DEPARTMENT OF AGRICULTURE
FOREST SERVICE
REGION 9
ALLEGHENY NATIONAL FOREST

Slugger Timber Sale

FR 147A	**Old State – A**	**0.8 Miles**	**Construction – Existing Corridor - Level J**
FR 516	**Blueberry Ridge**	**0.8 Miles**	**Construction – Existing Corridor - Level J**
FR 516A	**Blueberry Ridge – A**	**0.3 Miles**	**Construction – Existing Corridor - Level J**
FR 627A	**Bay Road – A**	**1.0 Mile**	**Construction – Existing Corridor - Level J**

Bradford Ranger District
Warren and McKean Counties
Pennsylvania

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The location and design elements of these facilities have been correlated with the plans, policies and constraints of the approved Morrison Run Environment Assessments.

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:

Fran E. Martinez

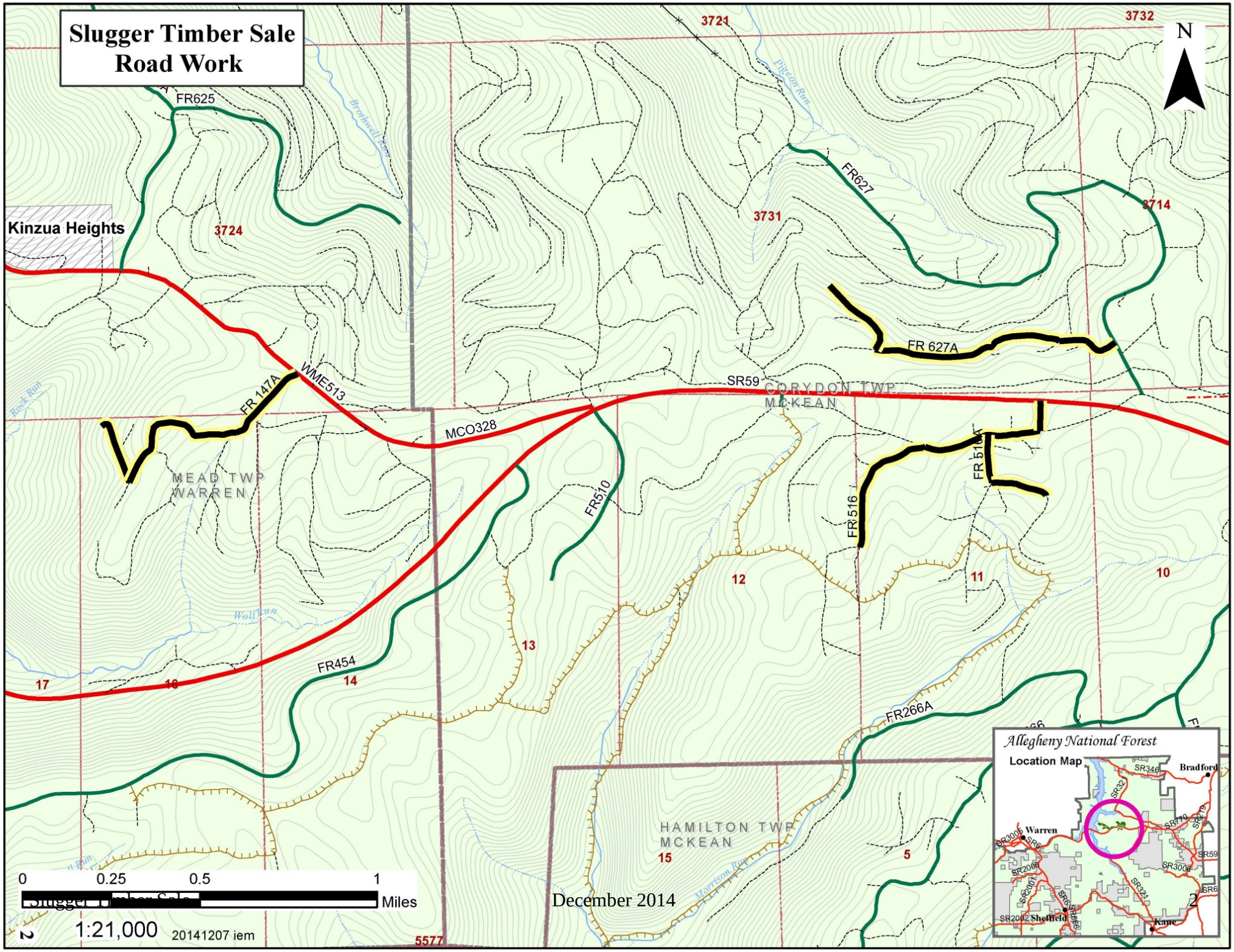
Approved By:

12/9/2014
District Ranger **Date**

12-9-2014
Forest Engineer **Date**

Dec 9, 2014
Forest Supervisor **Date**

Slugger Timber Sale Road Work



Road Summary

SPECIFIED ROADS

a. Description of Work:

Construction (Existing Corridor): FR 147A, 516, 516A and 627A

Mobilization, Road Reconditioning, Removal of Culverts, Clearing and Grubbing, Roadway Excavation, Drainage Excavation, Earthwork Geotextile, Culvert Installation, Sign and Gate Installation, Seeding & Mulching and Commercial Road Surfacing.

b. Construction Costs:

Road No.	Miles	Estimated Road Cost	Engineer's Estimate	Reconstruction Deposits
147A	0.8 ©	$30,278.00	$33,798.60	
516	0.8 ©	$27,111.00	$30,127.00	
516A	0.3 ©	$9,034.00	$10,227.00	
627A	1.0 ©	$10,701.00	$11,988.00	
Total		$77,124.00	$86,140.60	$0.00

c. Completion dates: 9/30/2015

Schedule of Items

FR 147A

Pay Item	Description	Pay Unit	Estimated Quantity	Unit Price	Extended Total	Engineer's Estimate Unit Price	Engineer's Extended Total
15101	Mobilization (Lump Sum)	All	1	1200.00	$ 1,200.00	1400.00	$ 1,400.00
20102	Clearing and grubbing	All	1	550.00	$ 550.00	600.00	$ 600.00
20301	Removal of culverts	Each	2	120.00	$ 240.00	140.00	$ 280.00
20499	Roadway excavation, compaction method B, finishing method B	All	1	500.00	$ 500.00	580.00	$ 580.00
20477	Drainage excavation, type reconstruction of outlet ditches	All	1	2400.00	$ 2,400.00	3000.00	$ 3,000.00
20701	Earthwork geotextile type nonwoven	Square Yard	903	2.00	$ 1,806.00	2.20	$ 1,986.60
30101	Aggregate base, grading **3A**, compaction method B	Ton	322	26.00	$ 8,372.00	28.50	$ 9,177.00
30109	Aggregate surface, grading **PA 2A**, compaction method B	Ton	450	23.00	$ 10,350.00	25.00	$ 11,250.00
30326	Road reconditioning/reconstruction (dozer)	Mile	0.1	2500.00	$ 250.00	2750.00	$ 275.00
60201	16 inch steel pipe casing	Linear Foot	60	35.00	$ 2,100.00	38.00	$ 2,280.00
62501	Seeding, hydraulic or dry method (Lump Sum)	All	1	950.00	$ 950.00	1235.00	$ 1,235.00
63301	Sign system (stop sign)	Each	1	100.00	$ 100.00	120.00	$ 120.00
	Sign system (road number sign)	Each	1	60.00	$ 60.00	65.00	$ 65.00
65001	Furnish and install road closure device, type gate size 21'	Each	1	1400.00	$ 1,400.00	1550.00	$ 1,550.00
TOTAL					**$ 30,278.00**		**$ 33,798.60**

FR 516

Pay Item	Description	Pay Unit	Estimated Quantity	Unit Price	Extended Total	Engineer's Estimate Unit Price	Engineer's Extended Total
15101	Mobilization (Lump Sum)	All	1	900.00	$ 900.00	1100.00	$ 1,100.00
20301	Removal of culverts	Each	2	120.00	$ 240.00	140.00	$ 280.00
20464	Turnout and Turnaround Construction/Reconstruction	All	1	400.00	$ 400.00	475.00	$ 475.00
20477	Drainage excavation, type reconstruction of outlet ditches	All	1	1440.00	$ 1,440.00	1800.00	$ 1,800.00
30109	Aggregate surface, grading **PA 2A**, compaction method B	Ton	687	23.00	$ 15,801.00	25.00	$ 17,175.00
30326	Road reconditioning/reconstruction (dozer)	Mile	0.8	1600.00	$ 1,280.00	1800.00	$ 1,440.00
60201	16 inch steel pipe casing	Linear Foot	134	35.00	$ 4,690.00	38.00	$ 5,092.00
60705	Removing, cleaning and resetting culvert	Each	1	150.00	$ 150.00	175.00	$ 175.00
62501	Seeding, hydraulic or dry method (Lump Sum)	All	1	750.00	$ 750.00	975.00	$ 975.00
63301	Sign system (road number sign)	Each	1	60.00	$ 60.00	65.00	$ 65.00
65001	Furnish and install road closure device, type gate size 21'	Each	1	1400.00	$ 1,400.00	1550.00	$ 1,550.00
TOTAL					**$ 27,111.00**		**$ 30,127.00**

FR 516A

Pay Item	Description	Pay Unit	Estimated Quantity	Unit Price	Extended Total	Engineer's Estimate Unit Price	Engineer's Extended Total
15101	Mobilization (Lump Sum)	All	1	700.00	$ 700.00	800.00	$ 800.00
20301	Removal of culverts	Each	2	120.00	$ 240.00	140.00	$ 280.00
20464	Turnout and Turnaround Construction/Reconstruction	All	1	800.00	$ 800.00	900.00	$ 900.00
20477	Drainage excavation, type reconstruction of outlet ditches	All	1	990.00	$ 990.00	1240.00	$ 1,240.00
30109	Aggregate surface, grading **PA 2A**, compaction method B	Ton	138	23.00	$ 3,174.00	25.00	$ 3,450.00
30326	Road reconditioning/reconstruction (dozer)	Mile	0.3	1600.00	$ 480.00	1800.00	$ 540.00
60201	16 inch steel pipe casing	Linear Foot	54	35.00	$ 1,890.00	38.00	$ 2,052.00
62501	Seeding, hydraulic or dry method (Lump Sum)	All	1	600.00	$ 600.00	780.00	$ 780.00
63301	Sign system (stop sign)	Each	1	100.00	$ 100.00	120.00	$ 120.00
	Sign system (road number sign)	Each	1	60.00	$ 60.00	65.00	$ 65.00
TOTAL					**$ 9,034.00**		**$ 10,227.00**

FR 627A

Pay Item	Description	Pay Unit	Estimated Quantity	Unit Price	Extended Total	Engineer's Estimate Unit Price	Engineer's Extended Total
15101	Mobilization (Lump Sum)	All	1	700.00	$ 700.00	800.00	$ 800.00
20301	Removal of culverts	Each	1	120.00	$ 120.00	140.00	$ 140.00
20477	Drainage excavation, type reconstruction of outlet ditches	All	1	1550.00	$ 1,550.00	1750.00	$ 1,750.00
30109	Aggregate surface, grading **PA 2A**, compaction method B	Ton	207	23.00	$ 4,761.00	25.00	$ 5,175.00
30326	Road reconditioning/reconstruction (dozer)	Mile	1.0	1600.00	$ 1,600.00	1800.00	$ 1,800.00
60201	16 inch steel pipe casing	Linear Foot	26	35.00	$ 910.00	38.00	$ 988.00
60705	Removing, cleaning and resetting culvert	Each	1	150.00	$ 150.00	175.00	$ 175.00
62501	Seeding, hydraulic or dry method (Lump Sum)	All	1	750.00	$ 750.00	975.00	$ 975.00
63301	Sign system (stop sign)	Each	1	100.00	$ 100.00	120.00	$ 120.00
	Sign system (road number sign)	Each	1	60.00	$ 60.00	65.00	$ 65.00
TOTAL					**$ 10,701.00**		**$ 11,988.00**

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.**

– All road work will be completed prior to timber haul, unless otherwise approved.

– 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.

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

– Contractor shall furnish, erect and maintain the minimum barricades and warning signs identified in the Special Project Specifications until final inspection and acceptance, unless otherwise directed by the Engineer. Signs shall conform to the Manual on Uniform Traffic Control Devices (MUTCD). **Contractor shall install "ROAD CONSTRUCTION AHEAD" signs on all roads in this project area and at ATV trail crossings. Contractor's sign plan must be approved by Forest Service prior to work. Signs will be covered on weekends, holidays and any days when contractor is not working**.

– 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, unless otherwise indicated for salvage. Steel pipe casings shall be returned to the Sheffield Work Center unless otherwise directed by the Engineer.

– Contouring, topsoil re-spreading, 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. Contractor 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.

– 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.

– **Contractor shall install silt fence and straw bales at live stream crossings to eliminate sediment in the stream course. Any sediment collected will be removed and stabilized with seed and mulch. This will be considered incidental to Pay Item 602.**

Road Log - Work Descriptions

FR 147A Old State - A
Service Level J – (Old Level D)

Station	**Road Log/Work Description**
0+00	Intersection with Kinzua Heights Township Road WME 513 **Coordinates: Latitude 41º 51’ 48.58” N (41.8635)** **Longitude 78º 55’24.14” W (-78.9234)**

CAUTION: GAS, OIL, AND ELECTRIC LINES BURIED IN SAME DITCH ON BOTH SIDES OF ROAD
Contact Information: Bear Cat Oil, Mike Collins, (814) 489-3297
US Energy, Steve Pratt, (800) 636-7606 Ext. 324, (716) 697-3339

0+00 – 6+50	**Dozer recondition roadbed to 14' subgrade width, see TYPICAL RECONDITION SECTION; clean all culverts**
0+00 – 6+50	**Install non-woven geotextile fabric, apply 4” 3A as subgrade (184 tons), 4” of compacted PA 2A as road surfacing (174 tons)**
0+30	**Install STOP (high intensity reflectivity) sign (on 10’ U channel post) left**
0+40	**Install road number sign right**
0+50 – 1+10	Parking area right
1+20	**Remove private gate and return to Bear Cat Oil, install new Forest Service gate**
1+65	OGM road left and right
3+10	**Reconstruct leadoff ditch to drain right**
5+50	**Reconstruct leadoff ditch to drain right**
6+50 – 40+90	**CLEAN all culverts (incidental to road reconditioning)**
7+30	Leadoff ditch left
7+70	OGM road right
9+10	OGM road left
9+60	Gas meter right
9+95	**CAUTION: raise overhead electric lines (by OGM operator)**
11+00	Tank battery right

13+05	OGM road left, road turns right
13+75	Well left
15+50	**Install 16” x 28’ steel casing, apply 46 tons PA 2A**
17+65	**Reset 12” x 20’ steel casing to drain; remove culvert, clean and reinstall, drop inlet and outlet 6” to drain seep, apply 23 tons PA 2A**
19+30	Well left
20+50	**Reconstruct leadoff ditch**
22+75	**Reconstruct broad-base dip for a smoother road transition, apply 23 tons PA 2A, see Broad-Base Dip Details**
22+75 – 24+65	**Apply 46 tons of PA 2A as spot surfacing**
24+90 – 25+80	**Realign road left 10’, clearing and grubbing (3 saw and 2 pulp trees), road excavation, apply 138 tons 3A as road subbase and 4” of compacted PA 2A (46 tons) as road surfacing**
24+90	Well right
29+30	**Remove 16” x 30’ CMP, install 16” x 32’ steel casing, reconstruct outlet ditch to drain, apply 23 tons PA 2A**
29+30	**Construct 400’ ditchline left up OGM road to drain road runoff into culvert at station 29+30**
29+80	OGM road left, **construct 200’ ditchline left up OGM road to drain OGM road runoff into culvert at station 33+85**
29+90 – 33+90	**Construct ditchline left**
30+00	Well right
30+30	Broad base dip, leadoff ditch right
33+85	15” x 25’ CMP, **outlet obstructed by sediment**
35+50	OGM road left, ahead and well left; road continues right
38+00 – 40+90	**Apply 4” of compacted PA 2A (69 tons)**
38+20	15” x 26’ CMP, **outlet and inlet obstructed by sediment and debris**
39+90	OGM road right and well left, use intersection as turnaround
40+90	**End of system road**, OGM road continues ahead

FR 516 Blueberry Ridge
Service Level J – (Old Level D)

CAUTION: BURIED GAS, OIL, AND ELECTRIC LINES AND RISERS IN ROAD DITCHES
Contact Information: Oil Creek Energy, LLC, Patrick W. Burgess, (814) 694-2149, Cell (814)881-3500
Catalyst, Matt Broker (412) 526-1167, Ted Williams – Well attendant

Station	**Road Log/Work Description**
0+00	Intersection with State Route 59 **Coordinates: Latitude 41º 51' 41.904" N (41.86164)** **Longitude 78º 52' 58.116" W (-78.88281)**
0+22	STOP sign left
0+40	**Install road number sign right**
2+80 – 43+25	**Dozer recondition roadbed see TYPICAL RECONDITION SECTION; clean all culverts and reestablish diches.**
2+80	30" x 40' CMP
3+20 – 4+60	**Reconstruct turnout/parking area left, apply 46 tons PA 2A**
4+30	**Install new Forest Service gate**
4+60 – 7+30	**Construct ditchline left**
4+60 – 14+25	**Apply 4" of compacted PA 2A as road surfacing (258 tons)**
8+55	OGM road left and right
9+80	Construct leadoff ditch left
11+15	FR 515A left
13+00	18" x 25' steel casing
14+00	OGM road right
15+90	18" x 25' steel casing, on right forward skew
15+50 – 16+75	**Apply 46 tons PA 2A as spot surfacing**
19+10	**CAUTION: Electric risers and pipeline in right ditch**
19+95	Well (Catalyst) left
20+45	Gas/oil valves right
21+65	OGM road right, FR 516 goes left
21+00 – 22+75	**Apply 46 tons PA 2A as spot surfacing**
22+30	Electric panel, meter station and tank right

23+50 – 27+50	**Apply 4” of compacted PA 2A as road surfacing (107 tons)**
27+75	Remove drivable dip, **install 16” x 26’ steel casing, construct outlet ditch to drain, apply 23 tons PA 2A**
30+05	OGM road right
30+71	Leadoff ditch left
31+35	Electric riser right
33+10	Remove drivable dip, **install 16” x 28’ steel casing, construct outlet ditch to drain, apply 23 tons PA 2A**
33+20 – 33+90	**Apply 23 tons PA 2A as road surfacing**
33+55	OGM road right
37+90	**Reset 18" x 25' steel casing to drain; remove culvert, clean and reinstall, reconstruct outlet ditch to drain, remove larger rock(s) at outlet and place them on side slope to armor, apply 23 tons PA-2A**
39+65	**Install 16” x 26’ steel casing, construct outlet ditch to drain, apply 23 tons PA 2A**
41+50	OGM road right
41+65	**Remove 15” x 23’ steel casing, install 16” x 26’ steel casing, apply 23 tons PA 2A**
41+70 – 42+20	**Apply 23 tons PA 2A as spot surfacing**
41+75	Tank battery right
41+95	Generator shed right
42+10	OGM road right
42+20	**Construct 100’ ditchline right up OGM road to drain into culvert at station 42+25**
42+25	**Install 16” x 28’ steel casing, construct outlet ditch to drain, apply 23 tons PA 2A**
42+25 – 43+25	**Construct ditchline right**
43+25	**End of system road and road reconditioning**, OGM road continues ahead

FR 516A Blueberry Ridge - A
Service Level J – (Old Level D)

CAUTION: BURIED GAS, OIL, AND ELECTRIC LINES AND RISERS IN ROAD DITCHES
Contact Information: Oil Creek Energy, LLC, Patrick W. Burgess, (814) 694-2149, Cell (814)881-3500
Catalyst, Matt Broker (412) 526-1167, Ted Williams – Well attendant

Station	**Road Log/Work Description**
0+00	Intersection with FR 516 station 11+15 **Coordinates: Latitude 41º 51' 37.152" N (41.86032)** **Longitude 78º 53' 12.12" W (-78.88570)**
0+00 – 16+00	**Dozer recondition roadbed see TYPICAL RECONDITION SECTION; clean all culverts and reestablish diches.**
0+20	**Install STOP (24" high intensity reflectivity) sign (on 10' U channel post) left**
0+40	**Install road number sign right**
1+25	OGM road left
1+60 – 3+25	**Apply 4" of compacted PA 2A as road surfacing (46 tons)**
2+90	OGM road left
4+65	**Reconstruct leadoff ditch left**
6+15	Tank battery and generator left
7+10	Intersection OGM roads straight and right, FR 516 turns left
7+80	15" x 24' CMP, **inlet and outlet clogged, reconstruct outlet ditch to drain**
8+80	15" x 24' CMP, **inlet and outlet clogged, reconstruct outlet ditch to drain**
8+80 – 9+50	**Reconstruct ditchline left to drain water behind well pad into culvert at station 8+80**
9+90	Well left
10+85	**Remove 15" x 24' CMP, install 16" x 28' steel casing, reconstruct outlet ditch to drain, apply 23 tons PA 2A**

12+35	**Remove 15” x 24’ CMP, install 16” x 26’ steel casing, reconstruct outlet ditch to drain, apply 23 tons PA 2A**
14+80 – 15+80	**Reconstruct turnout left, apply 23 tons PA 2A**
15+30	**Reconstruct turnaround right, apply 23 tons PA 2A**
16+00	**End of system road and end of road reconditioning,** OGM road continues ahead

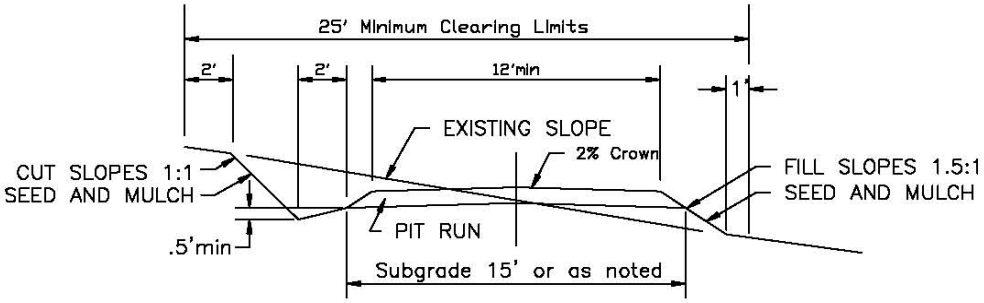
FR 627A Bay Road
Service Level J – (Old Level D)

CAUTION: BURIED GAS, OIL, AND ELECTRIC LINES AND RISERS IN ROAD DITCHES
Contact Information: Minard Run Oil Co., James MacFarlane (814) 362-3531

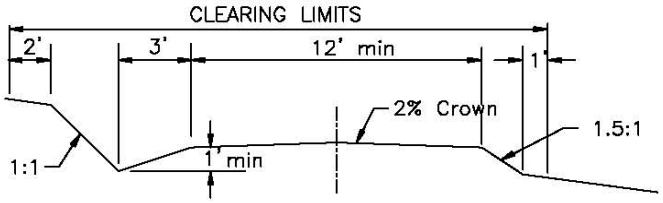
Station	**Road Log/Work Description**
0+00	Intersection with FR 267 **Coordinates: Latitude 41º 51' 50.148" N (41.86393)** **Longitude 78º 52' 43.1394" W (-78.87865)**
0+00 – 50+80	**Recondition roadbed see TYPICAL RECONDITION SECTION; clean all culverts and reestablish diches.**
0+05	**Reset 15" x 34' steel casing to drain; remove culvert, clean and reinstall, reconstruct outlet ditch to drain, apply 23 tons PA-2A**
0+20	**Install STOP (24" high intensity reflectivity) sign (on 10' U channel post) left**
0+40	**Install road number sign right**
2+00	Road widening left
4+80	OGM road left, 627A to right
5+55	OGM pond right
7+35	OGM road right
7+70	Electrical board right
8+65	15" x 32' steel casing, **clean sediment from inlet and backslope inlet approach flatter to allow vegetation**
8+85	OGM road left
9+00 – 16+00	**Reconstruct ditchline left**
11+90	Turnaround left
12+40	15" x 28' steel casing
12+30 – 13+00	**Apply 23 tons PA 2A as spot surfacing**
19+75 – 20+75	**Apply 23 tons PA 2A as spot surfacing**
19+95	OGM road left, **construct outlet ditch right 200' up OGM road**
20+00 – 21+60	**Reconstruct ditchline left**
21+60	15" x 30' steel casing

23+80	Well right
26+20 – 27+50	**Apply 46 tons PA 2A as spot surfacing**
26+90	**Install 16” x 26’ steel casing, apply 23 tons PA 2A**
28+90	Well left
29+65	15” x 28’ steel casing
32+70	15” x 19’ steel casing
34+10	Well right
35+00 – 36+30	**Apply 46 tons PA 2A as spot surfacing**
36+20	15” x 29’ steel casing
37+85	627A turns 90 degrees right, OGM road ahead, use intersection as turnaround
39+45	15” x 27’ steel casing
41+10	“Y” intersection, 627A to right, OGM road left, **CAUTION: buried pipelines in right shoulder**
41+50	18” x 47’ steel casing
43+80	Well right
43+40 – 44+20	**Apply 23 tons PA 2A as spot surfacing**
45+15	15” x 26’ steel casing
49+15	15” x 27’ steel casing
50+80	**End of system road, end of road reconditioning,** well

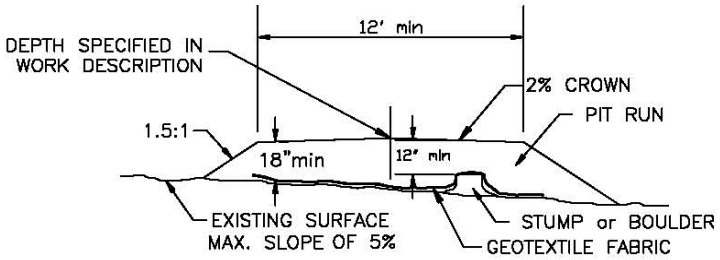
Roadbed Details & Drawings



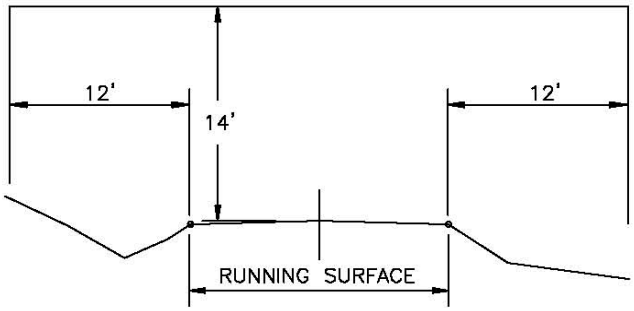
TYPICAL CONSTRUCTION SECTION



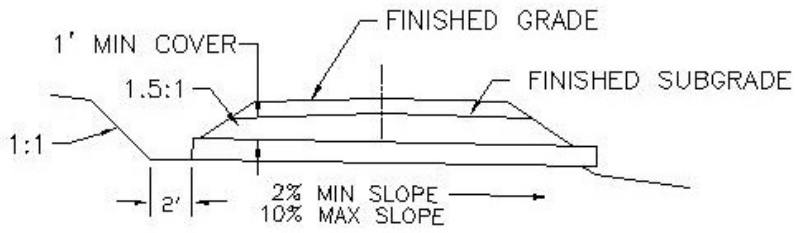
TYPICAL RECONDITION SECTION



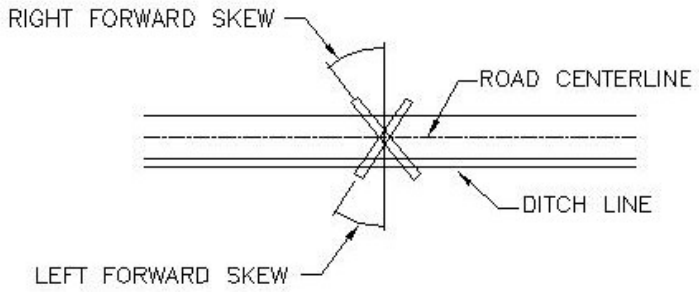
TYPICAL FABRIC SECTION W/O TEMPLATE



ROADSIDE BRUSHING DETAIL

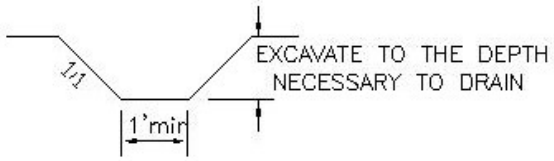


CULVERT SECTION

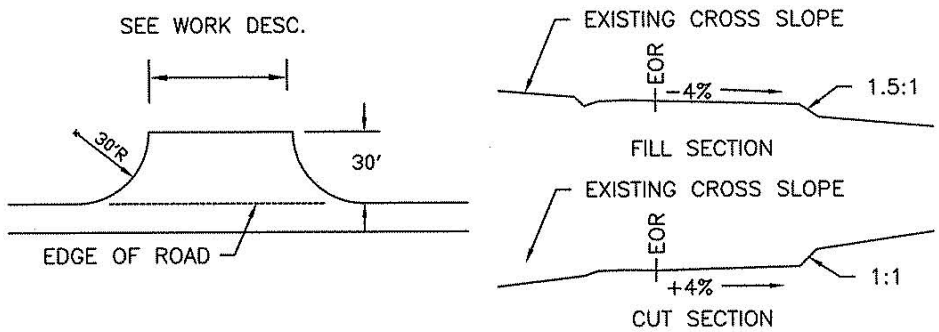


SKEW DETAIL

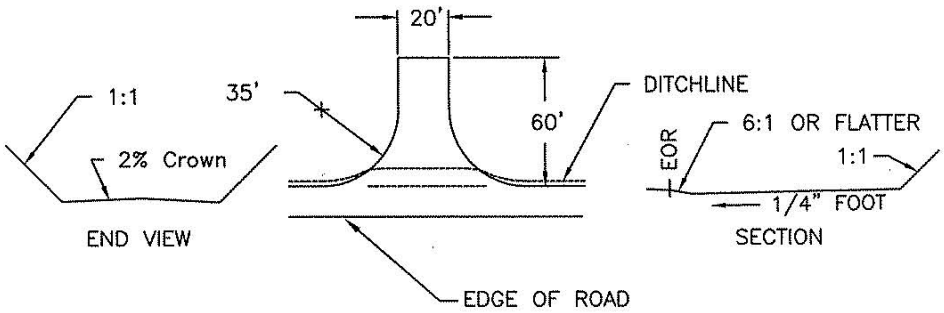
NOTE: Field locate ditch to minimize new clearing



