DEPARTMENT OF AGRICULTURE
FOREST SERVICE
REGION 9
ALLEGHENY NATIONAL FOREST

Hemlock Stewardship Project No. 002

East Fork Culvert Replacement (Aquatic Organism Passage Simulation) - FR 159 Pierson Hill

Bradford Ranger District
Forest County
Pennsylvania

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The location and design elements of this facility have been correlated with the plans, policies and constraints of the approved Coalbed Run Environmental Assessment.

Plans are to be used with "Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects FP-03 with Special Project Specifications thereto included in this contract.

Prepared By:

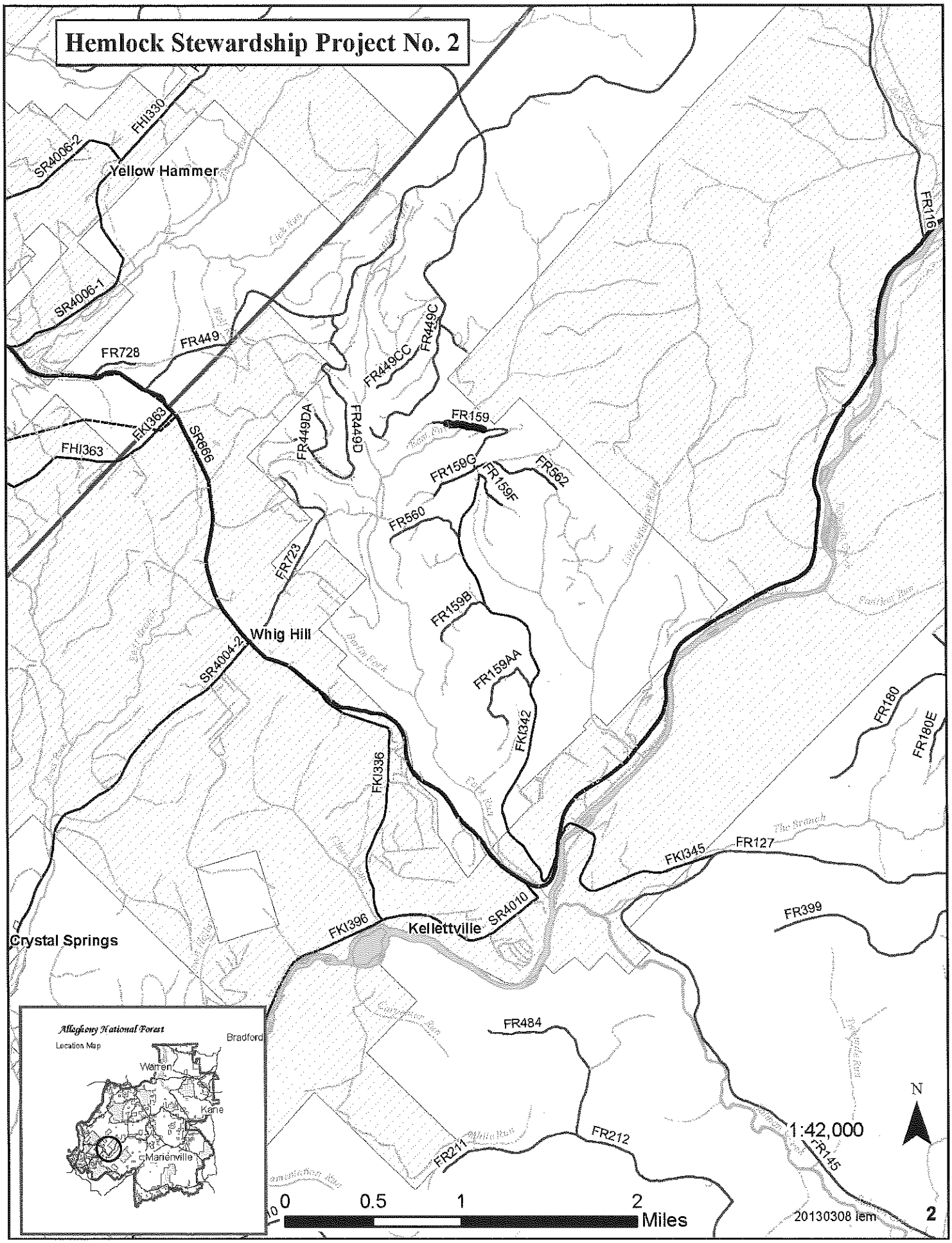
Demetrius

Approved By:

4/5/13
District Ranger **Date**

4-5-2013
Forest Engineer **Date**

Erin Connelly 4/5/13
Forest Supervisor **Date**


Hemlock Stewardship Project No. 2
SR4006-2
FHI330
Yellow Hammer
SR4006-1
FR728
FR449
FR449C
FR449CC
FR449DA
FR449D
FR159
FKI363
FHI363
SR666
FR159G
FR159F
FR562
FR560
FR723
FR159B
Whig Hill
SR4004-2
FR159AA
FKI342
FKI336
FR116
FR180
FR180E
FKI345
FR127
FR399
FKI396
Kellettville
SR4010
Crystal Springs
FR484
FR212
FR211
FR145
Allegheny National Forest
Location Map
Bradford
Warren
Kane
Marienville
N
1:42,000
0
0.5
1
2
Miles
20130308 lem
2

Schedule of Items

Pay items	Description	Method of Measure	Pay Unit	Estimated Quantity
15101	Mobilization(Lump Sum)	LSQ	ALL	1
15713	Soil Erosion & Pollution Control	LSQ	ALL	1
20102	Clearing and Grubbing (Lump Sum)	LSQ	ALL	1
20301	Removal Of Culvert	CQ	EACH	2
20957	Structural Excavation, Type unclassified Lump Sum	LSQ	ALL	1
25102	Placed riprap, NSA Size #R-5	VQ	TON	105
30101	Aggregate base, grading AASHTO #57, Compaction (footer bedding material)	VQ	TON	14
30103	Aggregate base, grading PA- 2A, compaction method A	VQ	TON	460
30115	Aggregate surface course, Type DSA limestone, compaction method B	VQ	TON	69
30318	Road reconditioning, roadbed, compaction method B	CQ	MILE	0.1
55201	Structural Concrete, Class A	CQ	C.Y.	40
60263	24 inch aluminized type 2, corrugated steel pipe, 0.064 inch thickness, method	CQ	L.F.	36
60305	19'-0" span, 5' 9-1/2" rise, structural plate arch	CQ	Foot	42
62503	Seeding, hydraulic or dry method (lump sum)	LSQ	ALL	1
63306	Object Markers , Type 3	CQ	EACH	8
63501	Temporary Traffic Control	CQ	EACH	1
64805	Stream simulation AASHTO #57,mixed on site	VQ	TON	30
64805	Stream simulation, riprap NSA R-3,mixed on site	VQ	TON	30

General Notes

-Prior to any earth disturbing activities, contractor shall call the Pennsylvania One Call System (800-242-1776) and all Oil & Gas Operators in the work area to determine locations of any underground utility lines.

-Culvert cleaning and repair will be considered incidental to road reconditioning.

-Contractor is responsible for maintenance of all Forest Service roads over which pit run or commercial stone material is hauled. Roads shall be bladed or shaped to restore travel way to the condition found prior to haul.

-Contractor shall install "ROAD CLOSED, TRUCK TRAFFIC and ROAD CONSTRUCTION AHEAD" signs on all roads worked on in this project. Signs shall conform to the Manual on Uniform Traffic Control Devices (MUTCD). Signs shall be covered when construction activity is not taking place.

-Roads shall be completed in such a manner that water shall not pond on roadbed or in ditch lines.

-All removed corrugated metal pipe culverts shall be hauled off Federal lands and become the property of the contractor. Steel pipe casings shall be returned to the Sheffield Work Center unless otherwise directed by the Engineer.

-Forest Service gate plans are available at the Allegheny National Forest Supervisor's Office, Warren, PA. 16365. The following are gate manufacturers:

Gary Asel Marienville, PA. (814) 927-8380	ADM Welding 2818 Penna. Ave. West Warren, PA. 16365 (814) 723-7227

-Please see gate typical drawing for gate signs required.
-Contouring, topsoil respreading, seeding and mulching of disturbed areas as determined by the Forest Service is required.

-DSA limestone shall be shipped at optimum moisture content not exceeding 15%. Limestone loads that fail field test parameters will be rejected.

-When replacing culverts in live streams, contractor shall install silt fence and straw bales at approaches to live stream crossings to eliminate sediment in the stream course. When culverts are located on High Quality and Exceptional Value streams, contractor shall install compost filter socks. Any sediment collected will be removed and ground will be stabilized with seed and mulch. Dewatering pumps will be used to redirect water out of the stream course at the time of stream crossing installation. Silt fence and straw bales will be removed only after vegetation is clearly re-established as determined by the Engineer. Forest Service is responsible for obtaining any Department Of Environmental Protection GP-11 or GP-7 stream crossing permits and preparing a Soil Erosion and Sediment Control Plan. This work will be considered incidental to Section 151 Mobilization.

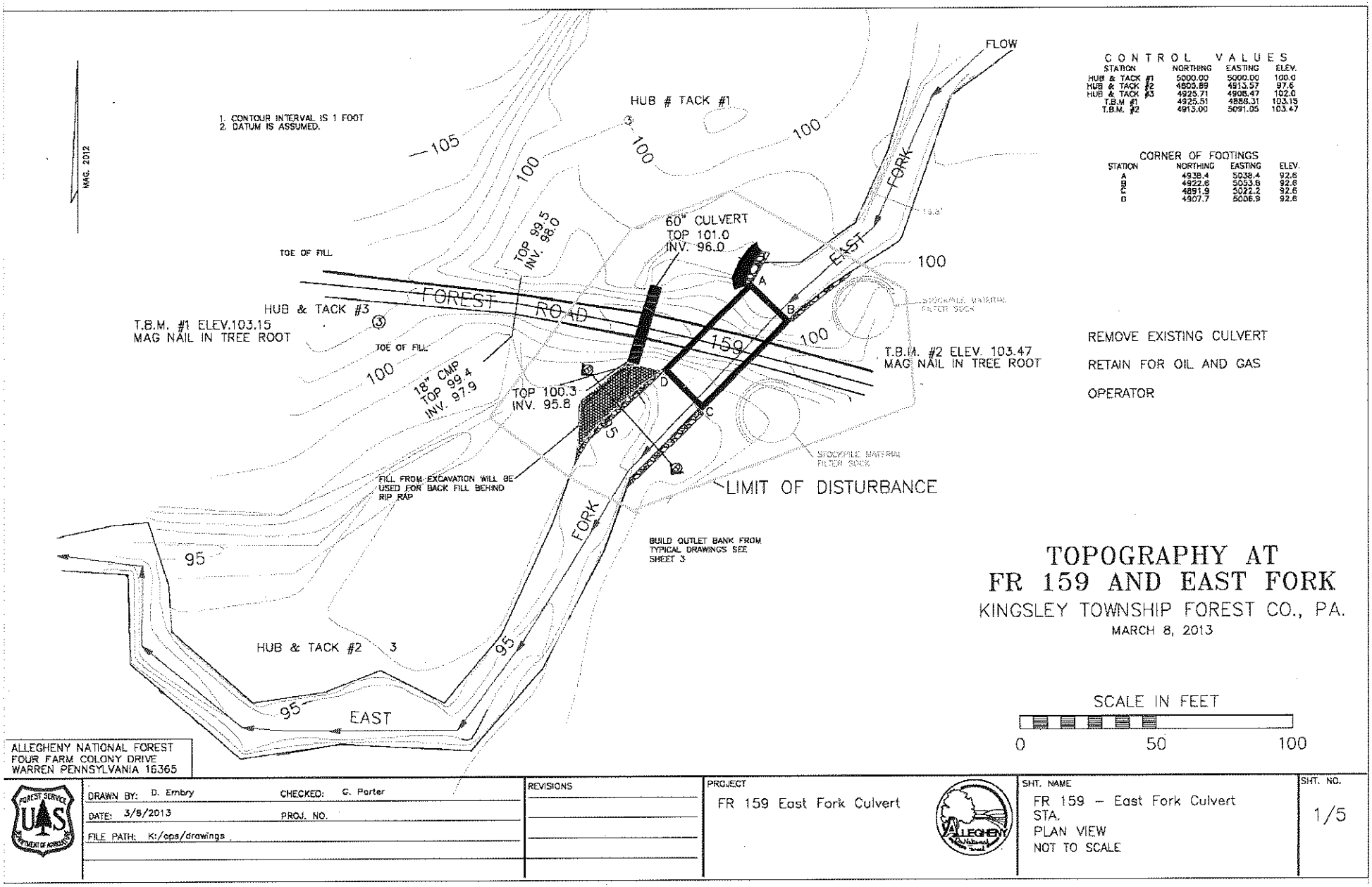
-Roadway sod encountered during road reconditioning operations will be spread and leveled outside the road template avoiding piles. Natural terrain depressions and openings are the preferred waste locations. Seeding and mulching may be required to supplement natural revegetation.
-Road segments designated for roadway ditching shall have excavated material hauled to pit.
-Vegetation cut down during roadside brushing will be pulled beyond the clearing limits and the toe of any roadway template construction. Mixing of soil and cut vegetation shall be avoided. All material will be scattered and lopped within 3' of the ground.
-Aggregate stockpiled for culvert replacement will be located on the existing road surface to assure maximum utilization of the material and eliminate disturbance of existing vegetated areas.

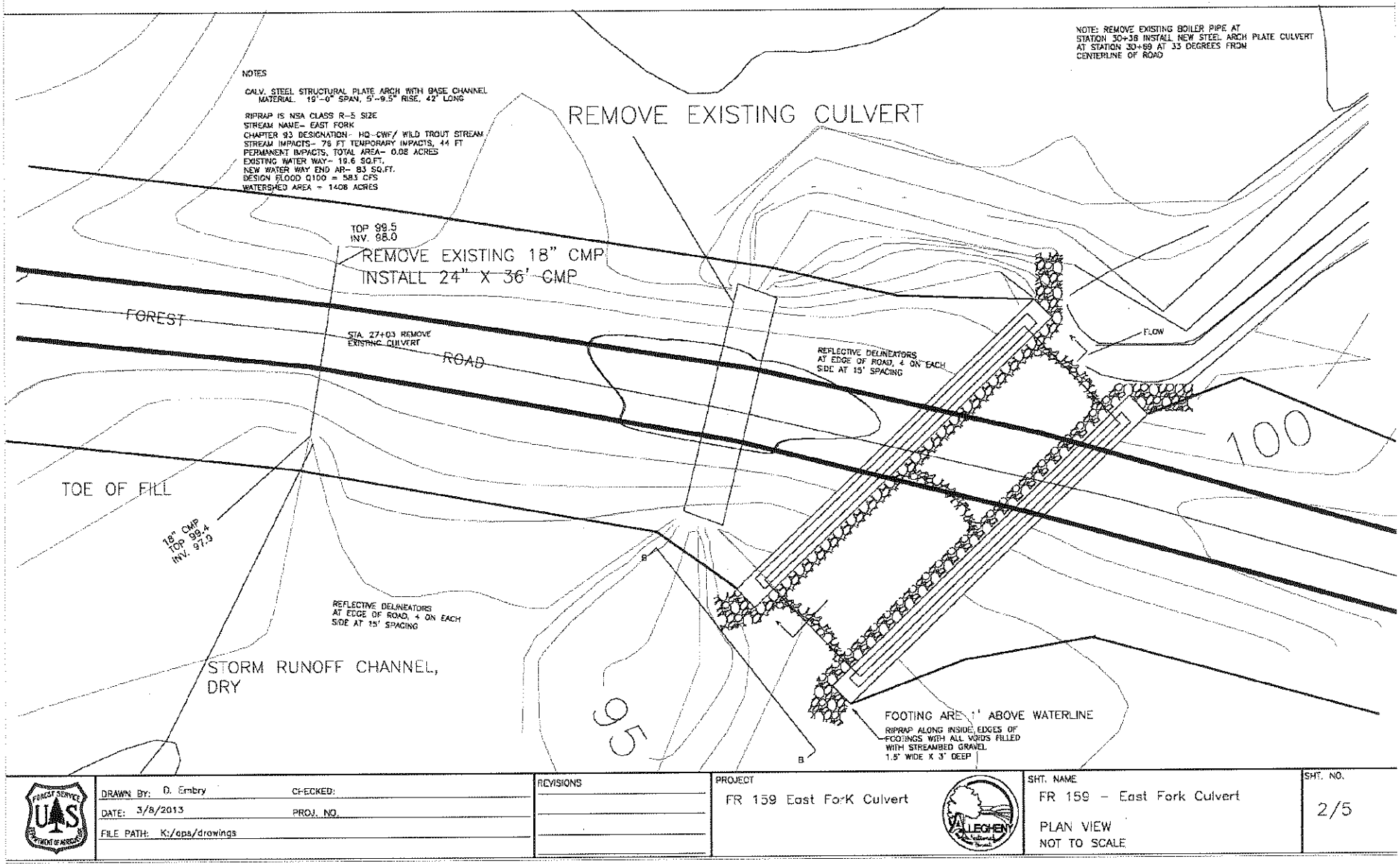
Work Descriptions

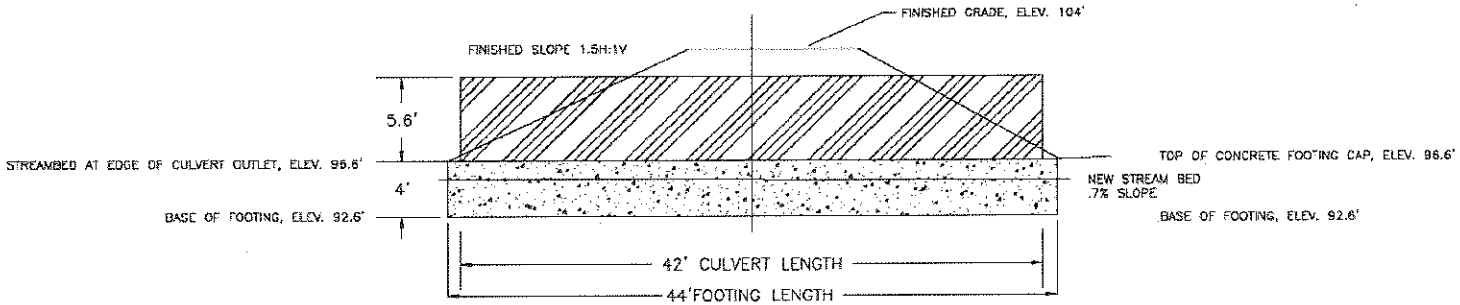
FR 159 Pierson Hill (Level D)

Milepost/Station	Road Log/Work Description
0+00	End of Kingsley Township road 342, Balltown road crossing
0+50	Road number sign right
0+55	Snowmobile trail #1 sign right
0+75	16" x 24' steel pipe casing on left forward skew
1+50	Snowmobile trail sign right
2+50	18" x 28' CMP
3+45	18" x 24' CMP (2025)
7+35	18" x 24' CMP
9+25	18" x 28' CMP
10+75	18" x 22' CMP (2025)
12+85	18" x 22' CMP (2025)
14+50	18" x 28' CMP
15+45	18" x 22' CMP (2025)
16+00	Snowmobile trail sign right
16+00-17+50	Turnout right
16+60	FR 159 bends sharply to left
17+55	18" x 22' CMP (2025)
17+65	Forest Service turnbuckle style gate
19+37	18'x 22' CMP
24+81	18'x 22' CMP
26+50-32+33	**Recondition roadbed to TYPICAL RECONDITION SECTION**
26+50	**Start road reconditioning**
27+03	**Remove exisiting 18'x 22' CMP, install 24" x36' CMP**
29+80-31+60	**Apply 6" of DSA limestone surfacing**
30+33	**REMOVE 60" X 28' OWNERSHIP RETAINED OGM OPERATOR**
30+69	**Install 19' x 9'5.5"x 42' structral arch plate skew on concrete footing (See Drawings)**
30+78	18'x 22' CMP
32+33	**End of reconditioning**

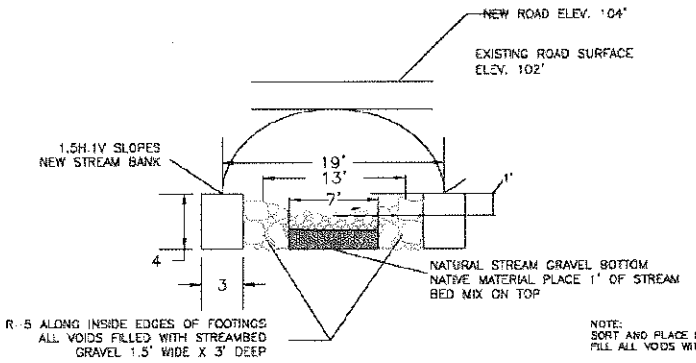
Culvert Installation Drawings




NOTES
CALV. STEEL STRUCTURAL PLATE ARCH WITH BASE CHANNEL MATERIAL. 19'-0" SPAN, 5'-9.5" RISE, 42' LONG
RIPRAP IS NSA CLASS R-5 SIZE
STREAM NAME- EAST FORK
CHAPTER 93 DESIGNATION- HQ-CWF/ WILD TROUT STREAM
STREAM IMPACTS- 75 FT TEMPORARY IMPACTS, 44 FT
PERMANENT IMPACTS, TOTAL AREA- 0.08 ACRES
EXISTING WATER WAY- 19.6 SQ.FT.
NEW WATER WAY END AR- 83 SQ.FT.
DESIGN FLOOD Q100 = 583 CFS
WATERSHED AREA = 1408 ACRES
NOTE: REMOVE EXISTING BOILER PIPE AT STATION 30+38 INSTALL NEW STEEL ARCH PLATE CULVERT AT STATION 30+69 AT 33 DEGREES FROM CENTERLINE OF ROAD
REMOVE EXISTING CULVERT
TOP 99.5
INV. 98.0
REMOVE EXISTING 18" CMP
INSTALL 24" X 36' CMP
FOREST
ROAD
STA. 27+03 REMOVE EXISTING CULVERT
REFLECTIVE DELINEATORS AT EDGE OF ROAD, 4 ON EACH SIDE AT 15' SPACING
FLOW
100
TOE OF FILL
18" CMP
TOP 99.4
INV. 97.9
REFLECTIVE DELINEATORS AT EDGE OF ROAD, 4 ON EACH SIDE AT 15' SPACING
STORM RUNOFF CHANNEL, DRY
95
FOOTING ARE 1' ABOVE WATERLINE
RIPRAP ALONG INSIDE EDGES OF FOOTINGS WITH ALL VOIDS FILLED WITH STREAMBED GRAVEL 1.5' WIDE X 3' DEEP
B
B
DRAWN BY: D. Embry
CHECKED:
DATE: 3/8/2013
PROJ. NO.
FILE PATH: K:/ops/drawings
REVISIONS
PROJECT
FR 159 East Fork Culvert
SHT. NAME
FR 159 - East Fork Culvert
PLAN VIEW
NOT TO SCALE
SHT. NO.
2/5



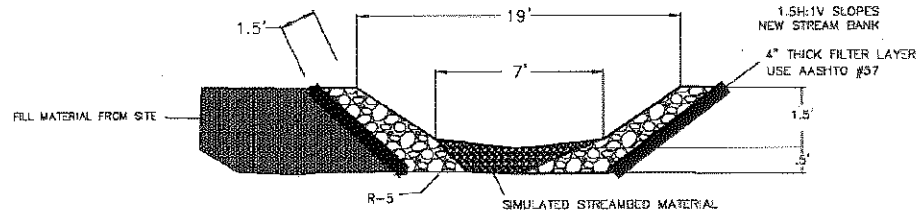
SECTION ALONG STREAM



SECTION AT OUTLET

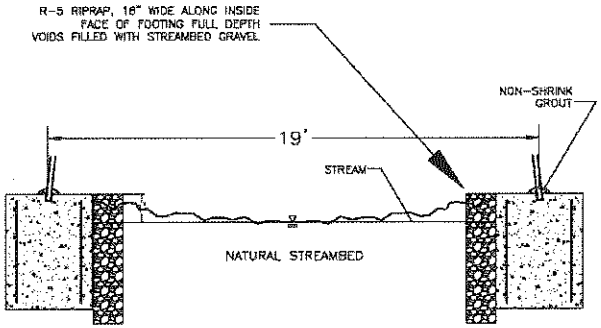
LOOKING UPSTREAM

NOTE:
SORT AND PLACE BOULERS (R-5) ALONG BANK LINES AS SHOWN IN OUTLET SECTION
FILL ALL VOIDS WITH STREAM SIMULATION ROCK

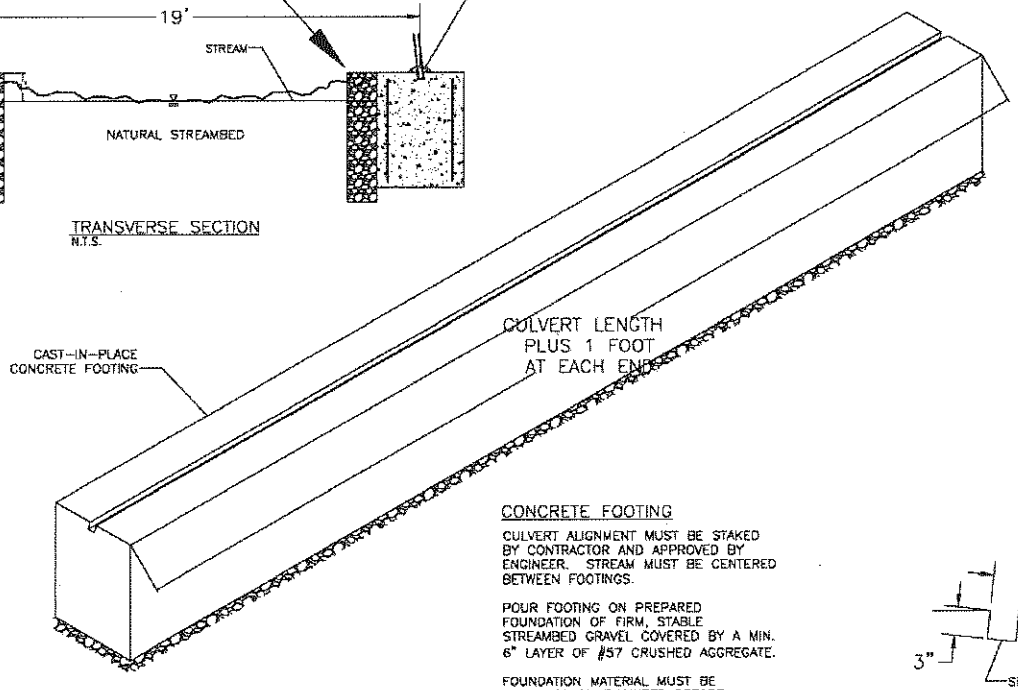


B-B SECTION BELOW OUTLET

DRAWN BY: D. Embry	CHECKED: G. Porter	REVISIONS	PROJECT FR 159 East ForK Culvert	SHT. NAME FR 159 – East ForK Culvert STA. SECTIONS NOT TO SCALE	SHT. NO. 3/5
DATE: 3/8/2013	PROJ. NO.				
FILE PATH: K:/ops/drawings					



TRANSVERSE SECTION
N.T.S.



CONCRETE FOOTING

CULVERT ALIGNMENT MUST BE STAKED BY CONTRACTOR AND APPROVED BY ENGINEER. STREAM MUST BE CENTERED BETWEEN FOOTINGS.

POUR FOOTING ON PREPARED FOUNDATION OF FIRM, STABLE STREAMBED GRAVEL COVERED BY A MIN. 6" LAYER OF #57 CRUSHED AGGREGATE.

FOUNDATION MATERIAL MUST BE APPROVED BY ENGINEER BEFORE PROCEEDING. UNSUITABLE MATERIAL SHALL BE REMOVED AND REPLACED BY SUITABLE COMPACTED GRAVEL PER ENGINEER'S DIRECTION.

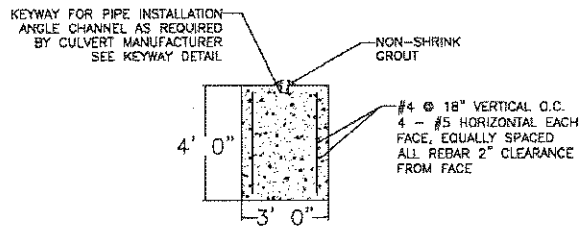
NOTES

ALL CONCRETE SHALL BE CLASS A AIR ENTRAINED.

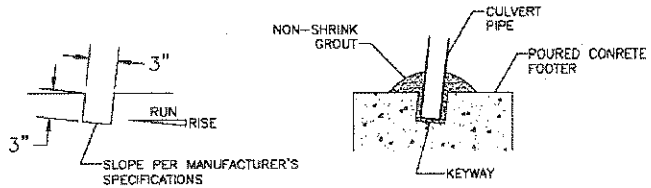
DO NOT DROP UNCONFINED CONCRETE A DISTANCE OF MORE THAN 5 FEET.

PLACE CONCRETE AS NEAR AS POSSIBLE TO ITS FINAL POSITION.

ALL DETAILS SUBJECT TO CHANGE PER MANUFACTURERS SPECIFICATIONS AND RECOMMENDATIONS AND FOREST SERVICE APPROVAL.

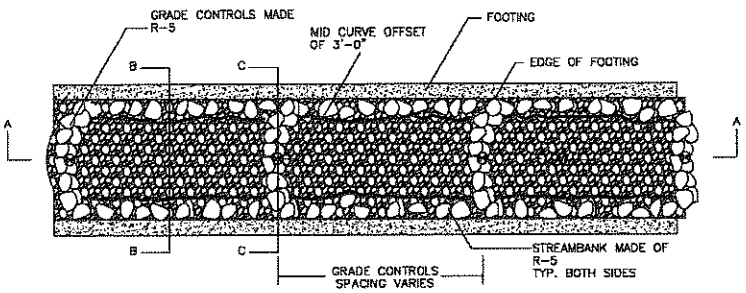


SECTION THROUGH FOOTING
N.T.S.

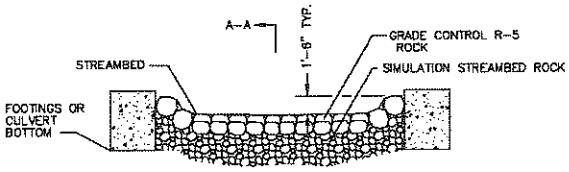


KEYWAY DETAIL
N.T.S.

DRAWN BY: D. Embry	CHECKED: G. Porter	REVISIONS	PROJECT: FR 159 EAST FORK Culvert
DATE: 3/8/2013	PROJ. NO.		SHT. NAME: FR 159 - EAST FORK Culvert STA. PLAN VIEW NOT TO SCALE
FILE PATH: K:/aps/drawings			SHT. NO. 4/5



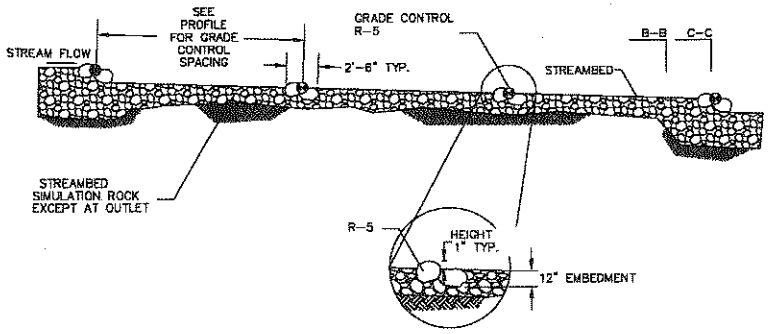
PLAN VIEW
(NOT TO SCALE)



SECTION C-C
(NOT TO SCALE)

NOTE:
SORT AND PLACE BOULERS (R-5) ALONG BANK LINES AS SHOWN SECTION B-B.
FILL ALL VOIDS WITH STREAM SIMULATION ROCK

CONSTRUCT GRADE CONTROLS IN A GENTLE CURVE ORIENTED CONVEX UPSTREAM SECTION C-C, TYPICAL, PLACE BOULDERS IN A CONTINUOUS ROW ACROSS THE ENTIRE WIDTH.



SECTION A-A
(PROFILE VIEW AT STREAM CENTERLINE)
(NOT TO SCALE)

Streambed Mix

PROPORTIONS	SIZE
30 TONS	R-3
30 tONS	AASHTO #57

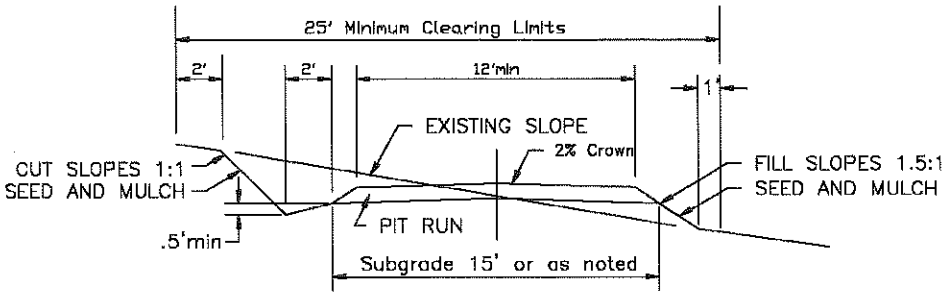
STREAMBED SIMULATION ROCK

* USE THIS MATERIAL TO MIX WITH R-5 ROCK IN CHANNEL BED FROM BEGINNING TO END.

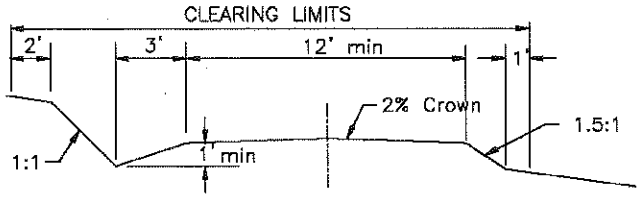
SCATTER 3 TONS OF R5 FROM BEGINNING OF CULVERT TO END OF CULVERT BURIED TO STREAM BED ELEVATION

DRAWN BY: D. Embry	CHECKED: G. PORTER	REVISIONS	PROJECT: FR 159 – East Fork Culvert
DATE: 3/8/2013	PROJ. NO.		SHT. NAME: CHANNEL TYPICAL DETAIL
FILE PATH: K:/ops/drawings			NOT TO SCALE

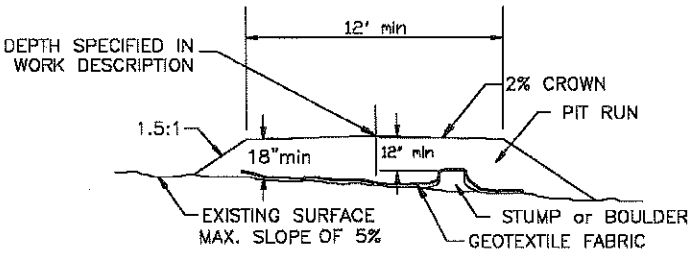
Roadbed Details



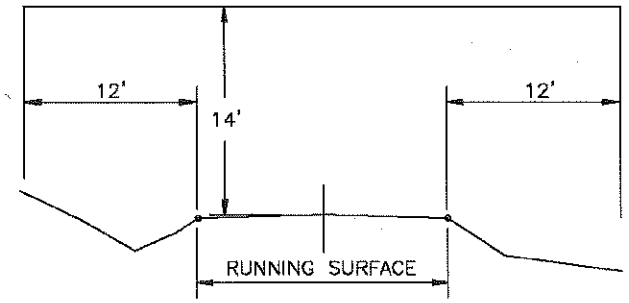
TYPICAL CONSTRUCTION SECTION



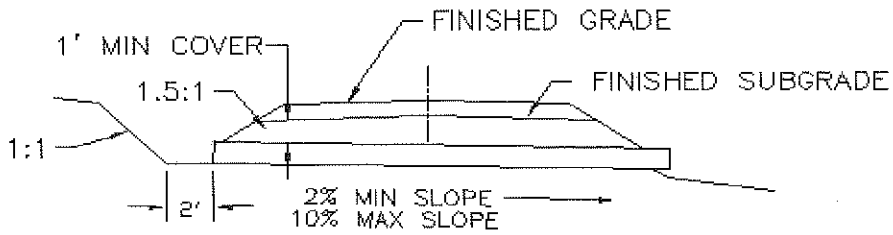
TYPICAL RECONDITION SECTION



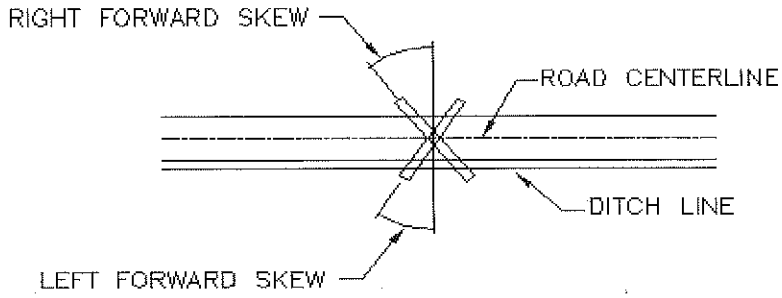
TYPICAL FABRIC SECTION W/O TEMPLATE



ROADSIDE BRUSHING DETAIL

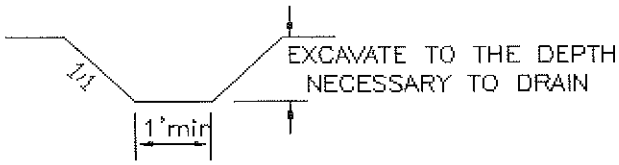


CULVERT SECTION

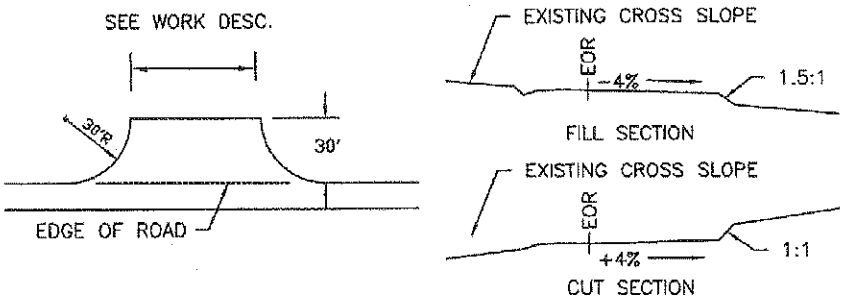


SKEW DETAIL

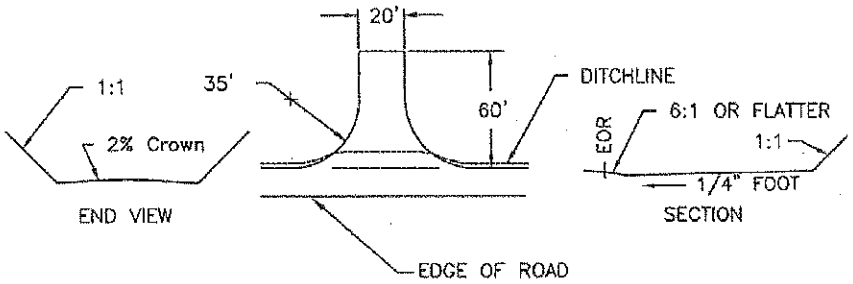
NOTE: Field locate ditch to minimize new clearing



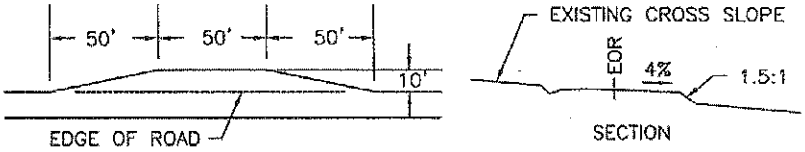
OUTLET/LEAD OFF DITCH SECTION



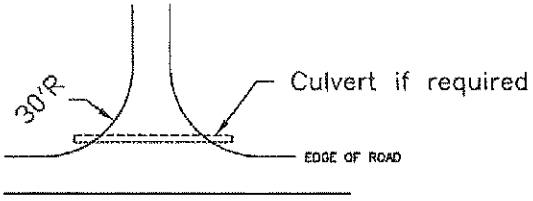
PARKING LOT DETAIL



TURNAROUND DETAIL



TURNOUT DETAIL



INTERSECTION DETAIL

GENERAL NOTES

ALL STEEL SHALL BE PAINTED WITH (2) COATS OF IRON OXIDE RED PRIMER AND (1) COAT OF WALNUT BROWN PAINT; FED. STANDARD 595 A PAINT NO. 20140 (EXCEPT PIVOT TUBE)

ALL STEEL SHALL BE NEW MATERIAL

WELD ALL CROSS ARM ASSEMBLY JOINTS WITH 3/16" FILLETS ALL AROUND ALL WELDS ON GATE ASSEMBLY SHALL BE STRUCTURALLY SOUND

DRILL 1/4" DIAMETER HOLES 4" ON CENTER IN BOTTOM OF CROSS ARM TO FACILITATE DRAINAGE.

APPLY GREASE TO OUTSIDE OF PIVOT TUBE, ENTIRE LENGTH, PRIOR TO INSTALLATION OF CROSS ARM ASSEMBLY. TYPE OF GREASE SHALL BE EXTREME PRESSURE MULTIPURPOSE WHEEL BEARING GREASE OR EQUAL

POSTS SHALL BE ENCASED WITH CONCRETE TO WITHIN 1 FT. OF GROUND LEVEL AND BACKFILL COMPACTED (3 POSTS)

PRIOR TO GATE INSTALLATION, NOTIFY FOREST SERVICE FOR LOCATION ON ROAD

PARTS MAY BE FLAME CUT AND ALL BURRS REMOVED

INSTALL SIGNS AFTER INSTALLATION OF GATE

TECHNICAL CONTACT IS JIM DUCKETT, FOREST SERVICE, WARREN, PA. (814) 728-6257

SIGN CODE

① (2) L-R AND (2) R-R TYPE 1 BARRICADE MARKERS - RED ON WHITE - 12" x 36"

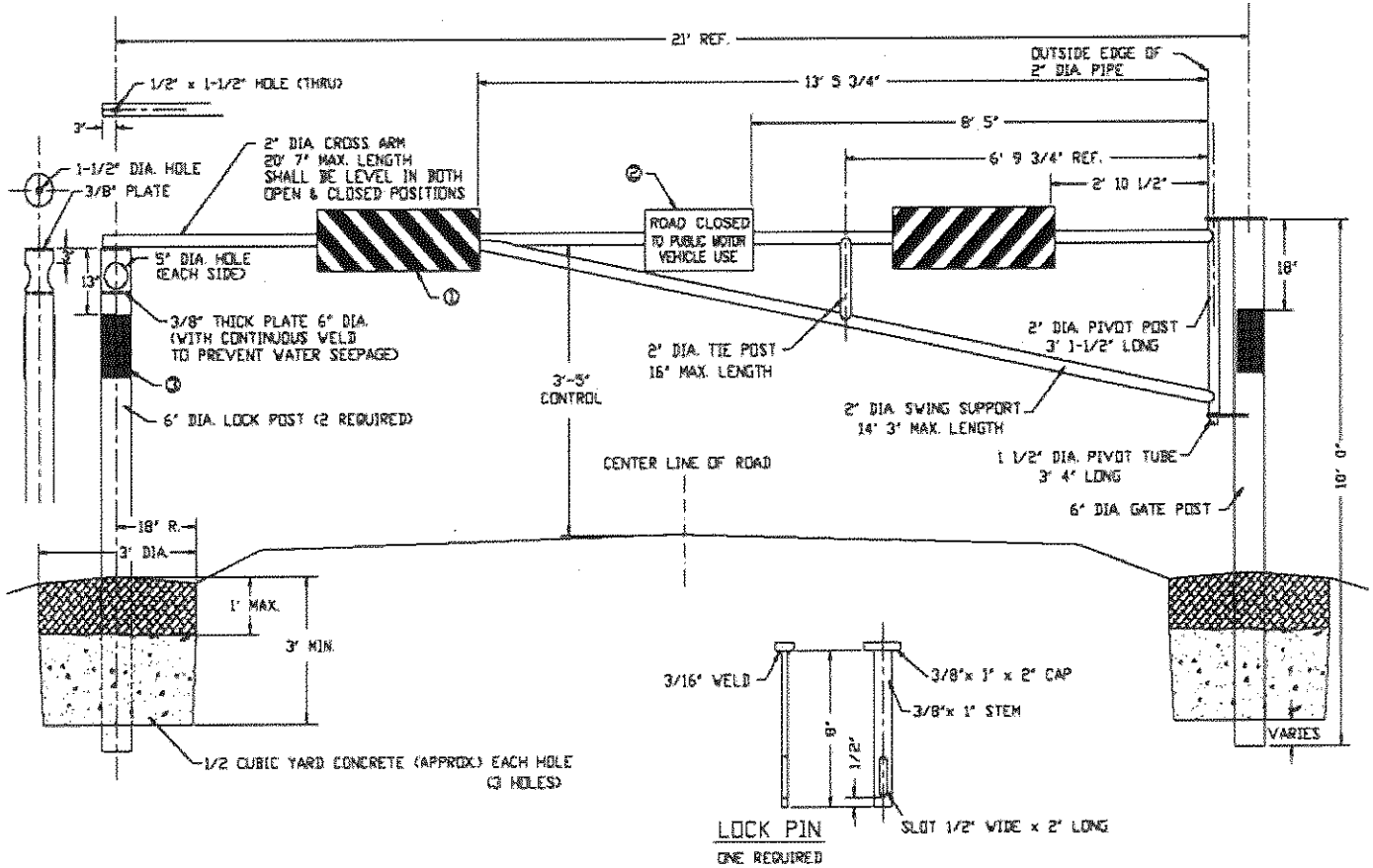
② (1) ROAD CLOSED TO PUBLIC MOTOR VEHICLE USE

③ (5) TYPE 2 OBJECT MARKERS (OM-2-B) - YELLOW (REFLECTORIZED) - 6" x 12" (2) ON GATE POST AND (2) ON CLOSED POSITION LOCK POST (1) ON OPEN POSITION LOCK POST FACED TO ONCOMING TRAFFIC

NOTE: ALL SIGNS SHALL BE FURNISHED BY THE FOREST SERVICE AND INSTALLED BY THE CONTRACTOR.

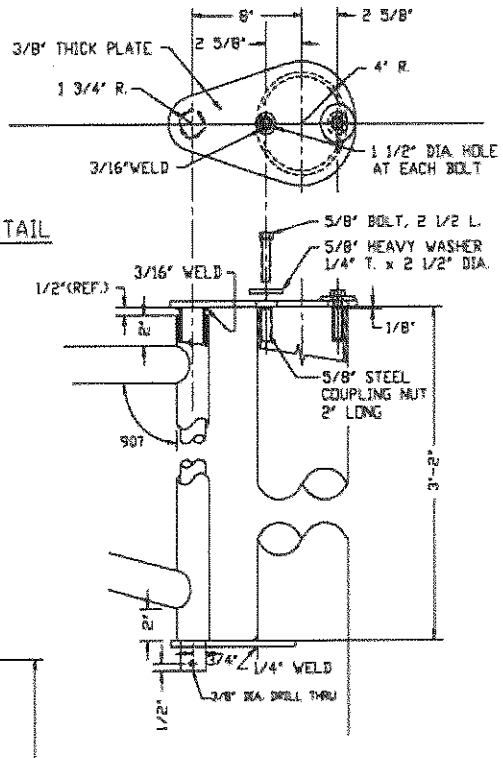
ESTIMATED QUANTITIES

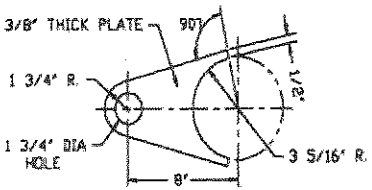
MATERIAL	QUANTITY (LF)	REMARKS
1-1/2" DIA. PIPE(NOM.)	3' 4"	PIVOT TUBE
2" DIA. PIPE(NOM.)	39' 4"	CROSS ARM ASSEMBLY
6" DIA. PIPE(NOM.)	30' 0"	GATE POSTS (3)
3/8" x 1" STRAP	0' 10"	LOCK PIN
3/8" x 8" PLATE	4' 1"	MISC.
BOLTS, NUTS, WASHERS		TWO (2) OF EACH



LOCK PIN
ONE REQUIRED

NOTE: PLATE SIZE 8" WIDE x 13 3/4" LONG





NOTE: PLATE SIZE 8" WIDE x 10" LONG

LEVEL "D" FOREST SERVICE GATE	
ALLEGHENY NATIONAL FOREST WARREN, PA	
DES. R.HEARING, B.JOHNSON, R.GALLO-9/27/89	
DRN. B.JOHNSON & R.GALLO - 12/89	
NOT TO SCALE	

SCHEDULE OF ITEMS, SPECIFICATIONS & DRAWINGS FOR SPECIFIED ROADS

I. Road Summary	**1 page**
II. Schedule of Items	**1 page**
III. Specifications and Special Project Specifications	**79 pages**
IV. Road Plans: Hemlock Service Contract Work Project #002	**14 pages**

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Road Summary

SPECIFIED ROADS

a. Description of Work:

Culvert Replacement and Reconstruction: FR 159

DSA Limestone, Reconditioning of Roadbed, Mobilization, Culvert Installation, Seeding & Mulching, Clearing and Grubbing, Removal of Culverts.

b. Construction Costs:

Road No.	Miles	Estimated Road Cost
159	0.1 ®	

Completion dates: 9/30/2015

Schedule of Items

FR159

Pay items	Description	Method of Measure	Pay Unit	Estimated Quantity	Engineer's Estimated unit Price	Engineer's Extend Total
15101	Mobilization(Lump Sum)	LSQ	ALL	1		
15713	Soil Erosion & Pollution Control	LSQ	ALL	1		
20102	Clearing and Grubbing (Lump Sum)	LSQ	ALL	1		
20301	Removal Of Culvert	CQ	EACH	2		
20957	Structural Excavation, Type unclassified Lump Sum	LSQ	ALL	1		
25102	Placed riprap, NSA Size #R-5	VQ	TON	105		
30101	Aggregate base, grading AASHTO #57, Compaction (footer bedding material)	VQ	TON	14		
30103	Aggregate Base , grading PA- 2A, compaction method A	VQ	TON	460		
30115	Aggregate surface course, Type DSA limestone, compaction method B	VQ	TON	69		
30318	Road reconditioning, roadbed, compaction method B	CQ	MILE	0.1		
55201	Structural Concrete, Class A	CQ	C.Y.	40		
60263	24 inch aluminized type 2, corrugated steel pipe, 0.064 inch thickness, method	CQ	L.F.	36		
60305	19'-0" span, 5' 9-1/2" rise, structural plate arch	CQ	Foot	42		
62503	Seeding, hydraulic or dry method (lump sum)	LSQ	ALL	1		
63306	Object Markers , Type 3	CQ	EACH	8		
63501	Temporary Traffic Control	CQ	EACH	1		
64805	Stream simulation AASHTO #57,mixed on site	VQ	TON	30		
64805	Stream simulation NSA R-3,mixed on site	VQ	TON	30		
TOTAL						

Specifications

The following specifications will be used for this contract:

Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects – FP-03 U.S. Customary Units. FP-03 is available on the internet at the following site: http://flh.fhwa.dot.gov/resources/pse/specs/

Supplemental Specifications – These specifications were prepared by the Forest Service and are a supplement to or change the FHWA specifications.

Special Project Specifications – Are specifications prepared on the Allegheny National Forest and pertain to Pennsylvania Department of Transportation nomenclature. These are designated SPS.

Preface

Preface_wo_03_15_2004_m

Delete all but the first paragraph and add the following:

The Forest Service, US Department of Agriculture has adopted FP-03 for construction of National Forest System Roads.

101 - Terms, Format, and Definitions

101.00_nat_us_07_25_2005

101.01_nat_us_01_22_2009

101.01 Meaning of Terms

Delete all references to the TAR (Transportation Acquisition Regulations) in the specifications.

101.03_nat_us_06_16_2006

101.03 Abbreviations.

Add the following to (a) Acronyms:

AFPA	American Forest and Paper Association
MSHA	Mine Safety and Health Administration
NIST	National Institute of Standards and Technology
NESC	National Electrical Safety Code
WCLIB	West Coast Lumber Inspection Bureau

Add the following to (b) SI symbols:

mp	Milepost
ppm	Part Per Million

101.04_nat_us_03_29_2007

101.04 Definitions.

Delete the following definitions and substitute the following:

Bid Schedule--The Schedule of Items.

Bridge--No definition.

Contractor--The individual or legal entity contracting with the Government for performance of prescribed work. In a timber sale contract, the contractor is the "purchaser".

Culvert--No definition.

Right-of-Way--A general term denoting (1) the privilege to pass over land in some particular line (including easement, lease, permit, or license to occupy, use, or traverse public or private lands), or (2) Real property necessary for the project, including roadway, buffer areas, access, and drainage areas.

Add the following:

Adjustment in Contract Price--"Equitable adjustment," as used in the Federal Acquisition Regulations, or "construction cost adjustment," as used in the Timber Sale Contract, as applicable.

Change--"Change" means "change order" as used in the Federal Acquisition Regulations, or "design change" as used in the Timber Sale Contract.

Design Quantity--"Design quantity" is a Forest Service method of measurement from the FS-96 *Forest Service Specifications for the Construction of Roads and Bridges.* Under these FP specifications this term is replaced by the term "Contract Quantities".

Forest Service--The United States of America, acting through the Forest Service, U.S. Department of Agriculture.

Neat Line--A line defining the proposed or specified limits of an excavation or structure.

Pioneer Road--Temporary construction access built along the route of the project.

Purchaser--The individual, partnership, joint venture, or corporation contracting with the Government under the terms of a Timber Sale Contract and acting independently or through agents, employees, or subcontractors.

Protected Streamcourse--A drainage shown on the plans or timber sale area map that requires designated mitigation measures.

