GOVERNMENT FURNISHED

- EMBANKMENT SOURCE
- WASTE DISPOSAL SITE (ON-SITE)
- RIPRAP SOURCE (ON-SITE)
- CSP CULVERTS
- WILLOW CUTTINGS

U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
REGION ONE

CONSTRUCTION PLANS FOR

ONTARIO CREEK ROAD RELOCATION ROAD NO. 123

HELENA-LEWIS AND CLARK NATIONAL FOREST
HELENA RANGER DISTRICT
POWELL COUNTY, MONTANA

SHEET INDEX

PROJECT: 1-16175
DATE: FEB 17, 2017

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SHEET 2	TYPICAL SECTIONS & QUANTITIES
SHEET 3	OVERALL SITE PLAN
SHEET 4	MASS-HAUL DIAGRAM
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SHEET 10	CENTERLINE STAKING TABLES
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SHEET 16	LOG CROSS-VANE & SOIL LIFT DETAILS
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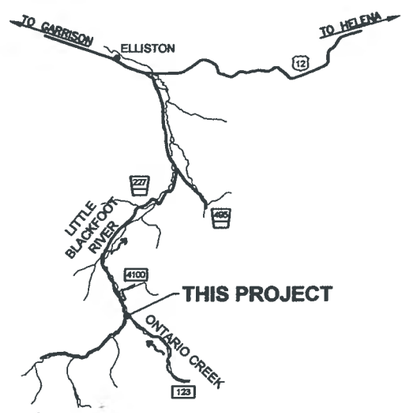
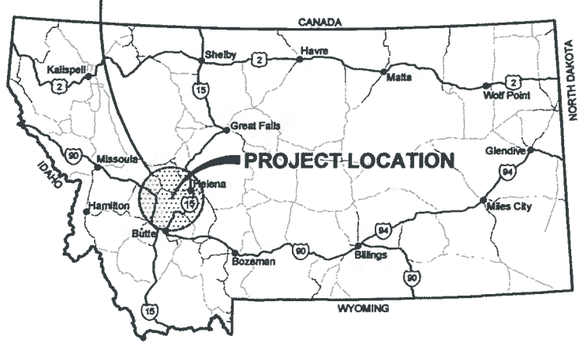
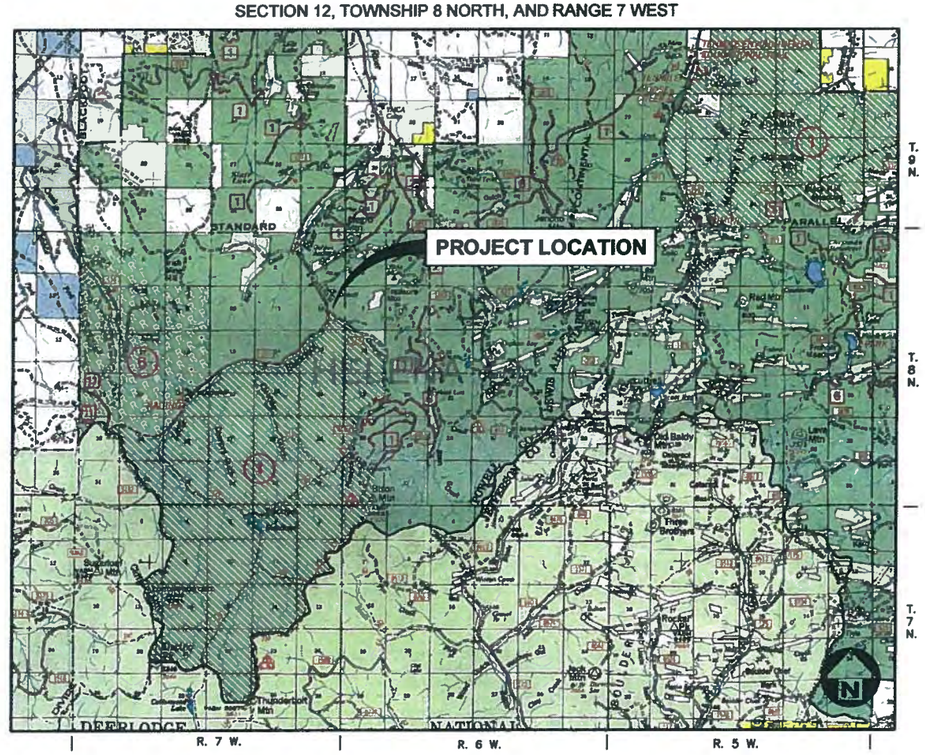
SHEET 18	WOOD HABITAT STRUCTURE DETAILS
SHEET 19	MISCELLANEOUS DETAILS
SHEET 20 - 28	ROADWAY CROSS-SECTIONS
SHEET 29 - 33	STREAM CROSS-SECTIONS





LOCATION MAP
NOT TO SCALE

SECTION 12, TOWNSHIP 8 NORTH, AND RANGE 7 WEST



VICINITY MAP
NOT TO SCALE

APPROVED:

FOREST SUPERVISOR
HELENA-LEWIS AND CLARK NATIONAL FOREST

2-24-17
DATE

APPROVED:

FOREST ENGINEER
HELENA-LEWIS AND CLARK NATIONAL FOREST

2/23/17
DATE

RECOMMENDED:

HELENA DISTRICT RANGER
HELENA-LEWIS AND CLARK NATIONAL FOREST

2/24/17
DATE

PLANS PREPARED BY:

JEREMY MORRIS, E.I.

QA/QC BY:

KARL YAKAWICH, P.E.

NOTE:
DRAWING SCALE IS ONLY ACCURATE WHEN PLANS ARE PLOTTED ON 11" X 17" (TABLOID)-SIZED PAPER.

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NO.	REVISION DESCRIPTION	BY	DATE

SET NO.

SHEET NO. 1

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GENERAL NOTES:

SPECIFICATIONS:
MATERIALS AND CONSTRUCTION OF THIS PROJECT SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS FOR CONSTRUCTION OF ROADS AND BRIDGES ON FEDERAL HIGHWAY PROJECTS, FP-03 (U.S. CUSTOMARY UNITS).

ROAD CLASSIFICATION:
NEW ROAD (ROAD NO. 123) IS CLASSIFIED AS LEVEL OF SERVICE (LOS) i.

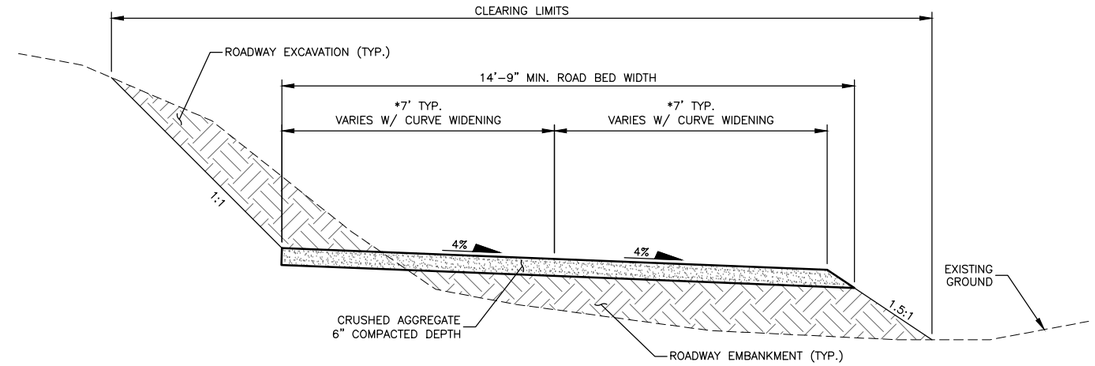
HYDROLOGY & HYDRAULICS:
HYDROLOGY AT ONTARIO CREEK FOR THE 2-YEAR, 10-YEAR AND 100-YEAR EVENTS WERE ESTIMATED AT 78 CFS, 176 CFS AND 321 CFS RESPECTIVELY.

EROSION CONTROL:
SUBMIT AN EROSION CONTROL PLAN TO THE C.O. FOR REVIEW PRIOR TO BEGINNING ANY WORK. PROVIDE METHODS TO PREVENT RUNOFF FROM THE CONSTRUCTION SITE FROM DIRECTLY ENTERING INTO LIVE STREAMS.

MATERIAL DISPOSAL:
CONTRACTOR TO DISPOSE OF EXCESS AND/OR UNSUITABLE MATERIAL AT THE GOVERNMENT FURNISHED WASTE SITE. HAULING OF MATERIAL IS PAID UNDER THEIR RESPECTIVE BID ITEMS.

SEEDING:
SEEDING IS REQUIRED ON ALL NEW ROAD CONSTRUCTION SLOPES AND IN NEW ROAD CONSTRUCTION AREAS OF DISTURBANCE. NO SEEDING IS REQUIRED FOR ROADWAY OBLITERATION.

TRAFFIC CONTROL:
CONTRACTOR TO PREPARE AND SUBMIT A TRAFFIC CONTROL PLAN TO THE C.O. FOR ACCEPTANCE AT LEAST 30 DAYS BEFORE INTENDED USE. TRAFFIC CONTROL PLAN MUST COMPLY WITH MUTCD (CURRENT EDITION) AND FOREST SERVICE SPECIFICATIONS. PAYMENT FOR TRAFFIC CONTROL IS INCIDENTAL TO THE MOBILIZATION BID ITEM.



*SEE ROADWAY CROSS-SECTIONS ON SHEETS 20-28 FOR WIDTH

TYPICAL SUPERELEVATED ROADWAY SECTION

NOT TO SCALE

ESTIMATED QUANTITIES*

ITEM NO.	DESCRIPTION	METHOD OF MEASUREMENT	UNIT	QUANTITY
15101	MOBILIZATION	LSQ	LS	1
15221	CONSTRUCTION SURVEY AND STAKING	LSQ	LS	1
15713	SOIL EROSION AND POLLUTION CONTROL	LSQ	LS	1
20101	CLEARING AND GRUBBING	CQ	ACRE	3.19
20401	ROADWAY EXCAVATION	CQ	CY	9688
20420	DRAIN DIPS	CQ	EA	4
25101	PLACED RIPRAP, CLASS 3 (GOVERNMENT FURNISHED SOURCE)	CQ	CY	800
30809a	CRUSHED AGGREGATE, COMPACTION METHOD 1	CQ	CY	1066
60201	24" DIAMETER CSP CULVERT, (GOVERNMENT FURNISHED)	CQ	LF	54
62201a	HYDRAULIC EXCAVATOR WITH THUMB	AQ	HR	110
62201b	LARGE DUMP TRUCK	AQ	HR	35
62301	GENERAL LABOR	AQ	HR	40
62501	SEEDING, DRY METHOD	CQ	ACRE	2.12
64808	CHANNEL EXCAVATION	CQ	CY	2805
64809	VEGETATED SOIL LIFT	AQ	LF	92

INFORMATIONAL ONLY - NOT FOR BIDDING PURPOSES - REFER TO BID SCHEDULE

OPTIONAL ADDITIVES*

ITEM NO.	DESCRIPTION	METHOD OF MEASUREMENT	UNIT	QUANTITY
21103a	ROADWAY OBLITERATION, METHOD 1 (RD 123) & REMOVAL OF BRIDGE & CULVERTS	LSQ	LS	1
21103b	ROADWAY OBLITERATION, METHOD SCARIFY	CQ	MILE	1.08
64804a	PLACED STREAMBED SIMULATION ROCK	CQ	CY	800
64804b	PLACED STREAMBANK SIMULATION ROCK	CQ	CY	417

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REGION ONE

ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

TYPICAL SECTIONS & QUANTITIES

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE
DESIGNED: JDM	DESIGN CHECKED: ----	△			
DRAWN: JDM	DRAWING CHECKED: KFY	△			

SHEET NO. 2 OF 33

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CONTROL POINT COORDINATE TABLE*

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
CP1	818390.04	1233468.40	5593.81	REBAR W/CAP
CP2	818110.06	1233947.20	5597.69	REBAR W/CAP
CP3	817812.40	1234296.40	5611.87	REBAR W/CAP
CP4	817654.67	1234400.18	5616.42	REBAR W/CAP
CP5	817664.53	1234451.33	5618.18	REBAR W/CAP
CP6	817502.95	1234547.48	5623.84	REBAR W/CAP
CP7	817982.30	1234373.85	5606.02	REBAR W/CAP
CP8	818084.04	1234310.60	5602.48	REBAR W/CAP
CP9	818143.06	1234261.63	5600.71	REBAR W/CAP
CP10	818340.44	1234167.63	5594.58	REBAR W/CAP
CP99	818509.54	1233307.41	5609.53	REBAR W/CAP
SEC.1	817583.68	1234401.31	5616.26	USFS ALUMINUM CAP

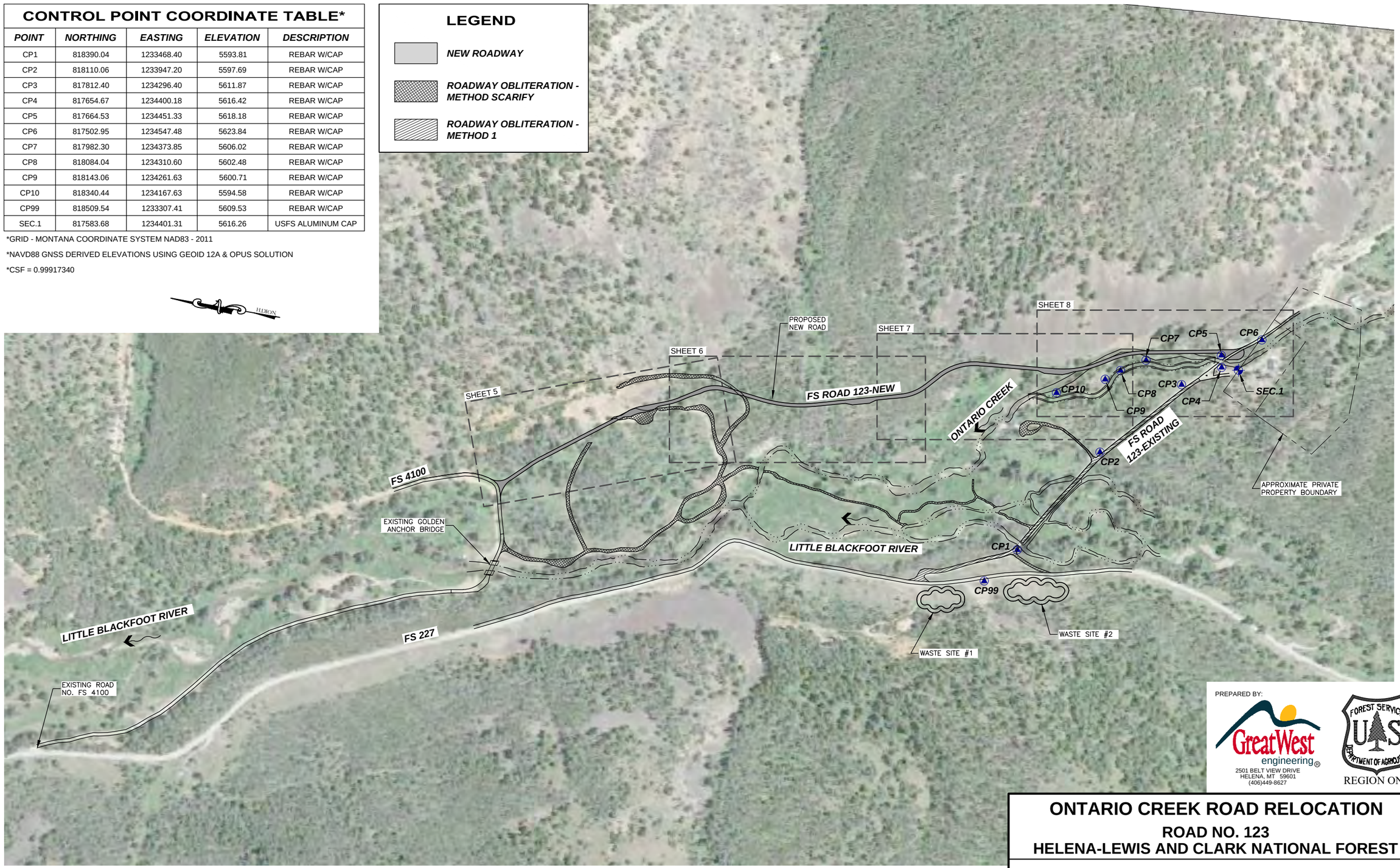
*GRID - MONTANA COORDINATE SYSTEM NAD83 - 2011

*NAVD88 GNSS DERIVED ELEVATIONS USING GEOID 12A & OPUS SOLUTION

*CSF = 0.99917340

LEGEND

- NEW ROADWAY
- ROADWAY OBLITERATION - METHOD SCARIFY
- ROADWAY OBLITERATION - METHOD 1



SITE PLAN

0 200 400

SCALE IN FEET

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ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

OVERALL SITE PLAN

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE
DESIGNED: JDM	DESIGN CHECKED: ----	△			
DRAWN: JDM	DRAWING CHECKED: KFY	△			

SHEET NO. 3 OF 33

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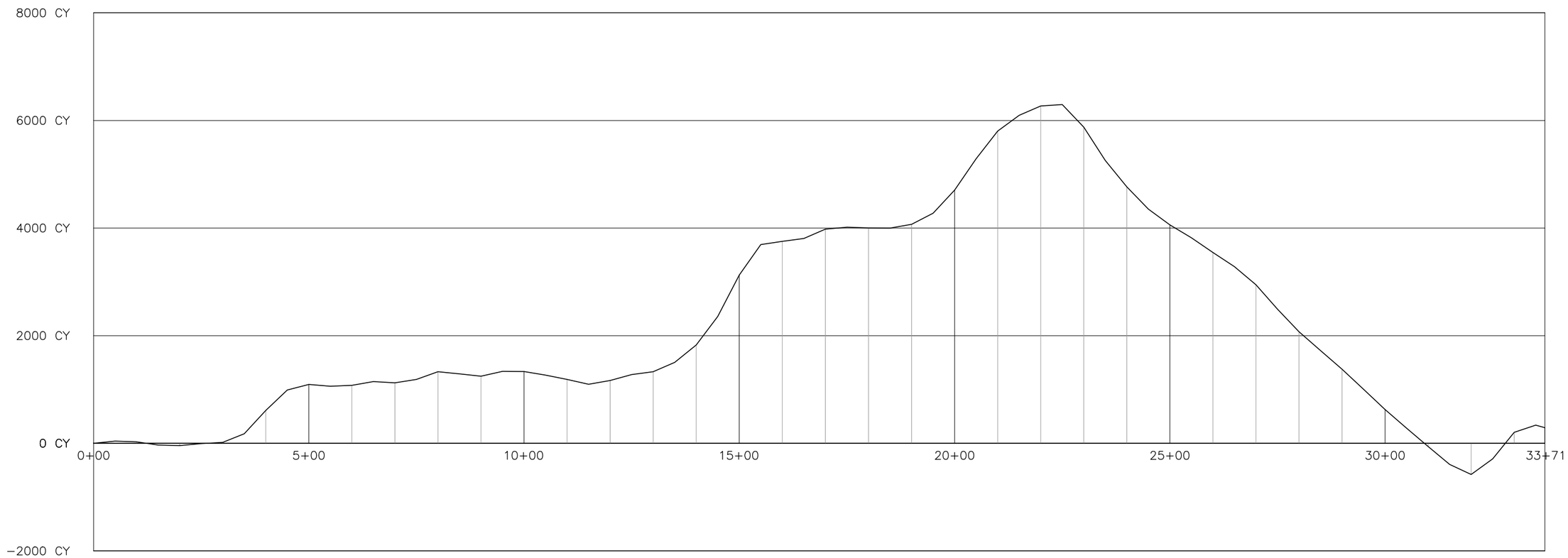

MASS-HAUL DIAGRAM OF ROAD NO. 123-NEW

HORIZONTAL SCALE: 1" = 250'
VERTICAL SCALE: 1" = 2000 CY

NOTES:

1. CONTRACTOR SHALL USE EXCESS SUITABLE MATERIAL FROM ROADWAY EXCAVATION FOR ROADWAY EMBANKMENT CONSTRUCTION. THE MATERIAL SHALL BE APPROVED BY C.O. BEFORE PLACEMENT. COMPACT ROADWAY EMBANKMENT PER FSSS 204.
2. ADDITIONAL ROADWAY EMBANKMENT MATERIAL SHALL COME FROM A SITE ALONG THE NEW ROAD 123 ROADWAY CORRIDOR AS LOCATED BY THE C.O. SEE FSSS 105.
3. REFER TO SHEETS 20 – 28 FOR ROADWAY CROSS–SECTIONS.
4. QUANTITIES PROVIDED FOR INFORMATION ONLY AND ARE IN–PLACE QUANTITIES, NO SHRINKAGE OR SWELL FACTORS HAVE BEEN APPLIED. CONTRACTOR SHALL VERIFY QUANTITIES. ROADWAY QUANTITIES ASSUME 4 INCHES OF TOPSOIL REMOVAL.
5. QUANTITIES FOR ENTIRE NEW ROAD 123:

ESTIMATED QUANTITIES	
DESCRIPTION	***(CY)***
TOPSOIL REMOVED	1571
ROADWAY EXCAVATION	8830
ROADWAY EMBANKMENT	8597
ROADWAY EXCAVATION WITH TOPSOIL	9688

6. ANY SLASH FROM CLEARING AND GRUBBING SHALL REMAIN ON–SITE, TEMPORARILY STOCKPILED AND THEN PLACED ON FILL SLOPES.
7. CONTRACTOR TO DISPOSE OF EXCESS AND/OR UNSUITABLE MATERIAL IN A GOVERNMENT FURNISHED WASTE SITE LOCATED BY THE C.O. AS SHOWN ON SHEET 3. CONSERVE EXISTING TOPSOIL & PLACE ON WASTED MATERIAL WITH SEEDING.
8. CONTRACTOR TO PRESERVE ALL LARGE DIAMETER TREES PER THE DIRECTION OF THE C.O. ALL MERCHANTABLE TIMBER WITHIN THE CLEARING LIMITS ON FOREST SERVICE LAND IS GOVERNMENT PROPERTY. DECK ALL MERCHANTABLE TIMBER AT APPROVED LOCATIONS ACCORDING TO FSSS 201.
9. TOPSOIL & DUFF LAYERS FROM NEW ROADWAY SHALL BE SALVAGED FOR PLACEMENT ON COMPLETED SLOPES. ALL WORK FOR TOPSOIL SALVAGE AND INSTALLATION SHALL BE PAID UNDER 20401.

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ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

MASS-HAUL DIAGRAM

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE	SHEET NO.
DESIGNED: JDM	DESIGN CHECKED: ----	△				4 OF 33
DRAWN: JDM	DRAWING CHECKED: KFY	△				

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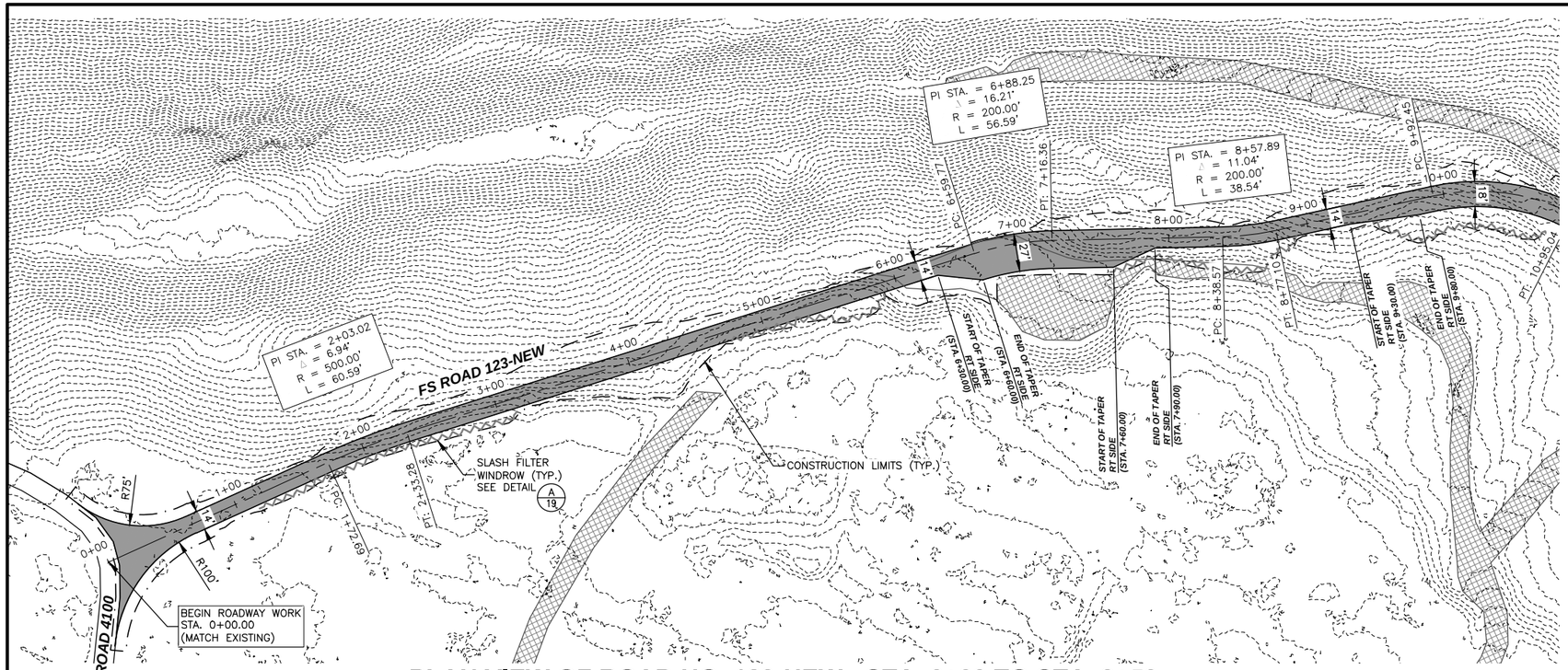
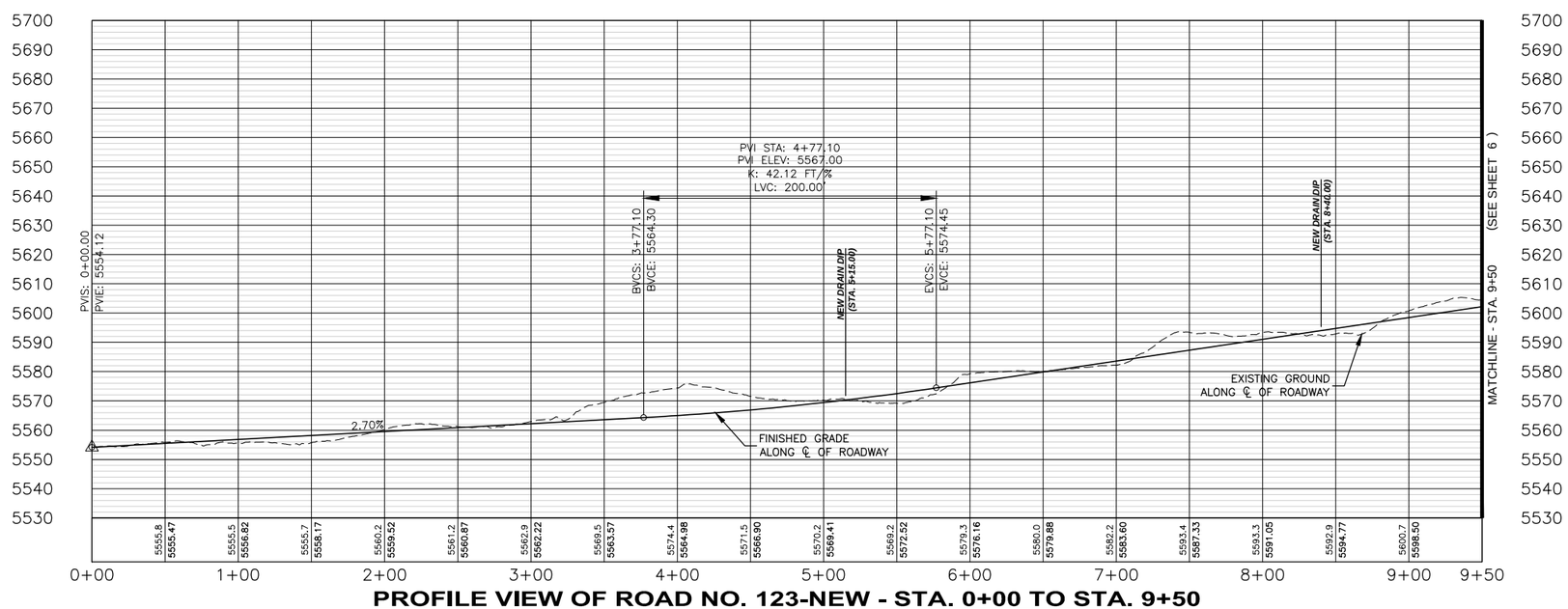


