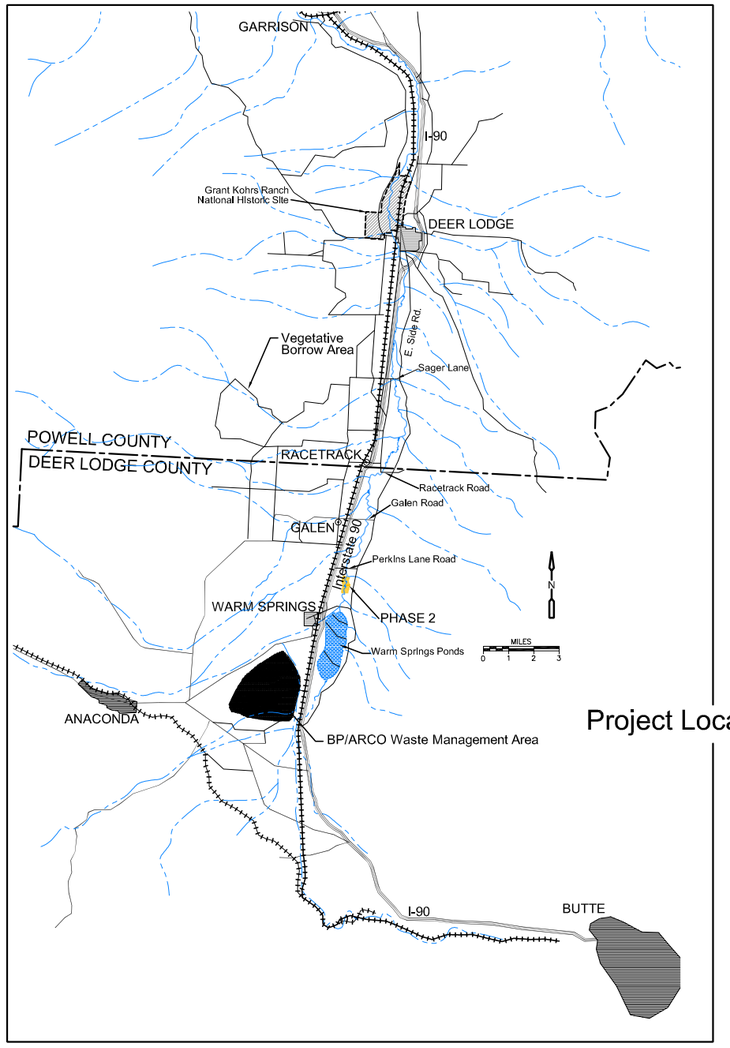
# Clark Fork River Operable Unit
# Phase 2 Remedial Action Reach A Preliminary Design
# Milltown Reservoir/Clark Fork River NPL Site
# Deer Lodge County, Montana

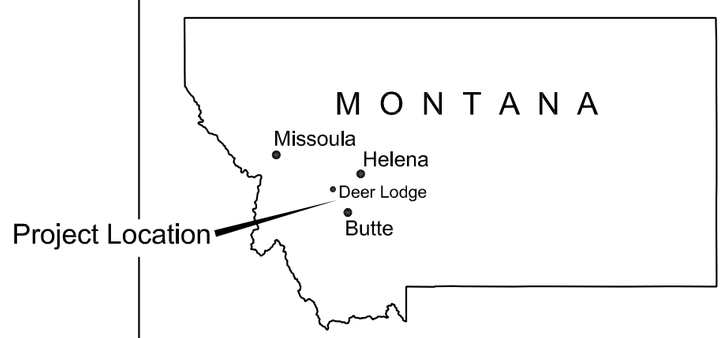
**July 2014**




Prepared for:

The Montana Department of Environmental Quality
Mine Waste Cleanup Bureau

The Montana Department of Justice
Natural Resource Damage Program




Prepared by:

CDM Smith, Inc. - Helena, Montana
Geum Environmental Consulting, Inc. - Hamilton, Montana

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## LEGEND

- PHASE 2 REMOVAL BOUNDARY
- PROPERTY BOUNDARY
- EXISTING ROAD
- PROPOSED PRIMARY HAUL ROADS
- PROPOSED SECONDARY HAUL ROADS
- FO — FIBER OPTIC LINE
- PP — OVERHEAD ELECTRIC LINE
- PH — TELEPHONE LINE
- E — BURIED ELECTRIC LINE
- OE — OVERHEAD ELECTRIC LINE
- X — EXISTING FENCE
- PROPOSED 8FT WILDLIFE FENCE
- WATER GAP
- CULVERT
- 5450 — EXISTING INDEX CONTOUR LINE AND ELEVATION DESIGNATION
- EXISTING INTERMEDIATE CONTOUR LINE
- 5450 — PROPOSED INDEX CONTOUR LINE AND ELEVATION DESIGNATION
- PROPOSED INTERMEDIATE CONTOUR LINE
- BUILDING OR STRUCTURE FOOTPRINT
- SHRUBBERY OR TERRY
- FLOODPLAIN ALLUVIUM
- POINT BAR ALLUVIUM
- EXISTING GROUND
- VEGETATIVE BACKFILL
- SURVEY CONTROL POINT
- 4775.23 / 24 — ELEVATION OF BASE OF EXCAVATION (FT) / DEPTH OF EXCAVATION (IN)
- * — ARSENIC CONCENTRATION GREATER THAN 620 PPM

## MAPPING SOURCES:

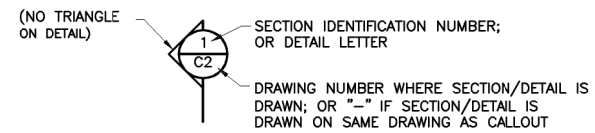
SURVEY CONTROL: DAN BROWN AND ASSOCIATES, BUTTE, MT
MAPPING BY FUGRO EARTH DATA AND DJA, AUGUST 2011 LIDAR DATA.

## SURVEY CONTROL POINTS

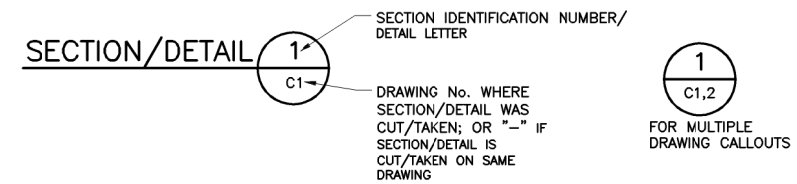
| NO./NAME | NORTH | EAST | ELEVATION (Z) | TYPE |
|---|---|---|---|---|
| GALEN | 741664.921 | 1145270.371 | 4721.540 | RR SPIKE |
| SEWER LAGOON | 722134.474 | 1137872.808 | 4818.926 | RR SPIKE |

HORIZONTAL SURVEY CONTROL IS STATE PLANE COORDINATES NAD83 CONVERTED TO INTERNATIONAL FEET. VERTICAL CONTROL IS NAVD88 IN US SURVEY FEET.

## SECTION AND DETAIL DESIGNATION




SECTION CUT/DETAIL CALLOUT SYMBOL




TITLE FOR SECTION/DETAIL

## EXISTING CONDITIONS GENERAL NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF CURRENT CONDITIONS AND LOCATIONS OF ALL THE EXISTING ITEMS WITHIN OR ADJACENT TO THE WORK, OR THAT MAY BE DISTURBED BY THE WORK.
2. THE LOCATIONS OF ALL SUBSURFACE CONDITIONS ARE BASED ON THE BEST AVAILABLE INFORMATION AS OF INVESTIGATION COMPLETED IN 2009.
3. THE CONTRACTOR SHALL VERIFY LOCATIONS OF ALL EXISTING SURFACE FEATURES, AND OTHER EXISTING ITEMS.
4. CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL SURFACE AND SUBSURFACE UTILITIES. UTILITY LOCATIONS SHOWN ON DRAWING ARE APPROXIMATE AND FOR INFORMATIONAL PURPOSE ONLY.
5. DRAWINGS PLOTTED IN COLOR FOR REALIZATION OF ALL DESIGNED FEATURES.

## SYMBOLS AND ABBREVIATIONS

| | |
|---|---|
| # | NUMBER |
| & | AND |
| @ | AT |
| % | PERCENT |
| Δ | DEFLECTION ANGLE IN DEGREES |
| > | GREATER THAN |
| < | LESS THAN |
| * | ARSENIC GREATER THAN 620 PPM |
| ' | U.S. FOOT |
| " | U.S. INCHES |
| ▼ | WATER SURFACE MARKER |
| ARCO | ATLANTIC RICHFIELD COMPANY |
| ASTM | AMERICAN SOCIETY FOR TESTING AND MATERIALS |
| BP | BRITISH PETROLEUM |
| BNSF | BURLINGTON NORTHERN SANTA FE |
| BT | BRUSH TRENCH |
| CF | CUBIC FEET |
| CFR | CLARK FORK RIVER |
| CHK'D | CHECKED |
| CMP | CORRUGATED METAL PIPE |
| CMPA | CORRUGATED METAL PIPE ARCH |
| CY | CUBIC YARDS |
| DEQ | MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY |
| DIA | DIAMETER |
| DWG | DRAWINGS |
| DRWN | DRAWN |
| DVSL | DOUBLE VEGETATED SOILS LIFT |
| E | EAST |
| E | BURIED ELECTRICAL LINE |
| EG | EXISTING GRADE |
| EPA | U.S. ENVIRONMENTAL PROTECTION AGENCY |
| FG | FINAL GRADE |
| FO | FIBER OPTIC |
| FT | U.S. FOOT |
| G | GAS LINE |
| GA | GAGE |
| GAL | U.S. GALLON |
| H | HORIZONTAL |
| HOR | HORIZONTAL |
| I–90 | INTERSTATE 90 |
| IN | U.S. INCHES |
| MAX | MAXIMUM |
| MIN | MINIMUM |
| MIN | MINUTE |
| LB | LATERAL BAR |
| LF | LINEAR FEET |
| LLC | LIMITED LIABILITY COMPANY |
| MDEQ | MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY |
| MI | U.S. MILE |
| MISC | MISCELLANEOUS |
| MUTCD | MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES |
| N | NORTH |
| NO | NUMBER |
| NT | NO TREATMENT |
| NTS | NOT TO SCALE |
| OC | ON CENTER |
| PB | POINT BAR |
| PH | TELEPHONE LINE |
| PP | OVERHEAD ELECTRIC |
| PPM | PARTS PER MILLION |
| PV | PRESERVE VEGETATION |
| QTY | QUANTITY |
| RD | ROAD |
| REV | REVISION |
| RR | RAILROAD |
| ROW | RIGHT OF WAY |
| SF | SQUARE FEET |
| S | SOUTH |
| STA | STATION |
| STD | STANDARD |
| SY | SQUARE YARDS |
| TYP | TYPICAL |
| UE | UNDERGROUND ELECTRIC |
| UP | UTILITY POLE |
| UG | UNDERGROUND |
| USGS | UNITED STATED GEOLOGICAL SURVEY |
| V | VERTICAL |
| VER | VERTICAL |
| W | WEST |
| WCBB | WILLOW CUTTING BEHIND BANKS |
| XS | CROSS SECTION |

DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|

DESIGNED BY: KM
DRAWN BY: KM
SHEET CHK'D BY: WHB
CROSS CHK'D BY: TJ
APPROVED BY: XXX
DATE: JULY 2014

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consulting • engineering • construction • operations

DEPARTMENT OF ENVIRONMENTAL QUALITY

CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

GENERAL LEGEND AND NOTES

PROJECT NO. 103068
FILE NAME: GSTPL001.DWG
SHEET NO. G1

## LEGEND

- PHASE 1 REMOVAL BOUNDARY
- PHASE 2 REMOVAL BOUNDARY
- PROPERTY BOUNDARY
- FO — FIBER OPTIC LINE
- PP — OVERHEAD ELECTRIC LINE
- X — FENCE
- G — GAS LINE
- PH — TELEPHONE LINE
- EXISITNG ROADS

N

250 0 500

NOTE:
ALL UNDERGROUND UTILITIES MAY NOT BE SHOWN AND LOCATIONS SHOWN MAY VARY FROM ACTUAL POSITION. CONTRACTOR IS RESPONSIBLE FOR UTILITY LOCATES PRIOR TO DISTURBING SUBSURFACE.

DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|

DESIGNED BY: KM
DRAWN BY: KM
SHEET CHK'D BY: WHB
CROSS CHK'D BY: WHB
APPROVED BY: WHB
DATE: JULY 2014

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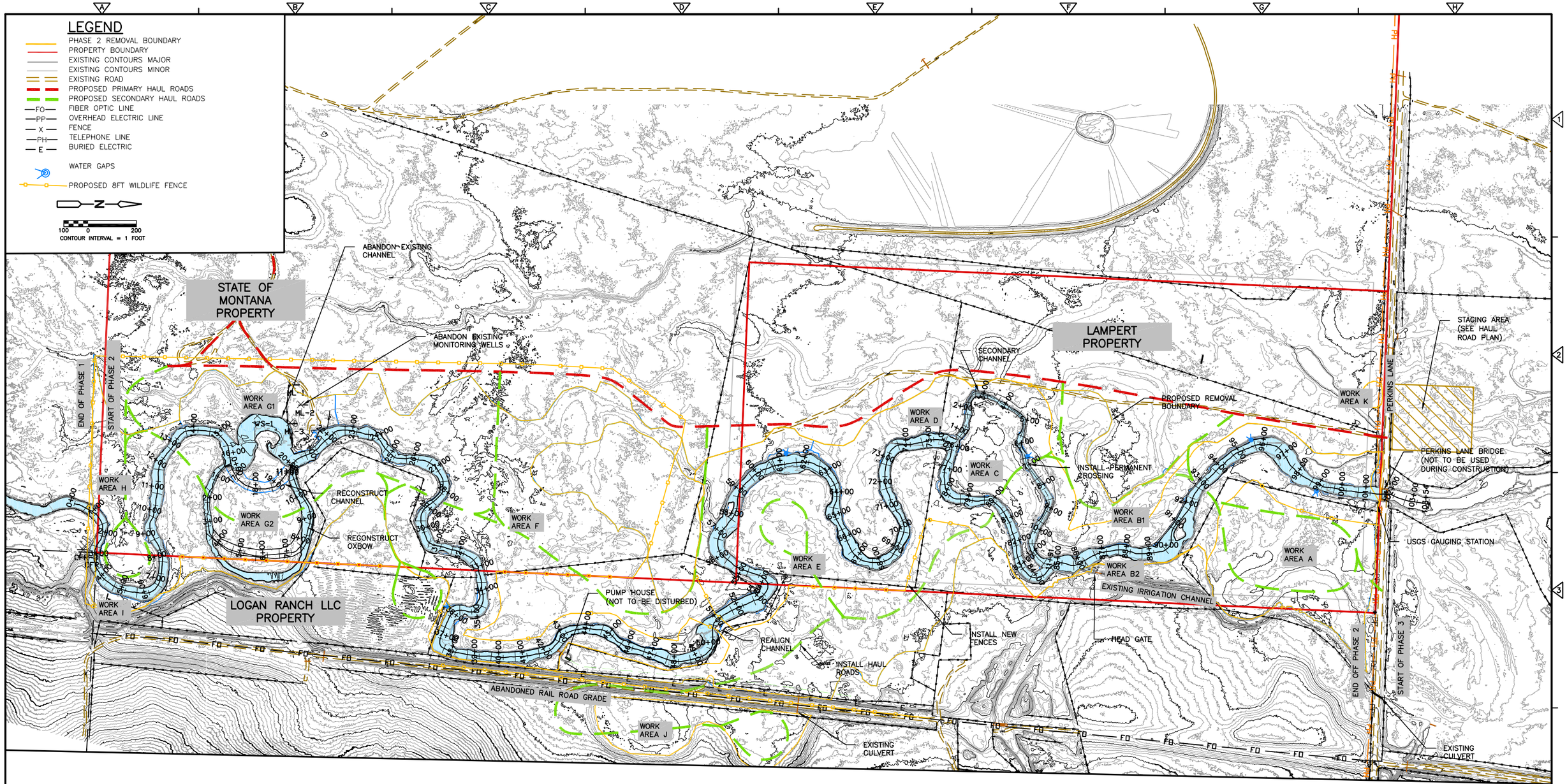
DEPARTMENT OF ENVIRONMENTAL QUALITY
CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

GENERAL SITE PLAN

PROJECT NO.
FILE NAME:
SHEET NO.
C1




DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|
| | | | | |

DESIGNED BY: KM
DRAWN BY: KM
SHEET CHK'D BY: WHB
CROSS CHK'D BY: WHB
APPROVED BY: WHB
DATE: JULY 2014

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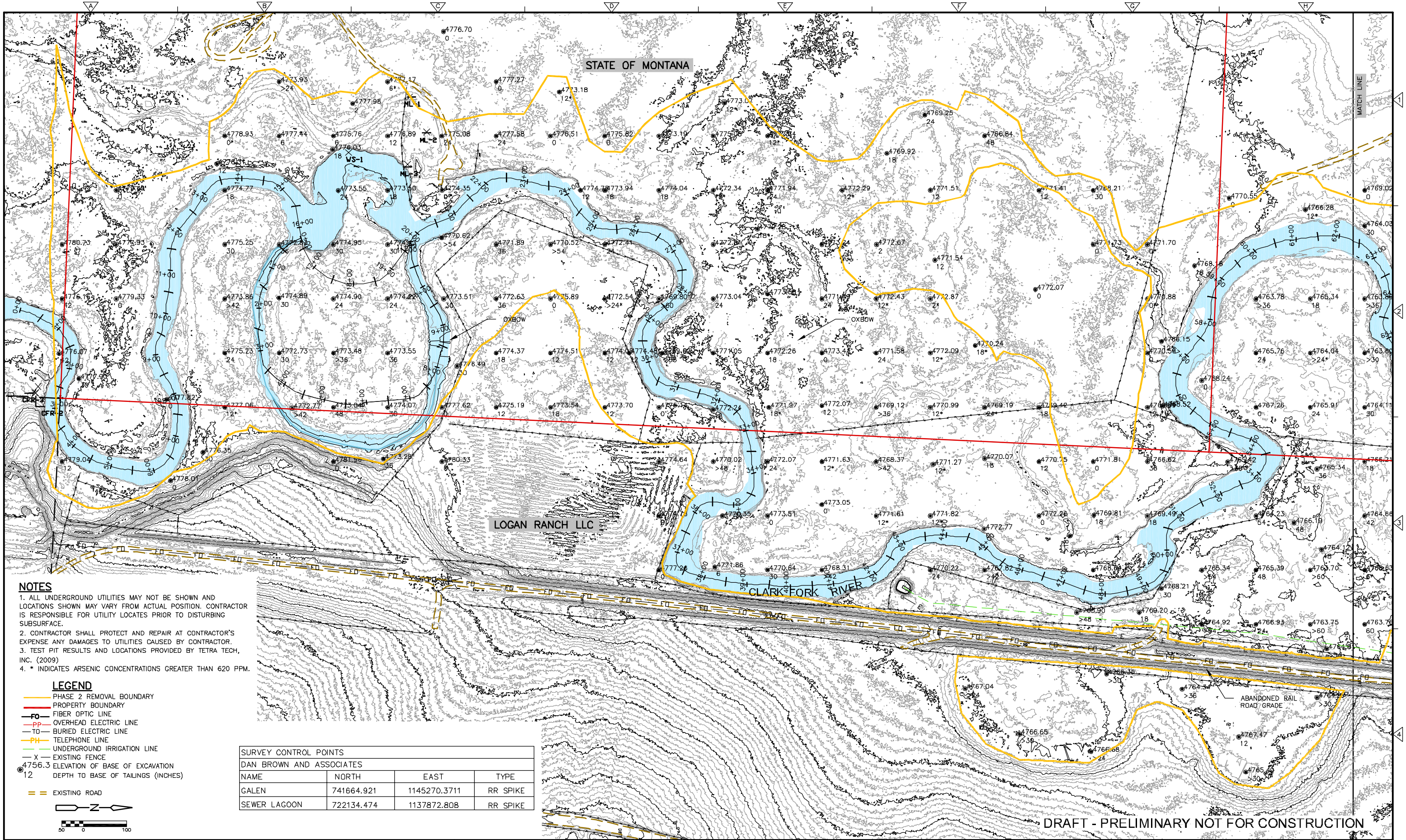
DEPARTMENT OF ENVIRONMENTAL QUALITY
CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

WORK THIS CONTRACT

PROJECT NO.
FILE NAME:
SHEET NO.
C2




## NOTES

1. ALL UNDERGROUND UTILITIES MAY NOT BE SHOWN AND LOCATIONS SHOWN MAY VARY FROM ACTUAL POSITION. CONTRACTOR IS RESPONSIBLE FOR UTILITY LOCATES PRIOR TO DISTURBING SUBSURFACE.
2. CONTRACTOR SHALL PROTECT AND REPAIR AT CONTRACTOR'S EXPENSE ANY DAMAGES TO UTILITIES CAUSED BY CONTRACTOR.
3. TEST PIT RESULTS AND LOCATIONS PROVIDED BY TETRA TECH, INC. (2009)
4. * INDICATES ARSENIC CONCENTRATIONS GREATER THAN 620 PPM.

