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Montana Superfund

Spring 5-2021

Butte Priority Soils Operable Unit Preliminary (30%) Design Butte Reduction Works Smelter Area Remedial Action Construction Drawings

Pioneer Technical Services, Inc.

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**BUTTE PRIORITY SOILS OPERABLE UNIT
PRELIMINARY (30%) DESIGN
BUTTE REDUCTION WORKS SMELTER AREA
REMEDIAL ACTION CONSTRUCTION DRAWINGS**

DRAFT
NOT FOR CONSTRUCTION

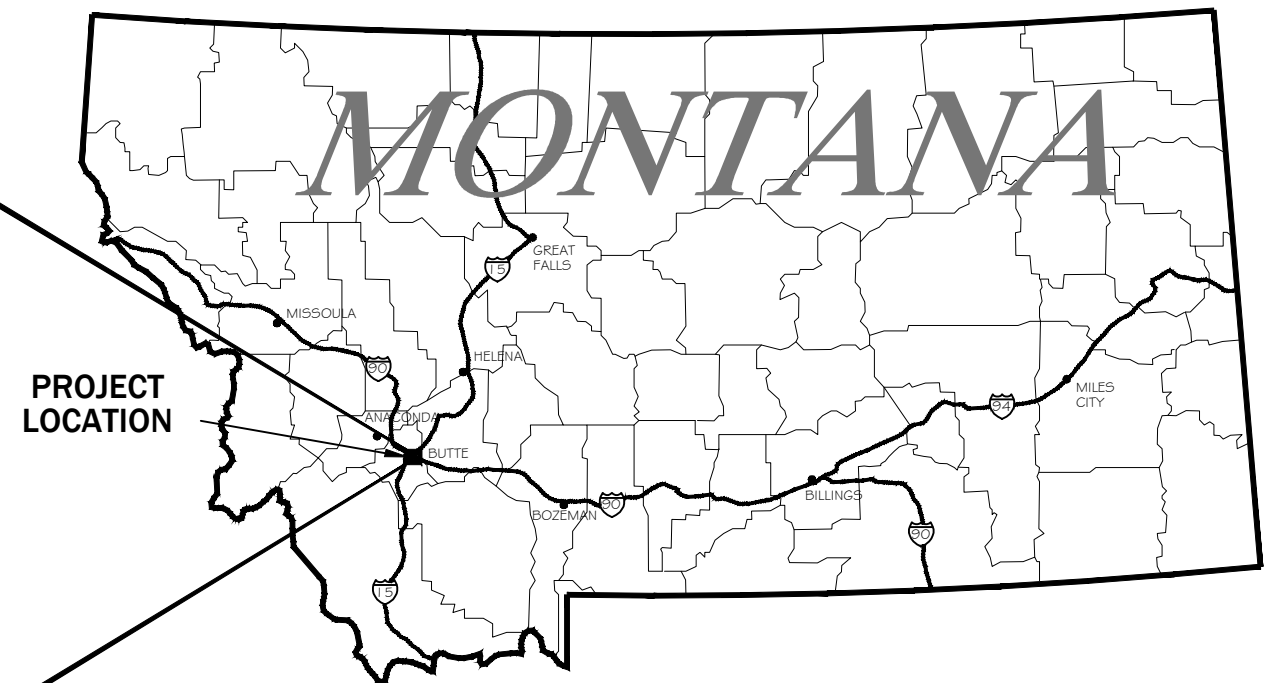
PREPARED FOR

ATLANTIC RICHFIELD COMPANY

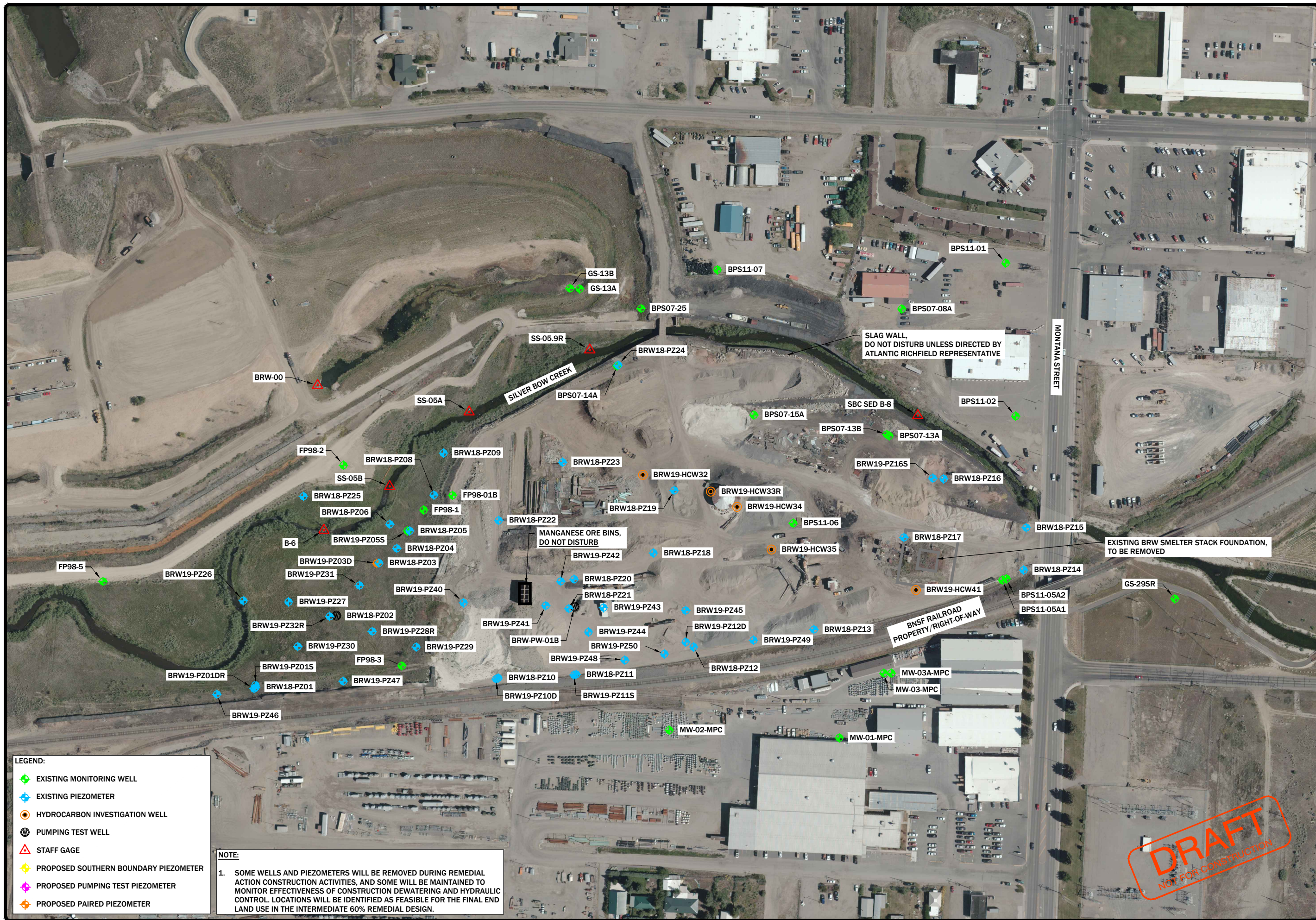
PREPARED BY

PIONEER TECHNICAL SERVICES, INC.

MAY 2021



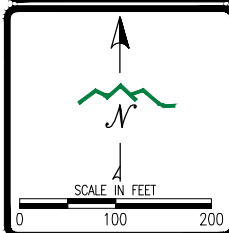
SITE VICINITY MAP
SOURCE: 2016 AES AERIAL IMAGE



REVISION:	DATE:	BY:	DESC:

DRAWN BY: CLM
 DESIGNED BY: JTB
 CHECKED BY: JSM/MWB
 APPROVED BY: KKH
 PROJECT NO:
 DATE: 5/2021

DISPLAYED AS:
 COORD SYS / ZONE: MSP83
 DATUM: NAV83 / NAVD88
 UNITS: INTERNATIONAL FEET
 SOURCE: AES 2016



ATLANTIC RICHFIELD COMPANY
 PRELIMINARY DESIGN
 BRW SMELTER AREA RA

EXISTING
 SITE CONDITIONS

PIONEER
 TECHNICAL SERVICES, INC.
 1101 SOUTH MONTANA
 BUTTE, MONTANA 59701
 (406) 782-5177

SHEET
 G3.0

- LEGEND:**
- EXISTING MONITORING WELL
 - EXISTING PIEZOMETER
 - HYDROCARBON INVESTIGATION WELL
 - ⊙ PUMPING TEST WELL
 - ▲ STAFF GAGE
 - PROPOSED SOUTHERN BOUNDARY PIEZOMETER
 - PROPOSED PUMPING TEST PIEZOMETER
 - PROPOSED PAIRED PIEZOMETER

NOTE:

1. SOME WELLS AND PIEZOMETERS WILL BE REMOVED DURING REMEDIAL ACTION CONSTRUCTION ACTIVITIES, AND SOME WILL BE MAINTAINED TO MONITOR EFFECTIVENESS OF CONSTRUCTION DEWATERING AND HYDRAULIC CONTROL. LOCATIONS WILL BE IDENTIFIED AS FEASIBLE FOR THE FINAL END LAND USE IN THE INTERMEDIATE 60% REMEDIAL DESIGN.

DRAFT
 NOT FOR CONSTRUCTION

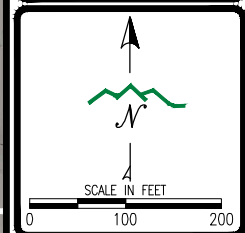
NOTES:
 1. PROPERTY OWNERSHIP BOUNDARIES ARE PROJECTED FROM EXISTING STATE CADASTRAL DATABASE AND ARE APPROXIMATE. BOUNDARIES ADJACENT TO THE SITE WILL BE CONFIRMED AS NECESSARY PRIOR TO REMEDIAL ACTION CONSTRUCTION ACTIVITIES.



REVISION:	DATE:	BY:	DESC:

DRAWN BY: CLA
 DESIGNED BY: JPB
 CHECKED BY: JSM/MWB
 APPROVED BY: KJH
 PROJECT NO:
 DATE: 5/2021

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ATLANTIC RICHFIELD COMPANY
 PRELIMINARY DESIGN
 BRW SMELTER AREA RA

PROPERTY OWNERSHIP

PIONEER
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 BUTTE, MONTANA 59701
 (406) 782-5177

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SHEET
 G3.2

Point Table			
Elevation	Northing	Easting	Point No.
5465.09	651872.51	1196032.52	CP-11
5458.00	651859.80	1195822.88	CP

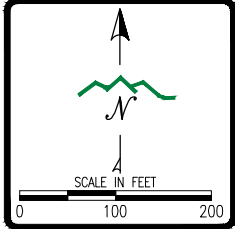
NOTE:
 1. ADDITIONAL CONSTRUCTION SURVEYING CONTROL POINTS WILL BE ESTABLISHED PRIOR TO REMEDIAL ACTION CONSTRUCTION ACTIVITIES.



REVISION:	DATE:	BY:	DESC:

DRAWN BY: CLA
 DESIGNED BY: JTB
 CHECKED BY: JSM/MWB
 APPROVED BY: KKH
 PROJECT NO:
 DATE: 5/2021

DISPLAYED AS:
 COORD SYS/ZONE: MSP83
 DATUM: NAV83/NAVD88
 UNITS: INTERNATIONAL FEET
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ATLANTIC RICHFIELD COMPANY
 PRELIMINARY DESIGN
 BRW SMELTER AREA RA

EXISTING
 CONTROL POINTS



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 NOT FOR CONSTRUCTION

SHEET
 G3.3

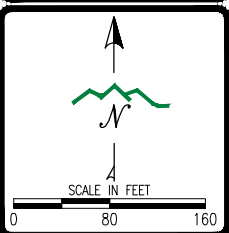
NOTES:

- 1. PRELIMINARY CONCEPTUAL END LAND USE RENDERING PROVIDED BY LAND DESIGN, INC. (LDI)
- 2. CONCEPTUAL RENDERING OF POTENTIAL AMPHITHEATER SHOWN FOR ILLUSTRATIVE AND PLANNING PURPOSES ONLY. ADDITIONAL AMPHITHEATER DESIGN DETAILS AND NEW UTILITY SERVICE LINES WILL BE PROVIDED IN THE INTERMEDIATE 60% REMEDIAL DESIGN.
- 3. DESIGN, CONSTRUCTION, AND OPERATION AND MAINTENANCE OF AMPHITHEATER REQUIRES MUTUAL AGREEMENT OF ATLANTIC RICHFIELD COMPANY AND BUTTE-SILVER BOW, AND IDENTIFICATION AND COMMITMENT OF A THIRD-PARTY INVESTOR AND OPERATOR.

REVISION:	DATE:	BY:	DESC:

DRAWN BY: LDI
 DESIGNED BY: LDI
 CHECKED BY: LDI
 APPROVED BY: LDI
 PROJECT NO:
 DATE: 5/2021

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 COORD SYS/ZONE: MSP83
 DATUM: NAV83/NAVD88
 UNITS: INTERNATIONAL FEET
 SOURCE: LDI

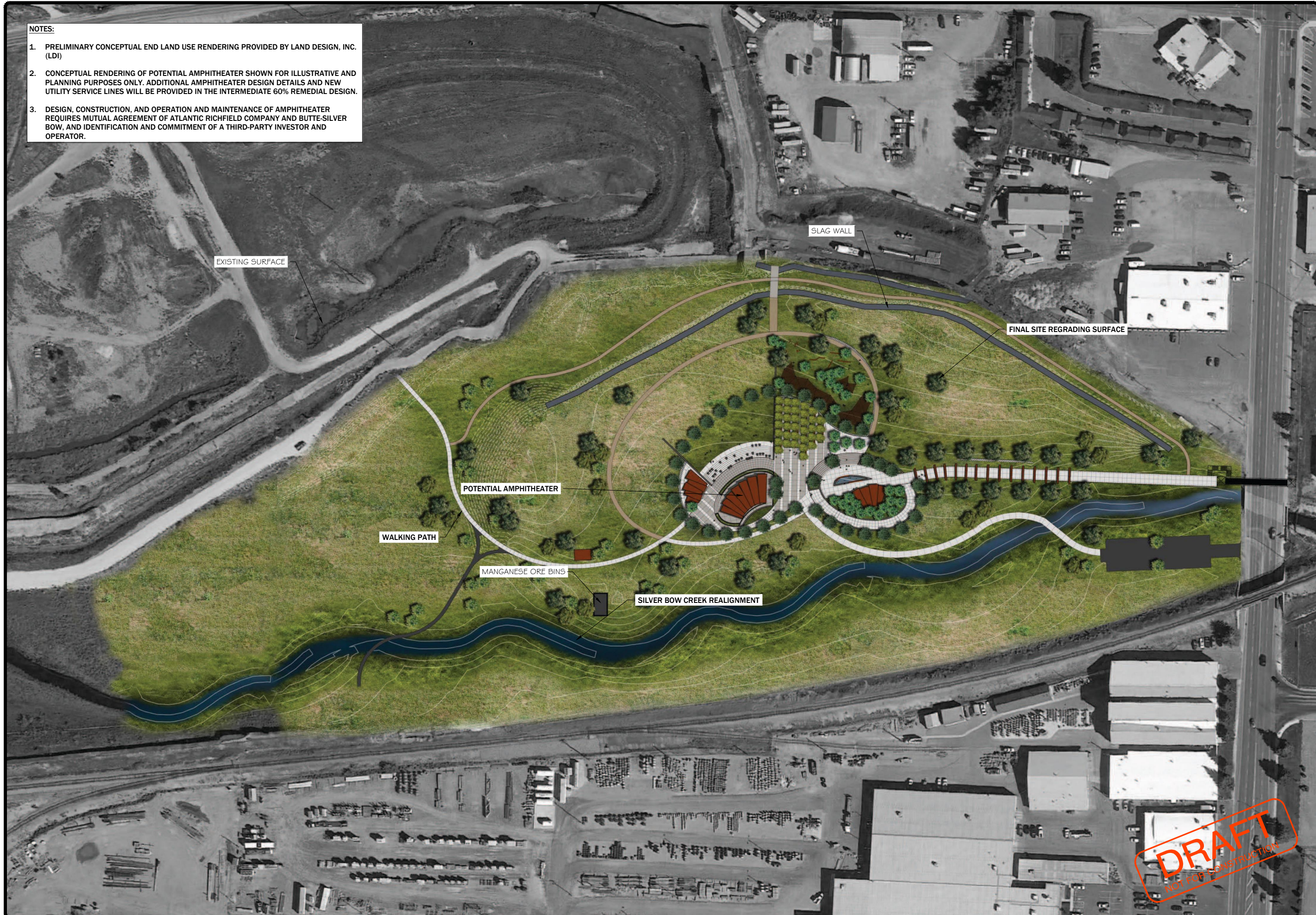


ATLANTIC RICHFIELD COMPANY
 PRELIMINARY DESIGN
 BRW SMELTER AREA RA

PROJECT OVERVIEW
 CONCEPTUAL END
 LAND USE
 RENDERING



SHEET
 G4.0



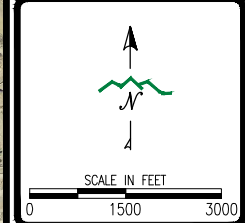
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 NOT FOR CONSTRUCTION



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 UNITS: INTERNATIONAL FEET
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ATLANTIC RICHFIELD COMPANY
 PRELIMINARY DESIGN
 BRW SMELTER AREA RA

HELEHAN
 BORROW
 HAUL
 ROUTE

PIONEER
 TECHNICAL SERVICES, INC.
 1101 SOUTH MONTANA
 BUTTE, MONTANA 59701
 (406) 782-5177

DRAFT
 NOT FOR CONSTRUCTION

SHEET
 G5.0



INTERSTATE PIT

SOUTH EXCELSIOR AVE.

CENTENNIAL AVE.

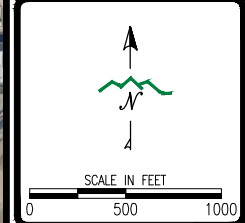
BRW SMELTER AREA

MONTANA ST.

REVISION:	DATE:	BY:	DESC:

DRAWN BY: CLA
 DESIGNED BY: JPB
 CHECKED BY: JSM/MWB
 APPROVED BY: KKH
 PROJECT NO:
 DATE: 5/2021

DISPLAYED AS:
 COORD SYS/ZONE: MSP83
 DATUM: NAV83/NAVD88
 UNITS: INTERNATIONAL FEET
 SOURCE: PIONEER



ATLANTIC RICHFIELD COMPANY
 PRELIMINARY DESIGN
 BRW SMELTER AREA RA

INTERSTATE PIT
 BORROW
 HAUL
 ROUTE

PIONEER
 TECHNICAL SERVICES, INC.
 1101 SOUTH MONTANA
 BUTTE, MONTANA 59701
 (406) 782-5177

DRAFT
 NOT FOR CONSTRUCTION

SHEET
 G5.1

NOTES:

1. STAGING AND STOCKPILE LOCATIONS WILL BE MUTUALLY AGREED UPON BETWEEN CONTRACTOR AND ATLANTIC RICHFIELD REPRESENTATIVE.
2. EXISTING FENCING WILL BE REMOVED AS REQUIRED TO COMPLETE THE REMEDIAL ACTION CONSTRUCTION ACTIVITIES, AND TEMPORARY FENCING AND GATES WILL BE INSTALLED. ADDITIONAL DETAILS TO BE PROVIDED IN THE INTERMEDIATE 60% REMEDIAL DESIGN.

POTENTIAL STOCKPILE AND STAGING AREA, SEE NOTE 1

POTENTIAL STOCKPILE AND STAGING AREA, SEE NOTE 1

POTENTIAL STOCKPILE AND STAGING AREA, SEE NOTE 1

MAIN SITE ACCESS GATE


OLD RAILROAD ACCESS GATE

CENTENNIAL AVE.

FRONT ST.

MONTANA ST.

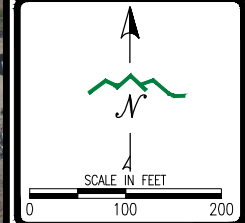
GEORGE ST.

LEGEND:
 EXISTING FENCE

REVISION:	DATE:	BY:	DESC:

DRAWN BY: CLA
 DESIGNED BY: JTB
 CHECKED BY: JSM/MWB
 APPROVED BY: KKH
 PROJECT NO:
 DATE: 5/2021

DISPLAYED AS:
 COORD SYS / ZONE: MSP83
 DATUM: NAV83 / NAVD88
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 SOURCE: AES 2016



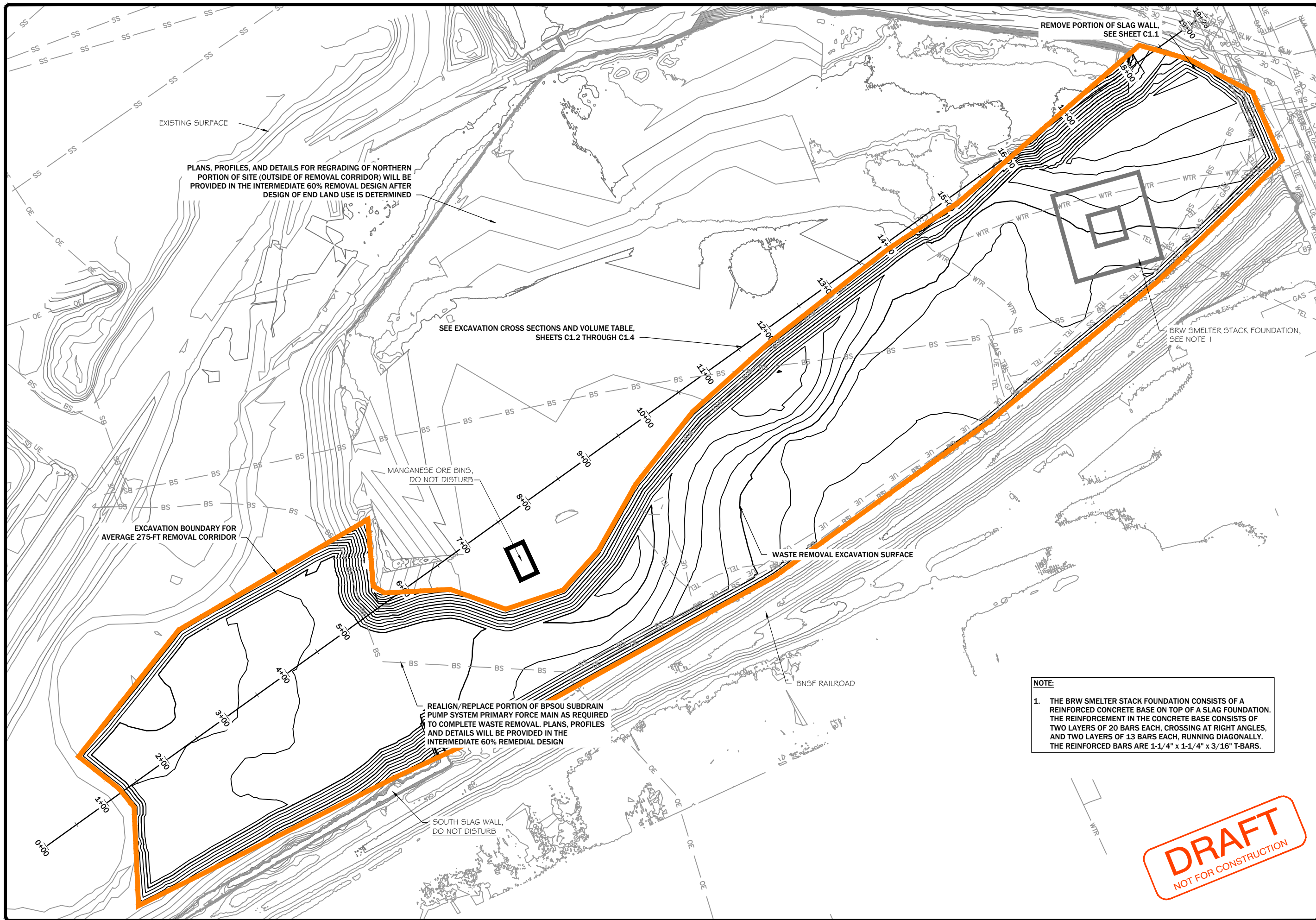
ATLANTIC RICHFIELD COMPANY
 PRELIMINARY DESIGN
 BRW SMELTER AREA RA

TEMPORARY
 CONSTRUCTION
 STAGING AND
 STOCKPILING MGMT

PIONEER
 TECHNICAL SERVICES, INC.
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 BUTTE, MONTANA 59701
 (406) 782-5177

SHEET
 G6.0

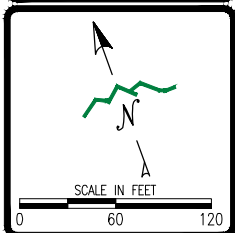
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 NOT FOR CONSTRUCTION



REVISION:	DATE:	BY:	DESC:

DRAWN BY: CLA
 DESIGNED BY: JPB
 CHECKED BY: JSM/MWB
 APPROVED BY: KKH
 PROJECT NO: 30-BRW-CO-PLN-006-19
 DATE: 5/2021

DISPLAYED AS:
 COORD SYS/ZONE: MSP83
 DATUM: NAV83/NAVD88
 UNITS: INTERNATIONAL FEET
 SOURCE: AES 2016



ATLANTIC RICHFIELD COMPANY
 PRELIMINARY DESIGN
 BRW SMELTER AREA RA

EXCAVATION
 PLAN
 VIEW

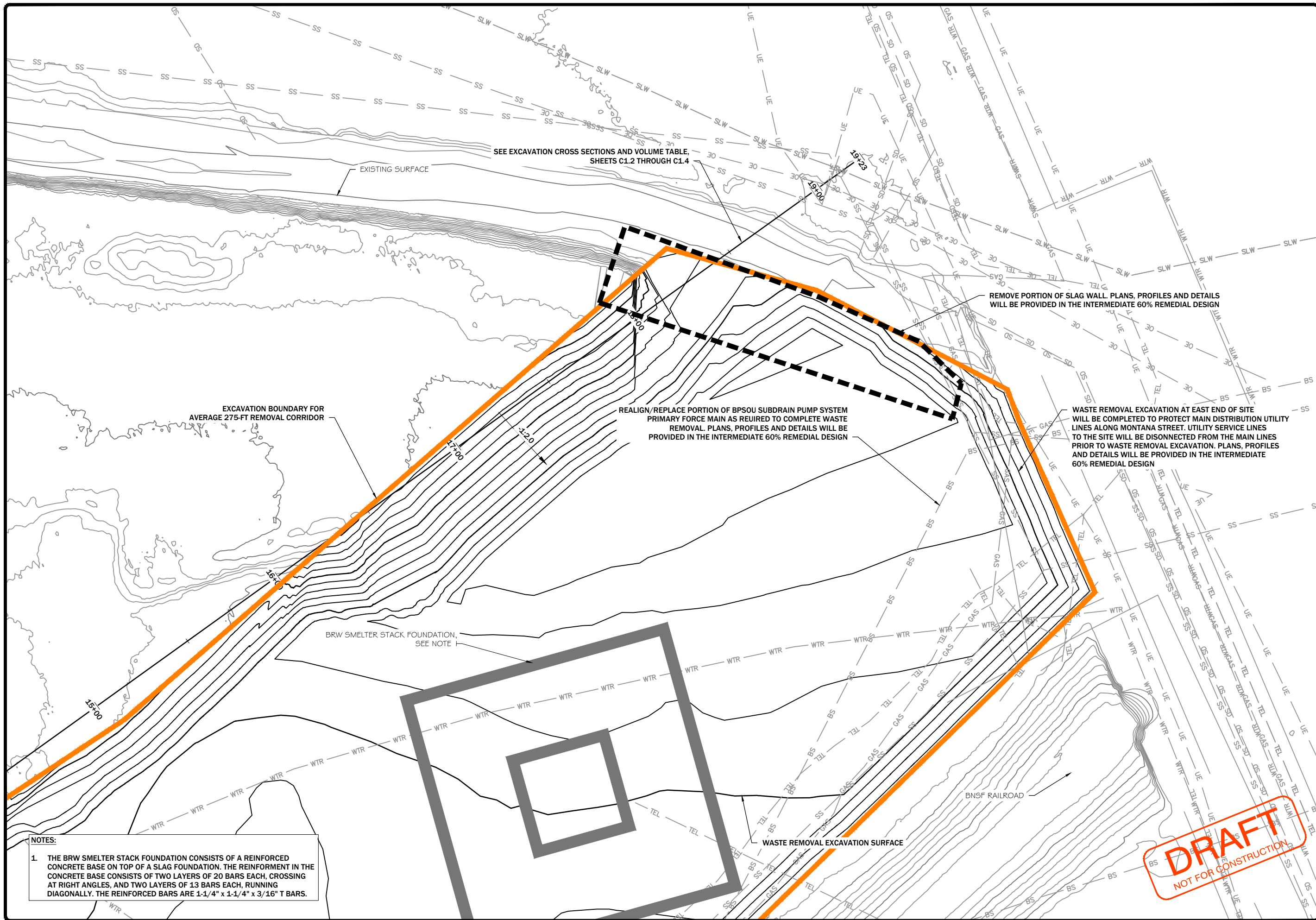
NOTE:

1. THE BRW SMELTER STACK FOUNDATION CONSISTS OF A REINFORCED CONCRETE BASE ON TOP OF A SLAG FOUNDATION. THE REINFORCEMENT IN THE CONCRETE BASE CONSISTS OF TWO LAYERS OF 20 BARS EACH, CROSSING AT RIGHT ANGLES, AND TWO LAYERS OF 13 BARS EACH, RUNNING DIAGONALLY. THE REINFORCED BARS ARE 1-1/4" x 1-1/4" x 3/16" T-BARS.

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 BUTTE, MONTANA 59701
 (406) 782-5177

SHEET
 C1.0



SEE EXCAVATION CROSS SECTIONS AND VOLUME TABLE, SHEETS C1.2 THROUGH C1.4

EXISTING SURFACE

EXCAVATION BOUNDARY FOR AVERAGE 275-FT REMOVAL CORRIDOR

REALIGN/REPLACE PORTION OF BPSOU SUBDRAIN PUMP SYSTEM
PRIMARY FORCE MAIN AS REQUIRED TO COMPLETE WASTE
REMOVAL. PLANS, PROFILES AND DETAILS WILL BE
PROVIDED IN THE INTERMEDIATE 60% REMEDIAL DESIGN

REMOVE PORTION OF SLAG WALL. PLANS, PROFILES AND DETAILS
WILL BE PROVIDED IN THE INTERMEDIATE 60% REMEDIAL DESIGN

WASTE REMOVAL EXCAVATION AT EAST END OF SITE
WILL BE COMPLETED TO PROTECT MAIN DISTRIBUTION UTILITY
LINES ALONG MONTANA STREET. UTILITY SERVICE LINES
TO THE SITE WILL BE DISCONNECTED FROM THE MAIN LINES
PRIOR TO WASTE REMOVAL EXCAVATION. PLANS, PROFILES
AND DETAILS WILL BE PROVIDED IN THE INTERMEDIATE
60% REMEDIAL DESIGN

BRW SMELTER STACK FOUNDATION,
SEE NOTE 1

BNSF RAILROAD

WASTE REMOVAL EXCAVATION SURFACE

DRAFT
NOT FOR CONSTRUCTION

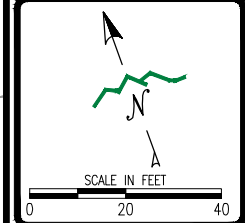
NOTES:

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SOURCE: AES 2016






ATLANTIC RICHFIELD COMPANY
PRELIMINARY DESIGN
BRW SMELTER AREA RA

EAST-END
SLAG WALL REMOVAL
PLAN VIEW

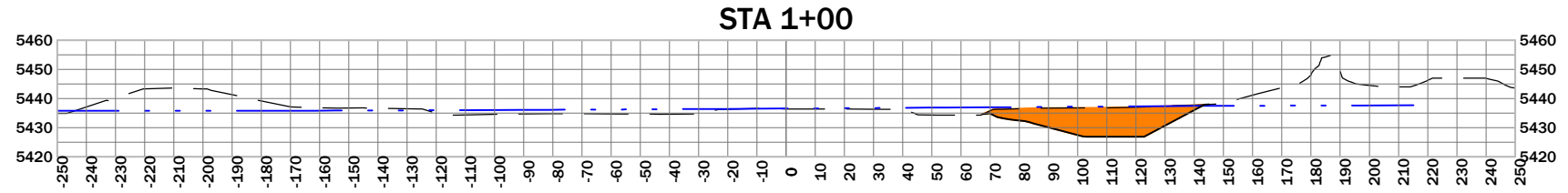
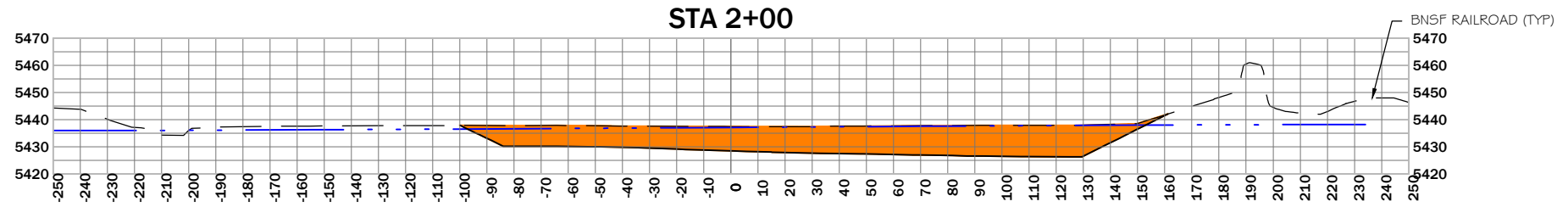
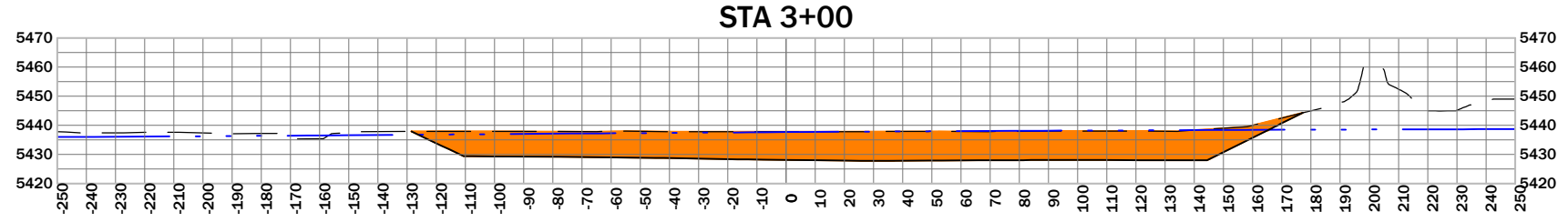
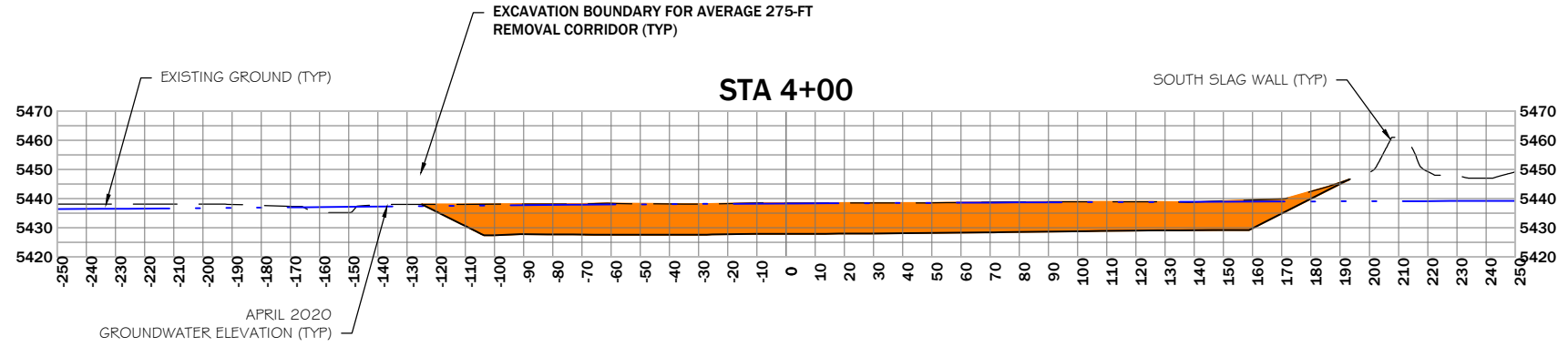
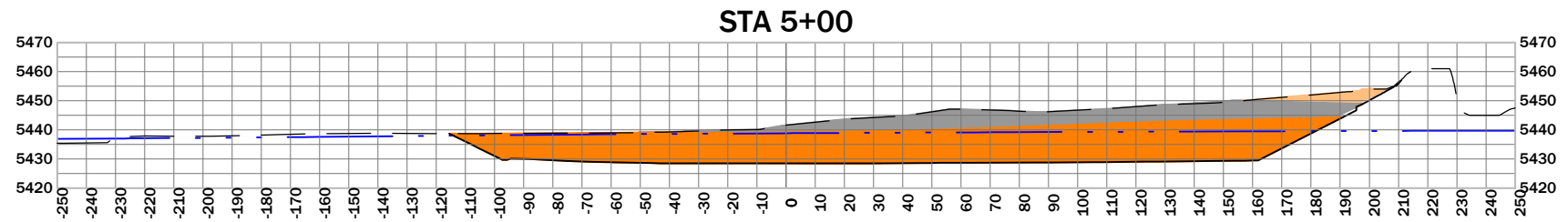
PIONEER
TECHNICAL SERVICES, INC.
1101 SOUTH MONTANA
BUTTE, MONTANA 59701
(406) 782-5177

SHEET
C1.1

LEGEND:

	SLAG
	DEMOLITION DEBRIS
	SOILS

NOTE:
SEE LEGEND AND CROSS SECTIONS FOR APPROXIMATE EXTENTS OF VARIOUS WASTE MATERIAL TYPES TO BE REMOVED.

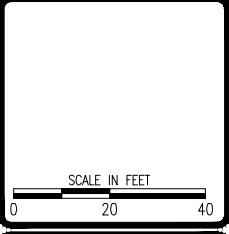


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ATLANTIC RICHFIELD COMPANY
PRELIMINARY DESIGN
BRW SMELTER AREA RA

EXCAVATION
CROSS
SECTIONS
STA 1+00 TO 5+00

PIONEER
TECHNICAL SERVICES, INC.
1101 SOUTH MONTANA
BUTTE, MONTANA 59701
(406) 782-5177

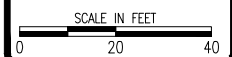
DRAFT
NOT FOR CONSTRUCTION

SHEET
C1.2

REVISION:	BY:	DESC:

DRAWN BY: CL
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CHECKED BY: JSM/MWB
APPROVED BY: KKH
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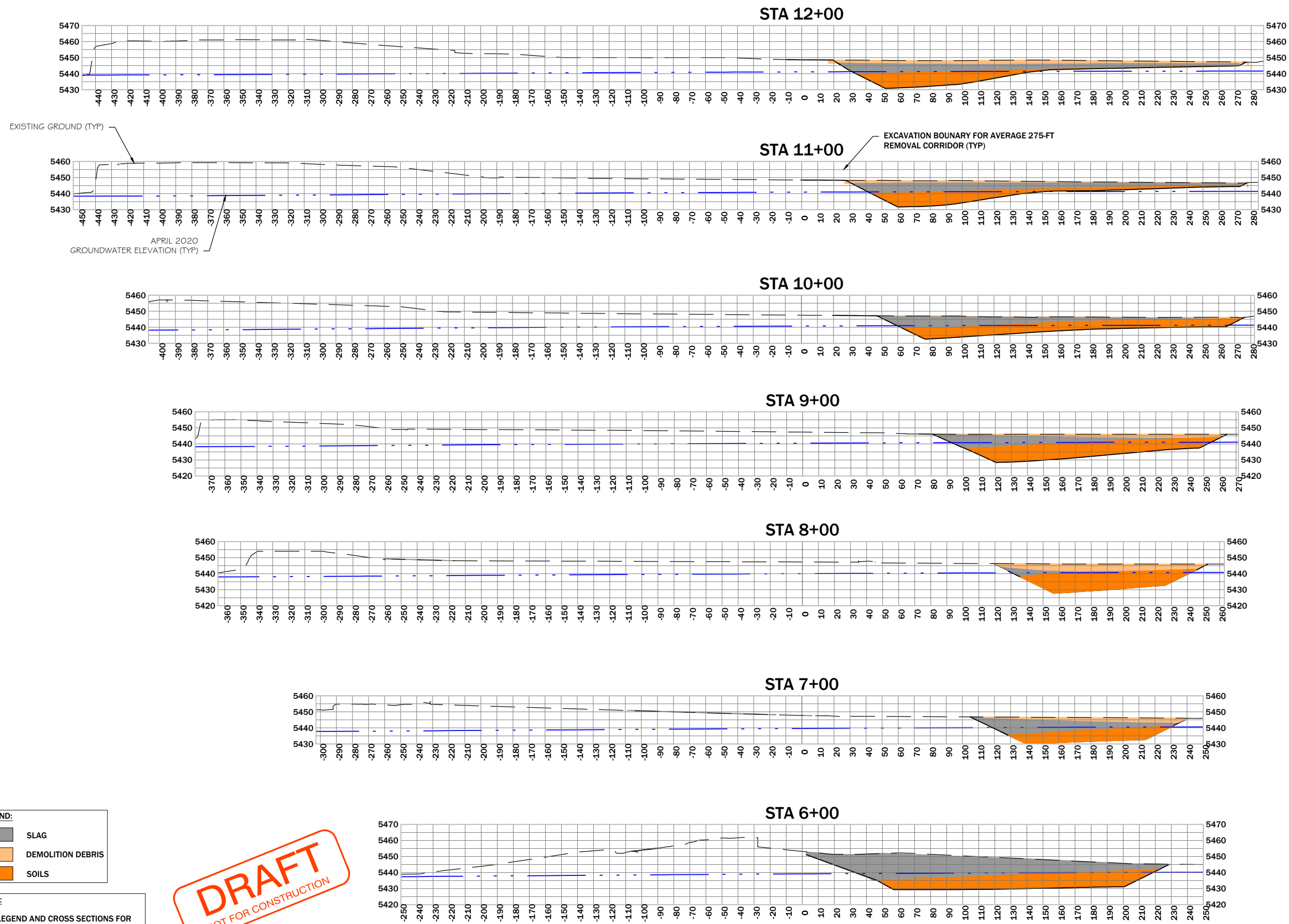


ATLANTIC RICHFIELD COMPANY
PRELIMINARY DESIGN
BRW SMELTER AREA RA

EXCAVATION
CROSS
SECTIONS
STA 6+00 TO 12+00

PIONEER
TECHNICAL SERVICES, INC.
1101 SOUTH MONTANA
BUTTE, MONTANA 59701
(406) 782-5177

SHEET
C13






LEGEND:
 SLAG
 DEMOLITION DEBRIS
 SOILS

NOTE:
SEE LEGEND AND CROSS SECTIONS FOR APPROXIMATE EXTENTS OF VARIOUS WASTE MATERIAL TYPES TO BE REMOVED.

DRAFT

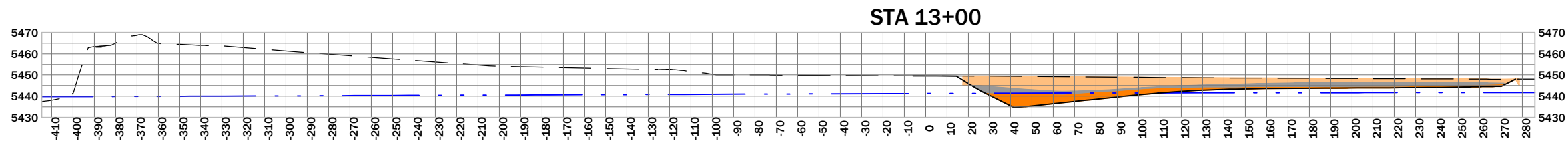
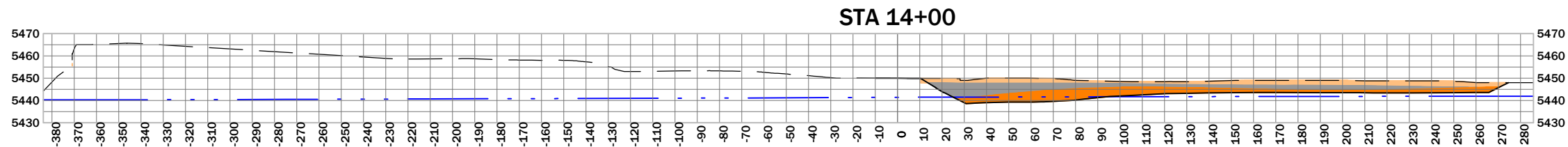
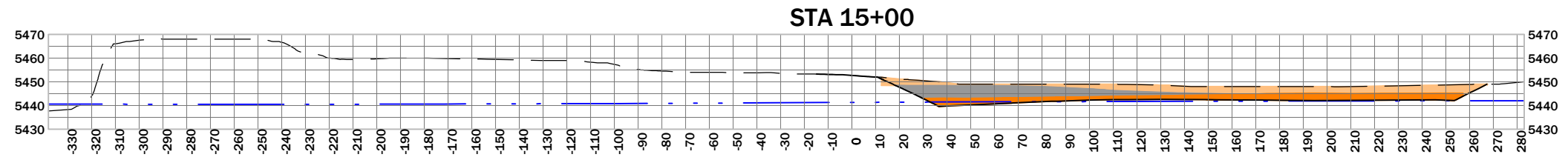
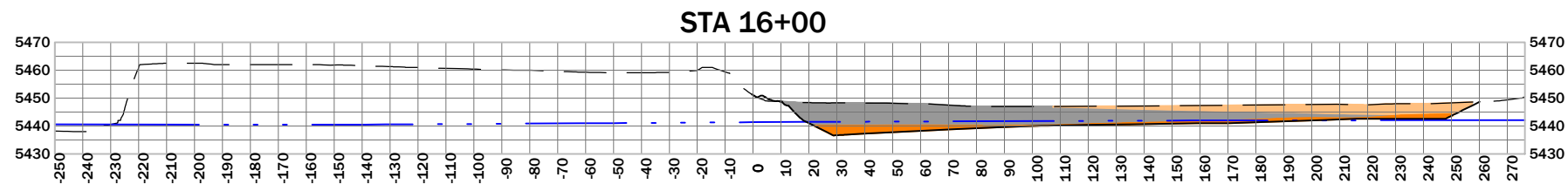
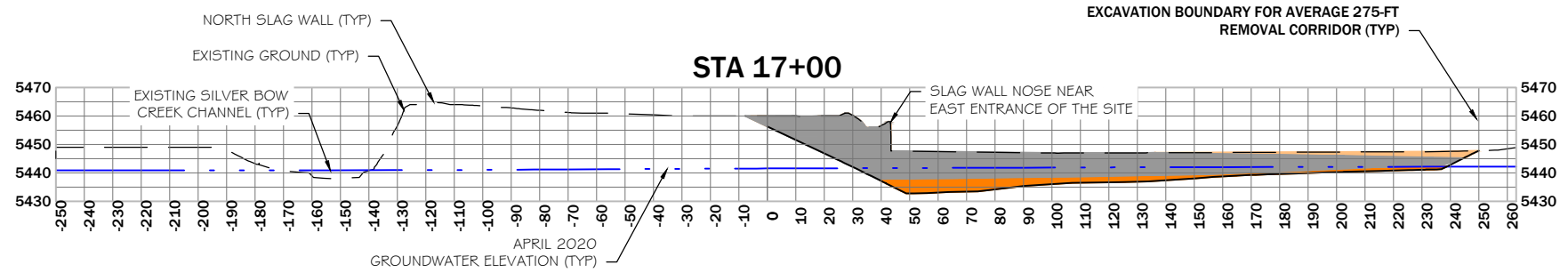
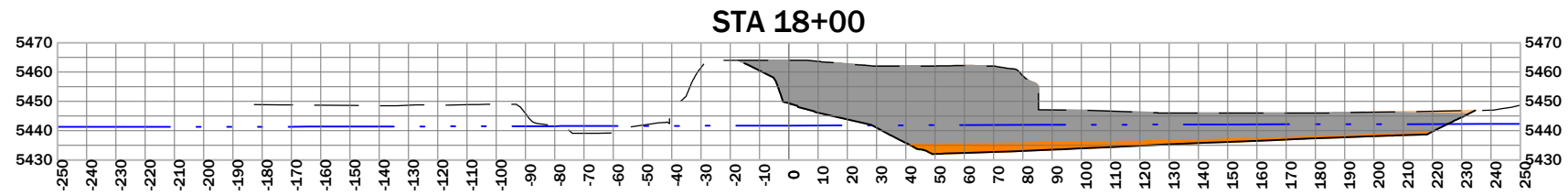
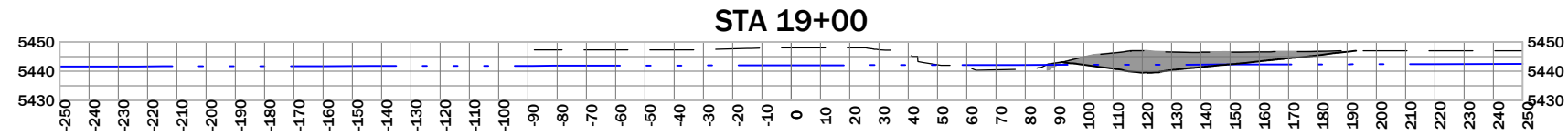
NOT FOR CONSTRUCTION

LEGEND:

	SLAG
	DEMOLITION DEBRIS
	SOILS

NOTE:
SEE LEGEND AND CROSS SECTIONS FOR APPROXIMATE EXTENTS OF VARIOUS WASTE MATERIAL TYPES TO BE REMOVED.

DRAFT
NOT FOR CONSTRUCTION

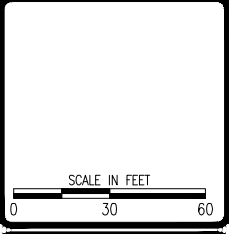


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ATLANTIC RICHFIELD COMPANY
PRELIMINARY DESIGN
BRW SMELTER AREA RA

EXCAVATION
CROSS
SECTIONS
STA 13+00 TO 19+00



SHEET
C1.4

Total Demo Debris Volume Table			
Station	Cut Area	Cut Volume	Cumulative Cut Vol
0+00.00	0	0	0
0+50.00	0	0	0
1+00.00	0	0	0
1+50.00	0	0	0
2+00.00	0	0	0
2+50.00	0	0	0
3+00.00	0	0	0
3+50.00	0	0	0
4+00.00	0	0	0
4+50.00	29	27	27
5+00.00	113	131	158
5+50.00	598	658	816
6+00.00	0	554	1,369
6+50.00	45	42	1,411
7+00.00	214	240	1,652
7+50.00	411	579	2,231
8+00.00	542	883	3,113
8+50.00	458	926	4,039
9+00.00	308	709	4,749
9+50.00	200	471	5,219
10+00.00	106	284	5,504
10+50.00	148	236	5,739
11+00.00	252	371	6,110
11+50.00	421	623	6,733
12+00.00	525	876	7,609
12+50.00	706	1,140	8,749
13+00.00	933	1,517	10,266
13+50.00	594	1,413	11,679
14+00.00	517	1,029	12,708
14+50.00	627	1,060	13,768
15+00.00	690	1,219	14,987
15+50.00	595	1,190	16,177
16+00.00	340	866	17,043
16+50.00	269	564	17,607
17+00.00	145	383	17,990
17+50.00	259	374	18,365
18+00.00	667	858	19,223
18+50.00	42	656	19,879
19+00.00	0	39	19,918
19+23.44	0	0	19,918

Total Slag Excavation Volume Table			
Station	Cut Area	Cut Volume	Cumulative Cut Vol
0+00.00	0	0	0
0+50.00	0	0	0
1+00.00	0	0	0
1+50.00	0	0	0
2+00.00	0	0	0
2+50.00	0	0	0
3+00.00	0	0	0
3+50.00	0	0	0
4+00.00	0	0	0
4+50.00	0	0	0
5+00.00	1,068	988	988
5+50.00	2,726	3,513	4,501
6+00.00	2,098	4,467	8,969
6+50.00	1,430	3,267	12,235
7+00.00	762	2,030	14,265
7+50.00	389	1,066	15,331
8+00.00	117	469	15,800
8+50.00	325	410	16,210
9+00.00	602	858	17,068
9+50.00	745	1,247	18,315
10+00.00	738	1,373	19,688
10+50.00	836	1,458	21,146
11+00.00	906	1,613	22,759
11+50.00	913	1,684	24,443
12+00.00	863	1,644	26,087
12+50.00	710	1,456	27,543
13+00.00	441	1,065	28,608
13+50.00	346	729	29,337
14+00.00	576	854	30,190
14+50.00	439	940	31,130
15+00.00	459	832	31,962
15+50.00	835	1,198	33,160
16+00.00	1,130	1,819	34,980
16+50.00	1,274	2,226	37,205
17+00.00	2,068	3,094	40,299
17+50.00	2,673	4,390	44,689
18+00.00	3,285	5,516	50,205
18+50.00	3,151	5,959	56,164
19+00.00	381	3,270	59,434
19+23.44	0	165	59,599

Total Soils Excavation Volume Table			
Station	Cut Area	Cut Volume	Cumulative Cut Vol
0+00.00	0	0	0
0+50.00	0	0	0
1+00.00	494	458	458
1+50.00	2,054	2,359	2,817
2+00.00	2,249	3,984	6,801
2+50.00	2,369	4,276	11,077
3+00.00	2,655	4,652	15,728
3+50.00	2,893	5,137	20,866
4+00.00	2,960	5,420	26,285
4+50.00	3,036	5,552	31,837
5+00.00	3,269	5,838	37,676
5+50.00	1,844	4,735	42,410
6+00.00	1,344	2,952	45,362
6+50.00	812	1,997	47,358
7+00.00	608	1,315	48,673
7+50.00	685	1,197	49,870
8+00.00	981	1,542	51,412
8+50.00	1,146	1,969	53,381
9+00.00	1,201	2,173	55,553
9+50.00	1,182	2,206	57,759
10+00.00	1,074	2,089	59,848
10+50.00	886	1,815	61,663
11+00.00	752	1,516	63,180
11+50.00	758	1,398	64,578
12+00.00	730	1,379	65,957
12+50.00	419	1,064	67,021
13+00.00	348	709	67,730
13+50.00	792	1,055	68,785
14+00.00	603	1,291	70,076
14+50.00	542	1,060	71,136
15+00.00	525	987	72,124
15+50.00	238	707	72,830
16+00.00	234	437	73,268
16+50.00	375	564	73,831
17+00.00	318	641	74,473
17+50.00	266	541	75,014
18+00.00	258	485	75,499
18+50.00	264	483	75,982
19+00.00	0	244	76,226
19+23.44	0	0	76,226

Cut/Fill Summary (TIN Surface Volume Comparison)

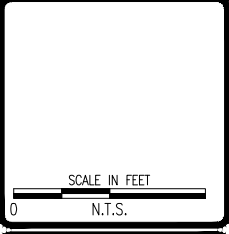
Name	Cut	Net
Soils Volume	76625.68 Cu. Yd.	76625.68 Cu. Yd.
Slag Volume	60188.40 Cu. Yd.	60188.40 Cu. Yd.
Demo Debris Volume	19377.09 Cu. Yd.	19377.09 Cu. Yd.

NOTE:
ALL VOLUMES ARE PROVIDED IN BANK CUBIC YARDS. CONTRACTOR IS RESPONSIBLE FOR DETERMINING MATERIAL SWELL.

REVISION:	DATE:	BY:	DESC:

DRAWN BY: CLA
DESIGNED BY: JPB
CHECKED BY: JSM/MWB
APPROVED BY: KKH
PROJECT NO:
DATE: 5/2021

DISPLAYED AS:
COORD SYS/ZONE: NA
DATUM: NA
UNITS: NA
SOURCE: PIONEER



ATLANTIC RICHFIELD COMPANY
PRELIMINARY DESIGN
BRW SMELTER AREA RA

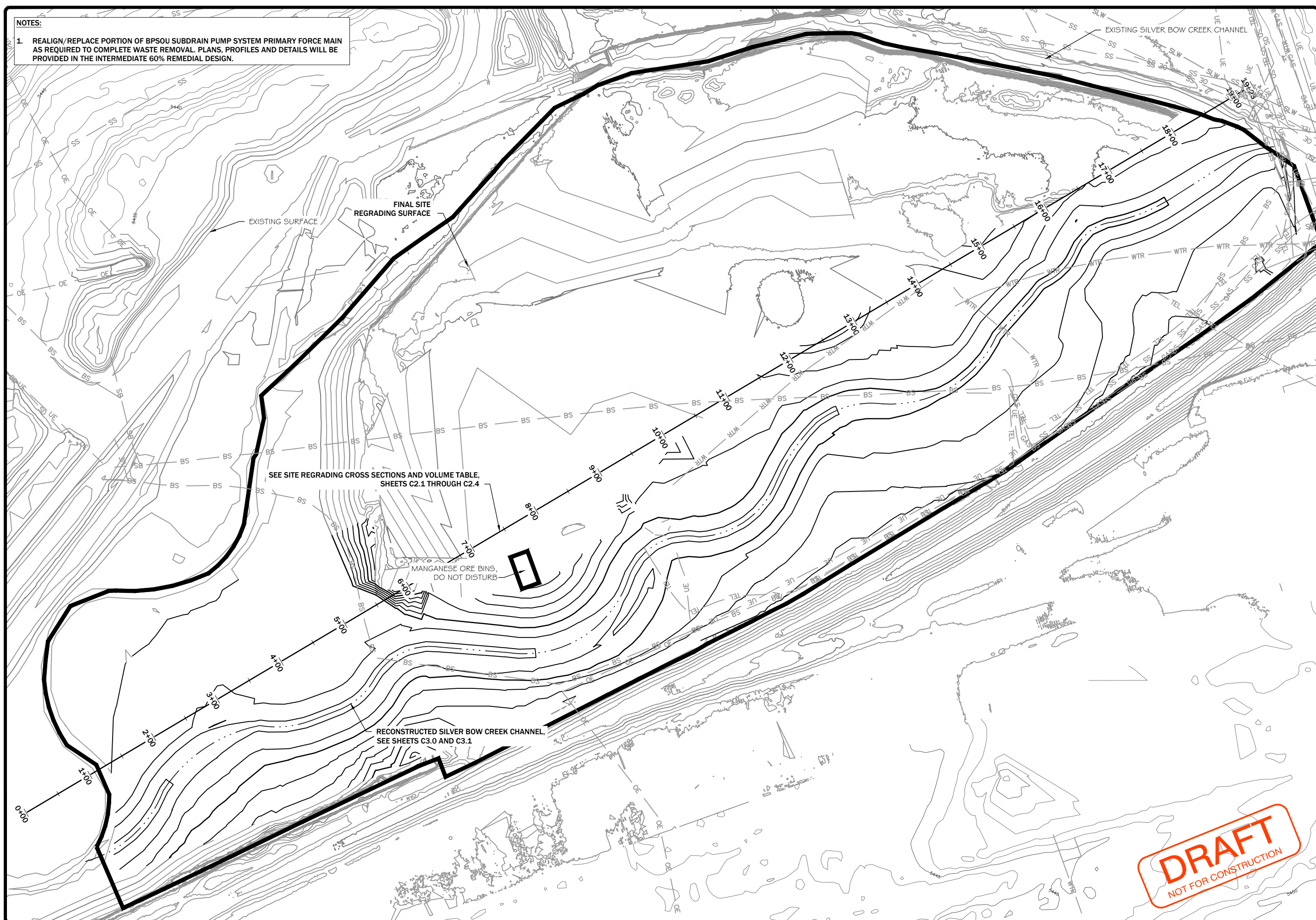
EXCAVATION
REMOVAL
VOLUME
TABLES

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PIONEER
TECHNICAL SERVICES, INC.
1101 SOUTH MONTANA
BUTTE, MONTANA 59701
(406) 782-5177

