

For future updates, please refer to the MDT website at <http://www.mdt.mt.gov/>. Once at the site, click on Doing Business tab OR click on <http://www.mdt.mt.gov/business/contracting.shtml/>. Under the Specifications heading (on the left-hand side of the page), click on Supplements.

The following Subsections have been revised since April 1, 2006. Current revisions are noted by an \* before the date on this index.

**SUPPLEMENTAL SPECIFICATIONS TO MONTANA  
STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION  
2006 EDITION**

<u>SUBSECTION</u>	<u>TITLE</u>	<u>PAGE</u>	<u>DATE</u>
101.01	General (Dual Units)	1	4-10-14
101.02	Abbreviations	1	4-10-14
101.03	Definitions (Administrator)	2	6-27-13
101.03	Definitions (Aquatic Resources)	2	2-23-12
101.03	Definitions (Bid Documents)	2	11-17-11
101.03	Definitions (Board of Contract Appeals)	3	2-10-11
101.03	Definitions (Calendar Date of Completion)	3	4-12-12
101.03	Definitions (Contract Time)	4	4-12-12
101.03	Definitions (Contractor)	4	10-8-09
101.03	Definitions (Engineer)	5	6-27-13
101.03	Definitions (Holidays)	5	4-12-12
101.03	Definitions (No Work Days)	6	11-14-13
101.03	Definitions (Off_Highway Vehicle)	6	2-11-10
101.03	Definitions (Project Manager)	6	6-27-13
101.03	Definitions (Joint Venture)	6	10-8-09
101.03	Definitions (Roadside Development)	8	1-12-12
101.03	Definitions (Unusually Severe Weather)	10	10-11-12
101.03	Definitions (Winter Shutdown)	10	4-12-12
101.03	Definitions (Working Day)	10	11-14-13
102.06	Examination of Documents and Site of Work	12	1-12-12
102.07	Bidding Requirements	13	10-1-06
102.08	Rejection of Bid Proposals	14	5-1-08
102.08	Rejection of Bid Proposals	14	10-1-06
102.10	Delivery and Public Opening of Proposals	15	10-11-12
102.11	Withdrawal of Proposals	15	4-12-12
102.15	Venue	16	2-19-09
102.17	Public Works Contracts	16	12-18-08
103.02	Award of Contract	17	6-27-13
103.05	Release of Proposal Guaranty	17	12-1-11
103.06	Contract Bond	17	3-27-14
103.07	Execution and Approval of Contract	17	9-26-13
103.08	Failure to Execute Contract	18	5-24-12
103.09	Bid Documents	18	11-17-11
104.03	Extra Work	22	4-10-14
104.02.3	Significant Changes in the Character of Work	22	4-8-10
104.02.4	Change Orders	22	11-8-07
104.05.1	General (Maintenance of the Work)	23	4-10-14
104.05.2	Failure to Properly Maintain Roadway or Structure	23	3-1-07
104.05.4	Maintenance for Traffic During Work Suspensions	24	3-1-07
104.06	Rights In and Use of Materials Found on the Work	24	2-10-11
104.08	Value Engineering Proposals	25	1-12-12
105.02	Contractor Furnished Drawings and Submittals	27	12-13-12
105.03.1	General (Conformity With Plans and Specifications)	27	2-11-10
105.03.2	Items Designated for Acceptance on a Lot Basis (Quality Assurance)	28-29	12-13-12
105.03.3	Quality Incentive Allowance	29	9-26-13
105.03.4	Table of Contractor Submittals	30	1-16-14
105.05	Cooperation by Contractor	31	3-1-07
105.08	Construction Stakes, Lines, and Grades	32	4-24-14
105.13	Equipment	35	10-1-07
105.15	Acceptance	35	4-10-14
105.16.1	Notice of Claim	36	7-31-08
105.16.2	Submission of Certified Claims	37	10-11-12
105.16.3	Decision on Claims	38	10-7-10
105.16.3	Decision on Claims	38	2-10-11
105.16.3	Decision on Claims	38	8-28-08
105.17	Project Finalization	38	*7-10-14
106.01.1	Source of Supply	39	8-1-07
106.01.2(B)	Materials Accepted By Department Testing	39	4-8-10
106.02.2	Prospected Sources	40	9-26-13
106.02.3	Contractor-Furnished Sources	40	2-11-10
106.03	Materials Certification	42	6-27-13
106.05	Field Laboratory	42	7-12-12
106.09	Domestic Materials	43	1-16-14
106.10	Mix Designs and Testing of Material Sources	44	7-26-12
107.02	Permits, Licenses, and Taxes	45	7-3-08

**SUPPLEMENTAL SPECIFICATIONS TO MONTANA  
STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION  
2006 EDITION**

<u>SUBSECTION</u>	<u>TITLE</u>	<u>PAGE</u>	<u>DATE</u>
107.06	Public Convenience and Safety	46	6-27-13
107.08	Load Restrictions	47	8-1-07
107.08	Load Restrictions	47	6-1-06
107.09	Use of Explosives	47	1-17-13
107.10	Protection and Restoration of Property and Landscape	48	12-2-10
107.11	Environmental Protection	48	1-16-14
107.12	Forest Protection	50	2-23-12
107.13	Insurance on Requirements	50	4-10-14
107.17	Contractors Responsibility For Work	51	4-10-14
107.18	Contractors Responsibility For Utility Property and Services	52	10-11-12
107.21	No Waiver of Legal Rights	53	4-10-14
107.23	Discovery of Underground Storage Tanks	54	9-9-10
107.24	Discovery and Removal of Unknown Hazardous Materials	54	9-9-10
108.01.1	Subcontracting	57	1-17-13
108.01.2	Contract Performance	57	9-26-13
108.01.3	Subcontractor Payments	57	4-8-10
108.03.1	General (Prosecution of Work)	58	9-26-13
108.03.2	Project Schedules	59	12-13-12
108.03.3	Critical Path Method (CPM) Scheduling	60	3-27-14
108.03.5	Basis of Payment (CPM)	61	1-17-13
108.05	Character of Workers	62	5-24-12
108.07	Determination of Compensation and Extension of Contract Time	62	4-12-12
108.07.1	Calendar Date Contracts	62	4-10-14
108.07.2	Calendar Day Contracts	63	4-10-14
108.07.3	Working Day Contracts	63	4-10-14
108.07.4	Delays	63	5-24-12
108.07.5	Extensions (Time)	64	9-26-13
108.07.6	Delay Compensation	64	10-11-12
108.08	Failure to Complete on Time	65	4-10-14
108.10.2	Payment	67	10-8-09
109.01	Measurement of Quantities	69	5-9-13
109.01.2	Metric Abbreviations in the Schedule of Items	71	5-9-13
109.02.1	Pay Unit Rounding	71	11-17-11
109.04.1	Unit Price or Lump Sum Basis (Extra Work)	72	3-1-07
109.04.2	Force Account Basis	72	1-16-14
109.05	Deleted or Terminated Work	73	3-12-09
109.06	Partial Payments	74	7-3-08
109.06.1	Billing Cycle	74	10-8-09
109.07	Stockpiled Material	74	5-24-12
109.08	Final Estimate	77	4-10-14
109.09.1	General (Mobilization)	77	3-1-07
109.09.2	Payment (Mobilization)	77	4-10-14
109.10	Overpayments	78	5-24-12
109.11	Fuel Price Adjustment	78	1-16-14
201.04.2	Area Basis	83	9-26-13
202.03	Construction Requirements (Removal of Structures and Obstructions)	85	6-27-13
202.03.1	Removal of Substructure	85	6-27-13
202.03.1(C)(2)	Concrete and Masonry (Removal of Structures)	85	6-1-06
202.03.2	Removal of Pipe Culverts and Minor Drainage Structures	86	9-26-13
202.03.3	Removal of Pavement, Sidewalks, Curbs, etc.	86	3-27-14
202.04.1	Remove Structures and Obstructions	86	1-12-12
202.04.2	Pipe Culvert Removal or Remove and Relay	86	9-26-13
202.05	Basis of Payment (Removal of Structures and Obstructions)	86	9-26-13
203	Excavation and Embankment	87	9-26-13
204	Existing Surface Preparation	99	12-13-12
204	Blasting (New)	99	9-26-13
206	Haul	101	12-13-12
206	Detours (New)	101	6-27-13
207.01	Description (Culvert and Trench Excavation)	103	1-12-12
207.03.6	Foundation Preparation	104	3-12-09
207.05	Basis of Payment (Culvert and Trench Excavation)	104	1-12-12
208	Water Pollution Control and Aquatic Resource Preservation	105	4-24-14
210.03.6	Test Trailer, Transport, and Setup	116	6-27-13
210.03.7	Test Trailer, Power and Blocking	116	7-26-12
210.04.2	Test Trailer, Transport, and Setup	117	7-26-12
210.04.3	Test Trailer, Power and Blocking	117	7-26-12
210.05	Basis of Payment	117	7-26-12
211	Road Leveler Operations	119	7-26-12
212	Obliterate Roadway	121	3-27-14
301.02.1	Aggregates	123	9-26-13
301.02.2	Binder	123	5-9-13

**SUPPLEMENTAL SPECIFICATIONS TO MONTANA  
STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION  
2006 EDITION**

<u>SUBSECTION</u>	<u>TITLE</u>	<u>PAGE</u>	<u>DATE</u>
301.02.4	Aggregate Treatment	123	1-17-13
301.03.1(B)	Acceptance Sampling and Testing (Aggregate Surfacing)	123	1-15-09
301.03.1(B)	Acceptance Sampling and Testing (Aggregate Surfacing)	123	7-31-08
301.03.1(B)	Acceptance Sampling and Testing (Aggregate Surfacing)	123	10-1-06
301.03.1(C)	Aggregate Surfacing-Acceptance (Aggregate Surfacing)	124	2-23-12
301.03.5(A)	Aggregate Surfacing Construction	125	12-13-12
301.03.5(C)	Aggregate Surfacing Construction	126	5-9-13
301.03.5(D)	Compaction (Aggregate Surfacing Construction)	126	9-26-13
301.03.5(E-H)	Trimming, Curing, Restrictions, & Surface Smoothness	126-127	7-26-12
301.03.7	Traffic Gravel	127	4-8-10
301.03.8	Aggregate Treatment	127	1-17-13
301.03.9	Bridge End Backfill	127	9-26-13
301.04.2	Binder	128	9-26-13
301.04.3	Existing Surface Preparation	128	12-13-12
301.04.4	Aggregate Haul	128	12-13-12
301.04.7	Aggregate Treatment	128	1-17-13
301.05	Basis of Payment	128	9-26-13
302	Bituminous Pavement Pulverization	131	4-8-10
303.04.2	Haul (Stockpiled Surfacing Aggregate)	133	12-13-12
303.05	Basis of Payment	133	11-14-13
304	Portland Cement Treated Base	135	3-27-14
401	Plant Mix Surfacing	141	1-16-14
402.03.2(A)	General (Sampling)	157	11-17-11
402.03.2(B)	Asphalt Sampling (Quality Assurance Sampling)	157	9-26-13
402.03.5	Acceptance	158	11-17-11
402.03.6	Loading and Application Temperatures	158	1-16-14
402.03.8	Performance Graded Asphalt Binder (PGAB)	159	11-17-11
402.03.8A	Performance Graded Asphalt Binder (PGAB)	160	10-7-10
403.02	Materials (Crack Sealant)	163	9-26-13
403.03.1	General (Construction)	163	12-13-12
403.03.4	Sealing	164	3-27-14
406	Road Mix Bituminous Pavement	165	1-12-12
407	Bituminous Prime and Tack Coat	169	9-26-13
409.01.1	Contract Time	171	7-3-08
409.02.2	Bituminous Material	171	11-17-11
409.02.3	Cover Aggregate	171	1-16-14
409.03.2	Aggregate and Bituminous Material Application Rates	172	6-24-10
409.03.3	Seasonal and Weather Limitations (Seal Coat)	172	1-12-12
409.03.5	Surface Preparation	173	9-23-10
409.03.6	Application of Fog Seal	173	3-12-09
409.03.7	Application of Seal Coat Materials	173	3-1-07
409.03.8	Warranty (Seal Coat)	173	10-7-10
409.03.10	Sweeping and Brooming	173	6-27-13
409.04.6	Sweeping and Brooming	174	1-16-14
409.05	Basis of Payment	174	10-11-12
410.03.2	Existing Surface Preparation	176	12-13-12
410.04.4	Existing Surface Preparation	177	12-13-12
410.05.1	Existing Surface Preparation	178	12-13-12
411.01	Description (Cold Milling)	179	10-11-12
411.03.2	General (Cold Milling)	179	10-11-12
411.03.1	Equipment (Cold Milling)	179	4-8-10
411.03.3(A)	Milling	179	4-8-10
411.03.3(B)	Milling	179	9-9-10
501.01	Description	181	9-26-13
501.02.1(A)	Cement (Concrete)	181	7-12-12
501.02.4	Tie Bars	181	9-26-13
501.02.5	Expansion Joint Filler and Joint Sealing Material	181	2-23-12
501.02.6	Curing Compound	181	11-14-13
501.03.1 (C)(2)	Auxiliary Finishing Equipment	183	7-26-12
501.03.8 (C)	Final Surface Finish	187	9-26-13
501.03.13	Joints	188	9-26-13
501.03.14	Surface Test	189	12-13-12
501.03.20	Pavement Thickness	192	12-13-12
501.03.21	Accelerated Paving Techniques	195	9-26-13
501.04	Method of Measurement	195	9-26-13
501.05	Basis of Payment (PCCP)	195	1-17-13
551.02.1	Cement	197	7-12-12
551.02.7	Curing Compounds and Protective Coatings	198	11-14-13
551.03.2(A)	Design (Composition of Concrete)	200	7-26-12
551.03.6	Curing Concrete	206	11-14-13
551.03.7(A)	Testing and Acceptance of Concrete	208	1-17-13

**SUPPLEMENTAL SPECIFICATIONS TO MONTANA  
STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION  
2006 EDITION**

<u>SUBSECTION</u>	<u>TITLE</u>	<u>PAGE</u>	<u>DATE</u>
551.03.7(C)	Acceptance of Concrete	209	2-14-13
552.03.5(A)	General (Placing Concrete)	214	2-23-12
552.03.5(D)	Concrete Piling (Placing Concrete)	216	5-9-13
552.03.9(A)	General (Cold Weather Concreting)	218	3-27-08
552.03.12	Finishing Concrete	220	7-26-12
552.03.12(E4)	Bridge Deck Surface Texture	223	9-23-10
552.03.12(E6)	Surface Smoothness	223	9-23-10
552.03.12(F)	Bridge Seats and Top of Walls	225	3-27-14
552.03.13(B)	Filled Joints	225	2-23-12
552.03.14	Placing Anchor Bolts	225	1-17-13
552.03.15	Setting Shoes and Bearing Plates	226	3-27-14
552.04	Method of Measurement	227	9-23-10
552.05	Basis of Payment	228	6-27-13
553.02.8	Fiber Reinforced Pads for Bearing Plates	229	12-13-12
553.02.9	Deck Sealer	229	3-27-14
553.02.10	Leveling Inserts	229	3-27-14
553.03.1	Fabrication	229	12-1-11
553.03.2	Fabrication Drawings	230	3-27-14
553.03.18	Bearing and Anchorage	239	3-27-14
553.03.19	Precast Prestressed Deck Sections	239	3-27-14
553.04	Method of Measurement	240	3-27-14
553.05	Basis of Payment	240	3-27-14
554.03.1	Fabrication Drawings	241	12-13-12
554.03.2	Design of Concrete Mixtures	241	7-26-12
555.01	Description (Reinforcing Steel)	245	12-13-12
555.02	Materials (Reinforcing Steel)	245	9-26-13
555.03.1	Protection of Material	245	12-13-12
555.03.3	Placing and Fastening (Reinforcing Steel)	246	9-1-06
556.03.1	Pre-qualification	249	12-1-11
556.03.2	Fabrication Drawings	250	12-13-12
556.03.5(B)	Fabrication of Curved Girders	251	6-27-13
556.03.9(E)(5)	Bolted Connections High Tensile Strength Bolts	259	6-27-13
556.03.9(F)	Metric Bolt Substitution	259	3-27-14
556.03.16	Erection	260	6-27-13
558	Timber Structures	265	6-27-13
558	Drilled Shafts	265	3-27-14
559.02.2	Furnish Pile	269	2-19-09
559.02.4	Splicing Piles	269	2-19-09
559.02.5	Holes in Piling	269	2-19-09
559.03.2	Evaluation of Pile Driving Equipment	271	5-12-11
559.03.3	Pile Capacity	271	5-12-11
559.03.5	Service Pile	274	2-19-09
559.03.7	Steel Pipe Pile	274	2-19-09
559.03.8	Painting Steel Pile or Steel Pipe Pile	275	12-27-07
559.04.1	Load Tests (Piling)	275	2-19-09
559.04.2	Furnish Pile	275	2-19-09
559.05	Basis of Payment (Piling)	276	2-19-09
561	Bridge Deck Milling	276	4-10-14
562	Bridge Deck Repair (New)	276	3-27-14
563	Modified Concrete Overlay	276	4-10-14
564	Structure Tolerances (New)	276	5-9-13
565	Bearing Devices (New)	276	3-27-14
601	Metal Water Service Lines	277	9-26-13
602.04.1	Remove Pipe Culverts	279	9-26-13
603.02	Material (Pipes, Storm Drains, Sanitary Sewer, Stockpasses)	281	1-16-14
603.03.1	General (Pipes, Storm Drains, Sanitary Sewer, Stockpasses)	281	6-12-14
603.03.4	Backfilling (Culverts and Pipes)	284	3-1-07
603.03.5	Restoration and Maintenance of Existing Pavement	284	9-26-13
603.04.3	Bedding Material	285	12-17-09
603.04.5	Granular Bedding Material for Storm Drains	285	12-13-12
603.05	Basis of Payment	285	12-13-12
606.01	Description (Guardrail)	289	10-11-12
606.02	Materials (Guardrail)	289	1-12-12
606.03.1	General (Guardrail)	289	10-11-12
606.03.2	Installing Posts	290	10-11-12
606.03.3	Metal Beam Guardrail Erection	290	1-12-12
606.03.8	Reset Concrete Barrier Rail	291	10-11-12
606.03.9	Raise Guardrail	291	5-9-13
606.03.11	Revise Guardrail Elements	291	10-11-12
606.03.13	Reset Guardrail Items	291	5-9-13
606.03.14	Optional Terminal Sections	291	5-9-13

**SUPPLEMENTAL SPECIFICATIONS TO MONTANA  
STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION  
2006 EDITION**

<u>SUBSECTION</u>	<u>TITLE</u>	<u>PAGE</u>	<u>DATE</u>
606.03.15	Guardrail End Terminal Section Widening	291	5-9-13
606.04.2	Metal Guardrail Terminal Sections	291	5-9-13
606.04.3	Bridge Approach Sections	291	10-11-12
606.04.6	Box Beam Guardrail Terminal Sections	292	10-11-12
606.04.11	Reset Concrete Barrier Rail	292	10-11-12
606.04.15	Remove Guardrail	292	10-11-12
606.04.19	Reset Guardrail Items	292	10-10-13
606.04.20	Guardrail End Terminal Section Widening	293	9-26-13
606.05	Basis of Payment (Guardrail)	293	5-9-13
607.02	Materials	295	5-9-13
607.02.1	Snow Fence (New)	295	7-12-12
607.03.4	Constructing Barbed and Woven Wire Fences	297	5-9-13
607.04.1	New Fence	298	10-10-13
607.04.2	Remove and Reset Fence	299	5-9-13
607.04.3	Gates	299	2-10-11
607.04.4	Fence Panels	299	5-9-13
607.04.7	Remove Fence	299	10-10-13
607.05	Basis of Payment	299	5-9-13
608	Concrete Sidewalks	301	10-10-13
609.04	Method of Measurement (Curbs and Gutters)	304	11-14-13
609.05	Basis of Payment (Curbs and Gutters)	304	11-14-13
610.01	Description (Roadside Revegetation)	305	3-12-09
610.02	Materials (Roadside Revegetation)	305	1-12-12
610.03.1	Topsoiling	305	3-12-09
610.03.2(A)	General (Seeding, Fertilizing, and Mulching)	305	1-12-12
610.03.2(B)	Seeding Season (Seeding, Fertilizing, and Mulching)	305	1-12-12
610.03.2(D)	Seed Distribution (Seeding, Fertilizing, and Mulching)	306	1-12-12
610.03.2(G)	Composting (Seeding, Fertilizing, and Mulching)	307	1-12-12
610.04.1	Topsoil	308	3-12-09
610.04.2	Seeding	308	10-10-13
610.04.3	Fertilizing	308	10-10-13
610.04.4	Condition Seedbed Surface	308	10-10-13
610.04.5(A)	Vegetative Mulch and Wood Cellulose Fiber Mulch	308	10-10-13
610.04.8	Composting (Method of Measurement)	309	1-12-12
610.05	Basis of Payment (Roadside Revegetation)	309	1-12-12
611.02.2	Steel (Cattle Guards)	311	10-7-10
611.02.3	Paint (Cattle Guards)	311	12-13-12
612	Paints and Painting	313	12-13-12
613.04.1	Riprap	320	10-10-13
613.04.2	Bank Protection	320	10-10-13
613.04.3	Concrete Slope Protection	321	10-10-13
614.02	Materials (Retaining Walls)	323	12-27-07
616.03.1	General (Construction Requirements)	327	1-17-13
616.03.2	Plastic Conduit	327	1-17-13
616.03.3	Steel Conduit	327	1-17-13
616.03.4	Pullboxes and Manholes	329	9-26-13
616.04.2	Conduit	329	10-10-13
617	Traffic Signals and Lighting	331	10-10-13
618	Traffic Control	339	4-10-14
619	Signs, Delineators, and Guideposts	351	5-9-13
619.01	Description (Signs, Delineators, and Guideposts)	351	5-9-13
619.02	Materials (Signs, Delineators, and Guideposts)	351	5-9-13
619.03.1	Definitions	351	9-26-13
619.03.2	Design Calculations and Shop Drawings	351	9-26-13
619.03.3	Fabrication and Erection	352	9-26-13
619.03.6	Replace, Reuse, and Reset Signs	353	9-26-13
619.03.9	Guideposts	353	5-9-13
619.03.12	Breakaway System	354	9-26-13
619.03.13	Remove Signs	354	9-26-13
619.04.1	Aluminum and Plywood Signs	354	10-10-13
619.04.2	Metal Posts	354	3-27-14
619.04.4	Delineators and Reference Markers	354	3-27-14
619.04.5	Guideposts	354	5-9-13
619.04.6	Reset Signs	354	9-26-13
619.04.9	Reuse Signs	355	9-26-13
619.04.10	Sheet Aluminum Overlay	355	10-10-13
619.04.11	Lump Sum Basis	355	9-26-13
619.05	Basis of Payment	355	5-9-13
620	Pavement Marking Application	357	3-27-14
622.03.2	Separation/Stabilization Geotextile	371	1-16-14
622.04	Method of Measurement (Geotextile)	374	5-24-12

**SUPPLEMENTAL SPECIFICATIONS TO MONTANA  
STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION  
2006 EDITION**

<u>SUBSECTION</u>	<u>TITLE</u>	<u>PAGE</u>	<u>DATE</u>
623	Mailboxes	375	1-16-14
624	Welding (New)	376	9-26-13
701.01	Aggregate for Concrete	377	3-27-14
701.01.1(B)	Deleterious Substances	377	9-9-10
701.01.2(B)	Deleterious Substances	379	9-9-10
701.01.2(G)	Grading (Course Aggregate for Concrete) (Table 701-4)	380	1-12-12
701.01.3	Optimized Gradations for Concrete	380	3-27-14
701.02.1	General Requirements – Aggregate for Surfacing	380	5-1-08
701.02.1	General Requirements (Aggregate)	380	3-12-09
701.02.4	Crushed Base Course Type “A”	382	2-23-12
701.02.7	Crushed Top Surfacing Type “B”	384	10-11-12
701.02.8	Crushed Cover Aggregate-Cover Material	385	1-16-14
701.02.9	Aggregate for Portland Cement Treated Base	385	3-12-09
701.03.1	General Requirements – Aggregate for Bituminous Mixtures	386	3-27-14
701.03.2	Aggregate for Plant Mix Surfacing	387	1-16-14
701.04.1	Bedding Material (Table 701-17 Table of Gradations)	388	3-1-07
701.04.3	Granular Bedding Material	389	9-26-13
701.11	Glass Cullet	391	1-31-08
701.12	Digout and Sub-ex Replacement Material (New)	391	5-9-13
701.13	Bridge End Backfill (New)	391	9-26-13
702	Bituminous Materials	393	10-10-13
703	Lighting and Signal Materials	401	11-14-13
704.01.1	Sheet Aluminum	421	9-26-13
704.01.4	Aluminum and Steel Posts	422	9-26-13
704.01.5	Treated Sawn Timber Posts	422	5-9-13
704.01.6	Treated Timber Posts and Poles	423	10-11-12
704.01.7	Barn Poles	423	9-1-07
704.01.8	Overhead Structures	423	9-26-13
704.01.10	Retro-Reflective Sheeting	423	12-13-12
704.01.11	Letters, Symbols, and Accessories	424	12-13-12
704.01.13	Hardware	425	9-26-13
704.03	Flexible Delineators (New)	425	9-26-13
705	Guardrail and Guide Posts	427	11-14-13
705.01.2	Wood Posts and Blockouts	427	1-12-12
705.01.5	Steel Posts	428	9-26-13
705.03.1	Wood Treatment	428	9-26-13
705.04	Guide Posts	428	5-9-13
706.04	Treated Timber and Lumber	429	9-1-07
706.04.1	Treating	429	10-11-12
706.04.2	Incising	429	10-11-12
706.04.3	Inspection	430	9-1-07
707.01.2	Concrete Structures Other than Pavement	431	5-9-13
707.01.3	Concrete Curbs, Gutters, and Sidewalks	431	5-9-13
707.02.1	Rubber Gaskets	431	12-13-12
707.02.2	Flexible Plastic Gaskets	431	12-13-12
707.03.3	Plastics	433	10-11-12
708.07	Polyethylene Corrugated Drainage Pipe or Tubing	436	9-26-13
708.08	High Density Polyethylene Pipe	436	9-26-13
709.01.1	Ductile Iron Water Pipe	437	9-26-13
709.03	Steel Structural Plate Pipe and Pipe Arches	438	10-7-10
710.02.3	Paint Coating Systems for Structures	445	3-1-07
710.03	Powder Coating Prequalification and Certification	445	12-13-12
710.04	Anti-Graffiti Coating – Permanent	445	9-26-13
711.01.2	Epoxy-coated Reinforcing Bars	447	9-26-13
711.02	Structural Steel	447	12-13-12
711.03	Structural Steel Tubing	447	9-23-10
711.09	Welded Stud Shear Connectors	448	11-17-11
711.10	Steel Piling	448	2-23-12
711.12.3	Drainage Structure Castings	448	1-12-12
711.13	Bearing Assembly Anchor Bolts for Bridges	449	12-13-12
711.14	Reinforced Elsetomeric Devices	449	3-27-14
711.18	Mechanical Rebar Connectors	450	11-14-13
711.19	Metric Plate Substitution	450	3-27-14
711.20	Polytetrafluoroethylene (PTFE)	450	3-27-14
712.01.1	General (Chain Link Fence)	451	10-9-08
712.01.3	Posts, Rails, and Braces	451	2-23-12
712.01.5	Fabric Bands and Stretcher Bars	451	11-17-11
712.01.6	Tie Wire (Fence)	451	10-9-08
712.01.7	Tension Wire (Fence)	451	10-9-08
712.01.8	Gates	452	2-23-12
712.02	Interstate and Farm Fence	454	10-10-13

**SUPPLEMENTAL SPECIFICATIONS TO MONTANA  
STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION  
2006 EDITION**

<u>SUBSECTION</u>	<u>TITLE</u>	<u>PAGE</u>	<u>DATE</u>
712.02.1	Woven Wire (Fence)	454	5-9-13
712.02.2	Barbed Wire	454	10-9-08
712.02.7	Metal Posts and Assemblies	454	5-9-13
712.02.8	Wood Fence Posts and Brace Rails	455	5-9-13
712.02.10	Gates for Interstate Fence	456	3-22-12
713.03	Calcium Chloride	457	9-26-13
713.06	Mineral Filler	458	1-16-14
713.07	Concrete Curing and Protective Coatings	458	11-14-13
713.08	Seed	458	9-26-13
713.09	Fertilizer	459	9-26-13
713.10	Mulch	459	9-26-13
713.11	Sod	460	9-26-13
713.12	Soil Retention/Erosion Control Blankets and Mats	461	9-26-13
713.13	Compost Mulch	463	10-10-13
714	Pavement Marking Materials	465	11-14-13
715.01	Signs and Channelizing Devices	475	4-8-10
715.02	Portable Sign Support Assemblies	475	4-8-10
715.05	Advance Flagger Ahead Warning Signs	475	7-12-12
716.01	General Physical Requirements (Geotextiles)	477	7-26-12
717	Concrete Sealants (New)	480	11-14-13

## MONTANA SUPPLEMENTAL SPECIFICATIONS

The following are supplementary or amendatory to the 2006 Edition of the Standard Specifications for Road and Bridge Construction insofar as they apply to this contract.

101.01 GENERAL (DUAL UNITS)

Page 1

4-10-14

Add the following paragraph after the first paragraph:

The Standard Specifications are written in dual units with English units first, followed by Metric units in parenthesis. The contract will be in one of the two units. All submittals and documentation provided to the Department must be in English or Metric units as shown in the contract.

Rescind the last paragraph, that begins, "Whenever the following..."

101.02 ABBREVIATIONS

Page 1

4-10-14

Rescind Subsection 101.02 and replace the following:

## 101.02 ACRONYMS AND ABBREVIATIONS

Whenever the following acronyms and terms are used in the contract, the intent and meaning is interpreted as follows:

AAN	American Association of Nurserymen
AAR	Association of American Railroads
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AGC	Associated General Contractors of America
AISC	American Institute of Steel Construction, Inc.
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute, Inc.
ARA	American Railway Association
AREA	American Railway Engineering Association
ARM	Administrative Rules of Montana
ARTBA	American Road and Transportation Builders Association
ASC	Activities Schedule Chart
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATTSA	American Traffic Safety Services Association
AWPA	American Wood Preservers Association
AWS	American Welding Society
AWWA	American Water Works Association
BMP	Best Management Practice
CAS	Construction Administration Services
CES	Construction Engineering Services
CFR	Code of Federal Regulations
CMP	Corrugated Metal Pipe
CO	Change Order
COE	U. S. Army Corps of Engineers
CPM	Critical Path Method
CRSI	Concrete Reinforcing Steel Institute
CTEP	Community Transportation Enhancement Program
CUF	Commercially Useful Function
CWI	Certified Welding Inspector
D/A	Dust to Asphalt ratio
DBE	Disadvantaged Business Enterprise
DEQ	Montana Department of Environmental Quality
DMS	District Materials Supervisor
DNRC	Montana Department of Natural Resources and Conservation
EBS	Electronic Bid System
EEO	Equal Employment Opportunity
EPA	Environmental Protection Agency
ESAL	Equivalent Single Axle Load
FETS	Flared End Terminal Section
FHWA	Federal Highway Administration
FSS	Federal Specifications and Standards
FWP	Montana Fish Wildlife and Parks
HDPE	High Density Polyethylene Pipe
IES	Illuminating Engineering Society
IMSA	International Municipal Signal Association
ITE	Institute of Transportation Engineers
MASH	Manual for Assessing Safety Hardware

- MCA ..... Montana Code Annotated
- MDT ..... Montana Department of Transportation
- MPDES ..... Montana Pollutant Discharge Elimination System
- MSDS ..... Material Safety Data Sheet
- MT ..... Montana Test Method
- MUTCD ..... Manual on Uniform Traffic Control Devices
- NBS ..... National Bureau of Standards
- NCHRP ..... National Cooperative Highway Research Program
- NEC ..... National Electric Code
- NEMA ..... National Electrical Manufacturer's Association
- NOI ..... Notice of Intent
- NPDES ..... National Pollutant Discharge Elimination System
- OHV ..... Off Highway Vehicles
- OSHA ..... Occupational Safety and Health Administration
- PCC ..... Portland Cement Concrete
- PCCP ..... Portland Cement Concrete Pavement
- PCI ..... Pre-stress Concrete Institute
- PGAB ..... Performance Graded Asphalt Binder
- QPL ..... Qualified Products List
- PVC ..... Polyvinyl Chloride Pipe
- QA ..... Quality Assurance
- Q&A ..... Contractor's Question and Answer Forum
- RAP ..... Recycled Asphalt Pavement
- RCP ..... Reinforced Concrete Pipe
- ROW or R/W ..... Right-of-Way
- SAE ..... Society of Automotive Engineers
- SPA ..... Stream Protection Act
- SSPC ..... Society for Protective Coatings
- SWPPP ..... Storm Water Pollution Prevention Plan
- TESC ..... Temporary Erosion and Sediment Control
- TRM ..... Turf Reinforcement Mat
- UL ..... Underwriters Laboratory
- USASI ..... United States of America Standards Institute
- VE ..... Value Engineering
- VFA ..... Voids Filled with Asphalt
- VMA ..... Voids in Mineral Aggregate
- VTM ..... Voids in the Total Mix
- WASHTO ..... Western Association of State Highway Transportation Officials
- WAQTC ..... Western Alliance for Quality Transportation Construction
- WN ..... Written Narrative
- WWPA ..... Western Wood Products Association

The Department uses the following abbreviations in the Schedule of Items for the respective units of measurement:

TABLE 101-1  
MEASUREMENT ABBREVIATIONS

UNIT OF MEASURE							
English				Metric			
Length				Area			
Inch	in.	millimeter	mm	Square inch	in <sup>2</sup>	square millimeter	mm <sup>2</sup>
Foot	ft.			Square foot	ft <sup>2</sup>		
Yard	yd.	meter	m	Square yard	yd <sup>2</sup>	Square meter	m <sup>2</sup>
Mile	mi.	kilometer	km	acre	acre	hectare	ha
Course Mile	CR. mi.	Course Kilometer	CR km	Square mile	mi <sup>2</sup>	Square kilometer	km <sup>2</sup>
Volume				Weight			
Cubic inch	in <sup>3</sup>	cubic millimeter	mm <sup>3</sup>	ounce	oz.	gram	g
cubic foot	ft <sup>3</sup>			pound	lb.	kilogram	kg

UNIT OF MEASURE							
English				Metric			
Length				Area			
cubic yard	yd <sup>3</sup>	cubic meter	m <sup>3</sup>	ton	t.	metric tonne	MT
Liquid Measure				Temperature			
ounce	fl. oz.	milliliter	ml	degree Fahrenheit	°F	degree Celcius	°C
gallon	gal.	liter	L				
Speed				Pressure			
miles per hour	mph	kilometers per hour	kpm	pounds per square inch	psi	kilopascals	kPa

101.03 DEFINITIONS (ADMINISTRATOR) Page 2 6-27-13

Add the following definition:

**ADMINISTRATOR**

The District Administrator, or the authorized representative, is responsible for the administrative oversight of the project.

101.03 DEFINITIONS (AQUATIC RESOURCES) Page 2 2-23-12

Add the following definition:

**AQUATIC RESOURCES**

Aquatic resources may include, but are not limited to, wetlands, springs, streams (perennial, ephemeral, and intermittent drainages), rivers, lakes, ponds, reservoirs, agricultural irrigation systems, and associated riparian areas.

101.03 DEFINITIONS (BID DOCUMENTS) Page 2 11-17-11

Rescind and replace the following definition:

**BID DOCUMENTS**

Any writings, working papers, computer printouts, computer generated and/or computer stored information, electronically stored information, charts, schedules of any kind (e.g., CPM, bar chart, etc.), and any data compilations, computerized or not, used by the Bidder to determine the bid submitted for a contract. "Bid Documents" includes, but is not limited to, Bidder equipment internal rates for ownership, Bidder overhead rates, labor rates, cost coding, equipment and manpower loading of activities, efficiency or productivity factors, scheduling calculations, review or analysis of the site of the work, analysis of how the work should be performed, arithmetic extension, worksheets used to prepare the bid (identifying by name and edition any software programs used to prepare them), and all quotations to the extent that these items were used in formulating and preparing the amount of the bid. "Bid Documents" also includes identification of all manuals used by the Bidder in preparing the bid for this contract, referenced by title, author, edition, date, and page or section number. The term does not include bid documents provided by the Owner (e.g., plans, specifications, etc.) for use by the Bidder in preparation of the bid proposal. Convert electronic information into paper copies for submittal purposes.

101.03 DEFINITIONS (BOARD OF CONTRACT APPEALS) Page 3 2-10-11

Change the title to the following:

**CLAIMS REVIEW BOARD**

101.03 DEFINITIONS (CALENDAR DATE OF COMPLETION) Page 3 4-12-12

Change the title to the following:

**COMPLETION DATE**

101.03 DEFINITIONS (CONTRACT TIME) Page 4 4-12-12

Rescind and replace the following definition:

**CONTRACT TIME**

The number of working days, calendar days, or the fixed completion date allowed for completing the contract, including authorized time extensions.

101.03 DEFINITIONS (CONTRACTOR) Page 4 10-8-09

Change the title to the following:

**CONTRACTOR OR PRIME CONTRACTOR**

Add the following sentence at the end of the first paragraph:

When used in the specifications, Prime Contractor has the same meaning as Contractor.

101.03 DEFINITIONS (ENGINEER) Page 5 6-27-13

Rescind and replace the following definition:

**ENGINEER**

The highest ranking Professional Engineer in the District Office, usually the Administrator, District Construction Engineer, or their authorized representative, responsible for engineering and administrative supervision of the project.

101.03 DEFINITIONS (HOLIDAYS) Page 5 4-12-12

Add the following sentence at the end of the first paragraph:

All holidays are defined as No Work Days, unless approved by the Engineer.

101.03 DEFINITIONS (NO WORK DAYS) Page 6 11-14-13

Add the following definition:

**NO WORK DAYS**

No Work Days are holidays, Sundays, or during the winter shutdown, unless approved by the Engineer. Travelway maintenance, stormwater BMP maintenance, and providing protection for the public are exempt and this work may be accomplished on No Work Days without assessment of contract time. Do not work after 12:00 noon on Friday, or on Saturday and Sunday prior to Memorial Day (last Monday in May) and Labor Day (first Monday in September). Do not work after 12:00 noon on Friday, or on Saturday or Sunday prior to Independence Day (July 4) when July 4 is on a Saturday, Sunday, or Monday.

101.03 DEFINITIONS (OFF-HIGHWAY VEHICLE) Page 6 2-11-10

Add the following definition:

**OFF-HIGHWAY VEHICLE**

A vehicle that exceeds legal weight limits, or cannot be legally registered or licensed to operate on public roadways.

101.03 DEFINITIONS (PROJECT MANAGER) Page 6 6-27-13

Rescind and replace the following definition:

**PROJECT MANAGER**

The Project Manager is the authorized representative of the Engineer. The Project Manager is responsible for direct oversight and documentation of the project. The Project Manager is the Contractor's first contact for all project related issues unless another person or agency is specifically stated in the contract.

101.03 DEFINITIONS (JOINT VENTURE) Page 6 10-8-09

Add the following definition:

**JOINT VENTURE**

An agreement between two or more persons or entities to be jointly and severally responsible for the performance of a contract.

101.03 DEFINITIONS (ROADSIDE DEVELOPMENT) Page 8 1-12-12

Rescind part (B) and replace with the following:

B. The rehabilitation and protection against erosion of areas disturbed by construction through seeding, sodding, mulching, composting, and the placing of other ground covers; and suitable plantings; and

Add the following paragraph at the end of ROADSIDE DEVELOPMENT:

Unless specified different in the contract, the following are the roadside areas:

- Area 1. Areas with slopes of 3:1 and flatter.
- Area 2. Areas with slopes steeper than 3:1.
- Area 3. A 15.0 foot (4.5 meter) wide strip adjacent and parallel to the finished pavement, along both roadsides.

101.03 DEFINITIONS (UNUSUALLY SEVERE WEATHER) Page 10 10-11-12

Add the following definition:

**UNUSUALLY SEVERE WEATHER**

Unusually severe weather is weather that is more severe than the adverse weather anticipated for the season or location involved.

101.03 DEFINITIONS (WINTER SHUTDOWN) Page 10 4-12-12

Add the following definition:

**WINTER SHUTDOWN**

All calendar days from November 16 through April 15, inclusive.

101.03 DEFINITIONS (WORKING DAY) Page 10 11-14-13

Rescind and replace the following definition:

**WORKING DAY**

All days are considered working days except Saturdays, No Work Days, and days on which the Contractor is specifically required by the contract to suspend construction operations. Working days will be charged during No Work Days for each day construction activities occur that have any impact on the traveling public, exclusive of traffic flowing unimpeded on approved detours or emergency and maintenance repairs to the project, when the time requirements under Subsection 104.05.2 are met.

102.06 EXAMINATION OF DOCUMENTS AND SITE OF WORK Page 12 1-12-12

Rescind the third paragraph (that begins with “Immediately submit...”) and replace with the following:

Immediately submit any request for an explanation of the meaning or interpretation of the bid package to the Department’s Q & A Forum found at <http://www.mdt.mt.gov>.

Within the seventh paragraph, rescind the second sentence (that begins with “Upon discovery...”) and replace with the following:

Upon discovery, immediately submit the discovery to the Department’s Q & A Forum found at <http://www.mdt.mt.gov> if an error, omission, or ambiguity exists and why it appears erroneous, omitted, or ambiguous.

102.07 BIDDING REQUIREMENTS Page 13 10-1-06

Add the following paragraph at the end of 102.07 (C) (2) Proposal Guarantee:

An electronic bid bond may be filed in lieu of completing the paper Bid Bond area of the Proposal Bid form. Submit on the most current Department-provided hard copy Electronic Bid Bond Form CPB\_102\_07.

102.08 REJECTION OF BID PROPOSALS Page 14 5-1-08

Delete the last sentence under part E that reads “(See Subsection 102.10 (B) (6)).”

102.08 REJECTION OF BID PROPOSALS

Page 14

10-1-06

Delete 102.08 (A) starting with "Failure to complete ....." and replace with the following:

A. Failure to complete the appropriate bid bond form, or Proposal, provided by the Department, by all specified persons, including notaries, in the correct blocks.

Delete 102.08 (G) starting with "Bidder fails to ..." and replace with the following:

G. Bidder fails to properly complete and sign, by original signatures, on the most current Department-furnished Proposal and appropriate bid bond form. Stamped signatures are not authorized.

102.10 DELIVERY AND PUBLIC OPENING OF PROPOSALS

Page 15

10-11-12

Rescind 102.10(A) and replace with the following:

- A. Bid Submission by Sealed Envelope. Place the bid Proposal in a sealed envelope plainly marked to indicate the contents. Proposals must be received by the Department's official conducting the bid opening before the bid opening time. Bids may be delivered to: Montana Department of Transportation, Contract Plans Bureau, 2701 Prospect Avenue, Helena, Montana.  
If mailed, the Department's mailing address is: Montana Department of Transportation, Contract Plans Bureau, P.O. Box 201001, Helena, Montana 59620-1001.  
The Contractor is solely responsible for the Proposal's delivery to the Department's official conducting the bid, prior to bid opening.

Rescind item 102.10(B)(4). (that begins with "Joint Venture Bids"...) )

102.11 WITHDRAWAL OF PROPOSALS

Page 15

4-12-12

Rescind Subsection 102.11 and replace with the following:

Submit withdrawal requests to the Department in writing before the time set for opening bid proposals. A bidder may withdraw any proposal in person or through an authorized agent before any bid proposal on that project is read.

If a bidder discovers a material (factual, not judgmental) mistake in its bid after the bids have been opened, the bidder understands and agrees that it may either perform the contract as originally bid or request permission from the Transportation Commission to withdraw its bid.

The request must be received by the Contract Plans Bureau no later than 4:30 p.m. two business days after the day of the bid opening (not counting the day of the opening). The notice must be by a notarized affidavit, under penalty of false swearing, signed by the bidder and accompanied by all worksheets used in the preparation of the bid, requesting relief from forfeiture of the bid bond and the responsibilities of award. The affidavit must describe the specific error(s), how they were made and who made them, and must certify that the worksheets provided are those that were used in preparing the erroneous bid.

The Department will make its recommendation to the Commission, who will review the request to determine if a mistake occurred, was material and factual, and whether the bid should be allowed to be withdrawn. If the Commission does not concur in the error or determines that the error has not been sufficiently proven, it may award the contract. If the bidder refuses to execute the contract as it was bid, the bid bond will be forfeited as stated under Section 18-1-204 MCA.

102.15 VENUE

Page 16

2-19-09

Rescind 102.15 and replace with the following:

In the event of any dispute concerning a project, whether over its advertisement, bidding, award, execution, or claim, any litigation filed by or against the Department has venue only in Lewis and Clark County.

102.17 PUBLIC WORKS CONTRACTS

Page 16

12-18-08

Add the following Subsection:

102.17 PUBLIC WORKS CONTRACT

Department projects under these specifications are public works contracts. Projects under these specifications require Contractors to provide all resources necessary to complete the project, fully complying with its plans and specifications. They are not "sales", nor are they sales of "goods", as those terms are used in Montana's Uniform Commercial Code (UCC). The UCC, particularly its Chapter 2, does not apply to these projects, and the contractor concurs with that by submitting its bid.

103.02 AWARD OF CONTRACT

Page 17

6-27-13

Rescind the second paragraph (that begins with "If the contract ") and replace with the following:

If the contract is not awarded within 45 calendar days, all bid proposals are void. The Commission can extend the 45-day time period.

Add the following after the second paragraph (that begins, "If the contract..."):

In the event two or more qualified bids are exactly equal for the lowest bid, the successful bidder will then be determined by totaling the major bid items listed on their schedule of items. The contract will be awarded to the bidder having the lowest total of major bid items. A major bid item is defined in Subsection 101.03.

103.05 RELEASE OF PROPOSAL GUARANTY

Page 17

12-1-11

Rescind Subsection 103.05 and replace with the following:

All proposal guaranties will be void immediately following opening and checking of the proposals. The successful bidder's proposal guaranty will be void after a satisfactory contract bond has been furnished and the contract has been executed.

103.06 CONTRACT BOND

Page 17

3-27-14

Add the following paragraphs at the end of 103.06:

The contract bond will remain in effect until the certificate of completion is executed and the contract is accepted by the Commission, plus any time period specified by Montana law.

The statutory time for filing claims against the contract bond is 90 calendar days from the date of the Commission acceptance of the project. See Sections 18-2-201 to 18-2-208 MCA.

103.07 EXECUTION AND APPROVAL OF CONTRACT

Page 17

9-26-13

Rescind and replace Item A. (That begins with "The signed contract") and replace with the following:

- A. The signed contract; and

Delete item C (That begins with "A copy of...") below the first paragraph.

Rescind part D (that begins with "Possessing a ...") below the third paragraph.

103.08 FAILURE TO EXECUTE CONTRACT

Page 18

5-24-12

Rescind and replace Subsection 103.08 with the following:

Upon failure to execute the contract and file acceptable bonds within 20 calendar days after receipt of the contract, under Section 18-1-204 MCA, the award will be canceled and the proposal guaranty forfeited. Award may then be made to the next lowest responsive, responsible and qualified bidder, or the work may be re-advertised. If, due to circumstances entirely beyond the control of the bidder, the bidder is unable to file acceptable bonds and insurance policies within the time specified above, the commission at its sole discretion may waive cancellation of the award and forfeiture of the proposal guaranty.

103.09 BID DOCUMENTS

Page 18

11-17-11

Rescind and replace Subsection 103.09 with the following:

103.09 BID DOCUMENTS103.09.1 General

The following requirements apply when submission of bid documents is required by the contract. The Department agrees to safeguard the bid documents, and all information contained therein, against disclosure to the fullest extent permitted by law.

103.09.2 Bid Documentation Inventory Affidavit and Escrow Agreement

Use the most current Department Form CSB103\_09A "Bid Documentation Inventory Affidavit" with the bid documentation. Follow all directions for the bid documentation listed on Form CSB103\_09A.

Use the most current Department Form CSB103\_09B "Escrow Agreement" when completing the bid documents escrow procedure. Follow all directions for the escrow procedure listed on Form CSB103\_09B. Modified versions of the "Escrow Agreement" provided by the escrow agent may be used with written approval by the Construction Engineering Services Engineer.

The forms must be signed by an authorized agent for the bidder. These forms are available at the following web page: <http://www.mdt.mt.gov/publications/forms.shtml#contract>

**103.09.3 Escrow of Bid Documents**

Once identified as the apparent low bidder on a contract requiring submission of bid documents, submit all bid documents to an approved escrow agent located in Helena, Montana. Convert electronically formatted information into paper copies. Include these paper copies as part of the bid documentation. Provide written notification including copies of the Bid Documentation Inventory Affidavit and the Escrow Agreement to the Contract Plans Bureau within seven business days, including the day of bid opening. The copy of the Escrow Agreement submitted to the Contract Plans Bureau must contain signatures from the Escrow Agent and representative of the bidder. The Department will review the documents and return a copy of the Escrow Agreement with a signature of a Department representative to the Escrow Agent.

An approved escrow agent includes any business such as a banking institution or other bonded storage facility which provides a deposit box, vault, or other secure accommodation.

Place the bid documents and completed Bid Documentation Inventory Affidavit in the container provided by the escrow agent. Clearly label the face of the container "Bid Documents" and include the bidder's name, the date of submittal, the contract name, and the contract number.

If the apparent low bidder, for whatever reason, is not awarded the contract, the apparent second low bidder will be told that it has seven business days from the date of its verbal notification (followed immediately in writing) to comply with the above requirements.

**103.09.4 Bid Responsiveness**

The copies of the Bid Documentation Inventory Affidavit and Escrow Agreement submitted as part of the escrow notification will be reviewed for completeness and responsiveness. If the forms are incomplete or are not submitted, the bid will be considered non-responsive. The second low, responsive responsible bid will then be reviewed and the bidder will be required to meet the above requirements.

**103.09.5 Release of Bid Documents to the Department**

The bid documents in escrow are and will remain the property of the Contractor unless a Certified Claim is filed by the Contractor or litigation or arbitration is initiated under the contract. In the event that the Contractor submits a Certified Claim or litigation or arbitration is initiated under the contract; the bid documents included in the escrow become the property of the Department for its use, specifically including use in preparing for and conducting of all claims, disputes, arbitration or litigation. Failure to submit all bid documents as defined in Subsection 101.03 and the Bid Documentation Inventory Affidavit as required, or failure to include the items indicated by the Bidder on the Bid Documentation Inventory Affidavit in the documents that are placed in escrow, will be a material breach of the contract, is a failure to comply with a condition precedent to filing a claim or lawsuit, acts as a total and final waiver of all claims or disputes involving matters that would have been included (e.g., claims of delay, changed site conditions, loss of productivity, etc.), and subjects the Contractor to action under ARM 18.3.101 et seq.

Upon the Department's receipt of the bid documents, the Contractor will be notified and must have a representative present during the opening, unless the representation is waived. Failure to appear at the date and time designated for the opening will be considered a waiver.

**103.09.6 Release of Bid Documents to the Contractor**

Except as provided for in Subsection 103.09.5, the bid documents will remain in the storage location during the life of the contract. After a certificate of completion has been issued for the contract, the Department will notify the escrow agent and the Contractor that the bid documents may be released. It is the Contractor's responsibility to obtain necessary signatures and retrieve the bid documents from the Escrow Agency.

**103.09.7 Method of Measurement and Basis of Payment**

Escrow of Bid Documents is measured and paid as lump sum. Payment will be made on the first progress estimate. Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract.

**104.02.3 SIGNIFICANT CHANGES IN THE CHARACTER OF WORK**

Page 22

4-8-10

Delete the first sentence of the second paragraph (that begins with "If the alterations ...") and replace with the following:

If the alterations or changes in quantities significantly change the character of the work under the contract, whether such alterations or changes are in themselves significant changes to the character of the work or by affecting other work cause such other work to become significantly different in character, an adjustment, excluding anticipated profit on unperformed work, will be made to the contract

Delete the first sentence of paragraph four (that begins with "The term ...") and replace with the following:

The term "significant change" applies when one or more of the following circumstances is met:

**104.02.4 CHANGE ORDERS**

Page 22

11-1-07

Rescind Part C. in the first paragraph (that begins with "Contract time ...") and replace Part C. with the following:

C. Contract time adjustments per Subsection 108.07.05.

104.03 EXTRA WORK

Page 22

4-10-14

Rescind the first paragraph (that begins "Perform unanticipated work...") and replace with the following:

Perform unanticipated work, not included in the contract, if the work is related to the contract items and is ordered before the Final Acceptance date. Perform extra work as directed. Payment for extra work is made under Subsection 109.04.

104.05.1 GENERAL (MAINTENANCE OF THE WORK)

Page 23

4-10-14

Rescind the first paragraph (that begins "Perform maintenance work...") and replace with the following:

Perform maintenance work on completed and uncompleted parts of the project until approval under Subsection 105.17.2.

Rescind the third paragraph (that begins "Maintenance work performed...") and replace with the following:

Maintenance work performed before approval under Subsection 105.17.2 is incidental to other contract items.

104.05.2 FAILURE TO PROPERLY MAINTAIN ROADWAY OR STRUCTURE

Page 23

3-1-07

Rescind Subsection 104.05.2 and replace with the following:

The Project Manager will immediately notify the Contractor if it fails to maintain the project. Failure to begin to remedy unsatisfactory maintenance within 4 hours of notification may result in:

- The Department performing the required repair. The cost of the repair will be deducted from monies due or to become due to the Contractor, or otherwise be billed to the Contractor.
- Contract time being charged. Contract time will be charged starting on the day of the Department's initial notification and will continue until the repairs are made and the Project Manager approves the repairs.

104.05.4 MAINTENANCE FOR TRAFFIC DURING WORK SUSPENSIONS

Page 24

3-1-07

Rescind Subsection 104.05.4 and replace with the following:

- A. Temporary Suspension. Make passable and open to traffic all portions of the project, connections, and temporary roadways before temporary work suspensions. Maintain parts of the project, connections, temporary roadways, and detours under traffic at Contractor expense during work suspensions.
- B. Winter Suspension. Be responsible for all traffic control and maintenance during winter weather shutdowns, including the time between November 16th and April 15th. Be responsible for all snow removal, sanding, and de-icing for all roadways not completed through the first lift of plant mix surfacing. Furnish all necessary supervision, personnel, and equipment to maintain the road in a safe condition and at the highest level of service to traffic.

The Department is not responsible for any repairs or maintenance to the project that results from snow plowing, sanding, and de-icing on any roadway not completed through top lift of plant mix surfacing.

The Contractor may request that the Department furnish all resources to perform snowplowing, sanding, and de-icing during winter suspension. This work would be detailed in a written agreement. Be responsible for all maintenance, traffic control, or other work not detailed in the agreement. Reimburse the Department, under an accounts receivable, for all Department plowing, sanding, and de-icing expenses according to the terms of the signed agreement.

Attend a meeting scheduled by the Department to review the project to develop the agreement details prior to the winter suspension.

Inspect the project at least once every 14 calendar days. Submit form CSB104\_05\_4 to the Project Manager within three days of the inspection.

Failure to maintain the project under these requirements will invoke Subsection 104.05.2.

Repair or replace all work and materials lost or damaged due to temporary use of the project. Maintenance work for acts of God or acts of the public enemy, or that are outside the Contractor's control during work suspensions is paid for at contract unit prices or as extra work.

104.06 RIGHTS IN AND USE OF MATERIALS FOUND ON THE WORK

Page 24

2-10-11

Rescind and replace Subsection 104.06 with the following:

104.06 MATERIAL AND PROPERTY RIGHTS104.06.1 Rights in and Use of Materials Found on the Project

Apply for and obtain the Engineer's written approval prior to using excavated materials for other contract items. Designate in the request which contract item the second payment is for. Only one item will be eligible for payment when more than one field measurement by the Department would be required. Replace the removed material with acceptable material at Contractor expense.

Do not excavate or remove material from within the right-of-way that is outside the grading limits without written permission.

#### 104.06.2 Use of Department Property

Do not use Department property outside the project limits for contractor operations, such as staging, without Department approval. Submit an Encroachment Permit to the MDT Maintenance Division for approval. The Encroachment Permit request form is available from the Department's website or the Project Manager. Be responsible for all requirements within the Encroachment Permit and obtain associated environmental permits prior to the use of the property.

Restore the property in accordance with the contract and Encroachment Permit requirements no later than the Encroachment Permit end date. Obtain seed blend mix designs and allowed seeding time frames from the Project Manager for any re-vegetation required to the area. Repair damaged areas in a timely manner.

The Department will revoke the use of Department property if the requirements of the contract or the Encroachment Permit are not being met. The use of Department property outside the project limits, including any required restoration or repair work is not measured for payment. Contractor failure to fulfill the encroachment requirements is cause for the Department to perform or have corrective actions performed and deduct those costs from monies due or that may become due the Contractor.

### 104.08 VALUE ENGINEERING PROPOSALS

Page 25

1-12-12

Rescind the seventh paragraph (that begins with "The Department's cost of ...") and replace with the following:

Costs incurred by the Department during a Preliminary Review will not be charged to the Contractor. If the proposal is advanced to the Detailed Review stage, costs incurred by the Department during the Detailed Review stage will be shared equally by the Department and the Contractor. The submittal of a formal proposal constitutes the Department's authority to deduct these costs from any monies due or that may become due to the Contractor under the contract. The Department costs for researching and defending claims related to an accepted VE Proposal will not be shared equally. These costs will be deducted from progress payments.

### 105.02 CONTRACTOR FURNISHED DRAWINGS AND SUBMITTALS

Page 27

12-13-12

Rescind the third paragraph (that begins with "The Department has 20 working days ...") and fourth paragraph (that begins with "Working drawings, falsework plans...") and replace with the following paragraphs:

The Department has 20 working days to review the submittals before returning them to the Contractor. The Department has 20 working days to review drawings returned for correction and that are re-submitted for review. The Department will consider extending contract time should the Department review exceed the 20 working day review time limit and the delay can be shown to affect the Contractor's operation based on the current schedule.

The Department's approval of the fabricator's shop detail drawings is verification that the fabricator and Contractor have correctly interpreted the intent of the Contract documents and the details reflect the material and connection requirements. "Approval" does not relieve the Contractor or fabricator of the responsibility for accuracy of design, dimensions, completeness or adherence to the requirements of the Contract, nor does it permit deviations from the Contract without the Department's documented consent.

The Department will perform an engineering review of the first submittal at no cost to the contractor. If the Department determines that the submittal fails to meet generally accepted engineering standards, it will return the submittal for correction. The Department will perform reviews of re-submittals with its own personnel when possible. If Department staff does not have time available to perform reviews, at the Department's sole option it may hire a consultant engineer from outside the Department to finish the review process.

The Department will charge for reviews of re-submittals for its staff time and at the rate charged by a hired engineering firm for its staff time, if the Department hires one. The Department will subtract the charges from contractor payments.

Working drawings and falsework plans for facilities open to public travel are to be signed by a professional engineer registered in the State of Montana before submittal to the Project Manager.

Check and approve working drawings and submittals before submittal to the Project Manager. Show the Contractor's approval on the drawings and submittals.

### 105.03.1 GENERAL (CONFORMITY WITH PLANS AND SPECIFICATIONS)

Page 27

2-11-10

Rescind the third paragraph (that begins with "When a contract ...") and replace with the following:

When a contract item does not meet the contract requirements but is adequate to serve the design purpose, the Contractor will be notified in writing of the deficiency. The Contractor will be given the choice to remove and replace the deficient work, correct the work at no expense to the Department, or accept a reduction in the contract unit price. If the Contractor chooses to accept a price reduction, the Project Manager will determine the amount of the reduction and will apply the reduction using a line item adjustment to the contract. The Project Manager may document the basis of the acceptance by change order.

Rescind Table 105-1 and replace with the following:

TABLE 105-1  
CONTRACT ITEMS - EVALUATION ELEMENTS

ELEMENTS EVALUATED				
Item	Aggregate Gradation	Fineness Modulus	Compaction	Fracture
Selected Surfacing	X			
Sand Surfacing	X			
Crushed Base Course Type A	X			X
Crushed Base Course Type B	X			
Crushed Top Surfacing Type A	X			X
Crushed Top Surfacing Type B	X			
Crushed Aggregate Cover Material	X			X
Portland Cement Treated Base	X		X	
Plant Mix Surfacing and Base	X		X	X
Portland Cement Concrete Paving	X	X		

Rescind Table 105-2 and replace with the following:

TABLE 105-2  
TABLE OF PRICE REDUCTION FACTORS

ELEMENT	FACTOR "F"	
100% size sieve	1	
1/2-inch (12.5 mm) sieve and larger	1	
No. 100 to 3/8-inch (0.150 mm to 9.5 mm) sieve, inclusive (except 100% size sieve)	Cover Material, 2 All Other Aggregates, 3	
No. 200 (0.075 mm) sieve	Cover Material, 3 All Other Aggregates, 6	
Fine aggregate fineness modulus	12	
Compaction	Non-Commercial	Commercial
	12	6
Compaction - CTB	6	
Fracture	2	

Add the following paragraph to the end of Subsection 105.03.2:

The Project Manager may allow the adjustments to be made without halting production.

Rescind Subsection 105.03.3 and replace with the following:

105.03.3 Quality Incentive Allowance

Quality incentive allowances will be used to offset any price reductions.

All quality incentive allowance remaining after all price reductions have been deducted will be paid as a lump sum when all work on the item is complete.

- A. Plant Mix Volumetric Properties. Outlier determination and payment adjustments are for properties only. If suspect test values are noted during construction, the Department will check plant production information, test equipment, processes, calculations, etc. for errors. If a problem is noted in the plant production,

sampling or other process controlled by the Contractor, the test result will be considered valid until production is complete. If a problem is found with the testing or other Department process, the test result will be corrected or the test redone on material from the same sample, if possible. If a non-correctable testing problem is found, the result will be discarded, if possible another sample will be taken and the new result used in its place. If re-sampling is not possible, the Department may discard the test results for a sub-lot considered to be an outlier and recalculate the incentives and disincentives using the remaining results in the lot. The Department may follow standard QA guidelines to adjust lot sizes.

If no identifiable problem is found, no corrections will be made until production is complete.

The following outlier evaluation only applies to projects with 10 or more QA sub-lots.

After all production of this product is completed, the Department will determine the Standard Deviation and Mean of all the Department's test results for each property representing material produced after the initial targets were set. For each property test, the Z value is defined as the absolute value of the difference between the test value and the mean, divided by the Standard Deviation. If the average of the Z values of the four properties in a sub-lot is greater than 2.00, the Department may consider the sub-lot an outlier. If more than one sub-lot outlier is identified in a lot, the test results will not be considered outliers. The Department will not adjust for outliers within the last lot of production.

The Department will discard the test results for a sub-lot considered to be an outlier and recalculate the incentives and disincentives using the remaining results in the lots. The Department will follow standard QA guidelines to adjust lot sizes.

- B. Density. A 1.08 pay factor will be applied to the lots of plant mix surfacing when the average density for the lot (Xn) is from 94 percent to 95 percent, inclusive, of the Maximum Specific Gravity (Rice's Method) and the range (R) is three or less.
- C. Ride Specification. The surface smoothness will be measured using the International Roughness Index (IRI). The surface smoothness will be evaluated in each travel lane for the entire length of the project. The following project category pay factors will be applied to each lane:

TABLE 105-3  
MAXIMUM ALLOWABLE VARIANCE AND DIVERGENCE

Project Category	Actual IRI (Inches/mi)	Pay Factor
Category I	< 35	1.25
	35 – 45	2.125 – 25/1000 * IRI
	> 45 – < 55	1
	55 – 75	1.825 – 3/200 * IRI
	> 75 – 90	0.7
	> 90	Corrective Action (Initially assumed zero pay)
Category II	< 50	1.1
	50 – 55	2.100 – 1/50 * IRI
	> 55 – < 60	1
	60 – 95	1.343 – 1/175 * IRI
	> 95	Corrective Action (Initially assumed zero pay)
	<40	1.25
Category III	40 – 55	1.918 – 1.67/100 * IRI
	>55 - <70	1
	70 – 100	1.700 – 1/100 * IRI
	>100	Corrective Action (Initially assumed zero pay)

Note 1: The pay factor is the same whether the plant mix is measured in English or metric units. Final pay factors are rounded to two decimals and used in calculating the value of the incentive/disincentive.

Note 2: The IRI used to calculate the Pay Factor is the average of two runs on each travel lane evaluated.

The incentive or disincentive for surface smoothness will be calculated based on the ride category and entire length the project in each travel lane or measured section using the following equation. The calculated value will be applied as a line item adjustment to the plant mix item on the estimate. Calculate the pay adjustment as follows:

- Pay adjustment = (Pay Factor -1) x L x Unit Cost
- Pay Factor = Calculate using the formulas for the appropriate project category
- L = Length of the lane measured
- Unit Cost = Use appropriate value from the table below

TABLE 105-4  
UNIT COST

Category	Description	Unit Cost/ft
I or III	Reconstruction or rehabilitation section with 0.3 ft or greater plant mix surfacing	\$6.425
I,II, or III	Reconstruction, rehabilitation, or overlay section with 0.2 to 0.29 ft plant mix surfacing	\$4.283
I, II, or III	0.19 ft or less thin lift overlay	\$3.213

Note: Isolation lifts are not considered to be part of the surfacing section when determining the appropriate overlay depth.

Incentives will be reduced based on the percentage of density tests that do not meet minimum plant mix pavement density requirements as determined by Table 105-5 Ride Incentive Reduction.

TABLE 105-5  
RIDE INCENTIVE REDUCTION TABLE

Project Size	Percent of Density Tests not Meeting Specifications		
	No Reduction of Ride Incentive	Incentive Reduced	No incentive Allowed
0 to 25,000 Tons	0 to 10 %	% Failing Tests * 6.667-66.67	25 %
> 25,000 Tons	0 to 5 %	% Failing Tests * 6.667-33.34	20 %

Note: Final incentive reductions are rounded to two decimals.

Payment at the contract unit price is full compensation for all necessary resources to complete the item of work under the contract.

105.03.4 TABLE OF CONTRACTOR SUBMITTALS Page 30 1-16-14

Add the following two paragraphs after the last paragraph (that begins with "Submit all required...")

Electronic submittals to the Department will be accepted if they are in a format accessible by the Department's software and legible once opened. Verify acceptable electronic format types with the Project Manager prior to submittal.

When a specification requires submittal of a form, submit the most current Department form. Forms are available from the Project Manager or on the Department's Contractor's system Internet site at <http://www.mdt.mt.gov>.

105.05 COOPERATION BY CONTRACTOR Page 31 3-1-07

Add the following sentence to the end of the third paragraph

This contact must be maintained during all work suspensions, including winter suspension.

Add the following paragraph at the end of Subsection 105.05

Failure to maintain the ability to be contacted within 2 hours during times of work suspension will result in contract time being charged. Time will be charged for the day the Department first attempts to make contact and each additional day that the Contractor's designated representative cannot be contacted.

105.08 CONSTRUCTION STAKES, LINES, AND GRADES Page 32 4-24-14

Rescind Subsection 105.08 and replace with the following:

**105.08 CONSTRUCTION STAKES, LINES, AND GRADES**

Maintain all survey controls required to control alignment and grade using survey personnel that are trained, experienced, and skilled in construction layout and staking. Do not hire Department personnel to perform any survey work.

Staking requests must be submitted on form CSB105\_08\_1. Department construction staking will be performed once for a given type and location. If construction staking is required more than once, submit an additional request to the Project Manager in writing with justification.

**105.08.1 Department Furnished Survey and Layout**

Unless otherwise stated, the Department will furnish the following:

- All right of way and monumentation surveys
- Centerline coordinates
- Benchmarks at the beginning, end and near midpoint of the project
- Construction stakes for establishing lines, slopes and profile grade (excluding finish grade control)
- Construction stakes for culverts, structures and appurtenances
- Wetland delineation

Preserve and protect Department furnished control points and replace any that may be damaged, displaced or removed. Replace any stakes that are obliterated by the Contractor or by construction activities.

Use provided controls as the field control to perform the work. Verify accuracy of all Department furnished controls before any layout staking or grading is performed. Request all Department furnished construction staking in writing.

## 105.08.2 Contractor Survey and Layout

When required by the contract, furnish all surveys and calculations necessary to layout and control the work to specified lines, grades, and tolerances. Provide surveys with accuracy and control equal to or better than the requirements of the Montana Department of Transportation Survey Manual (Survey Manual).

The Department will measure quantities for payment, except items specified under pre-determined quantities.

Protect Department-furnished control points. Set or reset destroyed control points, conduct all right-of-way and monumentation and public land monumentation surveys under the responsible charge of a Registered Land Surveyor licensed in Montana per Section 70-22-115 MCA. The Department will measure quantities for payment, except items specified under pre-determined quantities.

Identify Department set control points. Verify accuracy of the Department – furnished controls before any layout staking is performed.

A. Survey Plan. At least 14 calendar days prior to beginning survey work, submit two copies of a survey plan to the Project Manager that details each proposed survey operation including:

1. Methods for initial layout to include accuracy, references, independent verification and checks.
2. Methods for control surveys to include number and type of controls for various items and measurement tolerances and accuracy.

The plan will be reviewed for compliance with the requirements of the Survey Manual. The plan will be returned for correction if it does not meet or exceed requirements of the Survey Manual.

Do not begin survey operations until the survey plan has been reviewed and approved by the Project Manager.

B. Staking. Set all stakes necessary to control all work under the contract. This includes, but is not limited to:

- Bridges
- Centerline stations
- Clearing limits
- Drainage structures
- Fencing
- Pavement
- Reference points
- Retaining structures
- Right-of-way lines and monuments
- Sewers and waterlines
- Signs, pavement markings, guardrail
- Surfacing courses
- Wetland delineation
- Any other items of work included in the contract.
- Special conditions for specific layout items.

Determine the slope stake catch point and provide copies of the slope staking notes to the Department. Replace any stakes that are obliterated by the Contractor or by construction activities. Do not begin grading operations until all slope stakes within a balance or at least 20% of the project have been set.

C. Culverts. Take cross sections and profiles. Adjust culvert locations to match existing field conditions. Use form MDT-CON-603-1 to submit the list of proposed culvert lengths to the Project Manager. Profiles, cross sections, adjustments and culvert lengths must be approved by the Project Manager before culverts are ordered.

D. Bridges. Include a check of the bridge location relative to railroads, streams, roads, or fixed features in the initial layout. Report discrepancies before performing any bridge construction activities. Survey controls for the following are required as a minimum:

- Foundations
- Pile layout and cutoff
- All substructure elements
- Girder seat elevations
- Girder profiles
- Deck forms and placement
- Curbs, rails, joints

E. Plan Errors. Notification must be made immediately of any apparent errors, including but not limited to grade, alignment, location, dimensions and quantities. Changes to the plans must be approved in writing by the Project Manager.

F. Inspection. The Department may conduct inspections and random checks of any portion of the layout and control work. The Project Manager may order work not performed with sufficient accuracy to be corrected. No compensation will be allowed for corrective work.

The Contractor is responsible for securing proper dimensions, lines, grades, and elevations for all parts of the work and Department inspection will not relieve the Contractor of this responsibility.

G. Survey Notes. Submit survey notes, including electronic notes, to the Project Manager every 10 days and upon completion of each survey function.

H. Extra Work. Survey required for extra work may be performed by the Contractor or by the Department, as determined by the Project Manager.

I. Predetermined Pay Quantities. Quantity sheet amounts for items described under Sections 203 and 209 will be considered final quantities for payment. Requests for adjustment of bid schedule quantities for these items may be initiated by the Contractor or by the Project Manager if evidence indicates the total actual required in-place quantity varies from the bid schedule quantities by more than 5%.

Not taking cross section elevations during slope staking waives any adjustment to pre-determined pay quantity items, including borrow.

The party requesting the quantity adjustment must notify the other party in writing and furnish acceptable survey data and calculations to accurately establish any quantity adjustments. Load counts will not be considered acceptable for excavation and borrow items. The quantity adjustment will only apply for the amount greater than 5% of the bid schedule quantity.

Quantity adjustments due to changes ordered and approved in writing will be determined by measurement, calculation or both. These quantities will be added or deducted from bid schedule quantities without regard to the 5% limitations outlined herein.

#### 105.08.3 Finish Grade Control

Provide all finish grade control required to establish the surfacing sections shown in the plans. Calculate the finish grades for the subgrade and each surfacing course using the plan information and the furnished staking notes. Special borrow is a surfacing course for finish grade control purposes.

Run a level circuit to check the project benchmarks on each roadway section where finish grade is being controlled.

Use a finish grade control method that provides positive horizontal and vertical alignment control for the required surfacing sections and ride quality.

#### 105.08.4 Bridge Survey

The Department will establish control points defining median or roadway centerline, bridge centerline, and benchmarks for elevation control.

Establish and maintain all other survey controls required to control bridge alignment and grade meeting the plan dimensions and elevations using survey personnel trained, experienced, and skilled in construction layout and staking. Do not hire Department personnel to perform survey work.

Furnish horizontal and vertical control meeting the Department's Survey Manual requirements. Furnish the original survey notes upon request. Furnish the notes showing the initial layout and primary controls and references and the method of independent check before starting work on the substructure units. Submit a copy of the structure excavation cross-section notes. The Project Manager reserves the right to re-survey any pay item area.

Make calculations from the plan information to control alignment and elevation. Correct all mis-locations, mis-alignments, and incorrect elevations caused by Contractor calculations, layouts, and surveys at Contractor expense. Submit the proposed method of correction for approval. Do not begin the corrective work until the proposal has been reviewed and approved.

#### 105.08.5 Materials and Equipment

Furnish all materials and equipment required to perform this work.

Keep survey notes in a standard field notebook, written in a clear, orderly, neat manner meeting the Department's Survey Manual requirements and standard surveying practice. If survey notes are generated electronically, produce notes in a format meeting these requirements. The Project Manager will inspect the field notes for acceptance. The finished notes become the Department's property.

Perform the work meeting all contract requirements.

#### 105.08.6 Survey Tolerances and Inspection

The Department will perform finish grade checks based on the following:

- A. Subgrade. Three random stations per 1,000-foot (300 m) section will be checked. The 1,000-foot (300 m) section will be accepted if 80% or more of the points checked are within a vertical tolerance range of + 0.05 foot (+ 15 mm) to - 0.10 foot (- 30 mm), and the horizontal alignment is within 0.30 foot (90 mm) of the true line. If not within required tolerances, rework the entire 1,000-foot (300 m) section. Three new random stations will be checked after rework is completed. Random checks will be performed for finish ditch grade control to assure proper drainage.
- B. Special Borrow. Three random stations per 1,000-foot (300 m) section will be checked. The 1,000-foot (300 m) section will be accepted if 80% or more of the points checked are within a vertical tolerance range of + 0.05 foot (+ 15 mm) to - 0.10 foot (- 30 mm), and the horizontal alignment is within 0.30 foot (90 mm) of the true line. If not within required tolerances, rework the entire 1,000-foot (300 m) section. Three new random stations will be checked.
- C. Aggregate Surfacing. Six random stations per 1,000-foot (300 m) section will be checked. Each 1,000-foot (300-meter) section will be accepted if 85 percent or more of the points checked meet the requirements listed in Table 301-1, and the horizontal alignment is within 0.30 foot (90 mm) of the true line. If not within required tolerances, rework the entire 1,000-foot (300 m) section. Six new random stations will be checked.

Sections that are obviously defective may or may not be checked prior to rejection.

A station check consists of centerline, shoulders, any break in cross slope, and intermediate points not to exceed intervals of 20 feet (6 m). All elevation checks are taken on the material, not on the finish grade control. The Project Manager may increase or decrease the number of stations being checked. After receiving notification of a completed section, the Project Manager will perform the finish grade check by the close of the following business day. Contract time will be extended day for day, without any other compensation, for Department caused delays beyond the allotted time to perform the finish grade check.

#### 105.08.7 Method of Measurement

- A. Finish Grade Control. Finish grade control is measured by the course foot (km) along the roadway centerline to the nearest 50 feet (0.01 km). A course foot (CR km) is one foot (one km) for each two-lane roadway including shoulders and ditches. Each traffic lane is considered as one-half course foot (one-half CR km) including the adjacent shoulder, ditch, parking, turning, median lanes, and chain up areas.

The subgrade and each surfacing course requiring finish grade control are measured separately by the course foot (CR Km) for each roadway section, ramp, intersecting roadway, PTW connection, temporary detour, and each frontage road. Finished grade control for approaches is not measured for payment.

- B. Contractor Survey and Layout. Contractor survey and layout is measured by the lump sum.
- C. Bridge Survey. Bridge survey is measured by the lump sum.

#### 105.08.8 Basis of Payment

Payment for the completed and accepted quantities is made as follows:

Pay Item  
 Finish Grade Control  
 Contractor Survey and Layout  
 Bridge Survey

Pay Unit  
 Course Foot (km)  
 Lump Sum  
 Lump Sum

Correct all deficient work due to incorrect finish grade control or bridge survey and reset reference points lost or destroyed by traffic or construction at Contractor expense.

Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract.

105.13 EQUIPMENT Page 35 10-1-07

Delete Subsection 105.13.

105.15 ACCEPTANCE Page 35 4-10-14

Rescind Subsection 105.15 and replace with the following:

105.15 COMPONENT INSPECTION

Upon notice of completion for a project component with a contract specific warranty (non-manufacturer), a milestone, or defined phase or unit of construction, the Project Manager will arrange to make an inspection of that work. Seal Coat warranties will be administered in accordance with Section 409.

If the contract work is found satisfactorily completed, the inspection will constitute the component inspection. If the inspection discloses unsatisfactory work, the Project Manager will issue written instructions to the Contractor on the necessary corrections. When the deficiencies are corrected, another inspection will be made which constitutes the component inspection.

Upon completion of the component inspection, submit a completed "Contractor's Component Inspection" (form CSB105\_15\_1). The form is available from the Department's website or the Project Manager. The Contractor's project superintendent must sign the form. The form must state that:

1. The Department and the Contractor have completed a component inspection of the work, and the Contractor verifies that the work was completed in full accordance with the specifications and the requirements of the contract.
2. If applicable, the component has an associated incentive or disincentive, and they have been assessed.
3. If applicable, the component has an associated warranty and what the expiration date is.

Contract time assessment will not cease until all contract-specific warranties have expired, but may be suspended under Subsection 105.17.2. Within 14 calendar days of being notified of necessary warranty repairs, submit a plan detailing repair procedures, the expected date activities will begin, and expected duration of repair work. The time suspension will be rescinded and contract time charged if a repair plan is not provided within the allotted 14 calendar days.

The time suspension will be rescinded and contract time charged beginning on the date that repair activities begin or the date provided in the repair plan, whichever is earlier, and continue until repairs are complete.

Completion and approval of the Contractor's Work Component Inspection is not a statement or commitment by the Department that all work meets the contract requirements, and does not waive or alter any of the contract's terms.

Rescind Subsections 105.15.1, 105.15.2 and 105.15.3.

105.16.1 NOTICE OF CLAIM Page 36 7-31-08

Rescind the first sentence of the first paragraph (that begins with "Notify the Project Manager ...") and replace with the following:

Submit a notice of claim using the Department's "Notice of Claim" Form CSB105\_16\_1A, no later than the next business day of disagreements that are to be the subject of a claim for additional compensation, time extension, contract change, or other remedy.

105.16.2 SUBMISSION OF CERTIFIED CLAIMS Page 37 10-11-12

Add the following paragraph after part (C) between the second and third paragraphs:

If the claim includes requests for delay compensation, follow all procedures in Subsection 108.07.6.

Rescind the first sentence of the third paragraph (that begins with "The Prime Contractor ...") and replace:

The Prime Contractor must verify the claim data and certify the claim. Claims from a subcontractor or supplier will not be accepted.

Rescind the fourth paragraph and replace with the following:

Failure to timely submit the completed Certified Claim form or the Claim Cost Records as required is a

material breach of contract and waives the Contractor's right to make any claim for the disagreement or be entitled to any compensation, time extension or contract change related to the disagreement.

Add the following paragraph between the seventh and eighth paragraphs:

For claims over \$100,000, all claim costs must be certified by a certified public accountant (CPA) prior to the claim being resolved.

105.16.3 DECISION ON CLAIMS Page 38 10-7-10

Rescind and replace the first paragraph (that begins with "The District Construction ...") and replace with:

The Prime Contractor must verify the claim data and certify the claim. Claims from a subcontractor or supplier will not be accepted. The District Construction Engineer will provide a written decision no more than 30 calendar days after receipt of the Certified Claim for Contracts that do not require Escrow of Bid Documents. The District Construction Engineer will provide a written decision no more than 45 calendar days after receipt of Bid Documents for Contracts that do require Escrow of Bid Documents. If additional time is required to research and evaluate the Claim, the District Construction Engineer can extend the time period 14 calendar days by notifying the Contractor in writing.

105.16.3 DECISION ON CLAIMS Page 38 2-10-11

Rescind the first sentence of the second paragraph (that begins with "To advance the...") and replace with the following sentence

To advance the claim, appeal the District Construction Engineer's decision to the Claims Review Board (Board).

105.16.3 DECISION ON CLAIMS Page 38 8-6-08

Rescind the second sentence in the second paragraph (that begins with "Submit the ...") and replace with the following:

Submit the "Request for Appeal" Form CSB105\_16\_3H to the Construction Engineering Services Engineer no more than 30 calendar days after the date of the District Construction Engineer's decision.

Rescind the fourth sentence in the second paragraph (that begins with "The District Construction Engineer's decision ...") and replace with the following:

The District Construction Engineer's decision is final unless appealed no more than 30 calendar days after the date of the decision.

Delete the third paragraph (that begins with "If the District Construction Engineer ...").

Rescind sixth paragraph (that begins with "The Board may affirm ...") and replace with the following:

The Board may affirm, overrule, or modify, in whole or in part, the decision of the District Construction Engineer. The decision of the Board is the Department's final decision.

Add the following paragraph after the sixth (last) paragraph (that begins with "The Board may affirm ...")

The Contractor or Department may request non-binding, independent third party mediation. The Contractor's request for third party mediation must be submitted to the Construction Engineer on the "Request for Mediation" Form CSB105\_16\_3E no more than 30 calendar days after the date of the Board's decision. If the Department and Contractor both agree to mediation, they must mutually agree on a mediator and a mediation date within 14 calendar days of the date of the request for mediation. All costs associated with mediation will be shared equally between the Contractor and the Department.

105.17 PROJECT FINALIZATION Page 38 7-10-14

Add the following Subsection:

105.17 PROJECT FINALIZATION

105.17.1 Final Walk-through Process

When all physical work has been completed in accordance with the contract requirements, a final walk-through process will be completed to inspect the work and identify and resolve all punch-list items. If all work is complete but deferment of the final walk-through is necessary for causes outside the Contractor's control, the Project Manager will suspend contract time

The following describes the process between the Project Manager and the Contractor:

1. The Contractor requests a final walk-through inspection using form MDT-CON-105\_17\_1B. Submit the preliminary MPDES/NPDES storm water permit package, if applicable, for review with this form if not previously submitted.
2. A final walk-through inspection is conducted between the Project Manager, DCE and Contractor. The final walk-through process may be postponed due to project conditions outside of Contractor control.
3. A final storm water walk-through is conducted between the Project Manager, DEES, Contractor, and Maintenance or local entity as appropriate.
4. Punch-list items are identified; including site work deficiencies, outstanding materials and/or Civil Rights requirements, environmental permit compliance issues, and outstanding claims. A written list of punch-list items is submitted to the Contractor within 30 calendar days of the request for the final walk-through inspection.
5. The Contractor submits the final MPDES/NPDES storm water permit package.
6. When punch-list items are completed and/or resolved, the Contractor requests a final verification using form MDT-CON-105\_17\_1D. The Department is exercising some operational control of the MPDES/NPDES storm water permit when the requested changes are completed.
7. The Project Manager will grant Conditional Final Acceptance within 30 calendar days of the request for the final walk-through verification. The final acceptance is granted with the condition that all contract-specific warranties have expired and all warranty issues have been resolved. If the punch-list items are fully resolved, no further action is required. If deficiencies still exist, payment will be deducted from the estimate as appropriate.

Contract time assessment will not cease until all contract-specific warranties have expired, but may be suspended under Subsection 105.17.2.

#### 105.17.2 Final Acceptance

When the Final Walk-through Process is complete, all project-specific warranties have expired, and all warranty issues have been resolved, submit the Contractor's Certificate of Work Complete using form MDT-CON-105\_17\_2. Before the form will be approved by the Department, the contractor's representative must provide a sworn and notarized certification that the following items have been completed:

1. The work has been completed in accordance with the contract's specifications, and the required materials have been used, both in quality and quantity.
2. The Department and the Contractor have completed the final walk-through process, and the Contractor has corrected all deficiencies to the satisfaction of the Project Manager or payment will be deducted for outstanding deficiencies.
3. The project has been inspected for compliance with the MPDES/NPDES Storm Water Permit, all necessary corrective actions taken.
4. There are no pending investigations referencing alleged nonpayment to subcontractors or suppliers.
5. There are no pending labor compliance or nonpayment claims on the contract.
6. There are no known environmental violations. The Contractor is responsible for any violations issued for damages or non-compliance with permit requirements and conditions prior to the transfer of the MPDES/NPDES Storm Water Permit. The Contractor will defend and hold the Department harmless from any violations, claims, enforcement actions, penalties or fines issued for Contractor activities or recordkeeping that occurred prior to the transfer of the MPDES/NPDES Storm Water Permit; this does not include activities specifically directed by the Department in writing.
7. Liquidated damages have or have not been assessed, and damages that have been assessed either are or are not disputed by the Contractor.
8. The contract does or does not include any contract specific warranties (non-manufacturer). If it does, all contract specific warranties have expired and all corrective actions have been completed.

If any of the above is not completed in full before the certification form is submitted, the Project Manager will reject the form.

Contract time assessment will not cease until all warranty issues are corrected and the Contractor's Certificate of Work Complete form has been received and approved. The Project Manager may suspend contract time for punch-list items provided the roadway is in a safe and convenient condition. The date the form is approved is the Final Acceptance. Maintain the insurance specified in Subsection 107.13 until the Final Acceptance.

Completion and approval of the Contractor's Certificate of Work Complete form is not a statement or commitment by the Department that the work meets all contract requirements, and does not waive or alter any of the contract's terms.

#### 105.17.3 Final Estimate Process

When the contract has reached the Final Acceptance under Subsection 105.17.2, the contract documents will be finalized and the final estimate processed within 90 days. The final estimate will include the amount and value of each class of work performed and any extra work and materials. Errors made in previous partial payments will be corrected in the final estimate.

When the final estimate is prepared and all required documentation (such as material certifications, labor dispute resolutions, etc.) has been received, the Construction Administration Services Bureau will send a copy of the final estimate to the Contractor for review. The Contractor has ten calendar days to notify the Project Manager in writing if the final estimate is acceptable. If no response is received within that timeframe, concurrence will be assumed.

To dispute the final estimate, submit the items disputed and justification to the Construction Administration Services Bureau. Provide a copy to the Project Manager. The Construction Administration Services Bureau will provide a written decision on the disputed items.

The Department reserves the right to withhold all or part of the final payments earned under the contract until all taxes and assessments due and owing to the State of Montana for any reason have been paid in full unless a written release is received from the Department or the state agency having a claim against the Contractor.

106.01.1 SOURCE OF SUPPLY

Page 39

8-1-07

Add the following paragraph after the second paragraph:

Perform sampling of any material to be tested in accordance with the contract. The Department will decide if a sample was taken correctly. Samples not properly taken may be rejected and may not be accepted for testing.

106.01.2(B) MATERIALS ACCEPTED BY DEPARTMENT TESTING

Page 39

4-8-10

Rescind the last sentence in the second paragraph (that begins with "Copies of individual...") and replace with the following:

Copies of individual Montana test methods are available from the Department's Materials Bureau in Helena.

106.02.2 PROSPECTED SOURCES

Page 40

9-26-13

Rescind Subsection 106.02.2 and replace with the following:

Each District/Area lab has historical information of potential prospected sources. This information typically includes the source location, owner, and some test results of samples taken from the source. To view or obtain this information for sources near a project, contact the Area Lab Supervisor. The phone numbers for the District area offices are:

Missoula	(406) 523-5800
Kalispell	(406) 751-2000
Butte	(406) 494-9600
Bozeman	(406) 556-4700
Great Falls	(406) 454-5880
Havre	(406) 262-5500
Glendive	(406) 345-8200
Wolf Point	(406) 653-6700
Miles City	(406) 233-3600
Billings	(406) 252-4138
Lewistown	(406) 538-1300
Helena	(406) 444-6300

The Department is not responsible for the quantity or quality of materials indicated in the prospected source reports. Test data included in the reports are based on the samples tested from the exact locations shown using standard tests. No interpretation is made or intended by the Department. Any interpretation is the judgment of the person examining the tests. See Subsection 102.06 concerning verifying quantity and quality by an independent subsurface investigation before submitting a bid. Make arrangements with landowners for sampling and obtaining material from the prospected material sources.

Do not sell or use material from Department-owned or Department-optioned sources for anything other than the designated project without a written agreement from the landowner and Department approval. Other than those requirements specified in a written agreement between the landowner and Department, any arrangements between the landowner and the Contractor are solely between them. Submit copies of all correspondence and agreements with the landowner to the Project Manager.

Notify the Department in writing if a prospected source is to be used and list the contract items for which that material will be used.

Pay all royalties, obtain all required permits and follow their requirements. Coordinate with the landowner to determine the access routes that are allowed for use and any additional landowner requirements. Adhere to all agreed stipulations, including contouring of pits, topsoil conservation and replacement, seeding, repair or obliteration of haul roads, cattle guards, and fencing; the cost of which is incidental to and included in the materials cost.

106.02.3 CONTRACTOR-FURNISHED SOURCES

Page 40

2-11-10

Rescind Subsection 106.02.3 and replace with the following:

Acquire the rights to take materials from Contractor-furnished sources and pay all related costs, including costs due to increased haul length, exploring and source development.

Furnish material that meets all statutory and regulatory requirements for being non-toxic and non-hazardous. Do not furnish material from mine tailings and waste, slag, sources within state and federal superfund sites, or sources within areas known or suspected to be contaminated with toxic substances or petroleum products unless laboratory reports from an approved laboratory indicate the material meets these requirements.

Obtain Department approval for any special borrow or aggregate source prior to use. Arrange with the Project Manager for representative samples to be taken and witnessed by the Department at least 30 calendar days before beginning production. Provide all equipment and labor necessary for the sampling. See Subsection 106.10 for the number of Department furnished tests at Department expense.

The Department's approval of the source does not release the Contractor from the responsibility to produce materials meeting all specified acceptance requirements.

A. Borrow Source Approval. The 85th percentile of the samples taken from the source(s) must meet the R-value and/or the soils classification specified in the contract.

Furnish a minimum of eight Department-witnessed samples at the locations and depths designated within the limits of the proposed source(s).

Samples will be tested for R-value according to AASHTO T190. The R-value at a 300 psi (2,068 kPa) exudation pressure will be used for evaluation. Samples will be tested for soils classification according to MT 214. If the source is approved, it may be limited to certain areas, layers, or soil classes within a source, during or after source approval testing. Approval of the source does not preclude the Department from sampling from the roadway.

B. Aggregate Source Approval. The Department will process and test samples to determine the suitability of the material in accordance with Subsections 701.02.1 and 701.03.1.

Passing wear and volume swell test results are mandatory for Department approval of bituminized material aggregate sources. Passing wear test results are mandatory for Department approval of untreated aggregate sources.

Assume all risk for producing aggregate from sources not meeting the wear test (MT 209) and volume swell (MT 305) tests. The Department will randomly test stockpiled aggregate for wear and volume swell acceptance.

### 106.03 MATERIALS CERTIFICATION

Page 42

6-27-13

Rescind 106.03 and replace with the following:

#### 106.03.1 Certification of Compliance

A certification of compliance states the material meets the contract requirements. A manufacturer's authorized representative must sign the certificate. Clearly identify each lot of certified materials or assemblies delivered to the work in the certificate of compliance. Materials or assemblies used on the basis of certificates of compliance may be sampled and tested at any time. Materials not meeting contract requirements will be rejected.

#### 106.03.2 Product Data Sheet

A product data sheet describes the mechanical, thermal, physical, chemical, and specific properties of the product. Product data sheets must contain relevant standards, test methods, and results for applicable materials and subcomponents showing products to be in compliance with contract requirements.

### 106.05 FIELD LABORATORY AND EQUIPMENT

Page 42

7-12-12

Rescind Subsection 106.05 and replace with the following:

The Department will furnish all Department field laboratories and testing apparatuses.

Furnish and install appropriate electrical power to field offices and laboratories as directed:

- A continuous 200-ampere, 220 to 230 volt, single phase, 60-hertz power supply using a four wire connector; or
- A 110 to 120 volt alternating current of sufficient capacity.

Have the source connected by a Montana licensed electrician.

Furnish a potable water supply to operate all Department equipment.

No additional payment will be made for providing power and water to the field laboratories or testing apparatuses. Include these costs in the other items on the project.

### 106.09 DOMESTIC MATERIALS

Page 44

1-16-14

Rescind Subsection 106.09 and replace with the following:

Furnish domestic steel or iron materials for applicable products as defined in MT 601. Notify the Project Manager and obtain clarification for any materials containing steel or iron components prior to their incorporation if not clearly defined in MT 601. Domestic material is material produced by manufacturing processes, including coating of steel or iron, that have occurred entirely in the United States. Pig iron, and processed, pelletized and reduced iron ore may be manufactured outside the United States. As required, furnish certification from the original steel producing mill documenting the manufacturing processes, including coatings of covered materials, as performed in the United States.

Buy America requirements apply to all manufactured products composed predominantly of steel or iron materials. A product is considered to be manufactured predominantly of steel or iron if the product consists of at least 90 percent steel or iron content, as determined by the Department, when it is delivered to the job site for permanent incorporation. For purposes of addressing precast or pre-stressed items, the job site encompasses locations where the precast operations occur. Buy America requirements do not apply to miscellaneous steel or iron components, subcomponents, or hardware; such as cabinets, covers, shelves, clamps, fittings, sleeves, washers, bolts (excluding high strength and anchor bolts), nuts, screws, tie wire, spacers, chairs, lifting hooks, faucets, or door hinges that are commonly available as off-the-shelf products or minor items that are necessary to encase, assemble and construct project materials.

Do not incorporate steel or iron materials into the project until a completed Form 406 with all required documentation is submitted to the Department. Ensure that suppliers understand the Buy America and contract requirements to supply the required documentation. Submit documentation to the Department in a clear, organized, legible manner or it will be returned. Clarify which material certifications are for which items. The Department will review the submitted documentation one time at no cost to the contractor. If the Department determines that the submitted documentation is inadequate or fails to meet the contract requirements, the submitted documentation will be returned for clarification or correction. The cost for the Department's re-review of the same submittal is the contractor's responsibility, and may be deducted from contractor payments.

The Department will not pay for items installed until the submitted Form 406 and supporting documentation has been reviewed and is found to be in accordance with the contract requirements. Insufficient or unavailable documentation or documentation showing products to contain steel of foreign origin are grounds for removal and replacement at the contractor's expense.

Material inspection of pre-cast products, prefabricated steel products, or prefabrication plants will take place at the point of manufacture. The District Materials Lab, Helena Materials Bureau, or Department representative will inspect the manufacturing of these items and verify that the fabricator is maintaining supporting documentation. All precast products containing steel and prefabricated steel products delivered to the project must be accompanied by certification from the end product manufacturer or prefabrication plant which states that all steel used in the product has been melted/recycled and manufactured entirely in the United States and they have maintained supporting documentation. Submit a Form 406 with certification by the end product manufacturer or prefabrication plant that all steel incorporated has been melted/recycled and manufactured entirely in the United States. All supporting documentation must be maintained by the fabricator and made available to the Department as requested.

A minimal quantity of foreign manufactured steel and iron material may be used if the cost of the material, including delivery costs to the project, does not exceed one-tenth of one percent of the total contract amount or \$2,500.00, whichever is greater. Submit a request to use a minimal quantity of foreign manufactured steel and iron a minimum of five working days before incorporation into the work. Include in the request the dollar amount of the steel for this request, and the cumulative dollar amount requested to date. Provide documentation, typically in the form of invoices, showing product and delivery cost. Failure to do so will require removal and replacement of all foreign steel and iron with domestic steel and iron. If the foreign steel and iron cannot be positively distinguished from any domestic material used, then all of the material must be removed and replaced with domestic steel and iron at the contractor's expense.

106.10 MIX DESIGNS AND TESTING OF MATERIAL SOURCES

Page 44

7-26-12

Rescind Subsection 106.10 and replace with the following:

The Department will furnish the number of mix design verifications or tests shown in Table 106-1, at no cost to the Contractor:

TABLE 106-1  
NUMBER OF MIX DESIGN VERIFICATIONS OR TESTS FURNISHED AT NO COST

DESCRIPTION	NO. FURNISHED PER CONTRACT
Plant Mix Surfacing Mix Design Verification	2 per grade
Portland Cement Concrete Mix Design Verification	1 per class
Cement Treated Base Mix Design Verification	2 per grade
Special Borrow Testing Package	1 per 65,000 cubic yard (50,000 cubic meters) of plan quantity
Surfacing Material Testing Package	
Indicated source(s) shown on plans	2
Surfacing source(s) furnished by the Contractor	2

Requests for additional verification or testing will be processed in the order they are received, with a minimum 30-calendar day turnaround. The Contractor will be charged the Department's cost for each additional mix design verification or testing package. The total cost will be deducted from the progress estimate payments.

107.02 PERMITS, LICENSES, AND TAXES

Page 45

7-3-08

Rescind the first paragraph (that begins with "Obtain all ...") and replace with the following:

Obtain all legally required permits, authorizations and licenses, pay all charges, fees, taxes, and fuel taxes giving all notices necessary and incidental to the lawful prosecution of the work.

107.06 PUBLIC CONVENIENCE AND SAFETY

Page 46

6-27-13

Add the following 6 paragraphs after the first paragraph (that begins with "Conduct construction with...):

High-visibility safety apparel must be worn by all workers within the right-of-way of all projects. Use high-visibility safety apparel that meets the Performance Class 2 or 3 requirements of the ANSI/ISEA 107-2004 publication entitled "American National Standard for High-Visibility Safety Apparel and Headwear".

Workers include all persons on the project at the request of, employed by, or for the benefit of the Contractor. This includes suppliers and subcontractors at every tier including volunteers.

A workers failure to wear required apparel may result in the worker's immediate and permanent ejection from the project, and/or a suspension of work in that area, at the discretion of the Project Manager. No claim for compensation or delay costs may be made by or through the Contractor in such a case.

Provide complete protection at all times to the travelling public crossing under any structure. Employ positive means such as netting, tarpaulins, wood, or metal covering to prevent tools, materials, etc. from falling onto the roadway below. Positive protection may include traffic control methods, or other approved means to ensure complete protection.

Submit the proposed method and any modifications of the proposed method of traffic protection for approval to the Project Manager a minimum of 2 days prior to the start of this work. Do not begin work until the protection plan is approved and installed to the satisfaction of the Project Manager. Failure to maintain such safeguards in an effective manner may result in an immediate shutdown of work until corrected.

Providing protection to underlying roadways is not measured for payment.

107.08 LOAD RESTRICTIONS

Page 47

8-1-07

Delete the first paragraph (that starts with "Do not exceed legal load ...") and replace with the following:

Do not exceed legal load restrictions when hauling material and equipment on public roadways and bridges within and beyond the project limits and on all new and existing portland cement concrete roadways, completed and accepted gravel surfaces, treated base courses, bituminous surfacing lifts and courses, including plant mix base, plant mix surfacing, and seal and cover.

107.08 LOAD RESTRICTIONS

Page 47

6-1-06

Rescind the last sentence of the fourth paragraph (that begins with "Furnish a ...") and replace with the following:

Furnish a drawing showing distances between axles, truck tare weight, and the overall length of each truck prior to hauling or placing operations.

Add the following paragraph after the fifth paragraph under Subsection 107.08:

If raising a retractable or tag axle results in the truck being over the maximum legal weight, only raise the axles when backing to unload at a chip spreader, windrow, or plant mix paver. Back the minimum distance possible while over legal weight restrictions. Do not exceed the legal weight on the steering axle by more than 25 percent, or tandem axles by more than 50 percent while backing with the retractable or tag axles lifted.

107.09 USE OF EXPLOSIVES

Page 47

1-17-13

Rescind Subsection 107.09.

107.10 PROTECTION AND RESTORATION OF PROPERTY AND LANDSCAPE

Page 48

12-2-10

Rescind Subsection 107.10 and replace with the following:

**107.10 PROTECTION AND RESTORATION OF PROPERTY AND LANDSCAPE**

**107.10.1 Public and Private Property.**

Preserve all public and private property when performing work. Do not disturb or damage land monuments and property markers until witnessed or referenced by the Project Manager.

Be responsible for all damage to public and private property resulting from any act, omission, neglect, or misconduct in the manner or method of executing work until the project is accepted. This responsibility includes damage caused by compaction, vibratory, and impact equipment.

Replace or restore damaged property to its original condition at Contractor expense.

Conduct a review of all public roadways to be used by Contractor equipment, including haul operations, before work begins. Arrange for a local road authority representative and the Project Manager to attend the review. The parties are to review and document the roadways existing condition and determine a dispute resolution process if an agreement on roadway restoration cannot be reached.

Once the roadway is no longer in use by the Contractor, conduct another review by the same parties. The parties are to reach an agreement on what is required to restore the roadway comparable to its original condition. Perform all work required to restore the roadway comparable to its original condition and obtain the Engineer's approval of the work once completed.

Roadway restoration is not measured for payment.

**107.10.2 American Legion Fatality Markers.**

Take inventory of all American Legion Fatality Markers (fatality markers) within the project limits prior to construction activities. Identify the fatality marker's route, reference post, and side of road it is located on. Identify fatality markers that are in conflict with proposed construction activities and those that are not.

- A. Fatality Markers in Conflict with Construction Activities. Prior to construction activities in vicinity of fatality markers, remove and locate fatality markers to a safe location. Upon completion of construction activities, return the fatality markers to the same route as close as practical to the original reference post and side of road, at an offset distance established by the Department.
- B. Fatality Markers not in Conflict with Construction Activities. Do not disturb fatality markers not in Conflict with construction activities.

Be responsible for all damage to fatality markers resulting from any act, omission, neglect, or misconduct in the manner or method of executing work until the project is accepted. Replace or restore damaged fatality markers to their original condition at Contractor expense. All costs incurred to meet the American Legion Fatality Marker requirements are incidental to other items of the contract.

Rescind Subsection 107.11 and replace with the following:

## 107.11 ENVIRONMENTAL PROTECTION

### 107.11.1 General

Follow all state, local, tribal, and federal laws and regulations controlling pollution of the environment. Take precautions to prevent pollution of aquatic resources from silt, fuels, oils, bitumens, chemicals, or other harmful materials. Take precautions to prevent pollution of the atmosphere from particulate and gaseous matter. Do not begin work in areas covered by the permits, authorizations, or notifications until all are received from the regulatory agency. Allow a minimum of 45 days to receive required permits, authorizations, or notifications from the date of the submittal of a complete request, unless a different timeframe is specified by the regulatory agency. The Department is not responsible for delays caused by incomplete or inaccurate submittals by the Contractor.

Obtain and submit one copy to the Project Manager of all required environmental permits, authorizations, and notifications necessary for activities relating to construction activities, including those secured for sites outside of the project limits before construction activities start in permitted area. Submit to the Project Manager, within seven days of sending or receiving, all correspondence to or from regulatory agencies regarding potential noncompliance or violations.

### 107.11.2 Water Pollution Control Regulations

Refer to Section 208 for other requirements relating to water pollution control and aquatic resource protection.

A. Construction De-watering Permit. A Construction De-watering General Permit Authorization is required for any construction activity that discharges sediment-laden water from the work area, such as cofferdams, trenches, excavation pits, or other work types identified in the permit, to state waters. Obtain authorization from the Water Protection Bureau, Department of Environmental Quality (DEQ) before discharging into any state waters. If sediment-laden water is land-applied and will not reach state waters, then a discharge permit is not required.

B. Short-term Turbidity Standard (318 Authorization). Obtain authorization as required under MCA 75-5-318, for any activity that will cause a short term increase in turbidity.

C. Section 404 - Nationwide Permit (NWP) and Individual Permit (IP). Follow the provisions of the Federal Clean Water Act, including the requirements of Section 404.

Temporary facilities and construction activities in and around waters of the U.S. may be covered by a U.S. Army Corps of Engineers (COE) 404 Permit. Adhere to applicable permit conditions and/or NWP Fact Sheets, Regional Conditions, and 401 Certification requirements. Obtain a 404 Permit for temporary facilities and/or construction activities that are not covered by the 404 Permit obtained by the Department for permanent structures. These construction activities may include, but are not limited to, temporary work bridges, work pads, cofferdams, diversions, temporary fills and berms, haul roads, and other work that involves the placement of fill or dredged materials into waters of the U.S.

Prepare the application and submit to the Project Manager for Department review and submittal to the COE. The contract may include additional conditions and requirements for applicable Section 404 permits.

D. Section 10 Rivers and Harbors Act Permits. Follow the requirements of the Rivers and Harbors Act, including requirements of Section 10. COE permits are required for structures or work in, over, under or affecting navigable waters of the U.S. In Montana, navigable waters of the U.S. include, but are not limited to the: Kootenai River, Missouri River, and Yellowstone River. Section 10 permits can be issued concurrently with the Section 404 permits described above. Adhere to applicable permit conditions and/or NWP Fact Sheets, Regional Conditions, and 401 Certification requirements.

E. General Storm Water Permits. Follow the requirements of the National and Montana Pollutant Discharge Elimination Systems (NPDES and MPDES) Storm Water Permits. Coverage under the General Permit for Storm Water Discharges Associated with Construction Activities (General Storm Water Permit) is required for any construction activity that disturbs an area of at least one acre or has the potential of discharge. DEQ administers the MPDES permit. If the project is located on one of Montana's Indian Reservations, NPDES permit authorization is issued by the US Environmental Protection Agency (EPA). Permit authorization is obtained by submitting a complete application package, including the Notice of Intent (NOI) to the appropriate regulatory entities. The EPA allows electronic submittal of the NOI. Obtain the permit authorization directly from the DEQ or EPA.

F. SPA 124 Notification. Follow the requirements of the Montana Stream Protection Act (SPA). The SPA is administered by the Montana Department of Fish, Wildlife and Parks (FWP).

Obtain an SPA 124 for temporary facilities and/or construction activities that are not covered under the SPA 124 obtained by the Department. These activities may include, but are not limited to, work bridges, work pads, cofferdams, temporary detours, diversions, removal and disposal of existing structures, access, sequencing, and construction methodology.

Prepare the application and submit it to the Project Manager for Department review and submittal to FWP. The contract may include additional conditions from the SPA 124 obtained from Contractor submittal.

G. Tribal Permits. Work within reservations may require additional permits and submittals to tribal authorities. Coordinate with the Department to determine requirements and receive assistance in obtaining permits.

The Aquatic Lands Protection Ordinance (ALPO) #90-A provides regulation of all waters and aquatic lands on the Blackfeet Reservation in order to prevent or minimize their degradation. Obtain an ALPO permit for any project within or near aquatic resources.

The Shoreline Protection Office of the Confederated Salish and Kootenai Tribes (CSKT) Tribal Council administers the following Tribal Ordinances:

- Shoreline Protection Ordinance 64A, which deals with any work along the shoreline of Flathead Lake.

- Aquatic Lands Conservation Ordinance (ALCO) 87A, which is required for the alteration of aquatic lands, wetlands, or Flathead Reservation waters from activities such as dredging, filling, irrigation diversions and returns, drainage ditches, and maintenance repairs of these resources.

Tribal Permits are required for construction activities within the project limits and may be required for temporary facilities outside the project limits. If required, coordinate with the Department and obtain tribal permits from the tribal office for additional activities and facilities not covered by tribal permits obtained by the Department.

H. Floodplain Permit. Follow the requirements of the Montana Floodplain and Floodway Management Act. Any construction project within a designated 100-year floodplain is required to have a floodplain development permit prior to the start of construction. The Montana Department of Natural Resources and Conservation (DNRC) administer this permit through the Floodplain Management Section or local floodplain administrators.

MDT obtains this permit for permanent facilities. Obtain the Floodplain Permit from the DNRC or the local floodplain administrator for temporary facilities if required.

#### 107.11.3 Air Quality

Operate all equipment including, but not limited to, hot-mix paving plants, concrete batch plants, generators, aggregate crushers and screens, etc. to meet the minimum air quality standards and applicable requirements established by federal, state, tribal, and local agencies. Secure necessary air quality permits from the appropriate regulatory entity.

Use reasonable precautions to prevent or reduce dust on the project caused by construction operations or traffic, to be in compliance with all federal, state, tribal, and local laws and regulations.

Use water, liquid magnesium chloride, liquid calcium chloride, or other dust palliative approved by the Project Manager. Use only Contractor owned water sources or water that is obtained under a purchased water right according to applicable laws.

Dust control for compliance with all laws and regulations is not measured for payment. Include the cost for dust control in the item of work being performed that results in dust. Any violations or fines associated with dust control / dust control operations are the responsibility of the Contractor.

No additional payment will be made for the use or installation of dust or smoke control devices, for the disruption of work or loss of time occasioned by the installation of such control devices, or for any other related reasons.

#### 107.11.4 Noise Pollution

Adhere to local noise ordinances, laws and regulations, and follow all requirements contained in the contract regarding noise pollution.

#### 107.11.5 Noxious Weed Management

Follow the requirements of the County Noxious Weed Management Act, 7- 22-Part 21 MCA, 80-7-912 MCA and all county and contract noxious weed control requirements. Determine the specific noxious weed control requirements not specified in the contract of each county where the project is located before submitting a bid.

Any product containing forage per 80-7-903 MCA must be certified noxious weed seed free by Montana Department of Agriculture.

Noxious weeds include those species designated by the Montana Department of Agriculture. The most recent list of designated noxious weeds is available from the MT Department of Agriculture, or local county Extension Service or Weed District. The Montana Department of Agriculture web site with noxious weed information is: [www.agr.mt.gov/weedpest/noxiousweeds.asp](http://www.agr.mt.gov/weedpest/noxiousweeds.asp)

Clean all equipment and vehicles prior to their transport into the project area. Equipment or vehicles with visible dirt or plant parts will not be allowed into the project area until they are cleaned to the satisfaction of the Project Manager.

All costs incurred to meet the county weed control requirements are incidental to other items of the contract.

#### 107.11.6 Noxious Weed Control

When Noxious Weed Control is included as a bid item, provide noxious weed control to all lands within the right-of-way within the project limits.

Monitor the construction, borrow and staging areas at intervals necessary to prevent noxious weeds from developing viable seed. Noxious weeds may be controlled through hand-pulling or herbicide application. Select the most effective and appropriate means of control based upon the species and size of infestation and environmental conditions.

If the control is accomplished with the application of herbicides, use only a licensed commercial pesticide applicator certified to apply general and restricted-use herbicides. Use herbicides that meet all applicable state and federal pesticide laws and that are registered with the Montana Department of Agriculture as required by the Montana Pesticide Act. Apply herbicides in a manner that provides immediate control, but does not jeopardize or cause potential harm to final reclamation objectives. Follow all applicable state and federal pesticide laws. If it is determined that herbicide application caused or contributed to the failure of reclamation, take corrective action at no additional cost to the Department.

Do not perform noxious weed control on areas that have received final seeding.

Noxious Weed Control within the project limits is measured by force account methodology. Noxious Weed Control in areas outside of the project limits is not measured for payment.

Work performed within the project limits is paid by units of Noxious Weed Control.

#### 107.11.7 Plant and Animal Protection

- A. Migratory Bird Treaty Act. Complete operations in compliance with the Migratory Bird Treaty Act.

Migratory birds of any kind (including but not limited to swallows and other song birds) are protected under

the Migratory Bird Treaty Act. It is unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product, manufactured or not. Direct disturbance of an occupied migratory bird nest (with birds or eggs) is prohibited under the law.

The Migratory Bird Treaty Act does not prohibit the destruction of most unoccupied (without birds or eggs) migratory bird nests, provided that no possession occurs during the destruction. The destruction of unoccupied nests of eagles and other threatened and endangered species is not allowed.

Contact the Department District Biologist if further instruction, clarification or consultation is required prior to or during construction.

Compliance with the Migratory Bird Treaty Act is incidental to performance of the work and no additional payment is made.

B. Bald and Golden Eagle Protection Act. Complete operations in compliance with the Bald and Golden Eagle Protection Act. The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c) prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle or golden eagle, alive or dead, or any part, nest, or egg thereof." The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb."

For purposes of this contract, "disturb" means: "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle; 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death, or nest abandonment.

A violation of the Act can result in a fine of \$100,000 (\$200,000 for organizations), imprisonment for one year, or both, for a first offense. Penalties increase substantially for additional offenses, and a second violation of this Act is a felony.

C. Endangered Species Act. Complete operations in compliance with the Endangered Species Act (ESA) (16 U.S.C 1531 et seq.). The ESA provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The ESA prohibits any taking of a threatened or endangered species. The definition of "take" includes to harass, harm, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct.

#### 107.11.8 Protection of Aquatic Resources

Unless permitted or authorized, do not impact any aquatic resources located adjacent to the project. Avoid all equipment traffic, fill material, staging activities and other disturbances to all aquatic resources.

In areas adjacent to any water body including streams or irrigation ditches crossing the highway, and any wetland areas; or in areas immediately adjacent to the highway susceptible to sediment transport, conduct construction, staging and paving operations in a manner to avoid placement of materials in these areas.

Any impacts to these areas and associated consequences, without the proper permitting, are the responsibility of the Contractor. The Contractor must secure the appropriate permits or authorizations prior to working in these areas. If complete avoidance of these areas is not possible, contact the Project Manager who will coordinate the permitting effort with the District Biologist or the District Environmental Engineering Specialist.

#### 107.12 FOREST PROTECTION

Page 50

2-23-12

Rescind subsection 107.12 and replace with the following:

#### 107.12 FOREST PROTECTION

Observe sanitary laws and regulations regarding the performance of the work within or adjacent to State or national Forests and Parks. Keep all areas in a neat condition, dispose of all refuse, and obtain permits for the construction and maintenance of construction camps, stores, warehouses, residences, latrines, cesspools, septic tanks, and other structures.

Prevent, suppress, and assist in preventing and suppressing forest fires, and immediately notify a forest official of the location and extent of any fire discovered.

Maintain spark arresters to meet the Forest Supervisor's requirements on all steam, gas, or diesel-driven machinery and on all flues at construction camps.

#### 107.13 INSURANCE REQUIREMENTS

Page 50

4-10-14

Rescind Subsection 107.13 and replace with the following:

#### 107.13 INSURANCE REQUIREMENTS

Meet the timing requirements of subsection 103.07.

##### 107.13.1 Insurance on All Contracts

- A. Commercial General Liability Insurance. Obtain Commercial General Liability insurance with a general aggregate limit of \$2,000,000; an occurrence limit of \$1,000,000; and products and completed operations limit of \$1,000,000. The policy must name the State of Montana, its agents, employees, and officers as an additional named insured.

- B. Owners and Contractors Protective Liability Insurance. Obtain an Owner's and Contractor's Protective (OCP) liability insurance policy for all work to be done, on behalf of the owner (State of Montana, the Department, and its agents, employees and officers) to be submitted with the contract when executed, with a general aggregate limit of not less than \$2,000,000 and an occurrence limit of not less than \$1,000,000.
- C. Insurance Policies. Both of the above policies must:
  1. Provide coverage on an occurrence basis and not on a claims-made basis;
  2. Not contain exclusions for explosion, collapse, or underground damage hazards; and
  3. Provide that all insurance or self insurance maintained by the State, its agents, employees, and officers is in excess of the required insurance and does not contribute with it.

Maintain Commercial General Liability insurance in full force from the effective date stipulated in the Notice to Proceed until Commission acceptance of the project, unless written approval is given by the Construction Administration Services Engineer to cancel the policy. Maintain Owner's and Contractor's liability insurance in full force from the effective date stipulated in the Notice to Proceed until Final Acceptance (form MDT-CON-105\_17\_2) is approved by the Department.

Obtain all policies from an insurer with a Best rating of A- or better on the date the policy is written.

The insurance requirements are a condition precedent to the contract. Failure to obtain and maintain all required insurance is considered a material breach of the contract.

Reinstate the policies listed above if a return to the project is required to complete additional work. Do not begin work until the policies are reinstated and submitted to the Construction Administration Services Bureau in Helena.

#### 107.13.2 Insurance Involving Railroads

Furnish Railroad Protective Liability Insurance on behalf of the railroad when equipment or personnel are located or work is done on any railroad right of way.

The limits of liability are specified in the contract.

Maintain Railroad Protective Liability Insurance in full force until Final Acceptance (form MDT-CON-105\_17\_2) is approved by the Department.

Submit copies of the railroad insurance policies as specified in the contract for transmittal to and approval by the railroad. Do not use or enter railroad property until railroad approval is received and the policies are in effect. This applies to all work done as a part of the project.

Reinstate the Railroad Protective Liability Insurance if a return to the project is required to complete additional work. Do not begin work until the policy is reinstated and submitted to the Construction Administration Services Bureau in Helena.

#### 107.13.3 Insurance Requirements When Utilities Are Present

When working below the ground surface, ensure a comprehensive \$2,000,000 insurance policy covering underground work and resulting damage to underground utilities is in effect.

Maintain insurance in full force until Final Acceptance (form MDT-CON-105\_17\_2) is approved by the Department.

#### 107.13.4 General

Furnish insurance policies with an endorsement that prohibits canceling, altering, amending or reducing coverage without giving a minimum of 30 calendar days written notice by the insurance company to the insured and the Department. A Montana resident agent must countersign all insurance policies issued under the contract. If the state where the insurance is being purchased has a reciprocal agreement with the State of Montana and the insurance company is licensed to do business in the State of Montana, a countersignature by a Montana Resident Agent is not required.

### 107.17 CONTRACTORS RESPONSIBILITY FOR WORK

Page 51

4-10-14

Rescind and replace Subsection 107.17 with the following:

Protect the work against loss, injury, or damage caused by the elements, traffic, or any other cause, including, but not limited to, fire, theft, pilferage, vandalism, or third-party negligence until final acceptance. Repair all damage to any project work, or the project site, caused by the Contractor or anyone performing any project work at no expense to the Department.

Rebuilding, repairing, and restoring damage to the work due to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor (including, but not restricted to: acts of God such as earthquake, flood, tornado, or other cataclysmic phenomenon of nature or acts of the public enemy or of governmental authorities) will be paid for under Subsection 104.03. This does not excuse, or allow compensation or repayment for any act or omission by the Contractor or its subcontractors, either in violation of law, regulation, ordinance, etc., or for any act or occurrence, which could have or should have been foreseen.

Expect probable adverse weather and stream flow conditions to occur. The cost of delay, loss, injury, or damage occurring to dikes, cofferdams, caissons, work bridges, haul bridges, or any other construction item or equipment, caused by adverse weather and stream flow conditions is the Contractor's responsibility.

The above requirements do not apply if the contract has reached Final Acceptance under Subsection 105.17.2.

Provided the damage was not caused by the Contractor or Subcontractor, repair to items that have been accepted as complete is Extra Work under Subsection 104.03 and will be paid for under Subsection 109.04. A building is considered complete when it is fully functional, and is open to the public.

Payment for repair of damages resulting from public traffic and use does not entitle the Contractor to:

- A. The release of any part of unpaid contract funds; or
- B. Relief from responsibility for defective workmanship or materials; or
- C. A waiver of any contract provision.

Conduct the work to assure maximum convenience and safety to the general public and to the property owners adjacent to the work.

Maintain access for adjacent property owners at all times.

Take precautions to prevent damage to the project during work suspensions. Provide for drainage and erect all necessary temporary structures, signs, or other facilities at Contractor expense.

107.18 CONTRACTORS RESPONSIBILITY FOR UTILITY PROPERTY AND SERVICES Page 52 10-11-12

Rescind the second paragraph (that begins with "Call the utilities...") and replace with the following paragraph:

Call the Utilities Underground Location Center (1-800-424-5555) or other notification system, UDIG (1-800-551-5344) if in Flathead or Lincoln County, for the marking and locating of the utilities before excavation.

Add the following paragraph after the second paragraph (that begins with "Call the utilities..."):

The Department will locate existing Department owned utilities. If utilities are relocated or installed as part of the contract, the location of the relocated or newly installed utilities is the responsibility of the Contractor. The Contractor remains responsible for the relocated or newly installed utilities until the utility is functioning and in use by the traveling public.

Rescind the third paragraph (that begins "Obtain and carry...") and replace with the following"

Obtain insurance covering underground work per Subsection 107.13.

107.21 NO WAIVER OF LEGAL RIGHTS Page 53 4-10-14

Rescind the first paragraph (that begins with "Once the work...") and replace with the following:

Final Walk-through under Subsection 105.17.1 does not prevent the Department from correcting any measurement, estimate, or certificate made before or after contract completion and from recovering from the Contractor, or surety, or both overpayments sustained for failure to fulfill the obligations under the contract. A Department waiver of any breach of any part of the contract does not constitute a waiver of any other or subsequent breach.

107.23 DISCOVERY OF UNDERGROUND STORAGE TANKS Page 54 9-9-10

Rescind Subsection 107.23 and replace with the following:

Take the following action if an underground storage tank or tanks are encountered, the existence or location which was previously unknown to the Department or Contractor, on the project within the project limits.

- A. Immediately stop work in the vicinity and notify the Project Manager
- B. Immediately notify the local fire authority and protect people and property from fire, explosion, vapor, and other potential hazards, and prevent further release of the tank's contents. Take all actions requested by the Project Manager.
- C. Notify the Department of Environmental Quality (DEQ) within 24 hours if there is evidence of soil or groundwater contamination resulting from a tank leak or pipe leak, at:  
Underground Storage Tank Program  
Department of Environmental Quality  
Environmental Remediation Division, Petroleum Technical Section  
1-800-457-0568
- D. Perform the tank removal and closure work as permitted by DEQ.
- E. Do not resume work in the immediate vicinity of the tank or piping until approved by the Project Manager.

Costs incurred from the discovery of underground storage tanks within the project limits are paid for as extra work under Subsection 104.03. Costs from the discovery of underground storage tanks outside the project limits are not the Department's responsibility.

107.24 DISCOVERY AND REMOVAL OF UNKNOWN HAZARDOUS MATERIALS Page 54 9-9-10

Rescind Subsection 107.24 and replace with the following:

If hazardous material is discovered within the project limits, the existence or location of which was previously unknown to the Department or the Contractor or not identified in the contract, immediately stop work in that area and notify the Project Manager. Hazardous material includes, but is not limited to; contaminated soil, contaminated water, asbestos, PCBs, petroleum, PCPs, hazardous waste or radioactive material. If the area is determined to pose a hazard to the traveling public, close off all access to the area as directed. Work may continue in unaffected areas believed to be safe.

Once notified of the contaminated site, the Department will determine whether a separate Contractor will be used to assess and clean up the contaminated site before permitting the Contractor to resume work in the contaminated area. If the Department, after consulting with the Contractor, determines that the Contractor can perform the work it is

subject to Subsection 107.26 and is paid for under Subsection 104.03. Obtain all necessary clearances (procedures, permits, etc.) from the regulatory agencies before starting any work.

If the Contractor does not want to perform the work, it agrees and accepts that it waives any potential claim for itself, its subcontractors, and suppliers for damages for delay from the Department's securing another Contractor to perform the clean-up work.

The Department will equitably compensate the Contractor under Subsection 109.04.3 for costs associated with the delay to work in the affected area.

108.01.1 SUBCONTRACTING

Rescind Subsection 108.01.1 and replace with the following:

108.01.1 Subcontracting

Do not subcontract, assign, or otherwise dispose of more than 60 percent of the original contract cost without the written consent of the surety and the Department.

Table 108-1A illustrates when an executed subcontract is required. The table is not all-inclusive, but shows examples. When required, a final determination will be made by the Construction Administration Services Engineer.

TABLE 108-1A  
SUBCONTRACT REQUIREMENTS

Activity	Subcontract Required	Payroll Required
Physical work within the project limits	Yes	Yes
Material application (dust palliative, water, oil products, etc.)	Yes	Yes
Commercially supplied materials	No	No
Owner/Operator of heavy haul trucks	No	*
Crushing operations at a site dedicated to the project	Yes	*
Concrete pump truck (No labor by operator)	No	No
Equipment rentals (w/ operator)	No	Yes
Work performed by a Contractor on the prime's payroll	No	Yes
Survey Work	Yes	*
Consultant services within project limits	Yes	*
Consultant services not within project limits	No	No

\*Contact the Department's Civil Rights Bureau for a determination.

The same criteria apply to work added by a change order. A subcontract is required for work performed by a Subcontractor at any level (second-tier, third-tier, etc) of the contract.

Include in the written subcontract or assignment or in a separate written document with the subcontract or assignment the following language:

"In consideration of being awarded this subcontract, and in consideration of having this subcontract approved by the State of Montana, the Subcontractor hereby assigns to the State of Montana any and all claims or causes of action for any antitrust law violations, or damages arising there from, as to goods, materials, and services purchased under the terms of this subcontract or any change order that may result from this subcontract."

Do not hire or use in any manner a person or organization that performed any part of the design work for the Department unless first approved by the Department in writing.

108.01.2 CONTRACT PERFORMANCE

Rescind Subsection 108.01.2 and replace with the following:

108.01.2 Contract Performance

Perform at least 40 percent of the original contract cost with the Contractor's organization. The price of items designated in the contract as "Specialty Items" will be subtracted from the original contract price before the amount required to be performed by the Contractor is calculated.

Where an entire item is subcontracted, the percentage of the work subcontracted is based on the original contract item unit price. When a portion of an item is subcontracted, the percentage of the work subcontracted will be based on either the subcontract item unit price or on an estimated percentage of the contract item unit price, determined by the Construction Administration Services Engineer. An item will not be considered partially subcontracted unless the prime contractor performs a portion of the work (equipment, materials or labor). If the same item is subcontracted at multiple levels, the cost is only accounted for at the first level. When an item added by change order is subcontracted, the cost of the item does not count towards the required contract performance in Subsection 108.01.1.

Do not allow a Subcontractor at any contract tier to start work until its subcontract is consented to by the Construction Administration Services Engineer. Include one executed and certified copy of the subcontract, a letter from the surety consenting to the subcontract, and the Subcontractor's Checklist.

Inform the Subcontractor of all the contract provisions, and that the Subcontractor is bound by all terms of the prime's contract with the Department. Provide the Subcontractor a copy of all the contract provisions including the applicable prevailing wage rates and FHWA 1273. Include in the subcontract the following language:

"The Subcontractor agrees to comply with all of the labor provisions contained in the attached Special Required Contract Provisions and Davis Bacon Wage Decision."

All subcontractors are agents of the Contractor. The Contractor is responsible for all work, material furnished, project documentation provided by, and indebtedness incurred by its subcontractors.

Written consent to subcontract, assign or transfer the contract does not release the Contractor from liability under the contract and bond.

108.01.3 SUBCONTRACTOR PAYMENTS

Page 57

4-8-10

Add the following Subsection:

Submit payment information for all Subcontractors to the Civil Rights Bureau within 30 calendar days of the payment. This information can be submitted electronically on the Department's website.

108.03.1 GENERAL (PROSECUTION OF WORK)

Page 58

9-26-13

Rescind the third paragraph (that begins with "A pre-construction conference ...") and replace with the following:

A pre-construction conference will be held on a mutually agreed date between the Contractor, Department and other parties interested in the work before work within the project limits begins no later than twenty calendar days after the Notice to Proceed date. The Contractor's superintendent in charge of the project must attend the conference. Encourage subcontractors to attend. Submit a schedule meeting all requirements of Subsection 108.03.2 or 108.03.3 at or before the pre-construction conference. No other work, except obtaining permits, may begin until the schedule requirements have been met. No payments will be made on the contract until the pre-construction conference has been held and the submitted schedule reviewed.

108.03.2 PROJECT SCHEDULES

Page 59

12-13-12

Add the following sentence after the first sentence in the first paragraph:

The initial schedule must show that the work will be completed in the time frame as specified in the contract.

Add the following to the list after part (B) following the second paragraph (that begins "The Contractor may use..."):

4. The Contractor's anticipated number of days during each month that weather will affect operations.

Within the third paragraph, rescind the third sentence (that begins "If the work...") and replace with the following:

If the work is not proceeding consistent with the Contractor's most recently reviewed ASC and WN, the Project Manager may require that the Contractor submit two copies of an updated ASC and WN that accurately reflect the Contractor's progress, resource allocation for the project, and revised schedule.

Within the sixth paragraph, rescind the last sentence (that begins "The Project Manager's...") and replace with the following:

The Project Manager's review does not attest to the validity of the ASC or WN.

108.03.3 CRITICAL PATH METHOD (CPM) SCHEDULING

Page 60

3-27-14

Rescind the first paragraph (that begins "When requested...") and replace with the following:

Develop, maintain and provide a detailed time-scaled computer generated critical path method progress schedule using Primavera P6 or other Primavera product which generates a .xer file type.

Schedule all contract work including that of subcontractors, vendors and suppliers. The initial schedule must show that the work will be completed in the time frame as specified in the contract.

Rescind the first sentence of the third paragraph (that begins "The Project Manager...") and replace with the following:

The Project Manager may withhold ten percent of each monthly progress estimate for failure to submit an original or updated CPM schedule on time and in the manner required.

Under part (A), rescind the first sentence (that begins "Prepare an initial...") and replace with the following:

Prepare an initial schedule and submit an electronic file using Primavera P6 or other Primavera product which generates a .xer file type. Once an accepted baseline schedule is submitted, furnish one ANSI D (24-inch by 36-inch) paper copy.

Rescind part (C) and replace with the following:

- C. Schedule Requirements.

Schedule submittals include:

1. Activity identification numbers;
2. Project milestones;
3. Activity descriptions;
4. Appropriate relationships;
5. Activity durations appropriate for the work. Submit activity manpower, equipment, unit quantities and production rates to the Project Manager for review;
6. Procurement of permits;
7. Material procurement separated into at least two activities, fabrication and delivery. Include time for delivering all submittals and Department review of working drawing submittals as separate items in the schedule logic for all items requiring submittal, review and approval;
8. Activities coded to reflect the party performing each activity (only one party performs each activity) including subcontractors and suppliers and the area/location of each activity;
9. Work days per week, holidays, number of shifts per day, hours per shift and major equipment to be used;
10. Phasing (staging) details, if the work has phasing or is to be performed in phases;
11. Written narrative describing the anticipated work in an orderly sequence of the construction phasing, anticipated problems, and anticipated project completion dates, in a detailed description. Narratives that are a listing of the work will not be acceptable. Include written narratives with each submission; and
12. Calendars, including weekends, holidays, or other Contractor non-work periods. All activities must be identified by entry of their appropriate Calendar.
13. The Contractor's anticipated number of days during each month that weather will affect operations.

Use only contractual constraints in the schedule logic. Do not use any other schedule constraints such as activity mandatory start and finish dates or mandatory zero float constraints.

Float is defined as the amount of time between when an activity "can start" and when it "must start". Total float is float shared with all other activities and is defined as the amount of time an activity can be delayed without affecting the overall time of project completion. Float is a shared commodity, not for the exclusive use or financial benefit of either party. Either party has the full use of float until it is depleted.

The critical path is defined as the longest continuous Sequence of Activities through the network Schedule that establishes the minimum overall project duration. The submitted activity sequence and durations must generate a CPM schedule having a critical path. Multiple critical paths and near-critical paths must be kept to a minimum. Multiple critical paths and near-critical paths must be described with thorough and reasonable justification in the written narrative to be accepted.

Show the sequence and interdependence of all activities required for the complete performance of all items of work under this contract, including acquiring all the environmental permits. Show all network "dummies" on the diagram.

The Department reserves the right to limit the number of activities on the schedule to between 50 and 1000 activities.

Describe the activities so that the work is identifiable and the progress on each activity is measurable.

Under part (D) rescind the second paragraph (that begins "Each month...") and replace with the following:

Each month of the project, one week before the end of the project's monthly estimate cycle, submit an electronic file using Primavera P6 or other Primavera product which generates a .xer file type containing:

Rescind part (1) under part (D).

#### 108.03.5 BASIS OF PAYMENT

Page 61

1-17-13

Add the following after the first paragraph (that begins: "Payment for all..."):

Failure to submit a CPM schedule update to the Project Manager within two calendar days of its due date will result in a Contract Unit Price Adjustment. The adjustment will be a 10 percent deduct of the CPM Schedule bid item for each update that is late.

Rescind the second paragraph (that begins: "The Department may...") and replace with the following:

Failure to submit a revised CPM schedule as specified may also result in withholding ten percent of each monthly progress estimate. Payment withheld for violation of the schedule requirements will be included in the next progress estimate following the Contractor's submission of the required schedule.

#### 108.05 CHARACTER OF WORKERS

Page 62

5-24-12

Rescind the second paragraph (that begins "Remove any person...") and replace with the following:

Remove any person employed who does not perform work in a proper and skillful manner or who is intemperate, disorderly, or verbally abusive. Employees may not return to the project or communicate with Department personnel without the written approval of the Project Manager.

108.07 DETERMINATION OF COMPENSATION AND EXTENSION OF CONTRACT Page 62 4-12-12  
TIME FOR EXCUSABLE, NONCOMPENSABLE, AND COMPENSABLE DELAYS

Rescind the first paragraph under 108.07 and replace with the following:

Time allowed for completion of the contract is determined by the "Completion Date", "Calendar Day" or "Working Day" provision in the contract.

108.07.1 CALENDAR DATE CONTRACTS Page 62 4-10-14

Rescind Subsection 108.07.1 and replace with the following:

108.07.1 Completion Date Contracts

Complete all work by the completion date specified in the contract. The work begins on the effective date stated in the "Notice to Proceed".

The completion date will be extended for the following:

- A. Extensions according to the calendar days added under Subsection 108.07.5; or
- B. Suspensions of work authorized after the contract is awarded; or
- C. Delays in the award of the contract.

The new completion date is determined by adding the calendar days added under Subsection 108.07.5; the number of calendar days less No Work Days during authorized suspensions; or the number of calendar days the award was delayed past the posted award date to the specified completion date.

Obtain approval from the Project Manager to work on any No Work Days.

The actual completion date is the date the Project Manager approves the Contractor's Certificate of Work Complete form under Subsection 105.17.2.

Contract time overruns for assessment of liquidated damages will be computed as the number of calendar days elapsing between the contract completion date and the actual completion date.

108.07.2 CALENDAR DAY CONTRACTS Page 62 4-10-14

Rescind Subsection 108.07.2 Reserved and replace with the following:

108.07.2 Calendar Day Contracts

Complete all work within the number of calendar days specified in the contract.

A calendar day is defined in Subsection 101.03. The work begins on the effective date stated in the "Notice to Proceed".

Calendar days will be added for extensions added under Subsection 108.07.5.

Obtain approval from the Project Manager to work on any No Work Days. Work on any of these days will be considered a chargeable day and assessed against the contract time unless the work is an exempt work item defined in Subsection 101.03.

Contract time assessment will cease when the Project Manager approves the Contractor's Certificate of Work Complete form under Subsection 105.17.2.

Contract time overruns for assessment of liquidated damages will be computed as the number of calendar days the contract is not complete beyond the contract time specified.

108.07.3 WORKING DAY CONTRACTS Page 63 4-10-14

Rescind Subsection 108.07.3 and replace with the following:

Complete all work within the number of working days specified in the contract.

A working day is defined in Subsection 101.03. Time assessment begins on the effective date stated in the "Notice to Proceed".

Working days will be assessed against the contract time except for days when work cannot be performed due to inclement weather. Days will not be assessed if inclement weather or the aftermath of inclement weather prevents the contractor from working at least six hours in a day. Inclement weather will not be considered when assessing time if the contractor is not actively performing work or is not scheduled to work.

Obtain approval from the Project Manager to work on any No Work Days. Work on any of these days will be considered a chargeable day and assessed against the contract time unless the work is an exempt work item defined in Subsection 101.03.

A working day will not be assessed against the contract for work performed up until 12:00 noon on Friday prior to Memorial Day, Labor Day or Independence Day (July 4).

Chargeable or non-chargeable working days will be determined daily by the Project Manager. Except during the winter shutdown, the Project Manager will furnish a weekly report every Monday showing the number of working days:

- A. Charged for the preceding week;
- B. Previously charged;
- C. Specified for contract completion;
- D. Approved time extensions; and
- E. Remaining to complete the contract.

During winter shutdown, the Project Manager will furnish a report showing the information listed above for any week that the Contractor has chargeable days.

Submit a written protest to the Project Manager within the timeframe shown on the weekly report for any alleged discrepancies in the time assessed. Failure to file a protest is conclusive evidence that the time assessed is accepted as correct.

Contract time assessment will cease when the Project Manager approves the Contractor's Certificate of Work Complete form under Subsection 105.17.2.

Contract time overruns for assessment of liquidated damages will be computed as the number of working days assessed beyond the contract time specified.

#### 108.07.4 DELAYS

Page 63

5-24-12

Add the following sentence to the end of part (A):

Provide project and site specific documentation to support the delay cause.

#### 108.07.5 EXTENSIONS (TIME)

Page 64

9-26-13

Add the following paragraph after the first paragraph (that begins with "Provide a written..."):

Time extension requests must be made within 10 business days of the alleged delay. The time extension request must be accompanied with a written narrative and an updated schedule.

Rescind the second paragraph (that begins with "The contract time as awarded ...") and replace with the following:

The contract time as awarded is based on the estimated quantities as defined in Subsection 102.05. No decrease in contract time will be made for any decrease in a contract item. The contract time may be increased based on the quantity and difficulty of added work and how it impacts the critical activities of the Contractor's operation as shown on the most current work schedule as required under Subsection 108.03.

The time extension will be to the nearest whole day.

No additional contract time will be allowed for:

- A. Increases in percentages of asphalt in plant mix materials.
- B. The addition of anti-stripping additives to bituminous materials.
- C. The addition of or for increases in hydrated lime or mineral fillers to plant mix materials.
- D. Increases in traffic control devices.
- E. Delays for slow delivery of materials from the supplier or fabricator.
- F. Material deliveries delayed for reasons of late ordering, financial considerations, or other foreseeable and preventable causes within the Contractor's control.

#### 108.07.6 DELAY COMPENSATION

Page 64

10-11-12

Rescind Subsection 108.07.6 and replace with the following:

##### 108.07.6 Delay Compensation

Notify the Project Manager of the request for delay consideration. Keep daily records of all non-salaried labor, material costs, and equipment expenses for all operations affected by the delay.

Maintain a daily record of each operation affected by the delay. Identify the location, by stations, of the affected operations. Prepare and submit, each Monday, written reports to the Project Manager containing the following information:

1. Number of days behind schedule;
2. A summation of all operations that have been delayed, or will be delayed;
3. An explanation for compensable delays and how the Department's act or omission delayed each operation;
4. An estimate of the time required to complete the project; and
5. An itemization of all extra costs incurred, including:
  - a. Relating the extra costs to the delay and document how they are calculated and measured;
  - b. Identifying all non-salaried project employees for whom costs are being compiled; and
  - c. Summarizing the time charges for equipment, identified by manufacturer's number for which costs are compiled.

The Project Manager will maintain daily records of the operations by stations. At the end of each week, request a copy of the Project Manager's daily records, in writing. Compare the two records and provide a written summation of the comparison of the detailed reports to the Project Manager within ten calendar days of receipt of the Project Manager's daily records. Identify all disagreements between specific records.

Failure to review the Project Manager's records or to report disagreements between the records is considered the Contractor's acceptance of the Project Manager's records as accurate.

- A. Procedures Following Completion of Work Allegedly Delayed. Submit a written report to the Project Manager within 30 calendar days of completion of work allegedly delayed. All costs shown in the report submitted must be certified by a certified public accountant (CPA) and include the following:
  1. A description of the operations delayed and the documentation and explanation of the reason for the delay, including all reports prepared for the Contractor by consultants, if used; and
  2. An item-by-item measurement and explanation of extra costs requested for reimbursement due to the delay.

The Project Manager will provide a written decision to the Contractor within 14 calendar days of receiving the submittal.

In the case of compensable delays, if it is determined that the Department is responsible for delays to the Contractor's operations, the Project Manager's written decision will reflect the nature and extent of any equitable adjustment to the contract as specified in Subsection 109.04.3.

**108.08 FAILURE TO COMPLETE ON TIME**

Rescind Subsection 108.08 and replace with the following:

If the contract time is exceeded, including approved adjustments, a daily charge will be made against the contract until final acceptance under Subsection 105.17.2. This daily charge, determined from Table 108-1, will be deducted from any money due the Contractor. This deduction is for liquidated damages for added Department contract administration costs, etc. for failure to complete the work on time.

TABLE 108-1  
SCHEDULE OF LIQUIDATED DAMAGES

ORIGINAL CONTRACT AMOUNT		DAILY CHARGE
From More Than	To and Including	Working Day or Calendar Day
\$ 0	\$ 100,000	\$ 827
\$100,000	\$ 500,000	\$ 1,251
\$ 500,000	\$ 1,000,000	\$ 1,532
\$ 1,000,000	\$ 2,000,000	\$ 1,993
\$ 2,000,000	\$ 5,000,000	\$ 2,756
\$ 5,000,000	\$ 10,000,000	\$ 4,242
\$ 10,000,000	—	\$ 5,428

Permitting the Contractor to continue and complete the work after the specified contract completion time or approved extensions granted, does not waive the Department's rights under the contract.

If the Contractor disputes the liquidated damages on the approved "Contractor's Certificate of Work Complete" form, the Construction Administration Services Bureau will send a final notification in writing to the Contractor of the number of days to be assessed and the dollar amount of proposed liquidated damages. Submit any objections of the assessment to the Construction Administration Services Bureau in writing within thirty days of receipt of the Department's notification. Include with the objection the justification and all information to support an adjustment to the assessment. The Department will review the Contractor's information and perform a final analysis.

The Commission will review all liquidated damages and any disputes. The Construction Administration Services Bureau will submit the Contractor's information and the Department's recommendation to the Commission. A copy of the Department's recommendation will be sent within 45 days of receipt of the objections to the Contractor. The Contractor must state in writing within fourteen days of receipt of the Department's recommendation if an appearance before the Commission is requested. If an appearance is requested, the Department will notify the Contractor in writing of the date the Commission will review the liquidated damages recommendation. The Commission will not receive or hear new information at the meeting not already furnished in the Contractor's original response.

**108.10.2 PAYMENT**

Rescind the second and third paragraphs and replace with the following paragraphs:

Payment will be made for materials delivered or stockpiled, or work performed, that comply with the contract's specifications or that have been inspected, tested, and accepted for use. Payment will only be made for materials that have been properly stored and maintained until they are delivered to the Department. An equitable adjustment will be made under Subsection 109.05 for partially completed items of work and disposal of materials.

Submit the termination costs to the Project Manager within 60 calendar days of the date of the notice of Termination for Public Convenience, under Subsection 108.10.1. Provide sufficient detail and make all project records available so the Engineer can determine the basis and amount of the termination costs. If a basis cannot be agreed upon, then an adjustment will be made in such amount as the Engineer may determine to be fair and equitable. Follow the requirements of Subsection 105.16 if the Engineer's equitable adjustment is disputed.

**109.01 MEASUREMENT OF QUANTITIES**

Rescind the third paragraph (that begins with "Metric measurements are given..").

Rescind the second sentence in the sixth paragraph (that begins "No deductions will be...") and replace with:

No deductions will be made for individual fixtures having an area of 9 square feet (0.8 m<sup>2</sup>) or less.

Rescind the last paragraph (that begins "Items that are measured...") and replace with:

Items that are measured by the foot (m, mm), such as pipe culverts, guardrail, underdrains, and the like, are measured parallel to the structure base or foundation

109.01.2 METRIC ABBREVIATIONS IN THE SCHEDULE OF ITEMS Page 71 5-9-13

Rescind Subsection 109.01.2. Metric Abbreviations in the Schedule of Items

109.02.1 PAY UNIT ROUNDING Page 71 11-17-11

Add the following subsection:

109.02.1 Pay Unit Rounding

The Project Manager will determine the quantities of work performed for each pay estimate as outlined in Subsection 109.01. All quantity calculations will be rounded for payment as outlined in Table 109-1A.

TABLE 109-1A  
ROUNDING CRITERIA

PAY UNIT	ROUNDING
Foot (meter)	1 (0.1)
Station	0.01
Mile (kilometer)	0.01 (0.01)
Course Foot (kilometer)	10 (0.01)
Square Foot (meter)	1 (0.1)
Square Yard (meter)	0.1 (0.1)
Acre (hectare)	0.01 (0.001)
Cubic Yard (meter)	0.01 (0.01)
Thousand Board Feet (cubic meter)	0.01 (0.01)
Gallon (liter)	1 (1)
Pound (kilogram)	1 (1)
Ton (metric ton)	0.001 (0.001)
Ton-Mile (metric ton-kilometer)	1 (1)
Mile-Cubic Yard (kilometer-cubic meter)	1 (1)
Hour	0.1
Lump Sum	0.001
Each	1
Unit	1

All dollars will be rounded on progress and final estimates to \$0.01.

109.04.1 UNIT PRICE OR LUMP SUM BASIS (EXTRA WORK) Page 72 3-1-07

Rescind Subsection 109.04.1 Unit Price or Lump Sum Basis and replace with the following:

109.04.1 Unit Price or Agreed Price

Extra work performed under Subsections 104.02 and 104.03 is paid for at the unit price or price agreed upon and specified in the change order.

Force account basis under 109.04.2 will be used if a change order with an agreed price is not signed by the Contractor.

109.04.2 FORCE ACCOUNT BASIS

Page 72

1-16-14

Rescind the first paragraph (that begins with "Approved extra work ...") and replace with the following:

Approved extra work paid for on a force account basis will be accounted for daily. The daily report sheets are the true record of extra work. The payments below are full compensation and include profit and overhead. No additional profit will be added. Extra work on a force account basis ordered by the Engineer in writing, under Section 104, is paid for as follows

Rescind the first sentence of the first paragraph in part A (that begins with "The Contractor is paid ...") and replace with the following:

The Contractor is paid the wage rates for all labor and foremen assigned exclusively to performing the extra work for the total hours worked plus at least 80 percent of the total.

Add the following after the first sentence in the second paragraph of part A (that begins with "Submit evidence of ..."):

Only labor on certified payrolls is eligible. The rate paid will be that listed on the certified payroll.

Rescind the first sentence in Subsection C (that begins with "The Contractor will receive ...") and replace with the following:

The Contractor will receive the rental rate or invoice price, where applicable, for machinery or special equipment (other than small tools) used to perform the work plus 10 percent.

Add the following sentence after the second sentence of part D (that begins with "No surcharge is allowed ..."):

No payment will be made for additional performance bond premiums if the evidence is not submitted within 30 days of completion of the force account work.

Rescind the second paragraph of Subsection F (that begins with "The inspector will ...") and replace with the following:

The Inspector will compile and forward to the Project Manager, at the end of each day, a daily record of extra work done on a force account basis. The Project Manager will forward the information to the Contractor.

109.05 DELETED OR TERMINATED WORK

Page 73

3-12-09

Rescind the first sentence in 109.05, part (1) (that begins with "Payment will be...") and replace with the following sentence:

Payment will be made for the actual number of units of work completed and meeting all contract requirements at the contract unit prices unless the Engineer determines the contract unit prices are inappropriate for the work actually performed.

Rescind the first sentence in 109.05, part (2) (that begins with "Payment for partially ...") and replace with the following sentence:

Payment for partially completed lump sum items that meet contract requirements will be as mutually agreed.

109.06 PARTIAL PAYMENTS

Page 74

7-3-08

Rescind the first paragraph (that begins with "Partial payments will be made ...") and replace with the following:

Partial payments will be made once each month, following the effective date on the Notice To Proceed, based on estimates of the value of the work performed and materials complete in place under the contract, including materials delivered under Subsection 109.07. No payments will be made for work performed or materials produced without the required permits and authorizations in place as required under Subsection 107.02.

109.06.1 BILLING CYCLE

Page 74

10-8-09

Add the following subsection:

109.06.1 BILLING CYCLE

In accordance with §28-2-2115, MCA, this contract provides that the Department will submit payment estimates in billing cycles other than once a month, when deemed necessary. Do not submit a request for routine payment and requests for payment of any item does not initiate any period for payment. Requests may be submitted for stockpiled material payments in accordance with 109.07.

In accordance with federal regulations, the Project Manager will issue estimates, usually monthly, for progress payments greater than \$500 based on the documentation of approved work and the Project Manager's opinion of the percentage of completion, in accordance with specifications, of each of the project's "Schedule of Items". The Department will review work performed for completeness, specification compliance, and quality assurance before it is given conditional approval for progress payment. Should work that was previously paid for any reason, such as stockpiled material under 109.07, be later found not to comply with quality assurance or specification, such as compliance testing or any required material certification, that part of the work will be deleted from payment approval. In such case, future monthly estimates will be lessened by the reduced amount, or the Contractor will be required to repay the previously-paid amounts until the work is performed in full compliance with specification and quality assurance.

Notice of extended payment provision: this contract allows the Department to make payment within thirty (30) days after submission of estimates by the Project Manager.

The contract's final payment will not be made until:

- The Contractor has fully completed all work under the contract;
- All required documentation has been submitted to the Department's satisfaction; and
- The materials supplied and work performed has passed the Department's quality assurance testing.

Pay all subcontractors within seven days after receipt of a periodic or final payment from the Department, for the full amount due the subcontractor under the subcontract for work performed or materials provided that were included in the periodic or final payment according to the provisions of §28-2-2103(2)(a), MCA. A subcontract may not provide for a time longer than the law's mandated seven days.

#### 109.07 PAYMENT FOR MATERIAL ON HAND

Page 74

5-24-12

Rescind Subsection 109.07 and replace with the following:

#### **109.07 STOCKPILED MATERIALS**

Materials delivered and stockpiled at the project site or other location approved by the Project Manager may be considered for partial payment, if the following requirements are met:

1. The requirements of Subsection 108.03 have been satisfied.
2. The material meets the contract requirements.
3. The material is a manufactured end product or a fully fabricated product. Aggregate must be produced and stockpiled to the final stage for incorporation into the specified mixture or the roadway. Riprap meeting the gradations specified in Table 701-19 for the class specified in the plans is considered a manufactured end product for this Subsection.
4. Material is stored to prevent damage and theft, without obstructing or impeding the traveling public. MDT Inspectors have access to the inventory sheets and the stockpiles at all times.
5. A written request is accompanied with an invoice(s) for all items received at least one week before the end of the monthly estimate cycle. Include the quantity for which payment is requested, the length of time the material is to be stored, the location for material stored off the project site, and sufficient detail to justify the costs. If the material is manufactured by the prime contractor, include the manufacturing costs in the request.

Submit a new request and invoice(s) to the Project Manager whenever items are added to the stockpile. Clearly identify the project number, location, designation and the entire inventory on these sheets. Keep each project's stockpiled material separated from stockpiles belonging to other projects. Only use stockpiled material for the designated project.

Steel or Iron items meeting Subsection 106.09 may be stored at property owned or leased by the Contractor or approved Subcontractor if approved by the Project Manager. The property must be located in Montana and accessible to Department personnel at all times.

Payment made for material on hand does not constitute acceptance of the material.

If stored material is lost, stolen, or damaged, the material's value will be deducted from the subsequent estimate or estimates.

Payment of partial estimates for stored material, acceptance of the materials to be stored, or approval of the storage method does not relieve the Contractor's responsibility for all materials and work upon which payments have been made or the restoration of any damaged work. The payments are not a waiver by the Department of any other contract provisions or of its rights to require fulfillment of all contract terms.

Partial payment will be made for the invoice price, or for the manufacturing costs incurred by the prime contractor. Payment for stockpiled materials will not exceed the contract unit price or the amount justified to the Project Manager. When stockpiled material has been produced by crushing operations, payment will not exceed 40 percent of the contract unit price. Maximum payment for materials in storage will be based on quantities that will be measured for payment.

Obtain the Engineer's written approval of off-project site storage locations for bridge prestressed beams, bridge structural steel members, concrete box structures, and other large structural items.

No payment is made for bridge deck re-surfacing materials having a manufacturer's expiration date passing before its scheduled incorporation into the work.

#### 109.08 FINAL ESTIMATE

Page 77

4-10-14

Rescind Subsection 109.08 and replace with the following:

#### **109.08 RESERVED**

## 109.09.1 GENERAL (MOBILIZATION)

Page 77

3-1-07

Add the following number 7 after number 6 in Subsection 109.09.1 General:

7. Submission of all forms, certifications, and documentation required for the Department to prepare the final estimate and issue a certificate of completion.

Add the following paragraph at the end, after number 7:

Mobilization is only to be used for these reasonably-anticipated expenses, and is not to be used either to front-load a bid in order to receive payment earlier, or to unbalance a bid.

## 109.09.2 PAYMENT (MOBILIZATION)

Page 77

4-10-14

Rescind Subsection 109.09.2 and replace with the following:

## 109.09.2 Payment

The original contract amount is the total price of the contract as bid. The Contract Amount Paid is the cumulative amount paid on progress estimates, excluding all price adjustments. Partial payments for mobilization will be made based on the lump sum contract unit price under Table 109-2. No payments will be made for mobilization until the requirements of Subsection 108.03 have been satisfied.

TABLE 109-2  
MOBILIZATION PAYMENTS

Percent of Contract Amount Paid	Amount Paid (whichever is less)	
	Percent of Mobilization Bid Amount <sup>1</sup>	Percent of Original Contract Amount
First estimate after Notice to Proceed	99	1
5	25	3
10	50	6
25	60	8
50	90	10
70 or Conditional Final Acceptance, whichever occurs first	99	
Final Estimate	100	

Note:

1. This percentage is the cumulative amount paid to that point, not the amount paid on the progress estimate.

Payment at the contract unit price is full compensation for all necessary resources to complete the item of work under the contract.

## 109.10 OVERPAYMENTS

Page 78

5-24-12

Rescind Subsection 109.10 and replace with the following:

Overpayments on progress estimates will be deducted from subsequent progress estimate payments. If there are no subsequent progress estimate payments to be made, or the amounts to be paid are less than the overpayment, the Department may:

1. Notify the Contractor of the overpayment. The Contractor has 30 days from the date of receipt of notification of overpayment to repay the money owed. If the money owed is not received by the Department before the 30-day period expires, interest will be charged on the overpayment beginning with the date of receipt of notification of overpayment. The interest rate charged will be the average Short Term Investment Pool (STIP) rate, determined by the Montana State Board of Investments, for the period in which the overpayment is not repaid.  
The Contractor may be barred from bidding on Department projects until the money that is owed has been received.
2. The Department may deduct the amount of overpayment and accrued interest from the progress estimate payment of any contract with the Department.

## 109.11 FUEL PRICE ADJUSTMENT

Page 78

1-16-14

Rescind Subsection 109.11 Fuel Price Adjustment and replace with the following:

## 109.11 FUEL PRICE ADJUSTMENT

Notify the Project Manager in writing by the Notice to Proceed Date or at the Pre-construction Conference, whichever comes first, of intent to participate in fuel price adjustment. Once the provision is invoked, it will not be reversed. Submit a list of contract items, according to Table 109-3, that are requested to be subject to fuel price adjustment. Submit the list to the Project Manager for approval by the Pre-construction Conference, using form CSB109\_11.

TABLE 109-3  
ITEMS SUBJECT TO FUEL PRICE ADJUSTMENT

Original Contract Amount	Maximum Number of Items
\$0 to \$8,000,000	10
\$8,000,001 to \$15,000,000	15
Greater than \$15,000,000	20

When required by the Project Manager, provide actual diesel fuel, propane fuel and gasoline fuel costs along with the calculations used to determine the costs for the respective contract items. The accumulated diesel fuel, propane fuel and gasoline fuel costs may not exceed 20 percent of the contract unit price without additional justification acceptable to the Project Manager. Items measured on a lump sum basis will not be eligible for fuel price adjustment. No fuel price adjustment will be made for stockpiled materials.

Adjustments will be calculated using the increase or decrease between the base price and the monthly average price at the time the contract items are added to the progress estimate. The base price for the contract will be the average of the high and low price for the five business days before the bid opening. The base price for propane fuel will be the base price for diesel fuel divided by the difference in BTU/hr for each fuel, or 1.5455 BTU/hr. The monthly average price will be the average of the high and low prices on Wednesday of each week in the adjustment period taken from Platt's Oilgram Price Report, or other fuel price report determined by the Department for unleaded gasoline and ultra-low sulfur diesel fuel. The average price for propane fuel will be the average monthly price for diesel fuel divided by 1.5455. The adjustment period for fuel price is from the Wednesday of the full week before the beginning of the estimate cycle to the Wednesday of the full week prior to the next estimate cycle. If the estimate cycle extends beyond the monthly estimate period, only the fuel prices from the month in which the item is added to the estimate will be used to generate the average price.

Adjustments will be made only when the monthly average price exceeds \$0.25 per gallon more or less than the base price. The adjustments will be for the amount exceeding \$0.25 per gallon.

The price adjustment for each type of fuel will be the change in cost from the base price (BP) to the monthly average price (AP) that exceeds \$0.25, multiplied by the quantity (Q) of the item added to the progress estimate, multiplied by the fuel cost (FC).

Adjustments will be according to the following formulas:

$$\text{Increase} = \left( \frac{AP - BP - 0.25}{BP} \right) * FC * Q$$

$$\text{Decrease} = - \left( \frac{BP - AP - 0.25}{BP} \right) * FC * Q$$

Where:

AP = Monthly Average Price

BP = Base Price

FC = Fuel Cost

Q = Quantity

Include only the cost of fuel associated with the approved items in fuel cost (FC). Do not include additional costs related to items such as servicing of equipment, lubricants, tire and ground engaging component wear, depreciation, insurance, storage, licenses, inspection, etc.

Adjustments will be calculated for each type as described without regard to the grade or amount of fuel actually used. The total of the fuel price adjustments will be added to, or subtracted from, the monthly progress estimate.

#### 201.04.2 AREA BASIS

Page 83

9-26-13

Rescind Subsection 201.04.2 and replace with the following:

Measurement is by the acre (ha) for the area actually cleared to the limits in the contract or as staked by the Project Manager. Disposal is not measured for payment.

#### 202.03 CONSTRUCTION REQUIREMENTS

Page 85

6-27-13

Add the following paragraph prior to the first paragraph (that begins, "Raze, remove, and..."):

1. General. Retain a Blasting Consultant as required in Subsection 204.03.1 when using explosives to remove structures or obstructions.

Add the following Subsection after the third paragraph (that begins, "Install the necessary..."):

2. Structure Removal. Submit to the Project Manager, 5 copies of a written proposed plan for removal and/or salvage of bridges. Do not begin removal or salvage operations prior to receiving approval. Include a narrative of all operations, including all cutting and welding procedures. Include welder's certifications and

descriptions of welding processes. Approval of the plan is contingent on the plan meeting the requirements of the contract and all permits.

202.03.1 REMOVAL OF BRIDGES AND MAJOR DRAINAGE STRUCTURES Page 85 6-27-13

Rescind Part B. Removal of Substructures and replace with the following:

- B. Removal of Substructures. Remove or cut off piles and substructures to 3 feet (915 mm) below the finished grade or existing ground surface elevation, whichever is lower. Shape and contour the removal areas to blend with the surrounding terrain.  
Do not damage new work while removing existing structures.

Add the following Subsection:

- E. .Removal and Salvage of Structure. Do not weld or use a cutting torch on any portion of existing bridge without an approved welding or cutting plan. Follow the requirements of Section 624 Welding and do not commence welding without the presence of the Certified Welding Inspector (CWI). Notify the Project Manager at least 5 business days prior to welding/cutting operations for scheduling of the CWI.  
Assume all costs for repairs of damage contractor caused to the structure, including inspection and testing. Inspection/testing costs include salaries, travel expenses, and professional services fees performed by an entity hired by the Department.  
Notify each party (as listed in the contract as an owner), at least 30 days prior to the anticipated date of structure removal. Keep each party informed about any changes in the removal dates. If the new owners of the structure have a transport available onsite at the time of removal, set the structure on the transport. If the new owners do not provide a transport at the time of removal, set the structure aside onsite as directed by the Project Manager.  
Any loss or damage suffered by the new owner of a removed bridge or by a firm or entity hired to move the bridge on behalf of the new owner is solely the responsibility and at the expense of the contractor or may subject the contractor to action under its bond or insurance policy, at no expense to the Department.  
If the structure has not been transported from the site by the new owner within 60 days following the removal from its original location, dispose of it unless directed otherwise by the Project Manager. Dispose of all non-salvageable materials in accordance with all applicable rules, laws, and regulations. At the conclusion of the project, clean up all affected areas to the satisfaction of the Project Manager.

202.03.1(C)(2) CONCRETE AND MASONRY Page 85 6-1-06

In the first sentence, delete the words Section 203 and replace with Subsection 202.03.3.

202.03.2 REMOVAL OF PIPE CULVERTS AND MINOR DRAINAGE STRUCTURES Page 86 9-26-13

Rescind Subsection 202.03.2 and replace with the following:

202.03.2 Removal of Minor Drainage Structures

Remove minor drainage structures as specified in the contract. Replace lost or damaged salvaged material at Contractor expense.

202.03.3 REMOVAL OF PAVEMENT, SIDEWALKS, CURBS, ETC. Page 86 3-27-14

Rescind Subsection 202.02.3 and replace with the following:

202.03.3 Removal of Pavement, Concrete, and Masonry

Remove and dispose of all existing bituminous or concrete materials to be removed unless otherwise specified. If used for new roadway construction, process, handle and transport these materials for embankments; or crush, screen, mix and process for use as base, surfacing or traffic gravel as approved. Otherwise, dispose of them as solid waste in conformance with applicable laws, rules, regulations and the Montana Solid Waste Management Act.

Existing materials used for base gravel or surfacing must meet the specifications for the particular item. Process bituminous material to be used as embankment to a maximum 6-inch (150 mm) size in its largest dimension. Process concrete material, to be used in the embankment, to a maximum 12-inch (305 mm) size in its largest dimension. Do not place the removed bituminous or concrete material in ephemeral drainages or within 100 feet (30 m) of standing water and groundwater wells. Bituminous materials used for embankment of the new roadway must be covered with plant mix surfacing or 12 inches (305 mm) of soil capable of supporting plant growth.

Include all costs of this work in the unit price for the applicable contract item.

202.04.1 REMOVE STRUCTURES AND OBSTRUCTIONS Page 86 1-12-12

Rescind Subsection 202.04.1 and replace with the following:

Remove structures and obstructions is measured by the lump sum and includes the removal and disposal of all structures and obstructions encountered within the right-of-way.

202.04.2 REMOVE STRUCTURES AND OBSTRUCTIONS

Page 86

9-26-13

Rescind Subsection 202.04.2.

202.05 BASIS OF PAYMENT

Page 86

9-26-13

Rescind Subsection 202.05 and replace with the following:

Payment for the completed and accepted quantities is made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
Remove Structures and Obstructions	Lump Sum

Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract.

When the contract does not contain a lump sum item for removal and disposal of structures and obstructions, the work is incidental to and included in payment for other items of work.

203 EXCAVATION AND EMBANKMENT

Page 87

9-26-13

Rescind Section 203 and replace with the following:

SECTION 203  
EXCAVATION AND  
EMBANKMENT

## 203.01 DESCRIPTION

This work is the excavation, placing, compacting and disposal of material encountered within the construction limits necessary to construct the project. This is also referred to as grading.

## 203.01.1 Excavation

- A. **Unclassified Excavation.** Unclassified excavation is excavating and disposing, when required, of material from the right-of-way or construction easement areas except borrow excavation and muck excavation as defined in Subsection 203.01.1.
- B. **Borrow Excavation.** Borrow for embankment construction is Contractor furnished excavation from outside the right-of-way or construction easement areas.
  1. **Unclassified Borrow.**  
Use Department approved sources meeting current environmental and cultural resource preservation regulations.  
Material from a Department-optioned or Department-owned borrow source may be available at no cost.  
The applicable provisions of Subsections 102.06 and 106.02 apply to unclassified borrow.
  2. **Special Borrow.** Special borrow-excavation and special borrow-neat line is the providing and placing of the specified quality of borrow material from designated sources or from other approved sources.  
The applicable provisions of Subsection 203.01.1(B) (1) and Subsection 106.02 apply to special borrow-excavation and special borrow-neat line.
- C. **Unclassified Channel Excavation.** Unclassified channel excavation is excavating and disposing of all materials from new watercourses or channels and the widening, deepening, or relocation of existing channels.
- D. **Street Excavation.** Street excavation is excavating and disposal of all material to the street template.
- E. **Muck Excavation.** Muck excavation is removing and disposing of unsuitable material in cut sections or below the natural ground line in embankment sections. Material defined as Muck must be deemed unsuitable and is unable to be excavated using the same equipment and methods as for unclassified excavation.  
Material is considered unsuitable if:
  1. It contains soil or organic matter unsuitable for foundation material, regardless of moisture content; or
  2. It is too wet to be properly compacted and cannot be dried within a demonstrated reasonable timeframe prior to incorporating into work. Excessive moisture alone is not sufficient cause for determining unsuitable material.  
Topsoil removed below the natural ground line in embankment sections is unsuitable material.  
Excavated unsuitable material areas will be measured before they are backfilled.  
Do not place fill over unsuitable or unstable foundation soils without the Project Manager's approval.  
Materials placed before approval may be ordered removed and replaced at Contractor expense.
- F. **Sub-excavation.** Sub-excavation is removing unstable material from below the plan subgrade elevation as shown or directed.
- G. **Digout Excavation.** Digout excavation is removing and replacing sections of material at neat lines as shown on the plans or directed by the Project Manager.

## 203.01.2 Embankment

Place and compact excavation in roadway embankments, dikes, areas where unsuitable material is removed, holes, pits, and other roadway depressions. Prepare embankment foundations prior to placing embankment material.

## 203.02 RESERVED

## 203.03 CONSTRUCTION REQUIREMENTS

## 203.03.1 Excavation

- A. General. Do not begin grading operations before the area is cleared of vegetation and obstructions under Sections 201 and 202 and erosion controls are placed as specified in the contract.  
Excavate without disturbing material and vegetation outside of the slope limits.  
Use all suitable material removed from the excavation in embankments, subgrade, shoulders, topsoiling, and other designated locations. Excavated material not used as specified or directed is not paid for.  
Sequence excavation of backfill or road finishing material so it is placed into final position as soon as possible. Stockpile suitable material that is not immediately used.  
Construct temporary fencing to restrict livestock and vehicular traffic from the work under Subsection 607.03.5.  
Replace temporarily removed fence and repair damaged fence to a condition equal to the existing fence at Contractor expense. Confine livestock when fencing is disturbed.  
If excavated material from the roadbed is used outside the embankments, furnish and place at Contractor expense, an equal quantity of borrow to replace the material.  
Do not dispose of excess or unusable material within the right-of-way limits unless approved by the Project Manager.  
Compact the top 8 inches (205 mm) of the subgrade in cut sections under Subsection 203.03.3.
- B. Rock Blasting. Perform all blasting in accordance with Section 204.
- C. Rock Excavated Below Grade. Excavate all un-yielding materials that require blasting or the use of rippers to at least 6-inches (155 mm) below subgrade within the roadbed limits. Backfill the excavation with specified or approved material. Remove or drain surface rock pockets that trap or pond water.  
Rock, removed to a maximum depth of 6 inches (155 mm) below subgrade is measured and paid for as unclassified excavation. Rock removed or backfilling due to over excavating in excess of the 6 inches (155 mm) with approved backfill material is at Contractor expense.
- D. Removing Excess Moisture. Rework materials from excavation or borrow areas exceeding two percent of optimum moisture to the specified optimum moisture before use in embankments or as backfill. Costs to remove excess moisture from the material is incidental to the embankment.  
Remove excess moisture in the finished roadbed soil, introduced or caused by construction operations, for re-use in the work at Contractor expense. Excessively wet material, caused by the construction operations that cannot be properly compacted must be removed and replaced with suitable material at Contractor expense.
- E. Borrow Material. Excluding special borrow, borrow material may be used only after the roadway excavation has been placed in the embankment. If excess borrow is placed creating a waste of excavation, the waste quantity will be deducted from the measured volume in the borrow area.  
Provide the Project Manager five calendar days notice before excavating material from the borrow area so that the area may be surveyed. Do not excavate beyond the dimensions and elevations established for the borrow areas. Finish and shape all borrow areas to permit accurate measurements. Reclaim borrow areas meeting Subsection 106.02.5 requirements
- F. Roughen Slopes. Roughen slopes as directed.
- G. Digout. In areas of digout, excavate the full road width to a depth as shown in the plans or as directed by the Project Manager. Excavate parallel to the finish grade, daylighting to the left and right slopes. The ends of the digout must be sloped no steeper than a 4:1. Dispose of the excavated material to the satisfaction of the Project Manager.  
Provide Special Borrow for digout replacement material consisting of a well-graded sand and gravel, free of organic and other deleterious material, meeting the AASHTO M 145-91 requirements for A-1-a group classification, with 100% passing the 2 inch sieve and a maximum of 8% passing the No. 200 sieve. The material may consist of up to 50% millings if available. Crusher fines and reject material may be used if it meets the requirements in Table 701-22 of Subsection 701.12.  
Provide Stabilization Geotextile that meets the requirements of Subsection 716.03 for Stabilization geotextile.  
Place Stabilization Geotextile over the bottom and sides of the excavated digout area in conformance with Subsection 622.03. Extend the geotextile up the side walls of the excavation for the full height of the exposed subgrade soils.  
Place the initial lift of Special Borrow over the geotextile in accordance with Subsection 622.03.2.  
Repair any Geotextile damaged during construction in accordance with the Manufacturers recommendations or as directed by the Project Manager at Contractor expense.
- H. Sub Excavation. In areas of sub excavation, excavate the full road width to a depth as shown in the plans or as directed by the Project Manager. Excavate parallel to the finish grade, daylighting to the left and right slopes. Slope the ends of the excavation no steeper than a 10:1. Dispose of the excavated material to the satisfaction of the Project Manager.  
Provide Special Borrow for Sub-ex replacement material consisting of a well-graded sand and gravel, free of organic and other deleterious material, meeting the AASHTO M 145 requirements for A-1-a group classification, with 100% passing the 6-inch sieve and a maximum of 8% passing the No. 200 sieve. The material may consist of up to 50% millings, uniformly blended, if available. Crusher fines and crusher reject material may be used if it meets the requirements in Table 701-22 of Subsection 701.12.  
Provide Stabilization Geotextile that meets the requirements of Subsection 716.03.  
Place Stabilization Geotextile over the bottom and sides of the sub excavated area in conformance with Subsection 622.03. Extend the geotextile up the side walls of the excavation for the full height of the exposed subgrade soils.  
Place the initial lift of Special Borrow over the geotextile in accordance with Subsection 622.03.2.

Repair any Geotextile damaged during construction in accordance with Subsection 622.03.2.

### 203.03.2 Embankment

- A. General. Do not place stumps, trees, logs, rubbish, vegetation, muck, frozen material, pockets of rock, volcanic ash or other deleterious materials in embankments.  
Sod mixed with surface soil and soil containing excessive humus or other organic materials may be spread over the top of embankment slopes. Compact embankment, backfill, and embankment foundation areas under Subsection 203.03.3.  
Leave the surface of completed embankments in a roughened condition.  
Rework or remove and replace unstable or pumping material prior to placing additional lifts or materials. Reworking or replacing materials within constructed embankment is at contractor's expense.
- B. Embankment at Structures. Do not place rocks, broken concrete, or other solid material in areas where piling is to be driven.  
Do not place embankment against any backwall or abutment until the concrete has cured for 10 days or has reached 70 percent of the required strength. Furnish a certified laboratory test report showing the field-cured cylinders meet the required strengths.  
The Project Manager may approve early embankment work at backwalls or abutments with beams or girders in place, or that are cantilevered from a fixed footing or cap if the strength requirement is met.  
Do not place embankment against un-supported backwalls or U-shaped abutments rigidly connected to the deck until the deck is placed and cured meeting the applicable requirements of Section 552.  
The Contractor may submit a method of supporting the structure to permit early placement of embankment against the structure. If approved, all costs of the alternate method are at Contractor expense.  
Place embankment in 8-inch (205 mm) maximum layers loose thickness and compact adjacent to structures, around columns and similar structural supports, and on both sides of concrete walls, box type structures, and similar structures. Extend embankment material placed above the excavation limits or ground line a minimum 10 feet (3 m) from the structure or structural support.  
Restore, repair, or replace structures or structural members moved or distorted by placing and compacting embankment at Contractor expense.  
Compact embankment inaccessible to rollers by mechanical tampers to the density specified in Subsection 203.03.3.  
Before placing and compacting backfill, compact at least the top 8 inches (205 mm) of the existing ground under Subsection 203.03.3.
- C. Preparation of Embankment Foundations. Bench all embankments placed and compacted on hillsides, against existing embankments, built one-half width at a time, or on slopes 6:1 or steeper when measured at right angles to the roadway centerline. Construct benches in minimum 4-foot (1.2 m) widths. Maintain the horizontal inclination within 5 percent of horizontal. Backfill and compact each bench in maximum 8-inch (205 mm) layers.  
Excavate each bench as close to each other as the slope permits. Use approved material excavated from benches in the embankment.  
In excavation to embankment transitions where the natural ground slope exceeds 6:1, construct the excavated benches so the natural ground surface is a minimum 12 inches (305 mm) from the top of the subgrade.  
Remove frozen earth, snow and ice from the cut or embankment surface and place it outside the slope stakes. Provide the replacement borrow material at no cost to the Department.  
Clear the full width of the subgrade of sod and vegetative matter. Scarify the top 8 inches (205 mm) of the embankment foundation and compact under Subsection 203.03.3 before constructing embankments 4 feet (1.2 m) high or less, or embankments placed on soils having less than 95 percent maximum density, determined by MT-210.  
If original lightly compacted soils are encountered that exceed 8 inches (205 mm) in depth, remove it to the depth directed. Compact the upper 8 inches (205 mm) of the ground under Subsection 203.03.3. Place the removed material in the embankment or use it for topsoil as directed. Material useable as topsoil may be placed alongside the roadway after compaction is completed.
- D. Earth Embankment. Place earth roadway embankment in uniform horizontal layers not exceeding 8 inches (205 mm) loose measurement and compact under Subsection 203.03.3. Continuously level, work, and maintain moisture to compact to the specified density. Uniformly work the entire surface of each layer.  
Work each layer of earth embankment that is not rock, gravel or sand using a tandem type construction disk with a maximum disk spacing of 14 inches (355 mm) and a minimum worn disk diameter of 25 inches (635 mm). With the disk, work moisture into the soil, break clods of soil, disorient the soil particles, and penetrate the full depth of the layer being placed. Larger disks may be used if the ratio of disk spacing to disk size is comparable to the above dimensions. Leave the embankment slopes in a roughened condition.
- E. Rock Embankment. When the excavated material contains more than 25 percent rock by volume, 6 inches or larger (155 mm) in its greatest dimension, place the embankment in layers 2 inches (50 mm) thicker than the maximum size rock in the material not to exceed 24 inches (610 mm) loose thickness.  
Individual rocks and boulders larger than 24 inches (610 mm) in diameter may be placed in the embankment if the rocks do not exceed 48 inches (1.2 m) vertical height after placement, are evenly distributed, and are spaced to allow placing and compacting of the soil in between the rocks.  
Place and compact the upper 2 feet (610 mm) of the embankment in maximum 8-inch (205 mm) layers loose thickness as specified in Subsection 203.03.2(D).  
Dump and work rock from excavations to the stream face when the embankments are adjacent to streams or channels. Prevent the rock from entering the stream. This work is incidental to unclassified excavation.

- F. Embankment Over Swampy Areas. On low, swampy ground incapable of supporting haul equipment, construct the lower part of the embankment by dumping successive loads of uniformly distributed material in layers thick enough to support the equipment. Place subsequent layers under Subsection 203.03.2 (D) or (E) as directed.
- G. Disposal of Unsuitable or Excess Material. If disposal of excess or unusable excavation within the right-of-way limits is approved by the Project Manager, slope and shape all disposal areas to blend into the surrounding terrain and meet the requirements of Subsections 106.02.5 and 107.11.

203.03.3 Moisture and Density Requirements

Compact each layer of material to the in-place density requirements of Table 203-1 for the method of moisture and density control used. The moisture and density control is the Proctor method or the Zero Air Voids method, determined by the Project Manager.

If proctors are used for density control, the Contractor may make a written request to the Project Manager to compact the soils at a lower moisture content. Identify the soil class in the request. The Project Manager may approve the request provided a Department investigation determines the lower moisture content is not detrimental to the soil for the given application. For A-1 material in embankments, MT 218 and MT 230 tests will be used.

Compact rock embankments that cannot be tested by Montana Test Methods MT-212, and MT-218 (Proctor Method) or MT-229 (Zero Air Voids Method) with compaction equipment and hauling and spreading equipment. Use grid rollers, pneumatic-tired rollers, vibrating rollers, vibrating compactors, or self-propelled tamping rollers. Do not use sheepsfoot rollers unless approved by the Project Manager. Use water as required.

TABLE 203-1  
COMPACTION REQUIREMENTS

COMPACTION CONTROL METHOD		
Material Compacted	Proctor	Zero Air Voids
	Test Methods: MT-210, MT-230, MT-212, MT-218	Test Method: MT-229
Earth Embankment Including All Backfills Top 8 Inches (205 mm) of Subgrade in Cut Sections Culvert Foundations Top 8 Inches (205 mm) of Embankment Foundations Backfill Foundations	Minimum 95% of Maximum Density at Optimum Moisture $\pm$ 2%	Less than 10% Air-filled Voids

203.03.4 Sloping and Finishing

- A. Sloping. Finish and shape all cut slopes, ditches, embankments, and structure berms to a uniform, rough textured surface. Scarify smooth slopes.

Conduct slope roughening in accordance with the plans and Detailed Drawings. Slope roughening is a part of slope construction and is not measured for payment.

Where roadway slopes are not completed to the planned or directed lines and the material from the backslope erodes, sloughs, or slides due to incomplete erosion control measures or the Contractor's operations, the removal of the material and restoration of the slope is at Contractor expense.

Where roadway slopes are completed to the plan or directed lines, all required erosion control devices are in place as specified, and the material from the completed slopes erode, slough, or slide onto the roadbed before acceptance of the work, through no fault of the Contractor, the removing of the slide material, potential slide material, and the drainage excavation is paid for at an agreed unit price or on a force account basis under Subsection 109.04.

When directed, widen cuts and flatten slopes to obtain additional excavation for embankments or to increase slope stability. The Project Manager may steepen stable rock slopes. This work is measured and paid for under the grading item unless it requires non-contract construction methods increasing costs that are considered extra work under Subsection 104.03.

- B. Finishing. Finish the entire roadbed to the final elevations specified.

203.03.5 Maintenance of Constructed Roadway

Maintain the roadway during construction so it is continuously well drained.

Keep all drainage ditches and structures open and free from debris until the final inspection is approved.

If grading work is suspended, blade smooth and grade the entire roadway area to prevent water from collecting or ponding on the roadway. Maintain the roadway during suspension periods to the specified grade and cross section at Contractor expense.

Maintain erosion and siltation control devices meeting the contract requirements.

203.03.6 Topsoil - Salvaging and Placing

Remove sufficient amounts of topsoil from the excavation and embankment foundations to ensure replacement quantities are available to cover all disturbed areas with four inches (100 mm) of topsoil.

Place topsoil on the completed graded roadway to the lines, grades, and elevations specified.

Unless directed by the Project Manager, place topsoil on all slopes, excluding slopes 2:1 or steeper. Place topsoil to an average 4-inch (100 mm) loose depth on the base course surfacing inslope. Uniformly spread what is available over the remainder of the disturbed areas. Finish the disturbed areas in accordance with the requirements of Subsection 610.03.2.

Stockpile topsoil at acceptable selected locations within the right-of-way. When construction operations do not permit stockpiling within the right-of-way, make arrangements for stockpile sites outside the right-of-way at no additional cost to the Department.

Construct stockpiles so drainage is maintained and topsoil is easily reclaimed. Provide erosion controls following best management practice.

In the event that construction sequencing prevents replacement of topsoil over all disturbed areas prior to final paving, reserve adequate quantities to cover the exposed base course surfacing inslope as shown in the Detailed Drawings.

#### 203.03.7 Limitation on Grading Operations

The maximum length allowed to be disturbed at one time within the project limits is 2.0 miles (3200 meters) of clearing and grubbing and 2.0 miles (3200 meters) of borrow, excavation and embankment.

The Project Manager may modify the restriction when soil characteristics, Contractor operations or both, indicate that a smaller or larger area is acceptable. For long or complex projects, the Contractor may have several separate grading operations working, where the Project Manager may apply the limit to each individual operation, provided finishing, mulching, and seeding closely follow the rough grading operations at each location. Use the specified pollution controls at each individual location.

### 203.04 METHOD OF MEASUREMENT

#### 203.04.1 Excavation

The quantities of unclassified excavation, unclassified borrow excavation, special borrow-excavation, unclassified channel excavation, street excavation, sub-excavation, digout excavation, and muck excavation are measured for payment in cubic yards (cubic meters) as surveyed or calculated under Subsection 109.01.

The Department will provide the initial measurement at no charge for the following specific work areas:

1. In slide areas determined by the Department not to be the fault of the Contractor;
2. In excavated areas authorized by the Project Manager, outside the staked lines and grades; and
3. In un-staked areas such as borrow areas, muck excavations, sub-excavations, and un-staked excavations authorized by the Project Manager.

These areas of excavation and borrow are measured in their original position under Subsection 109.01. Disposal of excess or unusable excavation is not measured for payment.

The quantities of special borrow-neaft line for payment are calculated in its final position under Subsection 109.01 with no allowance for shrink or swell.

Either the Department or the Contractor may request re-measurement of specific work areas, or the entire project, if there is disagreement over the accuracy of quantities computed from the staked lines and grades. The party requesting the re-measurement is responsible for all costs associated with the re-measurement. Department staff may perform the re-measurement, in which case, the rate for determining the costs for performing the work are based upon the original contract amount, and the daily charge established in Subsection 108.08, Table 108-1. An independent third party acceptable to the District Construction Engineer, and under the direction of a professional land surveyor registered in Montana, may also be used to perform the re-measurement.

Excavation is eligible for a second payment under the following conditions:

1. A second handling is required;
2. The excavated material meets all the contract requirements for the second usage;
3. The second payment item quantity is calculated in-place in its final disposition, or computed from plan dimensions. Items that require a second field measurement, such as special borrow-excavation, are not eligible for a second payment;
4. The contractor makes up any shortfall in excavation, at no cost to the Department, caused by the second use. The material making up the shortfall is subject to approval by the Project Manager; and
5. The contractor is responsible for the haul, balance lengths, balance points or other foreseen or unforeseen project constraints. No payment will be made for any additional costs.

Authorized excavation of rock, shale, muck, or unstable material below grade necessary to provide the designed thickness of backfill is measured for payment. If the designated bottom plane of the excavation falls within a layer of rock, the below-grade excavation to the bottom of the layer, not exceeding 6 inches (150 mm) below grade, is considered authorized and is measured for payment.

Rock excavation exceeding 6 inches (150 mm) below grade is not measured for payment. If the nature of the material, the thickness of the layers or strata, and method of operations make it practical to excavate only to the plan depth, any material removed below plan depth is not measured.

Measurements are made for unusable materials excavated and removed.

Useable material temporarily removed and replaced for Contractor convenience is not measured for payment.

Removal and disposal of unusable materials from borrow areas is not measured for payment. Special borrow removed from areas before surveying is not measured for payment.

The actual quantities of plan and approved sub-excavation are measured and added to the quantities of unclassified excavation for payment.

Unstable material reworked under Subsection 203.03.1(D) is measured and paid for as unclassified excavation for the second handling.

When the contract does not contain a bid item for muck excavation and an area is determined to be Muck under Subsection 203.01.1(E), the muck excavation quantity is measured and paid for at an agreed price or force account basis under Subsection 109.04. Measurement and payment for muck excavation at the agreed price includes all excavating and hauling, disposing of all stumps, logs, and other debris encountered in the excavation, all pumping and de-watering required, and finishing of the planned disposal areas.

Unclassified excavation allowed for pre-split drill equipment clearance is calculated from the area bounded by the plan slope and lines parallel to plan slope, offset 2 feet (610 mm) for each 50-foot (15.2 m) increment in vertical cut height. The quantity for drill equipment clearance where the cut slope height is less than 50 feet (15.2 m) is not measured for payment.

Excavation used as select or stockpiled select material is measured by the cubic meter in its original position.

Removed and placed stockpile material is measured using the volume in its original excavated position.

Channel excavation is measured and paid for as unclassified channel excavation.

Street excavation is measured and paid for as unclassified excavation unless the contract has street excavation as a bid item. Disposal of material or other items within the limits of the street excavation are not measured for payment.

Geotextile is measured in accordance with Subsection 622.04. Accepted quantities of Geotextile are paid for in accordance with Subsection 622.05.

203.04.2 Reserved

203.04.3 Embankment in Place

The embankment quantities measured in cubic yards (cubic meters) for payment as Embankment In Place include the following:

1. The actual quantities of roadway embankment measured, above the original ground line under Subsection 109.01, with no volume adjustments made for shrinkage, compaction, or subsidence.
2. The topsoil replacement quantity, measured in the topsoil stockpiles.
3. Excavation of unusable material and sub-excavation in the contract or directed by the Project Manager in its original position.

203.04.4 Compaction

Work and materials to compact embankment material and backfill to the specified density is not measured for payment.

203.04.5 Topsoil

Excavation of topsoil material from its original position, loading, hauling, stockpiling, and removal from the stockpile and spreading on the designated areas is measured for payment by the cubic yard (cubic meter) in the stockpile before final placement.

Before measurement, shape and smooth each stockpile into the smallest practical area. Haul is not measured for payment.

Topsoil removed from cut areas is not deducted from the grading quantities.

Measurement is made as if the topsoil had not been removed.

Topsoil removed from embankment areas and from borrow areas, excluding Contractor-optional under Section 106, is measured under the bid item Topsoil - Salvaging and Placing.

203.05 BASIS OF PAYMENT

Payment for the completed and accepted quantities is made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
Unclassified Excavation	Cubic Yard (cubic meter)
Unclassified Borrow Excavation	Cubic Yard (cubic meter)
Special Borrow	Cubic Yard (cubic meter)
Unclassified Channel Excavation	Cubic Yard (cubic meter)
Digout Excavation	Cubic Yard (cubic meter)
Muck Excavation	Cubic Yard (cubic meter)
Drill Pre-splitting Holes	Foot (meter)
Embankment in Place	Cubic Yard (cubic Meter)
Topsoil - Salvaging and Placement	Cubic Yard (cubic meter)
Street Excavation	Cubic Yard (cubic meter)

Payment at the contract unit prices is full compensation for all resources necessary to complete these items of work under the contract.

204 EXISTING SURFACE PREPARATION Page 99 12-13-12

Rescind Section 204 Existing Surface Preparation

204 BLASTING (NEW) Page 99 9-26-13

Add the following Section 204 Blasting:

SECTION 204  
BLASTING

204.01 DESCRIPTION

This work is using blasting techniques to form cut slopes, remove rock obstructions and other objects to construct highway roads, bridges and facilities.

**204.02 MATERIAL**

Furnish non-plastic crushed granular material for stemming, meeting the following gradation requirements:

Sieve Size	Percent Passing
5/8" (16mm)	100
#4 (4.75 mm)	0 – 10

Provide a minimum of 35% of the +4.75 mm material with at least one mechanically fractured face.

**204.03 PRODUCTION BLASTING**

Production blasting refers to the main fragmentation blasting resulting from more widely spaced production holes drilled throughout the main excavation area adjacent to the controlled blast line.

**204.03.1 Blasting Professional**

- A. Blasting Consultant. Retain a recognized Blasting Consultant to assist in the blast design. Ensure the Blasting Consultant is an expert in the field of drilling and blasting and is not an employee of the Contractor, an explosives manufacturer, or explosives distributor. Review the Blasting Consultant's resume to ensure adequate experience in drilling and blasting. Submit a copy of the resume to the Project Manager at the Pre Construction Conference. The Blasting Consultant is professionally responsible when advising the Contractor on issues relating to blast safety, blast design, and public safety and convenience. The Contractor is responsible for all damage.

The Blasting Consultant is in responsible charge of the blast monitoring, pre-blast and post-blast surveys, ground vibration monitoring, and air overpressure monitoring. Have the Blasting Consultant review all blasting plans and submit comments regarding the adequacy of the blast plans to ensure conformance to these specifications and all other applicable Federal, State, and local regulations. The Blasting Consultant and the Blaster-in-Charge must coordinate their efforts to ensure these requirements are met. Forward the Blasting Consultant's comments, Master Blasting Plan, and all other ancillary plans required by the contract, to the Project Manager for review.

The Blasting Consultant has the authority to require modification of any of the proposed plans to meet project requirements, environmental requirements, or satisfy safety concerns. Submit these modifications to the Project Manager for review as required below.

The Blasting Consultant must attend all blasting related meetings including the preconstruction meeting.

- B. Prequalified Blasting Contractors. Use prequalified blasting contractors to complete the work required in the contract. A list of prequalified contractors is located at the following website:

<http://www.mdt.mt.gov/business/contracting/prequalified.shtml>.

Contractors not currently prequalified by the Department to perform blasting work can obtain pre-qualification information from the Construction Engineering Services Bureau, 2701 Prospect Ave., Helena, Montana. A complete Statement of Qualifications (SOQ) must be received a minimum of 14 calendar days prior to the bid opening as specified in the Invitation for Bids.

**204.03.2 Use of Explosives**

Explosives refer to any commercial explosive products, materials, blasting agents, primers, delays, initiators, etc., used in blasting operations.

Transport, store, handle, and load explosives and blasting agents following all laws and ordinances as well as the applicable requirements of Title 29, Title 30, and Title 49 of the Code of Federal Regulations and specifically the current Office of Surface Mining Reclamation and Enforcement (OSMRE) Blasting Guidance Manual when using, handling, loading, transporting, and storing explosives and blasting agents.

Use only explosives permitted by the State, local laws and ordinances, and all respective agencies having jurisdiction over them.

Use explosives without endangering life or property and be responsible for all resulting property damages, injury, or death.

Only use persons experienced in the handling of explosives and do not fire explosives until sounding a warning and removing all persons from the radius of danger.

Notify each property owner, Railway Company, and public utility Company having facilities near the blasting area of the intent to use explosives to enable them to take precautions to protect their property from injury. Be responsible for damages to property or injury to persons attributable to the use of explosives.

Do not use explosives and explosive products containing the chemical compound perchlorate (ClO<sub>4</sub>).

**204.03.3 Master Blasting and Safety Plan**

Submit a Master Blasting Plan, along with any comments from the Blasting Consultant, to the Project Manager for review not less than 10 working days before the start of test or production drilling operations or at any time the drilling and blasting methods, or explosive type or product are changed. Include full details of the drilling and blasting patterns and controls to be used for production blasting in the blasting plan.

- A. Blasting Plan. Include the following information, at a minimum, in all blast plans:
- Shot Number;
  - Date and proposed time of shot;
  - Top and bottom elevations of the blast;
  - Seismograph locations, elevations, and distances between the blast and vibration monitoring points;
  - The station limits of the proposed blast(s) and the number of holes to be drilled and shot per blast;
  - The hole diameter, hole depths, and explosive load for each hole (number of cartridges of each type, stemming depth, decks, and primers, etc.);
  - Explosive type; diameter; length; weight; and brand name;
  - Proposed quantities of production and presplit/cushion blasting for each blast and the entire project;
  - Appropriately scaled plan diagram(s) showing: blast hole locations, blast hole diameter, blast hole pattern, blast hole angle(s), free face, burden, spacing, lift height, sub drill depth(s), delay periods, delay

- pattern, and relative location of nearby structures and appurtenances. Base all plan diagrams on the project plan sheets, including topography;
10. Appropriately scaled cross section diagram(s) showing: blast hole depths, blast hole angle(s), loading, stemming, sub drill (as applicable), etc. Base all cross section views on the project plan sheets, including topography;
  11. Total pounds of explosives and number of cartridges to be used;
  12. Total volume of blasted material;
  13. Powder Factor and maximum pounds of explosives per delay;
  14. Detailed calculations for predicted peak particle velocities, and predicted vibration frequencies for ground and pertinent adjacent structures to ensure compliance with required peak particle velocity and vibration limits;
  15. The signatures of the Blaster-in-Charge and the Blasting Consultant;
  16. A storage plan for explosives, including the type of magazine or explosive facility, (if applicable) or a declaration indicating the use of daily explosive deliveries for the duration of the project. Provide a copy of the notification letter sent to the Federal Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF), signed by the magazine owner, if daily delivery will not be utilized at any time during the contract;
  17. A detailed plan with the methods describing fly rock or blast debris prevention;
  18. Manufacturer's product information sheets or technical bulletins and MSDS information for all explosives to be employed, and;
  19. Copies of the Blaster-in-Charge's current State of Montana Blasters License. The State of Montana requires blasters to have a current Montana Blasters License.

The Master Blasting Plan and required submittals will be reviewed and revised based on the results of the test blasts. After satisfactorily completing the test blast section(s), and incorporating all test blast results and Blasting Consultant's comments, submit the reviewed and revised blasting plan as the Master Blasting Plan.

Submit an individual production blast plan for all subsequent blasts at least four working days prior to the planned blast day. Include the items discussed above, in 204.03.3.A, items 1 through 15, in each blast plan. Submit the production blasting plans on MDT Form CSN-55.

Do not begin full scale production blasting until the master blast plan has been submitted and reviewed for conformance to the Project plans, Special Provisions, and Specifications. Review of the blast plan(s) does not relieve the Contractor of responsibility for the accuracy, adequacy, and safety of the plan when implemented in the field.

- B. Safety Plan. Submit a Safety Plan, in addition to the Master Blasting Plan and including any comments from the Blasting Consultant, to the Project Manager for review not less than 10 working days before the start of test or production drilling operations. Include the following information, in the Safety Plan:
  1. The name and telephone number of the Blaster-in-Charge. The Blaster-in-Charge is responsible for directing the day to day drilling and blasting operations, for clearing the blast site before excavation of the blasted material may proceed, for clearing local traffic through the blast zone, and for all required report preparation including daily blast logs, daily explosives consumption reports, and loss reports. Submit sample copies of daily blast logs, daily explosives consumption reports, and loss reports;
  2. A detailed access control plan with the methods proposed to clear the blast area and to control access to the blast site and other closure locations required by the contract by unauthorized personnel during drilling, loading, blasting, and scaling operations. This plan will be followed exclusively by all parties concerned;
  3. A detailed plan with the methods proposed to notify local residences, and all project personnel involved with field operations within the blast area, of an impending blast. Include the method(s) of notification and the proposed timeline(s) in the plan;
  4. A detailed plan with methods to document, assess, and control ground vibration and air overpressure as well as calculated scale distances to each structure or appurtenance within a minimum of 1320 feet (400 m) from the blast. Structures and appurtenances include, but are not limited to: culverts, bridges, other drainage facilities, wells, gabion walls, bin walls, other retaining structures, utilities, buildings, residences, railroads, etc;
  5. A detailed vibration and blast monitoring plan;
  6. A detailed fire prevention and protection plan;
  7. A detailed plan to identify all potential blast site electrical hazards including, but not limited to, a lightning detection and protection plan;
  8. A detailed emergency plan outlining the procedures to be followed in the event of an injury, accident, or unanticipated road closure in excess of one hour. Details of this plan must contain provisions for emergency vehicle traffic and personnel including potential detour routes, length of emergency detour, and estimated time to traverse the emergency detour;
  9. A detailed blasting day protocol to be followed exclusively by all parties concerned. Information in the blasting day protocol must include, but is not limited to: Required notifications of impacted local residences, all project personnel, local emergency response organizations, utilities, or other entities that may be impacted by the blast, a contact list and appropriate phone numbers of all parties impacted or involved in the blasting. Post copies of the contact list in the field office and submit a copy of the contact list to the Project Manager;
  10. A copy of a sign-up sheet for documenting attendance of mandatory safety meetings by all project personnel involved with field operations within the blasting area;
  11. A detailed scaling plan including the methods proposed and the entity responsible for conducting scaling operations on the project, and;

## 12. The signature of the Blaster-in-Charge and the Blasting Consultant.

Blasting and Safety Plan submittals must be complete. They may be submitted as two separate submittals, but each Plan must be a complete document. The review time does not start until the complete package is received. Electronic documents (.pdf) are encouraged, but may also be in the form of portable storage devices.

## 204.03.4 Blasting Test Section(s)

Prior to conducting full-scale blasting operations, demonstrate the adequacy of the proposed Master Blasting Plan by drilling, blasting, and excavating test sections 100 feet (30 meters) in length. Use the test sections to demonstrate which combination of methods, burden, spacing, other blast design parameters, and charge perform the best based on in-situ field conditions. When warranted by field conditions, test sections shorter than 100 feet (30 meters) may be required, as determined by the Project Manager.

Requirements for production blasting operations covered elsewhere in this specification also apply to the blasting operations carried out in conjunction with the test blasts.

Do not drill ahead of the test blast area until the test section has been excavated and the results are evaluated by the Project Manager. If the results of the test blast(s) are unsatisfactory, adopt revised methods as necessary to achieve the required results at no additional cost to the Department.

If methods of drilling and blasting do not produce a uniform slope and shear face or adequate fragmentation within the tolerances specified in the plans, drill, blast, and excavate in short sections, not exceeding 100 feet (30 meter) in length, until a technique is arrived at producing the desired results, with no additional cost to the Department.

Unsatisfactory blast results include, but are not limited to: fragmentation beyond the indicated lines and grade (over break), excessive oversize material, poor fragmentation, fly rock, excessive ground vibration or air overpressure, or violation of other requirements within these specifications. All costs incurred in adopting revised blasting methods necessary to produce an acceptable test blast are the sole responsibility of the Contractor.

## 204.03.5 Safety

Comply with all State and Federal requirements for blasting safety, including the OSMRE Blasting Guidance Manual, which provides guidance on the use of explosives and certification of blasters.

- A. General. Prior to the each blast, conduct a safety meeting to discuss the safety requirements for blasting operations and the blast day protocol. Attendance for this meeting is mandatory for all project personnel that may be involved in field operations within the blasting and closure areas. Document attendance with a sign-up sheet and provide a copy of this sheet to the Project Manager. If there any changes to the safety requirements or blast day protocol, conduct another mandatory meeting and document attendance as required above.
  1. Post required blasting signage prior to the start of the shift on the day of the blast. Signs must meet requirements of Section 715.
  2. Blasting during hours of darkness (one-half hour before sunset to one-half hour after the following sunrise) is strictly prohibited.
  3. Loading of holes during hours of darkness (as defined above) is strictly prohibited.
  4. Loading of explosives prior to MDT review of blast plans is strictly prohibited.
  5. Keep all personnel not involved in loading or blasting operations a minimum of 100 feet (30 meters) from the blast site during loading operations.
  6. Keep all equipment not required for loading a minimum of 100 feet (30 meters) from the blast site during loading operations.
  7. Keep all equipment and personnel a minimum of 1000 feet (305 meters) from the blast site during blasting operations
  8. Remove and properly dispose of all explosives packaging material prior to each blast.
- B. Protocol. The blasting day protocol is to be followed exclusively by all parties concerned. Information in the blasting day protocol includes, but is not limited to, the information listed in Subsection 204.03.3.B.9.
  1. Convene the following personnel one hour prior to blasting to coordinate traffic control, required closures, and blast procedures: Blasting Consultant, Blaster-in-Charge, Traffic Control Lead, Project Manager (or Representative), Contractors or Subcontractors Foreman, and other pertinent personnel.
  2. Road closures due to blasting operations and clean-up may not exceed the requirements of the contract. Clean-up activities include, but are not limited to, scaling or clean-up of loose rock or blasting related debris for safety purposes.
  3. If road closures due to blasting operations exceed the required time limit, the Project Manager will suspend all work not directly related to blasting activities in accordance with the following:
    - a. Closures up to 15 minutes beyond the allowed closure will result in a 2 day suspension of all work as defined above and time charged to the Contract.
    - b. Closures of 15 to 30 minutes beyond the allowed closure will result in a 3 day suspension of all work as defined above and time charged to the Contract.
    - c. Closures of greater than 30 minutes beyond the allowed closure will result in a 4 day suspension of all work as defined above and time charged to the Contract.
    - d. The Project Manager will rescind the suspension of work after receipt of a written plan from the Contractor detailing the measures to be taken ensuring compliance with the required road closure times. No adjustment to contract time will be made for work suspensions resulting in excessive road closures.
- C. Warnings and Signals. Provide a detailed explanation and description for the signals that will be used. The warning signals must be clearly audible for 1/2 mile (800 meters) from the blast site. The Blaster-in-Charge must demonstrate to the Project Manager that the method of warning meets this requirement.
  1. Sound an initial warning signal five minutes prior to blast initiation to notify all in the area of the start of blasting within a five minute period. Sound a second warning signal one minute prior to blast initiation.

2. After the blast is over, the Blaster-in-Charge and the Blasting Consultant are required to observe the entire blast area for a minimum of five minutes to determine if all explosives have detonated and to guard against rock fall before commencing cleanup work and excavation.
3. The Blaster-in-Charge is responsible for clearing the site. If any holes have not detonated, the Blaster-in-Charge, with the assistance and advice of the Blasting Consultant, is required to address the misfire(s) and eliminate the hazard before other personnel enter the worksite. The blast site is off limits to unauthorized personnel during this time. The Contractor is responsible for all costs resulting from misfires. If any instance of misfires occurs on a blast, notify the Project Manager immediately and submit a written report of existing conditions and remedial action taken to the Project Manager within 24 hours.
4. Once the Blaster-in-Charge and the Blasting Consultant indicate the area is free from misfires, blast damage, overhangs, or other hazards, sound an all clear signal to indicate to all personnel in the area that blasting operations are finished. Do not allow traffic to proceed until the all clear signal is given.

#### 204.03.6 Pre-Splitting Rock Slopes

- A. General. Pre-split rock cuts to a smooth plane using loaded, timed, and spaced drill holes. Produce a continuous or semi-continuous fracture between drill holes and a stable rock cut by eliminating overbreak in the backslope during primary blasting.
- B. Drilling. Use drills equipped with mechanical devices that accurately determine the angle the drill steel enters the rock. Do not drill if the devices are missing or inoperative.
  - Perform grading, as necessary, to remove overburden soil and loose or decomposed rock along the top of the excavation to establish a uniform and stable platform for drilling activities.
  - Use pre-split hole diameters that are between 2 ½ inches (64 mm) and 3 inches (75 mm). Drill pre-split holes within 3 inches (75 mm) of the staked collar location. Holes drilled outside the 3-inch (75 mm) tolerance will be rejected and not measured for payment. Drill hole intervals may vary between 24 inches (610 mm) and 36 inches (915 mm). A 30-inch (765 mm) interval is used to estimate the quantity of pre-split drilling in the contract.
  - When the cut height exceeds 30 feet (10 m), and after completion of the top excavation lift, an offset from the staked slope line, not to exceed 2 feet (610 mm) is allowed at the top of each lift after the top lift. The actual slope cannot deviate from the plan slope by more than 1 foot (305 mm).
  - Control the drilling operations to insure that no hole deviates from the slope plane by more than 9 inches (230 mm). This tolerance applies to deviations left or right of an apparent vertical projection of the hole when viewed from a right angle to the slope face or deviations into or out of the planned slope plane when viewed parallel to the slope face. Pre-split holes exceeding these limits will not be paid for.
  - Drilling 2 feet (610 mm) below ditch bottom to aid removing the toe berm is permitted.
  - Extend pre-split holes a minimum of 30 feet (9.2 m) beyond the limits of the production holes or to the end of the cut.
  - Maintain the length of pre-split holes for any individual lift at no more than 30 feet (9.2 m). The Project Manager may approve a written request to increase the hole length to a maximum of 60 feet (18.3 m) if it is demonstrated that the above pre-split hole tolerances and a uniform slope can be maintained. If over five percent of the pre-split holes are misaligned in any one lift, reduce the lift heights until the 9-inch (230 mm) tolerance is met.

#### 204.03.7 Blasting Operations

- A. General. All blasting operations, including the transport, storage, handling, and loading of explosives, are the direct responsibility of the Blaster-in-Charge. Conduct all blasting operations in accordance with the Specifications and all applicable Federal, State, and local regulations.
  - Store all explosives in accordance with the submitted storage plan and all applicable Federal, State, and local regulations.
  - Provide each cap period from one lot number. Mixing of lot numbers for any one cap period is prohibited. Any blasting materials in excess of one year of age are prohibited.
  - If any explosives are determined to be of either excessive age or in a deteriorated condition, cease all blasting work until the explosives age or quality can be verified. Do not use explosives that do not meet the manufacturer's specifications. Remove and properly dispose of explosives, not meeting the manufacturer's specifications, at no cost to the Department.
  - Explosives missing date codes are strictly prohibited and cannot be brought to the site.
  - The Blasting Consultant is responsible for verifying that the above requirements are met.
  - The Project Manager has the authority to:
    1. Require the explosives to be tested by an independent organization to determine its performance compared to the manufacturer's product information sheet.
    2. Approve the independent testing organization prior to performing the tests.
    3. Reject any lot number if the explosives performance and/or composition deviates more than 10 percent in any manner from the manufacturer's data sheet.
 All costs for testing and replacement of the explosives are the Contractor's responsibility if the explosives performance or composition deviates by more than 10 percent. The Department will pay the testing costs if the explosives meet the manufacturer's data sheet.
- B. Procedure. Drill production blast holes in accordance with the patterns shown on the submitted blasting plan(s). Drill the production blast holes within two blast-hole diameters of the staked collar location. Do not drill the production hole bottoms lower than the presplit hole bottoms. The maximum allowable diameter for production holes is 6 inches (155 mm).
  - Locate and stake the blast holes. If more than five percent of the holes are drilled outside of this tolerance, fill the holes with crushed stone or approved material and re-drill the blast holes at the proper location.
  - Detonate production holes on a delay sequence toward a free face. Stem production holes a minimum of 3 feet (915 mm) or 0.7 times the burden distance, whichever is greater, with stemming meeting the

requirements of this specification. Take all precautions necessary in the blasting operations to prevent blast damage to the final rock slope. Production blasting is incidental to and included in the measurement and payment for unclassified excavation.

Do not use bulk ammonium nitrate and fuel oil in the pre-split holes. Use only standard explosives manufactured specifically for pre-splitting.

Fit blast holes with a temporary plug to prevent overburden, drill cuttings, or other foreign material from falling into the hole after drilling. Verify that the drill holes are free of obstructions for their entire depth before placing charges. Take precautions to prevent material from entering the drill holes during loading operations.

Stem all presplit holes a minimum of 3 feet (915 mm) with stemming meeting the requirements of this specification. The Contractor may pre-split the slope face before production drilling or pre-split the slope face and production blast at the same time, if the pre-split drill holes are fired simultaneously at least 100 milliseconds before the production blast. Do not delay pre-split holes more than 25 milliseconds, hole to hole, to reduce noise and ground vibration.

Prior to loading any blast holes, check and measure holes for conformance to the submitted blast plan. The Blasting Consultant is responsible for verifying the location and depth of these holes. If the blast holes are not drilled to the correct depth, are plugged, or are unable to be fully loaded, clean out or re-drill those holes not meeting the contract requirements or the submitted blast plan. The Blasting Consultant is responsible for verifying that all explosives and stemming are installed in accordance with the submitted blast plan. The Blasting Consultant will immediately notify the Project Manager of any variations or deviations from the submitted blast plan. The Blasting consultant will submit a detailed written report on the discrepancies observed and recommended remedial action to the Project Manager as soon as possible.

#### 204.03.8 Scaling

Scale slopes throughout the duration of the contract, and at such frequency as required, removing all loose rocks, overhangs, or other hazards. Scale during or upon completion of excavation in each lift. Do not allow drilling of the next lift until this work has been completed. Scaling must be performed to industry standards and MDT requirements.

Perform additional stabilization or scaling, required as a result of the blasting, at no additional cost to the Department.

The Project Manager has the authority to prohibit or halt blasting operations if it is apparent that, through the methods being employed, the required slopes are not being obtained in a stable condition, the safety and convenience of the traveling public is being jeopardized, or unsatisfactory blast results are being obtained as defined in 204.03.4. All costs incurred in adopting revised blasting methods necessary to produce acceptable blasting results are the sole responsibility of the Contractor.

#### 204.03.9 Records

- A. Drilling Logs. On a daily basis, and prior to loading any explosives, provide copies of the daily drilling logs to the Blasting Consultant, the Blaster-in-Charge, and the Project Manager. Include all of the following information, at a minimum, for each hole drilled:
  1. Drill Hole Location within the blast pattern (i.e. Row Number and Hole Number).
  2. Drill Hole Diameter.
  3. Total Depth of Drill Hole.
  4. Drill Hole Angle.
  5. Depth of overburden.
  6. Depth to any changes in material hardness (i.e. clay seams, sand seams, soft rock, coal seams, etc.).
  7. Depth and length of any voids encountered.
  8. Depth to water if encountered.
  9. Date drilled.
  10. Driller's name.
- B. Blasting Logs. On a weekly basis, provide copies of the daily logs of blasting operations to the Project Manager. Include the numbers, times, dates, blasting locations, and patterns of all blasts in the logs for that week. Additionally, include all of the following information:
  1. The blast plan as submitted for review by the Project Manager.
  2. Trade names and sizes of all explosives.
  3. Explosives consumption and loss reports.
  4. All ground vibration and air overpressure records.
  5. Signature of Blaster-in-Charge.

#### 204.03.10 Survey

- A. Pre-Blast Condition Survey. Have the blast consultant arrange for a pre-blast survey of any nearby buildings, structures, utilities, or other appurtenances that may potentially be at risk from blasting damage. Use a survey method acceptable to the Contractor's insurance company. Submit copies of all pre-blast survey records to the Project Manager for review before blasting operations begin. Notify occupants/owners of local buildings, structures, utilities, or other appurtenances a minimum of 48 hours prior to the start of blasting operations.
- B. Post-Blast Condition Survey. If complaints of damage or annoyance are made, have the blast consultant arrange for a post-blast survey of any nearby buildings, structures, utilities, or other appurtenances affected by blasting. Use a survey method acceptable to the Contractor's insurance company. Be responsible for any damage as described in Subsections 107.15 and 204.03.2. Submit copies of all post-blast survey records to the Project Manager for review within 48 hours of completing the survey. Notify the Project Manager of any damage or annoyance claims from occupants/owners of local buildings, structures, utilities, or other appurtenances a within 24 hours of the complaint.
- C. Vibration Control and Monitoring. Have the blast consultant establish a vibration control and monitoring program. Submit the vibration control and monitoring program to the Project Manager for review not less

than 10 working days before the start of test or production drilling operations or at any time the drilling and blasting methods are changed.

When blasting near buildings, structures, or utilities, or other appurtenances that may be subject to damage from blast induced ground vibrations; control the ground vibrations by using properly designed delay sequences and allowable charge weights per delay. Establish allowable charge weights per delay by carrying out test blasts and measuring vibration levels. Confirm that the test blasts, in accordance with the requirements of Subsection 204.03.4 and modified as required, limit ground vibrations to below damage thresholds.

Monitor each blast using an approved seismograph(s) located, in accordance with the submitted Master Blasting Plan, between the blast area and the closest structure(s) subject to blast damage whenever vibration damage to adjacent structures is possible. Use a seismograph(s) capable of recording peak particle velocity for three mutually perpendicular components of vibration in the ranges typical for blasting operations. All seismographs employed for monitoring are required to be calibrated within the preceding 12 months. Provide certifications ensuring calibration is current to the Project Manager.

Do not allow peak particle velocity or frequency of each component to exceed the safe limits of the nearest structure subject to vibration damage. Have the Blasting Consultant interpret the seismograph records to insure that the seismograph data is effectively utilized in the control of the blasting operations with respect to the existing structures.

Provide the data recorded for each blast to the Project Manager prior to the next blast and include the following:

1. Identification of instrument used.
2. Name of qualified observer and interpreter.
3. Distance and direction of recording station from blast area.
4. Type of ground at recording station and material on which the instrument is sitting/placed.
5. Maximum peak particle velocity and frequency in each component.
6. A dated and signed copy of photographic records of seismograph readings.

Table 204-1 lists suggested conservative limits for maximum peak particle velocity and minimum frequency:

TABLE 204-1  
SEISMOGRAPH TOLERANCES

Structure Type	Maximum Peak Particle Velocity, Inches Per Second	Minimum Vibration Frequency, Hertz
Green Concrete (less than 7 days)	1.00	18
All other structures; utilities; wells; springs; and aquifers	2.00	30

The Blasting Consultant has the authority to modify the above parameters to safely meet the project and environmental requirements.

Older deteriorated structures, utilities, or structures housing computers or other sensitive equipment, may require lower peak particle velocity and different frequency limits than given in Table 1. Additionally, buried pipelines, fiber optic cables, or other appurtenances owned by private utility companies or structures owned by other entities may be subject to lower limiting values imposed by the owner. On critical projects where vibration and frequency control is important, have a vibration specialist, experienced in this type of work, establish safe vibration limits.

In special cases, the Blasting Consultant may use the Blasting Level Chart, (Figure 1, page 24, OSMRE Guidelines) to determine maximum allowable ground vibration. This figure provides Alternative Blasting Level Criteria based on blast vibration frequency and maximum allowable peak particle velocity.

The Blasting Consultant is responsible for; all necessary materials and equipment utilized in the performance of this work, for providing a high-speed film or video record of each blast, to be available to perform evaluation, monitoring, and record keeping as described above and as directed by the Project Manager.

204.03.11 Noise and Debris Control

- A. Air Overpressure and Noise Control. Have the Blasting Consultant install an air overpressure monitoring system, if appropriate, between the main blasting area and the nearest structure subject to blast damage or other detrimental effects. Ensure the equipment used to make the air overpressure measurements is the type specifically manufactured for that purpose. Hold peak overpressure below 0.05 psi (0.34 kPa) at the nearest structure or other designated location. Use appropriate blast hole patterns, stemming, and detonation systems to prevent venting of blasts and to minimize air overpressure and noise levels produced by the blasting operations. Lower the overpressure limit if it proves too high based on damage or complaints. Furnish a permanent signed and dated record of the peak overpressure measurements, immediately after each blast, to the Project Manager.
- B. Fly Rock Control. Where necessary, use approved blasting mats, soil, or other equally serviceable materials or containment methods to prevent fly rock and/or debris.

Permit violations, resulting from blasting operations, are the sole responsibility of the Contractor.

204.03.12 Controlled Blasting

Controlled blasting refers to the controlled use of explosives and blasting accessories in carefully spaced and aligned drill holes to produce a free surface or shear plane in the rock along the specified excavation back slope.

Controlled blasting techniques include presplitting and cushion (trim) blasting. All final slopes identified in the plans as pre-split slopes must be excavated with controlled blasting methods. Ripping is not allowed within 10 feet (3 m) of the final slope face.

- A. General. Meet all the requirements of Subsection 204.03 Production Blasting, in addition to the following for each Subsection:
  - 1. When presplitting, detonate the presplit line before detonating any of the production holes.
  - 2. Cushion blasting is similar to presplitting, except detonation along the cut face is after the detonation of the production holes.
  - 3. Unless otherwise allowed by the Project Manager, begin tests using controlled blast holes spaced 2.5 feet (0.76 m), adjusting if necessary, to a maximum spacing of 3.0 feet (0.915 m), until the Project Manager approves the spacing to be used for a full-scale controlled blasting operations.
- B. Controlled Blasting Methods
  - 1. Presplitting. Perform all presplitting, including the blasting test sections, in accordance with the requirements of Subsection 204.03.4.
  - 2. Cushion (Trim) Blasting. Cushion blast, in lieu of presplitting, where the horizontal distance from the cut face to the existing rock face is less than 15 feet (5 m). The difference in delay time between the trim line and the nearest production row cannot be more than 75 milliseconds or less than 25 milliseconds.

204.04 METHOD OF MEASUREMENT

204.04.1 Drill Pre-Splitting Holes

- A. Production Blasting. Production blasting is incidental to and included in the measurement for Unclassified Excavation in accordance with Section 203.
- B. Controlled Blasting. Drill pre-splitting holes are measured by the linear foot (meter) of controlled blast hole. The measurement is made from hole collar to a depth of 2 feet (0.6 meter) below finished ditch grade. Holes with alignments not meeting the requirements of Section 204.03.3 are not measured for payment. Quantities shown in the plans are based on 2½ foot (0.75-meter) hole spacing. Actual quantities will depend on field conditions and results from test sections. The quantity of drill pre-splitting holes shown in the contract is not guaranteed, and the Department reserves the right to increase or decrease this item with no adjustment in the contract unit price.

204.04.2 Blasting Consultant

Blasting Consultant is measured by the lump sum.

204.05 Basis of Payment

Payment for the completed and accepted quantities is made under the following:

Pay Item	Pay Unit
Drill Pre-Splitting Holes	Linear Foot (meter)
Blasting Consultant	Lump Sum

Equipment to perform vibration and air overpressure monitoring, pre-blast and post-blast surveying, film, videotape, and other expendable materials are incidental to Blasting Consultant work and are not paid separately. Payment for all costs associated with Blasting Consultant work is included in the lump sum bid price for Blasting Consultant.

Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract.

204.05.1 Production Blasting

Payment for all costs associated with production blasting including materials, explosives, labor, tools, and equipment is included in the contract unit price per cubic yard/meter of Unclassified Excavation.

204.05.2 Controlled Blasting

Payment for all costs associated with controlled blasting including materials, explosives, labor, tools, and equipment is included in the contract unit price per linear foot/meter of drill pre-splitting holes.

206 HAUL Page 101 12-13-12

Rescind Section 206 Haul.

206 DETOURS (NEW) Page 101 6-27-13

Add the following Section 206 DETOURS:

SECTION 206  
DETOURS

206.01 DESCRIPTION

This work consists of constructing, maintaining and removing a detour within the prescribed corridor and as specified in the contract.

206.02 RESERVED

206.03 CONSTRUCTION

206.03.1 General

Construct the detour to the lines and grades shown on the plans and cross sections. Provide surfacing materials and thicknesses as specified in the contract.

Remove and stockpile topsoil within areas of the detour that require excavation prior to detour grading operations. Complete detour grading operations in accordance with Section 203.

In wetland or riparian areas as shown in plans, cut shrubs impacted by temporary detour construction flush with the ground, do not grub. Use geotextile, or other approved separation between the natural ground and temporary detour fill to provide minimal disturbance to the existing ground.

206.03.2 Design

Construct the temporary detour within the right-of way or permit area and to the lines and grades shown on the plans and cross sections or as approved by the Project Manager. Surface the detour as indicated on the plans.

The method required for conveyance of a waterway is not included in the Preconstruction authorizations and permits issued by resource and regulatory agencies. Prior to commencing any work on the detour, determine a preferred method of conveyance and submit this with Contractor's temporary facilities Joint Application to the Project Manager. The submittal will be forwarded to the appropriate resource and regulatory agencies for review and approval.

- A. Culverts. If used, furnish culverts of the size and length shown in the plans. Provide adequate bulkheads at the approach fills to prevent fill materials from entering the waterway. Place culverts in accordance with Section 603.
- B. Structures. If a bridge is chosen as means for conveyance of the waterway, provide a waterway opening of sufficient size to accommodate the 2-year flood event, spanning the active channel with 1 foot (300 mm) minimum freeboard. Construct all temporary bents in a manner that the current remains un-deflected. Provide adequate bulkheads at the approach fills to prevent fill materials from entering the waterway. Provide the detour bridge with a width greater than or equal to that of the existing bridge, with a design load capacity of AASHTO HS-20 (MS-18). Provide a rail system with blunt end protection at all bridge ends. Ensure the rail system either meets NCHRP350 TL-1 crash test requirements or can resist raiiling design forces as specified in AASHTO LRFD TL-1 (Table A13.2-1).

206.03.3 Submittals

- A. Bridge. Submit a copy of the design and calculations plus 5 copies of the working drawings for the proposed detour bridge stamped and signed by a professional engineer licensed to practice in the State of Montana. Show the following in the drawings:
  - 1. Bridge length and width
  - 2. Location of all bents
  - 3. Clear water opening
  - 4. Bulkheads and method of construction
  - 5. Details of the bridge rail
- B. Culverts. When culverts are not shown on plans, submit a copy of the design for the proposed pipe which must show the following:
  - 1. Pipe size and length
  - 2. Location
  - 3. Minimum fill cover

The Department has 20 working days to review the submittals. Approval of the detour is contingent upon meeting the requirements of this provision and those of the resource and regulatory agencies with jurisdictional authority.

206.03.4 Maintenance

Maintain the detour in accordance with Section 104.05 to provide the travelling public with a safe and smooth riding surface. Provide a satisfactory surface similar or better to that which existed on the Presently Travelled Way (PTW) prior to beginning construction. Repair all damage to the detour and the PTW connections immediately and at no additional cost to the Department. This includes, but is not limited to, damage from washouts, chuckholes, soft spots, guardrail damage, or debris on the roadway. Failure to maintain the detour in a manner that provides the travelling public with a safe and smooth riding surface is cause for the Project Manager to stop work until corrective actions take place. All costs associated with the delay in the stopped work is solely the Contractor's responsibility.

206.03.5 Removal

Remove the detour only after the mainline work has been completed and approved by the Project Manager. Fill areas excavated for detour construction and incorporate the material removed from the detour into the mainline embankment. Grade the location impacted by detour to approximately match its original contours. Place salvaged topsoil over the disturbed area and seed as specified in the contract.

206.04 METHOD OF MEASUREMENT

Detour – Construct, Maintain, and Remove will be measured as a lump sum quantity in accordance with Section 109. Materials, labor, and equipment needed to construct, maintain, and remove the detour are considered incidental to this item of work and will not be measured for payment. No additional measurements will be made for finish grade control or traffic control devices associated with detour construction. Traffic control devices used to maintain traffic after detour construction is complete will be measured under the traffic control bid item specified in the contract.

206.05 BASIS OF PAYMENT

Payment for the completed and accepted quantities is made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
Detour – Construct, Maintain, Remove	Lump Sum

Include all materials, labor, and equipment needed to construct, maintain, and remove the detour in the lump sum bid for Detour – Construct, Maintain, and Remove. Traffic control devices required to construct the detour are considered incidental and will not be paid separately. Traffic control devices required for operation of the detour will be paid under the traffic control item specified in the contract.

Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract.

207.01 DESCRIPTION (CULVERT AND TRENCH EXCAVATION) Page 103 1-12-12

Rescind Subsection 207.01 and replace with the following:

207.01 DESCRIPTION

This work is the excavation for placing or removing drainage and other appurtenant structures. It includes foundation preparation, backfilling, disposal of excavation material, bailing, dewatering, drainage, sheeting, shoring, cribbing and installation of safety measures needed to satisfy the requirements of Subsection 107.17. Excavation classes are described below.

207.03.6 FOUNDATION PREPARATION Page 104 3-12-09

Rescind the second paragraph (that begins with “Remove unstable or ...”) and replace with the following paragraph:

Remove unstable or unsuitable material encountered below the excavation floor elevation and replace with material meeting Subsection 701.04.2. Cover with bedding material meeting Subsection 701.04.1 as directed. Substitute excavatable flowable fill as bedding material for concrete and steel pipes only with the Project Manager’s prior approval. A request to use excavatable flowable fill for any other pipes or application must be submitted a minimum of 5 working days prior to use. The Project Manager will investigate unstable pipe installations requiring 4 feet (1.2 m) or more of foundation material.

207.05 BASIS OF PAYMENT (CULVERT AND TRENCH EXCAVATION) Page 104 1-12-12

Add the following after the last paragraph:

Payment for safety measures required to protect open trenches is included in the contract unit price per foot (meter) of pipe (type and size).

208 WATER POLLUTION CONTROL AND AQUATIC RESOURCE PRESERVATION Page 105 4-24-14

Rescind Section 208 and replace with the following:

SECTION 208  
WATER POLLUTION CONTROL AND AQUATIC RESOURCE  
PRESERVATION

208.01 DESCRIPTION

Water pollution control is the planning, scheduling, installing, maintaining, and removing of measures and devices to prevent or minimize pollution and control sediment transport and soil erosion. Aquatic resource preservation is the avoidance and minimization of impacts to aquatic resources.

208.02 MATERIALS

Use materials meeting contract requirements or approved by the Project Manager if permanent and temporary materials are not specified.

208.03 CONSTRUCTION REQUIREMENTS

208.03.1 General

Comply with all local, state, tribal, and federal laws and regulations as well as applicable permits, authorizations, and notifications for prevention or abatement of erosion, water pollution, and siltation. Obtain and submit copies of any required permits, authorizations, and notifications to the Project Manager before beginning construction activities covered under the applicable permit. The Department is not responsible for delays caused by incomplete or inaccurate submittals by the Contractor. Defend, indemnify, and hold harmless the Department from legal actions or fines resulting from violations of the rules, regulations, permits, authorizations, and notifications due to any act, omission, neglect, or Contractor misconduct.

Plan, install, inspect, and maintain temporary and permanent water pollution controls (i.e. BMP’s) to provide economical, effective, continuous erosion and sediment control, prevent pollution during and after completion of construction activities, and preserve existing aquatic resources. Erosion and sediment control is required on all projects as necessary to minimize damage to the highway and adjacent properties and abate pollution of surface and ground water resources.

208.03.2 Water Pollution Control

Contractor failure to provide erosion, sediment, and water pollution controls may cause the Department to provide the work and deduct those costs from monies due or to become due the Contractor, or otherwise billed to the

Contractor. The Department may also stop the work or withhold any payments due until acceptable corrective action is taken.

- A. Spill Prevention and Waste Disposal. Prevent chemicals, fuels, lubricants, bitumens, raw sewage, and other wastes from entering regulated aquatic resources. Dispose of all wastes, refuse, and discarded materials complying with Subsection 107.11.
- B. Erosion and Sediment Control Measures. Control erosion, sediment, and water pollution during all work and work suspensions. Design, install, and maintain erosion and sediment controls to control stormwater discharges, including both peak flowrates and total stormwater volume, to minimize erosion at outlets and to minimize downstream channel and streambank erosion.
  1. Temporary Control Measures. Install BMP's prior to, or concurrently with, soil disturbance activities. When BMP installation is concurrent with the soil disturbance activity, limit the work to an area that can be protected by BMP's no later than the same day the work is performed. Failure to install BMP's within the same day will result in suspension of all work relating to those BMP's.
 

Maintain all temporary erosion control, sediment control, and other pollution control measures until it is no longer needed or conflicts with the work. If devices that conflict with the work are removed, replace these devices no later than the end of each shift.

Re-grade work sites to match the surrounding terrain after the devices are removed.

Repair or replace damaged, inadequate, non-functioning, or non-conforming devices. Initiate work to fix the problem immediately after discovering the problem. Unless specified differently in permits or authorizations, complete this work as soon as practicable, but no later than 7 calendar days after discovering any deficiencies.

Temporary pollution control measures required due to the Contractor's negligence, carelessness, failure to maintain, or failure to install designed permanent controls in place of temporary controls are at Contractor expense.
  2. Permanent Control Measures. Install permanent pollution controls concurrently or immediately following work that disturbs natural ground.
- C. Inspections. Conduct inspections as specified in the permit. When no permit is required, conduct inspections to evaluate performance and maintenance needs of water pollution controls in accordance with the following schedule unless specified differently in permits or authorizations:
  - At least once per month;
  - Within 24 hours of a storm event of 0.25 inches or greater.

Use the Department's most current Storm Water Pollution Prevention Plan (SWPPP) Inspection Report, when no permit is required. Use the Department's form or another form that conforms to permit requirements when a permit is required. Provide one copy of the signed inspection report to the Project Manager.

Failure to conduct inspections and submit inspection reports renders the BMP's unacceptable. Immediately report potential noncompliance in accordance with applicable regulations, guidance, and permit conditions. The Contractor is wholly responsible for all violations including but not limited to those that result during the times when the required monitoring is not conducted, inspection report forms are not submitted, BMPs are ineffective, required maintenance or monitoring of BMP's is not performed.

BMP's will be inspected as part of the final inspection to ensure they are adequate, maintained, and functioning properly.
- D. Erosion Control Plan. Montana Pollutant Discharge Elimination System (MPDES) permits are issued by the Montana Department of Environmental Quality (DEQ) for discharges within the state of Montana not including Indian Countries. National Pollutant Discharge Elimination System (NPDES) permits are issued by the U.S. Environmental Protection Agency (EPA) for discharges inside the boundaries of Indian Countries. Some of the Tribal governments also have NPDES review authority and/or separate permitting authority. For projects requiring MPDES and/or NPDES General Storm Water Permit coverage:
 

Submit one Notice of Intent (NOI) package and the associated fees for ground disturbance areas within the project limits to the appropriate permitting agency(ies). Use Department furnished blank erosion control plans to complete the SWPPP as required by the General Permit. Provide a copy of the NOI package submitted and confirmation for receipt of a complete NOI package from the permitting agency(ies) to the Project Manager and Environmental Services Bureau prior to conducting any ground disturbance activities.

Be responsible for erosion, sediment, and water pollution control for Contractor furnished material sources, staging areas, plant sites, or any other Contractor caused ground disturbance outside the project limits. Submit a separate NOI package and the associated fees to the permitting agency(ies) for ground disturbance areas outside the project limits. Contractor furnished material sources, staging areas, plant sites, or any other Contractor caused ground disturbance outside the project limits, are the Contractor's responsibility and must be submitted under a separate NOI package from the ground disturbance within the project limits. Although these areas are permitted separately, the areas of disturbance are considered cumulative with the project disturbance area when determining the requirement for permit coverage.

Comply with the conditions of the permit. Revise and/or update the SWPPP to reflect current conditions, pollution prevention measures, and installed BMPs in accordance with permit requirements. Submit all changes to the Project Manager.

Do not transfer or terminate the General Storm Water Permit coverage until the BMP's are inspected and approved and all records required under the permit, including inspection and monitoring reports, are furnished to the Project Manager. The Department may require that certain BMP's be replaced by another type of BMP as a condition of permit transfer.

When submitting the General Storm Water Permit transfer package/application to the Department, include a check for the permit transfer fee. Make the check for the amount of the fee payable to the Montana Department of Environmental Quality.

#### 208.03.4 Aquatic Resource Protection

- A. General. Unless authorized with approved permits and authorizations, meet the following general provisions:

1. Do not operate mechanized equipment in any regulated aquatic resource, unless authorized in accordance with Subsection 208.03.4B.
  2. Isolate work zones from flowing and standing waters during construction, unless authorized in accordance with Subsection 208.03.4B.
  3. Do not spill or dump material from equipment into regulated aquatic resources.
  4. Do not discharge wastewater from washout of concrete related equipment, concrete finishing, sawcutting, wet concrete, hydraulic demolition, etc. into any regulated aquatic resource.
  5. Do not place fill or other materials in any regulated aquatic resource unless included in the project plans. or authorized in accordance with Subsection 208.03.4B.
  6. Locate staging or storage areas at least 50 feet (15.2 m) horizontally from any aquatic resource, top of stream bank, or the highest anticipated water level during the construction period, whichever is furthest from the resource.
  7. Store and handle petroleum products, chemicals, cement and other deleterious materials to prevent their entering regulated aquatic resources.
  8. Provide sediment and erosion controls for topsoil stockpiles, staging areas, access roads, channel changes, and instream excavations.
  9. Shape and contour streambeds and streambanks to their pre-disturbed condition to match adjacent undisturbed ground, unless included in the project plans.
  10. Clean, maintain, and operate equipment so that petroleum-based products do not leak or spill into any regulated aquatic resource.
- B. Temporary Facilities and Construction Activities. Obtain required permits and authorizations for the installation, maintenance, operation, and removal of temporary facilities such as work bridges, work pads, cofferdams, temporary detours, diversions, etc. Department obtained permits and authorizations do not typically include removal and disposal of existing structures, access to and from authorized locations, sequencing and construction methodology to construct authorized features, impacts to areas outside of the planned construction footprint, and other items potentially affecting an aquatic resource.
- Plan temporary construction facilities to:
1. Minimize disturbance to regulated aquatic resources;
  2. Not restrict or impede fish passage in streams;
  3. Not restrict water flow anticipated during use; and
  4. Remove temporary facilities as soon as practicable once they are no longer needed.
- Complete application forms in accordance with the permitting agency requirements. Plans included as part of the application forms must at a minimum contain the following information:
1. Details depicting regulated aquatic resource features before installation of temporary construction facilities and after removal;
  2. Location of facilities relative to permanent work and regulated aquatic resources;
  3. Plan and elevation views of facilities showing regulated aquatic resources;
  4. Anticipated high water elevation during use of the facilities;
  5. Waterway openings and clearances;
  6. Type of bridge bent, pier, and superstructure construction (wood, steel, concrete, etc.);
  7. Quantity and type of material proposed for use;
  8. Written description for installing, operating, maintaining, and removing facilities including proposed construction techniques, containment plans, equipment, stockpile and storage areas, temporary erosion and sediment control measures, site revegetation/restoration and weed control plans;
  9. Estimated time the temporary facilities are to be in place; and
  10. A plan and written description of existing structure removal, if applicable, as described in Subsection 208.03.4C.
- Shape and contour areas disturbed by the installation or removal of temporary construction facilities to match adjacent undisturbed ground upon removal of the facilities.
- Submit copies of the plans and application packages, their modifications, or their revisions to the Project Manager. The Department will review the plans and application packages, their modifications, or their revisions, and either request revisions or submit to applicable resource and regulatory agencies within 21 calendar days. Resource and regulatory agency review time does not begin until the Department submits the application to the applicable agencies. Do not begin work on temporary construction facilities or modifications to approved plans until receiving written approval from the regulatory and resource agencies.
- C. Existing Bridge and Structure Removal. Furnish the Project Manager a plan and written description detailing how the existing bridge(s) and/or structure(s) are to be removed. Include in the description what methods and equipment are to be used to remove the bridge deck, superstructure, piers, footings, and end bents, and, if applicable, containment plan. Conduct work in accordance with Section 202.
- Provide the anticipated start date of removal work and estimated time to complete the work.
- Include details of erosion, sediment, and pollution control, and containment measures used during removal.
- Remove contract-related debris from the regulated aquatic resources within 48 hours of placement.
- Maintain constant progress on all in-stream work until completed.

#### 208.03.5 Seeding

- A. Temporary Seeding. Temporarily seed or implement other soil stabilization measures approved by the Project Manager on all disturbed soil areas as required by permits/authorizations. When no permit is required, temporarily seed or implement other soil stabilization measures approved by the Project Manager on all disturbed soil areas when grading activities will not resume for a period of 14 calendar days or more by the 14th day after the last disturbance. Permanently seed areas not requiring further disturbance, if they fall within the seeding dates
- B. Erosion Seeding. Conduct erosion seeding on freshly exposed slopes steeper than 3:1 that will not be topsoiled or redisturbed, unless implementing other soil stabilization measures in accordance with permits or as approved by the Project Manager. Manually broadcast seed the disturbed areas at the completion of

each day, regardless of season. Excessively rocky slopes that cannot be excavated by ripping are exempt from erosion seeding. Broadcast seed with the following mixture and rates:

Species	lbs PLS per acre
Cereal barley	10.0
"Pryor" slender wheatgrass	5.0
"MT origin" Canada wildrye	10.0

Erosion seeding does not replace or substitute for final seeding activities specified in the contract.

**208.04 METHOD OF MEASUREMENT**

Temporary erosion and sediment control devices for use within the project limits are measured as lump sum and will not be measured separately. Only erosion and sediment controls within the project right-of-way and installed in accordance with manufacturer specifications or the Detailed Drawings will be paid for. BMP's and associated permit costs for Contractor furnished material sources, staging areas, plant sites, or any other site that is not within project limits are not measured for payment.

Permit fees and monitoring costs associated with obtaining and maintaining permit coverage for ground disturbance areas both within and outside the project limits are considered incidental to the project and are not measured separately for payment.

Normal maintenance of BMP's, in accordance with permit requirements and the contract, are considered incidental to the work and no additional measurements will be made. Maintenance includes:

- Removal of BMP's no longer required;
- Removal of sediment and debris in front of and around BMP's;
- Repair and replacement of incorrectly installed devices;
- Mobilization and travel for inspections and maintenance; and
- Maintenance until the permit is terminated or transferred.

Replacement of satisfactory BMP's requested by the Department at the final inspection will be measured in accordance with the Erosion Control Rate Schedule.

**208.04.1 Temporary Erosion and Sediment Controls – Units**

Temporary Erosion and Sediment Control (TESC) devices are measured by the unit of control devices used and accepted. A unit is the base value for establishing the relative value of each type of TESC device. The relative value of each TESC device in units is shown in the "Erosion and Sediment Control Rate Schedule".

Temporary and erosion seeding are measured parallel to the ground line and include seedbed preparation, fertilizing and seeding.

These will not be used to correct deficiencies of lump sum items.

**208.05 BASIS OF PAYMENT**

No additional payment will be made for the fees or monitoring costs associated with the General Permit for Storm Water Discharges Associated with Construction Activity. Include fees associated with transferring the permit in the Lump Sum Temporary Erosion Control bid item.

Failure to implement BMPs identified in the SWPPP, update the SWPPP as required by the Construction General Permit, or conduct BMP inspections and submit inspection reports renders the BMP's unacceptable. No payment will be made for BMP's installed and the total paid to date on progress estimates for BMP's will be deducted on the next monthly progress estimate until SWPPP deficiencies are remedied and the inspection reports are completed and copies received by the Project Manager.

Payment for the completed and accepted quantities is made under the following:

Pay Item	Pay Unit
Temporary Erosion Control	Unit
Temporary Erosion Control - LS	Lump Sum

Payment at the contract unit price is full compensation for all resources necessary to complete the work under the contract.

**208.05.1 Temporary Erosion and Sediment Control – Lump Sum**

Partial payment for Temporary Erosion Control will be monthly based on the lump sum contract price as follows:

TABLE 208-1  
TEMPORARY EROSION CONTROL  
LUMP SUM PAYMENTS

% OF CONTRACT AMOUNT PAID	% OF EROSION CONTROL BID AMOUNT
First estimate after start of erosion control work	60
25	70
50	80
75	90
Conditional Final Acceptance	100

Include the cost of temporary erosion control in the cost of the lump sum item. Anticipate probable adverse weather and stream flow conditions.

A request may be submitted for compensation resulting from the addition of BMP's due to acts of God described in Subsection 107.17 or extra work added by change order. Include documentation in the request that demonstrates that such an event has occurred.

Payment for quantities required by an event or extra work, and approved by the Project Manager, will be by a change order and in accordance with the Erosion Control Rate Schedule contained in the contract at a unit price of \$1.00 per unit.

The installation of additional BMP's requested by the Department at the final inspection will be added by change order and paid for in accordance with the Erosion Control Rate Schedule.

Payment at the contract unit price is full compensation for all resources necessary to complete the work under the contract.

208.05.2 Temporary Erosion and Sediment Control - Units

Temporary erosion and sediment controls are paid for at the contract unit price per temporary erosion control. The units of each type of temporary erosion control paid for will be calculated by multiplying the measured quantity of each device by the assigned value per units shown in the "Erosion & Sediment Control Rate Schedule" included in the contract.

Payment for completed and accepted temporary erosion/sediment control devices will be made under one of the following two categories:

1. Category No. 1 – New Installation. When a device is new and used for the first time it will be paid at 100 percent of the rate schedule.
2. Category No. 2 – Reuse. When a previously used BMP material that meets contract specifications is placed in a new location, it will be paid at 75 percent of the rate schedule.

Maintenance of BMP's, in accordance with the MPDES/NPDES permit(s) and the contract, are not paid for separately. Include this work in the unit price bid for temporary erosion control devices.

No additional compensation is made for the removal of BMP's that are no longer required.

Payment at the contract unit price is full compensation for all resources necessary to complete the work under the contract.

210.03.6 TEST TRAILER, TRANSPORT, AND SETUP

Page 116

6-27-13

Rescind Subsection 210.03.6 and replace with the following:

Transport State-owned test trailers from a designated location to the project site and return it to a designated location as directed. Contact the Project Manager for details concerning the transport of the trailer at least 30 days prior to plant mix operations. The Contractor is responsible for all required permits.

Purchase minimum \$85,000 insurance for the trailer and its contents. Provide written proof of the insurance to the Project Manager prior to moving. Verify that the Department has prepared the trailer and contents for transport.

Repair or replace all contents and trailer damage occurring in transport at Contractor expense. Do not move the trailer without the Project Manager's permission.

Provide a level parking area, the required blocking, and electrical power service for the test trailer. Locate and construct the parking area a minimum 200 feet (61 m) from the plant mix dryer drum, mixing plant, and storage silo unless otherwise directed, to accommodate the 12 foot x 32 foot (3.6 m x 9.8 m) trailer. Transport, set up, and make the trailer fully operational at least two days before starting plant mix paving. Park, block, level, re-block, re-level and unblock the trailer as directed. Supply electrical power 24 hours a day, 7 days a week. Suspend paving work during power interruptions or periods of insufficient power to the trailer.

Furnish and install a continuous 200-ampere, 220 to 230 volt, single phase, 60 hertz power supply to the trailer. The power supply must be independent from the Hot Plant operation. Have the source connected by a Montana licensed electrician using a four wire conductor.

210.03.7 TEST TRAILER, POWER, AND BLOCKING

Page 116

7-26-12

Rescind Subsection 210.03.7 Test Trailer, Power, and Blocking.

210.04.2 TEST TRAILER, TRANSPORT, AND SETUP

Page 117

7-26-12

Rescind Subsection 210.04.2 and replace with the following:

Test trailer, transport, and setup is measured by the mile (kilometer) for the actual miles (kilometers) moved. It includes insurance, transporting, blocking, unblocking, leveling, furnishing and installing electrical power and associated wiring, removing power and wiring, and all other necessary resources to complete the item of work.

Maintenance re-blocking and re-leveling is incidental to the work and is not paid separately. The mileage shown in the contract is an estimate only and may be adjusted by the Project Manager.

210.04.3 TEST TRAILER, POWER, AND BLOCKING

Page 117

7-26-12

Rescind Subsection 210.04.3 Test Trailer, Power, and Blocking.

210.05 BASIS OF PAYMENT

Page 117

7-26-12

Rescind Subsection 210.05 and replace with the following:

Payment for the completed and accepted quantities is made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
Motor Grader	Hour
Dozer	Hour
Test Trailer Transport/Setup	Mile

Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract.

211 ROAD LEVELER OPERATIONS Page 119 7-26-12

Rescind Section 211.

212 OBLITERATE ROADWAY Page 121 3-27-14

Rescind Section 212 and replace with the following:

SECTION 212  
OBLITERATE ROADWAY

212.01 DESCRIPTION

Obliterate roadway includes removal of the existing roadway and related items, rehabilitating the abandoned roadway area by scarifying and shaping, and seeding..

212.02 RESERVED

212.03 CONSTRUCTION REQUIREMENTS

Grade and contour abandoned roadways to blend with the new roadway or existing terrain.

If not specified in the contract, dispose of the existing bituminous materials in conformance with applicable laws, rules, regulations and the Montana Solid Waste Management Act.

After the old roadway surfacing is removed, salvage the topsoil from areas to be graded and perform the rough grading. Grade and contour the obliterated roadway to blend with the new roadway and adjacent terrain. Spread the salvaged topsoil and seed the obliterated roadway area.

Work construction scars, sharp breaks, and steep slopes or cuts to blend with the terrain. Existing aggregate surfacing material may be used to construct fills when covered with 12 inches (305 mm) of soil capable of supporting plant growth. Existing bituminous materials used for embankment of the new roadway must conform to the requirements of Subsection 202.03.3.

Remove and dispose of bituminous materials, old structures, guardrail, and other non-salvageable items not included in other contract items for removal at Contractor expense. Remove and neatly store all material designated as salvageable to prevent damage.

The species of seed, seed bed preparation, fertilizing, mulching, and application rate is specified in the contract.

212.04 METHOD OF MEASUREMENT

Obliterate roadway is measured in stations to the nearest whole station along the centerline of the roadway obliterated.

Topsoil is measured under Subsection 203.04.

Seeding is measured under Subsection 208.04

212.05 BASIS OF PAYMENT

Payment for the completed and accepted quantities is made under the following:

Pay Item	Pay Unit
Obliterate Roadway	Station
Seeding	Acre (ha)
Topsoil	Cubic Yard (m3)

Material obtained from the obliterated roadway and used in the construction of the new roadway is measured and paid for as unclassified excavation under Section 203.

Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract.

212.05 BASIS OF PAYMENT (OBLITERATE ROADWAY) Page 121 12-13-12

Rescind the second paragraph (that begins with "Material obtained from...") and replace with the following:

Material obtained from the obliterated roadway and used in the construction of the new roadway is measured and paid for as unclassified excavation under Sections 203.

301.02.1 AGGREGATES Page 123 9-26-13

Add the following material to the existing table:

Bridge End Backfill	701.13
---------------------	--------

301.02.2 BINDER Page 123 5-9-13

Rescind the second paragraph (that begins with " Add and Blend the binder...")

301.02.4 AGGREGATE TREATMENT Page 123 1-17-13

Add the following Subsection:

301.02.4 Aggregate Treatment

Choose the material that will be used to treat the aggregate, which may include MC-70, emulsified prime, calcium or magnesium chloride, or other material approved by the Project Manager.

Furnish liquid magnesium or calcium chloride meeting Subsection 713.03 requirements. Furnish liquid asphalt meeting Section 702 requirements. If used, furnish MC-70 listed on the Department's QPL.

Blotter material is material with 100 percent passing the ½-inch (12.5 mm) screen and having a PI of 6 or less.

301.03.1(B) ACCEPTANCE SAMPLING AND TESTING (AGGREGATE SURFACING) Page 123 1-15-09

Rescind third paragraph (that begins with "The largest quantity ...")

301.03.1(B) ACCEPTANCE SAMPLING AND TESTING (AGGREGATE SURFACING) Page 123 7-31-08

Rescind the first Sentence (that begins with "The Project Manager will ...") and replace with the following:

The Project Manager will randomly select samples taken by the Contractor and witnessed by an Inspector, for gradation and fracture testing from processed material in its final position on the roadway under MT-201. Samples for other tests will be taken at the point of production.

301.03.1(B) ACCEPTANCE SAMPLING AND TESTING (AGGREGATE SURFACING) Page 123 10-1-06

Delete "Cleanness Value ..... MT-228" as an acceptance test.

301.03.1(C) ACCEPTANCE (SAMPLING, TESTING, AND ACCEPTANCE) Page 124 2-23-12

Rescind 301.03.1(C) and replace with the following:

C. Acceptance. Surfacing aggregates are evaluated for gradation and mechanical fracture on a lot-by-lot basis. The upper and lower limits in the gradation tables in Section 701 are the upper and lower limits in the evaluation formulas. The specified minimum fracture is the lower limit.

Acceptance is made under Subsection 105.03.2.

301.03.5(A) AGGREGATE SURFACING CONSTRUCTION Page 125 12-13-12

Rescind the first Sentence under part (A) (that begins "Prepare the existing...")

301.03.5(C) ROAD MIXING (AGGREGATE SURFACING CONSTRUCTION) Page 126 5-9-13

Rescind the fourth, fifth, and sixth paragraphs.

Rescind the last paragraph and replace with the following:

Correct or remove equipment from the work failing to maintain uniform gradation of the material for the entire width and thickness of the roadway.

301.03.5(D) COMPACTION (AGGREGATE SURFACING CONSTRUCTION) Page 126 9-26-13

Rescind the third paragraph (that begins "The Project Manager...") and replace with the following:

The Project Manager may take samples from the materials placed on the roadway. They will be tested and the results averaged to determine a new target density for the material remaining to be placed.

Remove "MT-210" and "MT-215" from the last paragraph (that begins with "Densities will be determined ...").

301.03.5(E-H) TRIMMING, CURING, RESTRICTIONS, & SURFACE SMOOTHNESS Page 126-127 7-26-12

Rescind Subsection 301.03.5(E) through Subsection 301.05.5(G) and replace with the following:

E. Finishing. Finish each course of compacted aggregate surfacing to the specified grade and section. The final lift will be accepted in accordance with Subsection 105.08.

Use trimmings on the inslopes, on sections of uncompleted roadway or return to the pit area. When quantities are measured by the ton (metric ton), excess material returned to the pit is deducted from the pay quantities.

F. Curing. Allow the final lift of crushed aggregate course to cure for a minimum of 72 hours and until in-place moisture content is 2% or more below optimum moisture content or a maximum of 5% final moisture content, whichever is lower. Meet these requirements prior to aggregate treatment or paving. Notify the Project Manager when a section is complete and ready for Department testing. The in-place soil moisture content will be determined on the final lift of surfacing aggregate in 2,000 foot (610 m) long sections. Moisture content will be tested within each section at 10 random locations. Not more than 1 test may be above the target value. The number of tests will be prorated for sections with partial lengths. Additional tests may be taken at the Project Manager's discretion.

The Contractor is responsible for corrective actions on sections not meeting moisture content requirements. After corrective actions have been taken, the sections will be tested at 10 random locations or prorated as determined by the Project Manager.

G. Restrictions. The Project Manager may restrict equipment speed and load weights to prevent damage to existing and new work, public thoroughfares or safety.

Unstable or pumping material is unacceptable. Rework or remove and replace the material prior to placing additional lifts or materials.

H. Surface Smoothness. Finish the aggregate surface to the specified grade within Table 301-1 tolerances.

TABLE 301-1  
SURFACE SMOOTHNESS

AGGREGATE SIZE	TOLERANCE	DISTANCE
1 ½-inch (40 mm) and larger	+0.08 foot (24 mm) to -0.05 foot (15mm)	30 feet (9.2 m)
1-inch (25 mm) and less	±0.04 foot (12 mm)	60 feet (18.4 m)

301.03.7 TRAFFIC GRAVEL Page 127 4-8-10

Add the following after the last paragraph:

Milled and/or pulverized plant mix material may be used as traffic gravel under the following conditions:

1. Submit in writing a detailed plan showing locations for the use of the milled or pulverized material. Include an updated traffic control plan and stockpile locations.
2. Place all milled/pulverized material below the finished subgrade elevation unless approved in writing by the Project Manager.
3. Do not mill/pulverize areas outside the planned limits unless approved in writing by the Project Manager.
4. 100% of the milled/pulverized material must pass the 2" sieve.

301.03.8 AGGREGATE TREATMENT Page 127 1-17-13

Add the following Subsection:

301.03.8 Aggregate Treatment

Furnish and apply aggregate treatment on aggregate surfaces. Submit the material(s) and application rates to be used for aggregate treatment to the Project Manager ten days before beginning the construction of the aggregate surfacing. The material must bond with the aggregate and the treated surface must be durable under vehicular traffic.

Apply aggregate treatment material and necessary blotter according to the manufacturer's recommendations.

301.03.9 BRIDGE END BACKFILL Page 127 9-26-13

Add the following Subsection:

301.03.9 Bridge End Backfill.

Place bridge end backfill full width of the roadway embankment typical section to ten feet behind the base of the pile cap then ascending on a 6H:1V slope. The top of the Bridge End Backfill is subgrade elevation. When the Bridge End Backfill does not daylight at an embankment slope to provide drainage, extend the Bridge End Backfill three feet beyond the wingwall and daylight to the slope facing the span. Place bridge end backfill material in conformance with moisture and density requirements of Section 301.

Do not contaminate bridge end backfill with water while performing bridge work.

301.04.2 BINDER Page 128 9-26-13

Rescind Subsection 301.04.2 Binder and replace with the following:

301.04.2 Bridge End Backfill

Bridge End Backfill is measured by the cubic yard (m<sup>3</sup>).

301.04.3 EXISTING SURFACE PREPARATION Page 128 12-13-12

Rescind Subsection 301.04.3 Existing Surface Preparation.

301.04.4 AGGREGATE HAUL Page 128 12-13-12

Rescind Subsection 301.04.4 Aggregate Haul.

301.04.7 AGGREGATE TREATMENT Page 128 1-17-13

Add the following Subsection:

301.04.7 Aggregate Treatment

Aggregate Treatment is measured by the square area. Blotter material is not measured separately for payment and is to be included in the bid price for aggregate treatment.

301.05 BASIS OF PAYMENT Page 128 9-26-13

Add the following pay items and unit to the end of the existing table:

<u>Pay Item</u>	<u>Pay Unit</u>
Aggregate Treatment	Square Yard (square meter)
Bridge End Backfill	Cubic Yard (m <sup>3</sup> )

Remove the following pay items and units from the table:

<u>Pay Item</u>	<u>Pay Unit</u>
Binder	Cubic Yard (cubic meter) or Ton (metric ton)
Binder Haul	Mile Cubic Yard (kilometer cubic meter) or Ton Mile (metric ton kilometer)
Existing Surface Preparation	See Subsection 204.05
Aggregate Haul	Ton Mile (metric ton kilometer) or Mile Cubic Yard (kilometer cubic meter)

Add the following sentence after the Pay Items and Pay Units:

Binder is not measured separately but is to be included in the cost for Aggregate material.

Add the following sentence after the last sentence of the third paragraph (that begins with "Sale of excess...") :

If milled/pulverized plant mix is used on any portion of the project, no payment for excess traffic gravel will be made.

302 BITUMINOUS PAVEMENT PULVERIZATION Page 131 4-8-10

Rescind Section 302 and replace with the following:

SECTION 302  
BITUMINOUS PAVEMENT PULVERIZATION

302.01 DESCRIPTION

This work consists of processing the existing plant mix surfacing with existing crushed aggregate course, additional crushed aggregate course, or combination of these to restore the roadway section.

302.02 MATERIALS

Furnish crushed aggregate course meeting the requirements of Subsection 701.02.1 and one of the following Subsections:

- Crushed Aggregate Course Type "A" Grade 5 .....701.02.4
- Crushed Aggregate Course Type "A" Grade 6 .....701.02.4

302.03 CONSTRUCTION REQUIREMENTS

302.03.1 Pulverization

Pulverize the bituminous surfacing to the depth(s) specified in the contract. Pulverize the existing material so that 100 percent by weight passes a 2-inch (50 mm) sieve.

302.03.2 Equipment

Equipment used to pulverize the existing surfacing must not reduce the aggregate size in the existing surfacing.

302.03.3 Mixing

Add crushed aggregate course as necessary to construct the roadway to the specified typical section and profile grade. Uniformly mix the pulverized material and crushed aggregate course by pugmilling or by using the pulverization equipment.

302.03.4 Compaction

Compact the pulverized mixture to maximum 8 inch (200 mm) compacted lifts to 98 percent of the target density. The target density will be determined by one of the following methods:

- A. Pugmill Mixing. MT-230 determines maximum density when the pulverized plant mix and crushed aggregate course are blended at a constant ratio by pugmill. The initial target density is the average of the maximum density of at least two tests on samples representing the material to be compacted.
- B. In-place Mixing. MT-219 determines maximum density when in-place pulverized plant mix and crushed aggregate course mixtures are combined at varying ratios.

The Project Manager will determine target densities and moisture corrections. A new target density will be established if the ratio of pulverized material and crushed aggregate course change by more than 20 percent or the Engineer determines the pulverized material characteristics or site conditions change.

302.03.5 Testing and Acceptance

Each lift of pulverized mixture material will be divided into 2000-foot long (610 meter) sections. The in-place dry density of each lift will be determined within each section at ten randomly selected locations. The average of the ten tests must exceed 98 percent of the target density with no more than two out of the ten tests being less than 98 percent of the target density.

Be responsible for controlling compaction and all necessary quality control testing.

Notify the Project Manager when compaction is complete on a section so it can be tested.

Re-compact sections not meeting density requirements. Re-compacted sections will be tested at ten new random locations.

Compaction and testing will continue until the section meets density requirements.

302.04 METHOD OF MEASUREMENT

302.04.1 Aggregate

Virgin crushed aggregate course is measured by the ton (metric ton) under Subsection 301.03.2(C) or by the cubic yard (meter).

302.04.2 Pavement Pulverization

Pavement pulverization is measured by the square yard (square meter) based on the bottom width of the pulverized material. The contract unit price may be adjusted if the average pavement depth varies by more than 0.10 foot (30 millimeters) from plan and the Project Manager issues a written order to increase or decrease the pulverization depth.

302.05 BASIS OF PAYMENT

Payment for the completed and accepted quantities is made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
Crushed Aggregate Course	Ton (metric ton) or Cubic Yard (cubic meter)
Pavement Pulverization	Square Yard (square meter)

Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract.

303.04.2 HAUL (STOCKPILED SURFACING AGGREGATE) Page 133 12-13-12

Rescind Subsection 303.04.2.

303.05 BASIS OF PAYMENT Page 133 11-14-13

Remove the following pay item and unit from the table:

<u>Pay Item</u>	<u>Pay Unit</u>
Haul	Ton Mile (metric ton kilometer) or Mile Yard (kilometer cubic meter)

304 PORTLAND CEMENT TREATED BASE Page 135 3-27-14

SECTION 304  
PORTLAND CEMENT  
TREATED BASE

304.01 DESCRIPTION

This work is producing and placing one or more courses of a mixture of water, portland cement, and aggregate or soil on a prepared surface in conformity with the lines, grades, and thicknesses established in the contract.

## 304.02 MATERIALS

## 304.02.1 Portland Cement

Furnish portland cement meeting AASHTO M 85 or ASTM C 150, Type I or Type II requirements and which is listed on the Department's QPL. Blended hydraulic cement that conforms to one of the following may be substituted:

- ASTM C595 Type IP or Type IP(MS)
- ASTM C1157 Type GU or Type MS

Fly ash may be used to replace a maximum of 25% of the cement by weight. Furnish fly ash meeting AASHTO M 295, Class C requirements. Mixtures with fly ash must meet all of the requirements of cement treated base.

## 304.02.2 Water

Furnish water meeting Subsection 713.01 requirements.

## 304.02.3 Aggregate

Obtain aggregates from sources meeting Section 106 requirements to produce aggregates meeting Subsection 701.02.9 requirements.

Stockpile aggregates meeting Subsection 303.03.

## 304.02.4 Blending Material

Blending material, consisting of selected natural or crushed mineral aggregate may be combined with the produced aggregate to meet gradation requirements. Blending material is at Contractor expense. The liquid limit for fine aggregate passing the No. 40 (0.425) sieve may not exceed 30, and the plasticity index may not exceed 7, tested under MT-208.

## 304.02.5 Composition and Proportioning

Develop and submit a proposed cement treated base mix design for approval. Submit the mix design a minimum of 10 business days before production. Develop a mix design with a cementitious materials content that:

- Ensures a 7-day unconfined compressive strength of 500 - 1500 psi (3450 - 10350 kpa) per MT 216, and
  - Is a minimum of 4.5% the weight of the dry aggregate.
- A. Items to be included as part of the mix design submittal:
1. Cement and fly ash certifications;
  2. Optimum moisture content and maximum density determined by MT 211;
  3. Aggregate gradations determined by MT 202;
  4. Soil-cement losses, moisture changes, and volume changes (swell and shrinkage) produced by the repeated wetting and drying of hardened soil-cement specimens determined by AASHTO T135
  5. Soil-cement losses, moisture changes, and volume changes (swell and shrinkage) produced by the repeated freezing and thawing of hardened soil-cement specimens determined by AASHTO T136. The maximum freeze/thaw weight loss is 14%;
  6. 7-Day compressive strength tests determined by MT 216;
  7. Atterberg Limits determined by MT 208; and
  8. Sand Equivalent determined by MT 213 or AASHTO T176 alternate method No. 2.

Acceptance of the mix design will be based on a review of the submitted results for all the above testing procedures.

Do not place cement treated base on the project until the submitted mix design has been approved.

## 304.03 CONSTRUCTION REQUIREMENTS

## 304.03.1 Aggregate Production, Testing, and Acceptance

- A. General. Perform all work meeting the approved job-mix target values within the specified tolerances.

Sample and test aggregates during production to control gradations.

- B. Acceptance Sampling and Testing. The Project Manager will randomly select samples of the stockpiles taken by the Contractor and witnessed by an Inspector, for acceptance of the aggregate's physical properties, excluding combined gradations. Aggregate gradation samples will be taken before portland cement and water are added to the mixture. Provide aggregate samples as directed by the Project Manager using an aggregate sampling device, just before the aggregate enters the pug mill mixer.

The approximate quantity represented by each sample is 1500 tons (1500 metric tons). Additional samples may be taken and tested.

The quantity represented by five samples will represent a lot whenever production schedules and material continuity permit. The Project Manager may establish a lot consisting of a quantity represented by three to seven consecutive samples when there are short production runs, significant material changes, or other unusual characteristics of the work.

- C. Acceptance. Cement treated base is evaluated for gradation requirements on a lot-by-lot basis. Acceptance is determined according to Subsection 105.03.2

## 304.03.2 Weather Limitations

Do not mix or place cement treated base when the ambient temperature is below 40 °F (4 °C) or the ground temperature is below 35 °F (2 °C). Do not mix or place cement treated base when the weather forecast for the project site includes a predicted temperature of 25°F or below for the following night.

Do not incorporate frozen aggregate in the cement treated base or place on a frozen subgrade.

## 304.03.3 Subgrade Preparation

Prepare the subgrade meeting the applicable requirements of Section 203.

Trim the subgrade to the thickness tolerances for cement treated base specified in Subsection 304.03.4.

## 304.03.4 Mixing and Placing

Mix the Portland cement treated base in a central plant.

Proportion the aggregate and cement by weight. Water may be proportioned by weight or by volume.

Use weigh systems and meters that are accurate to within plus or minus 0.5 percent of the total quantity batched and are equipped to indicate the total quantity of each ingredient batched between one-half and ten hours.

Calibrate the feed system before production mixing begins.

Periodically verify the mix ingredient proportions from the weigh indicators.

Produce cement treated base having a minimum of 4.5% cementitious materials. Maintain cementitious content to within plus or minus 0.5 percent of the job mix target at any periodic check and within plus or minus 0.3 percent for each day's production. Mixing will be suspended until corrections are made if the cement content is not maintained within the above tolerances.

Do not lower cement content during production that will result in freeze/thaw losses exceeding 14 percent based on mix design testing.

Uniformly mix aggregate, cement, and water. Modify mix procedures when evidence of a non-uniform mix is identified.

Place cement treated base in 4 to 8-inch compacted lifts. Place all lifts required to achieve full depth within 48 hours. Replace any partial depth section damaged prior to placement of successive lifts as directed by the Project Manager at contractor expense. Keep the compacted material of previous lifts moist until placement of successive layers. Keeping lower layers moist or furnishing and applying curing seal to partial depth layers is incidental to the cement treated base.

#### 304.03.5 Compaction

Compact the cement treated base to 98 percent of the maximum dry density within 2 hours of mixing.

The moisture and density relationship is determined by MT-211 using samples taken from the aggregate stockpiles before starting mixing operations. If a moisture and density test varies from the running average (as determined from MT 216) during production, a new moisture-density relationship will be determined.

Moisture and density tests will be taken in accordance with MT 212 on the roadway approximately every 750 cubic yards (575 cubic meters). Five tests will represent one lot of production.

Remove and re-process any un-compacted sections where the weather or contractor operation has increased the average moisture content above optimum by more than one percent. Removed mix may be re-processed as aggregate for producing cement treated base.

If the density of any section is less than or equal to 95 percent of the maximum dry density, two additional tests will be taken in that section and the average of all three test results will represent the section. The average density for the three tests must be at least the specified density, with none of the three tests less than 93 percent of the maximum dry density. Remove any section with an average density less than or equal to 95 percent of the maximum dry density. Removed mix may be re-processed as aggregate for producing cement treated base.

Cement treated base with densities between 95 and 98 percent is evaluated on a lot-by-lot basis under subsection 105.03.2.

#### 304.03.6 Finishing

Shape the compacted surface to the specified lines, grades, and cross sections.

Finish and compact to produce a smooth, dense surface free of compaction planes, cracks, irregularities, or loose material.

Complete the surface finishing within two hours of compaction.

Scarify and re-compact surface deformations in the base caused by equipment.

Do not permit the moisture content to fall below the specified optimum during finishing. Apply water in a uniform fog spray.

#### 304.03.7 Construction Joints

Construct straight vertical-faced transverse joints at the end of each day's work and when cement treated base operations are delayed or stopped for more than 2 hours. Do not place additional material until the transverse joint has been approved by the Project Manager.

Construct straight vertical faced longitudinal joints in compacted material that has been in place for more than one hour by cutting vertically approximately 3 inches from the existing edge. Dispose of the cut material according to Subsection 304.03.12.

Moisten joints prior to placing adjacent cement treated base material. Repair all construction related damage to finished sections of the cement treated base at Contractor expense.

#### 304.03.8 Protection and Curing

When the cement treated base is finished to grade, apply the specified bituminous curing seal at 0.15 - 0.25 gallons per square yard (0.91 L per square meter).

Keep the cement treated base surface moist between the final compaction and application of the curing seal. Apply the curing seal within 48 hours of finishing the cement treated base to grade.

Before applying the curing seal, assure the base surface is tightly knit, free of all loose material, and has sufficient moisture to prevent asphalt penetration.

Apply the specified blotter material at approximately 15 pounds per square yard (8.2 kg per square meter) when directed.

The actual application rate of curing seal and blotter may be adjusted by the Project Manager.

Remove cement treated base areas that have absorbed the curing seal, down to a hard, clean surface, within 24 hours of the curing seal application. Re-moisten and patch the area with approved cement treated material. Re-apply the curing seal as directed by the Project Manager.

Apply the curing seal and blotter material meeting the applicable requirements of Section 409.

#### 304.03.9 Curing Period

Do not perform any work on the cement treated base for three calendar days after the curing seal is applied. Do not place pavement on the cement treated base until the compressive strength reaches 400 psi (2760Kpa).

#### 304.03.10 Maintenance

Maintain the finished surface and seal before placing the wearing course. Make all repairs or patches the full depth of the base. Repair damage to the curing seal or cement treated base as directed by the Project Manager at the Contractor's expense. Remove any loose material from the cement treated base surface prior to paving operations.

304.03.11 Surface Smoothness and Thickness Requirements

Finish the cement treated base meeting the requirements of Subsection 105.08.

304.03.12 Use of Trimmed Material

Cement treated base trimmings may be used for shoulder construction in lieu of aggregate, subject to the following:

- A. The shoulder subgrade is prepared under the requirements of Subsection 304.03.3.
- B. Hardened material is reworked to the maximum size specified for aggregate placed on the shoulder.
- C. The trim material does not exceed 25 percent of the shoulder aggregate depth
- D. The trim material is uniformly distributed in the shoulder area before spreading additional shoulder material.

304.03.13 Testing and Acceptance of Cement Treated Base

Samples for determining the compressive strength will be taken following MT 201. Test method MT 216 will be used to mold cylinders for strength testing.

The approximate quantity represented by each sample is 750 cubic yards (575 cubic meters). Additional samples may be taken and tested.

The compressive strength tests will be conducted at seven days and the material represented will be accepted or rejected based on the requirements of Table 304-1. Any corrective action is at Contractor expense.

The Contractor may make additional cylinders to determine strength gain and to maintain quality control.

TABLE 304-1  
PAY FACTORS FOR CTB

PAY FACTORS Cement Treated Base LOT ACCEPTANCE STRENGTH, x psi (1 psi = 6.9 kPa)	
STRENGTH, x (psi)	Strength Pay factor, PF
x > 2000	PF = 0.90
2000 ≥ x ≥ 500	PF = 1.0
500 > x ≥ 400	PF = 1.0 - 0.50 (500 - x) / 100
x < 400	PF = 0, Remove and Replace

304.04 METHOD OF MEASUREMENT

304.04.1 Cement Treated Base

Cement treated base is measured by the cubic yard (cubic meter) of in-place volume.

Cement treated base placed outside the lines and grades shown in the contract or established by the Project Manager is not measured for payment.

No measurement is made of the width required for forms or equipment operations.

Gravel used in trimmings and lateral support sections outside the planned typical section dimensions are not measured for payment.

304.04.2 Curing Seal

Curing seal is measured by the gallon (liter) or by the ton (metric ton) under Subsection 409.04.1.

304.04.3 Blotter Material

Blotter material is measured by the square yard (square meter) based on the length and width of CTB placed and accepted.

304.05 BASIS OF PAYMENT

Payment for the completed and accepted quantities is made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
Cement Treated Base	Cubic Yard (cubic meter)
Curing Seal	Gallon (liter) or Ton (metric ton)
Blotter Material	Square Yard (square meter)

No separate payment will be made for cement, fly ash or surface preparation. Include the cost in the unit price bid for cement treated base.

Payment at the contract unit price is full compensation for all necessary resources to complete the item of work under the contract.

401 PLANT MIX SURFACING

Rescind Section 401 and replace with the following:

SECTION 401  
PLANT MIX SURFACING

401.01 DESCRIPTION

This work is producing, furnishing, placing, and compacting plant mix asphalt pavement.

Plant mix pavement is one or more courses of plant mixed aggregate, hydrated lime or chemical additive when required, and bituminous material, constructed on a prepared foundation.

Warm Mix Surfacing (Warm Mix) is plant mix surfacing which has been modified with additives or processes that allow a reduction in the temperature at which plant mix surfacing is produced and placed

401.02 MATERIALS

Provide aggregate from sources meeting the Section 106 requirements.

The Contractor is responsible for all sampling, testing and control of the aggregate. Furnish the Project Manager the quality control test results upon request.

Ensure that the aggregate, when combined at the job mix formula, meets Table 701-13b, and Subsection 701.03.1 requirements.

#### 401.02.1 Aggregate

Meet the aggregate requirements in Subsection 701.03.

For commercial mix, when no aggregate size is specified, use either ½-inch or ¾-inch nominal aggregate sizes.

#### 401.02.2 Hydrated Lime

Furnish hydrated lime meeting Subsection 713.02.

Sample fillers and hydrated lime in accordance with MT 601.

#### 401.02.3 Asphalt Cement

Provide asphalt cement meeting the requirements of Section 402.

PGAB modified with warm mix additives will be tested with the additives and must meet the contract requirements.

#### 401.02.4 Additives for Warm Mix

Comply with the warm mix technology manufacturer's recommendations for incorporating additives and/or processes into the warm mix. Comply with manufacturer's recommendations regarding receiving, storage, and delivery of warm mix additives. Mix warm mix at a minimum temperature of 220 °F (104 °C) and within the range recommended by the manufacturer and approved by MDT. Use asphalt additives listed in the Department's QPL for the production of Warm Mix.

Use foaming technology that is manufactured and marketed for the purpose of producing warm mix.

Ensure a manufacturer's technical representative is present during production and placement of warm mix for at least the first 10,000 tons (metric tons) of mix placed and as directed by the Project Manager for the remainder of the project. This requirement may be waived if successful experience in warm mix construction is demonstrated.

In addition to the information specified in Subsection 401.03.1, provide the following information at least 30 days before warm mix production:

1. Warm mix technology and/or warm mix additives information
2. Manufacturer's established recommendations for usage
3. Manufacturer's established target rate for water and additives, the acceptable variation for production, and documentation showing the impact of excessive production variation
4. Warm mix technology material safety data sheets
5. Temperature ranges for mixing and compacting
6. Asphalt binder performance grade test data over the range of warm mix additive percentages proposed for use.
7. The warm mix design and testing sample preparation may differ from conventional hot mix asphalt. Provide manufacturer's sample preparation recommendations for warm mix design and testing.
8. Include the binder supplier's recommendations for warm mix additive content, methods for incorporating warm mix additive into mix design samples and mixing and compaction temperature ranges.

#### 401.02.5 Recycled Asphalt Pavement (RAP)

Up to 15 percent RAP by weight may be incorporated into mix used in the top 0.15 ft. (45 mm) and up to 30 percent RAP by weight may be incorporated in the mix used in lower lifts. If RAP is included in the job mix formula and the final mix, meet all of the plant mix requirements. It is recommended that at least two separate RAP stockpiles be produced.

#### 401.02.6 Emulsified Asphalt

Furnish an emulsified asphalt, when required, meeting the requirements of Section 702.

### 401.03 CONSTRUCTION REQUIREMENTS

Produce plant mix meeting Table 701-13b, Table 701-14 Table 701-15, Table 701-16 and form CB30QA-VM (S)

Produce plant mix in a plant capable of accurately proportioning and uniformly mixing all ingredients. Do not begin plant mix production until receiving notification that the Department's mix design verification is complete.

For commercial mix, produce plant mix with actual asphalt cement content within +/- 0.3% of the mix design or field established job mix formula.

For non-commercial mix, set the initial job mix targets before producing more than 2000 tons of plant mix surfacing. Plant mix produced prior to setting initial targets is defined as start-up mix. Furnish the Project Manager copies of form CB30QA-VM (S) with the proposed job mix targets for VMA, VFA, VTM, and D/A. Once the job mix targets are set, Quality Assurance (QA) will be applied to all subsequent plant mix produced. No pay incentive or disincentive will be applied to the plant mix until the targets are set. Produce start-up mix meeting the criteria listed under the Start-Up Job Mix Range in Table 701-16. A Hamburg Wheel Track test (Hamburg) will be run when the produced mix does not meet all the criteria specified under the Start-Up Job Mix Range in Table 701-16.

The Contractor may revise the job mix targets one time during the contract. Submit revised job mix targets no later than 2 business days following completion of plant mix production, or initial job mix targets will be used to determine payment. If more than one project is included in the contract (tied projects), the job mix targets may be revised for each project only if the projects use different mix designs. Submit to the Project Manager four signed copies of form CB30-QA-VM (S) with the revised job mix targets for VMA, VFA, VTM and D/A. The revised targets will be applied retroactively to all plant mix produced after the initial targets are set, and payment will be recalculated.

No monetary, time or other compensation will be allowed for Department actions required due to the setting of initial targets, (e.g. P-value shutdowns, etc.).

#### 401.03.1 Mix Design

Submit to the Project Manager four copies of a plant mix design following AASHTO R35 and meeting AASHTO M323. Include the binder supplier's recommended mixing and compaction temperature ranges. This compaction temperature range is for testing purposes only. Choose the Design Air Voids target to be the lowest value, within the range of 3.4 to 4.0, as long as all other criteria are met. Report the dust/asphalt ratio (D/A) for the target asphalt content. The mix design is to be produced on a total weight of mix basis. On contracts with multiple gravel sources, or combination of gravel sources, provide a mix design and meet all the requirements for each source or combination of sources and suppliers. For mix designs using RAP, furnish the asphalt content and gradation of the RAP prior to mixing and after mixing with the virgin aggregate. Furnish all specific gravities.

Furnish samples of aggregate from each stockpile to produce an 800-pound (363 kg) sample, when combined at the mix design blend ratio and 5 gallons (19 L) of the PGAB.

The Department has thirty calendar days from receipt of the mix design materials and signed mix design documents to review the mix design. The mix design verification consists of passing Hamburg test results and a review of the submitted mix design documents to ensure all applicable design and aggregate requirements have been met. Tensile Strength Ratio test results do not have to be submitted with the signed mix design documents but must be received and reviewed before a mix design will be considered verified. Contract time will be extended for the actual contract time the contractor's paving start date was delayed, as verified by their most recent submitted schedule, and only for contract time assessed after the 30 day verification time frame. No additional compensation is allowed for these Department-caused delays. Contract time will not be extended if the delay occurs between November 1 and April 15.

Use MT 330 to determine the mixture resistance to moisture induced damage, modified to compact the 6-inch (150 mm) diameter specimens to 3.75 in.  $\pm$  0.20 (95 mm  $\pm$  5 mm), at 7  $\pm$  1.0 percent air voids. Meet a tensile strength ratio of 0.7 or greater.

A change in the asphalt supplier or aggregate source(s) will not require a new mix design, provided no change in the established job mix targets is requested, and the aggregate requirements and Hamburg requirements are met. Establish job mix targets immediately if changing asphalt supplier or aggregate source prior to setting initial targets on non-commercial mix projects. For commercial mix, any mix produced after a change in supplier will be considered production mix and subject to full disincentives. Provide the apparent and bulk dry specific gravities and absorption for the aggregate, and the specific gravity for asphalt cement when there are changes in the source(s).

In lieu of developing a new mix design, a previous MDT verified mix design may be requested for transfer. To be eligible for transfer, the transferred mix design must utilize the same material constituents, from the same sources, and in the same proportions as the original mix design. Mix design transfers will not be considered if the design traffic warrants different mix design criteria. Approval for transferring a mix design is at the discretion of MDT and may require Hamburg testing re-verification. Proposed transfers with variations to the original mix design such as asphalt supplier or other factors such as changes to the crushing operation which could create uncertainty in the performance of the mix design will be subject to re-verification testing. When submitting a request for a mix design transfer, furnish quantities from each stockpile to produce a 300-pound (136 kg) sample if MDT determines Hamburg testing re-verification is necessary.

#### 401.03.2 Hamburg Wheel Track Testing (Hamburg)

Provide the Project Manager a sample of plant mix surfacing material for Hamburg Wheel Track acceptance after initial job mix targets have been established for non-commercial mix and as directed by the Project Manager for commercial mix. The Department may require Hamburg samples at any time, including during the production of start-up mix.

If production non-commercial plant mix fails the Hamburg, make adjustments to produce plant mix meeting the requirements specified in the contract. After a failing Hamburg no more than 300 tons of plant mix may be produced until passing Hamburg results are received.

When two consecutive Hamburg samples do not meet the requirements, suspend production and submit a revised mix design and samples for verification and Hamburg testing. The initial Mix Design requirements will be used for verification. Do not resume production until the revised mix design is verified and Hamburg mix design requirements are met.

Plant mix lots represented by samples that do not meet Hamburg specifications are not eligible for QA incentives including ride and density incentives.

For non-commercial mix, remove and replace any start-up plant mix represented by a failing Hamburg test. For commercial mix, remove and replace any mix represented by a failing Hamburg test. Plant mix removal and replacement is at no cost to the Department.

#### 401.03.3 Test Procedures

Plant mix will be evaluated using the following test procedures.

- MT 303 – Sampling Bituminous Materials
- MT 314 – Method of Test for Bulk Specific Gravity of Compacted Bituminous Mixtures
- MT 319 – Ignition Oven Burn Procedure
- MT 320 – Gradation of Aggregate Recovered by MT 319
- MT 321 – Maximum Specific Gravity of Bituminous Mixtures (Rice Method)
- MT 328 – Method of Establishing Field Target Density for Plant Mix Surfacing Density Control
- AASHTO T 245 – Resistance of Bituminous Mixture to Moisture Induced Damage
- MT 332 – Gyrotory Compaction of Bituminous Mixtures
- MT 334 – Wheel Tracking Test Procedure (Hamburg Device)

#### 401.03.4 Composition of Mixtures.

- A. Job Mix Formula. Establish target asphalt cement and warm mix additive content (if applicable). Base the target asphalt cement content on design and field gyratory mix test results. Mix design specific gravities will be used during plant mix production unless otherwise directed by the Project Manager.
  - Include 1.4% hydrated lime by total weight of mix as part of the aggregate gradation.

B. Sampling. Furnish samples of plant mix surfacing in accordance with MT 601 as directed, by the Project Manager. The Project Manager will randomly select when plant mix samples are taken. Sample according to MT 303. A Department inspector will witness plant mix sampling. Furnish the sample to the inspector immediately after it is taken or deliver the sample to the Departments designated test location after the inspector seals the sample in a tamper proof container.

Plant mix sampling will begin after the initial daily 100 tons (100 metric tons) of plant mix has been produced or when a hot plant is cleaned out and 100 tons (100 metric tons) of plant mix has been produced. No sampling delay will be permitted at any other time, unless approved by the Project Manager.

401.03.5 Acceptance Commercial Plant Mix Surfacing.

The asphalt content used for calculations is determined using the asphalt ignition oven test method MT 319. The D/A is calculated based upon test method MT 319, and the gradation determined using the gradation method MT 320 on the aggregate remaining after the ignition oven test.

A \$3.00/ton price reduction in the unit bid price for plant mix surfacing will be applied for any start up mix represented by a test not meeting the VMA, VFA, VTM, or D/A specified. A \$3.00/ton price reduction (\$9.00/ton maximum) in the unit bid price for plant mix surfacing will be applied to production mix for each test not meeting the VMA, VFA, VTM, or D/A specified. For commercial plant mix, startup mix is the first 1,000 tons of mix produced and production mix is all subsequent mix. Price reductions will be assessed on the quantity of material represented by each failing sample. The quantity of material represented by each sample is the total tons of material produced divided by the total number of samples representing the material.

A minimum of one sample will be taken on projects with a plan quantity of 500 tons or more and samples will be tested at a minimum rate of one per two thousand tons. Commercial plant mix will not be tested on crossovers, detours, guardrail widening, patching or where the volume is less than 500 tons. Acceptance in these areas will be based on conformance with the established mix design proportions or agreed upon adjustments. Compact these areas to 97% of a control strip as determined necessary by the Project Manager.

401.03.6 Acceptance of Non-Commercial Plant Mix Surfacing (QA)

The properties listed in Table 701-16 for non-commercial plant mix are designated for acceptance on a lot-by-lot basis under Subsection 105.03.2. The pay factor in Table 401-1 is applied to plant mix surfacing lots for VMA, VFA, VTM and D/A. The asphalt content used for calculations is determined using the asphalt ignition oven test method MT 319. The D/A is calculated based upon test method MT 319, and the gradation determined using the gradation method MT 320 on the aggregate remaining after the ignition oven test.

The approximate mix quantity represented by each sub-lot is 1000 tons (1000 metric tons). The quantity represented by 5 tests or approximately 5000 tons (5,000 metric tons) of mix constitutes a lot whenever production schedules and material continuity permit. A lot represented by 3 to 7 consecutive random sub-lots will be established when there are short production runs, significant material changes, or other unusual characteristics of the work.

All other contract items are evaluated for acceptance under the applicable specifications covering those items.

Each element of a lot will be evaluated for pay adjustments.

All the individual test results in the lot for the element to be evaluated will be averaged, and the percent of price reduction for the lot determined by the applicable formula.

F is the price reduction factor to be applied for each element as shown in Table 105-2 and Table 401-1.

Table 401-1  
TABLE OF PAY FACTORS

Incentive Item	"F" Factor	Maximum Pay Factor
VMA	6	1.02
VFA	2	1.02
VTM	6	1.02
D/A	30	1.02

When adjustments are being made for one of the two reasons within Subsection 105.03.2, the Department may require additional samples to test the material being produced, in addition to the planned random samples. These additional tests will be used to determine if the adjustments are effective and production may continue. These tests will be used to identify obviously defective sections.

401.03.7 Quality Incentive Allowance

For each element with a 'P' value of less than three, the incentive is calculated by subtracting the calculated P value from three (3) to determine the pay factor. The maximum pay factor for each element is 2%. An additional 4% incentive will be applied to the lot payment if the sum of the pay factors for the individual elements for a lot is 6% or greater. The maximum pay factor for a lot is 12%.

401.03.8 Equipment

A. Mixing Plants. Use mixing plants that produce a mix meeting the contract requirements. Adapt the mixing plant as required by the manufacturer to introduce warm mix technology. Plant adaptations may include additional plant instrumentation, the installation of asphalt cement foaming systems and/ warm mix additive delivery systems, tuning the plant burner and adjusting the flights in order to operate at lower production temperatures and/or reduced tonnage.

B. Weigh System.

(1) Automatic Weighing. Use state certified automatic weigh systems to weigh materials. Ensure the weigh accuracy is within plus or minus 0.5 percent of the true weight throughout the use range.

Include in the system an automatic printer that provides the following information:

(a) Contract Number

- (b) Project No. (as shown on plans)
- (c) Item Name (as shown on detail estimate)
- (d) Date
- (e) Time
- (f) Ticket Number (consecutive)
- (g) Haul Unit No.
- (h) Net tons (metric ton) in load (to nearest 0.05 ton)
- (i) A subtotal of tons (metric tons) for each haul unit since the beginning of the shift.
- (j) An accumulated total for all haul units since the beginning of the shift.

Use a pre-programmed printer or one equipped to prevent manual override of any weight information. Have the weigh system tested, certified and sealed by the State Bureau of Weights and Measures after each plant move and before production for a project. Immediately stop production should the printer malfunction or breakdown and do not resume until corrected. Delivery of material from storage or surge bins will be permitted only if the weight can be maintained within weigh specifications.

If an independent certified scale is within a 20 mile (32 km) round trip distance from either end of the project, the Project Manager will randomly designate the re-weighing of loaded vehicles at least three times per project.

Re-test the plant weigh system any time the difference between the re-check and the plant system exceeds plus or minus one half of one percent of the load. Any weight difference will be addressed under Subsection 109.01.1.

- (2) Manual Weighing. The Contractor may manually weigh and record weights instead of using an automatic weigh system. Ensure manual weighing includes platform scales meeting Subsection 301.03.2(C), a competent weigh person, and dump person.

Direct the weigh person to record, on Department furnished forms, weights to the nearest 100 pounds (45.4 kilograms) as well as the other required information regarding delivery and placement.

Certify that weights and totals furnished are a true and correct record of materials delivered and placed in the work. Deliver the records and totals to the Project Manager before 10:00 a.m. the next work day following the shift.

401.03.9 Safety Requirements.

Install and maintain stairs, ladders, walkways and all other plant facilities meeting State and Federal safety requirements.

Provide access to the plant mix within the trucks for taking samples and mix temperature data.

401.03.10 Burner Fuel Restrictions

Use one of the approved fuels below to heat and dry aggregates.

- Propane
- Butane
- Natural Gas
- Fuel Oil (grades 1, 2, and 5 only)
- Coal

EPA Specification-Used Oil Fuel (EPA-UOF) may be used instead of the approved burner fuels provided the Table 401-2 requirements are met:

TABLE 401-2  
EPA SPECIFICATION - USED OIL FUEL REQUIREMENTS

PHYSICAL PROPERTIES	
Property	Range
API Gravity	20-28
Viscosity at 122 °F (60 °C) (Saybolt Flurol)	10-20
Pour Point °F (°C)	+10 (-12)
Flash Point, min. °F (°C)	100 (37.8)
Water by Distillation %	Under 1
Solids by Separation %	Under 1
Ash %	Under 0.4
Sulfur	Average 0.5%
Kinematic Viscosity at 100 °F (37.8 °C) (centistokes)	54-100
Kinematic Viscosity at 122 °F (60 °C) (centistokes)	15-75

CHEMICAL PROPERTIES	
Element or Compound	Permitted Level
Vanadium	Under 100 ppm (100 mg/L)
Cadmium	Under 2 ppm (2 mg/L)
Chromium	Under 10 ppm (10 mg/L)
Lead	Under 100 ppm (100 mg/L)
Arsenic	Under 5 ppm (5 mg/L)
Total Halogens	Under 1,000 ppm (1,000 mg/L)
PCB's	Under 2 ppm (2 mg/L)

Furnish a copy of certified test results from the supplier for each load of EPA-UOF delivered to the project. Furnish plant manufacturer information showing the plant burner is designed and equipped to burn EPA-UOF or grade 5 fuel oil. Upon request, provide a one-quart (liter) sample of EPA-UOF from the tank on the project.

Immediately stop using EPA-UOF or grade 5 fuel oil if burner flame outs or other evidence of incomplete combustion or mix contamination is evident. Begin using one of the other approved fuels to complete the work. Remove and replace all contaminated plant mix at Contractor expense. No additional compensation will be allowed.

#### 401.03.11 Dry Warm Mix Additive or Hydrated Lime Feed System.

Introduce dry hydrated lime into drum dryer mixing plants just below the asphalt cement introduction point. Introduce dry warm mix additive as directed by manufacturer.

Ensure the system provides positive, accurate material feed and is automatically synchronized to the aggregate feed. Ensure the system indicates the weight entering the mixing unit on a time-coordinated basis.

Weigh using an automatic indicating electronic system. The lime may be weighed directly, or the storage container including lime may be weighed.

Provide a continuous digital readout showing the weight or rate of feed in tons (metric tons) per hour. Record the information using a production monitor/recorder system or by a de-cumulating balance ticket-printing system. Record the information at minimum five-minute intervals or as directed.

Silo or storage container system weights are not used for acceptance during filling or transfer. Limit filling or transfer periods to one hour per three hours of plant operation. Record and furnish start and finish times for filling or transfer and the total quantity added.

Suspend mixing for erratic feeding or failure to feed hydrated lime to a minimum of 85% of the job mix formula. Do not resume until corrected or repaired.

#### 401.03.12 Flow Rate Meter

Measure the asphalt cement and liquid warm mix additive (if applicable) discharged into the mixing unit using a flow rate meter with totalizer and temperature compensation.

Ensure the totalizer records up to 1,000,000 gallons (3,785,000 L) and is certified to plus or minus 0.2 percent of the measured quantity.

Use a flow rate meter and totalizer that automatically corrects to a temperature of 60°F (16°C) with an operating range of +60°F (16°C) to +450°F (232°C).

Locate the totalizer readout in the plant control room so it is readily accessible to the inspector.

Ensure the flow rate meter automatically shuts off any time asphalt cement is diverted or stops entering the mixing unit.

Calibrate the flow rate meter and totalizer before the start of the project and as necessary during production. The Project Manager will witness the calibration.

Provide the equipment and assistance for initial and subsequent calibration checks and furnish the Project Manager a copy of all calibration checks.

Use a calibration volume of at least 3,000 gallons (11,355 L). Ensure the weigh scales have been tested and certified.

Furnish the Project Manager one copy of a test report showing the asphalt cement specific gravity.

Spot check failure will require re-testing and certification of the above. The Project Manager will establish the spot check interval.

#### 401.03.13 Production Monitor Recorder

Use recording equipment that automatically monitors and records on a time coordinated basis, the aggregate, lime, warm mix additive and asphalt cement weight entering the mixing unit. The records may be continuous (chart recorder) or digital printout.

Ensure that chart recorders clearly record asphalt cement content changes of 0.1 percent or more and aggregate feed rate changes of 1.5 percent or more.

Ensure the digital printout equipment records the day's total production at minimum five-minute intervals, or the interval directed by the Project Manager.

Digitally display the aggregate, warm mix additives, and asphalt cement (binder) rates in tons (metric tons) per hour and daily totals. Display lime by tons (metric tons) per hour or on a de-cumulating balance.

Ensure the monitor system operates on unprocessed signals from measuring devices.

Provide the Project Manager continuous access to the recorder during production.

Submit the permanent record to the Project Manager daily.

Operate the production/monitor recorder at all times during production. Stop production when the recorder is not operational.

#### 401.03.14 Plant Mix Preparation

Mix the aggregate, all additives and asphalt cement to produce a homogeneous mixture. Ensure all aggregates are thoroughly and uniformly coated with bitumen.

Immediately suspend operations if aggregate is not being completely dried prior to mixing.

Remove, dispose of, and replace all mix that is damaged by burning, improper mixing, or fails to meet the specifications at Contractor expense.

Maintain the mix discharge temperature within the asphalt cement manufacturer's recommended mix temperature range, not to exceed 355 °F (179 °C).

The discharge temperature will be periodically checked and recorded.

Remove and replace any mix produced when the mix discharge temperature exceeds the maximum temperature at Contractor Expense.

#### 401.03.15 Roadway Equipment

A. Pavers. Use self-propelled pavers that spread, shape, and finish the combined plant mix material to the specified profile and cross slope.

Immediately stop paving if the paver tears, shoves, segregates or otherwise damages the plant mix, and repair or replace the paver before resuming paving operations.

Equip the paver with a mobile grade reference system that provides a uniform pavement profile. Ensure the paver maintains the transverse slope at all times and is able to adjust the slope throughout super-elevated curves.

Ensure auger extensions are used to match the screed width.

Equip the paver with an attachment that produces joints meeting Subsection 401.03.19 requirements as the plant mix is placed.

B. Trucks. Remove trucks from service that leak fluids. When directed, cover each load with canvas or other approved material to protect the mix at Contractor expense.

C. Rollers. Furnish and use rollers that compact the plant mix to the specified density. Remove rollers that crush the paving aggregates or otherwise damage the plant mix and replace the damaged plant mix at Contractor expense.

D. Cleaning Agents. Do not use diesel fuel as a cleaning agent or as a release agent for any paving equipment or operations. Use a commercially manufactured release agent approved by the Project Manager.

#### 401.03.16 Existing Surface Preparation

Dispose of existing bituminous surface, designated to be removed, under Subsection 202.03.3.

Re-work all existing bituminous surfaces designated to remain in place as specified.

Before placing the leveling course, clean the existing surface of dirt and loose, extraneous material. Apply a prime or tack coat of bituminous material to the cleaned surface as specified.

Correct dips, depressions, sags, excessive or nonexistent crown, and other surface irregularities using a premixed bituminous mixture. Spread the mixture in 2-inch (50 mm) compacted layers.

Correct surface irregularities exceeding 6 inches (150 mm) deep using untreated aggregate material before leveling with a bituminous mixture.

#### 401.03.17 Tack Coat

Apply tack coat meeting the applicable requirements of Section 407 and the Contract.

Apply tack coat on the prepared surface, existing surfacing to be overlaid and between lifts when pavement is constructed in multiple lifts.

#### 401.03.18 Surface Conditions, Weather Limitations and Paving Dates

Stop plant mix paving when the surface temperature is less than 35°F (2°C); the surface is wet; the roadbed is unstable or the Project Manager determines adverse weather conditions prevent the proper handling, finishing or compacting of the mix.

Complete all sections of plant mix surfacing, to be open to traffic during winter shut down, to the full plan width and thickness, excluding the seal and cover. Complete this work meeting the specifications before the November 1st paving cessation date.

The Project Manager will suspend time assessment between November 1st and November 16th when the next scheduled significant work item is paving and all grading, gravel and other operations affecting the safe and convenient use of the roadway by the traveling public are complete.

Submit a written request to the Project Manager and obtain written approval in order to pave after November 1st and before April 15th.

Plant mix surfacing placed after November 1st and before April 15th is at the Contractor's risk and subject to the following conditions:

- The surface temperature to be paved is at least 35°F (2°C), measured by the Project Manager.
- All applicable specifications are met.

Make permanent repairs and restore partially completed pavement to the required profile, section and condition at Contractor expense before placing the remaining lifts.

This is not a waiver by the Department of any other contract requirement regarding the work sequence or traffic operation.

If the paving operation causes transverse joints spaced at less than one half mile (805 m), suspend work until the next April 15th.

No payment is made for the plant mix or asphalt on progress estimates between November 1st and April 15th for partial width or thickness.

Promptly repair damage to all partial width or thickness of plant mix surfacing used by traffic during this period for any reason including suspension of work due to adverse weather.

Provide all required interim traffic striping and traffic control on partially completed pavement at Contractor expense.

Failure to promptly make repairs and provide interim striping and traffic control is cause for the Department to perform or have the work performed and deduct the cost from monies due or that may become due the Contractor.

Payment for partial width or thickness pavement in acceptable condition will be made on the estimates following the end of the period on the next April 15th.

#### 401.03.19 Spreading and Finishing

Place and spread the mix using minimum lift thicknesses stated in table 401-3. Thinner lift thicknesses must be approved by the Project Manager.

TABLE 401-3  
MINIMUM LIFT THICKNESS

AGGREGATE SIZE	MINIMUM LIFT THICKNESS
3/8-inch (9.5 mm)	0.1 foot (30 mm)
1/2-inch (12.5 mm)	0.12 foot (36 mm)
3/4-inch (19 mm)	0.15 foot (45 mm)

Place and spread the mix to the widest practical width on the approved surface. Place shoulder-widening material with approved equipment.

Establish and maintain line control for paving. The Project Manager will furnish the Contractor the necessary information to establish these controls. Maintain the paving control line tolerance within 0.25 foot (75 mm) of a true line from the existing reference points.

Failure to maintain the paver control line within the specified tolerance is cause for corrective action or pavement removal and replacement, as directed by the Project Manager, at Contractor expense.

Include the cost of furnishing horizontal line control in the plant mix surfacing bid item.

Remove and replace segregated pavement areas behind the paver with new plant mix before initial rolling begins. Correct all segregated areas at Contractor expense.

On small or irregular areas, approaches, turnouts, around manholes, inlets, walls and on other areas not readily accessible to a paver, plant mix may be spread to the specified thickness using a specialty paver or other approved methods. Compact these areas as directed.

Remove and replace all plant mix that is segregated, loose, broken, contaminated, damaged or otherwise defective, with new plant mix that meets contract requirements at Contractor expense.

Remove any plant mix dropped from equipment onto any existing or new plant mix surfacing as directed by the Project Manager.

Roadways having a design Equivalent Single Axle Load (ESAL) of 100 or less may be opened to traffic or to haul units subject to the Project Manager's approval.

Roadways having a design ESAL of 100 or greater may be opened to traffic and haul units when the mat is compacted and the surface cools to 140°F (60°C).

#### 401.03.20 Constructing Joints

Continuously place each lift and provide at least a 6-inch (150 mm) offset between longitudinal joints in successive lifts. Offset transverse joints in successive lifts by at least six feet (1.8 m).

Correct joints that do not meet the surface tolerance requirements in Subsection 401.03.23

Uniformly coat the exposed face of all joints, excluding those formed by echelon paving, with a double shot of emulsified asphalt before placing the abutting course.

Construct longitudinal joints in the top lift of plant mix at the centerline or lane line. If these locations are not practical, construct the joint outside the wheel paths as approved by the Project Manager.

Construct a vertical transverse joint the full lift depth if the mix cools below the low temperature specified in Subsection 401.03.21. Remove loose material, brush the joint face with asphalt, and compact the fresh mix against the joint face when paving is resumed.

Taper the end of paving lifts at bridge ends and on roadways under traffic to a minimum 50:1 ratio. When paving of the lift resumes, remove the taper and construct the transverse joint.

Ensure transverse joints in lifts of plant mix surfacing or other lifts to be used by traffic for 15 days or more do not vary more than 3/8-inch (9.5 mm) from any point on a taut 25-foot (7.6 m) string line placed parallel to centerline.

Taper the longitudinal paving joint edges at a 4:1 to 6:1 slope. Compact the joint between abutting passes to the specified plant mix density. Do not permit an exposed longitudinal joint length to exceed one day's paving run.

Sign the new pavement end at the close of work each day meeting the project's traffic control plan and the Contract.

Construct the joints at bridge ends or other rigid structures after the existing base is prepared and compacted. Apply a coat of emulsified asphalt to the portions of structures abutting the plant mix surfacing.

#### 401.03.21 Compaction, Compaction Control Testing, and Density Acceptance Testing

Complete compaction rolling within the temperature range recommended by the asphalt cement manufacturer included in the mix design or before the mat temperature falls below 175°F (80°C). Compaction rolling after the temperature is below 175°F (80°C) is cause to suspend paving operations. Compaction rolling is rolling in the vibratory mode. The Project Manager may adjust the minimum 175°F (80°C) temperature if compaction rolling damages the new pavement or has received written approval from the asphalt cement manufacturer. Compact Warm Mixes as specified in Subsection 401.02.4.

Perform all necessary density testing to control compaction.

Once the plant mix is spread, struck off, and surface irregularities are corrected, compact to the plant mix to at least 93.0% percent of target Maximum Specific Gravity as determined using MT 328 with the following exceptions:

- 92.0% - 3/8-inch (9.5 mm) mixes with plan depths of less than 0.12 foot (36 mm)

- 92.0% - any mix placed directly on a crushed aggregate surfacing

Compact plant mix placed over any typical section containing CTB to 93.0% for the full width of the typical section.

Provide core samples of the compacted plant mix from the roadway. Core locations will be randomly selected based on the tons (metric tons) of mix placed. Core the locations selected after all rolling is complete and before the roadway is opened to traffic. The center of the core location will not be within 12 inches (300 mm) of longitudinal paving joints, 12 inches (300 mm) of a shoulder hinge point, or where the planned nominal thickness is less than 0.10 foot (30mm). The pavement density is determined from cores taken at randomly selected locations after all rolling is complete and before the roadway is open to traffic.

Density acceptance by cores does not apply to leveling or isolation lifts that have a depth of less than 0.10 foot (30 mm) thick.

Perform the following work within the project site.

Take cores after all rolling is complete. Provide two 4 inch (100 mm) cores the full depth of the plant mix surfacing, extracted from within a 5 inch (125 mm) radius of each designated location. Mark the core as directed.

Separate the plant mix lift to be tested from the total core. Cut the core to the actual lift thickness within plus or minus 0.15 inch (4 mm). The Department recommends using a saw to separate the lift to be tested from the total core. Perform this work within the project limits or other approved location.

The inspector will witness all of the above activities before traffic is permitted to use the plant mix lift being tested.

Furnish the core immediately to the inspector after it is removed, marked and separated. Do not remove the cores from the Inspector's visual control at any time. Re-core as directed any time either the Contractor requirements or procedures within this section are not met. The test results of the replacement core to be used in the QA evaluation for the lot represented will be the actual relative in-place density unless it exceeds:

- 92 %; then 92 % will be used for the relative in-place density of that core in the QA evaluation.
- 91 % for ¾-inch (9.5mm) mixes with plan depths of less than 0.12 foot (36 mm); then 91 % will be used for the relative in-place density of that core in the QA evaluation.
- 91 % for any mix placed directly on a crushed aggregate surfacing; and then 91 % will be used for the relative in-place density of that core in the QA evaluation.

The plant mix in the sub lot represented is considered to be not meeting density specifications.

Remove free water from each core hole; place and compact new hot plant mix, not exceeding 2-inch (50 mm) lifts, to the finished surface immediately after the core is removed. If approved by the Project Manager, fill with a commercially manufactured quick setting non-shrink grout to the finished surface. Apply a double shot of emulsified asphalt over the core holes when the patch material has set. Mark each core as directed by the inspector witnessing the coring.

MT 328 is used to establish the target Rice density. The Bulk Specific Gravity (MT-314) determined for each core will be divided by the target Rice density in effect at the time the plant mix was produced to determine the relative in-place density. The average of the results of the pair of cores from each location will be expressed as the percent of relative density. All results will be reported to the tenth of one percent (0.1).

The approximate mix quantity represented by each sub-lot is 600 tons (600 metric tons). Additional locations and tests may be required. The quantity represented by 5 tests or approximately 3000 tons (3000 metric tons) of mix constitutes a lot whenever production schedules and material continuity permit. A lot represented by 3 to 7 consecutive random sub-lots will be established when there are short production runs, significant material changes, or other unusual characteristics of the work.

All costs of furnishing the cores will be considered incidental to the plant mix surfacing item and no separate measurement or payment will be made.

Plant mix surfacing is evaluated for density on a lot-by-lot basis under Subsection 105.03.2.

#### 401.03.22 Pavement Repair

Cut out the defective pavement section to at least .15 ft. (45 mm) depth or as directed by the Project Manager. Clean the sides and bottom of the repair area and apply tack coat to the surfaces. Fill the repair area with contract specified mix, level, and compact to the specified density and surface smoothness.

#### 401.03.23 Surface Tolerance for Flexible Pavement

- A. Ride Specification. Construct all surfacing courses to provide completed plant mix pavements that meet surface smoothness levels derived from the International Roughness Index (IRI) for the category specified in the contract and that meet the surface profile requirements for the finished surface. Surface smoothness and surface profile will be analyzed from data collected by the Department using a Class I Laser Road Profiler following Department procedures for profiler operations. The IRI will be measured in inches/mile, regardless of the unit of measure used on the contract.

Target IRI values are determined by project category based on the opportunities for improving the ride, by the pre-paving IRI value, paving constraints or by a combination of these as follows:

1. Category I Projects:  
Target IRI Values - 45 to 55 inches per mile
    - Projects with two or more opportunities for improving the ride.
    - Single lift overlays with a pre-paving IRI value less than 110 in/mi
  2. Category II Projects:  
Target IRI Values - 55 to 60 inches per mile
    - Single lift overlays with a pre-paving IRI greater than or equal to 110 in/mi and less than 190 in/mi
  3. Category III Projects:  
Target IRI Values - 55 to 70 inches per mile
    - Urban projects with a posted speed limit of 55 MPH or less and curb and gutter controlling one or more edges of the paving
- Projects with High Pre-Paving IRI value:

- Projects with an average pre-paving IRI value greater than or equal to 190 in/mi and two or more opportunities to improve the ride are considered a Category I Project.
- Projects with an average pre-paving IRI value greater than or equal to 190 in/mi and one opportunity to improve the ride must have a post-paving IRI less than or equal to 50 percent of the pre-paving IRI. There is no pay adjustment factor based on smoothness; corrective action is required to produce a post-paving IRI less than or equal to 50 percent of the pre-paving IRI at Contractor expense.

Each opportunity to improve the ride is one of the following:

- Placing a gravel base or surfacing course
- Placing plant mix base
- Placing cement treated base
- Placing pulverized plant mix surfacing
- Milling
- Cold recycling (milling and laydown); or
- Each full 0.10 foot (30 mm) increment for 3/8 inch (9.5 mm) aggregate mix, 0.12 foot (36 mm) increment for 1/2 inch (12.5 mm) aggregate mix, and 0.15 foot (45 mm) increment for 3/4 inch (19 mm) aggregate mix of new plant mix surfacing

Leveling and isolation lifts are not included as an opportunity to improve the ride.

Correct surface profile defects greater than 0.40 inches (10mm) in a distance of 25 feet (7.62 meters) within 30 calendar days of notification but prior to seal and cover or plant mix seal operations. Correct surface profile defects by milling and filling deficient pavement depths or by diamond grinding excess pavement depths. Corrected surface profile defects will be retested and evaluated. Pavement thickness will be measured after profile corrections are made. Ensure corrected pavements do not create a transverse height difference between adjacent lanes exceeding 1/8 inch (3 mm). Fog seal corrected areas if the roadway is not chip sealed prior to winter shutdown.

The Department will test for surface smoothness and surface profile prior to the placement of seal and cover or plant mix seal on the final lift of plant mix surfacing pavement. Testing will consist of two passes in each travel lane. Data collected for each wheel path will be averaged for that lane. Tests will be performed within ten working days (extended by rain or other inclement weather conditions) of completion of all mainline paving. The Department will test divided highways within ten working days (extended by rain or other inclement weather conditions) of completion of mainline paving for each direction of travel. Ensure that the entire finished lane width to be tested is not impeded and is available to Department personnel at the time of testing. Test results will be furnished within two business days.

If the entire final lift of pavement cannot be completed before winter shutdown, data will be collected for all roadway sections paved through the final lift. Evaluation of the remaining pavement will be performed once the paving is completed.

The surface smoothness analysis will be used to determine the actual IRI for calculating pay factors for the surfacing section.

Actual IRI values will be determined on all mainline travel lanes including climbing lanes, passing lanes, and ramps that are 0.2 miles (0.30 km) or longer. Bridge decks will be included only if they are paved as part of the project.

Smoothness data will not be evaluated for the following roadway sections:

1. Climbing lanes and passing lanes less than 0.2 miles (0.30 km) long
2. Turning Lanes
3. Acceleration and deceleration lanes less than 0.2 miles (0.30 km) long
4. Shoulders and gore areas
5. Road approaches
6. Horizontal curves 900 feet (275 m) or less in centerline radius, and pavement within the super-elevation transitions of these short radius curves; or
7. Pavement within 50 feet (15 m) of bridge decks, approach slabs, and the terminal paving points of the project.

Areas requiring corrective work will be identified using the surface profile measurements of the finished surface.

Correction of profile defects will not be cause to reevaluate any section for surface smoothness except for locations identified as remove and replace as described below. Quality incentive allowances will be used to offset any price reductions on progress estimates.

Remove and replace any 0.5 mile (0.8 kilometer) segment of roadway requiring corrective action. Remove and replace the segment by milling 0.15 feet (45 mm) or to the lift line if within 0.02 feet (6 mm), whichever is greater and replacing with new material meeting the contract requirements. Remove and replace sections of roadway less than 0.5 miles (0.8 kilometers) that do not meet the applicable IRI requirements for the project category unless other corrective action is approved by the Project Manager. Sections requiring removal and replacement or other corrective action will be rerun once the corrective work has been performed. The maximum pay adjustment factor for the affected segment after corrective action is 1.00. Disincentives will be applied if applicable.

All work to prepare the roadway for testing, including sweeping, grinding and traffic control prior to the ride test, is incidental to the work and is not measured for payment. All work to complete any corrective action and re-testing, including but not limited to sweeping and traffic control, is incidental to the work and is not measured for payment. Include all costs and resources to prepare the roadway for surface tolerance testing in the plant mix surfacing item.

- B. Surface Smoothness. Finish the surface of the final lift to the specified grade and cross section meeting the surfacing smoothness values for all paved areas excluded from the Ride Specification in subsection 401.03.23A. The Contractor will be notified of sections to be corrected within three business days after the surface was placed. Perform all corrective work at Contractor expense. Table 401-4 values specify the maximum allowable variance and divergence from the mean constructed grade:

TABLE 401-4  
MAXIMUM ALLOWABLE VARIANCE AND DIVERGENCE

SURFACE	TOTAL VARIATION Per 100 feet	RATE
New Plant Mix	0.02 foot (6 mm)	0.20%
Plant Mix Overlays (≥ 90 mm)	0.03 foot (9 mm)	0.30%
Plant Mix Overlays (< 90 mm)	0.03 foot (9 mm)	No rate

The rate is applicable only to the longitudinal direction.  
The mean constructed grade for each section is the planned grade or a grade parallel to plan grade, acceptable to the Project Manager.

Surfaces will be checked for compliance at joints, bridge ends, and other sections where ride characteristics or other evidence indicates the surface tolerance is outside the specifications.

Surface smoothness is measured longitudinally in 100-foot (30.5 m) sections at 10-foot (3 m) intervals, and transversely at 4-foot (1.2 m) intervals. Correct out of specification plant mix surfacing by diamond grinding, cold milling a minimum depth of 0.15 feet (45 mm) the full width of the defect but not less than the paver width, or other approved method. If removing and replacing, extend the repair area for a minimum of 50 feet (15.2 m) each side of the defective pavement and fill with like material compacted to the specified density.

Ensure the corrected pavement and adjoining surface meet the smoothness specifications.

401.03.24 Rumble Strips

Construct rumble strips when specified. Cut the rumble strips into the finished plant mix surfacing. Use a machine equipped with a rotary type cutting head capable of making the cuts to the dimensions and pattern shown in the Detailed Drawings.

Produce the rumble strips without tearing and snagging the pavement. Remove resulting debris from the roadway before opening to traffic. Do not allow debris to enter any waterways.

Establish a control line and locate the rumble strips as shown in the plans and according to the Detail Drawings. The Project Manager may adjust the offset distance for the shoulder rumble strips to avoid longitudinal pavement joints. Do not place rumble strips where concrete barrier rail or other roadside features prevent placement as specified.

Do not cut rumble strips if the seal and cover operation will not be completed before winter shutdown. If seal and cover is not scheduled to be completed within 10 days after cutting rumble strips, fog seal the finished rumble strips.

Apply fog seal to finished rumble strips as follows;

- a. Apply a double shot of emulsified asphalt meeting Section 407 for fog seal
- b. Keep traffic off the fog seal until the emulsion has cured to no-tack.
- c. Apply the fog seal to the rumble strip for each lane in the direction of travel for that lane.

401.04 METHOD OF MEASUREMENT

401.04.1 Plant Mix Surfacing

Plant mix surfacing is measured by the ton (metric ton) on approved scales after complete mixing of all ingredients. The pay weight includes the asphalt cement and hydrated lime in the mixture.

401.04.2 Commercial Plant Mix Surfacing

Commercial plant mix surfacing is measured by the ton (metric ton) on approved scales after complete mixing of all ingredients. The pay weight includes the asphalt cement and hydrated lime in the mixture.

401.04.3 Asphalt Cement

When not included in another item, asphalt cement is measured by the ton (metric ton) as specified to the nearest ton (metric ton), under Subsection 402.04, excluding anti-stripping additive.

401.04.4 Hydrated Lime

When not included in another item, hydrated lime is measured by the ton (metric ton) meeting Subsection 109.01. Hydrated lime exceeding 1.6 percent by total weight of mix is not measured for payment as hydrated lime.

401.04.5 Rumble Strips

Rumble strips are measured by the mile (kilometer) along the centerline of the roadway, less all gaps in the rumble strips due to ramp terminals, objects, etc. Each individual line of rumble strips is measured separately.

Fog seal for rumble strips is not measured for payment.

401.04.6 Tack Coat

Tack coat is incidental to the plant mix surfacing and is not measured for payment.

401.05 BASIS OF PAYMENT

Payment for the completed and accepted quantities is made under the following:

Pay Item	Pay Unit
Plant Mix Surfacing	Ton (metric ton)
Commercial Plant Mix Surfacing	Ton (metric ton)
Asphalt Cement (Binder)	Ton (metric ton)
Hydrated Lime	Ton (metric ton)

Rumble Strip

Mile (kilometer)

For Commercial Plant Mix no separate payment will be made for asphalt cement, fillers, hydrated lime, and additives.

The contract unit price for rumble strips will be adjusted as shown in Table 401-5:

TABLE 401-5  
PRICE ADJUSTMENTS DUE TO LINE DEVIATIONS

LINE DEVIATION FROM THE TRUE LINE	PRICE ADJUSTMENT
0.0 feet to 0.15 feet (0 to 50 mm) in 500 feet (152 m)	None
0.15 feet to 0.25 feet (50 mm to 75 mm) in 500 feet (152 m)	50% price reduction
Greater than 0.25 feet (75mm) in 500 feet (152 m)	Correct as directed

Payment at the contract unit price is full compensation for all necessary resources to complete the item of work under the contract.

402.03.2(A) GENERAL (SAMPLING)

Page 157

11-17-11

Rescind the fourth paragraph (which begins with "Draw two one-quart...") and replace with the following:

Draw two one-quart (0.9 L) samples from each shipment, witnessed by the Project Manager. Submit both samples to the Project Manager for testing. One sample will be tested and the second sample will be retained for use as specified in Subsection 702.02.

402.03.2(B) ASPHALT SAMPLING (QUALITY ASSURANCE SAMPLING)

Page 157

9-26-13

Rescind the second paragraph (that begins with "Provide a sample...") and replace with the following

Provide a sample of the asphalt cement entering the mixing plant. One approved in-line sampling device is shown in AASHTO T 40.

Rescind the fourth paragraph (that begins with "The Project Manager...") and replace with the following:

The Project Manager will randomly designate the time of sampling based on the tons (metric tons) of asphalt cement incorporated into the completed mix produced. The approximate quantity of asphalt cement represented by each sample is 25 tons (25 mt). The Project Manager may require additional samples and testing.

Rescind the first sentence in the fifth paragraph (that begins with "Six samples represent...") and replace with the following:

Six samples represent approximately 150 tons (150 mt) of asphalt cement and constitute a lot whenever production schedules or material continuity permit.

402.03.5 ACCEPTANCE

Page 158

11-17-11

Rescind Subsection 402.03.5 and replace with the following:

402.03.5 Acceptance

- A. General. Provide the Project Manager a copy of the original bill of lading and a copy of the certificate of compliance, with each shipment. Assure the certificate is signed by the supplier's representative and attests that the bituminous material meets the Department's specifications for the type and grade of material provided and that the shipping container was inspected and found free of contamination. The certificate of compliance is the basis for tentative material acceptance and use.
- B. Failures. If a shipment of bituminous material fails to meet any of the specifications the material will be accepted at a 10% price reduction of the bituminous material cost if the test results are within the tolerances shown in Table 402-1a.
  - If a shipment fails to meet any one of the specifications after twice the allowable tolerances have been applied, the price reduction will be 25 percent of the unit price bid for bituminous material when it is paid as a separate item or the invoice price when it is part of a bid item.
  - If a shipment fails to meet any one of the specifications after triple the allowable tolerances have been applied, the Engineer may reject the material and require its removal from the work, or the Engineer may accept the material at a 50 percent price reduction of the cost of the bituminous material.
  - The cost of the bituminous material for calculating price reductions is the material's contract unit price.
  - If a shipment fails more than one of the specifications, the failure causing the largest percentage price reduction is assessed.

TABLE 402-1a  
SCHEDULE OF TOLERANCES

TEST	ALLOWABLE VARIATION		REMARKS
	From Min. Specification Requirement	From Max. Specification Requirement	
Penetration Distillation Residues	-10%	+10%	
% Residue from Distillation	-5%		% of Total Distillate: 2 ml may be added or subtracted at any distillation temp. before calculating the % recovered
Viscosity Cutback Asphalts Emulsified Asphalts	-10% -5%	+10% +25%	
Ductility	-10%		
Flash Test Cutback Asphalt	-10%		
Particle Charge	NO TOLERANCE - Materials in violation of spec. and any aggregate used in conjunction with its use will, at the Engineer's discretion, be either rejected or paid for at a unit rate not to exceed 50% of the cost of the materials.		

402.03.6 LOADING AND APPLICATION TEMPERATURES

Page 158

1-16-14

Rescind Note 2 under Table 402-1 and replace with the following:

2. Temperature - Viscosity Charts provided by manufacturer

402.03.8 PERFORMANCE GRADED ASPHALT BINDER (PGAB)

Page 159

11-17-11

Rescind the first sentence of the first paragraph (that begins with "Furnish Performance Graded...") and replace with the following sentence:

Furnish Performance Graded Asphalt Binder (PGAB) meeting Table 702-2 requirements for the binder specified in the contract.

402.03.8A PERFORMANCE GRADED ASPHALT BINDER (PGAB)

Page 160

10-7-10

Delete Part A of 402.03.8 (That begins with "A. Test Results. Provide...")

403.02 MATERIALS (CRACK SEALANT)

Page 163

9-26-13

Rescind the first sentence of Part (A) and replace with the following:

- A. Crack Sealant. Use a sealant that is listed on the Department's QPL and meets the specifications in Table 403-1:

Rescind the first sentence of Part (B) and replace with the following:

- B. Backer Rod. Furnish backer rod that is listed on the Department's QPL. The backer rod must be compatible with the crack sealant placement temperature listed in Table 403-1, and also meet ASTM D-5249, Type 1, sized for cracks meeting Subsection 403.03.4.

Rescind Part (C) and replace with the following:

- C. Blotter Material. Use toilet paper or an approved liquid blotter material. The liquid blotter must be a commercially manufactured surfactant. Provide blotter that is not detrimental to the crack sealant or the surfacing material.

403.03.1 GENERAL (CONSTRUCTION REQUIREMENTS) Page 163 12-13-12

Add the following paragraph to the end of Subsection 403.03.1:

Submit the type of blotter material and application rates to be used to the Project Manager ten days before beginning crack seal operations. The application rate must be sufficient to protect the crack sealant material.

403.03.4 SEALING Page 164 3-27-14

Rescind Subsection 403.03.4 and replace with the following:

Install backer rod in cracks 1 1/2-inch (40 mm) wide and larger.  
 Place sealant material as soon as practicable after the routed cracks are deemed clean and dry. Do not route further than sealant can be placed during the same day's shift.  
 Follow the sealant manufacturer's handling, mixing and application temperature requirements. Meet the following requirements:

- Ensure no moisture is present in cracks or reservoirs to prevent bubbling and non-adhesion of sealant during installation;
- Apply sealant filling the reservoir flush to the top using a pressure type applicator;
- Do not allow sealant to collect or pool at the low end of crack or reservoir elevation;
- Open the completed work to traffic once the sealant does not track; and
- Repair or replace all seal work damaged by traffic at Contractor expense.

Seal previously repaired cracks to restore water resistance. Spread and smooth the sealant as required to seal the reservoir, but do not exceed 2 inches of spread sealant on the roadway.  
 Apply blotter material to all sealed cracks.

406 ROAD MIX BITUMINOUS PAVEMENT Page 165 1-12-12

Rescind Section 406.

407 BITUMINOUS PRIME AND TACK COAT Page 169 9-26-13

Rescind Section 407 and replace with the following:

SECTION 407  
TACK COAT

407.01 DESCRIPTION

The work is furnishing and applying emulsified asphalt to a prepared aggregate, constructed bituminous or concrete surface before placing bituminous surfacing.

407.02 MATERIALS

407.02.1 Bituminous Material

Furnish emulsified asphalt meeting Section 702 requirements for the type and grade specified.

The Project Manager may change or substitute the type and grade of emulsified asphalt to be used under Subsection 402.03.7.

A one step change in grade will not change the contract unit price.

The Contractor may substitute CSS-1 emulsified asphalt for SS-1 emulsified asphalt for tack coat.

407.03 CONSTRUCTION REQUIREMENTS

407.03.1 Weather Limitations

Apply tack coat to a dry surface.

Apply the tack coat when the ambient temperature is 50 °F (10 °C) or higher, or when the surface temperature is 35 °F (2 °C) and rising.

Do not place plant mix on any surface with a tack coat until the tack coat has cured (breaks) as determined by the Project Manager.

Apply the tack coat after the Project Manager has approved the surface to receive the bituminous material.

Apply tack coat subject to the surface conditions and weather limitations in Subsection 401.03.18.

407.03.2 Equipment

Use equipment meeting Subsection 410.03.1 requirements.

407.03.3 Application of Emulsified Materials

Dilute emulsified asphalt to a 50-50 ratio with water, unless other approved proportions are directed by the Project Manager. Apply diluted emulsified asphalt for tack coat as specified by the Project Manager at a minimum rate of 0.1 gallon per square yard (0.45 L per square meter).

When a double shot of emulsion is called for in the contract, apply two applications at the minimum rate specified above. Ensure the first shot is cured prior to applying the second.

407.03.4 Maintenance of Surface

Maintain tack coated surface until covering with subsequent surfacing.

Repair all defects, deterioration or disintegration of the underlying surfacing course or courses as directed.

407.03.5 Traffic Control and Protection of Highway Structures

Furnish traffic control meeting the approved traffic control plan and Section 618.

Furnish highway structure protection as specified in Subsection 410.03.9.

407.04 METHOD OF MEASUREMENT

Emulsified asphalt is measured by the gallon (liter).

When not specified as a contract pay item, emulsified asphalt is not measured or paid for but is incidental to and included in the payment for other items of work. Water for diluting emulsified asphalt used in the work is not measured for payment.

407.05 BASIS OF PAYMENT

Payment for the completed and accepted quantities is made under the following:

Pay Item	Pay Unit
Emulsified Asphalt	Gallon (liter)

Payment at the contract unit price is full compensation for all necessary resources to complete the item of work under the contract. The emulsified asphalt quantities in the contract are estimated and may be increased or decreased with no adjustment of the contract unit prices.

409.01.1 CONTRACT TIME

Page 171

7-3-08

Add the following after the last sentence of the third paragraph (which begins with "Time charges according...")

In cases where seal coat and pavement marking application are the only remaining items of work as of August 21, contract time will not be charged after August 20 if seal coat work is not performed. Contract time will be charged according to Subsection 108.07.3, beginning on the day seal coat work begins, from August 21 through August 31 if seal coat work is performed.

Submit written notice to perform seal coat work from August 21 through August 31.

409.02.2 BITUMINOUS MATERIAL

Page 171

11-17-11

Rescind Subsection 409.02.2 and replace with the following:

409.02.2 Bituminous Material

Furnish material meeting Table 702-3.

409.02.3 COVER AGGREGATE

Page 171

1-16-14

Rescind Subsection 409.02.3 and replace with the following:

409.02.3 Cover Aggregate

Furnish cover aggregate in accordance with Subsection 701.02.8.

The responsibility for furnishing the aggregate source is specified in the contract.

409.03.2 AGGREGATE AND BITUMINOUS MATERIAL APPLICATION RATES

Page 172

6-24-10

Rescind the second sentence of the first paragraph (that begins with "Submit the following...") and replace with the following sentence:

Submit the following for informational purposes before starting full production or any time the source of aggregate or bituminous material changes:

Rescind the first sentence of the second paragraph (that begins with "Before starting full"...") and replace with the following sentence:

Before starting full production or after changing sources of either aggregate or bituminous material, complete a test section at least 2000 feet (0.6 km) long to verify the following:

409.03.3 SEASONAL AND WEATHER LIMITATIONS (SEAL COAT) Page 172 1-12-12

Rescind Subsection 409.03.3 and replace with the following:

## 409.03.3 Seal Coat Limitations

The following conditions govern seal coat work:

1. Perform seal coat operations between May 1 and August 31.
2. Do not perform seal coat work during the 48-hour period immediately preceding a holiday or a holiday weekend except for pilot car operation as specified in Subsection 618.03.11.
3. Perform seal coat work when both the ambient and pavement surface temperatures meet the bituminous material supplier's recommended temperatures.
4. Stop seal coat work at least 1/2 hour before sunset, to include equipment off of the roadway and placement of traffic control devices for non-construction activities.
5. Do not apply bituminous material to damp or wet roadway surfaces.
6. Do not apply bituminous material to plant mix pavement which has been placed, under the contract, within the previous 72 hours.

409.03.5 SURFACE PREPARATION Page 173 9-23-10

Rescind Subsection 409.03.5 and replace with the following:

## 409.03.5 Surface Preparation

Do not apply bituminous material unless the roadway surface is free of all dust, dirt, and foreign material. Remove excess crack seal blotter material placed under the contract prior to seal coat operations.

409.03.6 APPLICATION OF FOG SEAL Page 173 3-12-09

Rescind Subsection 409.03.6.

409.03.7 APPLICATION OF SEAL COAT MATERIALS Page 173 3-1-07

Rescind the third sentence of the second paragraph (that begins with "Locate longitudinal ...") and replace with the following two sentences:

Locate longitudinal joints at the centerline or lane line. Obtain approval from the Project Manager to construct the joint at any other location.

409.03.8 WARRANTY (SEAL COAT) Page 173 10-7-10

Rescind 409.03.8 and replace with:

The Contractor warrants the seal coat work. If the seal coat experiences chip loss, tracking, flushing or bleeding, at any time between the date the seal coat is completed and the first Wednesday in December of the same calendar year, perform repairs to the seal coat, and replace pavement markings covered by the repairs at no additional cost to the Department. Areas of cover material loss determined to result from means beyond the Contractor's control (snow plow damage, tire chain damage, or others) are not considered under these warranty requirements. Final determination regarding cover material loss will be made by the Engineer. When repairs are deemed necessary, reference is made to the "MDT Seal Coat Warranty Administration Guide". Submit a detailed repair plan to the Project Manager for approval within 14 calendar days of notification of required repairs. The repair plan must address the area of failure and transitions required to ensure a uniformly bonded, smooth surface. Make warranty repairs in accordance with the provisions of this specification when performing warranty work. furnish traffic control meeting Section 618 requirements at no additional cost to the Department.

409.03.10 FINAL SWEEPING AND BROOMING Page 173 6-27-13

Add the following Subsection:

## 409.03.10 Sweeping and Brooming

- A. Initial Sweeping and Brooming. Provide a roadway free of loose cover material. In curb and gutter sections, remove and dispose of all loose cover material. Correct surface irregularities affecting the ride quality at the Contractor's expense.  
Remove all loose cover material before terminating pilot car use. If pavement markings are not placed within 72 hours of completion of the seal coat work, the Department may have work performed and deduct the costs from monies due to the Contractor. Traffic control beyond these 72 hours, unless ordered by the Project Manager is at the Contractor's expense.  
Apply final pavement markings as specified elsewhere in the contract.
- B. Final Sweeping and Brooming. Perform final sweeping and brooming operations to remove excess loose material no sooner than 5 days before final pavement markings.

409.04.6 SWEEPING AND BROOMING Page 174 1-16-14

Rescind Subsection 409.04.6 and replace with the following:

**409.04.6 Sweeping and Brooming**

Initial sweeping and brooming and the disposal of excess material necessary for traffic control operations as outlined in Subsection 409.03.10(A) are not measured for payment.

Final sweeping and brooming operation is measured by the course mile (kilometer). A course mile (kilometer) is defined as a roadway portion consisting of 2 travel lanes and adjacent shoulders or turn lanes for a 1 mile (kilometer) length. Roadways with additional travel lanes or that require less than full width sweeping will be prorated. Traffic control from an approved plan necessary for final sweeping and brooming is measured under Section 618.

409.05 BASIS OF PAYMENT Page 174 10-11-12

Add the following pay item and unit to the end of the existing table:

<u>Pay Item</u>	<u>Pay Unit</u>
Final Sweep and Broom	Course Mile (kilometer)

410.03.2 EXISTING SURFACE PREPARATION Page 176 12-13-12

Rescind the first paragraph (that begins "Unless surface...") and replace with the following:

Prepare the aggregate to receive bituminous surface treatment to the requirements and tolerances found elsewhere in the contract.

Rescind the third paragraph (that begins "When required...") and replace with the following:

When required, apply an aggregate treatment at the rate directed before the initial application of bituminous surface treatment. Apply the aggregate under Section 301.

410.04.4 EXISTING SURFACE PREPARATION Page 177 12-13-12

Rescind Subsection 410.04.4 and replace with the following:

Where base construction is a part of the contract with bituminous surface treatment, the items of work for surface preparation are incidental to and included in payment for the base construction.

Where bituminous surface treatment is applied to an existing aggregate surface, the work for existing surface preparation is incidental to and included in payment for the bituminous surface treatment.

410.05.1 EXISTING SURFACE PREPARATION Page 178 12-13-12

Rescind the title and the first two paragraphs of Subsection 410.05.1. The following last paragraph of Subsection 410.05.1 is added to the end of Subsection 410.05:

Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract.

411.01 DESCRIPTION (COLD MILLING) Page 179 10-11-12

Rescind Subsection 411.01 and replace with the following:

This work is the removal of existing bituminous pavement at the locations and depth specified in the contract or designated by the Project Manager.

411.03.1 EQUIPMENT (COLD MILLING) Page 179 4-8-10

Delete the second paragraph (that begins with "Use cold milling...") and delete items 1. and 2.

411.03.2 GENERAL (COLD MILLING) Page 179 10-11-12

Rescind Subsection 411.03.2 and replace with the following:

Do not start cold milling until the surfacing plant is fully operational.

Starting at the center of the road, begin milling on a longitudinal line parallel to the centerline with succeeding passes progressing to the outer edge of the pavement, unless approved by the Project Manager.

Remove all thin delaminated or loose layers of existing pavement left after cold milling.

Replace the milled pavement at bridge ends and cattle guards with new bituminous surfacing the same day leaving no transverse joints in the milled areas.

If new surfacing cannot be placed on the milled area the same day, transition at no less than a 50:1 to the original surface. The completed milled surface is to be free from transverse and longitudinal irregularities exceeding ¼ inch (6 mm) when measured with a 10-foot (3 m) straightedge. Each successive pass will be pulled even with the previous and not staggered.

After cold milling, do not leave the remaining pavement exposed to traffic more than 72 hours before placing the plant mix surfacing. The 72 hour duration may be modified by the project manager depending on the durability of the milled surface.

The Contractor will be responsible to repair any damage that occurs to the roadway prior to plant mix paving. Do not proceed with paving without the approval of the Project Manager.

Replacing existing pavement is a separate operation from any succeeding overlay or lift.

---

**411.03.3 (A) MILLING**

Page 179

4-8-10

Rescind and replace 411.03.3 (A) with the following:

- A. Connections. Mill the existing bituminous surfacing from bridge decks, bridge approaches, cattle guards, and project connections at the locations specified in the contract or as directed by the Project Manager.

Bridge Decks

- Mill the depth shown in the contract or as adjusted to meet field conditions.

Bridge Ends

- Mill full depth from the bridge end out for a distance of 30 feet (10m) prior to the milling taper.
- For milling depths less than or equal to 0.35 feet (105 mm), mill a taper distance of 200 feet (60 m).
- For milling depths greater than 0.35 feet (105 mm), mill a taper distance based on a rate of 30 feet (10 m) per 0.05 feet (15 mm) of milling depth.

Cattle Guards or Railroad Crossings

- Mill full depth from the cattle guard or railroad crossing out for a distance of 15 feet (5 m) prior to the milling taper.
- Mill a taper distance of 50 feet (15m).

Project Connections

- For milling depths less than or equal to 0.35 feet (105 mm), mill a taper distance of 200 feet (60 m).
- For milling depths greater than 0.35 feet (105 mm), mill a taper distance based on a rate of 30 feet (10 m) per 0.05 feet (15 mm) of milling depth.

---

**411.03.3 (B) MILLING**

Page 179

9-9-10

Rescind Subsection 411.03.3 (B) and replace with the following:

- B. Milling at Other Designated Areas. Mill the existing pavement at the locations, widths and depths specified. The depth is measured below the existing pavement plane projected from points on un-distorted pavement near the centerline and the edge of the driving lane.

---

**501.01 DESCRIPTION**

Page 181

9-26-13

Rescind Subsection 501.01 and replace with the following:

This work is the construction of portland cement concrete pavement (PCCP) on a prepared subgrade or base course.

---

**501.02.1(A) CEMENT (CONCRETE)**

Page 181

7-12-12

Rescind part A under Subsection 501.02.1 and replace with the following:

- A. Cement. Furnish Type I or II portland cement listed on the Department's QPL, meeting ASTM C 150 or AASHTO M 85 requirements and the applicable requirements of Subsection 551.02.1.

---

**501.02.4 TIE BARS**

Page 181

9-26-13

Rescind Subsection 501.02.4 and replace with the following:

Furnish Grade 40 deformed steel bars in accordance with Subsection 711.01. The length, size, and spacing of the bars are specified in the contract.

---

**501.02.5 EXPANSION JOINT FILLER AND JOINT SEALING MATERIAL**

Page 181

2-23-12

Rescind Subsection 501.02.5 and replace with the following:

Furnish expansion joint filler and joint sealing material listed on the Department's QPL and meeting Subsection 707.01 requirements.

501.02.6 CURING COMPOUND Page 181 11-14-13

Rescind Subsection 501.02.6 and replace with the following:

Furnish Type 2 curing compound meeting Subsection 717.01.3.

501.03.1 (C)(2) AUXILIARY FINISHING EQUIPMENT Page 183 7-26-12

Add the following sentence to the end of the second paragraph (that begins "Provide hand floats..."):

Steel concrete hand tools are prohibited from being used on the project as a finishing aid.

501.03.8 PLACING AND FINISHING CONCRETE Page 185 9-26-13

Rescind paragraphs 1 through 3 and replace with the following:

Submit a plan for placing and curing PCCP to the Project Manager for approval a minimum of 15 business days before the start of paving work. Include specific detail of joint layout at manholes, water valves, drop inlets, monument boxes and other structures in the PCCP section.

Place and finish concrete using either the slip-form method or the stationary side form method using bridge deck finishing equipment.

Under Part (C), Final Surface Finish, add the following sentence after the first sentence (that begins "Hand-float the ..."):

Adding finishing water to unfinished concrete is prohibited.

501.03.13 JOINTS Page 188 9-26-13

Add the following paragraph prior to Part (A):

Construct the joints as shown in the plans. Submit an alternate plan for longitudinal and transverse joint layout with details that are determined by Contractor sequencing to the Project Manager for approval a minimum of 15 business days before the start of paving work.

501.03.14 SURFACE TEST Page 189 12-13-12

Rescind Subsection 501.03.14 and replace with the following:

501.03.14 Surface Test

Test pavement surfaces meeting the following criteria using method A. Straightedge.

- Sections less than 300 feet (91.5 m) in length.
- Sections within 50 feet (15.2 m) of existing pavements or bridge ends.
- Sections within 50 feet of intersections requiring warping to match side streets.
- Sections having horizontal curves with a centerline radius less than 1000 feet (305 m) and the superelevation transitions of those curves.
- Sections having vertical curves with L/A (K-value) less than 100 where L is the length of the curve in feet and A is the grade change in percent (L/A less than 30.5 where L is in meters).

Test all other surfaces under (B) Profilograph.

- A. Straightedge. Once the concrete has hardened, test the pavement surface with a 10 foot (3 m) straightedge placed parallel to the pavement centerline.
  - Span each low spot and touch each high spot with the testing edge revealing all irregularities.
  - Correct all pavement showing a variation from the testing edge exceeding 1/16-inch per foot (2 mm per 305 mm) from the nearest contact point with the testing edge or showing a total variation exceeding 1/4-inch (6 mm) from the 10 foot (3 m) straightedge by grinding until the areas are within the above limits.
  - Where the grinding methods would result in an unsatisfactory surface or in a slab thickness less than specified, the affected pavement may require an adjustment in the contract unit price or removal and replacement under Subsection 501.03.20.
- B. Profilograph. Furnish a 25 foot (7.6 m) wheel base California type profilograph and a competent operator to measure the surface smoothness before joint sealing. Do not exceed a maximum 3 mph (4.8 km/h) operational speed. Calibrate, adjust, and operate the profilograph following the manufacturer's instructions and California Test Method 526.
  - Provide the Project Manager 24 hours advance notice before using the profilograph. The Project Manager will witness all profilograph recordings. The profilogram must record a scale of 1 inch (25 mm)

to 25 feet (7.6 m) longitudinally and 1 inch (25 mm) to 1 inch (25 mm) vertically. Take a profile on a line parallel to and 3 feet (0.9 m) inside the outside edges of each traffic lane. Run the profilograph parallel to the pavement edge at all times. Additional profiles may be taken to define the limits of an out-of-tolerance surface. The Project Manager will determine the profile index using California Test Method 526.

Calculate an average profile index in 0.1 mile (161 m) lane segments, and segments greater than 300 feet (91 m) with no adjacent lanes. If a segment less than 0.1 mile (161 m) remains for a lane, that segment will be combined with the adjacent segment for an average profile index.

Perform corrective work when the lane average profile index exceeds the value specified in Table 501-1. Remove all high points in excess of 0.3-inch (8 mm) in 25 feet (7.6 m) or less using a method approved by the Project Manager. Re-profile corrected areas to demonstrate that the segment is acceptable.

Use the following definitions for Category 1 and Category 2 surfaces. Category 1 surfaces are through lanes with a speed limit of 45 mph or greater. Category 2 surfaces include ramps, acceleration lanes, turn lanes, and all other lanes not meeting the criteria of Category 1. Lane segments containing both Category 1 and Category 2 criteria will be evaluated as Category 2.

Contract unit price adjustments are made following Table 501-1. The Contractor may elect to perform corrective work to reduce the average profile index when it is less than the corrective index but greater than the incentive index. Incentive will not be paid on sections with an initial index requiring corrective work.

TABLE 501-1  
CONTRACT UNIT PRICE ADJUSTMENTS

ENGLISH		
Lane Average Profile Index (Inches per Mile-per 0.1 Mile)		Contract Unit Price Adjustment
Category 1	Category 2	
Less than 6	Less than 6	\$0.50 per square yard incentive pay
6 to 10	6 to 14	Contract Unit Price
10 to 15	14 to 20	\$1.00 per square yard deduction
Over 15	Over 20	Corrective work required
METRIC		
Lane Average profile Index (mm per 1.6 km-per 161 m )		Contract Unit Price Adjustment
Category 1	Category 2	
Less than 150 mm	Less than 150 mm	\$0.60 per square meter incentive pay
150 mm to 255 mm	150 mm to 355 mm	Contract Unit Price
255 mm to 380 mm	355 mm to 510 mm	\$1.20 per square meter deduction
Over 380 mm	Over 510 mm	Corrective work required

The price adjustment applies to the entire area of concrete for the lane segment, calculated using the plan lane width.

No payment is made for any section with an average profile index exceeding the corrective index until it is re-worked and re-profiled to an acceptable profile index. Re-profiled areas are not subject to incentive pay.

Complete all corrective work before measuring the pavement thickness.

Include all profilographing costs in the contract unit price for portland cement concrete pavement.

Perform all pavement corrections at Contractor expense.

Rescind Subsection 501.03.20 and replace with the following:

501.03.20 Pavement Thickness

Construct concrete pavement to the specified thickness. Pavement not meeting the required thickness will be subject to replacement according to 501.03.20(B) or to the price adjustments according to Table 501-2. Tolerances allowed for subgrade or base course construction do not modify the thickness requirements.

A primary unit of pavement is the pavement area placed in each day's paving operations. Within each primary unit there may be several secondary units as specified in 501.03.20(B)(2).

- A. Thickness Verification

1. Survey Method. Thickness measurement locations will be determined by random sampling under MT 606. A minimum of ten random locations will be tested for each 12,000 ft<sup>2</sup> (1115 m<sup>2</sup>) of pavement placed within the primary unit. Elevations will be recorded to the nearest 0.01 ft. (3 mm). Measurements will be taken as follows:
    - a. The locations will be selected on the finished surface before paving and at the same location on the finished concrete surface.  
 The thickness variation will be determined by subtracting the planned thickness from the constructed thickness at each surveyed location. Variations exceeding the planned thickness will be considered as a 0.00 feet (0.0 mm) deviation in the average. The average of the measurements will represent the variation for that primary unit.
  2. Coring Method. The Project Manager reserves the right to verify the thickness or resolve discrepancies by coring using MT 106, recording that measurement to the nearest 0.01 feet (3 mm). Fill core holes with concrete of the same quality as used for the pavement at no cost to the Department.
- B. Thickness Deficiency
1. Variation less than or equal to 0.07 feet (21 mm). If the thickness variation in a primary unit is less than 0.07 feet (21 mm), a deduction will be applied in the amount determined in Table 501-2 times the area of pavement in the primary unit. No incentive or contract adjustment will be allowed for constructed thicknesses exceeding the planned thickness.

TABLE 501-2  
CONCRETE PAVEMENT THICKNESS DEFICIENCY  
Pavement Greater Than 5 in (127 mm)

AVERAGE THICKNESS DEFICIENCY		PRICE DEDUCTION (%)
Feet	mm	
0.02	6	0
0.03	9	20
0.04	12	32
0.06	18	43
0.07	21	50

Average thickness deficiencies greater than 0.02 feet (6 mm) are rounded to the nearest 0.01 foot (3 mm) and the deficiency adjustment made using Table 501-2.

2. Variation greater than 0.07 feet (21 mm). For each section in a primary unit with a thickness variation greater than 0.07 feet (21 mm), the Project Manager will determine the dimensions of the secondary unit area. The secondary unit is made up of entire panels only. Panels are the areas bound by longitudinal and transverse joints and pavement edges.  
 The Project Manager will randomly measure the thickness in each panel adjacent to the panel(s) in the primary unit which exceeded 0.07 foot (21 mm), by either the Survey Method or MT 106. Measurements are taken in each panel until the panels which exceed 0.07 foot (21 mm) are isolated. The Project Manager will determine which panel(s) will require replacement and which may remain in place when the limits of the secondary unit have been defined. Acceptance will be in accordance with procedures (a) or (b) below:
  - a. Remove and replace the deficient panels at Contractor expense with new concrete meeting all contract requirements. If the area to be removed is not bounded by longitudinal or transverse joints, saw the weakened plane joints at Contractor expense at the locations designated by the Project Manager. Lower the subgrade or base to meet the full thickness requirements. Replaced pavement will be tested for thickness requirements using additional secondary measurements and is subject to all of the contract requirements.
  - b. The Contractor may leave deficient pavement panels in place if the panels meet all of the other contract requirements. A deduct equal to 50 percent of the contract unit price per square yard (square meter) will be imposed for those pavement panels left in place. The Department may deduct that amount from any monies due or that may become due the Contractor under the contract. The decision to leave a deficient panel in place will be by contract modification under Subsection 105.03.

The cost of all secondary thickness measurements made under this Subsection will be deducted from any monies due or that may become due the Contractor under the contract.

After isolating the secondary unit area(s) from consideration, the average thickness deficiency of the remainder of the primary unit areas will be determined under Subsection 501.03.20(B)(2). Secondary measurements made outside of a secondary unit area will be used to determine an average in the remaining primary unit area in which the measurements are taken.

No contract adjustment will be allowed for meeting these requirements.

Add the following Subsection:

501.03.21 Accelerated Paving Techniques.

Submit a request with details for any proposed accelerated paving techniques to the Project Manager a minimum of 7 calendar days before use. Accelerated paving techniques may include but are not limited to; admixtures, cement, alternative curing methods, sawing methods, and joint sealing.

501.04 METHOD OF MEASUREMENT (PCCP)

Page 195

9-26-13

Add the following paragraph under 501.04 Method of Measurement

Furnishing and installing all tie bars, dowels, setting and maintaining wire control lines, sawing longitudinal and transverse joints, sealant, reinforcing steel, accelerated paving techniques, and testing for opening to traffic is not measured for payment. Include all costs in the unit price of PCCP.

Rescind the second paragraph of Subsection 501.04.1 (that begins with "The measured width..." and replace with the following:

The measured width is from outside to outside of completed pavement including integral curb, not exceeding the specified width or the width ordered by the Project Manager.

Rescind the seventh (last) paragraph of Subsection 501.04.1 and replace with the following:

Integral curb included in the completed pavement is not measured separately for payment.

Rescind Subsection 501.04.2 Volume Measure.

501.05 BASIS OF PAYMENT

Page 195

1-17-13

Rescind the following pay item and unit from the table and replace with the following:

<u>Pay Item</u>	<u>Pay Unit</u>
Cement Concrete Pavement	Square Yard (square meter)

551.02.1 CEMENT

Page 197

7-12-12

Add the following sentence to the end of the first paragraph under Subsection 551.02.1:

Cement used must be listed on the Department's QPL.

551.02.7 CURING COMPOUNDS AND PROTECTIVE COATINGS

Page 198

11-14-13

Rescind Subsection 551.02.7 and replace with the following:

Furnish concrete curing compounds and protective coatings and combination curing-protective coating compounds meeting Subsection 717.01.3 requirements.

551.03.2(A) DESIGN (COMPOSITION OF CONCRETE)

Page 200

7-26-12

Rescind Number 1 (that begins "Upon written request...").

Rescind the first Sentence of Number 4 Part (d) (that begins with "Ground granulated ...") and replace with the following:

- d. Ground granulated blast furnace slag may be included in the mix design for up to 25 percent by weight of the total cementitious material.

551.03.6 CURING CONCRETE

Page 206

11-14-13

Rescind the first and second paragraphs of Part (B) (that begin "Use Type 2...") and replace with the following:

Use Type 2 curing compound meeting Subsection 717.01.3 on deck slabs and PCCP.  
Use Type 1-D curing compound meeting Subsection 717.01.3 for other surfaces.

Rescind the ninth paragraph of Part (B) (that begins "Apply the curing...") and replace with the following:

Apply the curing compound immediately after the concrete finishing is complete.

Rescind the first through the fourth paragraphs of Part (C) (that begins "When specified,...") and replace with the following:

When specified, uniformly apply a combination curing and protective coating compound meeting Subsection 717.01.3 requirements over horizontal surfaces such as pavements, bridge deck slabs, concrete floors, and sidewalks.

Use Type 2 curing compound meeting Subsection 717.01.3 on deck slabs and PCCP.

Use Type 1-D curing compound meeting Subsection 717.01.3 for other surfaces.

Thoroughly mix and apply the compound following the manufacturer's instructions or apply at a minimum uniform film of one gallon per 150 square feet (0.27 L per square meters).

#### 551.03.7(A) TESTING AND ACCEPTANCE OF CONCRETE

Page 208

1-17-13

Rescind Subsection 551.03.7(A)(1) General and replace with the following:

A compressive strength set consists of four test cylinders made at the same time from the same batch of concrete.

The Contractor may make additional cylinders to determine strength gain and to maintain job control.

Standard compressive strength tests will be made at seven and 28 days, except as specified below for concrete used in prestressed members.

The compressive strength results from a combination of the cylinders tested will determine if the concrete meets the required compressive strength in Table 551-2.

Samples for making the cylinder will be taken following MT-105. Test cylinders will be cast and cured following MT-101 and tested as specified in AASHTO T 22.

Rescind Subsection 551.03.7(A)(3) Class "SD" Concrete.

Add the following paragraph at the end of Subsection 551.03.7 (A) (4) Flowable Fill:

Cover the flowable fill trench with steel plates of sufficient thickness to hold traffic if the trenched area is opened to traffic prior to meeting the required strength listed in part b) above. Anchor the plates to prevent movement from traffic.

#### 551.03.7(C) ACCEPTANCE OF CONCRETE

Page 209

2-14-13

Rescind paragraphs 3 through 6 of Subsection 551.03.7(C)(1) and replace with the following:

A minimum of two sets of standard compressive test cylinders 6-inch x 12-inch (152 mm x 305 mm) or 4-inch x 8-inch (102 mm x 203 mm) will be made for each lot. Each set will be made from a sample taken from a separate batch or load selected at random from all loads or batches in the lot. For a lot less than 30 cubic yards (23 cubic meters), the Project Manager may elect to make only one set of standard compressive test cylinders to represent that lot.

Samples to make the cylinders will be taken following MT 105. Cylinders will be cast and cured using MT 101 and tested under AASHTO T 22.

Three cylinders from each set of cylinders are tested for compressive strength at 28 days and the fourth is tested at 7 days. The test results will be the average of the strengths of the three individual 28 day cylinders. If the compressive strength of any one specimen differs from the average by more than 10 percent, that specimen will be deleted and the average strength will be determined using the remaining two specimens.

Rescind and replace Subsection 551.03.7(C)(2) Class "Pre" Concrete with the following:

551.03.7(C)(2) Class "Pre" Concrete. Class "Pre" concrete is evaluated for acceptance on a lot-by-lot basis based on the average of the 28-day compressive strength cylinders and variation in test results as measured by the standard deviation. The average strength of the three cylinders must equal or exceed:

$$F'c + 0.35S$$

Where:

S is the standard deviation of the strengths for the three 28-day cylinders.

F'c is the concrete strength required for final acceptance as specified in the contract.

A lot is defined as all the concrete that is placed in a single pre-cast prestressed member.

Lots with any actual average cylinder strengths less than that calculated from the above formula will be rejected.

Three 28-day compressive test cylinders will be made for each lot, and each 28-day test cylinder sample will be selected on a random basis from all batches or loads.

The strengths of other cylinders made from a sample and tested at an earlier age will not be considered for acceptance purposes.

The cylinders for acceptance will be cast under MT-101, sampled under MT-111 and tested under AASHTO T 22.

The cylinders will be cured within the curing enclosure under the exact conditions and methods used to cure the prestressed member until transfer of pre-stress. After transfer of pre-stress, the cylinders will continue curing under MT-101.

552.03.5 (A) GENERAL (PLACING CONCRETE) Page 214 2-23-12

Within the eighth paragraph, rescind the third (last) sentence (that begins with "Do not allow concrete...") and replace with the following:

Do not allow concrete to segregate by falling through or over reinforcing steel, tie rods, or similar items.

Rescind the twelfth paragraph (that begins with "Place and secure...") and replace with the following:

Place and secure all reinforcing, dowels, and other embedded items as specified. Clean rust, scale, oil, dried mortar deposits or foreign material from all embedded materials before placing the concrete.

552.03.5 (D) CONCRETE PILING (PLACING CONCRETE) Page 216 5-9-13

Rescind Subsection 552.03.5(D) Concrete Piling.

552.03.9(A) GENERAL (COLD WEATHER CONCRETING) Page 218 3-27-08

Rescind the first sentence (that begins with "Assume all...") and replace with the following:

A. General. Assume all risk for placement and cure of concrete during cold weather.

552.03.12 FINISHING CONCRETE Page 220 7-26-12

Add the following paragraph after the second paragraph (that begins "Finish Concrete bridge..."):

When hand finishing of concrete is required, meet the requirements of Subsection 501.03.

552.03.12(E)(4) BRIDGE DECK SURFACE TEXTURE Page 223 9-23-10

Rescind 552.03.12, Part (E)(4) and replace with the following:

E. Concrete Bridge Decks. Finish deck slabs by the machine method, excluding small or irregularly shaped areas where a machine is impractical.

4. Bridge Deck Surface Texture. Perform transverse deck grooving prior to allowing traffic on the new deck. After the Project Manager has approved the finished deck surface and concrete has cured for the specified cure period, saw cut transverse grooves into the finished deck. Use grooving equipment capable of saw cutting  $\frac{1}{8}$ " (3 mm)  $\pm 1/16$ " (1 mm) wide,  $3/16$ " (5 mm)  $\pm 1/16$ " (2 mm) deep at  $1\frac{1}{4}$ " (30 mm)  $\pm 1/16$ " (2 mm) center-to-center spacing. Do not overlap grooves during succeeding passes. Terminate grooves 1 foot (.3 meter) from the face of rail or face of barriers and 4" (.1 meter) from the paving notch, guard angles or expansion joints.

552.03.12(E)(6) SURFACE SMOOTHNESS Page 223 9-23-10

Rescind and replace the first sentence of the first paragraph (that begins with "The finished Surface...") with the following sentence:

The finished surface must not vary more than  $3/16$ -inch (5 mm) from a 10-foot (3 m) straightedge placed parallel to the roadway centerline.

552.03.12(F) FINISHING CONCRETE Page 225 3-27-14

Rescind the fourth (last) paragraph (that begins with "Use steel shims...") and replace with the following:

When necessary, place shims in accordance with 565.03.2.

552.03.13 FILLED JOINTS Page 225 2-23-12

Rescind the first paragraph (that begins with "Construct poured...") and replace with the following:

Construct poured expansion joints similar to open joints. Use filler material listed on the Department's QPL meeting the requirements of Subsection 707.01.

552.03.14 PLACING ANCHOR BOLTS Page 225 1-17-13

Rescind Subsection 552.03.14 and replace with the following:

552.03.14 Placing Anchor Bolts and Dowel Bars

Install anchor bolts and dowel bars by one of the following methods:

- Securing in position prior to casting concrete;
- Drilling and grouting, or;
- Forming holes and grouting.

Determine the final bolt and dowel locations, making allowance for thermal effects on the superstructure at the time of grouting.

Ensure that all anchor bolts for shoe assemblies project above the plane of the substructure concrete to provide full anchor bolt and nut engagement after the final placement of the shoe assemblies.

Form holes by inserting treated wood plugs or metal pipe sleeves into the plastic concrete and withdrawing the devices after the concrete has partially set. Form holes at least 3 inches (75 mm) in diameter to allow for horizontal adjustment.

Drill holes at least 1 inch (25 mm) larger than the diameter of the anchor bolts. Verify diameter and depth before setting the beams.

Use an approved non-shrink or epoxy grout and fill holes two-thirds full. Force bolts and dowels down using uniform, even pressure or light blows with a hammer until the grout rises to the top of each hole and the bolts and dowels are inserted to the correct depth. Remove all excess grout, and clean the metal surfaces for painting. If below freezing temperatures are expected, a non-shrink or epoxy grout product formulated specifically for use at temperatures below freezing must be submitted for approval prior to grouting.

Protect holes against damage from ice by filling with a non-evaporating antifreeze solution. Before grouting, remove the antifreeze and thoroughly flush the holes with clean water.

Install the anchor bolt nuts as shown on the plans. Tighten the upper nut against the lower nut so neither nut can be turned by hand.

Correct all inaccuracies in bolt and dowel locations using approved methods at Contractor expense.

552.03.15 SETTING SHOES AND BEARING PLATES Page 226 3-27-14

Rescind Subsection 552.03.15 and replace with the following:

552.03.15 Setting Shoes and Bearing Plates

Set shoes and bearing plates under Subsections 565.03.2 and 552.03.12(F).

552.04 METHOD OF MEASUREMENT Page 227 9-23-10

Add the following paragraph at the end of 552.04:

Transverse Deck Grooving is measured in square yards (square meters) for the actual area grooved.

552.05 BASIS OF PAYMENT Page 228 6-27-13

Rescind and replace the Pay Item and Pay Unit tables with the following:

<u>Pay Item</u>	<u>Pay Unit</u>
Concrete	Cubic Yard (cubic meter)
Transverse Deck Grooving	Square Yard (square meter)

Rescind and replace Subsection 552.05(B) with the following:

B. A re-calculation will be made and the corrected quantity included for payment, in lieu of the contract quantity, when the contract quantity of any complete structure element is in error by 2 percent or more. A complete structure element is the smallest portion of a total structure for which a quantity is included in the Estimated Plan Quantities Table shown in the plans. The party to the contract requesting an adjustment in quantity must present to the other party 3 copies of the description and location and recalculated quantities of the structure element that has the quantity error.

553.02.8 FIBER REINFORCED PADS FOR BEARING PLATES Page 229 12-13-12

Add the following Subsection:

553.02.8 Fiber Reinforced Pads for Bearing Plates

Furnish fiber reinforced pads meeting the requirements of Subsection 711.16.

553.02.9 DECK SEALER Page 229 4-24-14

Add the following Subsection:

553.02.9 Deck Sealer

Furnish deck sealer for precast prestressed deck sections which is listed on the Departments QPL and meets the requirements of Subsection 717.02.

553.02.10 LEVELING INSERTS

Page 229

3-27-14

Add the following Subsection:

## 553.02.10 Leveling Inserts

Furnish Leveling inserts for precast prestressed deck sections designed for a minimum working tension of 5,500 lbs. (24.4 kN) and have machine threaded ferrules. Use ¾-inch (19 mm) minimum diameter structural connection type leveling inserts.

553.03.1 FABRICATION

Page 229

12-1-11

Rescind Subsection 553.03.1 and replace with the following:

## 553.03.1 Fabrication

Fabricate all prestressed concrete members using a manufacturing plant currently certified by the Prestressed Concrete Institute or the National Precast Concrete Association in the category applicable to the member being fabricated. The Department will make an exemption for new manufacturing plants that are of the same ownership as an existing certified plant, provided the new manufacturing plant operates under the same quality assurance and control programs as the certified plants, modified to address any production differences, and all fabrication is performed under the direct supervision of a quality assurance and control manager provided by an existing pre-qualified plant. Direct supervision means that the quality assurance and control manager is on site during all fabrication performed in the new fabrication plant and is responsible for the quality assurance and control activities.

Furnish a copy of the plant's current certification in the applicable category along with the fabrication drawings for the elements to be fabricated. For new manufacturing plants, submit and receive approval of any proposed modifications to the parent plant's quality assurance and control program prior to beginning production. Allow 30 working days from the date submitted for Department review and approval.

The fabricator may prestress by pretension or post-tensioning the member, subject to the contract requirements. Obtain written approval before changing the prestressing details.

553.03.2 FABRICATION DRAWINGS

Page 230

3-27-14

Rescind Subsection 553.03.2 and replace with the following:

## 553.03.2 Fabrication Drawings

Before casting members, submit fabrication drawings and designs calculations to the Project Manager. Show complete details of the method, materials, and equipment proposed for use in prestressing.

Include in the fabrication drawings the following information:

1. An erection layout of the members placed in the structure or structures with each prestress member assigned a production number. Mark each completed member with an assigned number;
2. A tentative fabrication schedule;
3. The proposed mix design, including admixtures;
4. The prestress steel manufacturer's name and the applicable specifications;
5. Details of the method and sequence of stressing including the numbered or lettered layout to be followed to stress the member. Show complete details of the proposed method for tensioning the draped strands. Include in the details gauge and elongation readings for initial, intermediate, and final tensioning, as well as the deflection sequence, where applicable;
6. Complete details, including anticipated camber, tensioning forces (initial and final), and required concrete strengths (transfer and 28-day);
7. A complete detensioning procedure for the castings;
8. Details of items to be incorporated into the beam, such as chairs, inserts, hold-downs, etc., listed by source, type, size or capacity, and supplier;
9. Show all items incidental to the beams, such as bearing plates, rocker assemblies, anchor bolts, etc., if supplied by the beam fabricator. Include the specification and grade of all steel items;
10. All information and data required for fabrication;
11. Show the tack welding procedures; and
12. Detail the use of all external weights or hold-downs if used. If weights are not required, note it on the fabrication drawings.
13. Show the finish for all steel members incorporated in the beams. For galvanized items, identify the applicable specification. For painted items specify paint type, manufacturer and recommended dried film thickness for each coat applied in the shop. Also identify surface preparation for each item to be painted. For paint requirements refer to Section 612.
14. Submit welder certifications and welding procedure specifications for all welding done to any member incorporated into the beam. For welding requirements see Subsection 556.03.1 and 556.03.10.
15. For precast prestressed deck sections:
  - a) Show the location of the leveling inserts.
  - b) Drawings of the proposed leveling system.

Show all changes from the prestressed details in the contract.

Submit five copies of shop drawings on 11" x 17" or larger sheets and five copies of welding procedures and design calculations on 8½" x 11" or larger sheets to the Project Manager. Shop drawings, design calculations, and welding procedures may be furnished in Adobe Acrobat Reader (.pdf) format in lieu of the hard copies. Assure the

submittal includes all information required to check the structural accuracy and fabrication procedures for the structure.

Structural shop drawings must be designed, and stamped by a professional engineer registered and licensed to conduct engineering in the State of Montana.

Do not begin fabrication until the Department approved drawings are received by both the plant and the Department inspector. Coordinate the fabrication schedule with the Department inspector.

553.03.18 BEARING AND ANCHORAGE Page 239 3-27-14

Add the following Subsection:

553.03.18 Bearing and Anchorage

Place masonry bearing plates in accordance with Subsection 565.03.2.

Place anchor bolts meeting Subsection 552.03.14 requirements.

553.03.19 PRECAST PRESTRESSED DECK SECTIONS Page 239 3-27-14

Add the following Subsection:

553.03.19 Precast Prestressed Deck Sections

- A. Fabrication Control. Schedule fabrication so that camber differences between adjacent deck sections are minimized. Measure camber on each deck section immediately after transfer of prestress forces. At transfer of prestress, the difference in camber between adjacent deck sections of the same design must not exceed 1/4-inch (6 mm) per 10 feet (3 meters) of span length or a maximum difference of 3/4-inch (19 mm), whichever is less.
- B. General. Locate the leveling inserts so that the specified camber corrections are achieved. Center the leveling inserts over the beams web, install a minimum of 1/8-inch (3 mm) below the finished deck surface and cast into the member. Fill all insert holes with a non-shrink epoxy grout meeting the requirements of Subsection 713.04.
- C. Leveling. Make adjustments by use of a leveling beam and jack assembly. Attach the leveling beam to the inserts and jack the deck sections to within 3/8-inch (9 mm) at the center of the span prior to placement of the weld tie connections and diaphragms. More than one leveling beam and jack assembly may be necessary to adjust adjacent sections.  
If the prescribed tolerance between deck sections cannot be attained by the approved leveling system, shim the bearings of the deck sections so that the required tolerance is met throughout the span.
- D. Acceptance. Remove any grease, oil or other contaminants on the deck surface by sandblasting. After sandblasting, power-wash the entire deck surface to remove concrete swarf, dirt, dust and other debris. Allow the deck to dry until it is visibly dry with no ponding or dark areas indicating moisture in the concrete surface. Apply Deck Sealer by spray until refusal to the cleaned, dry deck. Refusal means that additional spray applications remain on the surface of the concrete and do not soak in. Insure that a minimum of 28 calendar days have passed from the time the deck is cast to the application of the Deck Seal. Prevent chloride contamination of the deck during all stages of construction.

553.04 METHOD OF MEASUREMENT Page 240 3-27-14

Rescind Subsection 553.04 and replace with the following:

553.04 METHOD OF MEASUREMENT

Precast, prestressed concrete members, excluding piling, are measured by the foot (meter) for each specified type and/or size, installed and accepted.

Prestress beams are measured by the foot (meter) from centerline bearing to centerline bearing along the beam centerline.

Precast prestressed deck sections are measured by Foot (meter) for each type installed and accepted.

553.05 BASIS OF PAYMENT Page 240 3-27-14

Remove the following pay items and units from the table:

Concrete Piling	See Subsection 559.05
-----------------	-----------------------

Add the following to the Pay Items and Pay Units List:

<u>Pay Item</u>	<u>Pay Unit</u>
Prestressed Beam – (Type)	Foot (meter)

554.03.1 FABRICATION DRAWINGS Page 241 12-13-12

Rescind Subsection 554.03.1 and replace with the following:

Prior to casting members, submit fabrication drawings and design calculations to the Project Manager. Include on/with the fabrication drawings the following information:

1. An erection layout with each member assigned a production number;
2. A tentative fabrication schedule;
3. The proposed mix design, including admixtures, and;
4. All other information necessary to fabricate and install the product.

Submit five copies of shop drawings on 11" x 17" or larger sheets and five copies of welding procedures and design calculations on 8½" x 11" or larger sheets to the Project Manager. Shop drawings, design calculations, and welding procedures may be furnished in Adobe Acrobat Reader (.pdf) format in lieu of the hard copies. Assure the submittal includes all information required to check the structural accuracy and fabrication procedures for the structure.

Structural shop drawings must be designed, and stamped by a professional engineer registered and licensed to conduct engineering in the State of Montana.

Do not begin fabrication until the Department approved drawings are received by both the plant and the Department inspector. Coordinate the fabrication schedule with the Department inspector.

554.03.2 DESIGN OF CONCRETE MIXTURES Page 241 7-26-12

Rescind the first paragraph (that begins with "Upon request, the ...").

555.01 REINFORCING STEEL Page 245 12-13-12

Rescind the first paragraph (that begins "The work is ...") and replace with the following:

This work is furnishing, protecting and placing reinforcing steel and wire fabric.

555.02 MATERIALS (REINFORCING STEEL) Page 245 9-26-13

Add the following paragraph after the list of materials:

Use reinforcement listed on the Department's QPL and meeting the requirement of Section 711.

555.03.1 PROTECTION OF MATERIAL Page 245 12-13-12

Rescind Subsection 555.03.1 and replace with the following:

Protect new and existing reinforcing steel from damage. The Project Manager will reject damaged material or allow a repair meeting AASHTO M 284 at Contractor expense.

Handle epoxy-coated steel reinforcing with padded or nonmetallic slings and padded straps to prevent damage to the epoxy coating.

Store reinforcing and supports on wooden blocks. Cover all reinforcing steel from weather exposure using an opaque moisture resistant covering that permits air circulation. Do not permit epoxy coated reinforcing steel to be exposed to sunlight in excess of 60 days.

555.03.3 PLACING AND FASTENING (REINFORCING STEEL) Page 246 9-1-06

Rescind the tenth paragraph (that begins with "Use plastic-coated ...") and replace with the following:

Use plastic-coated tie wires or tie wires coated with another inert coating approved by the Engineer to tie the coated bars in place.

556.03.1 PRE-QUALIFICATION Page 249 12-1-11

Rescind Subsection 556.03.1 and replace with the following:

556.03.1 Pre-qualification for steel fabricators

Use metal fabricators that are pre-qualified under the AISC Quality Certification Program for the items listed below. The Department will make an exemption for new manufacturing plants that are of the same ownership as an existing certified plant, provided the new manufacturing plant operates under the same quality assurance and control programs as the certified plants, modified to address any production differences, and all fabrication is performed under the direct supervision of a quality assurance and control manager provided by an existing pre-qualified plant. Direct supervision means that the quality assurance and control manager is on site during all fabrication performed in the new fabrication plant and is responsible for the quality assurance and control activities. For new manufacturing plants, submit and receive approval of any proposed modifications to the parent plant's quality assurance and control program prior to beginning production. Allow 30 working days from the date submitted for Department review and approval. Items not listed may be fabricated by non-certified shops. AISC has quality certification in the following categories:

AISC has quality certification in the following categories:

- Standard for Steel Building Structures (STD). This certification applies uniformly to all building fabricators, regardless of project complexity.
  - Simple Steel Bridge Structures (SBR). The certification is typically specified for unspliced rolled beam bridges.
  - Major Steel Bridges (CBR). The certification is typically specified for large span bridges. Main members are typically fabricated girders that must be spliced with a welded or bolted connection.
- A. Certification Requirements
- 1) Use fabricators having Category CBR certification to fabricate the following:
    - a. Fracture critical members and attachments. Fabricators must have the Fracture Critical Endorsement (F).
    - b. Main members, (including spliced rolled beams).
    - c. Welded floor beams.
    - d. Diaphragms for horizontally curved girders.
  - 2) Use fabricators having Category SBR certification to fabricate the following:
    - a. Non-spliced rolled beams.
    - b. Non-spliced floor beams.
    - c. Diaphragms for straight girders (does not include diaphragms used for concrete beams).
  - 3) Use fabricators having a Category CBR, SBR, or STD certification to fabricate the following:
    - a. Modular expansion joints.
    - b. Steel grid decking.
    - c. Overhead sign bridge and cantilever sign structures.
    - d. Lighting poles and anchor bases.

**556.03.2 FABRICATION DRAWINGS**

Page 250

12-13-12

Rescind Subsection 556.03.2 and replace with the following:

Prior to casting members, submit fabrication drawings to the Project Manager.

Include on/with the fabrication drawings the following information:

1. An erection layout with each member assigned a production number;
2. A tentative fabrication schedule;
3. Denote any changes from the details in the Contract;
4. All dimensions, geometrical information, details and other data required for fabrication. Include camber information, blocking diagrams and shop splices;
5. Denote specification, grade, finish, required toughness testing and required surface preparation for all steel plates, shapes, pipes, tubes, bars and all miscellaneous hardware such as shear studs, bolts, stud bolts, threaded rods, nuts and washers;
6. For galvanized items, identify the applicable specification. For painted items, specify paint type, manufacturer and recommended dried film thickness for each coat applied in the shop. Also identify surface preparation for each item to be painted. For paint requirements see Sections 612 and 710;
7. A list of field bolts and other items furnished by the fabricator, and;
8. Appropriate weld sizes, symbols, requirements for non-destructive testing, heat cambering and bending procedures. Provide welding certifications and welding procedure specifications and any supporting documentation for all welding required for fabrication. For welding requirements see Subsection 556.03.1 and 556.03.10.

Submit five copies of shop drawings on 11" x 17" or larger sheets and five copies of welding procedures and design calculations on 8½" x 11" or larger sheets to the Project Manager. Shop drawings, design calculations, and welding procedures may be furnished in Adobe Acrobat Reader (.pdf) format in lieu of the hard copies. Assure the submittal includes all information required to check the structural accuracy and fabrication procedures for the structure.

Structural shop drawings must be designed, and stamped by a professional engineer registered and licensed to conduct engineering in the State of Montana.

Do not begin fabrication until the Department approved drawings are received by both the plant and the Department inspector. Coordinate the fabrication schedule with the Department inspector.

**556.03.5 WORKMANSHIP AND FINISH**

Page 251

6-27-13

Add "A. General." prior to the first paragraph (that begins, "Round all...") of Subsection 556.03.5.

Add the following after the last paragraph (that begins, "Curve rolled...") of 556.03.5:

- B. Fabrication of Curved Girders. Fabricate continuous girders with the horizontal curvature shown. Obtain curvature by either cutting the flanges to match the curves or by heat cambering. Do not change the physical properties of the metal, reduce the section or otherwise damage the material.
- The maximum permissible temperature of the steel during heating is 995°F (535°C).
- Submit 5 copies of the proposed method of curving the flange and web plates to the Project Manager prior to or at the time of submittal of the shop plans.

**556.03.9 BOLTS AND BOLTED CONNECTIONS**

Page 259

3-27-14

Add Subsection 556.03.9(E5):

5. Load Indicating Systems. For bridge superstructure work, tighten all high strength bolts using either of the following methods;
  - a. Direct Tension Indicators (DTI). Furnish DTI's in accordance with ASTM F959. Furnish direct tension indicators for use with weathering steel with a plain finish from steel conforming to the requirements of ASTM A325, Type3. Install DTI's using only the tools and methods recommended and approved by the manufacturer of the specific product used. Tighten to the FHWA requirement of 127 $\mu$  (0.127mm or 0.005") gap closure instead of the ASTM F959 specified 381 $\mu$  (0.381mm or 0.015"). This gap is the same for both coated and uncoated DTI's
  - b. Tension Control Bolts. Furnish ASTM F1852 bolts. Install using only the tools and methods recommended and approved by the manufacturer of the specific product used.

Add Subsection 556.03.9(F):

F. Metric Bolt Substitution. Allowable bolt substitutions are shown in Table 556-7.

TABLE 556-7  
BOLT SUBSTITUTIONS

High Strength Bolt Substitution	
Specified Bolt ASTM A 325M	Allowable Substitute ASTM A 325
M16	5/8"
M20	7/8"
M22	7/8"
M24	1"
Standard Bolt Substitution	
Specified Bolt ASTM F 568M Class 4.6	Allowable Substitute ASTM A 307
M6	1/4"
M8	5/16"
M10	3/8"
M12	1/2"
M14	9/16"
M16	5/8"
M20	3/4"
M22	7/8"
M24	1"
Stud Bolt Substitution	
Specified Bolt ASTM F 568M Class 8.8	Allowable Substitute ASTM A 449
M12	1/2"
M14	9/16"
M16	5/8"
M20	3/4"
M22	7/8"
M24	1"

Rescind Subsection 556.03.16 and replace with the following:

Furnish a steel erection plan and specifications that ensures safety, prevents overstressing of the steel, maintains stability, prevents damage to the work or surroundings, and achieves the proper final geometry. Furnish a complete erection plan and specifications for erection of the steel and for any falsework necessary, including temporary bracing, guy-wires, or other required items to the Project Manager a minimum of 14 days prior to construction of the superstructure.

The erection plan and specifications must bear the signature and the professional seal of a Professional Engineer licensed to practice in Montana.

## 558 TIMBER STRUCTURES

Page 265

6-27-13

Rescind Section 558.

## 558 DRILLED SHAFTS (NEW)

Page 265

3-27-14

Add the following Section 558 Drilled Shafts:

### SECTION 558 DRILLED SHAFTS

#### 558.01 DESCRIPTION

This work is constructing reinforced concrete shafts cast in cylindrically excavated holes that extend into soil or rock to support the structure and externally applied loads at the locations and to the lines and grades shown in the contract.

#### 558.02 MATERIALS

##### 558.02.1 Drilled Shaft Concrete

Use Drilled Shaft Concrete for all concrete placed between the bottom of the shaft and the top of the casing, unless otherwise shown on the plans. Obtain the Project Manager's approval before using a SCC mix design.

##### 558.02.2 Permanent Drilled Shaft Casing

Furnish casing meeting the size and thickness requirements specified and casing material that meets the requirements of AASHTO M 270, Grade 36. Furnish casing materials, fabrication and inspection as specified in Section 556.

#### 558.03 CONSTRUCTION REQUIREMENTS

##### 558.03.1 Submittals

Submit four copies of the following information to the Project Manager a minimum of 30 calendar days before start of drilling operations.

- A. Drilled Shaft Activities Schedule Chart and Written Narrative outlining:
  - a) Bent and shaft construction sequence. If more than one shaft will be worked on at any time, include that information in the submittal.
  - b) Method of shaft excavation.
  - c) Method to clean shaft excavation.
  - d) Temporary and permanent casing installation and removal methods. Include casing top and bottom elevations and diameters.
  - e) The effects of hydrostatic pressure differentials that may occur during excavation and shaft construction. Include a description of procedures relating to hydrostatic effects that will be used to ensure that the stability of the excavation is not compromised.
  - f) Method of concrete placement. State the planned initial elevation of the bottom of placement pipe. Provide descriptions of methods or devices that will be used to prevent the injection of air or water into the drilled shaft concrete when starting concrete placement and in the event the placement is stopped and restarted. Include descriptions of methods or devices that will be used to control the rate of concrete discharge in order to minimize turbulence that could result in concrete washout or other detrimental effects.
  - g) Time necessary for complete concrete placement.
- B. Name and experience record of Contractor, and Superintendent and Driller(s) to that will perform the drilled shaft work on this project. Include all experience in the last 10 years.
- C. List of proposed drilling equipment to be used, including any cranes, drills, augers, bits, temporary casings and cleaning tools. Include diameter of augers and cleaning buckets.
- D. Proposed size and location of all reinforcing steel used to support or maintain the shape of the reinforcing steel cage.

##### 558.03.2 Shaft Pre-construction Meeting

Schedule a shaft pre-construction meeting with the Project Manager for a time 7-14 days prior to drilling. The minimum required attendees are the superintendent, concrete supplier, and Project Manager. The purpose of the meeting is to review the requirements of this specification, discuss the drilled shaft installation plan, and to discuss logistical and contingency plans.

##### 558.03.3 Geotechnical Logging

The Department may provide a Geotechnical representative on-site during drilling and installation operations to log the excavation. Notify the Project Manager at least seven (7) calendar days prior to start of drilled shaft excavation so that the Project Manager may schedule the on-site representative.

##### 558.03.4 Shaft Excavation

Use excavation methods that provide contact with firm, undisturbed soil or rock with the sides and bottom of the shaft concrete when the temporary casing is removed. Do not excavate holes larger than the outside diameter of permanent casings.

#### 558.03.5 Shaft Locations, Alignment and Tolerances

Drill all shafts to the bottom elevations specified or as directed by the Project Manager. Construct the shaft so the vertical centerline axis of the finished shaft is within 3 inches (75 mm) of the plan location at the top of the shaft. Drill all shafts to within 2 percent of vertical the entire depth of the shaft excavation.

#### 558.03.6 Sloughing and Caving

Use tools and tool withdrawal rates that will not cause suction effects that result in soil intrusion or instability of the excavation. Use construction methods that will ensure no sloughing or caving of the shaft side walls. In the event any sloughing or caving does occur, remove all sloughed material. Ensure that concrete completely fills the shaft. If caving occurs during placement of drilled shaft concrete, immediately stop the flow of concrete and undertake corrective measures to completely remove the sloughed materials from the shaft. If necessary to facilitate material removal, remove the concrete and reinforcing steel already placed in the shaft.

#### 558.03.7 Permanent Casing

- A. Furnish and install permanent casing when specified in the contract. Permanent casing remains in place and is included in the design of the drilled shaft. The permanent casing diameter may be oversized up to 3 inches (75 mm) if necessary to facilitate temporary casing installation.
- B. If field welding, submit four copies of the weld procedures to the Project Manager for approval 30 calendar days prior to welding.
- C. Provide corrosion protection for all permanent casing. Galvanize the permanent casing to AASHTO M 111 and ASTM A 653 specifications or paint. If painting, meet the following requirements:
  - a) Furnish paint meeting the requirements of Subsection 710.02(B)(3).
  - b) Prepare the casing surface following the paint manufacturer's recommendations.
  - c) Follow the paint manufacturer's recommendations for paint application. Apply paint to the casing before installation, starting 24 inches (610 mm) below ground surface, continuing to the top of exposed steel.
  - d) Apply the first two paint coats to produce a minimum 12 mil (300  $\mu\text{m}$ ) dry film thickness. Provide two copies of the painter's certification that the paint was applied following the manufacturer's recommendations and the paint coat thickness on the casing.
  - e) Repair paint damage caused by transport, handling and welding following the paint manufacturer's recommendations before applying the finish coat.

For the finish coat, use the same paint or paint compatible with the first two coats. Provide a finish coat with a minimum 3 mil (75  $\mu\text{m}$ ) dry film thickness. Provide the finish coat paint that meets Federal specification 595B, pigment code 36440 (concrete gray).

#### 558.03.8 Temporary Casing

Do not use slurry construction methods as an alternative to or in conjunction with temporary casing unless specified in the Contract. Use temporary casing to facilitate shaft construction and prevent sloughing and caving of the shaft sidewalls. Place temporary casing to a minimum elevation as shown in the plans. Place the temporary casing deeper if necessary to prevent material from entering the shaft excavation. Use casing with an outside diameter no less than the specified diameter of the shaft. Limit the excavation in advance of the casing tip to no more than 10 feet (3 m) unless synthetic slurry is being used. During casing extraction, maintain a sufficient level of fluid in the casing to counteract external hydrostatic pressures but no less than 5 feet (1.5 m) of positive head. Maintain an adequate level of concrete within the casing to ensure that fluid trapped behind the casing is displaced upward and discharged at the ground surface without contaminating or displacing the shaft concrete. Temporary casings that have become bound or fouled during shaft construction and cannot be removed are considered to be a defect in the drilled shaft. Correct defective shafts using approved methods at no cost to the Department. Corrective action may consist of, but is not limited to, the following:

1. Removing the drilled shaft concrete and extending the drilled shaft deeper to compensate for the loss of frictional capacity to the cased zone.
2. Providing straddle drilled shafts to compensate for capacity loss.
3. Providing a replacement drilled shaft.

#### 558.03.9 Obstructions

An obstruction is defined as a specific object (including, but not limited to, boulders, logs, and man-made objects) encountered during the shaft excavation which prevents the advance of the shaft excavation. If an obstruction is encountered promptly notify the Project Manager. Submit four copies of a proposed obstruction removal method to the Project Manager for approval within two business days of encountering the obstruction.

#### 558.03.10 Cleaning

Remove all loose or disturbed material from the bottom of the shaft excavation immediately prior to placing reinforcing steel and concrete. After cleaning, no more than 1-inch (25 mm) of loose or disturbed material permitted in the bottom of the shaft. Maintain a sufficient level of fluid to counteract external hydrostatic pressures but no less than 5 feet (1.5 m) of positive head.

#### 558.03.11 Installation of Cross-hole Sonic Logging (CSL) Tubes

Install the CSL access tubes evenly spaced around the reinforcing cage and inside of all hoops and spiral reinforcing steel, as shown in the plans. Use 1½-inch (38 mm) nominal diameter schedule 40 PVC CSL access tubes. Provide an end plug at the lower end of the pipe and make all joints watertight. Ensure tubes extend to the shaft bottom. In the event that CSL access tubes are not installed to the shaft bottom, the Department may require coring of the shaft to verify shaft integrity at Contractor's expense. Fill the CSL access tubes with a 1:1 mixture of potable water and biodegradable antifreeze prior to or immediately after placing concrete in the drilled shaft. Temporarily cap the top of the tubes to prevent debris or concrete from entering the tubes. Clean any spilled antifreeze from the reinforcing steel and CSL tubes.

#### 558.03.12 Reinforcing Steel

Tie bars at all intersections. After inspection and approval of the drilled shaft excavation by the Project Manager, place the reinforcing steel cage into the shaft as one unit. Support the steel cage from the top so that racking and distortion are prevented. Remove internal stiffeners as necessary as the steel cage is placed in the excavation to prevent interference with the placement of concrete. Use non-corrosive, roller-type spacers or other non-corrosive devices as approved by the Project Manager along the steel cage length and around the steel cage perimeter to align and maintain clearance from reinforcing cage to edge of casing during concrete placement. Begin placing the drilled shaft concrete immediately after the Project Manager has inspected and approved the location and alignment of the cage within the drilled shaft. Remove the steel cage and re-inspect the excavation if the concrete placement is not started within 3 hours of placing the steel cage in position.

#### 558.03.13 Concrete Placement Record

Complete the Department's Drilled Shaft Concrete Placement Log. Accurately record all data required on the form as the concrete is placed. After the drilled shaft concrete has been placed and before the end of the day, give the completed form to the Project Manager. The Department will provide copies to the Contractor upon request.

#### 558.03.14 Drilled Shaft Concrete

Place concrete in the drilled shaft as specified for either dry excavations or wet excavations.

- A. Dry Excavations. Place concrete by gravity tremie tube or pumping. Concrete may free fall into the shaft if the concrete can be directed so that it does not strike the reinforcing steel, the excavation wall or any other obstruction during the fall.
- B. Wet Excavations
  - a) Place all drilled shaft concrete by tremie tube, pumping, or other approved method to avoid separation and segregation of the concrete mix components.
  - b) Separate the first concrete placed from the fluid in the excavation using a plug in the tube, or other approved device.
  - c) Begin concrete placement in a manner that minimizes mixing of the concrete with the water and material in the shaft.
  - d) Maintain a minimum 10 feet (3 m) of tremie pipe embedment and continuously place drilled shaft concrete to ensure upward displacement of all contaminated concrete. If at any time during the placement, it is necessary to temporarily stop or the tremie pipe orifice is removed from the concrete, stop and restart concrete placement in a manner that ensures that air, water, or other undesirable material is not allowed to be mixed into the concrete or incorporated into the drilled shaft. Concrete that is discharged above the rising concrete level in the shaft is considered undesirable material.
  - e) Once concrete has reached the top of the drilled shaft, remove and dispose of the top layer of concrete and any concrete contaminated with mud or fluid from the drilled shaft. Remove sufficient concrete to fully expose sound, homogeneous and uncontaminated concrete in the shaft.

#### 558.03.15 Shaft Testing and Acceptance

- A. Cross-Hole Sonic Logging. The Project Manager may use CSL to check the structural soundness of any completed drilled shaft. The CSL testing will be performed when the concrete has cured sufficiently to give consistent test readings. Schedule construction activities to allow twelve calendar days from the time concrete is placed in the shaft until the shaft is tested. Provide a stable 110-Volt AC or a 12-Volt DC electrical supply if requested. When the CSL testing access tubes are no longer needed for testing, as determined by the Project Manager, cut off the tubes flush with the top surface of the drilled shaft and remove the antifreeze solution to a depth of 4 inches (100 mm) from the top of the tubes. Permanently cap the CSL access tubes to provide a watertight seal that does not interfere with the subsequent construction operations. The Project Manager will accept or reject the shaft based on the CSL testing or a subsequent drilled core sample. For any drilled shaft determined by CSL testing to be of uncertain quality, drill core samples with a minimum diameter of 2.5 inches (65 mm), at locations and to depths specified by the Project Manager. Use a core drilling method that provides complete core recovery and minimizes abrasion and erosion of the core. Grout all core holes when directed by the Project Manager.
- B. Corrective Action. If the CSL or subsequent coring identifies any defect in the shaft that compromises the capacity of the shaft; repair the shaft by a method approved by the Project Manager. Submit a repair plan no later than 14 calendar days after notification. Include four copies of calculations and working drawings, stamped by a Professional Engineer licensed in Montana, to the Project Manager. Furnish all materials and work necessary to correct shaft defects at Contractor expense. Prior to constructing other shafts, submit four copies of a written proposal to the Project Manager that describes changes in construction methods or materials designed to avoid defects in subsequent drilled shafts.

#### 558.04 METHOD OF MEASUREMENT

##### 558.04.1 Drilled Shaft

Drilled shaft will be measured by the linear foot (m) of shaft between the actual bottom elevation of the drilled shaft and the top of shaft elevation shown on the plans.

##### 558.04.2 Drilled Shaft Concrete

Drilled shaft concrete will be measured by the cubic yard (m<sup>3</sup>) of concrete placed calculated from the planned cross sectional area times the as built length of the Drilled Shaft.

##### 558.04.3 Reinforcing Steel

Drilled shaft reinforcing steel will be measured by the pound (kg) in accordance with Subsection 555.04.

##### 558.04.4 Drilled Shaft Casing

Permanent drilled shaft casing will be measured by the linear foot (m) of permanent casing installed as shown in the plans or as directed by the Project Manager in writing.

##### 558.04.5 Temporary Casing

When the Contract contains the pay item "Temporary Drilled Shaft Casing", temporary drilled shaft casing will be measured by the linear foot (m) of temporary casing measured from the higher of the ground or water surface elevation down to the bottom elevation of the installed temporary casing.

##### 558.04.6 Cross-hole Sonic Logging (CSL) Tubes and Testing

Include all costs associated with furnishing and installing CSL access tubes and any required extensions and providing a power source in the Drilled Shaft Pay Item. No measurement or payment will be made for construction delays resulting from the initial CSL drilled shaft testing. The Department will extend the contract time by one day for each day over twelve calendar days required to complete the CSL drilled shaft testing. The Department will pay the costs for the initial CSL drilled shaft testing. Pay for all costs associated with coring, engineering design, cost required to correct the defect and any construction delay costs, if a defect is found based on the CSL drilled shaft testing or coring. Pay the costs of CSL drilled shaft retesting of the repaired drilled shafts. If no defect is found in the drilled shaft based on the coring, the Department will pay all costs of coring and any delays necessitated by the coring.

#### 558.05 BASIS OF PAYMENT

Payment for the completed and accepted quantities is made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
Drilled Shaft	Linear Foot (m)
Reinforcing Steel	Pound (kg)
Drilled Shaft Casing	Linear Foot (m)
Drilled Shaft Concrete	Cubic Yard (m <sup>3</sup> )

Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract. Temporary casings remain the property of the Contractor.

If the Contract contains the pay item Temporary Drilled Shaft Casing, all costs associated with temporary casing including, but not limited to, procurement, fabrication, transportation, installation and removal, are included in the Pay Item Temporary Drilled Shaft Casing. If the Contract does not contain the pay item Drilled Shaft Temporary Casing, no measurement or payment will be made. Include all costs associated with temporary casing including, but not limited to, fabrication, providing, transporting, installation and removal in the Drilled Shaft pay item.

Payment for obstruction removal will be made on a Force Account basis.

#### 559.02.2 FURNISH PILE

Page 269

2-19-09

Rescind the second paragraph (that begins with "The specified lengths...") and replace with the following:

The specified lengths are those required below cutoff. Adjust lengths for the difference between the cut off length and the pile position in the driving equipment and as necessary to meet the requirements of Subsection 559.02.5. Increase pile lengths 1.0 foot (300 mm) for steel pile. Remove and dispose of excess pile length after the pile is driven.

#### 559.02.4 SPLICING PILES

Page 269

2-19-09

Rescind the first sentence of the first paragraph (that begins with "Splice piles driven...") and replace with the following:

When directed by the Project Manager, splice piles driven to plan grade that do not obtain the required driving resistance and continue driving until the required capacity is obtained.

#### 559.02.5 HOLES IN PILING

Page 269

2-19-09

Add the following subsection:

##### 559.02.5 Holes in Piling

Pile segments with one drilled hole having a diameter of 7/8 inch (22 mm) or less in any cross-section may be incorporated into the finished structure. Pile with more than one hole in a cross-section, flame cut hole(s), or a hole greater than 7/8 inch (22 mm), must be cut off to remove the hole(s). This requirement does not apply to holes drilled for attaching dynamic testing equipment, holes shown in the plans or holes within 12 inches (305mm) of the cutoff elevation.

#### 559.03.2 EVALUATION OF PILE DRIVING EQUIPMENT

Page 271

5-12-11

Rescind Subsection 559.03.2 and replace with the following:

##### 559.03.2 Evaluation of Pile Driving Equipment

The Department will evaluate pile-driving equipment provided by the Contractor. The equipment must have the capability to drive the project pile to the design pile tip elevation and required ultimate pile capacity without damage to the pile. Provide pile-driving equipment that produces the following results from the wave equation analysis:

- 35 to 120 blows per one foot (0.3 meter) at ultimate capacity; and
- Maximum compressive driving stress less than 90 percent of the minimum pile material yield strength.

The Department will base hammer evaluations on a wave equation analysis. Submit the pile driving equipment information on Form CSB559\_03\_2.

The Project Manager will notify the Contractor of results of the pile driving equipment evaluation within 14 calendar days after receipt of the Pile and Driving Equipment Data form. If the Department's wave equation analysis indicates that pile damage may occur or that the proposed pile driving equipment cannot drive the pile to the specified ultimate capacity and design tip elevation, re-submit a plan that modifies the equipment or the method to ensure the

ability to drive pile to the specified ultimate capacity and design tip elevation without pile damage. The Project Manager will notify the Contractor of results of the revised pile driving submission within seven calendar days after receipt of the re-submittal.

Do not vary from the evaluated driving system without prior written approval. The Department will consider proposed changes to the pile driving equipment or method only after submittal of revised information for a new wave equation analysis. The Project Manager will notify the Contractor of evaluation results of the pile driving system changes within seven calendar days after receipt of the submittal. Delays and additional costs associated with developing, submitting and obtaining evaluation results for pile driving proposals and resulting changes in the pile driving equipment and work methods are at Contractor's expense.

### 559.03.3 PILE CAPACITY

Page 271

5-12-11

Delete the first two sentences of 559.03.3(A) (that begins with "Drive the pile to ...." ) and replace with the following:

- A. Driven Pile Capacity. Drive the pile to the design tip elevation shown on the plans, or deeper, if necessary and to the ultimate pile capacity during driving shown on the plans. The Project Manager will use one of the following methods specified to determine the ultimate driven pile capacity and the service pile driving criteria:

Within the first paragraph, rescind and replace the first sentence (that begins with "Use a pile...") with the following:

Use a pile specialty consultant with at least three years' experience in dynamic load testing and analysis to perform the dynamic load test, Case Pile Wave Analysis Program (CAPWAP) and the wave equation analysis.

Rescind and replace the third and fourth paragraphs in 559.03.3(B)(2) Dynamic Load Tests (that begins with "With dynamic testing ...") with the following:

With dynamic testing equipment attached, drive the pile in one continuous operation to the design tip elevation, or deeper if directed by the Project Manager. The Project Manager may lower the required tip elevation based on the ultimate pile capacity measurements at the time of driving or re-driving. Reduce the driving energy to the pile to maintain pile stresses below the values specified in Subsection 559.03.3(A)(2), using additional cushions or reduction of the hammer's output energy. If eccentric driving is indicated, immediately re-align the driving system. Provide a printed summary of the dynamic load test results and recommendations for service pile driving criteria (blow count and stroke) and pile tip elevation. The Project Manager will determine the service pile driving criteria and minimum pile tip elevations based on the dynamic load test results and specialty consultant's recommendations.

Perform a re-drive of the test pile when required by the Project Manager. After initial driving, wait the minimum time specified, then re-drive each dynamic load test pile with the instruments attached. Apply at least 20 resistance blows to warm the hammer before re-driving. Do not warm the hammer using the dynamic load test pile. Re-drive the dynamic load test pile for a maximum penetration of 6 inches (150mm) or a maximum of 50 blows, whichever occurs first.

### 559.03.5 SERVICE PILE

Page 274

2-19-09

Rescind 559.03.5 and replace with the following:

#### 559.03.5 Service Pile

Do not initiate driving of the service piles until all test piles and analysis are complete unless authorized by the Project Manager. Drive the pile to the design tip elevation shown on the plans, or deeper if necessary to achieve the ultimate pile capacity during driving. If specified, establish pile tip elevation and ultimate pile capacity by compression load testing or dynamic load testing.

Furnish the service pile lengths specified in the contract. Adjust pile lengths for the difference between cutoff length and the pile position in the driving equipment.

The Project Manager will observe the pile driving and calculate the predicted pile capacity as it is being driven.

When a re-drive of the service pile is required, re-drive the pile not less than 24 hours or more than 72 hours after initial driving and do not drive the pile below cut off elevation. If the Project Manager determines pile stresses during driving are damaging the pile, the Department may require other installation methods or equipment to obtain pile penetration.

Correct or replace improperly driven, damaged or defective pile at Contractor's expense.

Temporary welded plates for aligning field splices or hoisting may be used with the Project Manager's approval. Remove temporary plates and grind welds smooth.

### 559.03.7 STEEL PIPE PILE

Page 274

2-19-09

Rescind Supplemental Specification 559.03.7 (Effective 1-31-08) and replace with the following:

Securely cover driven pipe piling to prevent open-hole hazards.

Remove water in steel pipe piles before placing concrete or place the concrete using a tremie when water is present in the pile.

Provide lighting to illuminate the full pile length when requested to aid inspection of the pile before placing concrete. Fill steel pipe piles to an elevation no less than 2 feet (600 mm) below the cut off elevation with Class "DD" Portland cement concrete a minimum of 12 hours prior to pouring the cap. Do not place concrete in pipe piles until all piles for the bent have been driven.

559.03.8 PAINTING STEEL PILE OR STEEL PIPE PILE Page 275 12-27-07

Delete the reference to Subsection 710.02(B)(4) under part (A) Paint, and replace with 710.02(B)(3).

559.04.1 LOAD TESTS (PILING) Page 275 2-19-09

Rescind Subsection 559.04.1 and replace with the following:

Static and dynamic load tests, and test pile re-drives, completed and accepted are measured by the unit. Include all materials, tools, the first 24 hours of standby time for items dedicated solely to this work, and equipment required to perform each test or test pile re-drive in the unit bid price for the item. Furnishing, driving, splices, re-driving of service piles and pile end protection are measured for payment as outlined in other Subsections. Do not include these costs in the static and dynamic load tests.

559.04.2 FURNISH PILE Page 275 2-19-09

Rescind Subsection 559.04.2 and replace with the following:

Furnish pile is measured by the foot (meter) based on the plan quantity.

559.05 BASIS OF PAYMENT (PILING) Page 276 2-19-09

Rescind Supplemental Specification 559.05 (Effective 8-1-07) and replace with the following:

- The Department will not pay for:
- Furnishing or driving falsework pile;
- Pile driven out of place and not accepted;
- Defective pile, or pile damaged in handling or driving;
- Forming holes;
- Lengths of pile cut off according to Subsection 559.02; or
- Welding temporary plates, removing the plates and grinding the welds smooth.

Include payment for the costs associated with painting steel pile and steel pipe piles and filler concrete in the contract unit price per foot (meter) of drive pile.

Pile furnished, based on the plan quantities, but not incorporated in the finished structure, is paid for at the contract unit price per foot (meter) of furnish pile and becomes the property of the Contractor. Pile furnished in addition to plan quantity that is incorporated in the finished structure, is paid for by lump sum agreed price or under Subsection 109.04.2.

Payment for the completed and accepted quantities is made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
Static Load Test	Each
Dynamic Load Test	Each
Re-drive Test Pile	Each
Furnish Pile	Foot (meter)
Drive Pile	Foot (meter)
Pile Pre-bore	Foot (meter)
Pile Drill and Socket	Foot (meter)
Pile Splice	Force Account
Pile Driving Point	Each

<u>Pay Item</u>	<u>Pay Unit</u>
Pile Conical Driving Point	Each
Pile Cutting Shoe	Each
Re-drive Test Pile	Each
Re-drive of Service Pile	Force Account

Partial payments for drive pile will be made based on the total quantity as follows:

1. 95 percent when the piles are driven to final penetration.
2. 100 percent when the piles are cut off and painted as specified.

561 BRIDGE DECK MILLING (NEW) Page 276 4-10-14

Add new Section 561 Bridge Deck Milling:

SECTION 561  
BRIDGE DECK MILLING

561.01 DESCRIPTION

This work involves milling of deck concrete using hydrodemolition or mechanical scarification.

561.02 VACANT

561.03 CONSTRUCTION REQUIREMENTS

561.03.1 Submittals

At least 2 weeks before beginning construction, submit to the Project Manager for approval a written plan detailing the methods, materials, equipment and personnel to be used. If hydrodemolition is used, include in the submittal how wastewater will be managed for each hydrodemolition site and controlling the wastewater from the time it leaves the hydro milling machinery until its final disposal. Do not begin concrete removal until receiving approval.

Ensure adequate capacity to handle the amount of wastewater generated.

561.03.2 Equipment

- A. Hydrodemolition. Use a self-propelled hydrodemolition machine with high-pressure water jets capable of removing concrete to the removal depth shown in the plans. Use equipment of sufficient capacity and size to remove rust and concrete from the reinforcing steel. The equipment must have means to control the removal depth to within a tolerance of 3/8-inch (10 mm) above or below the plan depth. The equipment must have controls adequate to vary the water pressure, traverse and progression of the nozzle, oscillation or rotation of the nozzle head and the distance between the nozzle and the concrete surface. Provide accurate working pressure gauges at pumps and at the hydrodemolition unit.
- B. Scarification. Use self-propelled mechanical scarifying equipment capable of removing 1/4-inch (6 mm) depth minimum across the cutting path in one pass.

561.03.3 Procedures

- A. Hydrodemolition. Mechanical scarification equipment may be used in conjunction with hydrodemolition to remove the portion of the deck above the top mat of reinforcement. If the milling equipment snags reinforcing steel, adjust the depth of removal to prevent further snagging. Remove the remaining concrete to the specified depth using hydrodemolition.

Before beginning hydrodemolition, configure the hydrodemolition unit by adjusting water pressure, nozzle size and angle, nozzle travel speed and unit travel speed to remove sound concrete to the plan depth. Record all the settings and provide them to the Project Manager. During hydrodemolition, verify the removal depth every 30 feet (10 m) along the length of the deck and along the width of the hydrodemolition path. Record the settings at each of these points and provide them to the Project Manager.

Remove any remaining unsound concrete. Do not operate the hammers at an angle greater than 45 degrees from the deck.

Use only potable water for hydrodemolition. Do not use stream or lake water. Plug all deck drains. Install dams of clean, washed aggregate, hay bales, sand bags, or other materials as needed to strain and to direct the flow of runoff. Provide and use settlement basins if necessary to produce visibly clear water before disposal. Do not allow wastewater or waste-cement slurry to run across active travel lanes. Obtain necessary permits before beginning the work and comply with applicable water quality regulations when disposing of the wastewater. Protect all adjacent areas and the traveling public from flying debris during removal operations.

- B. Mechanical Scarification. Scarify the deck to the depth indicated on the plans. If the equipment snags reinforcing steel, stop work immediately and notify the Project Manager.

Remove concrete in areas designated for milling that the mechanical scarification equipment cannot reach with chipping hammers no larger than a nominal 15 lb. (7 Kg) class or other equipment as approved by the project manager.

Thoroughly clean the deck of all aggregate, paste, residue, oil, and any other substance that may interfere with the repair or overlay concrete.

Keep heavy loads off of reinforcing steel left unsupported by concrete due to concrete removal.

561.04 METHOD OF MEASUREMENT

Bridge Deck Milling is measured by the square yard of deck surface removed. No measurement will be made for mechanical scarification used in conjunction with hydromilling. Include costs associated with mechanical scarification used in conjunction with hydromilling in the unit price bid for Bridge Deck Milling.

561.05 BASIS OF PAYMENT

Payment for the completed and accepted work is made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
Bridge Deck Milling	Square Yard (square meter)

Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract.

562 BRIDGE DECK REPAIR (NEW)

Add new Section 562 Bridge Deck Repair:

SECTION 562  
BRIDGE DECK REPAIR

562.01 DESCRIPTION

This work involves Class A and B deck repair as specified in the plans or identified by the Project Manager.

- A. Class A Repair. Removal and replacement of existing deck concrete, no deeper than the top of the bottom mat of reinforcing steel.
- B. Class B Repair. Removal and replacement of existing concrete full depth through the slab.

#### 562.02 MATERIALS

Use Class SD concrete for Class A and B repair unless otherwise approved. Obtain the Project Manager's approval before using rapid-setting concrete or polymeric concrete.

#### 562.03 CONSTRUCTION REQUIREMENTS

##### 562.03.1 Submittals

Submit for review, a minimum of 14 days before placement, the following:

1. Any proposed rapid set or polymeric concrete product data sheets.
2. Description of deck preparation measures that will be used to promote a competent bond between existing and new concrete.

##### 562.03.2 Equipment

Provide equipment meeting the following requirements:

1. Power-driven hand tools for removal of concrete with the following limitations:
  - a) Jackhammers of a nominal 30 pound class or smaller.
  - b) Operate jackhammers or other mechanical chipping tools at an angle of 45 degrees or less from the deck surface.
  - c) To remove concrete from beneath a reinforcing bar in a Class A repair, use chipping hammers in a nominal 15 pound class or smaller.
2. Hand tools such as hammers and chisels for removing final particles of unsound concrete and to achieve final required depth.

##### 562.03.3 Location and Inspection of Repair Areas.

1. Complete milling operations, if included in the contract, prior to locating Class A or B repair areas
2. Use compressed air to dry the deck and to blow it clean of debris. The Project Manager will then locate nominal areas of Class A and Class B deck repair.
3. Notify the Project Manager if areas differ significantly from the nominal areas.
4. If the Project Manager determines that an area of Class A repair has exposed more than minimal amounts of the bottom mat of reinforcing steel, the Project Manager may require Class B repair in that area. Do not perform Class B repair without prior approval.

##### 562.03.4 Concrete Removal

1. For unmilled surfaces, saw cut ½-inch (13 mm) deep around all Class A and B repair area edges.
2. Remove all delaminated, cracked, disintegrated, loose, or otherwise unsound concrete using mechanical equipment. Finish the removal with lightweight hand tools. If the bond between existing concrete and reinforcing steel breaks, remove concrete adjacent to the bar at least 1 inch (25 mm) beyond the bar. Prevent cutting, stretching, or other damage to exposed reinforcing steel.
3. If the Project Manager finds an excessive amount of unsound concrete while performing a final check on a removal area, rework that entire area.
4. The Project Manager may approve the use of high-pressure water-blast equipment for concrete removal. The Project Manager will suspend the use of such equipment at any time if, the process produces unsatisfactory results.

##### 562.03.5 Reinforcing Steel

If an existing reinforcing bar has less than 1-inch (25 mm) clearance from the new finished concrete surface, remove concrete from under the bar, then press it down and fasten it in place to provide 1-inch clearance. Take similar measures to provide a minimum side and bottom clearance of ¾-inch (19 mm) to each bar.

Replace any reinforcement bar that is corroded, cut, or damaged to the point that it has lost 25% or more of its effective cross-sectional area. Replace such bars with new ones of the same size. The Project Manager will determine splice locations where bars need cutting and splicing. Repair epoxy coating that is damaged on reinforcing bars during concrete removal operations.

Prior to placing new concrete, remove all rust, dirt, laitance, oil, or other foreign materials from reinforcement surfaces.

##### 562.03.6 Placing and Finishing Concrete - Class A and B Repair

###### A. Repair

1. Prepare the surface as necessary in order to ensure a competent bond between the existing and repair concrete.
2. Use forms for new concrete in Class B repair areas. Do not attach forms to existing reinforcing bars unless approved by the Project Manager.
3. Repair concrete may be placed concurrently with an overlay if approved by the Project Manager. Provide a description of the proposed sequence and equipment to be used to place and consolidate the repair concrete ahead of the screed.
4. If repair concrete is not placed concurrently with an overlay, finish and cure the repair concrete as follows:
  - a. If the repair concrete will not be the final grade, provide roughened surfaces as specified in 562.03.7.
  - b. If the repair concrete will be the final grade, provide broom finish.
  - c. Cover the repair concrete with a single layer of clean, wet burlap immediately after completion of surface finishing.
  - d. Place a minimum 4 mil polyethylene film over the burlap.
  - e. For rapid-setting and polymeric concretes, cure according to manufacturer's recommendations. For other concrete, maintain the wet cure for a minimum of 72 hours.

###### B. Acceptance

1. Surface Smoothness will be checked per Subsection 552.03.12(E)(6). Correct areas identified by the Project Manager. Correct variations that prevent drainage from any part of the bridge deck.
2. A drag-chain survey will be conducted to determine the soundness of bond between the repair and the deck, placing particular emphasis on areas of visible cracking. Remove and replace areas that have debonded. The Project Manager may core the repair to determine depth of cracking. When directed by the project manager, seal cracks in repair concrete with a Bridge Deck Crack Sealant listed on the Department's QPL. Apply the product in accordance with the manufacturer's recommendations. In cases of excessive cracking, the Project Manager may require removal and replacement of part of or all of a repair.
3. All corrective actions, including crack sealing are at Contractor expense.

#### 562.04 METHOD OF MEASUREMENT

Class A Bridge Deck Repair and Class B Bridge Deck repair are measured by the square yard of deck surface and includes the repair concrete. Areas of concrete removed by milling operations, even if deeper than plan, are not measured for payment under Class A Bridge Deck repair or Class B Bridge Deck repair.

When an area of Class A Bridge Deck repair is upgraded to Class B Bridge Deck repair, the area will be measured as Class B Bridge Deck repair.

Replacement of reinforcing bars will be measured and paid for in accordance with Subsection 109.04.1. Replace any reinforcing bars damaged by Contractor operations at Contractor expense.

#### 562.05 BASIS OF PAYMENT

Payment for the completed and accepted quantities is made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
Class A Bridge Deck Repair	Square Yard (square meter)
Class B Bridge Deck Repair	Square Yard (square meter)

Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract.

### 563 MODIFIED CONCRETE OVERLAY (NEW)

Page 276

4-10-14

Add new Section 563 Modified Concrete Overlay:

#### SECTION 563 MODIFIED CONCRETE OVERLAY

##### 563.01 DESCRIPTION

This work consists of placing a bridge deck overlay of either a Latex Modified Concrete or Silica Fume Modified concrete. Select a single type of Modified Concrete Overlay and use it for all locations shown on the plans.

##### 563.02 MATERIALS

###### 563.02.1 Cement.

Furnish cement meeting the requirements of Subsection 551.02.1. Use only one brand of cement in a given overlay. Do not use Type III cement.

###### 563.02.2 Aggregate

Use aggregate meeting Subsection 701.01. Furnish ¾-inch coarse concrete aggregate. Use only aggregate in a Saturated Surface Dry (SSD) condition at the time of mixing concrete. Test the moisture content using MT 221, document the results for both total moisture content and for surface moisture content, and provide them to the Project Manager.

###### 563.02.3 Latex Admixture

Use a latex admixture containing a polymer of 66% ± 5% styrene and 34% ± 5% butadiene, with the polymer comprising between 46 and 49 percent of the total emulsion. The emulsion must have a sodium alkyl sulfate stabilizer acting as an anionic surfactant, polymer average particle size between 1900 and 2500 angstroms, a weight of 8.43 to 8.52 lb/gal at 75° F (mass of 1.01 to 1.02 kg/l at 25°C), and a pH between 9.5 and 11.0.

Protect the latex admixture from temperatures below 32° F (0° C) and above 85° F (29° C) at all times. Provide a thermometer capable of storing minimum and maximum temperatures and place it with any admixture stored on site. Replace admixture subjected to temperatures outside the range above at no expense to the Department.

##### 563.03 CONSTRUCTION REQUIREMENTS

###### 563.03.1 Submittals

Submit the following items to the Project Manager for approval at least 10 business days before concrete placement:

1. The method and materials used to contain, collect, and dispose of all debris generated by the cleaning and surface preparation process.
2. Details of the screed rail support system, including details of anchoring the rails and providing rail continuity, and of other equipment used to apply the overlay.
3. The methods that will be used to prepare the surface to ensure bonding of the overlay to the existing deck concrete.

### 563.03.2 Pre-placement Conference

Hold a pre-placement conference with a technical representative from the modified concrete supplier and the Project Manager at least 15 calendar days before the planned concrete placement. Present the mix design and methods of accomplishing all phases of the concrete overlay work.

### 563.03.3 Surface Preparation

Prepare the surface to ensure bonding between the surface and the overlay. Blow standing water out of depressions, holes, or areas of concrete removal with oil filtered compressed air. Protect the prepared surface from contamination using plastic sheeting or other means.

Deck preparation work may be performed in areas adjacent to newly placed overlay concrete. If this work begins less than 72 hours after overlay placement, perform the work with the following restrictions:

1. Wait a minimum of one day after placing the concrete to begin the adjacent surface preparation.
2. Minimize the disturbance of burlap and plastic sheeting and maintain uncured concrete in a wet condition at all times. Restore disturbed burlap and plastic sheeting as soon as possible.
3. Use no power tools heavier than 15 pound chipping hammers.
4. Operate air compressors on the deck only directly over piers or bents.
5. Prior to placement and completed cure of new concrete, allow no loads other than approved construction equipment on any part of the deck that has undergone surface preparation.

### 563.03.4 Mobile Mixing Equipment

Use mobile mixing equipment for batching Overlay-LM concrete. Do not use mobile mixing equipment to batch Overlay-SF concrete unless approved by the Project Manager.

Demonstrate that mobile mixing equipment meets the following requirements:

1. **Mixing Equipment.** Use self-contained, mobile, continuous-mixing equipment meeting the following requirements:
  - a. A capacity to mix a batch of at least 8 cubic yards (6 m<sup>3</sup>). The machine capacity must allow finishing operations to proceed at a steady pace, with final finishing completed before formation of the plastic surface film.
  - b. A positive means of controlling cement content entering the mix, complete with a recording meter visible at all times and a continuous printout of the accurately measured quantity.
  - c. Positive control of the water, and the latex emulsion (if applicable), flow into the mixing chamber. Positive means to adjust the water flow for variations in aggregate moisture and a flow meter indicating the water quantity.

The Project Manager will approve each mobile mixer used on the project based on a demonstration of its ability to produce concrete meeting project specifications. Calibrate each mobile mixer in the presence of the Project Manager, using the following tests. Record all test results and required calculations and provide the Project Manager with a copy of those data.

Inform the Project Manager what moisture content (percentage) the fine and coarse aggregates will have on entering the mix. Dry or wet the stockpiles to within 0.5% of this percentage at the beginning of each workday. Take moisture readings on the stockpiles before calibrating the mixer trucks and before each day's placement of latex modified concrete. Record the readings and give the information to the Project Manager. Perform yield, slump, and air content tests on concrete from each mixer in the Project Manager's presence.

2. **Cement Meter.** