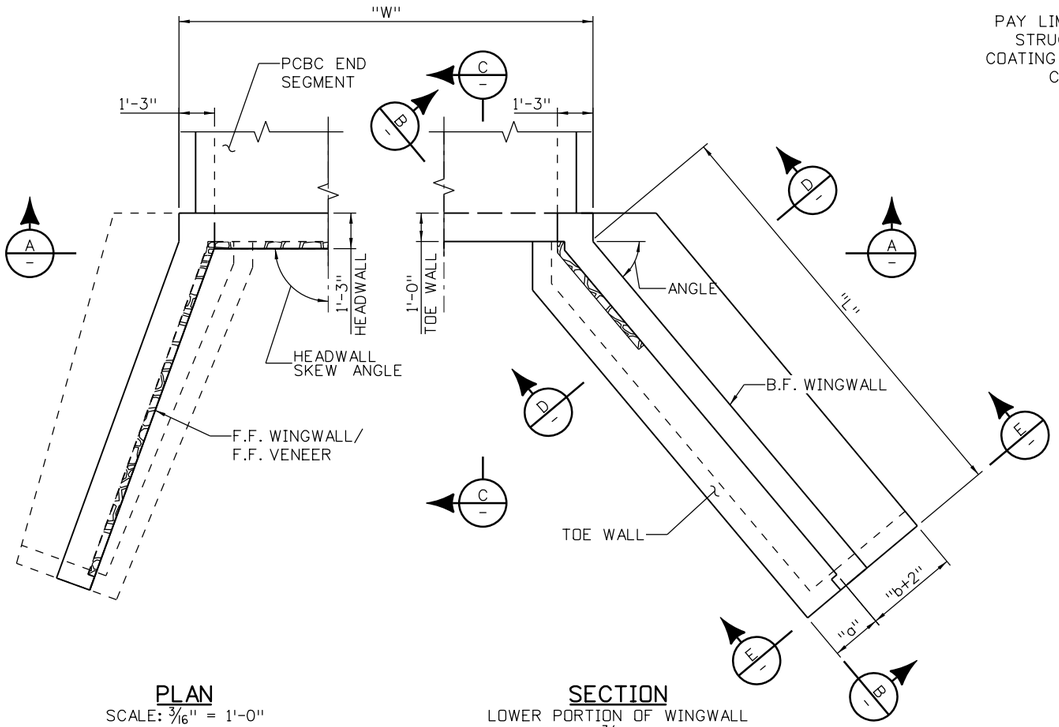
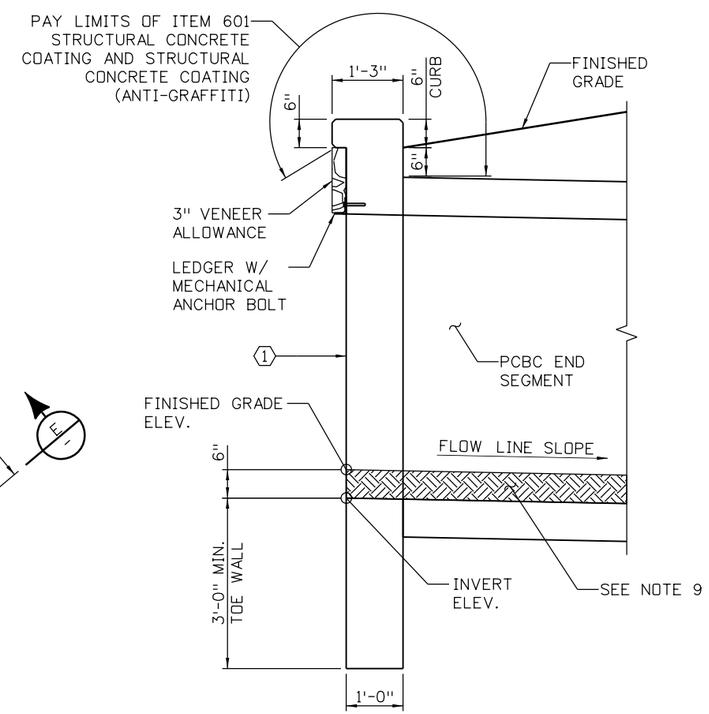
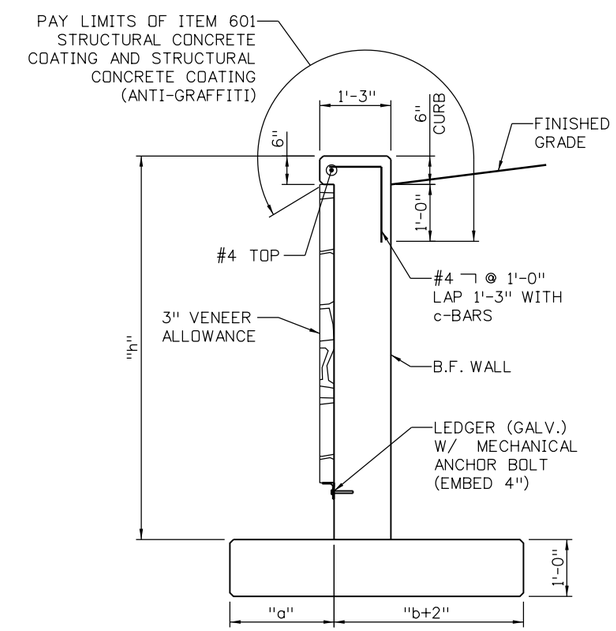


PLAN
SCALE: 3/16" = 1'-0"

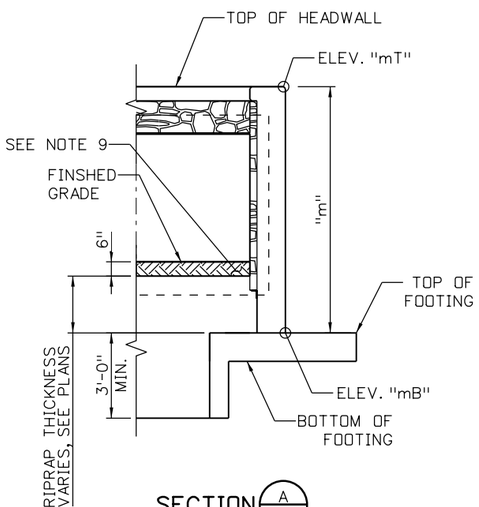
SECTION
LOWER PORTION OF WINGWALL
SCALE: 3/16" = 1'-0"



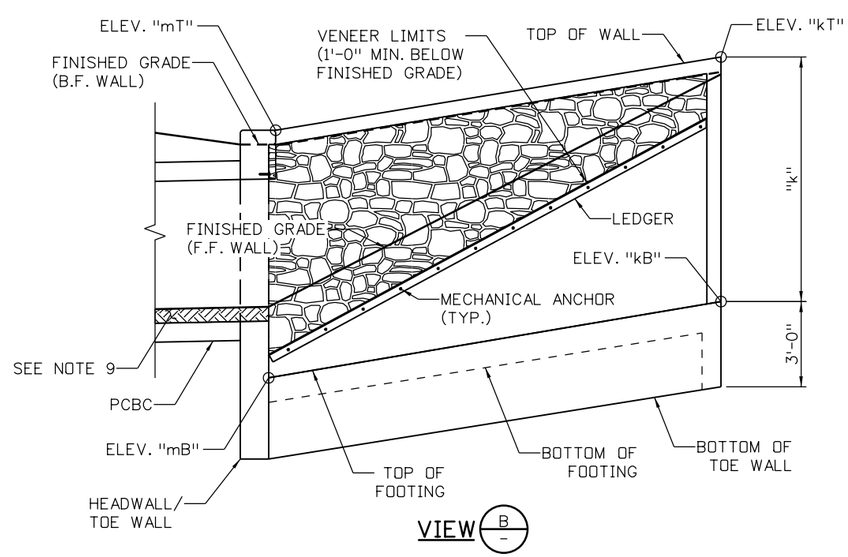
SECTION C
SCALE: 3/8" = 1'-0"



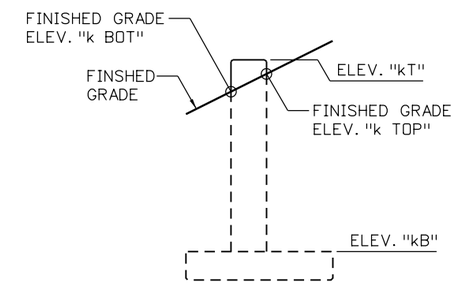
SECTION D
TOE WALL NOT SHOWN
SCALE: 3/8" = 1'-0"



SECTION A
SCALE: 3/16" = 1'-0"



VIEW B
SCALE: 3/16" = 1'-0"



VIEW E
SCALE: 3/16" = 1'-0"

NOTES:

1. FOR REINFORCING AND ADDITIONAL INFORMATION, REFER TO CDOT STANDARD PLAN NO. M-206-1, M-601-1, M-601-20, AND M-603-3.
2. FOR ARCHITECTURAL DETAILS, SEE STRUCTURES PLANS.
3. SEE HEADWALL AND WINGWALL DATA TABLE FOR PARAMETER VALUES.
4. TOE WALL MAY BE OMITTED WHEN FOOTINGS ARE ON BEDROCK AS PERMITTED BY THE ENGINEER.
5. ALL CONCRETE SHALL BE CONCRETE CLASS D.
6. FOR LEDGER AND MECHANICAL ANCHORS, SEE STRUCTURES PLANS.
7. STRUCTURAL CONCRETE COATING SHALL BE DARK BROWN, FEDERAL STANDARD 595C COLOR NO. 30045 OR APPROVED EQUAL.
8. STRUCTURAL CONCRETE COATING LIMITS ALSO APPLY AT END OF HEADWALL/WINGWALL.
9. 6" NATIVE SOIL (IF PRESENT).

KEYNOTES:

1. F.F. HEADWALL IS VERTICAL.

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

Boulder County
Michael Baker INTERNATIONAL

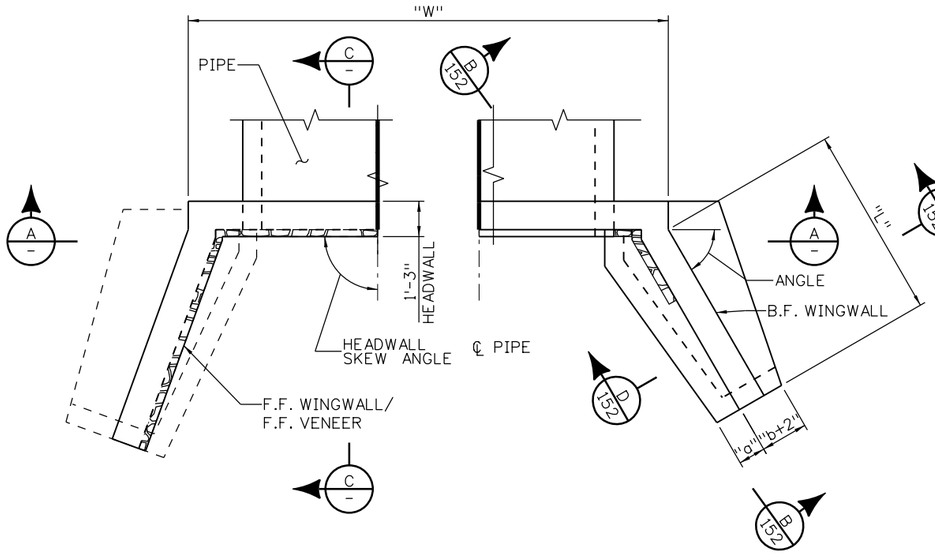
BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

DESIGNED:	CAD:	CHECKED:	DATE:
DLT	BMT	SLS	12/23/16

GOLD RUN ROAD
TYPICAL PRECAST BOX CULVERT END DETAILS

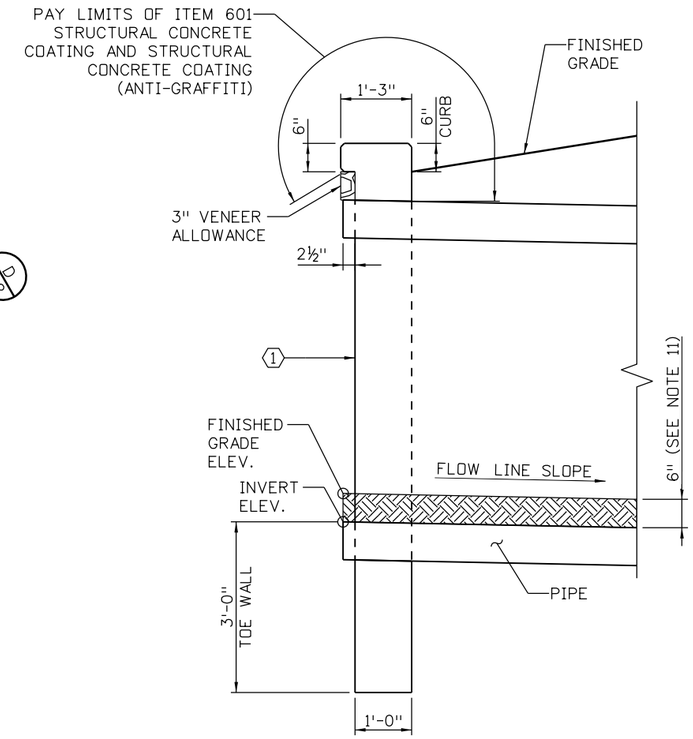
PROJECT NO: 4011.SEPT12C38 | SHEET NO: 166

jessica.wroy 5:45:46 PM 12/21/2016 pw:\\DCPWAPP1bkr.mbakercorp.com:pwprod\Documents\Projects\Lakewood_Office\Boulder_County_Emergency_Transportation\102\08_Sheet_Files\02_Hydraulics\DGN\DD-06.dgn

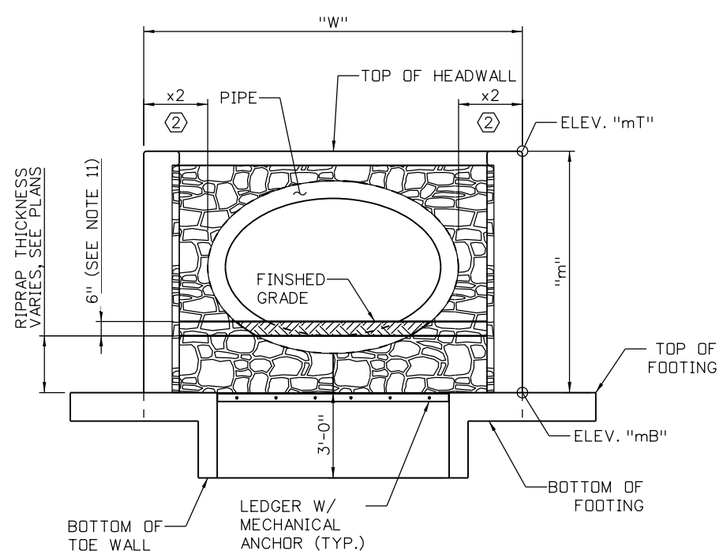


PLAN
SCALE: 3/16" = 1'-0"

SECTION
LOWER PORTION OF WINGWALL
SCALE: 3/16" = 1'-0"



SECTION C
SCALE: 3/8" = 1'-0"



SECTION A
SCALE: 3/16" = 1'-0"

NOTES:

1. NOT ALL REINFORCING AND DETAILS SHOWN. FOR ADDITIONAL INFORMATION, SEE CDOT STANDARD PLAN NO. M-206-1, M-601-10, AND M-601-20.
2. FOR ARCHITECTURAL DETAILS, SEE STRUCTURES PLANS.
3. SEE HEADWALL AND WINGWALL DATA TABLE FOR PARAMETER VALUES.
4. TOE WALL MAY BE OMITTED WHEN FOOTINGS ARE ON BEDROCK AS PERMITTED BY THE ENGINEER.
5. ALL CONCRETE SHALL BE CONCRETE CLASS D.
6. x2 DIMENSION AS SHOWN ON CDOT STANDARD PLAN NO. M-601-10 SHALL BE FOR THE WIDTH OF THE PIPE.
7. FOR LEDGER DETAILS, SEE TYPICAL PRECAST BOX CULVERT END DETAILS SHEET.
8. FOR LEDGER AND MECHANICAL ANCHORS, SEE STRUCTURAL PLANS.
9. STRUCTURAL CONCRETE COATING SHALL BE DARK BROWN, FEDERAL STANDARD 595C COLOR NO. 30045 OR APPROVED EQUAL.
10. STRUCTURAL CONCRETE COATING LIMITS ALSO APPLY AT END OF HEADWALL/WINGWALL AND EXPOSED END OF PIPE.
11. NATIVE SOIL (IF PRESENT). NOT ALL CULVERTS HAVE 6" OF NATIVE SOIL FILL. SEE HEADWALL AND WINGWALL DATA TABLE FOR INVERT AND FINISHED GRADE ELEVATIONS.

KEYNOTES:

1. F.F. HEADWALL IS VERTICAL.
2. PROVIDE x2 DIMENSION FOR BOTH FRONT AND BACK FACE OF HEADWALL AT LIMITS OF PIPE.

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS: NO.	DATE	REVISION DESCRIPTION:

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION
Michael Baker INTERNATIONAL

DESIGNED:	CAD:	CHECKED:	DATE:
DLT	BMT	SLS	12/23/16

GOLD RUN ROAD
TYPICAL ELLIPTICAL CULVERT END DETAILS

PROJECT NO: 4011.SEPT12C38 | SHEET NO: 167

jessica.wroy 5:46:02 PM 12/21/2016 pw:\\DCPWAPP1.bkr.mbakercorp.com:pwprod\Documents\Projects\Lakewood_Office\Boulder_County_Emergency_Transportation\T02\08_Sheet_Files\02_Hydraulics\DGN\DD-07.dgn

HEADWALL AND WINGWALL DATA TABLE

HEADWALL	CL NORTHING	CL EASTING	INVERT ELEV	FINISHED GRADE ELEV.	SKEW ANGLE (D M S)	W (FEET)	WINGWALL	ANGLE (D M S)	L (FEET)	ELEV. mT	ELEV. mB	m (FEET)	FINISHED GRADE ELEV. m TOP	FINISHED GRADE ELEV. m BOT	ELEV. kT	ELEV. kB	k (FEET)	FINISHED GRADE ELEV. k TOP	FINISHED GRADE ELEV. k BOT
							A1	70° 00'00"	7.75	7308.75	7300.83	7.92	7308.25	7302.33	7307.17	7301.61	5.57	7306.67	7306.11
A	263661.583	31469.542	7301.83	7302.33	90° 00'00"	14.00													
							A2	60° 00'00"	6.75	7308.75	7300.83	7.92	7308.25	7302.33	7307.36	7301.51	5.85	7306.86	7306.26
							B1	77° 00'00"	15.57	7296.33	7286.17	10.16	7295.83	7289.91	7294.09	7284.61	9.48	7293.59	7288.91
B	263572.610	31556.188	7289.41	7289.91	90° 00'00"	14.00													
							B2	85° 00'00"	19.00	7296.33	7284.34	11.99	7295.83	7289.91	7287.92	7282.44	5.48	7287.42	7286.74
							C1	90° 00'00"	16.50	7140.77	7133.60	7.17	7140.27	7135.60	7141.92	7135.25	6.67	7141.42	7140.66
C	263826.920	32696.373	7135.10	7135.60	90° 00'00"	10.50													
							C2	65° 00'00"	28.50	7140.77	7133.60	7.17	7140.27	7135.60	7143.58	7136.45	7.13	7143.08	7142.23
							D1	85° 00'00"	14.25	7136.70	7129.03	7.67	7136.20	7131.53	7134.80	7129.73	5.07	7134.30	7133.53
D	263809.060	32732.482	7131.03	7131.53	90° 00'00"	10.50													
							D2	75° 00'00"	20.00	7136.70	7129.03	7.67	7136.20	7131.53	7132.27	7127.39	4.88	7131.77	7131.19
							E1	50° 00'00"	14.00	7105.37	7097.87	7.50	7104.87	7099.37	7106.57	7099.27	7.30	7106.07	7105.29
E	263624.619	32810.125	7098.87	7099.37	90° 00'00"	13.25													
							E2	90° 00'00"	16.00	7105.37	7097.87	7.50	7104.87	7099.37	7109.51	7099.47	10.04	7109.01	7108.22
							F1	00° 00'00"	15.00	7101.71	7093.21	8.50	7101.21	7095.71	7101.59	7094.71	6.88	7101.09	7100.53
F	263573.744	32792.365	7095.21	7095.71	128° 17'15"	16.78													
							F2	00° 00'00"	19.00	7101.71	7093.21	8.50	7101.21	7095.71	7096.49	7091.81	4.68	7095.99	7095.61
							G1	80° 00'00"	16.00	7032.37	7024.70	7.67	7031.87	7026.20	7032.47	7026.30	6.17	7031.97	7031.15
G	263535.699	33444.805	7025.70	7026.20	90° 00'00"	10.50													
							G2	90° 00'00"	7.50	7032.37	7024.70	7.67	7031.87	7026.20	7030.56	7024.81	5.75	7030.06	7027.31
							H1	90° 00'00"	12.50	7026.86	7017.19	9.67	7026.36	7020.69	7022.43	7016.22	6.21	7021.93	7021.02
H	263563.644	33529.040	7020.19	7020.69	90° 00'00"	10.50													
							H2	45° 00'00"	16.50	7026.86	7017.19	9.67	7026.36	7020.69	7023.18	7017.26	5.92	7022.68	7022.06
							K1	85° 00'00"	13.00	6978.43	6970.51	7.92	6977.93	6972.01	6977.84	6971.81	6.03	6977.34	6976.84
K	263325.840	33899.393	6971.51	6972.01	105° 00'00"	14.74													
							K2	90° 00'00"	13.50	6978.43	6970.51	7.92	6977.93	6972.01	6980.91	6971.86	9.05	6980.41	6979.63
							L1	70° 00'00"	16.50	6970.61	6960.69	9.92	6970.11	6964.19	6965.60	6959.78	5.82	6965.10	6964.58
L	263243.730	33987.355	6963.69	6964.19	90° 00'00"	12.75													
							L2	00° 00'00"	7.25	6970.61	6960.69	9.92	6970.11	6964.19	6968.32	6961.42	6.90	6967.82	6967.71
M	263332.897	34842.894	6885.15	6885.65	90° 00'00"	10.19	M1	00° 00'00"	4.50	6891.17	6884.15	7.02	6890.67	6885.65	6890.82	6884.60	6.22	6890.32	6890.25
							N1	00° 00'00"	5.00	6889.54	6882.37	7.17	6889.04	6884.37	6889.13	6882.87	6.26	6888.63	6888.47
N	263315.441	34859.128	6883.87	6884.37	90° 00'00"	8.92													
							N2	72° 01'14"	4.65	6889.54	6881.85	7.69	6889.04	6884.37	6889.81	6881.38	8.43	6889.31	6883.38

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS: NO.	DATE	REVISION DESCRIPTION:

Boulder County
Michael Baker INTERNATIONAL

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

DESIGNED:	CAD:	CHECKED:	DATE:
BMM	BMM	SLS	12/23/16

GOLD RUN ROAD
HEADWALL AND WINGWALL DATA TABLE (SHEET 1 OF 3)

PROJECT NO: 4011.SEPT12C38 | SHEET NO: 168

jessica.wroy 5:46:18 PM 12/21/2016 pw:\\DCPWAPP1.bkr.mbakercorp.com:pwprod\Documents\Projects\Lakewood_Office\Boulder_County_Emergency_Transportation\T02\08_Sheet_Files\02_Hydraulics\DGN\DD-08.dgn

HEADWALL AND WINGWALL DATA TABLE

HEADWALL	CL NORTHING	CL EASTING	INVERT ELEV	FINISHED GRADE ELEV.	SKEW ANGLE (D M S)	W (FEET)	WINGWALL	ANGLE (D M S)	L (FEET)	ELEV. mT	ELEV. mB	m (FEET)	FINISHED GRADE ELEV. m TOP	FINISHED GRADE ELEV. m BOT	ELEV. kT	ELEV. kB	k (FEET)	FINISHED GRADE ELEV. k TOP	FINISHED GRADE ELEV. k BOT
	263316.233	34866.836								6889.81									
O	263306.206	34870.135	6883.38	6883.38	140° 33'13"	19.45				SEE NOTE									
	263298.618	34875.076								6888.76									
							P1	15° 00'00"	16.00	6891.27	6884.10	7.17	6890.77	6886.10	6891.78	6885.70	6.08	6891.28	6891.24
P	263346.253	34880.400	6886.10	6886.10	90° 00'00"	14.58													
							P2	80° 00'00"	14.00	6891.27	6884.10	7.17	6890.77	6886.10	6892.89	6885.50	7.39	6892.39	6891.34
							Q1	90° 00'00"	5.00	6739.13	6733.55	5.58	6738.00	6735.55	6738.20	6734.05	4.15	6737.70	6737.70
Q	262188.250	35987.115	6735.55	6735.55	130° 25'51"	7.42													
							Q2	00° 00'00"	8.00	6739.13	6733.55	5.58	6738.63	6735.55	6739.52	6734.35	5.17	6739.02	6738.89
							R1	80° 00'00"	20.25	6681.06	6673.39	7.67	6680.56	6674.89	6680.40	6675.42	4.98	6679.90	6678.71
R	261810.661	36487.123	6674.39	6674.89	90° 00'00"	10.50													
							R2	80° 00'00"	20.00	6681.06	6673.39	7.67	6680.56	6674.89	6682.53	6675.39	7.14	6682.03	6681.09
							S1	55° 00'00"	25.25	6679.48	6671.31	8.17	6678.98	6673.31	6674.81	6670.88	3.93	6674.31	6673.88
S	261829.378	36521.907	6672.81	6673.31	90° 00'00"	10.50													
							S2	90° 00'00"	35.60	6679.48	6671.31	8.17	6678.98	6673.31	6679.33	6673.95	5.38	6678.83	6677.95
							T1	00° 00'00"	6.50	6787.39	6781.22	6.17	6786.89	6783.22	6786.00	6781.87	4.13	6785.50	6785.20
T	262664.876	35594.421	6783.22	6783.22	95° 36'24"	6.42													
							T2	00° 00'00"	10.00	6787.39	6781.22	6.17	6786.89	6783.22	6788.29	6782.22	6.07	6787.79	6787.29
							U1	65° 00'00"	13.00	6727.19	6718.52	8.67	6726.69	6720.02	6726.20	6719.82	6.38	6725.70	6725.18
U	262084.164	36055.181	6719.52	6720.02	90° 00'00"	10.50													
							U2	70° 00'00"	18.00	6727.19	6718.52	8.67	6726.69	6720.02	6721.62	6719.11	2.51	6721.12	6721.11
							V1	60° 00'00"	14.00	6724.25	6715.08	9.17	6723.75	6717.08	6721.03	6716.48	4.55	6720.53	6720.05
V	262061.415	36086.402	6716.58	6717.08	90° 00'00"	10.50													
							V2	90° 00'00"	18.75	6724.25	6715.08	9.17	6723.75	6717.08	6717.30	6713.22	4.08	6716.80	6715.47
							W1	65° 00'00"	13.00	6717.48	6709.81	7.67	6716.98	6711.31	6715.62	6711.11	4.51	6715.12	6714.78
W	262008.903	36139.241	6710.81	6711.31	90° 00'00"	10.50													
							W2	65° 00'00"	12.75	6717.48	6709.81	7.67	6716.98	6711.31	6714.59	6711.09	3.51	6714.09	6713.37
							X1	00° 00'00"	10.25	6716.08	6707.91	8.17	6715.58	6709.91	6714.50	6708.94	5.57	6714.00	6714.00
X	261981.087	36157.035	6709.41	6709.91	90° 00'00"	9.34													
							X2	00° 00'00"	7.75	6716.08	6707.91	8.17	6715.58	6709.91	6715.95	6707.14	8.81	6715.45	6714.92
							Y1	80° 00'00"	14.00	6712.81	6705.14	7.67	6712.31	6706.64	6711.44	6706.54	4.90	6710.94	6710.38
Y	261945.950	36180.550	6706.14	6706.64	90° 00'00"	10.50													
							Y2	50° 00'00"	15.75	6712.81	6705.14	7.67	6712.31	6706.64	6714.62	6706.72	7.90	6714.12	6713.40
							Z1	75° 00'00"	14.00	6711.00	6702.83	8.17	6710.50	6704.83	6709.88	6704.23	5.65	6709.38	6708.35
Z	261926.118	36188.142	6704.33	6704.83	90° 00'00"	10.50													
							Z2	80° 00'00"	14.00	6711.00	6702.83	8.17	6710.50	6704.83	6710.62	6704.23	6.39	6710.12	6708.87

NOTE:

1. THE TOP ELEVATION (mT) OF HEADWALL 'O' VARIES, AND SHALL FOLLOW 6" ABOVE THE PROJECTED PROPOSED GROUND PROFILE AS CALCULATED FROM THE ROADWAY CENTERLINE TO THE RIGHT EDGE OF PAVEMENT. THE NORTHING, EASTING, AND ELEV. mT INFORMATION PROVIDED IN THE TABLE ABOVE FOR HEADWALL 'O' REPRESENTS THE TWO CORNERS OF THE HEADWALL FACING AND CLOSEST TO THE RIGHT EDGE OF PAVEMENT OF GOLD RUN ROAD.

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

Boulder County

Michael Baker INTERNATIONAL

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

DESIGNED:	CAD:	CHECKED:	DATE:
BMM	BMM	SLS	12/23/16

GOLD RUN ROAD
HEADWALL AND WINGWALL DATA TABLE (SHEET 2 OF 3)

PROJECT NO: 4011.SEPT12C38 | SHEET NO: 169

jessica.wroy 5:46:33 PM 12/21/2016 pw:\\DCPWAPP1.bkr.mbakercorp.com:pwprod\Documents\Projects\Lakewood_Office\Boulder_County_Emergency_Transportation\T02\08_Sheet_Files\02_Hydraulics\DGN\DD-09.dgn

HEADWALL AND WINGWALL DATA TABLE

HEADWALL	CL NORTHING	CL EASTING	INVERT ELEV	FINISHED GRADE ELEV.	SKEW ANGLE (D M S)	W (FEET)	WINGWALL	ANGLE (D M S)	L (FEET)	ELEV. mT	ELEV. mB	m (FEET)	FINISHED GRADE ELEV. m TOP	FINISHED GRADE ELEV. m BOT	ELEV. kT	ELEV. kB	k (FEET)	FINISHED GRADE ELEV. k TOP	FINISHED GRADE ELEV. k BOT
							AA1	90° 00'00"	11.00	6702.99	6694.82	8.17	6702.49	6696.82	6703.68	6695.92	7.76	6703.18	6702.35
AA	261830.479	36228.135	6696.32	6696.82	90° 00'00"	10.50													
							AA2	55° 00'00"	21.25	6702.99	6694.82	8.17	6702.49	6696.82	6706.01	6696.95	9.07	6705.51	6704.57
							BB1	83° 00'00"	20.50	6701.98	6693.81	8.17	6701.48	6695.81	6696.25	6693.22	3.03	6695.75	6695.55
BB	261787.185	36232.356	6695.31	6695.81	90° 00'00"	9.92													
							BB2	00° 00'00"	7.50	6701.98	6693.81	8.17	6701.48	6695.81	6702.47	6694.56	7.91	6701.97	6701.97
							CC1	80° 00'00"	25.00	7165.85	7157.93	7.92	7165.35	7159.43	7171.49	7160.43	11.06	7170.99	7169.93
CC	263770.395	32460.753	7158.93	7159.43	90° 00'00"	14.00													
							CC2	90° 00'00"	26.00	7165.85	7157.93	7.92	7165.35	7159.43	7164.55	7160.53	4.02	7164.05	7163.51
							DD1	75° 00'00"	22.00	7164.14	7155.22	8.92	7163.64	7157.72	7165.41	7157.42	7.99	7164.91	7163.65
DD	263783.379	32486.059	7157.22	7157.72	90° 00'00"	14.00													
							DD2	90° 00'00"	18.00	7164.14	7155.22	8.92	7163.64	7157.72	7158.34	7153.44	4.90	7157.84	7157.19
							EE1	90° 00'00"	7.93	6840.84	6836.26	4.58	6840.34	6838.26	6841.55	6837.05	4.50	6841.05	6841.00
EE	263047.225	35206.030	6838.26	6838.26	101° 13'14"	5.65													
							EE2	00° 00'00"	15.00	6841.47	6836.26	5.21	6840.97	6838.26	6843.12	6837.76	5.36	6842.62	6842.29
							FF1	85° 00'00"	9.00	7069.86	7062.69	7.17	7069.36	7064.69	7069.49	7063.59	5.90	7068.99	7068.16
FF	263451.714	33058.397	7064.19	7064.69	90° 00'00"	10.50													
							FF2	80° 00'00"	17.50	7069.86	7062.69	7.17	7069.36	7064.69	7069.18	7064.05	5.13	7068.68	7067.75
							GG1	80° 00'00"	11.50	7068.46	7060.79	7.67	7067.96	7063.29	7065.45	7060.35	5.10	7064.95	7064.15
GG	263454.793	33077.664	7062.79	7063.29	90° 00'00"	10.50													
							GG2	80° 00'00"	11.50	7068.46	7060.79	7.67	7067.96	7063.29	7067.66	7061.67	5.99	7067.16	7066.17
							HH1	60° 00'00"	20.00	6830.93	6819.76	11.17	6830.43	6821.76	6828.66	6821.76	6.90	6828.16	6827.65
HH	262983.639	35293.392	6821.26	6821.76	90° 00'00"	10.50													
							HH2	50° 00'00"	38.50	6830.93	6819.76	11.17	6830.43	6821.76	6835.42	6823.61	11.81	6834.92	6834.26
							JJ1	00° 00'00"	15.25	6829.50	6815.83	13.67	6829.00	6820.33	6828.63	6814.31	14.32	6828.13	6827.98
JJ	262982.865	35319.381	6819.83	6820.33	90° 00'00"	9.34													
							JJ2	00° 00'00"	5.25	6829.50	6815.83	13.67	6829.00	6820.33	6828.97	6816.36	12.62	6828.47	6828.39

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100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS: NO.	DATE	REVISION DESCRIPTION:

Boulder County

Michael Baker INTERNATIONAL

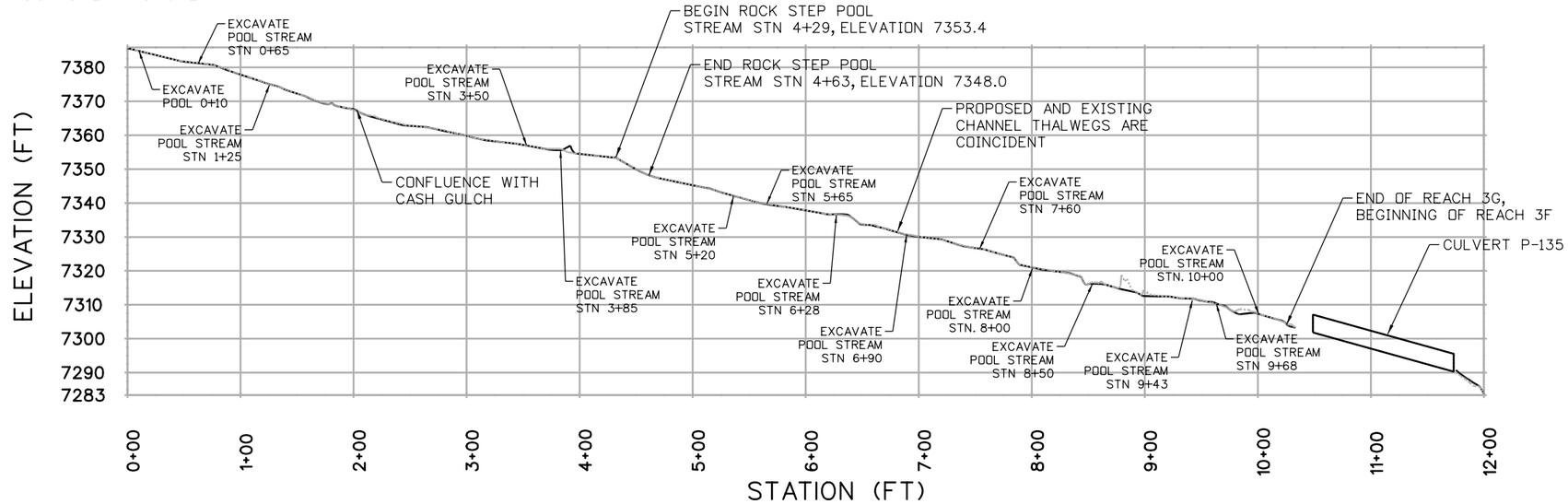
BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

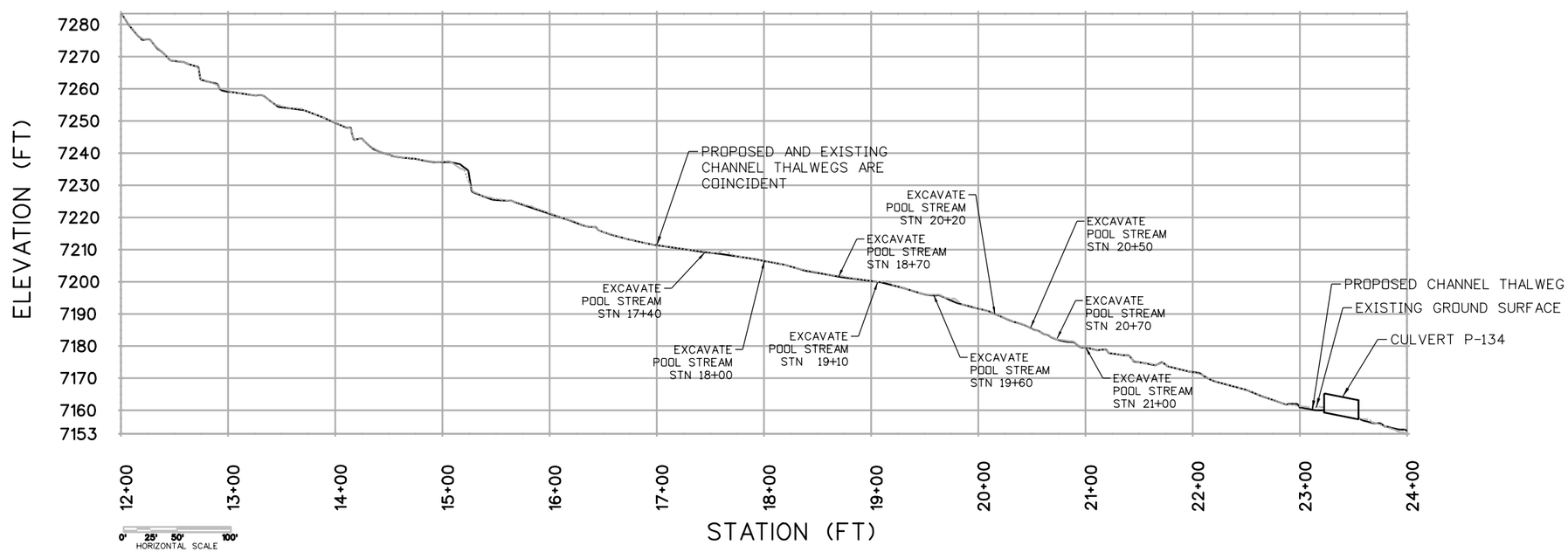
DESIGNED:	CAD:	CHECKED:	DATE:
BMM	BMM	SLS	12/23/16

GOLD RUN ROAD
HEADWALL AND WINGWALL DATA TABLE (SHEET 3 OF 3)

PROJECT NO: 4011.SEPT12C38 | SHEET NO: 170

EXISTING TOPOGRAPHY BASED ON NOVEMBER 2013 LIDAR.
SHOWN FOR APPROXIMATE COMPARISON ONLY. ACTUAL
TOPOGRAPHY MAY DIFFER.





VERTICAL EXAGGERATION = 3

HABITAT RESTORATION PLANS REPRESENT 30% DESIGN

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

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GOLD RUN ROAD
HABITAT REST. PROFILE (SHEET 1 OF 4)

PROJECT NO: 4011.SEPT12C38 | SHEET NO: 171

jessica.wroy 5:59:54 PM 12/21/2016 pw:\\DCPWAPP1.bkr.mbakercorp.com:pwprod\Documents\Projects\Lakewood_Office\Boulder_County_Emergency_Transportation\T02\05_Design\02_Hydraulics\Stream Restoration Base Files (CAD)\SR_pset\SRP-01_pset.dgn

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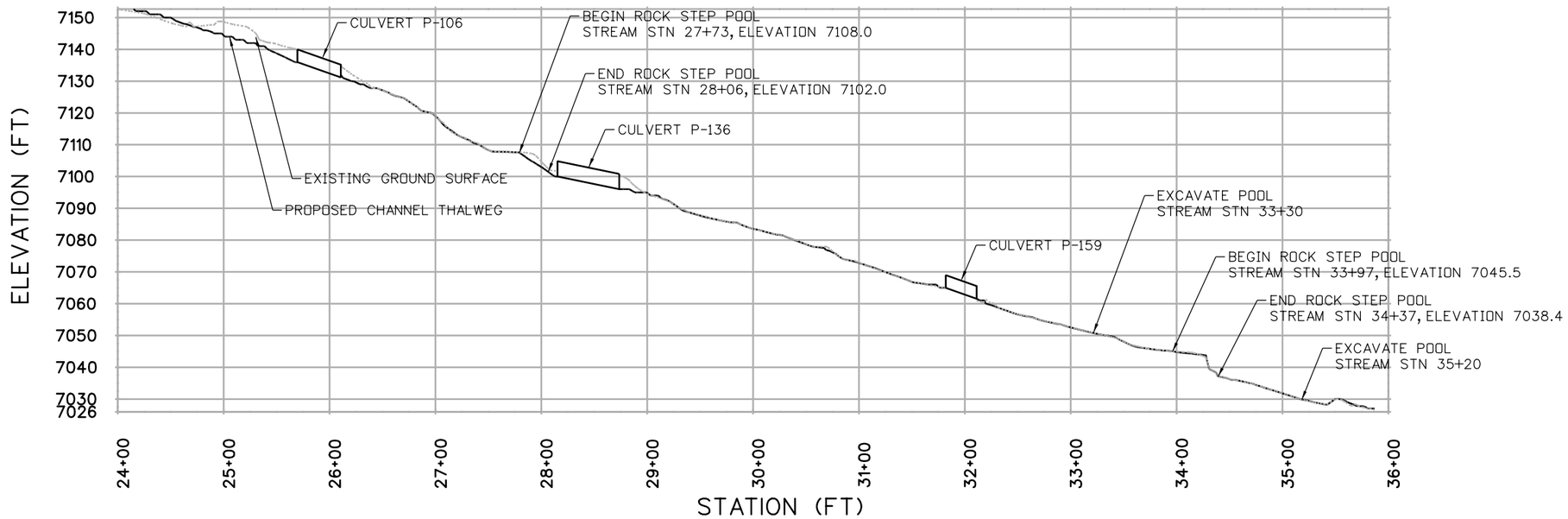

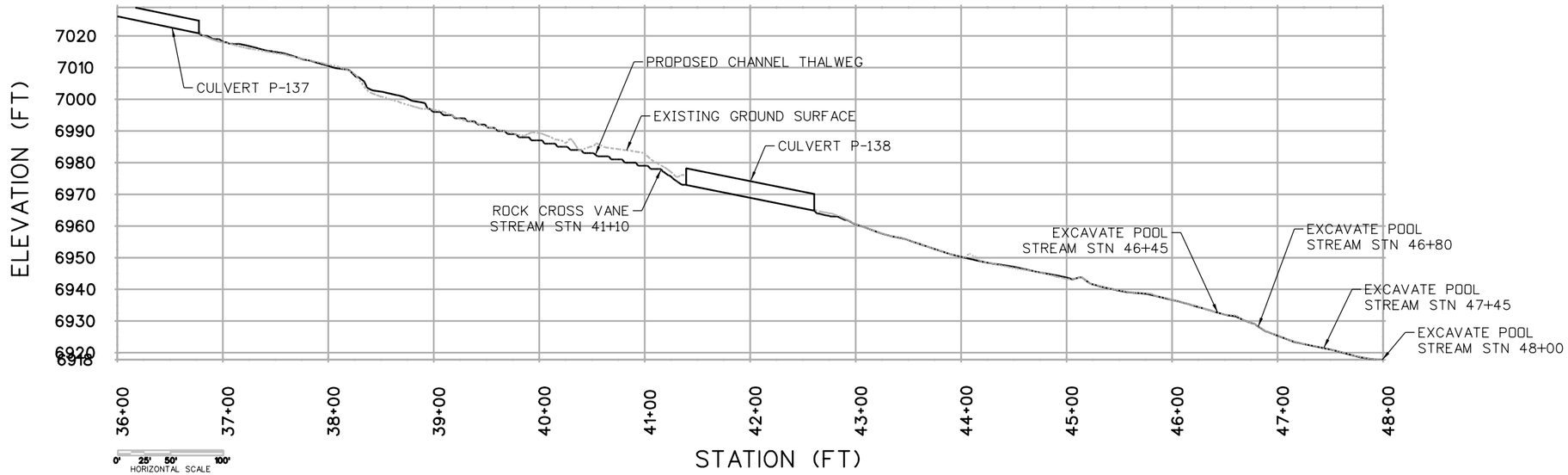

VERTICAL EXAGGERATION - 3

HABITAT RESTORATION PLANS REPRESENT 30% DESIGN

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

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GOLD RUN ROAD
HABITAT REST. PROFILE (SHEET 2 OF 4)

PROJECT NO: 4011.SEPT12C38 | SHEET NO: 172

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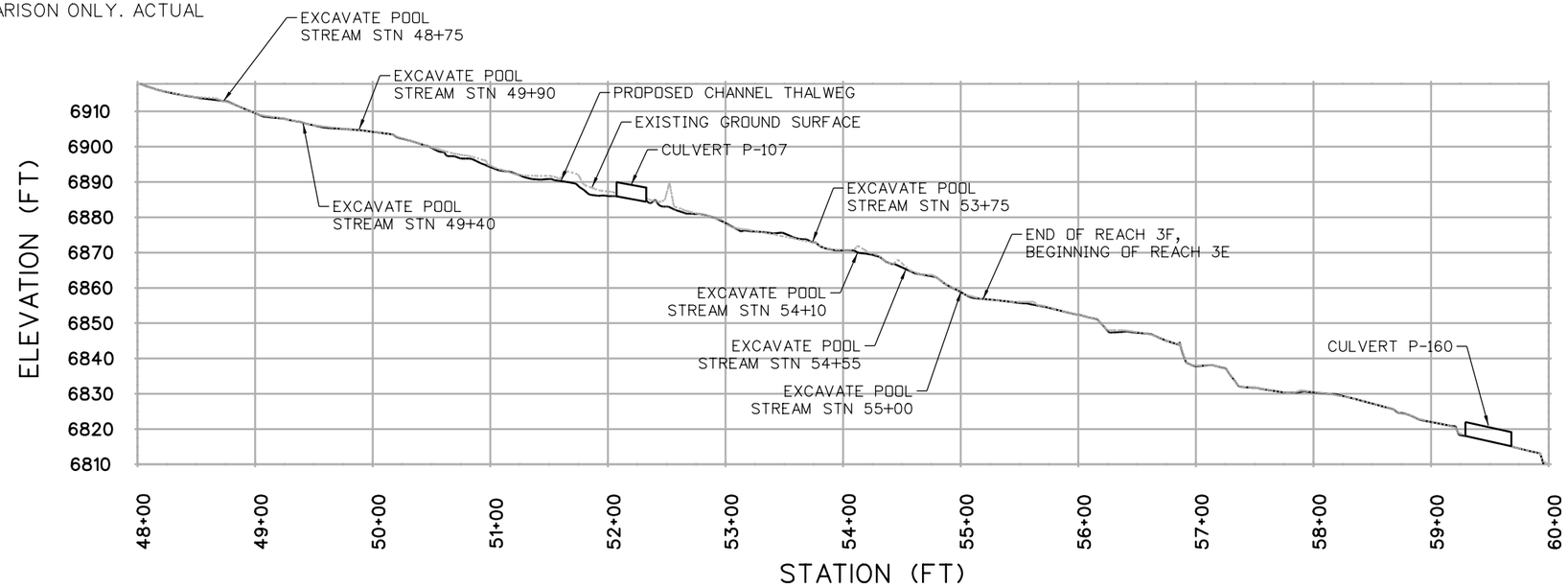

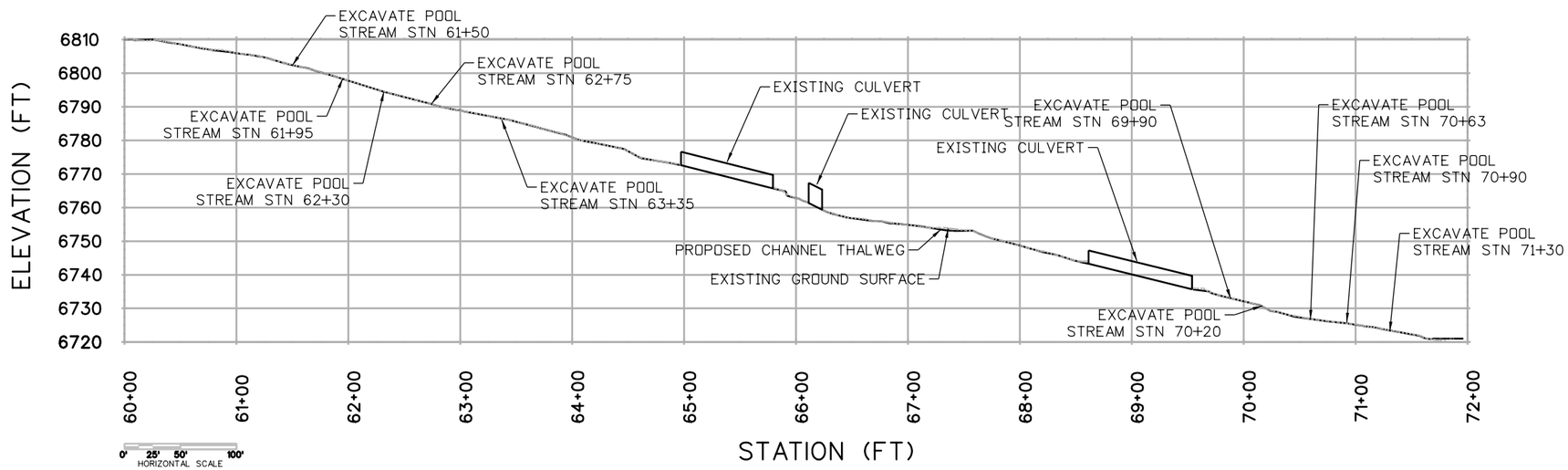

0' 25' 50' 100'
HORIZONTAL SCALE

0' 10' 20' 40'
VERTICAL SCALE

VERTICAL EXAGGERATION = 3

HABITAT RESTORATION PLANS REPRESENT 30% DESIGN

100% SET

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GOLD RUN ROAD
HABITAT REST. PROFILE (SHEET 3 0F 4)

PROJECT NO: 4011.SEPT12C38 | SHEET NO: 173

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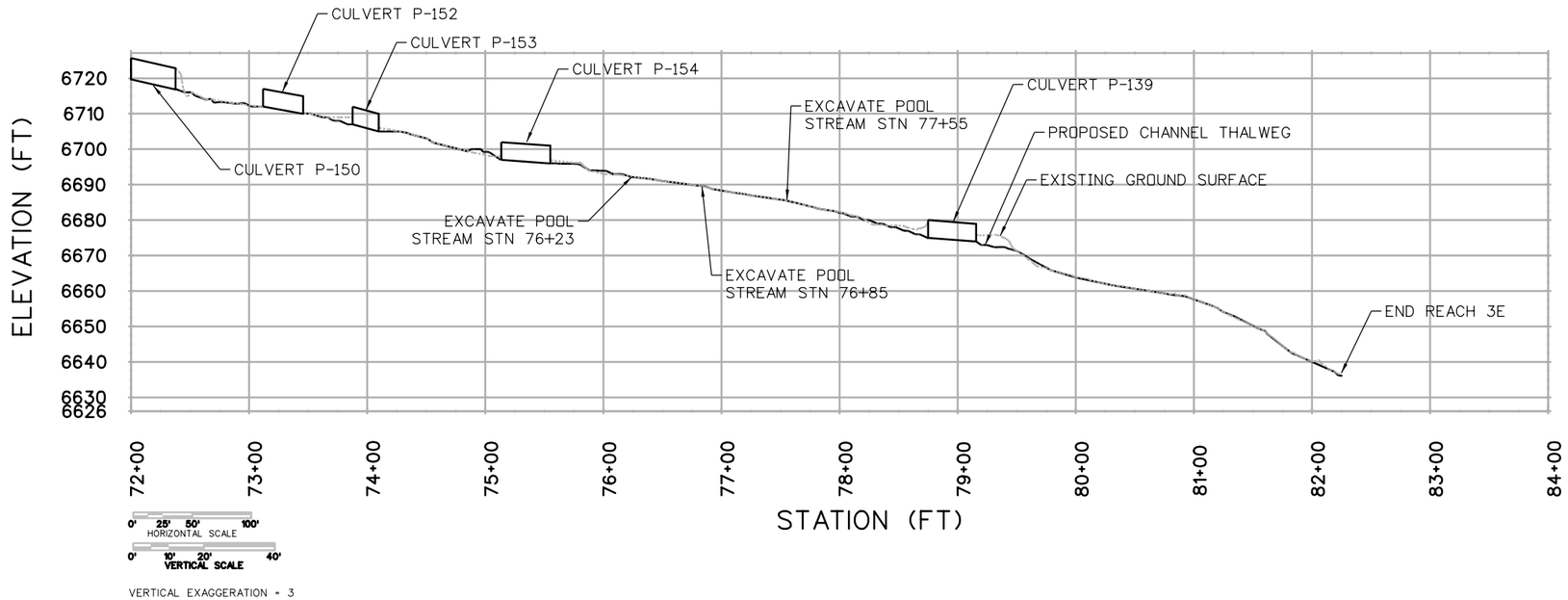

VERTICAL EXAGGERATION = 3

HABITAT RESTORATION PLANS REPRESENT 30% DESIGN

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

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ENGINEERING DIVISION

DESIGNED:	CAD:	CHECKED:	DATE:
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GOLD RUN ROAD
HABITAT REST. PROFILE (SHEET 4 OF 4)

PROJECT NO: 4011.SEPT12C38 | SHEET NO: 174

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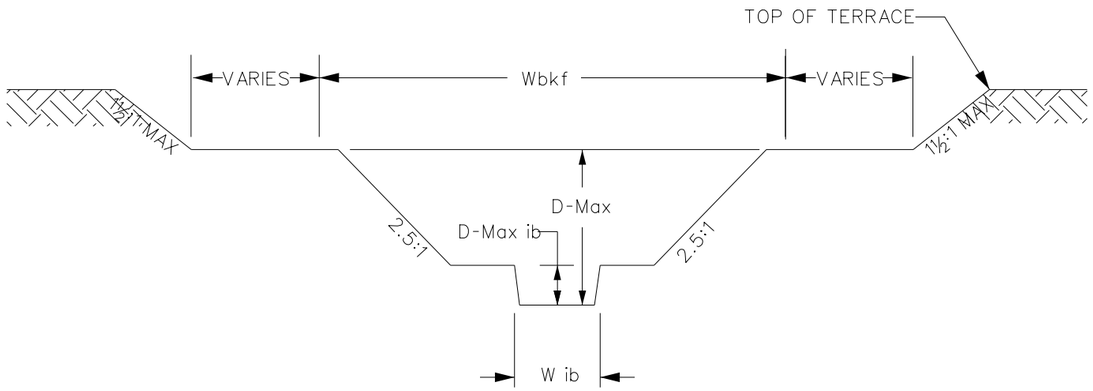
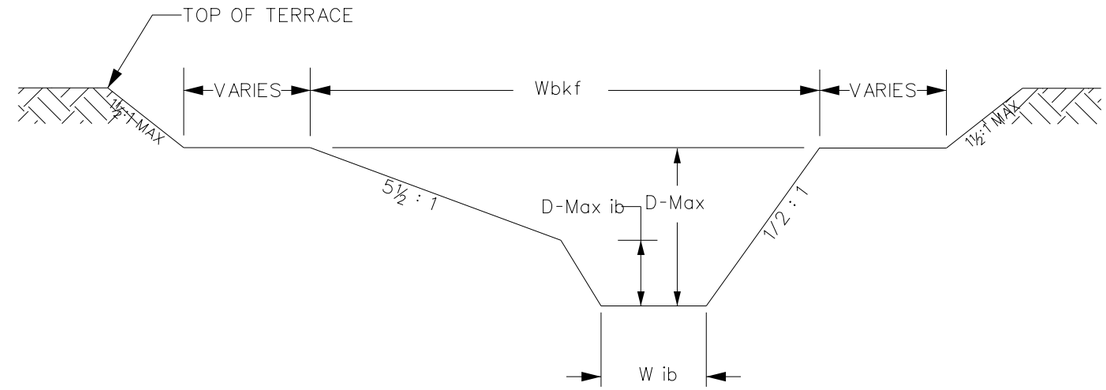


TYPICAL RIFFLE CROSS SECTION
NTS



TYPICAL POOL CROSS SECTION
NTS

UNITS IN FT.