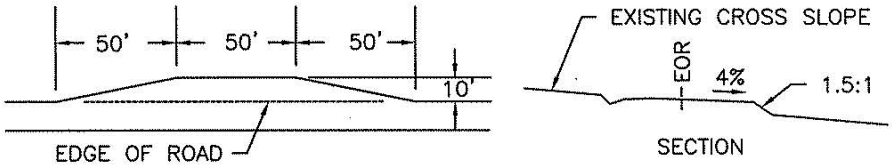
OUTLET/LEAD OFF DITCH SECTION



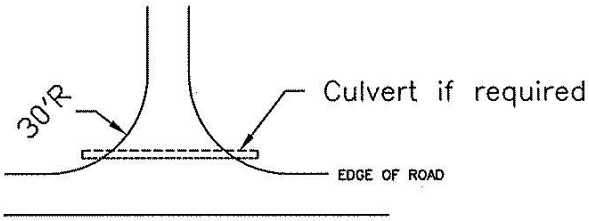
PARKING LOT DETAIL



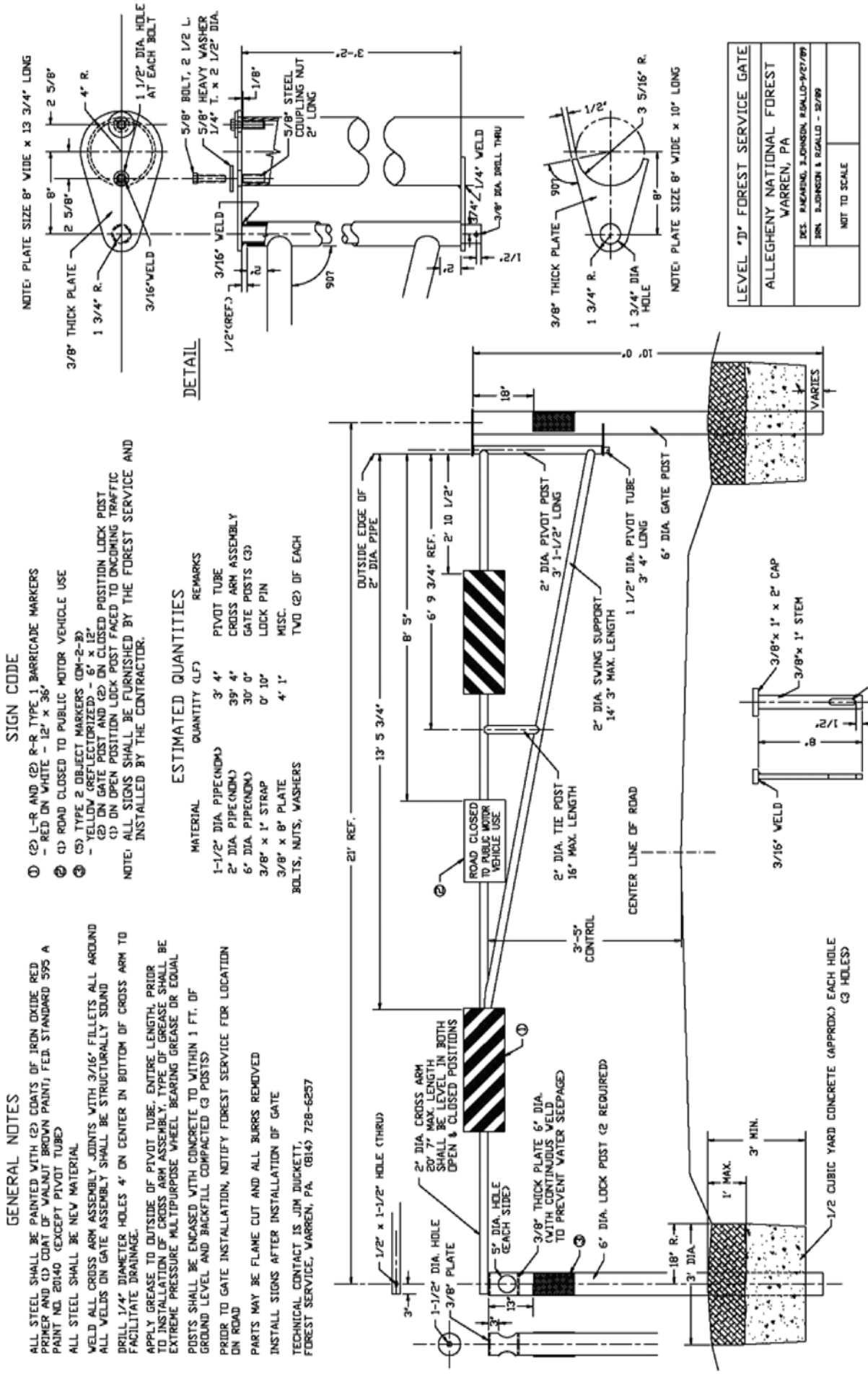
TURNAROUND DETAIL



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 (ON-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
DETAIL
NOTE: PLATE SIZE 8" WIDE x 13 3/4" LONG
3/8" THICK PLATE
1 3/4" R.
3/16" WELD
4" R.
2 5/8"
8"
1 1/2" DIA. HOLE AT EACH BOLT
5/8" BOLT, 2 1/2 L.
5/8" HEAVY WASHER 1/4" T. x 2 1/2" DIA.
5/8" STEEL COUPLING NUT 2" LONG
1/8"
3/16" WELD
1/2"(REF.)
90°
1/4" WELD
3/8" DIA. DRILL THRU
3/4"
1/2"
3/8" THICK PLATE
1 3/4" R.
1 3/4" DIA HOLE
3 5/16" R.
NOTE: PLATE SIZE 8" WIDE x 10" LONG
LEVEL "D" FOREST SERVICE GATE
ALLEGHENY NATIONAL FOREST
WARREN, PA
NOT TO SCALE
OUTSIDE EDGE OF 2" DIA. PIPE
21' REF.
13' 5 3/4"
8' 5"
6' 9 3/4" REF.
2' 10 1/2"
18'
10' 0"
VARIES
2" DIA. PIVOT POST 3' 1-1/2" LONG
1 1/2" DIA. PIVOT TUBE 3' 4" LONG
6" DIA. GATE POST
2" DIA. SWING SUPPORT 14' 3" MAX. LENGTH
2" DIA. TIE POST 16' MAX. LENGTH
ROAD CLOSED TO PUBLIC MOTOR VEHICLE USE
CENTER LINE OF ROAD
3'-5" CONTROL
2" DIA. CROSS ARM 20' 7" MAX. LENGTH SHALL BE LEVEL IN BOTH OPEN & CLOSED POSITIONS
1/2" x 1-1/2" HOLE (THRU)
1-1/2" DIA. HOLE
3/8" PLATE
5" DIA. HOLE (EACH SIDE)
3/8" THICK PLATE 6" DIA. (WITH CONTINUOUS WELD TO PREVENT WATER SEEPAGE)
6" DIA. LOCK POST (2 REQUIRED)
18" R.
3" DIA.
1' MAX.
3" MIN.
1/2 CUBIC YARD CONCRETE (APPROX.) EACH HOLE (3 HOLES)
3/8"x 1" x 2" CAP
3/8"x 1" STEM
SLOT 1/2" WIDE x 2" LONG
3/16" WELD
LOCK PIN
ONE REQUIRED

Technical Bulletin

Broad Based Dips

9/2008

Broad Based Dip: An intentional watercourse and associated high spot created across a roadway that conveys water from the uphill ditch over the road surface to a discharge area.

Purpose:

The main function of a *broad based dip* is to collect flowing water from the road surface and ditches, directing it across the road to a stable outlet. *Broad based dips* can be used in place of crosspipes in certain situations to outlet water from the uphill ditch across the road. *Broad based dips* also act as gradebreaks or water bars to prevent drainage from flowing down the wheel tracks on the road surface.

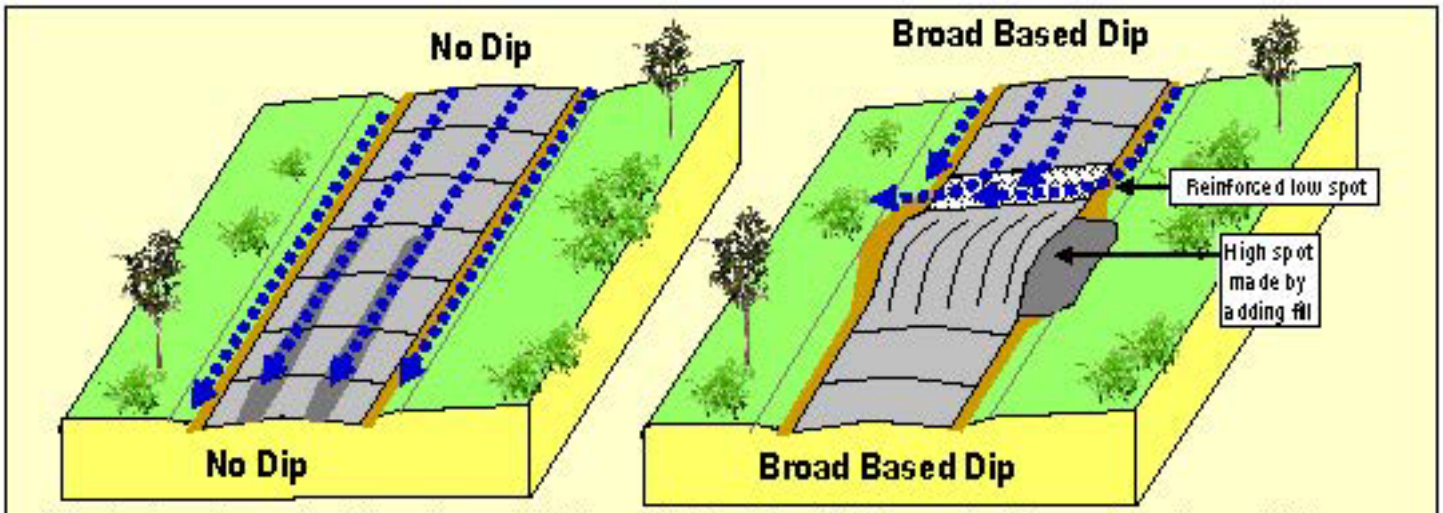
Benefits:

- Prevents erosion caused by water flowing down road.
- Acts as a crosspipe to outlet drainage from the uphill side of the road, reducing potential for erosion and stream pollution from long ditch runs.
- Cheap, easy, and effective on low volume roads.