SHEET
C15

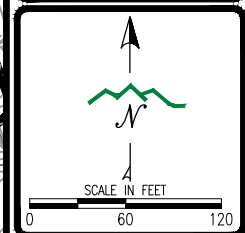
NOTES:
 1. REALIGN/REPLACE PORTION OF BPSOU SUBDRAIN PUMP SYSTEM PRIMARY FORCE MAIN AS REQUIRED TO COMPLETE WASTE REMOVAL. PLANS, PROFILES AND DETAILS WILL BE PROVIDED IN THE INTERMEDIATE 60% REMEDIAL DESIGN.



REVISION:	DATE:	BY:	DESC:

DRAWN BY: CL
 DESIGNED BY: JPB
 CHECKED BY: JSM/MWB
 APPROVED BY: KKH
 PROJECT NO:
 DATE: 5/2021

DISPLAYED AS:
 COORD SYS/ZONE: MSP83
 DATUM: NAV83/NAVD88
 UNITS: INTERNATIONAL FEET
 SOURCE: AES 2016



ATLANTIC RICHFIELD COMPANY
 PRELIMINARY DESIGN
 BRW SMELTER AREA RA

SITE REGRADING
 PLAN VIEW

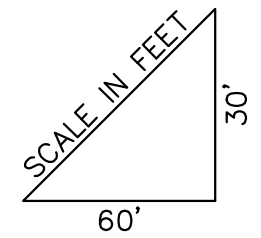
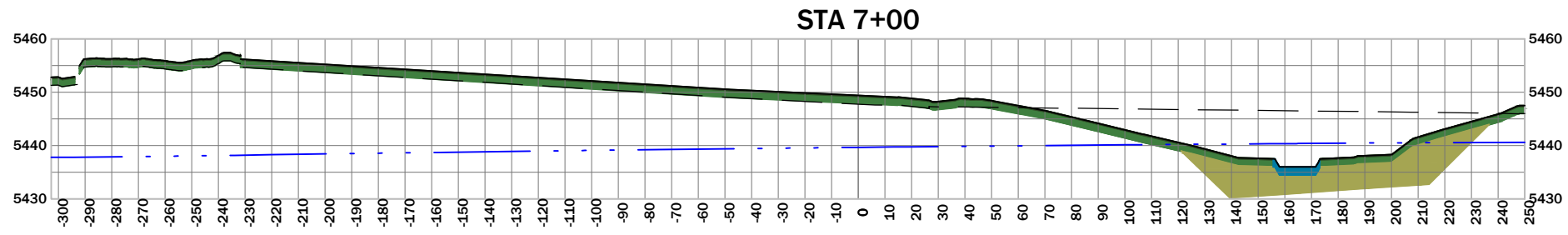
PIONEER
 TECHNICAL SERVICES, INC.
 1101 SOUTH MONTANA
 BUTTE, MONTANA 59701
 (406) 782-5177

DRAFT
 NOT FOR CONSTRUCTION

SHEET
 C2.0

LEGEND:

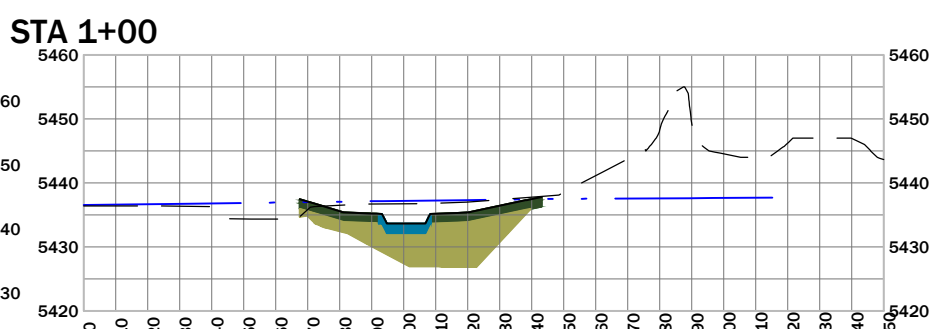
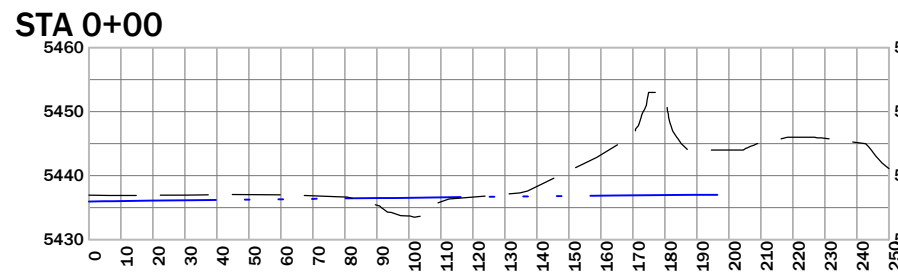
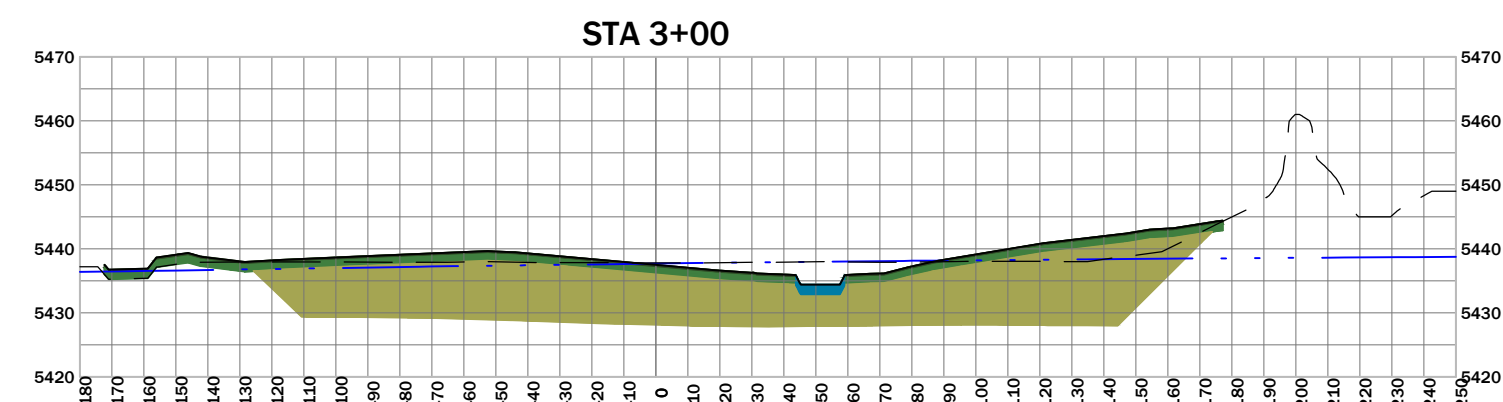
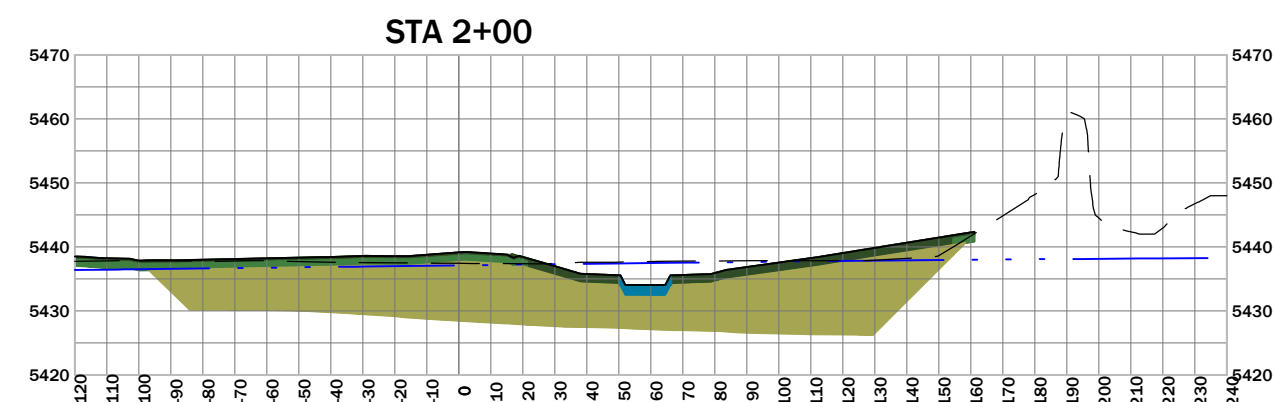
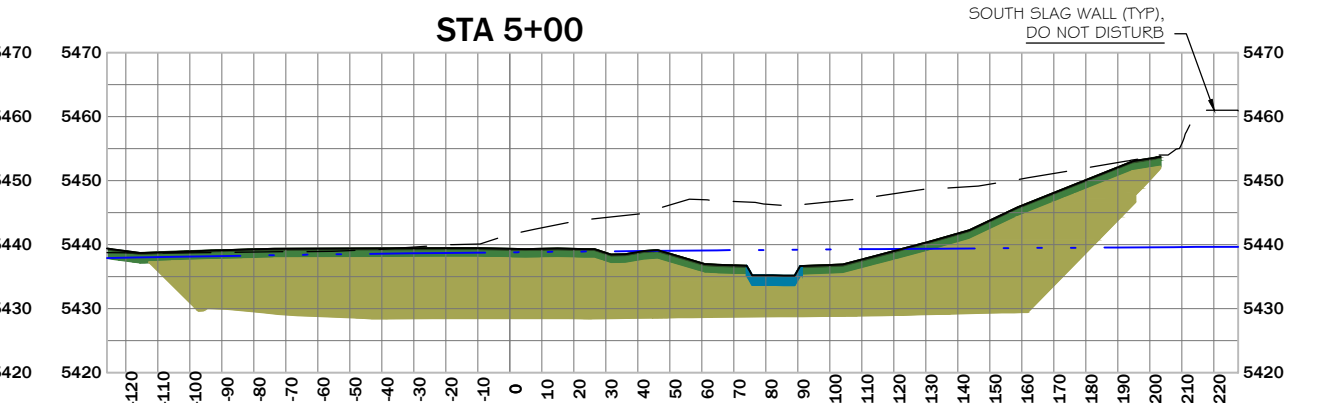
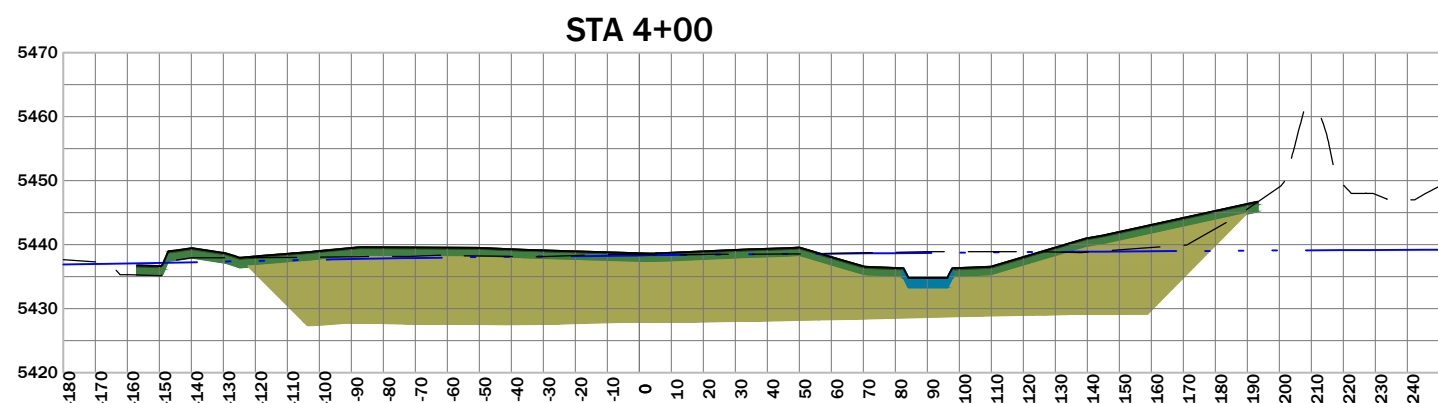
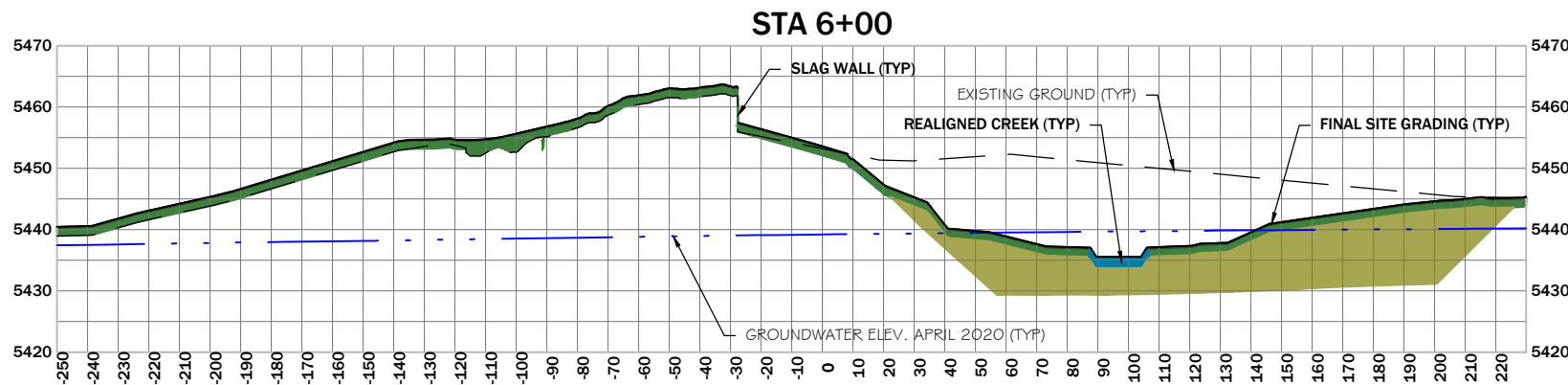
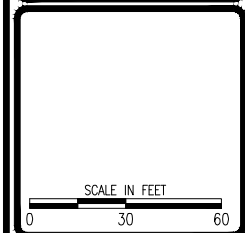
- TOPSOIL/TOPSOIL SUBSOIL
- HELEHAN MATERIAL
- BACKFILL MATERIAL
- STREAMBED