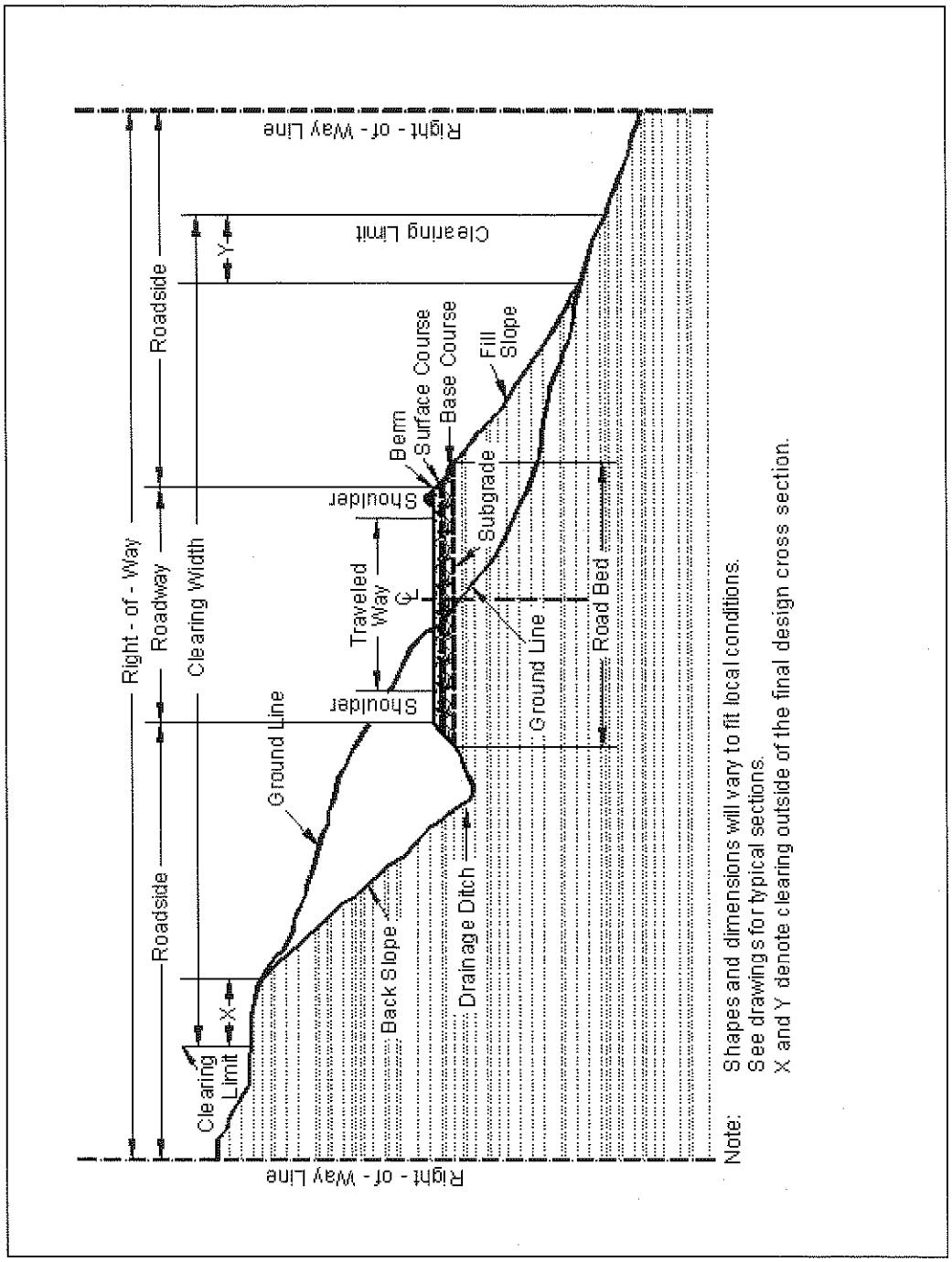
Road Order--An order affecting and controlling traffic on roads under Forest Service jurisdiction. Road Orders are issued by a designated Forest Officer under the authorities of 36 CFR, part 260.

Schedule of Items--A schedule in the contract that contains a listing and description of construction items, quantities, units of measure, unit price, and amount.

Utilization Standards--The minimum size and percent soundness of trees described in the specifications to determine merchantable timber.

Add Figure 101-1—Illustration of road structure terms:

Figure 101-1—Illustration of road structure terms.



102 - Bid, Award, and Execution of Contract

102.00_nat_us_02_16_2005

102 Bid, Award, and Execution of Contract

Delete Section 102 in its entirety.

103 - Scope of Work

103.00_nat_us_02_16_2005

Deletions

Delete all but subsection 103.01 Intent of Contract.

104 - Control of Work

104.00_nat_us_06_16_2006

Deletions

Delete Sections 104.01, 104.02, and 104.04.

104.06_nat_us_02_17_2005

Add the following subsection:

104.06 Use of Roads by Contractor

The Contractor is authorized to use roads under the jurisdiction of the Forest Service for all activities necessary to complete this contract, subject to the limitations and authorizations designated in the Road Order(s) or described in the contract, when such use will not damage the roads or national forest resources, and when traffic can be accommodated safely.

105 - Control of Material

105.02_nat_us_01_18_2007

105.02 Material Sources.

105.02(a) Government-provided sources.

Add the following:

Comply with the requirements of 30 CFR 56, subparts B and H. Use all suitable material for aggregate regardless of size unless otherwise designated. When required, re-establish vegetation in disturbed areas according to section 625.

105.05_nat_us_05_12_2004

105.05 Use of Material Found in the Work.

Delete 105.05 (a) and (b) and the last sentence of the second paragraph and substitute the following:

Materials produced or processed from Government lands in excess of the quantities required for performance of this contract are the property of the Government. The Government is not obligated to make reimbursement for the cost of producing these materials.

106 - Acceptance of Work

106.07_nat_us_05_11_2004

106.07 Delete

Delete subsection 106.07.

107 - Legal Relations and Responsibility to the Public

107.05_nat_us_05_11_2004

107.05 Responsibility for Damage Claims.

Delete the entire subsection.

107.06_nat_us_06_16_2006

107.06 Contractor's Responsibility for Work.

Delete the following from the first paragraph.

"except as provided in Subsection 106.07".

107.09_nat_us_06_16_2006

107.09 Legal Relationship of the Parties.

Delete the entire subsection.

107.10_nat_us_06_16_2006

107.10 Environmental Protection.

Add the following:

Design and locate equipment repair shops, stationary refueling sites, or other facilities to minimize the potential and impacts of hazardous material spills on Government land.

Before beginning any work, submit a Hazardous Spill Plan. List actions to be taken in the event of a spill. Incorporate preventive measures to be taken, such as the location of mobile refueling facilities, storage and handling of hazardous materials, and similar information. Immediately notify the CO of all hazardous material spills. Provide a written narrative report form no later than 24 hours after the initial report and include the following:

- Description of the item spilled (including identity, quantity, manifest number, and other identifying information).
- Whether amount spilled is EPA or state reportable, and if so whether it was reported, and to whom.
- Exact time and location of spill including a description of the area involved.
- Containment procedures.
- Summary of any communications the Contractor had with news media, Federal, state and local regulatory agencies and officials, or Forest Service officials.

- Description of clean-up procedures employed or to be employed at the site including final disposition and disposal location of spill residue.

When available provide copies of all spill related clean up and closure documentation and correspondence from regulatory agencies.

The Contractor is solely responsible for all spills or leaks that occur during the performance of this contract. Clean up spills or leaks to the satisfaction of the CO and in a manner that complies with Federal, state, and local laws and regulations.

108 - Prosecution and Progress

108.00_nat_us_02_16_2005

108 Delete.

Delete Section 108 in its entirety.

109 - Measurement and Payment

109.00_nat_us_02_17_2005

109 Deletions

Delete the following entire subsections:

109.06 Pricing of Adjustments.

109.07 Eliminated Work.

109.08 Progress Payments.

109.09 Final Payment.

109.02_nat_us_06_16_2006

109.02 Measurement Terms and Definitions.

(b) Contract quantity.

Add the following:

Contract quantities will be adjusted only when there are errors in the original design of 15% or more.

Change the following:

"(b) Cubic yard" to "(c) Cubic yard".

Add the following definition:

(p) Thousand Board Feet (Mbf). 1,000 board feet based on nominal widths, thickness, and extreme usable length of each piece of lumber or timber actually incorporated in the job. For glued laminated timber, 1,000 board feet based on actual width, thickness, and length of each piece actually incorporated in the job.

151 - Mobilization

151.03_nat_us_08_05_2005

151.03 Payment

Delete the entire subsection and add the following:

151.03 Payment

Mobilization is considered an indirect cost of this contract and will not be compensated as a separate work item.

153 - Contractor Quality Control

153.02_nat_us_02_17_2005

153.02 Contractor Quality Control Plan.

Add the following:

Submit written proposals for approval of alternate AASHTO or State approved test methods. Alternate methods may be allowed based on documented equivalence to the specified method.

153.02_04_us_06_22_2009

153.02 Contractor Quality Control Plan.

Add the following to (d) Personnel Qualifications

(3) For projects utilizing Self Consolidating Concrete (SCC) Quality Control personnel should have adequate experience with SCC and be a certified ACI Level 1 Field Testing Technician.

153.04_nat_us_10_24_2007

153.04 Records.

Delete all but the first sentence

155 - Schedules for Construction Contracts

155.00_nat_us_05_11_2004

155 Delete.

Delete Section 155 in its entirety.

157 - Soil Erosion Control

157.00_01_us_10_10_2006

157.02 Materials

Add the following:

Provide bales, wattles, logs and rolls from a certified noxious weed free source.

157.03 General.

Delete the first two paragraphs and replace with the following:

Prepare, file and submit storm water permits as required by the State with jurisdiction, including payment of necessary fees. The storm water permits shall be for ___ outfalls.

Submit an Erosion Control Plan detailing permanent and temporary control measures to minimize erosion and sedimentation during and after construction in accordance with the plans and storm water permits. Do not modify the type, size, or location of any control or practice without approval. Submit the erosion control plan proposal at least 7 days before operations begin to the CO for approval.

Reflect in the Erosion Control Plan special concerns and measures necessary to protect resources and government improvements. Include:

(a) The construction activities and sequence of implementation relating to specific erosion control measures.
(b) The location and type of permanent controls to be implemented during construction.
(c) The location and type of temporary controls to be implemented during construction.
(d) For work in stream channels with running water a detailed dewatering plan.
(e) For work in stream channels without flowing water describe level of ground and vegetative disturbance and measures to reduce potential sediment delivery.
(f) Description of the monitoring plan.

Add the following to the third paragraph:

Upon completion of construction at the site, remove all temporary erosion control devices, dewatering materials and equipment from Government property.

157.08 Water Crossings.

Add the following:

At any channel crossing where there is running water, dewater by rerouting water flow around the site before and during excavation and embankment operations.

157.09 Diversions.

Delete the first sentence and replace with the following:

When shown on the plans, construct temporary channels, temporary culverts, or sandbags to divert water around disturbed areas and slopes. Earthen dams are prohibited.

Erosion & Sedimentation Control Plan

EROSION & SEDIMENTATION CONTROL PLAN

FOR

FR 159 Culvert Replacement Project

KINGSLEY TOWNSHIP, FOREST COUNTY, PENNSYLVANIA

March 2013
Prepared by:

U.S.D.A. Forest Service Allegheny National Forest
4 Farm Colony Drive
Warren, PA 16365
814-728-6169

RECEIVING STREAM CLASSIFICATION:

The USDA Forest Service, Allegheny National Forest plans to replace an undersized culvert on East Fork, a tributary to Fork Run in Forest County. The Chapter 93 classification is High Quality- CWF. This stream is a Wild Trout Stream. In-stream work will not be completed between October 1 and December 31.

DIRECTIONS TO THE SITE:

Refer to the enclosed portion of the Kelletville USGS quadrangle map for the project location. To access this site from SR 62, take SR-666 east for 9.7 miles. Take a sharp left on Pierson Hill Road and travel 2.8 miles. The road becomes FR 159. Go straight through main intersection and drive 0.3 miles. Turn left on FR 159. Drive 0.2 miles. Park at the culvert.

PROJECT DECRIPTION:

The existing culvert to be replaced is located along FR 159, a snowmobile trail on Forest Service property. East Fork is currently constricted to a 5' x 30' casing at the FR 159 crossing. The aggradation above the culvert and scour below the culvert was caused by the existing undersized culvert. A new alignment is needed for the new culvert because of the upstream migration of the channel. The new crossing will be a 19' span, 5'9.5" rise, 42' long bottomless galvanized steel structural plate box culvert with concrete footers.

The stream bankfull width ranges from 16 to 19 feet. The waterway opening will be increased from 19.6 square feet to 83 square feet. This pipe installation is designed to allow the passage of 100 year flood flows with minimal constriction. The Head Water to Depth ratio is 0.7 for a 100 year flow. 100 year flows were calculated using USGS StreamStats. The contributing watershed area is .1414 acres, and 100 year flood flow is 583 cfs. The new culvert alignment will increase the slope in this section of stream from 0.5% slope to 0.7% slope. This stream has good armoring in the channel bed material and is expected to have only minor adjustments from this change in slope. The stream bottom will be constructed using R-5 riprap rock for the channel banks, and a mixture of R-3 and AASHTO #57 for the stream bottom material. This size rock has been designed to mimic natural stream conditions. 3 cross-channel ribs will be built inside the culvert to provide cross channel structure to the stream bed.

A new channel will be constructed for 46' downstream of the new culvert alignment. Fill from the new crossing will be placed in the old channel to fill in some of the large scour pool. This material will be built up no higher than the surrounding floodplain height. This fill material will be covered with 4" of AASHTO # 57 to provide a filter layer. Then this layer will be covered with R-5 Riprap to build the channel banks. The stream bed mixture of R3 and AASHTO #57 will be placed in the channel bottom and to fill in the voids of the R-5. Channel bank slopes will be 1.5 to 1. The same method and materials will be used to block off the old upstream channel to the height of the floodplain. Disturbance upstream of the culvert will be limited to 30' upstream of the culvert.

The limits of earth disturbance are shown on the plan map and the area is 0.26 acres. Typical disturbance off the road way will be limited to delivery of material and construction of the channel, so actual disturbance will be much less than 0.26 acre. Stream and floodway impacts will be limited to a 120' x 39' area, or 0.1 acres. All construction activities must be performed within the designated disturbance limits. Excess fill material will be removed from the floodway and stockpiled, seeded, and mulched. The proposed crossing will be backfilled with roadway sides sloped at (2:1), seeded, and mulched. The project is expected to be completed within two weeks of beginning construction. Construction is anticipated to be completed during low flows in June through September.

SOILS TYPES:

The material properties of the native soils have no impact on this project because the proposed excavation will take place in the Forest Service roadway consisting of approximately 1.5 feet of non-native compacted fill material. Disturbance off of the roadway will be minimized as much as possible

The native soil type encountered onsite has been identified using the Soil Map online access information presented by Penn State Cooperative Extension Geospatial Technology Program. The following soils have been identified.

Soil Map Unit- BkB:

Brinkerton silt loam, 0 to 8 percent slopes

- Potential Erosion Hazard: Moderate due to Slope/erodibility

Bedrock Depth- Very deep

CONSTRUCTION SEQUENCE:

1. Stage necessary equipment and materials to begin work.

2. Install filter sock as necessary to prevent sediment from entering the stream.

3. If possible, maintain stream flow through the existing culvert using a temporary diversion dam during stream channel construction. Various methods (e.g. pipe flume, coffer dam) will be used by the contractor to divert the stream around the disturbed areas during construction of the footers and culvert. The project will be scheduled during low flows and instream work will be completed as quickly as possible. Suitable excavated material will be stockpiled and protected from rain away from the stream. Filter sock will be placed around stockpile. All unsuitable material will be hauled off-site.

4. Construct footers in accordance with Contract Drawings, backfill sump hole and place riprap along inside edge of footing. All voids in riprap should be filled with streambed gravel.

5. Construct cross-channel ribs using R-5. Scatter 5 tons of R-5 throughout channel inside culvert so that rock will be near stream bed elevation. Place 40 tons of streambed mixture (R-3 and AASHTO # 57) into channel between footers to rebuild natural stream channel.

6. Assemble the structural plate low profile box culvert following manufacturer's specifications. Backfill and compact fill material around the pipe. Place riprap as indicated on the contract drawings.

7. Remove existing pipe and channel water as necessary to confine water to stream center line. Implement stream diversion BMPs (e.g. pump-around, coffer dam) to construct downstream channel. Place fill in old channel below culvert to construct new channel bank. Place a filter layer 4" thick of AASHTO # 57 on both banks of the new channel. Place 1.5' of R5 on top of AASHTO #57. Place 24 tons of stream bed mixture in the center of downstream channel. Use the same method and materials to block off the old upstream channel to the height of the floodplain.

8. Retain removed pipe for OGM operator off-site.

9. Permanently seed and mulch all disturbed areas outside of the roadway.

10. All erosion and sediment control practices will be inspected at least every 7 days and after rainfall events. Needed repairs will be made immediately.

11. Permanently seed and mulch all disturbed areas outside of the roadway.

NOTE: Site stabilization is achieved when a minimum of 70% perennial vegetated cover is established on all disturbed areas.

12. After site stabilization is achieved, contractor is to remove temporary erosion control measures (e.g. Filter sock).

Temporary Planned Erosion and Sedimentation Control Practices

(Note: Best Management Practices and drawing details are from the Department of Environmental Protection's Erosion and Sediment Pollution Control Manual)

1. Pumped Water Filter Bags

   Sump holes will be constructed on the downstream end of each footer excavation in order to drain any water from the area. The water shall be pumped to a filter bag located in a well vegetated area on the edge of the road. This shall be done prior to placement of the gravel bedding and concrete.

2. Compost Filter Socks– used to control sheet flow runoff from disturbed areas or material stockpiles.

3. Pipe Flume

   A natural barrier will be created upstream of the pipe inlet to serve as a temporary dam and will be maintained across the stream channel. Downstream of the pipe is manmade weir. A flexible pipe will be installed through the upstream dam to funnel the stream away from the construction past the downstream weir. The pipe flume is intended to keep the construction in the stream channel dry and away from the excavation and construction of the footers. It will isolate the water to the pipe and place it back into the stream channel outside construction limits. This will help to mitigate sedimentation from the construction of the new culvert pipe into the stream.

