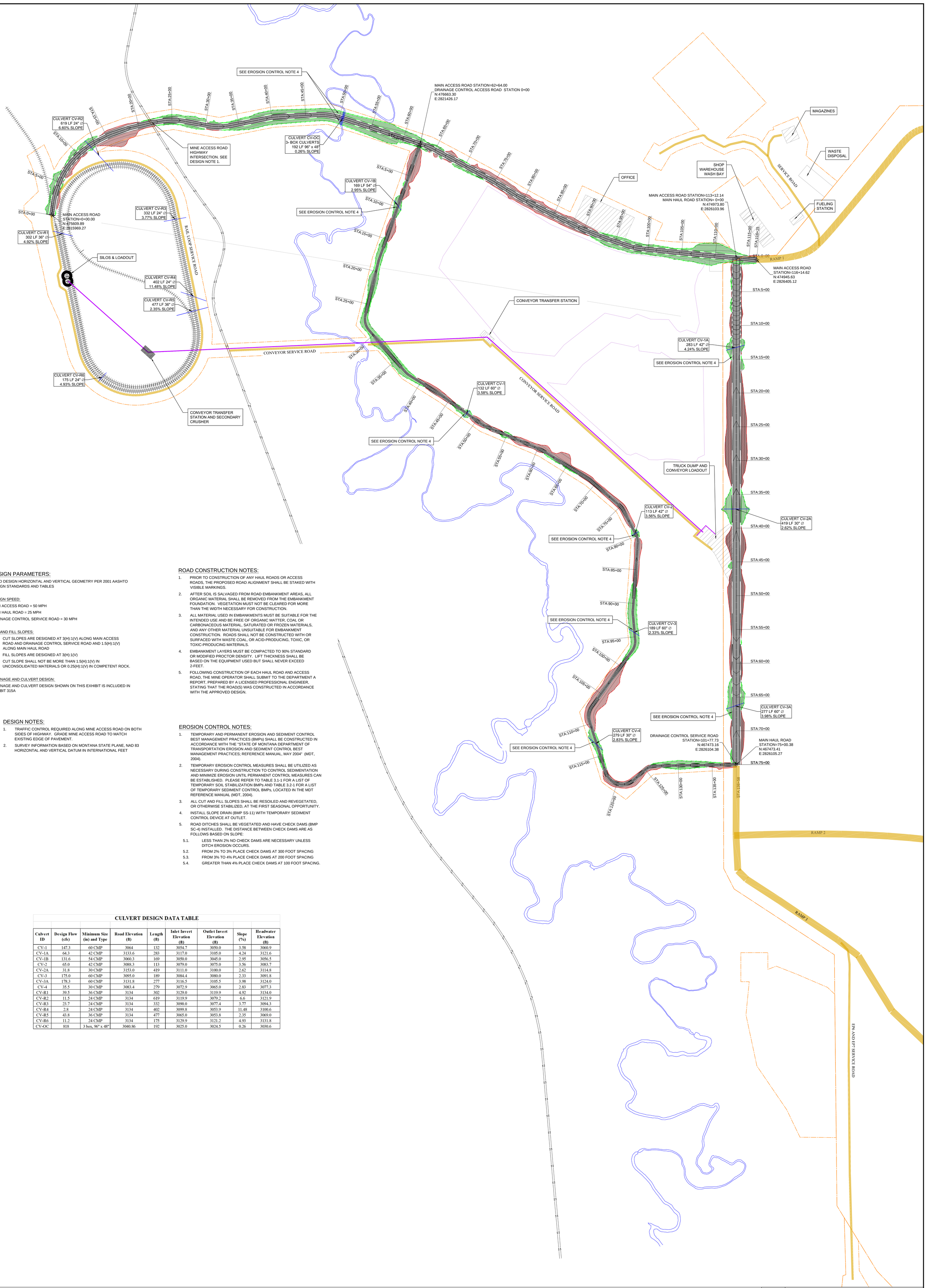

DESIGN PARAMETERS:

ROAD DESIGN HORIZONTAL AND VERTICAL GEOMETRY PER 2001 AASHTO DESIGN STANDARDS AND TABLES

DESIGN SPEED:

MAIN ACCESS ROAD = 50 MPH

MAIN HAUL ROAD = 25 MPH

DRAINAGE CONTROL SERVICE ROAD = 30 MPH

CUT AND FILL SLOPES:

1. CUT SLOPES ARE DESIGNED AT 3(H):1(V) ALONG MAIN ACCESS ROAD AND DRAINAGE CONTROL SERVICE ROAD AND 1.5(H):1(V) ALONG MAIN HAUL ROAD
2. FILL SLOPES ARE DESIGNED AT 3(H):1(V)
3. CUT SLOPE SHALL NOT BE MORE THAN 1.5(H):1(V) IN UNCONSOLIDATED MATERIALS OR 0.25(H):1(V) IN COMPETENT ROCK.