## LEGEND

- PHASE 2 REMOVAL BOUNDARY
- PROPERTY BOUNDARY
- —FO— FIBER OPTIC LINE
- —PP— OVERHEAD ELECTRIC LINE
- —TO— BURIED ELECTRIC LINE
- —PH— TELEPHONE LINE
- UNDERGROUND IRRIGATION LINE
- —X— EXISTING FENCE
- 4756.3 ELEVATION OF BASE OF EXCAVATION
- 12 DEPTH TO BASE OF TAILINGS (INCHES)
- EXISTING ROAD

50 0 100

| SURVEY CONTROL POINTS | | | |
|---|---|---|---|
| DAN BROWN AND ASSOCIATES | | | |
| NAME | NORTH | EAST | TYPE |
| GALEN | 741664.921 | 1145270.3711 | RR SPIKE |
| SEWER LAGOON | 722134.474 | 1137872.808 | RR SPIKE |

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|

DESIGNED BY: KM
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CROSS CHK'D BY: WHB
APPROVED BY: WHB
DATE: JULY 2014

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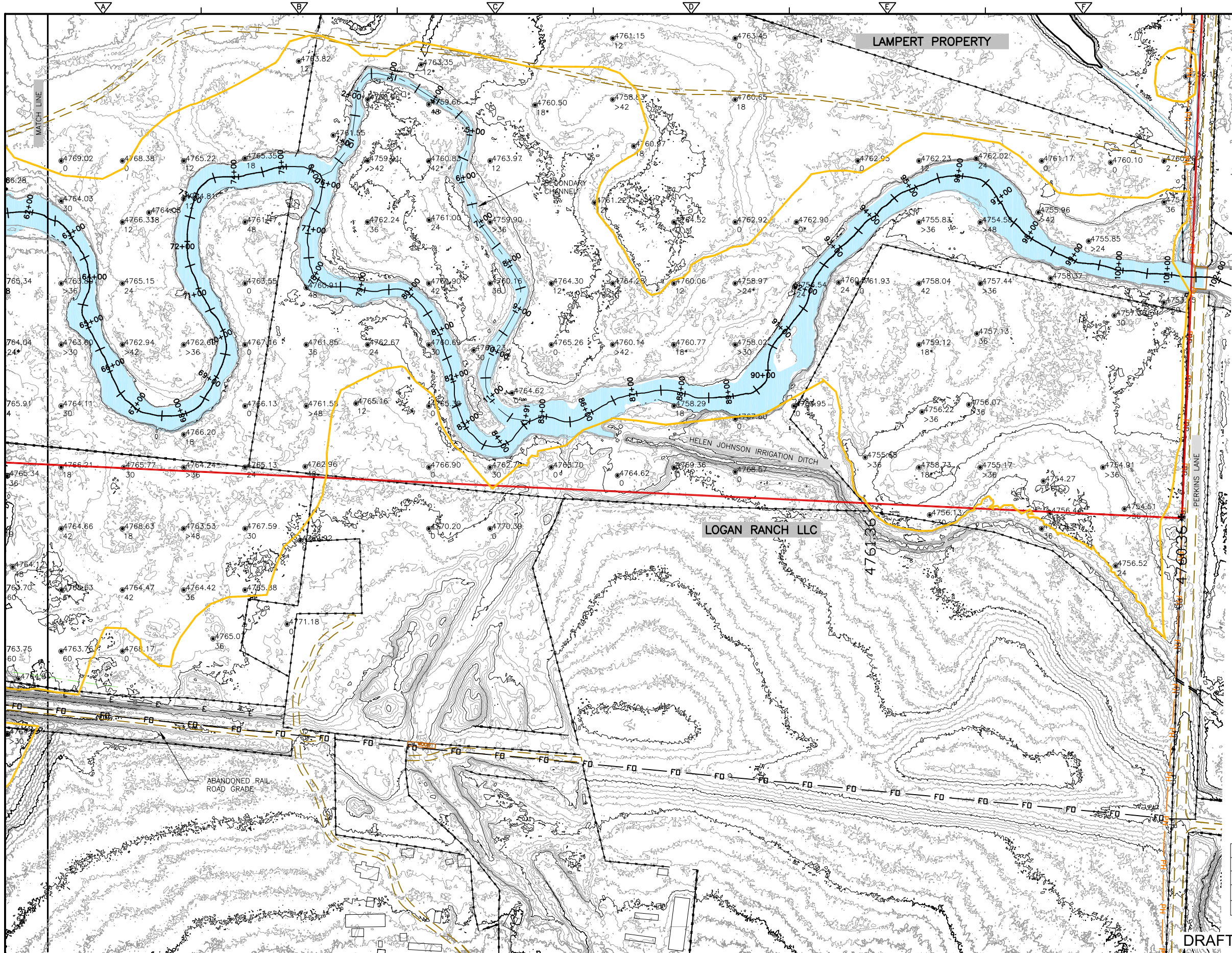
DEPARTMENT OF ENVIRONMENTAL QUALITY

CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

EXISTING CONDITIONS AND TEST PIT LOCATIONS

PROJECT NO.
FILE NAME:
SHEET NO.
C3




## NOTES

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4. * INDICATES ARSENIC CONCENTRATIONS GREATER THAN 620 PPM.

## LEGEND

- PHASE 2 REMOVAL BOUNDARY
- PROPERTY BOUNDARY
- FO — FIBER OPTIC LINE
- PP — OVERHEAD ELECTRIC LINE
- TO — BURIED ELECTRIC LINE
- PH — TELEPHONE LINE
- UNDERGROUND IRRIGATION LINE
- X — EXISTING FENCE
- 4756.3 / 12 — ELEVATION OF BASE OF EXCAVATION / DEPTH TO BASE OF TAILINGS (INCHES)
- EXISTING ROAD

| SURVEY CONTROL POINTS | | | |
|---|---|---|---|
| DAN BROWN AND ASSOCIATES | | | |
| NAME | NORTH | EAST | TYPE |
| GALEN | 741664.921 | 1145270.3711 | RR SPIKE |
| SEWER LAGOON | 722134.474 | 1137872.808 | RR SPIKE |

DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|

DESIGNED BY: KM
DRAWN BY: KM
SHEET CHK'D BY: WHB
CROSS CHK'D BY: WHB
APPROVED BY: WHB
DATE: JULY 2014

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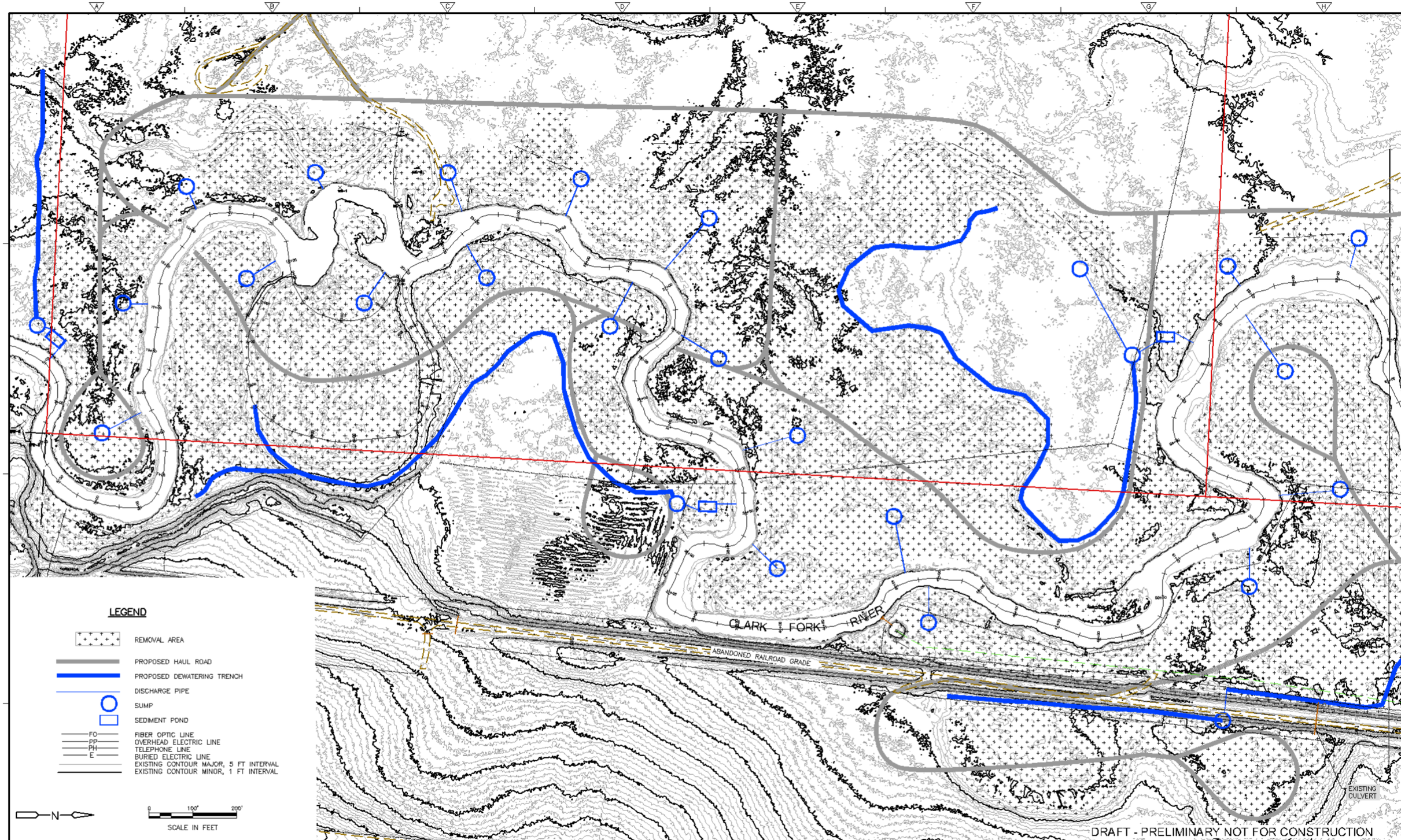
DEPARTMENT OF ENVIRONMENTAL QUALITY

CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

EXISTING CONDITIONS AND TEST PIT LOCATIONS

PROJECT NO.
FILE NAME:
SHEET NO.
C4




| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|

DESIGNED BY: MJP
DRAWN BY: MJP
SHEET CHK'D BY: WHB
CROSS CHK'D BY: TJ
APPROVED BY: XX
DATE: JULY 2014

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DEPARTMENT OF ENVIRONMENTAL QUALITY

CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

DEWATERING PLAN

PROJECT NO. 103068
FILE NAME: CSTPL05.DWG

SHEET NO.
C5

PROPOSED STAGING AREA

EXISTING CROSSING

PERKINS LANE BRIDGE (DO NOT USE DURING CONSTRUCTION)

CLARK FORK RIVER

HELEN JOHNSON IRRIGATION DITCH

EXISTING CULVERT

PERKINS LANE

ABANDONED RAILROAD GRADE

MATCH LINE

**LEGEND**

- REMOVAL AREA
- PROPOSED HAUL ROAD
- PROPOSED DEWATERING TRENCH
- DISCHARGE PIPE
- SUMP
- SEDIMENT POND
- FO — FIBER OPTIC LINE
- PP — OVERHEAD ELECTRIC LINE
- PH — TELEPHONE LINE
- E — BURIED ELECTRIC LINE
- EXISTING CONTOUR MAJOR, 5 FT INTERVAL
- EXISTING CONTOUR MINOR, 1 FT INTERVAL

N

0 100' 200'

SCALE IN FEET

DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|

DESIGNED BY: MJP
DRAWN BY: MJP
SHEET CHK'D BY: WHB
CROSS CHK'D BY: TJ
APPROVED BY: XX
DATE: JULY 2014

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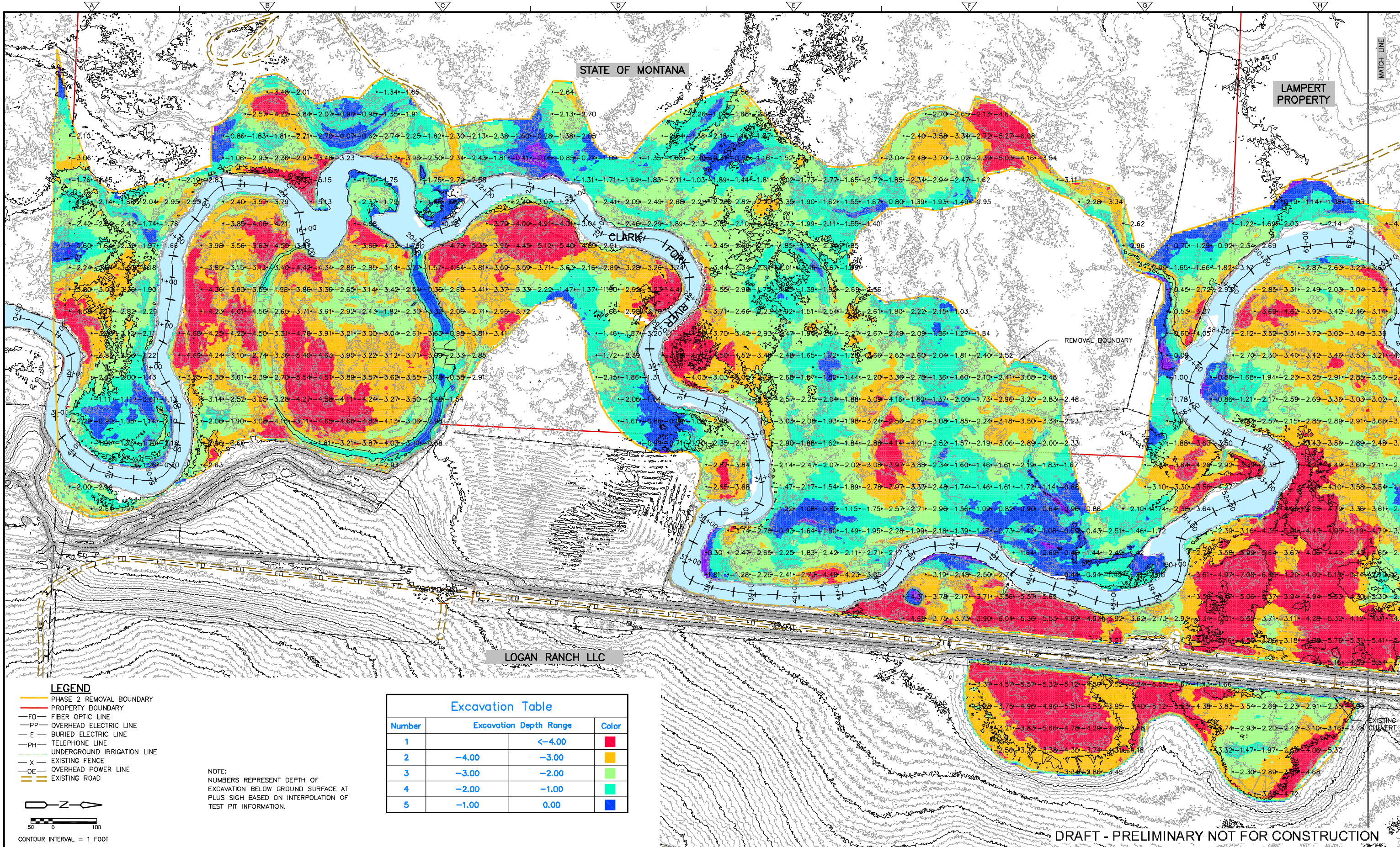
DEPARTMENT OF ENVIRONMENTAL QUALITY

CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

DEWATERING PLAN

PROJECT NO. 103068
FILE NAME: CSTPL04.DWG

SHEET NO.
C6




## LEGEND

- PHASE 2 REMOVAL BOUNDARY
- PROPERTY BOUNDARY
- FO — FIBER OPTIC LINE
- PP — OVERHEAD ELECTRIC LINE
- E — BURIED ELECTRIC LINE
- PH — TELEPHONE LINE
- UNDERGROUND IRRIGATION LINE
- X — EXISTING FENCE
- OE — OVERHEAD POWER LINE
- EXISTING ROAD

N

50 0 100

CONTOUR INTERVAL = 1 FOOT

NOTE:
NUMBERS REPRESENT DEPTH OF EXCAVATION BELOW GROUND SURFACE AT PLUS SIGH BASED ON INTERPOLATION OF TEST PIT INFORMATION.

### Excavation Table

| Number | Excavation Depth Range | | Color |
|---|---|---|---|
| 1 | | <−4.00 | |
| 2 | −4.00 | −3.00 | |
| 3 | −3.00 | −2.00 | |
| 4 | −2.00 | −1.00 | |
| 5 | −1.00 | 0.00 | |

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|

DESIGNED BY: KM
DRAWN BY: KM
SHEET CHK'D BY: WHB
CROSS CHK'D BY: WHB
APPROVED BY: WHB
DATE: JULY 2014

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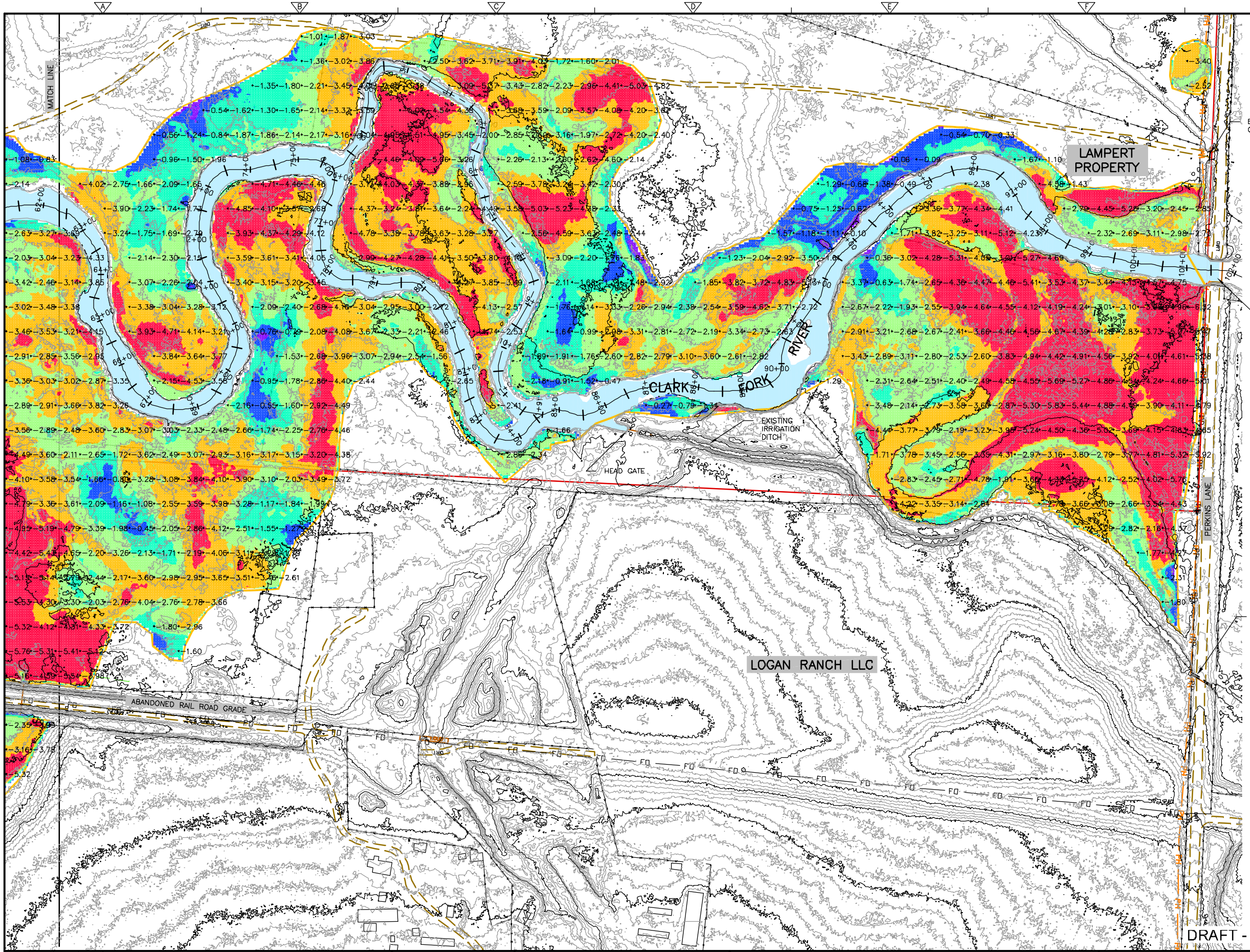
DEPARTMENT OF ENVIRONMENTAL QUALITY

CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

EXCAVATION PLAN

PROJECT NO.
FILE NAME:
SHEET NO.
C7




## LEGEND

- PHASE 2 REMOVAL BOUNDARY (1400 PPM)
- PROPERTY BOUNDARY
- FO — FIBER OPTIC LINE
- PP — OVERHEAD ELECTRIC LINE
- E — BURIED ELECTRIC LINE
- PH — TELEPHONE LINE
- UNDERGROUND IRRIGATION LINE
- X — EXISTING FENCE
- OE — OVERHEAD POWER LINE
- EXISTING ROAD

N

50 0 100

CONTOUR INTERVAL = 1 FOOT

NOTE:
NUMBERS REPRESENT DEPTH OF EXCAVATION BELOW GROUND SURFACE AT PLUS SIGN BASED ON INTERPOLATION OF TEST PIT INFORMATION.

