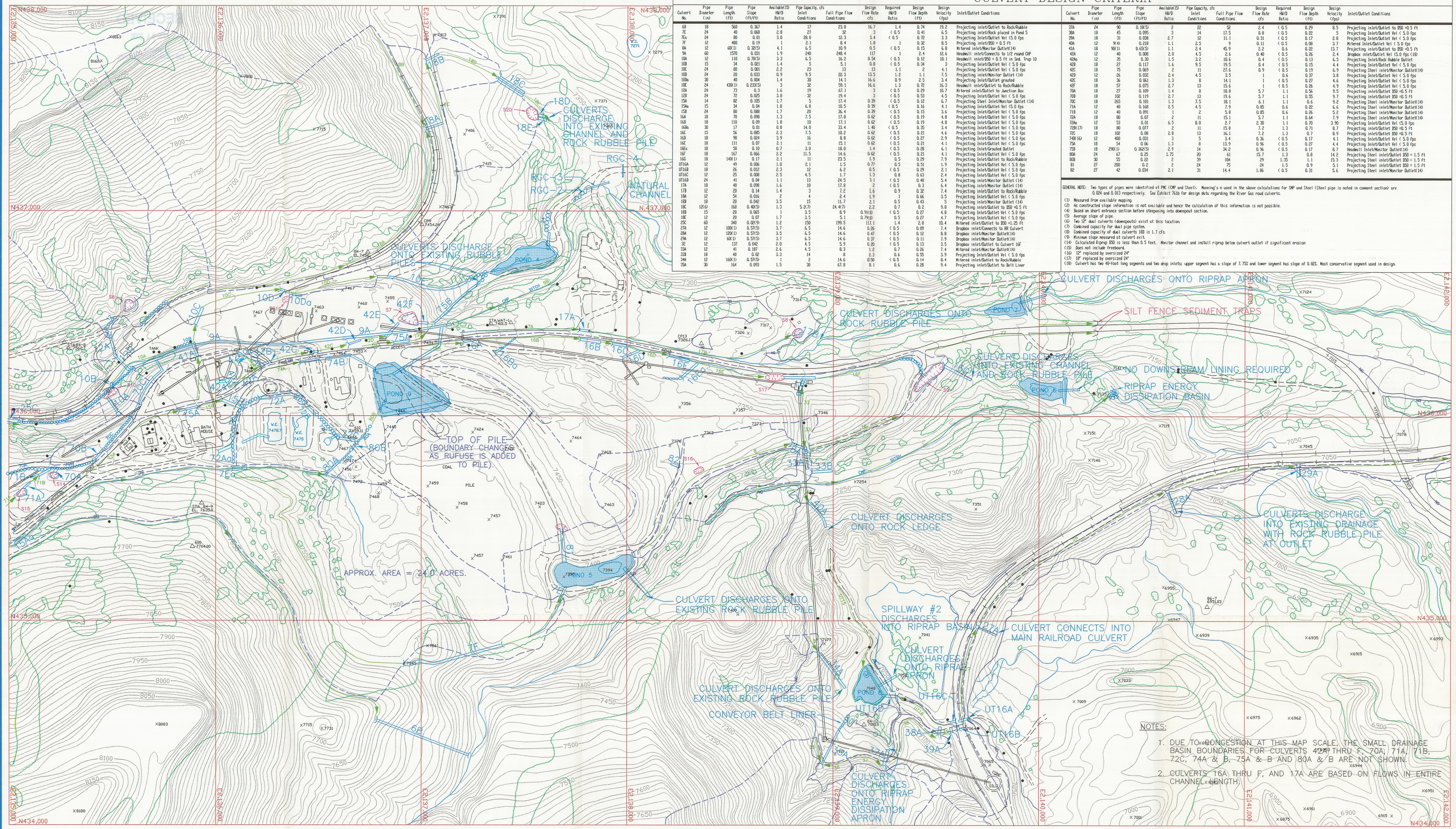
CULVERT DESIGN CRITERIA

Culvert No.	Pipe Diameter (in)	Pipe Length (ft)	Pipe Slope (ft/ft)	Available(5) HW/D Ratio	Pipe Capacity, cfs Inlet Conditions	Pipe Capacity, cfs Full Pipe Flow Conditions	Design Flow Rate cfs	Required HW/D Ratio	Design Flow Depth (ft)	Design Velocity (fps)	Inlet/Outlet Conditions
6B	18	560	0.367	1.4	17	23.8	16.7	1.4	0.74	19.2	Projecting inlet/Outlet to Rock/Rubble
7E	24	40	0.068	2.8	27	32	3	< 0.5	0.41	6.5	Projecting inlet/Rock placed in Pond 5
7Ea	24	80	0.01	3.0	28.0	12.3	3.4	< 0.5	0.72	3.3	Projecting Inlet/Outlet Vel < 5.0 fps
7F	12	480	0.19	1	2.1	8.4	1.8	1	0.32	8.5	Projecting inlet/D50 = 0.5 ft
8A	12	60(1)	0.32(5)	4.1	6.5	10.9	0.5	< 0.5	0.15	6.8	Mitered inlet/Monitor Outlet(14)
9A	60	1570	0.031	1.9	240	248.4	117	1	2.4	12.6	Headwall inlet/Connects to 1/2 round CMP
10A	12	110	0.70(5)	3.3	6.5	16.2	0.54	< 0.5	0.12	10.1	Headwall inlet/D50 = 0.5 ft in Sed. Trap 10
10B	15	34	0.021	1.4	5	5.1	0.8	< 0.5	0.34	3	Projecting Inlet/Outlet Vel < 5.0 fps
10C	24	80	0.001	2.2	23	13	13	1.1	2	4.1	Projecting Inlet/Outlet Vel < 5.0 fps
10D	24	20	0.033	0.9	9.5	22.3	13.5	1.2	1.1	7.5	Projecting Inlet/Monitor Outlet (14)
10Da	30	40	0.004	1.4	30	14.1	16.6	0.9	2.5	3.4	Projecting Inlet/Outlet grouted
11C	24	430(1)	0.233(5)	3	32	59.1	16.6	1.3	0.72	16.3	Headwall Inlet/Outlet to Rock/Rubble
12A	24	73	0.3	1.6	19	67.1	3	< 0.5	0.29	10.7	Mitered inlet/Outlet to Junction Box
12B	24	72	0.025	3.8	32	19.4	3	< 0.5	0.53	4.5	Projecting Inlet/Outlet Vel < 5.0 fps
15A	14	82	0.105	1.7	5	17.4	0.39	< 0.5	0.12	6.7	Projecting Steel Inlet/Monitor Outlet (14)
15Aa	15	34	0.04	1.8	6.8	10.5	0.39	< 0.5	0.16	4.1	Projecting Inlet/Outlet Vel <5.0 fps