DRAINAGE AND CULVERT DESIGN:

DRAINAGE AND CULVERT DESIGN SHOWN ON THIS EXHIBIT IS INCLUDED IN EXHIBIT 315A

DESIGN NOTES:

1. TRAFFIC CONTROL REQUIRED ALONG MINE ACCESS ROAD ON BOTH SIDES OF HIGHWAY. GRADE MINE ACCESS ROAD TO MATCH EXISTING EDGE OF PAVEMENT.
2. SURVEY INFORMATION BASED ON MONTANA STATE PLANE, NAD 83 HORIZONTAL AND VERTICAL DATUM IN INTERNATIONAL FEET

ROAD CONSTRUCTION NOTES:

1. PRIOR TO CONSTRUCTION OF ANY HAUL ROADS OR ACCESS ROADS, THE PROPOSED ROAD ALIGNMENT SHALL BE STAKED WITH VISIBLE MARKINGS.
2. AFTER SOIL IS SALVAGED FROM ROAD EMBANKMENT AREAS, ALL ORGANIC MATERIAL SHALL BE REMOVED FROM THE EMBANKMENT FOUNDATION. VEGETATION MUST NOT BE CLEARED FOR MORE THAN THE WIDTH NECESSARY FOR CONSTRUCTION.
3. ALL MATERIAL USED IN EMBANKMENTS MUST BE SUITABLE FOR THE INTENDED USE AND BE FREE OF ORGANIC MATTER, COAL OR CARBONACEOUS MATERIAL, SATURATED OR FROZEN MATERIALS, AND ANY OTHER MATERIAL UNSUITABLE FOR EMBANKMENT CONSTRUCTION. ROADS SHALL NOT BE CONSTRUCTED WITH OR SURFACED WITH WASTE COAL, OR ACID-PRODUCING, TOXIC, OR TOXIC-PRODUCING MATERIALS.
4. EMBANKMENT LAYERS MUST BE COMPACTED TO 90% STANDARD OR MODIFIED PROCTOR DENSITY. LIFT THICKNESS SHALL BE BASED ON THE EQUIPMENT USED BUT SHALL NEVER EXCEED 2-FEET.
5. FOLLOWING CONSTRUCTION OF EACH HAUL ROAD AND ACCESS ROAD, THE MINE OPERATOR SHALL SUBMIT TO THE DEPARTMENT A REPORT, PREPARED BY A LICENSED PROFESSIONAL ENGINEER, STATING THAT THE ROAD(S) WAS CONSTRUCTED IN ACCORDANCE WITH THE APPROVED DESIGN.

EROSION CONTROL NOTES:

1. TEMPORARY AND PERMANENT EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES (BMPs) SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE "STATE OF MONTANA DEPARTMENT OF TRANSPORTATION EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES; REFERENCE MANUAL, MAY 2004" (MDT, 2004).
2. TEMPORARY EROSION CONTROL MEASURES SHALL BE UTILIZED AS NECESSARY DURING CONSTRUCTION TO CONTROL SEDIMENTATION AND MINIMIZE EROSION UNTIL PERMANENT CONTROL MEASURES CAN BE ESTABLISHED. PLEASE REFER TO TABLE 3.1-1 FOR A LIST OF TEMPORARY SOIL STABILIZATION BMPs AND TABLE 3.2-1 FOR A LIST OF TEMPORARY SEDIMENT CONTROL BMPs, LOCATED IN THE MDT REFERENCE MANUAL (MDT, 2004).
3. ALL CUT AND FILL SLOPES SHALL BE RESOILED AND REVEGETATED, OR OTHERWISE STABILIZED, AT THE FIRST SEASONAL OPPORTUNITY.
4. INSTALL SLOPE DRAIN (BMP SS-11) WITH TEMPORARY SEDIMENT CONTROL DEVICE AT OUTLET.
5. ROAD DITCHES SHALL BE VEGETATED AND HAVE CHECK DAMS (BMP SC-4) INSTALLED. THE DISTANCE BETWEEN CHECK DAMS ARE AS FOLLOWS BASED ON SLOPE:
   - 5.1. LESS THAN 2% NO CHECK DAMS ARE NECESSARY UNLESS DITCH EROSION OCCURS.
   - 5.2. FROM 2% TO 3% PLACE CHECK DAMS AT 300 FOOT SPACING
   - 5.3. FROM 3% TO 4% PLACE CHECK DAMS AT 200 FOOT SPACING
   - 5.4. GREATER THAN 4% PLACE CHECK DAMS AT 100 FOOT SPACING.

