FUTURE FISHERIES IMPROVEMENT PROGRAM GRANT APPLICATION

All sections must be addressed, or the application will be considered invalid

I. APPLICANT INFORMATION

A. Applicant Name: Bitterroot National Forest, Darby-Sula Ranger District

Mailing Address: 712 N. Main Street, PO Box 388

City: Darby State: MT Zip: 59829

Telephone: 406-821-3913 E-mail: mike.jakober@usda.gov

B. Contact Person (if different than applicant): Michael Jakober (south zone fisheries biologist)

Address: 6735 West Fork Road

City: Darby State: MT Zip: 59829

Telephone: 406-821-3269 E-mail: mike.jakober@usda.gov

C. Landowner and/or Lessee Name (if different than applicant):

Mailing Address:

City: State: Zip:

Telephone: E-mail:

II. PROJECT INFORMATION

A. Project Name: Lick Creek Culvert Replacements

River, stream, or lake: Lick Creek, tributary to Moose Creek, tributary to East Fork Bitterroot River

Location: Road 432 Township: 2 N Range: 17 W Section: 9 NE 1/4

Latitude: N 45.93875 Longitude: W 113.71673 *within project (decimal degrees)*

Road 5771 Township: 2 N Range: 17 W Section: 10 NW 1/4

Latitude: N 45.94201 Longitude: W 113.70281 *within project (decimal degrees)*

County: Ravalli

B. Purpose of Project:

Reconnect the bull trout and westslope cutthroat trout populations in Lick Creek and re-establish year-round connectivity with Moose Creek and the East Fork Bitterroot River. This would be accomplished by replacing two culvert barriers on Lick Creek that currently fragment the populations.

C. Brief Project Description (attach additional information to end of application):

Lick Creek is a bull trout and westslope cutthroat trout spawning and rearing tributary to Moose Creek, which is tributary to the East Fork Bitterroot River. There are currently two culverts that impede fish movement and fragment the bull trout and westslope cutthroat trout populations in Lick Creek. Both culverts are undersized and pinch the bankfull channel width by about 50%.

The lower culvert is located near the mouth of Lick Creek on Bitterroot National Forest Road 432 at stream milepost 0.1. The Road 432 culvert is a 48-inch wide X 32-inch high X 52-foot long corrugated metal arch culvert that functions as a partial barrier to upstream fish movement due to excessively fast velocities during high flow periods.

The upper culvert is located on Bitterroot National Forest Road 5771 at stream milepost 0.8 (i.e. about 0.7 miles upstream from the Road 432 culvert). The Road 5771 culvert is a 36-inch diameter X 36-foot long round corrugated metal pipe that is believed to be a complete barrier to upstream fish movement due to its steep gradient and excessively fast velocities inside the pipe.

There is about 1.6 miles of occupied spawning and rearing habitat for westslope cutthroat trout above the Road 5771 culvert, and about 0.5 miles of potentially suitable rearing habitat for bull trout. At present, a few small bull trout (presumably resident life history fish) are present but rare above the Road 5771 culvert. Westslope cutthroat trout are easily the more numerous of the two species throughout Lick Creek.

Historically, all of Lick Creek was available for spawning migratory bull trout and westslope cutthroat trout coming out of the East Fork Bitterroot River via Moose Creek.

For the Road 432 culvert, the proposal is to replace the existing 48-inch wide X 32-inch high X 52-foot long arch culvert with a 128-inch wide X 83-inch high X 60-foot long arch culvert. The new arch culvert would be 1.5 times wider than the bankfull channel width of seven feet (84 inches).

For the Road 5771 culvert, the proposal is to replace the existing 36-inch diameter X 36-foot long round culvert with a 108-inch wide X 35-inch high X 40-foot long bottomless arch. The new bottomless arch would be 1.8 times wider than the bankfull channel width of five feet (60 inches).

Both of the new structures would be stream simulation structures, and both would be sized to pass the 100-year flood.

D. Length of stream or size of lake that will be treated: Each replacement site is about 0.25 acres in area. Year-round access would be provided to about 2.7 miles of suitable fish habitat.

E. Project Budget:

Grant Request (Dollars): $ 50,000

Matching Dollars: $ **125,000 (none is secured at this time)**

Matching In-Kind Services:* $ **33,455 (completed engineering survey and designs)**
1,210 (mileage for USFS contract administrator engineer)

**salaries of government employees are not considered matching contributions*

Total Project Cost: $ 209,665

F. **Attach** itemized (line item) budget – *see budget template*

G. **Attach** specific project plans, detailed sketches, plan views, photographs, maps, evidence of landowner consent, evidence of public support and fish biologist support, and/or other information necessary to evaluate the merits of the project. If project involves water leasing or water salvage complete a *supplemental questionnaire.* (http://fwp.mt.gov/fwpDoc.html?id=36110)

H. **Attach** land management & maintenance plans that will ensure protection of the reclaimed area.

III. PROJECT BENEFITS (attach additional information to end of application):

A. What species of fish will benefit from this project?

Westslope cutthroat trout and bull trout. At present, westslope cutthroat trout occupy all of the suitable habitat in Lick Creek (about 2.4 miles), but the population is fragmented into three distinct segments by the two culvert barriers. Bull trout occupy the lower 1.5 miles of Lick Creek, but at very low densities, particularly upstream from the Road 5771 culvert. The lower 2.1 miles of Lick Creek is designated as critical habitat (spawning and rearing) for bull trout by the U.S. Fish and Wildlife Service.

B. How will the project protect or enhance wild fish habitat?

Eliminating the two culvert barriers and reconnecting the fragmented segments of the bull trout and westslope cutthroat trout populations would improve the resiliency of these populations to future disturbances such as fire and/or climate change. It would also provide year-round access to all of the potential spawning and rearing habitat in Lick Creek, and to cold water refuge habitat upstream of the Road 5771 culvert.

C. Will the project improve fish populations and/or fishing? To what extent?

Lick Creek is mostly unfished because of its small size and brushy stream banks. However, it is a nursery stream that produces and recruits juvenile bull trout and westslope cutthroat trout to larger streams that are frequently fished such as Moose Creek and the East Fork Bitterroot River.

D. Will the project increase public fishing opportunity for wild fish and, if so, how?

See response to C. Improved access to spawning and rearing habitat in Lick Creek could improve trout production and recruitment of juvenile trout to fished waters such as Moose Creek and the East Fork Bitterroot River.

E. The project agreement includes a 20-year maintenance commitment. Please discuss your ability to meet this commitment.

The new structures (arch culvert and bottomless arch) would have an expected lifespan of at least 50 years. The structures would be located on well-traveled Forest Service roads that receive regular maintenance with year-round access for all types of motorized vehicles (snowmobiles in winter; full size vehicles, OHVs, and motorcycles in summer).

F. What was the cause of habitat degradation in the area of this project and how will the project correct the cause?

The cause of habitat degradation is reduced (Road 432) or complete blockage of (Road 5771) upstream fish passage due to undersized culverts. Replacing the undersized culverts with larger structures will eliminate these barriers to fish movement and allow year-round access to all of the suitable fish habitat in Lick Creek.

G. What public benefits will be realized from this project?

The main public benefit that could be realized from this project would be improved trout production and recruitment of juvenile trout to fished waters such as Moose Creek and the East Fork Bitterroot River.

H. Will the project interfere with water or property rights of adjacent landowners? (explain):

No. The project would not affect water rights or private property rights. The project is located on Bitterroot National Forest land with no private property nearby.

I. Will the project result in the development of commercial recreational use on the site? (explain):

No. Commercial recreational use is currently not occurring on Lick Creek, nor would it be attracted to the area because of this project.

J. Is this project associated with the reclamation of past mining activity?

No

Each approved project applicant must enter into a written agreement with Montana Fish, Wildlife & Parks specifying terms and duration of the project. The applicant must obtain all applicable permits prior to project construction. A competitive bid process must be followed when using State funds.

IV. AUTHORIZING STATEMENT

I (we) hereby declare that the information and all statements to this application are true, complete, and accurate to the best of my (our) knowledge and that the project or activity complies with rules of the Future Fisheries Improvement Program.

Applicant Signature: _____ Date: MARCH 12, 2021

Sponsor (if applicable): _____

Submittal: **Applications must be *signed and received before* December 1 and June 1 of each year to be considered for the subsequent funding period**. Late or incomplete applications will be rejected.

Mail to:	Montana FWP Fish Management Bureau PO Box 200701 Helena, MT 59620-0701	Email:	Michelle McGree mmcgree@mt.gov (electronic submissions must be signed) For files over 10MB, use https://transfer.mt.gov

Applications may be rejected if this form is modified.

BUDGET TEMPLATE SHEET FOR FUTURE FISHERIES PROGRAM APPLICATIONS

Both tables must be completed or the application will be returned

WORK ITEMS (ITEMIZE BY CATEGORY)	NUMBER OF UNITS	UNIT DESCRIPTION*	COST/UNIT	TOTAL COST	CONTRIBUTIONS			
					FUTURE FISHERIES REQUEST	IN-KIND SERVICES**	IN-KIND CASH	TOTAL
Personnel* **								
Survey	44	hours	$106.58	$ 4,689.52		4,689.52		$ 4,689.52
Design	295	hours	$97.51	$ 28,765.45		28,765.45		$ 28,765.45
								$ -
								$ -
								$ -
				$ -				$ -
			Sub-Total	$ 33,454.97	$ -	$ 33,454.97	$ -	$ 33,454.97
Travel								
Mileage	2200	miles	$0.55	$ 1,210.00		1,210.00		$ 1,210.00
Per diem				$ -				$ -
			Sub-Total	$ 1,210.00	$ -	$ 1,210.00	$ -	$ 1,210.00
Construction Materials** **								
included in government construction contracts				$ -				$ -
				$ -				$ -
				$ -				$ -
				$ -				$ -
				$ -				$ -
				$ -				$ -
				$ -				$ -
				$ -				$ -
				$ -				$ -
			Sub-Total	$ -	$ -	$ -	$ -	$ -
Equipment and Labor								
Government construction contract for Road 432 culvert	1	each	$86,000.00	$ 86,000.00	25,000.00		61,000.00	$ 86,000.00
Government construction contract for Road 5771 culvert	1	each	$89,000.00	$ 89,000.00	25,000.00		64,000.00	$ 89,000.00
				$ -				$ -

BUDGET TEMPLATE SHEET FOR FUTURE FISHERIES PROGRAM APPLICATIONS

				$ -				$ -
				$ -				$ -
				$ -				$ -
			Sub-Total	$ 175,000.00	$ 50,000.00	$ -	$ 125,000.00	$ 175,000.00
Mobilization								
included in government construction contract				$ -				$ -
				$ -				$ -
				$ -				$ -
				$ -				$ -
			Sub-Total	$ -	$ -	$ -	$ -	$ -
			TOTALS	$ 209,664.97	$ 50,000.00	$ 34,664.97	$ 125,000.00	$ 209,664.97

OTHER REQUIREMENTS:

All of the columns in the budget table and the matching contribution table MUST be completed appropriately or the application will be invalid. Please see the example budget sheet for additional clarification.

*Units = feet, hours, inches, etc. Do not use lump sum unless there is no other way to describe the costs.

**Can include in-kind materials. Justification for in-kind labor (e.g. hourly rates used for calculations). Describe here or in text.

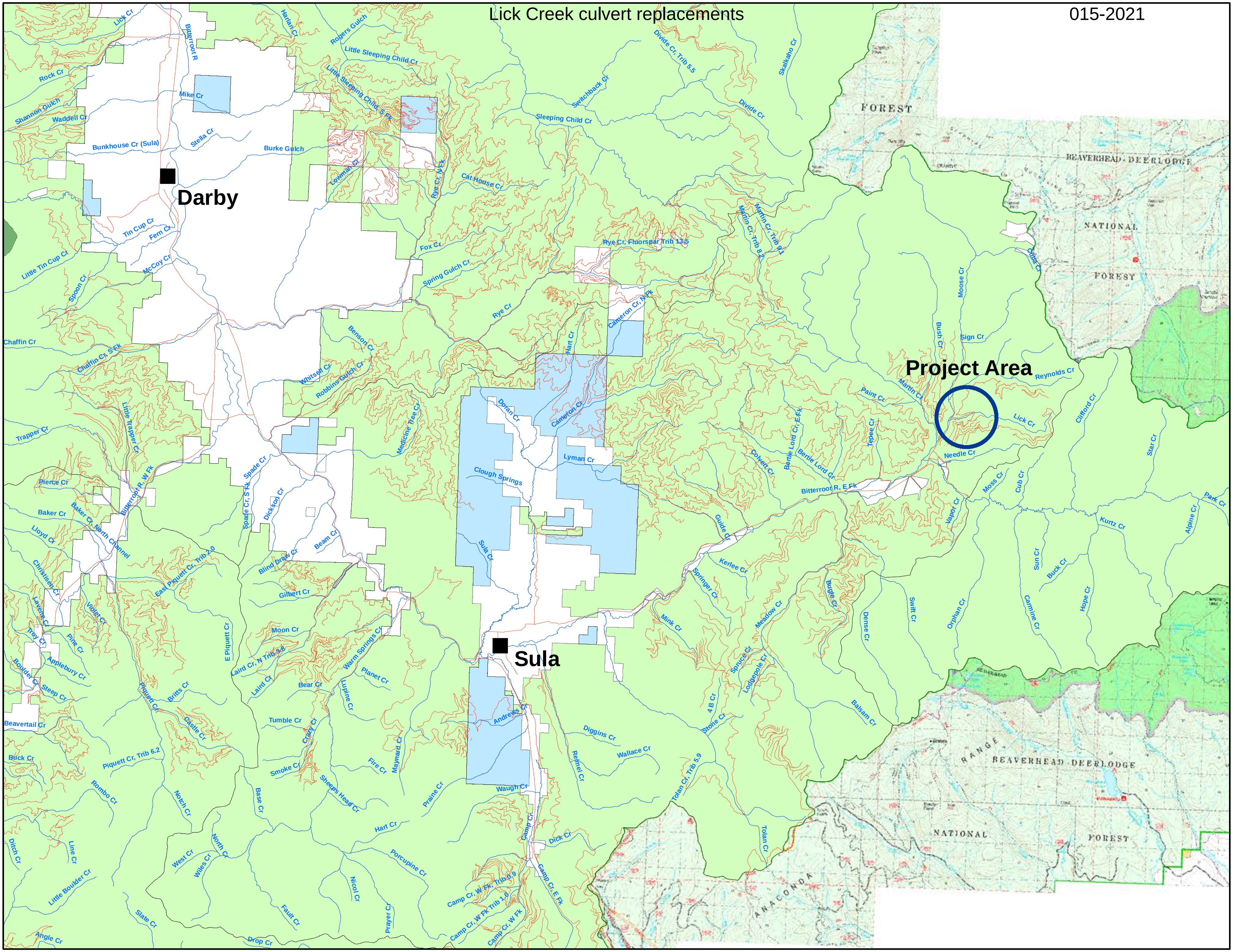
Reminder: Government salaries cannot be used as in-kind match

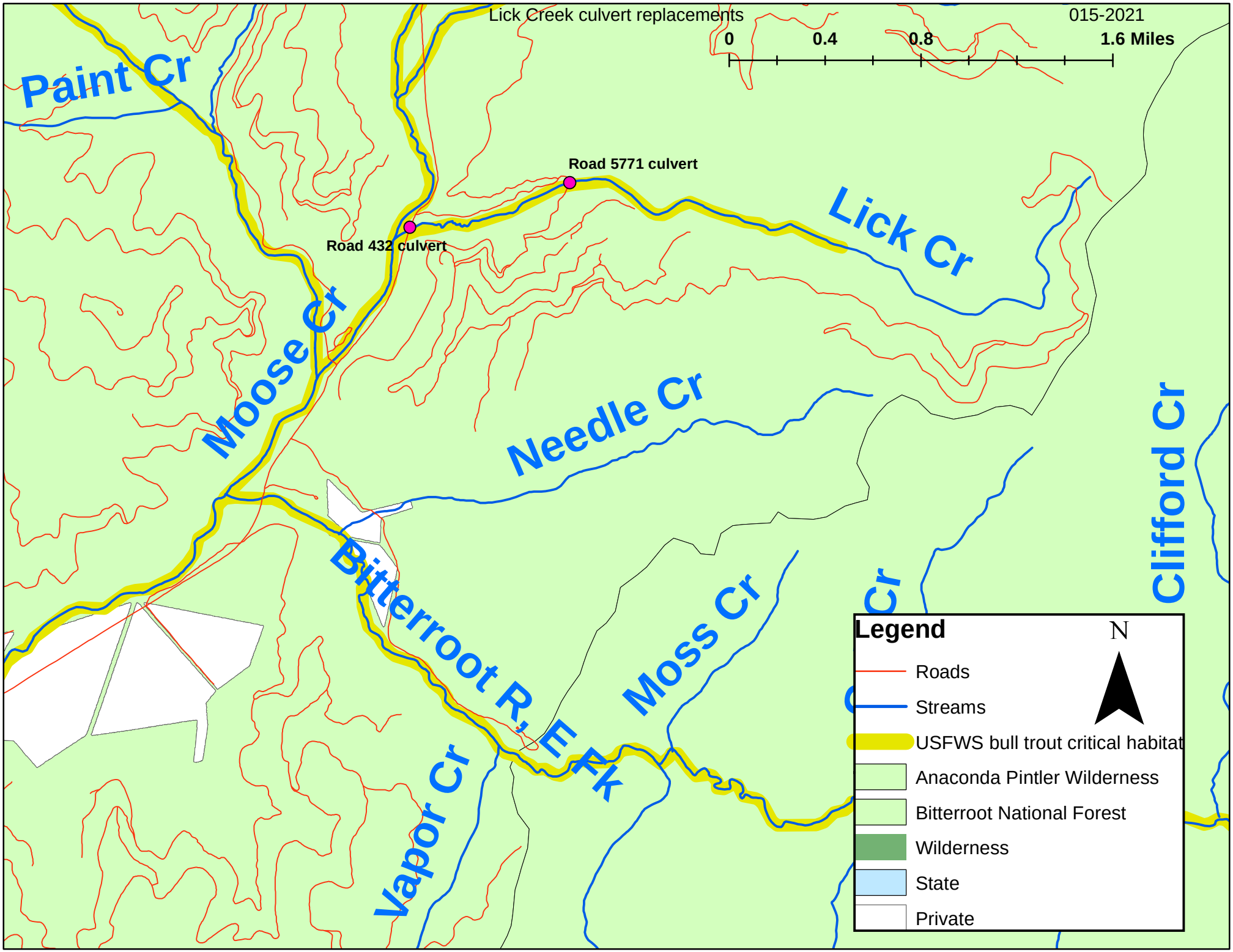
***The Review Panel suggests that design and oversight costs associated with a proposed project not exceed 15% of the total project budget. If design and oversight costs are in excess of 15%, applications must include a minimum of two competitive bids for the cost of undertaking the project.

****The Review Panel recommends a maximum fencing cost of $1.50 per foot. Additional costs may be the responsibility of the applicant and/or partners.

MATCHING CONTRIBUTIONS (do not include requested funds)

CONTRIBUTOR	IN-KIND SERVICE	IN-KIND CASH	TOTAL	Secured? (Y/N)
USFS Region One Aquatic Restoration Funds	$ -	$ 62,500.00	$ 62,500.00	N
Bitterroot National Forest	$ -	$ 62,500.00	$ 62,500.00	N
Morrison and Maierle Engineering Survey and Design	$ 33,454.97	$ -	$ 33,454.97	Y
Contract Administration Travel Expenses	$ 1,210.00	$ -	$ 1,210.00	Y
	$ -	$ -	$ -	
	$ -	$ -	$ -	
	$ -	$ -	$ -	
	$ -	$ -	$ -	
TOTALS	$ 34,664.97	$ 125,000.00	$ 159,664.97	


Lick Creek culvert replacements
015-2021
Darby
Sula
Project Area
Lick Cr
Needle Cr
Reynolds Cr
Martin Cr
Sign Cr
Moose Cr
Bush Cr
Paint Cr
Clifford Cr
Moss Cr
Cub Cr
Bitterroot R, E Fk
FOREST
NATIONAL
BEAVERHEAD - DEERLODGE
RANGE
ANACONDA


Lick Creek culvert replacements
015-2021
0
0.4
0.8
1.6 Miles
Paint Cr
Road 5771 culvert
Road 432 culvert
Lick Cr
Moose Cr
Needle Cr
Clifford Cr
Bitterroot R, E Fk
Moss Cr
Vapor Cr
Legend
N
Roads
Streams
USFWS bull trout critical habitat
Anaconda Pintler Wilderness
Bitterroot National Forest
Wilderness
State
Private

Lick Creek culvert photos, Forest Road 432

Road 432 culvert, looking upstream towards the outlet.