PLAN VIEW OF ROAD NO. 123-NEW - STA. 0+00 TO STA. 9+50

0 50 100
SCALE IN FEET



PROFILE VIEW OF ROAD NO. 123-NEW - STA. 0+00 TO STA. 9+50

HORIZONTAL SCALE: 1" = 100'
VERTICAL SCALE: 1" = 50'

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ROAD NO. 123
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ROAD PLAN & PROFILE

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE
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DRAWN: JDM	DRAWING CHECKED: KFY	△			

SHEET NO.
5 OF 33

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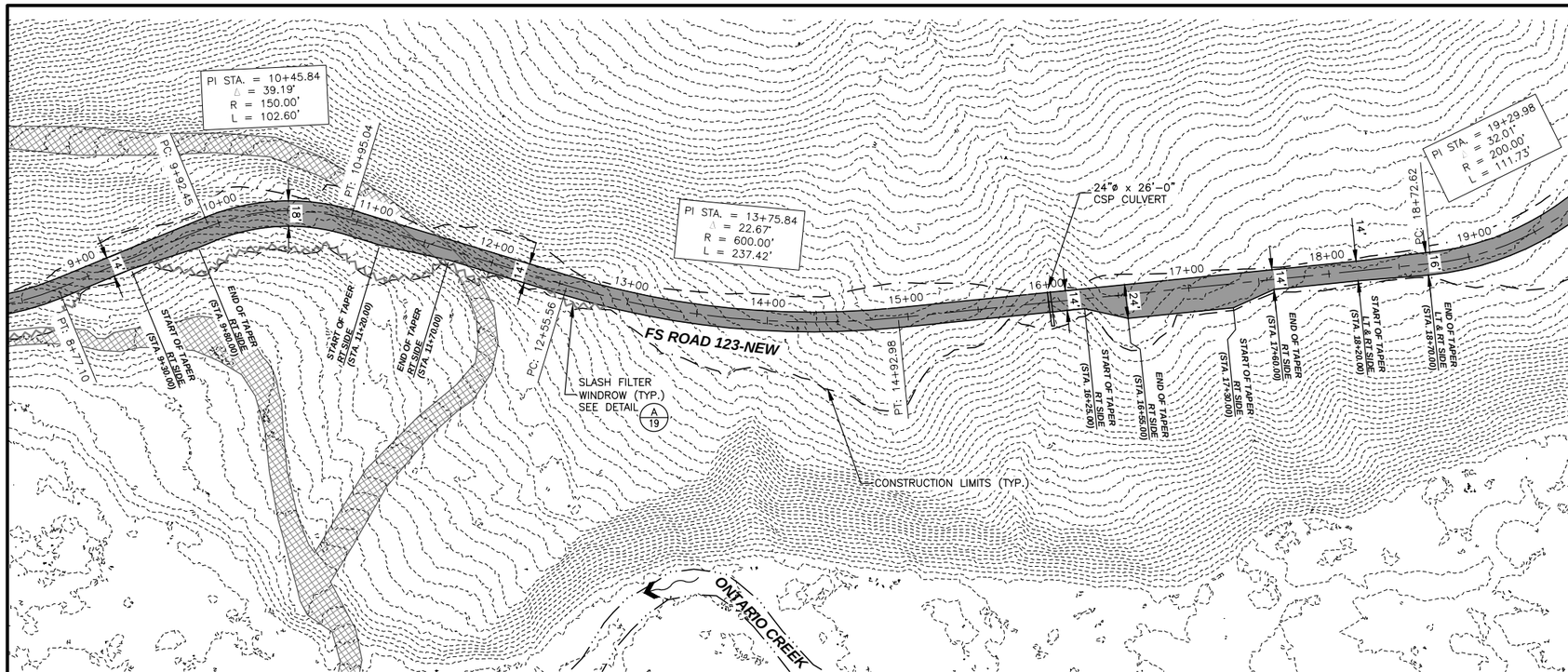
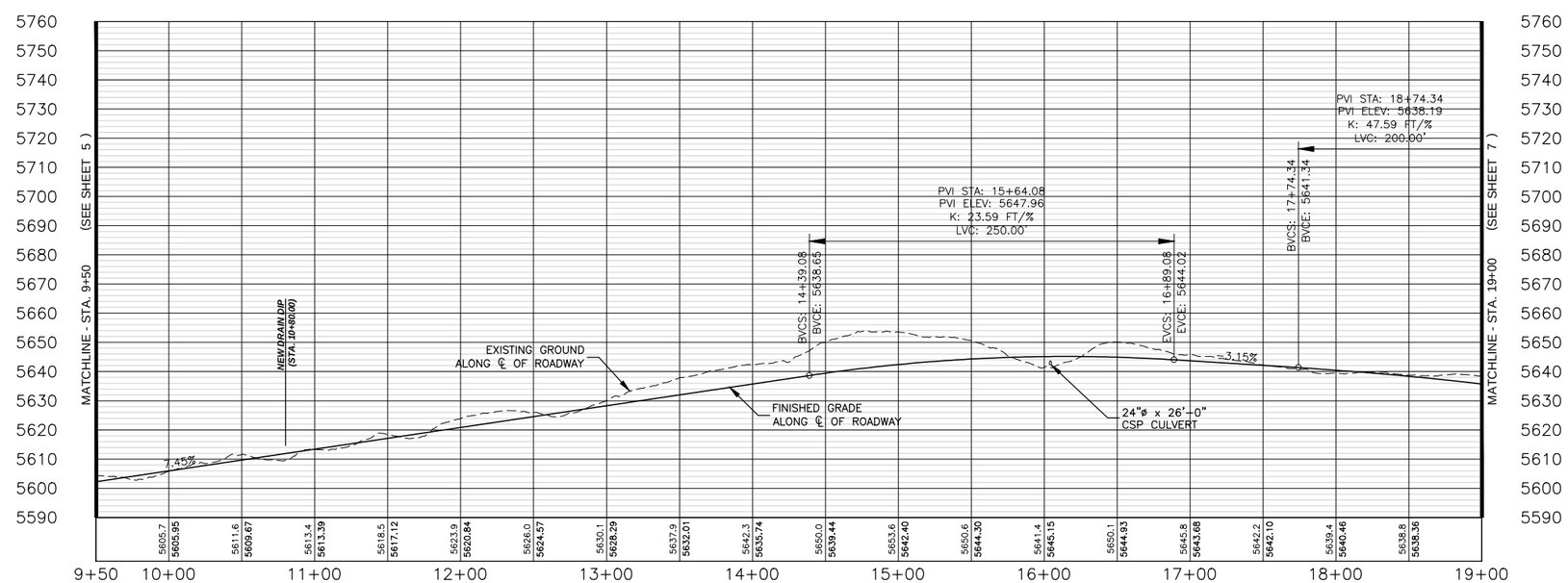


PLAN VIEW OF ROAD NO. 123-NEW - STA. 9+50 TO STA. 19+00

0 50 100
SCALE IN FEET



PROFILE VIEW OF ROAD NO. 123-NEW - STA. 9+50 TO STA. 19+00

HORIZONTAL SCALE: 1" = 100'
VERTICAL SCALE: 1" = 50'

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ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

ROAD PLAN & PROFILE

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE	SHEET NO.
DESIGNED: JDM	DESIGN CHECKED: ----	△				6 OF 33
DRAWN: JDM	DRAWING CHECKED: KFY	△				

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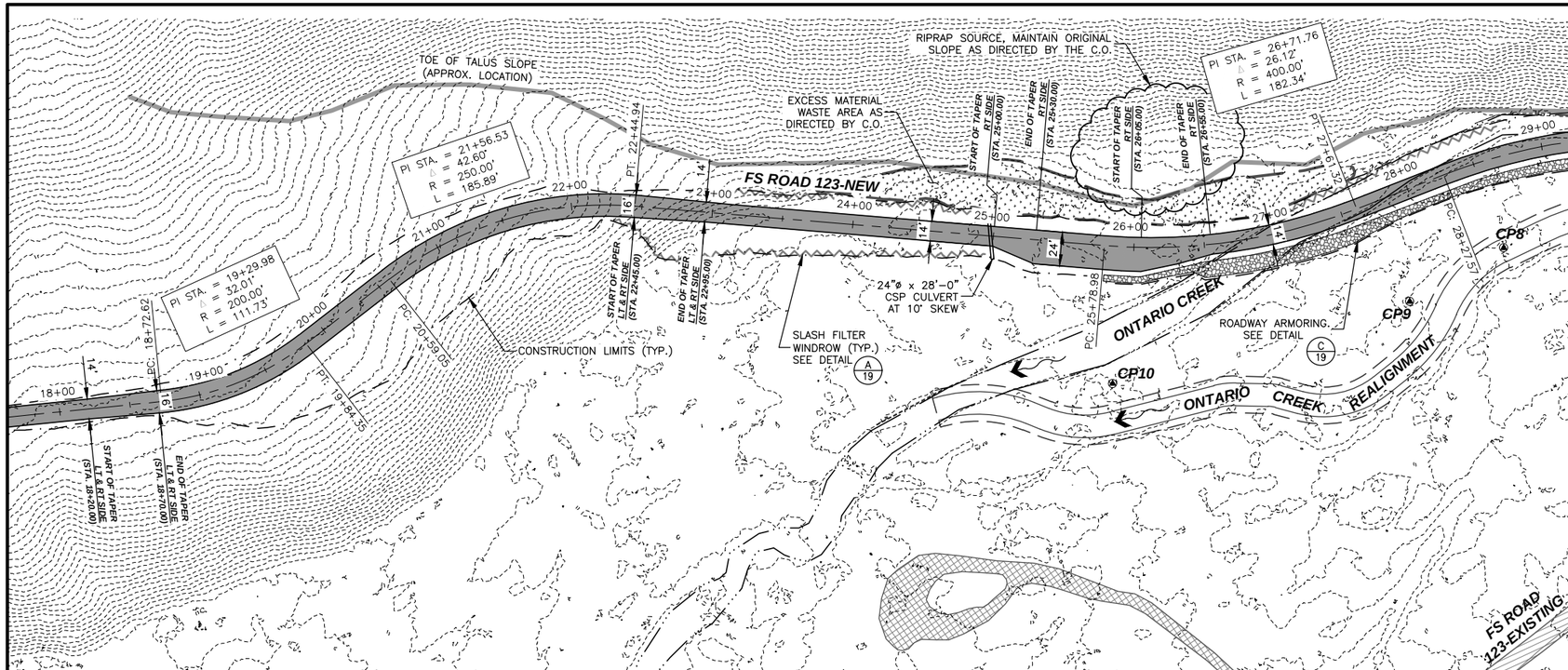
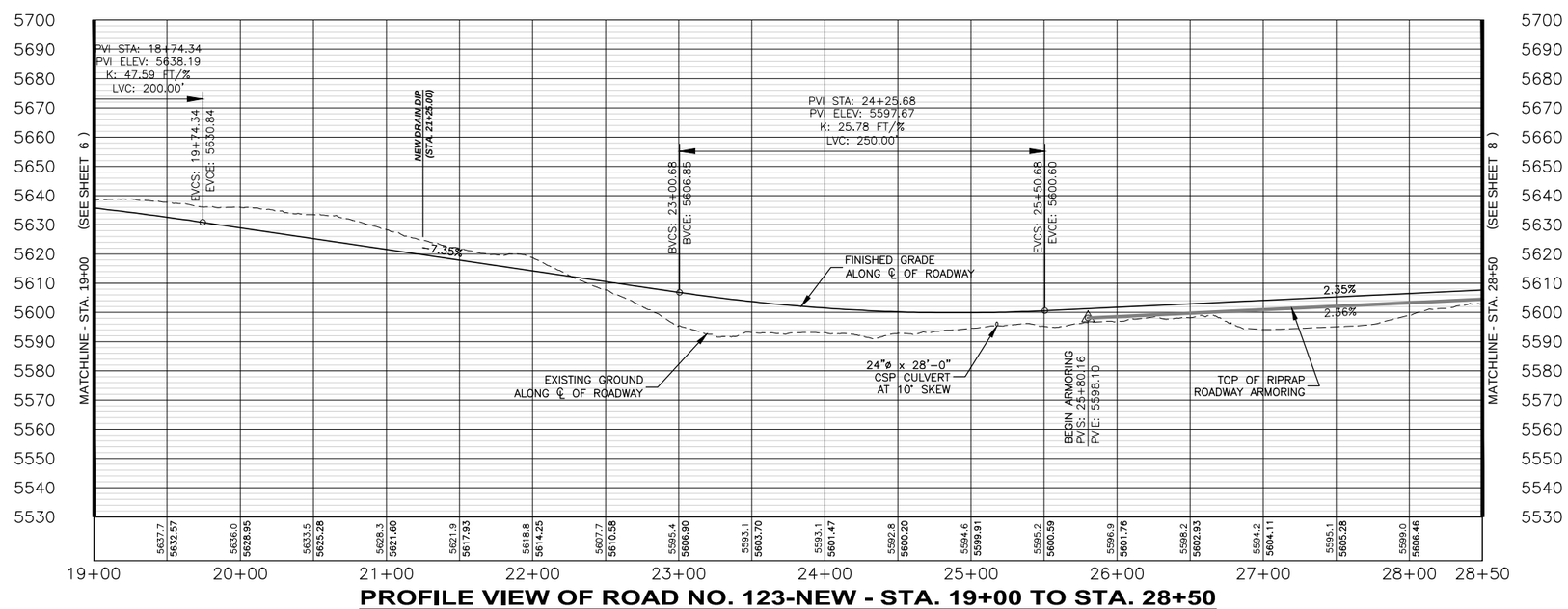


PLAN VIEW OF ROAD NO. 123-NEW STA. 19+00 TO STA. 28+50

0 50 100
SCALE IN FEET



PROFILE VIEW OF ROAD NO. 123-NEW - STA. 19+00 TO STA. 28+50

HORIZONTAL SCALE: 1" = 100'
VERTICAL SCALE: 1" = 50'

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ROAD NO. 123
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ROAD PLAN & PROFILE

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE	SHEET NO.
DESIGNED: JDM	DESIGN CHECKED: ----	△				7 OF 33
DRAWN: JDM	DRAWING CHECKED: KFY	△				

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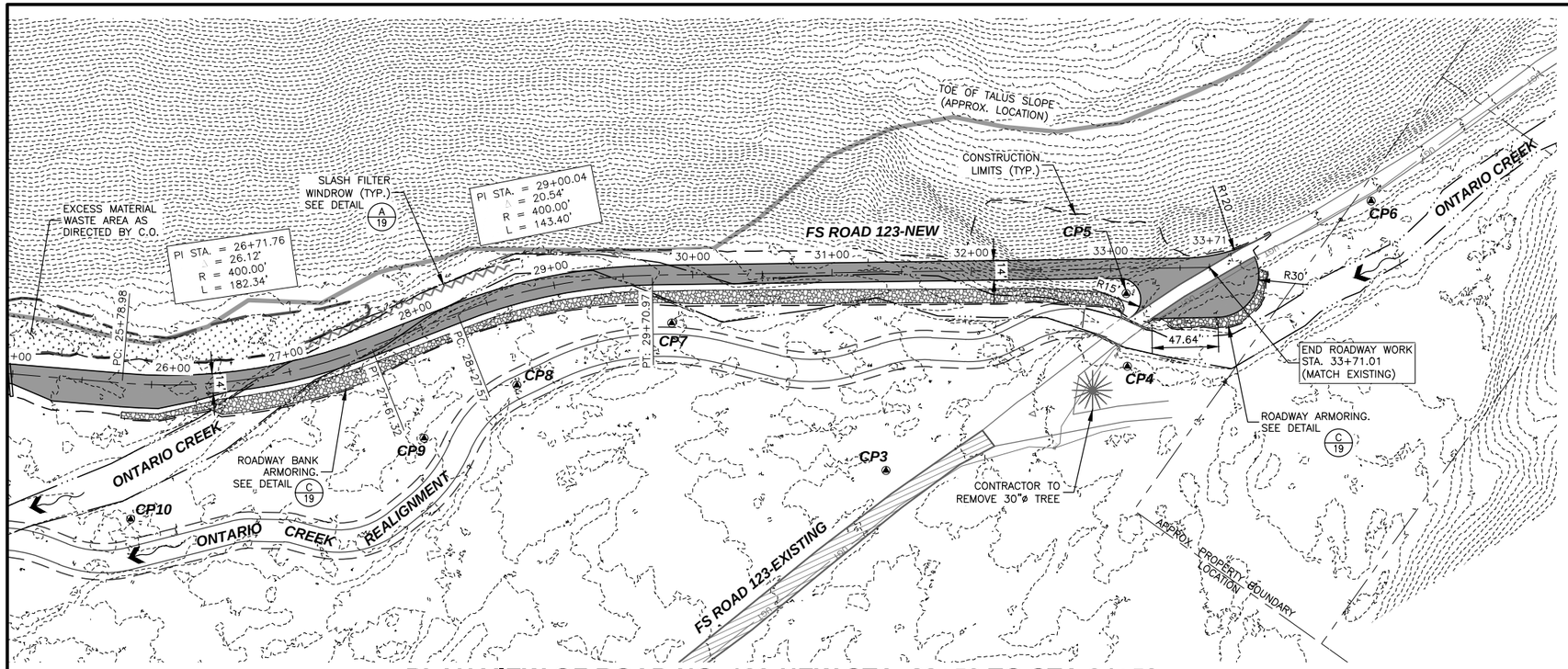
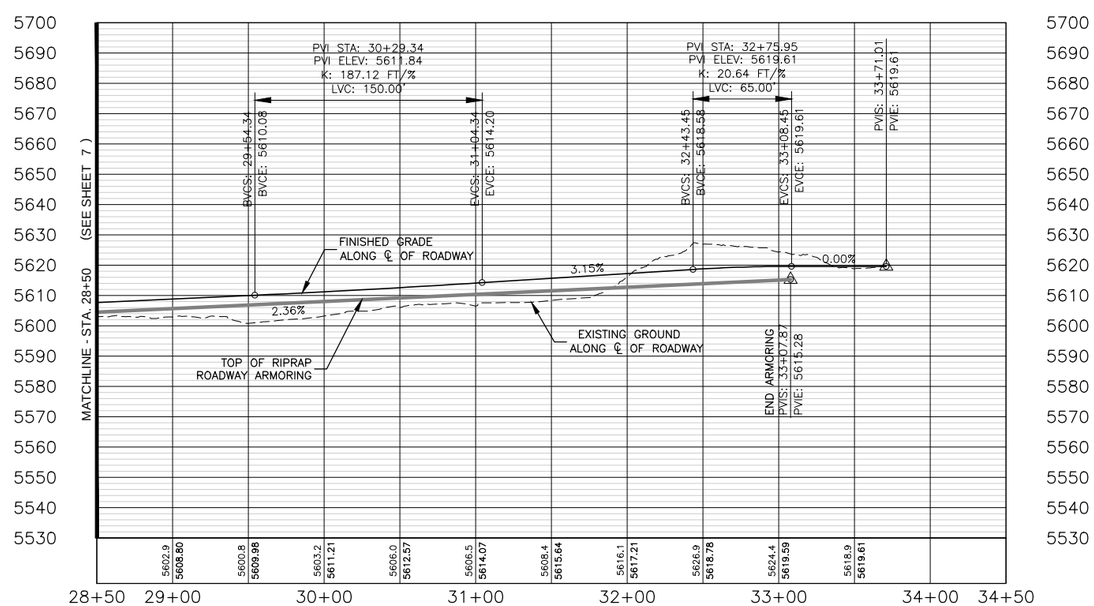


PLAN VIEW OF ROAD NO. 123-NEW STA. 28+50 TO STA 34+50

0 50 100
SCALE IN FEET



PROFILE VIEW OF ROAD NO. 123-NEW - STA. 28+50 TO STA. 34+50

HORIZONTAL SCALE: 1" = 100'
VERTICAL SCALE: 1" = 50'

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ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

ROAD PLAN & PROFILE

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE	SHEET NO.
DESIGNED: JDM	DESIGN CHECKED: ----	△				8 OF 33
DRAWN: JDM	DRAWING CHECKED: KFY	△				

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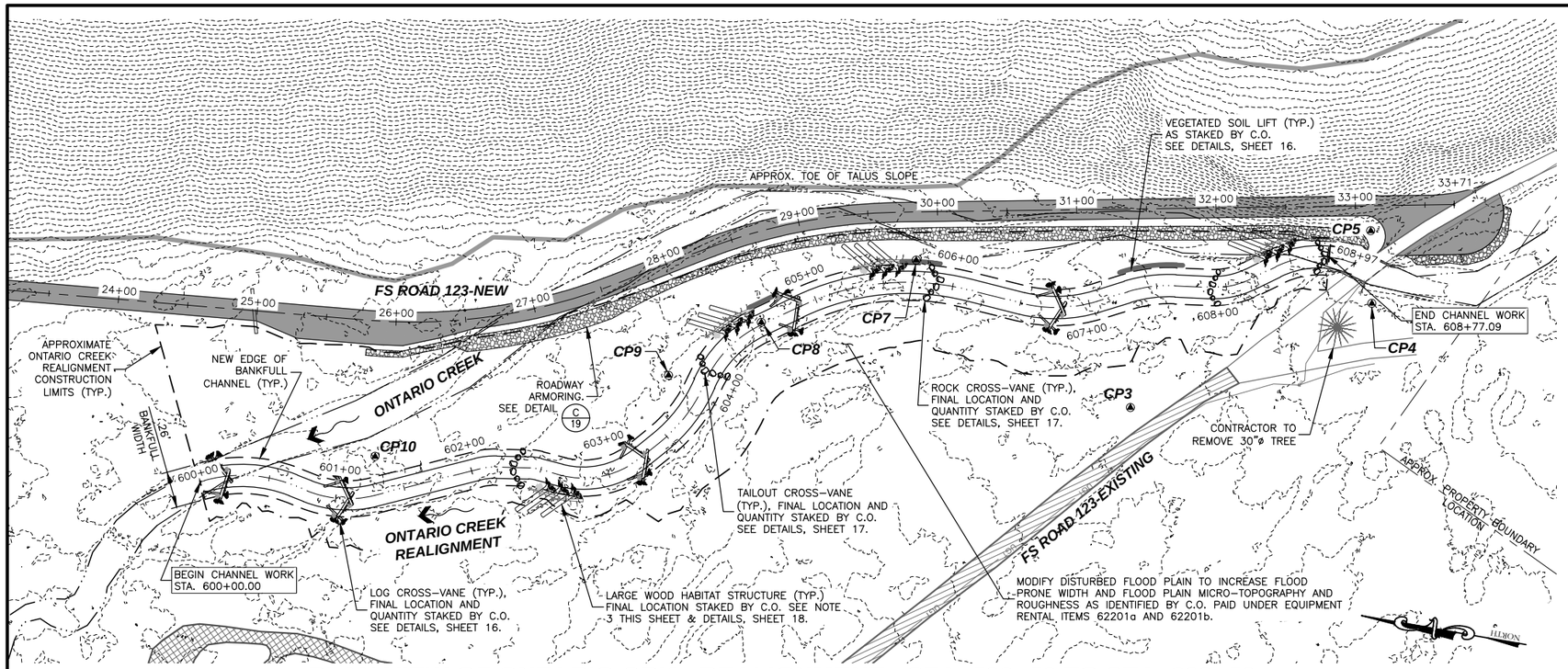
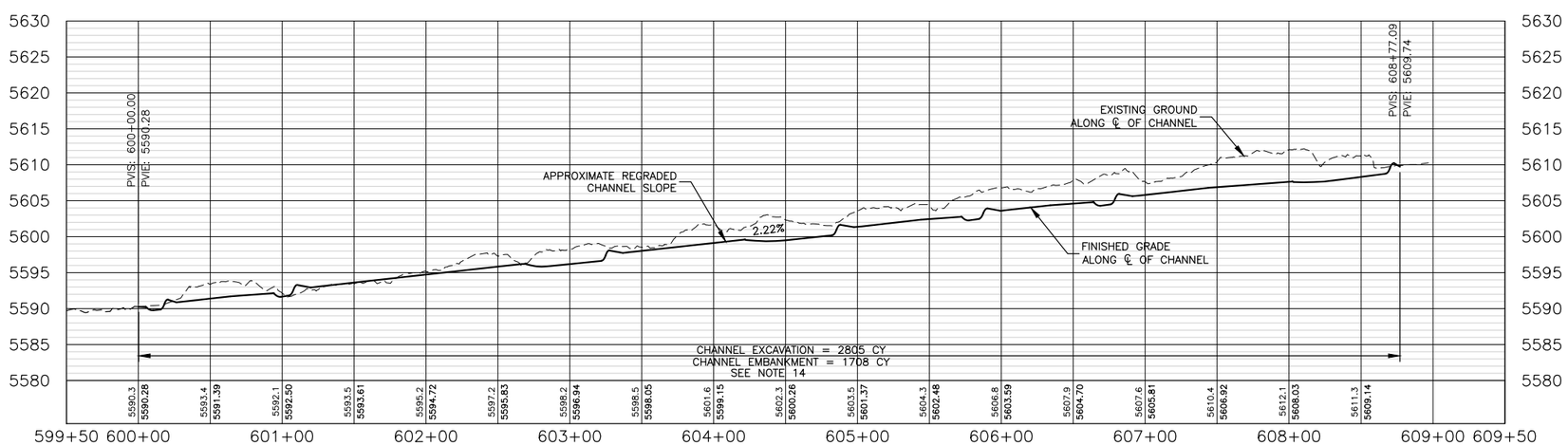