### Excavation Table

| Number | Excavation Depth Range | | Color |
|---|---|---|---|
| 1 | | <−4.00 | |
| 2 | −4.00 | −3.00 | |
| 3 | −3.00 | −2.00 | |
| 4 | −2.00 | −1.00 | |
| 5 | −1.00 | 0.00 | |

DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|
| | | | | |

DESIGNED BY: KM
DRAWN BY: KM
SHEET CHK'D BY: WHB
CROSS CHK'D BY: WHB
APPROVED BY: WHB
DATE: JULY 2014

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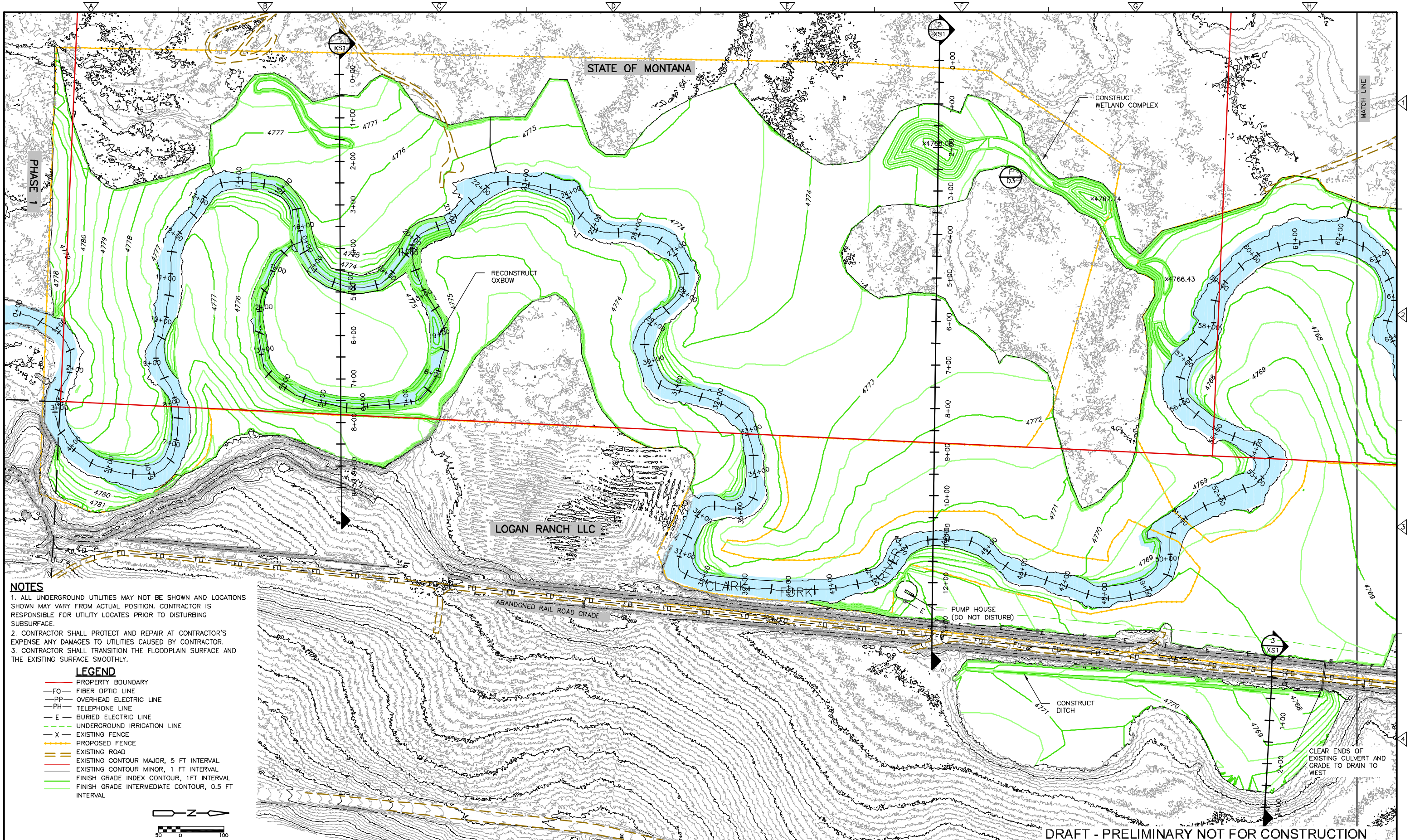
DEPARTMENT OF ENVIRONMENTAL QUALITY

CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

EXCAVATION PLAN

PROJECT NO.
FILE NAME:
SHEET NO.
C8




## NOTES

1. ALL UNDERGROUND UTILITIES MAY NOT BE SHOWN AND LOCATIONS SHOWN MAY VARY FROM ACTUAL POSITION. CONTRACTOR IS RESPONSIBLE FOR UTILITY LOCATES PRIOR TO DISTURBING SUBSURFACE.
2. CONTRACTOR SHALL PROTECT AND REPAIR AT CONTRACTOR'S EXPENSE ANY DAMAGES TO UTILITIES CAUSED BY CONTRACTOR.
3. CONTRACTOR SHALL TRANSITION THE FLOODPLAIN SURFACE AND THE EXISTING SURFACE SMOOTHLY.

## LEGEND

- PROPERTY BOUNDARY
- —FO— FIBER OPTIC LINE
- —PP— OVERHEAD ELECTRIC LINE
- —PH— TELEPHONE LINE
- — E — BURIED ELECTRIC LINE
- UNDERGROUND IRRIGATION LINE
- — X — EXISTING FENCE
- PROPOSED FENCE
- EXISTING ROAD
- EXISTING CONTOUR MAJOR, 5 FT INTERVAL
- EXISTING CONTOUR MINOR, 1 FT INTERVAL
- FINISH GRADE INDEX CONTOUR, 1FT INTERVAL
- FINISH GRADE INTERMEDIATE CONTOUR, 0.5 FT INTERVAL

N

50 0 100

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|
| | | | | |

DESIGNED BY: KM
DRAWN BY: KM
SHEET CHK'D BY: WHB
CROSS CHK'D BY: WHB
APPROVED BY: WHB
DATE: APRIL 2014

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DEPARTMENT OF ENVIRONMENTAL QUALITY

CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

FINAL GRADING PLAN

PROJECT NO.
FILE NAME:
SHEET NO.
C11

LAMPERT PROPERTY

LOGAN RANCH LLC

MATCH LINE

PERKINS LANE

CLARK FORK RIVER

INSTALL PERMANENT CULVERT

SECONDARY CHANNEL (MAINTAIN IN PLACE)

EXISTING IRRIGATION CHANNEL

HEAD GATE

PERKINS LANE BRIDGE (DO NOT USE DURING CONSTRUCTION)

USGS GAUGING STATION (DO NOT DISTURB)

## NOTES

1. ALL UNDERGROUND UTILITIES MAY NOT BE SHOWN AND LOCATIONS SHOWN MAY VARY FROM ACTUAL POSITION. CONTRACTOR IS RESPONSIBLE FOR UTILITY LOCATES PRIOR TO DISTURBING SUBSURFACE.
2. CONTRACTOR SHALL PROTECT AND REPAIR AT CONTRACTOR'S EXPENSE ANY DAMAGES TO UTILITIES CAUSED BY CONTRACTOR.
3. CONTRACTOR SHALL TRANSITION THE FLOODPLAIN SURFACE AND THE EXISTING SURFACE SMOOTHLY.

## LEGEND

- PROPERTY BOUNDARY
- FO — FIBER OPTIC LINE
- PP — OVERHEAD ELECTRIC LINE
- PH — TELEPHONE LINE
- E — BURIED ELECTRIC LINE
- UNDERGROUND IRRIGATION LINE
- X — EXISTING FENCE
- PROPOSED FENCE (BY OTHERS)
- EXISTING ROAD
- EXISTING CONTOUR MAJOR, 5 FT INTERVAL
- EXISTING CONTOUR MINOR, 1 FT INTERVAL
- FINISH GRADE INDEX CONTOUR, 1FT INTERVAL
- FINISH GRADE INTERMEDIATE CONTOUR, 0.5 FT INTERVAL

DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|
| | | | | |

DESIGNED BY: KM
DRAWN BY: KM
SHEET CHK'D BY: WHB
CROSS CHK'D BY: WHB
APPROVED BY: WHB
DATE: APRIL 2014

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50 West 14th Street, Suite 200
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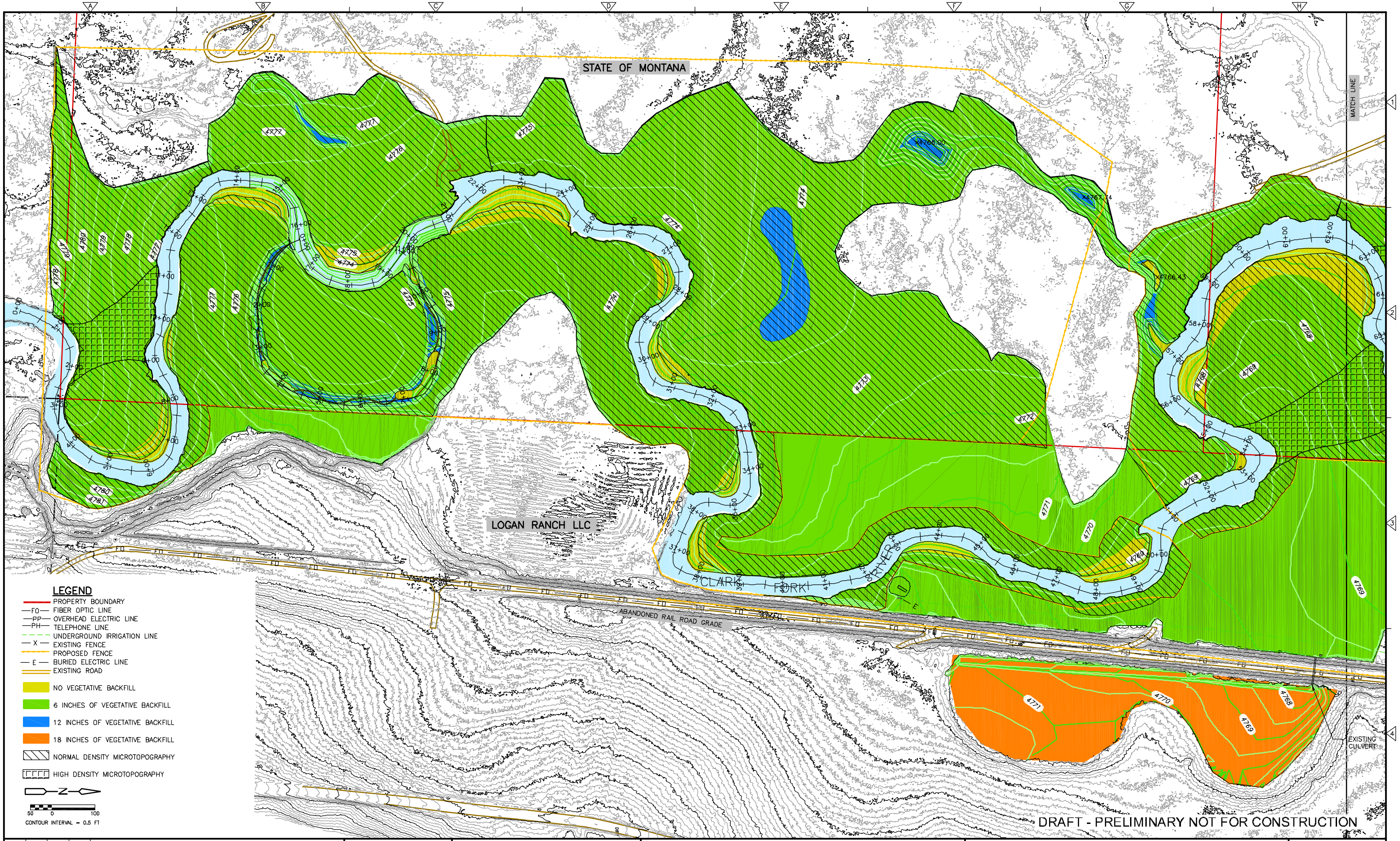
consulting - engineering - construction - operations

DEPARTMENT OF ENVIRONMENTAL QUALITY

CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

FINAL GRADING PLAN

PROJECT NO.
FILE NAME:
SHEET NO.
C12




| REV. NO. | DATE | DRWN | CHKD | REMARKS |
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| | | | | |

DESIGNED BY: AS
DRAWN BY: KM
SHEET CHK'D BY: WHB
CROSS CHK'D BY: WHB
APPROVED BY: WHB
DATE: APRIL 2014

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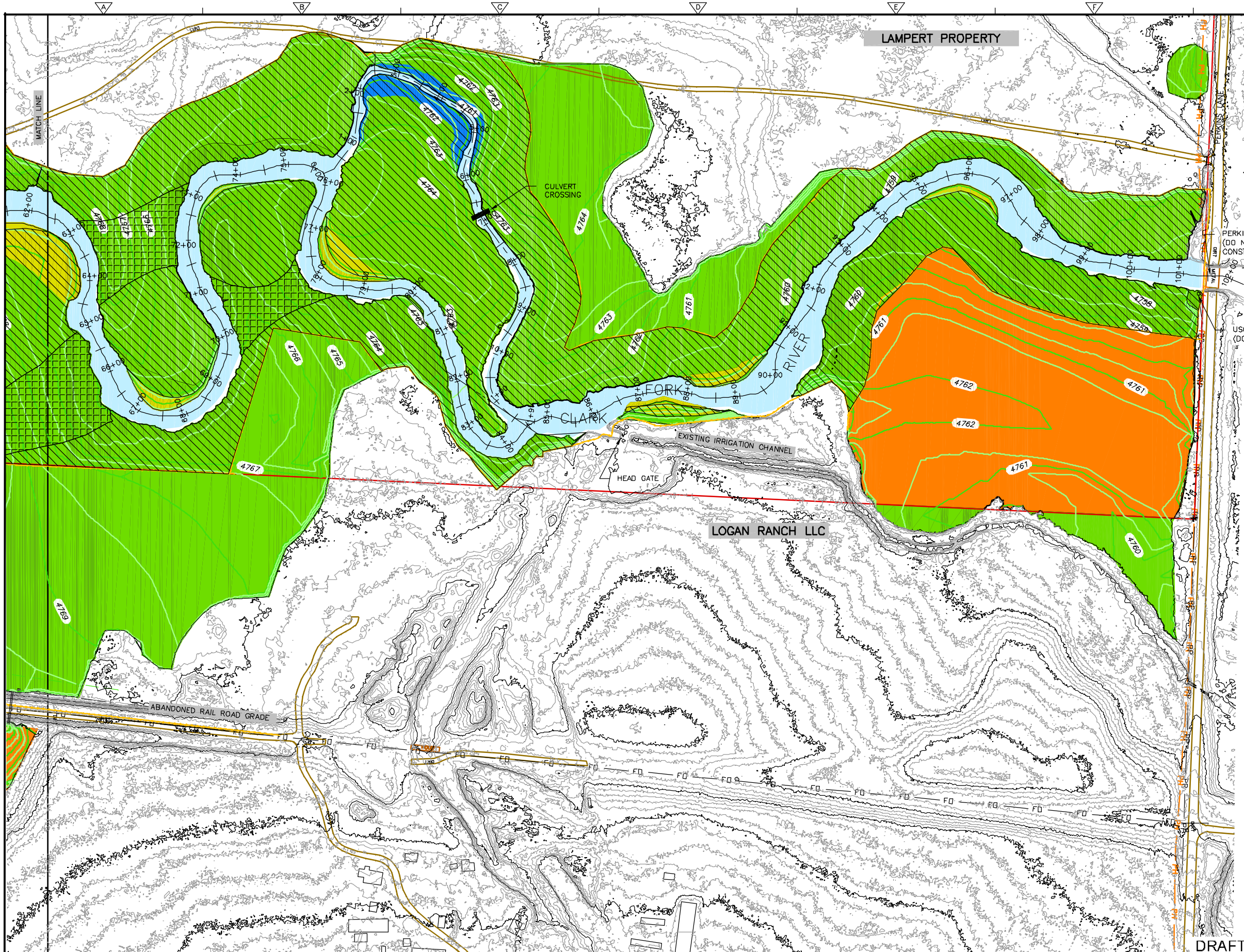
DEPARTMENT OF ENVIRONMENTAL QUALITY

CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

VEGETATIVE BACKFILL DEPTHS

PROJECT NO.
FILE NAME:
SHEET NO.
C13




## LEGEND

- PROPERTY BOUNDARY
- FIBER OPTIC LINE
- OVERHEAD ELECTRIC LINE
- TELEPHONE LINE
- UNDERGROUND IRRIGATION LINE
- EXISTING FENCE
- PROPOSED FENCE
- BURIED ELECTRIC LINE
- EXISTING ROAD
- NO VEGETATIVE BACKFILL
- 6 INCHES OF VEGETATIVE BACKFILL
- 12 INCHES OF VEGETATIVE BACKFILL
- 18 INCHES OF VEGETATIVE BACKFILL
- NORMAL DENSITY MICROTOPOGRAPHY
- HIGH DENSITY MICROTOPOGRAPHY

DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|

DESIGNED BY: AS
DRAWN BY: KM
SHEET CHK'D BY: WHB
CROSS CHK'D BY: WHB
APPROVED BY: WHB
DATE: APRIL 2014

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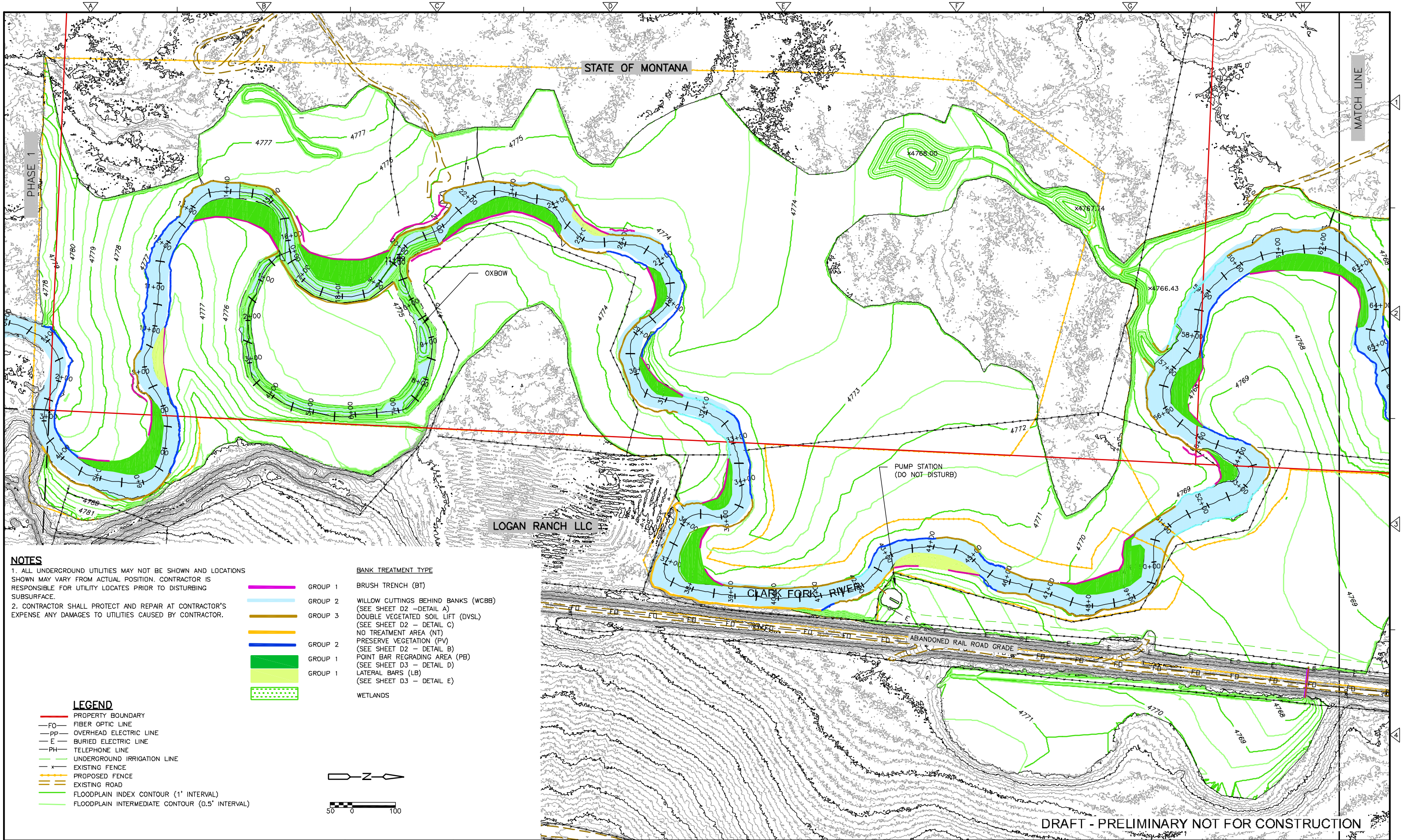
DEPARTMENT OF ENVIRONMENTAL QUALITY

CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

VEGETATIVE BACKFILL DEPTHS

PROJECT NO.
FILE NAME:
SHEET NO.
C14




## NOTES

1. ALL UNDERGROUND UTILITIES MAY NOT BE SHOWN AND LOCATIONS SHOWN MAY VARY FROM ACTUAL POSITION. CONTRACTOR IS RESPONSIBLE FOR UTILITY LOCATES PRIOR TO DISTURBING SUBSURFACE.
2. CONTRACTOR SHALL PROTECT AND REPAIR AT CONTRACTOR'S EXPENSE ANY DAMAGES TO UTILITIES CAUSED BY CONTRACTOR.

| | BANK TREATMENT TYPE |
|---|---|
| GROUP 1 | BRUSH TRENCH (BT) |
| GROUP 2 | WILLOW CUTTINGS BEHIND BANKS (WCBB) (SEE SHEET D2 –DETAIL A) |
| GROUP 3 | DOUBLE VEGETATED SOIL LIFT (DVSL) (SEE SHEET D2 – DETAIL C) |
| | NO TREATMENT AREA (NT) |
| GROUP 2 | PRESERVE VEGETATION (PV) (SEE SHEET D2 – DETAIL B) |
| GROUP 1 | POINT BAR REGRADING AREA (PB) (SEE SHEET D3 – DETAIL D) |
| GROUP 1 | LATERAL BARS (LB) (SEE SHEET D3 – DETAIL E) |
| | WETLANDS |

## LEGEND

- PROPERTY BOUNDARY
- —FO— FIBER OPTIC LINE
- —PP— OVERHEAD ELECTRIC LINE
- — E — BURIED ELECTRIC LINE
- —PH— TELEPHONE LINE
- UNDERGROUND IRRIGATION LINE
- —x— EXISTING FENCE
- PROPOSED FENCE
- EXISTING ROAD
- FLOODPLAIN INDEX CONTOUR (1' INTERVAL)
- FLOODPLAIN INTERMEDIATE CONTOUR (0.5' INTERVAL)

