDULE

12/15/2016

Scientific Name	Common Name	Indicator Status	Height at 20 years	Spread	Preferred Size / Form	Plant Spacing	Percent of Mix	Quantity
Zone 5 - Upper Riparian Trees & Shrubs								
*Zone 5 Upper Riparian species folded in to Zone 2 Lower Riparian Trees and Shrubs.								
Zone 4 - Lower Riparian Trees & Shrubs								
						Absolute Cover =	40%	
						Acre	=	34.39
						Average Spacing =	10	
*Celtis reticulata	hackberry	UPL	30	25	14" tall 1-gal.	12.5	2.5%	150
*Prunus americana	American Plum	UPL	24	24	14" tall 1-gal.	12.0	5.0%	300
*Ribes cereum	wax currant	UPL	5	5	14" tall 1-gal.	5.0	5.0%	300
*Symphoricarpos occidentalis	snowberry	UPL	3	3	14" tall 1-gal.	3.0	15.0%	900
Crataegus erythropoda	hawthorn	FAC	24	24	14" tall 1-gal.	12.0	2.5%	150
Populus deltoides var. monilifera	plains cottonwood	FAC	80	40	14" tall 1-gal.	30.0	35.0%	2,100
Prunus virginiana var. melanocarpa	chokecherry	FACU	15	15	14" tall 1-gal.	15.0	12.5%	750
Rosa woodsii	Wood's rose	FACU	3	3	14" tall 1-gal.	3.0	10.0%	600
Ribes aureum	golden currant	FACU	5	5	14" tall 1-gal.	5.0	12.5%	750
						TOTAL	100.0%	6,000
Zone 3A - Willow Cuttings (Streambanks, Bars & Reservoir Bottoms)								
						Absolute Cover =	100%	
						Acre	=	36.04
						Average Spacing =	5	
Salix exigua	coyote willow	FACW	5	5	48" cutting	5.0	65.0%	40,815
Salix irrorata	dewey-stem willow	FACW	12	12	48" cutting	5.0	35.0%	21,975
						TOTAL	100.0%	62,790
Zone 3B - Willow Cuttings (Bank Stabilization Types A, B & C)								
						Absolute Cover =	100%	
						Lineal Feet =	5,200	
						Average Spacing =	6 Cuttings per LF	
Salix exigua	coyote willow	FACW	5	5	48" cutting	0.1	65.0%	19,880
Salix irrorata	dewey-stem willow	FACW	12	12	48" cutting	0.1	35.0%	10,705
						TOTAL	100.0%	30,585
Zone 2A - Wetland Trees & Shrubs (Wetted Edge of Streambanks)								
						Absolute Cover =	100%	
						Lineal Feet =	44,825	
						Average Spacing =	9	
Alnus incana ssp. Tenuifolia	thinleaf alder	FACW	15	15	14" tall 1-gal.	7.5	15.0%	750
Amorpha fruticosa	leadplant	FACW	3	3	14" tall 1-gal.	1.5	5.0%	250
Betula occidentalis	water birch	FACW	25	25	14" tall 1-gal.	12.5	15.0%	750
Cornus sericea	redosier dogwood	FACW	12	12	14" tall 1-gal.	6.0	10.0%	500
Populus angustifolia	narrowleaf cottonwood	FACW	60	30	14" tall 1-gal.	15.0	15.0%	750
Salix amygdaloides	peachleaf willow	FACW	45	60	14" tall 1-gal.	30.0	10.0%	500
Salix exigua	coyote willow	FACW	10	10	14" tall 1-gal.	5.0	25.0%	1,245
Salix irrorata	dewey-stem willow	FACW	12	12	14" tall 1-gal.	6.0	5.0%	250
						TOTAL	100.0%	4,995
Zone 2B - Wetland Trees & Shrubs (Bank Stabilization Types B & C)								
						Absolute Cover =	100%	
						Lineal Feet =	3,650	
						Average Spacing =	5	
Alnus incana ssp. Tenuifolia	thinleaf alder	FACW	15	15	14" tall 1-gal.	5.0	15.0%	110
Amorpha fruticosa	leadplant	FACW	3	3	14" tall 1-gal.	5.0	5.0%	35
Betula occidentalis	water birch	FACW	25	25	14" tall 1-gal.	5.0	15.0%	110
Cornus sericea	redosier dogwood	FACW	12	12	14" tall 1-gal.	5.0	15.0%	110
Populus angustifolia	narrowleaf cottonwood	FACW	60	30	14" tall 1-gal.	5.0	20.0%	150
Salix amygdaloides	peachleaf willow	FACW	45	60	14" tall 1-gal.	5.0	5.0%	35
Salix exigua	coyote willow	FACW	10	10	14" tall 1-gal.	5.0	10.0%	70
Salix irrorata	dewey-stem willow	FACW	12	12	14" tall 1-gal.	5.0	15.0%	110
						TOTAL	100.0%	730

TOTAL PLANTS: 105,100

REVISIONS

Revision	Date	Description

Engineering Analytics, Inc.

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

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1455 WASHBURN STREET
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(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. 110666

Date: December 21, 2016

SHEET LS1

7/11/2016 St. Vrain Breaches Landscape Details Ecos.dwg SAVED:12/21/2016 PRINTED:12/21/16

ST. VRAIN RIVER - BREACHES RESTORATION (30% DESIGN)

STREAMBANK WETLAND SCHEDULE
12/15/2016

Scientific Name	Common Name	Preferred Size / Form	Indicator Status	Zone (Relative to WSEL)	Plant Spacing	Percent of Mix	Quantity
Zone 1A - Herbaceous Wetland Plugs				Absolute Cover =	100%		
				Acres =	3.16		
				Average Spacing =	2		
Carex emoryi	Emory's sedge	10 cu. inch tubling	OBL	0 to 12"	2.0	30.0%	10310
Glyceria grandis	American mannagrass	10 cu. inch tubling	OBL	0 to -3"	2.0	5.0%	1715
Carex pellita	woolly sedge	10 cu. inch tubling	OBL	0 to 12"	2.0	10.0%	3435
Carex praegracilis	clustered field sedge	10 cu. inch tubling	FACW	6" to 18"	2.0	10.0%	2435
Deschampsia caespitosa	tufted hairgrass	10 cu. inch tubling	FACW	6" to 18"	2.0	5.0%	1715
Juncus balticus	Baltic rush	10 cu. inch tubling	FACW	6" to 18"	2.0	10.0%	3435
Juncus ensifolius	swordleaf rush	10 cu. inch tubling	FACW	6" to 18"	2.0	5.0%	1715
Juncus torreyi	Torrey rush	10 cu. inch tubling	FACW	6" to 18"	2.0	5.0%	1715
Spartina pectinata	prairie cordgrass	10 cu. inch tubling	FACW	6" to 18"	2.0	10.0%	3435
Panicum virgatum	switchgrass	10 cu. inch tubling	FAC	12" to 36"	2.0	10.0%	3435
					TOTAL	100.0%	33,345

TOTAL PLANTS: 33,345

NOTES:
Species listed above are sorted by indicator status.
Indicator Status derived from national List of Plant Species That Occur in Wetlands (Region 5 - Great Plains).
Wetland plugs are set at 2' on center diagonal spacing to be planted in 2 rows along streambanks indicated on the plans.
All planting areas are to be seeded. (Refer to seed schedules)

ST. VRAIN RIVER - BREACHES RESTORATION (30% DESIGN)

BACKWATER WETLAND SCHEDULE
12/15/2016

Scientific Name	Common Name	Preferred Size / Form	Indicator Status	Zone (Relative to WSEL)	Plant Spacing	Percent of Mix	Quantity
Zone 1B - Herbaceous Wetland Plugs				Absolute Cover =	100%		
				Acres =	0.57		
				Average Spacing =	1		
Sagittaria latifolia	arrowhead	10 cu. inch tubling	OBL	0 to -12"	1.0	2.5%	620
Eleocharis palustris	common spikerush	10 cu. inch tubling	OBL	0 to -3"	1.0	5.0%	1235
Glyceria grandis	American mannagrass	10 cu. inch tubling	OBL	0 to -3"	1.0	5.0%	1235
Scirpus microcarpus	small fruit bulrush	10 cu. inch tubling	OBL	3 to -12"	1.0	5.0%	1235
Schoenoplectus acutus	hard-stem bulrush	10 cu. inch tubling	OBL	3 to -12"	1.0	10.0%	2475
Schoenoplectus pungens	three square	10 cu. inch tubling	OBL	3 to -12"	1.0	2.5%	620
Carex emoryi	Emory's sedge	10 cu. inch tubling	OBL	0 to 12"	1.0	20.0%	4950
Carex nebrascensis	Nebraska sedge	10 cu. inch tubling	OBL	0 to 12"	1.0	5.0%	1235
Asclepias incarnata	swamp milkweed	10 cu. inch tubling	FACW	6" to 18"	1.0	1.0%	250
Carex praegracilis	clustered field sedge	10 cu. inch tubling	FACW	6" to 18"	1.0	5.0%	1235
Deschampsia caespitosa	tufted hairgrass	10 cu. inch tubling	FACW	6" to 18"	1.0	3.0%	740
Helianthus nuttallii	Nuttall's sunflower	10 cu. inch tubling	FACW	6" to 18"	1.0	1.0%	250
Iris missouriensis	Rocky Mt. iris	10 cu. inch tubling	FACW	6" to 18"	1.0	1.0%	250
Juncus balticus	Baltic rush	10 cu. inch tubling	FACW	6" to 18"	1.0	5.0%	1235
Juncus ensifolius	swordleaf rush	10 cu. inch tubling	FACW	6" to 18"	1.0	5.0%	1235
Juncus torreyi	Torrey rush	10 cu. inch tubling	FACW	6" to 18"	1.0	5.0%	1235
Spartina pectinata	prairie cordgrass	10 cu. inch tubling	FACW	6" to 18"	1.0	10.0%	2475
Verbena hastata	blue vervain	10 cu. inch tubling	FACW	6" to 18"	1.0	2.0%	495
Asclepias speciosa	showy milkweed	10 cu. inch tubling	FAC	12" to 36"	1.0	1.0%	250
Coreopsis tinctoria	plains coreopsis	10 cu. inch tubling	FAC	12" to 36"	1.0	1.0%	250
Panicum virgatum	switchgrass	10 cu. inch tubling	FAC	12" to 36"	1.0	5.0%	1235
					TOTAL	100.0%	24,740

TOTAL PLANTS: 24,740

NOTES:
Species listed above are sorted by indicator status.
Indicator Status derived from national List of Plant Species That Occur in Wetlands (Region 5 - Great Plains).
Wetland plugs are set at 1' on center diagonal spacing to fill backwater/nursery areas indicated on the plans.
All planting areas are to be seeded. (Refer to seed schedules)

REVISIONS	
Revision	Description

Engineering Analytics, Inc.
1600 South Platt Road, Suite 200
Fort Collins, CO 80525
(970) 488-3111

EA

1455 WASHBURN STREET
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: December 21, 2016
SHEET LS2

ST. VRAIN RIVER - BREACHES RESTORATION (30% DESIGN)