PLAN VIEW OF ONTARIO CRK - REALIGNMENT - STA. 599+50 TO STA. 609+50

0 50 100
SCALE IN FEET



PROFILE VIEW OF ONTARIO CRK - REALIGNMENT - STA. 599+50 TO STA. 609+50

HORIZONTAL SCALE: 1" = 100'
VERTICAL SCALE: 1" = 20'

NOTE:

1. UTILIZE NATIVE STREAMBED MATERIAL TO REGRADE AND SHAPE THE CHANNEL PER THE STREAM CROSS-SECTION SHEETS 29-33. THIS WORK IS INCIDENTAL TO ITEM 64808.
2. ALL CHANNEL CLEARING AND GRUBBING FOR CHANNEL WORK SHALL BE PAID FOR UNDER BID ITEM 64808.
3. LOG AND WOOD MATERIAL TO BE SALVAGED ON SITE. C.O. WILL DIRECT CONTRACTOR TO WHICH MATERIALS TO SALVAGE FOR LARGE WOOD HABITAT STRUCTURES. LOG STEP POOLS AND WOOD HABITAT STRUCTURES ARE PAID UNDER THE EQUIPMENT RENTAL ITEMS 62201a AND 62201b.
4. CONTRACTOR SHALL USE EXCESS SUITABLE MATERIAL FROM CHANNEL EXCAVATION FOR CHANNEL EMBANKMENT. ADDITIONAL CHANNEL EMBANKMENT MATERIAL SHALL COME FROM A BORROW SITE LOCATED ALONG THE NEW ROAD 123 ROADWAY CORRIDOR AS LOCATED BY THE C.O. THE MATERIAL SHALL BE APPROVED BY C.O. BEFORE PLACEMENT. EXCESS MATERIAL TO BE WASTED AT GOVERNMENT FURNISHED WASTE SITE.
5. DEWATER THE EXCAVATION IN ACCORDANCE WITH FP-03 SECTIONS 208, 209 AND 157 AND THESE NOTES.
6. DEWATERING IS THE RESPONSIBILITY OF THE CONTRACTOR AND CONTRACTOR SHALL SUBMIT A DEWATERING PLAN TO THE C.O. FOR APPROVAL ALONG WITH THE EXCAVATION PLAN. CONTRACTOR SHALL DEVELOP THEIR OWN PROJECT SPECIFIC DEWATERING PLANS AND SHALL INCLUDE DRAWINGS AND A WRITTEN OUTLINE ILLUSTRATING AND DESCRIBING PROPOSED LAYOUT, METHODS, EQUIPMENT, FISH PASSAGE CONSIDERATIONS AND ANTICIPATED STREAM FLOW VOLUMES. APPROVAL OF THE DEWATERING PLAN BY THE CONTRACTING OFFICER DOES NOT RELIEVE THE CONTRACTOR FROM COMPLETING THE WORK AS SPECIFIED. IF CONTRACTOR'S IDENTIFIED DEWATERING METHODS ARE NOT PRODUCING DESIRED RESULTS, CONTRACTOR SHALL RE-EVALUATE AND SUBMIT ANOTHER PLAN TO C.O. FOR APPROVAL. NO ADDITIONAL PAYMENT WILL BE MADE FOR THIS WORK. ALL WORK RELATING TO THE STREAM DIVERSION IS PAID UNDER ITEM 15713.
7. CONTRACTOR IS RESPONSIBLE FOR SIZING ALL PUMPS, DAMS, BYPASS PIPES, OPEN CHANNELS, ETC AND WILL NEED TO MAINTAIN PUMPING CAPACITY OF THE INFLOW DURING THE DURATION OF THE PROJECT. PUMPS TO BE PLACED IN LOCATION OR WITHIN SECONDARY CONTAINMENT TO PREVENT FUEL/OIL FROM SPILLING INTO STREAM. CONTRACTOR TO BE RESPONSIBLE FOR CLEANUP OF ANY FUEL/OIL SPILLAGE.
8. SOIL EROSION AND SEDIMENT CONTROL MEASURES SPECIFIC TO THE DEWATERING PLAN SHALL BE INCLUDED AND SHALL BE IN CONFORMANCE WITH PROJECT PERMITS.
9. INSTALL A MINIMUM OF 3 SEDIMATS (OR AS RECOMMENDED BY THE MANUFACTURER) DOWNSTREAM OF STREAM WORK PRIOR TO CONSTRUCTION. SEDIMATS ARE TO BE INSTALLED PER THE MANUFACTURE'S RECOMMENDATIONS. SEDIMATS ARE TO BE REMOVED BY CONTRACTOR. THIS WORK IS INCIDENTAL TO BID ITEM 15713.
10. CONTRACTOR SHALL GIVE AT LEAST 72 HOURS NOTICE BEFORE DEWATERING. DEWATERING SHALL TAKE PLACE FIRST THING IN THE MORNING AND NO IN-STREAM WORK OR WORK NEARBY SHALL TAKE PLACE FOR THE REST OF THE DAY.

    ONCE CHANNEL REHABILITATION IS COMPLETE, THE STREAMBED SHALL BE WASHED AND SEDIMENT-LADEN WATER WITHIN THE ISOLATION AREA SHOULD BE PUMPED TO THE FOREST FLOOR AND NOT ALLOWED TO RETURN TO THE STREAM. ONCE THE ISOLATED STREAMBED IS WASHED, WATER WILL BE SLOWLY RELEASED BACK INTO THE CHANNEL TO MINIMIZE SEDIMENT SUSPENSION.

    THE CONTRACTOR SHALL BE REQUIRED TO OBTAIN AN MPDES PERMIT FOR DISCHARGES ASSOCIATED WITH CONSTRUCTION DEWATERING FROM THE DEPARTMENT OF ENVIRONMENTAL QUALITY. THE FOREST WILL COMPLETE SEDIMENT MONITORING. THE CONTRACTOR SHALL STOP WORK IF THE FOLLOWING SEDIMENT LEVELS ARE EXCEEDED:
    - a. SUSPENDED SEDIMENT EXCEEDS THE FOLLOWING LEVELS AND DURATIONS AT A DISTANCE OF 100 FEET BELOW THE SITE BOUNDARY DURING THE REWATERING AND INSTREAM AND STREAMBANK ACTIVITIES IF:
        - i. ANY TIME SEDIMENT CONCENTRATIONS EXCEED 1,097 MG/L OVER BACKGROUND
        - ii. WHEN SEDIMENT CONCENTRATIONS EXCEED 885 MG/L OVER BACKGROUND FOR MORE THAN ONE HOUR CONTINUOUSLY.
        - iii. WHEN SEDIMENT CONCENTRATIONS EXCEED 345 MG/L OVER BACKGROUND FOR MORE THAN THREE HOURS CUMULATIVELY.
        - iv. WHEN SEDIMENT CONCENTRATIONS EXCEED 167 MG/L OVER BACKGROUND FOR OVER SEVEN HOURS CUMULATIVELY.
11. CLEARING LIMITS WILL VARY DEPENDING ON THE DIVERSION PLAN SUBMITTED BY THE CONTRACTOR. CONTRACTOR TO SUBMIT PROPOSED CLEARING LIMITS WITH DIVERSION PLAN.
12. LARGE BOULDER PLACEMENT LOCATIONS WITHIN RIFFLE AND RUN REACHES TO BE DETERMINED BY C.O. PAID UNDER EQUIPMENT RENTAL ITEMS.
13. CHANNEL POOL, RIFFLE AND STREAM FEATURES ARE SPECIFIED IN THE FEATURE LOCATION TABLE, AND DIMENSIONS ARE SPECIFIED IN THE BANKFULL CHANNEL DESIGN CRITERIA TABLE. SEE SHEET 15 FOR BOTH TABLES.
14. CHANNEL EXCAVATION & EMBANKMENT ARE FOR INFORMATION ONLY AND ARE BASED ON AVERAGE CHANNEL WIDTH (26.0') AND AVERAGE CHANNEL DEPTH (1.4'). SEE SHEET 15 FOR TYPICAL POOL AND RIFFLE SECTION DETAILS. THESES QUANTITIES SHALL BE VERIFIED BY THE CONTRACTOR.

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FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE
REGION ONE

ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

STREAM PLAN & PROFILE

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE	SHEET NO.
DESIGNED: JDM	DESIGN CHECKED: ----	△				9 OF 33
DRAWN: JDM	DRAWING CHECKED: KFY	△				

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ROADWAY CENTERLINE COORDINATE STAKING TABLE

DESCRIPTION	NORTHING	EASTING	ELEVATION
STA. 0+00.00 BEGIN ROAD WORK	820662.50	1233342.01	5554.12
STA. 0+50.00	820626.80	1233377.02	5555.47
STA. 1+00.00	820591.11	1233412.02	5556.82
STA. 1+50.00	820555.41	1233447.03	5558.17
STA. 1+72.69 PC	820539.21	1233462.92	5558.78
STA. 2+33.28 PT	820493.48	1233502.62	5560.42
STA. 3+00.00	820440.55	1233543.23	5562.22
STA. 3+50.00	820400.88	1233573.67	5563.57
STA. 4+00.00	820361.21	1233604.11	5564.98
STA. 4+50.00	820321.54	1233634.54	5566.90
STA. 5+00.00	820281.87	1233664.98	5569.41
STA. 5+50.00	820242.20	1233695.42	5572.52
STA. 6+30.00, BEGIN TAPER RT.	820178.73	1233744.11	5578.39
STA. 6+59.77 PC, END TAPER RT.	820155.11	1233762.24	5580.61
STA. 7+16.36 PT	820105.97	1233789.91	5584.82
STA. 7+60.00, BEGIN TAPER RT.	820065.31	1233805.76	5588.07
STA. 7+90.00, END TAPER RT.	820037.36	1233816.65	5590.31
STA. 8+38.57 PC	819992.10	1233834.28	5593.92
STA. 8+77.10 PT	819957.76	1233851.62	5596.79
STA. 9+30.00, BEGIN TAPER RT.	819913.06	1233879.91	5600.73
STA. 9+80.00, END TAPER RT.	819870.81	1233906.65	5604.46
STA. 9+92.45 PC	819860.29	1233913.30	5605.38
STA. 10+50.00	819807.01	1233934.11	5609.67
STA. 10+95.04 PT	819762.16	1233935.47	5613.02
STA. 11+20.00, BEGIN TAPER RT.	819737.38	1233932.49	5614.88
STA. 11+70.00, END TAPER RT.	819687.73	1233926.51	5618.61
STA. 12+55.56 PC	819602.79	1233916.28	5624.98
STA. 13+00.00	819558.51	1233912.61	5628.29
STA. 13+50.00	819508.52	1233912.41	5632.01
STA. 14+00.00	819458.70	1233916.36	5635.74
STA. 14+50.00	819409.37	1233924.45	5639.44
STA. 14+92.98 PT	819367.63	1233934.67	5642.05
STA. 15+50.00	819312.77	1233950.20	5644.30
STA. 16+25.00, BEGIN TAPER RT.	819240.60	1233970.63	5645.17
STA. 16+55.00, END TAPER RT.	819211.74	1233978.81	5644.85
STA. 17+30.00, BEGIN TAPER RT.	819139.57	1233999.24	5642.73
STA. 17+60.00, END TAPER RT.	819110.71	1234007.41	5641.79
STA. 18+20.00, BEGIN TAPER RT. & LT.	819052.98	1234023.75	5639.68
STA. 18+70.00, END TAPER RT. & LT.	819004.87	1234037.37	5637.37
STA. 18+72.62 PC	819002.35	1234038.09	5637.23
STA. 19+25.00	818954.38	1234058.75	5634.21
STA. 19+84.35 PT	818908.63	1234096.22	5630.11
STA. 20+59.05 PC	818858.47	1234151.57	5624.61
STA. 21+00.00	818828.61	1234179.53	5621.60
STA. 21+50.00	818786.61	1234206.50	5617.93
STA. 22+00.00	818740.08	1234224.58	5614.25
STA. 22+44.94 PT, BEGIN TAPER RT. & LT.	818695.93	1234232.65	5610.95
STA. 22+95.00, END TAPER RT. & LT.	818646.08	1234237.20	5607.27
STA. 23+50.00	818591.31	1234242.20	5603.70
STA. 24+00.00	818541.51	1234246.74	5601.47
STA. 24+50.00	818491.72	1234251.28	5600.20

ROADWAY CENTERLINE COORDINATE STAKING TABLE (cont.)

DESCRIPTION	NORTHING	EASTING	ELEVATION
STA. 25+00.00, BEGIN TAPER RT.	818441.93	1234255.82	5599.91
STA. 25+30.00, END TAPER RT.	818412.05	1234258.55	5600.20
STA. 25+78.98 PC	818363.27	1234263.00	5601.27
STA. 26+05.00, BEGIN TAPER RT.	818337.46	1234266.20	5601.88
STA. 26+55.00, END TAPER RT.	818288.68	1234277.03	5603.05
STA. 27+00.00	818246.24	1234291.92	5604.11
STA. 27+61.32 PT	818191.62	1234319.67	5605.55
STA. 28+27.57 PC	818135.03	1234354.12	5607.10
STA. 29+00.00	818070.10	1234385.98	5608.80
STA. 29+70.97 PT	818001.93	1234405.37	5610.48
STA. 30+50.00	817924.29	1234420.16	5612.57
STA. 31+00.00	817875.18	1234429.52	5614.07
STA. 31+50.00	817826.06	1234438.88	5615.64
STA. 32+00.00	817776.94	1234448.24	5617.21
STA. 32+50.00	817727.83	1234457.60	5618.78
STA. 33+00.00	817678.71	1234466.96	5619.59
STA. 33+50.00	817629.60	1234476.32	5619.61
STA. 33+71.01 END ROAD WORK	817608.96	1234480.25	5619.61

DRAIN-DIP CENTERLINE COORDINATE STAKING TABLE**

DESCRIPTION	NORTHING	EASTING	ELEVATION
STA. 4+65.00, BEGIN DRAIN-DIP 1	820309.64	1233643.67	5567.59
STA. 5+15.00, TROUGH	820269.97	1233674.11	5569.18
STA. 5+90.00, END DRAIN-DIP 1	820210.47	1233719.76	5575.41
STA. 7+90.00, BEGIN DRAIN-DIP 2	820037.36	1233816.65	5590.31
STA. 8+40.00, TROUGH	819990.77	1233834.80	5592.93
STA. 9+15.00, END DRAIN-DIP 2	819925.73	1233871.89	5599.62
STA. 10+30.00, BEGIN DRAIN-DIP 3	819826.38	1233929.22	5608.18
STA. 10+80.00, TROUGH	819777.15	1233936.52	5610.80
STA. 11+55.00, END DRAIN-DIP 3	819702.63	1233928.30	5617.49
STA. 20+50.00, BEGIN DRAIN-DIP 4	818864.55	1234144.87	5625.28
STA. 21+25.00, TROUGH	818808.28	1234194.07	5618.67
STA. 21+75.00, END DRAIN-DIP 4	818763.80	1234216.70	5616.09

***** SEE DRAIN-DIP DETAIL (B) ON SHEET 19***

STREAM CENTERLINE COORDINATE STAKING TABLE***

DESCRIPTION	NORTHING	EASTING	ELEVATION
STA. 600+00.00, BEGIN CHANNEL WORK	818460.85	1234127.90	5590.28
STA. 600+25.00	818437.43	1234136.48	5590.83
STA. 600+50.00	818412.63	1234139.06	5591.39
STA. 600+75.00	818387.91	1234135.64	5591.94
STA. 601+00.00	818363.11	1234133.33	5592.50
STA. 601+25.00	818338.84	1234138.84	5593.05
STA. 601+50.00	818316.01	1234149.03	5593.61
STA. 601+75.00	818293.20	1234159.26	5594.16
STA. 602+00.00	818270.39	1234169.50	5594.72
STA. 602+25.00	818246.48	1234176.27	5595.27
STA. 602+50.00	818221.69	1234178.84	5595.83
STA. 602+75.00	818196.75	1234177.56	5596.38
STA. 603+00.00	818172.80	1234184.15	5596.94
STA. 603+25.00	818153.06	1234199.25	5597.49
STA. 603+50.00	818136.70	1234218.14	5598.05
STA. 603+75.00	818123.71	1234239.44	5598.60
STA. 604+00.00	818115.77	1234263.10	5599.15
STA. 604+25.00	818105.60	1234285.83	5599.71
STA. 604+50.00	818089.15	1234304.53	5600.26
STA. 604+75.00	818069.01	1234319.33	5600.82
STA. 605+00.00	818048.43	1234333.51	5601.37
STA. 605+25.00	818026.25	1234345.00	5601.93
STA. 605+50.00	818002.69	1234353.32	5602.48
STA. 605+75.00	817978.21	1234358.29	5603.04
STA. 606+00.00	817953.28	1234359.83	5603.59
STA. 606+25.00	817928.33	1234358.40	5604.15
STA. 606+50.00	817903.39	1234356.61	5604.70
STA. 606+75.00	817878.48	1234357.63	5605.26
STA. 607+00.00	817854.59	1234364.78	5605.81
STA. 607+25.00	817832.27	1234376.05	5606.37
STA. 607+50.00	817809.15	1234385.41	5606.92
STA. 607+75.00	817784.51	1234389.47	5607.47
STA. 608+00.00	817759.92	1234393.72	5608.03
STA. 608+25.00	817738.27	1234405.95	5608.58
STA. 608+25.00	817717.56	1234419.89	5609.14
STA. 608+50.00	817717.56	1234419.89	5609.14
STA. 608+77.09 END CHANNEL WORK	817691.64	1234427.19	5609.74

****** ELEVATIONS BASED ON AVERAGE CHANNEL DEPTH OF 1.4'. REFER TO TYPICAL CHANNEL SECTIONS SHOWN ON SHEET 15.***

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FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE
REGION ONE

ONTARIO CREEK ROAD RELOCATION
ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

CENTERLINE STAKING TABLES

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE
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SHEET NO. 10 OF 33

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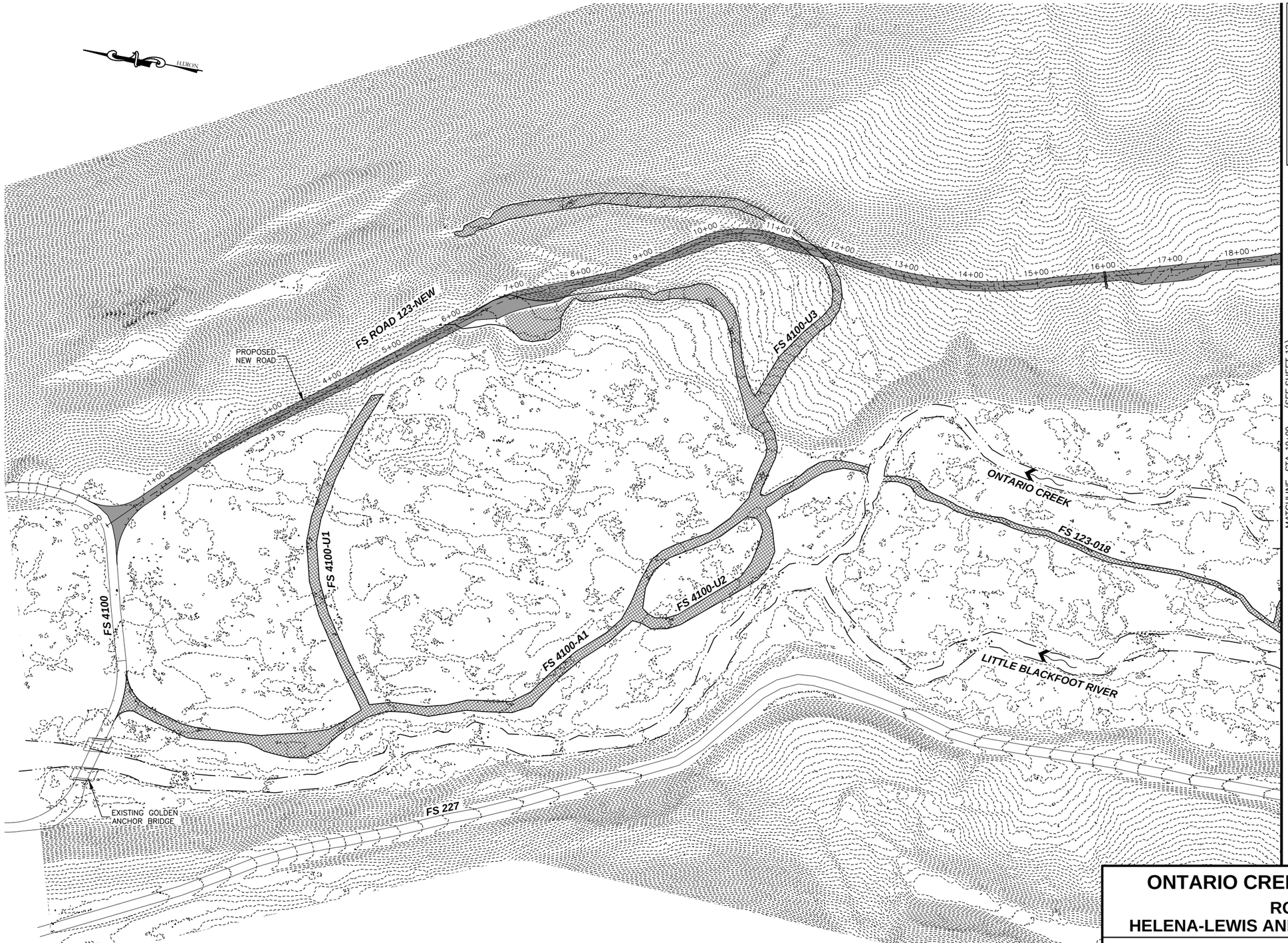

LEGEND

- NEW ROADWAY
- ROADWAY OBLITERATION - METHOD SCARIFY
- ROADWAY OBLITERATION - METHOD 1

ROADWAY OBLITERATION - PLAN

0 75 150
SCALE IN FEET

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FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE
REGION ONE

ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

ROADWAY OBLITERATION - SITE PLAN

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE	SHEET NO.
DESIGNED: JDM	DESIGN CHECKED: ----	△				11 OF 33
DRAWN: JDM	DRAWING CHECKED: KFY	△				

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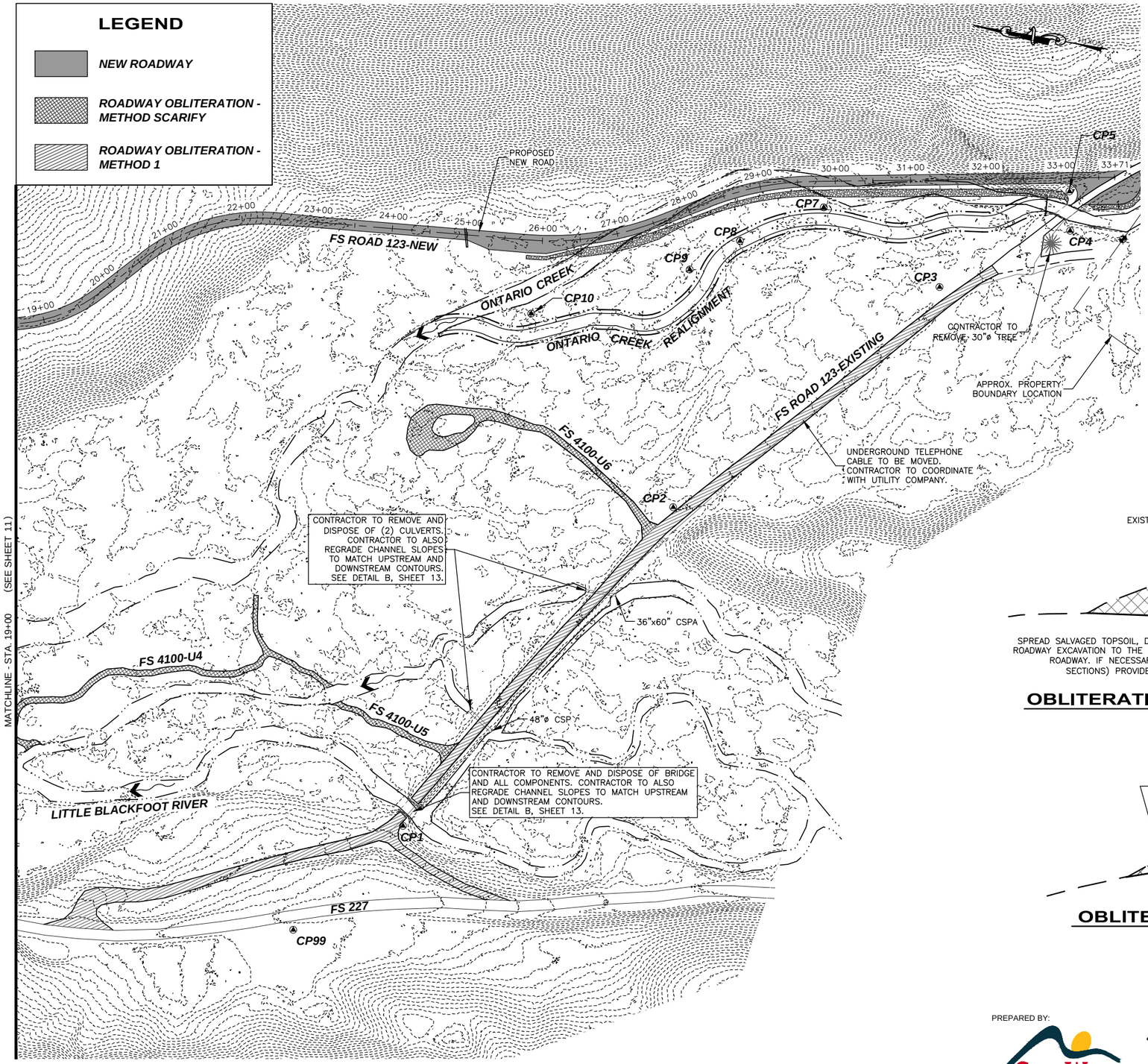
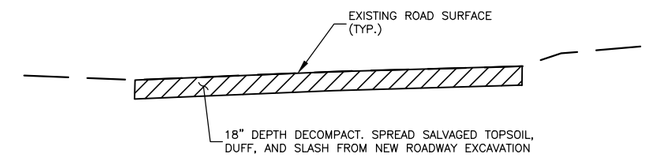


ROADWAY OBLITERATION - PLAN

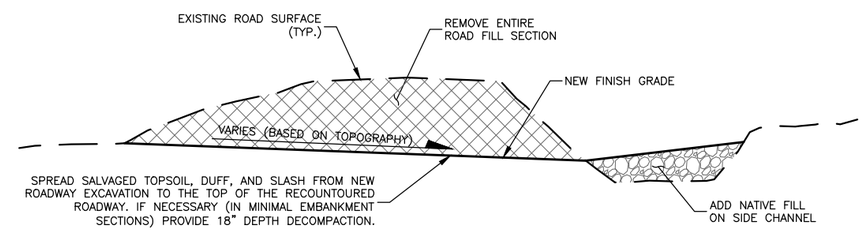
0 75 150
SCALE IN FEET

NOTES:

1. ANTICIPATED OBLITERATION REMOVAL QUANTITY OF EXISTING ROAD NO. 123 IS 1883 CY (AGGREGATE SURFACING AND SUBGRADE MATERIAL BELOW THE AGGREGATE SURFACING). ALL EXCAVATED MATERIAL SHALL BE STOCKPILED AT THE WASTE SITE SHOWN ON SHEET 3. ALL WORK TO COMPLETE THIS IS PAID UNDER THE ROADWAY OBLITERATION BID ITEM.
2. CLUMP PLANTINGS SHALL OCCUR THROUGHOUT THE OBLITERATED ROADWAY AT 12 CLUMP PLANTS PER 100 LINEAR FEET OF ROADWAY. CLUMP PLANTINGS SHALL ALSO OCCUR ON CHANNEL DRAINAGE SIDE SLOPES (PER DIRECTION OF C.O) CLUMP PLANTINGS ON SLOPES IS PAID UNDER ITEM 62201a.
3. PLACE SLASH ON RECONTOURED SLOPE. COVERAGE SHALL BE BETWEEN 40% AND 60%.