15B	24	80	0.080	1.7	20	36.4	0.39	< 0.5	0.15	3.6	Projecting Inlet/Outlet Vel < 5.0 fps
16A	18	70	0.098	1.3	7.5	17.8	0.62	< 0.5	0.19	4.8	Projecting Inlet/Outlet Vel < 5.0 fps
16B	18	110	0.09	1.8	10	17.1	0.62	< 0.5	0.19	4.8	Projecting Inlet/Outlet Vel < 5.0 fps
16Ba	30	17	0.01	0.8	14.9	33.4	1.40	< 0.5	0.25	3.4	Projecting Inlet/Outlet Vel < 5.0 fps
16C	15	56	0.085	2.3	7.5	10.2	0.62	< 0.5	0.21	4.6	Projecting Inlet/Outlet Vel < 5.0 fps
16D	18	90	0.024	3.9	16	8.8	0.62	< 0.5	0.27	2.9	Projecting Inlet/Outlet Vel < 5.0 fps
16E	18	111	0.07	2.1	11	15.1	0.62	< 0.5	0.21	4.1	Projecting Inlet/Outlet Vel < 5.0 fps
16Ea	18	50	0.10	0.7	3.0	18.0	1.4	< 0.5	0.28	6.1	Projecting Inlet/Grouted Outlet
16F	18	167	0.066	2.2	11.5	14.6	0.62	< 0.5	0.21	4.1	Projecting Inlet/Outlet Vel < 5.0 fps
16G	18	140(1)	0.17	2.1	11	23.5	1.9	0.5	0.29	7.9	Projecting Inlet/Outlet to Rock/Rubble
UT16A	12	49	0.006	1.0	2.1	1.5	0.77	0.5	0.51	1.9	Projecting Inlet/Outlet Vel < 5.0 fps
UT16B	18	26	0.012	2.3	12	6.2	0.5	0.5	0.29	2.1	Projecting Inlet/Outlet Vel < 5.0 fps
UT16C	12	25	0.008	2.5	4.5	1.7	1.3	0.8	0.63	2.4	Projecting Inlet/Outlet Vel < 5.0 fps
UT16D	24	41	0.04	1.1	13	24.5	3.1	< 0.5	0.48	5.4	Projecting inlet/Monitor Outlet (14)
17A	18	40	0.098	1.6	10	17.8	2	< 0.5	0.3	6.4	Projecting inlet/Monitor Outlet (14)
17B	12	20	0.14	1.4	3	7.6	1.6	0.9	0.32	7.4	Projecting Inlet/Outlet to Rock/Rubble
18A	12	54	0.016	2	4	2.4	1.9	1	0.66	3.5	Projecting Inlet/Outlet Vel < 5.0 fps
18B	18	20	0.042	3.5	15	11.7	2.1	0.5	0.43	5	Projecting inlet/Monitor Outlet (14)
18C	12(6)	160	0.40(5)	1.3	5.2(7)	24.4(7)	2.2	0.7	0.2	9.8	Projecting inlet/Outlet to D50 =0.5 ft
