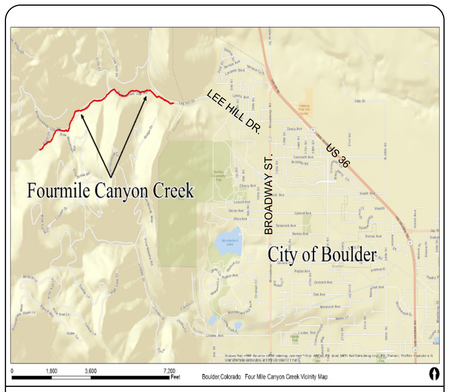
STATE	BAKER PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
CO	138200	1	28

FOURMILE CANYON CREEK

LOCATION: WAGONWHEEL GAP ROAD AND LEE HILL DRIVE TO ANNE U WHITE TRAIL HEAD

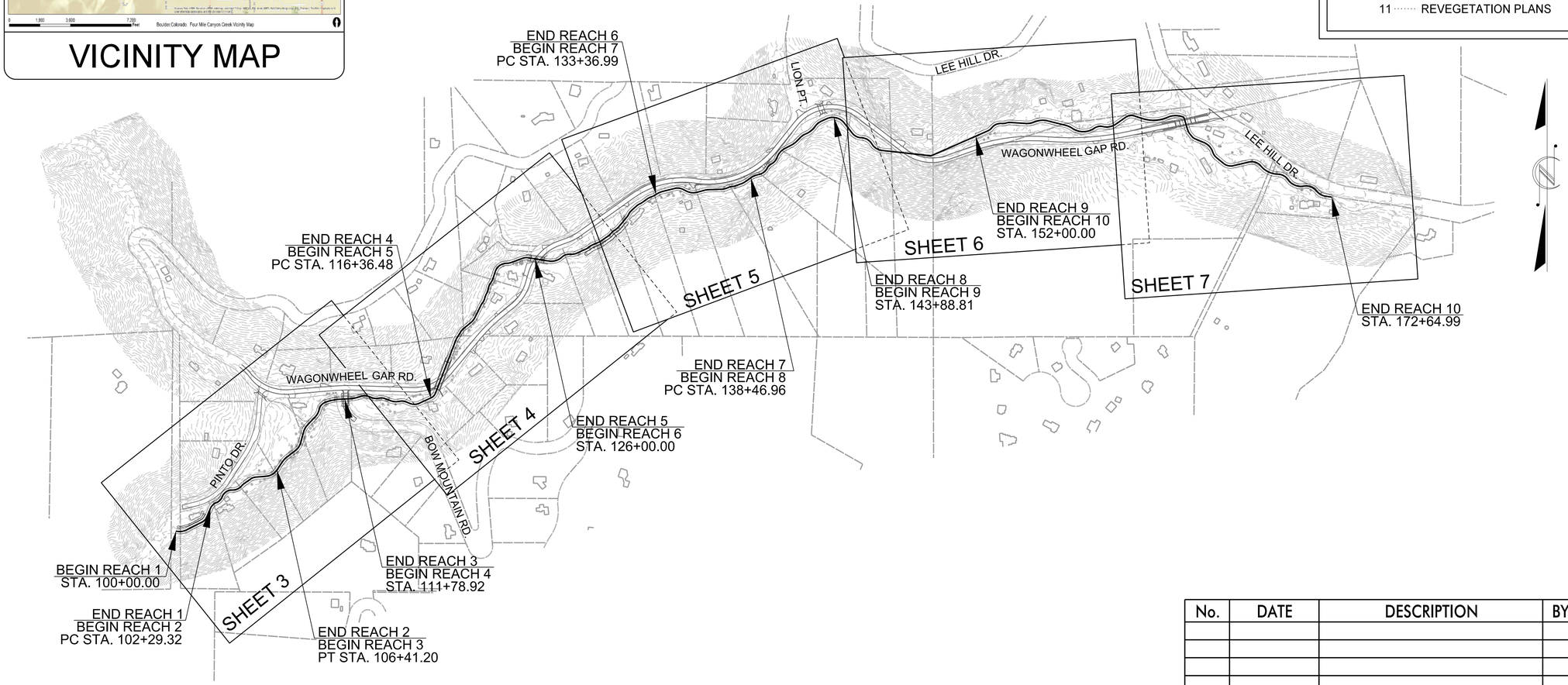
TYPE OF WORK: 30% STREAM RESTORATION PLANS



VICINITY MAP

INDEX OF SHEETS

1 ..... TITLE SHEET
1-A ..... STREAM CONVENTIONAL SYMBOLS GENERAL NOTES
2 - 2D ..... DETAILS
3 - 7 ..... PLAN SHEETS
8 - 10 ..... PROFILE SHEETS
X-1 - X-12 ..... CROSS SECTIONS
11 ..... REVEGETATION PLANS



No.	DATE	DESCRIPTION	BY	APPROVED

PROJECT: 138200 FOURMILE CANYON CREEK

GRAPHIC SCALES

50 0 50 100
PLANS

50 0 50 100
PROFILE (HORIZONTAL)

10 0 10 20
PROFILE (VERTICAL)

PRELIMINARY DESIGN DATA

		UPSTREAM OF LION POINT	DOWNSTREAM OF LION POINT	
DESIGN REACH LENGTH	=	4,389	2,882	ft
BANKFULL XSEC AREA	=	25	27	sq ft
BANKFULL WIDTH	=	21.5	22.5	ft
AVERAGE BANKFULL DEPTH	=	1.17	1.2	ft
W/D RATIO	=	18	19	
DRAINAGE AREA	=	4.97	7.19	sq mi

PREPARED FOR
BOULDER COUNTY
DEPARTMENT OF TRANSPORTATION

Boulder County

CONTACT: STACEY PROCTOR

Michael Baker INTERNATIONAL
Michael Baker Engineering Inc.
165 South Union Boulevard, Suite 200
Lakewood, COLORADO 80228
Phone: 720.514.1100
Fax: 720.514.1120

TBD
LETTING DATE:

LUCAS BABBITT, PE, CFM
PROJECT ENGINEER

PROJECT ENGINEER

P.E.
SIGNATURE:

GENERAL NOTES

1. THE CONTRACTOR IS REQUIRED TO INSTALL INSTREAM STRUCTURES USING A EXCAVATOR OR EQUIVALENT WITH A HYDRAULIC THUMB OF SUFFICIENT SIZE TO PLACE BOULDERS, LOGS, AND ROOTWADS.

2. WORK IS BEING PERFORMED AS AN ENVIRONMENTAL RESTORATION PLAN. THE CONTRACTOR SHOULD MAKE ALL REASONABLE EFFORTS TO REDUCE SEDIMENT LOSS AND MINIMIZE DISTURBANCE OF THE SITE WHILE PERFORMING THE CONSTRUCTION WORK.

3. CONTRACTOR SHALL CALL UTILITY NOTIFICATION CENTER OF COLORADO 2 - BUSINESS DAYS IN ADVANCE BEFORE DIGGING, GRADING, OR EXCAVATION FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

4. PROPOSED CHANNEL ALIGNMENT IS INTENDED TO CAUSE MINIMAL DISTURBANCE TO THE EXISTING TREES AND VEGETATION. THE ON-SITE ENGINEER RESERVES THE RIGHT TO MAKE FIELD-FIT CHANGES TO THESE PLANS AND DETAILS TO FURTHER REDUCE DISTURBANCE.

5. NO FIELD FIT CHANGES SHALL BE MADE WITHOUT ENGINEER BEING PRESENT ON-SITE AND WITHOUT MUTUAL AGREEMENT.

6. THIS IS A PRELIMINARY PLAN SET THAT WAS COMPLETED TO EVALUATE MAJOR DESIGN FEATURES PRIOR TO ADVANCING TO THE DESIGN-BUILD PHASE. CONSTRUCTION SHALL NOT BEGIN, OR CONTINUE, WITHOUT ENGINEER BEING PRESENT.

7. CONSTRUCTION SHALL BEGIN AT THE UPSTREAM END OF THE PROJECT AT STA 100+00 AND CONTINUE TO THE DOWNSTREAM END AT STA 172+64.99 IN ORDER TO AVOID DAMAGING PREVIOUSLY COMPLETED WORK. THIS IS A PRELIMINARY PLAN SET THAT WAS COMPLETED TO EVALUATE MAJOR DESIGN FEATURES PRIOR TO ADVANCING TO THE DESIGN-BUILD PHASE. CONSTRUCTION SHALL NOT BEGIN, OR CONTINUE, WITHOUT ENGINEER BEING PRESENT. AS SUCH, THE ENGINEER RESERVES THE RIGHT TO MAKE DESIGN MODIFICATIONS TO IMPROVE STREAM FUNCTION AND/OR CONSTRUCTABILITY. MODIFICATIONS COULD INCLUDE, BUT ARE NOT LIMITED TO, GRADING MODIFICATIONS, CHANGE IN MATERIAL TYPE, CHANGE IN MATERIAL SIZE, CHANGE IN MATERIAL PLACEMENT, ETC.

8. THE CONTRACTOR SHALL CONFIRM THE RECEIPT OF ALL NECESSARY PERMITS AND APPROVALS BEFORE THE START OF CONSTRUCTION.

9. THE CONTRACTOR SHALL CONDUCT THEIR OPERATIONS IN SUCH A WAY THAT THE AREA OF DISTURBANCE IS MINIMIZED. ALL EXISTING TREES, SHRUBS AND VEGETATION SHALL BE PROTECTED UNLESS OTHERWISE NOTED ON THE DRAWINGS. NO TREES SHALL BE REMOVED WITHOUT APPROVAL FROM LANDOWNER, ENGINEER, AND BOULDER COUNTY.

10. FOR ALL SITE GRADING, SMOOTH, PARABOLIC TRANSITIONS SHALL BE MADE BETWEEN CHANGES IN SLOPE.

11. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR PROVIDING STABLE EXCAVATIONS AND TEMPORARY SLOPES AND FOR SATISFYING ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS.

12. CONSTRUCTION OF THE PROPOSED WORK WILL TAKE PLACE WITHIN THE CHANNEL AND WATER CONTROL MEASURES WILL BE REQUIRED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ACCEPTANCE AND CONTROL OF DRAINAGE WATER FROM AREAS ADJACENT TO FOURMILE CANYON CREEK AND ITS TRIBUTARIES INCLUDING STORMWATER OUTFALLS. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ESTABLISHING MEANS AND METHODS OF GROUND AND SURFACE WATER CONTROL APPROPRIATE FOR CONSTRUCTION IN ACCORDANCE WITH THE REQUIREMENTS OF THE PROJECT DRAWINGS AND SPECIFICATIONS AND ALL APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS AND ALL PERMITS.

13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING AND MAINTAINING IN CONTINUOUS OPERATION, ALL EXISTING STRUCTURES, NOT ALL POTENTIALLY IMPACTED STRUCTURES MAY BE SHOWN ON THE DRAWINGS AND IT IS THE CONTRACTOR'S RESPONSIBILITY TO IDENTIFY AND PROTECT ALL STRUCTURES INCLUDING BUT NOT LIMITED TO STREETS, CURB AND GUTTER, BRIDGE PIERS AND ABUTMENTS, CREEK BANK PROTECTION OF VARIOUS TYPES, CREEK DROP STRUCTURES, SIGNS, PEDESTRIAN WALKS, RETAINING WALLS AND FENCING. IN THE EVENT THAT A STRUCTURE OR UTILITY IS DAMAGED DURING CONSTRUCTION THE CONTRACTOR SHALL IMMEDIATELY NOTIFY BOULDER COUNTY IN WRITING AND MAKE REPAIRS IN ACCORDANCE WITH BOULDER COUNTY REQUIREMENTS.

14. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE STANDARDS OF BOULDER COUNTY UNLESS SPECIFICALLY DETAILED OTHERWISE ON THESE PLANS AND ASSOCIATED SPECIFICATIONS.

15. THE CONTRACTOR SHALL MAINTAIN AT THE SITE AT ALL TIMES ONE SIGNED COPY OF THE PROJECT DRAWINGS AND SPECIFICATIONS, ONE COPY OF BOULDER COUNTY STANDARDS, AND ONE COPY OF ALL REQUIRED PERMITS.

16. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PREPARING AND SUBMITTING AS-BUILT DRAWINGS TO BOULDER COUNTY.

17. THE CONTRACTOR SHALL PREPARE AND MAINTAIN THE STORMWATER MANAGEMENT PLAN AND OBTAIN THE NATIONAL POLLUTION DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT THROUGH THE COLORADO DEPARTMENT OF PUBLIC HEALTH (CDPHE).

18. THE CONTRACTOR SHALL PROVIDE DAILY ON-SITE SURVEY CONTROL TO THE LEVEL OF DETAIL REQUIRED TO EVALUATE CONSTRUCTION VERSUS THESE DESIGN PLANS.

GROUND COORDINATE TABLE:

PT#	NORTHING	EASTING	ELEVATION	DESCRIPTION
401	266,824.52	56,029.71	5780.4	#5 REBAR w/1-1/4" ORANGE PLASTIC CAP
402	265,571.50	56,625.58	N/A	#5 REBAR w/1-1/4" ORANGE PLASTIC CAP
403	266,345.15	51,185.07	N/A	#5 REBAR w/1-1/4" ORANGE PLASTIC CAP

NOTES:
1. THE BASIS OF COORDINATES FOR THIS MAP IS THE NORTH AMERICAN DATUM OF 1983-2011 (NAD 83 (2011)) U.S. SURVEY FEET, BASED LOCALLY UPON THE DAVID EVANS AND ASSOCIATES, INC. CONTROL POINT DEA CP 402 FOR GROUND COORDINATE SCALE FACTOR DETERMINATION.
2. THE BASIS OF ELEVATIONS FOR THIS MAP IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88), BASED LOCALLY UPON THE CP 401.
3. TO MODIFY GROUND CONTROL TO COLORADO STATE PLANE NORTH ZONE; ADD 1,000,000 FEET TO NORTH COORDINATE, ADD 3,000,000 FEET TO EAST COORDINATE AND MULTIPLY BY 1/CFS (COMBINED SCALE FACTOR = 1/1.000319292 = 0.999680809.
4. FIELDWORK FOR CONTROL WAS COMPLETED NOVEMBER 2013.
5. SET 18" LONG #5 REBAR w/1-1/4"

19. THE PROJECT ENGINEER SHALL BE ON-SITE DURING CONSTRUCTION TO HELP INTERPRET DESIGN PLANS.

20. THE PROPOSED PLANS WERE BASED ON NOVEMBER 2013 LiDAR INFORMATION AND NOT DETAILED SURVEY DATA. AS A RESULT, EXISTING TOPOGRAPHY INFORMATION SHOWN ON THIS PLAN SET IS APPROXIMATE ONLY AND ACTUAL CONDITIONS MAY VARY.

STREAM CONVENTIONAL SYMBOLS

- OUTLET PROTECTION
- ROCK CROSS VANE
- CONSTRUCTED RIFFLE
- LOG VANE
- STREAM REALIGNMENT REQUIRED AS A RESULT OF ROADWAY IMPROVEMENTS
- EXISTING STREAM ALIGNMENT
- BANKFULL CHANNEL EXTENTS
- EXISTING PROPERTY BOUNDARY
- EXISTING STRUCTURE / HOMES
- EXISTING ROAD CROSSING
- PROPOSED ROAD CROSSING
- POOL
- EXISTING RIGHT OF WAY
- LOG STEP POOL
- BOULDER STEP POOL
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- EXISTING DECIDUOUS TREE
- EXISTING CONIFEROUS TREE
- BOULDER CLUSTER
- CONVERGING BOULDER CLUSTER
- ROCK WING
- BOULDER BANK PROTECTION
- TOE WOOD BANK PROTECTION

**NOTE: ALL ITEMS ABOVE MAY NOT BE USED ON THIS PROJECT

NOTES

BAKER PROJECT REFERENCE NO.	SHEET NO.
138200	1A

PROJECT ENGINEER

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BAKER PROJECT REFERENCE NO.	SHEET NO.
138200	2

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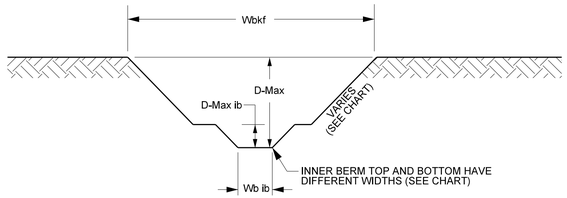
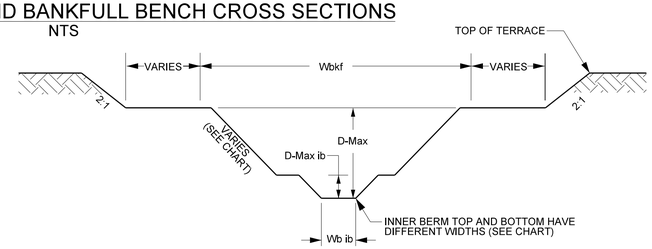
TYPICAL RIFFLE, POOL, AND BANKFULL BENCH CROSS SECTIONS

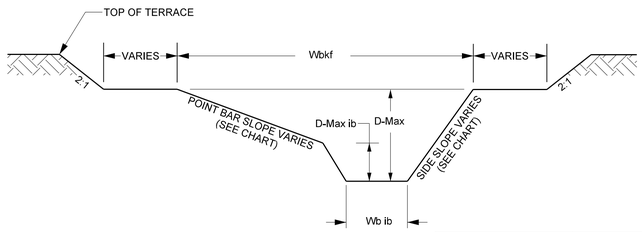
NTS



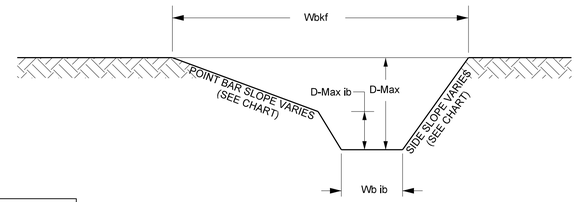
RIFFLE A-A



RIFFLE WITH BANKFULL BENCH



POOL B-B



POOL WITH BANKFULL BENCH

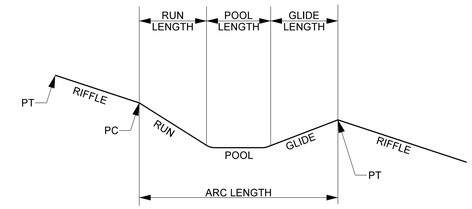
RIFFLE		POOL			
UPSTREAM OF LION POINT	DOWNSTREAM OF LION POINT	POOL WITH BOULDERS	POOL - MAX AREA	POOL - MIN AREA	
21.5	22.5	23.5	23.5	23.5	WIDTH BANKFULL (Wbkf)
1.2	1.2	1.3	1.5	1.3	AVERAGE DEPTH (D)
1.9	1.9	2.3	2.6	2.3	MAXIMUM DEPTH (D-Max)
18.4	18.8	18.1	15.7	18.1	WIDTH TO DEPTH RATIO (Wbkf/D)
3.0	3.0	2.0	0.5	0.5	SIDE SLOPE
0.6	0.7	1.7	2.3	2.3	INNER BERM SIDE SLOPE
25.3	27.1	31.0	35.0	29.9	BANKFULL XSEC AREA
2.7	2.7	–	–	–	INNER BERM BENCH WIDTH (Wbnch)
9.5	10.5	12.0	10.8	10.8	INNER BERM WIDTH TOP (W ib)
7.5	8.5	7.5	7.5	7.5	INNER BERM WIDTH BOTTOM (Wb ib)
0.6	0.6	1.0	1.0	1.0	INNER BERM AVERAGE DEPTH (D ib)
0.6	0.8	1.2	1.2	2.3	INNER BERM MAX DEPTH (D-max ib)
1.3	1.2	1.6	1.4	1.4	INNER BERM W/D RATIO (W ib/D ib)
5.9	6.6	11.5	11.0	11.0	INNER BERM AREA (A ib)

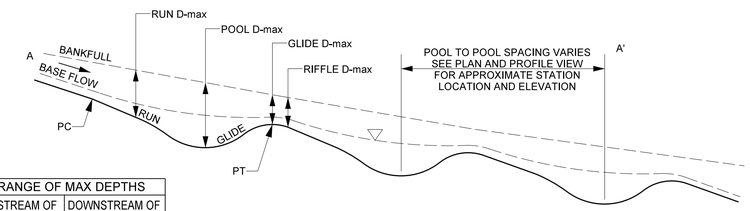
NOTES:

1. DURING CONSTRUCTION CORNERS OF DESIGN CHANNEL WILL BE ROUNDED AND A THALWEG WILL BE SHAPED PER DIRECTION OF ENGINEER.
2. POOL SHOWN ABOVE IS RIGHT BANK POOL ONLY.