CULVERT DESIGN DATA TABLE

Culvert ID	Design Flow (cfs)	Minimum Size (in) and Type	Road Elevation (ft)	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Slope (%)	Headwater Elevation (ft)
CV-1	147.3	60 CMP	3064	132	3054.7	3050.0	3.58	3060.9
CV-1A	64.3	42 CMP	3133.6	283	3117.0	3105.0	4.24	3121.6
CV-1B	131.6	54 CMP	3060.3	169	3050.0	3045.0	2.95	3056.5
CV-2	65.0	42 CMP	3088.3	113	3079.0	3075.0	3.56	3083.7
CV-2A	31.8	30 CMP	3153.0	419	3111.0	3100.0	2.62	3114.8
CV-3	175.0	60 CMP	3095.0	189	3084.4	3080.0	2.33	3091.8
CV-3A	178.3	60 CMP	3131.8	277	3116.5	3105.5	3.98	3124.0
CV-4	35.5	30 CMP	3083.4	279	3072.9	3065.0	2.83	3077.3
CV-R1	39.5	36 CMP	3134	302	3129.0	3119.9	4.92	3134.0
CV-R2	11.5	24 CMP	3134	619	3119.9	3079.2	6.6	3121.9
CV-R3	23.7	24 CMP	3134	332	3090.0	3077.4	3.77	3094.3
CV-R4	2.8	24 CMP	3134	402	3099.8	3053.9	11.48	3100.6
CV-R5	43.8	36 CMP	3134	477	3065.0	3053.8	2.35	3069.0
CV-R6	11.2	24 CMP	3134	175	3129.9	3121.2	4.93	3131.8
CV-OC	818	3 box, 96" x 48"	3040.86	192	3025.0	3024.5	0.26	3030.6

MONTANA
GREGORY WADE
LOFTSGAARD
16556PE
LICENSED
PROFESSIONAL ENGINEER
10/06/2014

ENGINEER CERTIFICATION:

TO THE BEST OF THE DESIGN ENGINEERS KNOWLEDGE, THIS ROAD DESIGN MEETS THE PERFORMANCE STANDARDS OF ARM 17.24.601, 17.24.602, 17.24.603, 17.24.605, AND CURRENT PRUDENT ENGINEERING PRACTICES.

Hydrometrics, Inc.
Consulting Scientists and Engineers

EXISTING GROUND SURFACE: Olympus October 26, 2010 Aerial Survey

Legend:

- MINE DISTURBANCE BOUNDARY
- RAIL LOOP
- EXISTING 5' AND 25' CONTOURS
- DESIGN 5' AND 25' CONTOURS
- DESIGNED ACCESS AND HAUL ROADS
- MINE RAMPS (NO DESIGN)
- ANCILLARY AND SERVICE ROADS (NO DESIGN)
- CONVEYOR
- FILL SLOPE
- FACILITIES
- TEMPORARY EROSION CONTROL BMPs AT FILL SLOPES DAYLIGHT
- CUT SLOPE
- CUT SLOPE DAYLIGHT
- OTTER CREEK
- EXISTING HIGHWAY

N

0 SCALE 400
feet
1"=400'
Montana State Plane
NAD83 US Feet

DRAWN	
DATE	BY
6/28/12	jas
REVISED	
DATE	BY
APPROVED	
DATE	BY

OTTER CREEK COAL, LLC
P.O. BOX 7152 Billings, Mt. 59103

Otter Creek Mine
Permit ID: C2012018

EXHIBIT 321 A

ROAD PLAN VIEW

FILE NAME: PLATE1_ROAD_PLAN_VIEW_R0_2014.DWG
LAYOUT: PLATE 1
Path: I:\LAND PROJECTS\OTRCR\DWG\321A