Lick Creek, looking downstream from the Road 432 crossing

Lick Creek, looking upstream from the Road 432 crossing

Lick Creek culvert photos, Forest Road 5771

Road 5771 culvert, looking upstream towards the outlet

Lick Creek, looking downstream from the Road 5771 crossing

Looking downstream through the barrel of the Road 5771 culvert

FWP.MT.GOV THE OUTSIDE IS IN US ALL.

March 15, 2021

Montana Fish, Wildlife & Parks
Future Fisheries Program, Attn: Michelle McGree
PO Box 200701
Helena, MT 59620

RE: Support for the Lick Creek Culvert Replacement Projects.

I am writing to express my support for the Bitterroot National Forest's culvert replacement projects on Lick Creek in the upper East Fork of the Bitterroot River. Lick Creek supports important populations of westslope cutthroat trout (a Montana Species of Concern) and bull trout, a Threatened Species under the Federal Endangered Species Act. The existing culverts on Forest Roads 432 and 5771 fragment the available habitat by forming partial (FSR 432) or complete (FSR 5771) barriers to upstream fish movement. These culverts are the only man-made barriers in the watershed. These proposed projects would eliminate these barriers and reconnect approximately 2.5 miles of quality habitat. These culvert replacements would enhance the long-term sustainability of westslope cutthroat trout and bull trout in Lick Creek, as well Moose Creek and the East Fork of the Bitterroot River. I am in full support of this project.

Montana Fish, Wildlife and Parks has collaborated with the Bitterroot National Forest on a number of aquatic habitat enhancement projects over the years. Based on these experiences, I can speak to their ability to develop and execute projects effectively and responsibly. I have full confidence that they will carry out the activities under this proposed grant in a manner that aligns well with the goals of the Future Fisheries program.

Sincerely,

Jason Lindstrom

Jason Lindstrom – Fisheries Biologist
Montana Fish, Wildlife & Parks
1801 N. First St.
Hamilton, MT 59840
Ph# (406) 363-7169

U.S. DEPARTMENT OF AGRICULTURE FOREST SERVICE, REGION ONE

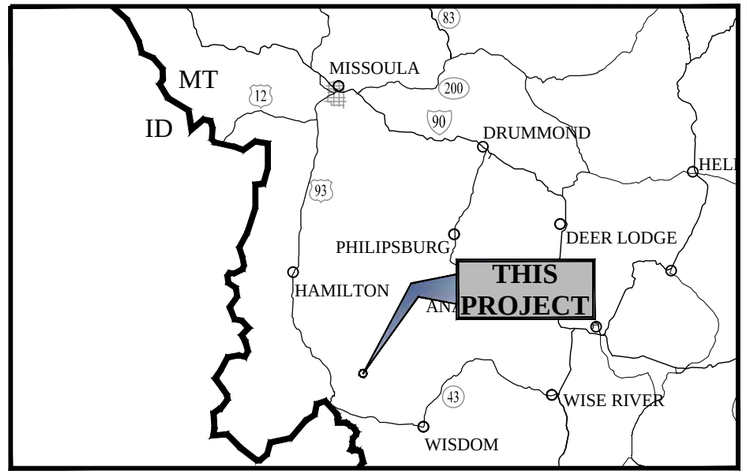
PROPOSED CULVERT PLANS FOR:

LICK CREEK CULVERT REPLACEMENT

(NFSR 432-MP 15.9)

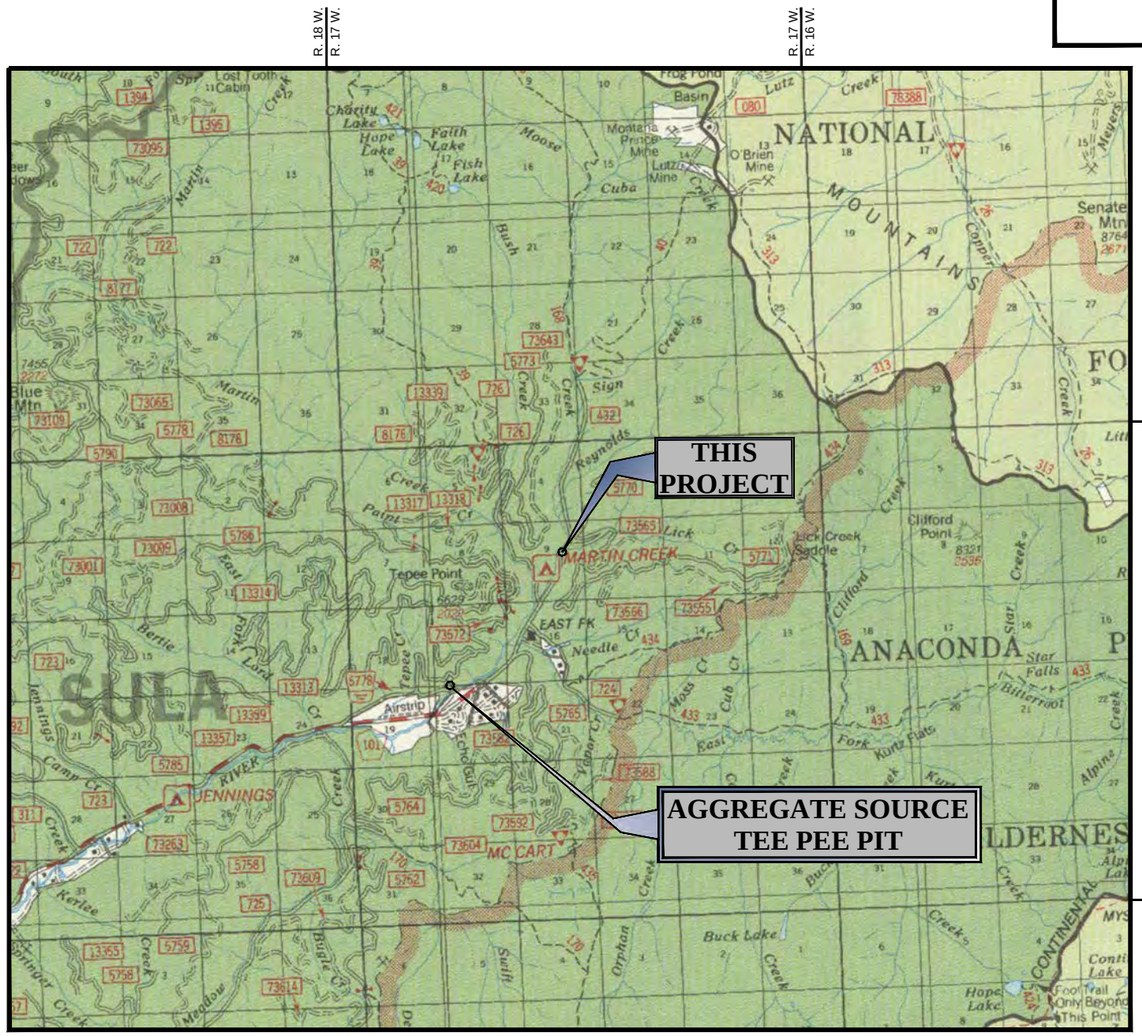
BITTERROOT NATIONAL FOREST
DARBY/SULA RANGER DISTRICT
RAVALLI COUNTY, MONTANA

REGION ONE



WESTERN MONTANA
SCALE: NO SCALE

INDEX TO SHEETS	
No.	DESCRIPTION
0	COVER SHEET
1	GENERAL NOTES & ESTIMATED QUANTITIES
2	EXISTING SITE CONDITIONS
3	ROAD PLAN & PROFILE
4	CREEK PLAN & PROFILE
5	GRADE CONTROLS & STRUCTURE DETAILS
6	STREAM ELEVATIONS & DIMENSIONS
7	MISCELLANEOUS DETAILS
8	CROSS SECTIONS



SEC. 9, T. 2 N., R. 17 W.

VICINITY MAP
SCALE: NO SCALE

REVIEWED:

_____ DATE _____

FOREST ENGINEER
BITTERROOT NATIONAL FOREST

RECOMMENDED:

_____ DATE _____

DARBY/SULA DISTRICT RANGER
BITTERROOT NATIONAL FOREST

APPROVED:

_____ DATE _____

FOREST SUPERVISOR
BITTERROOT NATIONAL FOREST

GOVERNMENT FURNISHED:

CRUSHED AGGREGATE

BORROW AND WASTE SITES

Morrison Maierle
engineers ▪ surveyors ▪ planners ▪ scientists
3011 Palmer Street Missoula, MT 59808
Phone: 406.542.8880 Fax: 406.542.4801

SUMMARY OF QUANTITIES

Pay Item	Description	Method of Measurement	Unit	Quantity
15101	**Mobilization**	*LSQ*	*LS*	*1*
15201	**Construction Survey and Staking**	*LSQ*	*LS*	*1*
15713	**Soil Erosion, Pollution Control, Stream Diversion & Dewatering**	*LSQ*	*LS*	*1*
20304	**Removal of Culvert, Disposal Method (a)**	*LSQ*	*LS*	*1*
20404	**Unclassified Borrow, Government Source**	*CQ*	*CY*	*540*
20478	**Roadway Embankment**	*LSQ*	*LS*	*1*
20806	**Structure Excavation**	*LSQ*	*LS*	*1*
25101a	**Placed Riprap, Class 3**	*CQ*	*CY*	*19*
25101b	**Placed Channel Rock, Class CR-3**	*CQ*	*CY*	*41*
25150	**Grade Control Structure**	*AQ*	*EACH*	*7*
30801	**Crushed Aggregate (Roadway and Bedding), Government Source**	*CQ*	*CY*	*148*
60211	**128" Span, 83" Rise Corrugated Steel Pipe-Arch, 12 Gauge Thickness for Steel**	*AQ*	*LF*	*60*
62201a	**Equipment Rental, Hydraulic Excavator with Thumb**	*AQ*	*HR*	*16*
62201b	**Equipment Rental, Dump Truck**	*AQ*	*HR*	*16*
62528	**Seeding, Fertilizing, and Mulching Dry Method**	*LSQ*	*LS*	*1*

GENERAL NOTES:

SPECIFICATIONS: CONSTRUCT THE PROJECT IN COMPLIANCE WITH FEDERAL HIGHWAY ADMINISTRATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION OF ROADS AND BRIDGES ON FEDERAL HIGHWAY PROJECTS" (FP-03) AND APPLICABLE FOREST SERVICE SPECIAL SPECIFICATIONS (FSSS).

DESIGN SPECIFICATIONS: THIS STRUCTURE IS DESIGNED FOR HL-93 IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS 7TH ADDITION - 2014 WITH CURRENT INTERIMS.

CORRUGATED STEEL PIPE: THE ANNULAR CORRUGATED STEEL PIPE SHALL BE 128-INCH SPAN BY 83-INCH RISE PIPE-ARCH, 60' LENGTH WITH 5X1 CORRUGATIONS AND GALVANIZED STEEL OF 12 GAUGE THICKNESS. STEEL PIPE SHALL BE CONNECTED PER MANUFACTURER'S SPECIFICATIONS. SUBMIT SHOP DRAWINGS FOR REVIEW.

SLASH:
ALL VEGETATION REMOVED DURING EXCAVATION SHALL BE STOCKPILED. SPREAD STOCKPILED SLASH ON FINISHED SLOPES AT THE DIRECTION OF THE CO.

SITE SPECIFIC NOTES:

1. STRUCTURE BACKFILLING IS INCIDENTAL TO PAY ITEM 20806, STRUCTURE EXCAVATION.
2. PAY ITEM 25101a, RIPRAP CLASS 3, QUANTITY INCLUDES RIPRAP USED TO PROTECT INLET AND OUTLET.
3. PAY ITEM 25150, GRADE CONTROL STRUCTURES, INCLUDES ALL EFFORT TO CONSTRUCT GRADE CONTROL STRUCTURES AS SHOWN IN THE CONSTRUCTION DRAWINGS USING CLASS CR-3 CHANNEL ROCK. CHANNEL ROCK IS PAID UNDER PAY ITEM 25101b.
4. PAY ITEM 25101b, CLASS CR-3 CHANNEL ROCK, QUANTITY INCLUDES ROCK USED FOR GRADE CONTROL STRUCTURES, BANKLINE ROCK, AND ALL EFFORT TO CONSTRUCT CHANNEL BANKLINE.
5. PLACING STREAMBED MATERIAL INSIDE OF STRUCTURE IS INCIDENTAL TO STRUCTURE EXCAVATION. PLACING OF CHANNEL ROCK FOR BANKLINE AND GRADE CONTROL STRUCTURES ARE PAID UNDER PAY ITEMS 25101b AND 25150, RESPECTIVELY.
6. EXCAVATION OF STREAM CHANNEL OUTSIDE OF STRUCTURE IS INCIDENTAL TO PAY ITEM 20806.
7. CRUSHED AGGREGATE, PAY ITEM 30801, INCLUDES QUANTITIES FOR BOTH THE ROADWAY BASE AGGREGATE AND FOR THE CULVERT BEDDING, FROM GOVERNMENT SOURCE. COMPACTION REQUIREMENTS FOR ROADWAY AGGREGATE (SEE SHEET 7) AND CULVERT BEDDING (SEE SHEET 5) ARE AS SHOWN ON THE DRAWINGS.
8. A WASTE SITE WILL BE IDENTIFIED WITHIN 5 MILES OF THE PROJECT SITE FOR UNUSED EXCAVATION MATERIAL.

EXCAVATION & BACKFILL NOTES:

STRUCTURE EXCAVATION

1. SHALL BE COMPLETED IN ACCORDANCE WITH FP-03, SECTION 208.
2. LIMITS SHOWN ARE MINIMUM EXCAVATION REQUIREMENTS BASED ON ENGINEERS DETERMINATION OF OSHA SOIL TYPE B AND OSHA EXCAVATION REQUIREMENTS. DETERMINATION IS BASED ON SURFACE OBSERVATIONS AND ACTUAL SITE CONDITIONS MAY VARY. IF CONTRACTOR ENCOUNTERS A DIFFERENT SOIL TYPE THAN STATED ABOVE, CONTACT CO IMMEDIATELY.
3. CONTRACTOR SHALL SUBMIT AN EXCAVATION PLAN TO CO FOR APPROVAL. PLAN SHALL INCLUDE DRAWINGS AND WRITTEN OUTLINE ILLUSTRATING AND DESCRIBING PROPOSED EXCAVATION LIMITS, METHODS, EQUIPMENT, LOCATION OF STOCKPILES, AND ESTIMATED QUANTITIES AND COMPLY WITH OSHA EXCAVATION SOIL TYPING AND REQUIREMENTS. CHANGES TO THE EXCAVATION LIMITS SHOWN ON SHEET 3 FOR CONTRACTOR'S DEWATERING METHODS OR OTHER CONTRACTOR CONVENIENCE, MUST BE SHOWN ON THE PLAN AND ARE THE RESPONSIBILITY OF THE CONTRACTOR AND INCIDENTAL TO THE WORK.
4. EXCAVATION QUANTITY IS FOR INFORMATION PURPOSES ONLY AND SHALL BE VERIFIED BY CONTRACTOR.

STRUCTURE BACKFILL

1. BACKFILL SHALL BE PLACED IN ACCORDANCE WITH FP-03, SECTION 208 AND MEET THE REQUIREMENTS OF FP-03, SECTION 704.04 STRUCTURAL BACKFILL.
2. BACKFILL LIMITS AS SHOWN ON SHEET 3 ARE MINIMUM REQUIREMENTS.
3. SATURATED SOILS ARE CONSIDERED UNSUITABLE FOR USE AS STRUCTURAL BACKFILL. ALL UNSUITABLE SOILS MUST BE HAULED AND DISPOSED TO THE DESIGNATED WASTE SITE.
4. NON-SATURATED STRUCTURE EXCAVATION MATERIAL IS ANTICIPATED TO BE SUITABLE FOR BACKFILL MATERIAL
   - 4.1. SOME MIXING AND SORTING MAY BE REQUIRED.
   - 4.2. MUST HAVE APPROVAL FROM CO PRIOR TO USE.
5. BACKFILL MATERIAL SHALL BE COMPACTED IN ACCORDANCE WITH FP-03, 208.11 (AASHTO T99, METHOD C AND AASHTO T310).
6. BACKFILL QUANTITY IS FOR INFORMATION PURPOSES ONLY AND SHALL BE VERIFIED BY CONTRACTOR.

Morrison Maierle
engineers ▪ surveyors ▪ planners ▪ scientists
3011 Palmer Street Missoula, MT 59808
Phone: 406.542.8880 Fax: 406.542.4801

FOREST SERVICE US DEPARTMENT OF AGRICULTURE
REGION ONE

LICK CREEK CULVERT REPLACEMENT

NFSR 432, M.P. 15.9

GENERAL NOTES & ESTIMATED QUANTITIES

Designed By: MDB	Design Checked: DAJ	Sheet: **1** of **8**
Drawn By: CRH	Drawing Checked: MDB	

CONTROL POINT TABLE				
POINT NUMBER	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	20000.00	40000.00	1000.00	NAIL
2	19946.41	40004.22	998.23	RPC
3	20140.94	40059.83	1003.69	RPC

EDGE OF WATER AT TIME OF SURVEY (TYP.)

STREAM THALWEG (TYP.)

EXISTING 48" X 30" X 52LF CMP

MMI CONTROL POINT (TYP.)

EDGE OF ROAD (TYP.)

ROAD CENTERLINE (TYP.)

NFSR 432

LICK CREEK

995

1000

1005

1010

1015

1020

1

2

3

N

0 15 30

SCALE IN FEET

M:\0916\071 - USFS 5 YEAR CONTRACT\12- BNF AOP\LICK CREEK 432\ACADSHEETS\2-EXISTING SITE.DWG PLOTTED BY:MELINDA HANKEL ON Mar/31/2016

Morrison Maierle
engineers ▪ surveyors ▪ planners ▪ scientists
3011 Palmer Street Missoula, MT 59808
Phone: 406.542.8880 Fax: 406.542.4801

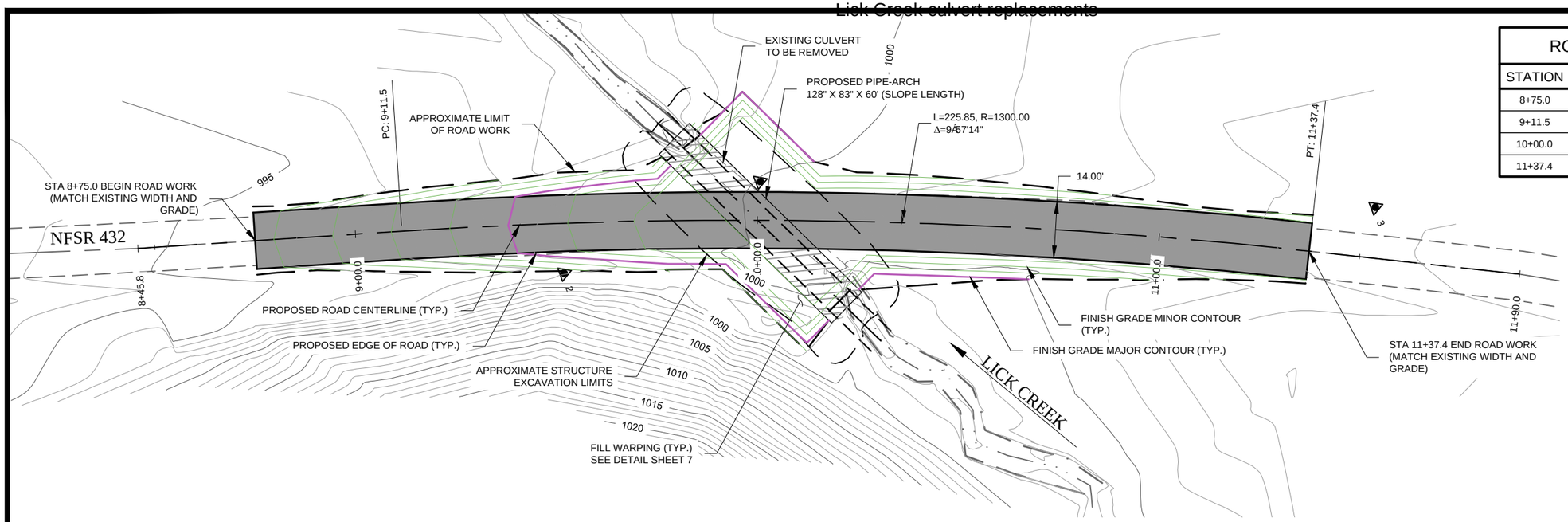
FOREST SERVICE USDA DEPARTMENT OF AGRICULTURE
REGION ONE