TYPICAL PROFILE SECTION

NTS

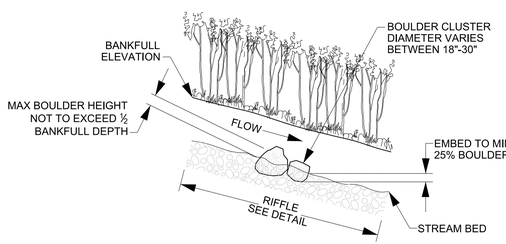


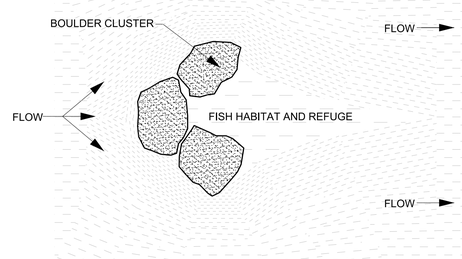


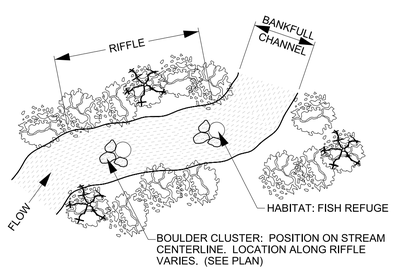
	RANGE OF MAX DEPTHS			
	UPSTREAM OF LION POINT		DOWNSTREAM OF LION POINT	
	MIN	MAX	MIN	MAX
RIFFLE	1.7		1.9	
RUN	1.7	2.0	1.9	2.2
POOL	2.3	2.6	2.3	2.6
GLIDE	1.3	1.6	1.4	1.7

BOULDER CLUSTER

NTS

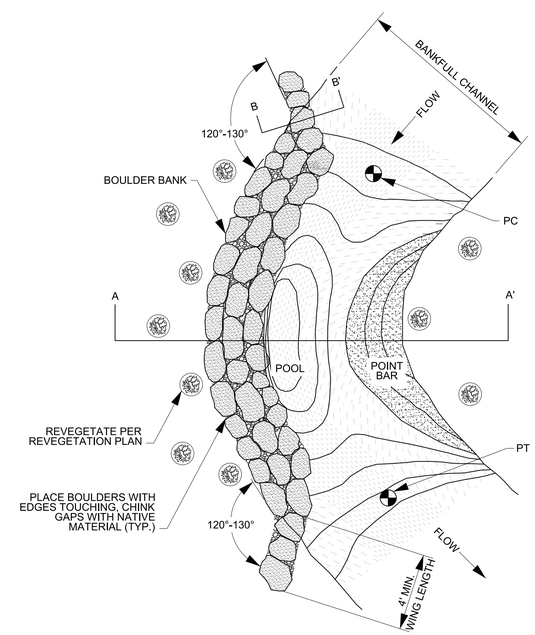


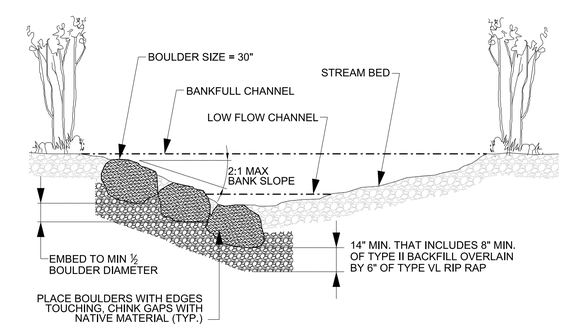




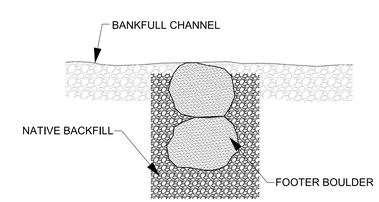
BOULDER BANK PROTECTION

NTS





CROSS SECTION A - A'



CROSS SECTION B - B'

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BAKER PROJECT REFERENCE NO.	SHEET NO.
138200	2A

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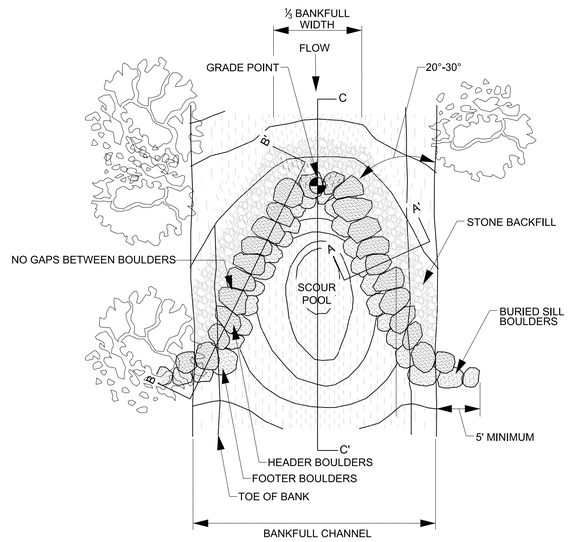
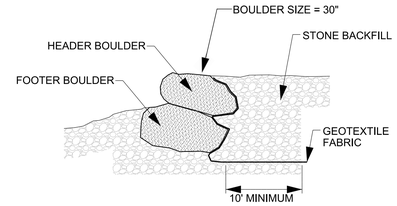
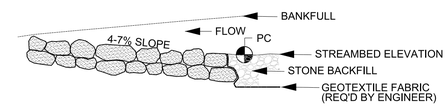
ROCK CROSS VANE
NTS

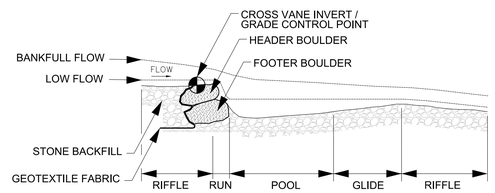




CROSS SECTION A - A'

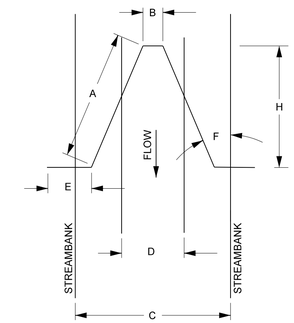


CROSS SECTION B - B'



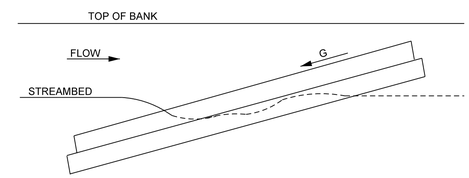
PROFILE C - C'

CROSS VANE TYPICAL
NTS



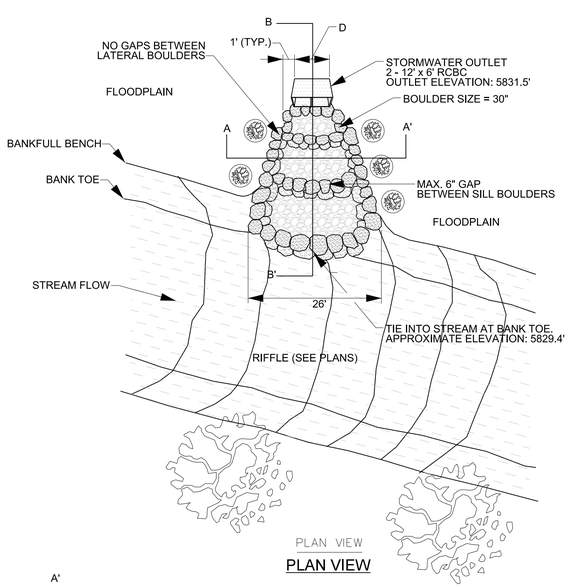
PLAN VIEW

		UPSTREAM OF LION POINT	DOWNSTREAM OF LION POINT
A	VANE ARM LENGTH	19.2 ft	20.1 ft
B	INVERT LENGTH	7.1 ft	7.4 ft
C	BANKFULL WIDTH	21.5 ft	22.5 ft
D	BOTTOM WIDTH	14.9 ft	15.9 ft
E	SILL LENGTH	5.0 ft	5.0 ft
F	VANE ARM ANGLE	22.0°	22.0°
G	VANE ARM SLOPE	8.8%	9.4%
H	STRUCTURE LENGTH	17.8 ft	18.7 ft

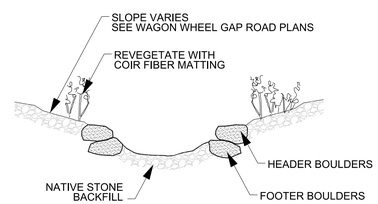


PROFILE VIEW

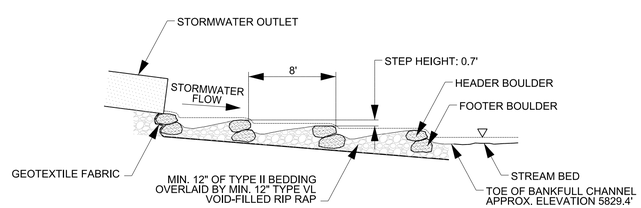
OUTLET PROTECTION
NTS



PLAN VIEW

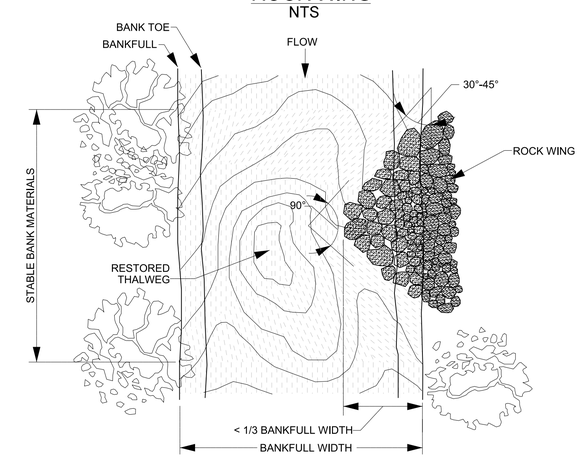


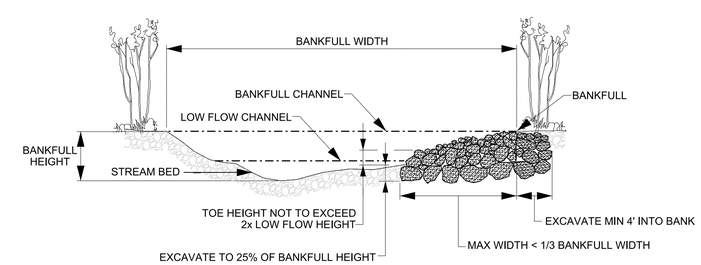
CROSS SECTION A - A'



PROFILE B - B'

ROCK WING
NTS





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BAKER PROJECT REFERENCE NO.	SHEET NO.
138200	2B

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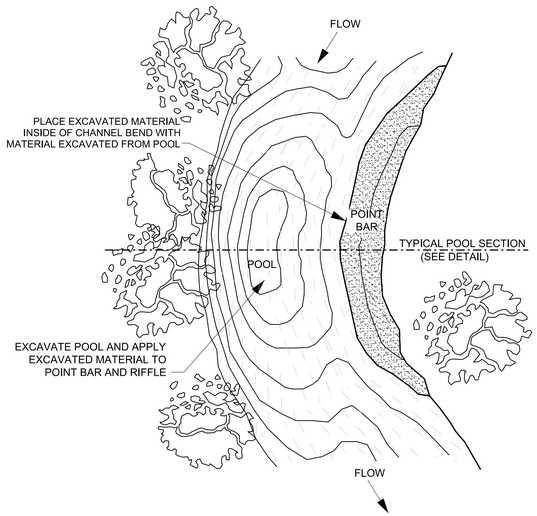
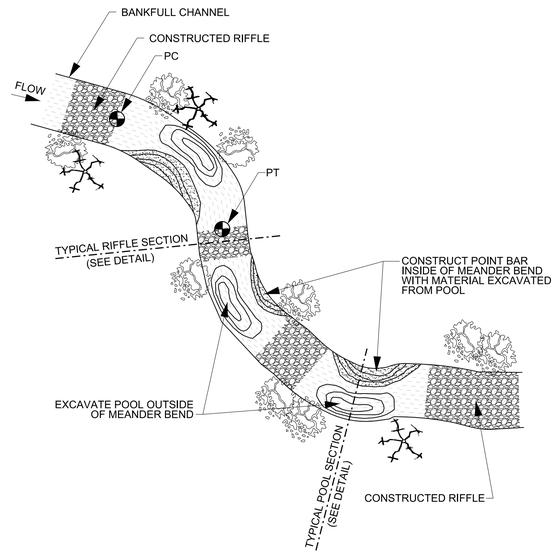
CONSTRUCTED POOL AND POINT BAR

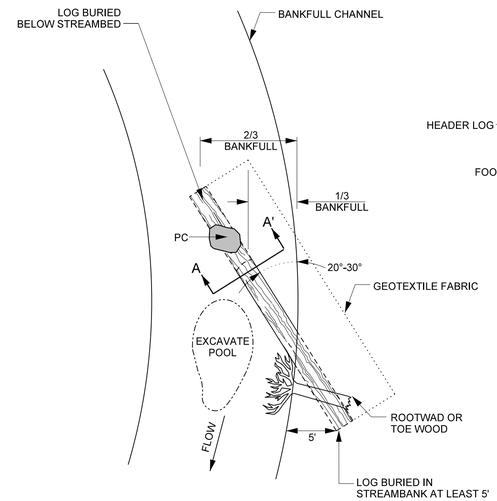
NTS



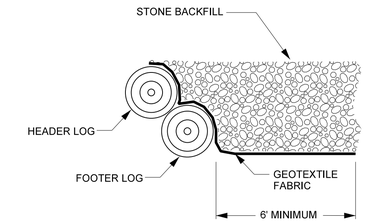


LOG VANE

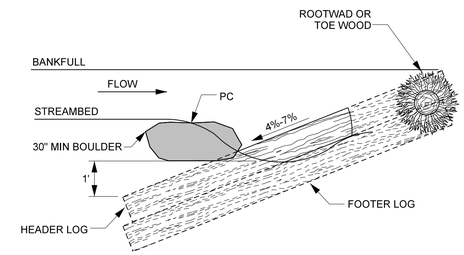
NTS



PLAN VIEW



SECTION A - A'



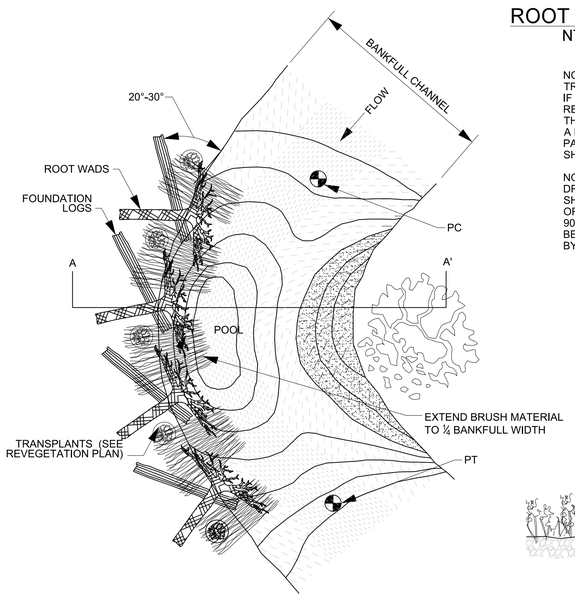
PROFILE VIEW

NOTES:

1. LOGS SHOULD BE AT LEAST 12" IN DIAMETER, RELATIVELY STRAIGHT, HARDWOOD, AND RECENTLY HARVESTED.
2. BOULDERS MUST BE OF SUFFICIENT SIZE TO ANCHOR LOGS.
3. SOIL SHOULD BE COMPACTED WELL AROUND BURIED PORTIONS OF LOGS.
4. ROOTWADS SHOULD BE PLACED BENEATH THE HEADER LOG AND PLACED SO THAT IT LOCKS THE HEADER LOG INTO THE BANK. SEE ROOTWAD DETAIL.
5. BOULDER SHOULD BE PLACED ON TOP OF HEADER LOG FOR ANCHORING.
6. GEOTEXTILE FABRIC SHOULD BE NAILED TO THE LOG BELOW THE BACKFILL.
7. TRANSPLANTS CAN BE USED INSTEAD OF ROOTWADS, PER DIRECTION OF ENGINEER.