18D	15	20	0.065	1	3.5	8.9	0.91(8)	< 0.5	0.27	4.8	Projecting Inlet/Outlet Vel < 5.0 fps
18E	12	20	0.07	1.7	3.5	5.1	0.79(8)	0.5	0.27	4.7	Projecting Inlet/Outlet Vel < 5.0 fps
25C	60	340	0.02(9)	1.2	150	199.5	117.1	1.4	2.8	10.4	Mitered inlet/Outlet to D50 =1.25 ft
27A	12	100(1)	0.57(5)	3.7	6.5	14.6	0.26	< 0.5	0.09	7.4	Dropbox inlet/Connects to 6R Culvert
29A	12	100(1)	0.57(5)	3.5	6.5	14.6	0.47	< 0.5	0.12	8.8	Dropbox inlet/Monitor Outlet(14)
29A	12	60(1)	0.57(5)	3.7	6.5	14.6	0.37	< 0.5	0.11	7.9	Dropbox inlet/Monitor Outlet(14)
32	12	137	0.042	2.0	4.5	5.9	0.20	< 0.5	0.13	3.5	Dropbox inlet/Outlet to Culvert 16F
33A	12	41	0.187	2.6	4.5	8.3	1.2	0.7	0.26	7.4	Mitered inlet/Monitor Outlet(14)
33B	18	40	0.02	3.3	14	8	2.3	0.6	0.55	3.9	Projecting Inlet/Outlet Vel < 5.0 fps
34A	12	160(1)	0.57(5)	1	2	14.6	0.58	< 0.5	0.14	8.4	Mitered inlet/Outlet to Rock/Rubble
35A	30	164	0.093	1.5	30	67.8	8.1	0.6	0.28	9.4	Projecting inlet/Outlet to Belt Liner
37A	24	90	0.18(5)	2	22	52	2.4	< 0.5	0.29	8.5	Projecting inlet/Outlet to D50 =0.5 ft
38A	18	45	0.095	3	14	17.5	0.8	< 0.5	0.22	5	Projecting Inlet/Outlet Vel < 5.0 fps
39A	18	31	0.038	2.7	12	11.1	0.31	< 0.5	0.17	2.8	Projecting Inlet/Outlet Vel < 5.0 fps
40A	12	9(4)	0.218	1.1	2.5	9	0.11	< 0.5	0.08	3.7	Mitered Inlet/Outlet Vel < 5.0 fps
41A	18	90(1)	0.65(5)	1.1	2.4	45.9	2.2	0.6	0.22	13.7	Projecting inlet/Outlet to D50 =0.5 ft
42A	12	40	0.008	2.0	4.5	2.6	0.40	< 0.5	0.26	2.4	Dropbox inlet/Outlet Vel <5.0 fps (10)
42Aa	12	35	0.30	1.5	3.2	10.6	0.4	< 0.5	0.13	6.5	Projecting Inlet/Rock Rubble Outlet
42B	18	27	0.117	1.6	9.5	19.5	0.4	< 0.5	0.15	4.4	Projecting Inlet/Outlet Vel < 5.0 fps