REACH 3G		REACH 3F AND 3E		
RIFFLE	POOL	RIFFLE	POOL	
11.0	11.0	13.5	13.5	WIDTH OF BANKFULL (Wbkf)
0.7	1.0	0.9	1.2	AVERAGE DEPTH (D)
1.2-1.4	1.7-1.9	1.4-1.6	2.0-2.2	MAXIMUM DEPTH (D-Max)
15.7	---	15.4	---	WIDTH TO DEPTH RATIO (Wbkf / D)
7.7	---	11.8	---	BANKFULL XSEC AREA
3.5	---	4.0	---	WIDTH OF INNER BERM (Wib)
0.66	---	0.66	---	DEPTH OF INNER BERM (D-Max ib)
1.8	---	2.0	---	CROSS SECTION AREA OF INNER BERM (SF)
---	0.5 - 1.5 Wbkf	---	0.5 - 1.5 Wbkf	POOL LENGTH(Wp)
---	1 - 5 Wbkf	---	1 - 5 Wbkf	POOL TO POOL SPACING - CASCADE POOL SYSTEM
---	0.5 - 1.5 Wbkf	---	0.5 - 1.5 Wbkf	POOL TO POOL SPACING - STEP POOL SYSTEM
1 - 7 Wbkf		1 - 7 Wbkf		RIFFLE CASCADE LENGTH
0.1 - 0.75 Wbkf		0.1 - 0.75 Wbkf		STEP LENGTH
0.5 - 2 AVG. DEPTH		0.5 - 2 AVG. DEPTH		STEP HEIGHT

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.

HABITAT RESTORATION PLANS REPRESENT 30% DESIGN

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

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Michael Baker INTERNATIONAL

DESIGNED:	CAD:	CHECKED:	DATE:
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GOLD RUN ROAD
HABITAT RESTORATION DTLS (SHEET 1 OF 12)

PROJECT NO: 4011.SEPT12C38 | SHEET NO: 175

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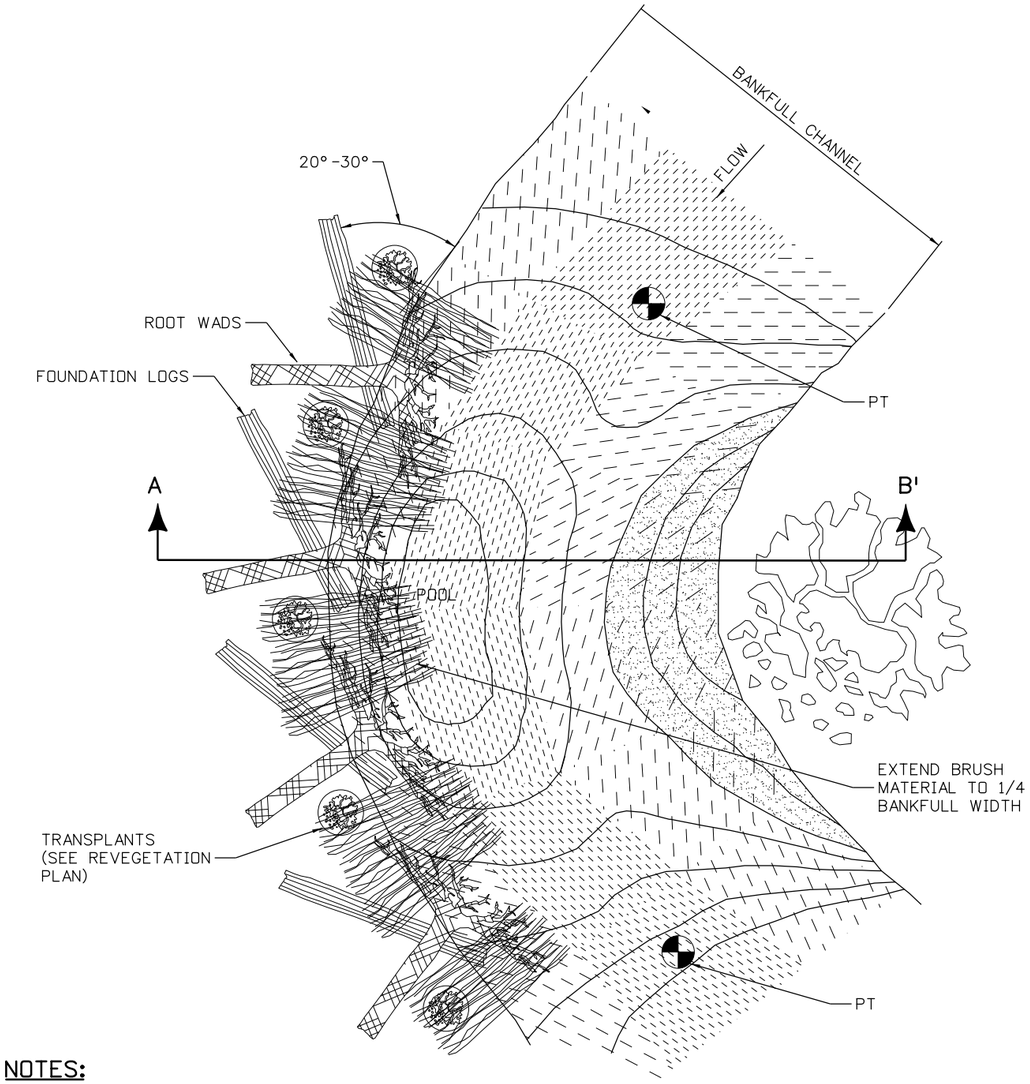

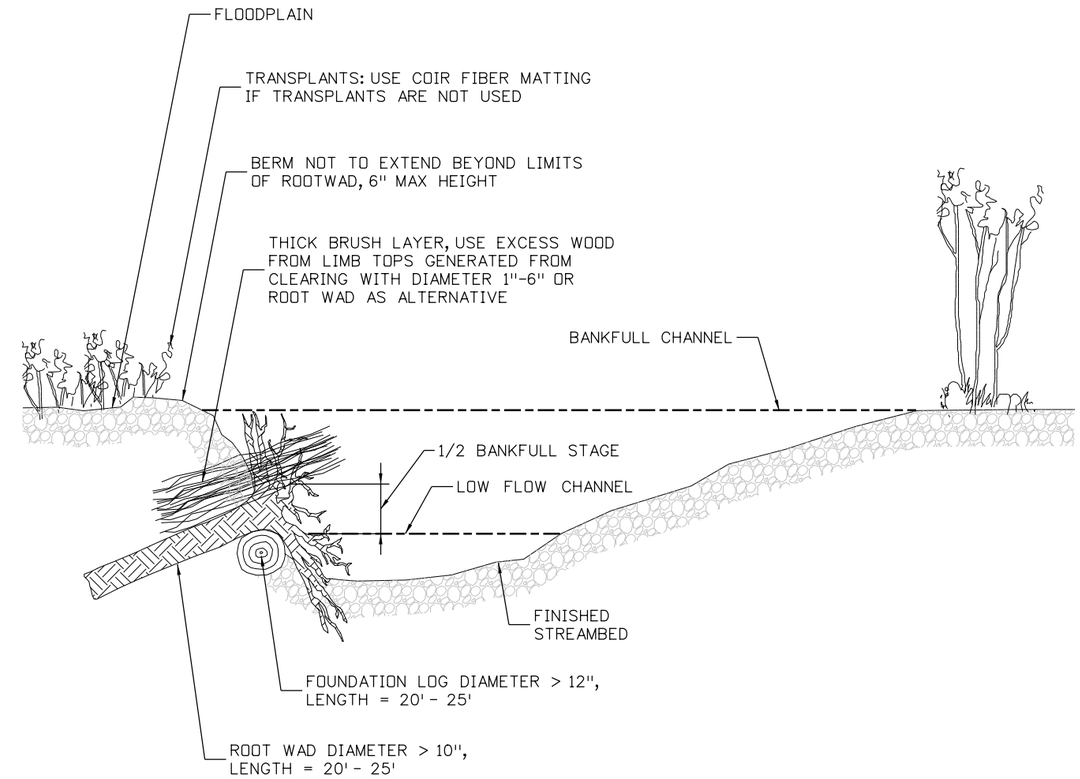

CROSS SECTION A - A'

NTS

NOTES:

1. 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.
2. BANK PROTECTION SHALL BE EXTENDED A MINIMUM OF 10 FEET UPSTREAM OF PC AND 10 FEET DOWNSTREAM OF PT UNLESS OTHERWISE NOTED.
3. CONTRACTOR SHALL HARVEST TREES DESIGNATED ON TREE PLANS AS REMOVAL IN A MANNER SUITABLE FOR ROOT WAD PROTECTION AS DIRECTED BY THE STREAM RESTORATION ENGINEER.

ROOT WAD BANK PROTECTION

NTS

HABITAT RESTORATION PLANS REPRESENT 30% DESIGN

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
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GOLD RUN ROAD
HABITAT RESTORATION DTLS
(SHEET 2 OF 12)

PROJECT NO: 4011.SEPT12C38 | SHEET NO: 176

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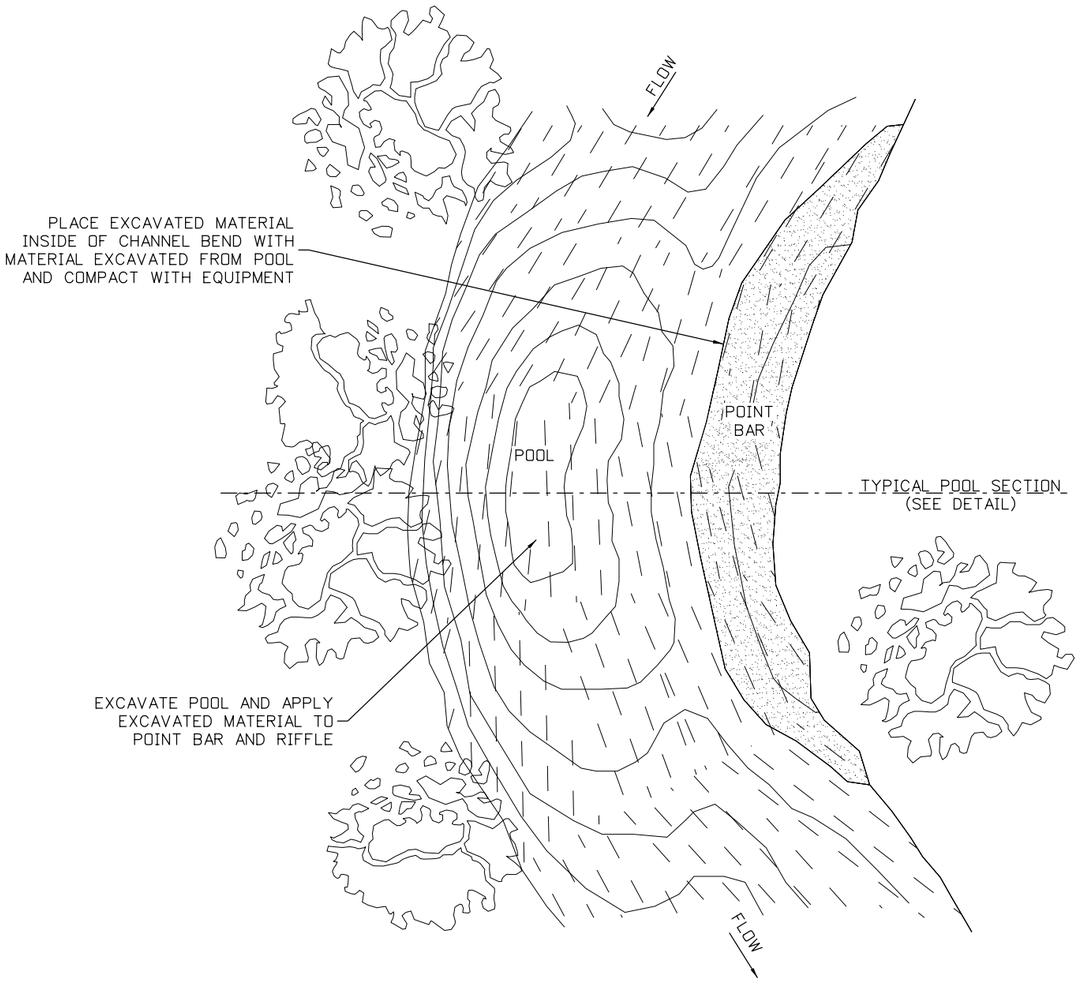

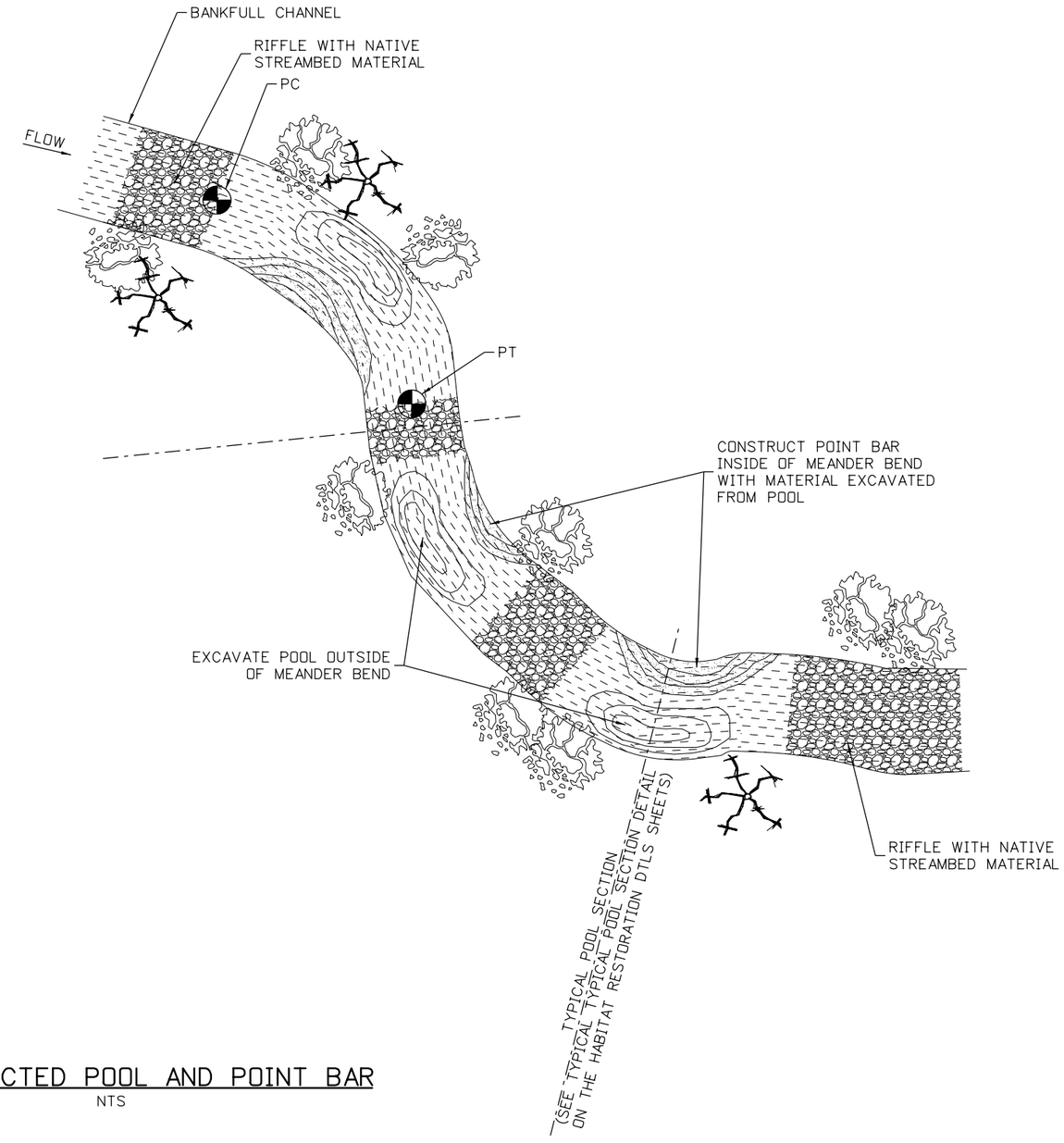

CONSTRUCTED POOL AND POINT BAR

NTS

HABITAT RESTORATION PLANS REPRESENT 30% DESIGN

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
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GOLD RUN ROAD
HABITAT RESTORATION DTLS (SHEET 3 OF 12)

PROJECT NO: 4011.SEPT12C38 | SHEET NO: 177

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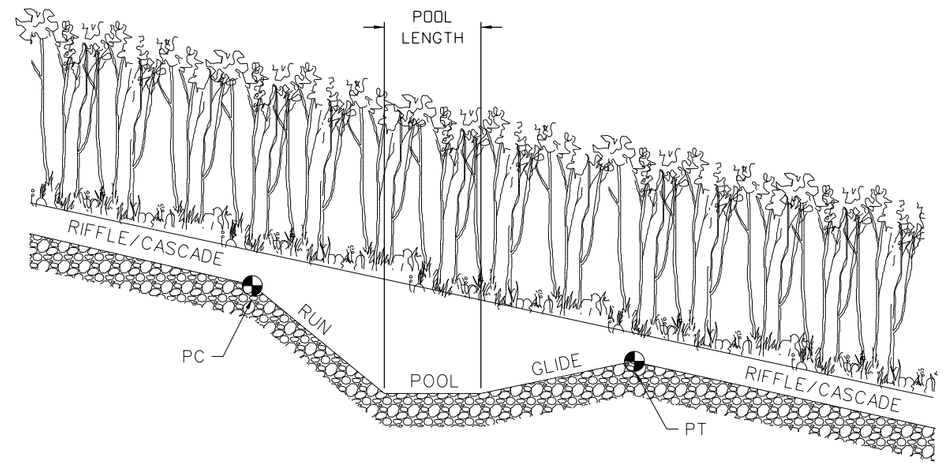

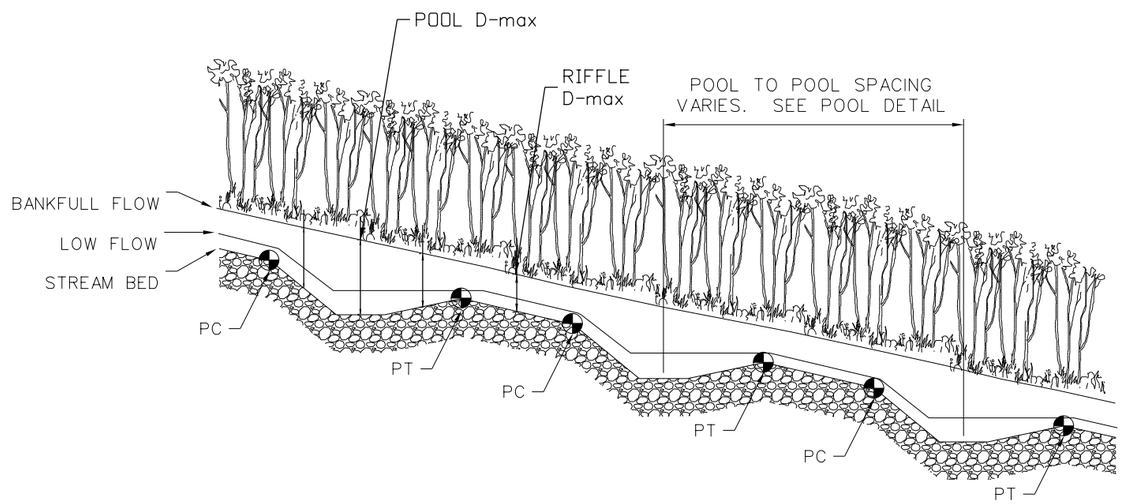

TYPICAL RIFFLE CASCADE PROFILE

NTS

HABITAT RESTORATION PLANS REPRESENT 30% DESIGN

100% SET

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BOULDER COUNTY TRANSPORTATION DEPARTMENT
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GOLD RUN ROAD
HABITAT RESTORATION DTLS (SHEET 4 OF 12)

PROJECT NO: 4011.SEPT12C38 | SHEET NO: 178

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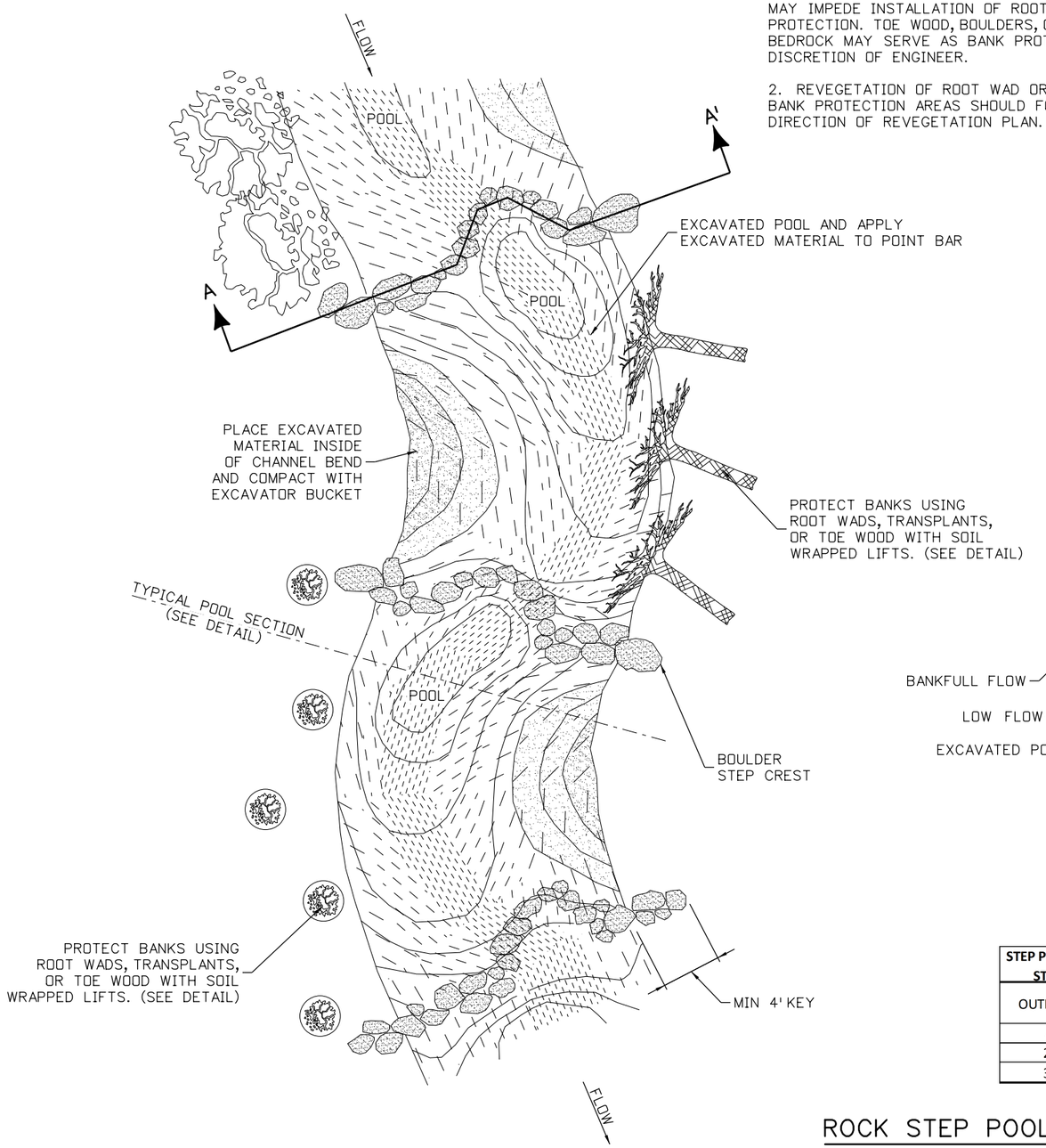
NOTES:

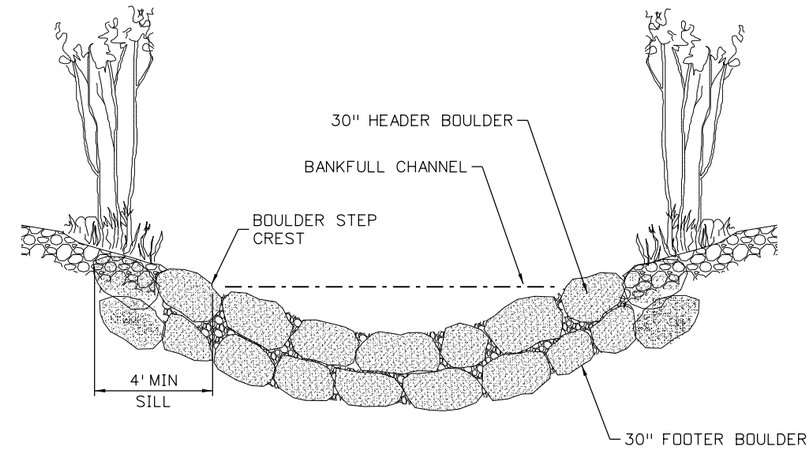
1. DEPENDING ON SITE CONDITIONS, BEDROCK MAY IMPEDE INSTALLATION OF ROOT WAD BANK PROTECTION. TOE WOOD, BOULDERS, OR EXISTING BEDROCK MAY SERVE AS BANK PROTECTION PER DISCRETION OF ENGINEER.