ROOT WADS

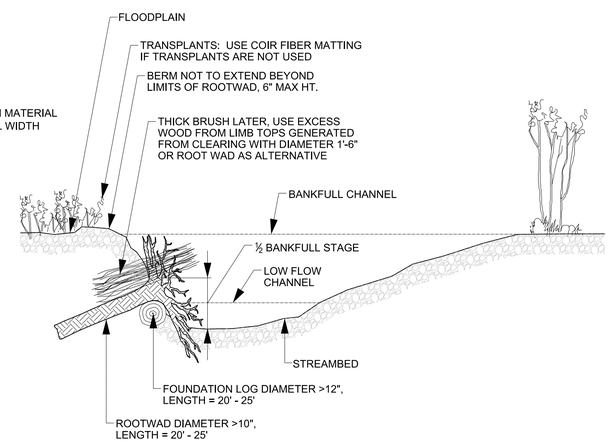
NTS



PLAN VIEW

NOTES:
TRENCHING METHOD:
IF THE ROOT WAD CANNOT BE DRIVEN INTO THE BANK OR THE BANK NEEDS TO BE RECONSTRUCTED, THE TRENCHING METHOD SHOULD BE USED. THIS METHOD REQUIRES THAT A TRENCH BE EXCAVATED FOR THE LOG PORTION OF THE ROOT WAD. IN THIS CASE, A FOOTER LOG SHOULD BE INSTALLED UNDERNEATH THE ROOT WAD IN A TRENCH EXCAVATED PARALLEL TO THE BANK AND WELL BELOW THE STREAMBED. ONE-THIRD OF THE ROOT WAD SHOULD REMAIN BELOW NORMAL BASE FLOW CONDITIONS.

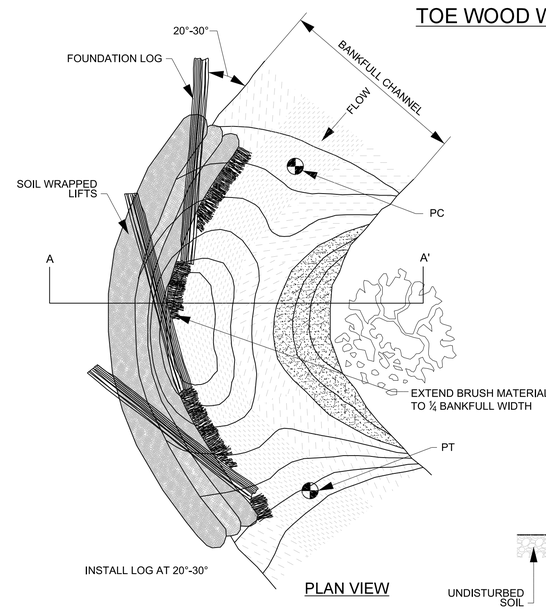
NOTES:
DRIVE POINT METHOD:
SHARPEN THE END OF THE LOG WITH A CHAINSAW BEFORE "DRIVING" IT INTO THE BANK. ORIENT ROOT WADS UPSTREAM SO THAT THE STREAM FLOW MEETS THE ROOT WAD AT A 90DEGREE ANGLE, DEFLECTING THE WATER AWAY FROM THE BANK. A TRANSPLANT SHOULD BE PLACED ON THE DOWNSTREAM SIDE OF THE ROOT WAD IF A BACK EDDY IS FORMED BY THE ROOT WAD.



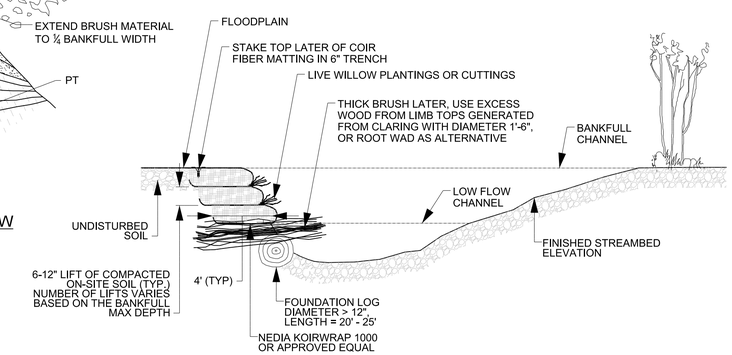
CROSS SECTION A - A'

TOE WOOD WITH SOIL WRAPPED LIFT

NTS



PLAN VIEW



CROSS SECTION A - A'

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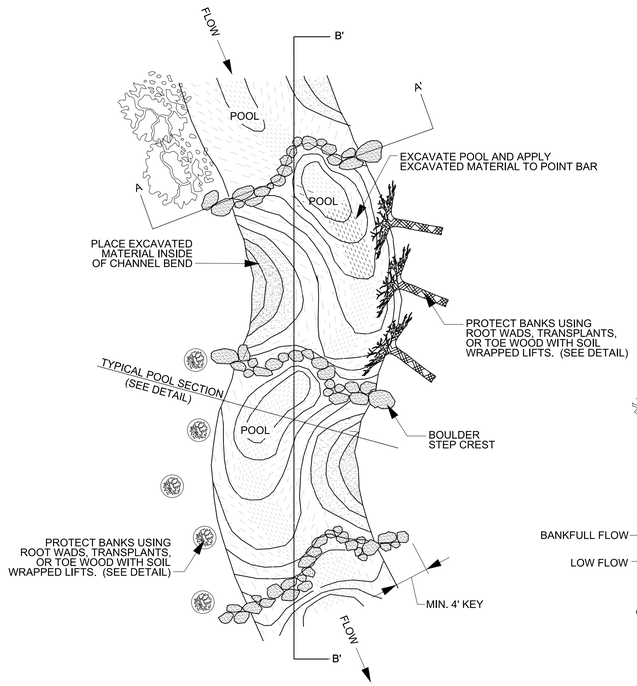
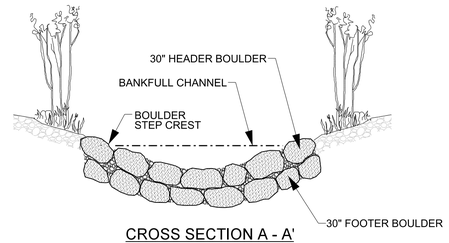
ROCK STEP POOL
NTS





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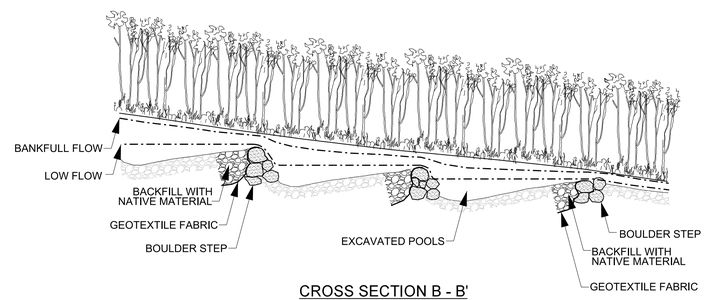
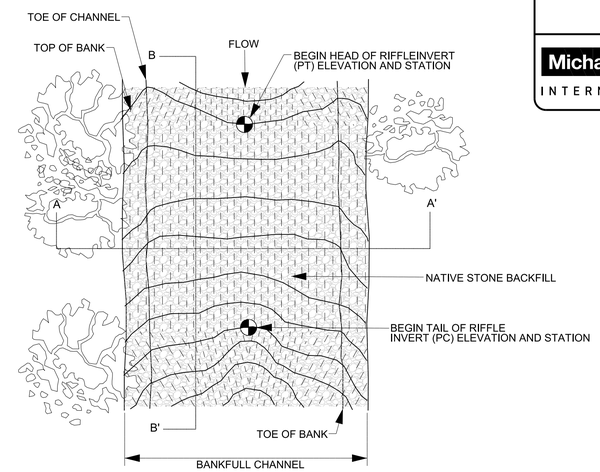
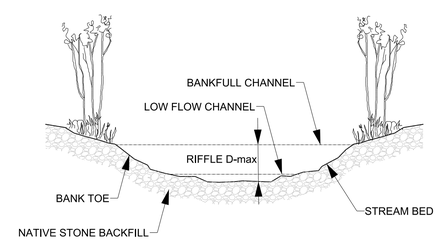


CROSS SECTION B - B'

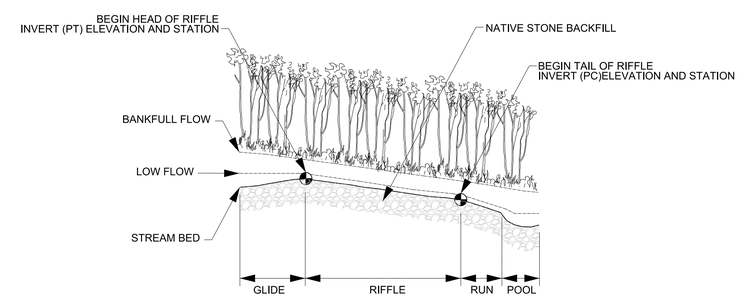
CONSTRUCTED RIFFLE
NTS



PLAN VIEW

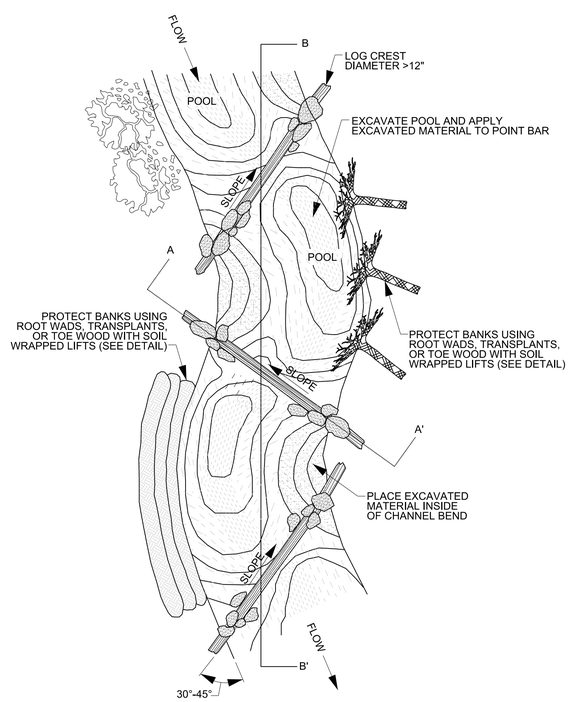


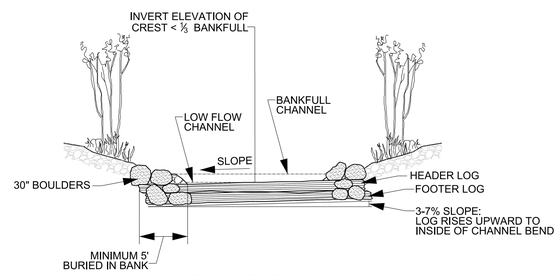
CROSS SECTION A - A'



PROFILE B - B'

ROCK AND LOG STEP POOL
NTS





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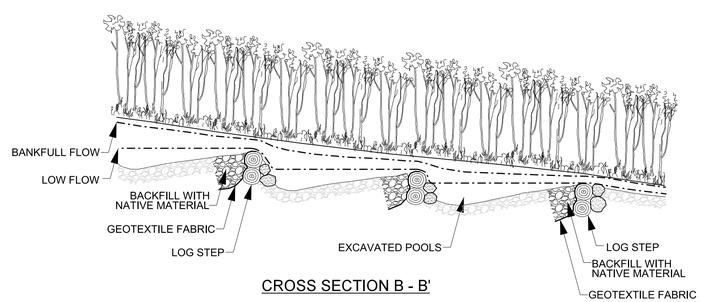

CROSS SECTION B - B'

NOTES:

1. UNDERCUT CHANNEL BED ELEVATION AS NEEDED TO ALLOW FOR LAYERS OF STONE TO ACHIEVE FINAL GRADE.
2. INSTALL STONE BACKFILL, COMPACTED TO GRADE.
3. FINAL CHANNEL BED SHAPE SHOULD BE ROUNDED, SMOOTH, AND CONCAVE, WITH THE ELEVATION OF THE BED 0.2 FT DEEPER IN THE CENTER THAN AT THE EDGES.
4. NOT ALL RIFFLE LOCATIONS SHOWN ON PLANS NEED TO BE COMPLETELY RECONSTRUCTED, SOME JUST NEED TO BE RESHAPED.

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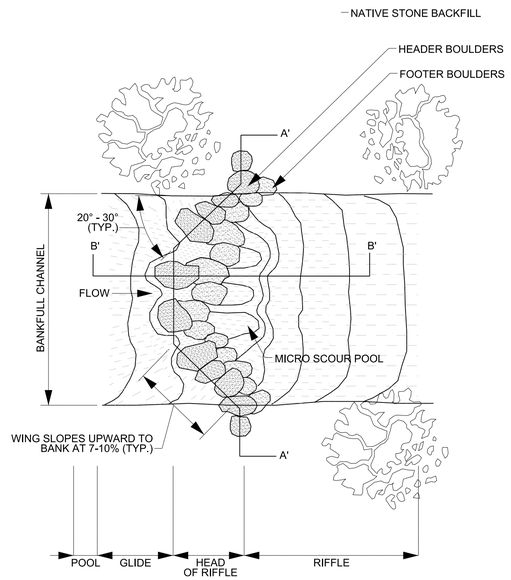
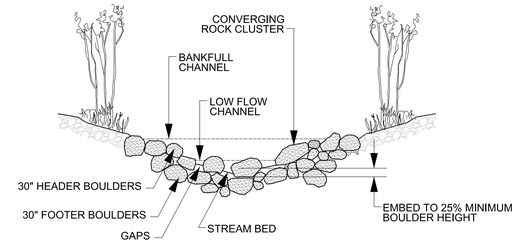
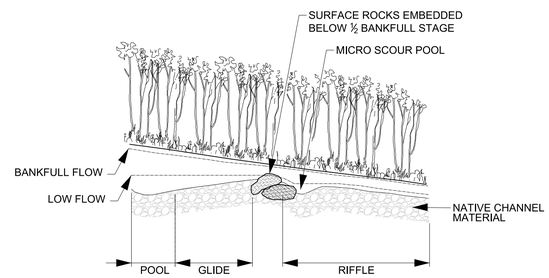
CONVERGING BOULDER CLUSTER
NTS



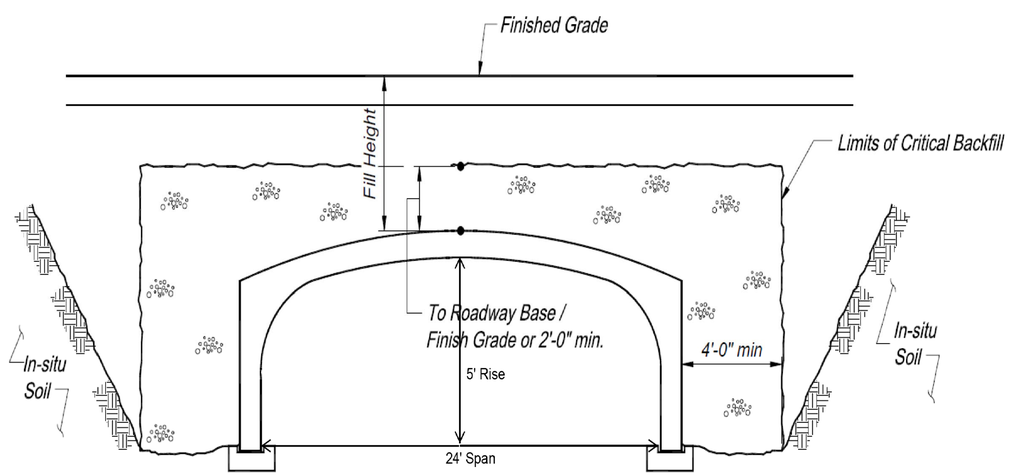


CROSS SECTION A - A'



PROFILE B - B'

CONSPAN PRECAST BRIDGE
NTS



CON/SPAN B-Series Precast Bridge Unit with i-Series Invert

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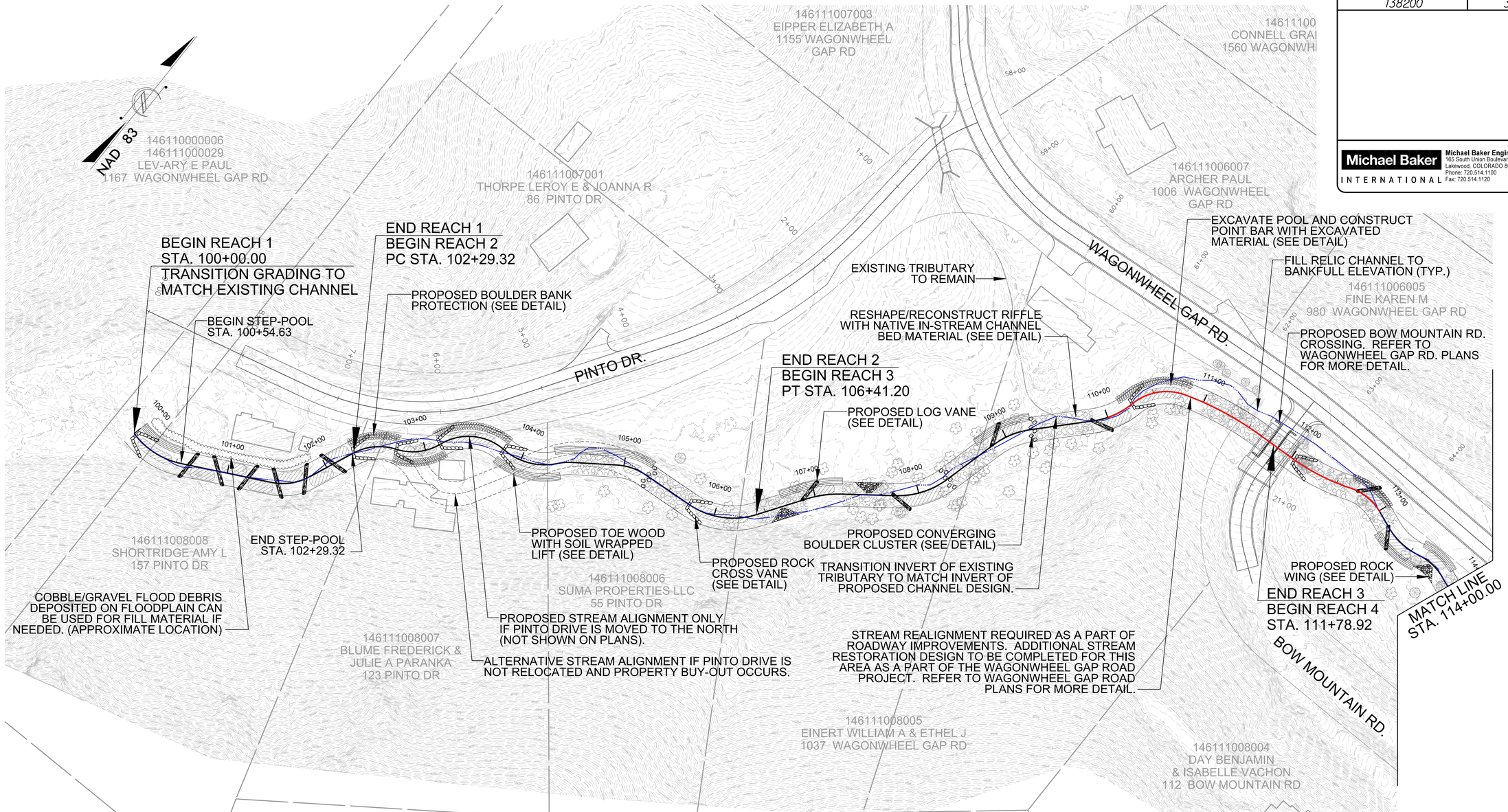