LICK CREEK CULVERT REPLACEMENT

NFSR 432, M.P. 15.9

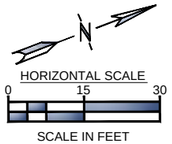
EXISTING SITE CONDITIONS

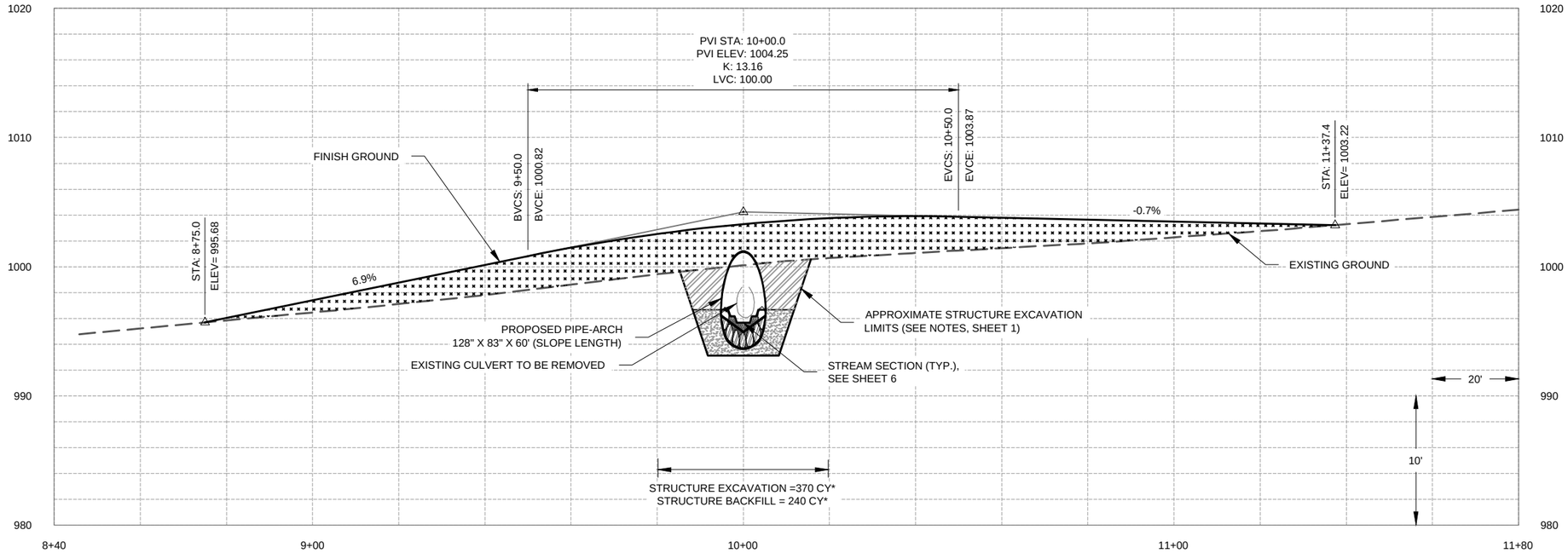
Designed By: MDB	Design Checked: DAJ	Sheet: **2** of **8**
Drawn By: CRH	Drawing Checked: MDB	

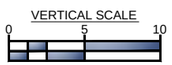


ROAD CENTERLINE COORDINATE TABLE

STATION	DESCRIPTION	NORTHING	EASTING	ELEVATION
8+75.0	BEGIN ROAD WORK	19877.41	39969.68	995.68
9+11.5	PC	19912.36	39980.28	998.18
10+00.0	THALWEG CROSSING	20000.77	40010.60	1003.30
11+37.4	END ROAD WORK/PT	20121.72	40064.22	1003.22







NOTES:

1. A SOIL INVESTIGATION HAS NOT BEEN CONDUCTED AT THIS CULVERT SITE. IF BEDROCK IS ENCOUNTERED NOTIFY THE CO IMMEDIATELY. DO NOT PLACE FOOTINGS ON BEDROCK OR ANY OTHER UNSUITABLE BEDDING MATERIAL.
2. CLEARING AND GRUBBING SHALL BE INCIDENTAL TO THIS PROJECT. DISPOSE OF CLEARING AND GRUBBING DEBRIS PER FSSS 203.
3. CONTRACTOR SHALL DISPOSE OF EXCESS AND UNSUITABLE STRUCTURE EXCAVATION MATERIAL AT DESIGNATED WASTE AREA. CO WILL DESIGNATE A WASTE AREA WITHIN 5 MILES OF THE PROJECT.
4. SEED AND MULCH ALL DISTURBED AREAS AFTER CONSTRUCTION PER FSSS 625.

* QUANTITIES ARE ESTIMATES & PROVIDED FOR INFORMATIONAL PURPOSES ONLY

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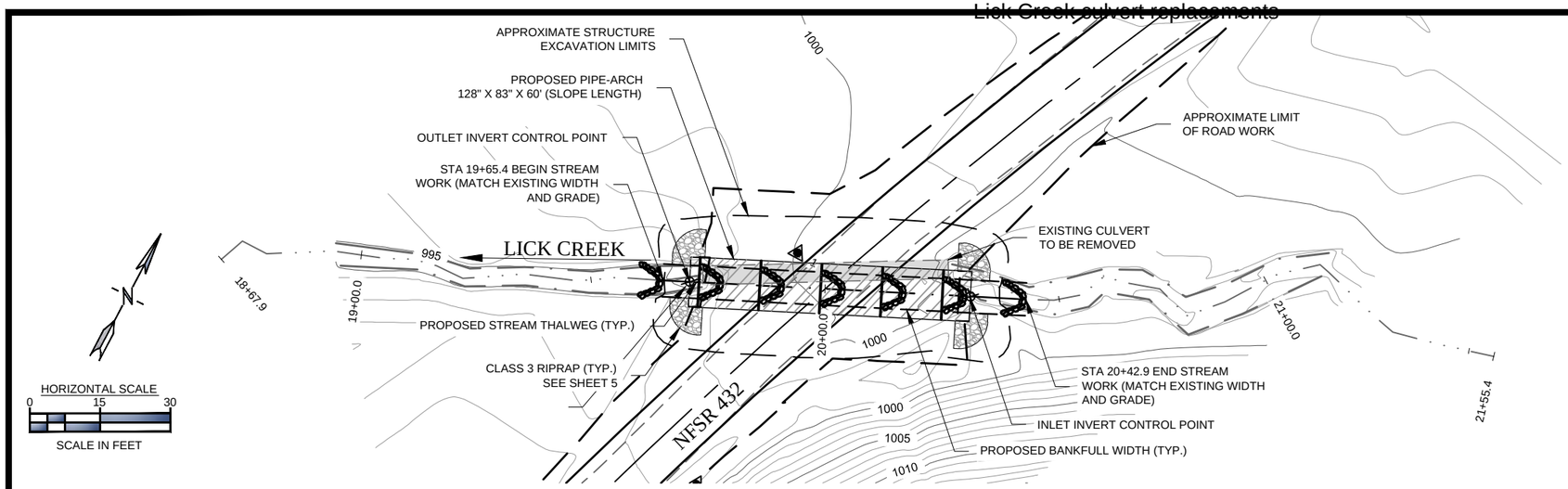
FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE
REGION ONE

LICK CREEK CULVERT REPLACEMENT

NFSR 432, M.P. 15.9

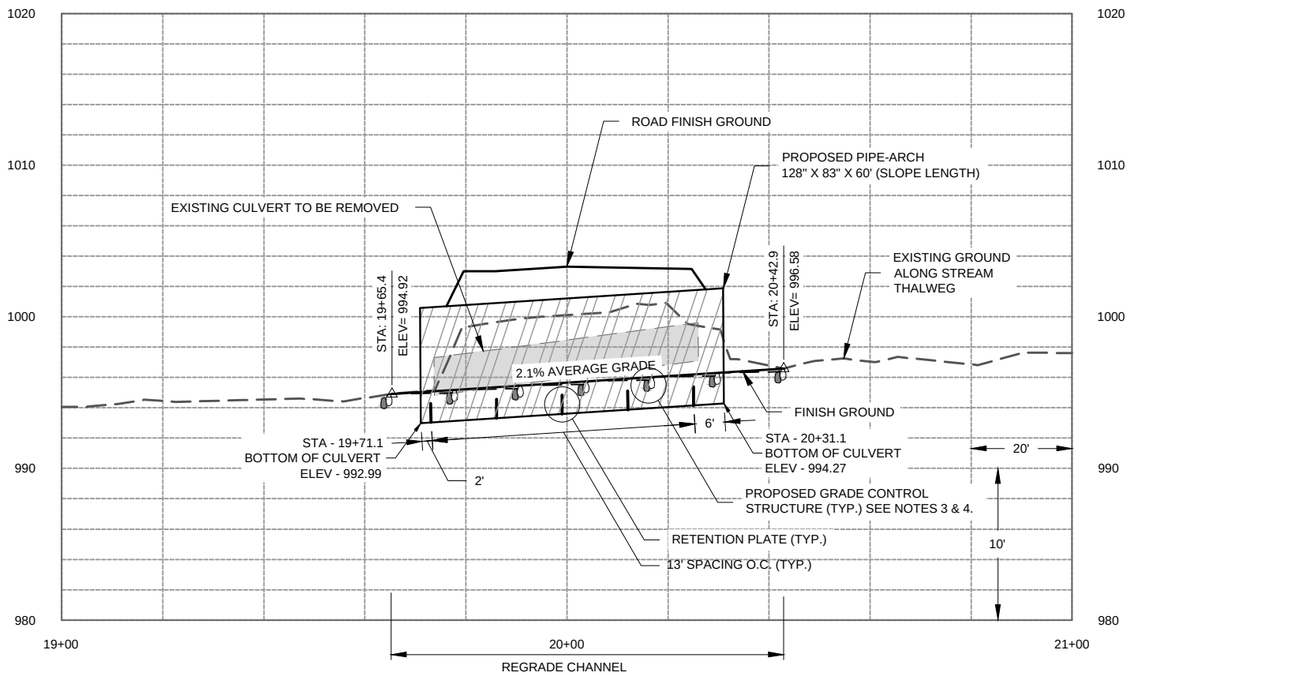
ROAD PLAN & PROFILE

Designed By: MDB	Design Checked: DAJ	Sheet: **3** of **8**
Drawn By: CRH	Drawing Checked: MDB	



CREEK THALWEG COORDINATE TABLE

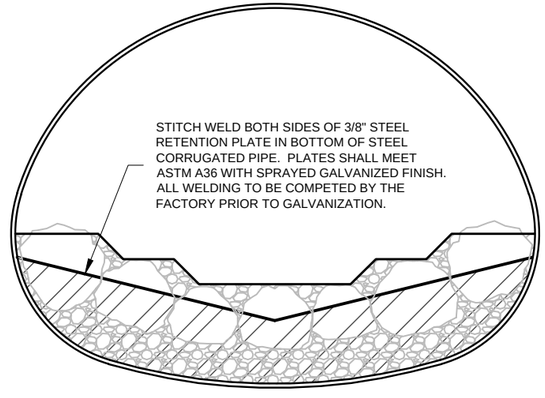
STATION	DESCRIPTION	NORTHING	EASTING	ELEVATION
	OUTLET INVERT CONTROL POINT	19983.80	39982.60	992.99
	INLET INVERT CONTROL POINT	20009.23	40036.93	994.27
19+65.4	BEGIN STREAM WORK	19981.38	39977.43	994.92
20+00.0	ROAD C/L CROSSING @ THALWEG	19996.06	40008.80	995.66
20+42.9	END STREAM WORK	20014.25	40047.66	996.58



REGRADE CHANNEL
THIS WORK INCIDENTAL TO STRUCTURE EXCAVATION (ITEM 20806) (SEE NOTE 1).
GRADE CONTROL STRUCTURE SPACING IS APPROXIMATELY
13' SPACING, LOCATION, & NUMBER OF GRADE CONTROL
STRUCTURES MAY BE ADJUSTED BY CO.

NOTES:

1. UTILIZE NATIVE STREAMBED MATERIAL TO REGRADE AND SHAPE THE STREAM CHANNEL. REGRADE AND SHAPE THE CHANNEL WITHIN THE CULVERT PER DETAILS ON SHEET 6. REGRADE AND SHAPE THE CHANNEL OUTSIDE THE CULVERT PER THE TYPICAL CHANNEL SECTION DETAIL ON SHEET 6.
2. CONTRACTOR MUST DIVERT STREAM CHANNEL AROUND WORK AREA DURING CONSTRUCTION. CONTRACTOR MUST SUBMIT A STREAM DIVERSION PLAN AND SOIL EROSION CONTROL PLAN TO THE CO FOR APPROVAL PRIOR TO STARTING CONSTRUCTION.
3. GRADE CONTROL STRUCTURES FOLLOW THE GEOMETRY OF THE TYPICAL CHANNEL SECTION. GRADE CONTROL STRUCTURES DIP AT THE THALWEG AND RISE TO BANKLINE ELEVATION AT BOTH SIDES. MAY BE ADJUSTED BY CO. SEE DETAILS ON SHEET 5.
4. GRADE CONTROL STRUCTURES SHOWN IN PLAN AND PROFILE VIEW ARE FOR GRAPHICAL REPRESENTATION ONLY.



RETENTION PLATE DETAIL
NOT TO SCALE

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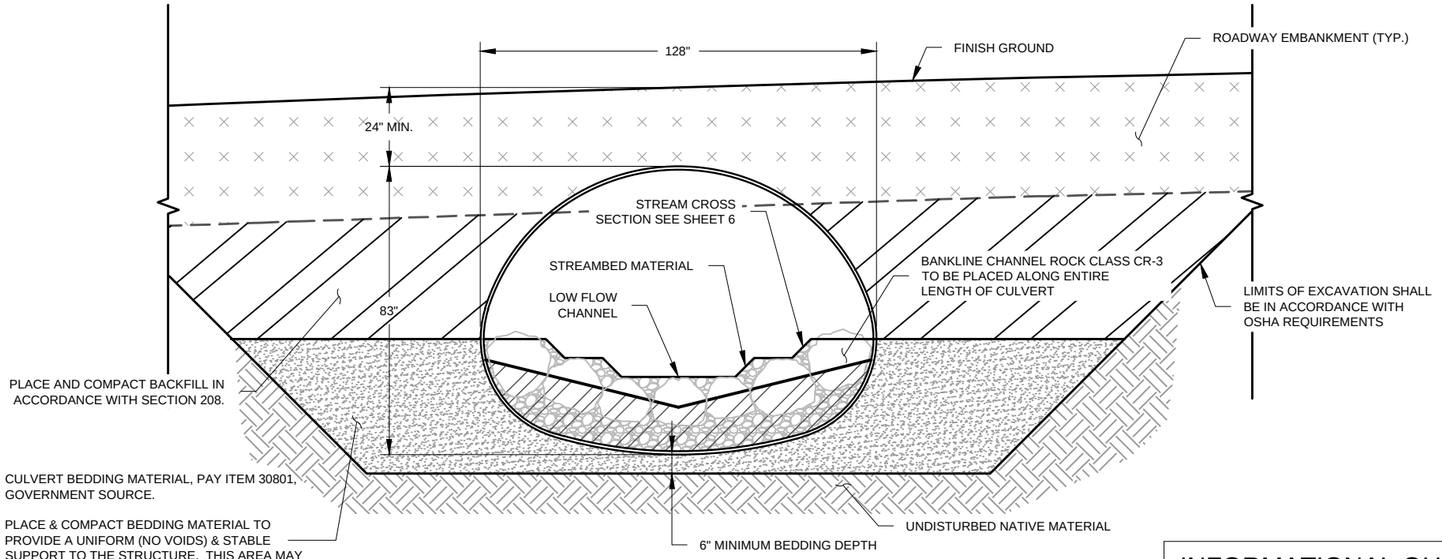
FOREST SERVICE US DEPARTMENT OF AGRICULTURE
REGION ONE

LICK CREEK CULVERT REPLACEMENT

NFSR 432, M.P. 15.9

CREEK PLAN & PROFILE

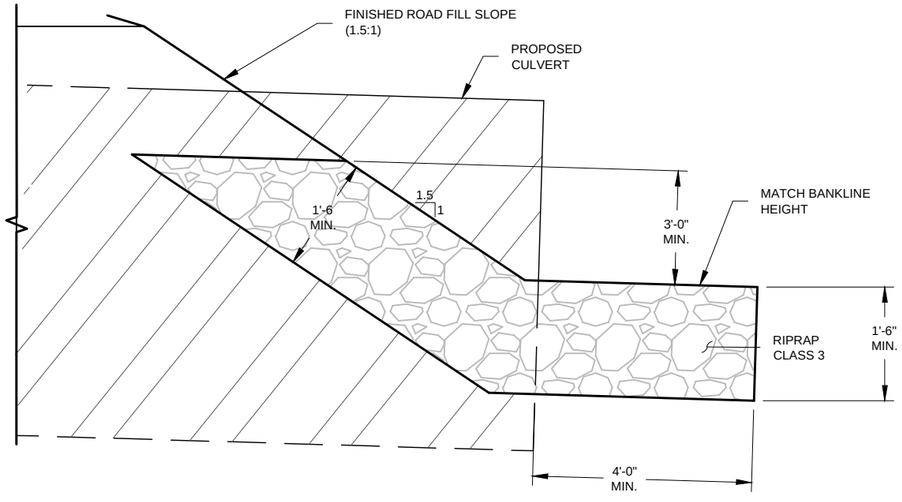
Designed By: MDB	Design Checked: DAJ	Sheet: **4** of **8**
Drawn By: CRH	Drawing Checked: MDB	



CORRUGATED STEEL PIPE CULVERT DETAIL

SCALE: N.T.S.

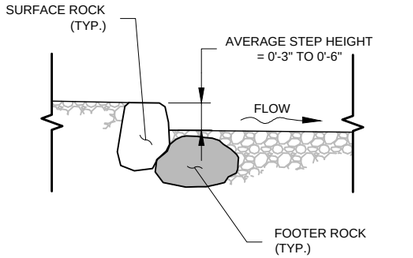
INFORMATIONAL QUANTITIES		
ITEM DESCRIPTION	UNIT	QUANTITY
PIPE BEDDING	CY	78



NOTE:
REFER TO SHEET 4 FOR LOCATION OF RIPRAP ALONG CULVERT INLET/OUTLET. EXTEND RIPRAP 6' HORIZONTAL BOTH SIDES OF THE CULVERT.

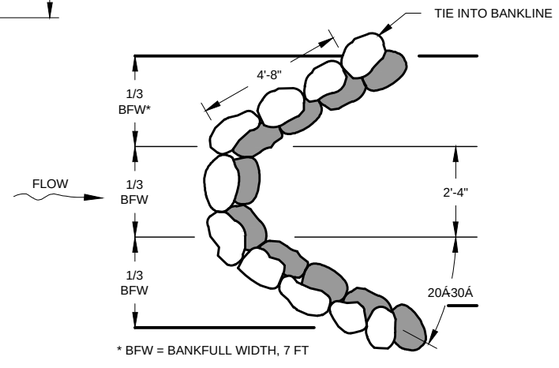
TYPICAL INLET/OUTLET RIPRAP PROFILE

SCALE: N.T.S.



GRADE CONTROL STRUCTURE
ROCK WEIR/STEP POOL DETAIL

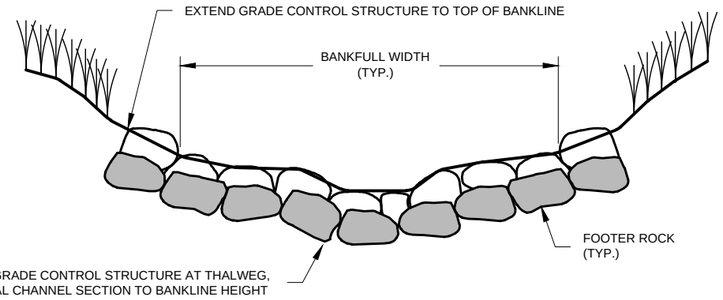
SCALE: N.T.S.



* BFW = BANKFULL WIDTH, 7 FT

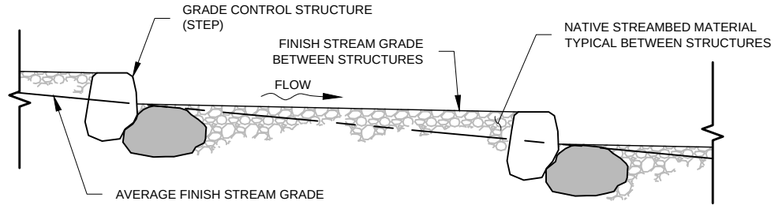
GRADE CONTROL STRUCTURE
ROCK WEIR DIMENSIONS

SCALE: N.T.S.