42C	18	75	0.069	2	11	27.6	0.9	< 0.5	0.19	6.9	Projecting Steel Inlet/Monitor Outlet(14)
42D	12	26	0.032	2.4	4.5	3.5	1	0.6	0.37	3.8	Projecting Inlet/Outlet Vel < 5.0 fps
42E	18	36	0.061	1.3	8	14.1	1	< 0.5	0.27	4.6	Projecting Inlet/Outlet Vel < 5.0 fps
42F	18	57	0.075	2.7	13	15.6	1	< 0.5	0.26	4.9	Projecting Inlet/Outlet Vel < 5.0 fps
70A	18	27	0.109	1.4	8	18.8	5.7	1.1	0.56	9.5	Projecting inlet/Outlet D50 =0.5 ft
70B	18	102	0.119	2.7	13	19.6	5.7	1.1	0.55	9.7	Projecting inlet/Outlet D50 =0.5 ft
70C	18	265	0.101	1.3	7.5	18.1	6.1	1.1	0.6	9.2	Projecting Steel inlet/Monitor Outlet(14)
71A	12	40	0.168	2.5	4.5	7.9	0.85	0.6	0.22	6.6	Projecting Steel inlet/Monitor Outlet(14)
71B	12	40	0.091	1	2	5.8	0.85	0.6	0.26	5.2	Projecting Steel inlet/Monitor Outlet(14)
72A	18	80	0.07	2	11	15.1	5.7	1.1	0.64	7.9	Projecting Steel inlet/Monitor Outlet(14)
72Aa	12	53	0.01	6.5	8.0	2.7	2.30	1.1	0.70	3.90	Projecting Steel inlet/Monitor Outlet (5.0 fps
72B(17)	18	80	0.077	2	11	15.8	7.2	1.3	0.71	8.7	Projecting inlet/Outlet D50 =0.5 ft
72C	18	102	0.08	2.8	13	16.1	7.2	1.3	0.7	8.9	Projecting inlet/Outlet D50 =0.5 ft
74A(16)	12	400	0.031	3	5	3.4	0.36	< 0.5	0.17	4.1	Projecting Inlet/Outlet Vel < 5.0 fps
75A	18	54	0.06	1.3	8	13.9	0.96	< 0.5	0.27	4.4	Projecting Inlet/Outlet Vel < 5.0 fps
75B	18	290(1)	0.362(5)	2.9	14	34.2	0.96	< 0.5	0.17	8.7	Headwall Inlet/Monitor Outlet(14)
80A	24	67	0.25	1.75	20	61	15.7	1.3	0.8	14.2	Projecting Steel inlet/Outlet D50 = 1.5 ft
80B	30	55	0.22	2	29	104	29	1.35	1.1	15.3	Projecting Steel inlet/Outlet D50 = 1.5 ft
81	27	200	0.2	2	24	75	24	1.5	0.9	5.1	Projecting Steel inlet/Outlet D50 = 1.5 ft
82	27	42	0.034	2.1	31	14.4	1.86	< 0.5	0.31	5.6	Projecting Steel inlet/Monitor Outlet(14)