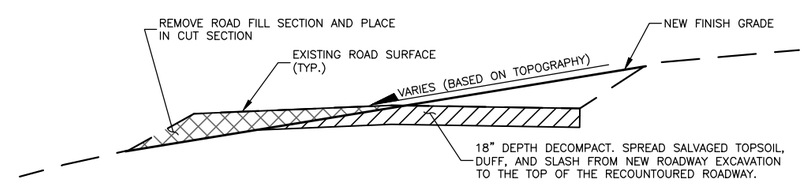


OBLITERATION DETAIL, SCARIFY



OBLITERATION DETAIL, METHOD 1 - EMBANKMENT SECTION

FULL RECONTOUR



OBLITERATION DETAIL, METHOD 1 - CUT SECTION

FULL RECONTOUR

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FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE
REGION ONE

ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

ROADWAY OBLITERATION - SITE PLAN

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE
DESIGNED: JDM	DESIGN CHECKED: ----	△			
DRAWN: JDM	DRAWING CHECKED: KFY	△			

SHEET NO. 12 OF 33

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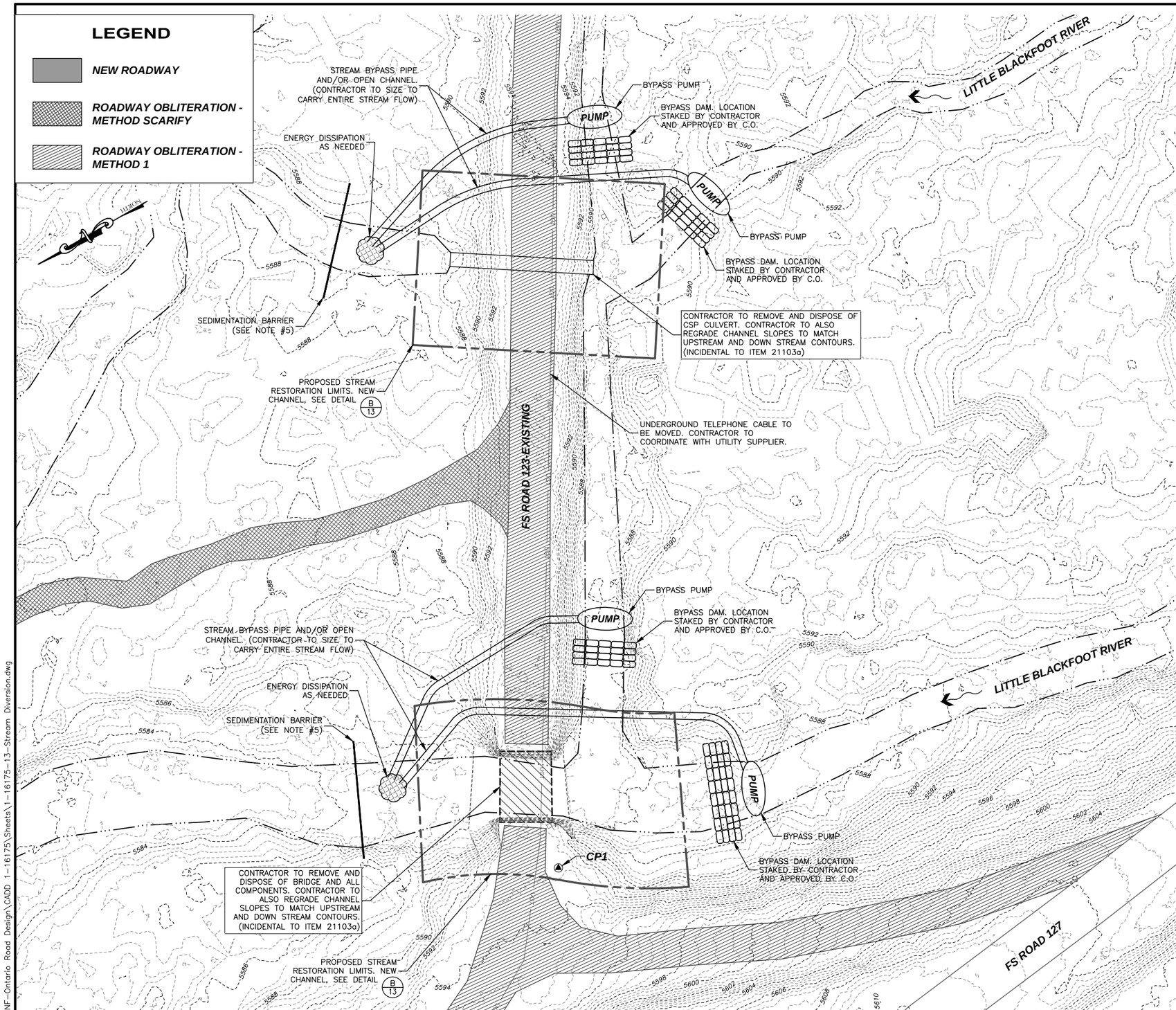
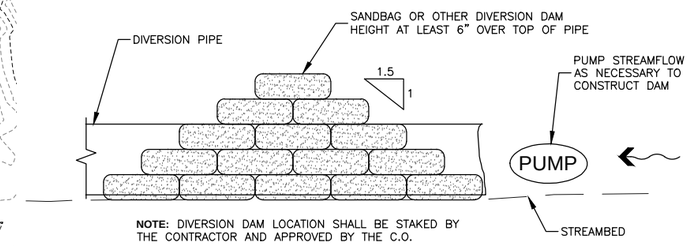


STREAM DIVERSION PLAN AT BRIDGE AND FIRST CULVERT

0 15 30
SCALE IN FEET

NOTES:

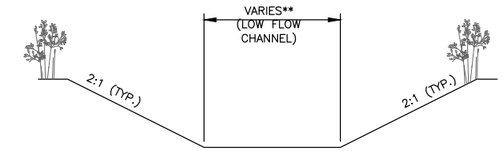
1. DE–WATER THE EXCAVATIONS IN ACCORDANCE WITH FP–03 SECTIONS 157, 208, 209 AND THE REQUIREMENTS ON THIS SHEET.
2. DE–WATERING IS THE RESPONSIBILITY OF THE CONTRACTOR AND CONTRACTOR SHALL SUBMIT A DE–WATERING PLAN TO THE C.O. FOR APPROVAL ALONG WITH THE EXCAVATION PLAN. THIS SHEET ILLUSTRATES GENERIC DE–WATERING REQUIREMENTS AND POSSIBLE METHODS AND EQUIPMENT. CONTRACTOR SHALL DEVELOP THEIR OWN PROJECT SPECIFIC DE–WATERING PLANS AND SHALL INCLUDE DRAWINGS AND A WRITTEN OUTLINE ILLUSTRATING AND DESCRIBING PROPOSED LAYOUT, METHODS, EQUIPMENT, AND ANTICIPATED STREAM FLOW VOLUMES. APPROVAL OF THE DE–WATERING PLAN BY THE C.O. DOES NOT RELIEVE THE CONTRACTOR FROM COMPLETING THE WORK AS SPECIFIED. IF CONTRACTOR'S IDENTIFIED DE–WATERING METHODS ARE NOT PRODUCING DESIRED RESULTS, CONTRACTOR SHALL RE–EVALUATE AND SUBMIT ANOTHER PLAN TO C.O. FOR APPROVAL. NO ADDITIONAL PAYMENT WILL BE MADE FOR THIS WORK. ALL WORK RELATING TO THE STREAM DIVERSION IS PAID UNDER ITEM 21103a.
3. CONTRACTOR IS RESPONSIBLE FOR SIZING ALL PUMPS, DAMS, BYPASS PIPES, OPEN CHANNELS, ETC.
4. SOIL EROSION AND SEDIMENT CONTROL MEASURES SPECIFIC TO THE DE–WATERING PLAN SHALL BE INCLUDED AND SHALL BE IN CONFORMANCE WITH PROJECT PERMITS.
5. INSTALL SEDIMENTATION BARRIER DOWNSTREAM OF WORK. THE BARRIER MAY CONSIST OF EITHER ONE OR A COMBINATION OF THE FOLLOWING: STRAW BALES OR SILT FENCE. INSTALL BARRIER PRIOR TO COMMENCEMENT OF WORK. THE LOCATION OF THE BARRIER WILL BE LOCATED BY THE CONTRACTOR AND APPROVED BY THE C.O. THIS WORK IS INCIDENTAL ITEM 21103a.
6. CLEARING LIMITS WILL VARY DEPENDING ON THE DIVERSION PLAN SUBMITTED BY THE CONTRACTOR. CONTRACTOR TO SUBMIT PROPOSED CLEARING LIMITS WITH DIVERSION PLAN.



NOTE: DIVERSION DAM LOCATION SHALL BE STAKED BY THE CONTRACTOR AND APPROVED BY THE C.O.

A/13 DIVERSION DAM DETAIL

NOT TO SCALE



**BRIDGE – LOW FLOW WIDTH (16'–0")
**FIRST CULVERT – LOW FLOW WIDTH (8'–0")
**SECOND CULVERT – LOW FLOW WIDTH (14'–0")

B/13 NEW CHANNEL DRAINAGE DETAIL

NOT TO SCALE

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ONTARIO CREEK ROAD RELOCATION
ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

STREAM DIVERSION PLAN

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE	SHEET NO.
DESIGNED: JDM	DESIGN CHECKED: ----	△				13 OF 33
DRAWN: JDM	DRAWING CHECKED: KFY	△				

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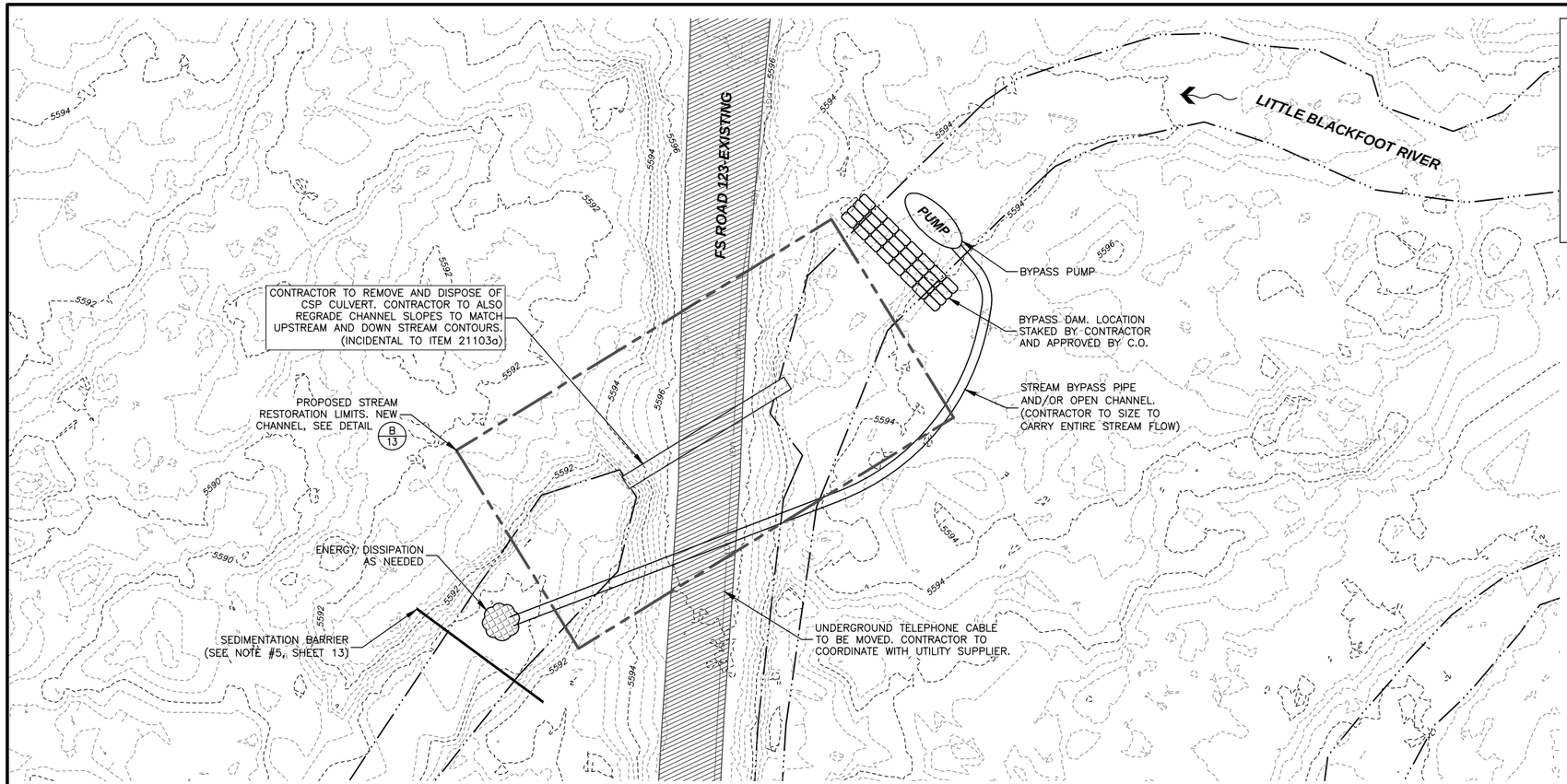

LEGEND

- NEW ROADWAY
- ROADWAY OBLITERATION - METHOD SCARIFY
- ROADWAY OBLITERATION - METHOD 1

STREAM DIVERSION PLAN AT SECOND CULVERT

0 15 30
SCALE IN FEET

PREPARED BY:

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FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE
REGION ONE

ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

STREAM DIVERSION PLAN

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE
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DRAWN: JDM	DRAWING CHECKED: KFY	△			

SHEET NO. 14 OF 33

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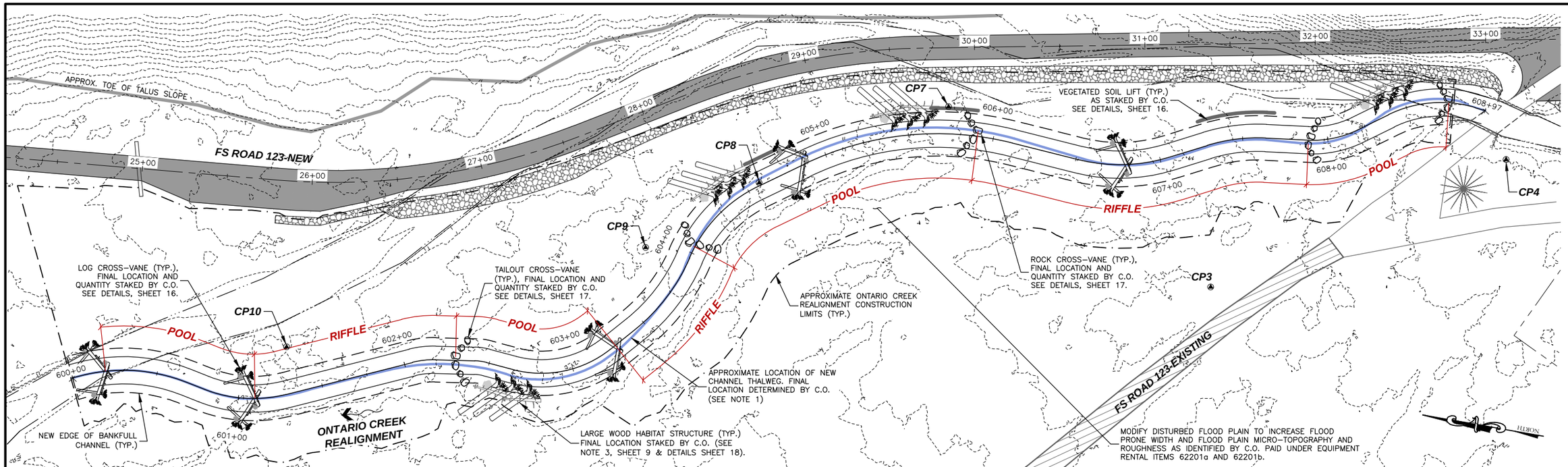
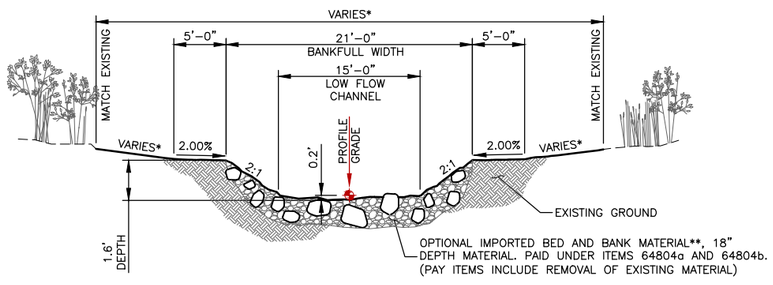


PLAN VIEW OF ONTARIO CRK - REALIGNMENT - STA. 600+00 TO STA. 608+97

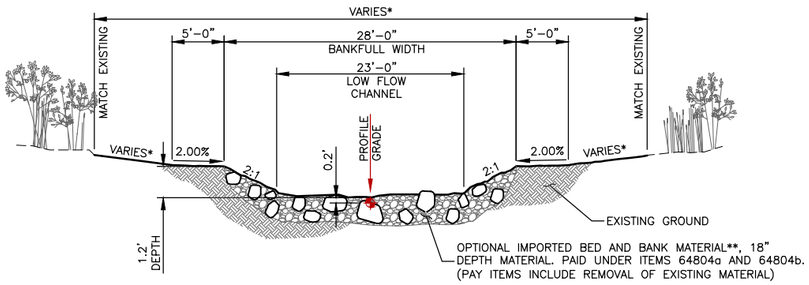
0 30 60
SCALE IN FEET



* SEE CHANNEL CROSS-SECTIONS, SHEETS 29 – 33
** REFER TO FSSS 705 FOR STREAMBED & STREAMBANK MATERIAL REQUIREMENTS

TYPICAL POOL SECTION

NOT TO SCALE



* SEE CHANNEL CROSS-SECTIONS, SHEETS 29 – 33
** REFER TO FSSS 705 FOR STREAMBED & STREAMBANK MATERIAL REQUIREMENTS

TYPICAL RIFFLE SECTION

NOT TO SCALE

FEATURE LOCATIONS

START STATION	END STATION	
600+20	601+10	POOL
601+10	602+30	RIFFLE
602+30	603+29	POOL
603+29	604+04	RIFFLE
604+04	605+91	POOL
605+91	607+89	RIFFLE
607+89	608+75	POOL

NOTE:

1. THE CHANNEL THALWEG SHOWN REPRESENTS THE APPROXIMATE LOW POINT OR INVERT KEY FOR THE LOG & ROCK CROSS-VANE STRUCTURES. LOG & ROCK CROSS-VANE STRUCTURE SHAPE WILL VARY AS NEEDED TO MATCH THE CHANNEL THALWEG.

STRUCTURE SCHEDULE

STATION	BANK	
600+20	CENTER	LOG CROSS-VANE
601+10	CENTER	LOG CROSS-VANE
602+30	CENTER	TAILOUT CROSS-VANE
602+65	RIGHT	LARGE WOOD HABITAT
603+29	CENTER	LOG CROSS-VANE
604+05	CENTER	TAILOUT CROSS-VANE
604+44	LEFT	LARGE WOOD HABITAT
604+55 - 604+73	LEFT	VEG. SOIL LIFT
604+88	CENTER	LOG CROSS-VANE
605+50	LEFT	LARGE WOOD HABITAT
605+63 - 605+91	LEFT	VEG. SOIL LIFT
605+90	CENTER	ROCK CROSS-VANE
606+80	CENTER	LOG CROSS-VANE
607+27 - 607+73	LEFT	VEG. SOIL LIFT
607+88	CENTER	TAILOUT CROSS-VANE
608+40	LEFT	LARGE WOOD HABITAT
608+76	CENTER	ROCK CROSS-VANE

BANKFULL CHANNEL DESIGN CRITERIA

STREAM TYPE	C4b
DISCHARGE	96 CFS
VALLEY SLOPE	0.031 FT/FT
SINUOSITY	1.07
CHANNEL SLOPE	0.022 FT/FT
POOL	
LENGTH	55.5 FT
WIDTH	21 FT
MEAN DEPTH	0.82 FT
MAX. DEPTH	1.6 FT
CROSS-SECTION AREA	17.2 SQ FT
RIFFLE	
LENGTH	215.5 FT
WIDTH	28 FT
MEAN DEPTH	0.61 FT
MAX. DEPTH	1.2 FT
CROSS-SECTION AREA	17.1 SQ FT

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ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

STREAM FEATURE LOCATION

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE
DESIGNED: JDM	DESIGN CHECKED: ----	△			
DRAWN: JDM	DRAWING CHECKED: KFY	△			

SHEET NO. 15 OF 33

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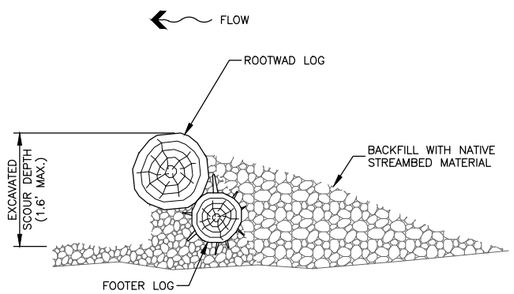
LOG CROSS-VANE - MATERIAL SCHEDULE (PER STRUCTURE)

ITEM	QUANTITY	DIAMETER (IN)	LENGTH (FT)	ROOTWAD (Y/N)	LIMBS (Y/N)
ROOTWAD LOG	4	12"-18"	20'-30'	YES	NO
FOOTER LOG	2	6"-12"	12'-20'	OPTIONAL	YES
BALLAST BOULDER	3 (MIN.)	36" (MIN.)			

VEGETATED SOIL LIFT - MATERIAL SCHEDULE (PER 10 FT SECTION)

ITEM	QUANTITY	DIAMETER (IN)	LENGTH (FT)	ROOTWAD (Y/N)	LIMBS (Y/N)
12" COIR LOG* (OPTIONAL)	1	12"	10'		
COIR MAT	1	N/A	10' x ROLL		
WOODEN STAKE	SPACE AT 1' O.C.	2"	1.5'		
WILLOW CUTTINGS	5	0.25"	6' - 8'		YES
CONIFER FASCINES	1	6"-MINUS	8' - 10'	OPTIONAL	YES

**** COIR LOG INSTALLATION IS OPTIONAL AT THE DIRECTION OF THE C.O.***

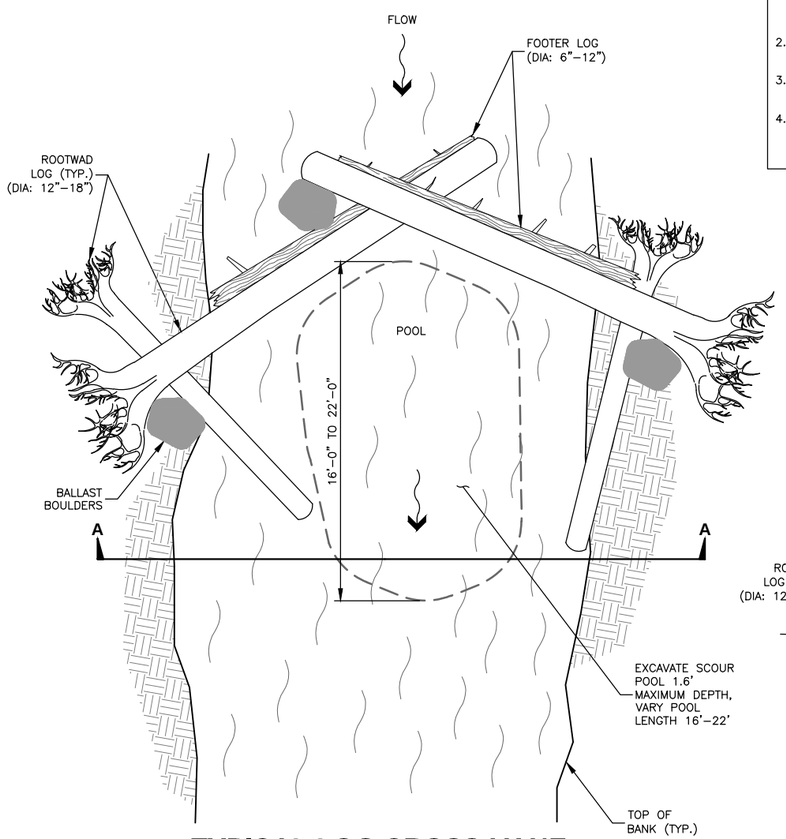


LOG CROSS-VANE DETAIL

NOT TO SCALE

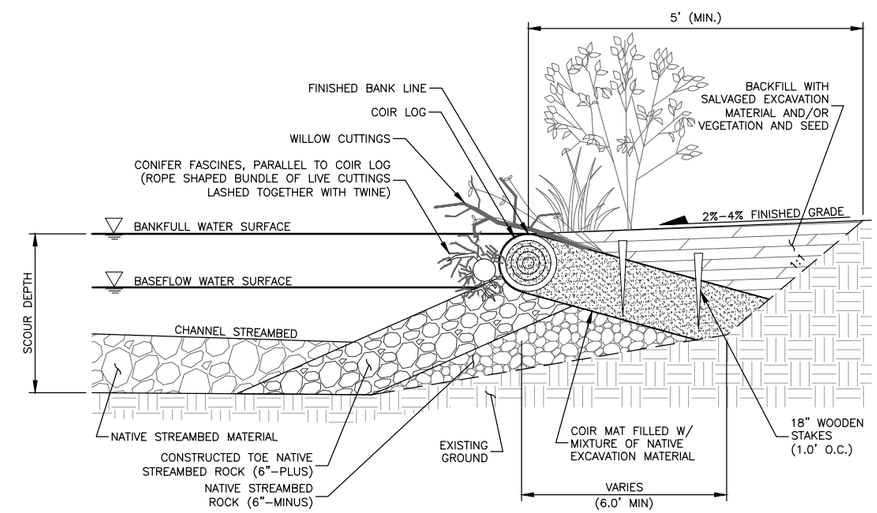
NOTES:

1. TYPICAL SECTION DRAWINGS ARE PROVIDED TO INDICATE THE GENERAL SHAPE AND ORIENTATION OF THE CROSS-SECTIONAL CHANNEL FEATURES. THE DIMENSIONS MAY BE VARIED +/- 10% AT THE DISCRETION OF THE C.O.
2. SPECIFIC LOCATION OF CHANNEL FEATURES MAY BE ADJUSTED DURING CONSTRUCTION BASED ON SITE CONDITIONS AND AT THE DISCRETION OF THE C.O.
3. LOG CROSS-VANE IS PAID FOR UNDER THE EQUIPMENT RENTAL ITEM 62201a & 62201b AND GENERAL LABOR ITEM 62301.
4. VEGETATED SOIL LIFT (PAID FOR UNDER ITEM 64809) INCLUDES SUPPLY & INSTALLATION OF COIR LOG, COIR MAT, STAKES, PLACEMENT OF NATIVE MATERIALS, AND INSTALLATION OF WILLOW CUTTINGS & CONIFER FASCINES. REFER TO FSSS 648A.