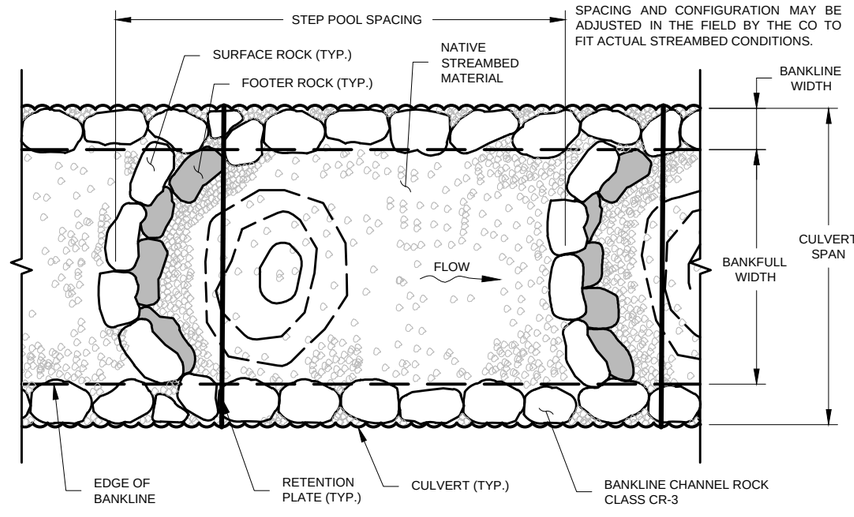
GRADE CONTROL STRUCTURE

SCALE: N.T.S.



GRADE CONTROL STRUCTURE - PROFILE VIEW

SCALE: N.T.S.



GRADE CONTROL STRUCTURE - PLAN VIEW
ROCK WEIR/STEP POOL STREAM TYPE

SCALE: N.T.S.

NOTES:

1. REGRADE THE STREAMBED TO THE EXTENTS SHOWN ON THE DRAWINGS. MECHANICALLY COMPACT NATIVE STREAMBED AS DIRECTED BY CO. ENSURE ALL VOIDS WITHIN THE STREAMBED AND GRADE CONTROL STRUCTURES ARE FILLED. ALL STREAMBED WORK INCIDENTAL TO ITEM 20806.
2. EACH GRADE CONTROL STRUCTURE UTILIZES APPROXIMATELY 0.7 CY TO 1.4 CY OF CLASS CR-3 CHANNEL ROCK. CONTRACTOR TO VERIFY.

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FOREST SERVICE US DEPARTMENT OF AGRICULTURE
REGION ONE

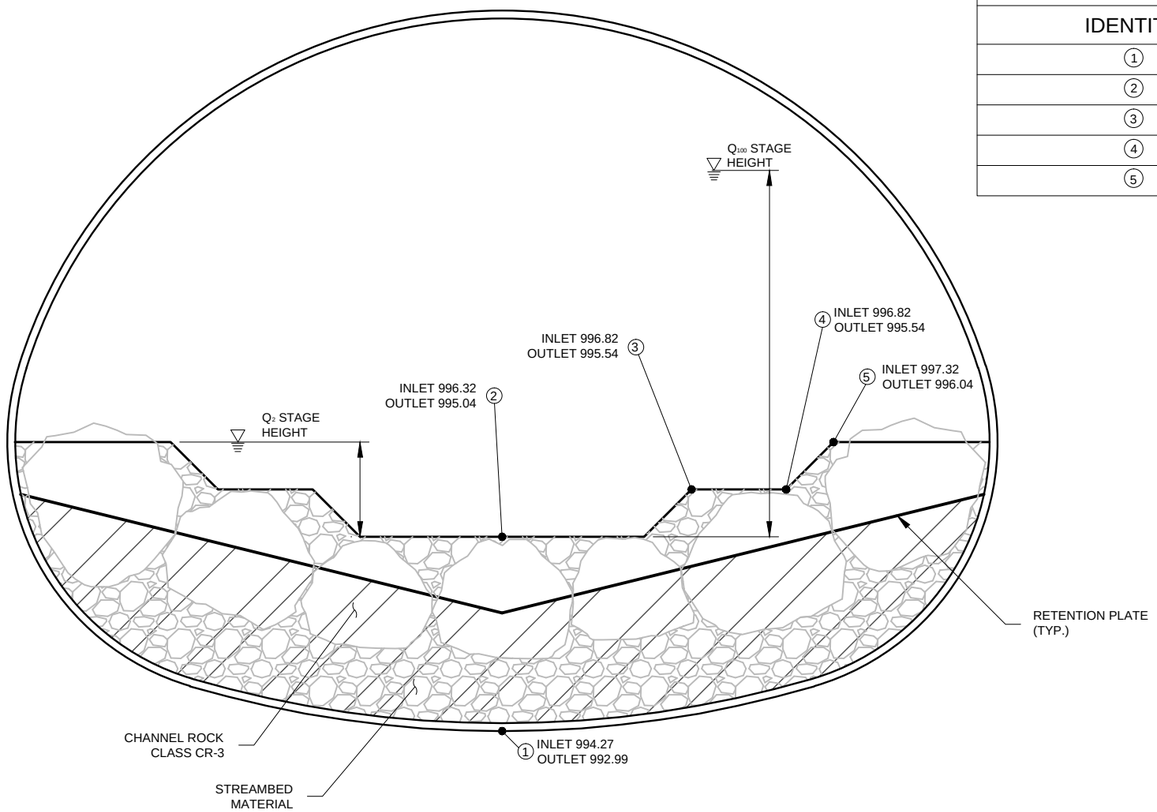
LICK CREEK CULVERT REPLACEMENT

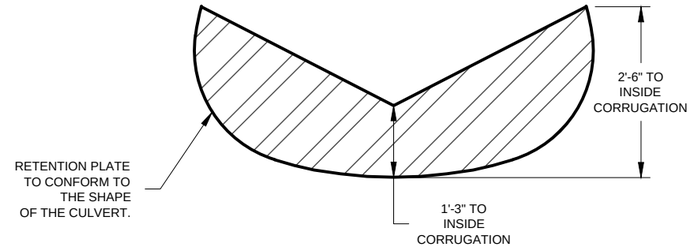
NFSR 432, M.P. 15.9

GRADE CONTROLS & STRUCTURE DETAILS

Designed By: MDB	Design Checked: DAJ	Sheet: **5** of **8**
Drawn By: MDH	Drawing Checked: MDB	

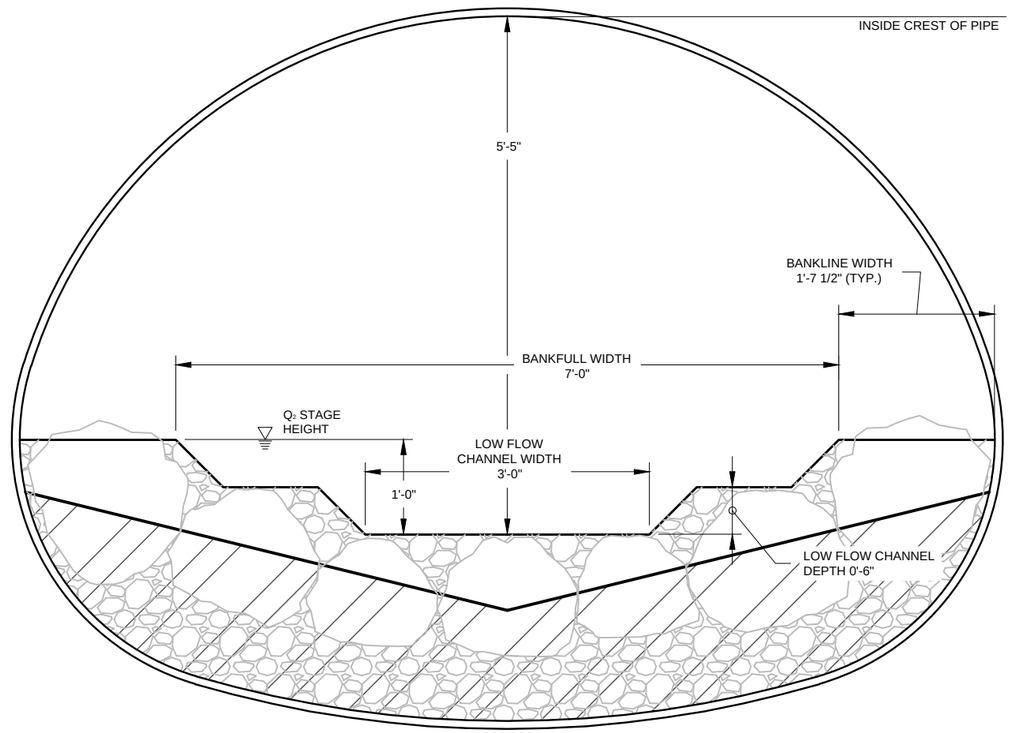
STREAM CROSS-SECTION ELEVATIONS (FT.)	
IDENTITY	DESCRIPTION
①	PIPE INVERT (OUTSIDE CORRUGATION)
②	THALWEG
③	TOP OF LOW FLOW CHANNEL
④	BOTTOM OF CHANNEL
⑤	TOP OF BANKLINE WIDTH





RETENTION PLATE DETAILS

NOT TO SCALE

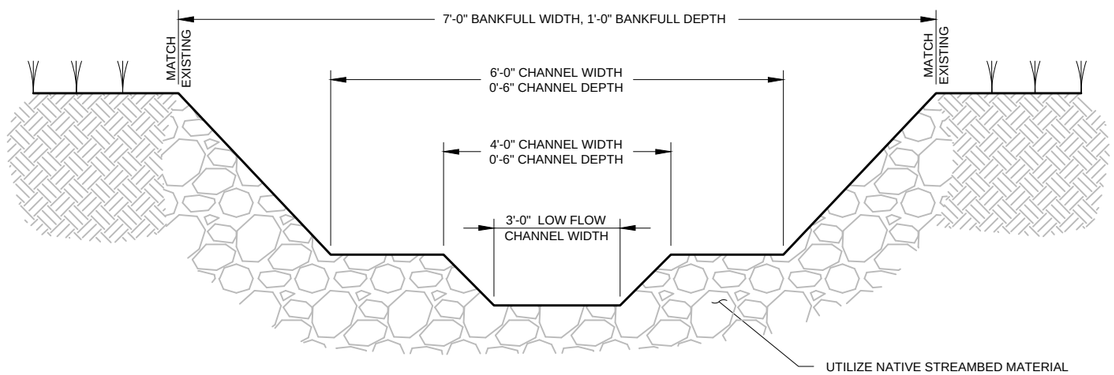


STREAM CROSS-SECTION DIMENSIONS

SCALE: N.T.S.

STREAM INLET/OUTLET CROSS-SECTION ELEVATIONS

SCALE: N.T.S.



TYPICAL CHANNEL SECTION

SCALE: N.T.S.

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REGION ONE

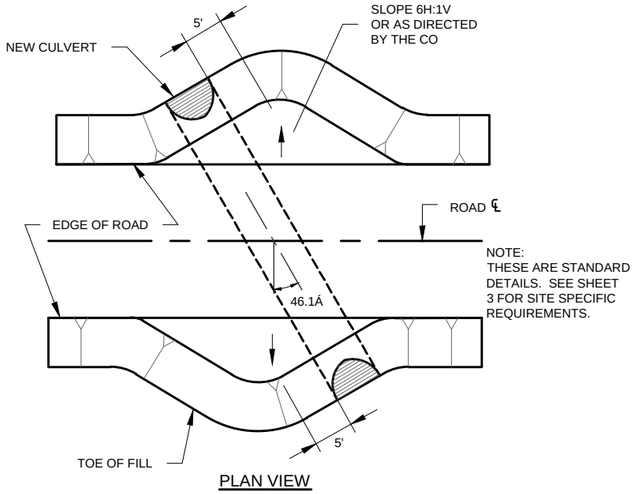
LICK CREEK CULVERT REPLACEMENT

NFSR 432, M.P. 15.9

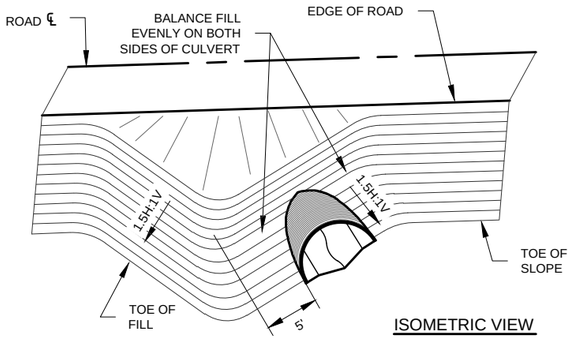
STREAM ELEVATIONS & DIMENSIONS

Designed By: MDB	Design Checked: DAJ	Sheet: **6** of **8**
Drawn By: MDH	Drawing Checked: MDB	

M:\0916\07\1 - USFS 5 YEAR CONTRACT\12- BNF AO\PLICK CREEK 432\ACAD\SHEETS\6-STREAM ELEVATIONS & DIMENSIONS.DWG PLOTTED BY: MELINDA HANKEL ON Mar/31/2016



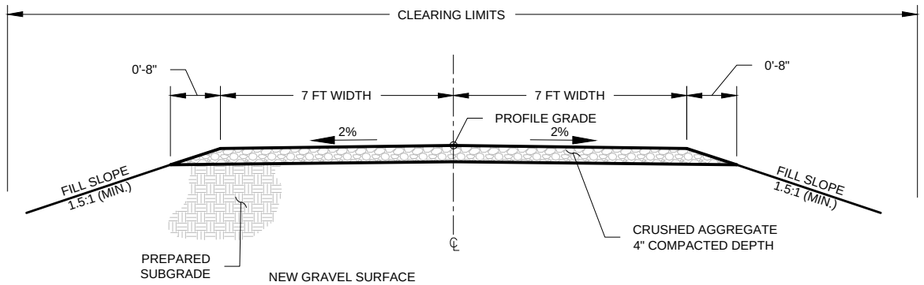
PLAN VIEW



ISOMETRIC VIEW

FILL WARPING DETAILS

SCALE: N.T.S.



ROAD NO.	FROM STA.	TO STA.	WIDTH
NFSR 432	8+75.03	11+37.40	14'

NOTE:

1. ROADWAY AGGREGATE SHALL BE COMPACTED TO MEET REQUIREMENTS 0F SECTION 308, COMPACTION METHOD 2.

TYPICAL ROAD CROSS SECTION

SCALE: N.T.S.

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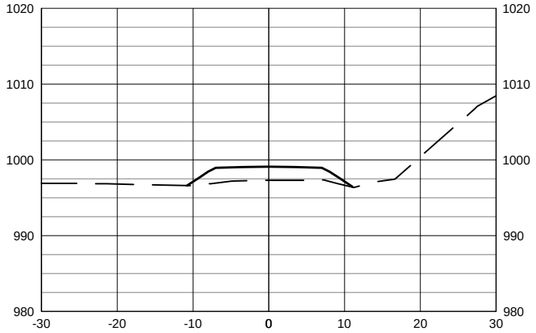
FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE
REGION ONE

LICK CREEK CULVERT REPLACEMENT

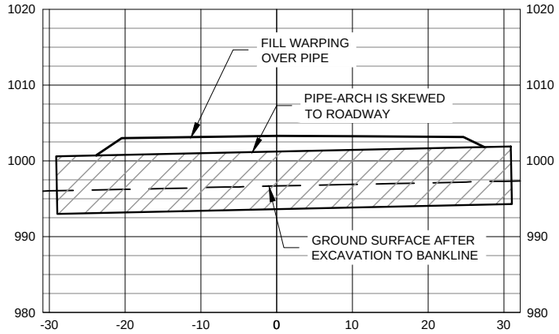
NFSR 432, M.P. 15.9

MISCELLANEOUS DETAILS

Designed By: MDB	Design Checked: DAJ	Sheet: **7** of **8**
Drawn By: MDH	Drawing Checked: MDB	

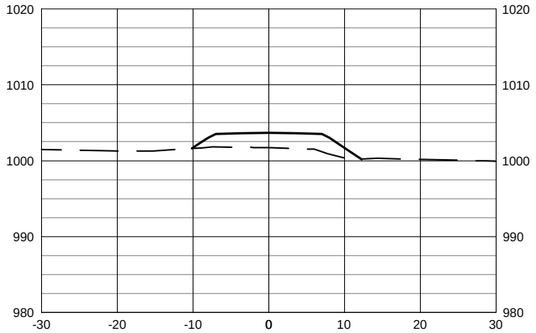


STA. 9+25.00



STA. 10+00.00

NOTE:
CROSS SECTION 10+00.00 IS CUT PARALLEL TO PIPE. ALL OTHER SECTIONS ARE PERPENDICULAR TO ROAD CENTERLINE.



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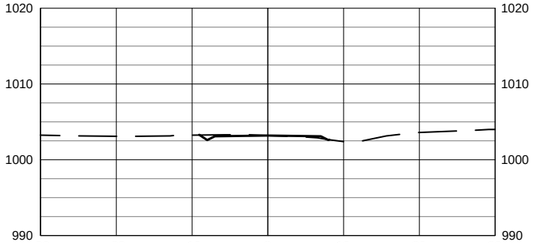
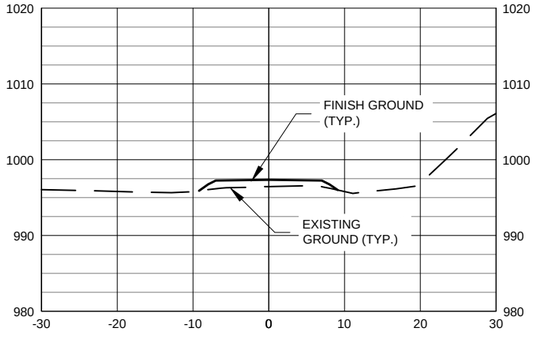


STA. 11+37.40



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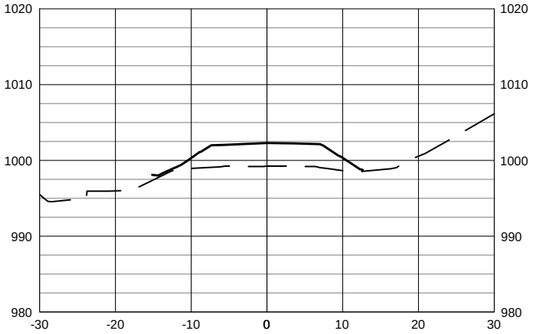
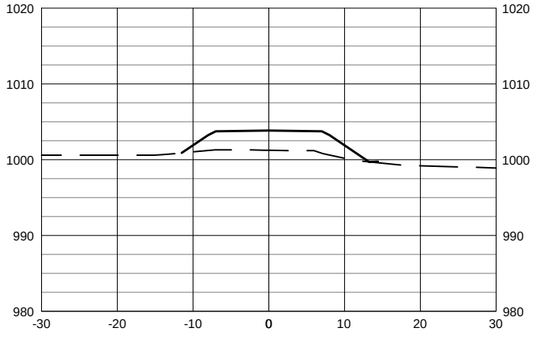
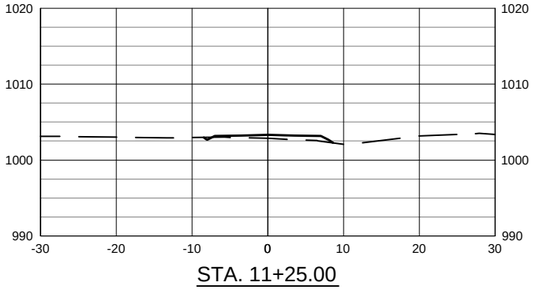


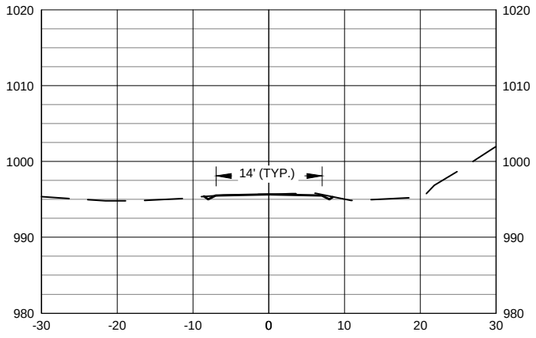
STA. 9+75.00



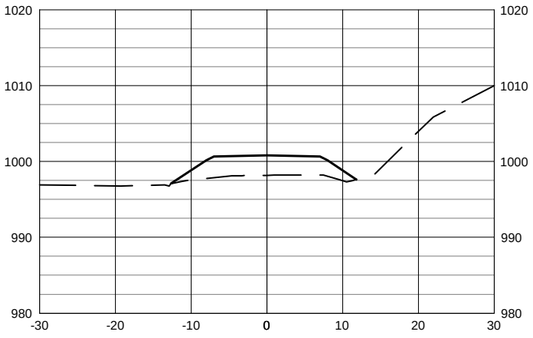
STA. 10+50.00



STA. 11+25.00



STA. 8+75.03



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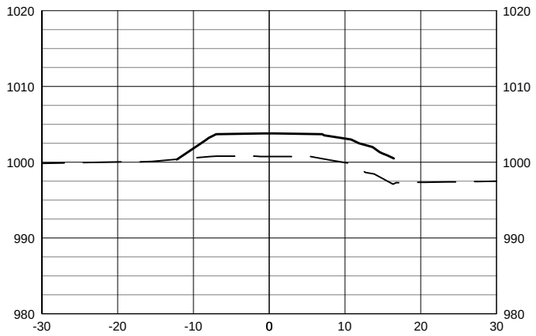