REVISION:	DATE:	BY:	DESC:

DRAWN BY: CLA
 DESIGNED BY: JPB
 CHECKED BY: JSM/MWB
 APPROVED BY: KLH
 PROJECT NO:
 DATE: 5/2021

DISPLAYED AS:
 COORD SYS/ZONE: MSP83
 DATUM: NAV83/NAVD88
 UNITS: INTERNATIONAL FEET
 SOURCE: PIONEER



- NOTES:**
- SEE SHEET CD1.0 FOR BACKFILL MATERIAL THICKNESS DETAILS.
 - PLANS, PROFILES, AND DETAILS FOR REGRADING OF NORTHERN PORTION OF SITE (OUTSIDE OF REMOVAL CORRIDOR) WILL BE PROVIDED IN THE INTERMEDIATE 60% REMOVAL DESIGN AFTER DESIGN OF END LAND USE IS DETERMINED.

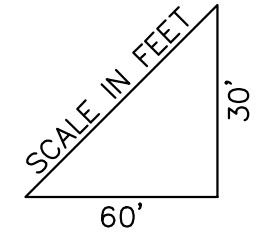
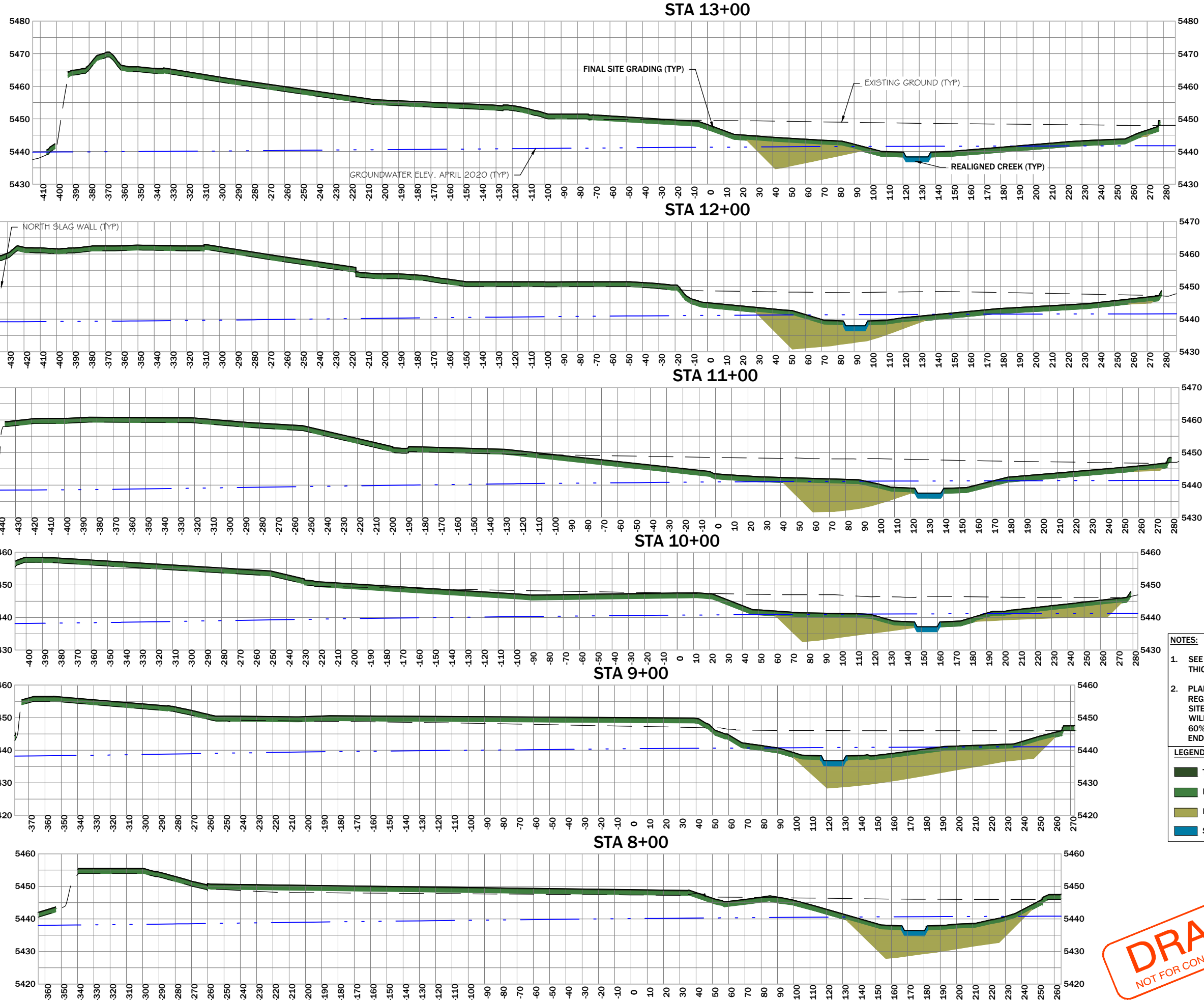
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ATLANTIC RICHFIELD COMPANY
 PRELIMINARY DESIGN
 BRW SMELTER AREA RA

SITE REGRADING
 CROSS
 SECTIONS
 STA 0+00 TO 7+00

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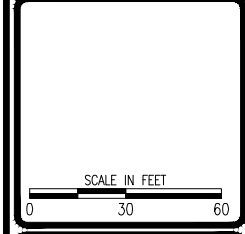
SHEET
 C2.1



REVISION:	DATE:	BY:	DESC:

DRAWN BY: CL
 DESIGNED BY: JPB
 CHECKED BY: JSM/MWB
 APPROVED BY: KKH
 PROJECT NO:
 DATE: 5/2021

DISPLAYED AS:
 COORD SYS/ZONE: MSP83
 DATUM: NAV83/NAVD88
 UNITS: INTERNATIONAL FEET
 SOURCE: PIONEER



ATLANTIC RICHFIELD COMPANY
 PRELIMINARY DESIGN
 BRW SMELTER AREA RA

SITE REGRADING
 CROSS
 SECTIONS
 STA 8+00 TO 13+00

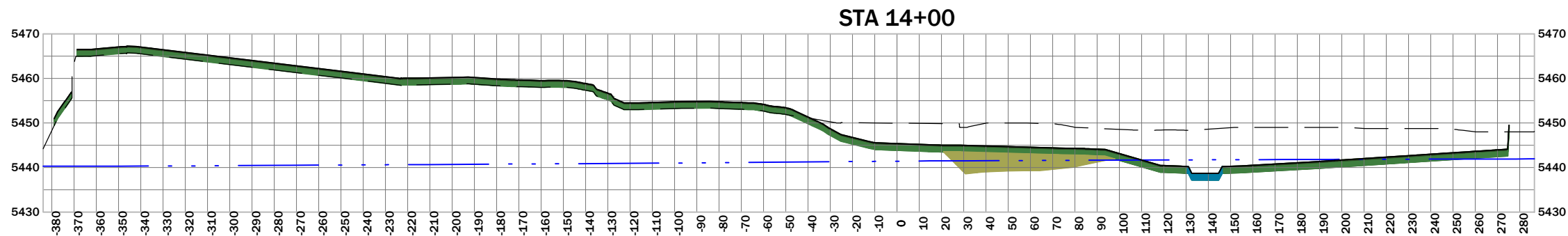
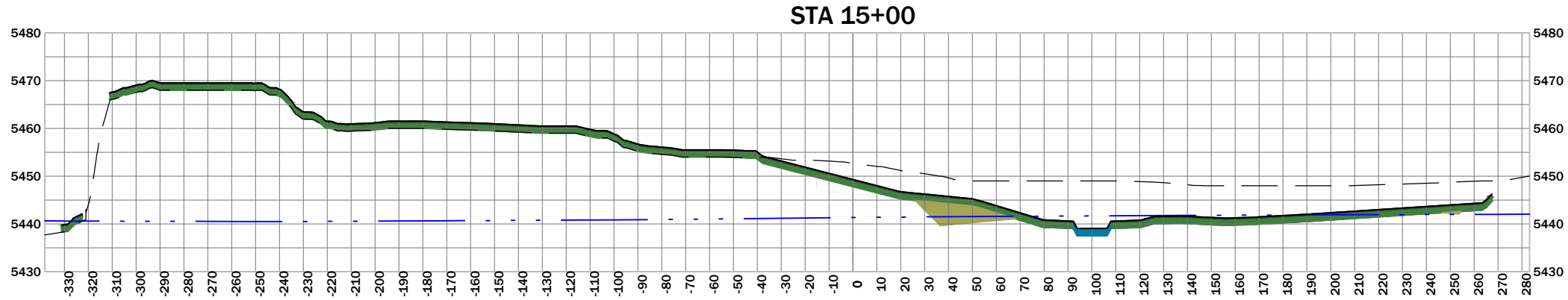
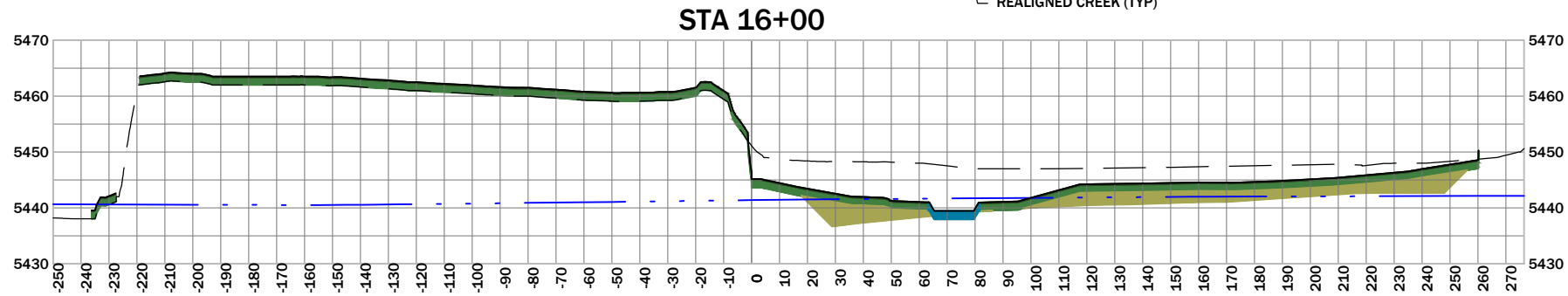
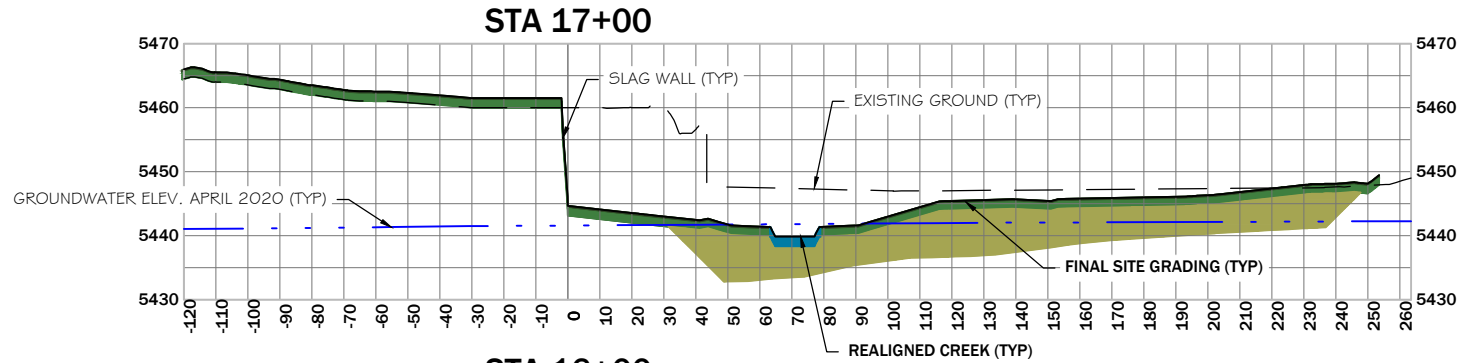
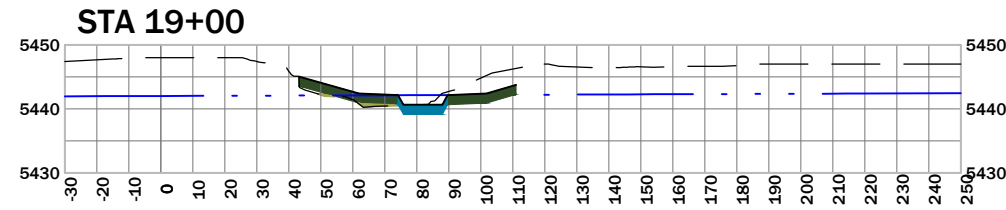
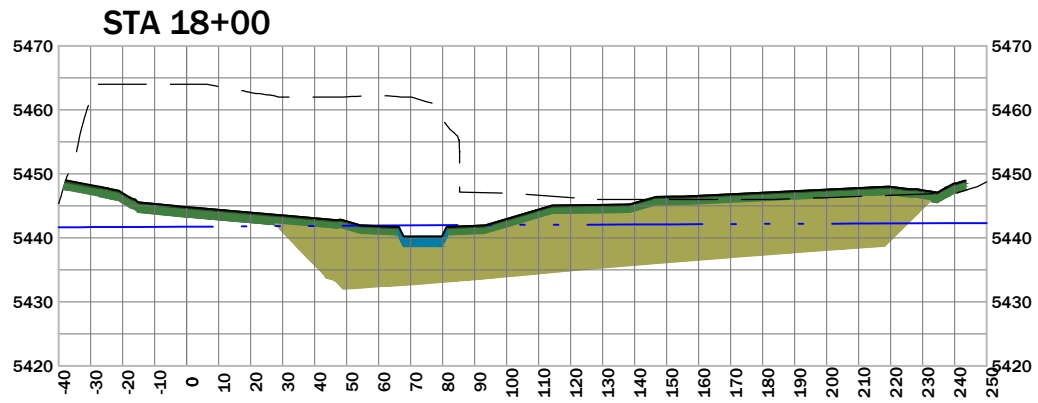
PIONEER
 TECHNICAL SERVICES, INC.
 1101 SOUTH MONTANA
 BUTTE, MONTANA 59701
 (406) 782-5177

SHEET
 C2.2

- NOTES:**
- SEE SHEET CD1.0 FOR BACKFILL MATERIAL THICKNESS DETAILS.
 - PLANS, PROFILES, AND DETAILS FOR REGRADING OF NORTHERN PORTION OF SITE (OUTSIDE OF REMOVAL CORRIDOR) WILL BE PROVIDED IN THE INTERMEDIATE 60% REMOVAL DESIGN AFTER DESIGN OF END LAND USE IS DETERMINED.