N

50 0 100

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|

DESIGNED BY: KM
DRAWN BY: KM
SHEET CHK'D BY: WHB
CROSS CHK'D BY: WHB
APPROVED BY: WHB
DATE: APRIL 2014

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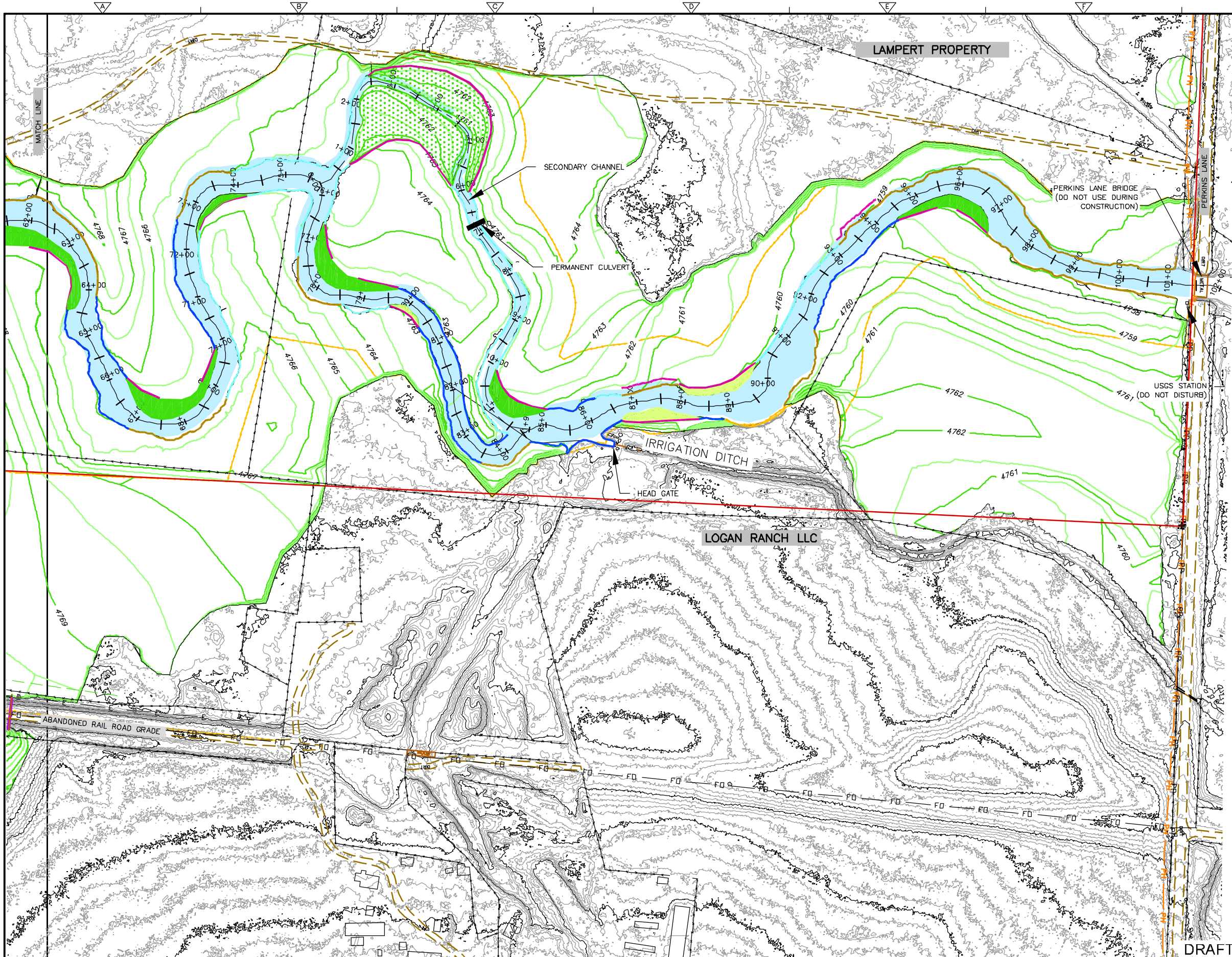
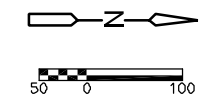
DEPARTMENT OF ENVIRONMENTAL QUALITY

CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

STREAMBANK TREATMENT PLAN

PROJECT NO.
FILE NAME:
SHEET NO.
C15




## NOTES

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2. CONTRACTOR SHALL PROTECT AND REPAIR AT CONTRACTOR'S EXPENSE ANY DAMAGES TO UTILITIES CAUSED BY CONTRACTOR.

## LEGEND

- PROPERTY BOUNDARY
- FO — FIBER OPTIC LINE
- PP — OVERHEAD ELECTRIC LINE
- E — BURIED ELECTRIC LINE
- PH — TELEPHONE LINE
- UNDERGROUND IRRIGATION LINE
- X — EXISTING FENCE
- PROPOSED FENCE
- EXISTING ROAD
- FLOODPLAIN INDEX CONTOUR (1' INTERVAL)
- FLOODPLAIN INTERMEDIATE CONTOUR (0.5' INTERVAL)

| | BANK TREATMENT TYPE |
|---|---|
| GROUP 1 | BRUSH TRENCH (BT) |
| GROUP 2 | WILLOW CUTTINGS BEHIND BANKS (WCBB) (SEE SHEET D2 –DETAIL A) |
| GROUP 3 | DOUBLE VEGETATED SOIL LIFT (DVSL) (SEE SHEET D2 – DETAIL C) |
| | NO TREATMENT AREA (NT) |
| GROUP 2 | PRESERVE VEGETATION (PV) (SEE SHEET D2 – DETAIL B) |
| GROUP 1 | POINT BAR REGRADING AREA (PB) (SEE SHEET D3 – DETAIL D) |
| GROUP 1 | LATERAL BARS (LB) (SEE SHEET D3 – DETAIL E) |
| | WETLANDS |

DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|

DESIGNED BY: KM
DRAWN BY: KM
SHEET CHK'D BY: WHB
CROSS CHK'D BY: WHB
APPROVED BY: WHB
DATE: APRIL 2014

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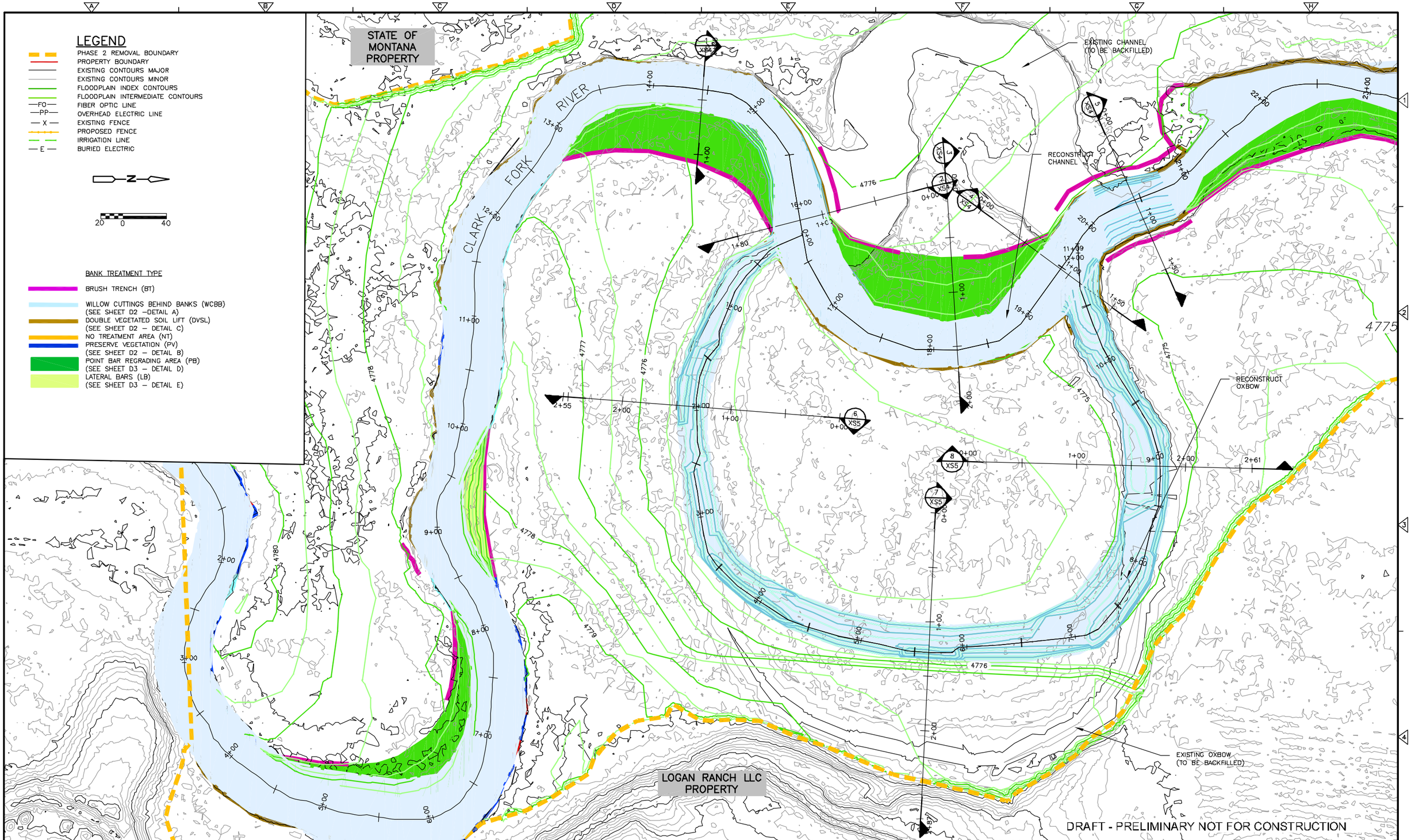
DEPARTMENT OF ENVIRONMENTAL QUALITY

CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

STREAMBANK TREATMENT PLAN

PROJECT NO.
FILE NAME:
SHEET NO.
C16




| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|
| | | | | |

DESIGNED BY: KM
DRAWN BY: KM
SHEET CHK'D BY: WHB
CROSS CHK'D BY: WHB
APPROVED BY: WHB
DATE: JULY 2014

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DEPARTMENT OF ENVIRONMENTAL QUALITY
CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

CHANNEL AND OXBOW RECONSTRUCTION PLAN
STATIONS 14+25 TO 20+75

PROJECT NO.
FILE NAME:
SHEET NO.
C17

## LEGEND

- PHASE 2 REMOVAL BOUNDARY
- PROPERTY BOUNDARY
- EXISTING CONTOURS MAJOR
- EXISTING CONTOURS MINOR
- FLOODPLAIN INDEX CONTOURS
- FLOODPLAIN INTERMEDIATE CONTOURS
- FO — FIBER OPTIC LINE
- PP — OVERHEAD ELECTRIC LINE
- X — EXISTING FENCE
- PROPOSED FENCE
- IRRIGATION LINE
- E — BURIED ELECTRIC

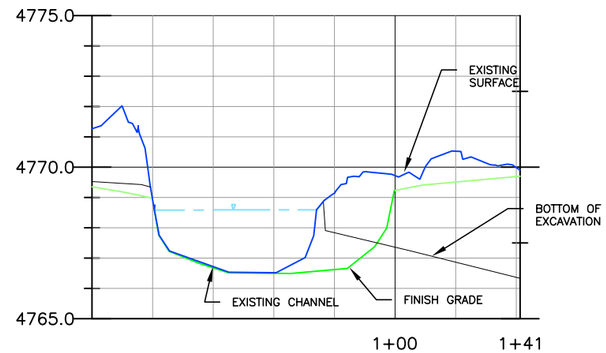
BANK TREATMENT TYPE

- BRUSH TRENCH (BT)
- WILLOW CUTTINGS BEHIND BANKS (WCBB) (SEE SHEET D2 –DETAIL A)
- DOUBLE VEGETATED SOIL LIFT (DVSL) (SEE SHEET D2 – DETAIL C)
- NO TREATMENT AREA (NT)
- PRESERVE VEGETATION (PV) (SEE SHEET D2 – DETAIL B)
- POINT BAR REGRADING AREA (PB) (SEE SHEET D3 – DETAIL D)
- LATERAL BARS (LB) (SEE SHEET D3 – DETAIL E)

N

15 0 30

CONTOUR INTERVAL = 0.5 FT (CHANNEL RECONSTRUCTION)
CONTOUR INTERVAL = 0.5 FT (FINISH GRADE)
CONTOUR INTERVAL = 1 FT (EXISTING SURFACE)




STA 50+48
**SECTION 1**
1" – 5' V
1"– 50' H

LOGAN RANCH LLC PROPERTY

WORK LIMIT

PROPOSED BANK RECONSTRUCTION

EXISTING PUMP HOUSE (NOT TO BE DISTURBED)

CLARK FORK RIVER

EXISTING APPROACH

EXISTING IRRIGATION LINE (TO BE REPLACED)

ABANDONED RAILROAD GRADE

LOGAN RANCH LLC PROPERTY

DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|

DESIGNED BY: KM
DRAWN BY: KM
SHEET CHK'D BY: WHB
CROSS CHK'D BY: WHB
APPROVED BY: WHB
DATE: JULY 2014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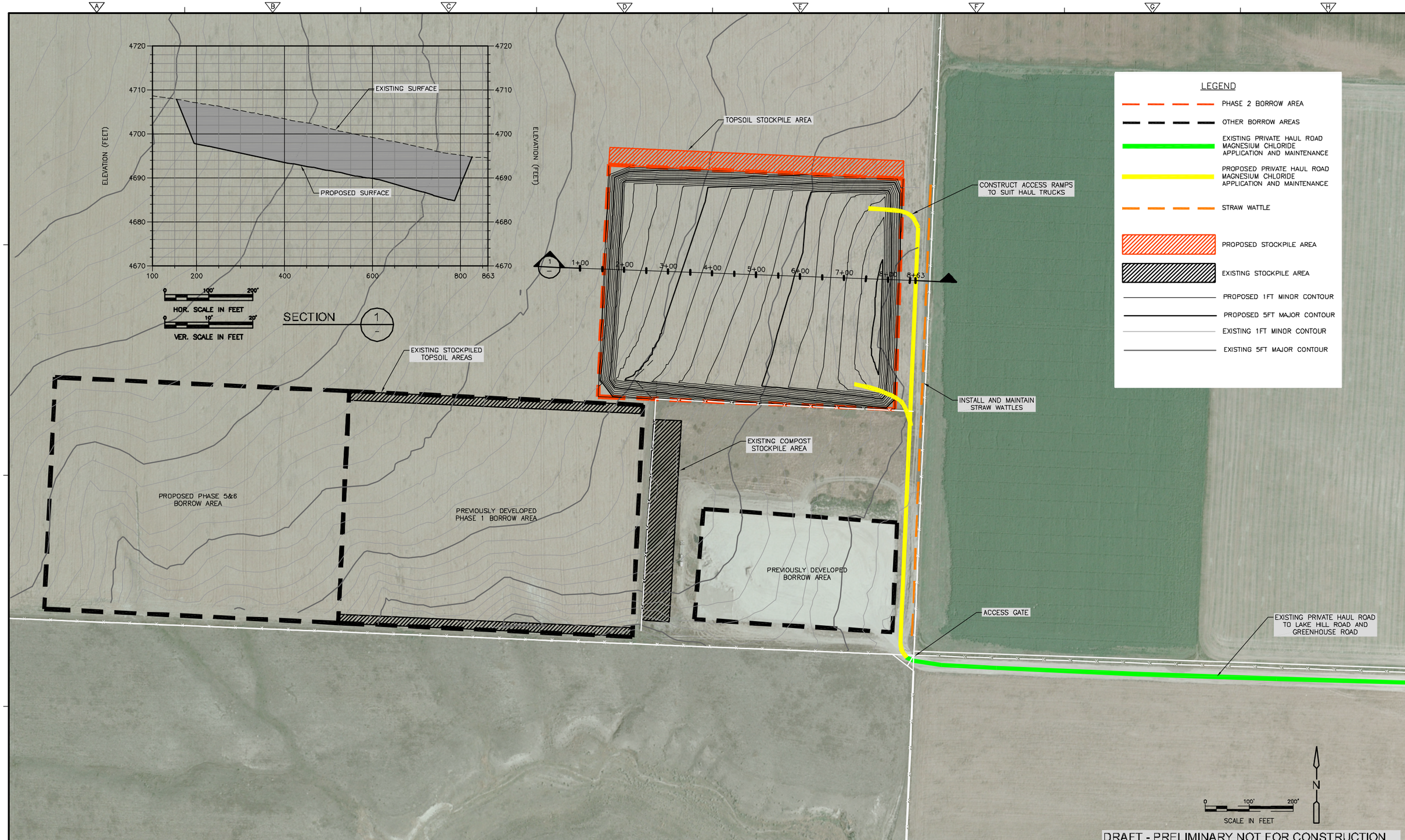
DEPARTMENT OF ENVIRONMENTAL QUALITY
CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

CHANNEL RESHAPING
STATIONS 50+00 TO 51+00

PROJECT NO.
FILE NAME:
SHEET NO.
C18




| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|

DESIGNED BY: MJP
DRAWN BY: MJP
SHEET CHK'D BY: WHB
CROSS CHK'D BY: TJ
APPROVED BY: XX
DATE: JULY 2014

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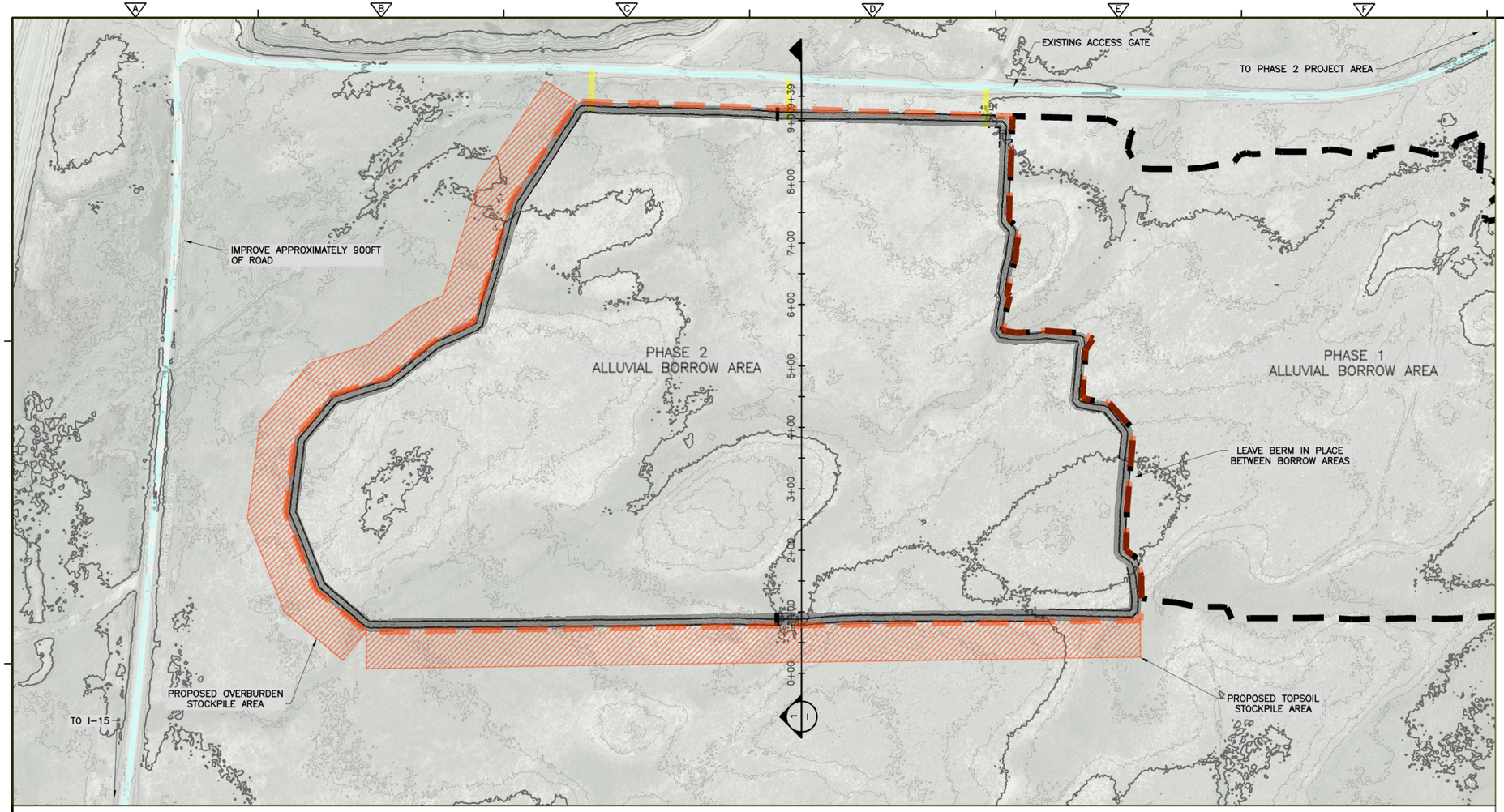
DEPARTMENT OF ENVIRONMENTAL QUALITY

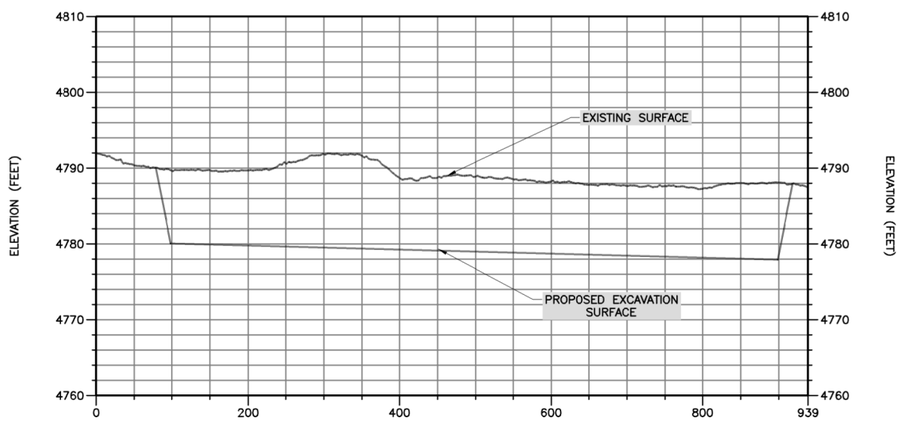
CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