Seeds per SF:	50	1	2	3	4	5	6
TOTAL ACRES:	156.58	3.73	-	36.04	34.39	-	82.42

ZONE 6 - GRASS & GRASS-LIKE SEED SCHEDULE

12/15/2016

Scientific Name	Common Name	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	UPL	W	2.0%	1.0	43560	191,000	0.23	35.71	71.42
<i>Bouteloua gracilis</i>	blue grama	UPL	W	8.0%	4.0	174240	825,000	0.21	33.07	66.14
<i>Koeleria macrantha</i>	Prairie Junegrass	UPL	C	5.0%	2.5	108900	2,315,400	0.05	7.36	14.73
<i>Hesperostipa comata</i>	needle-and-thread	UPL	C	2.0%	1.0	43560	115,000	0.38	59.31	118.62
<i>Nassella viridula</i>	green needlegrass	UPL	C	2.0%	1.0	43560	181,000	0.24	37.68	75.37
<i>Achnatherum hymenoides</i>	indian ricegrass	FACU	C	2.0%	1.0	43560	141,000	0.31	48.37	96.75
<i>Andropogon gerardii</i>	big bluestem	FACU	W	2.0%	1.0	43560	130,000	0.34	52.47	104.93
<i>Elymus canadensis</i>	Canada wildrye	FACU	C	5.0%	2.5	108900	115,000	0.95	148.27	296.55
<i>Elymus trachycaulus</i>	slender wheatgrass	FACU	C	5.0%	2.5	108900	159,000	0.58	107.24	214.49
<i>Pascopyrum smithii</i>	western wheatgrass	FACU	C	12.0%	6.0	261360	110,000	2.38	372.03	744.07
<i>Schizachyrium scoparium</i>	little bluestem	FACU	W	5.0%	2.5	108900	260,000	0.42	65.58	131.17
<i>Sorghastrum nutans</i>	yellow indian grass	FACU	W	2.0%	1.0	43560	170,000	0.26	40.12	80.24
<i>Sporobolus cryptandrus</i>	sand dropseed	FACU	W	2.0%	1.0	43560	5,298,000	0.01	1.29	2.57
<i>Elymus lanceolatus psammophilus</i>	streambank wheatgrass	FACU	C	5.0%	2.5	108900	156,000	0.70	109.30	218.61
<i>Panicum virgatum</i>	switchgrass	FAC	W	5.0%	2.5	108900	389,000	0.28	43.83	87.67
<i>Sporobolus airoides</i>	alkali sacaton	FAC	W	5.0%	2.5	108900	1,758,000	0.06	9.70	19.40
<i>Carex praegracilis</i>	meadow sedge	FACW	C	2.0%	1.0	43560	1,616,000	0.02	3.76	7.51
<i>Distichlis spicata</i>	inland saltgrass	FACW	W	2.0%	1.0	43560	520,000	0.08	13.12	26.23
<i>Juncus ensifolius</i>	swordleaf rush	FACW	C	2.0%	1.0	43560	2,914,000	0.01	2.34	4.68
<i>Juncus tenuis</i>	Poverty rush	FACW	C	2.0%	1.0	43560	51,300,000	0.01	1.57	3.13
<i>Juncus torreyi</i>	Torrey rush	FACW	C	2.0%	1.0	43560	12,300,000	0.01	1.57	3.13
<i>Poa palustris</i>	fowl bluegrass	FACW	C	5.0%	2.5	108900	3,156,000	0.03	5.40	10.81
<i>Spartina pectinata</i>	prairie cordgrass	FACW	W	5.0%	2.5	108900	197,000	0.55	86.56	173.11
<i>Carex utriculata</i>	beaked sedge	OBL	C	2.0%	1.0	43560	485,000	0.09	14.06	28.13
<i>Carex nebrascensis</i>	Nebraska sedge	OBL	C	2.0%	1.0	43560	534,100	0.08	12.77	25.54
<i>Juncus balticus</i>	Baltic rush	OBL	C	5.0%	2.5	108900	8,000,000	0.01	2.13	4.26
<i>Schoenoplectus americanus</i>	three-square	OBL	C	2.0%	1.0	43560	400,000	0.11	17.05	34.10
				100.0%	50.0			8.50	1331.68	2663.36

NOTES:
Species listed above sorted by indicator status.
Species in bold type are dominant/co-dominant.
Indicator Status derived from national List of Plant Species That Occur in Wetlands (Region 5 - Great Plains).

ST. VRAIN RIVER - BREACHES RESTORATION (30% DESIGN)

Seeds per SF:	50
TOTAL ACRES:	156.58

ZONE 6 - FORB SEED SCHEDULE

12/15/2016

Scientific Name	Common Name	* 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	5.0%	2.5	108900	449,600	0.24	37.93	75.85
<i>Asclepias incarnata</i>	swamp milkweed	5.0%	2.5	108900	68,000	1.60	250.76	501.52
<i>Asclepias speciosa</i>	showy milkweed	5.0%	2.5	108900	58,000	1.88	293.99	587.98
<i>Coreopsis lanceolata</i>	lance-leaved coreopsis	6.0%	3.0	130680	221,000	0.59	92.59	185.18
<i>Coreopsis tinctoria</i>	plains coreopsis	6.0%	3.0	130680	1,400,000	0.09	14.62	29.23
<i>Echinacea purpurea</i>	prairie coneflower	6.0%	3.0	130680	117,000	1.12	174.89	349.78
<i>Ericameria nauseosa</i>	rubber rabbitbrush	6.0%	3.0	130680	400,000	0.33	51.15	102.31
<i>Erigeron speciosus</i>	low fleabane	5.0%	2.5	108900	1,600,000	0.07	10.66	21.31
<i>Gaillardia aristata</i>	perennial gaillardia	6.0%	3.0	130680	132,000	0.99	155.01	310.03
<i>Gaillardia pulchella</i>	annual gaillardia	6.0%	3.0	130680	238,000	0.55	85.97	171.95
<i>Glycyrrhiza lepidota</i>	wild licorice	3.0%	1.5	65340	58,000	1.13	176.40	352.79
<i>Helianthus nuttallii</i>	Nuttall's sunflower	5.0%	2.5	108900	216,800	0.50	78.65	157.30
<i>Iris missouriensis</i>	Rocky Mountain iris	3.0%	1.5	65340	21,000	3.11	487.19	974.37
<i>Linum lewisii</i>	blue flax	6.0%	3.0	130680	170,000	0.77	120.36	240.73
<i>Machaeranthera tanacetifolia</i>	prairie aster	6.0%	3.0	130680	408,000	0.32	50.15	100.30
<i>Monarda fistulosa</i>	wild bergamot/beeibalm	5.0%	2.5	108900	1,272,500	0.09	13.40	26.80
<i>Solidago canadensis</i>	Canada goldenrod	5.0%	2.5	108900	1,950,400	0.06	8.74	17.49
<i>Sphaeralcea coccinea</i>	scarlet globemallow	6.0%	3.0	130680	500,000	0.26	40.92	81.85
<i>Verbena hastata</i>	blue vervain	5.0%	2.5	108900	1,792,800	0.06	9.51	19.02
			100.0%	50		13.75	2152.90	4305.79

NOTES:
Species listed in alphabetical order.
Forbs to be seeded after weed control measures are implemented (approximately 2 years post construction)

ST. VRAIN RIVER - BREACHES RESTORATION (30% DESIGN)

Seeds per SF	50
TOTAL ACRES:	64.4

ZONE 8 - GRASS & GRASS-LIKE SEED SCHEDULE

12/15/2016

Scientific Name	Common Name	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	UPL	W	4.0%	2.0	87120	191,000	0.46	29.37	58.75
<i>Bouteloua gracilis</i>	blue grama	UPL	W	10.0%	5.0	217800	825,000	0.26	17.00	34.00
<i>Koeleria macrantha</i>	Prairie Junegrass	UPL	C	5.0%	2.5	108900	2,315,400	0.05	3.03	6.06
<i>Hesperostipa comata</i>	needle-and-thread	UPL	C	4.0%	2.0	87120	115,000	0.76	48.79	97.57
<i>Nassella viridula</i>	green needlegrass	UPL	C	4.0%	2.0	87120	181,000	0.48	31.00	61.99
<i>Achnatherum hymenoides</i>	indian ricegrass	FACU	C	4.0%	2.0	87120	141,000	0.62	39.79	79.58
<i>Andropogon gerardii</i>	big bluestem	FACU	W	4.0%	2.0	87120	130,000	0.67	43.16	86.32
<i>Elymus canadensis</i>	Canada wildrye	FACU	C	5.0%	2.5	108900	115,000	0.95	60.98	121.97
<i>Elymus trachycaulus</i>	slender wheatgrass	FACU	C	7.5%	3.8	163350	159,000	1.03	66.16	132.32
<i>Pascopyrum smithii</i>	western wheatgrass	FACU	C	15.0%	7.5	326700	110,000	2.97	191.27	382.54
<i>Schizachyrium scoparium</i>	little bluestem	FACU	W	7.5%	3.8	163350	260,000	0.63	40.46	80.92
<i>Sorghastrum nutans</i>	yellow indian grass	FACU	W	3.5%	1.8	76230	170,000	0.45	28.88	57.76
<i>Sporobolus cryptandrus</i>	sand dropseed	FACU	W	4.0%	2.0	87120	5,298,000	0.02	1.06	2.12
<i>Elymus lanceolatus psammophilus</i>	streambank wheatgrass	FACU	C	7.5%	3.8	163350	156,000	1.05	67.43	134.87
<i>Panicum virgatum</i>	switchgrass	FAC	W	7.5%	3.8	163350	389,000	0.42	27.04	54.09
<i>Sporobolus airoides</i>	alkali sacaton	FAC	W	7.5%	3.8	163350	1,758,000	0.09	5.98	11.97
				100.0%	50.0			10.89	701.41	1402.82

NOTES:
Species listed above sorted by indicator status.
Species in bold type are dominant/co-dominant.
Indicator Status derived from national List of Plant Species That Occur in Wetlands (Region 5 - Great Plains).

REVISIONS

Revision	Date	Description

Engineering Analytics, Inc.

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

ecosystem services

1800 Speight Road, Suite 209
Fort Collins, CO 80525
(970) 488-3111

ST. VRAIN CREEK REACH 3

PLANT SCHEDULES

SCALE VERIFICATION:
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Designed by: ECOS

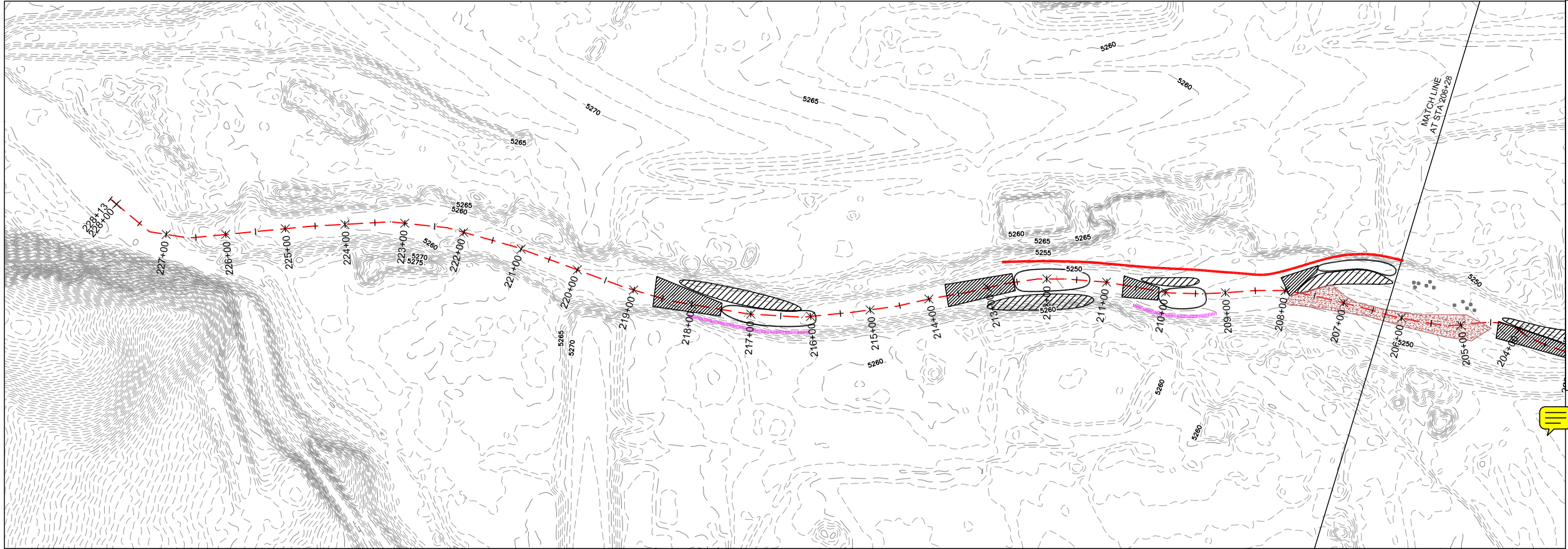
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Project No. 110668