- LEGEND:**
- TOPSOIL/TOPSOIL SUBSOIL
 - HELEHAN MATERIAL
 - BACKFILL MATERIAL
 - STREAMBED

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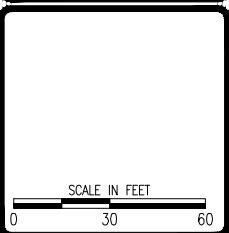


SCALE IN FEET
60'
30'

REVISION:	DATE:	BY:	DESC:

DRAWN BY: CLG
DESIGNED BY: JPB
CHECKED BY: JSM/MWB
APPROVED BY: KKH
PROJECT NO:
DATE: 5/2021

DISPLAYED AS:
COORD SYS/ZONE: MSP83
DATUM: NAV83/NAVD88
UNITS: INTERNATIONAL FEET
SOURCE: PIONEER



ATLANTIC RICHFIELD COMPANY
PRELIMINARY DESIGN
BRW SMELTER AREA RA

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LEGEND:

	TOPSOIL/TOPSOIL SUBSOIL
	HELEHAN MATERIAL
	BACKFILL MATERIAL
	STREAMBED

- NOTES:
- SEE SHEET CD1.0 FOR BACKFILL MATERIAL THICKNESS DETAILS.
 - PLANS, PROFILES, AND DETAILS FOR REGRADING OF NORTHERN PORTION OF SITE (OUTSIDE OF REMOVAL CORRIDOR) WILL BE PROVIDED IN THE INTERMEDIATE 60% REMOVAL DESIGN AFTER DESIGN OF END LAND USE IS DETERMINED.

SITE REGRADING
CROSS
SECTIONS
STA 14+00 TO 19+00

PIONEER
TECHNICAL SERVICES, INC.
1101 SOUTH MONTANA
BUTTE, MONTANA 59701
(406) 782-5177

SHEET
C2.3

Topsoil Volume Table (SEE NOTE 2)			
Station	Fill Area	Fill Volume	Cumulative Fill Vol
0+00.00	0	0	0
0+50.00	0	0	0
1+00.00	67	62	62
1+50.00	163	213	276
2+00.00	178	315	591
2+50.00	178	330	921
3+00.00	168	320	1,241
3+50.00	163	307	1,548
4+00.00	169	307	1,855
4+50.00	186	329	2,183
5+00.00	158	319	2,502
5+50.00	243	371	2,873
6+00.00	232	440	3,314
6+50.00	238	435	3,748
7+00.00	268	469	4,217
7+50.00	307	532	4,749
8+00.00	301	562	5,312
8+50.00	305	561	5,873
9+00.00	317	576	6,449
9+50.00	328	597	7,046
10+00.00	336	615	7,661
10+50.00	345	630	8,291
11+00.00	356	649	8,940
11+50.00	357	660	9,600
12+00.00	353	658	10,258
12+50.00	343	644	10,903
13+00.00	330	623	11,526
13+50.00	326	608	12,134
14+00.00	319	597	12,732
14+50.00	308	580	13,312
15+00.00	287	550	13,862
15+50.00	261	507	14,369
16+00.00	236	461	14,830
16+50.00	213	416	15,245
17+00.00	180	364	15,609
17+50.00	160	315	15,925
18+00.00	129	268	16,192
18+50.00	103	215	16,407
19+00.00	0	95	16,503
19+23.44	0	0	16,503

Helehan Material Volume Table			
Station	Fill Area	Fill Volume	Cumulative Fill Vol
0+00.00	0	0	0
0+50.00	0	0	0
1+00.00	135	125	125
1+50.00	326	426	551
2+00.00	356	631	1,182
2+50.00	356	659	1,841
3+00.00	336	641	2,482
3+50.00	326	613	3,095
4+00.00	337	614	3,710
4+50.00	373	657	4,367
5+00.00	315	637	5,004
5+50.00	487	743	5,747
6+00.00	464	880	6,627
6+50.00	484	878	7,505
7+00.00	537	945	8,450
7+50.00	613	1,065	9,515
8+00.00	601	1,125	10,640
8+50.00	610	1,122	11,762
9+00.00	633	1,151	12,914
9+50.00	657	1,194	14,108
10+00.00	671	1,230	15,338
10+50.00	690	1,260	16,598
11+00.00	712	1,298	17,896
11+50.00	715	1,321	19,217
12+00.00	706	1,316	20,533
12+50.00	686	1,289	21,822
13+00.00	661	1,247	23,068
13+50.00	653	1,216	24,285
14+00.00	638	1,195	25,480
14+50.00	615	1,160	26,640
15+00.00	573	1,100	27,740
15+50.00	523	1,015	28,755
16+00.00	472	921	29,676
16+50.00	426	831	30,508
17+00.00	360	728	31,235
17+50.00	321	631	31,866
18+00.00	258	536	32,401
18+50.00	206	430	32,831
19+00.00	0	191	33,022
19+23.44	0	0	33,022

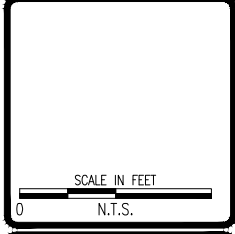
Streambed Volume Table			
Station	Fill Area	Fill Volume	Cumulative Fill Vol
0+00.00	0	0	0
0+50.00	0	0	0
1+00.00	24	23	23
1+50.00	26	47	70
2+00.00	24	47	116
2+50.00	21	42	158
3+00.00	23	41	199
3+50.00	26	45	244
4+00.00	24	46	289
4+50.00	21	41	331
5+00.00	26	44	375
5+50.00	23	45	420
6+00.00	29	48	468
6+50.00	30	55	522
7+00.00	26	52	574
7+50.00	24	46	621
8+00.00	24	44	665
8+50.00	28	48	713
9+00.00	24	48	761
9+50.00	26	46	807
10+00.00	24	46	853
10+50.00	23	43	896
11+00.00	27	46	943
11+50.00	24	47	989
12+00.00	22	43	1,032
12+50.00	24	43	1,075
13+00.00	25	46	1,122
13+50.00	22	44	1,165
14+00.00	23	42	1,207
14+50.00	27	46	1,253
15+00.00	24	47	1,300
15+50.00	22	42	1,342
16+00.00	27	46	1,388
16+50.00	22	46	1,433
17+00.00	24	42	1,476
17+50.00	24	44	1,520
18+00.00	23	43	1,562
18+50.00	23	42	1,604
19+00.00	0	21	1,625
19+23.44	0	0	1,625

Backfill Material Volume Table			
Station	Fill Area	Fill Volume	Cumulative Fill Vol
0+00.00	0	0	0
0+50.00	0	0	0
1+00.00	287	266	266
1+50.00	1,592	1,740	2,006
2+00.00	1,927	3,259	5,264
2+50.00	2,129	3,755	9,020
3+00.00	2,379	4,173	13,193
3+50.00	2,581	4,592	17,785
4+00.00	2,650	4,843	22,628
4+50.00	2,534	4,800	27,428
5+00.00	2,691	4,838	32,266
5+50.00	1,870	4,223	36,489
6+00.00	1,437	3,062	39,551
6+50.00	866	2,132	41,683
7+00.00	521	1,284	42,967
7+50.00	480	927	43,895
8+00.00	595	996	44,891
8+50.00	756	1,251	46,142
9+00.00	866	1,501	47,643
9+50.00	771	1,516	49,159
10+00.00	540	1,214	50,373
10+50.00	431	899	51,273
11+00.00	429	796	52,069
11+50.00	477	839	52,908
12+00.00	488	893	53,801
12+50.00	314	743	54,543
13+00.00	312	580	55,123
13+50.00	222	494	55,617
14+00.00	238	425	56,043
14+50.00	184	391	56,433
15+00.00	113	276	56,709
15+50.00	177	269	56,978
16+00.00	412	546	57,524
16+50.00	912	1,225	58,749
17+00.00	1,149	1,908	60,657
17+50.00	1,349	2,313	62,970
18+00.00	1,496	2,634	65,605
18+50.00	1,585	2,853	68,458
19+00.00	4	1,471	69,929
19+23.44	0	2	69,931

REVISION: _____
DATE: _____ BY: _____ DESC: _____

DRAWN BY: _____ CLA
DESIGNED BY: _____ JPB
CHECKED BY: _____ JSM/MWB
APPROVED BY: _____ KKH
PROJECT NO: _____
DATE: _____ 5/2021

DISPLAYED AS:
COORD SYS/ZONE: NA
DATUM: NA
UNITS: NA
SOURCE: PIONEER



ATLANTIC RICHFIELD COMPANY
PRELIMINARY DESIGN
BRW SMELTER AREA RA

SITE
REGRADE
VOLUME
TABLE

PIONEER
TECHNICAL SERVICES, INC.
1101 SOUTH MONTANA
BUTTE, MONTANA 59701
(406) 782-5177

SHEET
C2.4

NOTE:

- ALL VOLUMES ARE PROVIDED IN BANK CUBIC YARDS. CONTRACTOR IS RESPONSIBLE FOR DETERMINING MATERIAL SHRINK AND SWELL.
- TOPSOIL VOLUME INCLUDES BOTH CRITERIA E FOR UPLAND COVER AND CRITERIA D FOR RIPARIAN AREAS. SEE AREAS ON SHEET C2.5 AND CROSS SECTION DETAILS ON SHEET CD1.0.

Cut/Fill Summary (TIN Surface Volume Comparison)

Name	Cut	Fill	Net
Topsoil Volume	0.00 Cu. Yd.	17097.63 Cu. Yd.	17097.63 Cu. Yd.<Fill>
Helehan Material Volume	0.00 Cu. Yd.	34195.25 Cu. Yd.	34195.25 Cu. Yd.<Fill>
Streambed Volume	0.00 Cu. Yd.	1689.99 Cu. Yd.	1689.99 Cu. Yd.<Fill>
Backfill Material Volume	0.00 Cu. Yd.	72968.81 Cu. Yd.	72968.81 Cu. Yd.<Fill>



LEGEND:

- UPLAND COVER - 16.50 ACRES
- RIPARIAN AREA - 5.23 ACRES
- STREAMBED - 0.63 ACRES

NOTE:

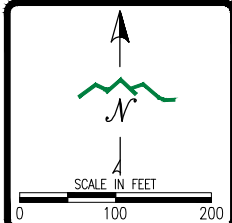
1. SEE SHEET CD1.0 FOR COVER DETAILS.
2. COVER PLACEMENT AREAS WILL BE UPDATED IN THE 60% RD TO INCLUDE HARDSCAPE AND VEGETATION AREAS FOR END LAND USE FEATURES, AMENITIES, AND TRAILS.



REVISION:	DATE:	BY:	DESC:

DRAWN BY: CLA
 DESIGNED BY: JPB
 CHECKED BY: JSM/MWB
 APPROVED BY: KKH
 PROJECT NO:
 DATE: 5/2021

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 DATUM: NAV83/NAVD88
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 SOURCE: AES 2016



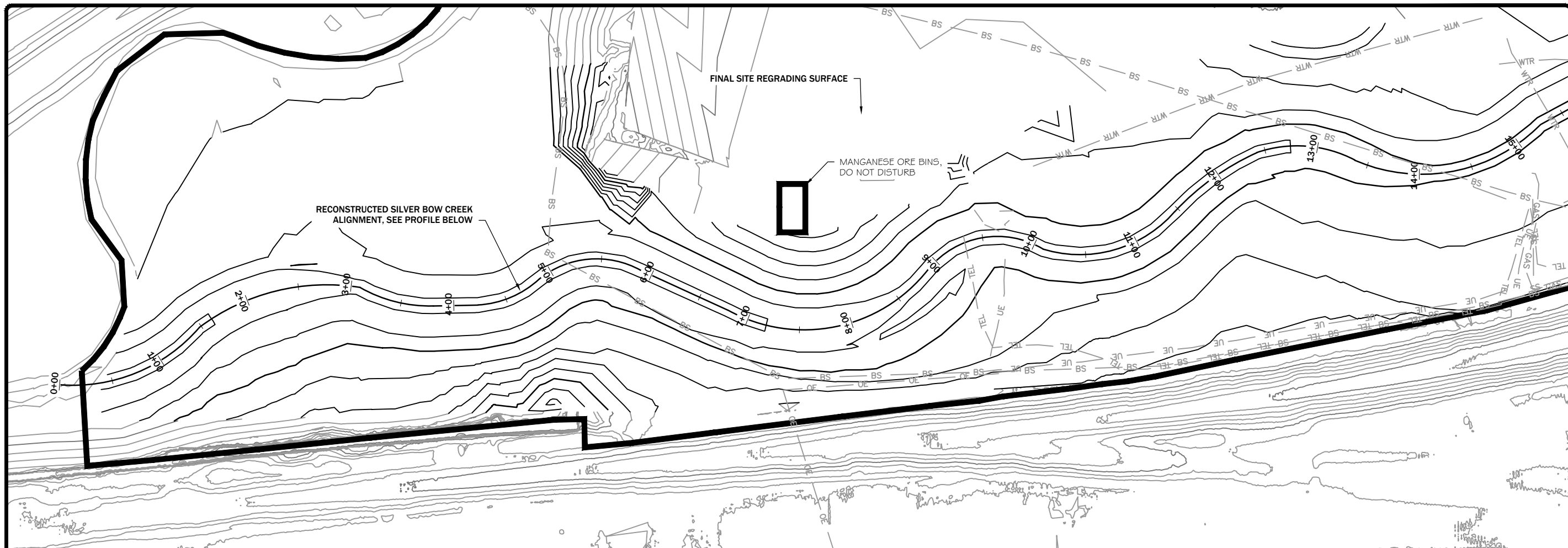
ATLANTIC RICHFIELD COMPANY
 PRELIMINARY DESIGN
 BRW SMELTER AREA RA