2. REVEGETATION OF ROOT WAD OR SOIL LIFT BANK PROTECTION AREAS SHOULD FOLLOW DIRECTION OF REVEGETATION PLAN.



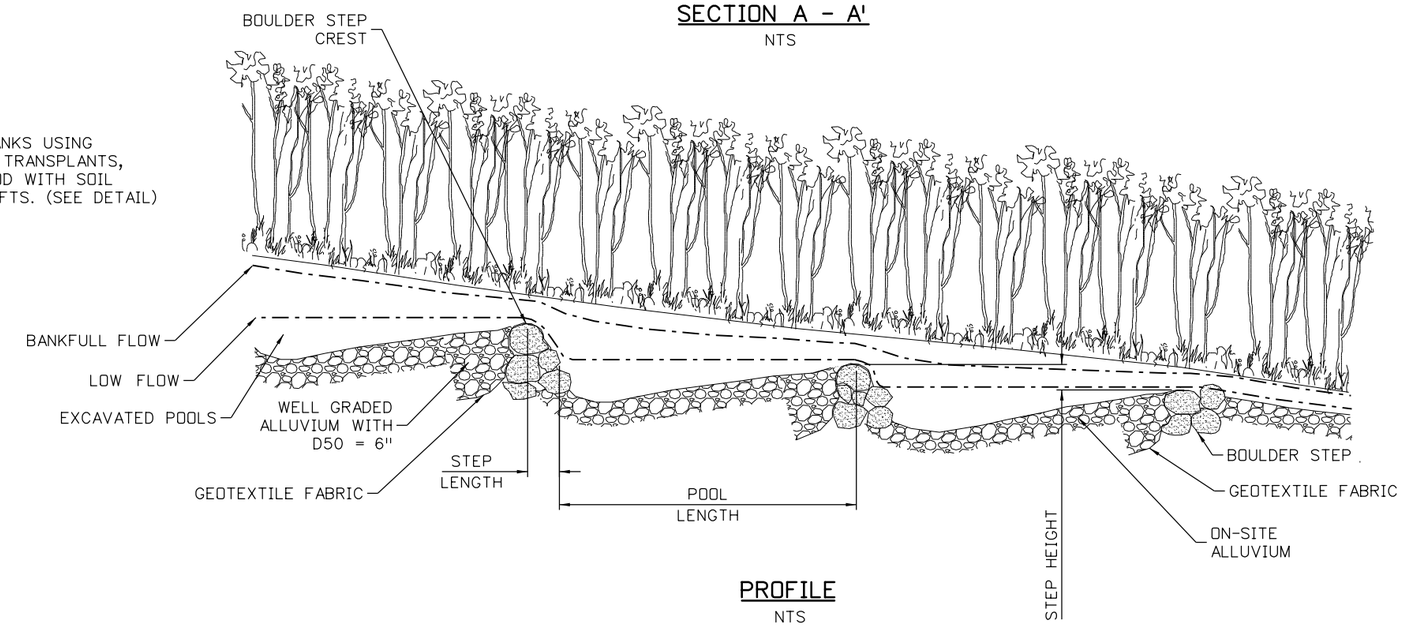
ROCK STEP POOL

NTS



SECTION A - A'

NTS



PROFILE

NTS

STEP POOL START STATION	STEP POOL END STATION	UPSTREAM TIE-IN ELEVATION	DOWNSTREAM TIE-IN ELEVATION	# OF BOULDER STEP CRESTS	STEP HEIGHT (FT)	STEP LENGTH (FT)	POOL LENGTH (FT)	BOULDER SIZE (INCHES)
OUTLET P-132	CONFLUENCE W/ GOLD RUN	7374.1	7367	5	1.3-1.5	1.4 - 1.6	11.5 - 12.5	30
4+29	4+63	7353.4	7348.0	3	1.7 - 1.9	1.4 - 1.6	9 - 10	30
27+73	28+06	7108.0	7102.0	4	1.9 - 2.1	1.4 - 1.6	9 - 10	30
33+97	34+37	7045.5	7038.4	4	1.9 - 2.1	1.4 - 1.6	11.5 - 12.5	30

HABITAT RESTORATION PLANS REPRESENT 30% DESIGN

100% SET

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GOLD RUN ROAD
HABITAT RESTORATION DTLS (SHEET 5 OF 12)

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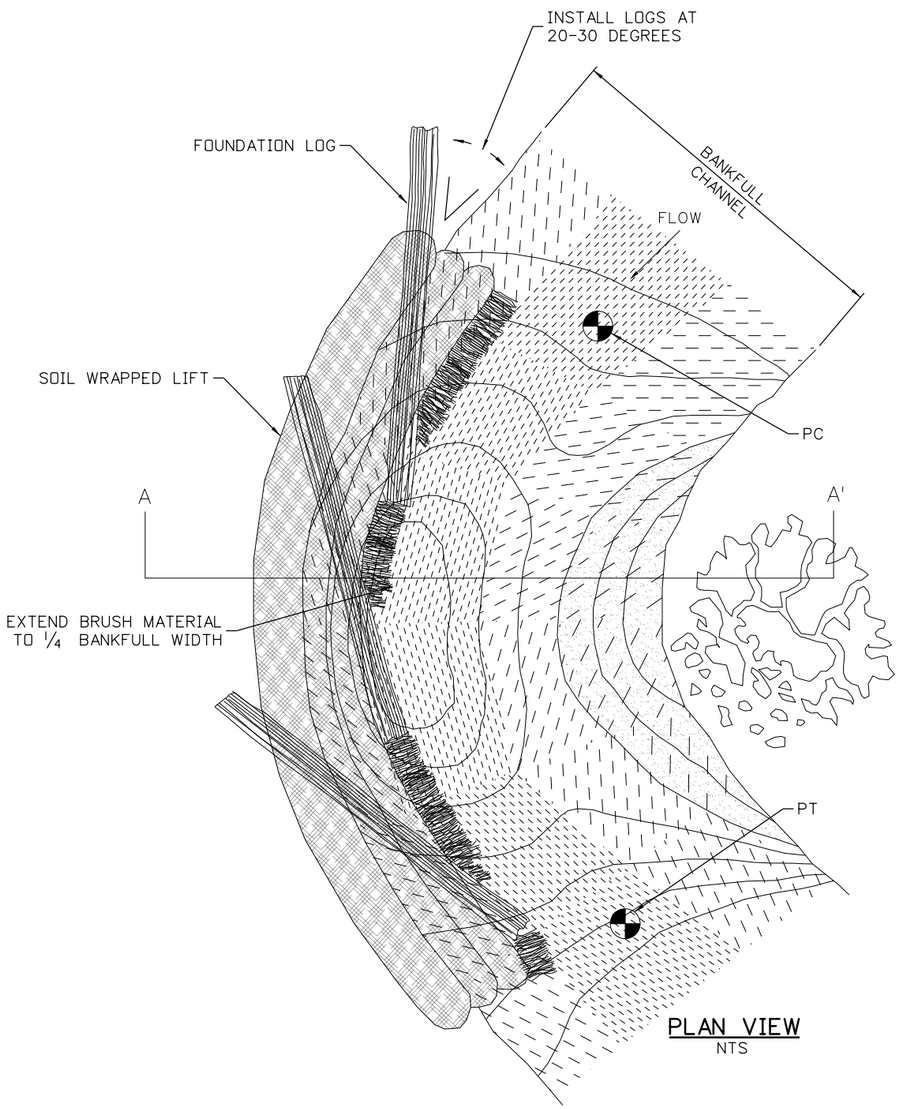
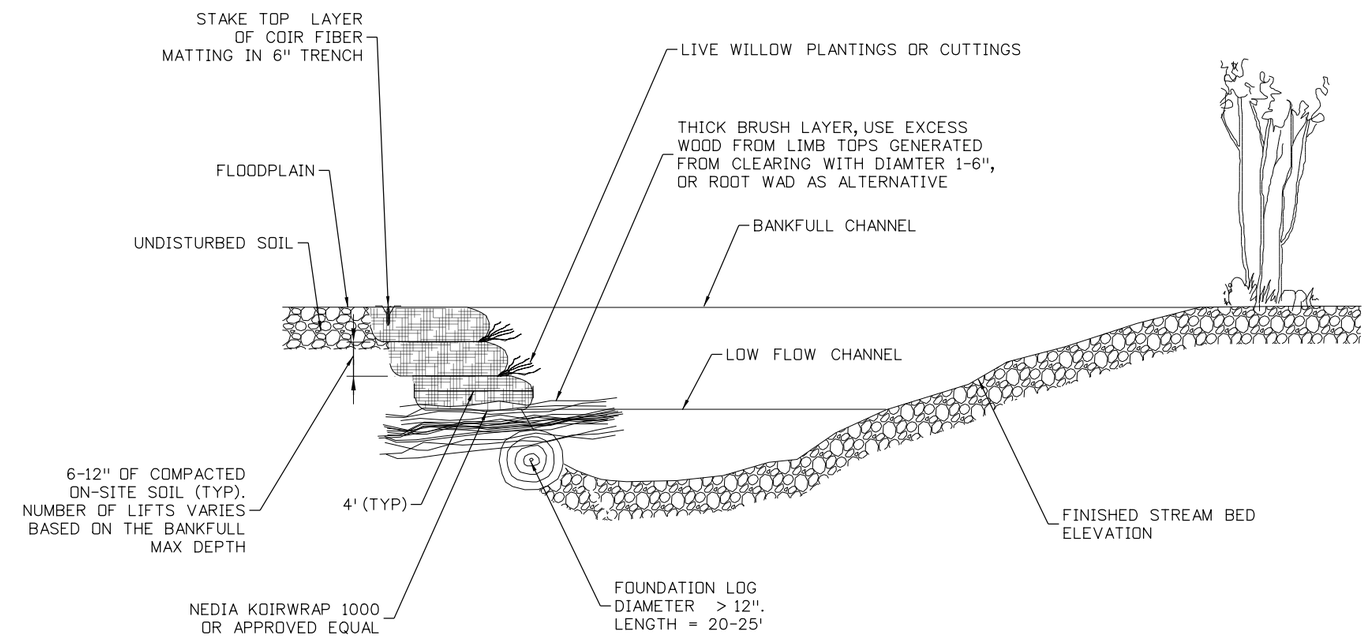
NOTES:

1. BANK PROTECTION SHALL BE EXTENDED A MINIMUM OF 10 FEET UPSTREAM OF PC AND 10 FEET DOWNSTREAM OF PT UNLESS OTHERWISE NOTED.



PLAN VIEW

NTS



SECTION A - A'

NTS

TOE WOOD BANK PROTECTION

NTS

HABITAT RESTORATION PLANS REPRESENT 30% DESIGN

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
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GOLD RUN ROAD
HABITAT RESTORATION DTLS (SHEET 6 OF 12)

PROJECT NO: 4011.SEPT12C38 | SHEET NO: 180

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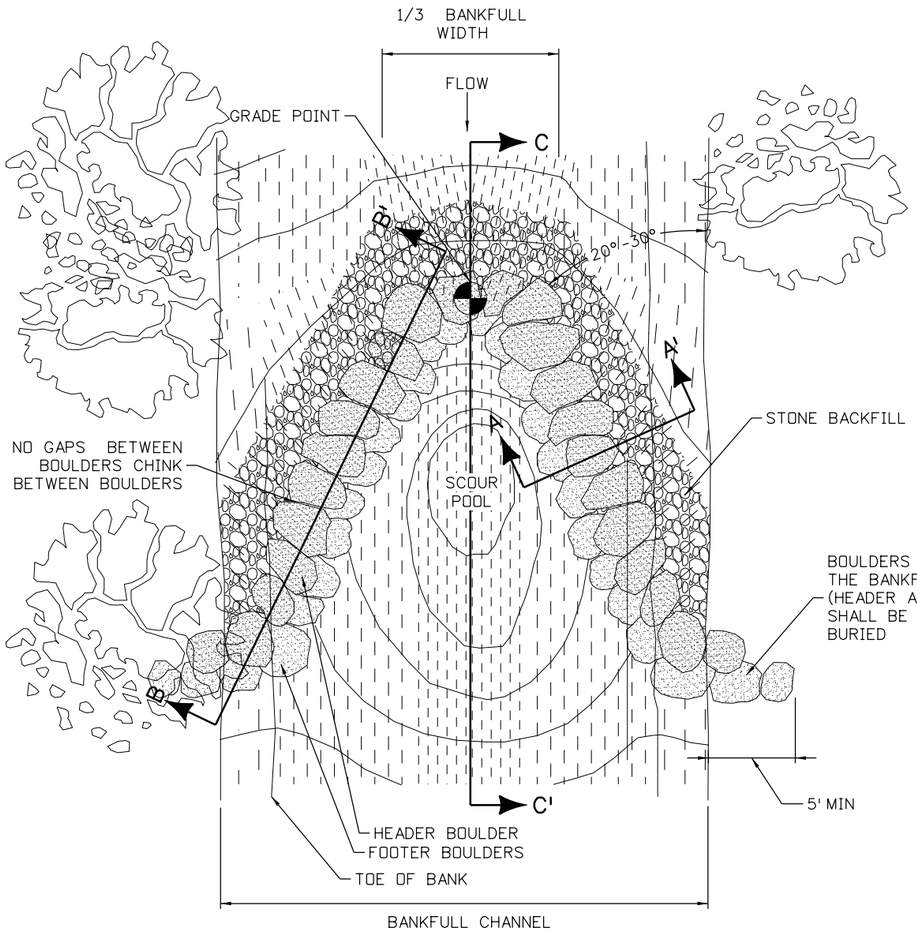
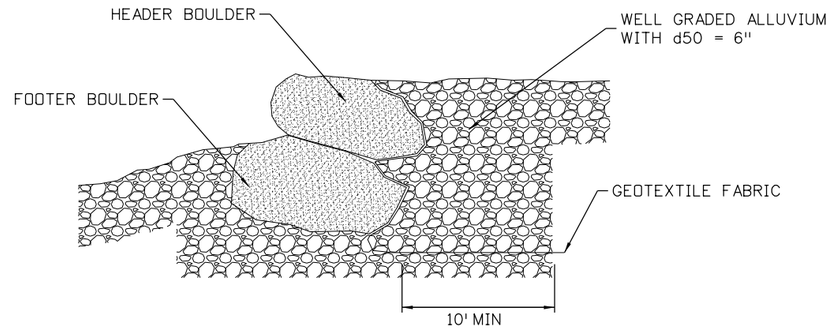


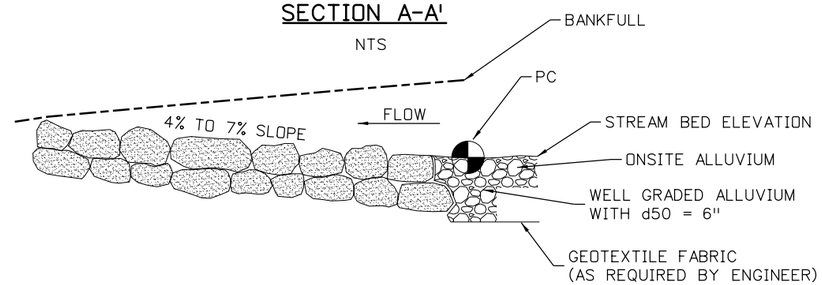
PLAN VIEW

NTS



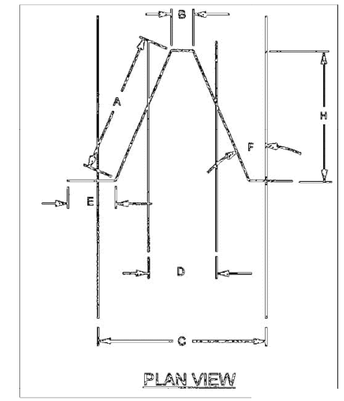
SECTION A-A'

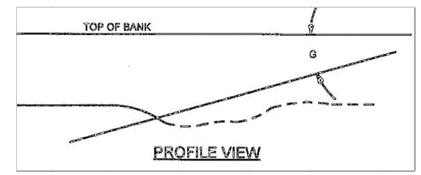
NTS



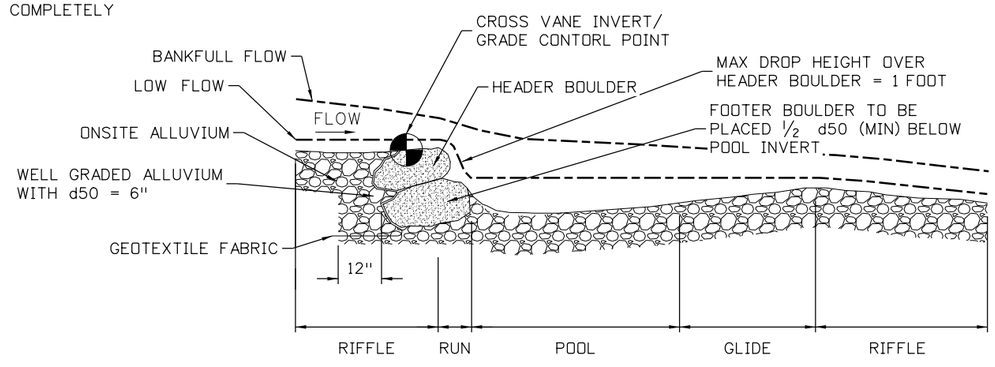
PROFILE VIEW B - B'

NTS





A	Vane Arm Length	13.3 ft
B	Invert Length	3.5 ft
C	Bankfull Width	13.5 ft
D	Bottom Width	4.0 ft
E	Sill Length	5.0 ft
F	Vane Arm Angle	22.0°
G	Vane Arm Slope	11.2%
H	Structure Length	12.4 ft



PROFILE VIEW C - C'

NTS

ROCK CROSS VANE

NTS

HABITAT RESTORATION PLANS REPRESENT 30% DESIGN

100% SET

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GOLD RUN ROAD
HABITAT RESTORATION DTLS
(SHEET 7 OF 12)

PROJECT NO: 4011.SEPT12C38 | SHEET NO: 181

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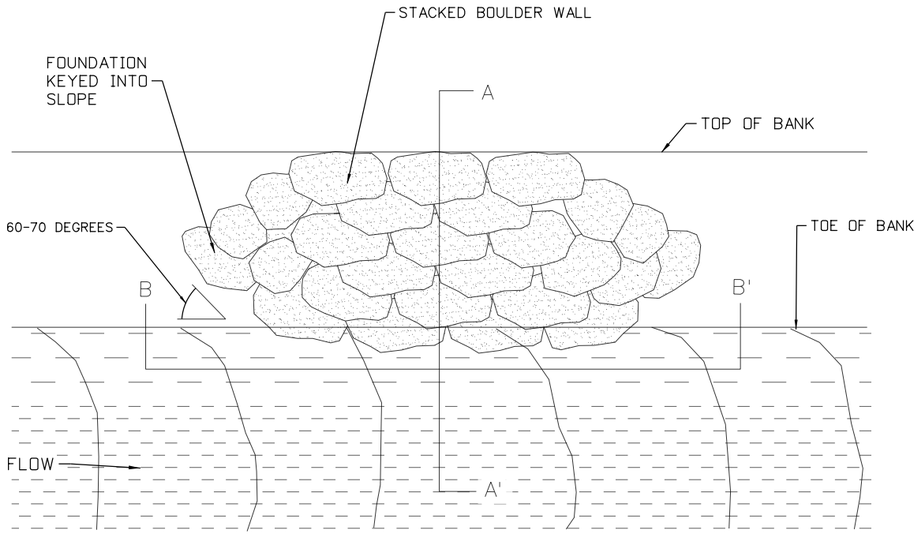
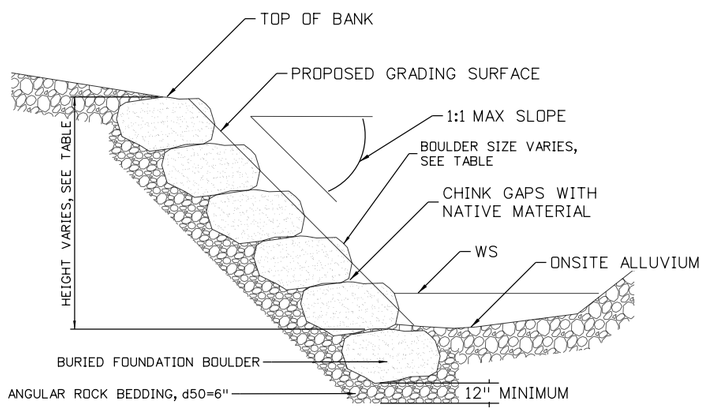


PLAN VIEW
NTS



CROSS SECTION A-A'
NTS

Reach	Stream Start Station	Stream End Station	Bank (L or R)	Max Height (ft)	Boulder Size (inches)
3G	Cash Gulch - culvert p-132	Confluence with Gold Run	L	6	36
3F	2185	2305	L	8	36
	2100	2180	R	8	36
	2210	2305	R	6	36
	2370	2460	L	4	24
	2428	2465	L	8	36
	2625	2665	L	8	36
	2865	2900	R	4	24
	2935	2970	L	4	24
	3035	3175	L	4	24
	3210	3265	L	6	36
	3210	3285	R	8	36
	3730	3810	R	4	24
	3890	4120	R	4	24
	3890	4120	L	4	24
	4420	4550	L	4	24
	5035	5142	L	4	24
3E	5860	5910	L	10	36
	5870	5910	R	10	36
	6580	6600	R	6	36
	6630	6695	R	8	36
	6850	6860	L	4	24
	6850	6860	R	4	24
	7080	7165	L	4	24
	7165	7190	L	8	36
	7255	7300	L	4	24
	7255	7300	R	4	24
	7345	7375	L	4	24
	7345	7375	R	6	36
	7425	7500	L	4	24
	7425	7490	R	4	24
	7565	7615	R	6	36
	7800	7865	R	4	24
	7800	7865	L	4	24
	7950	7975	L	8	36
	8017	8070	L	10	36
	8070	8170	L	8	36
	8170	8232	L	10	36

BOULDER SIZING TABLE

STACKED BOULDER WALL
NTS

HABITAT RESTORATION PLANS REPRESENT 30% DESIGN

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GOLD RUN ROAD
HABITAT RESTORATION DTLS (SHEET 8 OF 12)

PROJECT NO: 4011.SEPT12C38 | SHEET NO: 182

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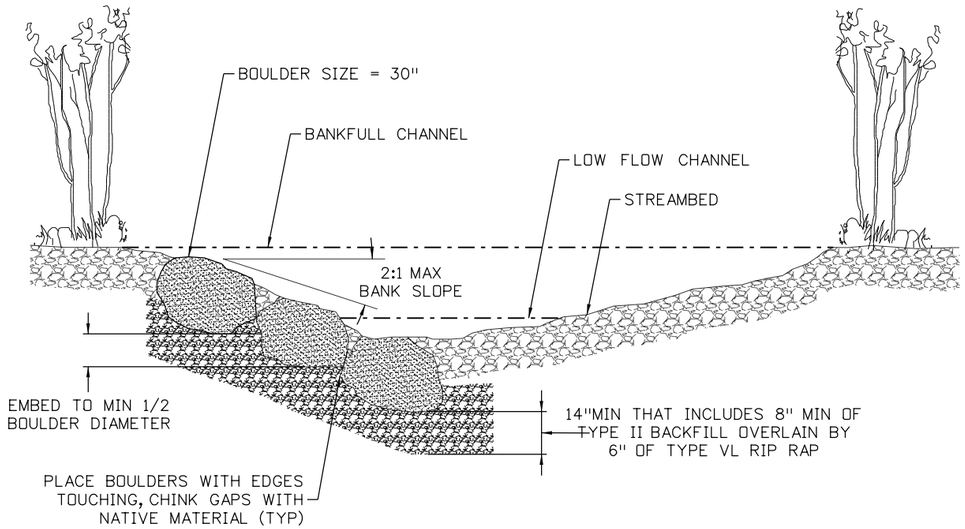
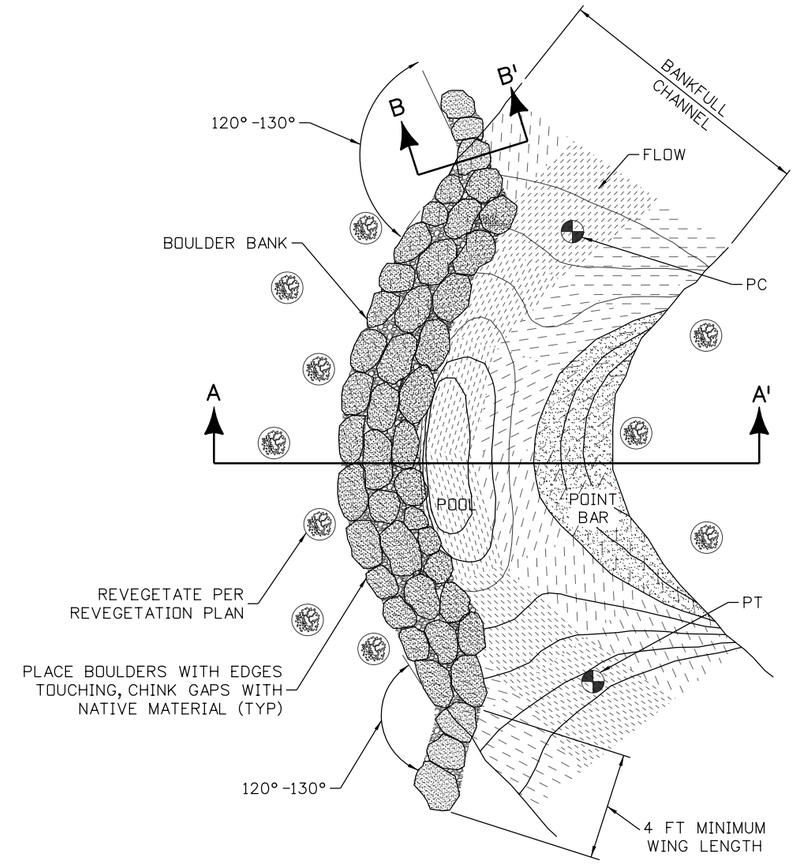


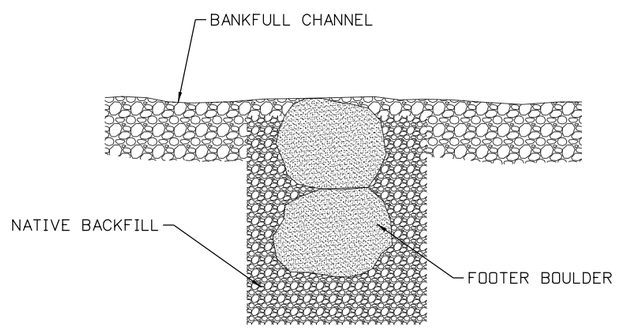
CROSS SECTION A - A'

NTS



PLAN VIEW

NTS



CROSS SECTION B - B'

NTS

BOULDER BANK PROTECTION

NTS

HABITAT RESTORATION PLANS REPRESENT 30% DESIGN

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GOLD RUN ROAD
HABITAT RESTORATION DTLS (SHEET 9 OF 12)

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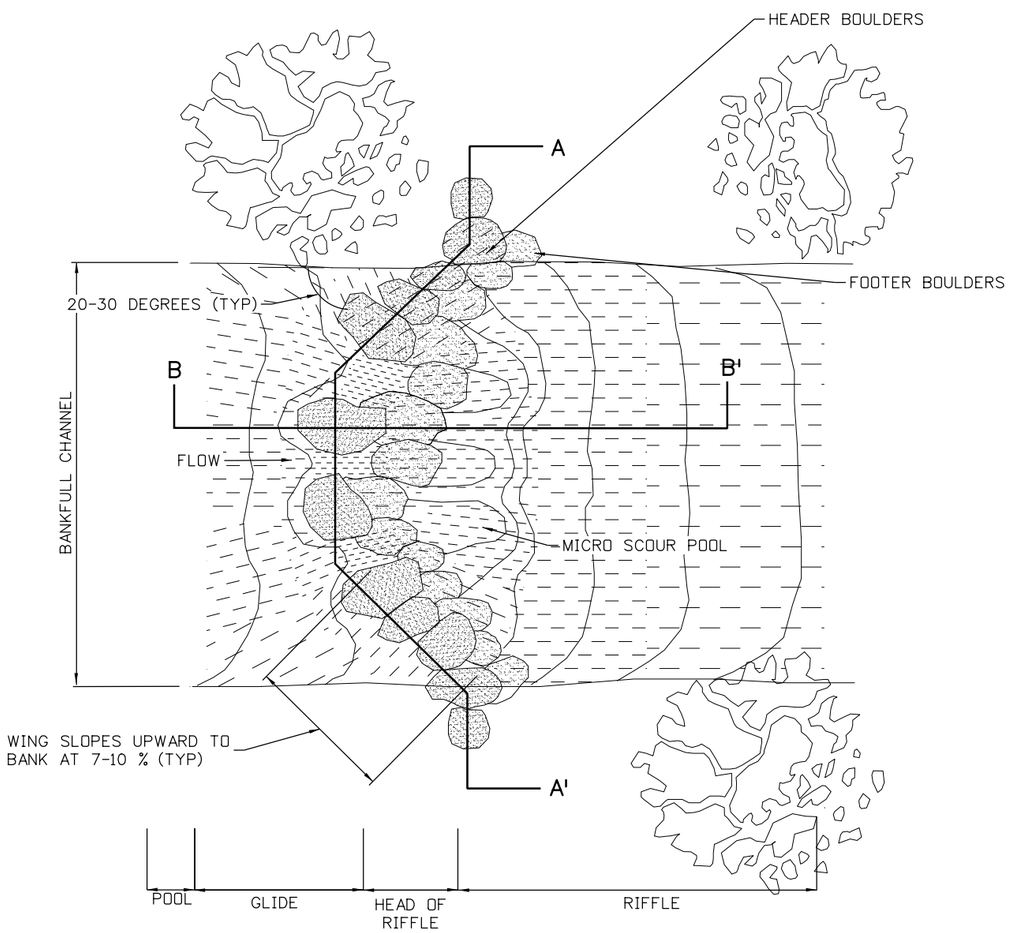
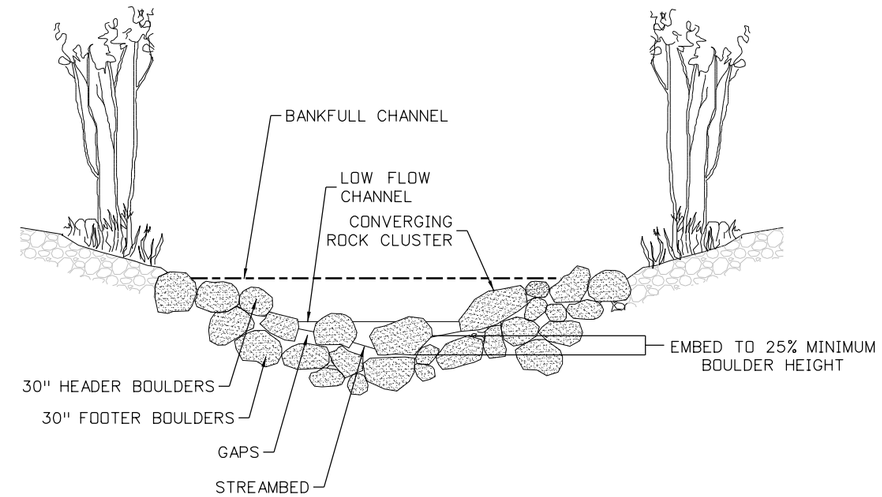


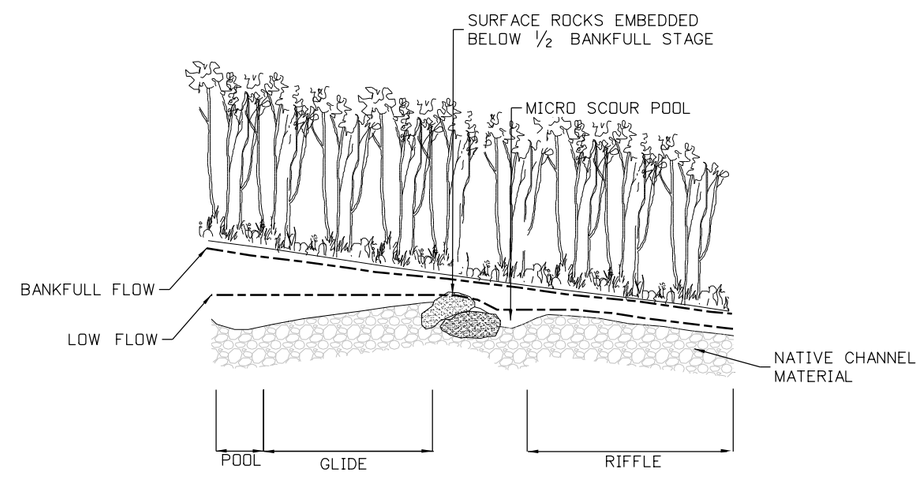
PLAN VIEW

NTS



PROFILE A - A'

NTS



PROFILE B - B'

NTS

CONVERGING BOULDER CLUSTER

NTS

HABITAT RESTORATION PLANS REPRESENT 30% DESIGN

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GOLD RUN ROAD
HABITAT RESTORATION DTLS (SHEET 10 OF 12)