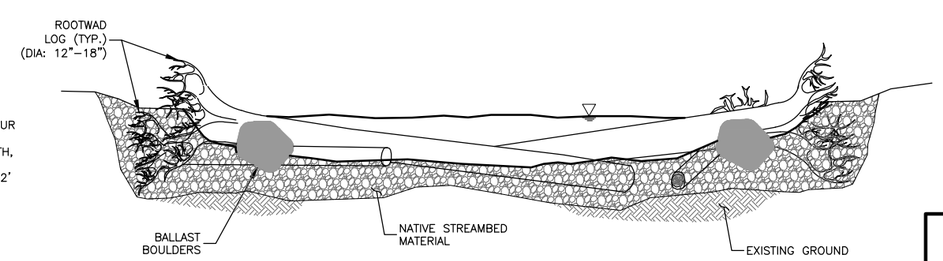
TYPICAL LOG CROSS-VANE

NOT TO SCALE



VEGETATED SOIL LIFT

NOT TO SCALE



LOG CROSS-VANE: VIEW A-A

NOT TO SCALE

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FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE
REGION ONE

ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

LOG CROSS-VANE & SOIL LIFT DETAILS

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE
DESIGNED: JDM	DESIGN CHECKED: ----	△			
DRAWN: JDM	DRAWING CHECKED: KFY	△			

SHEET NO. 16 OF 33

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CONSTRUCTION NOTES:

1. MINIMIZE GAPS BETWEEN FOOTER ROCKS. BACKFILL EACH POOL FILLING ALL GAPS & VOIDS OF EACH STRUCTURE WITH NATIVE GRAVELS & COBBLE TO MINIMIZE PIPING OF WATER THROUGH EACH STRUCTURE.
2. EXCAVATE POOL ACCORDING TO SPECIFIED DIMENSIONS.
3. PLACE SILL ROCKS SLIGHTLY UPSTREAM OF FOOTER ROCKS. MINIMIZE GAPS IN SILL ROCKS IN THE OUTER ⅓ CHANNEL WIDTHS. SILL ROCKS IN THE MIDDLE ⅓ OF THE CHANNEL SHALL HAVE A GAP EQUAL TO ¼ OF THE ROCK DIAMETER.
4. THE SHAPE AND SPACING OF THE CROSS–VANE STRUCTURES SHOWN IS CONCEPTUAL AND MAY BE MODIFIED IN THE FIELD BY THE C.O. TO BEST FIT THE CHANNEL AND OTHER SITE CONDITIONS.
5. CONTRACTOR MAY USE SUITABLE ON–SITE MATERIAL FOR CROSS–VANE STRUCTURES. THE MATERIAL SHALL BE APPROVED BY THE C.O. BEFORE PLACEMENT.
6. CONTRACTOR SHALL SHAPE CHANNEL BETWEEN CROSS–VANES UTILIZING NATIVE STREAMBED MATERIAL.
7. ROCK SHALL BE EQUIPMENT PLACED SO THAT LARGER ROCKS ARE UNIFORMLY DISTRIBUTED AND IN CONTACT WITH ONE ANOTHER WITH SMALLER ROCKS FILLING IN VOIDS. NO END DUMPING OF WILL BE ALLOWED.

GENERAL NOTE:

1. ROCK CROSS–VANE STRUCTURE IS PAID FOR UNDER THE EQUIPMENT RENTAL ITEMS 62201a & 62201b AND GENERAL LABOR ITEM 62301.

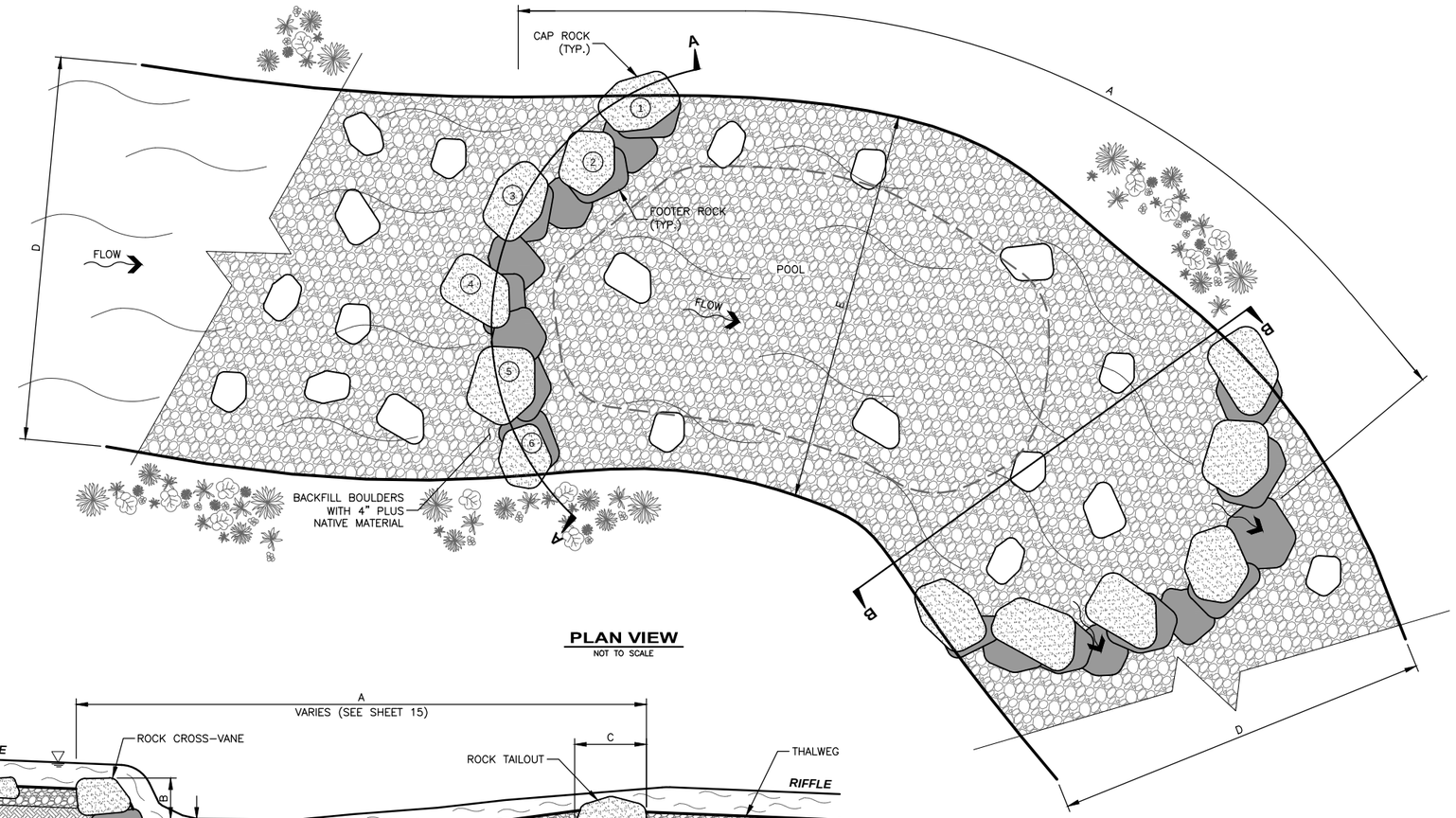
STRUCTURE DIMENSIONS

A = POOL LENGTH	50 - 60 FT
B = STEP HEIGHT	0.8 - 0.95 FT
C = ROCK DIAMETER	3 FT
D = RIFFLE WIDTH	28 FT
E = POOL WIDTH	21 FT
G = BANKFULL DEPTH	1.4 FT
H = BOULDER PROTRUSION	0.5 FT
J = FOOTER DEPTH	3 - 4 FT
K = POOL SPACING	90 - 100 FT
L = POOL DEPTH	1.6 FT

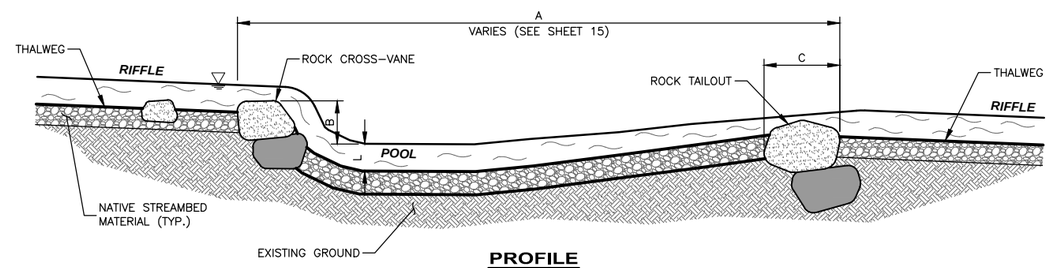
MATERIAL SCHEDULE (PER STRUCTURE)

ITEM	QUANTITY	DIAMETER (IN)
CAP ROCK	12 - 18	30 - 36
FOOTER ROCK	12 - 18	30 - 36
RIFFLE ROCK	1 CY	6-PLUS
FILL ROCK	1 CY	6-MINUS

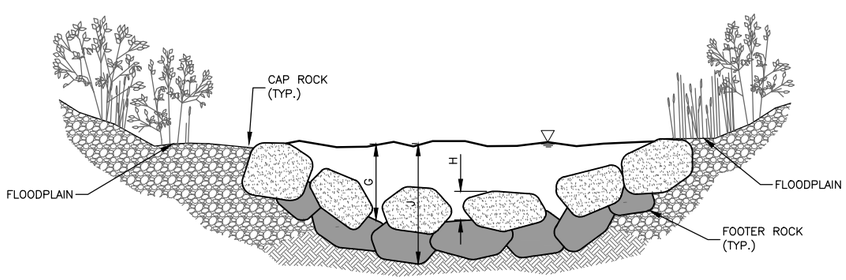
ROCK NO.	CAP ROCK ELEVATION
1	BANKFULL + 0.5'
2	BANKFULL - 0.5'
3	BANKFULL - 1.0'
4	BANKFULL - 1.0'
5	BANKFULL - 0.5'
6	BANKFULL + 0.5'



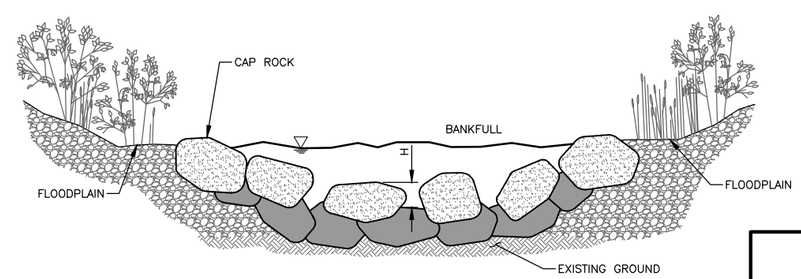
PLAN VIEW
NOT TO SCALE



PROFILE
NOT TO SCALE



CROSS-VANE STRUCTURE: A-A
NOT TO SCALE



TAILOUT STRUCTURE: B-B
NOT TO SCALE

ROCK CROSS-VANE & TAILOUT STRUCTURE DETAILS

NOT TO SCALE

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ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

ROCK CROSS-VANE DETAIL

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE
DESIGNED: JDM	DESIGN CHECKED: ----	△			
DRAWN: JDM	DRAWING CHECKED: KFY	△			

SHEET NO. 17 OF 33

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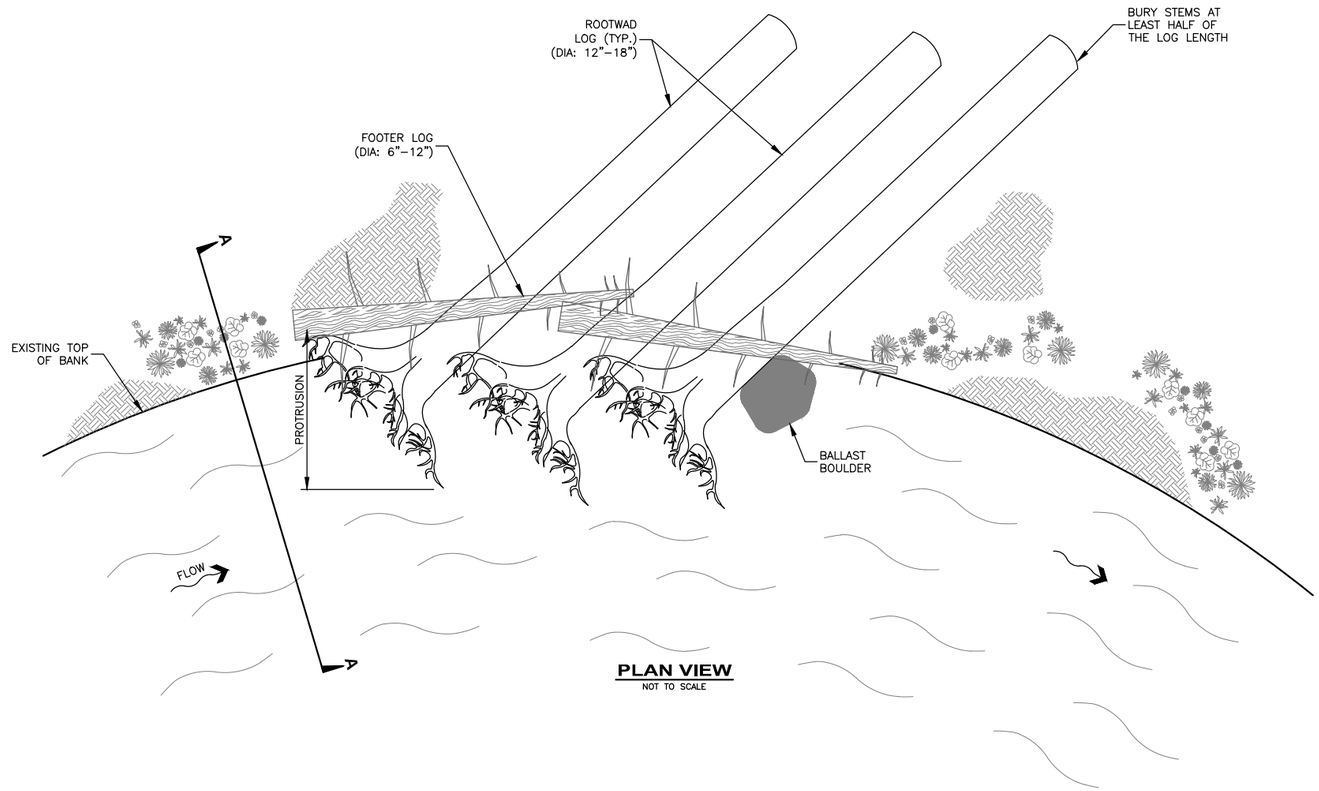


PLAN VIEW
NOT TO SCALE

MATERIAL SCHEDULE (PER STRUCTURE)

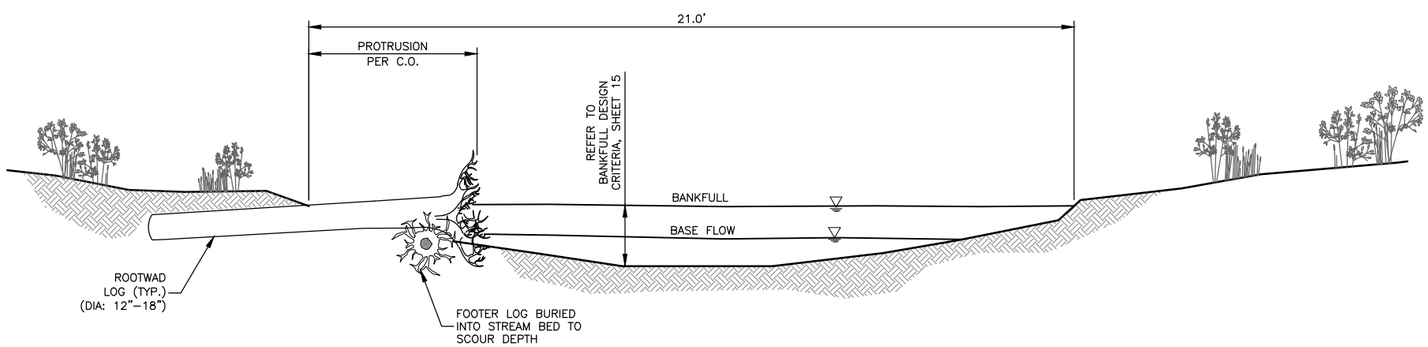
ITEM	QUANTITY	DIAMETER (IN)	LENGTH (FT)	ROOTWAD (Y/N)	LIMBS (Y/N)
FOOTER LOG	2	6 - 12	10 - 12	OPTIONAL	YES
ROOTWAD LOG	3	12 - 18	18 - 20	YES	NO
BALLAST BOULDER	1	18 - 24			

CONSTRUCTION NOTES:

1. EXCAVATE AN AREA ON THE STREAMBED TO PLACE BOTTOM LOGS. PLACE BOULDER AND LOGS IN A CONFIGURATION THAT WILL ENSURE STABILITY OF HABITAT. AT A MINIMUM, EACH LOG SHALL BE PINNED BY ANOTHER FOOTER LOG. EACH LOG SHOULD BE SECURED BY BURYING AT MINIMUM HALF OF ITS LENGTH. THE BOULDER SHOULD BE BURIED AND NOT READILY VISIBLE AFTER COMPLETION OF THE WOOD HABITAT STRUCTURE. WOOD HABITAT STRUCTURE SHALL BE BACKFILLED WITH NATIVE STREAMBED MATERIAL.
2. PLACE ADDITIONAL TREE TOPS AND STEMS IN AND AROUND THE BALLASTED LARGE WOOD HABITAT STRUCTURE FOR ADDITIONAL HABITAT BENEFITS AS DIRECTED BY THE C.O.
3. FINAL LOCATION OF LOGS TO BE DETERMINED IN THE FIELD BY C.O.

GENERAL NOTE:

1. LARGE WOOD HABITAT STRUCTURE IS PAID FOR UNDER THE EQUIPMENT RENTAL ITEMS 62201a & 62201b AND GENERAL LABOR ITEM 62301.



VIEW A-A
NOT TO SCALE

LARGE WOOD HABITAT STRUCTURE DETAILS

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WOOD HABITAT STRUCTURE DETAILS

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE
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DRAWN: JDM	DRAWING CHECKED: KFY	△			

SHEET NO.
18 OF 33

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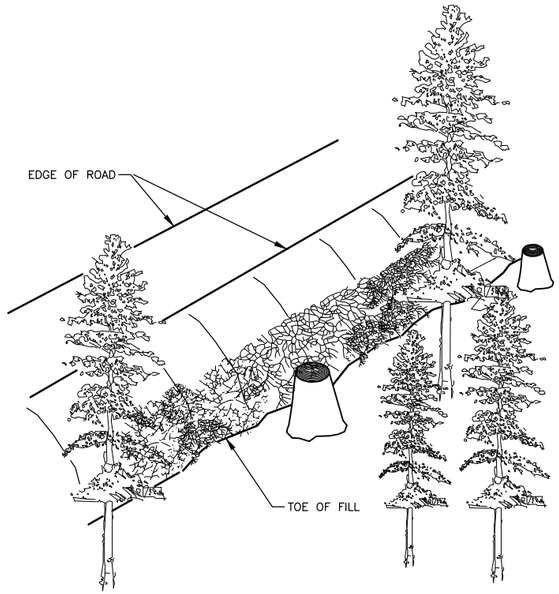
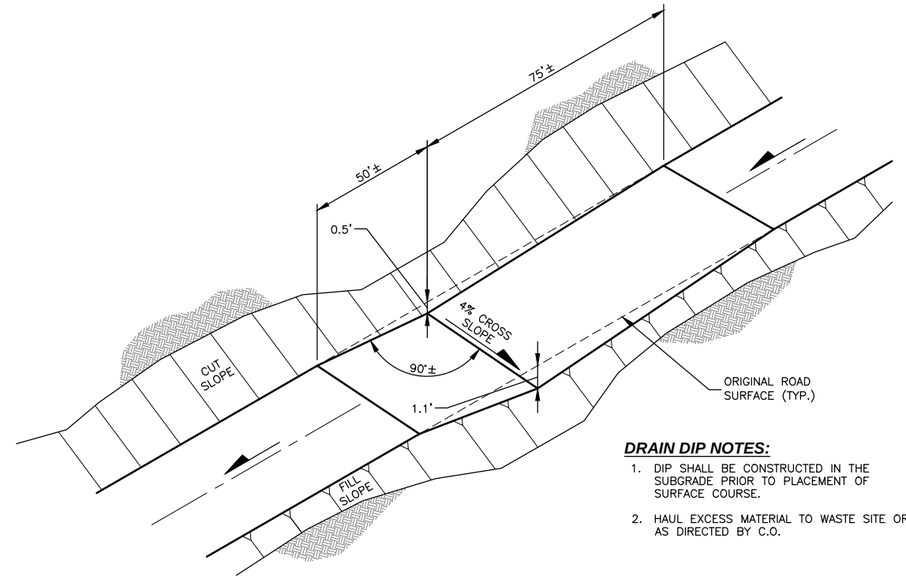


TYPICAL INSTALLATION

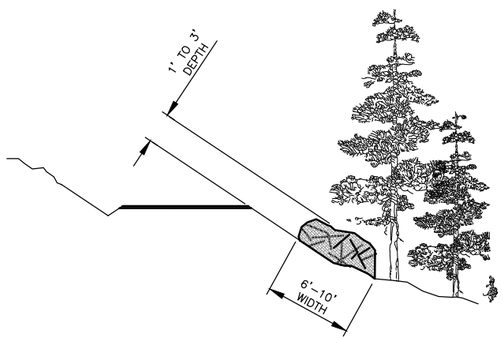


B/19 DRAIN DIP DETAIL

NOT TO SCALE

DRAIN DIP NOTES:

1. DIP SHALL BE CONSTRUCTED IN THE SUBGRADE PRIOR TO PLACEMENT OF SURFACE COURSE.
2. HAUL EXCESS MATERIAL TO WASTE SITE OR AS DIRECTED BY C.O.



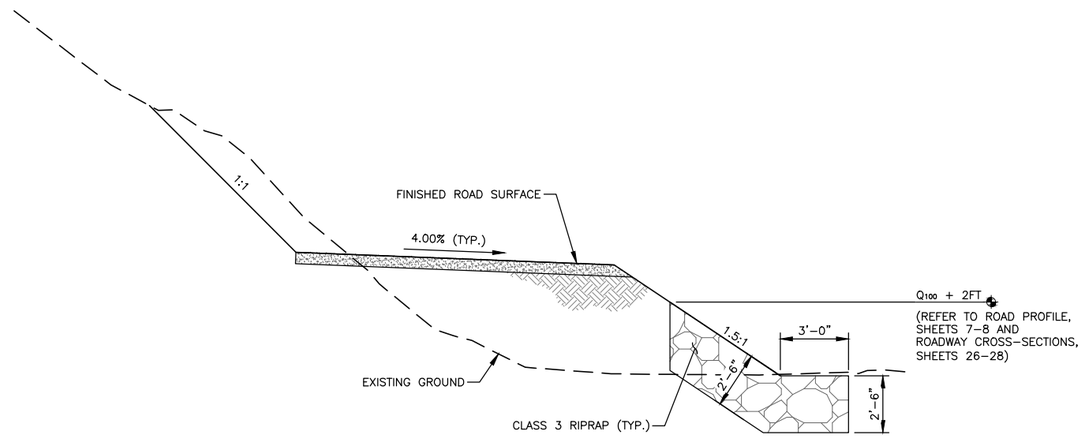
WINDROW DIMENSIONS

A/19 SLASH FILTER WINDROW DETAIL

NOT TO SCALE

SLASH FILTER WINDROW NOTES:

1. CONTRACTOR SHALL UTILIZE CLEARING AND GRUBBING MATERIAL TO ERECT SLASH FILTER WINDROW. IF ADDITIONAL MATERIAL IS NEEDED FOR SLASH FILTER CONSTRUCTION, THE C.O. WILL DESIGNATE A SITE WITHIN 1 MILE OF THE PROJECT. SLASH FILTER WINDROW, INCIDENTAL TO CLEARING AND GRUBBING (BID ITEM 20101).
2. SLASH, LIMBS AND TOPS MUST BE SMALLER THAN 12 FEET LONG AND 3 INCHES IN DIAMETER. DO NOT USE STUMPS AND ROOT WADS.
3. PLACE SLASH AT THE TOE OF THE NEW FILL SLOPE WITH A BACKHOE AND TAMP INTO PLACE WITH THE BUCKET. SLASH SHOULD BE TAMPED SO IT IS EMBEDDED APPROXIMATELY 6 INCHES INTO THE SURFACE TO PREVENT WATER FROM RUNNING UNDER THE WINDROW.
4. DO NOT INTERFERE WITH THE FUNCTIONING OF DRAINAGE STRUCTURES OR BLOCK STREAM CHANNELS WITH WINDROWS. ALL LOCATIONS WILL BE STAKED OR FLAGGED BY THE C.O.
5. INSTALL A 20' BREAK IN WINDROWS EVERY 200'.
6. SLASH FILTER WINDROW QUANTITY ESTIMATED AT 1370 L.F.