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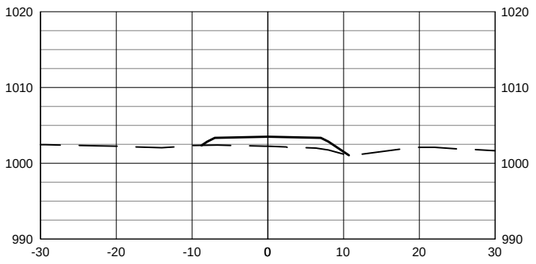

STA. 11+00.00

VERTICAL SCALE
0 10 20
SCALE IN FEET

HORIZONTAL SCALE
0 10 20
SCALE IN FEET

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FOREST SERVICE US DEPARTMENT OF AGRICULTURE
REGION ONE

LICK CREEK CULVERT REPLACEMENT

NFSR 432, M.P. 15.9

CROSS SECTIONS

Designed By: MDB	Design Checked: DAJ
Drawn By: MDH	Drawing Checked: MDB

Sheet: **8** of **8**

U.S. DEPARTMENT OF AGRICULTURE FOREST SERVICE, REGION ONE

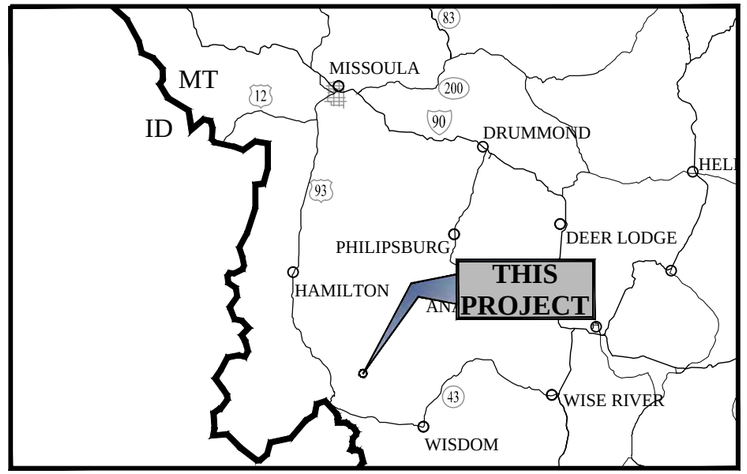
PROPOSED CULVERT PLANS FOR:

LICK CREEK CULVERT REPLACEMENT

(NFSR 5771-MP 0.71)

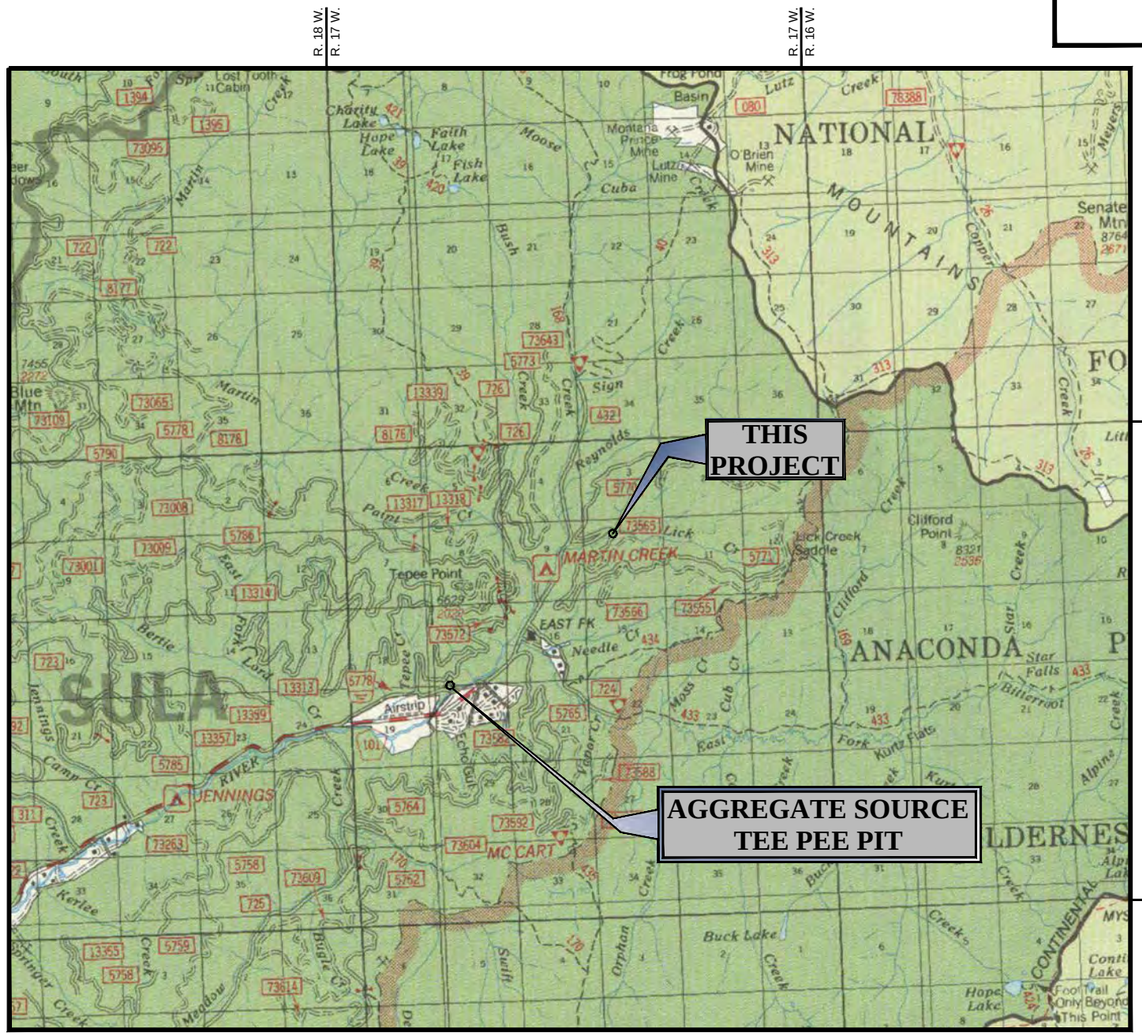
BITTERROOT NATIONAL FOREST
DARBY/SULA RANGER DISTRICT
RAVALLI COUNTY, MONTANA

REGION ONE



WESTERN MONTANA
SCALE: NO SCALE

INDEX TO SHEETS



SEC. 10, T. 2 N., R. 17 W.

VICINITY MAP
SCALE: NO SCALE

MONTANA
MATTHEW D. BARNES
No. 32934 PE
03/31/2016
LICENSED PROFESSIONAL ENGINEER

GOVERNMENT FURNISHED:
CRUSHED AGGREGATE
BORROW AND WASTE SITES

REVIEWED:

_____ DATE _____
FOREST ENGINEER
BITTERROOT NATIONAL FOREST

RECOMMENDED:

_____ DATE _____
DARBY/SULA DISTRICT RANGER
BITTERROOT NATIONAL FOREST

APPROVED:

_____ DATE _____
FOREST SUPERVISOR
BITTERROOT NATIONAL FOREST

Morrison Maierle
engineers ▪ surveyors ▪ planners ▪ scientists
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SUMMARY OF QUANTITIES

Pay Item	Description	Method of Measurement	Unit	Quantity
15101	**Mobilization**	*LSQ*	*LS*	*1*
15201	**Construction Survey and Staking**	*LSQ*	*LS*	*1*
15710	**Sediment Trap**	*AQ*	*EACH*	*2*
15713	**Soil Erosion, Pollution Control, Stream Diversion & Dewatering**	*LSQ*	*LS*	*1*
20304	**Removal of Culvert, Disposal Method (a)**	*LSQ*	*LS*	*1*
20404	**Unclassified Borrow, Government Source**	*CQ*	*CY*	*200*
20426	**Grade Dip**	*AQ*	*EACH*	*1*
20478	**Roadway Embankment**	*LSQ*	*LS*	*1*
20806	**Structure Excavation**	*LSQ*	*LS*	*1*
25101a	**Placed Riprap, Class 3**	*CQ*	*CY*	*34*
25101b	**Placed Channel Rock, Class CR-3**	*CQ*	*CY*	*41*
25150	**Grade Control Structure**	*AQ*	*EACH*	*7*
27250	**Geocell Abutment Stabilization, 6 inch depth**	*CQ*	*SY*	*48*
30801	**Roadway Aggregate, Compaction Method 2 (Government Source)**	*CQ*	*CY*	*50*
553A05	**Precast Concrete Member - Footings**	*LSQ*	*LS*	*1*
60201	**18" Corrugated Metal Culvert**	*AQ*	*LF*	*30*
60304	**9' Span, 2'-11" Rise Structural Plate Arch, 12 Gauge Thickness for Steel**	*AQ*	*LF*	*40*
62201a	**Equipment Rental, Hydraulic Excavator with Thumb**	*AQ*	*HR*	*16*
62201b	**Equipment Rental, Dump Truck**	*AQ*	*HR*	*16*
62528	**Seeding, Fertilizing, and Mulching Dry Method**	*LSQ*	*LS*	*1*

EXCAVATION & BACKFILL NOTES:

STRUCTURE EXCAVATION

1. SHALL BE COMPLETED IN ACCORDANCE WITH FP-03, SECTION 208.
2. LIMITS SHOWN ARE MINIMUM EXCAVATION REQUIREMENTS BASED ON ENGINEERS DETERMINATION OF OSHA SOIL TYPE B AND OSHA EXCAVATION REQUIREMENTS. DETERMINATION IS BASED ON SURFACE OBSERVATIONS AND ACTUAL SITE CONDITIONS MAY VARY. IF CONTRACTOR ENCOUNTERS A DIFFERENT SOIL TYPE THAN STATED ABOVE, CONTACT CO IMMEDIATELY.
3. CONTRACTOR SHALL SUBMIT AN EXCAVATION PLAN TO CO FOR APPROVAL. PLAN SHALL INCLUDE DRAWINGS AND WRITTEN OUTLINE ILLUSTRATING AND DESCRIBING PROPOSED EXCAVATION LIMITS, METHODS, EQUIPMENT, LOCATION OF STOCKPILES, AND ESTIMATED QUANTITIES AND COMPLY WITH OSHA EXCAVATION SOIL TYPING AND REQUIREMENTS. CHANGES TO THE EXCAVATION LIMITS SHOWN ON SHEET 3 FOR CONTRACTOR'S DEWATERING METHODS OR OTHER CONTRACTOR CONVENIENCE, MUST BE SHOWN ON THE PLAN AND ARE THE RESPONSIBILITY OF THE CONTRACTOR AND INCIDENTAL TO THE WORK.

STRUCTURE BACKFILL

1. BACKFILL SHALL BE PLACED IN ACCORDANCE WITH FP-03, SECTION 208 AND MEET THE REQUIREMENTS OF FP-03, SECTION 704.04 STRUCTURAL BACKFILL.
2. BACKFILL LIMITS AS SHOWN ON SHEET 3 ARE MINIMUM REQUIREMENTS.
3. SATURATED SOILS ARE CONSIDERED UNSUITABLE FOR USE AS STRUCTURAL BACKFILL. ALL UNSUITABLE SOILS MUST BE HAULED AND DISPOSED TO THE DESIGNATED WASTE SITE.
4. NON-SATURATED STRUCTURE EXCAVATION MATERIAL IS ANTICIPATED TO BE SUITABLE FOR BACKFILL MATERIAL
   - 4.1. SOME MIXING AND SORTING MAY BE REQUIRED.
   - 4.2. MUST HAVE APPROVAL FROM CO PRIOR TO USE.
5. BACKFILL MATERIAL SHALL BE COMPACTED IN ACCORDANCE WITH FP-03, 208.11 (AASHTO T99, METHOD C AND AASHTO T310).
6. BACKFILL QUANTITY IS FOR INFORMATION PURPOSES ONLY AND SHALL BE VERIFIED BY CONTRACTOR.

GENERAL NOTES:

SPECIFICATIONS: CONSTRUCT THE PROJECT IN COMPLIANCE WITH FEDERAL HIGHWAY ADMINISTRATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION OF ROADS AND BRIDGES ON FEDERAL HIGHWAY PROJECTS" (FP-03) AND APPLICABLE FOREST SERVICE SPECIAL SPECIFICATIONS (FSSS).

DESIGN SPECIFICATIONS: THIS STRUCTURAL PLATE ARCH IS DESIGNED FOR HL-93 IN ACCORDANCE WITH THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS 7TH ADDITION - 2014 WITH CURRENT INTERIMS.

CONCRETE: USE CONCRETE WITH 28 DAY COMPRESSIVE STRENGTH, F'C = 4,000 PSI. CONCRETE SHALL BE CLASS A(AE). CONCRETE SHALL HAVE A FORMED SURFACE FINISH. USE PRECAST CONCRETE FOOTINGS. PRECAST CONCRETE FOOTINGS SHALL REACH 28 DAY COMPRESSIVE STRENGTH BEFORE SHIPPING. PRECAST SECTIONS MAY BE BOLTED OR WELDED TOGETHER AS SHOWN ON SHEET 7. THE CONTRACTOR SHALL DESIGN LIFTING POINTS FOR PRECAST SECTIONS.

CHAMFER ALL EXPOSED EDGES OF CONCRETE AND FILLET ALL RE-ENTRANT ANGLES 3/4" UNLESS NOTED OTHERWISE.

REINFORCING STEEL: PROVIDE REINFORCING STEEL THAT CONFORMS TO ASTM A615 (AASHTO M31), GRADE 60. PROVIDE CONCRETE COVER AS SHOWN, AND WHERE NOT SHOWN, CONFORM TO AASHTO. USE MAXIMUM SPLICE LENGTHS FOR ALL BAR SIZES. ALL CUTTING AND BENDING OF REBAR SHALL CONFORM TO ASTM 315.

HARDWARE AND STRUCTURAL STEEL: USE STEEL STRUCTURE PLATE AND ALL FASTENERS CONFORMING TO AASHTO M167. PROVIDE MISCELLANEOUS GALVANIZED STEEL SHAPES, BARS AND PLATES MEETING AASHTO M183 (ASTM A36).

STRUCTURAL PLATE ARCH: THE STRUCTURE PLATE ARCH SHALL BE 2'-11" RISE, 9'-0" SPAN, 40' LENGTH WITH 6X2 CORRUGATIONS WITH GALVANIZED STEEL PLATE OF 12 GAUGE THICKNESS. STEEL PLATES SHALL BE CONNECTED PER MANUFACTURER'S SPECIFICATIONS. SUBMIT SHOP DRAWINGS FOR REVIEW. BEVEL ENDS OF PLATE ARCH TO MAINTAIN MINIMUM 2' OF TOP OF ARCH EXPOSED. SUBMIT SHOP DRAWINGS FOR REVIEW.

SLASH:
ALL VEGETATION REMOVED DURING EXCAVATION SHALL BE STOCKPILED. SPREAD STOCKPILED SLASH ON FINISHED SLOPES AT THE DIRECTION OF THE CO.

SITE SPECIFIC NOTES:

1. STRUCTURE BACKFILLING IS INCIDENTAL TO PAY ITEM 20806, STRUCTURE EXCAVATION.
2. TRAFFIC CONTROL IS INCIDENTAL TO PAY ITEM 15101 MOBILIZATION.
3. PAY ITEM 20304 IS DISPOSAL OF CULVERT ONLY. EXCAVATION OF EXISTING STRUCTURE IS INCIDENTAL TO STRUCTURE EXCAVATION - PAY ITEM 20806. STRUCTURE BACKFILLING IS INCIDENTAL TO PAY ITEM 20806.
4. PAY ITEM 25101a, PLACED RIPRAP CLASS 3, QUANTITY INCLUDES RIPRAP USED TO PROTECT INLET AND OUTLET OF STRUCTURAL PLATE ARCH CULVERT AND ALL EFFORT TO PLACE RIPRAP.
5. PAY ITEM 25101b, PLACED CHANNEL ROCK CLASS CR-3, QUANTITY INCLUDES ROCK USED FOR GRADE CONTROL STRUCTURES, BANKLINE ROCK, AND ALL EFFORT TO CONSTRUCT CHANNEL BANKLINE.
6. PAY ITEM 25150, GRADE CONTROL STRUCTURES, INCLUDES ALL EFFORT TO CONSTRUCT GRADE CONTROL STRUCTURES AS SHOWN IN THE CONSTRUCTION DRAWINGS USING CLASS CR-3 CHANNEL ROCK. CHANNEL ROCK IS PAID UNDER PAY ITEM 25101b.
7. A WASTE SITE WILL BE IDENTIFIED WITHIN 5 MILES OF THE PROJECT SITE FOR UNUSED EXCAVATION MATERIAL.
8. AREAS FOR EXCAVATION OR DISTURBANCE THAT CONTAIN EXISTING RIPARIAN SOD MATS SHALL HAVE SOD MATS STRIPPED AND STOCKPILED PRIOR TO DISTURBANCE. STRIP EXISTING SOD MATS IN APPROXIMATELY 3' WIDE BY 6' LONG SECTIONS FOR PLACEMENT AS DIRECTED BY CO.
9. SEDIMENT TRAP, PAY ITEM 15710, INCLUDES QUANTITY FOR CLASS 1 AND 2 RIPRAP.