Description	Station	Elevation	Northing	Easting
BEGIN	100+00.00	6022.53	264816.0999	51404.0708
PC	100+02.47	6022.44	264815.5449	51406.4761
PT	100+54.63	6020.67	264821.7147	51457.2206
PC	101+43.84	6016.57	264862.0184	51536.8107
PT	101+80.16	6014.89	264887.9804	51561.1377
PC	102+29.32	6012.63	264933.1936	51580.4534
PCC	102+71.22	6010.54	264961.4073	51609.8906
PCC	103+15.64	6008.32	264991.9652	51640.2627
PCC	103+80.90	6005.05	265025.8402	51691.0615
PCC	104+36.15	6002.29	265047.6363	51739.7243
PT	104+49.95	6001.60	265047.6363	51739.7243
PC	104+93.15	5999.44	265081.9700	51785.0573
PT	105+23.84	5997.91	265091.9917	51813.6379
PC	105+73.53	5995.42	265095.7534	51863.1923
PT	106+41.20	5992.24	265128.6389	51919.7202
PC	106+90.91	5990.06	265169.8644	51947.4885

Description	Station	Elevation	Northing	Easting
PT	107+26.14	5988.51	265195.3098	51971.6226
PC	107+77.27	5986.26	265226.0759	52012.4610
PT	108+30.89	5983.90	265269.8029	52041.7392
PC	108+85.07	5981.51	265322.2281	52055.3979
PT	109+25.18	5979.75	265356.9584	52074.6243
PC	109+85.96	5977.07	265401.1670	52116.3340
PCC	110+26.98	5975.27	265437.0440	52135.1429
PCC	110+81.28	5972.88	265475.6390	52169.7863
PT	111+61.34	5969.36	265490.2275	52248.2636
PC	112+02.42	5967.75	265492.2957	52289.2948
PCC	112+63.73	5965.61	265504.6452	52349.1005
PT	113+01.72	5964.28	265504.3334	52386.2503
PC	113+17.99	5963.71	265498.3923	52401.4020
PCC	113+58.51	5962.29	265495.3715	52441.2115
PT	113+89.35	5961.21	265493.1153	52471.5160

FOURMILE CANYON CREEK PLAN VIEW

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SCALE (FT)

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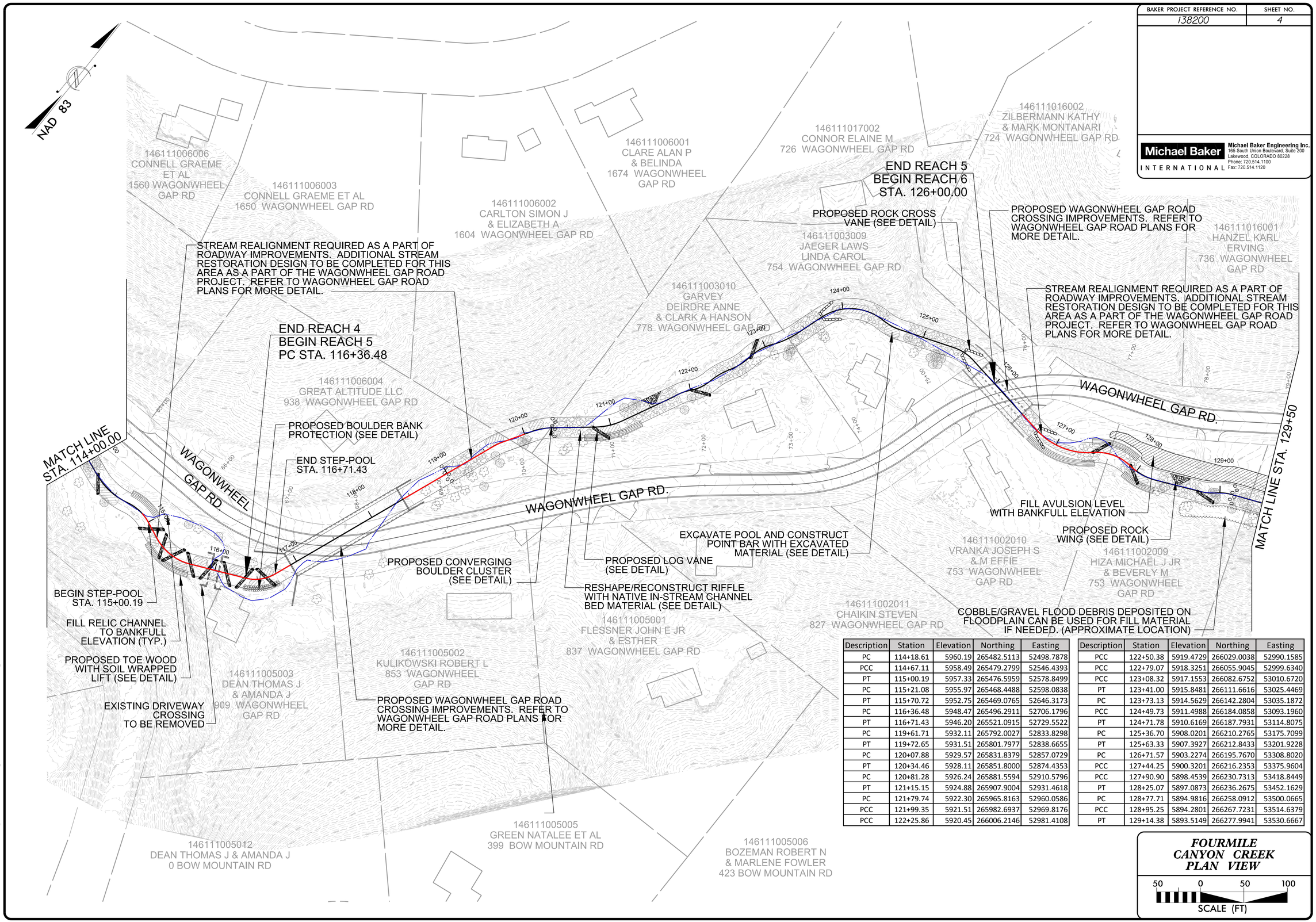

Description	Station	Elevation	Northing	Easting
PC	114+18.61	5960.19	265482.5113	52498.7878
PCC	114+67.11	5958.49	265479.2799	52546.4393
PT	115+00.19	5957.33	265476.5959	52578.8499
PC	115+21.08	5955.97	265468.4488	52598.0838
PT	115+70.72	5952.75	265469.0765	52646.3173
PC	116+36.48	5948.47	265496.2911	52706.1796
PT	116+71.43	5946.20	265521.0915	52729.5522
PC	119+61.71	5932.11	265792.0027	52833.8298
PT	119+72.65	5931.51	265801.7977	52838.6655
PC	120+07.88	5929.57	265831.8379	52857.0729
PT	120+34.46	5928.11	265851.8000	52874.4353
PC	120+81.28	5926.24	265881.5594	52910.5796
PT	121+15.15	5924.88	265907.9004	52931.4618
PC	121+79.74	5922.30	265965.8163	52960.0586
PCC	121+99.35	5921.51	265982.6937	52969.8176
PCC	122+25.86	5920.45	266006.2146	52981.4108

Description	Station	Elevation	Northing	Easting
PCC	122+50.38	5919.4729	266029.0038	52990.1585
PCC	122+79.07	5918.3251	266055.9045	52999.6340
PCC	123+08.32	5917.1553	266082.6752	53010.6720
PT	123+41.00	5915.8481	266111.6616	53025.4469
PC	123+73.13	5914.5629	266142.2804	53035.1872
PCC	124+49.73	5911.4988	266184.0858	53093.1960
PT	124+71.78	5910.6169	266187.7931	53114.8075
PC	125+36.70	5908.0201	266210.2765	53175.7099
PT	125+63.33	5907.3927	266212.8433	53201.9228
PC	126+71.57	5903.2274	266195.7670	53308.8020
PCC	127+44.25	5900.3201	266216.2353	53375.9604
PCC	127+90.90	5898.4539	266230.7313	53418.8449
PT	128+25.07	5897.0873	266236.2675	53452.1629
PC	128+77.71	5894.9816	266258.0912	53500.0665
PCC	128+95.25	5894.2801	266267.7231	53514.6379
PT	129+14.38	5893.5149	266277.9941	53530.6667

FOURMILE CANYON CREEK PLAN VIEW

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SCALE (FT)

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Description	Station	Elevation	Northing	Easting
PC	129+47.47	5892.19	266290.8503	53561.1542
PT	129+60.22	5891.68	266296.9216	53572.3434
PC	130+08.86	5889.74	266324.1963	53612.6218
PCC	130+28.33	5888.96	266337.5169	53626.7074
PCC	130+50.00	5888.09	266351.9301	53642.7170
PT	130+84.38	5886.71	266374.1966	53668.7100
PC	131+43.44	5884.35	266419.3627	53706.7765
PCC	131+61.95	5883.61	266434.9866	53716.5748
PT	131+84.63	5882.70	266453.1784	53729.8376
PC	132+22.22	5881.20	266478.2688	53757.8267
PCC	132+40.60	5880.47	266487.9971	53773.3226
PT	132+54.83	5879.90	266494.9142	53785.7193
PC	132+82.97	5878.77	266511.4357	53808.4971
PCC	133+13.28	5877.56	266525.2721	53835.3386
PCC	133+36.99	5876.61	266536.0239	53856.3712
PT	133+74.81	5875.10	266551.7533	53890.5220
PC	134+38.21	5872.56	266566.9758	53952.0599
PT	134+80.65	5870.86	266562.3658	53993.3629
PC	135+00.47	5870.07	266553.4775	54011.0880
PT	135+58.65	5867.74	266547.7294	54067.7031
PC	135+95.94	5866.25	266557.4023	54103.7106

Description	Station	Elevation	Northing	Easting
PT	136+19.23	5865.3208	266560.7827	54126.7026
PC	136+83.24	5862.7606	266562.6720	54190.6798
PCC	137+16.62	5861.0079	266570.4914	54222.8870
PCC	137+39.69	5859.5081	266576.2658	54245.0797
PT	137+57.14	5858.3744	266579.8484	54262.0866
PC	137+90.53	5856.2037	266591.3927	54293.4240
PT	138+11.03	5854.8715	266600.8500	54311.5430
PC	138+46.96	5852.5359	266621.4097	54341.0131
PCC	138+90.10	5849.7318	266637.8203	54380.5476
PCC	139+44.08	5847.3249	266668.4619	54422.7844
PCC	139+78.71	5845.9399	266692.6930	54446.8449
PCC	140+22.69	5844.1807	266725.4742	54474.6762
PT	140+82.32	5841.7952	266769.6550	54512.6617
PC	141+27.70	5839.9803	266790.9260	54552.7405
PT	141+51.57	5839.0253	266805.0762	54571.8596
PC	141+84.06	5837.7259	266828.0685	54594.8078
PCC	142+16.97	5836.4093	266845.9976	54622.1358
PCC	142+76.69	5834.0207	266882.6901	54668.1208
PT	143+19.78	5832.2971	266910.2038	54700.6061
PC	143+49.81	5831.0958	266922.8172	54727.8633

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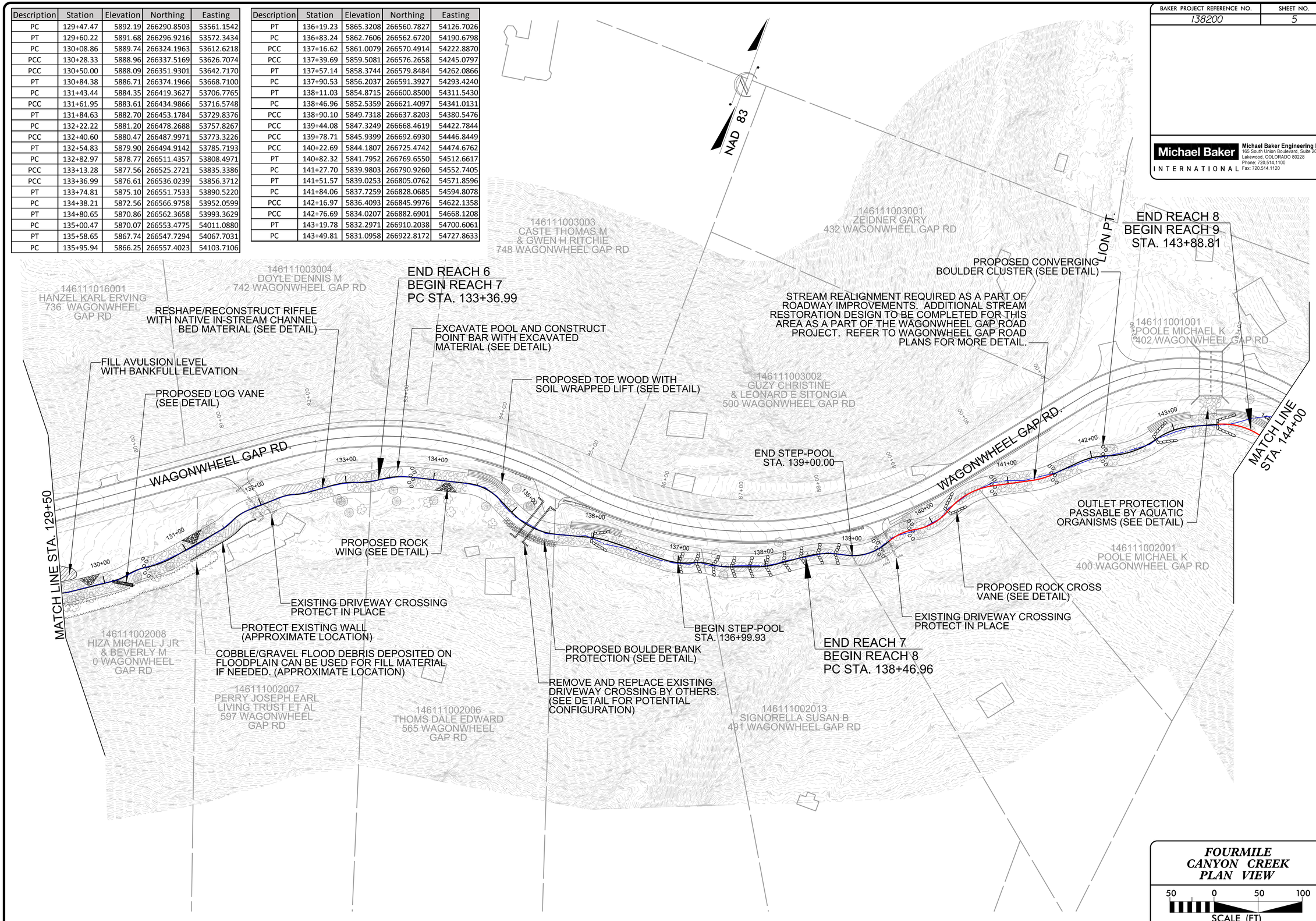

FOURMILE CANYON CREEK PLAN VIEW

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SCALE (FT)

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Description	Station	Elevaton	Northing	Easting
PT	144+50.22	5826.98	266901.0553	54818.3609
PC	145+16.48	5824.33	266848.9297	54859.2694
PCC	145+69.23	5822.22	266825.9931	54904.8965
PCC	146+34.45	5819.61	266794.5016	54958.9032
PT	146+98.85	5817.03	266760.9835	55011.2443
PC	152+66.19	5792.46	266860.5476	266860.5476
PCC	152+94.47	5791.33	266877.6621	55572.5449
PCC	153+50.53	5789.09	266898.6407	55622.0284
PCC	153+74.00	5788.15	266901.2005	55645.1915
PT	153+95.50	5787.29	266903.9223	55666.3794
PC	154+77.75	5784.00	266898.6497	55748.4616
PCC	155+16.67	5782.44	266905.5151	55786.3827
PT	155+89.78	5779.52	266911.9681	55857.8654
PC	156+82.35	5775.81	266889.7568	55947.7341
PCC	157+21.09	5774.27	266874.0991	55982.9490
PCC	158+40.82	5769.48	266874.5697	56095.6527
PCC	158+87.76	5767.60	266882.8947	56140.4690

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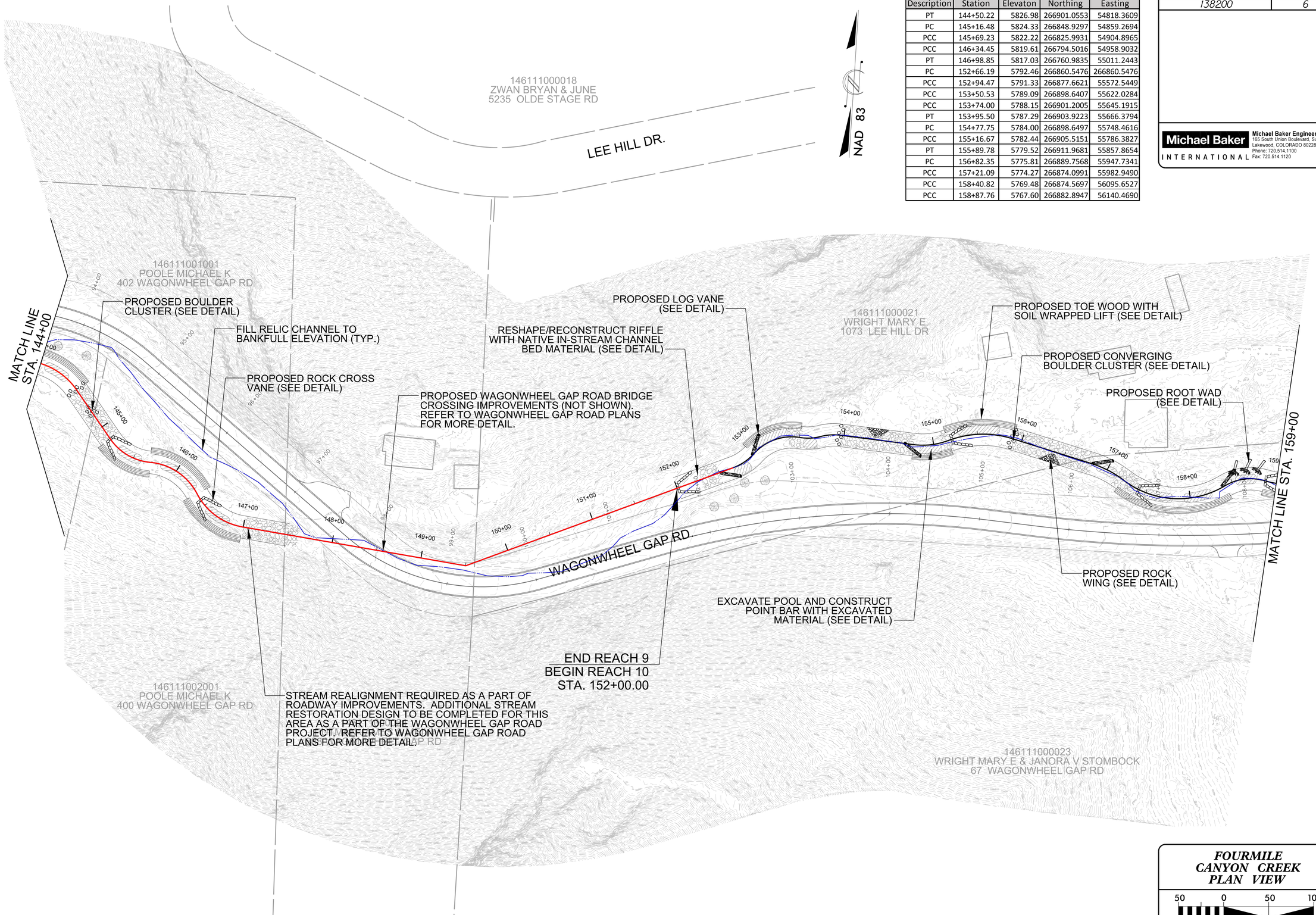

FOURMILE CANYON CREEK PLAN VIEW

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SCALE (FT)

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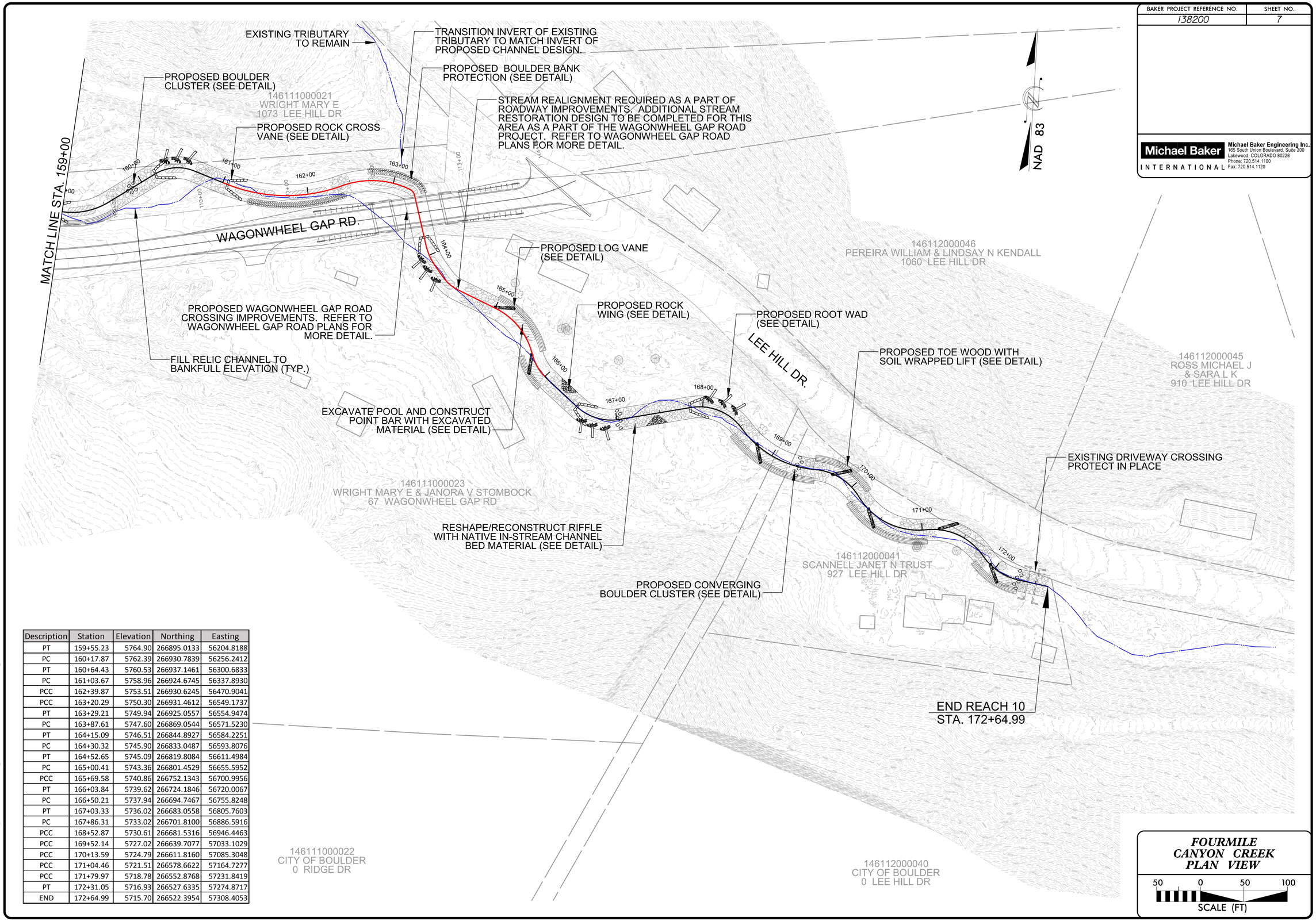

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PCC	162+39.87	5753.51	266930.6245	56470.9041
PCC	163+20.29	5750.30	266931.4612	56549.1737
PT	163+29.21	5749.94	266925.0557	56554.9474
PC	163+87.61	5747.60	266869.0544	56571.5230
PT	164+15.09	5746.51	266844.8927	56584.2251
PC	164+30.32	5745.90	266833.0487	56593.8076
PT	164+52.65	5745.09	266819.8084	56611.4984
PC	165+00.41	5743.36	266801.4529	56655.5952
PCC	165+69.58	5740.86	266752.1343	56700.9956
PT	166+03.84	5739.62	266724.1846	56720.0067
PC	166+50.21	5737.94	266694.7467	56755.8248
PT	167+03.33	5736.02	266683.0558	56805.7603
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PCC	169+52.14	5727.02	266639.7077	57033.1029
PCC	170+13.59	5724.79	266611.8160	57085.3048
PCC	171+04.46	5721.51	266578.6622	57164.7277
PCC	171+79.97	5718.78	266552.8768	57231.8419
PT	172+31.05	5716.93	266527.6335	57274.8717
END	172+64.99	5715.70	266522.3954	57308.4053

FOURMILE CANYON CREEK PLAN VIEW

50 0 50 100
SCALE (FT)

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138200	8

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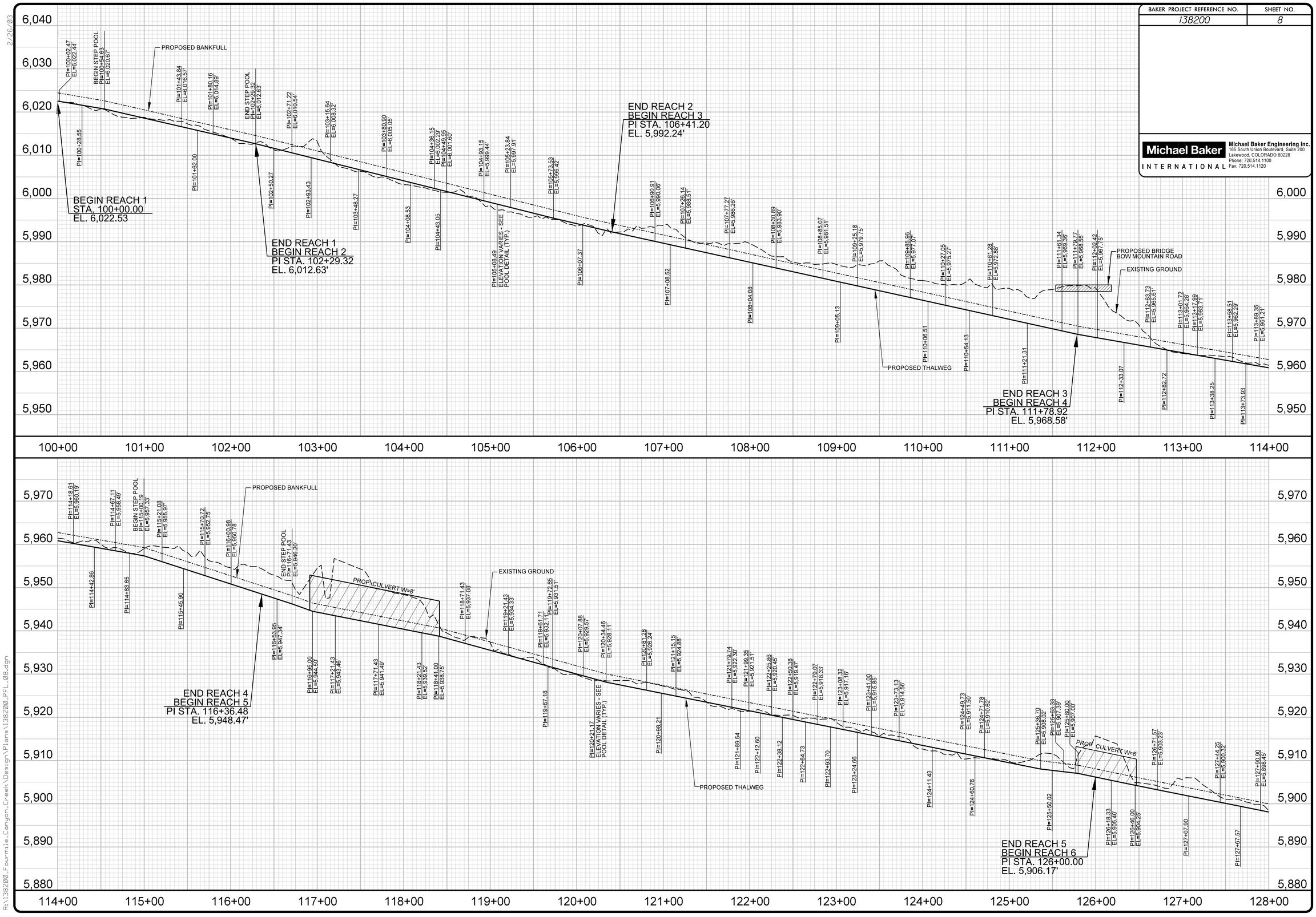

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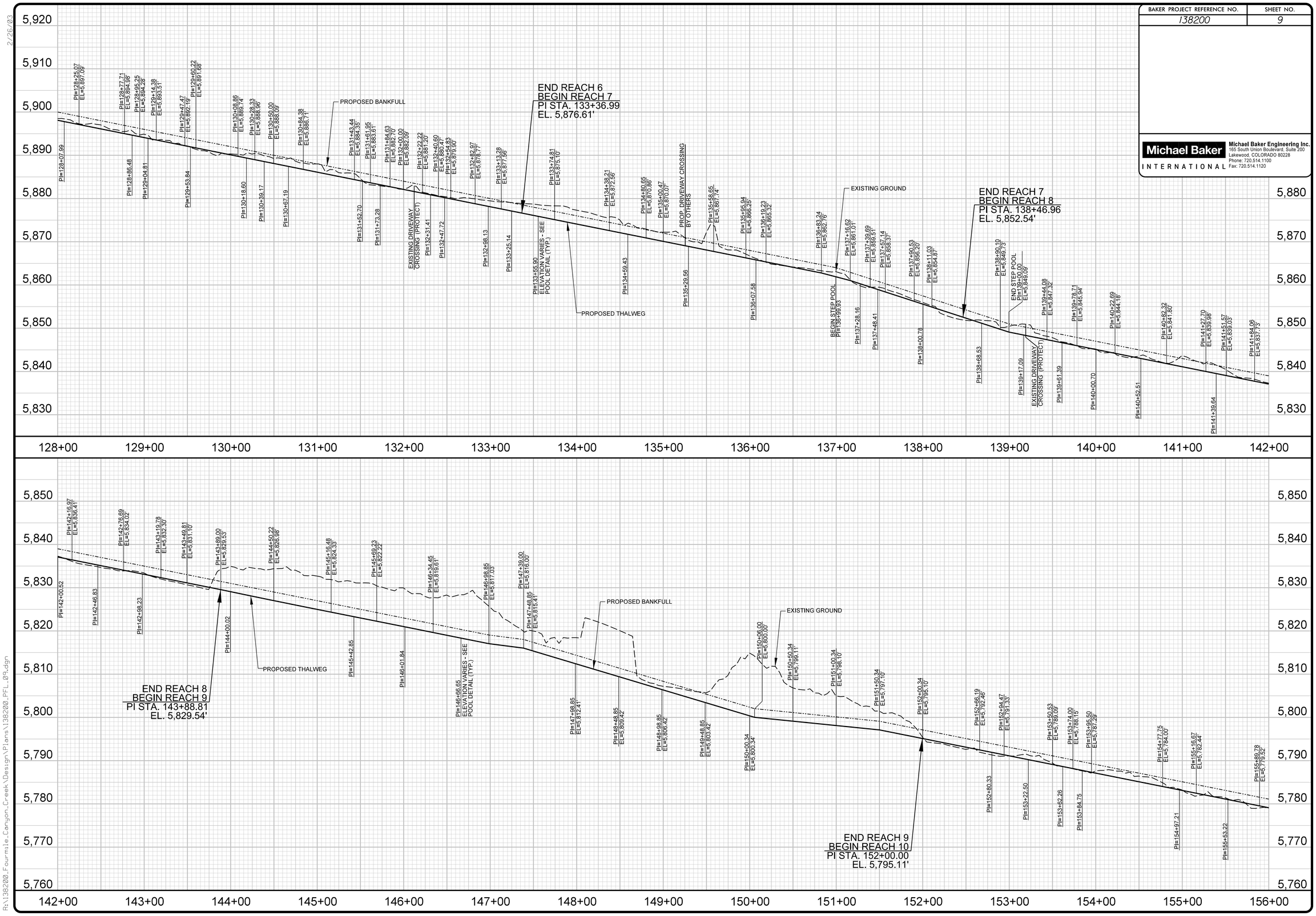

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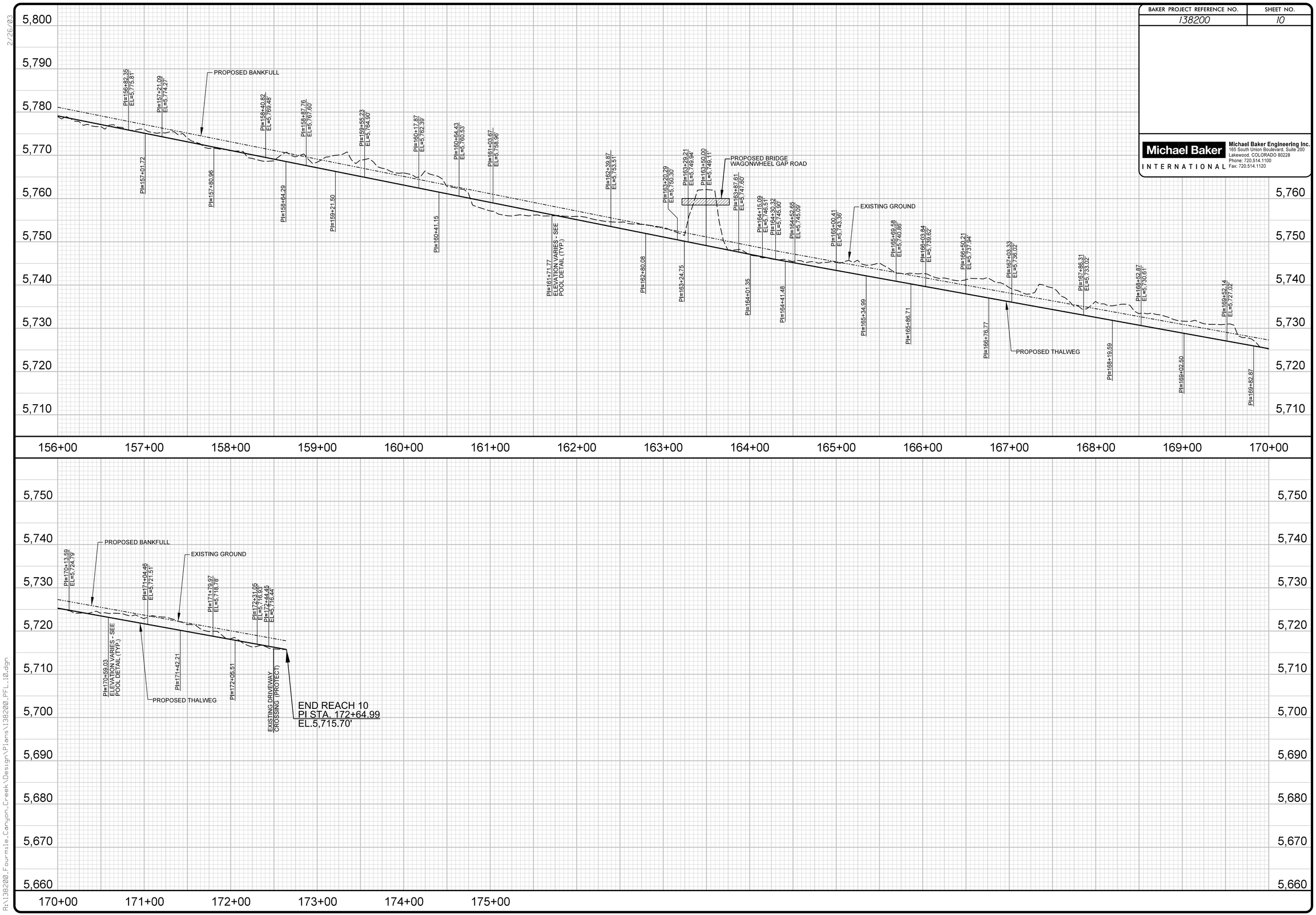