COVER
 PLACEMENT

PIONEER
 TECHNICAL SERVICES, INC.
 1101 SOUTH MONTANA
 BUTTE, MONTANA 59701
 (406) 782-5177

DRAFT
 NOT FOR CONSTRUCTION

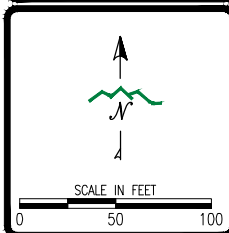
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REVISION:	DATE:	BY:	DESC:

DRAWN BY: CLM
 DESIGNED BY: JPB
 CHECKED BY: JSM/MWB
 APPROVED BY: KKH
 PROJECT NO.:
 DATE: 5/2021

DISPLAYED AS:
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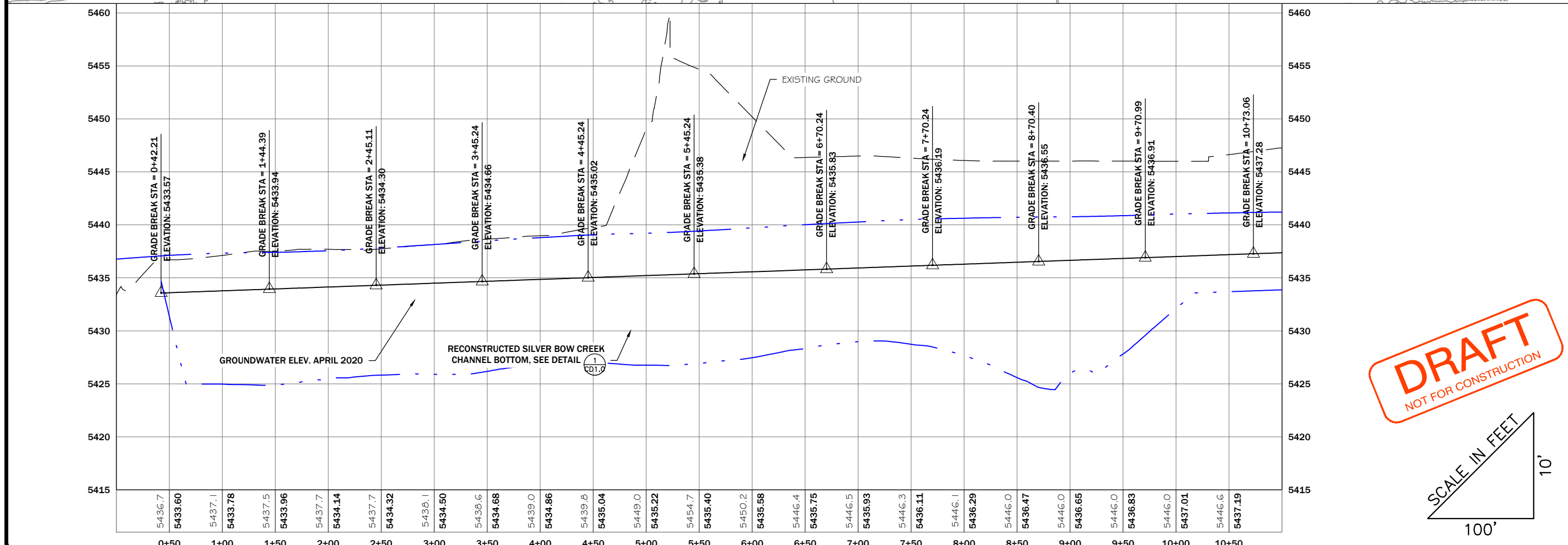


ATLANTIC RICHFIELD COMPANY
 PRELIMINARY DESIGN
 BRW SMELTER AREA RA

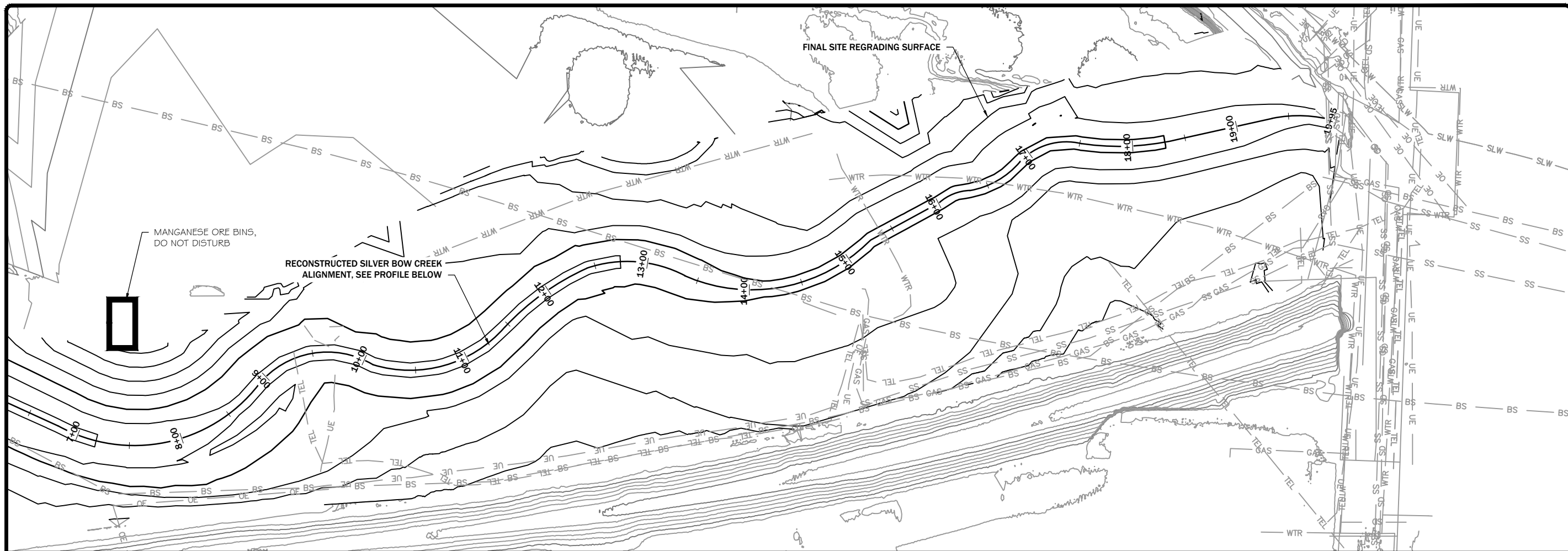
SILVER BOW CREEK
 PLAN AND PROFILE
 STA 0+00 TO 11+00



SHEET C3.0



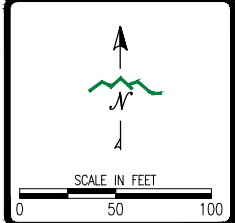
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NOT FOR CONSTRUCTION



REVISION:	DATE:	BY:	DESC:

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 DATE: 5/2021

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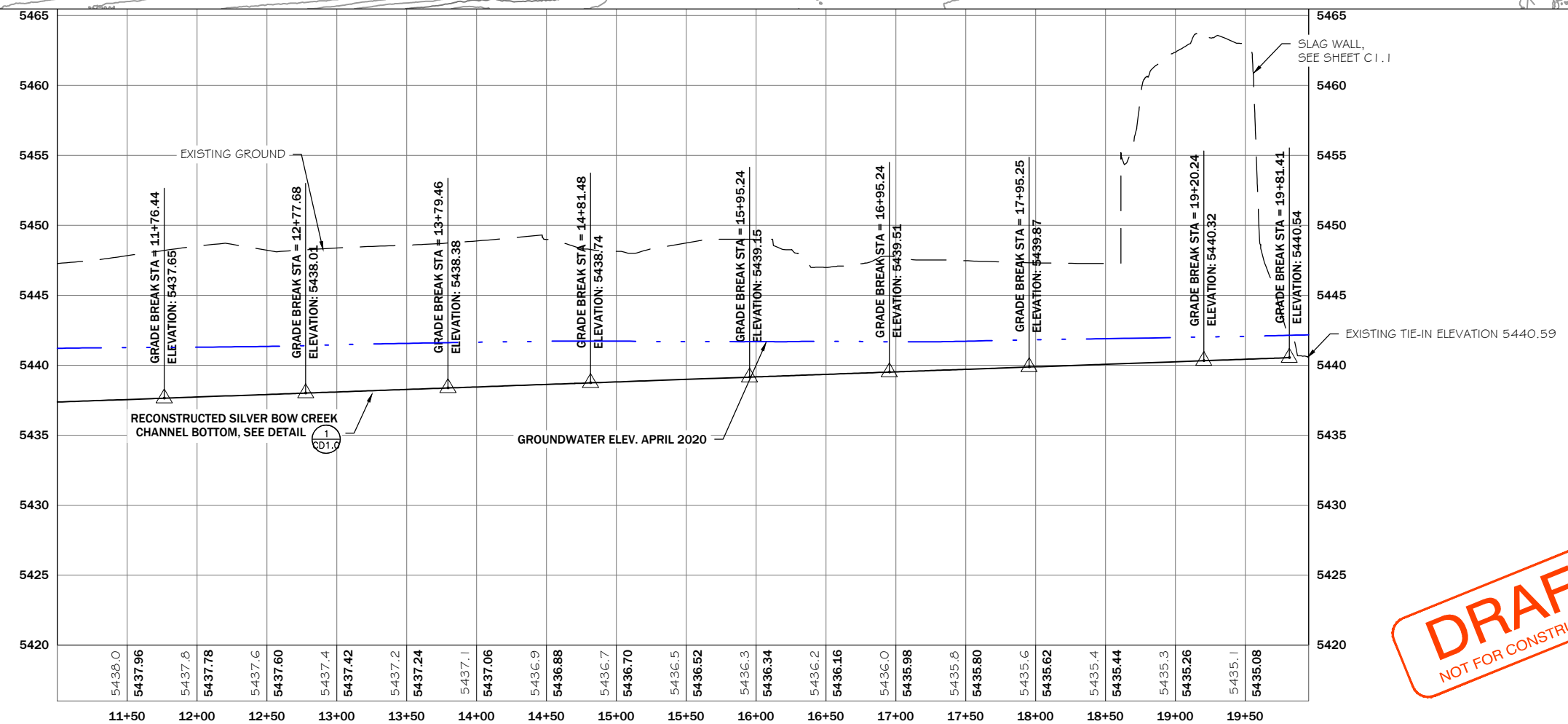


ATLANTIC RICHFIELD COMPANY
 PRELIMINARY DESIGN
 BRW SMELTER AREA RA

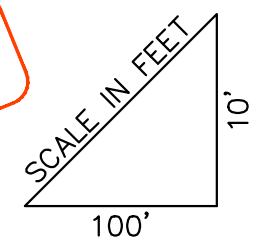
SILVER BOW CREEK
 PLAN AND PROFILE
 STA 11+00 TO 19+95

PIONEER
 TECHNICAL SERVICES, INC.
 1101 SOUTH MONTANA
 BUTTE, MONTANA 59701
 (406) 782-5177

SHEET
 C3.1



DRAFT
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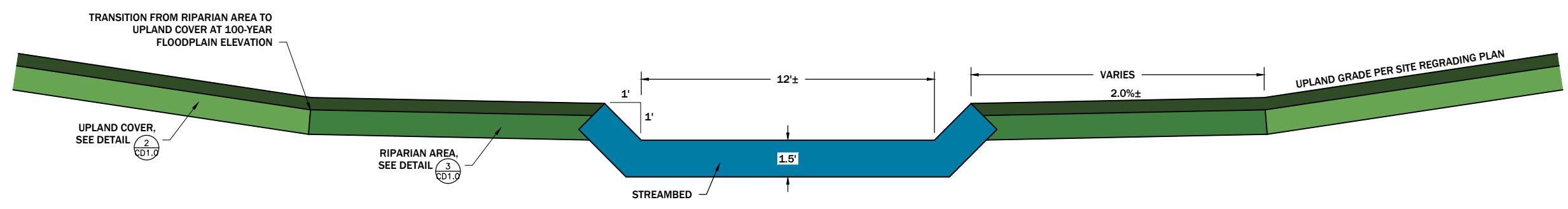
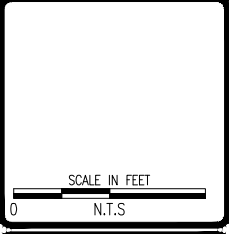


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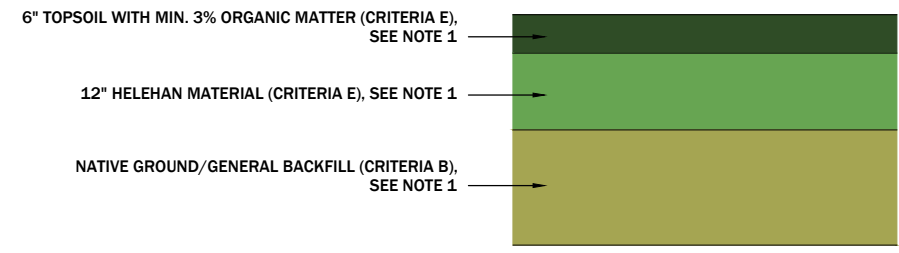
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 DATE: 5/2021

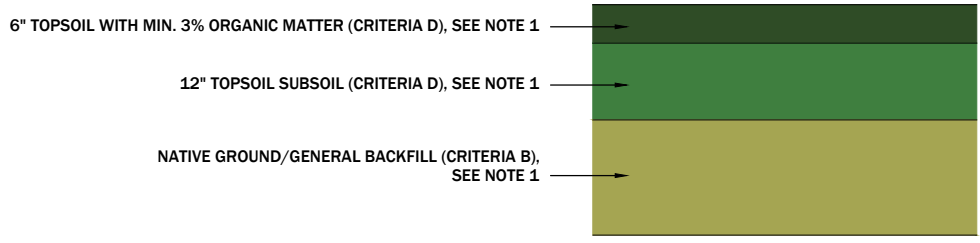
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TYPICAL SILVER BOW CREEK CROSS SECTION DETAIL (1)
NOT TO SCALE



UPLAND COVER DETAIL (2)
NOT TO SCALE



RIPARIAN AREA DETAIL (3)
NOT TO SCALE

NOTE:
 1. BACKFILL AND COVER MATERIAL CRITERIA PROVIDED IN TABLES 2 AND 3 (INCLUDED IN THE REMEDIAL DESIGN REPORT).

ATLANTIC RICHFIELD COMPANY
 PRELIMINARY DESIGN
 BRW SMELTER AREA RA

CIVIL
 CONSTRUCTION
 DETAILS

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SHEET
 CD1.0