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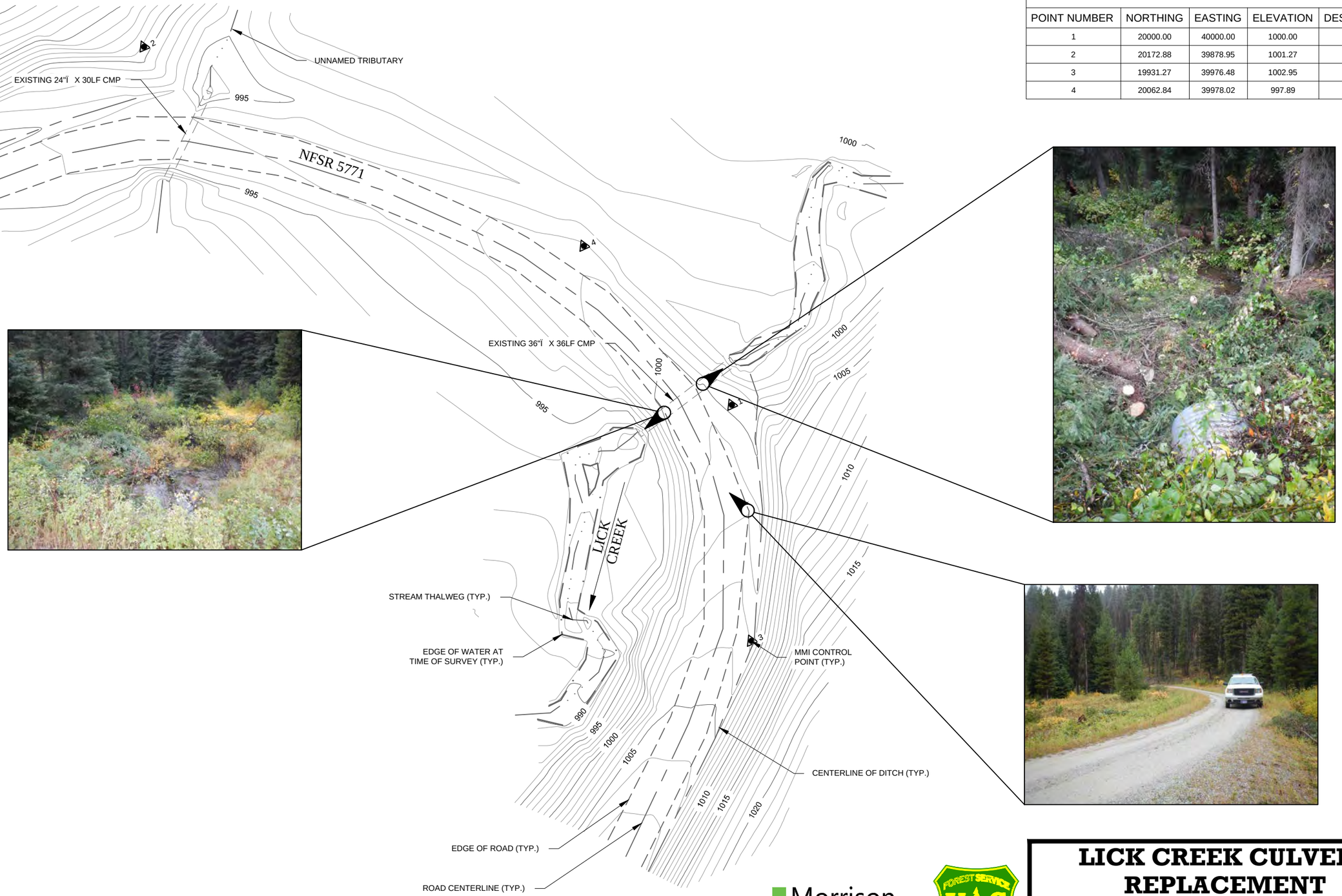
LICK CREEK CULVERT REPLACEMENT

NFSR 5771, M.P. 0.71

GENERAL NOTES & ESTIMATED QUANTITIES

Designed By: MDB	Design Checked: DAJ	Sheet: **1** of **9**
Drawn By: CRH	Drawing Checked: MDB	

CONTROL POINT TABLE				
POINT NUMBER	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	20000.00	40000.00	1000.00	NAIL
2	20172.88	39878.95	1001.27	RPC
3	19931.27	39976.48	1002.95	RPC
4	20062.84	39978.02	997.89	NAIL



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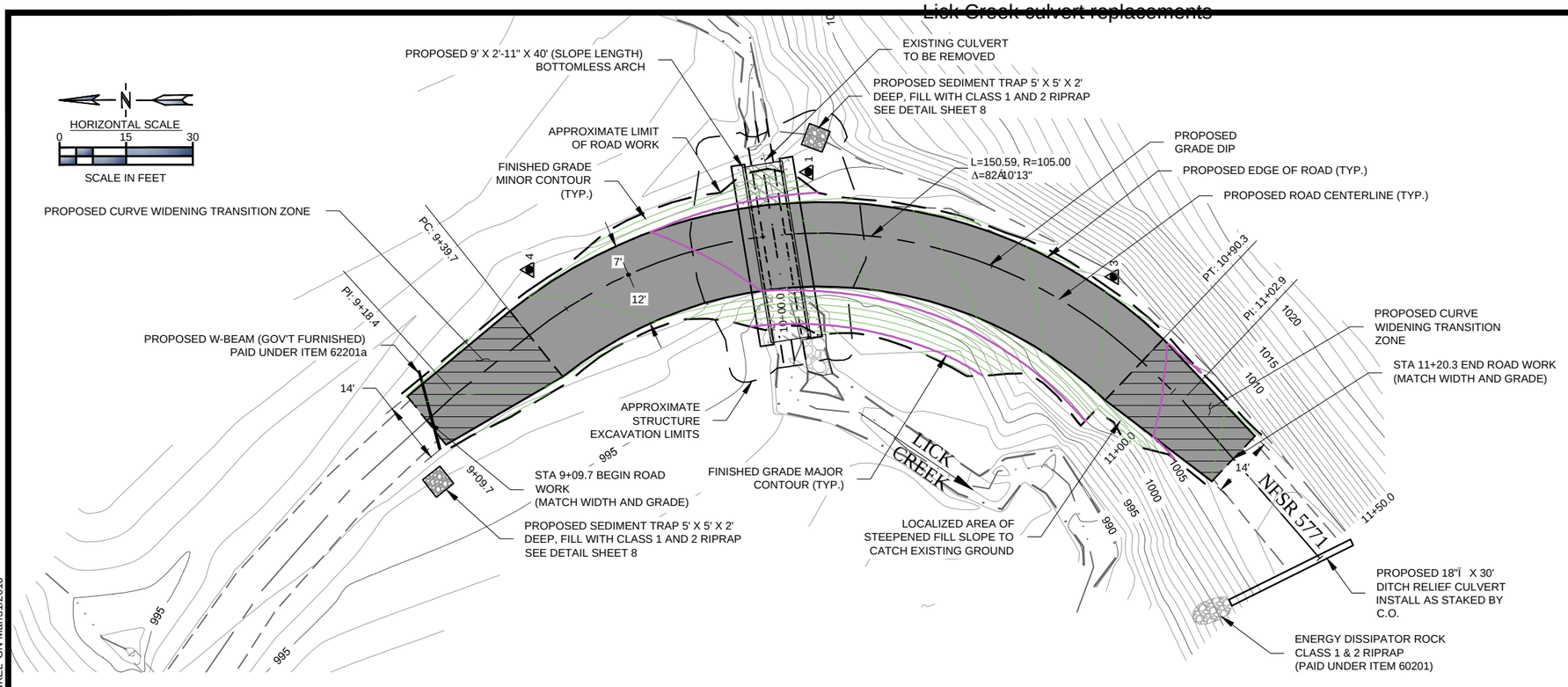
EXISTING SITE CONDITIONS

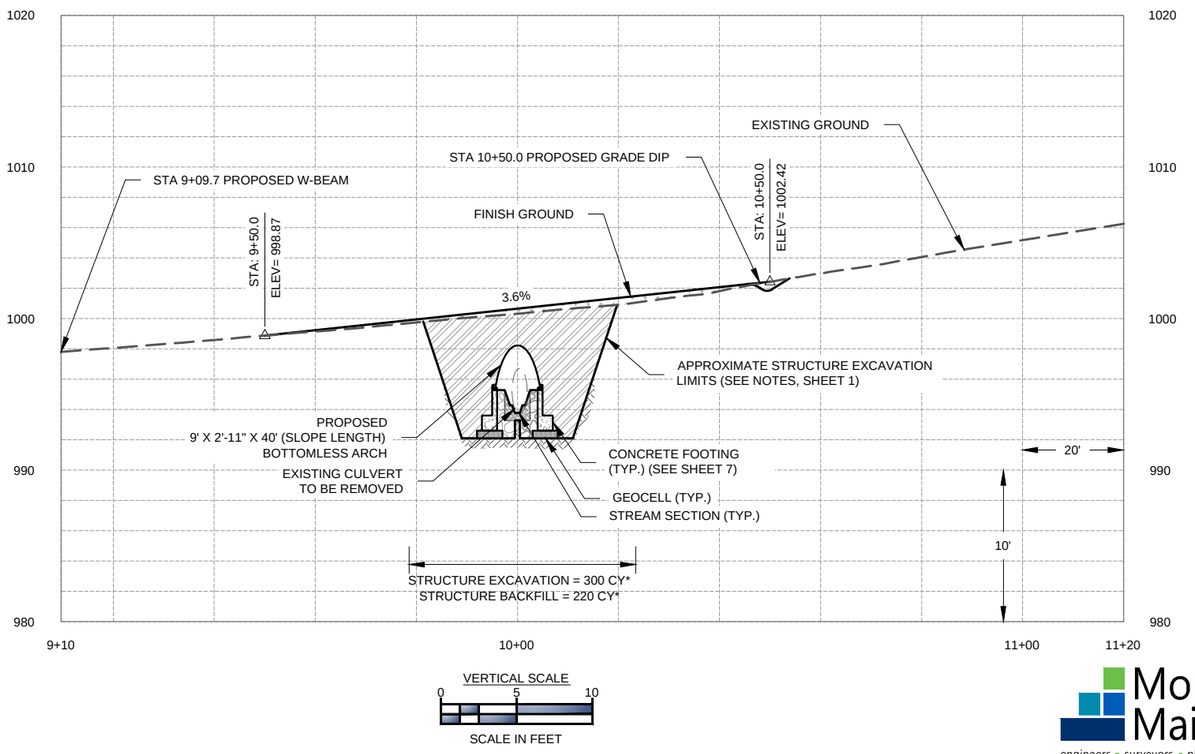
Designed By: MDB	Design Checked: DAJ	Sheet: **2** of **9**
Drawn By: CRH	Drawing Checked: MDB	



ROAD CENTERLINE COORDINATE TABLE				
STATION	DESCRIPTION	NORTHING	EASTING	ELEVATION
9+09.7	BEGIN ROAD WORK	20085.93	39944.12	997.80
9+39.7	PC	20062.84	39963.28	998.58
9+50.0	BEGIN VERTICAL REALIGNMENT	20054.47	39969.32	998.87
10+00.0	THALWEG CROSSING	20007.74	39985.73	1000.65
10+50.0	END VERTICAL REALIGNMENT	19958.69	39978.92	1002.42
10+90.3	PT	19924.96	39957.39	1004.64
11+20.3	END ROAD WORK	19904.35	39935.53	1006.26

NOTES:

1. A SOIL INVESTIGATION HAS NOT BEEN CONDUCTED AT THIS CULVERT SITE. IF BEDROCK IS ENCOUNTERED NOTIFY THE CO IMMEDIATELY. DO NOT PLACE FOOTINGS ON BEDROCK OR ANY OTHER UNSUITABLE BEDDING MATERIAL.
2. CLEARING AND GRUBBING SHALL BE INCIDENTAL TO THIS PROJECT. DISPOSE OF CLEARING AND GRUBBING DEBRIS PER FSSS 203.
3. CONTRACTOR SHALL DISPOSE OF EXCESS AND UNSUITABLE STRUCTURE EXCAVATION MATERIAL AT DESIGNATED WASTE AREA. CO WILL DESIGNATE A WASTE AREA WITHIN 5 MILES OF THE PROJECT.
4. SEED AND MULCH ALL DISTURBED AREAS AFTER CONSTRUCTION PER FSSS 625.



* QUANTITIES ARE ESTIMATES & PROVIDED FOR INFORMATIONAL PURPOSES ONLY

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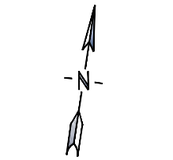
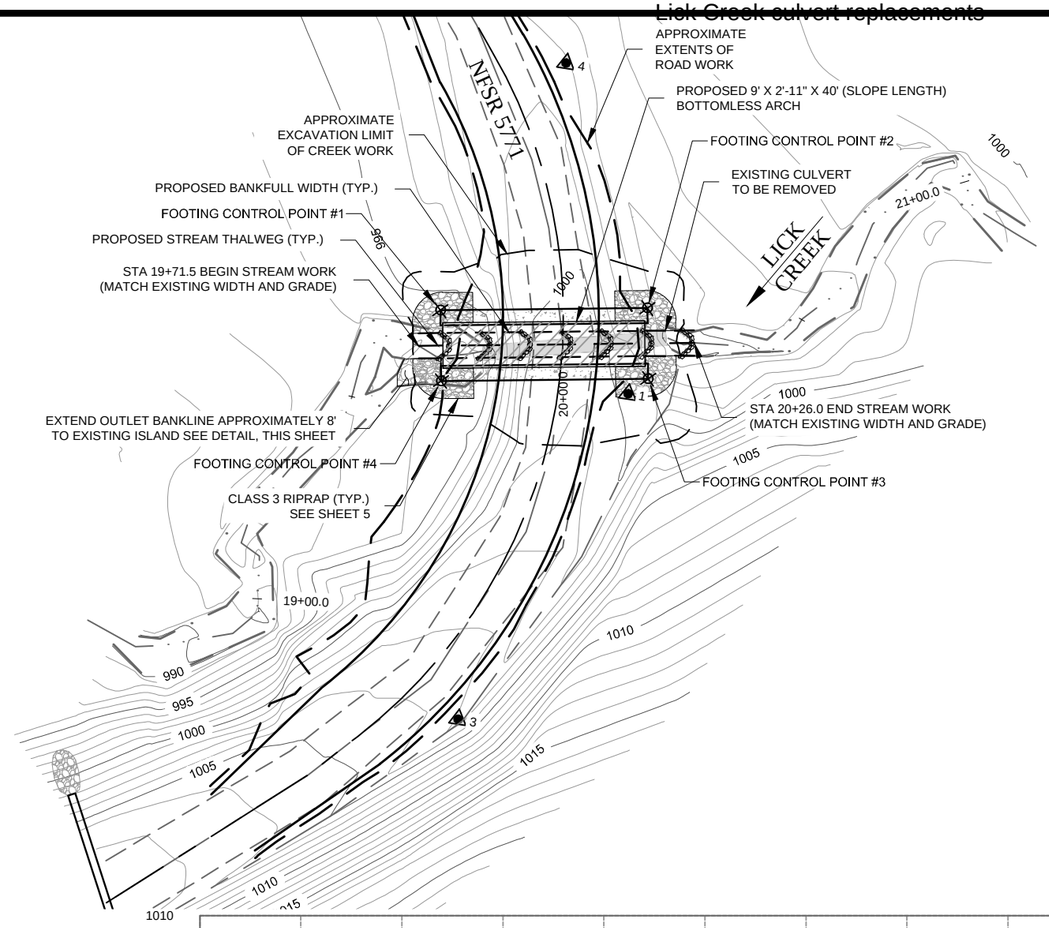
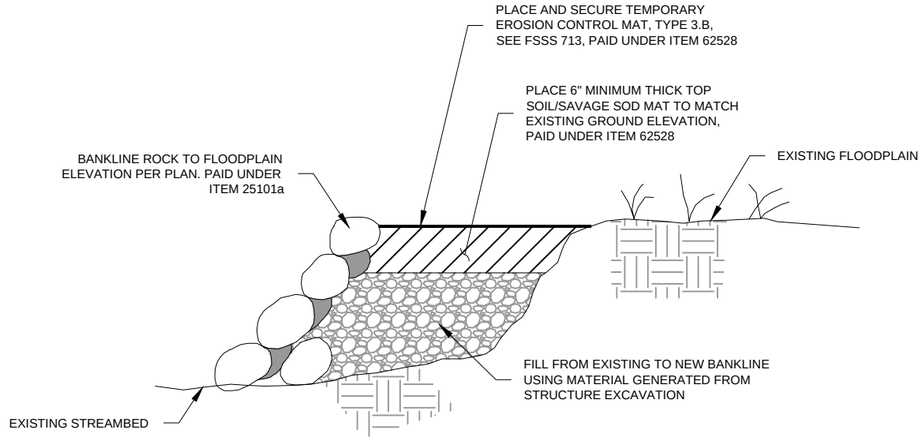
ROAD PLAN & PROFILE

Designed By: MDB	Design Checked: DAJ	Sheet: **3** of **9**
Drawn By: CRH	Drawing Checked: MDB	



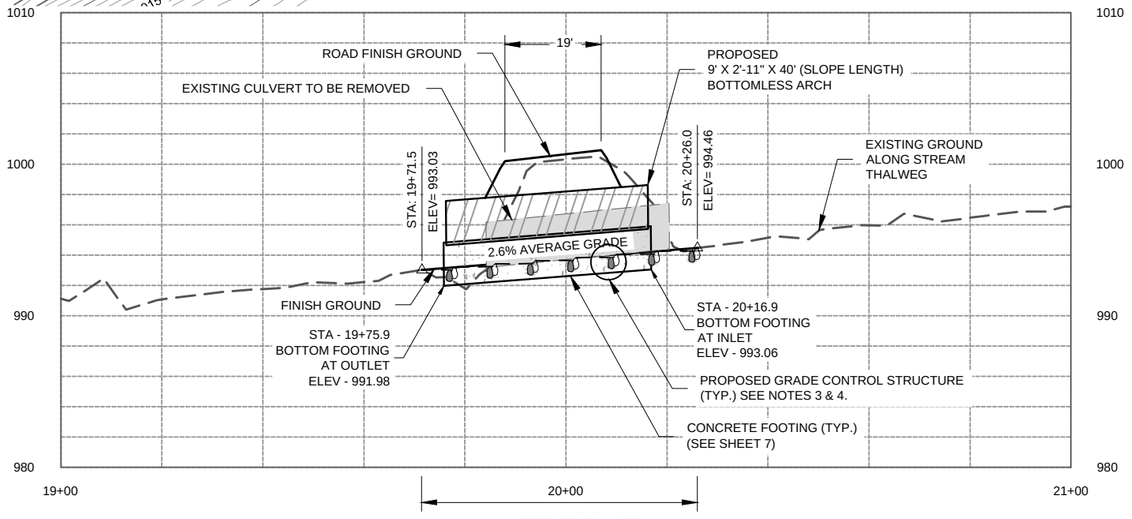


CREEK THALWEG COORDINATE TABLE				
STATION	DESCRIPTION	NORTHING	EASTING	ELEVATION
19+71.5	BEGIN CREEK WORK	20003.15	39957.63	993.03
20+00.0	ROAD C/L @ THALWEG CROSSING	20007.75	39985.74	993.78
20+26.0	END CREEK WORK	20011.95	40011.44	994.46
	FOOTING CONTROL POINT #1	20010.76	39960.80	991.98
	FOOTING CONTROL POINT #2	20017.37	40001.25	993.06
	FOOTING CONTROL POINT #3	20003.56	40003.51	993.06
	FOOTING CONTROL POINT #4	19996.94	39963.06	991.98



OUTLET BANKLINE DETAIL

SCALE: N.T.S.



REGRADE CHANNEL
THIS WORK IS INCIDENTAL TO STRUCTURE EXCAVATION (ITEM 20806)
REGRADE CONTROL SPACING APPROXIMATELY 8',
LOCATION, NUMBER, AND SHAPE MAY BE ADJUSTED BY CO.

VERTICAL SCALE
0
5
10
SCALE IN FEET

NOTES:

1. UTILIZE NATIVE STREAMBED MATERIAL TO REGRADE AND SHAPE THE STREAM CHANNEL. REGRADE AND SHAPE THE CHANNEL WITHIN THE CULVERT PER DETAILS ON SHEET 6. REGRADE AND SHAPE THE CHANNEL OUTSIDE THE CULVERT PER THE TYPICAL CHANNEL SECTION DETAIL ON SHEET 6.
2. CONTRACTOR MUST DIVERT STREAM CHANNEL AROUND WORK AREA DURING CONSTRUCTION. CONTRACTOR MUST SUBMIT A STREAM DIVERSION PLAN AND SOIL EROSION CONTROL PLAN TO THE CO FOR APPROVAL PRIOR TO STARTING CONSTRUCTION.
3. GRADE CONTROL STRUCTURES FOLLOW THE GEOMETRY OF THE TYPICAL CHANNEL SECTION. GRADE CONTROL STRUCTURES DIP AT THE THALWEG AND RISE TO BANKLINE ELEVATION AT BOTH SIDES. MAY BE ADJUSTED BY CO. SEE DETAILS ON SHEET 5.
4. GRADE CONTROL STRUCTURES SHOWN IN PLAN AND PROFILE VIEW ARE FOR GRAPHICAL REPRESENTATION ONLY.