4. Seed & Mulch

   All disturbed areas shall be seeded and mulched 5 days after the completion of ground disturbing activities. Seeding and mulching shall be done in accordance with Contract Specifications Section 625 and Supplemental Specifications 625 Turf Establishment (see Appendix C)

Permanent Planned Erosion and Sedimentation Control Practices

The new culvert installation and riprap placement has been designed to help minimize erosion in the stream channel. The following erosion control measures are permanent controls:

1. Vegetative cover
2. Riprap placement at the toe of the stream banks and around the culvert.

Soil Preparation in areas of compacted soils and/or addition of rock/surfacing material: Loosen soil to a depth of one inch or depth sufficient to allow soil to seed contact. If rock material is placed for stabilization, it must be scraped-off/removed from planting areas to allow sufficient amount of soil to be exposed/manipulated for planting.

Recommended Seed Mixes and Rates of Application:

ERNMX-181 Native Steep Slope Mix with Annual Ryegrass Seeding Rate 30 lb per acre or 1 lb per 1,000 sq ft. http://www.ernstseed.com/seed-mix/?category-id=60

- 24% Little Bluestem, FIG PA Ecotype (Schizachyrium scoparium, FIG PA Ecotype)
- 20% Annual Ryegrass (Lolium multiflorum (L. perenne var. italicum))
- 12% Canada Wild Rye (Elymus canadensis)
- 11% Indiangrass, 'Prairie View', IN Ecotype (Sorghastrum nutans, 'Prairie View', IN Ecotype)
- 8% Virginia Wild Rye, PA Ecotype (Elymus virginicus, PA Ecotype)
- 4% Switchgrass, 'Cave-In-Rock' (Panicum virgatum, 'Cave-In-Rock')
- 3% Autumn Bentgrass, APB (Agrostis perennans, APB)
- 3% Ticklegrass (Rough Bentgrass), PA Ecotype (Agrostis scabra, PA Ecotype)
- 3% Purple Top (Tridens flavus)
- 2% Partridge Pea, PA Ecotype (Chamaecrista fasciculata (Cassia f.), PA Ecotype)
- 2% Wild Bergamot (Monarda fistulosa)
- 2% Tall White Beard Tongue, PA Ecotype (Penstemon digitalis, PA Ecotype)
- 2% Black Eyed Susan, CP NC Ecotype (Rudbeckia hirta, CP NC Ecotype)
- 2% Lance Leaved Coreopsis, CP NC Ecotype (Coreopsis lanceolata,CP NC Ecotype)
- 1% Marsh (Dense) Blazing Star (Spiked Gayfeather) (Liatris spicata)
- 1% Purple Coneflower (Echinacea purpurea)

Total: 100%

Mulching

- One ton per acre of straw or hydroseed.
- No fertilizer or lime is to be applied.

Site stabilization is achieved when a minimum of 70% perennial vegetated cover is established on all disturbed areas.

MAINTENANCE OF EROSION CONTROL FACILITIES:

Inspections should be conducted weekly and/or after each significant storm event. All necessary cleaning, repair, and/or maintenance should be made immediately to maintain all erosion control measures.

The following maintenances must be performed until stabilization is achieved onsite.

1. **Compost Filter Socks**– used to control sheet flow runoff from disturbed areas or material stockpiles.

2. **Vegetative Surface Stabilization** – Disturbed area's failing to establish vegetation shall be re-seeded and re-mulched according to the original specifications.

3. **Pump Filter Bag** - A new bag and properly disposed when the bag has been filled to ½ its total capacity.

4. **Sandbag Headwall** – Inspect sandbag headwall and check for washout. Make necessary repairs maintain the integrity of the dam.

201 - Clearing and Grubbing

201.00_nat_us_08_05_2009

201.02 Material:

Delete Tree wound dressing material reference.

201.03 General.

Delete the last sentence.

201.04 Clearing.

Delete the last sentence of (d).

201.01 Description

Replace with the following

This work consists of clearing and grubbing within clearing limits and other designated areas.

201.04_nat_us_03_03_2005

Construction Requirements

201.04 Clearing.

Add the following:

Utilization standards for merchantable timber are listed below. Fall and buck merchantable material into lengths not to exceed 40 feet. Pieces (logs) meet utilization standards when such pieces would have met Utilization Standards if bucking lengths were varied to include such material.

Minimum Utilization Standards

Length	Diameter (Inside Bark) at Small End	33-1/3% Net Scale in % of Gross Scale
8 feet	9.6 inches	

201.04_nat_us_02_22_2005

201.04 Clearing. (c)

Delete paragraph (c) and replace with the following:

(c) In areas outside the excavation, embankment, and slope rounding limits, cut stumps to within 12 inches or one-third of the stump diameter of the ground, whichever is higher, measured on the side adjacent to the highest ground. For timber sales, stump heights will meet the requirements of the Timber Sale contract.

201.04 Clearing.

Delete subsection (d) and replace with the following:

(d) Do not cut vegetation less than 3 feet tall and less than 3 inches in diameter, that is within the clearing limits but beyond the roadway and not in a decking area, and that does not interfere with sight distance along the road.

Add the following:

(e) Trim branches of remaining trees or shrubs to give a clear height of 14 feet above the roadbed unless otherwise indicated. Trim tree limbs as near flush with the trunk as practicable.

(f) Remove brush from log decks. Deck logs so that logs are piled parallel to one another; can be removed by standard log loading equipment; will not damage standing trees; will not interfere with drainage, and will not roll. Keep logs in log decks free of brush and soil.

201.04_nat_us_02_18_2005

201.04 Clearing.

Add the following:

When marked in advance, remove dead trees over 6 inches in diameter measured at 12 inches above the ground that lean toward the road and are tall enough to reach the roadbed.

201.06_nat_us_11_04_2004

201.06 Disposal.

Delete the first sentence of this subsection and substitute the following:

Merchantable timber removed from Forest Service land is subject to the Forest Resources Conservation and Shortage Relief Act of 1990 (PL 101-382; 104 Stat. 714-726; 16 USC 620 et. seq.). Do not export timber from the United States or use in direct or indirect substitution for unprocessed timber exported from the United States, from private lands by Purchaser, or any person as defined in Section 493 (16 USC 620e) of the Act.

Unless Forest Service determines that circumstances warrant a written waiver or adjustment, (1) hammer brand all products on both ends with an assigned contract brand before removal from the project site, (2) hammer brand each product exempt from domestic processing on both ends with an exempt brand registered for use on exempt logs from National Forest, and (3) paint all domestic processing products on both ends with 2 inch circle of yellow paint according to Interim Specification 2400-400 (available upon request). Paint or brand products before removing them from project site unless approved by the CO. Brands and yellow paint must remain on logs until they are processed.

Contractor may remanufacture logs into different log lengths as approved. Repaint or rebrand all remanufactured pieces. Pay all surveillance costs except that Forest Service may waive such payment if such costs are minor and part of normal remanufacturing operations.

203 - Removal of Structures and Obstructions

203.01_nat_us_02_25_2005

203.01 Description.

Delete and replace with the following:

This work consists of disposing of construction slash and debris, salvaging, removing, and disposing of buildings, fences, structures, pavements, culverts, utilities, curbs, sidewalks, and other obstructions.

203.05_nat_us_02_24_2005

203.05 Disposing of Material.

Add the following:

(e): Scattering. Scatter pieces of wood less than 3 inches in diameter and 3 feet in length within the clearing limits. Do not place construction slash in lakes, meadows, streams, or streambeds. Immediately remove construction slash that interferes with drainage structures.

203.08_nat_us_02_24_2005

203.08 Payment

Add the following:

Disposal of construction slash will be compensated under the designated pay item in Section 201.

204 - Excavation and Embankment

204.00_nat_us_03_26_2009

Replace Section 204 in its entirety with the following:

Description

204.01 This work consists of excavating material and constructing embankments. This includes furnishing, hauling, stockpiling, placing, disposing, sloping, shaping, compacting, and finishing earthen and rocky material.

204.02 Definitions.

(a) Excavation. Excavation consists of the following:

(1) Roadway excavation. All material excavated from within the right-of-way or easement areas, except subexcavation covered in (2) below and structure excavation covered in Sections 208 and 209. Roadway excavation includes all material encountered regardless of its nature or characteristics.

(2) Subexcavation. Material excavated from below subgrade elevation in cut sections or from below the original groundline in embankment sections. Subexcavation does not include the work required by Subsections 204.05, 204.06(b), and 204.06(c).

(3) Borrow excavation. Material used for embankment construction that is obtained from outside the roadway prism. Borrow excavation includes unclassified borrow, select borrow, and select topping.

(b) Embankment construction. Embankment construction consists of placing and compacting roadway or borrow excavation. This work includes:

(1) Preparing foundation for embankment;
(2) Constructing roadway embankments;
(3) Benching for side-hill embankments;
(4) Constructing dikes, ramps, mounds, and berms; and
(5) Backfilling subexcavated areas, holes, pits, and other depressions.

(c) Conserved topsoil. Excavated material conserved from the roadway excavation and embankment foundation areas that is suitable for growth of grass, cover crops, or native vegetation.

(d) Waste. Excess and unsuitable roadway excavation and subexcavation that cannot be used.

Material

204.03 Conform to the following Subsections:

Backfill material	704.03
Select borrow	704.07
Select topping	704.08
Topping	704.05
Unclassified borrow	704.06
Water	725.01

Construction Requirements

204.04 Preparation for Roadway Excavation and Embankment Construction. Clear the area of vegetation and obstructions according to Sections 201 and 203.

204.05 Reserved.

204.06 Roadway Excavation. Excavate as follows:

(a) General. Do not disturb material and vegetation outside the construction limits. Incorporate only suitable material into embankments. Replace any shortage of suitable material caused by premature disposal of roadway excavation. Dispose of unsuitable or excess excavation material according to Subsection 204.14.

At the end of each day's operations, shape to drain and compact the work area to a uniform cross-section. Eliminate all ruts and low spots that could hold water.

Retrieve material deposited outside of the clearing limits as directed by the CO. Place unsuitable material in designated areas.

(b) Rock cuts. Blast rock according to Section 205. Excavate rock cuts to 6 inches below subgrade within the roadbed limits. Backfill to subgrade with topping or with other suitable material. Compact the material according to Subsection 204.11

(c) Earth cuts. Scarify earth cuts to 6 inches below subgrade within the roadbed limits. Compact the scarified material according to Subsection 204.11.

(d) Pioneer Roads. Road pioneering, slash disposal, and grubbing of stumps may proceed concurrently with excavation. Conduct excavation and placement operations so material to be treated under Section 201 will not be incorporated into the roadway

unless specified in the slash treatment method. Maintain drainage during pioneering operations.

Remove snow and ice in advance of the work and deposit beyond the roadway limits in a manner that will not waste material or generate sediment. Do not incorporate snow and ice into embankments. Place snow or ice in a manner to prevent resource damage.

204.07 Subexcavation. Excavate material to the limits designated by the CO. Take cross-sections according to Section 152. Prevent unsuitable material from becoming mixed with the backfill. Dispose of unsuitable material according to Subsection 204.14. Backfill the subexcavation with topping, or other suitable material. Compact the material according to Subsection 204.11.

204.08 Borrow Excavation. Use all suitable roadway excavation in embankment construction. Do not use borrow excavation when it results in excess roadway excavation. Deduct excess borrow excavation from the appropriate borrow excavation quantity.

Obtain borrow source acceptance according to Subsection 105.02. Develop and restore borrow sources according to Subsection 105.03. Do not excavate beyond the established limits. When applicable, shape the borrow source to permit accurate measurements when excavation is complete.

204.09 Preparing Foundation for Embankment Construction. Prepare foundation for embankment construction as follows:

(a) Embankment less than 4 feet high over natural ground. When designated, remove topsoil and break up the ground surface to a minimum depth of 6 inches by plowing or scarifying. Compact the ground surface according to Subsection 204.11.

(b) Embankments over an existing asphalt, concrete, or gravel road surface. Scarify gravel roads to a minimum depth of 6 inches. Scarify or pulverize asphalt and concrete roads to 6 inches below the pavement. Reduce all particles to a maximum size of 6 inches and produce a uniform material. Compact the surface according to Subsection 204.11.

(c) Embankment across ground not capable of supporting equipment. Dump successive loads of embankment material in a uniformly distributed layer to construct the lower portion of the embankment. Limit the layer thickness to the minimum depth necessary to support the equipment.

(d) Embankment on an existing slope steeper than 1V:3H. Cut horizontal benches in the existing slope to a sufficient width to accommodate placement and compaction operations and equipment. Bench the slope as the embankment is placed and compacted in layers. Begin each bench at the intersection of the original ground and the vertical cut of the previous bench.

204.10 Embankment Construction. Incorporate only suitable roadway excavation material into the embankment. When the supply of suitable roadway excavation is exhausted, furnish unclassified borrow to complete the embankment. Obtain written approval before beginning construction of embankments over 6 feet high at subgrade centerline. Construct embankments as follows:

(a) General. At the end of each day's operations, shape to drain and compact the embankment surface to a uniform cross-section. Eliminate all ruts and low spots that could hold water.

During all stages of construction, route and distribute hauling and leveling equipment over the width and length of each layer of material.

Compact embankment side slopes flatter than 1V:1.75H with a tamping type roller or by walking with a dozer. For slopes 1V:1.75H or steeper, compact the slopes as construction of the embankment progresses.

Where placing embankment on one side of abutments, wing walls, piers, or culvert headwalls, compact the material using methods that prevent excessive pressure against the structure.

Where placing embankment material on both sides of a concrete wall or box structure, conduct operations so compacted embankment material is at the same elevation on both sides of the structure.

Where structural pilings are placed in embankment locations, limit the maximum particle size to 4 inches.

(b) Embankment within the roadway prism. Place embankment material in horizontal layers not exceeding 12 inches in compacted thickness. Incorporate oversize boulders or rock fragments into the 12-inch layers by reducing them in size or placing them individually as required by (c) below. Compact each layer according to Subsection 204.11 before placing the next layer.

Material composed predominately of boulders or rock fragments too large for 12-inch layers may be placed in layers up to 24 inches thick. Incorporate oversize boulders or rock fragments into the 24-inch layer by reducing them in size or placing them individually according to (c) below. Place sufficient earth and smaller rocks to fill the voids. Compact each layer according to Subsection 204.11 before placing the next layer.

(c) Individual rock fragments and boulders. Place individual rock fragments and boulders greater than 24 inches in diameter as follows:

(1) Reduce rock to less than 48 inches in the largest dimension.
(2) Distribute rock within the embankment to prevent nesting.
(3) Place layers of embankment material around each rock to a depth not greater

than that permitted by (b) above. Fill all the voids between rocks.

(4) Compact each layer according to Subsection 204.11 before placing the next layer.

(d) Embankment outside of roadway prism. Where placing embankment outside the staked roadway prism, place material in horizontal layers not exceeding 24 inches in compacted thickness. Compact each layer according to Subsection 204.11.

204.11 Compaction. Compact the embankment using one of the following methods as specified:

(a) **Compaction A.** Use AASHTO T 27 to determine the amount of material retained on a Number 4 sieve. If there is more than 80 percent retained on the No. 4 sieve use procedure (1). If there is 50 to 80 percent retained on the No. 4 sieve use procedure (2). If there is less than 50 percent retained on the No. 4 sieve use procedure (3).

(1) Adjust the moisture content to a level suitable for compaction. Fill the interstices around rock with earth or other fine material as practical. Use compression-type rollers at speeds less than 6feet per second and vibratory rollers at speeds less than 3 feet per second. Compact each layer of material full width with one of the following and until there is no visible evidence of further consolidation.

(a) Four roller passes of a vibratory roller having a minimum dynamic force of 40,000 pounds impact per vibration and a minimum frequency of 1000 vibrations per minute.

(b) Eight roller passes of a 20-ton compression-type roller.

(c) Eight roller passes of a vibratory roller having a minimum dynamic force of 30,000 pounds impact per vibration and a minimum frequency of 1000 vibrations per minute.

Increase the compactive effort for layers deeper than 12 inches as follows:

- For each additional 6 inches or fraction thereof, increase the number of roller passes in (a) above by four passes.
- For each additional 6 inches or fraction thereof, increase the number of roller passes in (b) and (c) above, by eight passes.

(2) Use AASHTO T 99 to determine the optimum moisture content of the portion of the material passing a No. 4 sieve. Multiply this number by the percentage of material passing a No. 4 sieve, and add 2 percent to determine the optimum moisture content of the material. Adjust the moisture content of material classified A-1 through A-5 to a moisture content suitable for compaction. Adjust the moisture content of material classified A-6 and A-7 to within 2 percent of the optimum moisture content.

Use compression-type rollers at speeds less than 6 feet per second and vibratory rollers at speeds less than 3 feet per second. Compact each layer of material full width according to (1) above.

(3) Classify the material according to AASHTO M 145. For material classified A-1 or A-2-4, determine the maximum density according to AASHTO T 180, method D. For other material classifications, determine the optimum moisture content and maximum density according to AASHTO T 99, method C.

Adjust the moisture content of material classified A-1 through A-5 to a moisture content suitable for compaction. Adjust the moisture content of material classified A-6 and A-7 to within 2 percent of the optimum moisture content.

Use compression-type or vibratory rollers. Compact each layer of material full width to at least 95 percent of the maximum density. Determine the in-place density and moisture content according to AASHTO T 310 or other approved test procedures. When required, use AASHTO T 224 to correct for coarse particles.

(b) **Compaction B.** Place material by end dumping to the minimum depth needed for operation of spreading equipment. Adjust the moisture content of the material to obtain a mass that will not visibly deflect under the load of the hauling and spreading equipment. Operate compaction equipment over the full width of each layer until there is no visible evidence of further consolidation or, if when a sheepsfoot roller is used, the roller "walks out" of the layer. Make at least three complete passes.

(c) **Compaction C.** Place material by end dumping to the minimum depth needed for operation of spreading equipment. Level and smooth each embankment layer before placing the next layers. Operate hauling and spreading equipment uniformly over the full width of each layer. Construct a solid embankment with adequate compaction by working smaller rock and fines in with the larger rocks to fill the voids, and by operating hauling and spreading equipment uniformly over the full width of each layer as the embankment is constructed.

204.12 Ditches. Slope, grade, and shape ditches. Remove all projecting roots, stumps, rock, or similar matter. Maintain all ditches in an open condition and free from leaves, sticks, and other debris.

Form furrow ditches by plowing or using other acceptable methods to produce a continuous furrow. Place all excavated material on the downhill side so the bottom of the ditch is approximately 18 inches below the crest of the loose material. Clean the ditch using a hand shovel, ditcher, or other suitable method. Shape to provide drainage without overflow.

204.13 Sloping, Shaping, and Finishing. Complete slopes, ditches, culverts, riprap, and other underground minor structures before placing aggregate courses. Slope, shape, and finish as follows:

(a) Sloping. Leave all earth slopes with uniform roughened surfaces, except as described in (b) below, with no noticeable break as viewed from the road. Except in solid rock, round tops and bottoms of all slopes including the slopes of drainage ditches. Round material overlaying solid rock to the extent practical. Scale all rock slopes. Slope rounding is not required on tolerance class D though M roads.

If a slide or slipout occurs on a cut or embankment slope, remove or replace the material, and repair or restore all damage to the work. Bench or key the slope to stabilize the slide. Reshape the cut or embankment slope to an acceptable condition.

(b) Stepped slopes. Where required by the contract, construct steps on slopes of 1⅓V:1H to 1V:2H. Construct the steps approximately 18 inches high. Blend the steps into natural ground at the end of the cut. If the slope contains nonrippable rock outcrops, blend steps into the rock. Remove loose material found in transitional area. Except for removing large rocks that may fall, scaling stepped slopes is not required.

(c) Shaping. Shape the subgrade to a smooth surface and to the cross-section required. Shape slopes to gradually transition into slope adjustments without noticeable breaks. At the ends of cuts and at intersections of cuts and embankments, adjust slopes in the horizontal and vertical planes to blend into each other or into the natural ground.

(d) Finishing. Finish the roadbed to be smooth and uniform, and shaped to conform to the typical sections. Remove unsuitable material from the roadbed and replace it with suitable material. Finish roadbeds to the tolerance class shown in table 204-2.Ensure that the subgrade is visibly moist during shaping and dressing. Scarify to 6 inches below the bottom of low sections, holes, cracks, or depressions and bring back to grade with suitable material. Maintain proper ditch drainage.

For surfaced roads, remove all material larger than 6 inches from the top 6 inches of the roadbed.

For unsurfaced roads, use one of the following methods to finish the roadbed:

(1) **Method A**. Remove all material larger than 6 inches from the top 6 inches of the roadbed and replace with suitable material.
(2) **Method B**. Use a vibratory grid roller or approved equal with a minimum weight of 10 tons. Roll at least 5 full-width passes or until there is no visible evidence of further consolidation.
(3) **Method C**. For roads designated as Construction Tolerance Class K, L, or M, finish the roadbed by spreading the excavation. Eliminate rock berms.

204.14 Disposal of Unsuitable or Excess Material. Dispose of unsuitable or excess material at designated sites or legally off of the project.

When there is a pay item for waste, shape and compact the waste material in its final location. Do not mix clearing or other material not subject to payment with the waste material.

204.15 Acceptance. See Table 204-1 for sampling and testing requirements.

Material for embankment and conserved topsoil will be evaluated under Subsections 106.02 and 106.04.

Excavation and embankment construction will be evaluated under Subsections 106.02 and 106.04.

Clearing and removal of obstructions will be evaluated under Sections 201 and 203.

Measurement

204.16 Measure the Section 204 items listed in the bid schedule according to Subsection 109.02 and the following as applicable.

(a) Roadway excavation. Measure roadway excavation in its original position as follows:

(1) Include the following volumes in roadway excavation:
(a) Roadway prism excavation;
(b) Rock material excavated and removed from below subgrade in cut sections;
(c) Unsuitable material below subgrade and unsuitable material beneath embankment areas when a pay item for subexcavation is not shown in the bid schedule;
(d) Ditches, except furrow ditches measured under a separate bid item;
*(e*Topsoil;
(f) Borrow material used in the work when a pay item for borrow is not shown in the bid schedule;
(g) Loose scattered rocks removed and placed as required within the roadway;
(h) Conserved material taken from stockpiles and used in Section 204 work; and
(i) Slide and slipout material not attributable to the Contractor's method of operation.

(2) Do not include the following in roadway excavation:
(a) Overburden and other spoil material from borrow sources;
(b) Overbreakage from the backslope in rock excavation;
(c) Water or other liquid material;
(d) Material used for purposes other than required;
(e) Roadbed material scarified in place and not removed;
(f) Material excavated when stepping cut slopes;

(g) Material excavated when rounding cut slopes;
(h) Preparing foundations for embankment construction;
(i) Material excavated when benching for embankments;
(j) Slide or slipout material attributable to the Contractor's method of operation;
(k) Conserved material taken from stockpiles constructed at the option of the Contractor; and
(l) Material excavated outside the established slope limits.

(3) When both roadway excavation and embankment construction pay items are shown in the bid schedule, measure the following as roadway excavation only:
(a) Unsuitable material below subgrade in cuts and unsuitable material beneath embankment areas when a pay item for subexcavation is not shown in the bid schedule;
(b) Slide and slipout material not attributable to the Contractor's method of operations; and
(c) Drainage ditches, channel changes, and diversion ditches.

(b) Unclassified borrow, select borrow, and select topping. When measuring by the cubic yard measure in its original position. If borrow excavation is measured by the cubic yard in place, take initial cross-sections of the ground surface after stripping overburden. Upon completion of excavation and after the borrow source waste material is returned to the source, retake cross-sections before replacing the overburden. Do not measure borrow excavation used in place of excess roadway excavation.

(c) Embankment construction. Measure embankment construction in its final position. Do not make deductions from the embankment construction quantity for the volume of minor structures.

(1) Include the following volumes in embankment construction:
(a) Roadway embankments;
(b) Material used to backfill subexcavated areas, holes, pits, and other depressions;
(c) Material used to restore obliterated roadbeds to original contours; and
(d) Material used for dikes, ramps, mounds, and berms.

(2) Do not include the following in embankment construction:
(a) Preparing foundations for embankment construction;
(b) Adjustments for subsidence or settlement of the embankment or of the foundation on which the embankment is placed; and
(c) Material used to round fill slopes.

(d) Rounding cut slopes. Measure rounding cut slopes horizontally along the centerline of the roadway if a pay item for slope rounding is included in the bid schedule. If a pay item for slope rounding is not included in the bid schedule slope rounding will be considered subsidiary to excavation.

(e) Waste. Measure waste by the cubic yard in its final position. Take initial cross-sections of the ground surface after stripping over burden. Upon completion of the waste placement, retake cross-sections before replacing overburden.

(f) Slope scaling. Measure slope scaling by the cubic yard in the hauling vehicle.

Payment

204.17 The accepted quantities will be paid at the contract price per unit of measurement for the Section 204 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 109.05.

Table 204-1
Sampling and Testing Requirements

Material or Product	Type of Acceptance (Subsection)	Characteristic	Category	Test Methods Specifications	Sampling Frequency	Point of Sampling	Split Sample	Reporting Time
Topping (704.05) & unclassified borrow (704.06)	Measured and tested for conformance (106.04)	Classification	—	AASHTO M 145	1 per soil type	Processed material before incorporating in work	Yes, when requested	Before using in work
		Moisture-density	—	AASHTO T 180, method D[1] or T 99, method C[1]	1 per soil type but not less than 1 per [illegible]	"	"	"
		Compaction	—	AASHTO T 310 or other approved procedures	1 per 6000 yd^2 but not less than 1 per layer	In-place	—	Before placing next layer
Select borrow (704.07 & Select topping (704.08)	Measured and tested for conformance (106.04)	Classification	—	AASHTO M 145	1 per soil type but not less than 1 for each day of production	Processed material before incorporating	Yes, when requested	Before using in work
		Gradation	—	AASHTO T 27	"	"	"	"
		Liquid limit	—	AASHTO T 89	"	"	"	"
		Moisture-density	—	AASHTO T 180, method D[1] or T 99, method C[1]	1 per soil type but not less than 1 per [illegible]	"	"	"
		Compaction	—	AASHTO T 310 or other approved procedures	1 per 6000 yd^2 but not less than 1 per layer	In-place	—	Before placing next layer

(1) Minimum of 5 points per proctor

Table 204-1 (continued)
Sampling and Testing Requirements

Material or Product	Type of Acceptance (Subsection)	Characteristic	Category	Test Methods Specifications	Sampling Frequency	Point of Sampling	Split Sample	Reporting Time
Earth embankment (204.11, Compaction A)	Measured and tested for conformance (106.04)	Classification	—	AASHTO M 145	1 per soil type	Source of Material	Yes, when requested	Before using in work
		Moisture-density	—	AASHTO T 180, method D[1] or T 99, method C[1]	1 per soil type but not less than 1 per 13,000 yd^3	"	"	"
		Compaction	—	AASHTO T 310 or other approved procedures	1 per 3500 yd^2 but not less than 1 per layer	In-place	—	Before placing next layer
Top of subgrade (204.11 Compaction A)	Measured and tested for conformance (106.04)	Compaction	—	AASHTO T 310 or other approved procedures	1 per 2500 yd^2	In-place	—	Before placing next layer

(1) Minimum of 5 points per proctor.

Table 204-2
Construction Tolerances

	Tolerance Class [a]												
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**
Roadbed width (ft)	+0.5	+0.5	+1.0	+1.0	+1.0	+1.0	+1.5	+1.0	+2.0	+2.0	+2.0	+2.0	+2.0
Subgrade elevation (ft)	±0.1	±0.2	±0.2	±0.5	±0.5	±1.0	±1.0	±1.5	±2.0	±3.0	±2.0	±3.0	(c)
Centerline alignment (ft)	±0.2	±0.2	±0.5	±0.5	±1.0	±1.0	±1.5	±1.5	±2.0	±3.0	±3.0	±5.0	(c)
Slopes, excavation, and embankment (% slope[b])	±3	±5	±5	±5	±5	±5	±10	±10	±10	±10	±20	±20	±20

(a) Maximum allowable deviation from construction stakes and drawings.
(b) Maximum allowable deviation from staked slope measured from slope stakes or hinge points.
(c) Unless otherwise shown the centerline alignment and subgrade elevation, as built, have no horizontal curves with a radius of less than 80 feet, and no vertical curves with a curve length of less than 80 feet when the algebraic difference in the grade change is less than 10 percent, or a curve length of less than 100 feet when the algebraic difference of the grade change is greater than or equal to 10 percent. The centerline grade is not to exceed 20 percent in 100 feet of length.

209 - Structure Excavation and Backfill

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Section 209A. — STRUCTURE EXCAVATION AND BACKFILL FOR SELECTED MINOR STRUCTURES

Description

209A.01 This work consists of excavating, preparing foundations, backfilling, and subsequent removal of safety features for the construction of selected structures with or without a geogrid reinforcing mesh and welded wire facing.

Material

209A.02 Conform to the following Subsections:

Crushed Aggregate	703.06
Backfill Material	704.03
Structural backfill	704.04
Geotextile type I-D	714.01
Geogrids, Category 1, 2, 3, 4, 5 or 6	714.03
Welded wire form	720.01(b)

Construction Requirements

209A.03 Preparation for Structure Excavation. Clear the area of vegetation and obstructions according to Sections 201 and 203.

209A.04 General. Excavate trenches or foundation pits to a width and length that allows room for work. When excavation is complete obtain written approval of the foundation. Ensure the foundation is firm with uniform density throughout its length and width. Foundation grade is the elevation at the bottom of any bedding for installing the structure.

Where necessary to blast rock, blast according to Section 205.

Follow OSHA safety regulations (29 CFR, Part 1926, Subpart P, Excavation) for sloping the sides of excavations, using shoring and bracing, and for using other safety features. When sides of excavations are sloped for safety considerations, provide one copy of the design that demonstrates conformity with OSHA regulations. Where support systems, shield systems, or other protective systems are to be used, design the shoring according to Section 562 and submit working drawings and construction details according to Subsection 104.03.

Remove safety features when no longer necessary. Remove shoring and bracing to at least 2 feet below the surface of the finished ground.

Saw cut or mill existing pavements or concrete structures adjacent to the area to be excavated that are designated to remain.

Do not deposit excavated material in or near a waterway. Do not stockpile excavated material or allow equipment closer than 2 feet from the edge of the excavation.

Dispose of unsuitable or excess material at designated sites or legally off the project. If approved, suitable excavated material may be used as backfill material or structural backfill.

Remove all water as necessary to perform work.

Survey minor structures according to Subsection 152.03 (e) and (i), and verify the limits of the structure. Survey and establish controls within $\pm$ 0.16 feet. Grade the foundation for a width equal to the length of the bottom geogrid layer.

209A.05 Foundation Preparation. Excavate any unsuitable material below foundation grade, and replace it with backfill material. Place backfill material in horizontal layers that, when compacted, do not exceed 6 inches in depth. Compact each layer according to Subsection 210.07.

Compact the foundation prior to placing backfill in Subsection 210.06

209A.06 Backfill. Place leveling course with crushed aggregate on the foundation grade when required. Backfill with structural backfill material. Place backfill in horizontal layers that do not exceed 6 inches in compacted thickness. Compact each layer according to Subsection 210.07.

Bring structural backfill up evenly on all sides of the structure as appropriate. Extend each layer to the limits of the excavation or to natural ground.

Ensure when placing the geotextile or geogrid layers that there are no voids below the layer. When placing geotextiles overlap the geotextile a minimum of one foot. When placing geogrid no overlap is required but ensure no gap between adjoining sheets is larger than one-inch. Do not operate equipment directly on top of or damage the welded wire form facing, geotextile, or geogrid elements. Place the geotextile and geogrid smooth and free of wrinkles or folds. Correct all damaged, misaligned, or distorted structure elements. Repair all damage to galvanized coating before installation.

Do not deviate from the design batter of the welded wire form by more than 1 inch per 10 feet of structure height.

209A.07 Compacting. Determine optimum moisture content and maximum density according to AASHTO T 99, method C. Adjust the moisture content of the backfill material to a moisture content suitable for compaction.

Compact material placed in all layers to at least 95 percent of the maximum density. Determine the inplace density and moisture content according to AASHTO T 310 or other approved test procedures.

Do not apply density requirements as measured by AASHTO T 310 to material that is incapable of being tested or compacted to maximum values determined by AASHTO T 99. For these materials, fill the voids around the rock in each layer with earth or other fine material. Compact each layer, full width, until there is no visible evidence of further consolidation, with a vibratory steel wheeled roller with a mass of at least 8 tons.

In places not accessible to the rollers compact with alternative equipment to obtain the required compaction requirements.

209A.08 Acceptance. See Table 210-1 for sampling and testing requirements.

Clearing and removal of obstructions will be evaluated under Sections 201 and 203.

Survey work will be evaluated under Subsection 106.02 and 106.04.

Material for the backfill material and structural backfill will be evaluated under Subsections 106.02 and 106.04.

Structure excavation and backfill work will be evaluated under Subsections 106.02 and 106.04.

Shoring and bracing will be evaluated under Subsections 106.02 and 106.04.

Welded wire forms, geotextiles, and geogrids will be evaluated under Subsection 106.02 and 106.03.

Placement of welded wire forms, geotextiles, and geogrids will be evaluated under Subsection 106.02 and 106.04.

Measurement

209A.09 Measure the Section 210 items listed in the bid schedule according to Subsection 109.02 and the following.

Measure structural excavation by the cubic yard in its original position according to Subsections 204.16 (a) (1) and (2). Do not include the following volumes in structure excavation:

(a) Any material included within the staked limits of the excavation, such as contiguous channel changes and ditches, for which measurement is covered under other sections; or

(b) Material rehandled, except when the contract specifically requires excavation after embankment placement.

Measure backfill material and structural backfill by the cubic yard in place for the volume placed according to Subsection 204.16 (c).

Measure geotextile by the horizontal and vertical dimensions.

Payment

209A.10 The accepted quantities measured as provided in Subsection 109.02 and above, will be paid at the contract price per unit of measurement for the Section 210 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 109.05.

Payment for structure excavation, shoring, and bracing will be full compensation for excavation to a depth of 6 feet below the lowest elevation shown on the plans for each minor structure. When the excavation exceeds 6 feet, either the Contractor or the CO may request an equitable price adjustment for the depth in excess of 6 feet.

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209.10 Backfill.

(a) General.

Add the following:

Replace any pipe that is distorted by more than 5 percent of nominal dimensions, or that is ruptured or broken.

Do not place or backfill pipe that meets any of the following conditions until the excavation and foundation have been approved in writing by the CO:

- Embankment height greater than 6 feet at subgrade centerline.
- Installation in a protected streamcourse.
- Round pipe with a diameter of 48 inches or greater.
- Pipe arches with a span of 50 inches or greater.
- Any box culvert of structure other than pipe culverts.

(b) Pipe culverts.

(1) Pipe culverts with compacted backfill.

Add the following:

Excavate an area on each side of the pipe as needed to effectively achieve compaction requirements. Backfill without damaging or displacing the pipe. Complete backfilling of the trench with suitable material.

209.11 Compacting.

Delete the subsection and add the following:

Compact backfill using designated compaction method A, B, or C:

Method A. Ensure that backfill density exceeds the density of the surrounding embankment.

Method B. Adjust the moisture content of the backfill material to a moisture content suitable for compaction. Compact each layer using appropriate compaction equipment until visual displacement ceases. For compaction under sections 252, 254, 255, 257, 258 and 262 compact with a vibratory steel wheeled roller with a mass of at least 8 tons.

Method C. Determine optimum moisture content and maximum density according to AASHTO T 99 method C. Adjust the moisture content of the backfill material to a moisture content suitable for compaction. Compact material placed in all layers to at least 95 percent of the maximum density. Determine the in place density and moisture content according to AASHTO T 310 or other approved test procedures.

Table 209-1 Sampling and Testing Requirements

Add the following:

(2) Compaction methods (A) and (B) do not require AASHTO T-99 or T-310 test methods for foundation fill.

251 - Riprap

251.03_nat_us_08_05_2009

Construction Requirements

251.03 General.

Add the following:

Place riprap under or adjacent to structures before placing prefabricated superstructure units or constructing superstructure falsework unless otherwise approved by the CO.

251.08 Measurement.

Add the following:

Payment for excavation and embankment required for placement of riprap is indirectly included in the pay item for riprap.

301 - Untreated Aggregate Courses

301.00_nat_us_03_03_2005

301 Title Change.

Change the title to: **Section 301 Aggregate Courses**

301.01_nat_us_03_03_2005

301.01 Work.

Add the following:

Work includes producing aggregate by pit-run, grid rolling, screening, or crushing methods, or placing Government-furnished aggregate. Work may include additive mineral filler, or binder.

301.02_nat_us_05_16_2005

301.02 Material.

Add the following:

Bentonite	725.30
Calcium Chloride Flake	725.02
Lignon Sulfonate	725.20
Magnesium Chloride Brine or Calcium Chloride Liquid	725.02

301.03_nat_us_09_14_2005

301.03 General.

Add the following:

Written approval of the roadbed is required before placing aggregate.

For pit run or grid-rolled material, furnish material smaller than the maximum size. No gradation other than maximum size will be required for pit-run or grid-rolled material. For grid rolling, use all suitable material that can be reduced to maximum size. After processing on the road, remove all oversize material from the road and dispose of it as directed by the CO.

Provide additives or binder, if required, at the proportions specified.

Develop and use Government furnished sources according to Section 105.

If the aggregate is produced and stockpiled before placement, handle and stockpiled according to Section 320. Establish stockpile sites at locations approved. Clear and grub stockpile sites according to Section 201.

301.04_nat_us_03_03_2005

301.04 Mixing and Spreading.

Delete the first sentence of the first paragraph and add the following:

Ensure that aggregate and any required additives, water, mineral filler, and binder are mixed by the specified method except, if crushed aggregate products are being produced and mineral filler, binder, or additives are required, uniformly blend following crushing. Control additive proportions to 0.5 percent dry weight.

(a) Stationary Plant Method. Mix the aggregate with other required materials in an approved mixer. Add water during the mixing operation in the amount necessary to provide the moisture content for compacting to the specified density. After mixing, transport the aggregate to the jobsite while it contains the proper moisture content, and place it on the roadbed or base course using an aggregate spreader.

(b) Travel Plant Method. After placing the aggregate for each layer with an aggregate spreader or windrow-sizing device, uniformly mix it with other required materials using a traveling mixing plant. During mixing, add water to provide the necessary moisture content for compacting.

(c) Road Mix Method. After placing the aggregate for each layer, mix it with other required materials at the required moisture content until the mixture is uniform throughout. Mix aggregate, water, and all other materials until a uniform distribution is obtained.

Spread the aggregate in a uniform layer, with no segregation of size, and to a loose depth that will provide the required compacted thickness.

When placing aggregate over geotextile, place aggregate in a single lift to the full depth specified.

Route and distribute hauling and leveling equipment over the width and length of each layer.

301.05_nat_us_05_17_2005

301.05 Compacting

Delete and replace with the following:

Compact each layer full width. Roll from the sides to the center, parallel to the centerline of the road. Along curbs, headers, walls, and all places not accessible to the roller, compact the material with approved tampers or compactors.

Compact the aggregate using one of the following methods as specified:

Compaction A. Operating spreading and hauling equipment over the full width of the travelway.

Compaction B. Operate rollers and compact as specified in Subsection 204.11(a)(1).

Compaction C. Moisten or dry the aggregate to a uniform moisture content between 5 and 7 percent based on total dry weight of the mixture. Operate rollers and compact as specified in Subsection 204.11(a)(1).

Compaction D. Compact to a density of at least 95 percent of the maximum density, as determined by AASHTO T 99, method C or D.

Compaction E. Compact to a density of at least 96 percent of the maximum density, as determined by the Modified Marshall Hammer Compaction Method (available upon request from USDA Forest Service, Regional Materials Engineering Center, P.O. Box 7669, Missoula, MT 59807).

Compaction F. Compact to a density of at least 95 per-cent of the maximum density, as determined by AASHTO T 180, method C or D.

Compaction G. Compact to a density of at least 100 percent of the maximum density as determined by the Modified Marshall Hammer Compaction Method (available upon request from USDA Forest Service, Regional Materials Engineering Center, P.O. Box 7669, Missoula, MT 59807).

For all compaction methods, blade the surface of each layer during the compaction operations to remove irregularities and produce a smooth, even surface. When a density requirement is specified, determine the in place density and moisture content according to AASHTO T 310 or other approved test procedures.

301.06_nat_us_03_03_2005

301.06 Surface Tolerance.

Add the following:

Thickness and Width requirements:

The maximum variation from the compacted specified thickness is ½ inch. The compacted thickness is not consistently above or below the specified thickness and the average thickness of 4 random measurements for any ½ mile of road segment is within + ¼ inch of the specified thickness.

The maximum variation from the specified width will not exceed +12 inches at any point. The compacted width is not consistently above the specified width and the average of any

four random measurements along any ½ mile of road segment is within +4 inches of the specified width.

301.09_nat_us_07_07_2005

301.09 Measurement.

Replace the second paragraph with the following:

Measure aggregate by cubic yard compacted in place when payment is by contract quantities.

301.10_nat_us_03_03_2005

301.10 Payment

Delete the following:

adjusted according to Subsection 106.05

303 - Road Reconditioning

303.00_01_us_10_11_2006

Delete Section 303 in its entirety and replace with the following.

Description

303.01 This work consists of reconditioning ditches, shoulders, roadbeds, parking areas, turnouts, approach road intersections, cattleguards, asphalt surfaces and aggregate surfaces. Construct outslopes, clean and maintain all roadbed drainage structures when shown on the plans.

Material

303.02 Conform to the following Subsection:

Water 725.01

Construction Requirements

303.03 Ditch Reconditioning. Remove all slide material, sediment, vegetation, and other debris from the existing ditches and culvert inlets and outlets. Reshape ditches and culvert inlets and outlets to achieve positive drainage and a uniform ditch width, depth, and grade. Dispose of waste as shown on the plans.

303.04 Shoulder Reconditioning. Repair soft and unstable areas according to Subsection 204.07. Remove all slide material, vegetation, and other debris from existing shoulders including shoulders of parking areas, turnouts, and other widened areas. Dispose of waste as shown on the plans.

303.05 Roadbed Reconditioning Repair soft and unstable areas according to Subsection 204.07. Remove all organic, deleterious material larger than 6 inches from the top 6 inches of subgrade. Dispose of waste as shown on the plans. Scarify, rip and shape the traveled way and shoulders at locations and to the depth and width designated on the plans. Remove surface irregularities and shape to provide a uniform surface.

Dispose of rock larger than 4 inches brought to the surface during scarification in areas designated on the plans.

For portions of roads not requiring scarification, the roadbed may contain rocks larger than 4 inches provided they do not extend above the finished roadbed surface. Reduce in

place or remove rock extending above the finished roadbed surface. Dispose of removed rock in areas designated on the plans.

Compact using the following method as specified:

(a) Compaction A. Operate equipment over the full width.

(b) Compaction B. Operate rollers over the full width of each layer until visual displacement ceases, but not fewer than three complete passes. Use rollers that meet the following requirements:

(1) Steel wheeled rollers, other than vibratory, capable of exerting a force of not less than 250 pounds per inch of width of the compression roll or rolls.

(2) Vibratory steel wheeled rollers equipped with amplitude and frequency controls with a minimum weight of 6 tons, specifically designed to compact the material on which it is used.

(3) Pneumatic-tired rollers with smooth tread tires of equal size that will provide a uniform compacting pressure for the full width of the roller and capable of exerting a ground pressure of at least 80 psi.

303.06 Aggregate Surface Reconditioning. Repair soft and unstable areas to the full depth of the aggregate surface and according to Subsection 204.07. Scarify to the depth of the aggregate surface or to a depth of 8 inches, whichever is less, and remove surface irregularities. Reshape, finish, and compact the entire aggregate surface according to Section 308.

303.07 Roadway Reconditioning. Perform all the applicable work described in Subsections 303.03 through 303.06.

Maintain the existing cross slope or crown unless otherwise shown on the plans. Establish a blading pattern that will retain the surfacing on the roadbed and provide a through mixing of the materials within the completed surface width.

Blade and shape the subgrade for both surfaced and unsurfaced roads when moisture content is suitable for compaction.

303.08 Pulverizing. Scarify the surface to the designated depth and width. Pulverize all material to a size one and one half times the maximum sized aggregate or to 1½ inches, whichever is greater. Mix, spread, compact, and finish the material according to Section 301.

303.09 Acceptance. See Table 303-1 for sampling and testing requirements. Road reconditioning work will be evaluated under Subsections 106.02 and 106.04.

Measurement

303.10 Measure the Section 303 items listed in the Schedule of Items according to Subsection 109.02 and the following as applicable.

Measure ditch reconditioning and shoulder reconditioning by the mile, by the station or foot horizontally along the centerline of the roadway for each side of the roadway.

Measure roadbed reconditioning, aggregate surface reconditioning, roadway reconditioning, and pulverizing by the mile, by the station, or by the square yard.

Payment

303.11 The accepted quantities will be paid at the contract price per unit of measurement for the Section 303 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 109.05.

552 - Structural Concrete

552.02_nat_us_06_20_2007

Material

552.02 Add the following:

Anchor bolts	717.01
Dowels	717.17
Epoxy resin adhesives	725.21
High strength non-shrink grout	701.02
Mortar	701.02
Portland cement	701.01
Sealants, fillers, seal, and sleeves	712.01

Construction Requirements

552.03 Composition (Concrete Mix Design).

Delete Tables 552-1, 2, and 3 and replace with the following:

Table 552-1
Composition of Concrete

Class of Concrete	Minimum Cement Content (pound per cubic yard)	Maximum W/C Ratio	Slump (1) (inches)	Maximum Nominal Coarse Aggregate Size (5) (inches)
A	611	0.49	2 to 4	1½
A(AE)	611	0.44	1 to 4	1½
B	517	0.58	2 to 4	2½
B(AE)	517	0.58	2 to 4	2½
C	658	0.49	2 to 4	¾
C(AE)	658	0.44	1 to 3	¾
D(AE)(2)	611	0.40	1 to 3	1½
E(AE)(3)	611	0.40	4 to 6 (4)	¾
P (Prestressed)	658	0.44	0 to 4	1
P(AE)	658	0.44	0 to 4	1
Seal	658	0.54	4 to 8	1½

(1) Maximum slump is 8 inches if approved mix design includes a high-range water reducer.

(2) Concrete with a water reducing and retarding admixture conforming to AASHTO M 194, type D.
(3) A latex modified concrete with 0.037 gallons of modifier per pound of cement.
(4) Measure the slump 4 to 5 minutes after the concrete is discharged from the mixer.
(5) Meeting the processing requirements of AASHTO M43, Table 1 – Standard Sizes of Processed Aggregate.
(6) Use Class P (AE) concrete in the entire depth of the top flange of all multi-beam bridge girders. In lieu of this, Class P (AE) concrete may be used for fabrication of the entire girder, and throughout the entire depth of prestressed slabs. In all cases, furnish concrete meeting the 28 day specified minimum concrete strength requirements for the prestressed members as shown on the plans, unless otherwise specified.

Table 552-2
Minimum Air Content for Air Entrained Concrete

Nominal Maximum Aggregate Size (1)	As Delivered Minimum Air Content (2) (3) (%)
2½ inch	3.5
2 inch	3.5
1½ inch	4.0
1 inch	4.5
¾ inch	4.5
½ inch	5.5

(1) Meeting the processing requirements of AASHTO M 43, Table 1 – Standard Sizes of Processed Aggregate.
(2) These air contents apply to the total mix. When testing these concretes, aggregates larger than 1½ inches are removed by handpicking or sieving, and air content is determined on the minus 1½-inch fraction of the mix. Air content of the total mix is computed from the value determined on the minus 1½-inch fraction.
(3) For P(AE) concrete, the as delivered minimum air contents may be reduced 1.0 % and the maximum air content is 6.0 %

Table 552-3
Required Average Compressive Strength (1)

Specified Compressive Strength (f'c) (psi)	Required Average Compressive Strength (f'cr) (psi)
Less than 3000	f'c + 1000
3000 to 5000	f'c + 1200
Over 5000	1.10f'c + 700

(1) Use this table when there is not enough data available to establish a standard deviation

Delete the first paragraph after Table 552-2 and replace with the following:

Submit written concrete mix designs for approval at least 30 calendar days before production.

Add the following under the list of items to be included in the mix design submittal:

(y) Evaluation of potential aggregate reactivity

552.08 Delivery.

(a) Truck mixer/agitator.

Add the following:

Do not exceed 130 total revolutions at mixing speed, including both initial mixing and remixing. Do not exceed 300 total revolutions, including both mixing and agitating speed.

552.09 Quality Control of Mix.

Add the following after the first paragraph:

At least 2 weeks prior to the start of concrete placement operations, arrange a pre-concrete placement conference. Coordinate attendance with the CO and any applicable subcontractors. Be prepared to discuss and/or submit the following:

(1) Proposed concrete placement schedule.

(2) Review approved concrete mix design and determination of batch weights.

(3) Discuss Section 153, Contractor Quality Control, minimum frequency schedule for process control sampling and testing (to be performed by the Contractor).

(4) Discuss batching, mixing, placing, and curing requirements.

(5) Discuss Subsections 106.03, Certification, and 106.05, Statistical Evaluation of Material for Acceptance.

552.11 Handling and Placing Concrete.

Add the following after the forth paragraph:

Use an approved form release agent to produce a minimum of staining, air holes, and hydration discoloration.

552.12 Construction Joints.

Add the following at the end of the first paragraph:

Provide form cleanout ports at construction joints.

552.18 Loads on New Concrete Structures.

Add the following paragraph:

Do not allow public traffic on the bridge until approaches, curbs, and bridge rail are completed and in-place. Erect barricades at each end of bridge spans when road approaches allow vehicles to drive directly onto the structure.

554 - Reinforcing Steel

554.03_nat_us_06_20_2007

Construction Requirements

554.03 Order Lists.

Delete the first paragraph and replace with the following:

Do not submit order lists or bending diagrams for approval.

554.08 Placing & Fastening.

Delete the first sentence and replace with the following:

Place, fasten, and support the bars according to the CRSI *Manual of Standard Practice*. Use precast concrete blocks or metal supports, but only use precast mortar blocks in areas permanently hidden from view in the completed structure.

Measurement

554.11 Method.

Add the following to the end of the second paragraph:

Do not measure or include reinforcing steel fabricated into the prestressed member.

602 - Culverts and Drains

602.03_nat_us_09_06_2005

602.03 General.

Add the following:

Ensure that the final installed alignment of all pipe allows no reverse grades, and does not permit horizontal and vertical alignments to vary from a straight line drawn from center of inlet to center of outlet by more than 2 percent of pipe center length or 1.0 feet, whichever is less.

603 - Structural Plate Structures

603.03_nat_us_03_02_2005

603.03 General.

Add the following:

Do not place or backfill structure until the CO has approved in writing the excavation and foundation. Submit four sets of shop drawings of the long-span structure to the CO at least 21 days before planned construction. Accompany shop drawings with all calculations used to determine the size, shape, location, and spacing of stiffening ribs, thrust beams, or other special structural features.

603.04_nat_us_03_02_2005

603.04 Erecting.

Add to the third paragraph:

Torque all bolts before beginning the backfill.

625 - Turf Establishment

625.03_nat_us_07_02_2007

625.03 General.

Delete this subsection and replace with the following:

Apply turf establishment to prepared ground or any disturbed area between ***April 15th*** and ***October 15th***. Apply turf establishment to the areas shown on the plans or worklists within 7 days after completion of ground disturbing activities. Unless otherwise specified in writing by the CO apply turf establishment after each ***1000*** foot section of road has been constructed to template lines. Seeded areas damaged by construction activities shall be reseeded within 10 days of the damage. Do not seed during windy weather or when the ground is excessively wet, frozen, or snow covered.
Assure that all seed and mulch used in the work conforms to the weed free requirements of Section 713.

625.04 Preparing Seedbed.

Delete entire subsection and replace with the following:
Ensure that the surface soil is in a roughened condition favorable for germination and growth.

625.05 Watering

Delete entire subsection.

625.06 Fertilizing.

Delete entire subsection and replace with the following:

Apply fertilizer having a chemical analysis as listed below by the following methods.

> **(a) Dry Method.** Apply the fertilizer with approved mechanical equipment. Hand operated methods are satisfactory on areas inaccessible to mechanical equipment.
>
> **(b) Hydraulic method.** Use hydraulic-type equipment capable of providing a uniform application using water as the carrying agent. Add fertilizer to the slurry and mix before adding seed. Add the tracer material when designated by the CO.

Fertilizer. Apply fertilizer at the rate of ***450*** pounds per acre. Insure that the fertilizer meets the following chemical analysis:

Nutrient	Percent

Nitrogen, N	***10***
Phosphorus, P_2O_5	***20***
Potassium, K	***20***

625.07 Seeding.

Delete the first sentence and add the following.
Apply seed mix by the following methods:

(a) Dry method. Delete the third sentence.

Add the following after subsection

(b).Seed Mix. Furnish and apply the following kinds and amounts of pure live seed from Ernst Conservation Seeds, 9006 Mercer Pike, Meadville, PA (800) 873-3221 or Fax (814) 336-5191 or www.ernstseed.com Native Right-of Way Woods Seed Mix with Annual Ryegrass-ERNMX-132-1:

Type of Seed	Quantity of Pure Live Seed (Lbs/Acre)
1. 30% Virginia Wild Rye	9
2. 20% Annual Rye Grass	6
3. 15% Shelter Switchgrass	4.5
4. 10% Creeping Red Fescue	3
5. 5% Autumn Bentgrass	3
6. 5% Fox Sedge	3
7. 5% Showy Tick Trefoil	3
8. 5% Nimble Will	3
9. 5% Tioga Deer Tongue	3
	Total Seeding Rate 30lb per acre

Determine the pounds of seed to be furnished per acre by dividing the pounds of pure live seed required per acre by the product of the percent purity and percent germination.

625.08 Mulching.

Delete the entire subsection and replace with the following:

Apply Mulch within ***24*** hours after seeding by the following methods.

(a) Dry Method. Apply mulch with a hand spreader or a spreader utilizing forced air at a rate of ***4000*** pounds per acre. Anchor the mulch with an approved stabilizing emulsion tackifier at a rate of ***0***gallons per acre. Do not mark or deface structure, pavements, utilities, or plant growth with tackifier.

(b) Hydraulic Method. Apply mulch in a separate application from the seed using hydraulic-type equipment according to Subsection 625.07(b).

Apply wood fiber or grass straw cellulose fiber mulch at a rate of 775 pounds per acre.

Apply bonded fiber matrix hydraulic mulch at a minimum rate of 775 pounds per acre. Apply so no hole in the matrix is greater than 0.04 inches. Apply so that no gaps exist between the matrix and the soil.

Inaccessible areas may be mulched by hand. Apply mulch uniformly over the entire disturbed area.

625.09 Protecting and Caring for Seeded Areas

Delete the first sentence and add the following:

Protect and care for seeded areas until final acceptance.

625.11 Measurement.

Delete the entire Subsection and replace with the following:

Measure the Section 625 items listed in the bid schedule according to Subsection 109.02.

635 - Temporary Traffic Control

635.03_nat_us_05_13_2004

635.03 General.

Add the following:

Install temporary traffic control signs to temporary posts or approved temporary sign mounts.

648 – Streambed Simulation

Description

648.01 This work consists of placing rock and fill to simulate a natural streambed, profile and cross section though road stream crossings. The placement of Channel Rock for: fish rest stop, rock bands, rock weirs, stream bank rocks, and other in stream rock structures, is included within this specification.

Material

648.02 Conform to the following Subsections.

Foundation Fill	704.01
Stream Bed Simulation Material	705.07
Channel Rock	705.08

Construction Requirements

648.03 General. Place streambed simulation material on a prepared surface to form a well-graded, low permeability mass, similar in appearance and texture to the natural streambed. Do not drive metal track or rubber tired equipment directly on metal or concrete structure surfaces.

648.04 Placed Streambed Simulation Material and Channel Rock.

(a) Method A, Machine Placed. Place stream simulation rock in one or more layers with a layer depth less than 1 ½ times the maximum dimension of the stream simulation rock. Place stream simulation by methods that do not cause segregation or damage to the prepared surface. Place or rearrange individual rocks by mechanical methods to obtain a compact low permeability mass matching streambed simulation details. Fill voids before placing the next lift. Place fish rest stop, rock bands, rock weirs, stream bank rocks, and other in stream rock structures as designated.

(b) Method B, End Dumped. Dump stream simulation rock in one or more layers with a layer depth less than 1 ½ times the maximum dimension of the stream simulation rock. Distribute larger rocks throughout the mass of stone. Obtain a uniformly dense, compact, low permeability bed with a surface matching stream simulation bed details. Fill voids before placing the next lift. Place fish rest stop, rock bands, rock weirs, stream bank rocks, and other in stream rock structures as designated.

(c) Method C, Hand Placed. Place stream simulation rock using hand labor. Material may be hand carried, or carried in wheelbarrows and end dumped to obtain its full

thickness. Compact each load using hand operated or hand operated mechanical equipment to obtain a uniformly dense, compact, low permeability bed with a surface matching stream simulation bed details. Fill voids before placing the next lift. Place fish rest stop, rock bands, rock weirs, stream bank rocks, and other in stream rock structures as designated.

648.04 Foundation fill. Fill all voids left during placement of Channel Rocks and Streambed Simulation adjacent to footings, concrete structures or corrugated pipes with foundation fill. Use water pressure, metal tamping rods, and similar hand operated equipment to force material into all surface and subsurface voids between the structure and rocks and between individual rocks.

648.05 Acceptance. Placing streambed simulation material will be evaluated under Subsections 106.02 and 106.04.

Measurement

648.06 Measure the items listed in the bid schedule according to Subsection 109.02.

Payment

648.07 The accepted quantities, measured as provided in Subsection 109.02, will be paid at the contract unit price per unit of measurement for Section 648 pay items listed in the bid schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 109.05

See **705.07** for Streambed Simulation Rock details.

SPF 703 - Aggregate

Add the following:

703.20 Driving Surface Aggregate

All Driving Surface Aggregate (DSA) is to be derived from natural limestone formations. Stone is defined as rock that has been crushed; rock is defined as consolidated mineral material. For use in this program, both are restricted to that which has been mined or quarried from existing bedrock formations.

All components of the aggregate mix are to be derived from crushed parent rock material that meets program specifications for abrasion resistance, pH and freedom from contaminants. Ninety-eight percent (98%) of the fines passing the #200 sieve must be parent rock material. No clay or silt soil may be added. The amount of particles passing the #200 sieve shall be determined using the washing procedures specified in PTM No. 100.

Size: The required amount and allowed ranges, determined by weight, for various size particles are:

PASSING SIEVE	LOWER%	HIGH%
1 ½ inch	100%	
¾ inch	65%	90%
#4	30%	65%
#16	15%	30%
#200	10%	20%

LA Abrasion: The acceptable limit is measured by weight loss is "less than 40% loss". Los Angeles Abrasion test, AASHTO T-96 (ASTM C 131) shall be used to determine this property. Existing tests made for and approved by PennDOT will be accepted.

Sulfate Test: Soundness or resistance to freeze/thaw (i.e. sulfate test) is not specified for this application because a gravel road driving surface aggregate is not bound within a concrete or asphalt mix.

pH: Aggregate must be within the range of pH 6 to pH 9 as measured by EPA 9045C.

Optimum Moisture: Material is to be delivered and placed at optimum moisture content as determined for the particular source. The optimum percentage moisture is to be identified by the supplier in the bid purchasing documents. Loads with excessive

moisture shall be rejected. Water draining from the tailgate, excess material sticking to the roller drum or the inability to compact the material are field indicators of excess moisture. In addition, if a load is too dry or does not have enough fines it will be rejected. Visual inspection of the load and poorly consolidated material after compactive effort are field indicators of low moisture or poor product gradation.

Transport: Tarps are to be used to cover 100% of the load's exposed surface from the time of loading until immediately before dumping. This requirement includes standing time waiting to dump.

Aggregate producers are required by the program to certify that the aggregate they deliver conforms to the program specifications. To eliminate segregation of material, stockpiling of material at jobsite will not be permitted unless authorized by COR.

The following are "Local" sources for this material:

Hawbaker – Turtlepoint, PA. 814-237-1444 or 814-642-2500

New Enterprise Stone & Lime Co. Tyrone, PA 814-695-4405

Road Preparation Specifications: The road surface to receive the aggregate should have template with crown of 2% or ¼ inch per foot. The receiving surface is to be scarified to permit knitting of the aggregate.

Driving Surface Aggregate Placement: Minimum compacted depth of four inches is to be established for driving surface. Driving Surface Aggregate is to be applied by tailgate spreading unless spreader box is specified. Material when placed shall be compacted as follows: Beginning on the lower or berm side of the crown, begin rolling and work your way to the top of the crown by overlapping the successive longitudinal passes. Do not run the roller lengthwise directly on the crown. Compaction with truck tires is not accepted. Steel wheel rollers other than vibratory shall be capable of exerting a force of not less than 250 pounds per inch of width of the compression roller or rollers. Rollers shall be self propelled with a minimum weight of 6 tons. Contractor must have certification in writing that material placed is Driving Surface Aggregate meeting this specification.

1" Minus Aggregate (DSA Gravel non limestone) Size: The required amount and allowed ranges, determined by weight, for various size particles are:

PASSING SIEVE	LOWER%	HIGH%
1 ½ inch	100%	
¾ inch	65%	95%

#4	30%	65%	LA Abrasion < 40%
#16	15%	30%	Sulfate Test – Not Applicable
#200	10%	15%	PH between 6 and 9

Material available at Glenn O. Hawbacker – Pittsfield Pit 814-563-7911

Pennsylvania 2A Gradation:

The required amount and allowed ranges, determined by weight, for various size particles are:

PASSING SIEVE	LOWER%	HIGH%	
2 inch	100%		
¾ inch	52%	100%	
#4	24%	50%	LA Abrasion < 40%
#16	10%	30%	Sulfate Test – Not Applicable
#200	0%	10%	PH between 6 and 9

AASHTO 57 Gradation:

The required amount and allowed ranges, determined by weight, for various size particles are:

PASSING SIEVE	LOWER%	HIGH%
1-1/2 inch	100%	
1 inch	95%	100%
1/2 inch	25%	60%
#4	0%	10%
#8	0%	5%

703 - Aggregate

703.05_nat_us_08_14_2009

Delete 703.05 and replace with the following:

703.05 Subbase, Base, Surface Course, and Screened Aggregate.

(a) Subbase or base aggregate. Furnish hard, durable particles or fragments of crushed stone, crushed slag, or crushed gravel conforming the following:

(1) Gradation	Table 703-2
(2) Liquid limit, AASHTO T 89	25 max.
(3) Plastic limit, AASHTO T 90	Nonplastic
(4) Los Angeles abrasion, AASHTO T 96	40% max.
(5) Sodium sulfate soundness loss (5 cycles), AASHTO T 104	12% max.
(6) Durability index (coarse), AASHTO T 210	35 min.
(7) Durability index (fine), AASHTO T 210	35 min.
(8) Fractured faces, ASTM D 5821	50% min.
(9) Free from organic matter and lumps or balls of clay	

Do not use material that breaks up when alternately frozen and thawed or wetted and dried.

Obtain the aggregate gradation by crushing, screening, and blending processes as necessary. Fine aggregate, material passing the No. 4 sieve, shall consist of natural or crushed sand and fine mineral particles.

(b) Surface course aggregate. Furnish hard, durable particles or fragments of crushed stone, crushed slag, or crushed gravel conforming the following:

(1) Gradation	Table 703-3
(2) Liquid limit, AASHTO T 89	35 max.
(3) Plastic Index, AASHTO T 90	
a) If the percent passing the No. 200 sieve is less than 12%	2 to 9
b) If the percent passing the No. 200 sieve is greater than 12%	Less than 2
(4) Los Angeles abrasion, AASHTO T 96	40% max.
(5) Sodium sulfate soundness loss (5 cycles), AASHTO T 104	12% max.
(6) Durability index (coarse), AASHTO T 210	35 min.
(7) Durability index (fine), AASHTO T 210	35 min.
(8) Fractured faces, ASTM D 5821	75% min.
(9) Free from organic matter and lumps or balls of clay	

Do not use material that breaks up when alternately frozen and thawed or wetted and dried.

Do not furnish material that contains asbestos fibers.

Obtain the aggregate gradation by crushing, screening, and blending processes as necessary. Fine aggregate, material passing the No. 4 sieve, shall consist of natural or crushed sand and fine mineral particles.

(c) Screened aggregate – Furnish hard, durable particles or fragments of stone, slag, or gravel conforming the following:

(1) Gradation	Table 703-16
(2) Plastic Index, AASHTO T 90	Less than 9
(3) Los Angeles abrasion, AASHTO T 96	55% max.
(4) Free from organic matter and lumps or balls of clay.	

Do not use material that breaks up when alternately frozen and thawed or wetted and dried. Obtain the aggregate gradation by crushing, screening, and blending processes as necessary.

Delete Table 703-2 and replace with the following:

Table 703-2
Target Value Ranges for Subbase and Base Gradation

Sieve Size	Percent by Mass Passing Designated Sieve (AASHTO T 27 and T 11)				
	Grading Designation				
	A (Subbase)	B (Subbase)	C (Base)	D (Base)	E (Base)
2½ inch	100				
2 inch	97 – 100	100	100		
1½ inch		97 – 100			
1 inch	65 – 79 (6)		80 – 100 (6)	100	
3/4 inch			64 – 94 (6)	86 – 100 (6)	100
1/2 inch	45 – 59 (7)				
3/8 inch			40 – 69 (6)	51 – 82 (6)	62 – 90 (6)
No. 4	28 – 42 (6)	40 – 60 (8)	31 – 54 (6)	36 – 64 (6)	36 – 74 (6)
No. 40	9 – 17 (4)			12 – 26 (4)	12 – 26 (4)
No. 200	4.0 – 8.0 (3)	4.0 – 12.0 (4)	4.0 –7.0 (3)	4.0 – 7.0 (3)	4.0 – 7.0 (3)

( ) The value in the parentheses is the allowable deviation (±) from the target values..

Delete Table 703-3 and replace with the following:

Table 703-3

Target Value Ranges for Surface Gradation

Sieve Size	Percent by Mass Passing Designated Sieve (AASHTO T 27 and T 11)					
	Grading Designation					
	F	G	H	S	T	U
1 1/2 inch	100			100		
1 inch	97-100	100		72 – 92 (6)	100	
3/4 inch	76-89 (6)	97 - 100	97 - 100			100
1/2 inch					71 – 91 (6)	
3/8 inch	56-68 (6)	70 – 80 (6)	80 – 92 (6)	51 – 71 (6)		71 – 90 (6)
No. 4	43-53 (7)	51 – 63 (7)	58 – 70 (7)	36 – 53 (7)	43 – 60 (7)	50 – 68 (7)
No. 8				26 – 40 (6)	30 – 46 (6)	34 – 51 (6)
No. 16	23-32 (6)	28 – 39 (6)	28 – 40 (6)			
No. 40	15-23 (5)	19 – 27 (5)	16 – 26 (5)	14 – 25 (5)	16 – 28 (5)	19 – 30 (5)
No. 200	10.0-16.0 (4)	10.0 – 16.0 (4)	9.0 – 14.0 (4)	8.0 – 15.0 (4)	8.0 – 15.0 (4)	8.0 – 15.0 (4)

( ) The value in the parentheses is the allowable deviation (±) from the target values.
If the plasticity index (PI) is greater than 0, the TV range for the No. 200 sieve size is 8-12 (4).

SPF 705 - Rock

Replace 705.02 with the following:

705.02 Riprap Rock. Furnish rock sound, free from structural defects and foreign substances such as soil, shale, and organic materials. Use rock conforming to the following requirements:

No shale seams

Hard and angular shaped rock with neither width nor thickness less than one-third its length.

Minimum specific gravity of 2.5 as determined according to AASHTO T 85, bulk saturated, but surface-dry basis.

Each load of rock well-graded, from smallest to the largest size

	Percent Passing (Square Openings)				
Class, Size No. Rock Size (inches)	R-7	R-6	R-5	R-4	R-3
30	100				
24		100			
18	15-50		100		
12	0-15	15-50		100	
9			15-50		
6		0-15		15-50	100
4			0-15		
3				0-15	15-50
2					0-15
Nominal Thickness	36	30	24	18	12

705 - Rock

705.02_nat_us_08_05_2009

705.02 Riprap Rock.

Delete Table 705-1 and replace it with the following:

Gradation Requirements for Riprap

Class	Percent of Rock by Mass	Mass (pounds)	Approximate Cubic Dimension [b,c] (inches)
1	20	22 to 33	6 to 8
	30	11 to 22	5 to 6
	40	1 to 11	2 to 5
	10[a]	0 to 1	0 to 2
2	20	55 to 110	8 to 10
	30	22 to 55	6 to 8
	40	2 to 22	3 to 6
	10[a]	0 to 2	0 to 3
3	20	220 to 330	14 to 16
	30	110 to 220	10 to 14
	40	11 to 110	5 to10
	10[a]	0 to 11	0 to 5
4	20	550 to 770	18 to 20
	30	220 to 570	14 to 18
	40	22 to 220	6 to 14
	10[a]	0 to 22	0 to 6
4a	20	770 to1353	20 to 24
	30	330 to 770	16 to 20
	40	33 to 330	7 to16
	10[a]	0 to 33	0 to 7
5	20	1540 to 2200	26 to 28
	30	1100 to 1540	20 to 26
	40	55 to 1100	8 to 20
	10[a]	0 to 55	0 to 8
6	20	1870 to 3520	28 to 34
	30	1100 to 1870	22 to 28
	40	110 to 1100	10 to 22

	10[a]	0 to 110	0 to 10
7	20	4400 to 5940	35 to 39
	30	2200 to 4400	28 to 35
	40	220 to 2200	14 to 28
	10[a]	0 to 220	0 to 14
8	20	7000 to 10000	42 to 47
	30	4000 to 7000	35 to 42
	40	400 to 4000	16 to 35
	10[a]	0 to 400	0 to 16

(a) Furnish spall and rock fragments graded to provide a stable dense mass.
(b) The volume of a rock with these cubic dimensions has a mass approximately equal to the specified rock mass.
(c) Furnish rock with breadth and thickness at least one-third its length.

705.02_01_us_10_12_2006

705.02 Riprap Rock

Delete the second sentence of this subsection. Additionally delete the requirements specified for (a), (b), and (c).

Add the following:

705.07 Streambed Simulation Rock.

(a) General. Furnish a mixture of soil, gravel, cobble, and boulders to simulate a natural streambed. Th boulders should be hard, durable rock that conforms to test values in 705.02.

Table 705-5 – Gradation requirements for Streambed Simulation Material, inches or sieve size

Bed Class	100% passing	84% passing	50% passing	16% passing	10% passing
2	5	2	3/4	1/4	No. 10
4	10	4	1 3/4	1/2	No. 10
6	14	6	2 1/2	3/4	No. 10
8	22	8	3	1	No. 10
10	24	10	4	1	No. 10
12	30	12	5	1 1/2	No. 10
14	36	14	6	1 3/4	No. 10
16	42	16	7	2	No. 10
20	48	20	8	3	No. 10
24	60	24	10	3	No. 10
36	72	36	14	4	No. 10
48	96	48	18	6	No. 10

705 - Rock

705.07_nat_us_03_02_2005

Add the following:

705.08 Stream Bed Simulation Rock. Furnish hard durable rock that is resistant to weathering and water action and free of organic or other unsuitable material. Do not use shale, rock with shale seams, or other fissile or fissured rock tha may break into smaller pieces in the process of handling and placing. Conform to the following:

718 - Traffic Signing and Marking Material

718.05_nat_us_08_05_2009

718.05 Aluminum Panels

Delete the third paragraph and replace with the following:

Clean, degrease and properly prepare the panels according to methods recommended by the sheeting manufacturer. Conversion coatings will conform to ASTM B-921 or ASTM B-449.