Considerations:

- Use discretion when considering *broad based dips*. They are only appropriate for use on low traffic roads. Roads with high vehicle traffic and oversized loads may not be appropriate for *broad based dips*.
- *Broad based dips* should not be used on roads with a slope of greater than 10%.
- A *broad based dip* is designed to carry runoff across the surface of the road. It may be necessary to reinforce the bottom of the dip and dip outlet to prevent erosion, depending on site conditions.
- *Broad based dips* are not designed to accommodate continually flowing water such as springs or streams.

This *broad based dip* in Huntingdon County is located on an access road that is only open to the public for hunting season. This low-use road is ideal for *broad based dips* instead of crosspipes to reduce long term maintenance. The dip pictured here collects road and ditch water and directs it from left to right across the road.



Water is allowed to run down the roadway and ditch. This builds volume and velocity which can erode the road area and deliver sediment to streams.

The *Broad Based Dip* forces water flowing on the roadway and in the ditches to a stable outlet area to reduce erosion. Reinforcement of the outlet area may be needed, depending on site conditions.

The publishers of this publication gratefully acknowledge the financial support of the PA State Conservation Commission. For additional information, contact: Center for Dirt & Gravel Roads Studies, Pennsylvania State University, 207 Research Unit D, University Park, PA 16802 (Toll-Free Phone: 1-866-668-6683, Fax: 814-863-6787, Email: dirtandgravel@psu.edu). Additional copies available on our website at www.dirtandgravelroads.org.

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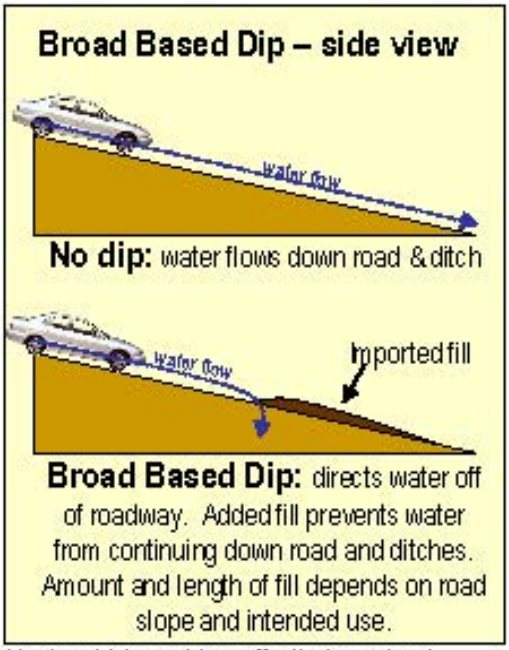

A *broad based dip* is pictured here during a heavy rainstorm. Notice how gradual the dip would be to vehicles, yet how effectively road and ditch flow is directed across the road. Without the dip, road and ditch drainage would continue to build erosive force around the corner.

Construction Considerations:

- **SPACING**: Multiple *broad based dips* can be used in sequence, similar to crosspipes, to drain a long stretch of road. Spacing for *broad based dips* depends on a variety of site-specific conditions including road slope, native soils, and hydrologic conditions.
- **SIZE & SHAPE**: Sizing for *broad based dips* will vary widely depending mostly on road slope and anticipated traffic. Dips constructed on flat roads may be relatively small (fill transitions as short as 12 feet and as low as 6 inches). Dips installed on steeper sections of road will require more "approach fill" to ease the transition into and out of the structure (fill transitions over 100 feet long and up to 18 inches deep). Be sure to take anticipated traffic into account. The dip pictured on the front of this document is on a gated access road and is much more abrupt. The dip pictured above has much smoother transitions to accommodate cars and log trucks. A relatively wide dip bottom is recommended to accommodate water and ease vehicle transitions. The upslope end of the dip should be tied into the uphill bank to insure water does not bypass the structure and continue flowing down the ditch.
- **ANGLE**: *Broad based dips* should be angled across the road at approximately 20-40 degrees, not placed at 90 degrees perpendicular to the road like a speed bump. The angle will facilitate the flow of water across the road. A dip placed straight across the road will be much more likely to fail because it forces water to turn at a right angle to flow across the roadway.
- **SLOPE**: Similar to crosspipes, the bottom of a *broad based dip* should have an elevation drop towards the outlet end. A 3% slope is recommended across the bottom of the dip
- **DIP REINFORCEMENT**: Because a *broad based dip* is designed to carry concentrated flow on the surface of the road, reinforcement of the dip bottom is recommended. Hard stone and even geo-synthetic materials can be used to reinforce the bottom of the dip to resist erosion.
- **OUTLET REINFORCEMENT:** Because a *broad based dip* outlets water similar to a crosspipe, similar outlet stability concerns apply. When possible, outlet dips into a vegetated buffer area. Depending on the amount of water and slope of the land, additional outlet stabilization with stone may be required.
- **MAINTENANCE:** A properly constructed *broad based dip* will function for years with minimal maintenance. Care must be taken not to remove the dip during any future maintenance activity.

Broad based dips are a cheap and effective means of drainage control on low volume roads. Farm lanes, camp roads, gated access roads, and other low use roads are ideal candidates for these structures. Always try to discharge dips to a stable outlet away from streams.

A **Gradebreak is a related surface drainage structure designed to divert water off the road surface, but not to carry flowing water across the road. For details about gradebreaks, see the Center's related technical bulletin at www.dirtandgravelroads.org.*

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PENNSTATE

Specifications for Specified Roads

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Specifications Description

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 – The specifications identified in this contract 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.