VEGETATIVE BACKFILL BORROW AREA PLAN
BECK

PROJECT NO. 103068
FILE NAME: CSTPL19.DWG

SHEET NO.
C19




SECTION 1 / –

0 200' 200'
HOR. SCALE IN FEET
0 10' 20'
VER. SCALE IN FEET

## LEGEND

- PHASE 2 BORROW AREA
- PHASE 1 BORROW AREA
- EXISTING PUBLIC HAUL ROAD MAGNESIUM CHLORIDE APPLICATION AND MAINTENANCE
- EXISTING PUBLIC HAUL ROAD REQUIRING IMPROVEMENTS
- PROPOSED PRIVATE HAUL ROAD MAGNESIUM CHLORIDE APPLICATION AND MAINTENANCE
- STRAW WATTLE BMP
- PROPOSED STOCKPILE AREA
- PROPOSED 1FT MINOR CONTOUR
- PROPOSED 5FT MAJOR CONTOUR
- EXISTING 1FT MINOR CONTOUR
- EXISTING 5FT MAJOR CONTOUR

0 100' 200'
SCALE IN FEET

N

DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|

DESIGNED BY: MJP
DRAWN BY: MJP
SHEET CHK'D BY: WHB
CROSS CHK'D BY: TJ
APPROVED BY: XX
DATE: JULY 2014

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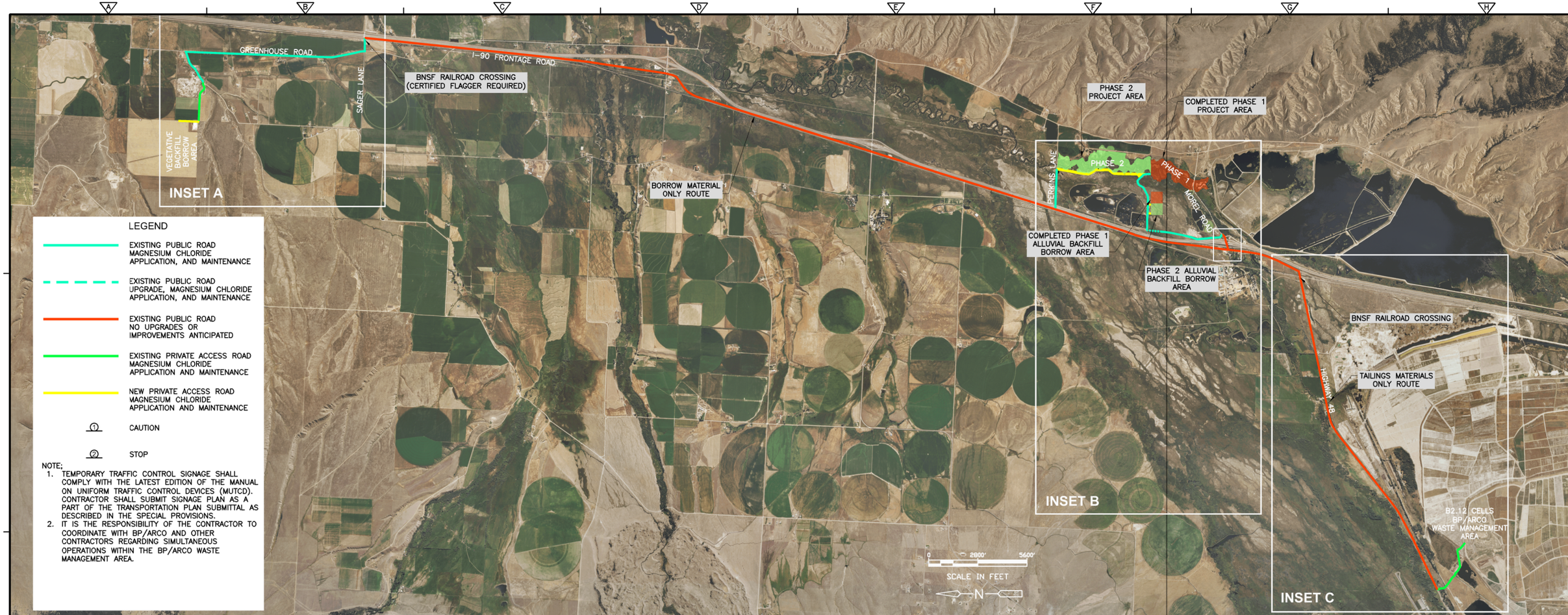
DEPARTMENT OF ENVIRONMENTAL QUALITY
CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

ALLUVIAL BACKFILL BORROW AREA PLAN

PROJECT NO. 103068
FILE NAME: CSTPL22.DWG
SHEET NO.
C22

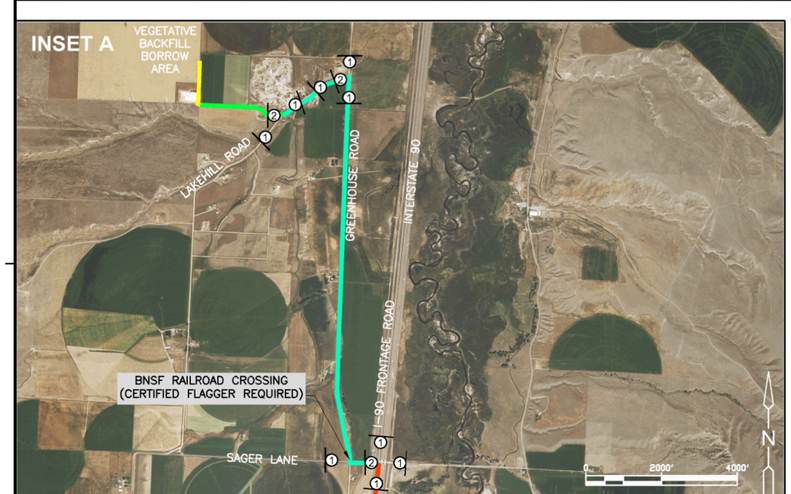


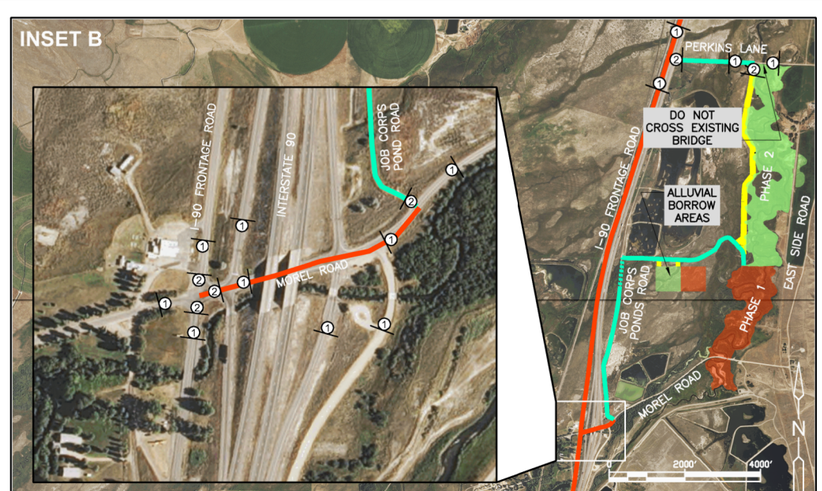

LEGEND

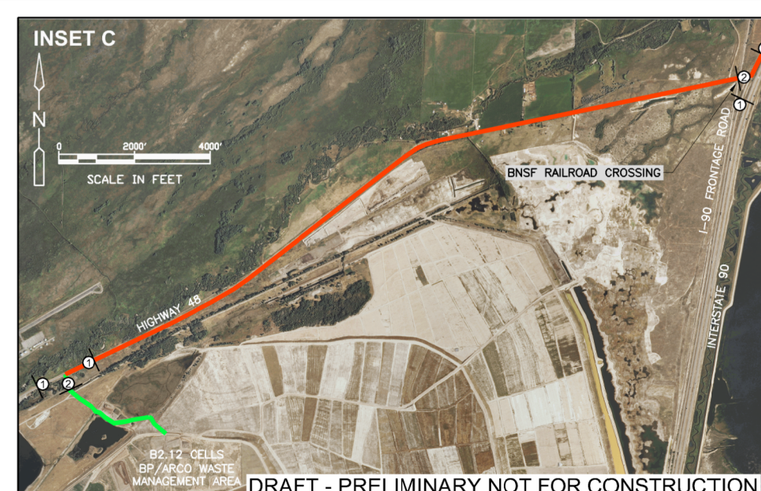
- EXISTING PUBLIC ROAD MAGNESIUM CHLORIDE APPLICATION, AND MAINTENANCE
- EXISTING PUBLIC ROAD UPGRADE, MAGNESIUM CHLORIDE APPLICATION, AND MAINTENANCE
- EXISTING PUBLIC ROAD NO UPGRADES OR IMPROVEMENTS ANTICIPATED
- EXISTING PRIVATE ACCESS ROAD MAGNESIUM CHLORIDE APPLICATION AND MAINTENANCE
- NEW PRIVATE ACCESS ROAD MAGNESIUM CHLORIDE APPLICATION AND MAINTENANCE
- (1) CAUTION
- (2) STOP

NOTE;

1. TEMPORARY TRAFFIC CONTROL SIGNAGE SHALL COMPLY WITH THE LATEST EDITION OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD). CONTRACTOR SHALL SUBMIT SIGNAGE PLAN AS A PART OF THE TRANSPORTATION PLAN SUBMITTAL AS DESCRIBED IN THE SPECIAL PROVISIONS.
2. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE WITH BP/ARCO AND OTHER CONTRACTORS REGARDING SIMULTANEOUS OPERATIONS WITHIN THE BP/ARCO WASTE MANAGEMENT AREA.




DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|
| | | | | |

DESIGNED BY: MJP
DRAWN BY: MJP
SHEET CHK'D BY: WHB
CROSS CHK'D BY: TJ
APPROVED BY: XX
DATE: JULY 2014

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DEPARTMENT OF ENVIRONMENTAL QUALITY

CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

TRANSPORTATION PLAN

PROJECT NO. 103068
FILE NAME: CSTPL23.DWG
SHEET NO. C23

TO ALLUVIAL BORROW & I-90 FRONTAGE ROAD

PHASE 1 BOUDARY

PROPOSED TEMPORARY BRIDGE

PROPOSED TEMPORARY BRIDGE

MATCHLINE

IRRIGATION PUMP DO NOT DISTURB

IMPROVE RAMP WITH FILL NO CUTTING PERMITTED

IMPROVE RAMP WITH FILL NO CUTTING PERMITTED

EXISTING CULVERT

## LEGEND

- REMOVAL AREA
- NO HAULING AREA WITHIN 25 FEET OF WATER
- NEW PRIMARY HAUL ROAD
- NEW SECONDARY HAUL ROAD
- EXISTING ROAD
- EXISTING 1FT MINOR CONTOUR LINE
- EXISTING 5FT MAJOR CONTOUR LINE

N

0 100' 200'

SCALE IN FEET

DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|
| | | | | |

DESIGNED BY: MJP
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DEPARTMENT OF ENVIRONMENTAL QUALITY

CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

HAUL ROAD PLAN

PROJECT NO. 103068
FILE NAME: CSTPL24.DWG

SHEET NO.
C24

TO I-90 FRONTAGE ROAD

PROVIDE TEMPORARY CROSSING OVER CHANNEL

REPLACE EXISTING CULVERT

PROPOSED STAGING AREA

TEMPORARY BRIDGE OR PERMANENT CULVERT

PERKINS LANE BRIDGE DO NOT USE FOR CONSTRUCTION HAUL TRAFFIC

TEMPORARY BRIDGE CROSSING

TEMPORARY BRIDGE

MATCHLINE

PERKINS LANE

## LEGEND

- REMOVAL AREA
- NO HAULING AREA WITHIN 25 FEET OF WATER
- NEW PRIMARY HAUL ROAD
- NEW SECONDARY HAUL ROAD
- EXISTING ROAD
- PROPOSED STAGING AREA BOUNDARY
- EXISTING 1FT MINOR CONTOUR LINE
- EXISTING 5FT MAJOR CONTOUR LINE

N

0 100' 200'

SCALE IN FEET

DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|
| | | | | |

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DEPARTMENT OF ENVIRONMENTAL QUALITY

CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

HAUL ROAD PLAN

PROJECT NO. 103068
FILE NAME: CSTPL24.DWG

SHEET NO.
C25

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|

DESIGNED BY: MJP
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CROSS CHK'D BY: TJ
APPROVED BY: XX
DATE: JULY 2014

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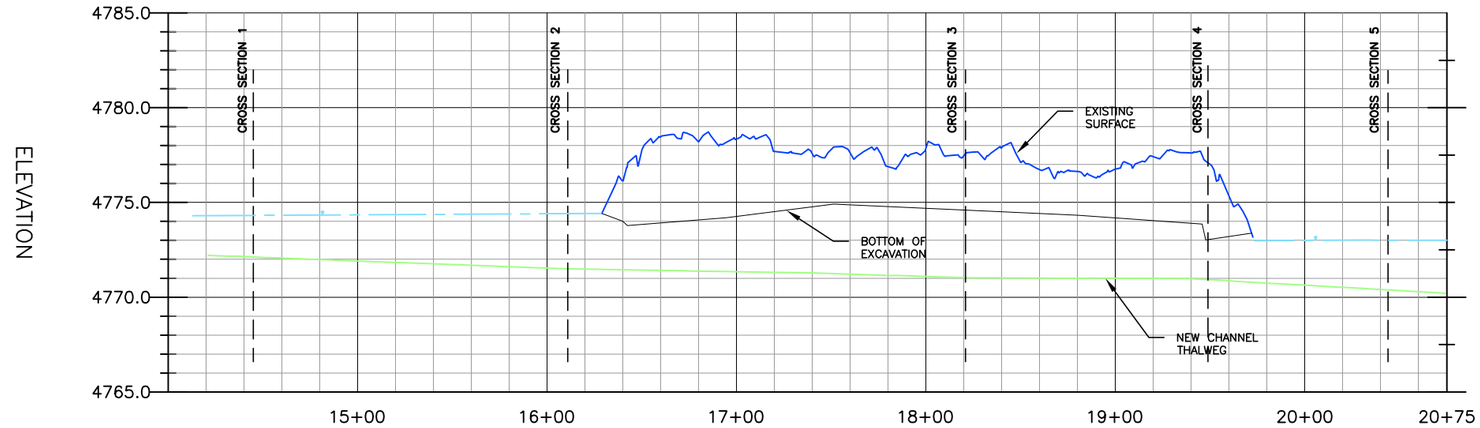
DEPARTMENT OF ENVIRONMENTAL QUALITY

CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

REPOSITORY PLAN

PROJECT NO. 103068
FILE NAME: CSTPL26.DWG

SHEET NO.
C26

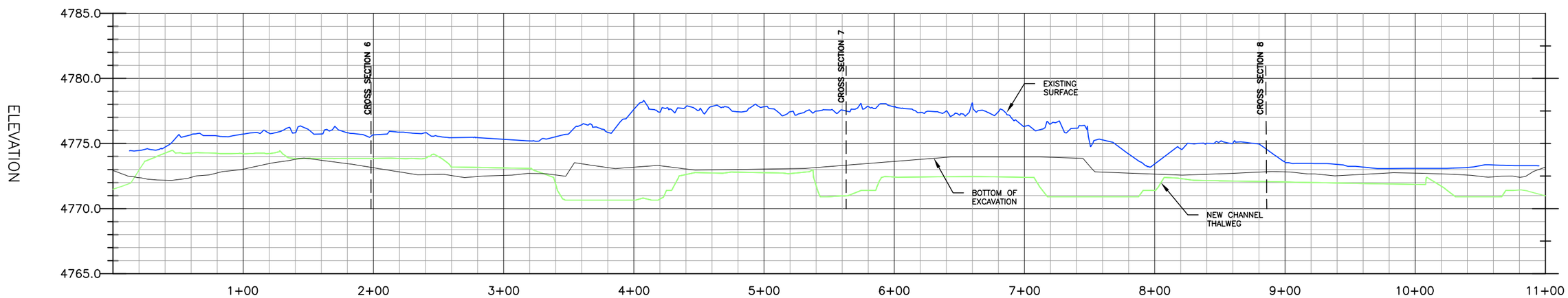



MAIN CHANNEL THALWEG (STA 14+00 TO 20+75)

**PROFILE** 1 / C17

SCALE
1"= 8' V
1"= 80' H

NOTE:
WHERE EXISTING SURFACE IS NOT SHOWN, IT IS BELOW THE CURRENT WATER SURFACE.




OXBOW THALWEG

**PROFILE** 2 / C17

SCALE
1"= 8' V
1"= 80' H

DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

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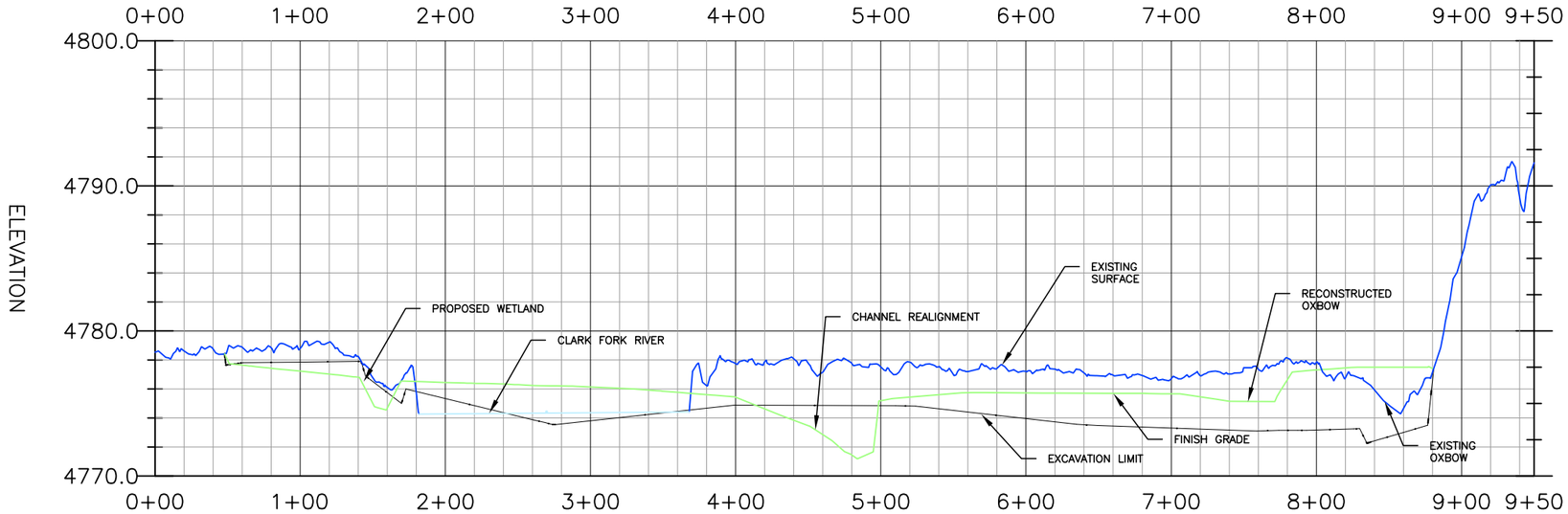
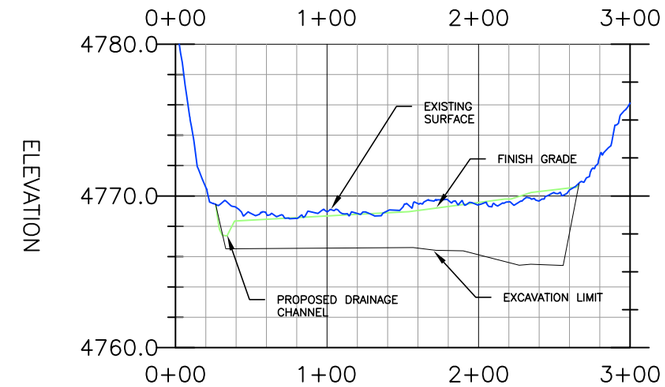
DEPARTMENT OF ENVIRONMENTAL QUALITY
CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

CHANNEL RECONSTRUCTION
MAIN CHANNEL AND OXBOW THALWEG PROFILES

PROJECT NO.
FILE NAME:
SHEET NO.
XS3




**SECTION 1** (C11)
1"= 100' H
1"= 10' V

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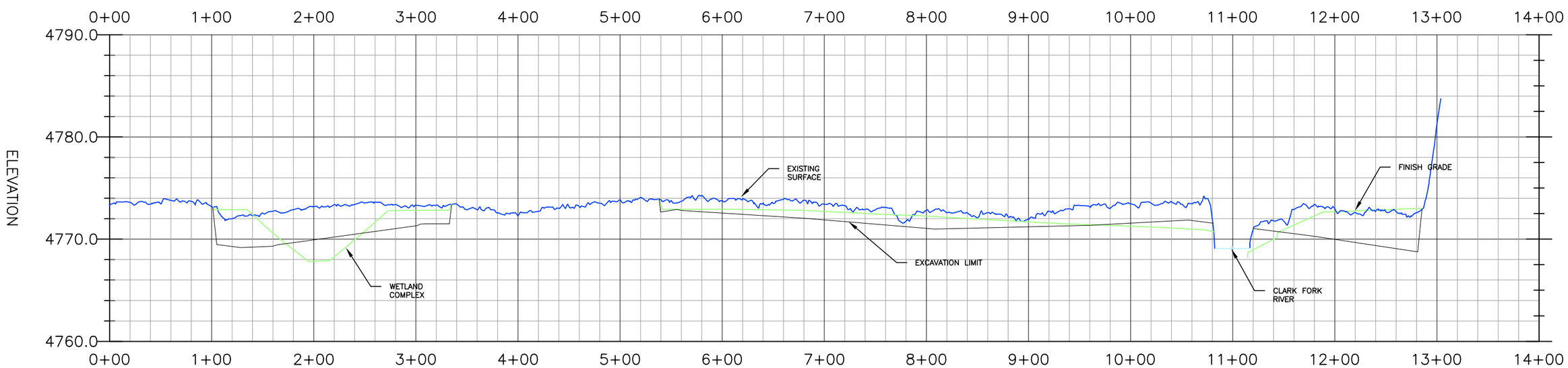