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CREEK PLAN & PROFILE

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Drawn By: CRH	Drawing Checked: MDB	

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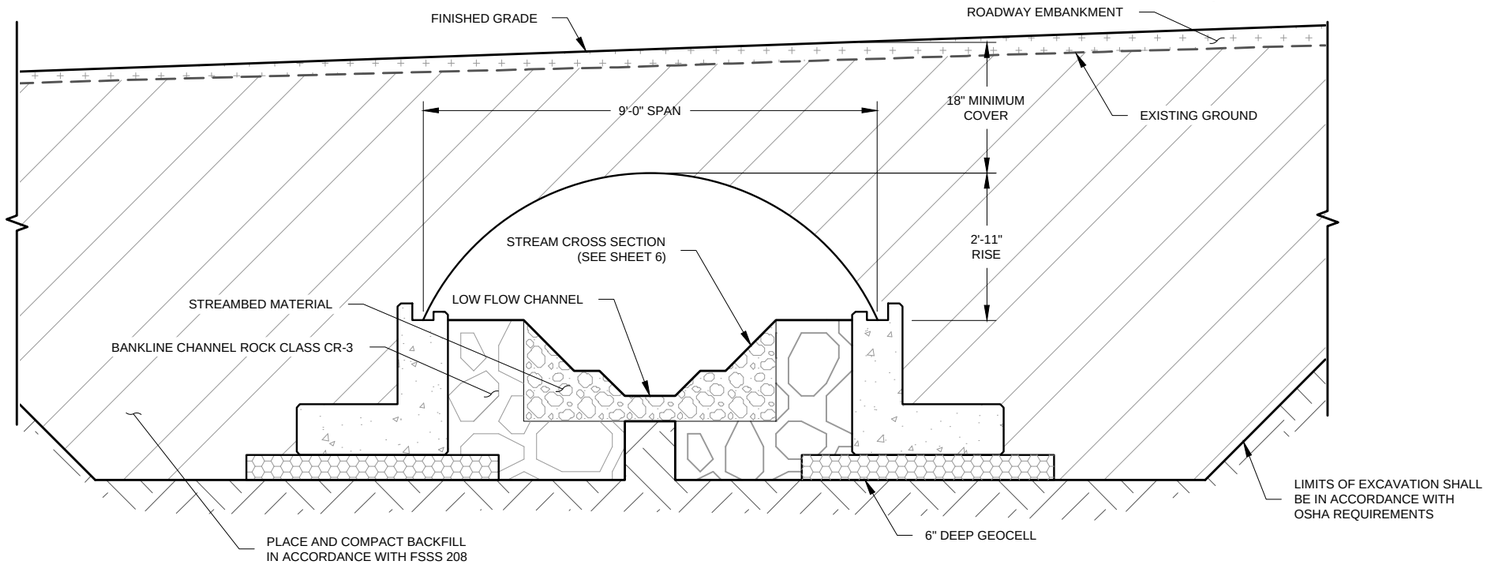
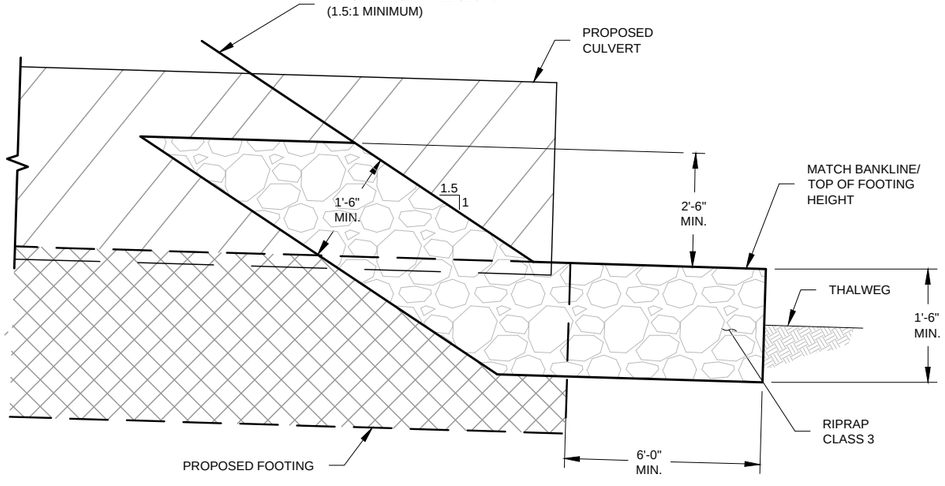


OPEN BOTTOM STRUCTURAL PLATE ARCH CULVERT DETAIL

SCALE: N.T.S.



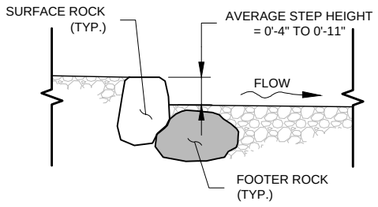
NOTE:
REFER TO SHEET 4 FOR LOCATION OF RIPRAP ALONG CULVERT INLET/OUTLET. EXTEND RIPRAP 6' HORIZONTAL BOTH SIDES OF THE CULVERT.

TYPICAL INLET/OUTLET RIPRAP PROFILE

SCALE: N.T.S.

NOTES:

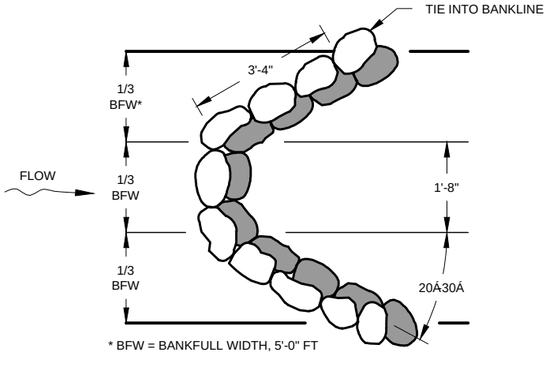
1. EXCAVATE THE FOUNDATION FOR ARCH FOOTING TO THE PROPER GRADE, PLACE AND COMPACT A 6 INCH DEEP GEOCELL ON UNDISTURBED GROUND IN ACCORDANCE WITH FSSS 272.
2. REGRADE THE STREAMBED TO THE EXTENTS SHOWN ON THE DRAWINGS. MECHANICALLY COMPACT NATIVE STREAMBED AS DIRECTED BY CO. ENSURE ALL VOIDS WITHIN THE STREAMBED AND GRADE CONTROL STRUCTURES ARE FILLED. ALL STREAMBED WORK INCIDENTAL TO ITEM 20806.
3. EACH GRADE CONTROL STRUCTURE UTILIZES APPROXIMATELY 0.5 CY TO 1.0 CY OF CLASS CR-3 CHANNEL ROCK. CONTRACTOR TO VERIFY.



GRADE CONTROL STRUCTURE

ROCK WEIR/STEP POOL DETAIL

SCALE: N.T.S.

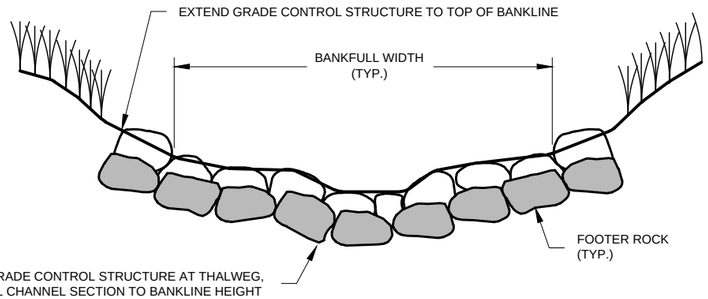


* BFW = BANKFULL WIDTH, 5'-0" FT

GRADE CONTROL STRUCTURE

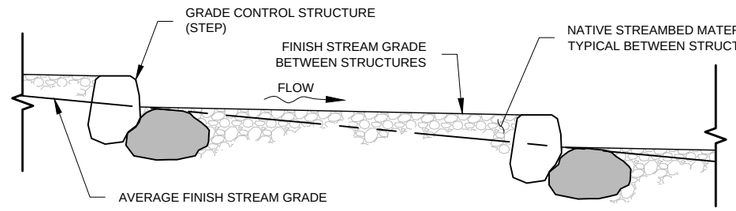
ROCK WEIR DIMENSIONS

SCALE: N.T.S.



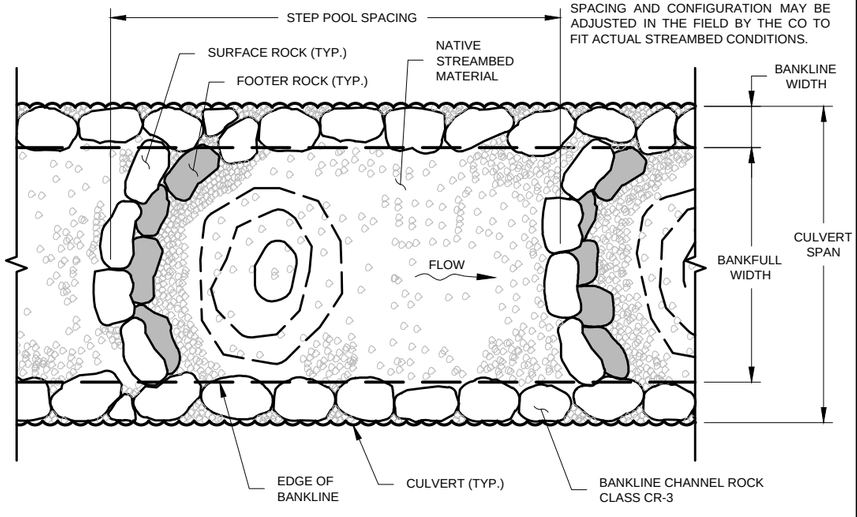
GRADE CONTROL STRUCTURE

SCALE: N.T.S.



GRADE CONTROL STRUCTURE - PROFILE VIEW

SCALE: N.T.S.



GRADE CONTROL STRUCTURE - PLAN VIEW

ROCK WEIR/STEP POOL STREAM TYPE

SCALE: N.T.S.

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GRADE CONTROL & STRUCTURE DETAILS

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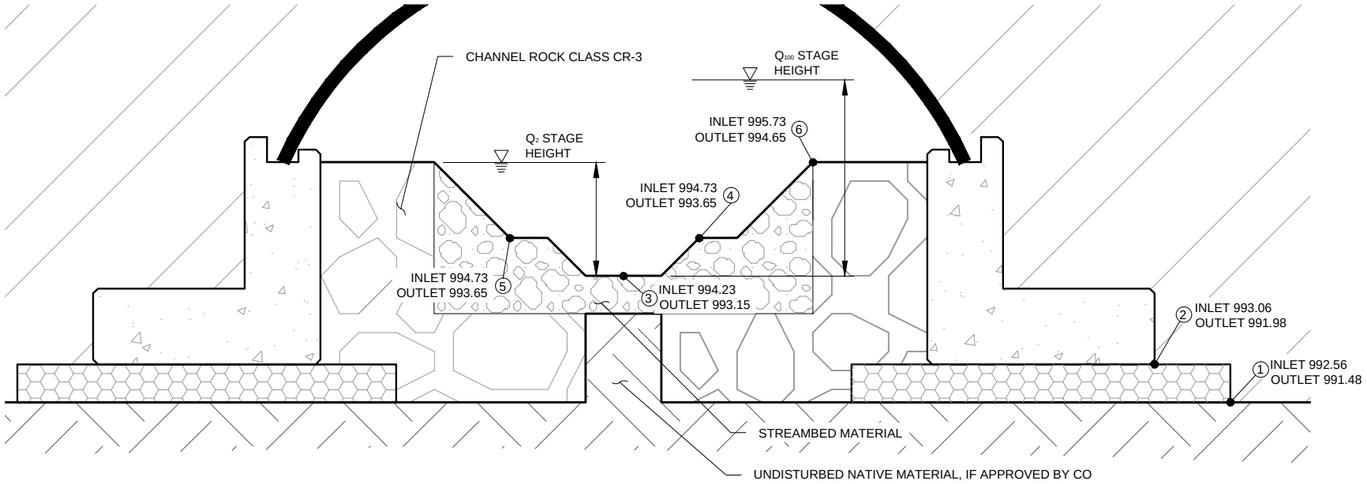
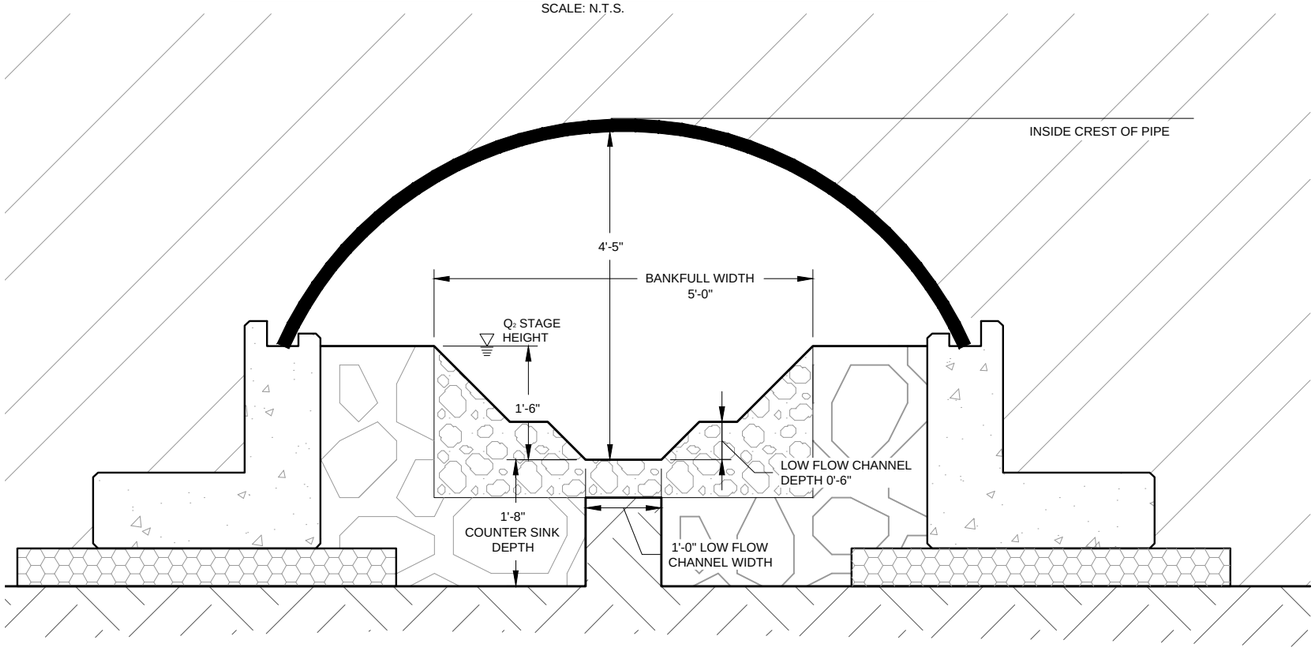


STREAM INLET/OUTLET CROSS-SECTION ELEVATIONS

SCALE: N.T.S.

STREAM INLET/OUTLET CROSS-SECTION ELEVATIONS

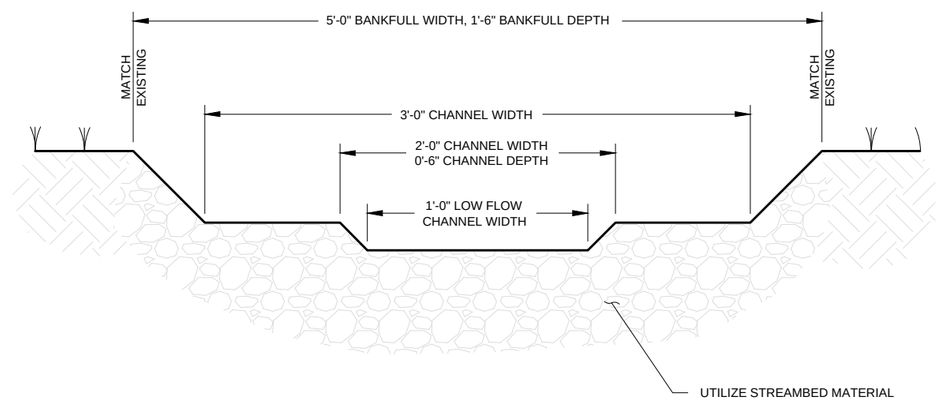
SCALE: N.T.S.



STREAM CROSS-SECTION DIMENSIONS

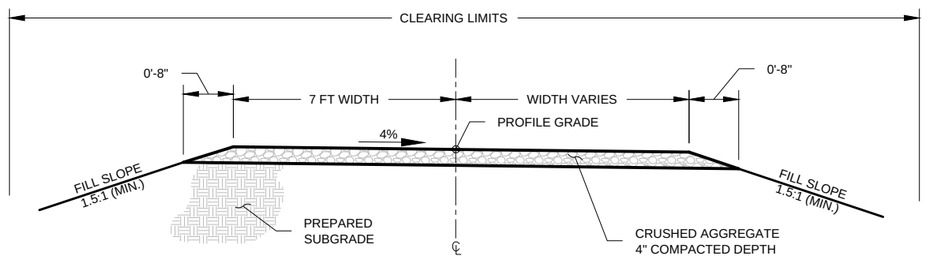
SCALE: N.T.S.

STREAM CROSS-SECTION ELEVATIONS (FT.)	
IDENTITY	DESCRIPTION
①	BOTTOM OF GEOCELL
②	BOTTOM OF FOOTING
③	THALWEG
④	TOP OF LOW FLOW CHANNEL
⑤	BOTTOM OF CHANNEL
⑥	TOP OF BANKFULL WIDTH, Q_2 STAGE HEIGHT



TYPICAL CHANNEL SECTION

SCALE: N.T.S.



NEW GRAVEL SURFACE

ROAD NO.	FROM STA.	TO STA.	WIDTH
NFSR 5771	9+09.66	9+39.68	14' TO 19'
	9+39.68	10+90.26	19'
	10+90.26	11+20.34	19' TO 14'

TYPICAL ROAD CROSS SECTION

SCALE: N.T.S.

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STREAM ELEVATIONS AND STREAM & ROAD TYPICAL SECTIONS

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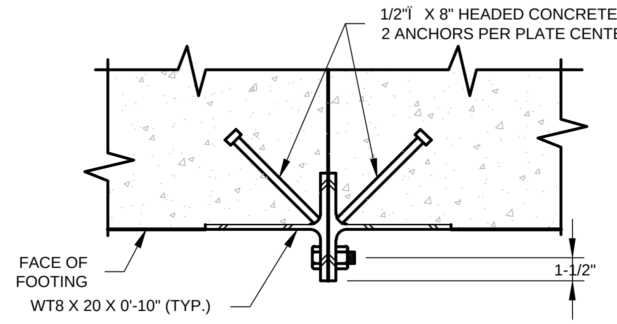
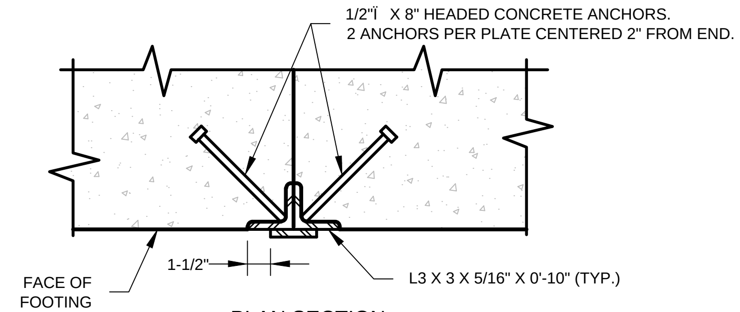
Drawn By: MDH	Drawing Checked: MDB	



PLAN SECTION



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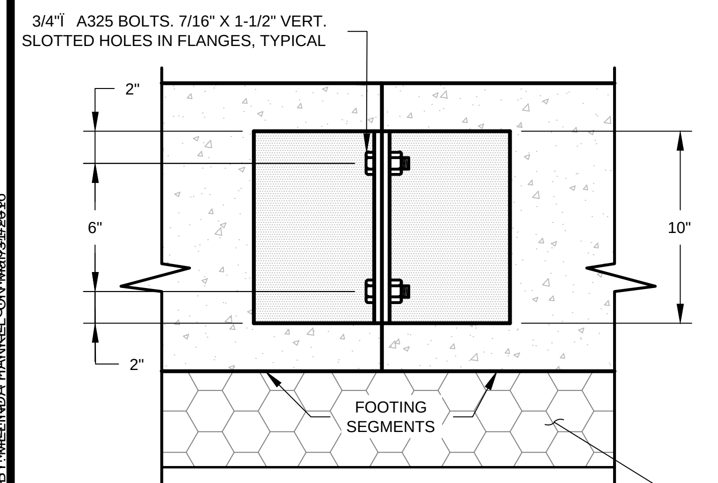
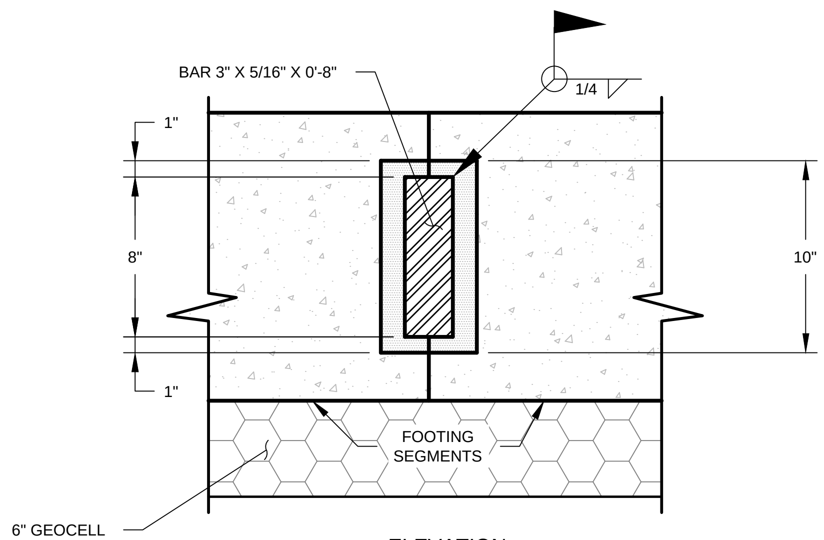


ELEVATION

BOLTED ALTERNATE

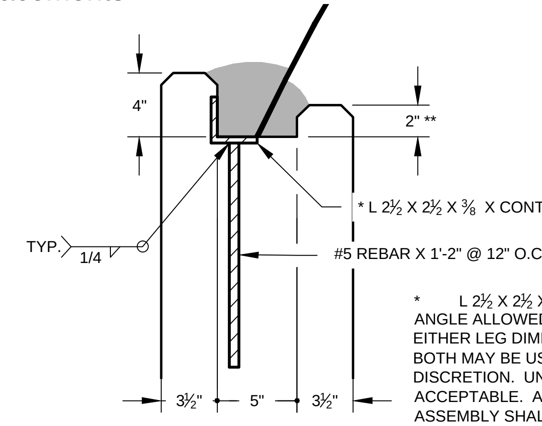


ELEVATION

WELDED ALTERNATE

PRECAST FOOTING SPLICE DETAILS

SCALE: N.T.S.