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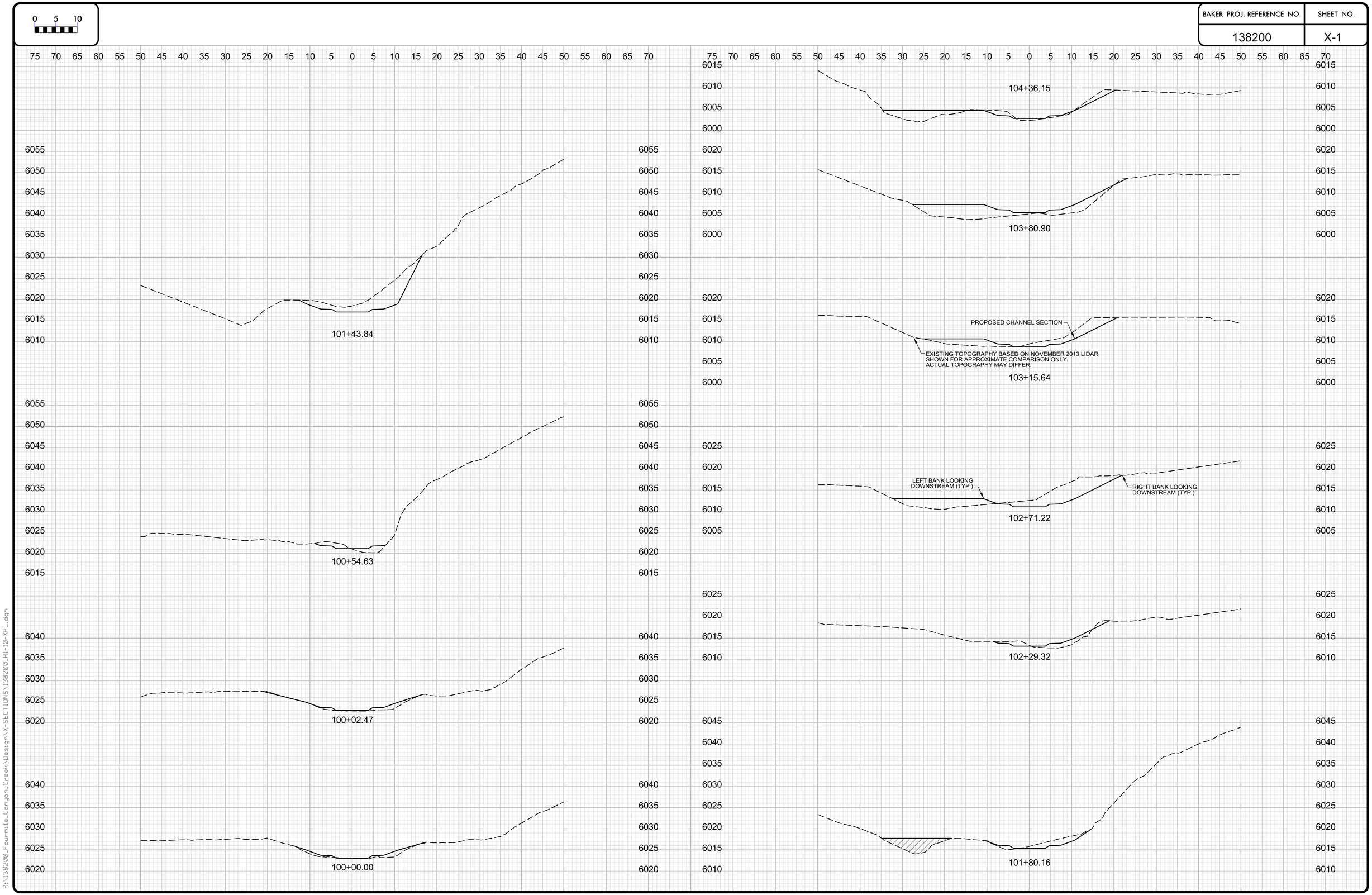

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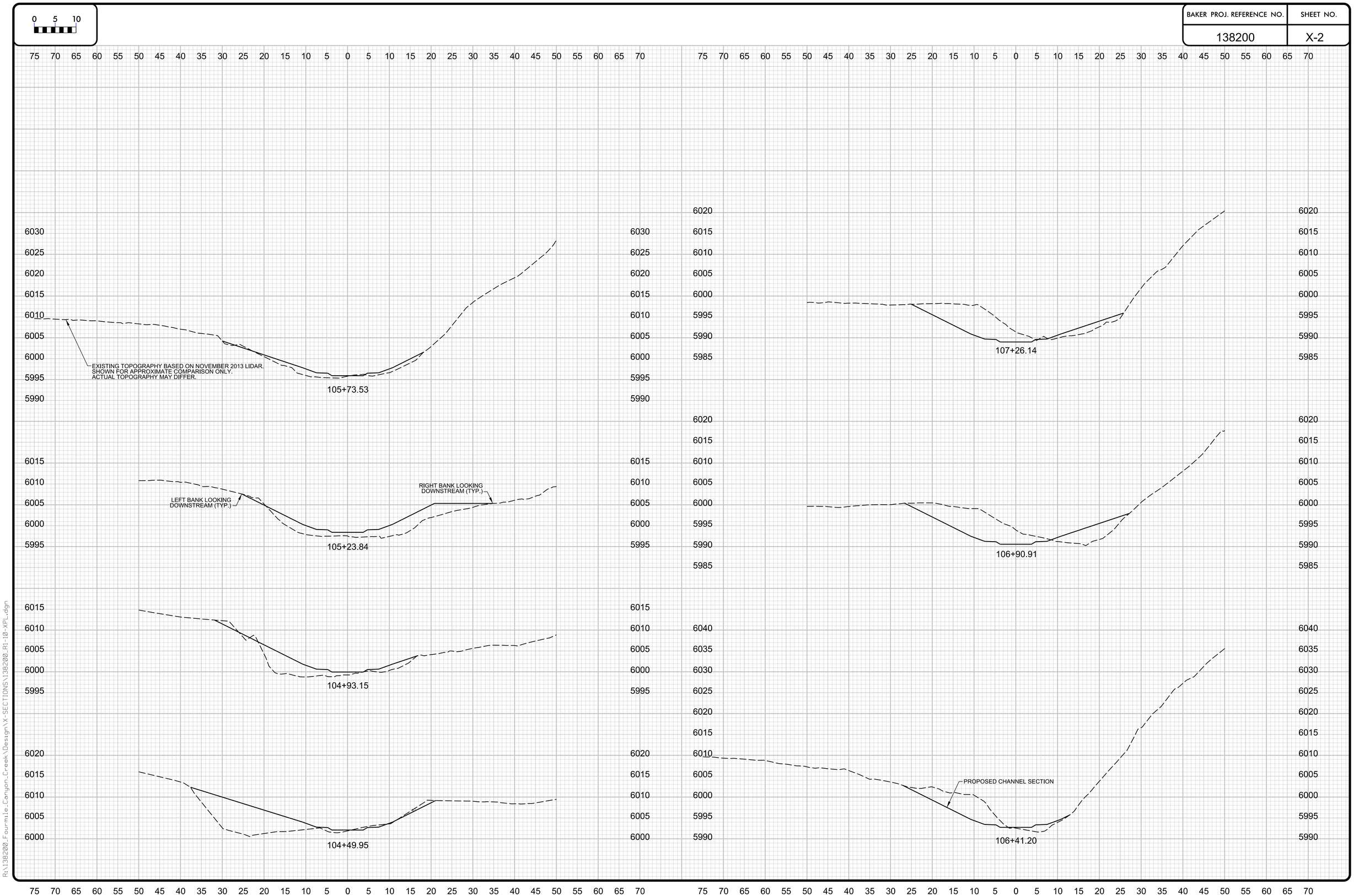

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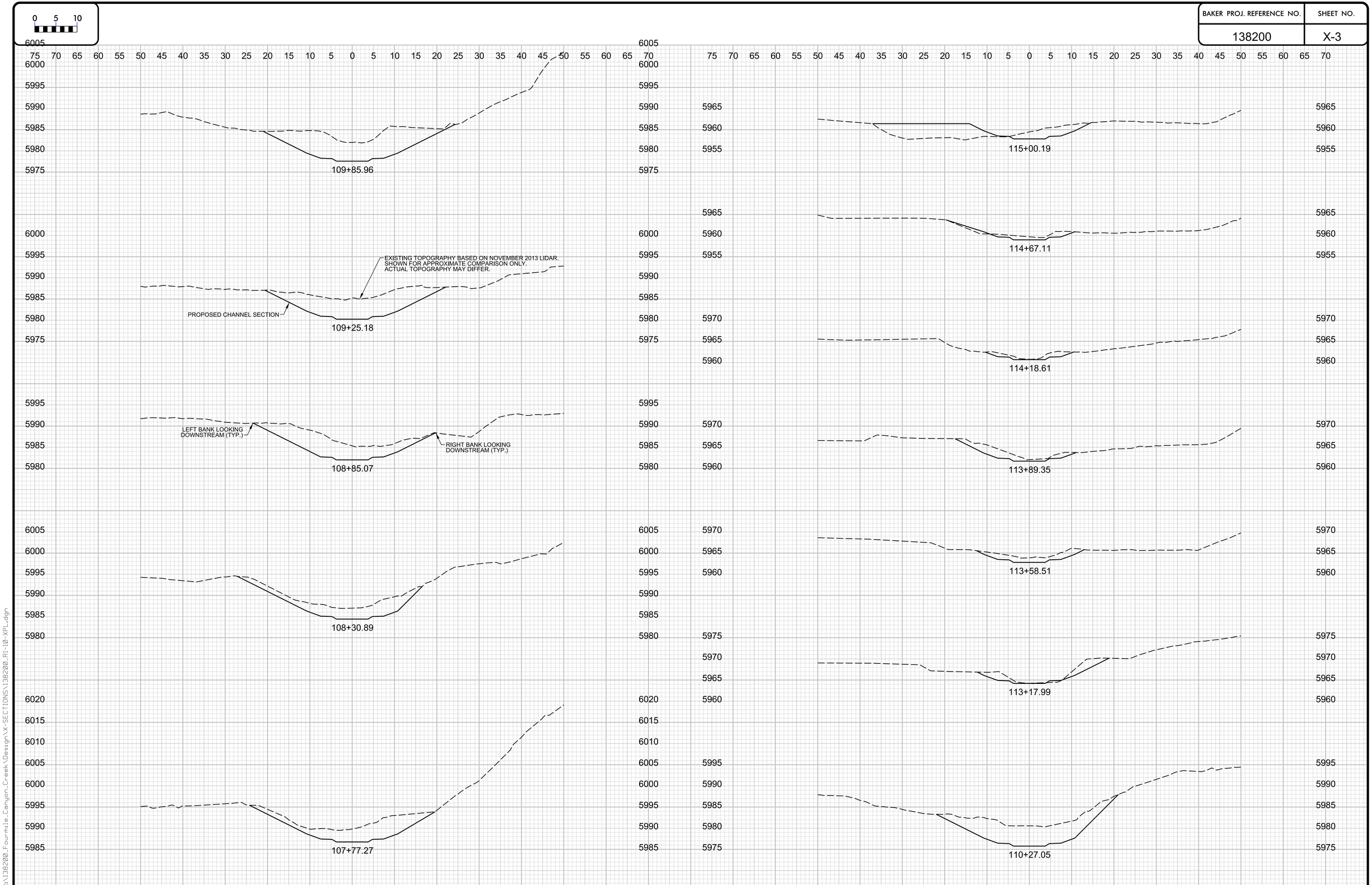

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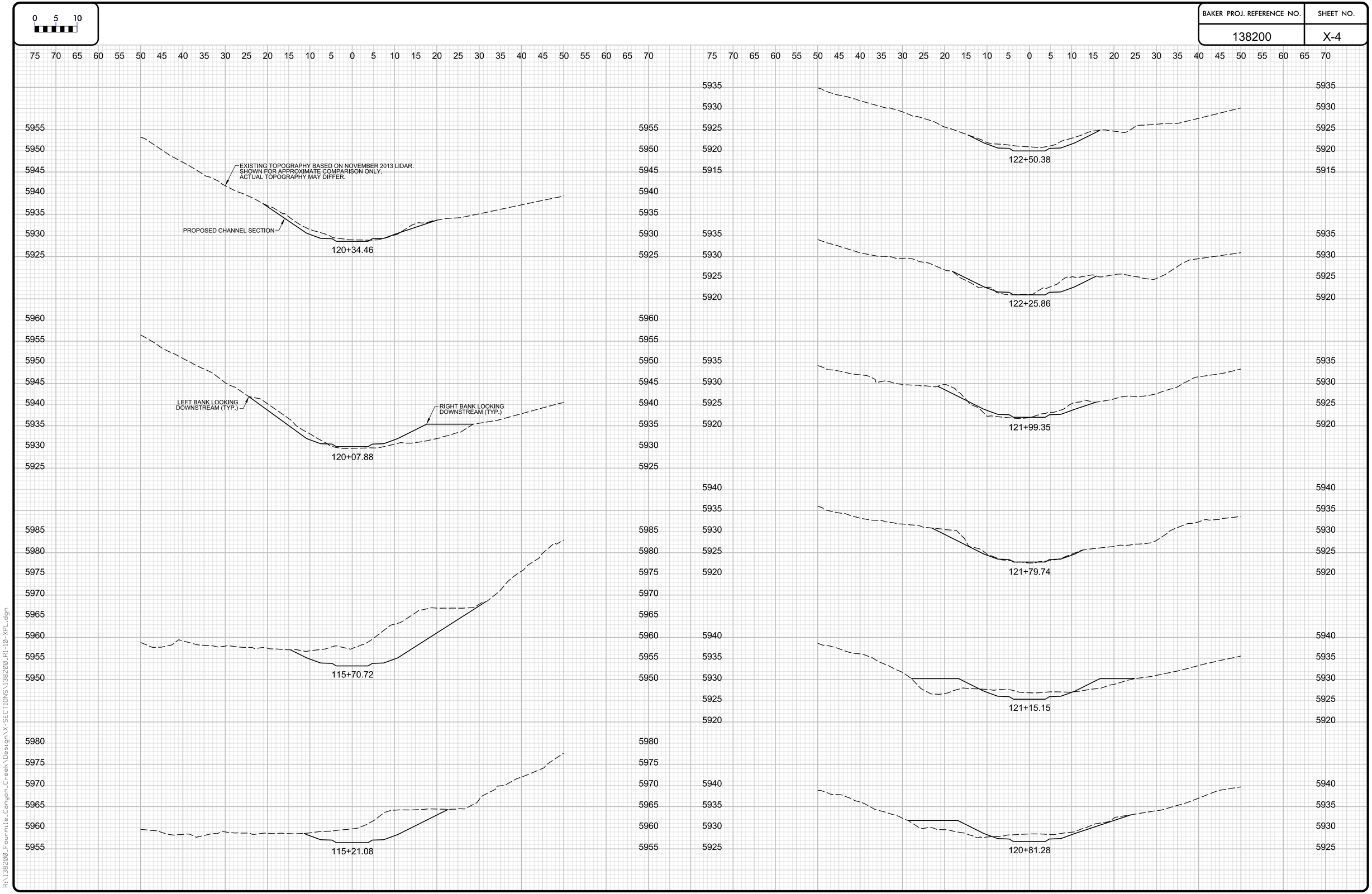

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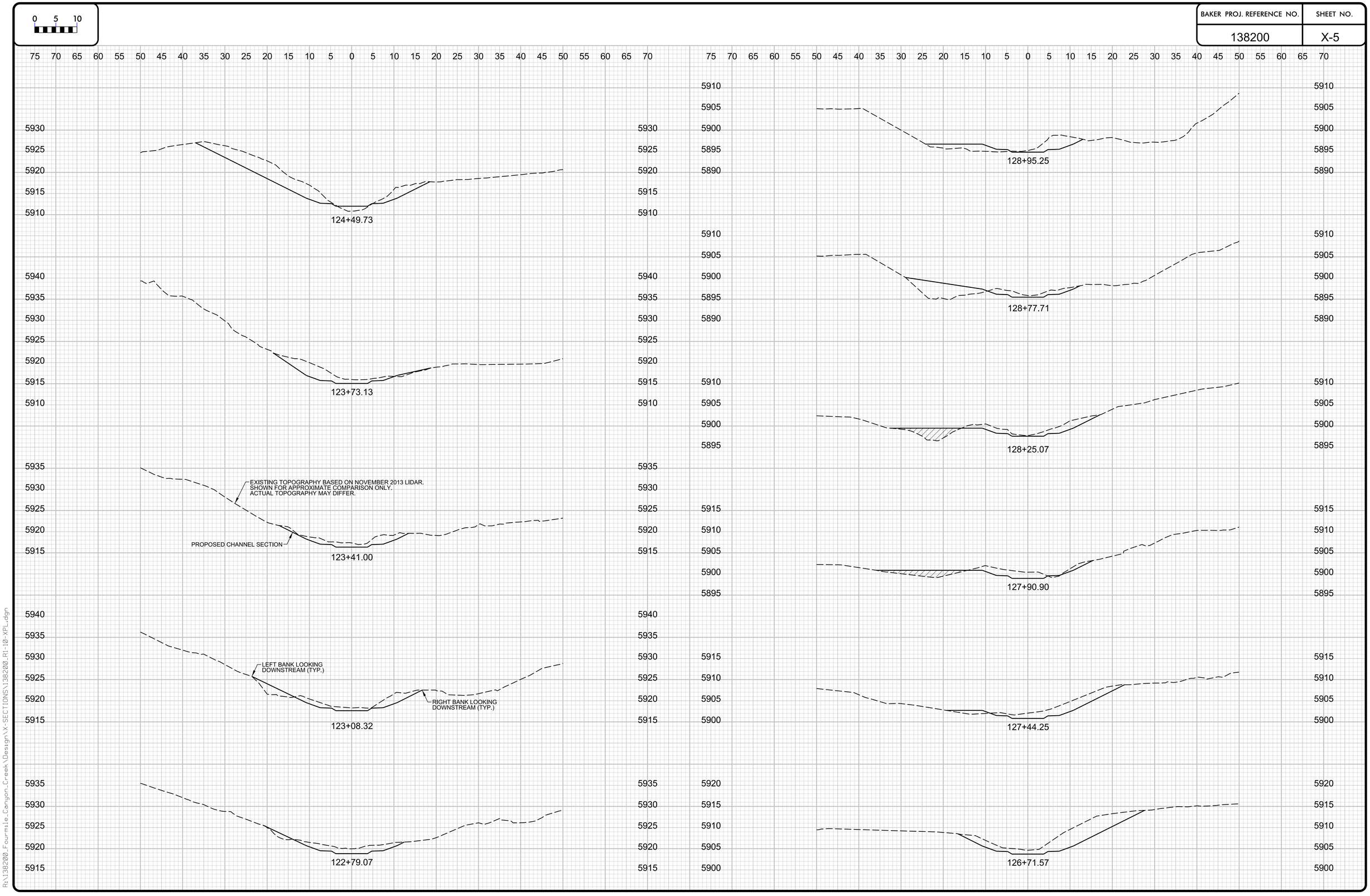

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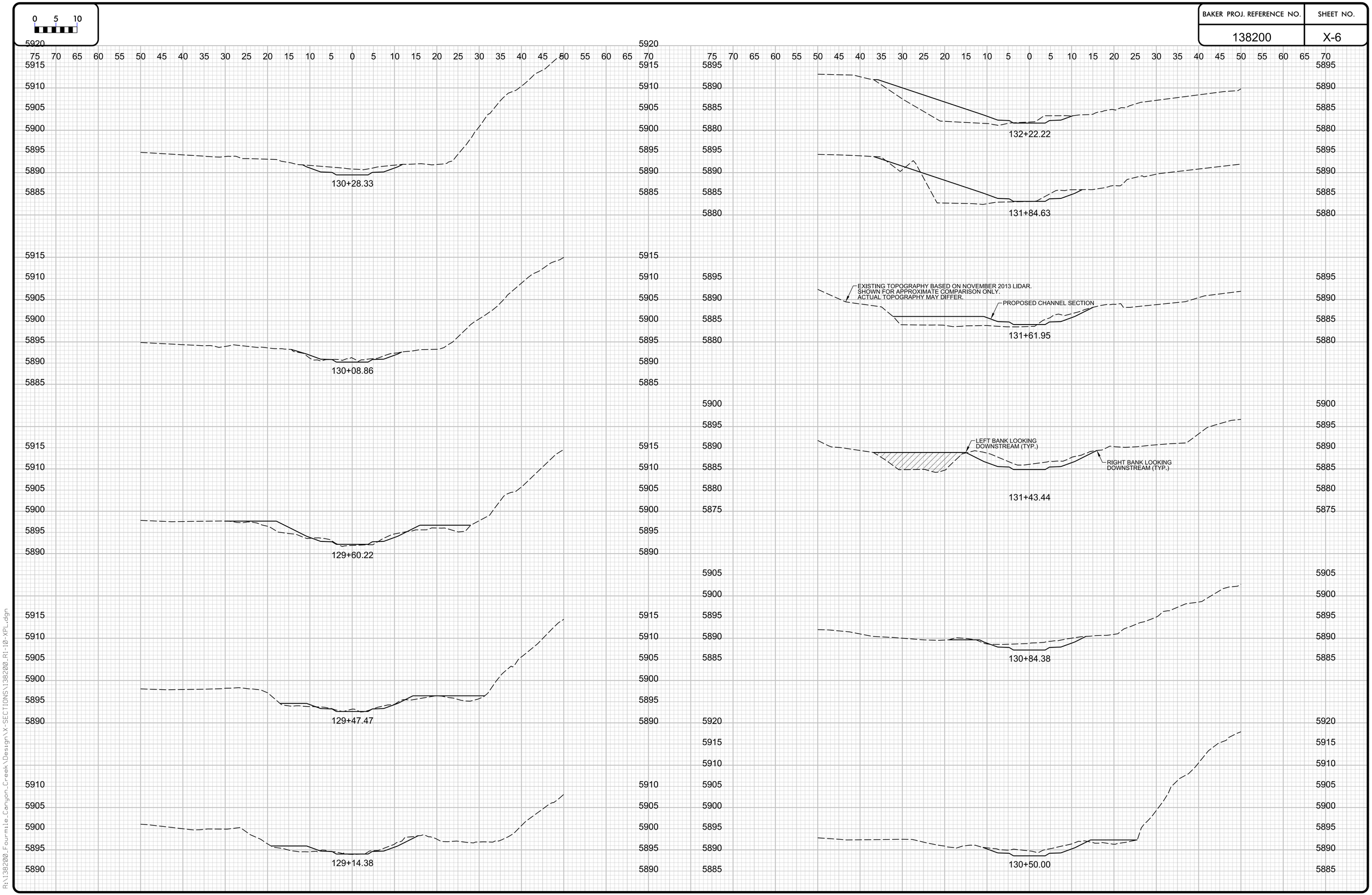

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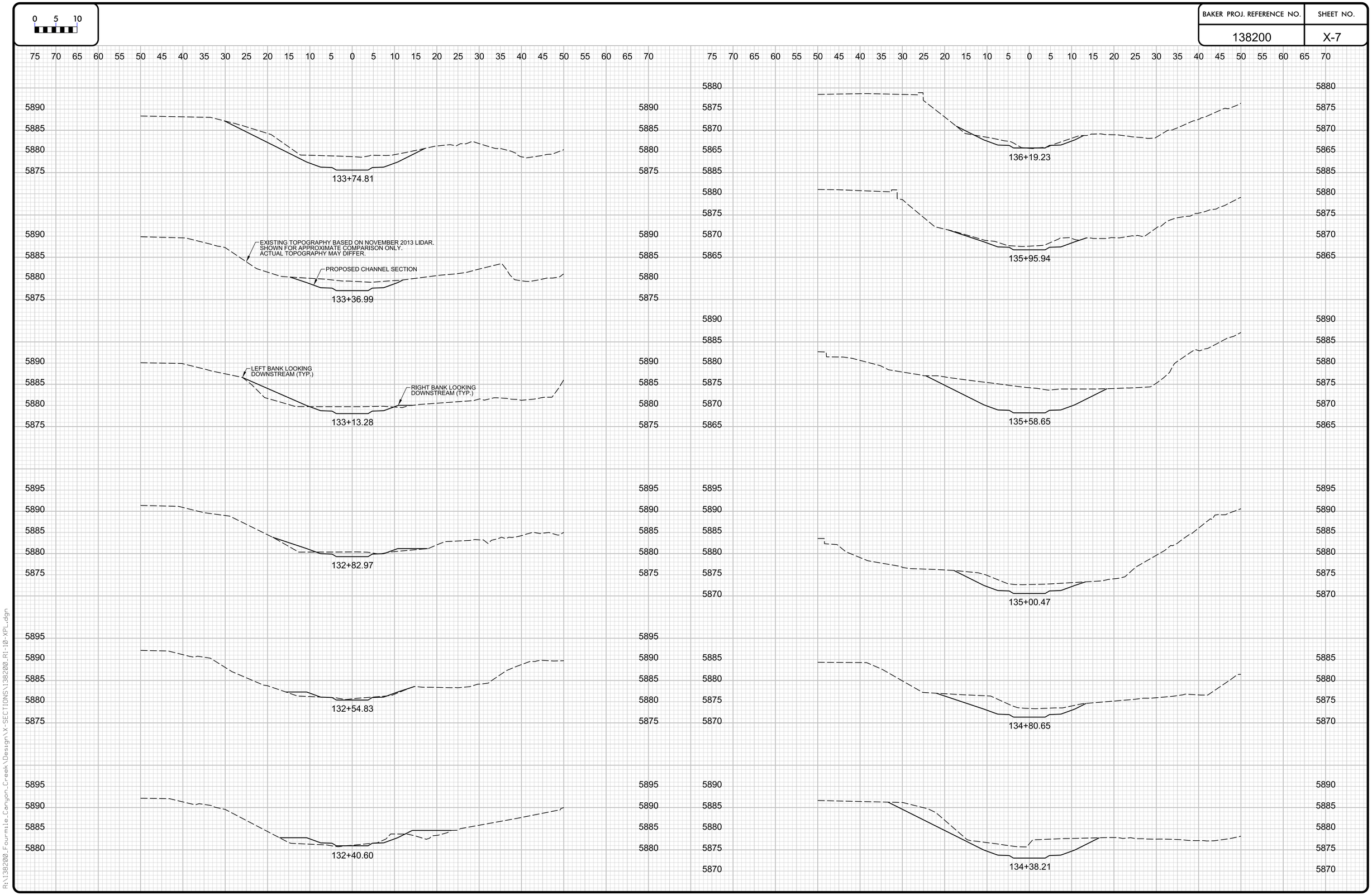

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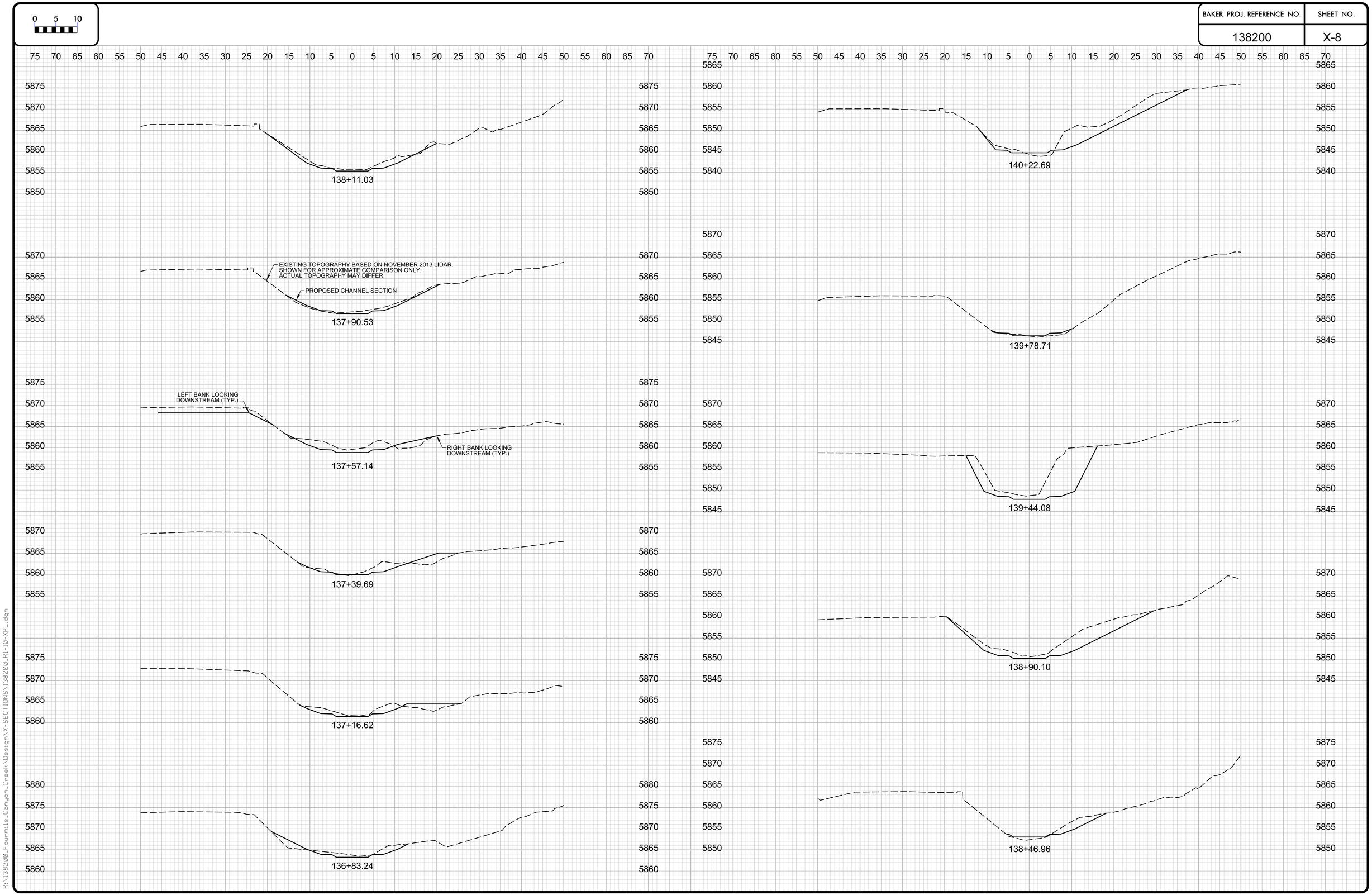

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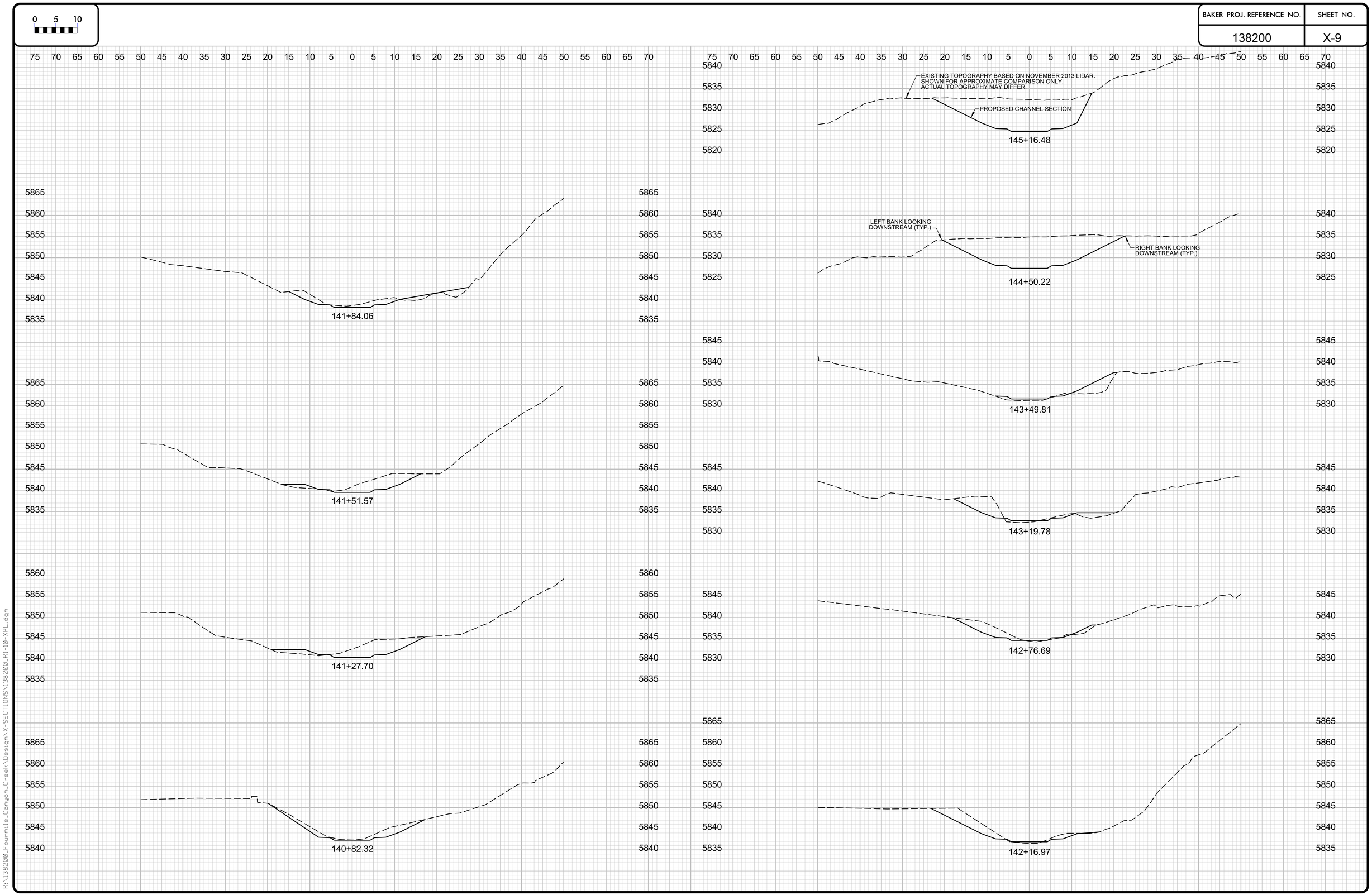

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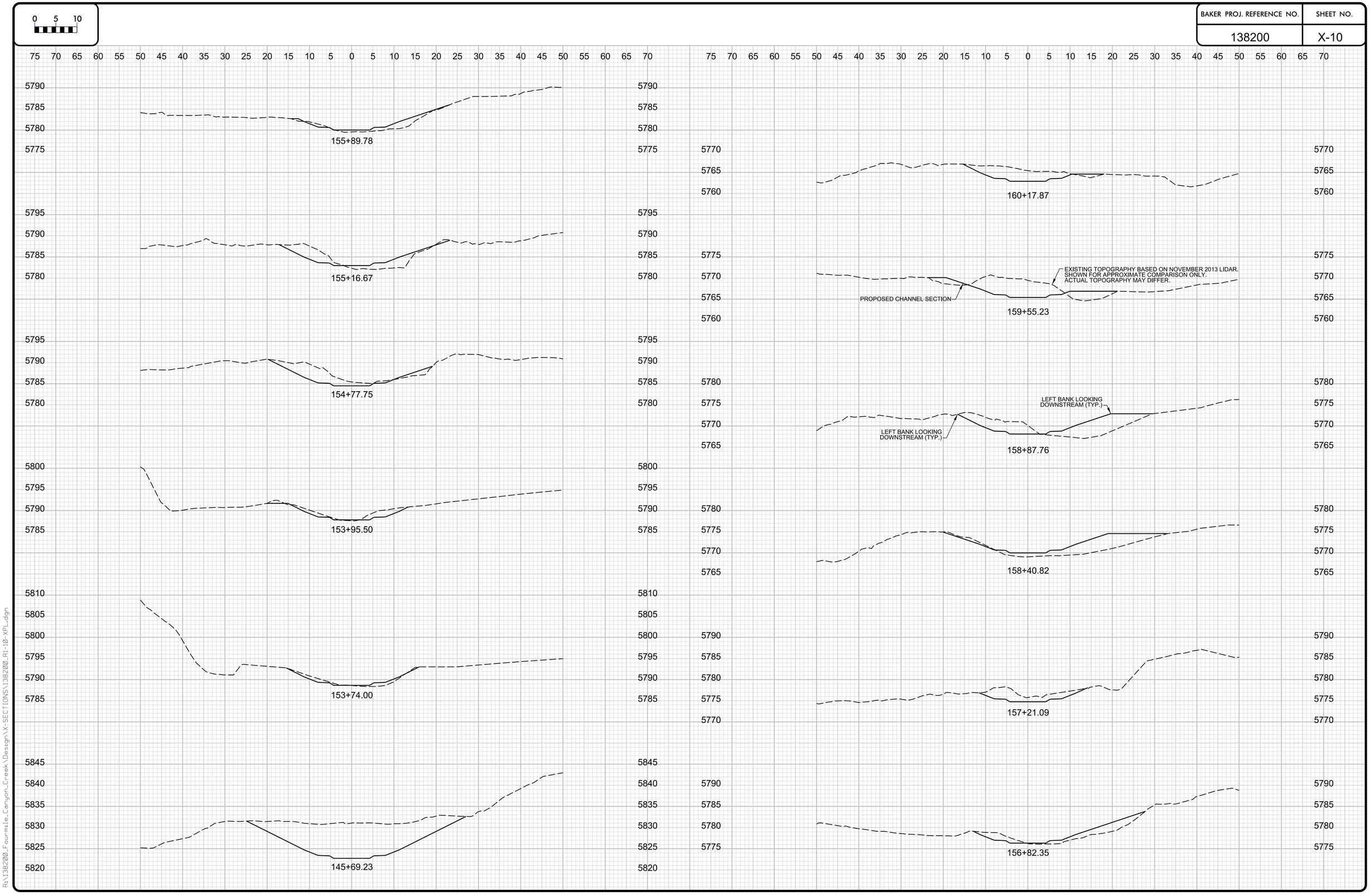

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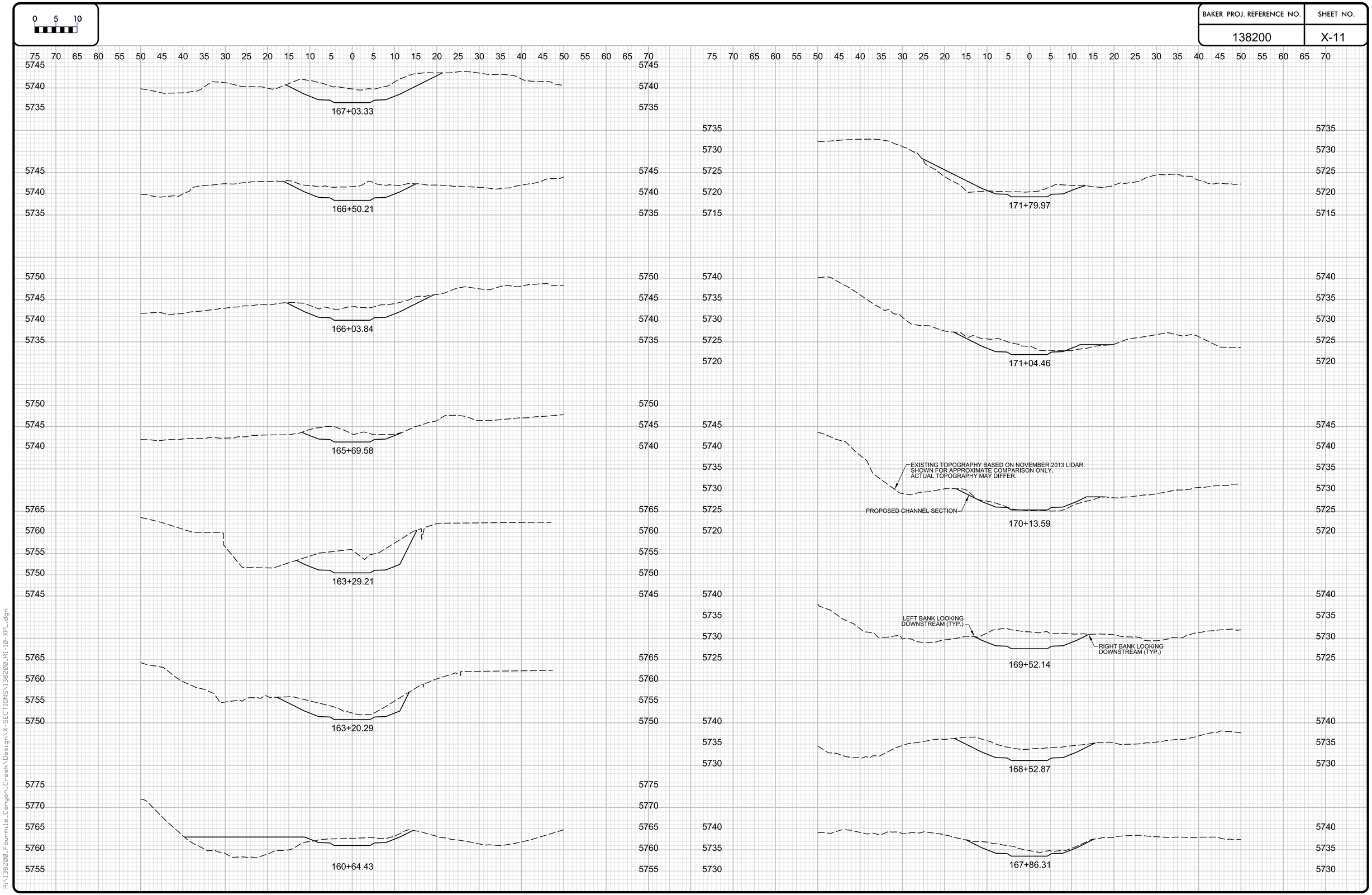

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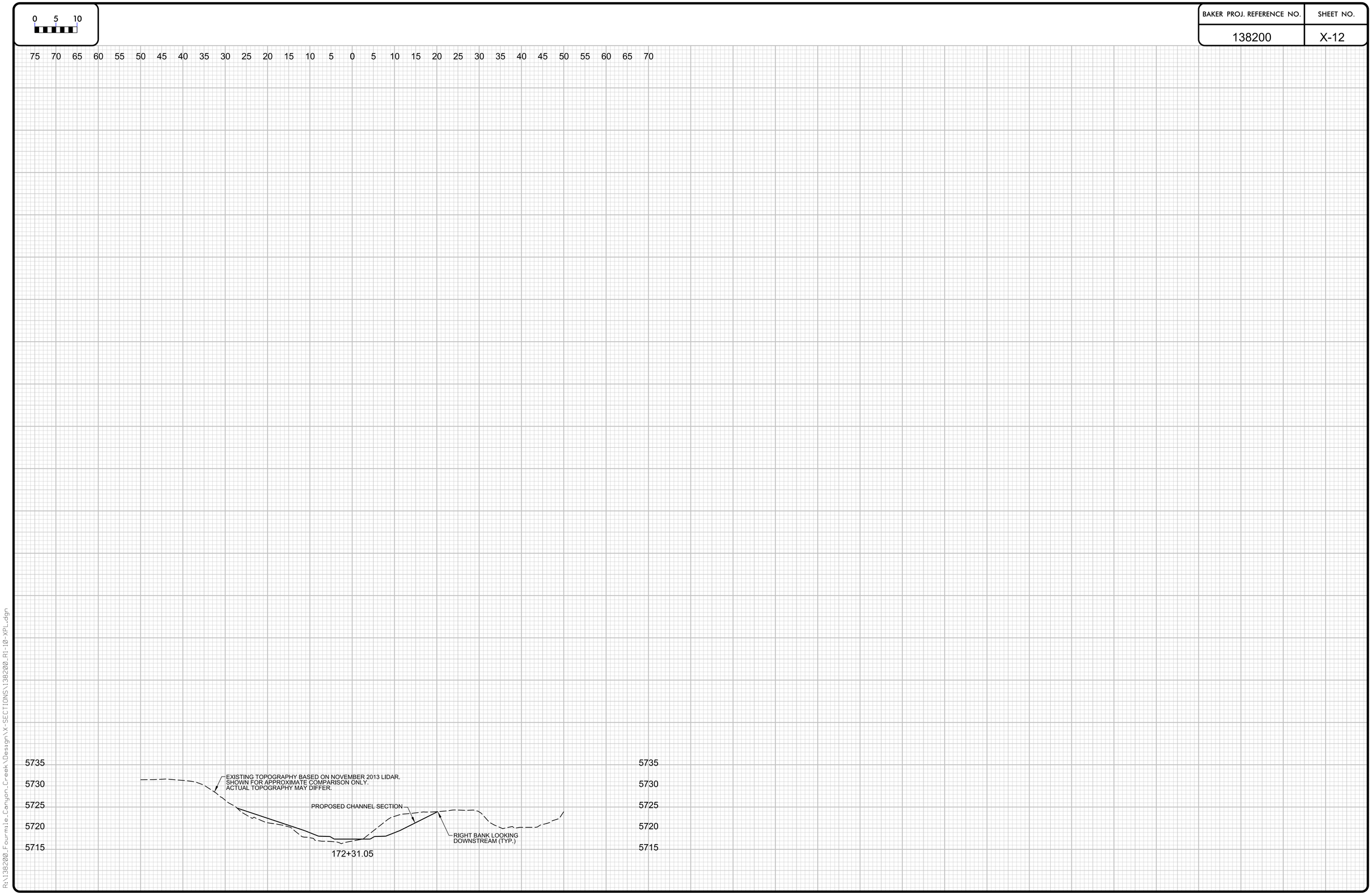

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138200	11

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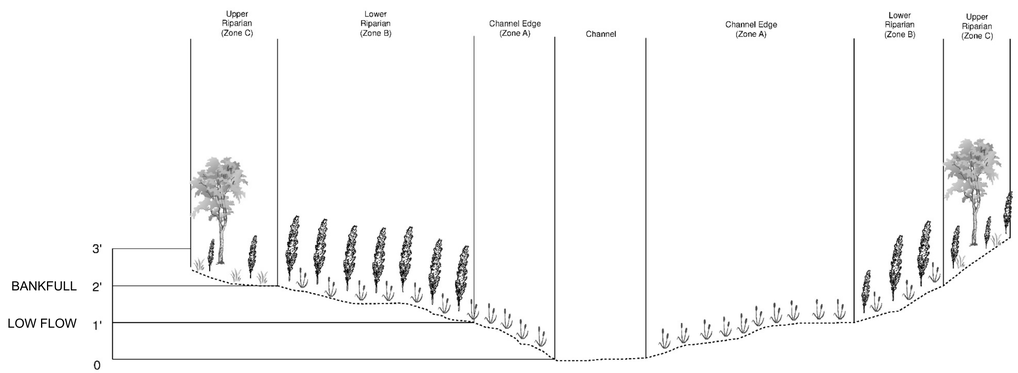
Typical Cross Section



REVEGETATION PLANTING ZONES FOR DESIGN REACHES

REACH	CHANNEL EDGE ZONE A	LOWER RIPARIAN ZONE B	UPPER RIPARIAN ZONE C	RIPARIAN SEED
1		X	X	X
2		X	X	X
3		X	X	X
4	X	X	X	X
5	X	X	X	X
6	X	X	X	X
7	X	X	X	X
8	X	X	X	X
9	X	X	X	X
10	X	X	X	X

X = INDICATES TYPE OF PLANTINGS TO BE APPLIED TO EACH REACH

Table 1: Plants Needed for Restoration[1]

Common Name	Scientific Name	Plant Size (cubic inch)	Plants per Acre
Zone A: Channel Edge[2]			
Nebraska sedge	*Carex nebrascensis*	10	882
Emory's sedge	*Carex emoryi*	10	1,470
Creeping spikerush	*Eleocharis palustris*	10	882
Baltic rush	*Juncus balticus*	10	1,470
Red-tinge bulrush	*Scirpus microcarpus*	10	882
		Total	**5,586**
Zone B: Lower Riparian[2]			
Peachleaf willow	*Salix amygdaloides*	40	1,000
Peachleaf willow	*Salix amygdaloides*	3' cutting	500
Narrowleaf willow	*Salix exigua*	40	2,500
Narrowleaf willow	*Salix exigua*	3' cutting	500
Dewystem willow	*Salix irrorata*	40	2,000
Dewystem willow	*Salix irrorata*	3' cutting	500
		Total	**7,000**
Zone C: Upper Riparian[3]			
Rubber rabbitbrush	*Ericameria nauseosus*	40	50
Narrowleaf cottonwood	*Populus angustifolia*	40	500
Plains cottonwood	*Populus deltoides*	40	500
American plum	*Prunus americana*	40	75
Chokecherry	*Prunus virginiana*	40	75
Common snowberry	*Symphoricarpos alba*	40	75
Golden current	*Ribes aureum*	40	50
Woods' rose	*Rosa woodsii*	40	75
		Total	**1,400**

[1]Zone A is 0-1', Zone B is 1-2', and Zone C is 2-2.5' above channel; planting will only occur in discrete pockets based on final grading
[2]Based on approximately 3-foot centers
[3]Based on approximately 6-foot centers

Table 2: Riparian Seed Mix[1]

[1]Nomenclature follows PLANTS Database (NRCS 2015); seeding rate based on hand-broadcasting; any substitutions must be native to Colorado and from a US or Canada seed source.

Type	Common Name	Scientific Name	Variety[2]	Seeds per Pound[3]	Seeds per Square Foot	Pounds of Pure Live Seed/Acre
Graminoids	Indian ricegrass	*Acnatherum hymenoides*	Paloma	141,000	3.9	1.2
	Sideoats grama	*Bouteloua curtipendula*	Butte or Pierre	191,000	5.3	1.2
	Blue grama[3]	*Bouteloua gracilis*[3]	Birds Eye, Alma, or Lovington	825,000	11.4	0.6
	Slender wheatgrass	*Elymus trachycaulus*	White River or San Luis	159,000	4.4	1.2
	Idaho fescue[3]	*Festuca idahoensis*[3]	Winchester	450,000	8.3	0.8
	Fowl mannagrass	*Glyceria striata*	-	180,000	8.3	2.0
	Needle and thread	*Hesperostipa comata*	-	115,000	5.3	2.0
	Prairie junegrass[3]	*Koeleria macrantha*[3]	-	2.3 million	5.3	0.1
	Baltic rush[3]	*Juncus balticus*[3]	-	10.9 million	25.0	0.1
	Torrey's rush[3]	*Juncus torreyi*[3]	-	12.3 million	28.2	0.1
	Green needlegrass	*Nassella viridula*	Cucharas or Lodorm	181,000	4.2	1.0
	Western wheatgrass	*Pascopyrum smithii*	Arriba	110,000	10.1	4.0
	Fowl bluegrass[3]	*Poa palustris*[3]	-	3.2 million	7.3	0.1
	Sandberg bluegrass[3]	*Poa secunda*[3]	Sims Mesa or High Plains	1 million	6.9	0.3
	Bluebunch wheatgrass	*Pseudoroegneria spicata*	P7	140,000	6.4	2.0
	Little bluestem	*Schizachyrium scoparium*	Pastura, Cimarron, or Camper	260,000	6.0	1.0
	Prairie cordgrass	*Spartina pectinata*	-	197,000	4.5	1.0
Forbs	Common yarrow[3]	*Achillea millefolium*[3]	-	2.7 million	6.2	0.1
	Rocky Mountain bee plant	*Cleome serrulata*	-	66,000	3.0	2.0
	Golden tickseed[3]	*Coreopsis tinctoria*[3]	-	1.4 million	3.2	0.1
	Blanketflower	*Gaillardia aristata*	Meriweather	132,000	1.5	0.5
	Showy goldeneye[3]	*Heliomeris multiflora*[3]	-	1 million	2.3	0.1
	Rocky Mountain penstemon	*Penstemon strictus*	Bandera	490,000	2.2	0.2
	American vetch	*Vicia americana*	-	33,000	0.8	1.0
Bulk	Rice hulls	-	-	-	-	2.3
				Total	**170.0**	**25.0**

[2]Sources: NRCS 2015, Granite Seed 2015, Western Native Seed 2015, NSN 2015
[3]Bag separately if drill-seeding

Notes:

- All planting zones will be seeded with the Riparian Seed Mix (Table 2). Seeding will only be performed between September 1 and when the ground is frozen, and when the ground is thawed and June 1, unless approved by a qualified ecologist.
- Woody plants (Zones B and C) will be installed in discrete pockets. The exact locations will be based on the final grading and determined after grading is complete.
- Compost (300 cubic yards per acre) will be mixed with native soil in discrete pockets within the restoration areas. Exact locations will be determined by the presence of adequate native soil.
  - Compost will have the following characteristics:
    a. pH: 5.5-8.0
    b. Moisture content: 35-55 percent
    c. Particle size: pass through 1-inch screen or smaller
    d. Stability: stable to highly stable, providing nutrients for plant growth
    e. Maturity/growth screening: demonstrate ability to enhance plant growth
    f. Soluble salt concentration: 2.5 dS (mmhos/cm) or less preferred
    g. Organic matter content: 30-70 percent
  - Suggested compost source: A-1 Organic, Eaton, Colorado 970-454-3492 or an approved equal.
- All willow cuttings must be harvested while dormant and planted within 3 to 14 days (after soaking—completely submerged)
- All containerized plants will be inspected by a qualified ecologist prior to planting. Any dead, dying, stressed, or badly "rootbound" plants will be rejected.
- A qualified ecologist will direct and supervise all plantings
- All seed will be hand-broadcast and lightly raked by hand to encourage contact with the soil
- All seeded areas will be mulched with certified weed-free straw and tackified with a cellulose-based tackifier (or hydromulched). No hay mulch will be used on the site.
- No fertilizers will be used on the site
- In an attempt to avoid the continued spreading of noxious weeds, all discrete populations of Colorado List A or B noxious weeds found in or within 100 feet of the restoration area will be sprayed with the appropriate herbicide(s) prior to construction
- All finish grades will be rough (plus or minus 4 inches), and all straight edges and right angles will be avoided
- No equipment will be allowed in the restoration area after seeding or planting.
- Any trees to be removed for the project will be removed during the non-nesting season for migratory birds (between September 1 and March 31)
- All best management practices (BMPs) used shall be selected, installed, implemented, and maintained according to good engineering, hydrologic and pollution control practices.
- The use of chemicals such as soil stabilizers, dust palliatives, herbicides, growth inhibitors, fertilizers, deicing salts, etc., shall be in accordance with the manufacturer's recommended application rates, frequency, and instructions. These chemicals shall not be used, stored, or stockpiled within 50 horizontal feet of Fourmile Canyon Creek.
- Construction equipment, fuels, lubricants, and other petroleum distillates shall not be stored or stockpiled within 50 horizontal feet of Fourmile Canyon Creek. Equipment fueling and servicing shall occur only within approved designated areas.

FOURMILE CANYON CREEK REVEGETATION PLAN

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