**SECTION 2** (C11)
1"= 100' H
1"= 10' V

DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|

DESIGNED BY: KM
DRAWN BY: KM
SHEET CHK'D BY: WHB
CROSS CHK'D BY: WHB
APPROVED BY: WHB
DATE: JULY 2014

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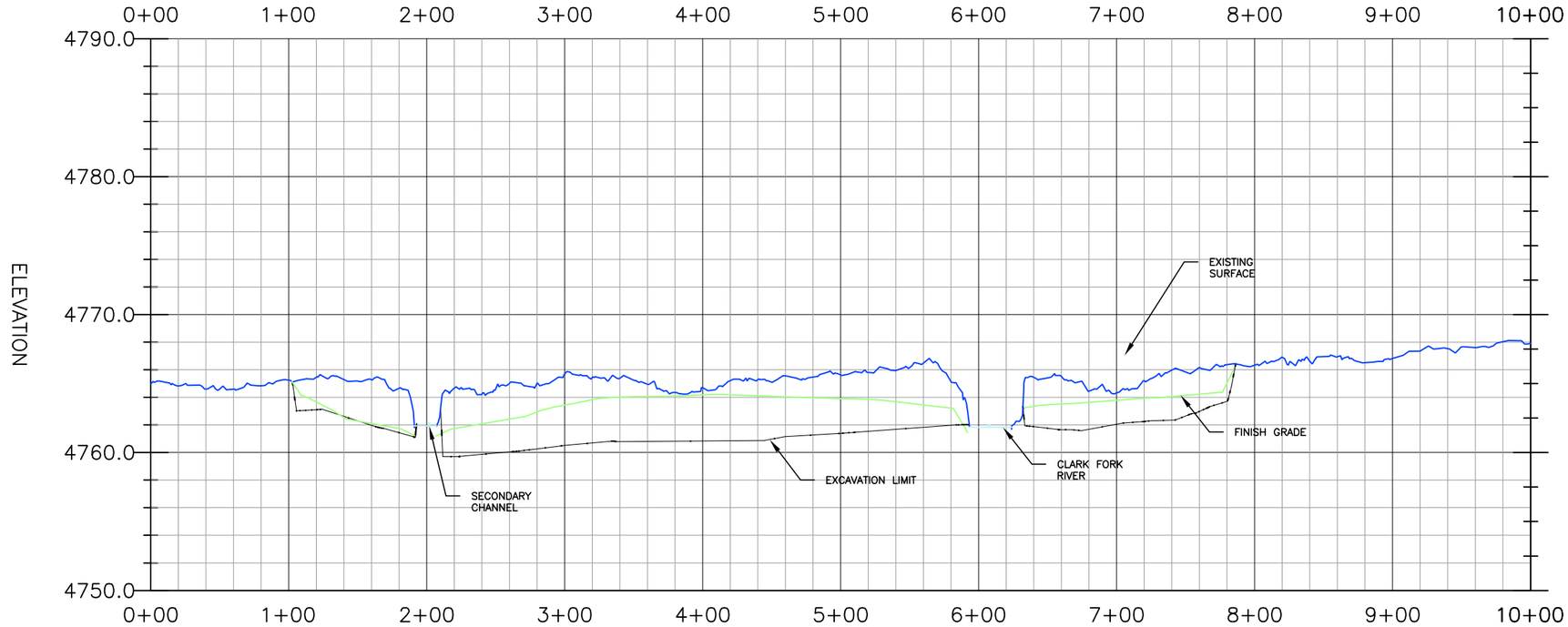
DEPARTMENT OF ENVIRONMENTAL QUALITY
CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

FLOODPLAIN
CROSS SECTIONS

PROJECT NO.
FILE NAME:
SHEET NO.
XS1

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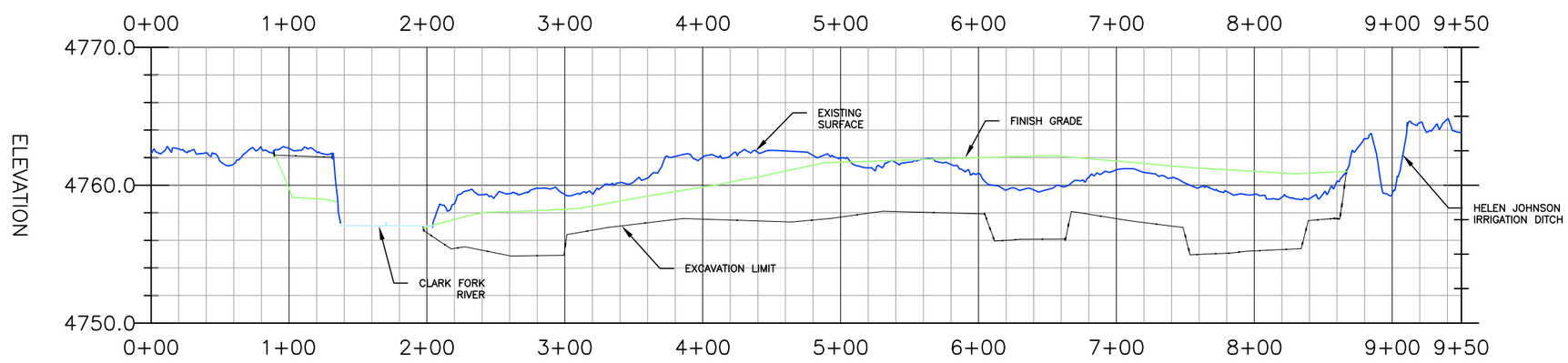


**SECTION 5** (C12)
1"= 100' H
1"= 10' V

DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|

DESIGNED BY: KM
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SHEET CHK'D BY: WHB
CROSS CHK'D BY: WHB
APPROVED BY: WHB
DATE: JULY 2014

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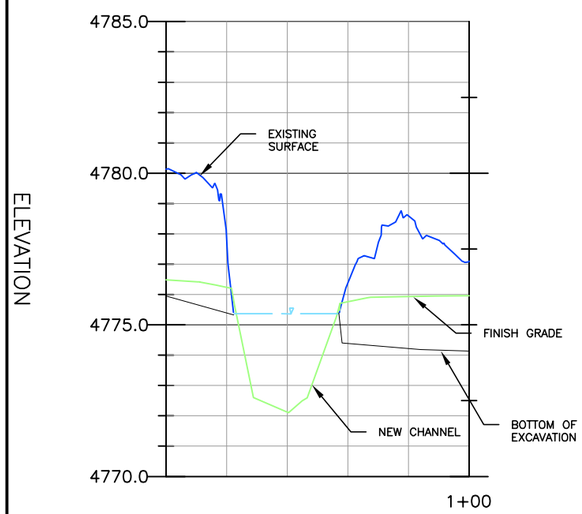
DEPARTMENT OF ENVIRONMENTAL QUALITY
CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

FLOODPLAIN
CROSS SECTIONS

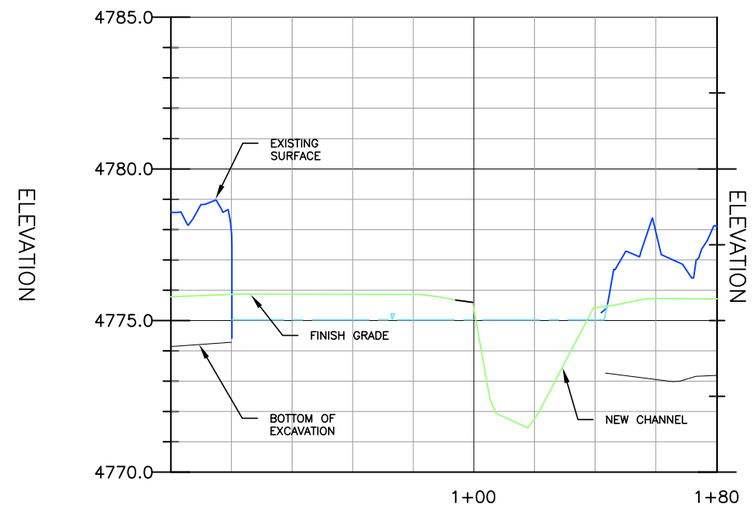
PROJECT NO.
FILE NAME:
SHEET NO.
XS2




STATION 14+45

**SECTION 1** C17

1"= 50' H
1"= 5' V




STATION 15+50

**SECTION 2** C17

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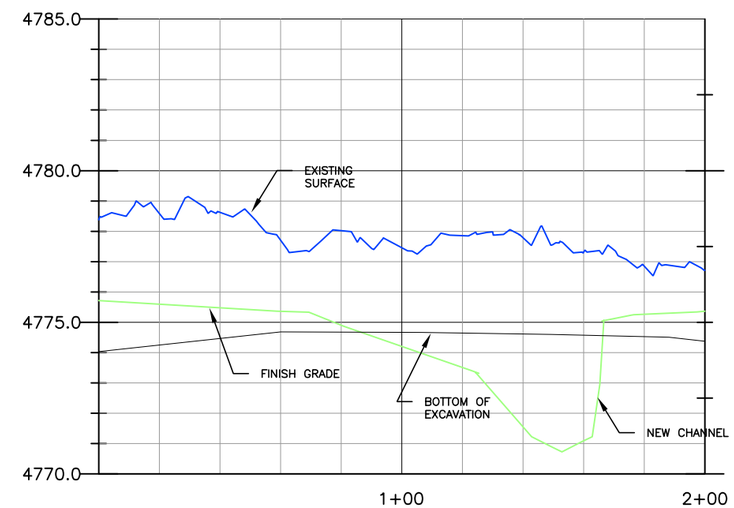
1"= 5' V




STATION 18+20

**SECTION 3** C17

1"= 50' H
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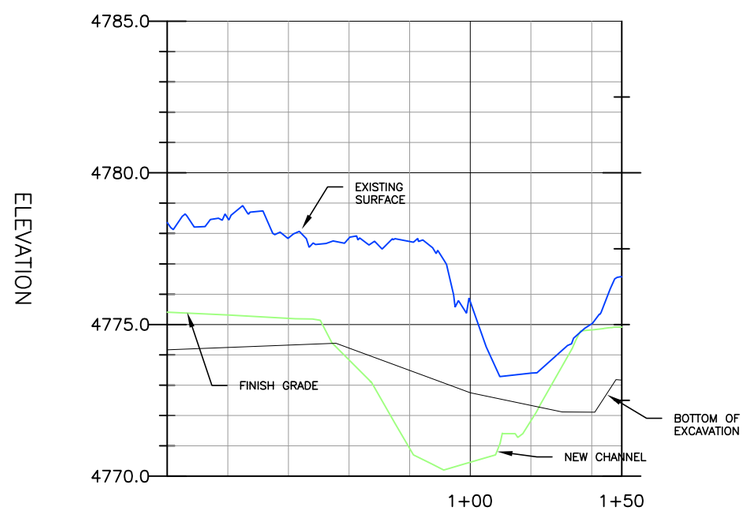


STATION 19+48

**SECTION 4** C17

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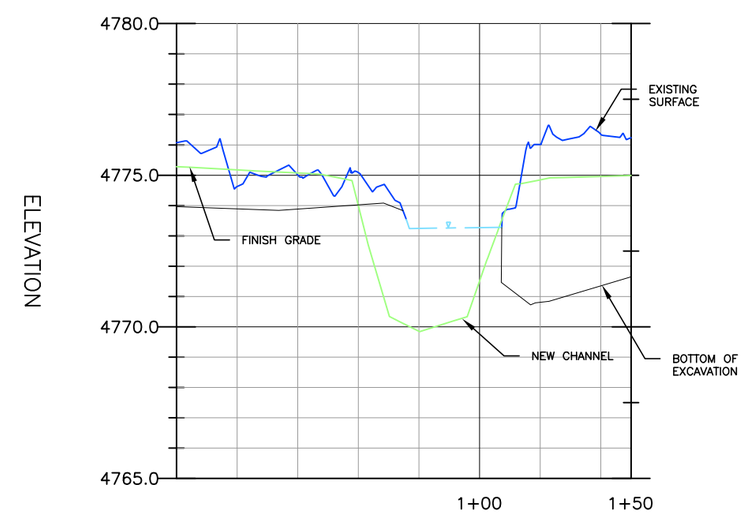


STATION 20+45

**SECTION 5** C17

1"= 50' H
1"= 5' V

DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|

DESIGNED BY: KM
DRAWN BY: KM
SHEET CHK'D BY: WHB
CROSS CHK'D BY: WHB
APPROVED BY: WHB
DATE: JULY 2014

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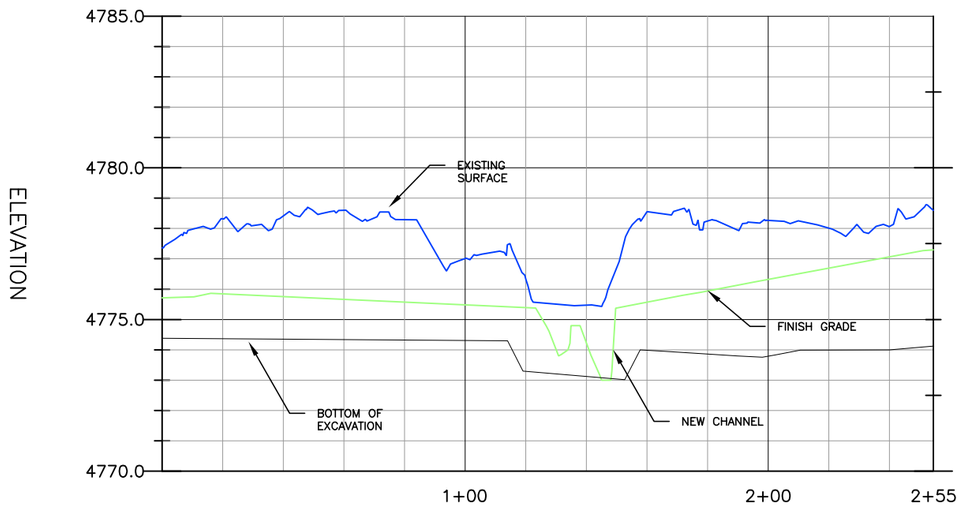
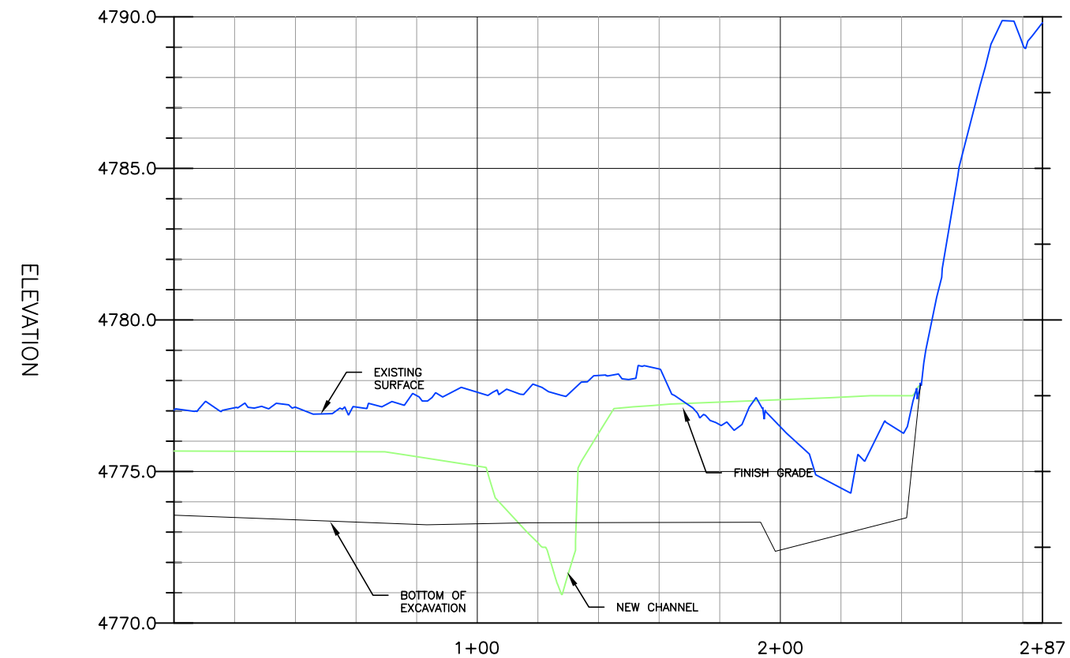
DEPARTMENT OF ENVIRONMENTAL QUALITY
CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

CHANNEL RECONSTRUCTION
CROSS SECTIONS

PROJECT NO. 94424
FILE NAME: 94424
SHEET NO.
XS4

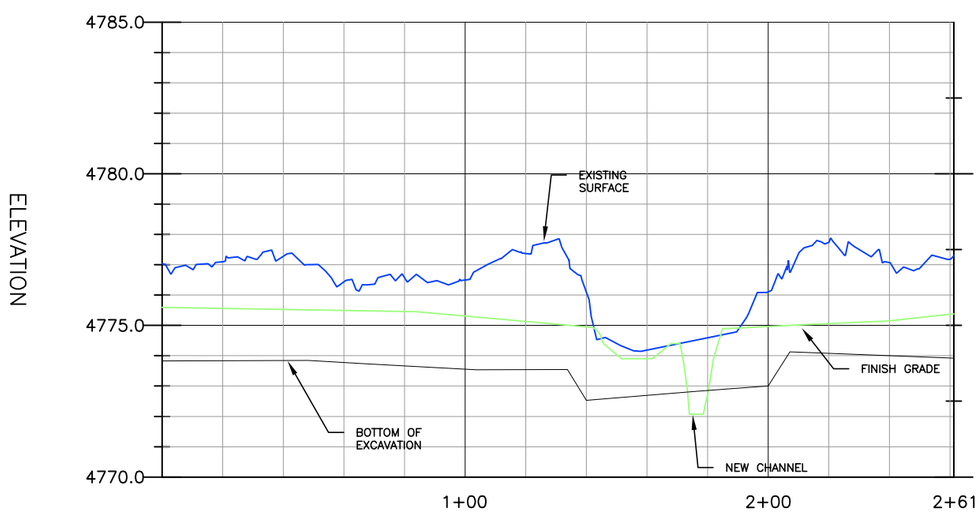



**SECTION** 6 / C17
1"= 50' H
1"= 5' V




STATION 18+20

**SECTION** 7 / C17
1"= 50' H
1"= 5' V




**SECTION** 8 / C17
1"= 50' H
1"= 5' V

DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|

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SHEET CHK'D BY: WHB
CROSS CHK'D BY: WHB
APPROVED BY: WHB
DATE: JULY 2014

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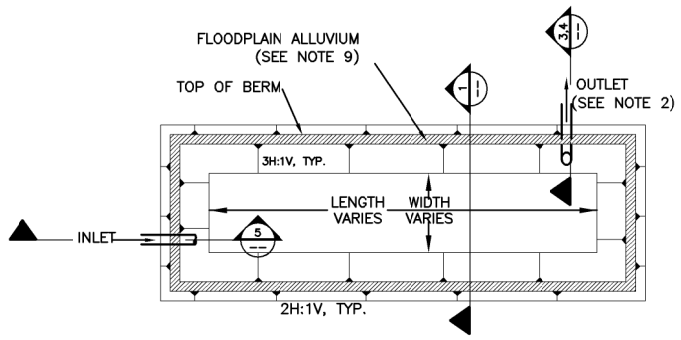
DEPARTMENT OF ENVIRONMENTAL QUALITY
CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

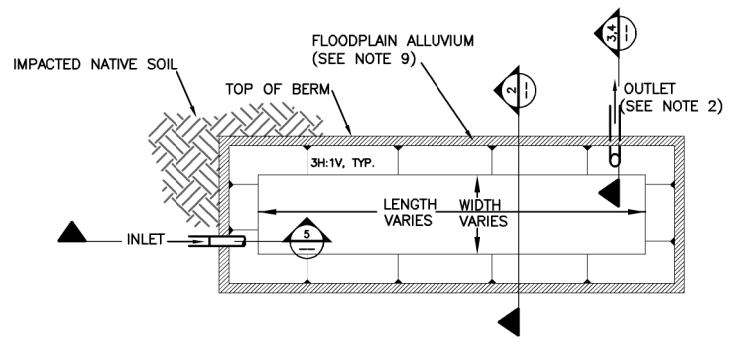
OXBOW RECONSTRUCTION
CROSS SECTIONS

PROJECT NO.
FILE NAME:
SHEET NO.
XS5



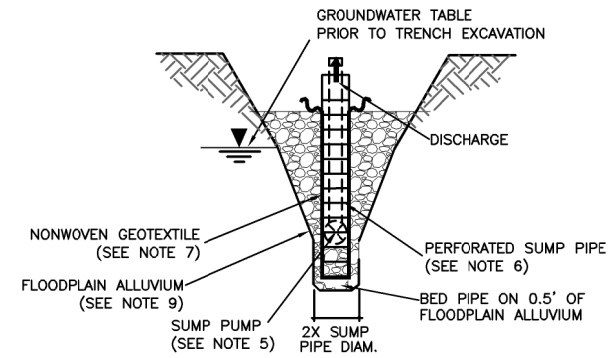

RAISED SEDIMENT DETENTION POND

DETAIL A
NTS C5,6




RECESSED SEDIMENT DETENTION POND

DETAIL B
NTS C5,6

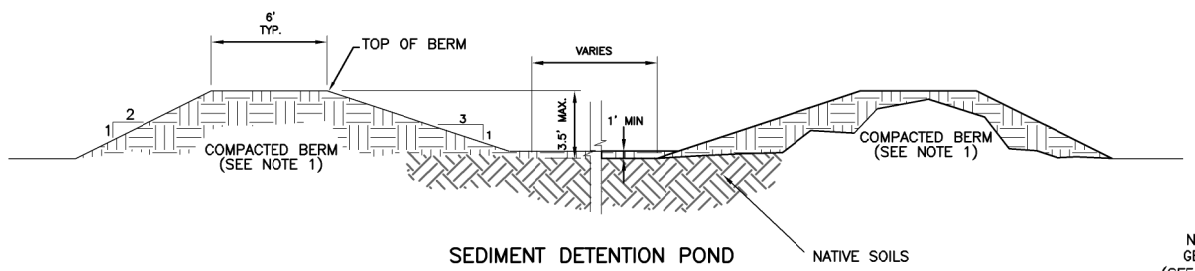



WELL POINT SUMP PROFILE

DETAIL C
NTS C5,6

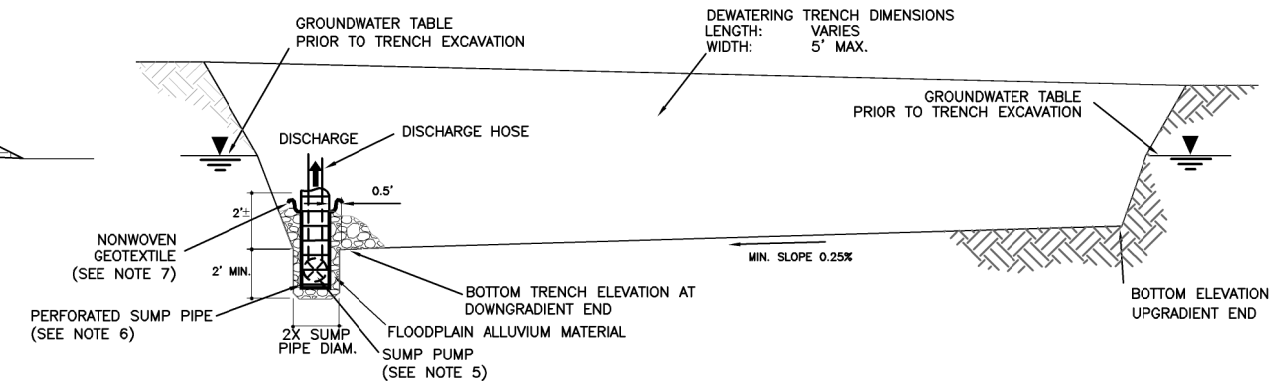
NOTES:

1. FILL FOR CONSTRUCTING SEDIMENT DETENTION PONDS SHALL BE CLEAN LOCAL FLOODPLAIN ALLUVIUM. FILL SHALL BE PLACED BY 1' LIFTS AND MECHANICALLY COMPACTED AS DIRECTED ENGINEER. FILL SHALL HAVE NO ROCKS LARGER THAN 6" DIAMETER. EACH COMPACTED LIFT SHALL BE SCARIFIED TO A DEPTH OF AT LEAST 2" PRIOR TO THE PLACEMENT OF THE NEXT LIFT.
2. OUTLET PIPE CAPACITY SHALL MEET OR EXCEED POND INFLUENT RATES.
3. STREAM CHANNEL BANKS SHALL BE PROTECTED FROM EROSION AT THE SEDIMENT POND PUMP OUTLET DISCHARGES IN A SIMILAR MANNER AS THE GRAVITY OUTLET DISCHARGES (SECTION 3).
4. SEDIMENT DETENTION POND PUMP OUTLET SHALL HAVE A MINIMUM CAPACITY EQUAL TO SEDIMENT POND INFLUENT FLOW RATE.
5. THE PUMP SHALL HAVE A MINIMUM CAPACITY OF 100GAL/MIN/100FT OF TRENCH, OR 100GAL/MIN PER WELL POINT SUMP.
6. SUMP PIPE SHALL BE HAVE MINIMUM DIAMETER OF 24". OPEN SPACE OF PERFORATIONS IN SUMP PIPE SHALL EXCEED 80 SQUARE INCHES PER 100 FEET OF TRENCH.
7. GEOTEXTILE SHALL BE AS DESCRIBED IN THE SPECIAL PROVISIONS.
8. PROVIDE SUITABLE RIGID SUPPORT FOR PIPING AND ELECTRICAL CROSSINGS OF DEWATERING TRENCHES, AND ACTIVE STREAM CHANNEL.
9. FLOODPLAIN ALLUVIUM USED AS FILL IN THE DEWATERING SYSTEM SHALL BE CONSIDERED CONTAMINATED UPON ABANDONMENT. FILL SHALL BE DISPOSED OF IN ACCORDANCE WITH THE SPECIAL PROVISIONS.
10. ALL PETROLEUM POWERED PUMPS AND FUEL CONTAINERS SHALL BE PLACED IN SECONDARY CONTAINMENT WITH A MINIMUM CAPACITY OF 200% OF THE FUEL VOLUME.
11. IF GRAVITY PUMP OUTLET TO THE SEDIMENT DETENTION POND CANNOT BE INSTALLED, A PUMP OUTLET WILL BE USED.



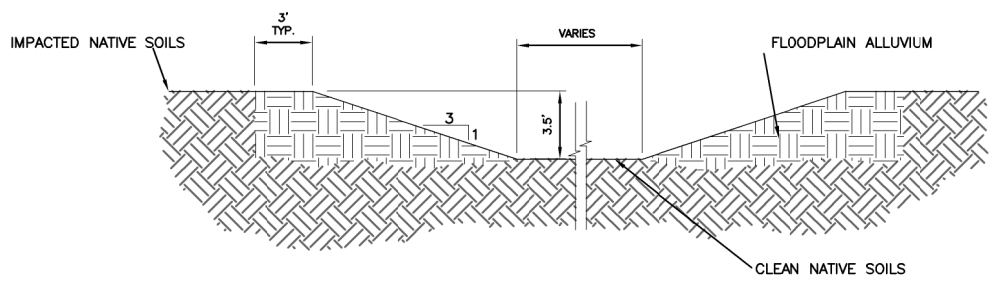

SEDIMENT DETENTION POND

SECTION 1
NTS –



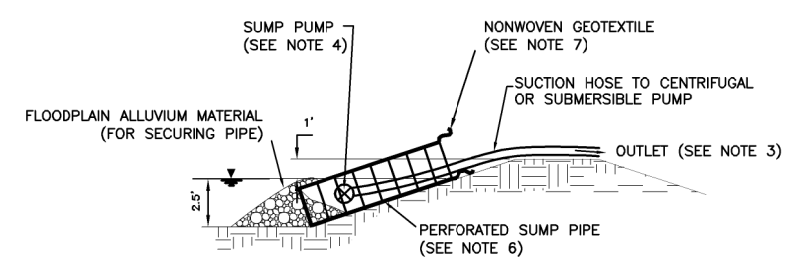

GROUNDWATER DEWATERING TRENCH AND SUMP PROFILE (TYP)

DETAIL D
NTS C5,6



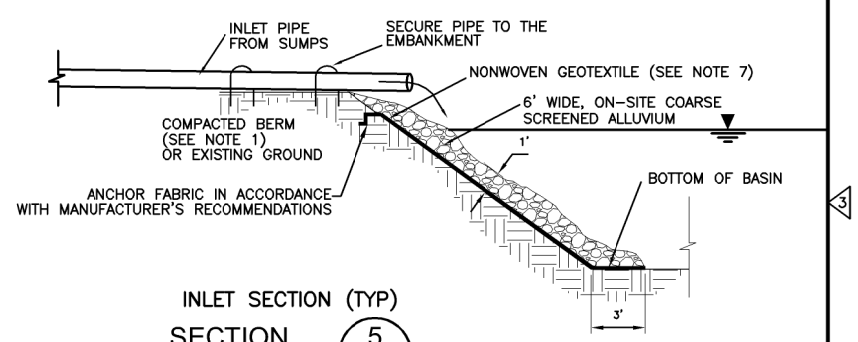

SEDIMENT DETENTION POND

SECTION 2
NTS –



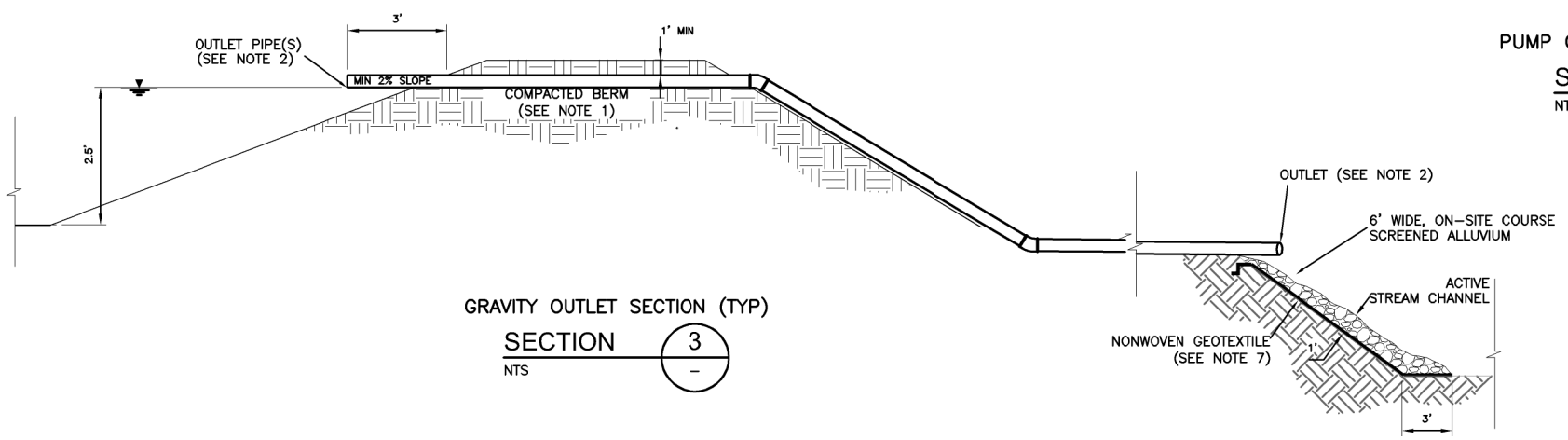

PUMP OUTLET (TYP) SEE NOTE 11

SECTION 4
NTS –



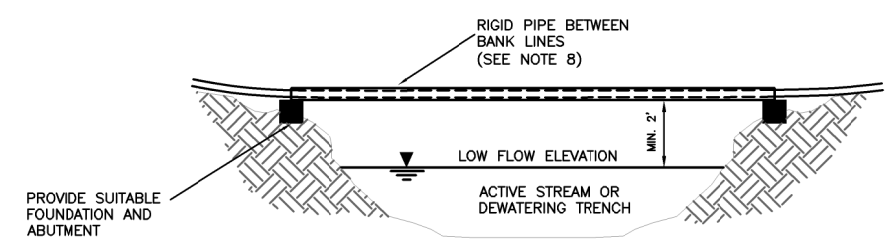

INLET SECTION (TYP)

SECTION 5
NTS –




GRAVITY OUTLET SECTION (TYP)

SECTION 3
NTS –




STREAM CHANNEL CROSSING

DETAIL E
NTS C5,6

DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|

DESIGNED BY: MJP
DRAWN BY: MJP
SHEET CHK'D BY: WHB
CROSS CHK'D BY: TJ
APPROVED BY: XX
DATE: JULY 2014

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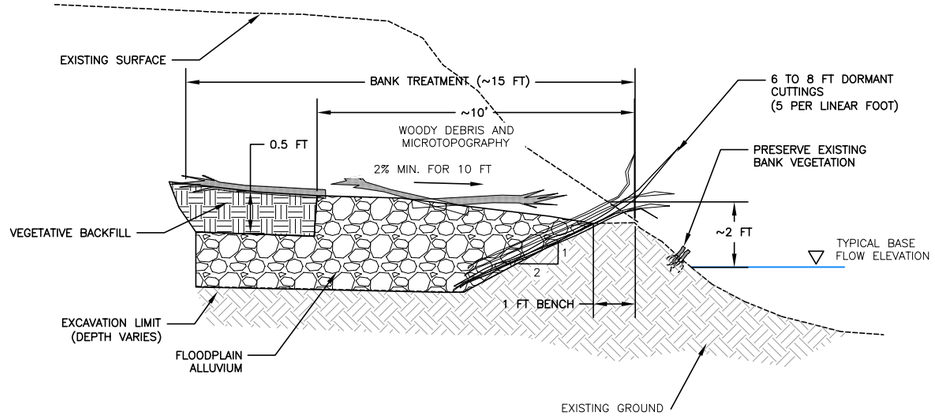
DEPARTMENT OF ENVIRONMENTAL QUALITY
CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

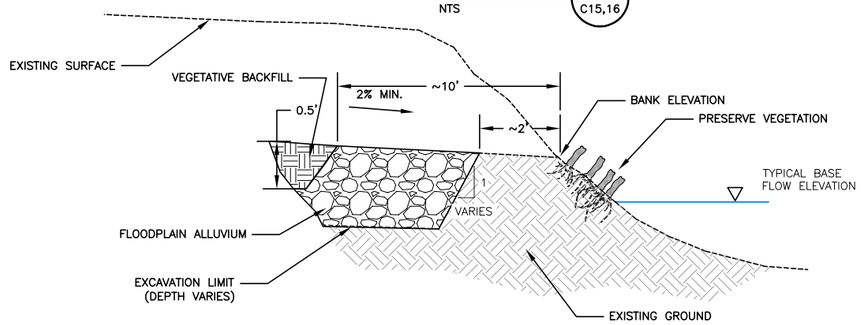
DEWATERING PLAN DETAILS

PROJECT NO. 103068
FILE NAME: DSTPL01.DWG
SHEET NO.
D1




WILLOW CUTTING BEHIND BANK TREATMENT (WCBB)

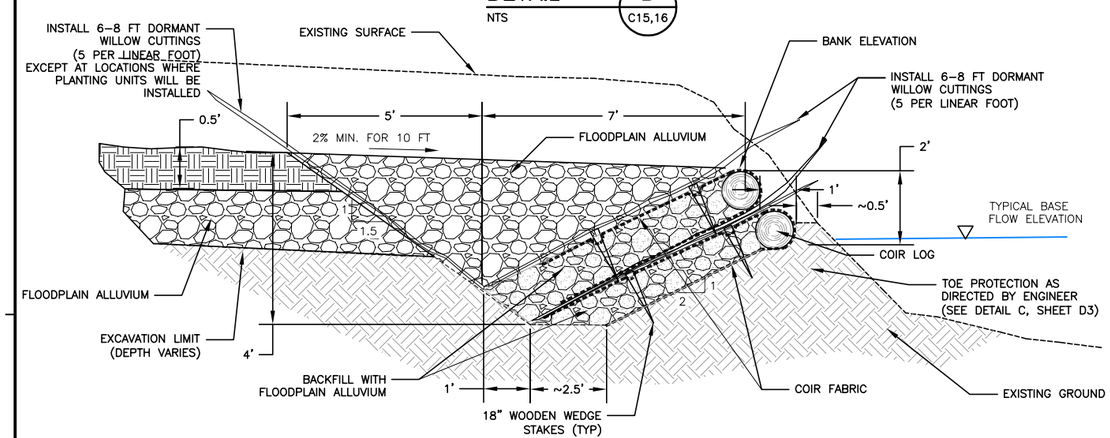
DETAIL A
NTS C15,16




NOTE:
pv BANK TREATMENT SHALL NOT BE CONSTRUCTED IF GROUND IS FROZEN.

PRESERVE VEGETATION (PV)

DETAIL B
NTS C15,16




DOUBLE VEGETATED SOIL LIFT (DVSL)

DETAIL C
NTS C15,16

GENERAL NOTES:

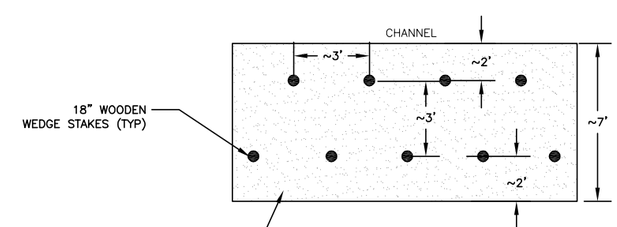
1. IF STREAMBANK CONSTRUCTION WILL OCCUR AFTER FLOODPLAIN EXCAVATION IS COMPLETE IN THE VICINITY OF THE STREAM BANKS, LEAVE ABOUT 4 FEET OF MATERIAL BETWEEN EXCAVATION AND EXISTING STREAMBANKS TO MAINTAIN STABILITY UNTIL STREAMBANK CONSTRUCTION OCCURS.
2. BANK EXCAVATION SLOPE VARIES DEPENDING ON THE MATERIAL'S ANGLE OF REPOSE.
3. THE FLOODPLAIN SHALL THEN BE BACKFILLED AND SLOPED 2 PERCENT TOWARDS THE REMAINING BANKS. IF HIGH WATER PREVENTS REDUCTION OF THE BANK HEIGHT, THIS WORK WILL NEED TO BE PERFORMED AFTER WATER RECEDES,
4. MICROTOPOGRAPHY EXTENDS TO STREAMBANK OR AS DIRECTED BY ENGINEER. SEE SHEET D6 FOR DETAILS.

NOTES ON COIR FABRIC INSTALLATION

1. UNROLL COIR FABRIC PARALLEL TO THE CHANNEL.
2. OVERLAPS SHALL BE MADE SO THAT THE TOP SURFACE OF THE UPSTREAM FABRIC LIES OVER DOWNSTREAM FABRIC. ALL OVERLAPS IN COIR FABRIC SHALL BE STAKED WITH A MINIMUM OF 2 STAKES.
3. WHERE VEGETATED SOILS LIFTS END, CONTRACTOR SHALL SECURE THE COIR FABRIC ENDS TIGHTLY BY FOLDING THE COIR FABRIC WITH THE TOP EDGE OF FOLDS GOING WITH THE DIRECTION OF STREAM FLOW.

DOUBLE VEGETATED SOIL LIFT INSTALLATION (DVSL) NOTES:

1. EXCAVATE TO LIMITS OF BANK CONSTRUCTION. THIS EXCAVATED MATERIAL IS CONSIDERED CONTAMINATED AND SHALL BE HAULED TO THE REPOSITORY AS DESCRIBED IN SUBSECTION 9R OF THE SPECIAL PROVISIONS – EXCAVATE, HAUL AND PLACE TAILINGS/IMPACTED SOILS.
2. AFTER EXCAVATION TO LIMITS OF BANK CONSTRUCTION IS COMPLETED, THE ENGINEER SHALL DETERMINE IF ADEQUATE TOE MATERIAL IS PRESENT. IF NO ADEQUATE BANK TOE IS LOCATED AT BASE OF EXCAVATION, EXCAVATION SHALL CONTINUE UNTIL GRAVEL AND COBBLES ARE ENCOUNTERED. IF NO GRAVELS AND COBBLES ARE ENCOUNTERED BEFORE THE SCOUR DEPTH IS REACHED, EXCAVATION SHALL CEASE AT THE SCOUR DEPTH. SCOUR DEPTH SHALL BE DETERMINED BY ENGINEER.
3. CONSTRUCT BANK TOE BY PLACING BANK TOE ALLUVIUM AS SHOWN ON DETAIL B, DRAWING D4. BUCKET COMPACT TO THE EXTENT POSSIBLE.
4. IF NO BANK TOE IS CONSTRUCTED AND EXCAVATION IS LOWER THAN BOTTOM OF SOIL LIFT, PLACE AND BUCKET COMPACT FLOODPLAIN ALLUVIUM BEHIND THE EXISTNG BANK TO CREATE THE BASE FOR THE FIRST LIFT OF THE DVSL AS SHOWN ON DETAIL C.
5. LAY COIR OUTER FABRIC ON BASE FOR THE LOWER LIFT OF THE DSVL WITH APPROXIMATELY TWO–THIRDS EXTENDING BEYOND THE FRONT EDGE OF THE BASE. PLACE INNER FABRIC ON TOP OF OUTER COIR FABRIC.
6. PLACE COIR LOGS AT POSITION SHOWN ON DRAWINGS AND BACKFILL BEHIND COIR LOGS WITH FLOODPLAIN ALLUVIUM APPROXIMATELY 1 FOOT THICK. COMPACT BACKFILL WITH BUCKET. VERIFY THAT COIR LOG IS PLACED WITH ITS TOP AT THE BANK ELEVATION AS DETERMINED FROM FINAL GRADING SURFACE.
7. WRAP INNER FABRIC AND OUTER COIR FABRIC OVER TOP OF COIR LOGS. PULL FABRICS TIGHT WITH MINIMUM WRINKLES AND STAKE IN PLACE USING STAKING PATTERN SHOWN ON DETAIL D, DRAWING D2.
8. PLACE 6 TO 8 FOOT LONG DORMANT WILLOW CUTTING ON LOWER SOIL LIFT AS SHOWN ON DETAIL C. PLACE WILLOW CUTTTINGS AT A DENSITY OF 5 STEMS PER LINEAR FOOT. WILLOW CUTTINGS STEMS MAY OVERLAP. THE CUT ENDS SHALL BE PLACED AT THE BASE OF THE SLOPE WITH THE UN–CUT ENDS EXTENDING BEYOND THE EDGE OF COIR LOG SO THAT APPROXIMATELY ONE–THIRD OF THE TOTAL CUTTING LENGTH IS EXPOSED.
9. LAY COIR OUTER FABRIC ON COMPLETED FIRST LIFT OF THE DVSL WITH APPROXIMATELY TWO–THIRDS EXTENDING BEYOND THE FRONT EDGE OF THE FIRST LIFT. PLACE INNER FABRIC ON TOP OF OUTER COIR FABRIC.
10. PLACE COIR LOGS AT POSITION SHOWN ON THE DRAWINGS AND BACKFILL BEHIND COIR LOGS WITH 1:1 MIX OF VEGETATED BACKFILL AND FLOODPLAIN ALLUVIUM APPROXIMATELY 1 FOOT THICK. COMPACT BACKFILL WITH BUCKET.
11. WRAP INNER AND OUTER COIR FABRIC OVER TOP OF COIR LOGS AND FILL. PULL FABRIC TIGHT WITH MINIMUM WRINKLES AND STAKE IN PLACE AS SHOWN USING STAKING PATTERN SHOWN ON DETAIL D, DRAWING D2.
12. PLACE 6 TO 8 FOOT LONG DORMANT WILLOW CUTTING ON UPPER SOIL LIFT AND ON BACK SLOPE OF EXCAVATION AS SHOWN ON DETAIL C. PLACE WILLOW CUTTTINGS AT A DENSITY OF 2.5 STEMS PER LINEAR FOOT ON TOP OF UPPER SOIL LIFT AND AT A DENSITY OF 5 STEMS PER LINEAR FOOT ON THE BACK SLOPE. WILLOW CUTTINGS STEMS MAY OVERLAP. THE CUT ENDS SHALL BE PLACED AT THE BASE OF THE SLOPE WITH THE UN–CUT ENDS EXTENDING BEYOND THE EDGE OF COIR LOG OR TRENCH SO THAT APPROXIMATELY ONE–THIRD OF THE TOTAL CUTTING LENGTH IS EXPOSED.
13. PLACE AND BUCKET COMPACT FLOODPLAIN ALLUVIUM OVER DVSL AS SHOWN ON C. FINAL GRADE SHALL SLOPE TOWARDS THE TOP OF THE DVSL WITH APPROXIMATELY 2 PERCENT SLOPE. NO LOW AREAS SHALL BE LEFT BEHIND THE CONSTRUCTED BANK.




SOIL LIFT STAKING PATTERN

DETAIL D
NTS –

DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

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|---|---|---|---|---|

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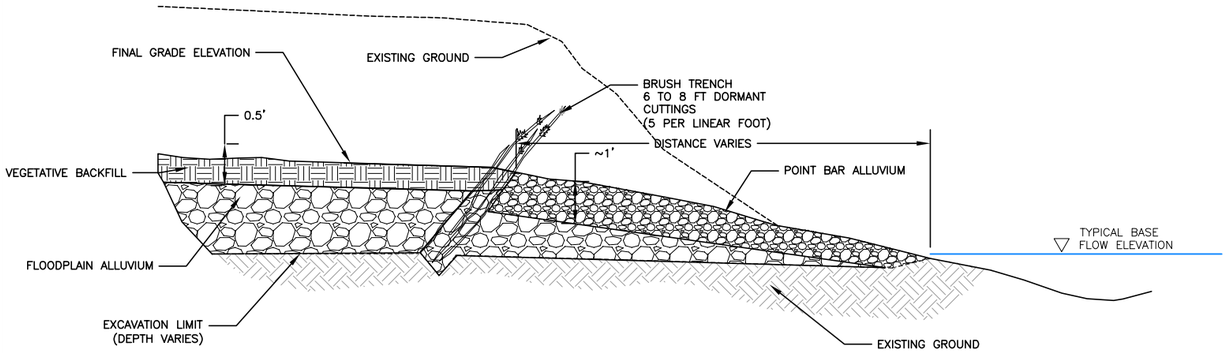
CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

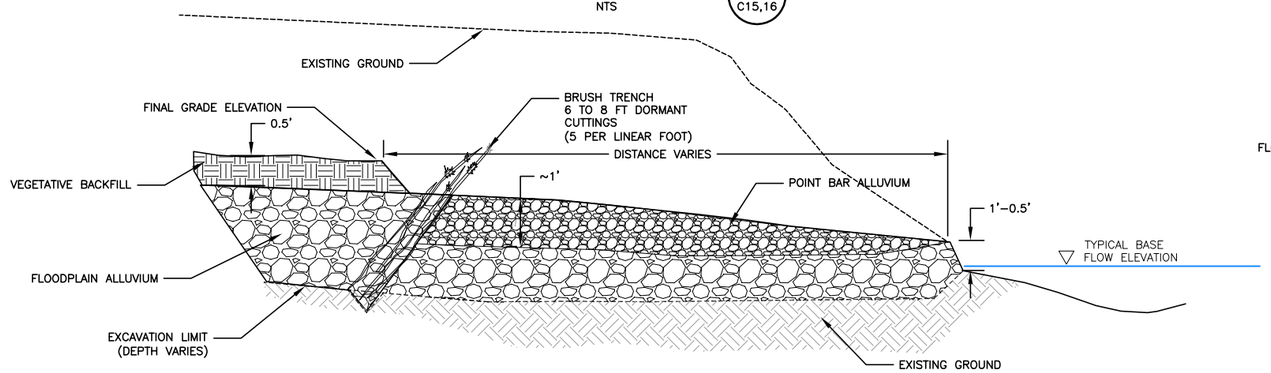
STREAMBANK TREATMENT DETAILS

PROJECT NO.
FILE NAME:
SHEET NO.
D2



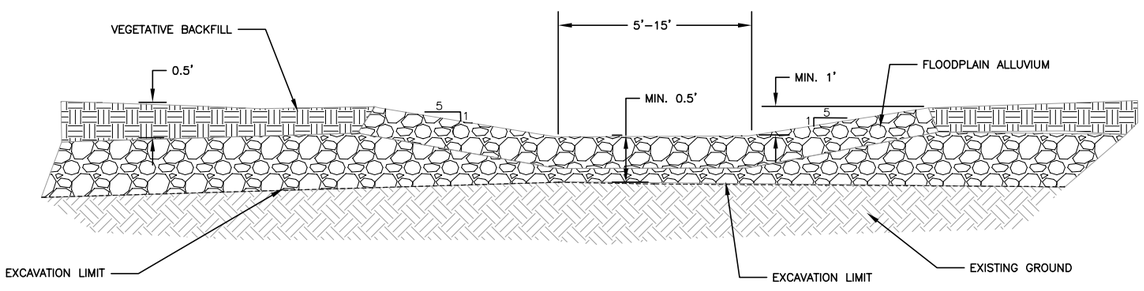

POINT BAR REGRADING WITH BRUSH TRENCH

DETAIL D
NTS C15,16




LATERAL BAR WITH BRUSH TRENCH

DETAIL E
NTS C15,16

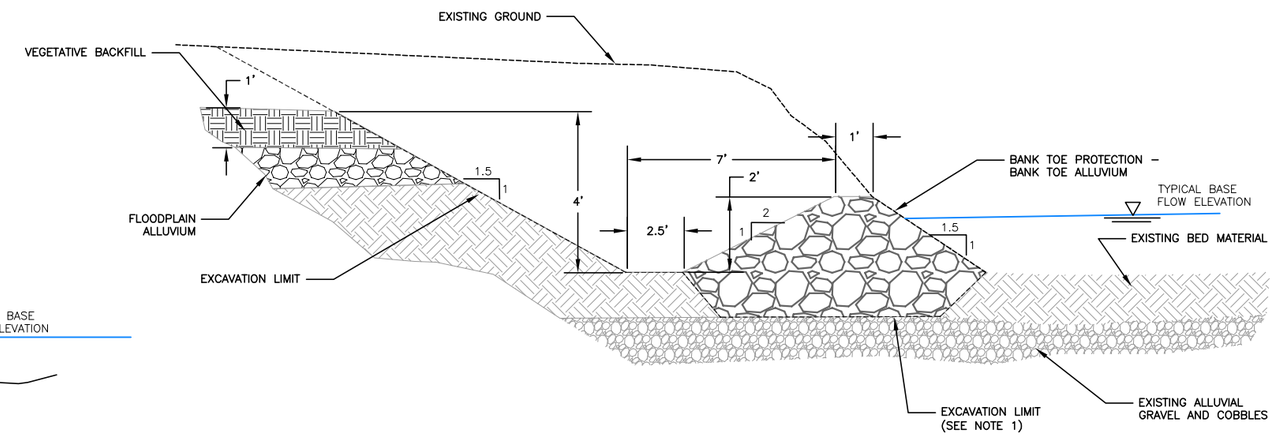



SECONDARY CHANNEL DETAIL

DETAIL F
NTS C11

BRUSH TRENCH

1. EXCAVATE FOR BRUSH TRENCH AT THE SAME TIME GROUND BETWEEN BRUSH TRENCH AND STREAM IS EXCAVATED AND BACKFILLED.
2. COMPLETE BACKFILL, MICROTOPOGRAPHY AND WOOD PLACEMENT ON STREAM SIDE OF BRUSH TRENCH IF THIS AREA WILL BECOME INACCESSIBLE AFTER CONSTRUCTION OF BRUSH TRENCH.
3. PLACE 6 TO 8 FEET LONG DORMANT WILLOW CUTTINGS ON THE STREAM SIDE SLOPE OF BRUSH TRENCH EXCAVATION AS SHOWN ON DETAIL A, DRAWING D2. PLACE WILLOW CUTTINGS AT A DENSITY OF 5 STEMS PER LINEAR FOOT. WILLOW CUTTING STEMS MAY OVERLAP. THE CUT ENDS SHALL BE PLACED AT THE BASE OF THE SLOPES WITH THE UN-CUT ENDS EXTENDING BEYOND THE EDGE OF THE TRENCH SO THAT APPROXIMATELY ONE-THIRD OF THE TOTAL CUTTINGS LENGTH IS EXPOSED.
4. PLACE AND BUCKET COMPACT FLOODPLAIN ALLUVIUM IN THE TRENCH BEHIND WILLOW CUTTINGS AS SHOWN ON THE DRAWINGS. FINAL GRADE OF THE ALLUVIUM SHALL SLOPE TOWARDS THE BRUSH TRENCH WITH APPROXIMATELY 2 PERCENT SLOPE. FINAL GRADE AT THE BRUSH TRENCH SHALL BE APPROXIMATELY THE STREAMBANK ELEVATION. NO LOW AREAS SHALL BE LEFT BEHIND THE BRUSH TRENCH.




BANK TOE PROTECTION

DETAIL C
NTS C11,12

BANK TOE NOTES:

1. ELEVATION OF BASE OF BANK TOE PROTECTION IS THE ELEVATION OF EXISTING ALLUVIUM OR SCOUR DEPTH, WHICH EVER IS HIGHER. ELEVATION OF TOP OF BANK TOE PROTECTION IS 2 FT. BELOW TOP OF FINAL BANK. SCOUR DEPTH TO BE DETERMINED BY ENGINEER WHERE NEEDED.
2. TYPICAL SCOUR DEPTH ON BENDS IS 7 FT BELOW FINISH BANK ELEVATION.
3. UPPER BANK IS DVSL BANK TREATMENT.
4. INSTALL COFFER DAM AS NECESSARY.

DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|

DESIGNED BY: KM
DRAWN BY: KM
SHEET CHK'D BY: WHB
CROSS CHK'D BY: WHB
APPROVED BY: WHB
DATE: JULY 2014

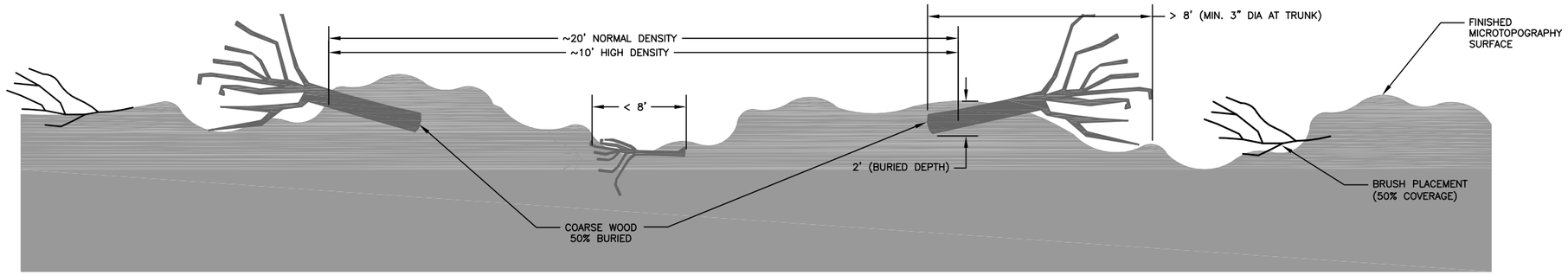
CDM Smith
50 West 14th Street Suite 200
Helena, Montana
Tel: (406) 441-1400
consulting • engineering • construction • operations

DEPARTMENT OF ENVIRONMENTAL QUALITY
CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

STREAMBANK TREATMENT DETAILS

PROJECT NO.
FILE NAME:
SHEET NO.
D3

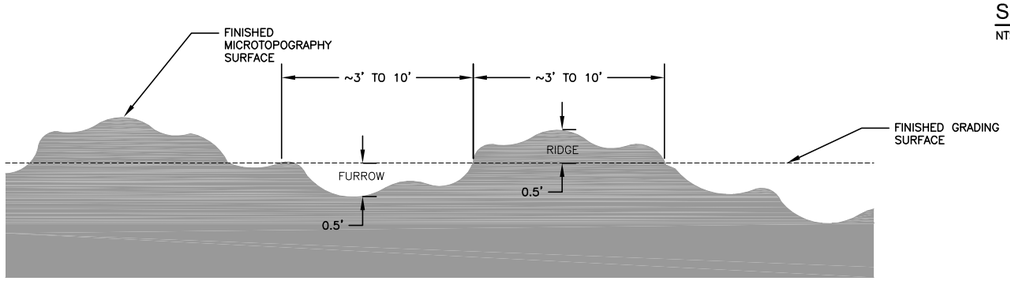
K:\CFR - PHASE 2\dwg rev dec2013\CSDT006-Microtopography.dwg SAVED: 4/3/14 PRINTED: 5/29/14 BY: HUFFSMI




TYPICAL WOOD AND BRUSH PLACEMENT

SECTION 1 / –

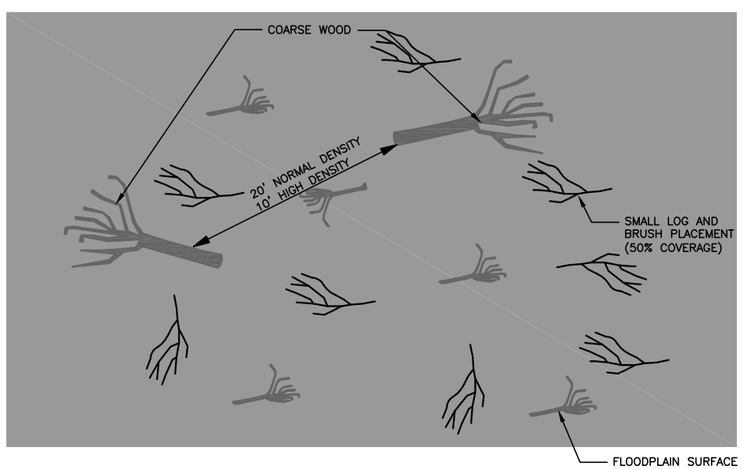
NTS




TYPICAL MICROTOPOGRAPHY GRADING

SECTION 2 / –

NTS




WOOD AND BRUSH PLACEMENT – PLAN VIEW

DETAIL C / C15,16

NTS

NOTES

1. COARSE WOODY SHALL BE PLACED AS NORMAL AND HIGH DENSITY IN THE LOCATIONS SHOWN ON SHEETS C13 AND C14, VEGETATIVE BACKFILL DEPTHS.
2. BURY COARSE WOOD WITHIN THE FLOODPLAIN SURFACE WITH ONE HALF OF THE LENGTH BURIED TO A DEPTH OF 3 FEET AND ONE HALF EXPOSED AS SHOWN ON DETAILS.
3. CONSTRUCT LOW AND HIGH FEATURES (RIDGES AND FURROWS) AS SHOWN ON DETAILS. MAXIMUM HEIGHT OF RIDGES AND DEPTH OF FURROWS SHALL BE NO GREATER THAN 0.5 FOOT RELATIVE TO FINISH GRADE.

DRAFT - PRELIMINARY NOT FOR CONSTRUCTION

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|

DESIGNED BY: KM
DRAWN BY: KM
SHEET CHK'D BY: WHB
CROSS CHK'D BY: WHB
APPROVED BY: WHB
DATE: JULY 2014

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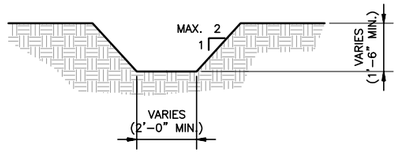
CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

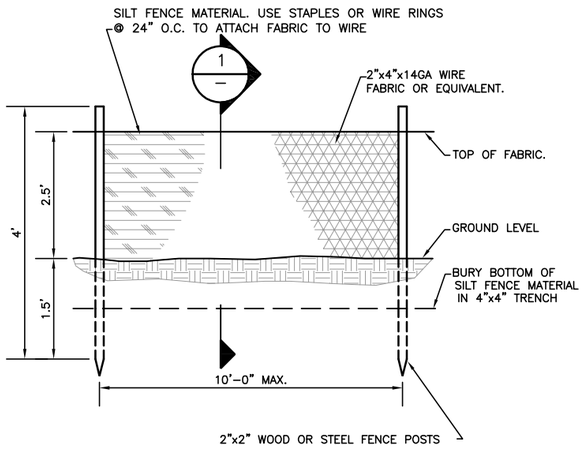
MICROTOPOGRAPHY, WOOD AND BRUSH PLACEMENT DETAILS

PROJECT NO.
FILE NAME:
SHEET NO. D6



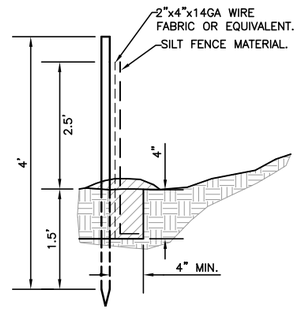

DIVERSION DITCH

DETAIL A
NTS



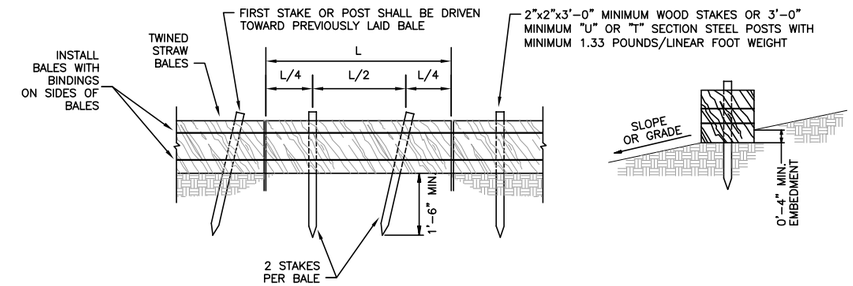

SILT FENCE

DETAIL B
NTS




SILT FENCE

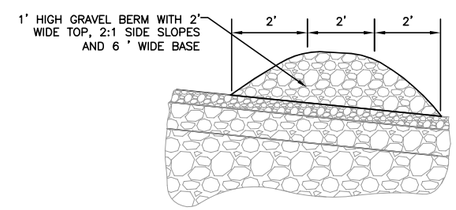
SECTION 1
NTS




STRAW BALE

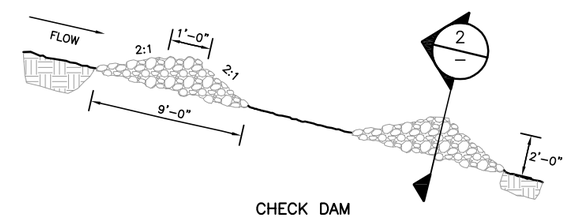
DETAIL D
NTS

**NOTE:**
SEE SUBSECTION 9F OF THE SPECIAL PROVISIONS FOR INSTALLATION, MAINTENANCE AND REMOVAL OF EROSION CONTROL.



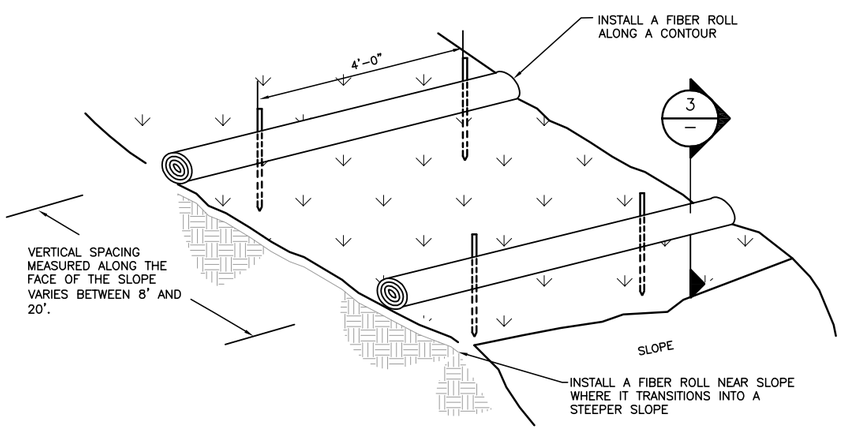

ROCK BERM

DETAIL E
NTS



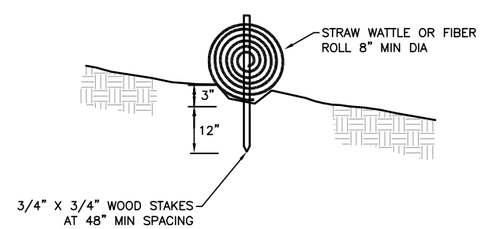

CHECK DAM

DETAIL F
NTS



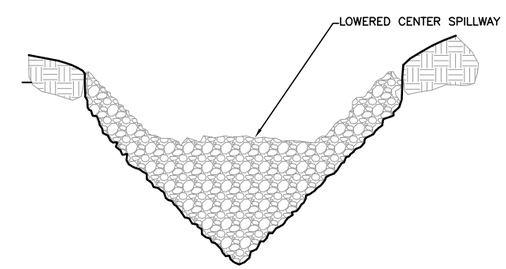

STRAW WATTLES OR FIBER ROLLS

DETAIL C
NTS




STRAW WATTLE OR FIBER ROLLS

SECTION 3
NTS




CHECK DAM

SECTION 2
NTS

| REV. NO. | DATE | DRWN | CHKD | REMARKS |
|---|---|---|---|---|
| 01 | 1.03.13 | KM | WHB | MODIFIED SILT FENCE MESH SIZE TO 2"X4"X14GA WIRE FABRIC |

DESIGNED BY: WHB
DRAWN BY: KM
SHEET CHK'D BY: WHB
CROSS CHK'D BY: TJ
APPROVED BY: XX
DATE: JULY 2014

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DEPARTMENT OF ENVIRONMENTAL QUALITY

CLARK FORK RIVER - PHASE 2 REMEDIAL ACTION

EROSION CONTROL DETAILS

PROJECT NO.
FILE NAME:
REVISED SHEET NO.
D7