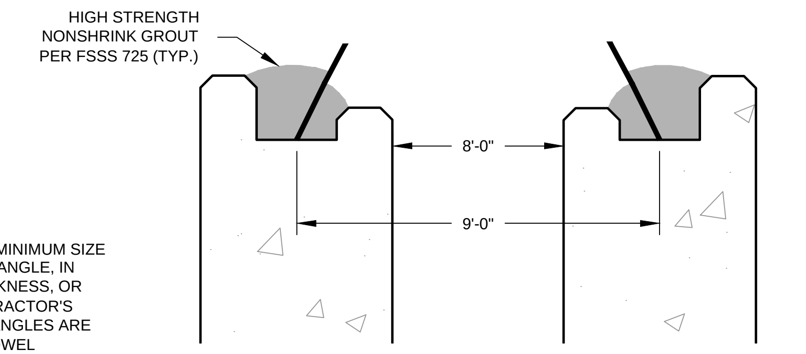


DETAIL A

SCALE: 1"=1'-0"

* L 2½ X 2½ X ⅜ X IS THE MINIMUM SIZE ANGLE ALLOWED. A LARGER ANGLE, IN EITHER LEG DIMENSION, THICKNESS, OR BOTH MAY BE USED AT CONTRACTOR'S DISCRETION. UNEQUAL LEG ANGLES ARE ACCEPTABLE. ANGLE AND DOWEL ASSEMBLY SHALL BE CAST-IN-PLACE.

** HEIGHT OF INSIDE FIN MAY VARY FROM 2"-4". IF A HEIGHT > 2" IS USED, IT MUST BE VERIFIED THE MULTI-PLATE ARCH WILL CLEAR THE FIN WHEN SET IN ITS PROPER LOCATION.



INSTALLATION DETAIL

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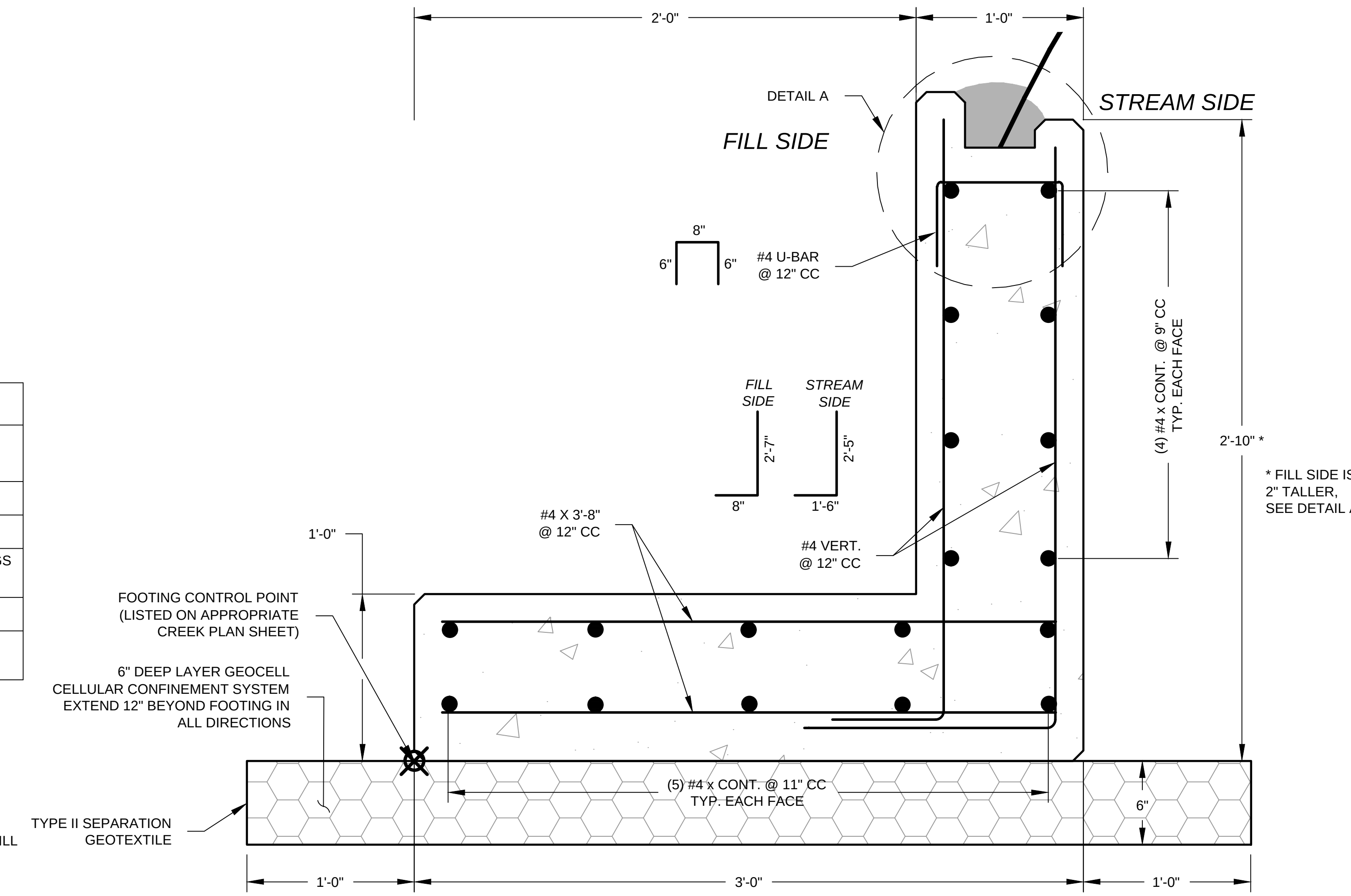
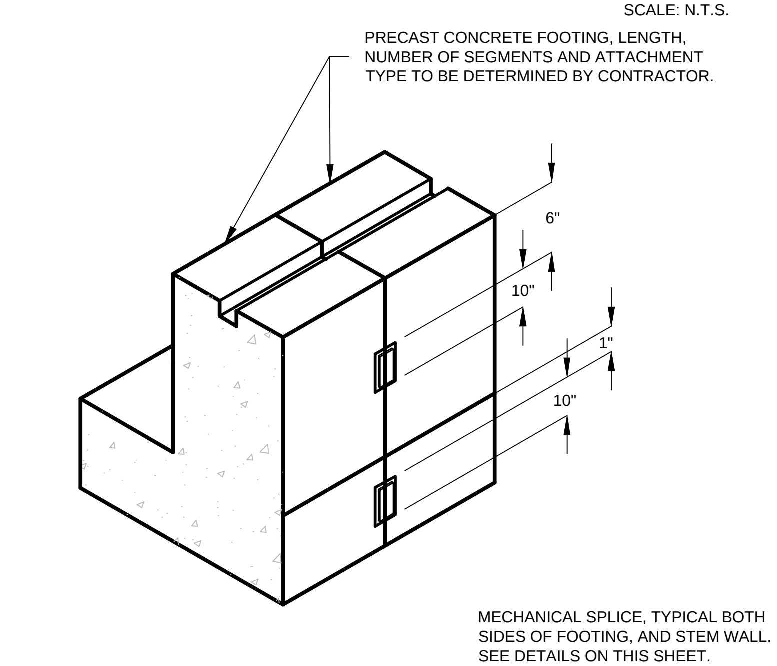


FOOTING DETAIL

SCALE: N.T.S.



TYPICAL PRECAST FOOTING SEGMENTS

SCALE: N.T.S.

INFORMATIONAL QUANTITIES

ITEM DESCRIPTION	UNIT	QUANTITY
STRUCTURAL CONCRETE, CLASS A(AE)	CY	15.2
REINFORCING STEEL	LB	2104
INFORMATIONAL QUANTITIES SHOWN ABOVE ARE FOR THE PRECAST CULVERT FOOTINGS ONLY (BOTH SIDES) AND CONSIDERED INCIDENTAL TO ITEM 553A05.		
GRANULAR BACKFILL	CY	7.9
INFORMATIONAL QUANTITY SHOWN ABOVE IS FOR THE GEOCELL ABUTMENT STABILIZATION ONLY AND CONSIDERED INCIDENTAL TO ITEM 27250.		

NOTES:

1. NO CONNECTION USING AN UNBALANCED CHANNEL OR SIMILAR CONNECTION WILL BE ALLOWED.
2. MINIMUM 2" CLEAR COVER OVER REBAR UNLESS OTHERWISE NOTED.
3. ALL CONCRETE REINFORCING STEEL SHALL BE CONSIDERED INCIDENTAL TO ITEM 553A05.
4. PLACE GEOCELL ON UNDISTURBED SOIL. BACKFILL GEOCELL WITH COARSE GRANULAR BACKFILL PER FSSS 272. EXTEND GEOCELL 1 FOOT BEYOND LIMITS OF FOOTING IN ALL DIRECTIONS.
5. PLACE TYPE II SEPARATION GEOTEXTILE UNDER GEOCELL AND WRAP OVER TOP AFTER GEOCELL IS BACKFILLED.
6. FOOTINGS SHALL BE PRECAST. ALL PRECAST UNITS MUST BE MECHANICALLY SPLICED. SEE THIS SHEET FOR TYPICAL SPLICE DETAIL. CONTRACTOR TO DESIGN LIFTING POINTS AND FOOTING SEGMENT LENGTHS. ALTERNATE CONNECTION DETAILS MAY BE SUBMITTED.

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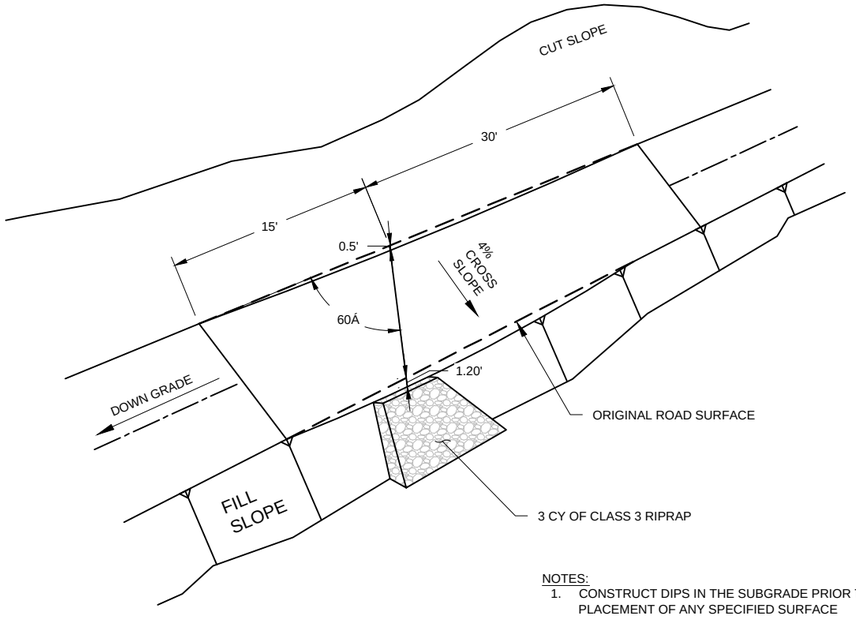
REGION SIX

LICK CREEK CULVERT REPLACEMENT

NFSR 5771, M.P. 0.71

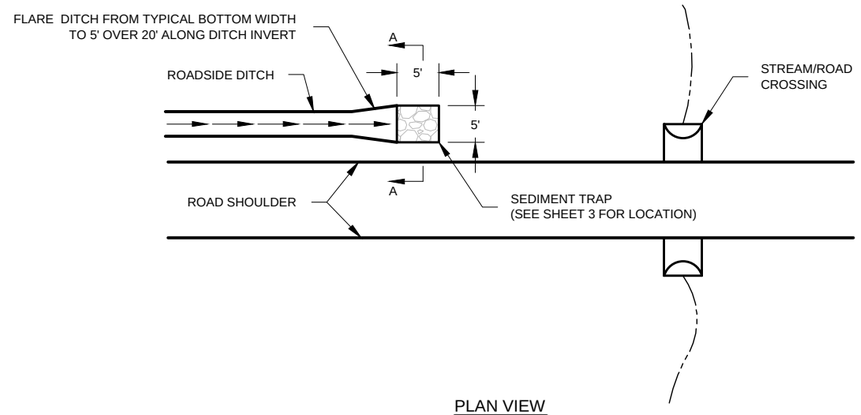
BOTTOMLESS ARCH FOOTING DETAILS

Designed By: MDB	Design Checked: DAJ
Drawn By: MDH	Drawing Checked: MDB

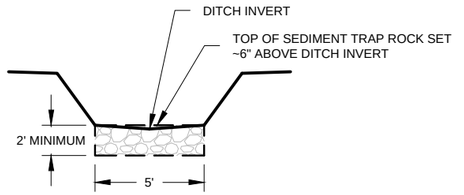


NOTES:
1. CONSTRUCT DIPS IN THE SUBGRADE PRIOR TO PLACEMENT OF ANY SPECIFIED SURFACE COURSE.
2. HAVE CO APPROVE DIP LOCATION PRIOR TO CONSTRUCTION.
3. UNIFORMLY SPREAD SUITABLE EXCESS MATERIAL ON THE ADJACENT ROADBED. DO NOT SIDECAST ON THE FILL SLOPE.

GRADE DIP DETAIL
SCALE: NO SCALE



PLAN VIEW



SECTION A-A

NOTE:
1. LOCATION AND ORIENTATION MAY BE ADJUSTED BY CO.

SEDIMENT TRAP DETIAL
SCALE: NO SCALE

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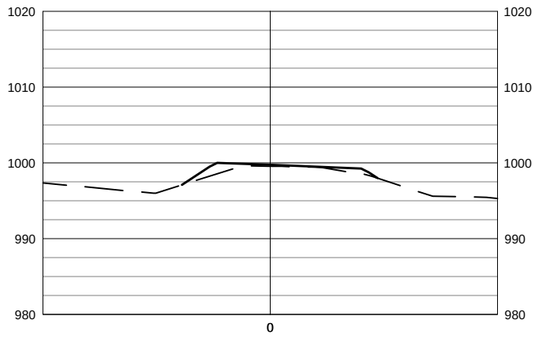
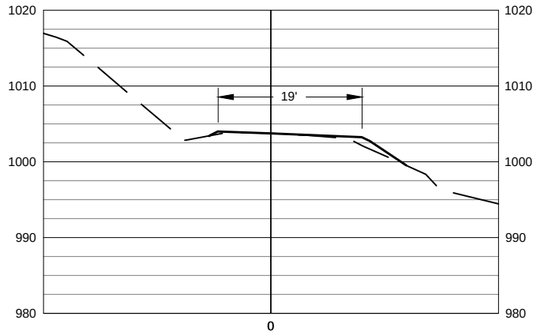
REGION ONE

LICK CREEK CULVERT REPLACEMENT
NFSR 5771, M.P. 0.71
MISCELLANEOUS DETAILS

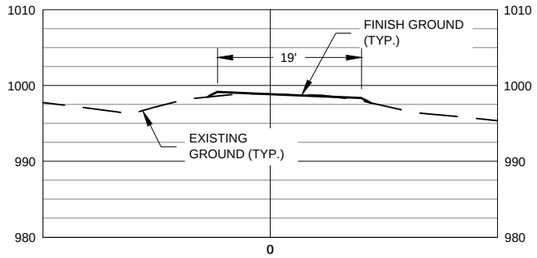
Designed By: MDB	Design Checked: DAJ	Sheet: **8** of **9**
Drawn By: MDH	Drawing Checked: MDB	



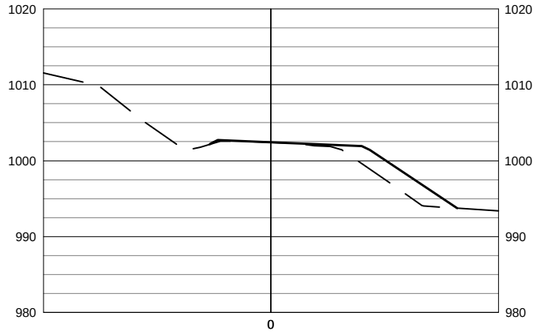
STA. 9+75.0



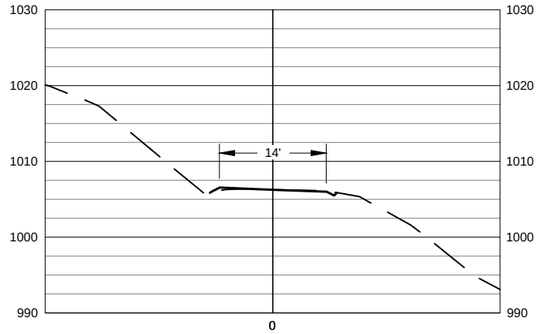
STA. 10+75.0



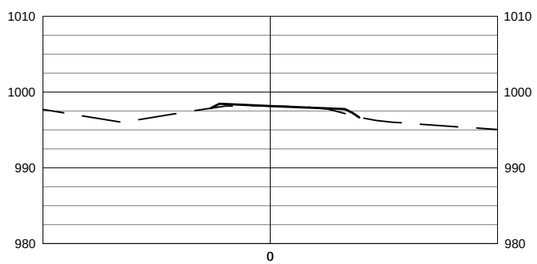
STA. 9+50.0



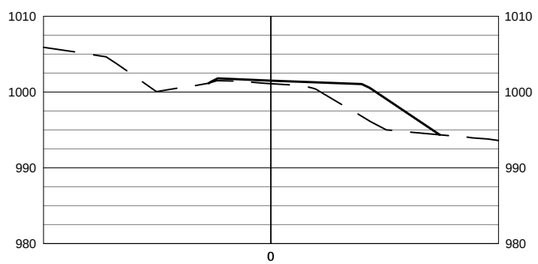
STA. 10+50.0



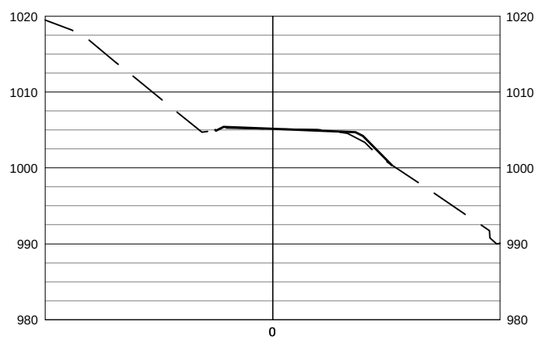
STA. 11+20.3



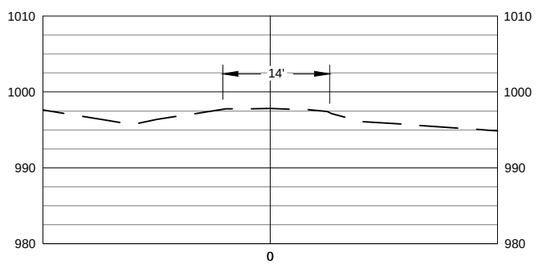
STA. 9+25.0



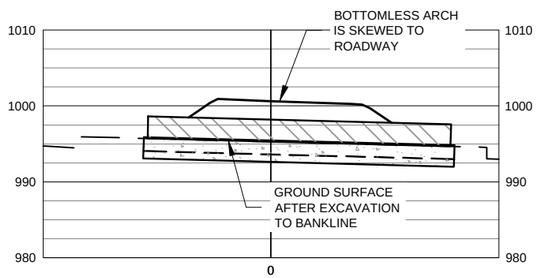
STA. 10+25.0



STA. 11+00.0



STA. 9+09.7



STA. 10+00.0

NOTE:
CROSS SECTION 10+00.00 IS CUT PARALLEL TO PIPE. ALL OTHER SECTIONS ARE PERPENDICULAR TO ROAD CENTERLINE.

HORIZONTAL SCALE
0 10 20
SCALE IN FEET

VERTICAL SCALE
0 10 20
SCALE IN FEET

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CROSS SECTIONS

Designed By: MDB	Design Checked: DAJ	Sheet: **9** of **9**
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