PROJECT NO: 4011.SEPT12C38 | SHEET NO: 184

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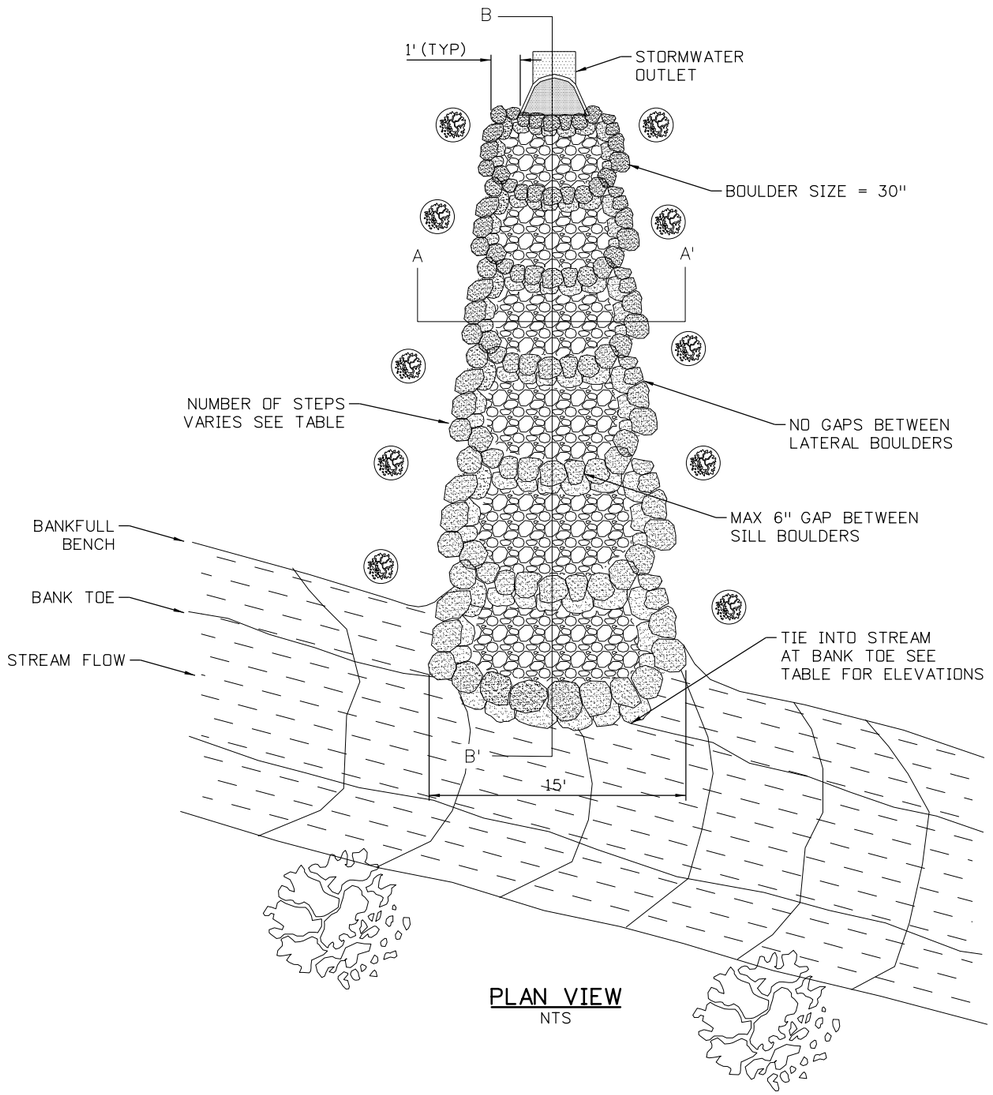
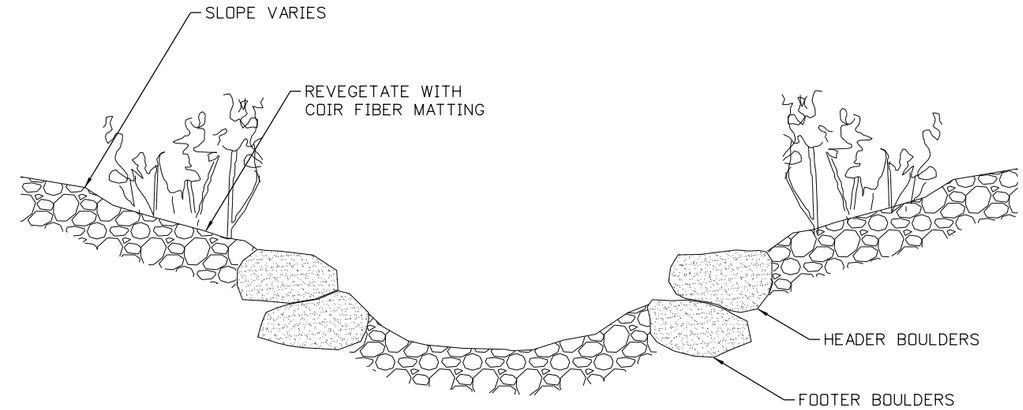


PLAN VIEW
NTS



CROSS SECTION A-A'
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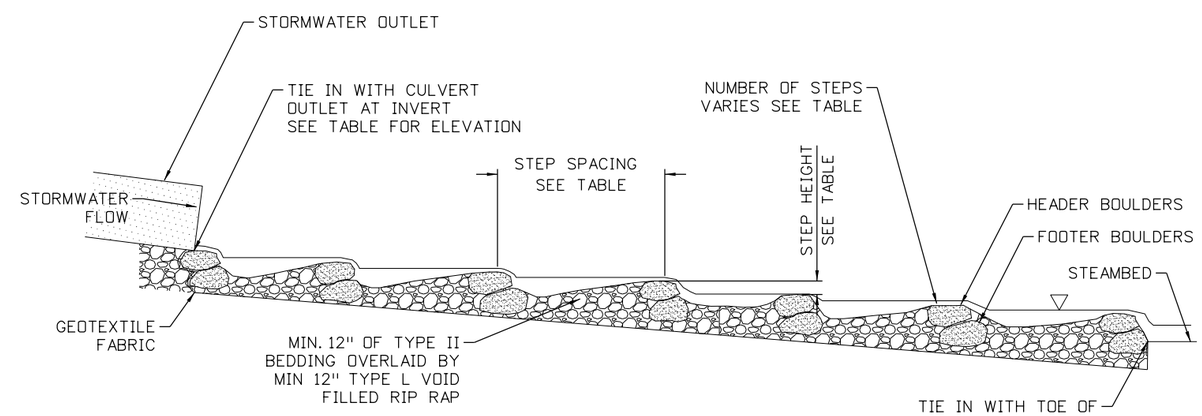

PROFILE B-B'
NTS

OUTLET PROTECTION START	GOLD RUN STATION	OUTLET PROTECTION LENGTH (FT)	UPSTREAM TIE-IN ELEVATION (FT)	DOWNSTREAM TIE-IN ELEVATION (FT)	# OF STEP FEATURES	STEP HEIGHT (FT)	STEP SPACING (FT)
OUTLET P-132	21+86.53	68	7371.2	7367	5	1.3-1.5	13-14
OUTLET P-101	27+06.23	43	7333.95	7328	6	1.2	7-8

CULVERT OUTLET PROTECTION
NTS

HABITAT RESTORATION PLANS REPRESENT 30% DESIGN

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GOLD RUN ROAD
HABITAT RESTORATION DTLS
(SHEET 11 OF 12)

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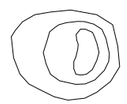
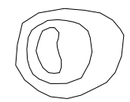
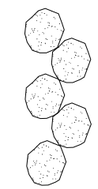


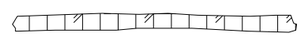
POOL RIGHT BEND



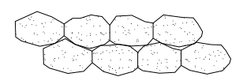
POOL LEFT BEND



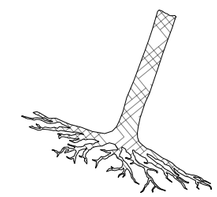
CONVERGING BOULDER CLUSTER



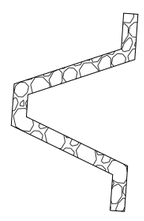
TOE WOOD WITH SOIL WRAPPED LIFT BANK PROTECTION



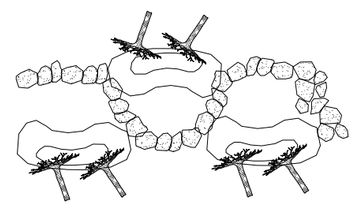
BOULDER BANK PROTECTION



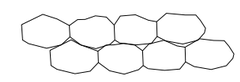
ROOT WAD BANK PROTECTION



ROCK CROSS VANE



ROCK STEP/POOL



STACKED BOULDER WALL

HABITAT RESTORATION LEGEND

HABITAT RESTORATION PLANS REPRESENT 30% DESIGN

100% SET

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GOLD RUN ROAD
HABITAT RESTORATION DTLS (SHEET 12 OF 12)

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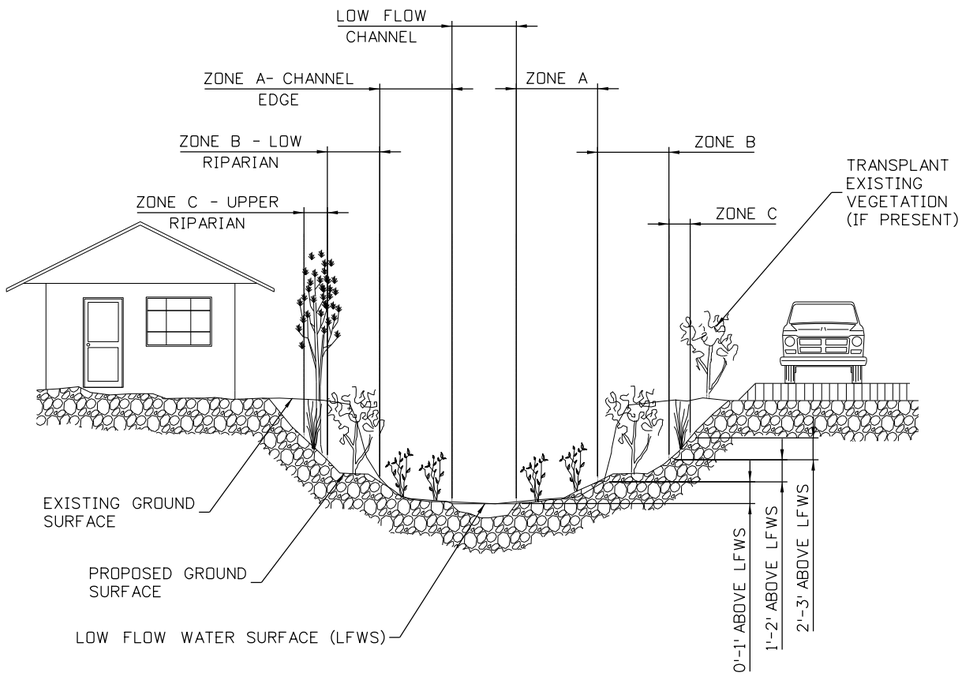
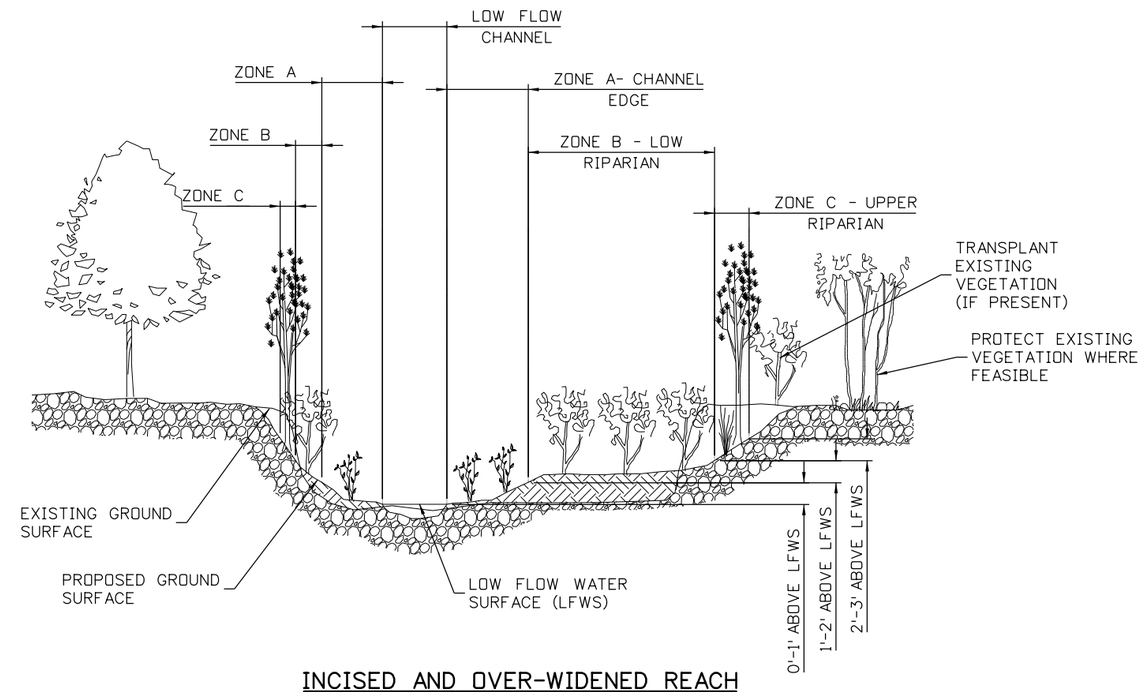


INCISED AND NARROW REACH

NTS



INCISED AND OVER-WIDENED REACH

NTS

REVEGETATION PLANS FOR INCISED REACHES

NTS

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100% SET

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GOLD RUN ROAD
REVEGETATION PLANS (SHEET 1 OF 2)

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Table 1: Plants Needed for Standard Restoration[1]

Common Name	Scientific Name	Plant Size (cubic inch)	Plants per Acre
Zone A: Channel Edge[2]			
Bluejoint	*Calamagrostis canadensis*	10	750
Nebraska sedge	*Carex nebrascensis*	10	1,500
Woolly sedge	*Carex pellita*	10	1,000
Creeping spikerush	*Eleocharis palustris*	10	1,000
Baltic rush	*Juncus balticus*	10	1,000
Red-tinge bulrush	*Scirpus microcarpus*	10	750
		Total	**6,000**
Zone B: Lower Riparian[2]			
Thinleaf alder	*Alnus incana*	40	1,000
Water birch	*Betula occidentalis*	40	750
Redosier dogwood	*Cornus alba*	40	750
Mixed cottonwood/willow alder	*Populus/Salix/Alnus spp.*	Transplant	As available
Narrowleaf cottonwood	*Populus angustifolia*	40	1,250
Narrowleaf cottonwood	*Populus angustifolia*	5' cutting	2,000
Mixed willow	*Salix spp.*	5' cutting	2,000
Narrowleaf willow	*Salix exigua*	40	1,250
Dewystem willow	*Salix irrorata*	40	1,000
		Total	**10,000**
Zone C: Upper Riparian[3]			
Narrowleaf cottonwood	*Populus angustifolia*	40	350
Chokecherry	*Prunus virginiana*	40	250
Common snowberry	*Symphoricarpos alba*	40	250
White-stem gooseberry	*Ribes inerme*	40	200
Woods' rose	*Rosa woodsii*	40	350
		Total	**1,400**

[1]Zone A is 0-1', Zone B is 1-2', and Zone C is 2-3' above the water surface of the low-flow channel; exact planting locations will be based on final grading and directed by a qualified ecologist; plant nomenclature from Corps 2016

[2]Quantity of containerized stock based on approximately 3-foot centers. Whenever possible, Zone B plants will be installed in a trench (excavated using earthmoving equipment) parallel to the channel located at approximately the edge of the bankfull channel; the bottom of the trench will be approximately the elevation of the low-flow water surface; mixed willow will be harvested from Boulder County (or adjacent counties) within 1,000 vertical feet (see notes); all plants randomly mixed; plant nomenclature from Corps 2016

[3]Based on approximately 6-foot centers

Table 2: Plants Needed for Rootwads/Channel Blocks[1]

Common Name	Scientific Name	Plant Size (cubic inch)	Plants per Rootwad
Zone A: Channel Edge			
Nebraska sedge	*Carex nebrascensis*	10	75
Creeping spikerush	*Eleocharis palustris*	10	75
Red-tinge bulrush	*Scirpus microcarpus*	10	75
		Total	**225**
Zone B: Lower Riparian			
Thinleaf alder	*Alnus incana*	40	5
Water birch	*Betula occidentalis*	40	5
Narrowleaf cottonwood	*Populus angustifolia*	40	5
Narrowleaf cottonwood	*Populus angustifolia*	5' cutting	50
Mixed willow	*Salix spp.*	5' cutting	50
Mixed riparian shrub	--	transplant	as available
Narrowleaf willow	*Salix exigua*	40	5
Dewystem willow	*Salix irrorata*	40	5
		Total	**125**

[1]Zone A is 0-1' and Zone B is 1-2' above the water surface of the low-flow channel; exact planting locations will be based on final grading and directed by a qualified ecologist; mixed willow will be harvested from Boulder County (or adjacent counties) within 1,000 vertical feet (see notes); plant nomenclature from Corps 2016

Table 3: Plants Needed for Soil Lifts[1]

Common Name	Scientific Name	Plant Size (cubic inch)	Plants per Linear Foot
Zone A: Channel Edge[2]			
Nebraska sedge	*Carex nebrascensis*	10	3
Woolly sedge	*Carex pellita*	10	3
		Total	**6**
Zone B: Lower Riparian[3]			
Mixed willow	*Salix spp.*	5' cutting	6
		Total	**6**

[1]Plant nomenclature from Corps 2016

[2]Zone A plants only placed between lifts that are within 1 foot (vertical) of the low-flow water surface elevation; species not mixed, a minimum of 16 linear feet of each species

[3]Zone B plants only placed between lifts that are 1 to 2 feet (vertical) above the low-flow water surface elevation; mixed willow will be harvested from Boulder County (or adjacent counties) within 1,000 vertical feet (see notes).

Table 4: Riparian Seed Mix[1]

Type	Common Name	Scientific Name	Variety[2]	Seeds per Pound[2]	Seeds per Square Foot	Pounds of Pure Live Seed/Acre
Graminoids	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
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	-	-	-	-	4.5
				Total	**161.6**	**25.0**

[1]Nomenclature follows PLANTS Database (NRCS 2016); seeding rate based on hand-broadcasting; any substitutions must be native to Colorado and from a US or Canada seed source.

[2]Sources: NRCS 2016, Granite Seed 2016, Western Native Seed 2016. NSN 2016

[3]Bag separately if drill-seeding

General Notes:

- If existing riparian shrubs or small trees (<4" diameter at breast height) are present but too high above the low-flow channel to be wetted through capillary action (because of channel degradation associated with the flood), then the banks will be laid back and the existing vegetation will be moved (transplanted) to the appropriate elevation above the water surface of the low-flow channel; 0 to 1 foot above for herbaceous wetland vegetation and 1 to 3 feet for wetland/riparian woody vegetation.
- All natural floodplain areas (including those not disturbed by restoration activities) will be hand-seeded with the Riparian Seed Mix (Table 4) at approximately 25.0 pounds of pure live seed per acre, including rice hulls for bulk. Seeding will only be performed between September 1 and when the ground freezes, and when the ground thaws and June 1, unless approved by a qualified ecologist.
- After seeding, all portions of Zone B and C disturbed by restoration activities will be hand-mulched using excelsior (spun aspen wood) mulch applied at approximately 1,800 pounds per acre (approximately 30 bales at 60 pounds each). Although floodplain areas not disturbed by restoration activities will be seeded, only those disturbed will be mulched.
- The exact locations of live plant material will be based on the final grading, as determined by a qualified ecologist.
- All areas disturbed by restoration activities, including the soil lifts, will be amended with 300 cubic yards per acre of compost. The compost will be mixed with native soil/alluvium to a depth of 12 inches. The compost will have the following characteristics:
  - pH: 5.5-8.0
  - Moisture content: 35-55 percent
  - Particle size: pass through 1-inch screen or smaller
  - Stability: stable to highly stable, providing nutrients for plant growth
  - Maturity/growth screening: demonstrate ability to enhance plant growth
  - Soluble salt concentration: 2.5 dS (mmhos/cm) or less preferred
  - Organic matter content: 30-70 percent
  - Suggested compost source: A-1 Organic, Eaton, Colorado 970-454-3492 or an approved equal.
- All willow and cottonwood cuttings will be collected on-site or from elsewhere in Boulder County (or immediately adjacent counties) within 1,000 vertical feet of near the site, as directed by a qualified ecologist. Acceptable willow species for "mixed willow" include (nomenclature from Corps 2016): *Salix exigua, S. interior, S. irrorata, S. bebbiana, S. monticola, S. drummondiana, S. ligulifolia, S. lasiandra,* and *S. lutea*. No one species can account for more than 70 percent of the mix.
- Standard Revegetation (see Tables 1 and 4)
  - Standard treatment areas include the entire natural floodplain, unless otherwise noted. The standard revegetation plan includes three planting zones (A, B, and C), and seeding in all zones.
  - Planting Zone A (Channel Edge) encompasses those areas between 0 and 1 foot (vertical) above the low flow channel water surface elevation and generally in areas protected from scour/direct flow. Zone B (Lower Riparian) includes those areas between 1 and 2 feet above the low flow channel, and Zone C (Upper Riparian) includes those areas between 2 and 3 feet above. See typical cross-section.
  - All portions of the project corridor (including areas where no earthwork occurs) will be hand-seeded with the Riparian Seed Mix (Table 4) at approximately 25.0 pounds of pure live seed per acre, including rice hulls for bulk.
  - All portions of Zones B and C where earthwork occurs will be hand-mulched with excelsior (spun aspen wood) at a rate of approximately 1,800 pounds per acre (approximately 30 bales at 60 pounds each).
- Rootwads/Channel Blocks (see Table 2)
  - The treatment for Root Wads/Channel Blocks conforms with the typical detail and includes the installation of live plant material (transplants, containerized stock, and cuttings). These materials will be installed during and after the construction of the rootwads/channel blocks and placed primarily in the area downstream of the rootwad (where a back eddy may form), but will also be installed in other areas of suitable hydrology (according to the elevation above the low-flow channel water surface—see Treatment 1 typical cross-section for planting zones).
  - Willow cuttings (3-foot long) will be placed during installation of the rootwads in areas where a portion of the cutting is the elevation is between 1 and 2 feet above the low-flow water surface.
  - Containerized herbaceous plants (10 ci) will be placed after the rootwads are installed in areas protected from direct flow/scour (mainly on the downstream side of the rootwad) where the elevation is 1 foot or less above the low-flow water surface.
- Soil Lifts (see Table 3)
  - This treatment involves the installation of live plant material during the construction of the soil lifts. Containerized herbaceous plants (10 ci) will be placed in between lifts (during construction of the lifts) where the elevation is 1 foot or less above the water surface of the low-flow channel. Willow cuttings (5-foot long) will be installed between the lifts (during construction) where the elevation is between 1 and 2 feet above the low-flow water surface.
  - The lifts will be constructed with native soil mixed with compost (300 cubic yards/acre) and then hand-seeded with the Riparian Mix at approximately 25.0 pounds of pure live seed per acre (including rice hulls for bulk) before wrapping with fabric. Seed should be placed on the soil surface, just beneath the fabric.
- All willow and cottonwood cuttings will be harvested when dormant (before leaves emerge or after they are dropped) from live plants 0.5 to 1.0 inch in diameter. The stem will be stripped of all branches before cutting and then trimmed to the desired length. The lower (rooting) end of the stem will be cut at a 45 degree angle and the upper end will be cut at 90 degree angle. The cuttings will be placed into water within two minutes of cutting and soaked—completely submerged—for at least 72 hours, but not more than 14 days, prior to planting. The cuttings will be kept wet until placed into the ground and will not be allowed out of water for more than 10 minutes during planting. All cuttings will be trimmed after installation to ensure that no more than one-third of their length is left above ground.
- Whenever possible, Zone B live plant material (containerized stock and cuttings) will be installed by using equipment to excavate a trench parallel to the channel, with the bottom of the trench corresponding to the approximate elevation of the low-flow channel water surface. The plant material will be placed into the trench, backfilled, and lightly tamped. Willow and cottonwood cuttings may be completely buried (horizontally or vertically), but containerized stock and transplants will be placed upright and so that at least 1/3 of the above-ground plant mass is above the new ground surface.
- 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
- 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 in coordination with the Boulder County weed coordinator.
- All finish grades will be left rough and natural with no smooth surfaces, straight edges, or right angles
- All work areas (other than the immediate channel banks) will be loosened to a depth of 12 inches before planting and seeding
- 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). If this is not possible, active nest surveys for migratory birds may be required.
- All finish grades will be left rough and natural with no smooth surfaces, straight edges, or right angles
- All work areas (other than the immediate channel banks) will be loosened to a depth of 12 inches before planting and seeding
- 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). If this is not possible, active nest surveys for migratory birds may be required.
  - All best management practices (BMPs) used shall be selected, installed, implemented, and maintained according to appropriate 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 the creek or other aquatic habitats.
- Construction equipment, fuels, lubricants, and other petroleum distillates shall not be stored or stockpiled within 50 horizontal feet of the creek or other aquatic habitats. Equipment fueling and servicing shall occur only within approved designated areas.

Literature Cited

Granite Seed and Erosion Control (Granite Seed). 2016. Website: http://www.graniteseed.com/

Native Seed Network (NSN). 2016. Website: http://www.nativeseednetwork.org

Natural Resources Conservation Service (NRCS). 2016. The PLANTS Database (http://plants.usda.gov). National Plant Data Team, Greensboro, NC 27401-4901 USA.

US Army Corps of Engineers (Corps). 2016. *National Wetland Plant List*, version 3.2. Website: http://wetland_plants.usace.army.mil/. Accessed in September.

Western Native Seed. 2016. Website: http://www.westernnativeseed.com/

PLANT LISTS FOR STREAM AND FLOODPLAIN REVEGETATION PLANS

HABITAT RESTORATION PLANS REPRESENT 30% DESIGN

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS: NO.	DATE	REVISION DESCRIPTION:

Boulder County

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

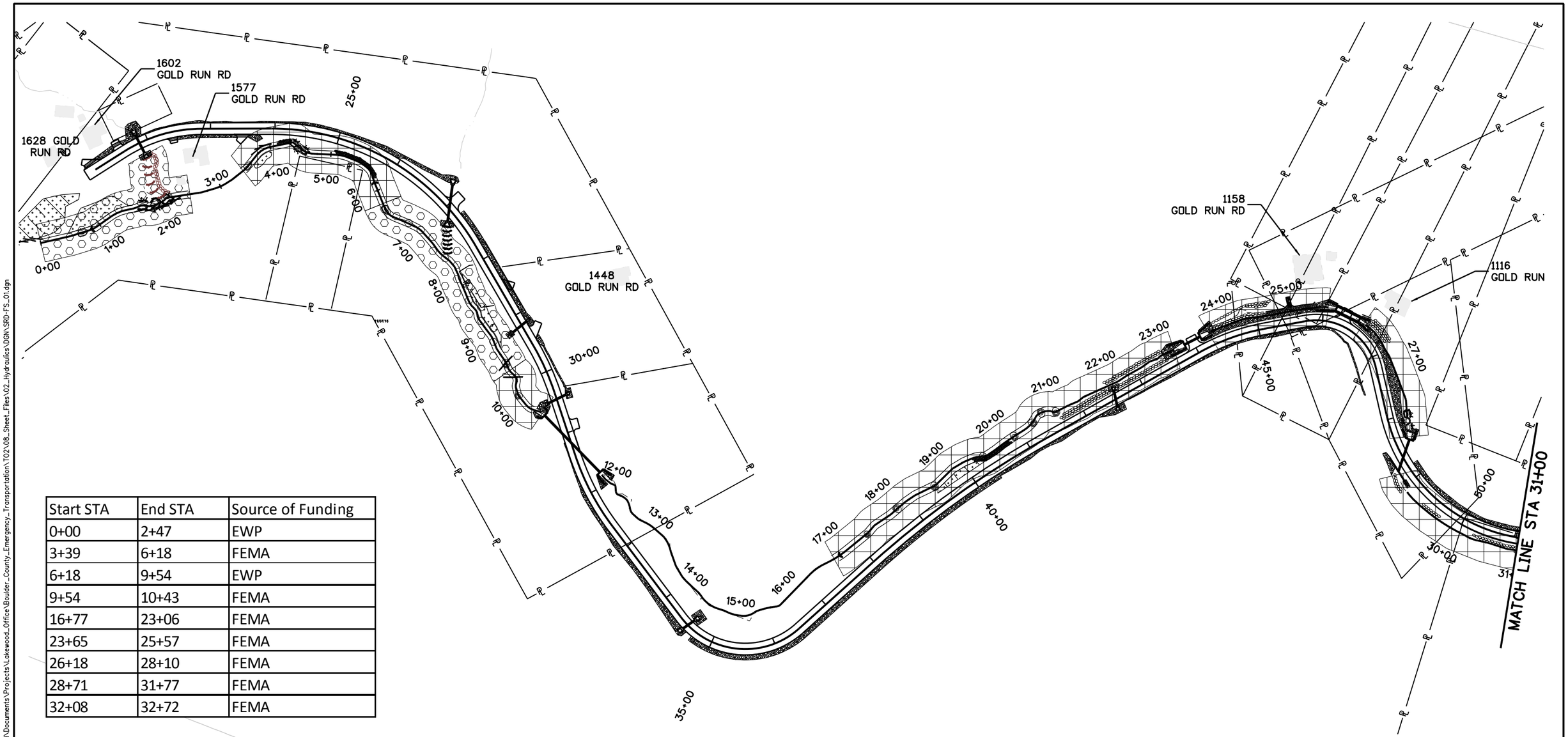
Michael Baker INTERNATIONAL

DESIGNED:	CAD:	CHECKED:	DATE:
LTB	DJA	SMA	12/23/16

GOLD RUN ROAD
REVEGETATION PLANS
(SHEET 2 OF 2)

PROJECT NO: 4011.SEPT12C38 | SHEET NO: 188

jessica.wray 6:07:04 PM 12/21/2016 pw:\\DCPWAPP1.bkr.mbakercorp.com:pwprod\Documents\Projects\Lakewood_Office\Boulder_County_Emergency_Transportation\T02\08_Sheet_Files\02_Hydraulics\DGN\SRD-13.dgn



Start STA	End STA	Source of Funding
0+00	2+47	EWP
3+39	6+18	FEMA
6+18	9+54	EWP
9+54	10+43	FEMA
16+77	23+06	FEMA
23+65	25+57	FEMA
26+18	28+10	FEMA
28+71	31+77	FEMA
32+08	32+72	FEMA

LEGEND

FEMA FUNDING
(CORRESPONDS WITH
ROADWAY CONSTRUCTION)

EWP FUNDING
(CORRESPONDS WITH
STREAM RESTORATION)

N

75 0 75 150 FT
HORIZONTAL SCALE: 1"=150'

HABITAT RESTORATION PLANS REPRESENT 30% DESIGN

100 % SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

Boulder County

Michael Baker INTERNATIONAL

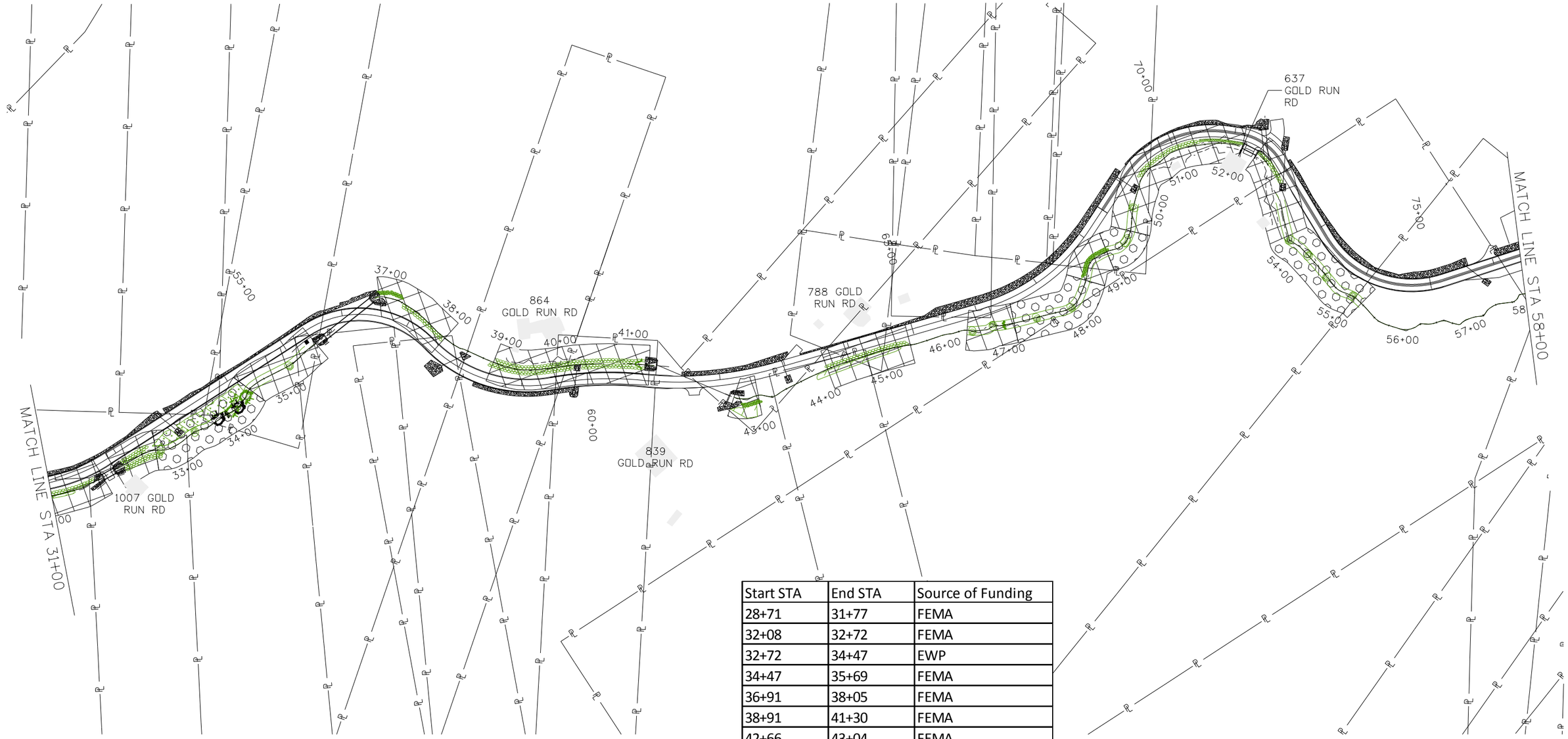
BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

DESIGNED:	CAD:	CHECKED:	DATE:
DJA	DJA	LTB	12/23/16

GOLD RUN ROAD
HABITAT RESTORATION
FUNDING SOURCES (1 OF 3)

PROJECT NO: 4011.SEPT12C38 SHEET NO: 189

mary.monks 5:26:04 PM 12/21/2016 pw:\\DCPWAPP1.bkr.mbakercorp.com:pwproj\Documents\Projects\Lakewood_Office\Boulder_County_Emergency_Transportation\T02\08_Sheet_Files\02_Hydraulics\DGN\SRD-FS_01.dgn



Start STA	End STA	Source of Funding
28+71	31+77	FEMA
32+08	32+72	FEMA
32+72	34+47	EWP
34+47	35+69	FEMA
36+91	38+05	FEMA
38+91	41+30	FEMA
42+66	43+04	FEMA
44+00	45+49	FEMA
46+38	47+11	FEMA
47+11	48+47	EWP
48+47	49+05	FEMA
49+05	49+55	EWP
49+55	52+04	FEMA
51+00	53+68	FEMA
53+68	55+21	EWP

LEGEND

FEMA FUNDING (CORRESPONDS WITH ROADWAY CONSTRUCTION)

EWP FUNDING (CORRESPONDS WITH STREAM RESTORATION)

N

75 0 75 150 FT

HORIZONTAL SCALE: 1"=150'

HABITAT RESTORATION PLANS REPRESENT 30% DESIGN

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO

811

CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

Boulder County

Michael Baker INTERNATIONAL

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

DESIGNED:	CAD:	CHECKED:	DATE:
DJA	DJA	LTB	12/23/16

GOLD RUN ROAD
HABITAT RESTORATION FUNDING SOURCES (2 OF 3)

PROJECT NO: 4011.SEPT12C38 SHEET NO: 190

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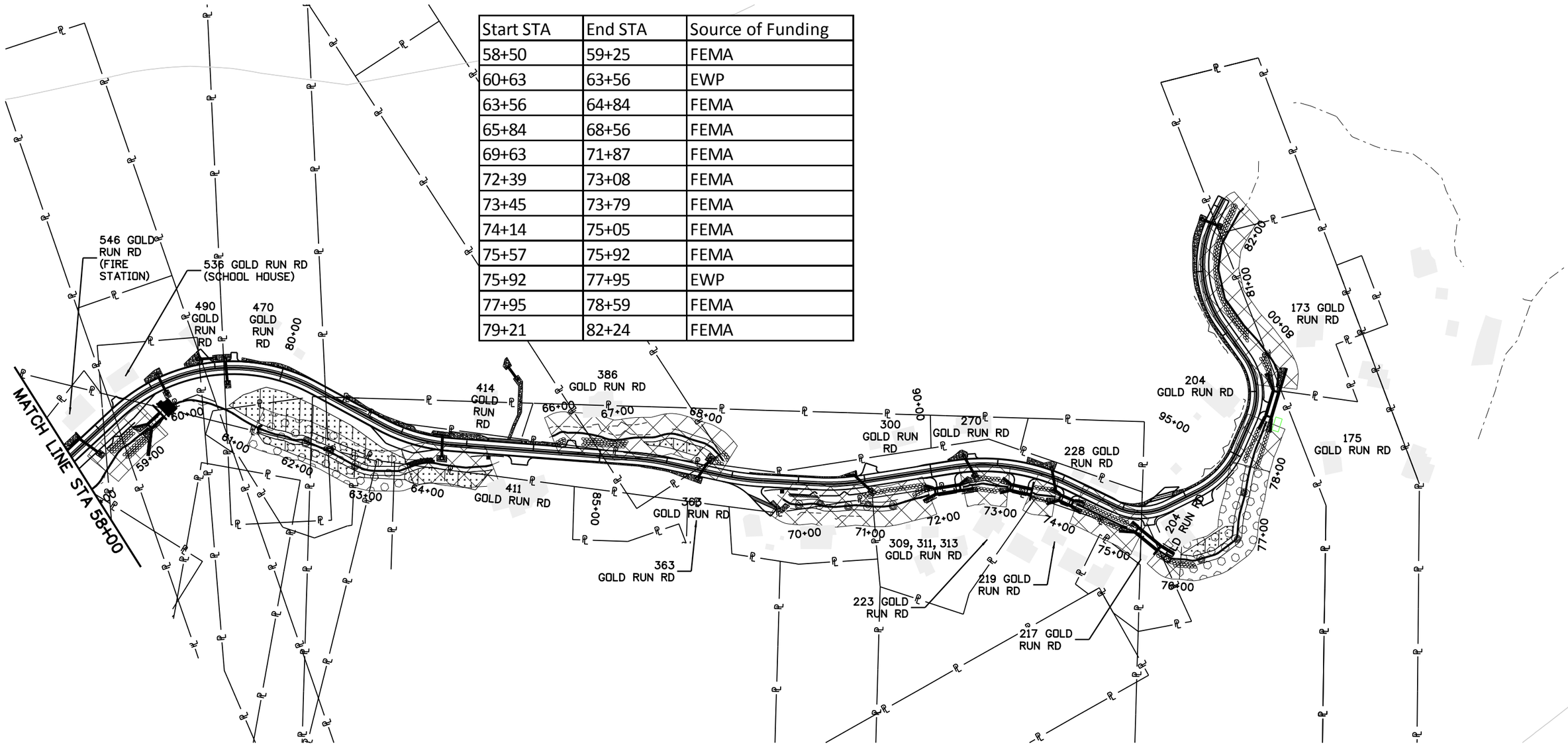
Start STA	End STA	Source of Funding
58+50	59+25	FEMA
60+63	63+56	EWP
63+56	64+84	FEMA
65+84	68+56	FEMA
69+63	71+87	FEMA
72+39	73+08	FEMA
73+45	73+79	FEMA
74+14	75+05	FEMA
75+57	75+92	FEMA
75+92	77+95	EWP
77+95	78+59	FEMA
79+21	82+24	FEMA



LEGEND

FEMA FUNDING (CORRESPONDS WITH ROADWAY CONSTRUCTION)

EWP FUNDING (CORRESPONDS WITH STREAM RESTORATION)

N

75 0 75 150 FT
HORIZONTAL SCALE: 1"=150'

HABITAT RESTORATION PLANS REPRESENT 30% DESIGN

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS: NO.	DATE	REVISION DESCRIPTION:

Boulder County

Michael Baker INTERNATIONAL

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

DESIGNED:	CAD:	CHECKED:	DATE:
DJA	DJA	LTB	12/23/16

GOLD RUN ROAD
HABITAT RESTORATION FUNDING SOURCES (3 OF 3)

PROJECT NO: 4011.SEPT12C38 SHEET NO: 191

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1. SITE DESCRIPTION

The Contractor shall comply with all CDOT contractual requirements and all requirements associated with the CDPS-SCP on this project. The SWMP Administrator shall update to reflect current project site conditions.

A. PROJECT SITE LOCATION: Boulder County is conducting permanent repairs and improvements for flood damaged areas in response to the September 2013 flood event. Gold Run Road will be reconstructed from approximately 100 feet above the Cash Gulch crossing to approximately 600 feet above Salina Junction.

B. PROJECT SITE DESCRIPTION: Prior to the flood event, the roadway was paved from Salina Junction to about 100 feet upstream from property address 864 Gold Run Road (near Ingram Gulch), with the remainder of the road predominately non-paved, gravel surface with some small stretches of paved surface. Emergency roadway repairs were initiated in November 2013 to establish temporary access to Gold Run Road. These repairs became known as the winter road construction. The improvements on Gold Run Road include a 20-foot wide typical roadway section consisting of paved roadway with two 9-foot lanes and two 1-foot shoulders. The paved section of Gold Run Road extends from Ingram Gulch to connect with the Salina Junction Project (TO5). The improvements on the unpaved section of Gold Run Road include an 18 foot wide typical roadway section. The unpaved section of Gold Run Road extends from approximately 100 feet above the Cash Gulch crossing to Ingram Gulch. Sections of the roadway on curves in the unpaved roadway will be paved to provide protection against erosion. Roadside drainage is incorporated in order to convey runoff in ditches to culverts that outfall to Gold Run.

C. PROPOSED SEQUENCING FOR MAJOR CONSTRUCTION ACTIVITIES: Construction of the project will come in phases, as laid out by the contractor. There is currently a staging area downstream of Salina Junction for this project. Sequencing for the construction of the project shall include the following steps: clearing and grubbing, retaining walls, culverts, roadway, grading and stabilization with seeding and planting native plants. All traffic phasing and planning before, during and after the completion of the project shall be coordinated with Boulder County and managed by the contractor. Activities throughout construction will be determined by the contractor and are subject to change.

D. ACRES OF DISTURBANCE:

1. Total area of construction site (LOC (PERMITTED AREA)): 12.8 acres
2. Total area of proposed disturbance (LDA): 8.1 acres
3. Total area of seeding: 3.0 acres
4. Total area of impervious surface: 3.42 acres
5. Total area of NEW impervious surface: 0.30 acres

E. EXISTING SOIL DATA: According to the Soil Survey of Boulder County, Colorado the site consists of 2 soil types. The information was collected from the USDA http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx). The soil types are:

1. FcF, Fern Cliff - Allens Park - rock outcrop complex, 15 to 60 percent slopes
2. JrF, Juget - Rock outcrop complex, 9 to 55 percent slopes

F. EXISTING VEGETATION, INCLUDING PERCENT COVER:
During design the SWMP Administrator for Design in consultation with the Engineer will determine if the SWMP Administrator for Design or the SWMP Administrator will conduct the Vegetation Transects as outlined in Chapter 4.11.2 of the Erosion Control and Stormwater Quality Guide.

Pre-Construction

Date of survey: October 2014 %Density: 55
Description of existing vegetation: The vegetation present is typical for mountain terrain habitat Elevations within the project area range from 6,639 feet to 7,384 feet. Vegetation within and surrounding the project area consists of mature trees with herbaceous understory with riparian vegetation located adjacent to Gold Run. Dominant trees within the project include Ponderosa pine (Pinus ponderosa) and Douglas fir (Pseudotsuga menziesii) with some aspen (Populous tremuloides), narrowleaf cottonwood (Populus angustifolia), and willow species (Salix Sp.). Existing vegetation makes up approximately 55% of the existing ground cover within the project area.
Map or table showing transect locations in SWMP notebook tab 17:

Post-Construction Date of survey: _____ %Density: _____
Description of existing vegetation: **Date of CDPS-SCP Closure:** _____
Map or table showing transect locations in SWMP notebook tab 17:

G. POTENTIAL POLLUTANTS SOURCES: See First Construction Activities under Potential Pollutant Sources. The SWMP Administrator shall prepare a list of all potential pollutants and their locations in accordance with subsection 107.25.

H. RECEIVING WATER:

1. Outfall locations: See Drainage Plans for size, type and location of pipes throughout the project.
2. Names of receiving water(s) on site: Gold Run, Blackhawk Gulch, Ingram Gulch, Cash Gulch, and Fourmile Creek
3. Ultimate receiving water: St. Vrain Creek
4. Horizontal distance nearest water of the state is from project: approximately 21 miles

I. NON-STORMWATER DISCHARGES: Potential non-stormwater discharges for this site include potable water used for grading, dust suppression and erosion control seeding (permanent and temporary) within the entire site.

ALLOWABLE:

1. Groundwater and stormwater dewatering: Discharges to the ground of water from construction dewatering activities may be authorized provided that:
   a. the source is groundwater and/or groundwater combined with stormwater that does not contain pollutants
   b. the source and BMPs/Control Measures are identified in the SWMP
   c. discharges do not leave the site as surface runoff or to surface waters
   d. The contractor shall protect all work areas and facilities from water at all times. Areas and facilities subject to flooding, regardless of the source of water, shall be promptly dewatered and restored at no cost to the owner. This shall include removal of any debris caused by flooding. Any dewatering shall be done in accordance with Subsection 107.25

CONTAMINATED:

2. If discharges do not meet the above criteria a separate CDPS permit shall be obtained by the Contractor from the CDPHE. See standard special provision 250 Hazardous Waste and Contaminated Water.

2. SITE MAP COMPONENTS:

Pre-construction

A. PROJECT CONSTRUCTION POTENTIAL SITE BOUNDARIES See Stormwater Management Plan

B. ALL AREAS OF GROUND SURFACE DISTURBANCE See Stormwater Management Plan

C. AREAS OF CUT AND FILL See Stormwater Management Plan

D. LOCATION OF ALL STRUCTURAL BMPs/CONTROL MEASURES IDENTIFIED IN THE SWMP See Stormwater Management Plan

E. LOCATION OF NON-STRUCTURAL BMPs/CONTROL MEASURES AS APPLICABLE IN THE SWMP See Stormwater Management Plan

F. SPRINGS, STREAMS, WETLANDS AND OTHER SURFACE WATER See Stormwater Management Plan

G. PROTECTION OF TREES, SHRUBS, CULTURAL RESOURCES AND MATURE VEGETATION See Stormwater Management Plan

H. AREAS USED FOR STORING AND STOCKPILING OF MATERIALS, STAGING AREAS (field trailer, fueling, etc.) and BATCH PLANTS See Stormwater Management Plan

3. SWMP ADMINISTRATOR:

A. SWMP ADMINISTRATOR FOR DESIGN:

Name/Title	Contact Information
Sean Stellish, P.E. Senior Roadway Engineer	sean.stellish@mbakerintl.com, (720) 514-1100

B. SWMP ADMINISTRATOR FOR CONSTRUCTION: (As defined in Subsection 208) The Contractor shall designate a SWMP Administrator for Construction upon ownership of the SWMP. The SWMP Administrator shall become the owner/operator and assume responsibility for all design changes to the SWMP implementation and maintenance in accordance to 208.03. The SWMP Administrator shall be responsible for implementing, maintaining and revising SWMP, including the title and contact information. The activities and responsibilities of the SWMP administrator shall address all aspects of the projects SWMP. (Update the information below for each new SWMP Administrator) (Copy of TECS Certification must also be included in the SWMP Notebook.)

Name/Title	Contact Information	Certification #	Start Date	Engineer Approval

C. EROSION CONTROL INSPECTOR: (As defined in Subsection 208) The Contractor may designate an Erosion Control Inspector. The Erosion Control Inspector shall complete duties in accordance with subsection 208.03 (c) (Copy of TECS Certification must also be included in the SWMP Notebook.)

Name/Title	Contact Information	Certification #	Start Date	Engineer Approval

4. STORMWATER MANAGEMENT CONTROLS FIRST CONSTRUCTION ACTIVITIES

THE CONTRACTOR SHALL PERFORM THE FOLLOWING:

A. POTENTIAL POLLUTANT SOURCES

Evaluate, identify, locate and describe all potential sources of pollutants at the site in accordance with subsection 107.25, CDPS-SCP and place in the SWMP notebook. All BMPs/Control Measures related to potential pollutants shall be shown on the SWMP site map by the Contractor's SWMP Administrator.

B. OFFSITE DRAINAGE (RUN ON WATER)

1. Describe and record BMPs/Control Measures on the SWMP site map that have been implemented to address off site run-on water in accordance with subsection 208.03.

C. VEHICLE TRACKING PAD/VEHICLE TRACKING CONTROL

1. BMPs/Control Measures shall be implemented in accordance with subsection 208.04.

D. PERIMETER CONTROL

1. Perimeter control shall be established as the first item on the SWMP to prevent the potential for pollutants leaving the construction site boundaries, entering the stormwater drainage system, or discharging to state waters.
2. Perimeter control may consist of vegetation buffers, berms, silt fence, erosion logs, existing landforms, or other BMPs/Control Measures as approved.
3. Perimeter control shall be in accordance with subsection 208.04

5. DURING CONSTRUCTION

RESPONSIBILITIES OF THE SWMP ADMINISTRATOR DURING CONSTRUCTION

The SWMP should be considered a "living document" that is continuously reviewed and modified. During construction, the following items shall be added, updated, or amended as needed by the SWMP Administrator in accordance with subsection 208.

During construction, indicate how items that have not been addressed during design are being handled in construction. If items are covered in the template or other sections of the SWMP notebook indicate below what section the discussion takes place.

A. STOCKPILE MANAGEMENT: Shall be done in accordance with subsection 107.25 and 208.07

B. CONCRETE WASHOUT: Concrete wash out water or waste from field laboratories and paving equipment shall be contained in accordance with subsection 208.05.

C. SAW CUTTING: Shall be done in accordance with subsection 107.25, 208.04, 208.05

D. STREET SWEEPING: Shall be done in accordance with subsection 208.04

6. INSPECTIONS

A. Inspections shall be in accordance with subsection 208.03 (c).

7. BMP/CONTROL MEASURE MAINTENANCE

A. Maintenance shall be in accordance with subsection 208.04 (f).

8. RECORD KEEPING

A. Records shall be kept in accordance with subsection 208.03 (d).

9. INTERIM AND PERMANENT STABILIZATON

A. SEEDING PLAN

Soil preparation, soil conditioning or topsoil, seeding (native), mulching (weed free) and mulch tackifier will be required for an estimated 3.0 acres of disturbed area within the right-of-way limits which are not surfaced. The following types and rates shall be used:

Foothills Seed Mix (5,500 Feet to 7,000 Feet Elevation)

COMMON NAME	BOTANICAL NAME	Variety	LBS. PLS PER ACRE
Side Oat Grama	Bouteloua curtipendula	Vaughn	1.82
Blue Grama	Boutelous grailis	Native, Alma or Hachita	0.63
Slender Wheatgrass	Elymus trachycaulus	San Luis	4.38
Junegrass	Koeleria macrantha	Native	0.15
Western Wheatgrass	Pascopyrum smithii	Arriba	3.17
Western Wheatgrass	Pascopyrum smithii	Native	3.17
Switchgrass	Panicum virgatum	Blackwell or Nebraska 28	0.63
Little Bluestem	Schizachrium scoparium	Cimarron or Pastura	1.07
Green Needlegrass	Stipa viridula	Lodorm or Native	1.93
TOTAL			

Mountain Seed Mix (7,000 Feet and Above Elevation)

COMMON NAME	BOTANICAL NAME	Variety	LBS. PLS PER ACRE
Blue Grama	Boutelous grailis	Native, Alma or Hachita	0.84
Canada Wildrye	Elymus Canadensis	Native	3.03
Thickspike Wheatgrass	Elymus lanceolatus	Critana	5.58
Slender Wheatgrass	Elymus trachycaulus	San Luis	5.48
Junegrass	Koeleria macrantha	Native	0.15
Sandberg's Bluegrass	Poa secunda	Native	0.38
TOTAL			

B. SEEDING APPLICATION: Drill seed 0.25 inch to 0.5 inch into the soil. In small areas not accessible to a drill, hand broadcast or hydroseed at double the rate and rake 0.25 inch to 0.5 inch into the soil per subsection 212.

C. MULCHING APPLICATION: Apply a minimum of 2 tons of certified weed free hay or 2 1/2 tons of certified weed free straw per acre and in accordance with Section 213, and mechanically crimp it into the soil in combination with an organic mulch tackifier.

1. Prior to winter shutdown or the summer seeding window closure: Uncompleted slopes shall be mulched with 2 tons of mulching (weed free) per acre, mechanically crimped into the topsoil in combination with an organic mulch tackifier per subsections 208 and 213.

D. SPECIAL REQUIREMENTS:

1. Due to steep slopes (>2:1), hydroseeding will be allowed on this project for permanent stabilization. Hydroseeding rate shall be at double the seeding rate. Hydroseed shall be applied in two applications. The first application is a slurry which contains seed, organic amendment and fertilizer. The second application is a slurry of mulch and tackifier. Both slurry applications shall be applied from top of slope downward, in 50' vertical lifts, unless otherwise approved by the Engineer.

E. SOIL CONDITIONING AND FERTILIZER REQUIREMENTS: Minimum requirements for all disturbances to receive seeding (native).

Soil conditioner paid for as Item 212- Soil Conditioning (Acre)		
Biological nutrient organic based fertilizer (lbs/acre)*	Humate (lbs/acre)	Compost (cys/acre) [**] **All areas <2:1** [1/2 inch depth]
300	200	65

*Biological nutrient shall not exceed 8-8-8 (N-P-K).

Humate based material shall be in accordance to Standard Special Provision 212 and compost shall be in accordance to Standard Special Provision 212.

F. SOIL RETENTION COVERING: On slopes and ditches requiring a blanket or turf reinforcement mat (trm), the blanket/trm shall be placed in lieu of mulch and mulch tackifier and placed after seeding (native). See SWMP site map for blanket/trm locations.

G. RESEEDING OPERATIONS/CORRECTIVE STABILIZATION
Prior to partial acceptance.

1. All seeded areas shall be reviewed during the 14 day inspections by the SWMP Administrator and or Erosion Control Inspector for bare soils caused by surface or wind erosion. Bare areas caused by surface or gully erosion, blown away mulch, etc. shall be re-graded, seeded, and have the designated mulching applied as necessary, at no additional cost to the project.
2. The Contractor shall maintain seeding/mulch/tackifier/blanket/TRM, mow to control weeds or apply herbicide to control weeds in the seeded areas until Partial Acceptance of the stormwater construction work.

10. PRIOR TO PROJECT FINAL ACCEPTANCE

A. Partial Acceptance shall be in accordance with subsection 107.25 (d), 208.10 and 214.04 at the Partial Acceptance of the project, it shall be determined by the SWMP Administrator and the Engineer which temporary BMPs/Control Measures shall remain until 70% revegetation is established or which shall be removed.
B. At the end of the project, all ditch checks shall either consist of temporary erosion logs (or equivalent) or permanent rip-rap.
C. All storm drains shall be cleaned prior to the Final Acceptance of the project. Work shall be included in 202 Clean Culvert.

11. NARRATIVES:

A. ADDITIONAL BMPS/CONTROL MEASURES AND NARRATIVES:
BMP/Control Measure details and narratives not covered by the SWMP or Standard Plan M-208, M-216 shall be added to the SWMP notebook by the SWMP Administrator.

BMP Matrix:

1. M-Standards have been included along with standard BMP narratives. If a Non-Standard BMP will be used or the standard narrative does not apply, the SWMP Administrator shall write a Non-Standard BMP narrative, place an "X" in the column and complete a Non-Standard BMP Specification and Narrative for the SWMP notebook.
2. The SWMP Administrator shall place an "X" in the column In Use on Site when the BMP/Control Measure has been installed.
3. Place an "X" in the column BMP/Control Measure to be located by SWMP Administrator if the SWMP Administrator shall locate the BMP/Control Measure during construction. These BMP/Control Measures are not currently located on SWMP Plans but are anticipated to be used during construction (i.e. Vehicle Tracking Pad, Batch Plants, etc.). The SWMP Administrator shall locate these prior to or during construction and reflect on SWMP Map.
4. Place an "X" in the column Installation BMP/Control Measure Pre-Construction if the BMP/Control Measure is to be installed prior to construction activity.

STRUCTURAL BMPs/Control Measures that may be potentially used on the project for erosion and sediment control; practices may include, but are not limited to:

APPLICATION, BMP/CONTROL MEASURE	NARRATIVE	M-STANDARD/NON-STANDARD	IN USE ON SITE	BMP/CONTROL MEASURE TO BE LOCATED BY SWMP ADMINSTRATOR	INSTALLATION BMP/CONTROL MEASURE PRE-CONSTRUCTION	BMP/CONTROL MEASURE PHASING		
						FIRST/INITIAL CONSTRUCTION ACTIVITIES	INTERIM CONSTRUCTION ACTIVITIES	PERMANENT STABILIZATION
PROTECTION OF EXISTING WETLANDS *Fence (plastic) and erosion logs*	Fence (plastic) shall be placed in combination with erosion logs to prevent encroachment of construction traffic and sediment into state waters prior to start of construction disturbances. Fence (plastic) shall be placed adjacent to the wetlands; erosion logs shall be placed between the plastic fence and disturbance area. Logs shall be placed to direct flows away from or filter water running into wetlands from disturbance areas.					X	X	
PROTECTION OF EXISTING TREES/LANDSCAPING *Fence (plastic)*	Fence (plastic) shall be used in areas indicated in the plans to prevent encroachment of construction traffic and sediment for the protection of mature trees and/or existing landscaping prior to start of construction disturbances.		X			X	X	
CHECK DAM/DITCH CHECK *Erosion log, silt berm, silt dike, rock check dam*	Placed in ditches immediately upon completion of ditch grading to reduce velocity of runoff in ditch. For existing ditches, place prior to start of construction disturbances.	M-208	X			X	X	X
TYPE R AND TYPE 16 INLET PROTECTION *Storm drain inlet protection (Type 1,2 and 3)*	Placed prior to construction disturbances as detailed in M-208-1, to protect existing inlets or immediately upon completion of new inlets to prevent sediment from entering the inlet throughout construction.	M-208				X	X	X
CULVERT INLET/OUTLET PROTECTION *Erosion logs, aggregate bags*	Placed at mouth of culvert inlets and over top of culvert at inlet and outlet where disturbance may be occurring adjacent to pipe to prevent sediment laden water from entering pipe or drainage. Place prior to start of construction disturbances.	M-208				X	X	X
TYPE C, TYPE D AND TYPE 13 PROTECTION *Erosion logs, aggregate bags, erosion bales*	Placed around inlet grate or slope and ditch paving to prevent sediment from entering inlet. Place prior to start of construction disturbances.	M-208				X	X	X
STOCKPILE PROTECTION *Temporary berm, erosion logs, aggregate bags**	Placed within specified distance, in accordance with subsection 208.06, from toe to contain sediment around stockpile. *Aggregate bags are easily moved and replaced for access during the work day. Place prior to start of stock pile, increase control as stock pile increases size.	M-208	X				X	
TOE OF FILL PROTECTION *Erosion logs, temporary berm, silt fence, topsoil windrow**	Place prior to slope/embankment work to capture sediment and protect and delineate undisturbed areas. *Can be used to stockpile topsoil for salvage.	M-208	X			X	X	
PERIMETER CONTROL *Erosion logs, silt fence, temporary berm, topsoil windrow**	Placed prior to construction commencing to address potential run-on water from off site, and to divert around disturbed area. *Can be used to stockpile topsoil for salvage.	M-208	X			X	X	
SEDIMENT CONTROL/ SLOPE CONTROL *Silt fence, erosion logs*	Placed on the contour of a slope to contain and slow down construction runoff. Place prior to start of construction disturbances.	M-208	X			X	X	

TEMPORARY SEDIMENT TRAP (SWMP Administrator shall add locations to SWMP site maps)	Used to capture sediment laden runoff from disturbed areas < 5 acres during construction. Place prior to start of construction disturbances.	M-208	X			X	X	
PERMANENT SEDIMENT BASIN Extended detention basin or other Permanent Water Quality features	Constructed early in project, prior to storm sewer/ditches to capture storm flow as a temporary sediment trap. Outlet structure shall be modified for contaminants of construction runoff a non-standard detail is needed.					X	X	
EMBANKMENT PROTECTION OR TEMPORARY SLOPE DRAIN	Placed as a conduit or chute to drain runoff down slope and to prevent erosion of slope.	M-208					X	X
OUTLET PROTECTION Riprap, or approved other	Material placed as energy dissipater to prevent erosion at outlet structure.		X				X	X
CONCRETE WASHOUT In-ground or fabricated	Construction control, used for waste management of concrete and concrete equipment cleaning. Place prior to start of concrete activities.	M-208	X			X	X	
VEHICLE TRACKING PAD	Source control, placed to prevent tracking of sediment from disturbed area to offsite surface. Place prior to start of construction disturbances.	M-208	X			X	X	
SWEEPING	Source control, used to remove sediment tracked onto paved surfaces and to prevent sediment from entering drainage system. Sweep daily and at the end of the construction shift as needed. Kick brooms shall not be permitted.		X			X	X	
DEWATERING (Contractor is responsible for obtaining a permit from Colorado Department of Health and Environment.)	Shall be done in such a manner to prevent potential pollutants from entering state waters.		X			X	X	
TEMPORARY STREAM CROSSING (SWMP Administrator shall add locations to SWMP site maps)	Constructed over stream or drainage to prevent discharge of pollutants from construction equipment into water.		X			X	X	
CLEAN WATER DIVERSION	Placed to divert clean surface or ground water around disturbance area to prevent it from mixing with construction runoff.		X			X	X	
OTHER								

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CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

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Boulder County

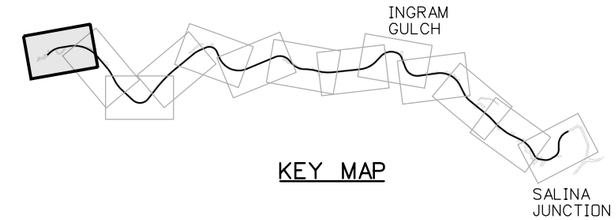
Michael Baker INTERNATIONAL

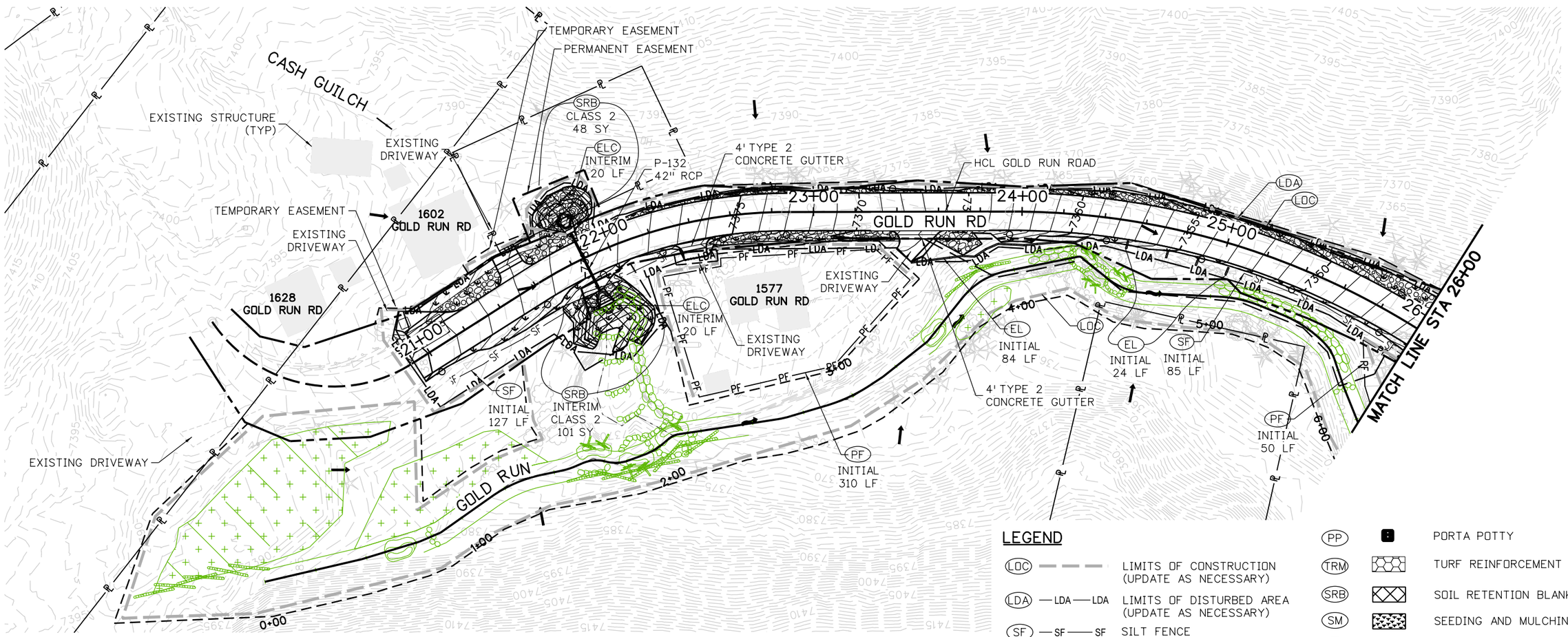
BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

DESIGNED:	CAD:	CHECKED:	DATE:
JLW	EMR	SLS	12/23/16

GOLD RUN ROAD
SWMP PLANS - GENERAL (SHEET 5 OF 7)

PROJECT NO: 4043.SEPT12C38 | SHEET NO: 196





LEGEND

LOC	— — —	LIMITS OF CONSTRUCTION (UPDATE AS NECESSARY)
LDA	—LDA—LDA	LIMITS OF DISTURBED AREA (UPDATE AS NECESSARY)
SF	—SF——SF	SILT FENCE
PF	—PF——PF	PLASTIC FENCE
EL		EROSION LOG
ELC		EROSION LOG FOR CULVERT
EL		EROSION LOG FOR DITCH
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SM		SEEDING AND MULCHING
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VTC		VEHICLE TRACKING PAD
CW		CONCRETE WASHOUT STRUCTURE
		RIPRAP
		STREAM FLOW DIRECTION
		FLOW ARROW

N

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HORIZONTAL SCALE: 1"=50'

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GOLD RUN ROAD
SWMP PLAN
(1 OF 13)

PROJECT NO: 4043.SEPT12C38 | SHEET NO: 197

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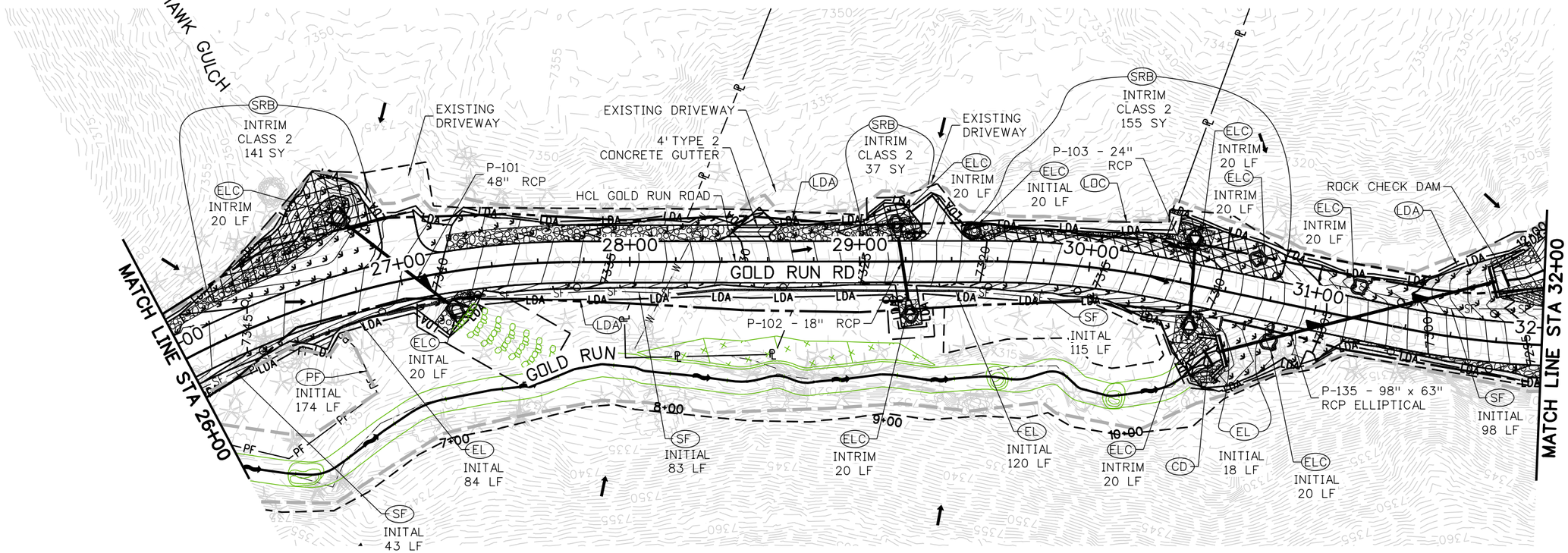

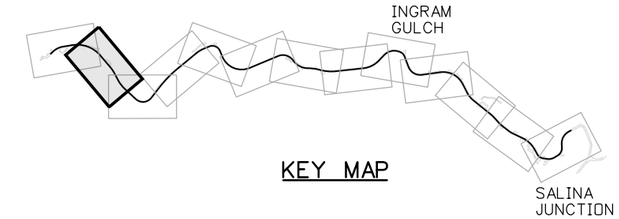

KEY MAP

LEGEND

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GOLD RUN ROAD
SWMP PLAN
(2 OF 13)

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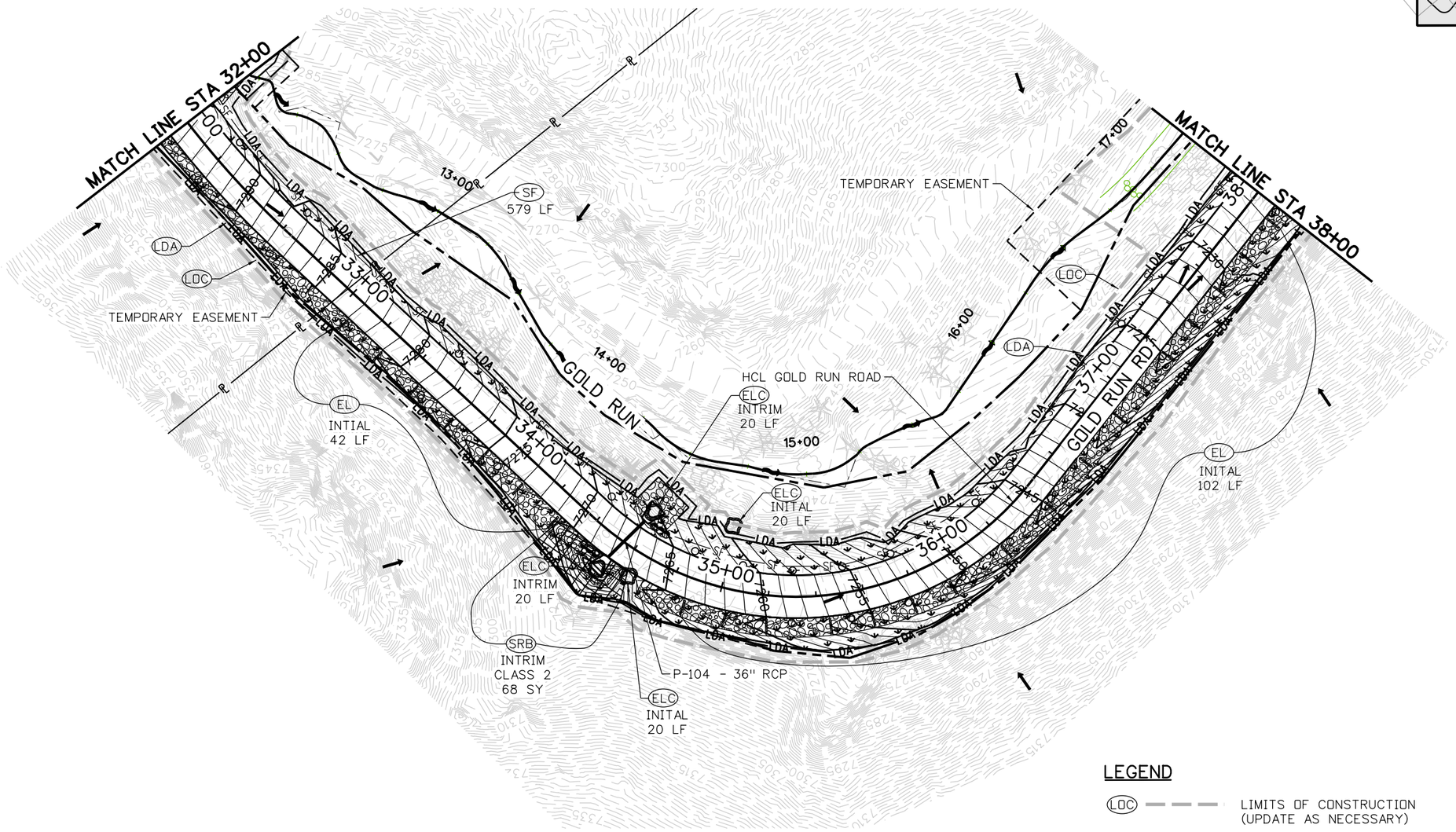

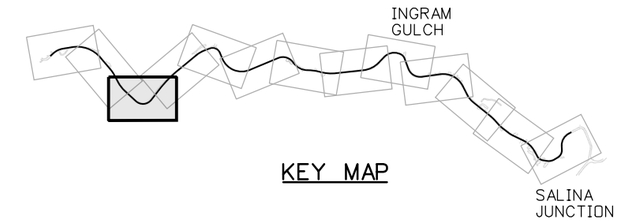

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GOLD RUN ROAD
SWMP PLAN
(3 OF 13)

PROJECT NO: 4043.SEPT12C38 | SHEET NO: 199

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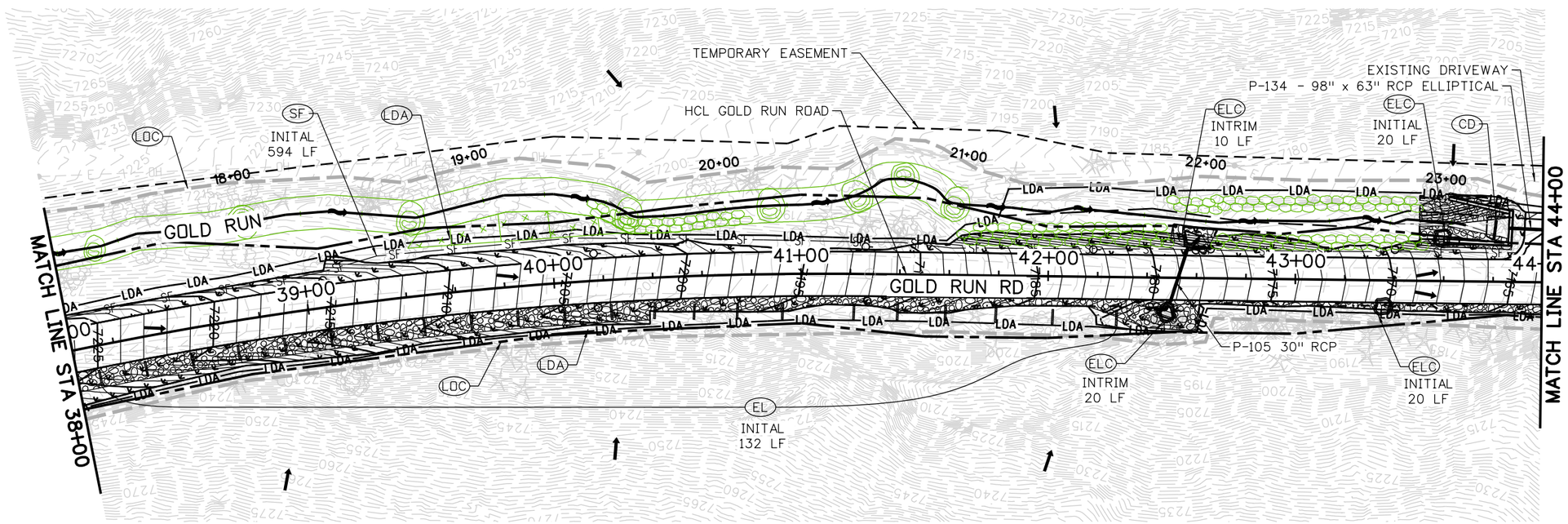

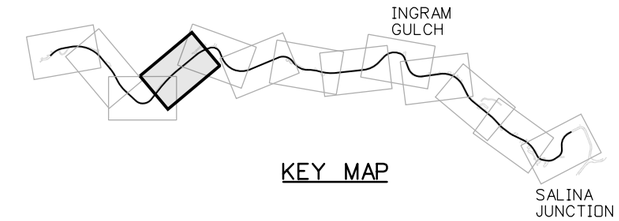

KEY MAP

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GOLD RUN ROAD
SWMP PLAN
(4 OF 13)

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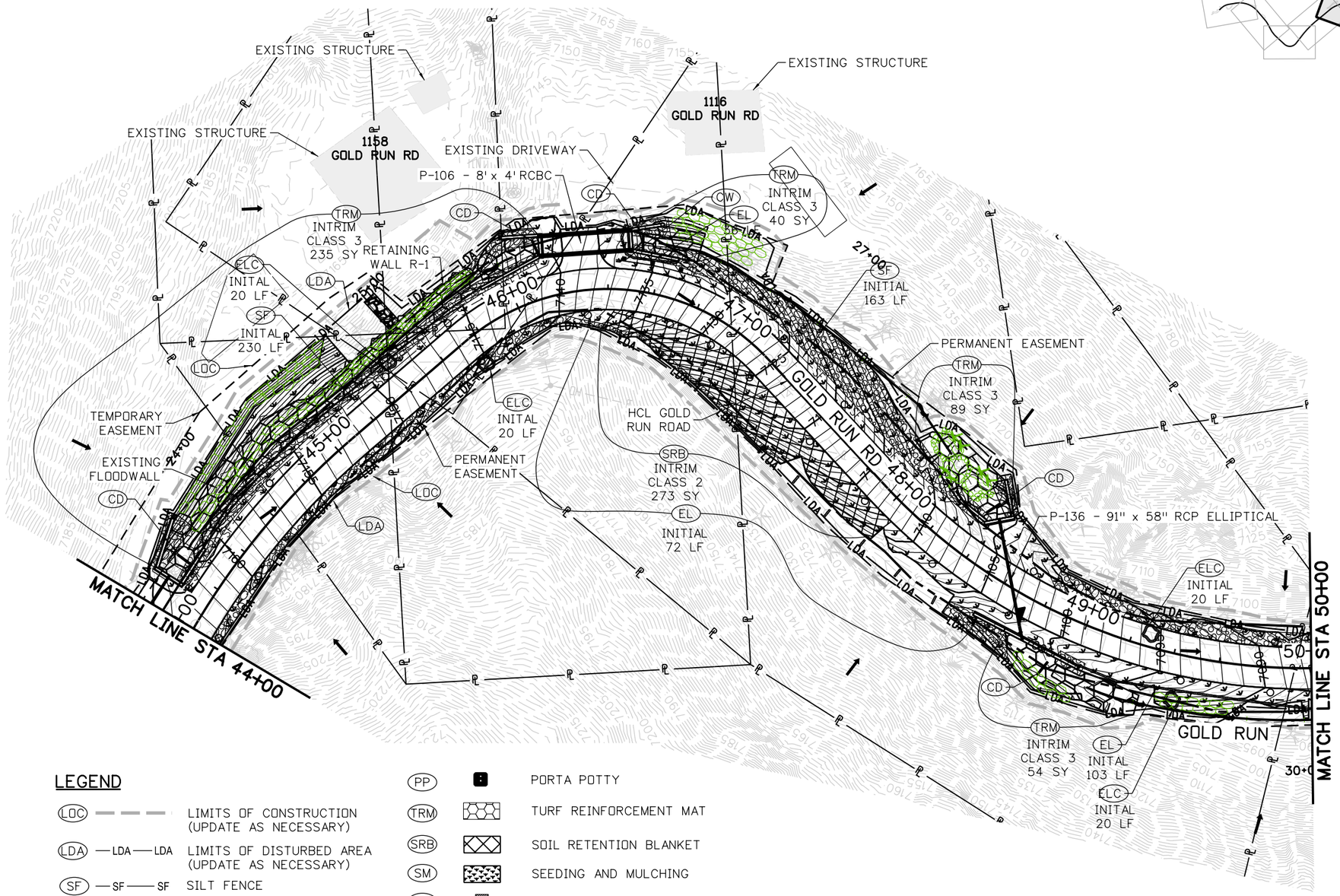

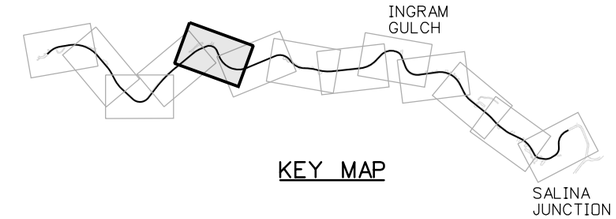

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Boulder County

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

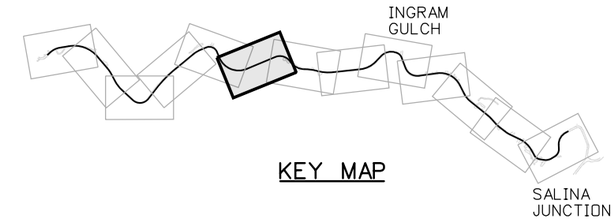
Michael Baker INTERNATIONAL

DESIGNED:	CAD:	CHECKED:	DATE:
JWL	EMR	SLS	12/23/16

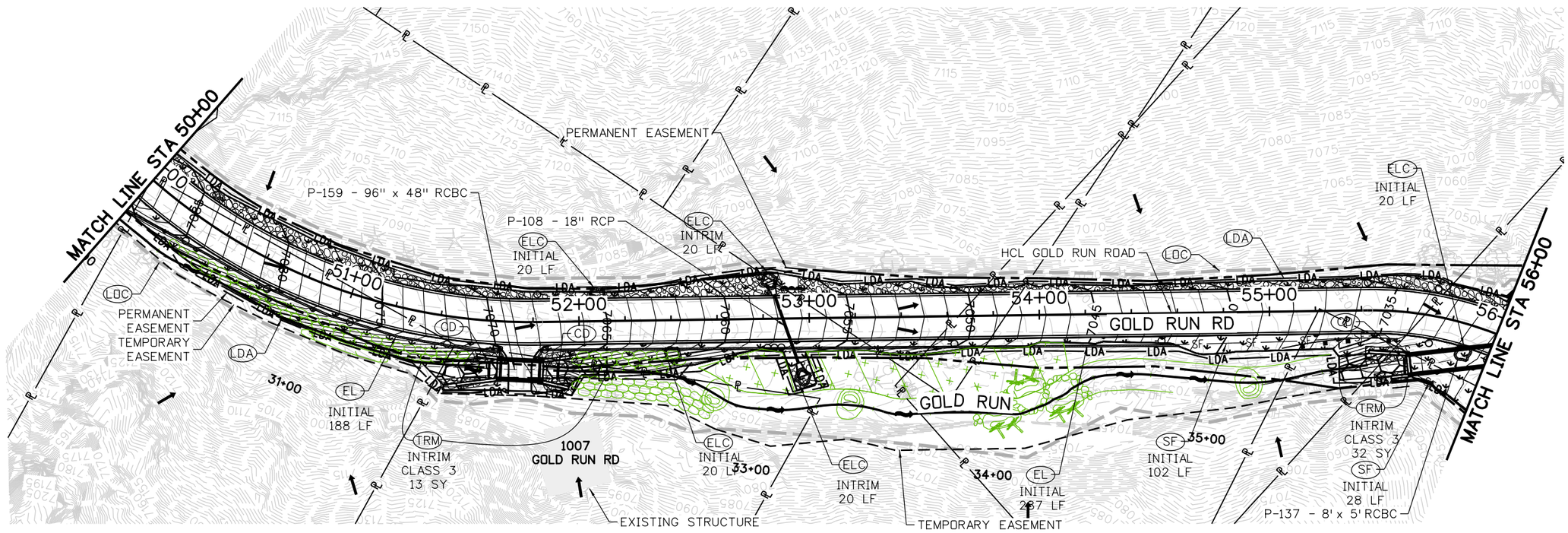
GOLD RUN ROAD
SWMP PLAN
(5 OF 13)

PROJECT NO: 4043.SEPT12C38 SHEET NO: 201

jessica.wray 1:43:47 PM 12/22/2016 pw:\\DCPWAPP1bkr.mbakercorp.com:pwprod\Documents\Projects\Lakewood_Office\Boulder_County_Emergency_Transportation\T02\08_Sheet_Files\11_SWMP\DGN\GOLD_RUN_SWMP05.dgn



KEY MAP



LEGEND

LOC	LIMITS OF CONSTRUCTION (UPDATE AS NECESSARY)
LDA — LDA — LDA	LIMITS OF DISTURBED AREA (UPDATE AS NECESSARY)
SF — SF — SF	SILT FENCE
PF — PF — PF	PLASTIC FENCE
EL	EROSION LOG
ELC	EROSION LOG FOR CULVERT
EL	EROSION LOG FOR DITCH
CD	ROCK CHECK DAM
PP	PORTA POTTY
TRM	TURF REINFORCEMENT MAT
SRB	SOIL RETENTION BLANKET
SM	SEEDING AND MULCHING
IP	INLET PROTECTION
VTC	VEHICLE TRACKING PAD
CW	CONCRETE WASHOUT STRUCTURE
	RIPRAP
	STREAM FLOW DIRECTION
	FLOW ARROW

N

25 0 25 50 FT
HORIZONTAL SCALE: 1"=50'

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

Boulder County

Michael Baker INTERNATIONAL

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

DESIGNED:	CAD:	CHECKED:	DATE:
JWL	EMR	SLS	12/23/16

GOLD RUN ROAD
SWMP PLAN
(6 OF 13)

PROJECT NO: 4043.SEPT12C38 SHEET NO: 202

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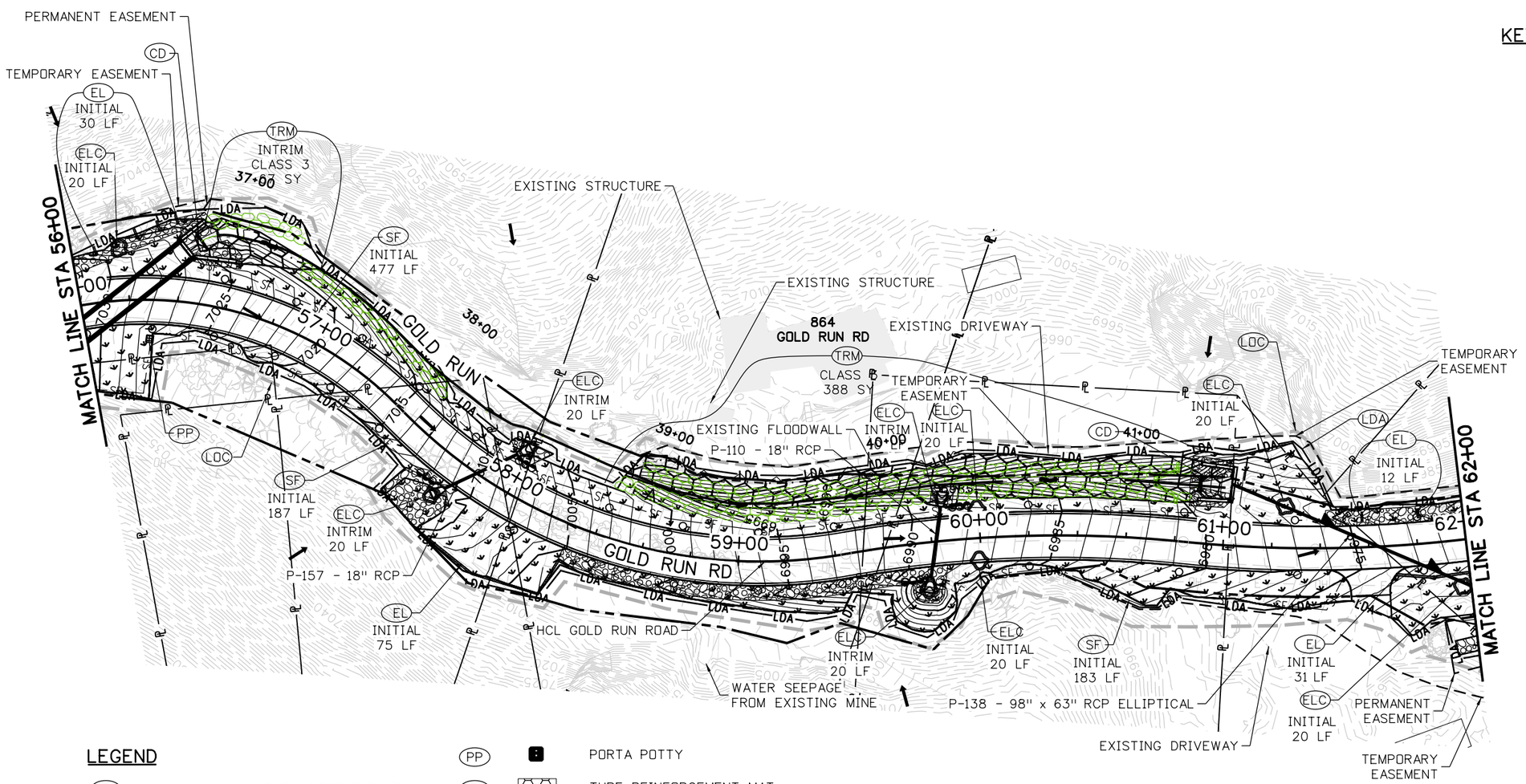

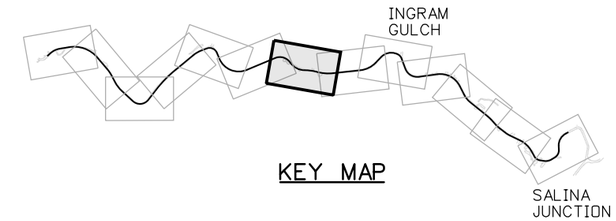

KEY MAP

LEGEND

LOC	— — —	LIMITS OF CONSTRUCTION (UPDATE AS NECESSARY)
LDA	—LDA—LDA	LIMITS OF DISTURBED AREA (UPDATE AS NECESSARY)
SF	—SF——SF	SILT FENCE
PF	—PF——PF	PLASTIC FENCE
EL		EROSION LOG
ELC		EROSION LOG FOR CULVERT
EL		EROSION LOG FOR DITCH
CD		ROCK CHECK DAM
PP		PORTA POTTY
TRM		TURF REINFORCEMENT MAT
SRB		SOIL RETENTION BLANKET
SM		SEEDING AND MULCHING
IP		INLET PROTECTION
VTC		VEHICLE TRACKING PAD
CW		CONCRETE WASHOUT STRUCTURE
		RIPRAP
		STREAM FLOW DIRECTION
		FLOW ARROW

N

25 0 25 50 FT
HORIZONTAL SCALE: 1"=50'

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
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Boulder County

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ENGINEERING DIVISION

Michael Baker INTERNATIONAL

DESIGNED:	CAD:	CHECKED:	DATE:
JWL	EMR	SLS	12/23/16

GOLD RUN ROAD
SWMP PLAN
(7 OF 13)

PROJECT NO: 4043.SEPT12C38 | SHEET NO: 203

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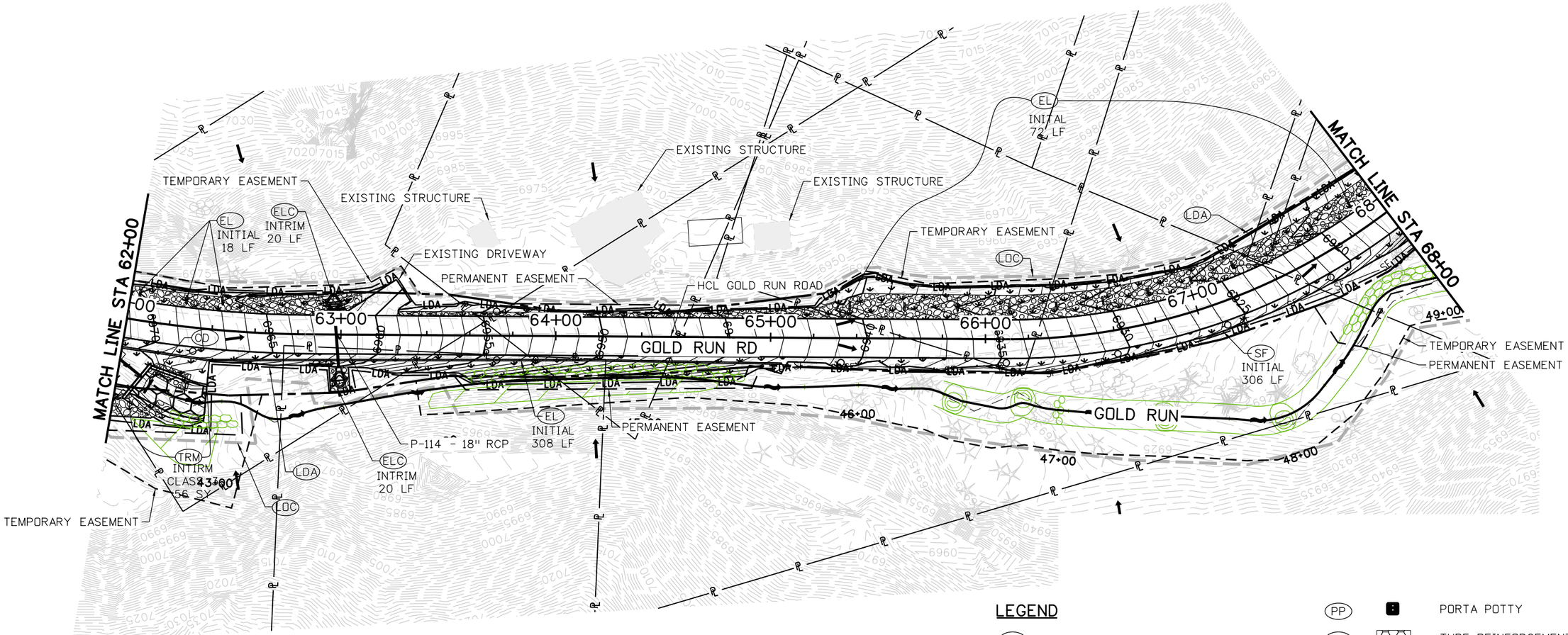

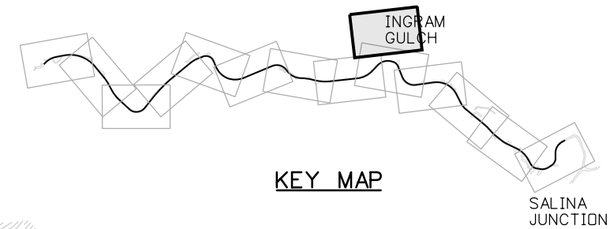

KEY MAP

N

25 0 25 50 FT

HORIZONTAL SCALE: 1"=50'

LEGEND

LOC	— — —	LIMITS OF CONSTRUCTION (UPDATE AS NECESSARY)
LDA	—LDA—LDA	LIMITS OF DISTURBED AREA (UPDATE AS NECESSARY)
SF	—SF—SF	SILT FENCE
PF	—PF—PF	PLASTIC FENCE
EL		EROSION LOG
ELC		EROSION LOG FOR CULVERT
EL		EROSION LOG FOR DITCH
CD		ROCK CHECK DAM
PP		PORTA POTTY
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SRB		SOIL RETENTION BLANKET
SM		SEEDING AND MULCHING
IP		INLET PROTECTION
VTC		VEHICLE TRACKING PAD
CW		CONCRETE WASHOUT STRUCTURE
		RIPRAP
		STREAM FLOW DIRECTION
		FLOW ARROW

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

Boulder County

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

Michael Baker INTERNATIONAL

12/23/16

DESIGNED:	CAD:	CHECKED:	DATE:
JWL	EMR	SLS	04/15/16

GOLD RUN ROAD
S\ 4043.SEPT12C38 N
(8 OF 13)

204

PROJECT NO: 4043.SEPT12C38 | SHEET NO:

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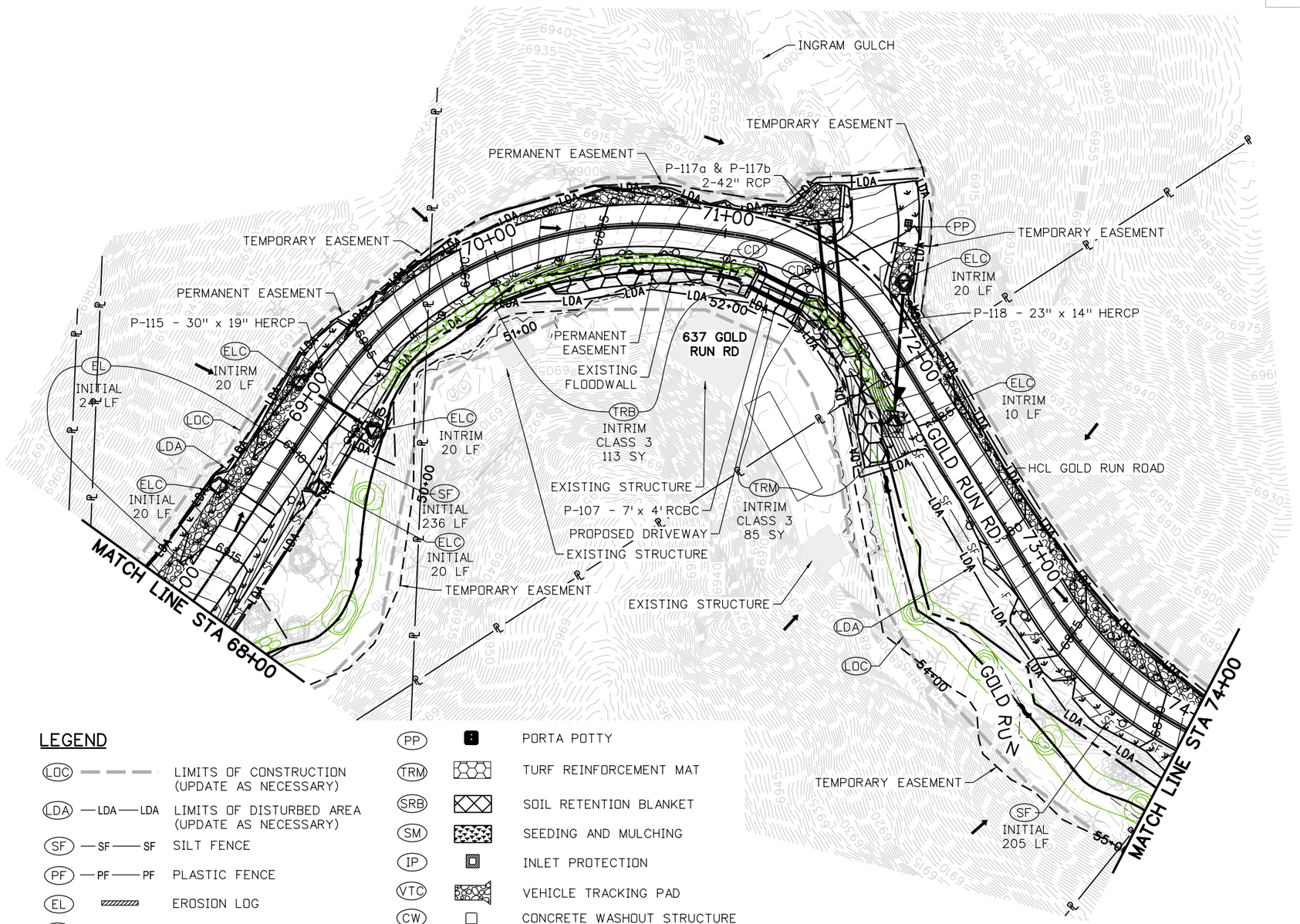

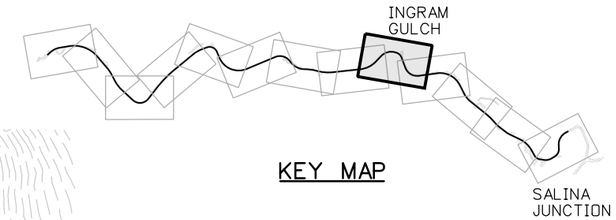

KEY MAP

LEGEND

LOC	— — —	LIMITS OF CONSTRUCTION (UPDATE AS NECESSARY)
LDA	—LDA—LDA	LIMITS OF DISTURBED AREA (UPDATE AS NECESSARY)
SF	—SF——SF	SILT FENCE
PF	—PF——PF	PLASTIC FENCE
EL		EROSION LOG
ELC		EROSION LOG FOR CULVERT
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CD		ROCK CHECK DAM
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SRB		SOIL RETENTION BLANKET
SM		SEEDING AND MULCHING
IP		INLET PROTECTION
VTC		VEHICLE TRACKING PAD
CW		CONCRETE WASHOUT STRUCTURE
		RIPRAP
		STREAM FLOW DIRECTION
		FLOW ARROW

N

25 0 25 50 FT
HORIZONTAL SCALE: 1"=50'

100% SET

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Boulder County

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

Michael Baker INTERNATIONAL

DESIGNED:	CAD:	CHECKED:	DATE:
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GOLD RUN ROAD
SWMP PLAN
(9 OF 13)

PROJECT NO: 4043.SEPT12C38 | SHEET NO: 205

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LEGEND

LOC	— — —	LIMITS OF CONSTRUCTION (UPDATE AS NECESSARY)
LDA	—LDA—LDA	LIMITS OF DISTURBED AREA (UPDATE AS NECESSARY)
SF	—SF——SF	SILT FENCE
PF	—PF——PF	PLASTIC FENCE
EL		EROSION LOG
ELC		EROSION LOG FOR CULVERT
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		RIPRAP
		STREAM FLOW DIRECTION
		FLOW ARROW

N

25 0 25 50 FT
HORIZONTAL SCALE: 1"=50'

100% SET

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ENGINEERING DIVISION

Michael Baker INTERNATIONAL

DESIGNED:	CAD:	CHECKED:	DATE:
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GOLD RUN ROAD
SWMP PLAN
(10 OF 13)

PROJECT NO: 4043.SEPT12C38 | SHEET NO: 206

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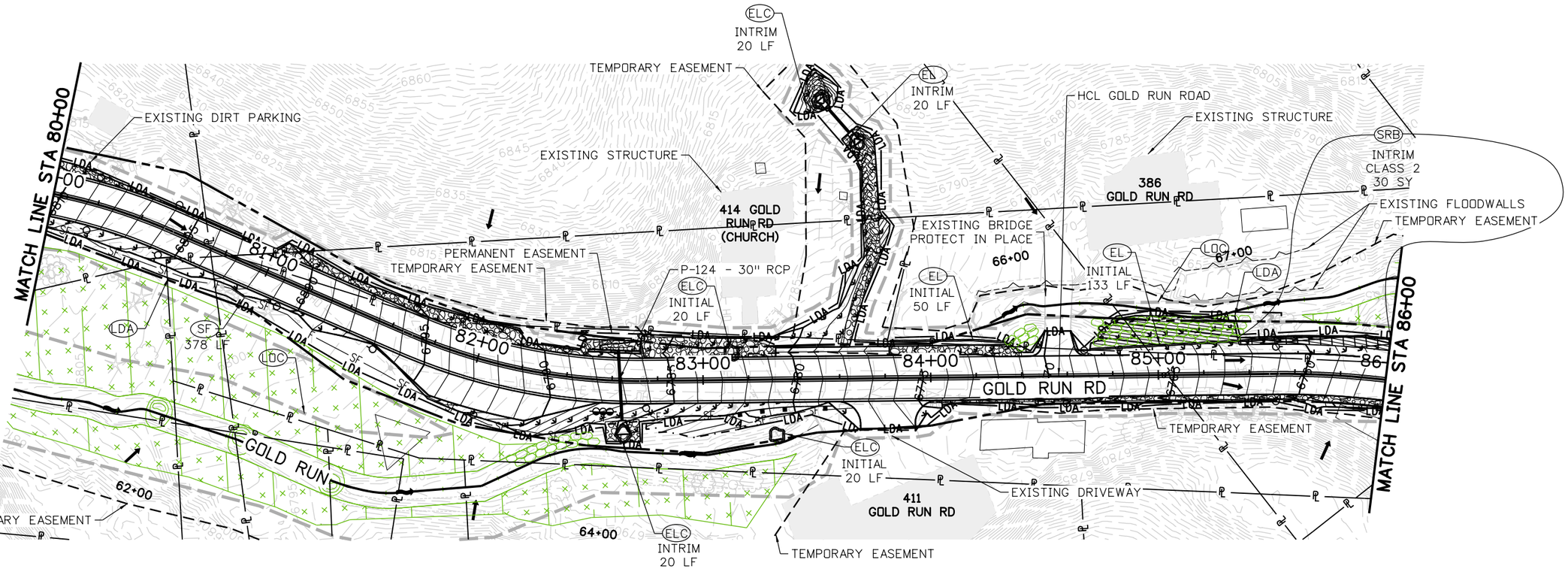

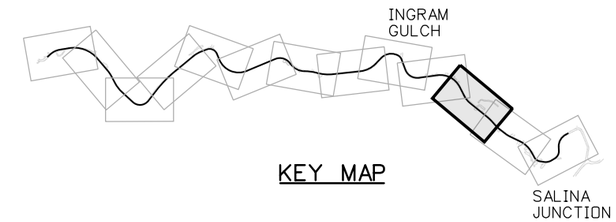

KEY MAP

LEGEND

LOC	— — —	LIMITS OF CONSTRUCTION (UPDATE AS NECESSARY)
LDA	—LDA—LDA	LIMITS OF DISTURBED AREA (UPDATE AS NECESSARY)
SF	—SF——SF	SILT FENCE
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CW		CONCRETE WASHOUT STRUCTURE
		RIPRAP
		STREAM FLOW DIRECTION
		FLOW ARROW

N

25 0 25 50 FT
HORIZONTAL SCALE: 1"=50'

100% SET

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ENGINEERING DIVISION

Michael Baker INTERNATIONAL

DESIGNED:	CAD:	CHECKED:	DATE:
JWL	EMR	SLS	12/23/16

GOLD RUN ROAD
SWMP PLAN
(11 OF 13)

PROJECT NO: 4043.SEPT12C38 | SHEET NO: 207

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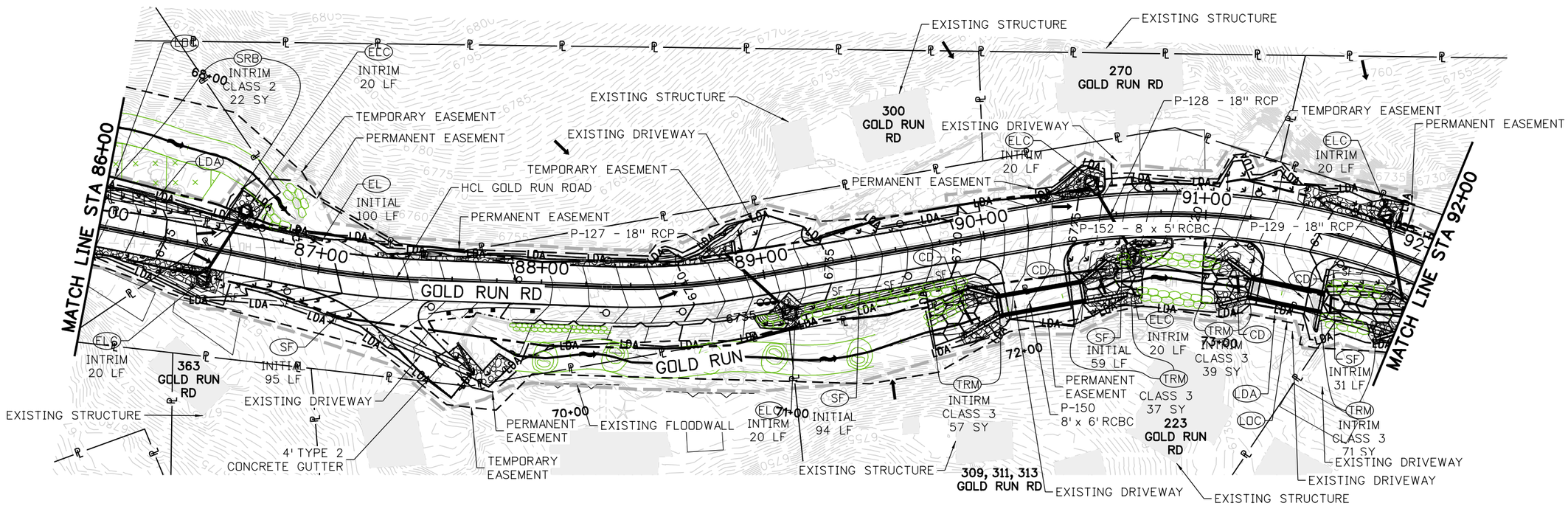

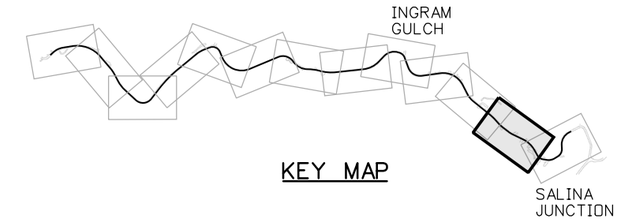

KEY MAP

LEGEND

LOC		LIMITS OF CONSTRUCTION (UPDATE AS NECESSARY)
LDA	—LDA—LDA	LIMITS OF DISTURBED AREA (UPDATE AS NECESSARY)
SF	—SF——SF	SILT FENCE
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CW		CONCRETE WASHOUT STRUCTURE
		RIPRAP
		STREAM FLOW DIRECTION
		FLOW ARROW

N

25 0 25 50 FT
HORIZONTAL SCALE: 1"=50'

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
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REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

Boulder County

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

Michael Baker INTERNATIONAL

DESIGNED:	CAD:	CHECKED:	DATE:
JWL	EMR	SLS	12/23/16

GOLD RUN ROAD
SWMP PLAN
(12 OF 13)

PROJECT NO: 4043.SEPT12C38 | SHEET NO: 208

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LEGEND

LOC	LIMITS OF CONSTRUCTION (UPDATE AS NECESSARY)
LDA	LIMITS OF DISTURBED AREA (UPDATE AS NECESSARY)
SF	SILT FENCE
PF	PLASTIC FENCE
EL	EROSION LOG
ELC	EROSION LOG FOR CULVERT
EL	EROSION LOG FOR DITCH
CD	ROCK CHECK DAM
PP	PORTA POTTY
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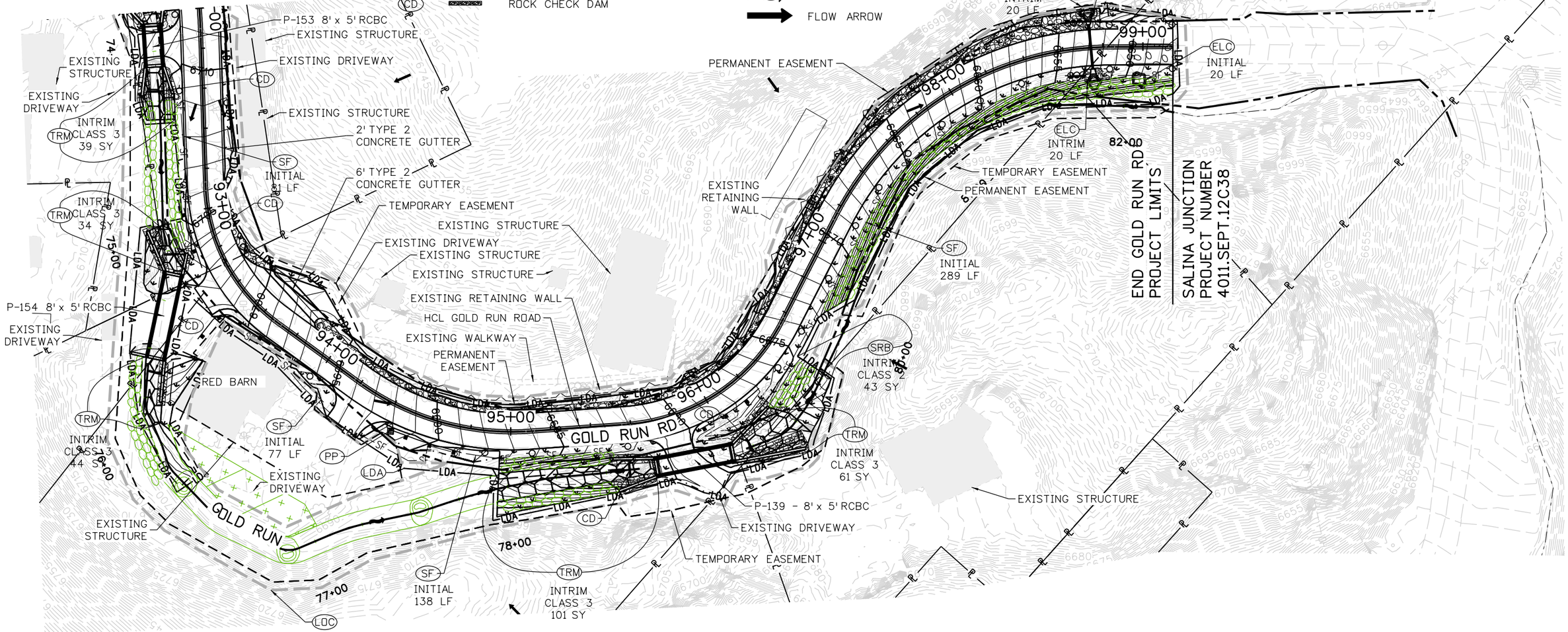
	RIPRAP
	STREAM FLOW DIRECTION
	FLOW ARROW



100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
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REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION
Boulder County
Michael Baker INTERNATIONAL

DESIGNED:	CAD:	CHECKED:	DATE:
JWL	EMR	SLS	12/23/16

GOLD RUN ROAD
SWMP PLANS (13 OF 13)

PROJECT NO: 4043.SEPT12C38 | SHEET NO: 209

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