GENERAL NOTE: Two types of pipes were identified at PMC (CMP and Steel). Manning's n used in the above calculations for CMP and Steel (Steel pipe is noted in comment section) are 0.024 and 0.013 respectively. See Exhibit 761b for design data regarding the River Gas road culverts.

(1) Measured from available mapping.
(2) As constructed slope information is not available and hence the calculation of this information is not possible.
(4) Based on short entrance section before steepening into downspout section.
(5) Average slope of pipe.
(6) Two 12" dual culverts (downspouts) exist at this location.
(7) Combined capacity for dual pipe system.
(8) Combined capacity of dual culverts 18D is 1.7 cfs.
(9) Minimum slope measured at culvert exit.
(14) Calculated Riprap D50 is less than 0.5 feet. Monitor channel and install riprap below culvert outlet if significant erosion
(15) Does not include freeboard.
(16) 12" replaced by oversized 24"
(17) 18" replaced by oversized 24"
(18) Culvert has two 40-foot long segments and two drop inlets; upper segment has a slope of 7.75% and lower segment has slope of 0.82%. Most conservative segment used in design.



NOTES:

1. DUE TO CONGESTION AT THIS MAP SCALE, THE SMALL DRAINAGE BASIN BOUNDARIES FOR CULVERTS 42D THRU F, 70A, 71A, 71B, 72C, 74A & B, 75A & B AND 80A & B ARE NOT SHOWN.
2. CULVERTS 16A THRU F, AND 17A ARE BASED ON FLOWS IN ENTIRE CHANNEL LENGTH.

LEGEND

PRIMARY ROAD
SECONDARY ROAD
TRAIL
BRIDGE, CULVERT
RAILROAD
BUILDINGS, STRUCTURES
LAKE, POND
RIVER, STREAM
FENCE
CONTOURS
TREE LINES
TRAVERSE STATION
HORIZONTAL CONTROL
VERTICAL CONTROL
PHOTO CENTER
DRILL HOLE
SPOT ELEVATION
WATER SPOT
NEW LOCAL COORDINATE GRID TICK
SECTION CORNER
SWAMP
REFUSE PILE BOUNDARY
MINE PORTAL
DOWN SPOUT
CATCH BASIN
LIGHT POLE
POWER POLE
UNLINED DITCH SECTION AND DITCH NUMBER
LINED DITCH SECTION AND DITCH NUMBER
BERM
DITCH DRAINAGE BASIN DIVIDE
CULVERT AND CULVERT NUMBER
SEDIMENT TRAP

FILE: G:\UC569\07\DWG\731-720E 3-20-00

NOTE:
SEE TABLE 526.11o FOR EXISTING FACILITIES NAMES.

NORTH

200 100 0 200

RECEIVED
APR 04 2000
DIVISION OF OIL, GAS AND MINING

REGISTERED PROFESSIONAL ENGINEER
No. 168246
RICHARD B. WHITE
STATE OF UTAH

RAG

REVISION/HISTORY		
BY	DATE	DESCRIPTION
	12-7-95	UPDATE
1.		
2.		
3.		
4.		
5.		
6.		

STARPOINT MINE
SURFACE WATER AND SEDIMENTATION CONTROL FACILITIES MAP B

INCORPORATED EFFECTIVE: APR 26 2000
UTAH DIVISION OIL, GAS AND MINING

PLATEAU MINING CORPORATION
847 NW HIGHWAY 191 HELPER, UTAH 84526
PHONE: (435) 472-0475

F-12

MAP 731.720e