C/19 ROADWAY ARMORING

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MISCELLANEOUS DETAILS

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE
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DRAWN: JDM	DRAWING CHECKED: KFY	△			

SHEET NO. 19 OF 33

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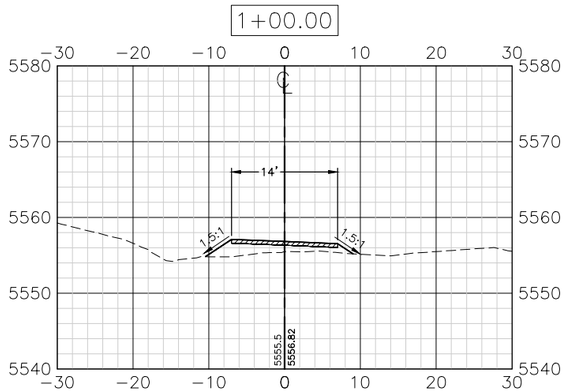

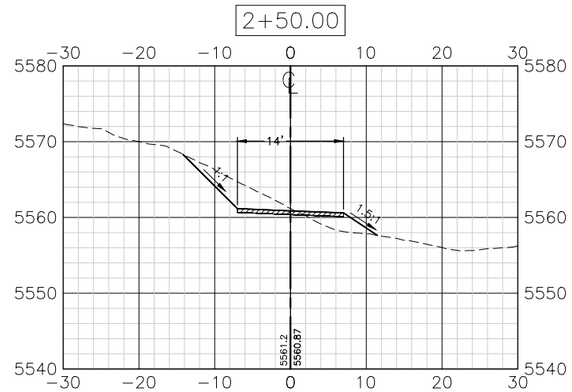

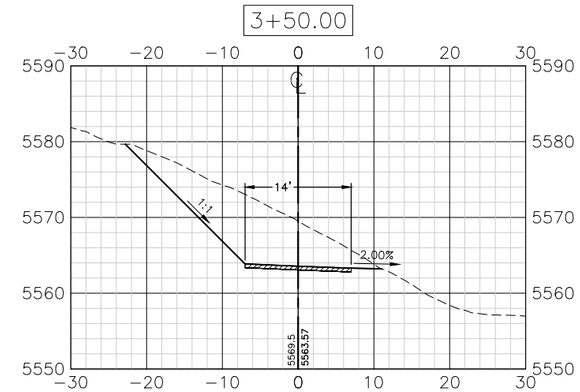

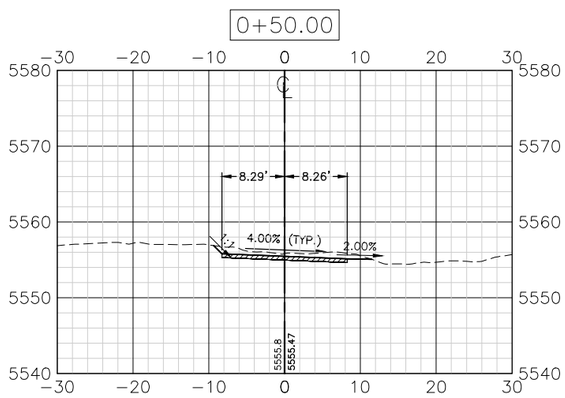

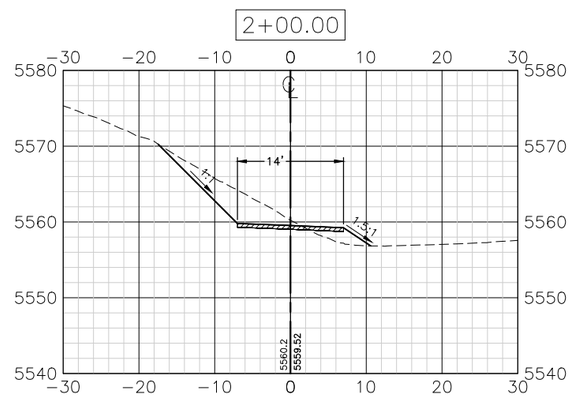

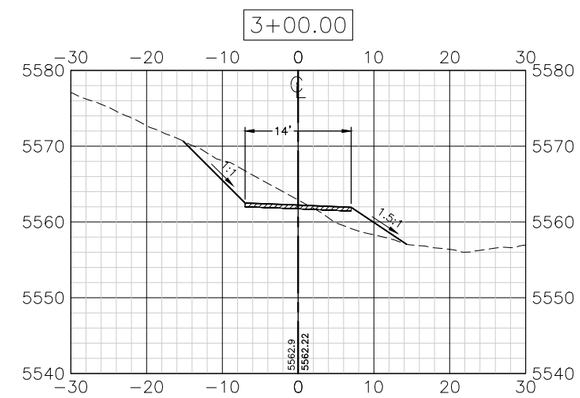

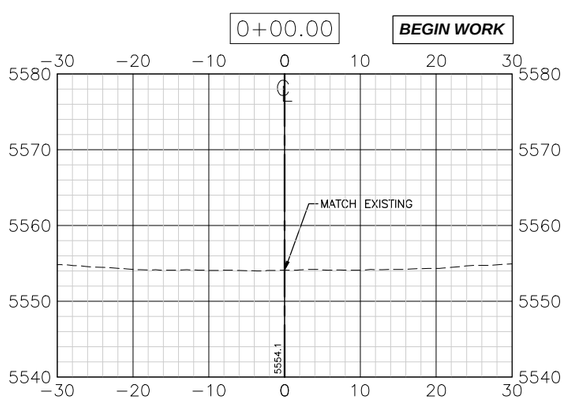

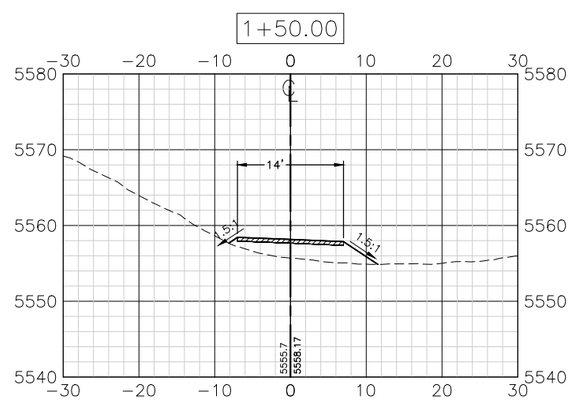

ROADWAY CROSS-SECTIONS

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 20'

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REGION ONE

ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

ROADWAY CROSS-SECTIONS

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE
DESIGNED: JDM	DESIGN CHECKED: ----	△			
DRAWN: JDM	DRAWING CHECKED: KFY	△			

SHEET NO. 20 OF 33

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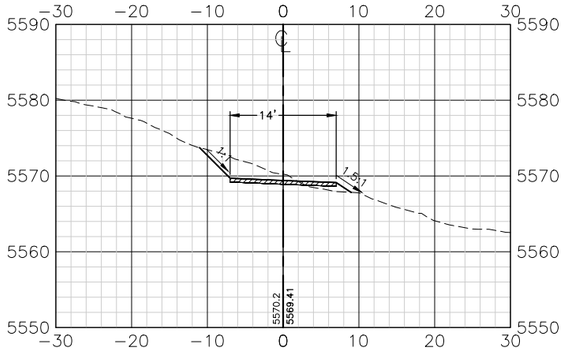
5+00.00



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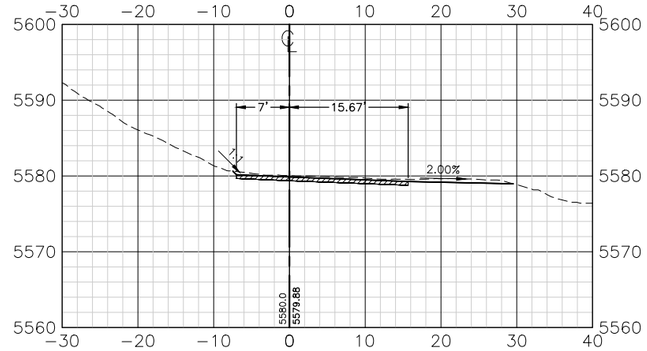

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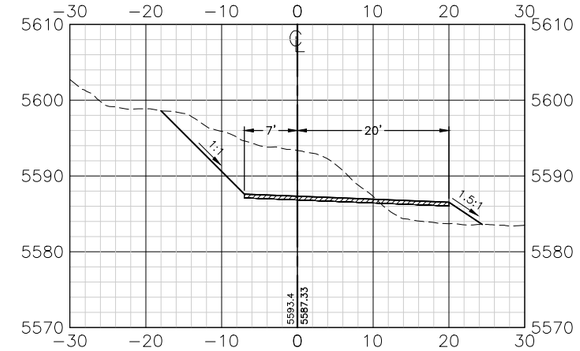

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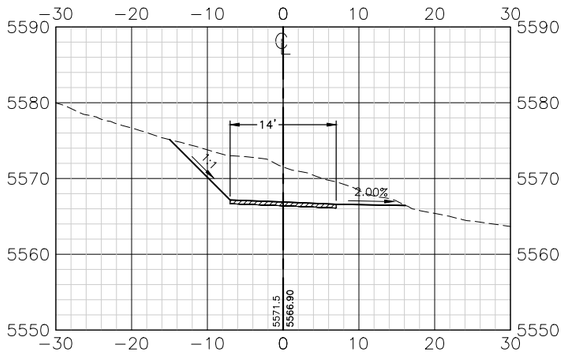

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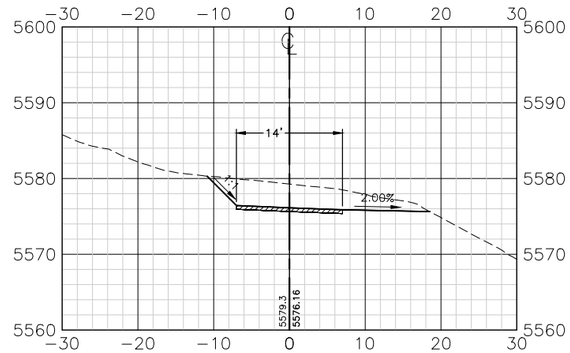

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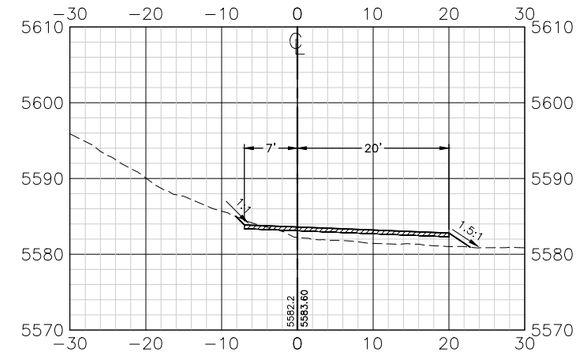

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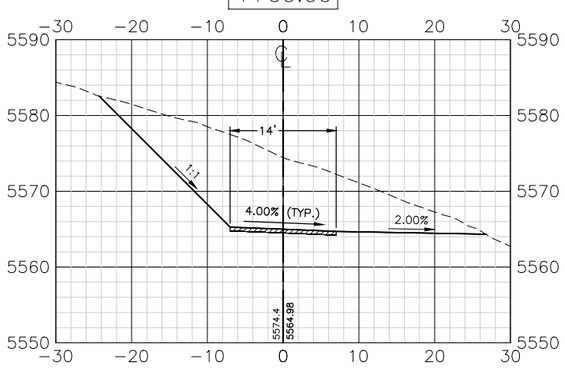

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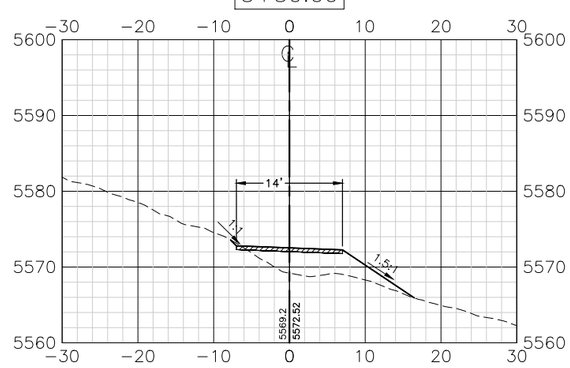

ROADWAY CROSS-SECTIONS

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 20'

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REGION ONE

ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

ROADWAY CROSS-SECTIONS

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE
DESIGNED: JDM	DESIGN CHECKED: ----	△			
DRAWN: JDM	DRAWING CHECKED: KFY	△			

SHEET NO. 21 OF 33

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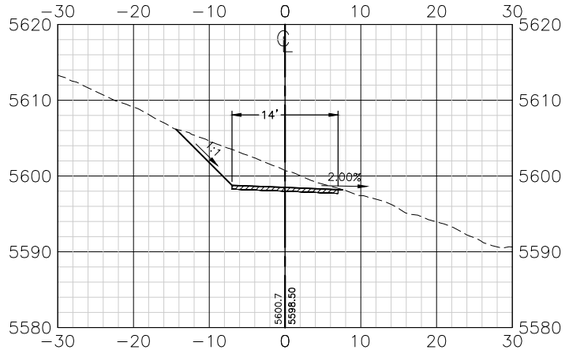

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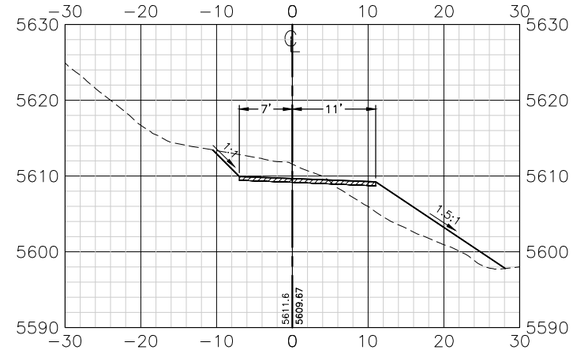

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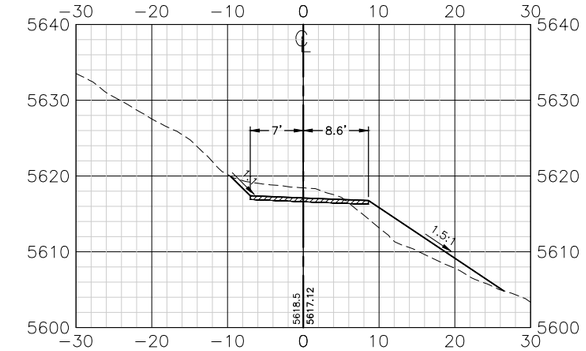

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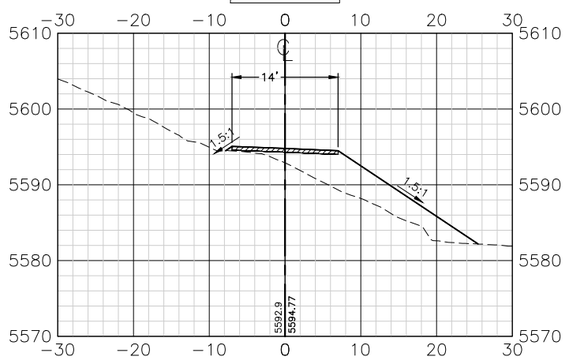

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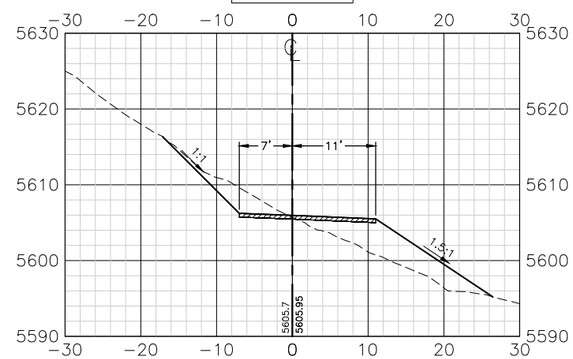

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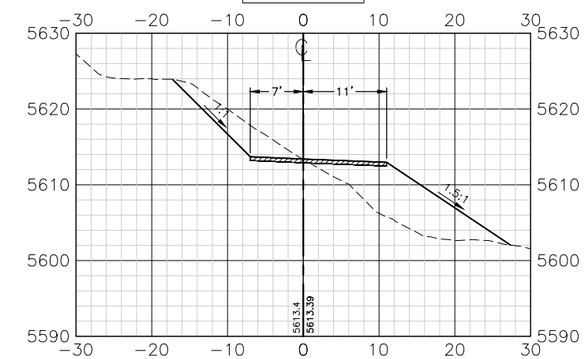

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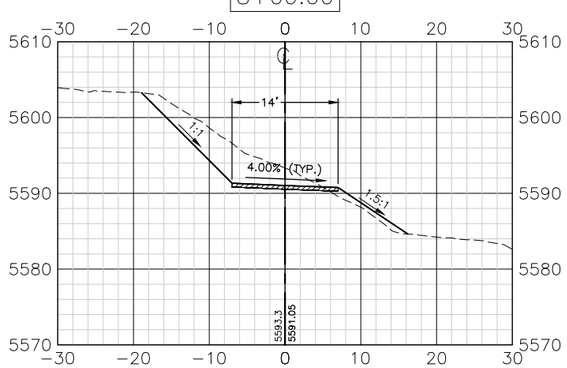

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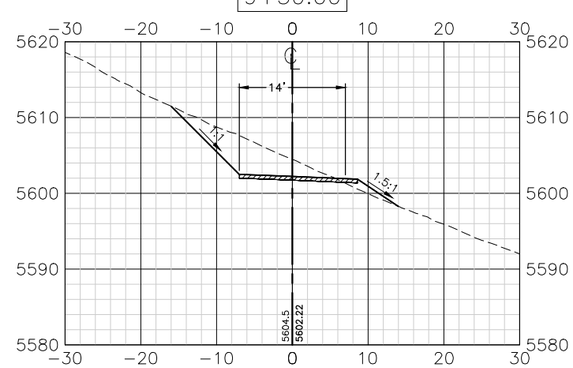

ROADWAY CROSS-SECTIONS

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 20'

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REGION ONE

ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

ROADWAY CROSS-SECTIONS

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE	SHEET NO.
DESIGNED: JDM	DESIGN CHECKED: ----	△				22 OF 33
DRAWN: JDM	DRAWING CHECKED: KFY	△				

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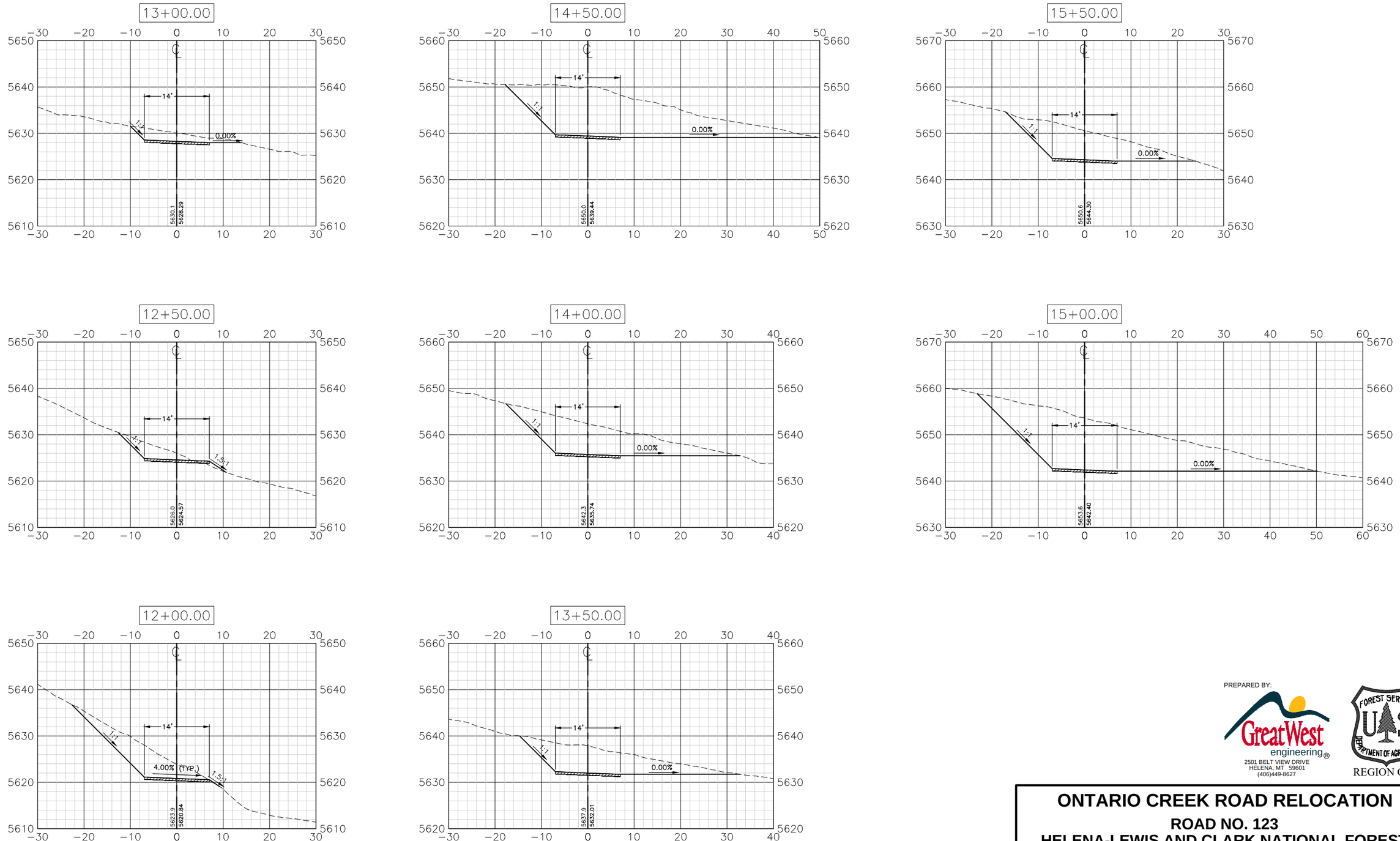

ROADWAY CROSS-SECTIONS

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 20'

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ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

ROADWAY CROSS-SECTIONS

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE	SHEET NO.
DESIGNED: JDM	DESIGN CHECKED: ----	△				23 OF 33
DRAWN: JDM	DRAWING CHECKED: KFY	△				

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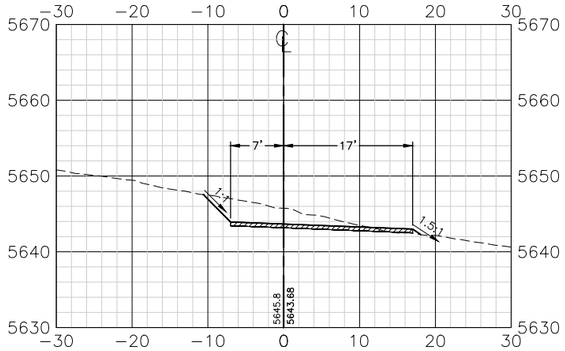

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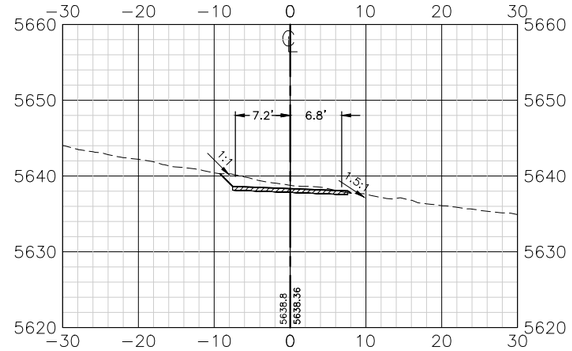

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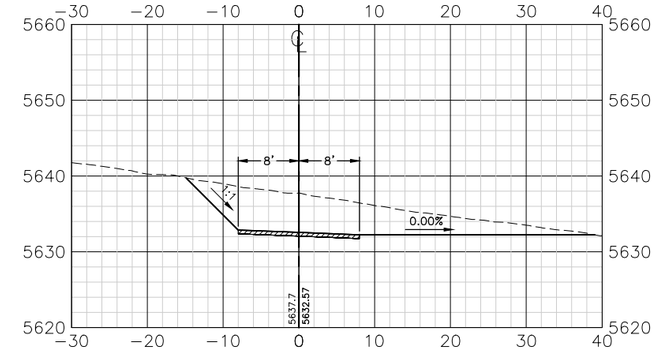

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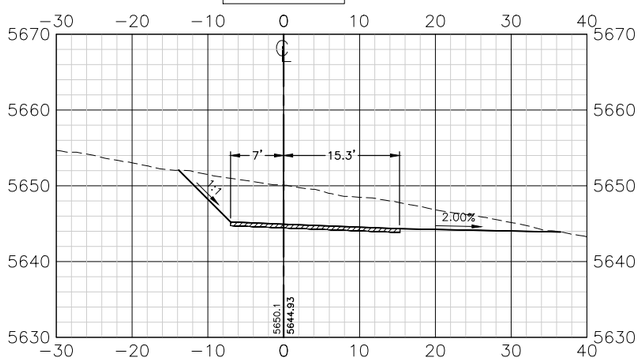

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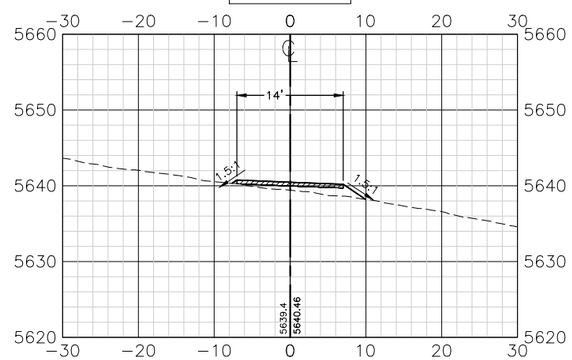

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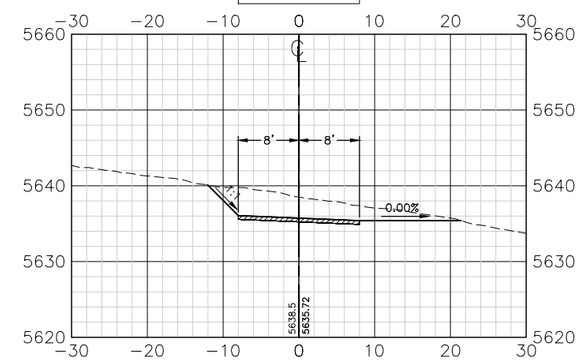

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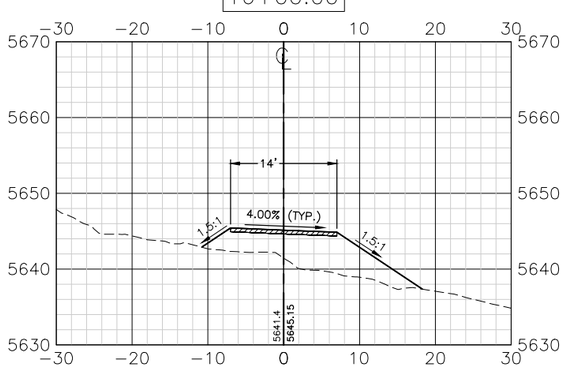

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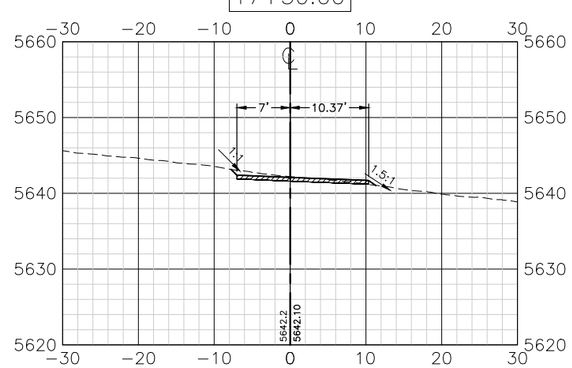