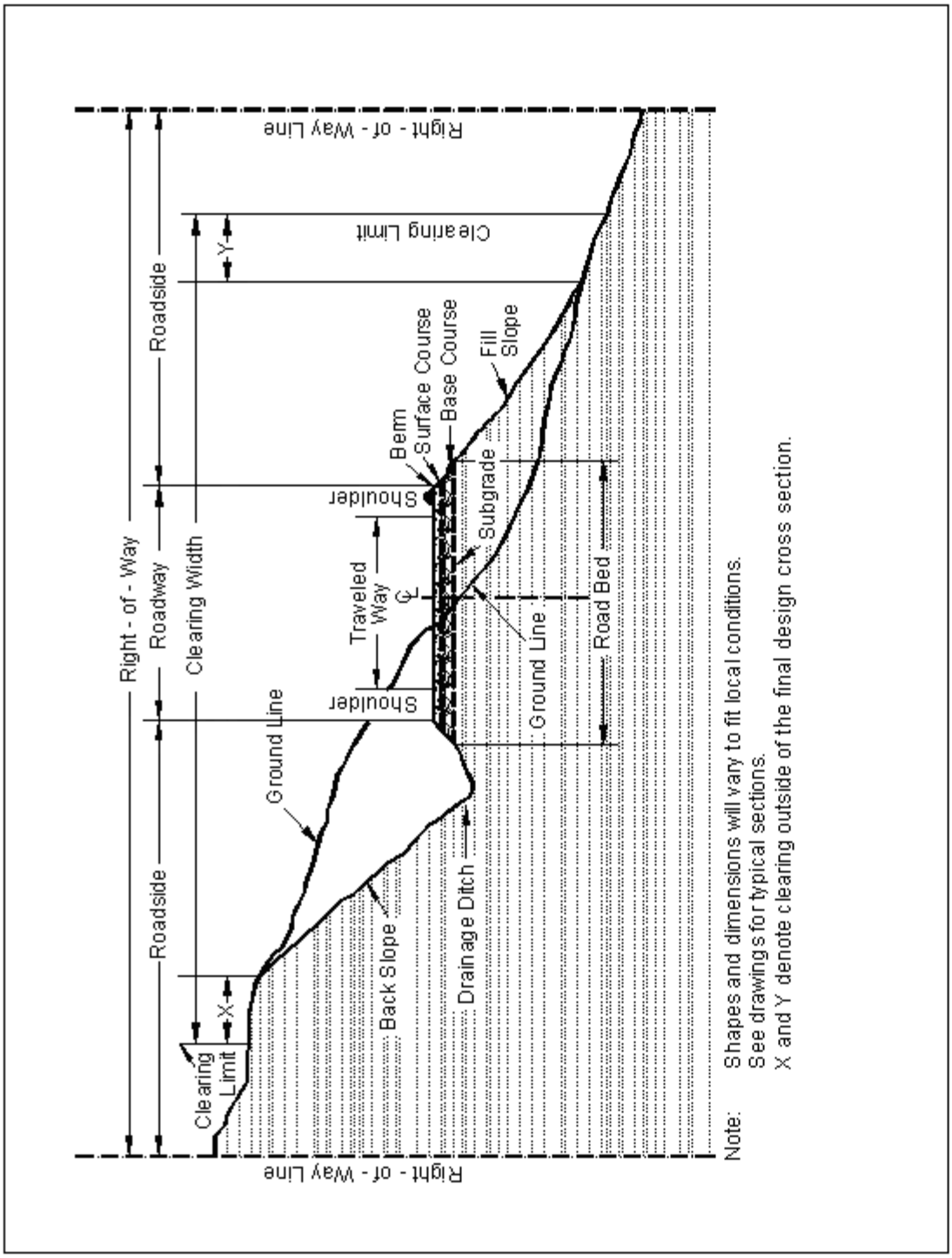
Road Order--An order affecting and controlling traffic on roads under Forest Service jurisdiction. Road Orders are issued by a designated Forest Officer under the authorities of 36 CFR, part 260.

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.

153.04_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.

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) <u>Compaction A.</u> 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	"	"	"
		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	"	"	"
		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

209.10_nat_us_10_23_2007

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_nat_us_02_24_2005

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.

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.

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.

607 - Cleaning, Reconditioning, and Repairing Existing Drainage Structures

607.04_nat_us_05_01_2013

607.04 Cleaning Culverts in Place.

Add the following:

If approved by the CO, all or part of the pipe designated to be cleaned in-place may be removed, cleaned, and re-laid in accordance with Section 602. In these cases, furnish all material required to replace damaged pipe and joints and relay the pipe.

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.

650 - Road Closure Devices

650.00_nat_us_06_28_2007

Description

650.01 Work. Furnish and install, or install only, road closure devices using fabricated gates and accessories, combination post and rail barriers, concrete barriers, earth mound barriers, and other devices.

Materials

650.02 Requirements. Furnish materials to be used in fabricating gates and barriers. Ensure that all hardware is galvanized in accordance with AASHTO M 232 and meets the requirements of ASTM A 307. Furnish plain or cut washers that are American Standard Washers.

Furnish timber posts, rails, and lumber that meet the requirements of AASHTO M 168. Provide timber of the species and type, and rate of preservative treatment. Furnish concrete that meets the requirements of Subsection 601.03, method B or C. Construct earth mound barriers from excavated material adjacent to the barrier location, or from other designated locations.

Construction

650.03 Performance. Place road closure devices at designated locations. Construct all devices to the required dimensions. In assembling gates, perform required welding in accordance with the best modern practice and the applicable requirements of AWS D1.1.

After assembly, clean non-galvanized steel pipe gates and paint them with one coat of zinc-rich primer and two coats of exterior enamel of the required type and color.

Set all posts vertically and embed them to the required depth. Place concrete for embedment against undisturbed earth within an excavation sized to achieve the embedment dimensions. Compact the backfill in 6 inch layers to finished grade.

Furnish and install all signs and/or reflective warning markers accessory to the road closure device.

650.04 Acceptance. Construction of road closure devices will be evaluated under Subsections 106.02 and 106.04.

Measurement

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

Payment

650.06 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 650 pay item listed in the bid

schedule. Payment will be full compensation for the work prescribed in this Section. See Subsection 109.05.

633 - Permanent Traffic Control

633.02_nat_us_03_03_2005

633.02 Material.

Add the following subsections

Protective Overlay Film	718.02
Edge Film	718.02

633.03_nat_us_03_03_2005

633.03 General.

Delete the subsection and add the following:

Furnish traffic control devices and guide signs according to the MUTCD, approved USDA-FS and state supplements, the current edition of USDA-FS EM-7100-15 Sign and Poster Guidelines for the Forest Service, and Standard Highway Signs published by FHWA. Submit the sign list for approval before ordering.

633.05_nat_us_03_03_2005

633.05 Panels.

Add the following:

Apply protective overlay film and top edge film as required and according to with manufacturer's recommendations.

Delete the sentence: "Use antitheft fasteners where possible" in the fifth paragraph and replace it with the following: "For each sign panel use at least one antitheft fastener."

SPS 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

AI Construction Corporation – Gardland Plant 814-563-7680

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%

704 - Soil

704.02_nat_us_03_02_2005

704.02 Bedding Material.

Delete Subsection 704.02 and substitute the following:

Furnish a well graded, free draining material free of excess moisture, muck, frozen lumps, roots, sod, or other deleterious material conforming to the following:

(a) Maximum particle size	3 inch or half the corrugation depth, whichever is smaller
(b) Material passing No. 200 sieve, AASHTO T 27 and T 11	10% max.

714 - Geotextile and Geocomposite Drain Material

714.03_nat_us_02_25_2005

Tables 714-1 and 714-4.

Add the following note to both tables:

(4) Woven slit film will not be allowed.

Add the following:

714.03 Geogrids.

Furnish geogrids consisting of polymeric materials such as polypropylene, polyethylene, or polyester formed into a stable network of bars or straps fixed at their junctions such that the bars retain their relative position to each other.

Elevate and protect rolls with a waterproof cover if stored outdoors.

(a) Physical requirements. Furnish geogrid treated to resist ultraviolet degradation, and conforming to the physical strength requirements shown in table 714-7 according to ASTM D 4595 for the specified geogrid category. Strength values shown in table 714-7 represent minimum average roll values and are for the direction of primary reinforcement. Ensure that the aperture size for all geogrids is between ¾ to 3 inches.

(b) Evaluation procedures. Geogrids will be evaluated under Subsection 106.03. Furnish a certification and a sample of the geogrid.

Table 714-7—Physical strength requirements for geogrids.

Category	Minimum Ultimate Strength at Breakage *(lbs/ft)*
1	890
2	1985
3	2875
4	4110
5	5475
6	8215

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.