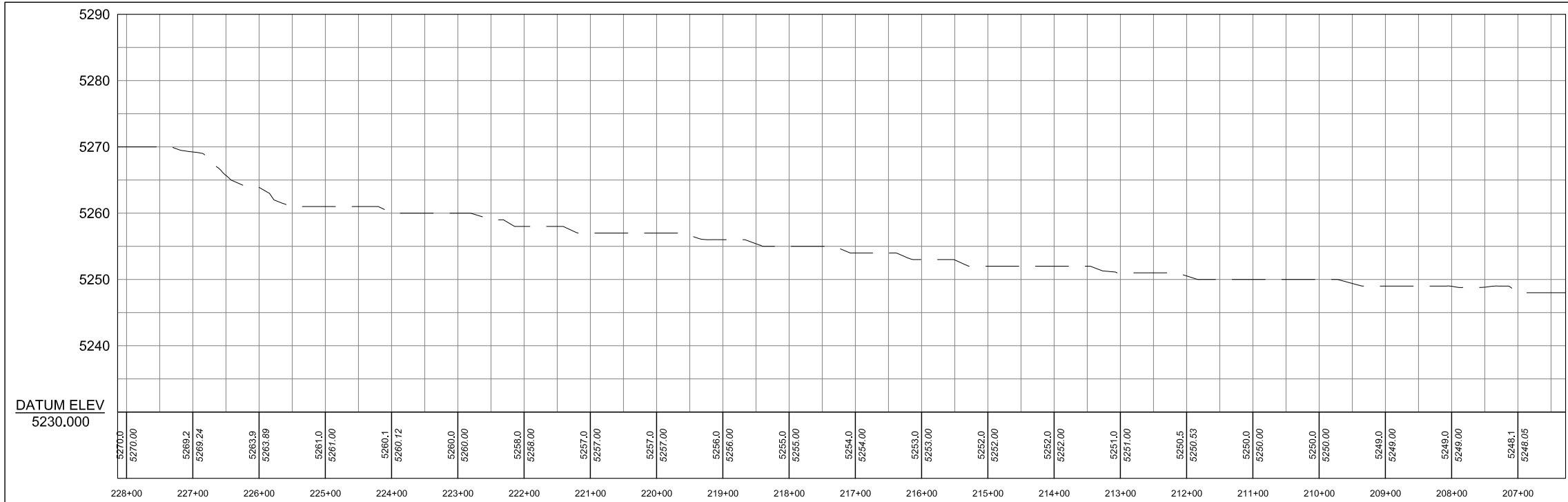
Date: December 21, 2016

SHEET LS3



PLAN
1" = 100'

- LEGEND
- RIFFLE
 - POINT BAR
 - POOL
 - BOULDER OR WOODY DEBRIS
 - TYPE A BANK STABILIZATION
 - TYPE B BANK STABILIZATION
 - TYPE C BANK STABILIZATION



PROFILE
1" = 100'

REVISIONS

Revision	Date	Description

Engineering Analytics, Inc.
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(970) 488-3111

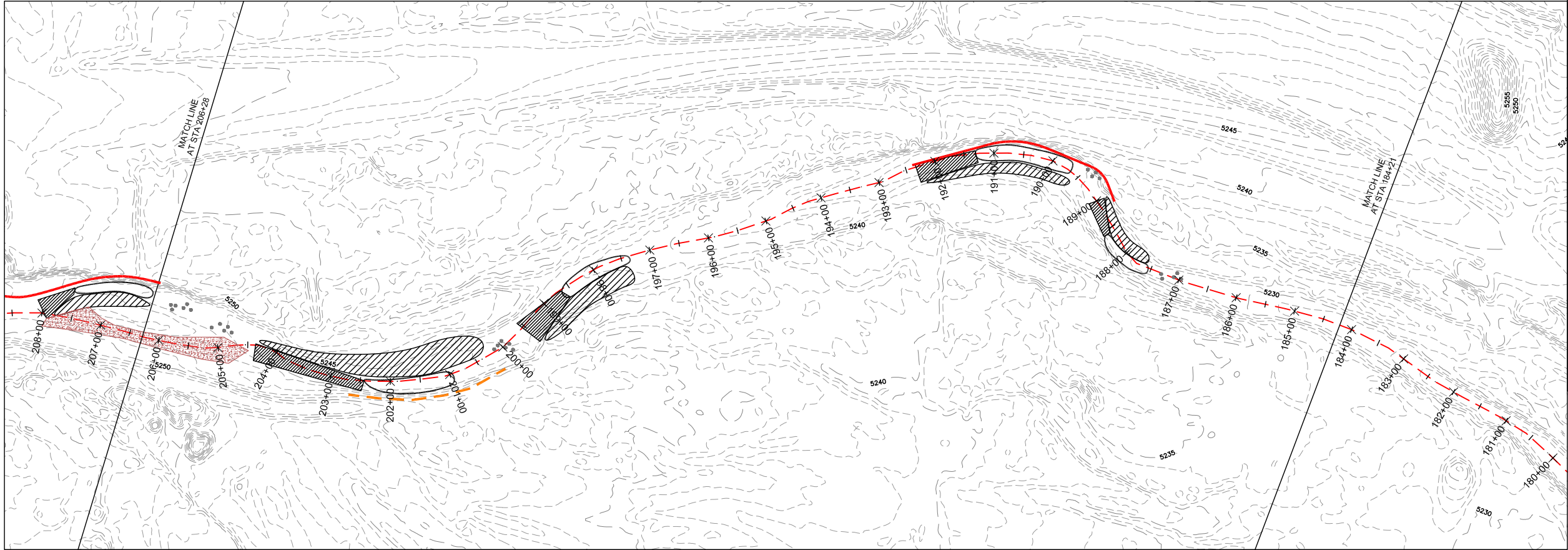
ECOLOGICAL RESOURCES CONSULTANTS, INC.
35715 US HIGHWAY 40, SUITE D24
EVERGREEN, CO 80439

ST. VRAIN CREEK REACH 3
STREAM RESTORATION
STA 206+28 to 228+00

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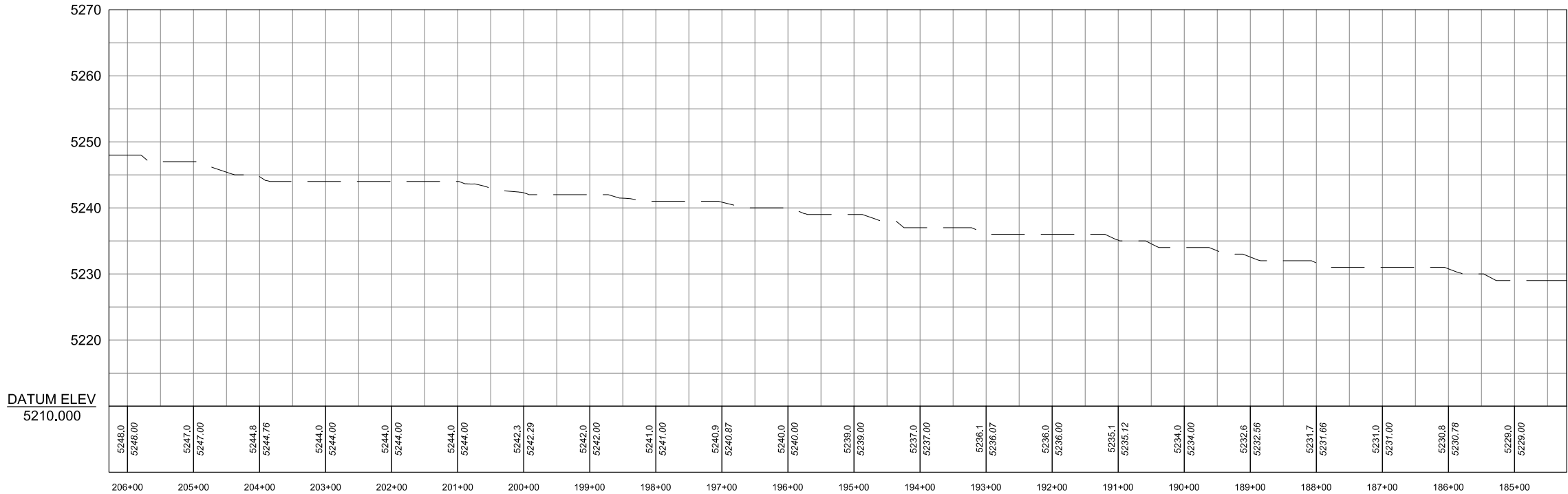
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Project No. 110666
Date: December 21, 2016
SHEET R1

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LEGEND

- RIFFLE
- POINT BAR
- POOL
- BOULDER OR WOODY DEBRIS
- TYPE A BANK STABILIZATION
- TYPE B BANK STABILIZATION
- TYPE C BANK STABILIZATION



REVISIONS

Revision	Date	Description

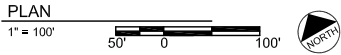
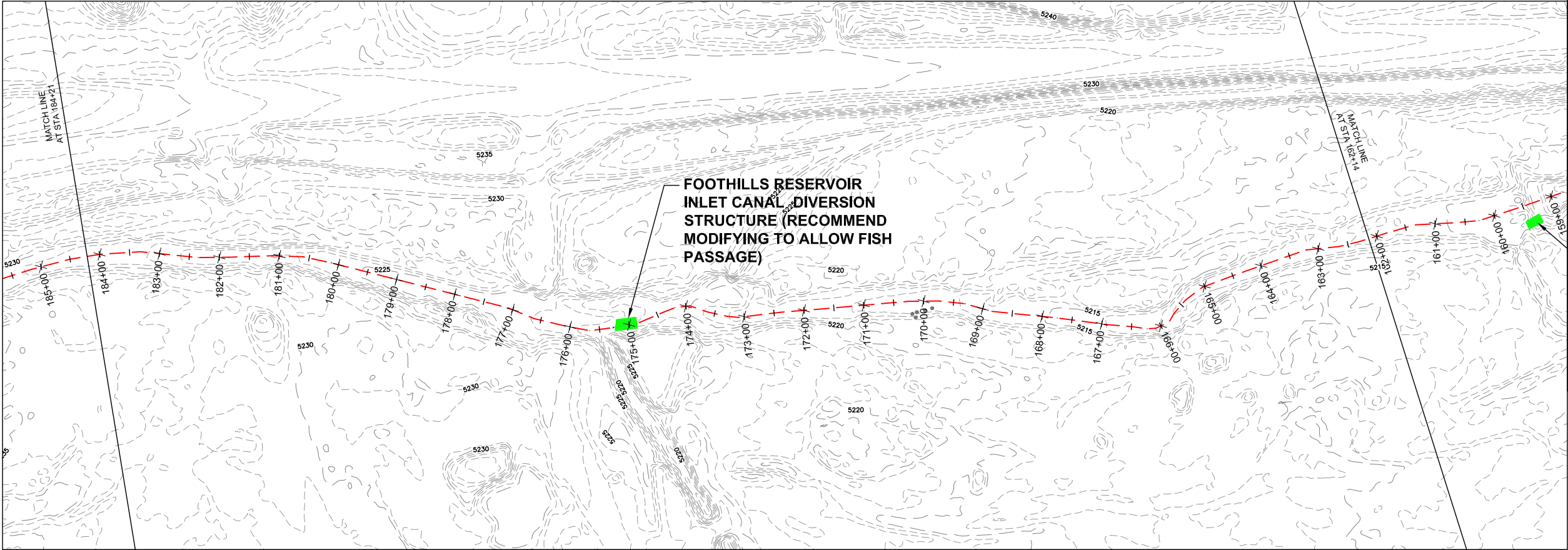
EA Engineering Analytics, Inc.
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(970) 488-3111

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

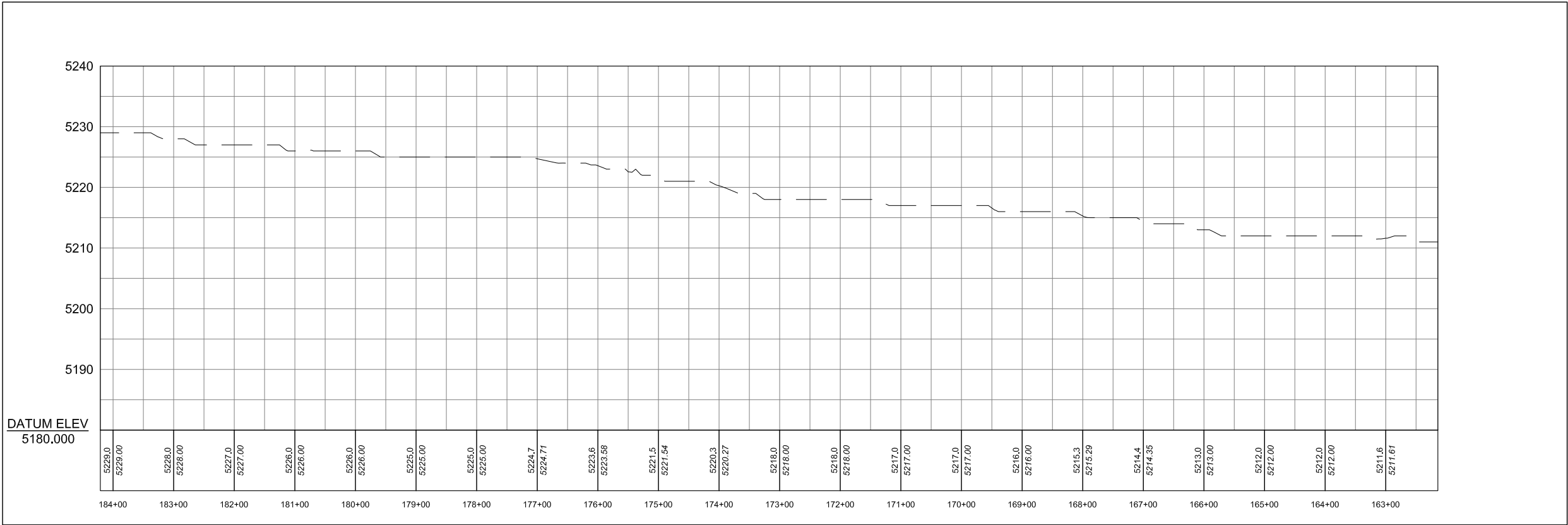


ST. VRAIN CREEK REACH 3
STREAM RESTORATION
STA 184+21 TO 206+28

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Project No. 110666
Date: December 21, 2016
SHEET R2



- LEGEND**
- RIFFLE
 - POINT BAR
 - POOL
 - BOULDER OR WOODY DEBRIS
 - TYPE A BANK STABILIZATION
 - TYPE B BANK STABILIZATION
 - TYPE C BANK STABILIZATION



PROFILE
1" = 100'

REVISIONS

Revision	Date	Description

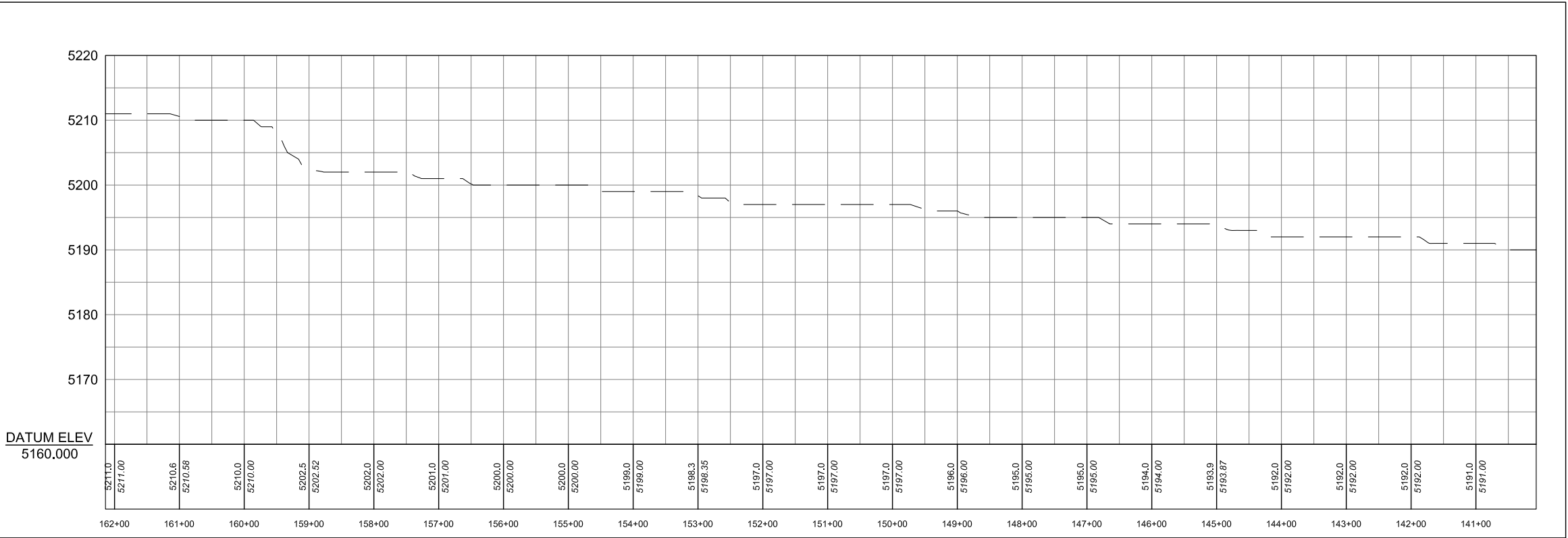
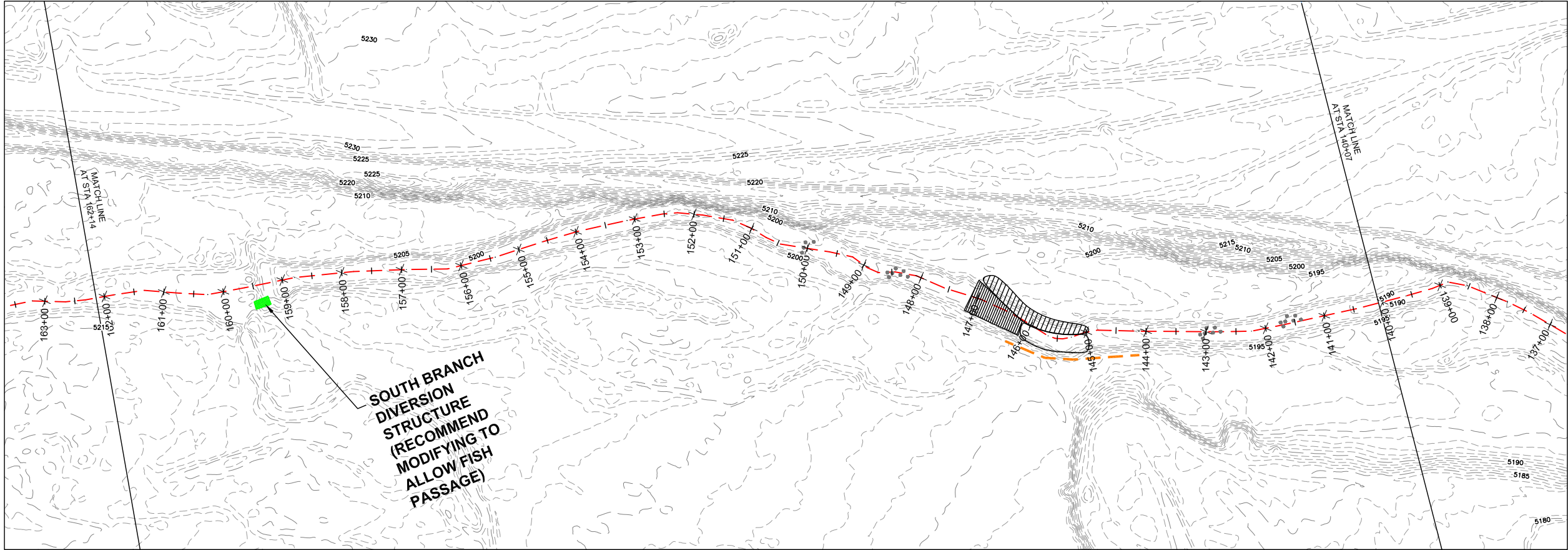
Engineering Analytics, Inc.
1600 Speight Road, Suite 209
Fort Collins, CO 80525
(970) 488-3111

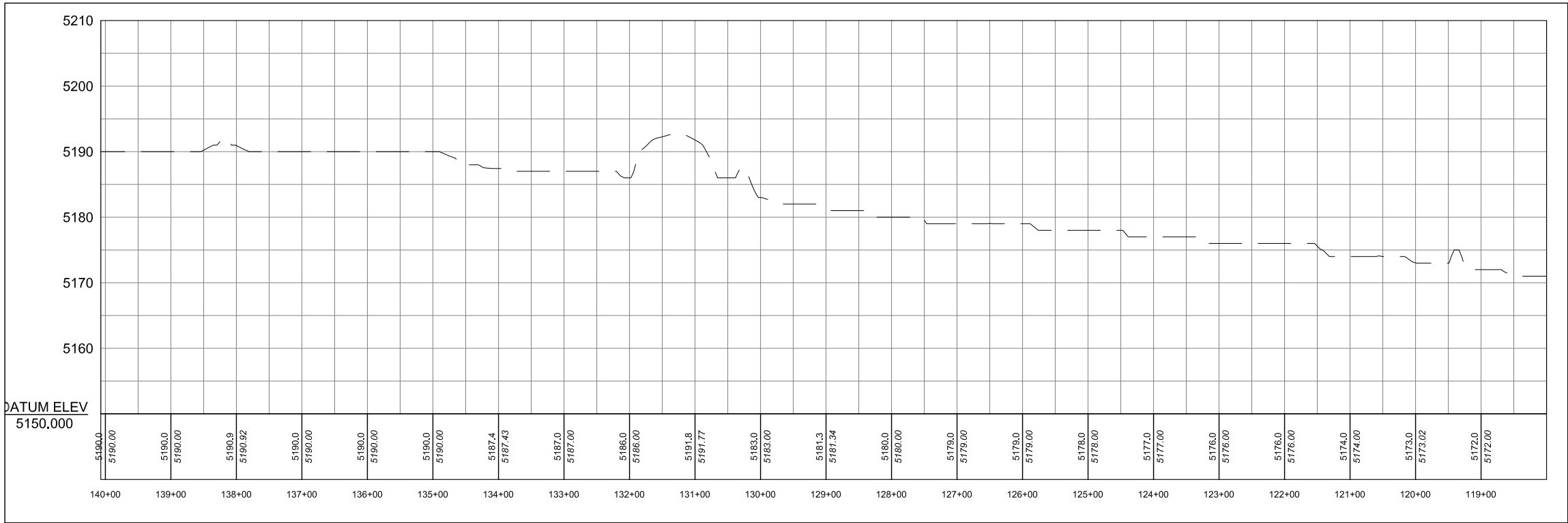
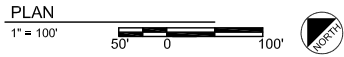
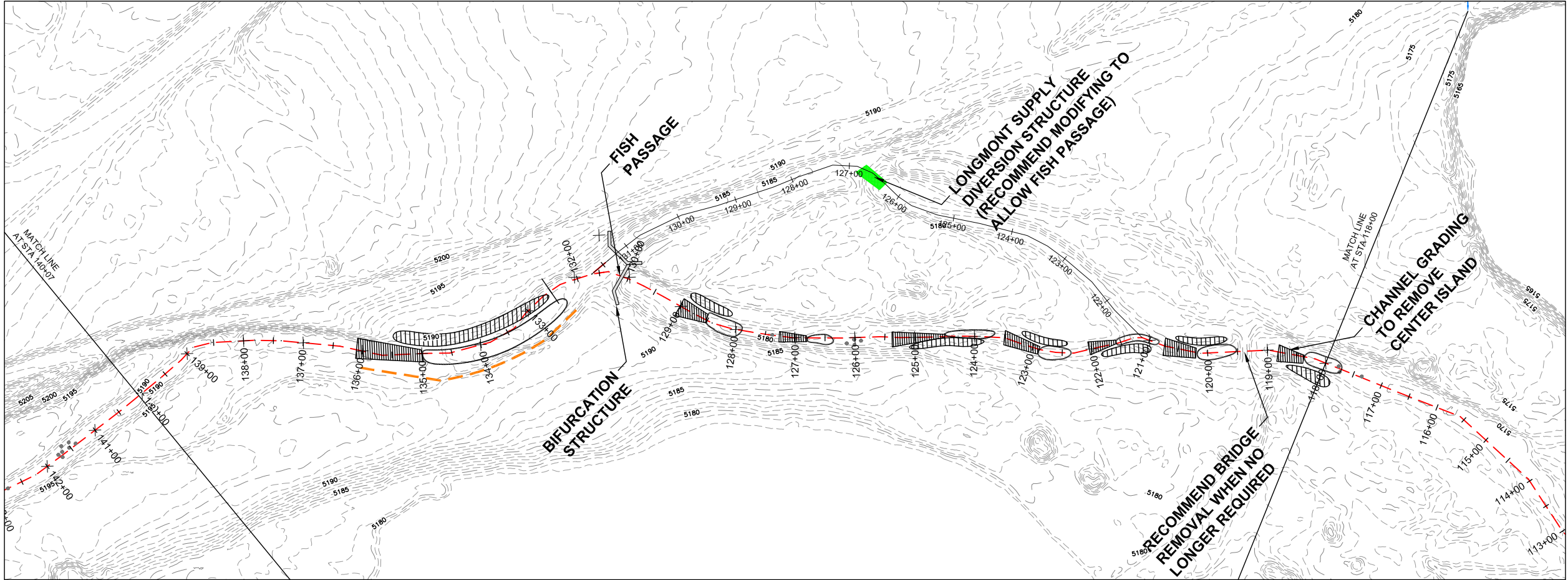
ECOLOGICAL RESOURCES CONSULTANTS, INC.
35715 US HIGHWAY 40, SUITE D204
EVERGREEN, CO 80439

ST. VRAIN CREEK REACH 3
STREAM RESTORATION
STA 162+14 TO 184+21

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PROFILE
1" = 100'

LEGEND

- RIFFLE
- POINT BAR
- POOL
- BOULDER OR WOODY DEBRIS
- TYPE A BANK STABILIZATION
- TYPE B BANK STABILIZATION
- TYPE C BANK STABILIZATION

REVISIONS	
Revision	Description

Engineering Analytics, Inc.

1800 Speight Road, Suite 209
Fort Collins, CO 80525
(970) 488-3111

ECOLOGICAL RESOURCES CONSULTANTS, INC.

35715 US HIGHWAY 40, SUITE D204
EVERGREEN, CO 80439

ST. VRAIN CREEK REACH 3

STREAM RESTORATION

STA 118+00 TO 140+07

SCALE VERIFICATION:
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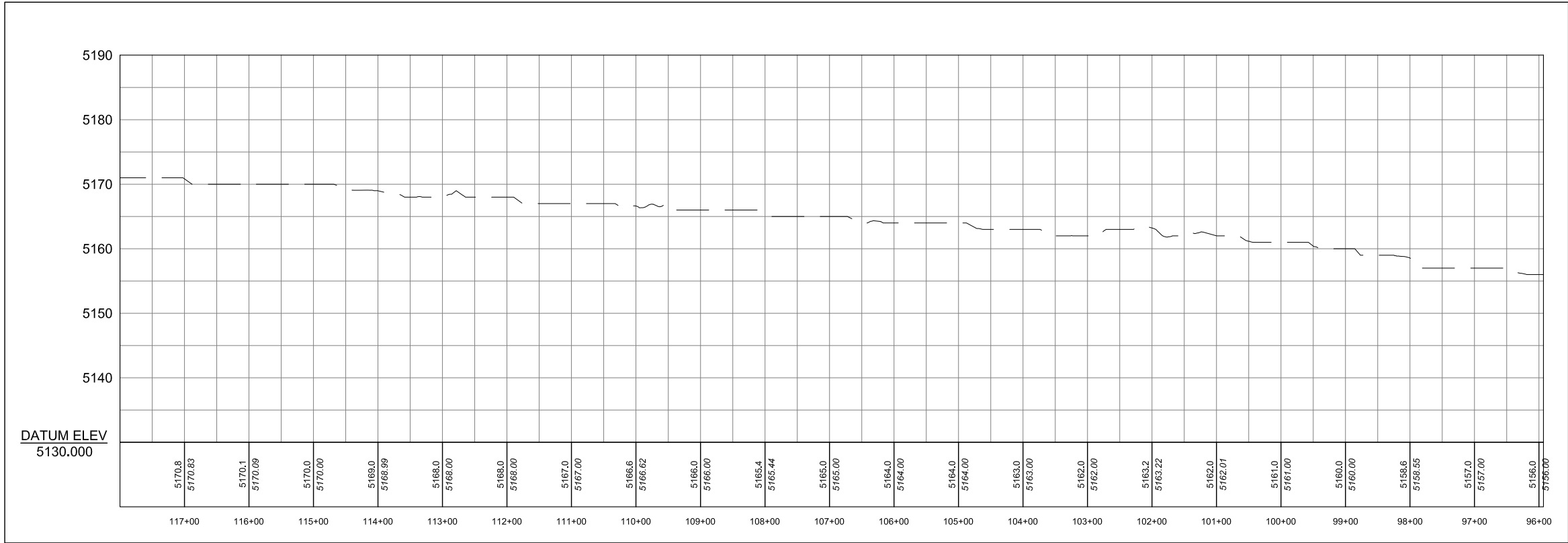
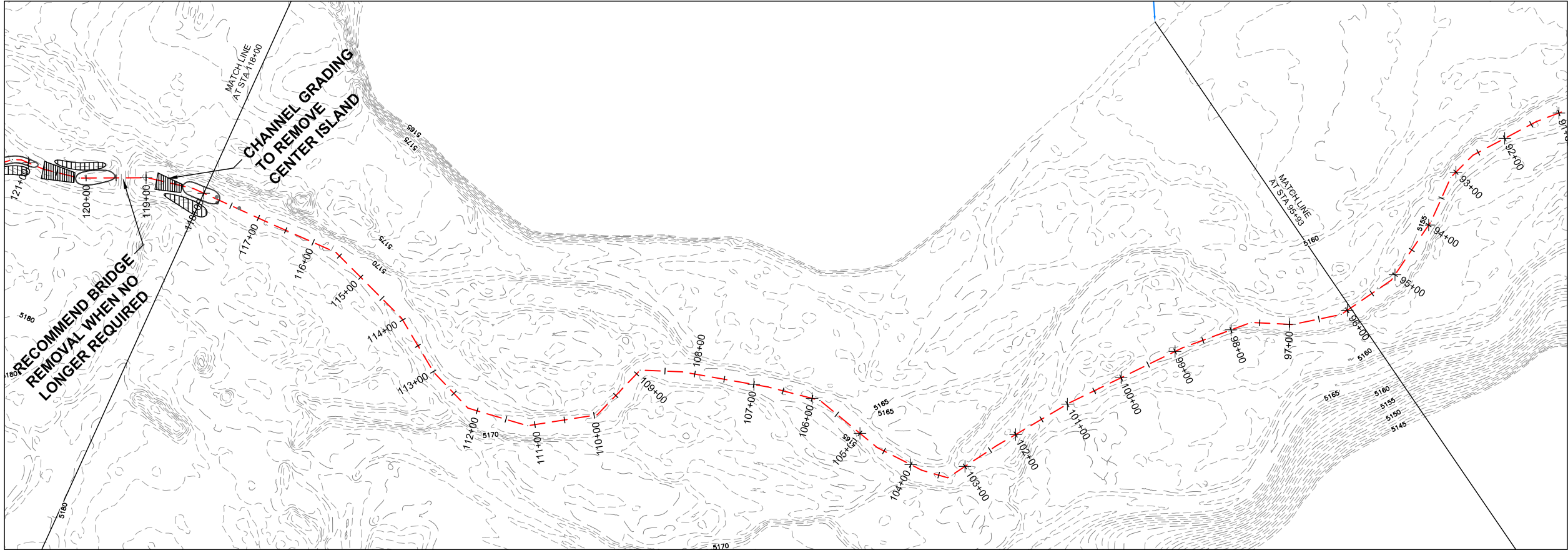
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SHEET R5

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

STREAM RESTORATION
STA 95+93 TO 118+00

SCALE VERIFICATION:
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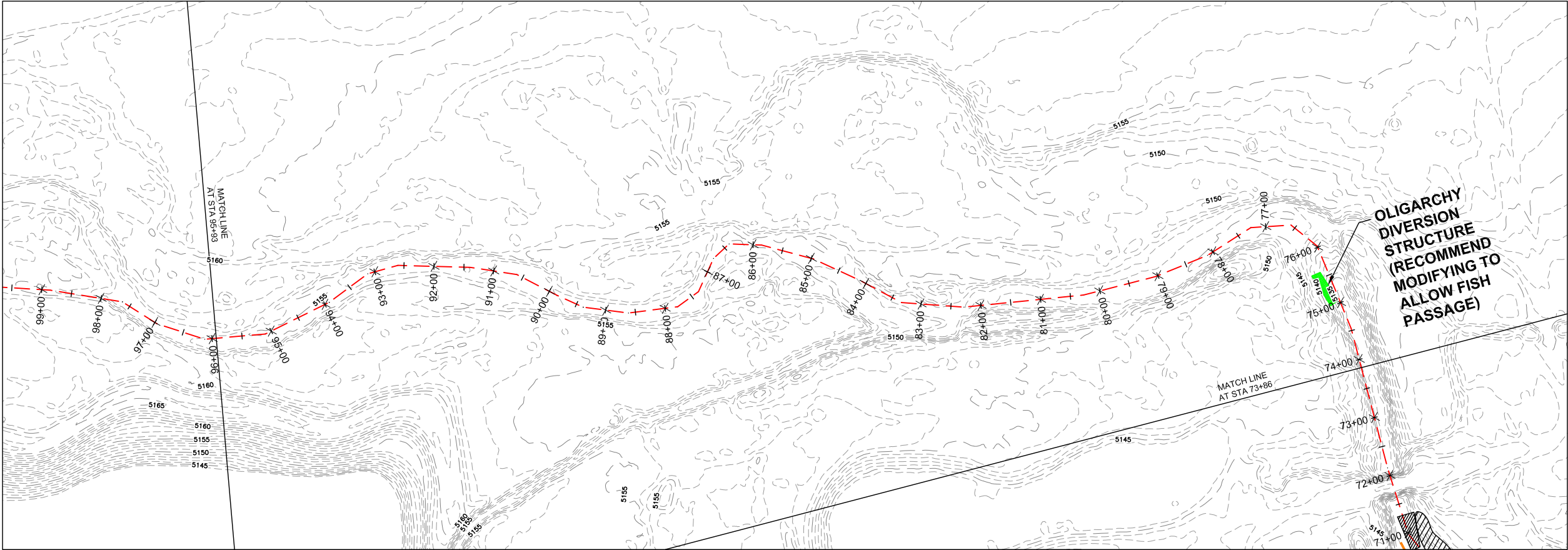
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LEGEND

RIFFLE

POINT BAR

POOL

BOULDER OR WOODY DEBRIS

TYPE A BANK STABILIZATION

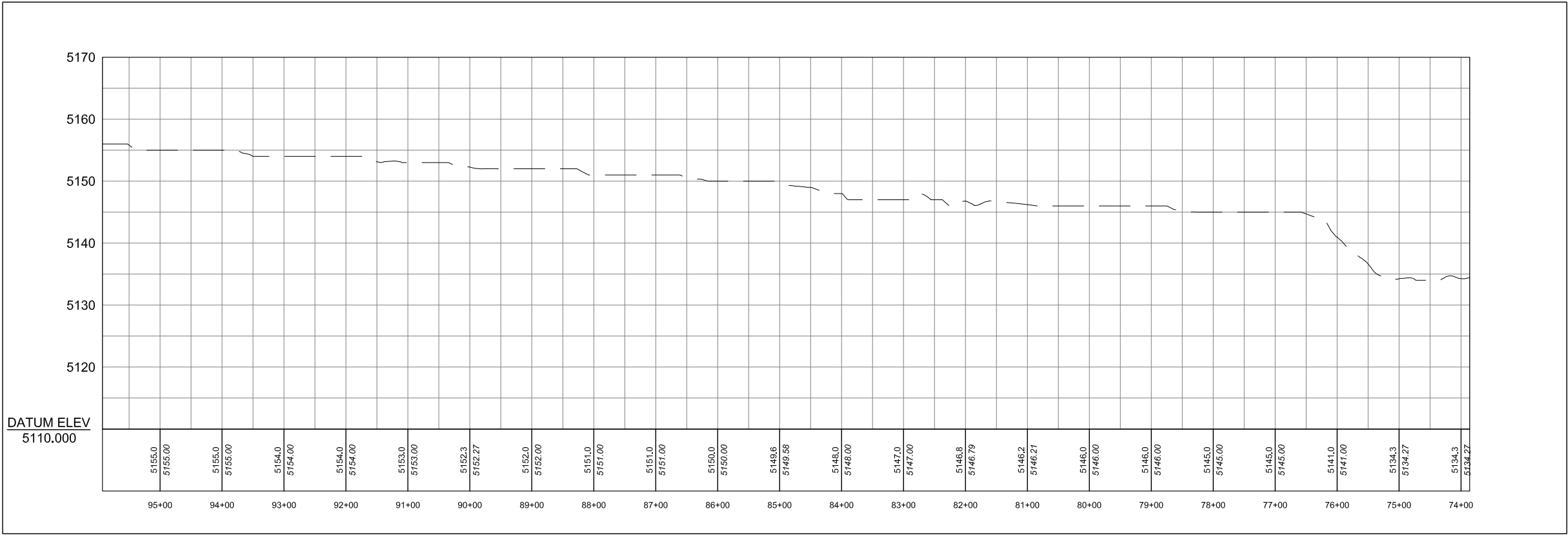
TYPE B BANK STABILIZATION

TYPE C BANK STABILIZATION

REVISIONS		
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ST. VRAIN CREEK REACH 3
STREAM RESTORATION
STA 73+86 TO 95+93

SCALE VERIFICATION:
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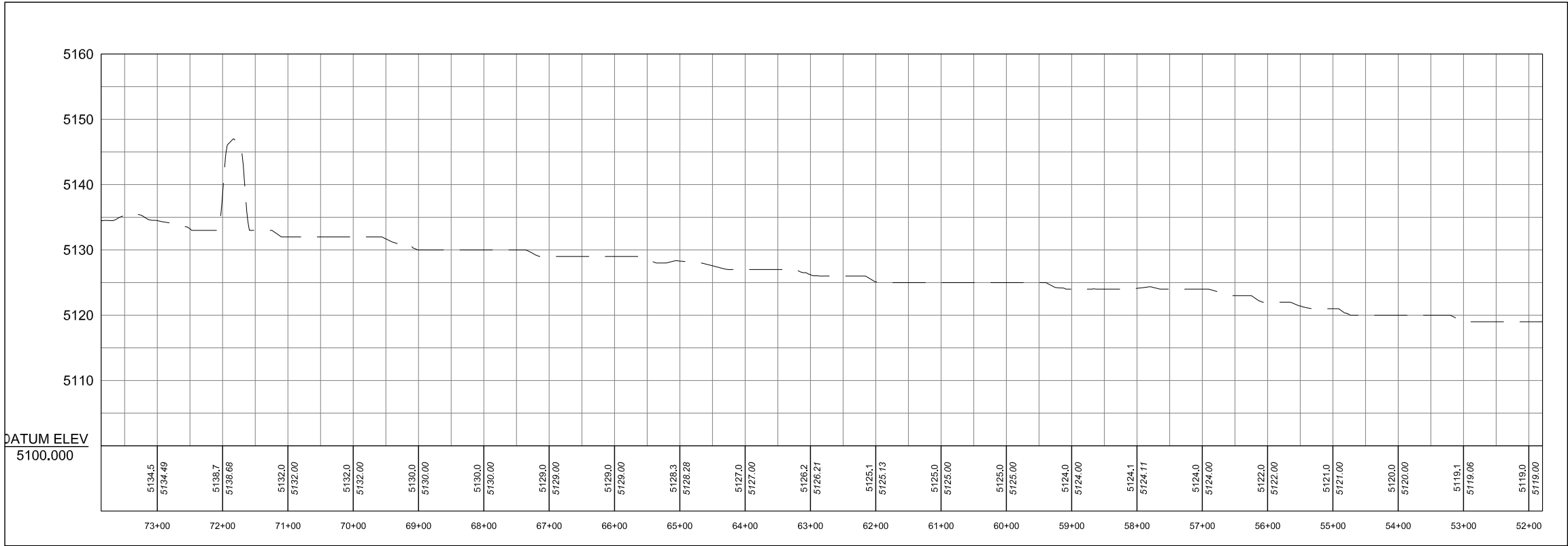
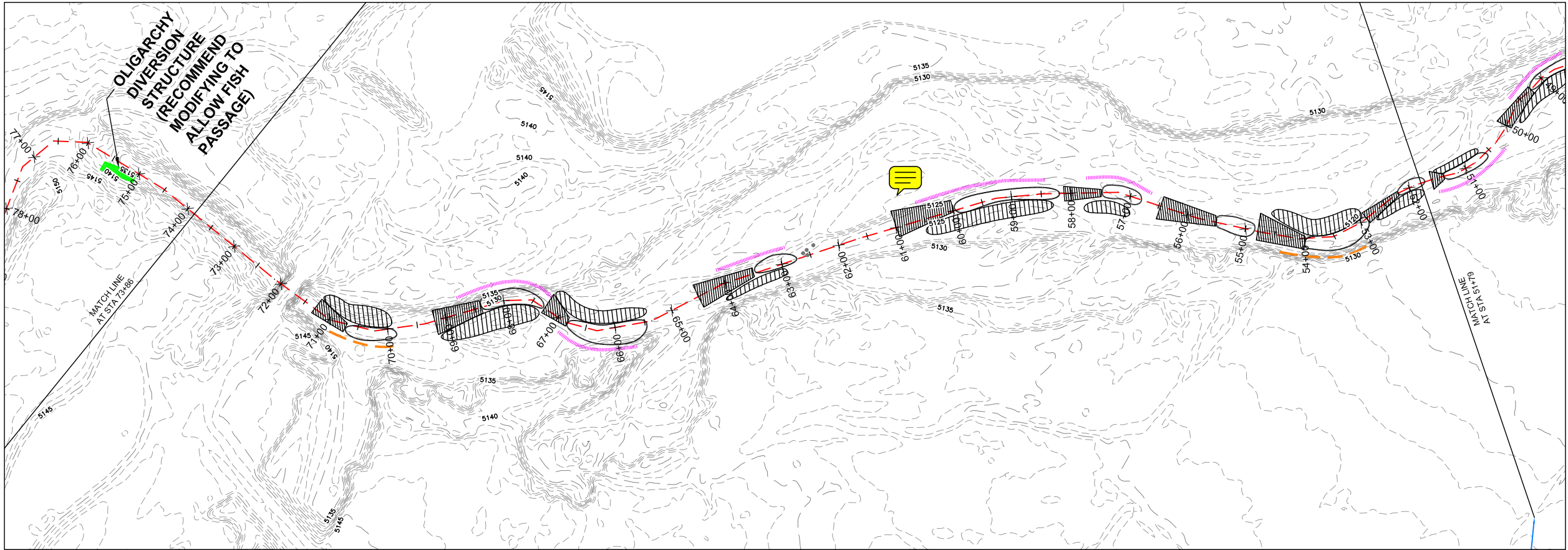
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SHEET R7

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PROFILE
1" = 100'

LEGEND

	RIFFLE
	POINT BAR
	POOL
	BOULDER OR WOODY DEBRIS
	TYPE A BANK STABILIZATION
	TYPE B BANK STABILIZATION
	TYPE C BANK STABILIZATION

REVISIONS	
Revision	Description

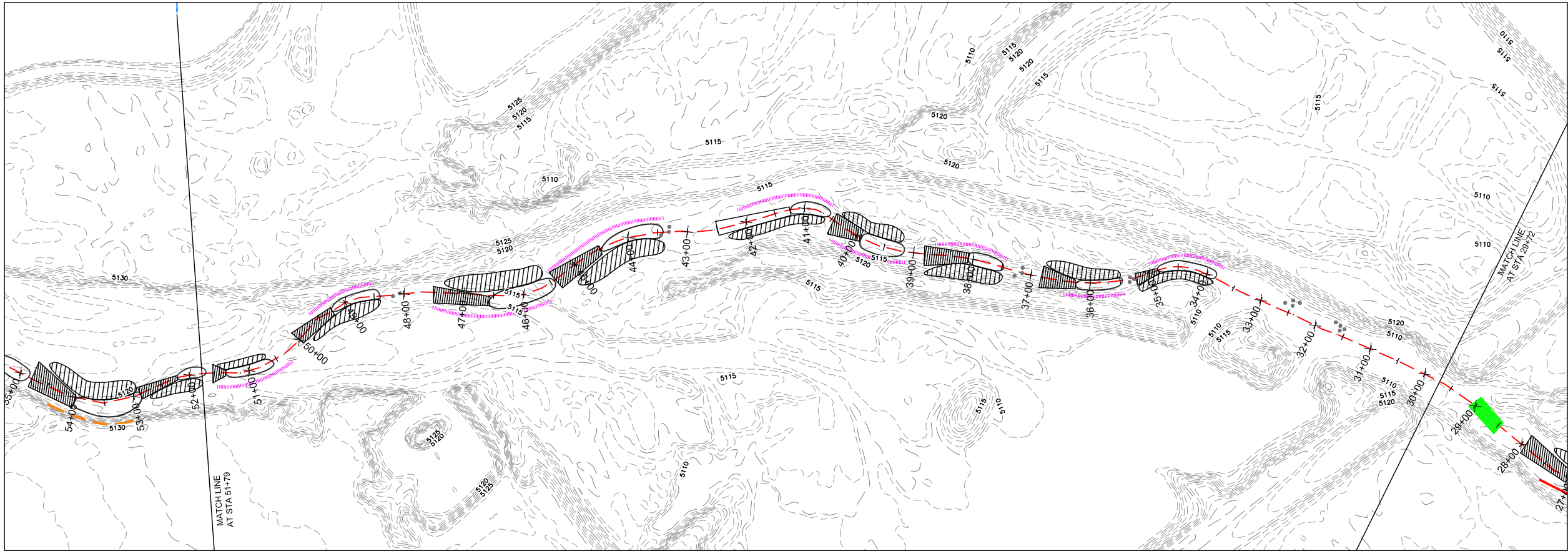
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ST. VRAIN CREEK REACH 3	
STREAM RESTORATION	
STA 51+79 TO 73+86	

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

RIFFLE

POINT BAR

POOL

BOULDER OR WOODY DEBRIS

TYPE A BANK STABILIZATION

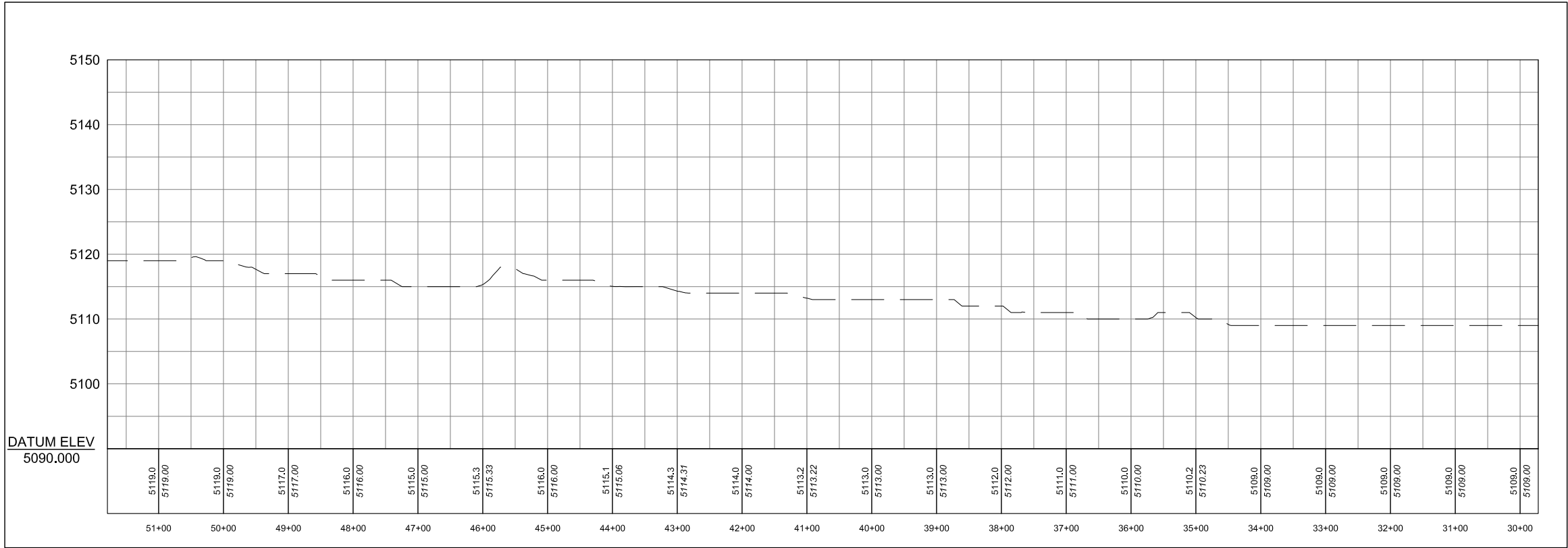
TYPE B BANK STABILIZATION

TYPE C BANK STABILIZATION

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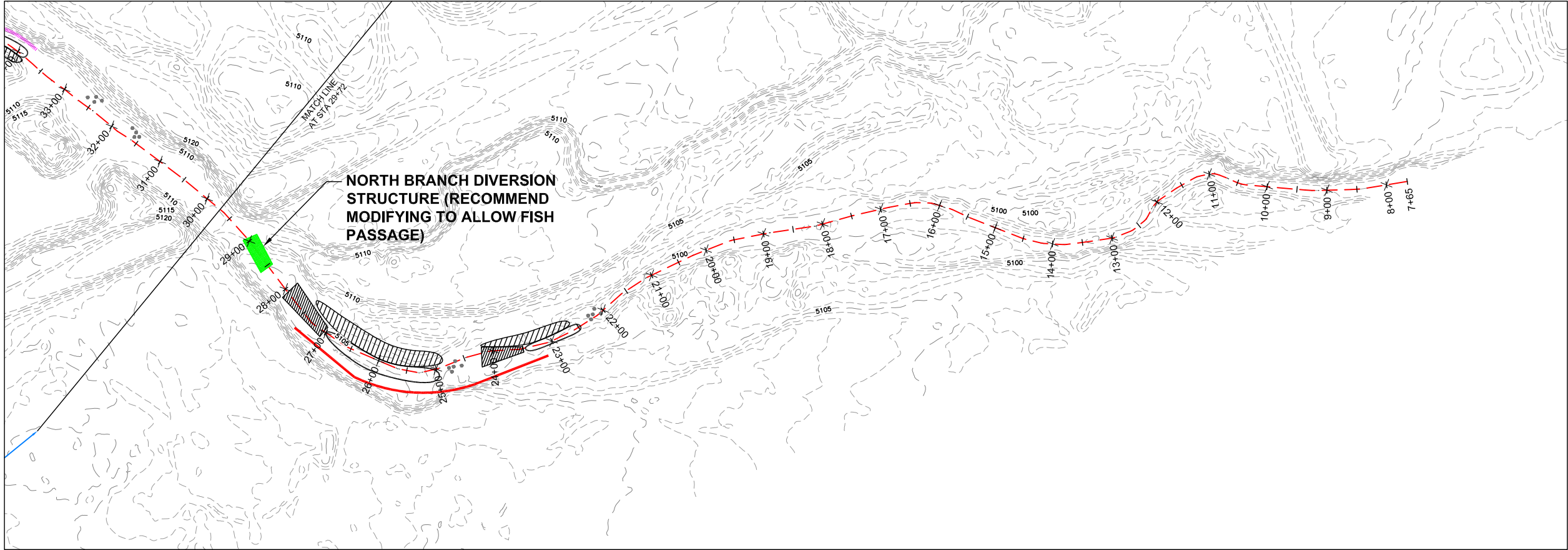
ECOLOGICAL RESOURCES CONSULTANTS, INC.
35715 US HIGHWAY 40, SUITE D204
EVERGREEN, CO 80439



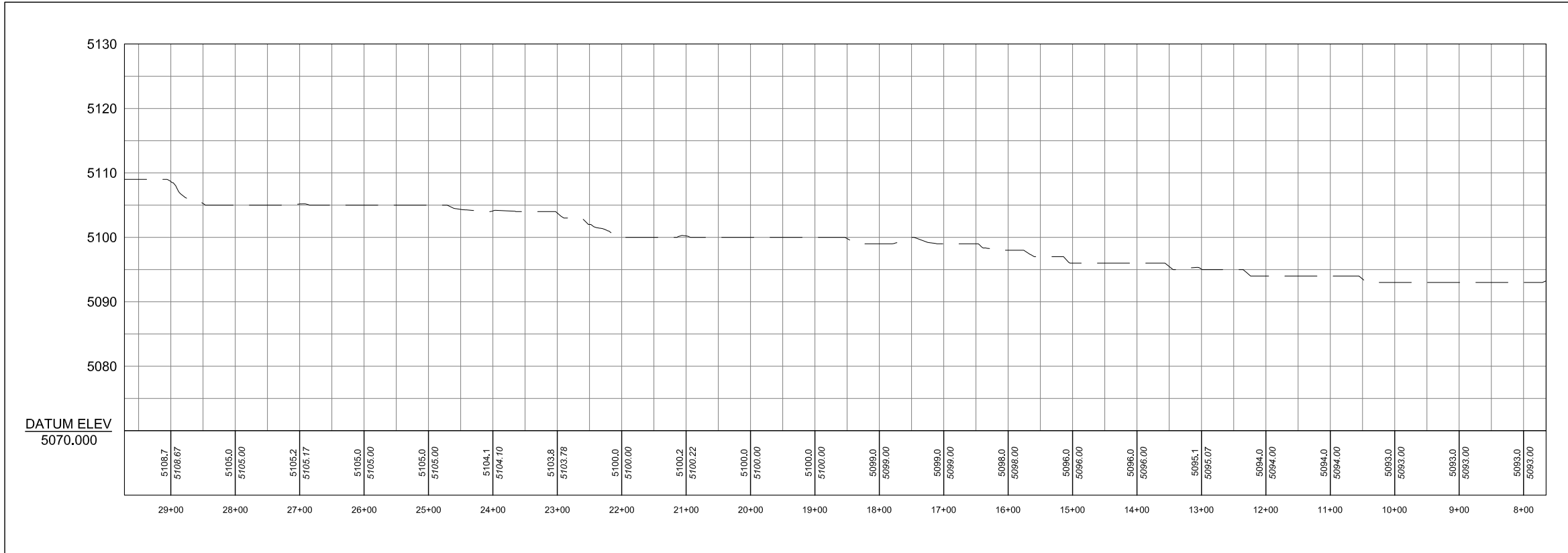
ST. VRAIN CREEK REACH 3
STREAM RESTORATION
STA 29+72 TO 51+79

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SHEET R9



PLAN
1" = 100'



PROFILE
1" = 100'

LEGEND

- RIFFLE
- POINT BAR
- POOL
- BOULDER OR WOODY DEBRIS
- TYPE A BANK STABILIZATION
- TYPE B BANK STABILIZATION
- TYPE C BANK STABILIZATION

E:\110666 St. Vrain Breaches\Restoration Plans ERS.dwg - SAVED:12/20/16 - PRINTED:12/21/16

REVISIONS

Revision	Date	Description

Engineering Analytics, Inc.

1900 Speer Point Road, Suite 209
Fort Collins, CO 80525
(970) 488-3111

ECOLOGICAL RESOURCES CONSULTANTS, INC.

35715 US HIGHWAY 40, SUITE D204
EVERGREEN, CO 80439

ST. VRAIN CREEK REACH 3

STREAM RESTORATION
STA 7+65 TO 29+72

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

Drawn by: ERC

Designed by: ERC

Checked by: ERC

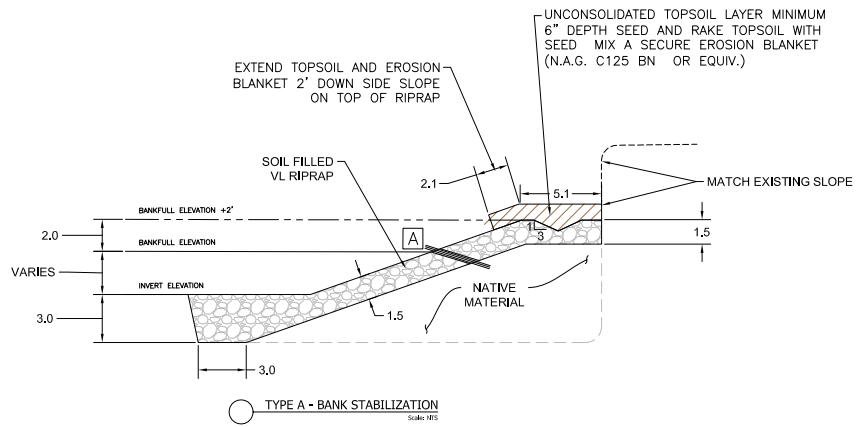
Scale: As Shown

Project No. 110666

Date: December 21, 2016

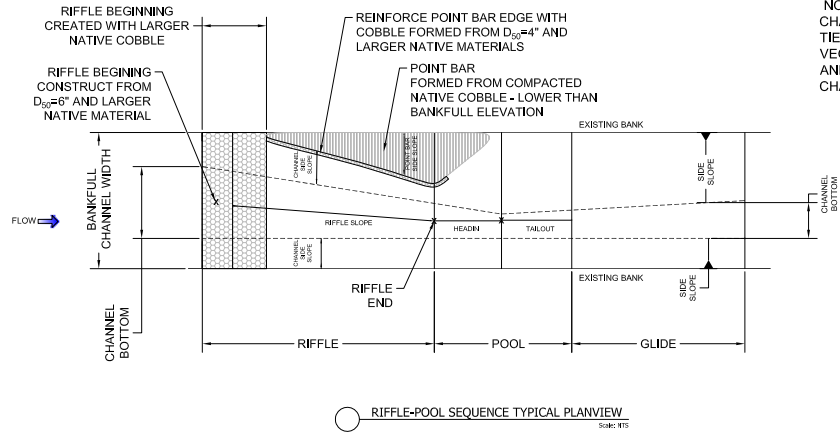
SHEET R10

EA110666 St. Vrain Creek Restoration Details ERS.dwg
SAVED: 12/20/16
PRINTED: 12/21/16

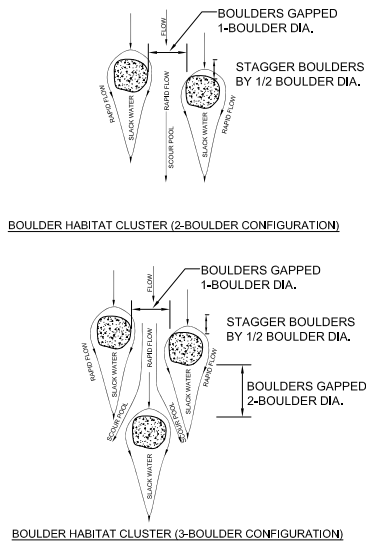
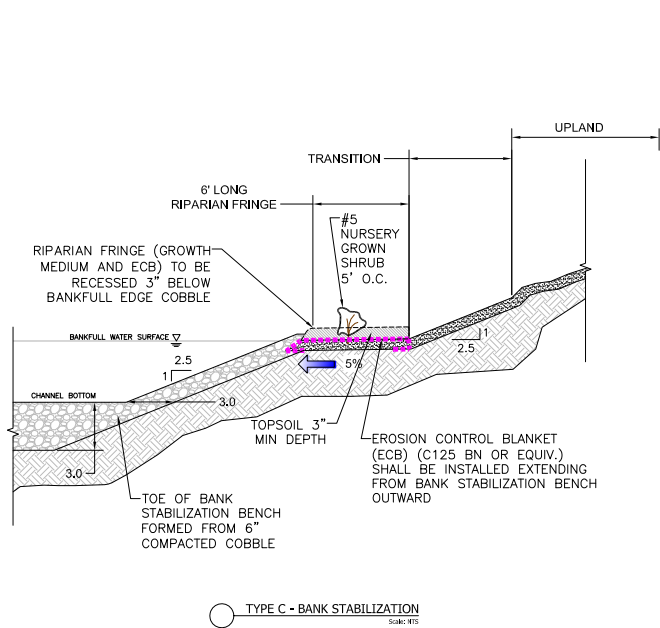
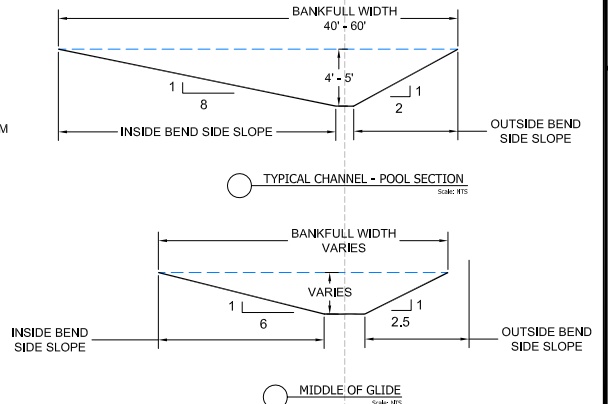
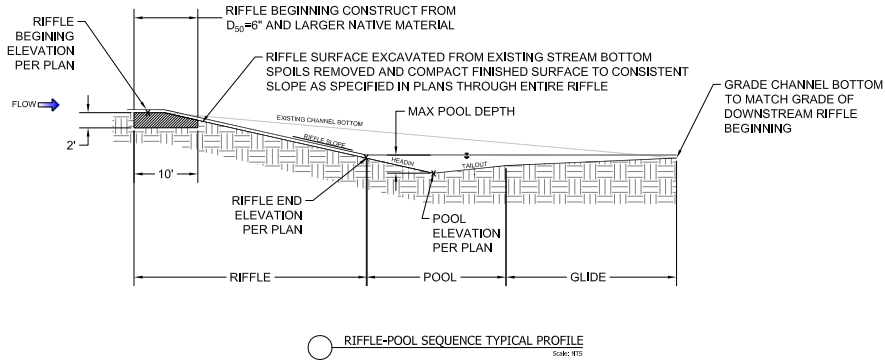
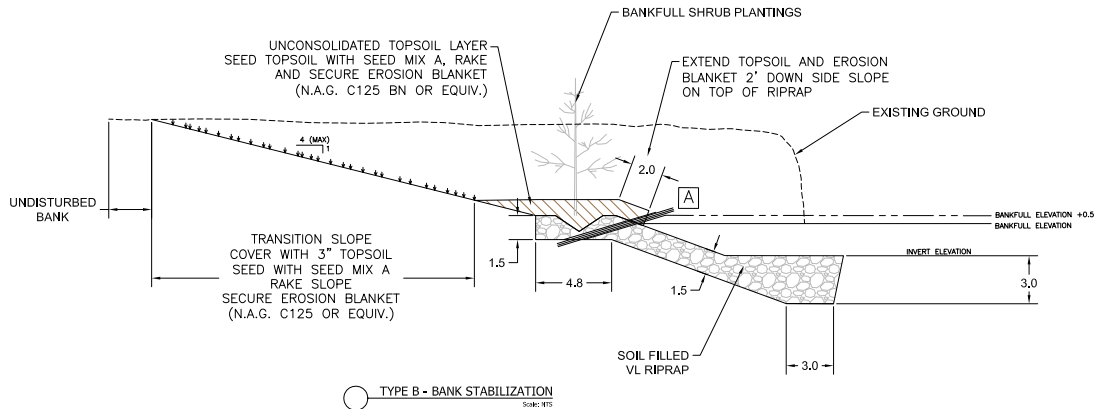
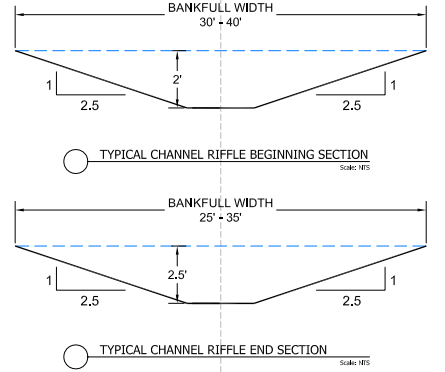


BRUSH LAYERING [A]

1. INSTALL A CONTINUOUS LAYER OF WILLOW CUTTINGS DURING PLACEMENT OF SOIL FILLED RIPRAP
2. APPROXIMATELY 12 WILLOW CUTTINGS SHALL BE PLACED SIDE BY SIDE PER LINEAR FOOT
3. 3" LAYER OF NATIVE SAND OR TOPSOIL SHOULD BE PLACED BELOW AND ON TOP OF BRUSH LAYER
4. BRUSH LAYER SHALL BE INSTALLED AT BANKFULL ELEVATION
5. WILLOW CUTTINGS SHALL EXTEND BEYOND RIPRAP INTO NATIVE MATERIAL
6. WILLOW CUTTINGS SHALL BE HARVESTED ON SITE AT APPROVED LOCATIONS
7. CUTTINGS SHALL BE HARVESTED DURING DORMANCY PRIOR TO LEAF OUT
8. CUTTINGS SHALL BE A MINIMUM LENGTH OF 4'
9. ALL CUTTINGS SHALL BE SOAKED COMPLETELY SUBMERGED FOR 48 HOURS PRIOR TO INSTALLATION AND SHALL REMAIN MOIST AT ALL TIMES UPON HARVEST



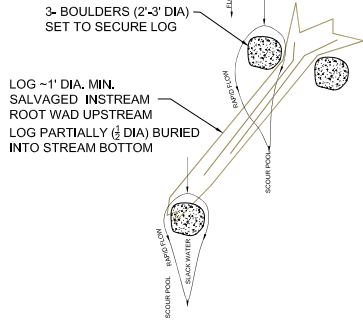
NOTE:
CHANNEL GRADING TO
TIE-IN TO EXISTING
VEGETATION LINE
AND/OR BANKFULL
CHANNEL WIDTH.



BOULDER HABITAT CLUSTERS (BHC) (NTS)

BHC NOTES:

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



LARGE WOODY DEBRIS HABITAT (LWD) (NTS)

LWD NOTES:

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

Preliminary Layout Summary Table				
Feature	#	Station	Proposed El (ft)	Riffle Slope (%)
Match		2100	5100.2	
Glide	1	2200	5099.1	
Pool	1	2300	5098	
RE	1	2350	5100.5	
RB	1	2425	5102	2.0%
Glide	2	2512.5	5100.875	
Pool	2	2600	5099.75	
RE	2	2675	5102.25	
RB	2	2800	5105	2.2%
Match		2900	5108.5	
Glide	3	3112.5	5107.35	
Pool	3	3425	5106.2	
RE	3	3475	5108.7	
RB	3	3525	5109.3	1.2%
Glide	4	3555	5108.1	
Pool	4	3585	5106.9	
RE	4	3625	5109.4	
RB	4	3675	5110	1.2%
Glide	5	3725	5108.8	
Pool	5	3775	5107.6	
RE	5	3800	5110.1	
RB	5	3875	5111	1.2%
Glide	6	3912.5	5109.85	
Pool	6	3950	5108.7	
RE	6	3975	5111.2	
RB	6	4025	5111.8	1.2%
Glide	7	4062.5	5110.56	
Pool	7	4100	5109.32	
RE	7	4135	5111.82	
RB	7	4250	5113.2	1.2%
Glide	8	4325	5111.96	
Pool	8	4400	5110.72	
RE	8	4450	5113.22	
RB	8	4540	5114.3	1.2%
Glide	9	4570	5113.05	
Pool	9	4600	5111.8	
RE	9	4650	5114.3	
RB	9	4750	5115.5	1.2%
Glide	10	4825	5114.6	
Pool	10	4900	5113.7	
RE	10	4935	5116.2	
RB	10	5000	5117.5	2.0%
Glide	11	5050	5116.5	
Pool	11	5100	5115.5	
RE	11	5125	5118	
RB	11	5150	5118.5	2.0%
Glide	12	5175	5117.2625	
Pool	12	5200	5116.025	
RE	12	5225	5118.525	
RB	12	5250	5119.5	1.5%
Glide	13	5320	5118.15	
Pool	13	5350	5116.8	
RE	13	5400	5119.3	
RB	13	5475	5120.8	2.0%

Preliminary Layout Summary Table				
Feature	#	Station	Proposed El (ft)	Riffle Slope (%)
Glide	14	5500	5119.65	
Pool	14	5525	5118.5	
RE	14	5550	5121	
RB	14	5650	5123	2.0%
Glide	15	5687.5	5121.6875	
Pool	15	5725	5120.375	
RE	15	5750	5122.875	
RB	15	5825	5124	1.5%
Glide	16	5887.5	5122.6	
Pool	16	5950	5121.2	
RE	16	6000	5123.7	
RB	16	6100	5125.2	1.5%
Glide	17	6200	5124.05	
Pool	17	6300	5122.9	
RE	17	6350	5125.4	
RB	17	6450	5127.4	2.0%
Glide	18	6537.5	5126.45	
Pool	18	6625	5125.5	
RE	18	6675	5128	
RB	18	6725	5129	2.0%
Glide	19	6757.5	5127.72	
Pool	19	6790	5126.44	
RE	19	6825	5128.94	
RB	19	6915	5130.2	1.4%
Glide	20	6970	5129.15	
Pool	20	7025	5128.1	
RE	20	7075	5130.6	
RB	20	7125	5131.6	2.0%
Match		7150	5132	
Match		11600	5170.1	
Glide	21	11700	5169.3	
Pool	21	11800	5168.5	
RE	21	11825	5171	
RB	21	11875	5172	2.0%
Glide	22	11937.5	5170.875	
Pool	22	12000	5169.75	
RE	22	12025	5172.25	
RB	22	12075	5173.5	2.5%
Glide	23	12100	5172.395	
Pool	23	12125	5171.29	
RE	23	12160	5173.79	
RB	23	12215	5175	2.2%
Glide	24	12232.5	5173.75	
Pool	24	12250	5172.5	
RE	24	12275	5175	
RB	24	12350	5176.5	2.0%
Glide	25	12387.5	5175.2	
Pool	25	12425	5173.9	
RE	25	12450	5176.4	
RB	25	12540	5178.2	2.0%
Glide	26	12550	5177	
Pool	26	12650	5175.8	
RE	26	12675	5178.3	
RB	26	12725	5179.3	2.0%

Preliminary Layout Summary Table				
Feature	#	Station	Proposed El (ft)	Riffle Slope (%)
Glide	27	12775	5178.775	
Pool	27	12825	5178.25	
RE	27	12850	5180.75	
RB	27	12900	5182	2.5%
Glide	28	13150	5181.665	
Pool	28	13400	5181.33	
RE	28	13440	5183.83	
RB	28	13650	5189.5	2.7%
Match		13690	5190	
Match		14390	5192	
Glide	29	14477.5	5191	
Pool	29	14565	5190	
RE	29	14590	5192.5	
RB	29	14690	5195	2.50%
Match		14790	5195	
Match		18590	5231	
Glide	30	18685	5230.2	
Pool	30	18780	5229.4	
RE	30	18815	5231.9	
RB	30	18880	5233.2	2%
Glide	31	18960	5232.3	
Pool	31	19040	5231.4	
RE	31	19100	5233.9	
RB	31	19205	5236	2%
Match		19290	5236.7	
Match		19490	5239	
Glide	32	19627.5	5238.45	
Pool	32	19765	5237.9	
RE	32	19830	5240.4	
RB	32	19915	5242.1	2%
Glide	33	20027.5	5242.2	
Pool	33	20140	5242.3	
RE	33	20215	5242.3	
RB	33	20340	5244.8	2%
Glide	34	20515	5244.725	
Pool	34	20690	5244.65	
RE	34	20730	5247.15	
RB	34	20800	5248.9	2.5%
Glide	35	20880	5247.35	
Pool	35	20960	5245.8	
RE	35	21000	5248.3	
RB	35	21075	5249.8	2.0%
Glide	36	21137.5	5248.4	
Pool	36	21200	5247	
RE	36	21250	5249.5	
RB	36	21375	5252	2.0%
Glide	37	21525	5251.4	
Pool	37	21675	5250.8	
RE	37	21740	5253.3	
RB	37	21860	5255.7	2.0%
Match		21900	5256	