ROADWAY CROSS-SECTIONS

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 20'

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FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE
REGION ONE

ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

ROADWAY CROSS-SECTIONS

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE	SHEET NO. 24 OF 33
DESIGNED: JDM	DESIGN CHECKED: ----	△				
DRAWN: JDM	DRAWING CHECKED: KFY	△				

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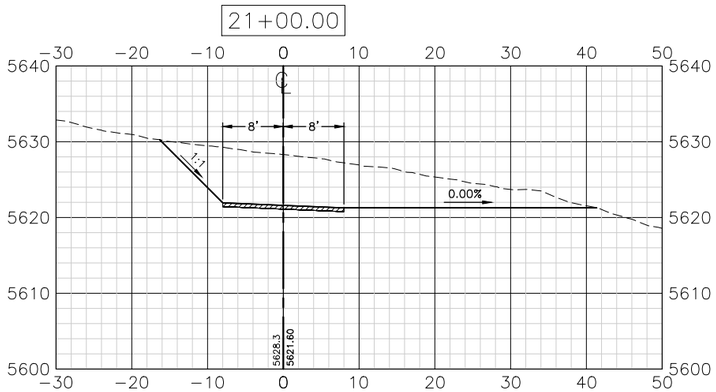

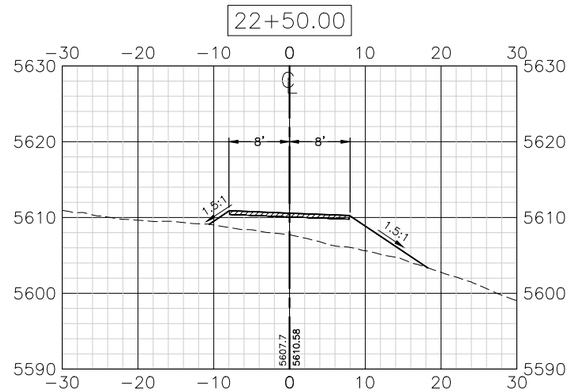

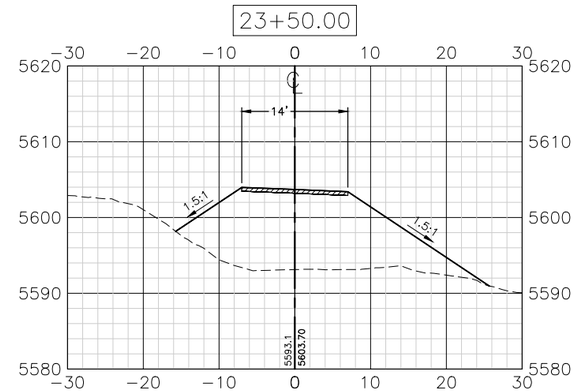

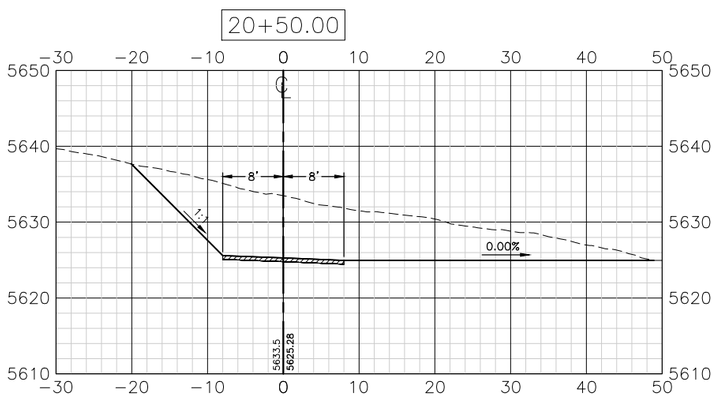

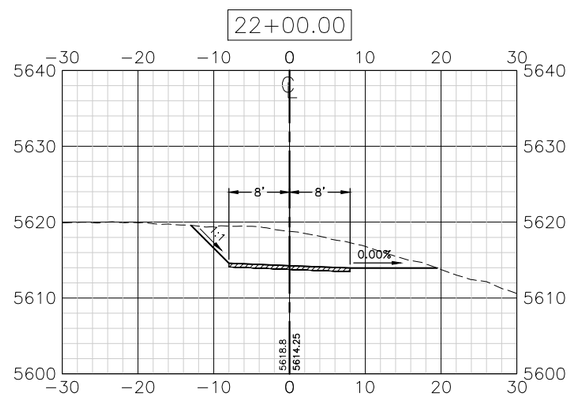

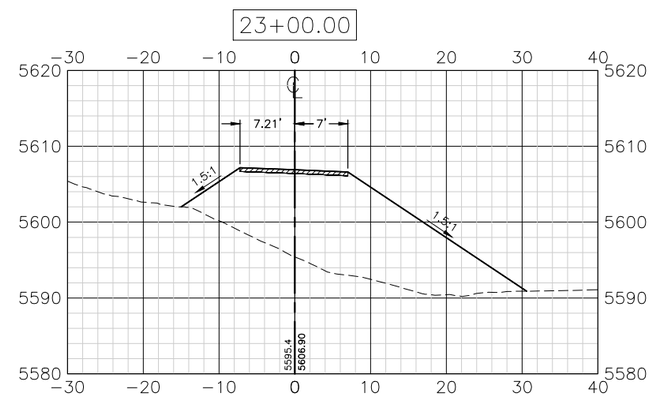

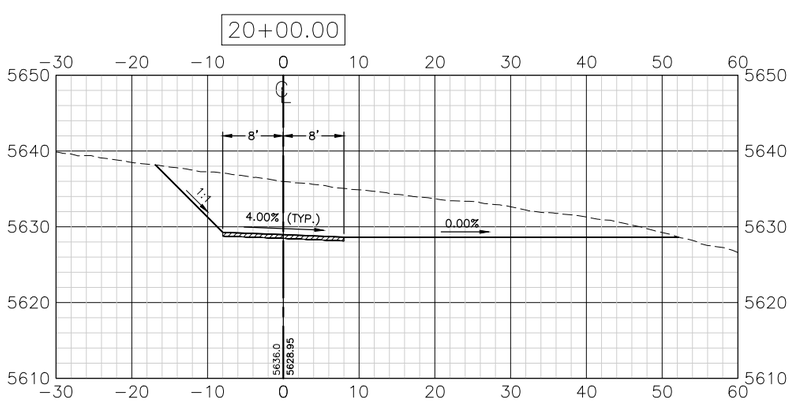

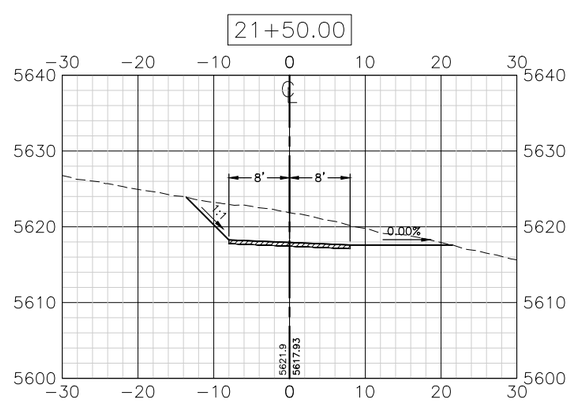

ROADWAY CROSS-SECTIONS

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 20'

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ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

ROADWAY CROSS-SECTIONS

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE	SHEET NO.
DESIGNED: JDM	DESIGN CHECKED: ----	△				25 OF 33
DRAWN: JDM	DRAWING CHECKED: KFY	△				

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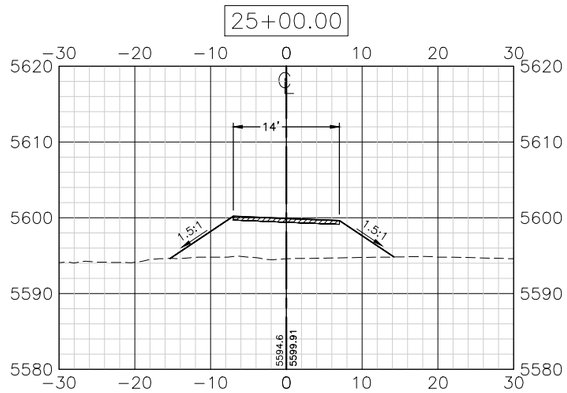

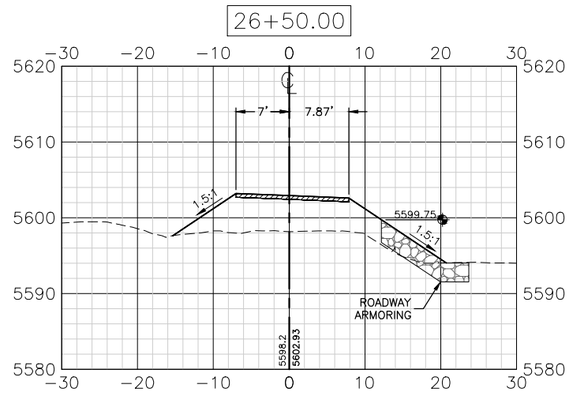

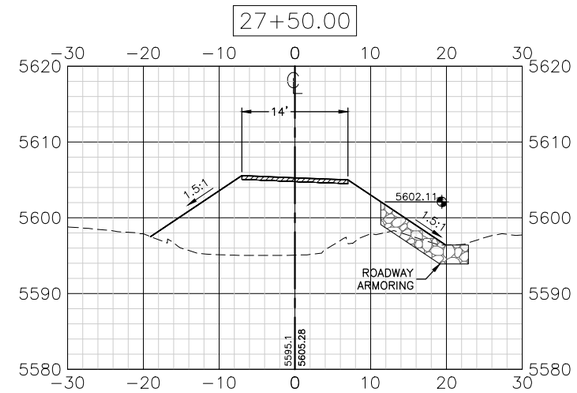

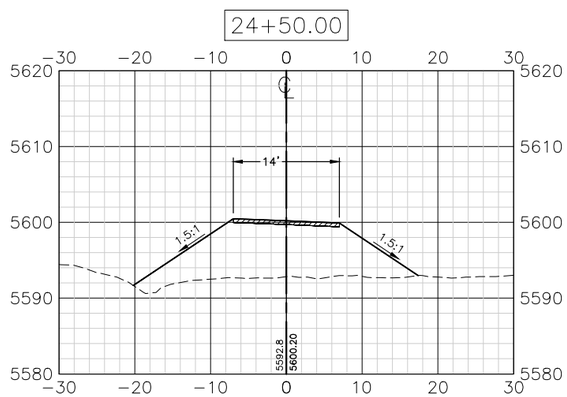

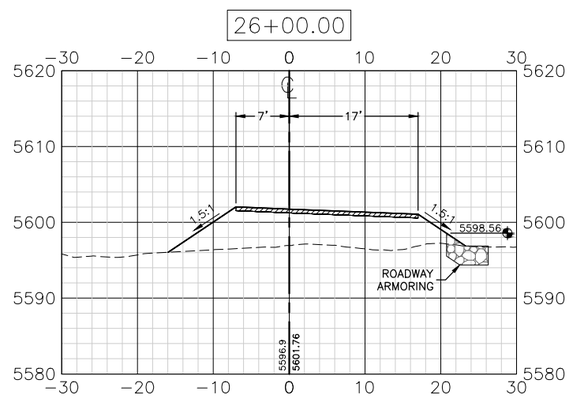

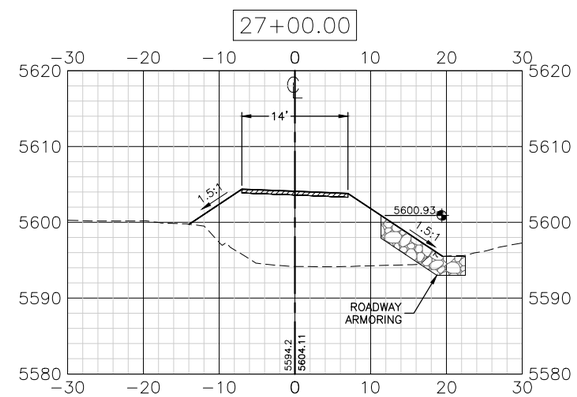

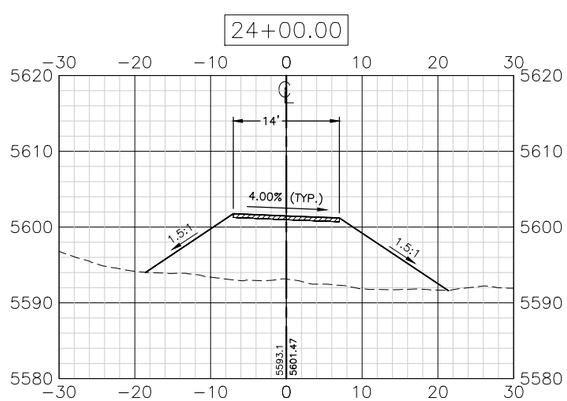

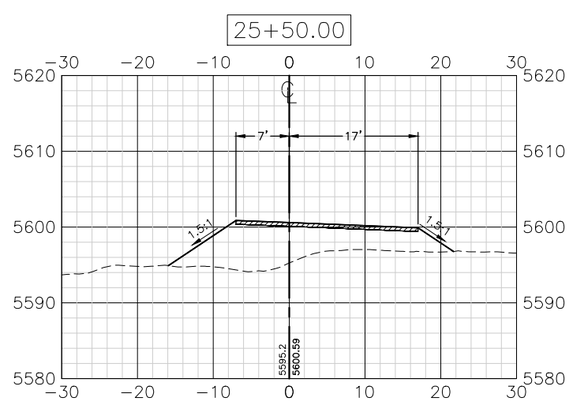

ROADWAY CROSS-SECTIONS

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 20'

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REGION ONE

ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

ROADWAY CROSS-SECTIONS

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE
DESIGNED: JDM	DESIGN CHECKED: ----	△			
DRAWN: JDM	DRAWING CHECKED: KFY	△			

SHEET NO. 26 OF 33

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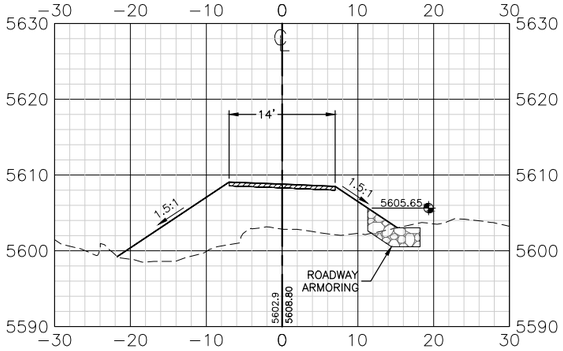

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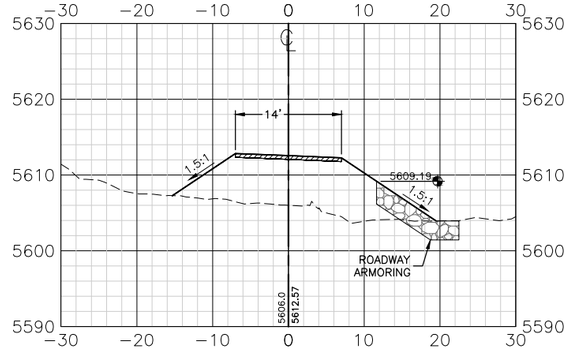

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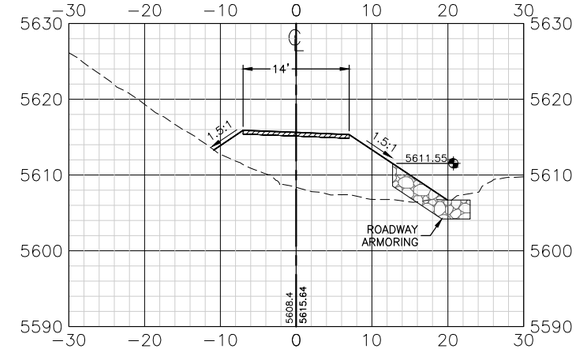

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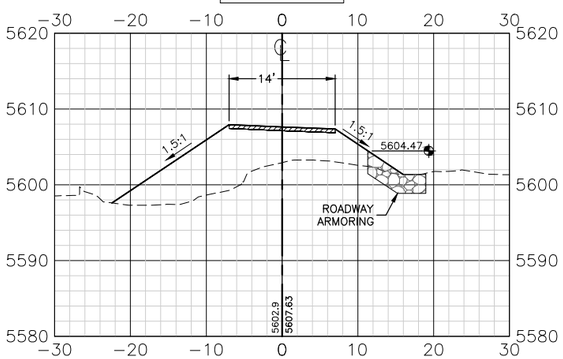

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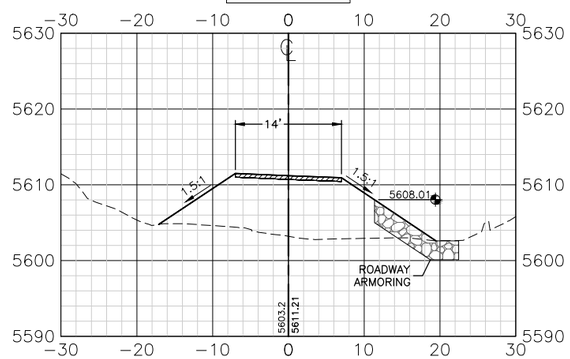

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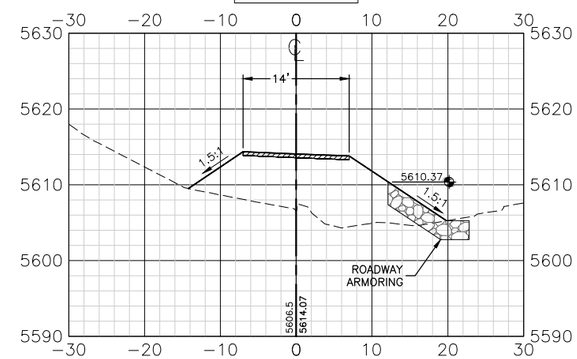

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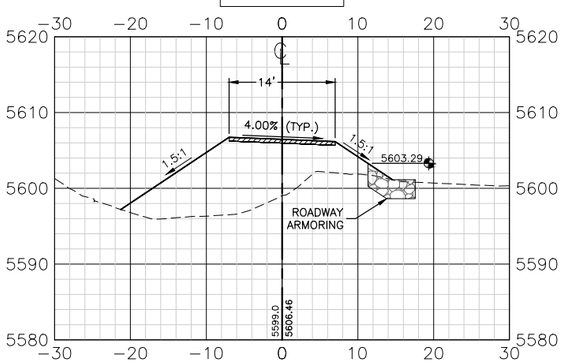

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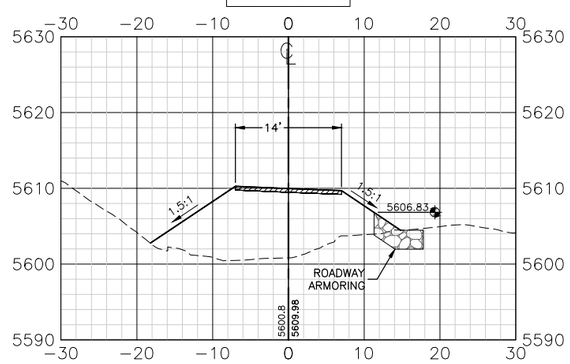

ROADWAY CROSS-SECTIONS

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 20'

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FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE
REGION ONE

ONTARIO CREEK ROAD RELOCATION

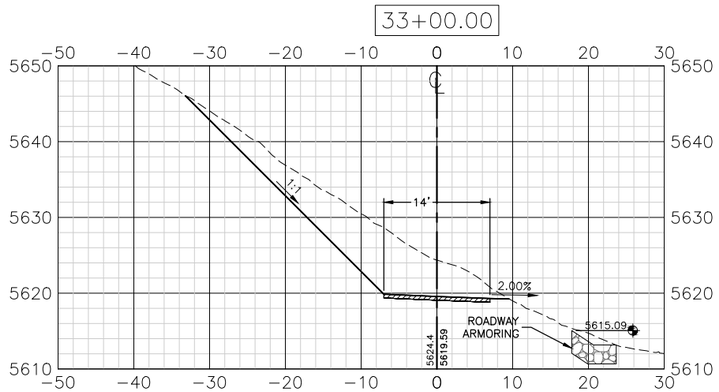
ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

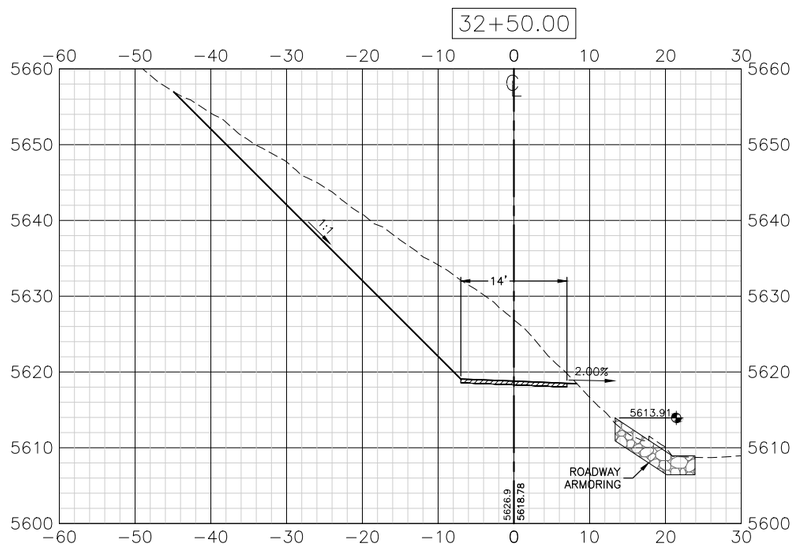
ROADWAY CROSS-SECTIONS

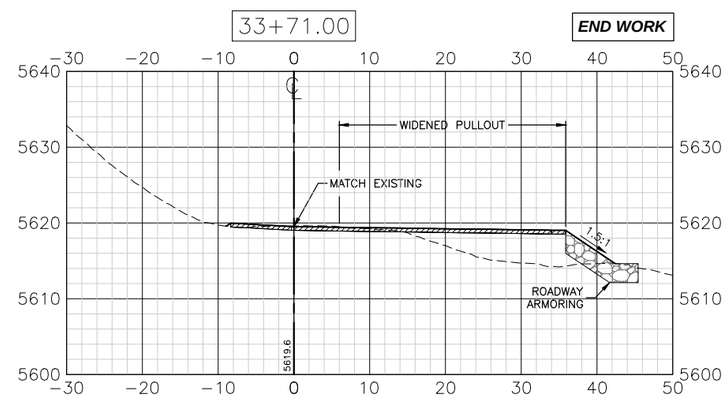
PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE
DESIGNED: JDM	DESIGN CHECKED: ----	△			
DRAWN: JDM	DRAWING CHECKED: KFY	△			

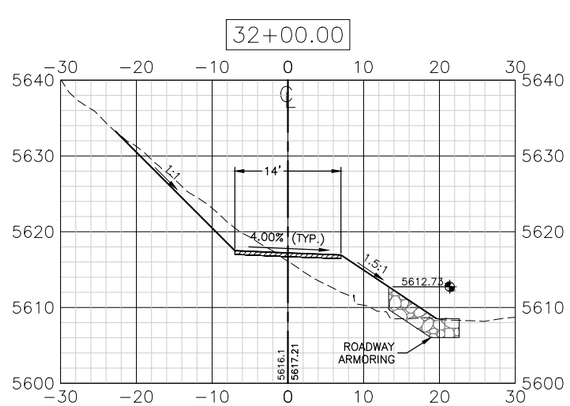
SHEET NO. 27 OF 33

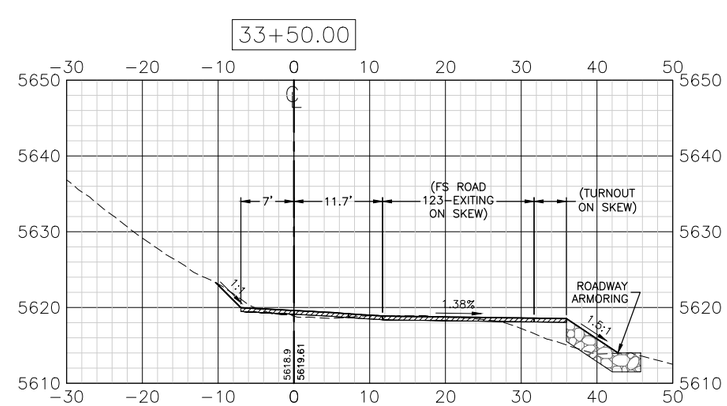
F:\1-16175 HLCNF-Ontario Road Design\CADD 1-16175\Sheets\1-16175-27-Road XS.dwg











ROADWAY CROSS-SECTIONS

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 20'

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HELENA, MT 59601
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FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE
REGION ONE

ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

ROADWAY CROSS-SECTIONS

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE
DESIGNED: JDM	DESIGN CHECKED: ----	△			
DRAWN: JDM	DRAWING CHECKED: KFY	△			

SHEET NO. 28 OF 33

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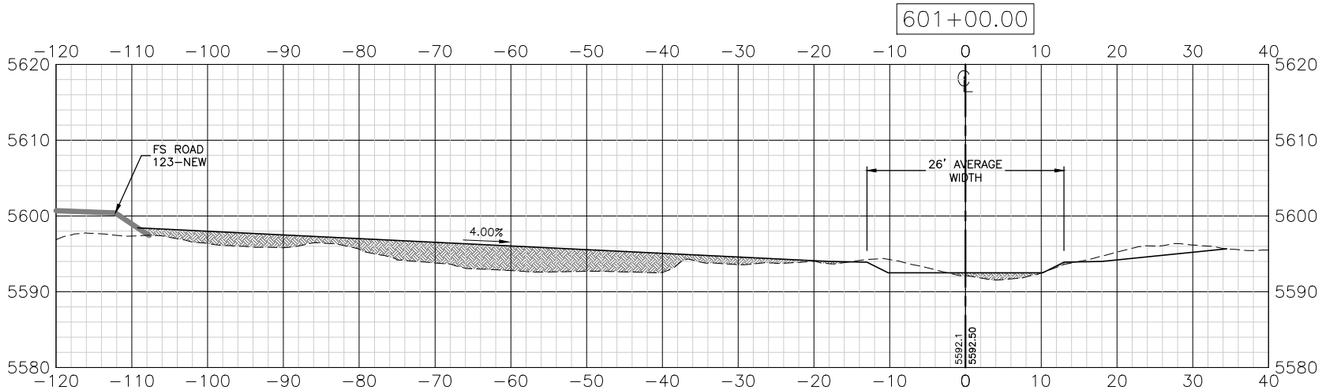

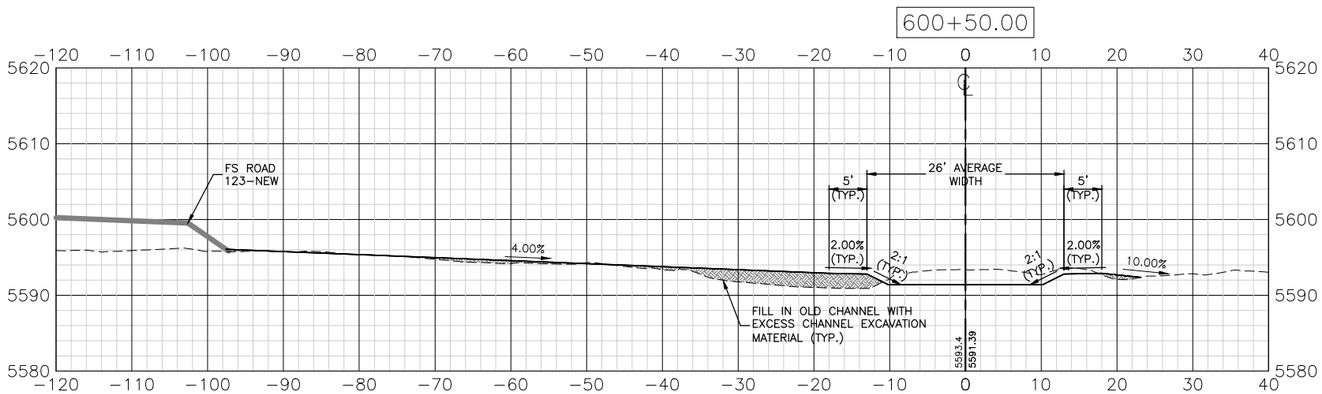

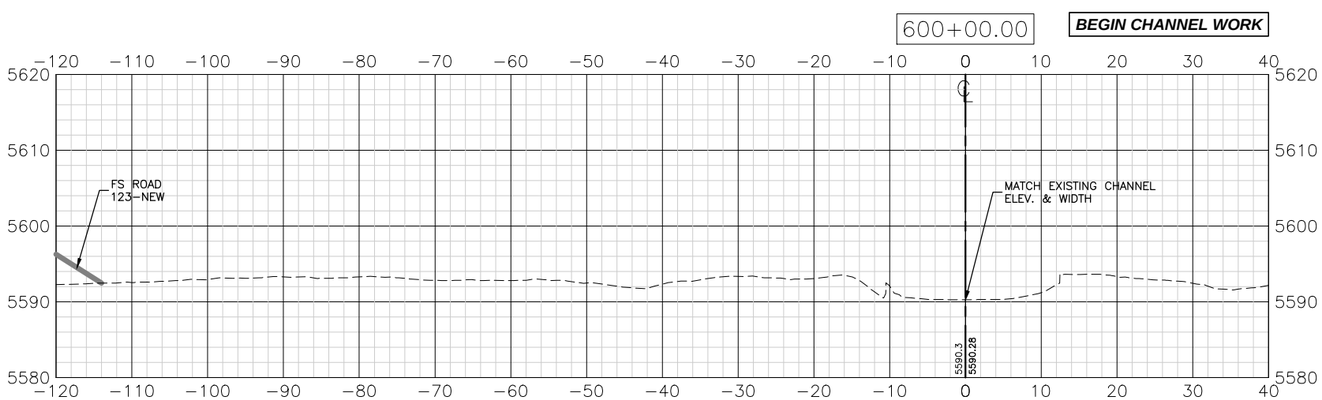

STREAM CROSS-SECTIONS

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 20'

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ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

STREAM CROSS-SECTIONS

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE	SHEET NO.
DESIGNED: JDM	DESIGN CHECKED: ----	△				29 OF 33
DRAWN: JDM	DRAWING CHECKED: KFY	△				

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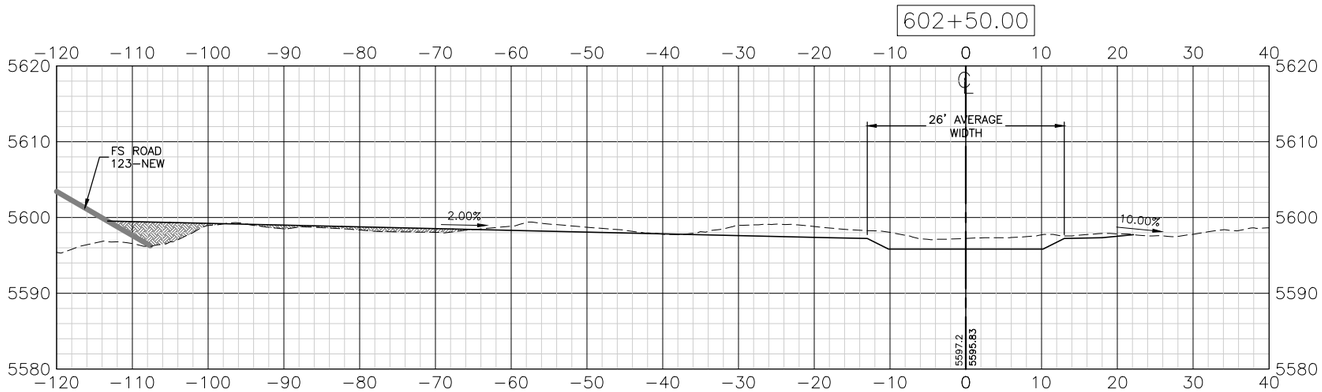

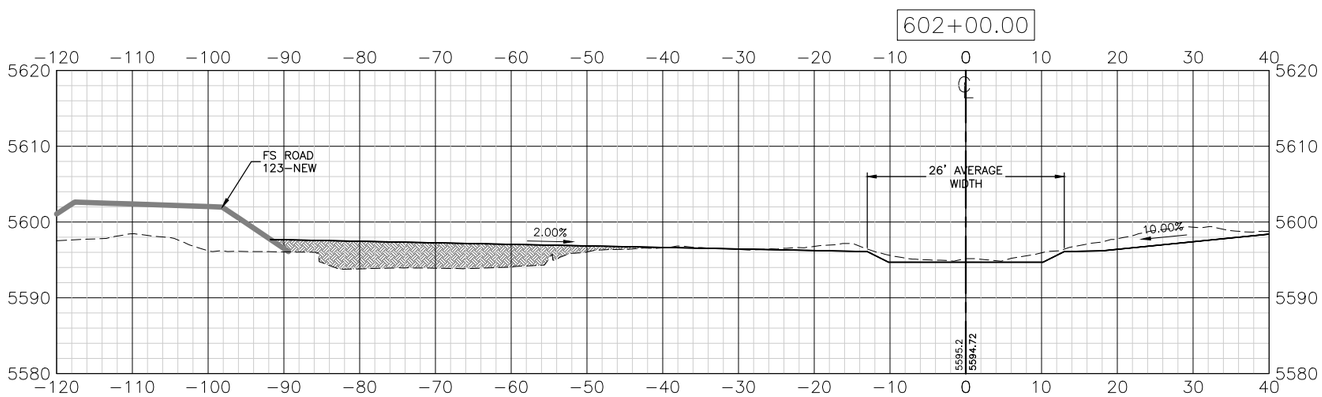

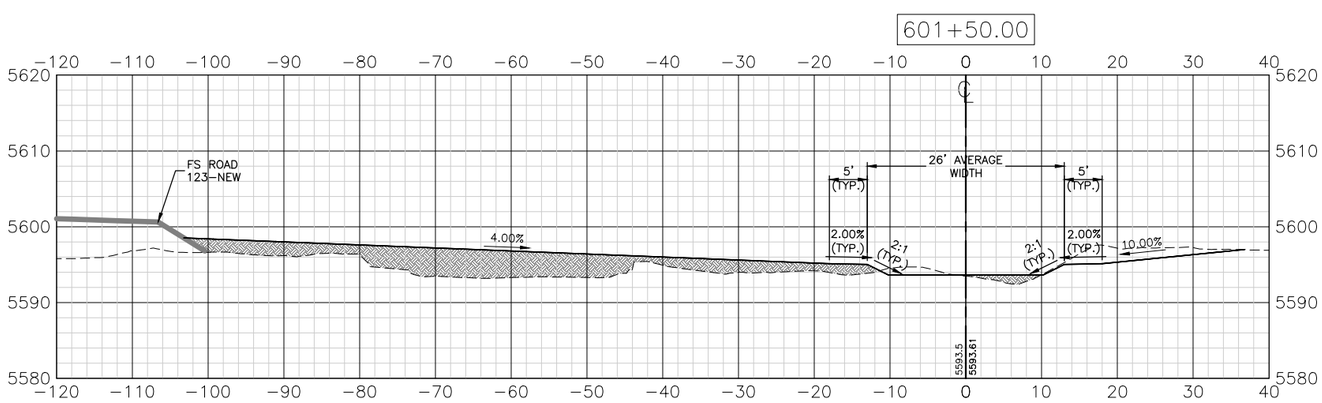

STREAM CROSS-SECTIONS

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 20'

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ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

STREAM CROSS-SECTIONS

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE	SHEET NO.
DESIGNED: JDM	DESIGN CHECKED: ----	△				30 OF 33
DRAWN: JDM	DRAWING CHECKED: KFY	△				

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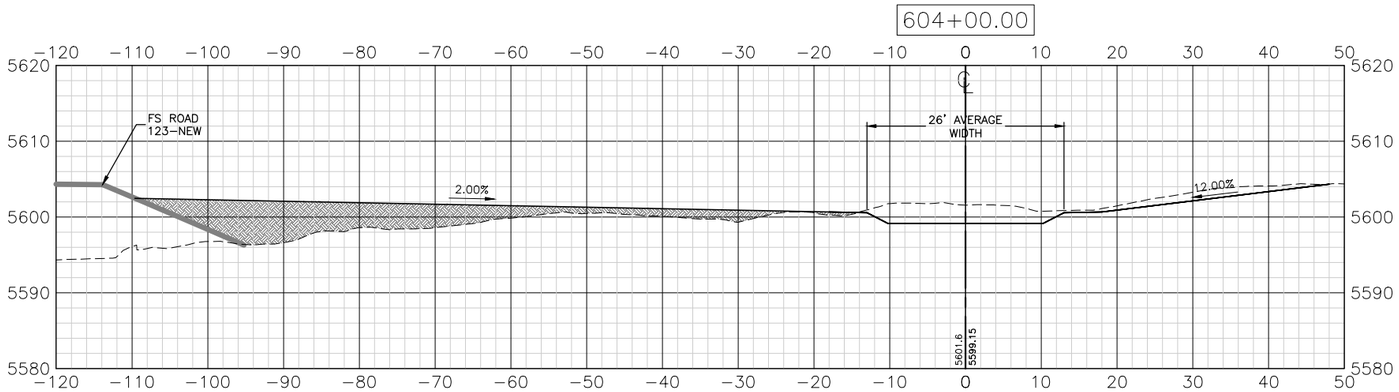

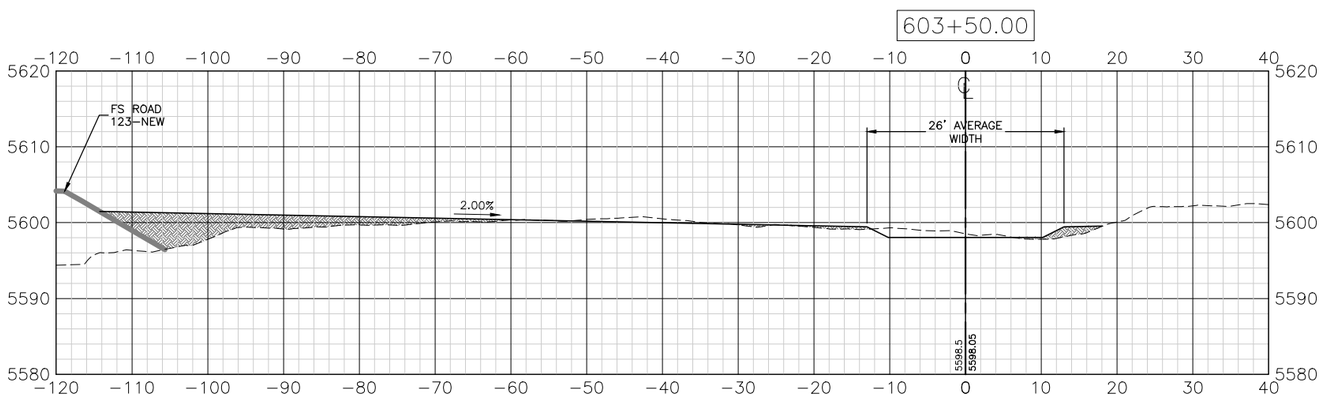

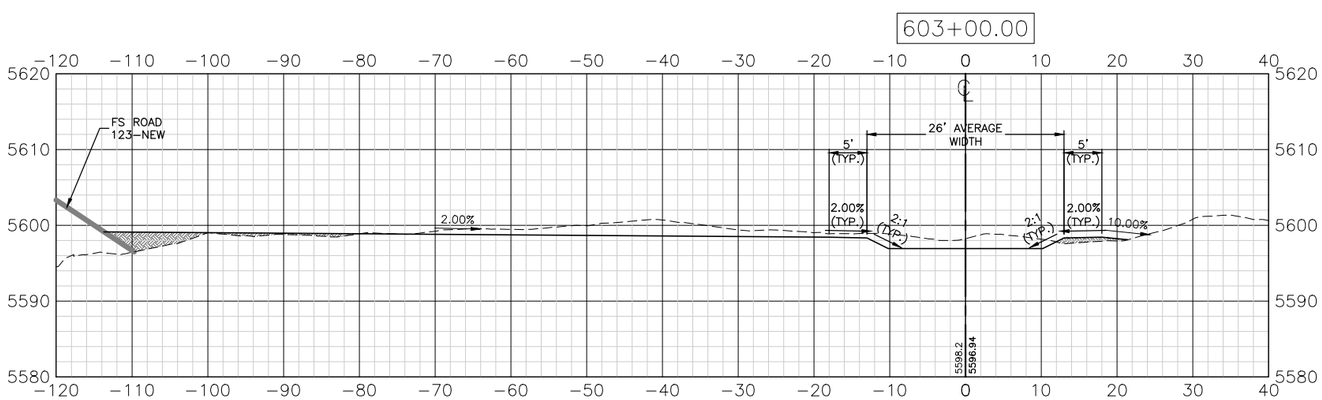

STREAM CROSS-SECTIONS

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 20'

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ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

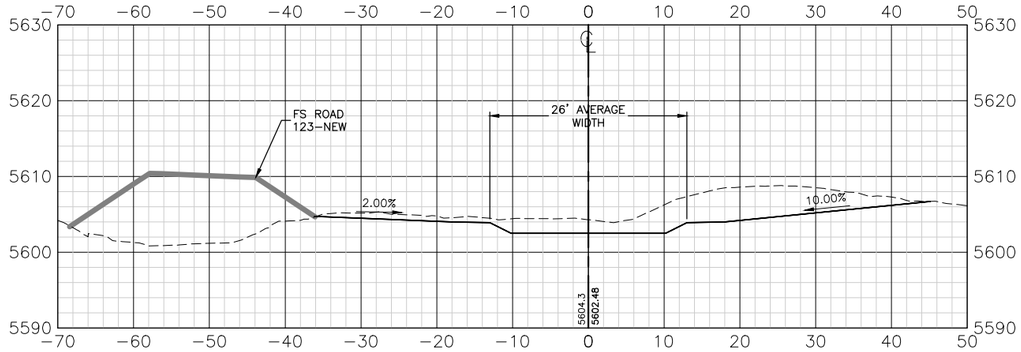
STREAM CROSS-SECTIONS

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE
DESIGNED: JDM	DESIGN CHECKED: ----	△			
DRAWN: JDM	DRAWING CHECKED: KFY	△			

SHEET NO. 31 OF 33

F:\1-16175 HLCNF-Ontario Road Design\CADD 1-16175\Sheets\1-16175-31-Stream XS.dwg

605+50.00



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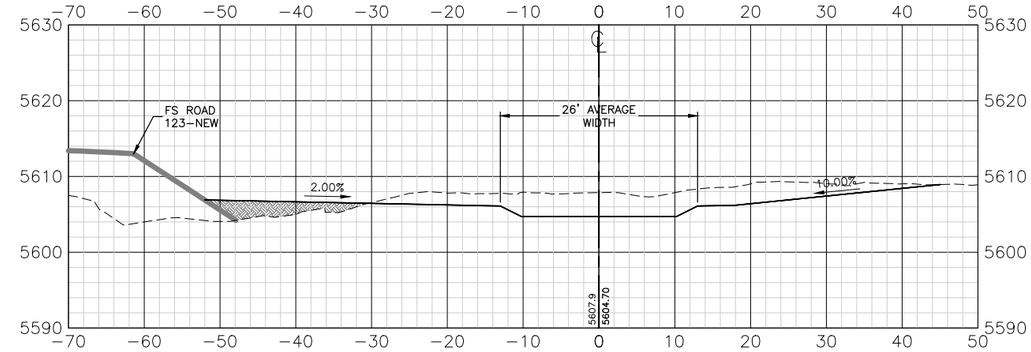

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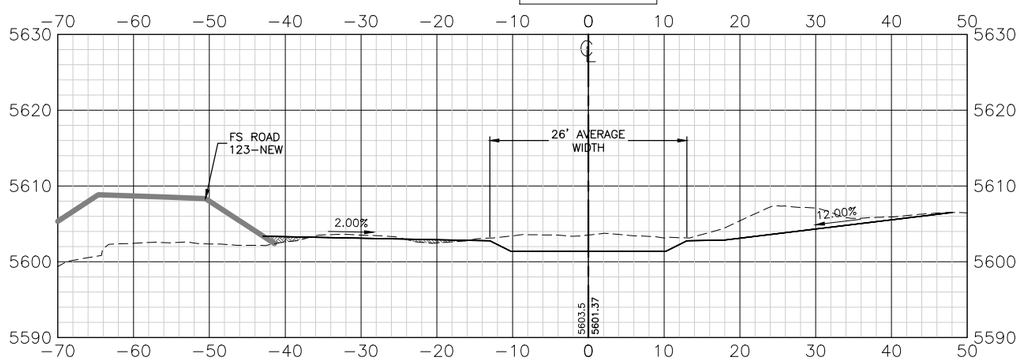

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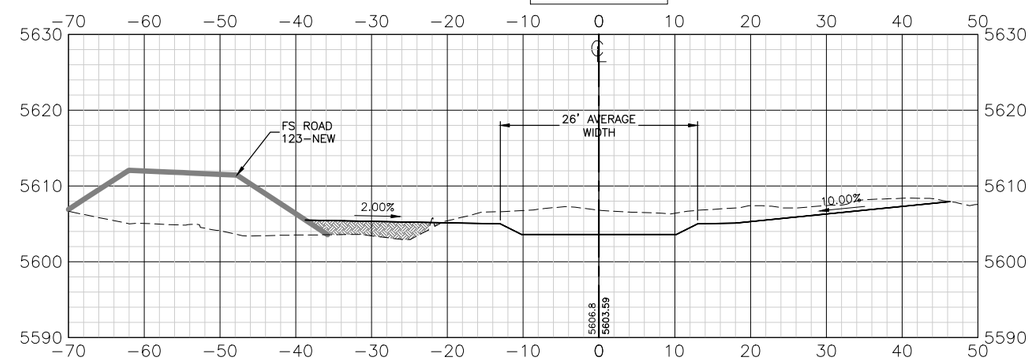

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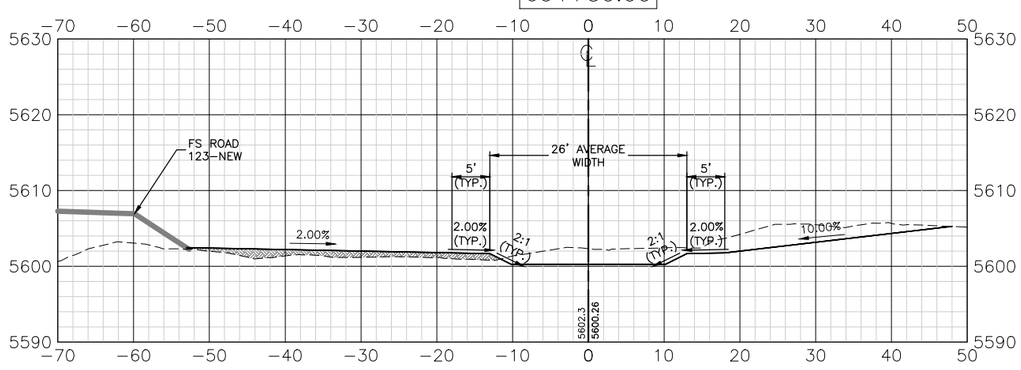

STREAM CROSS-SECTIONS

HORIZONTAL SCALE: 1" = 20'
VERTICAL SCALE: 1" = 20'

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ONTARIO CREEK ROAD RELOCATION

ROAD NO. 123
HELENA-LEWIS AND CLARK NATIONAL FOREST

STREAM CROSS-SECTIONS

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE	SHEET NO.
DESIGNED: JDM	DESIGN CHECKED: ----	△				32 OF 33
DRAWN: JDM	DRAWING CHECKED: KFY	△				

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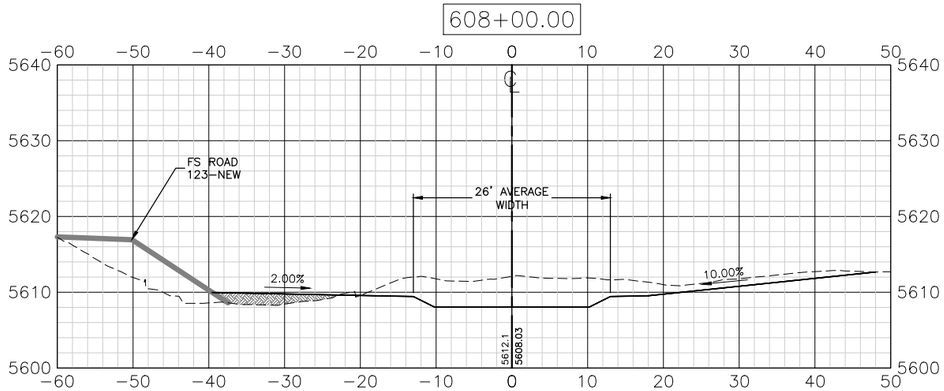

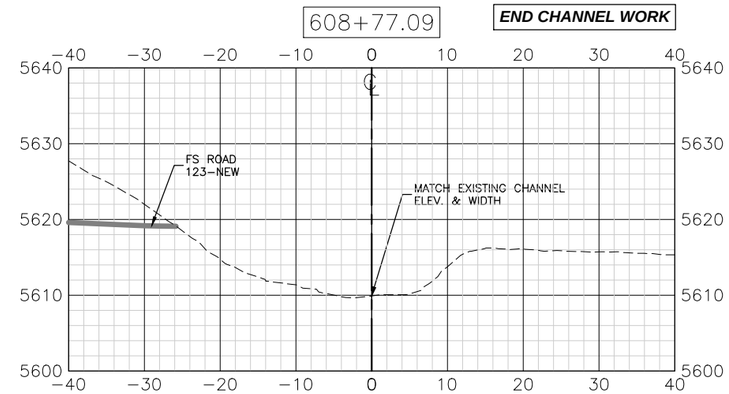

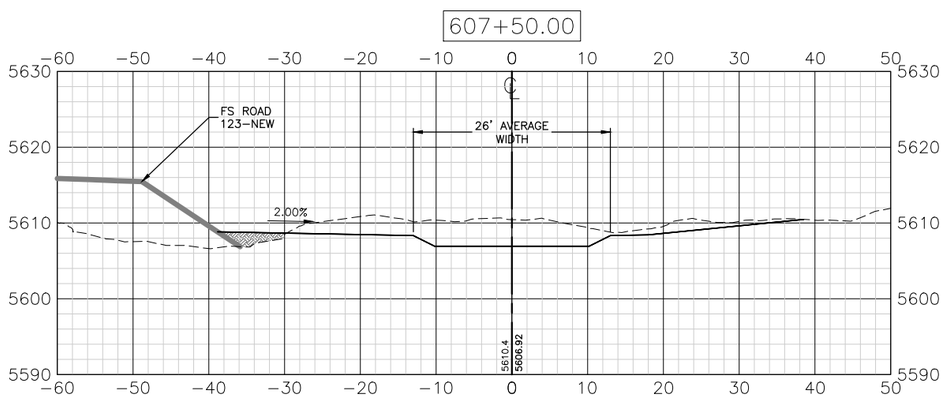

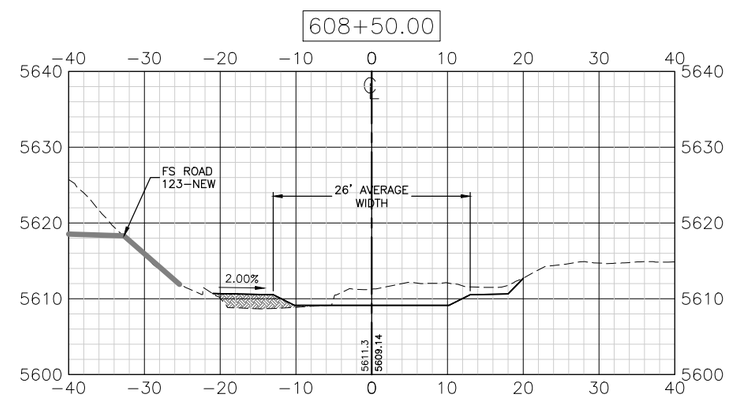

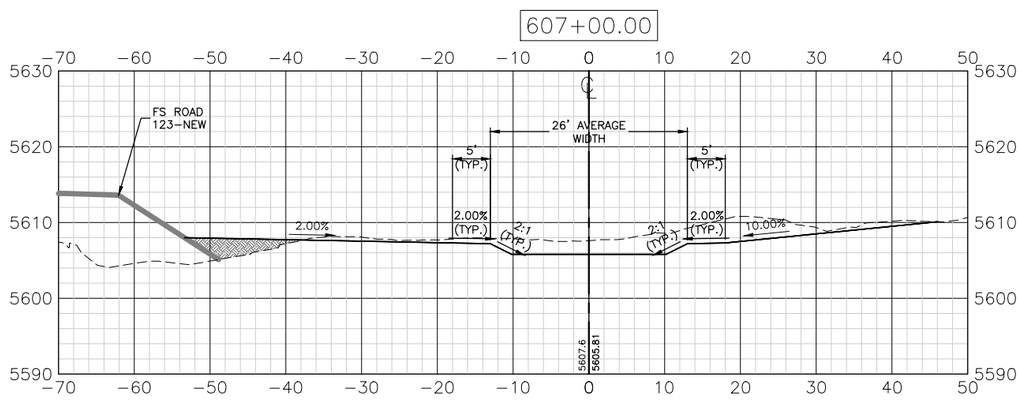

STREAM CROSS-SECTIONS

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STREAM CROSS-SECTIONS

PROJECT: 1-16175	DATE: FEB 17, 2017	NO.	REVISION DESCRIPTION	BY	DATE	SHEET NO.
DESIGNED: JDM	DESIGN CHECKED: ----	△				33 OF 33
DRAWN: JDM	DRAWING CHECKED: KFY	△				

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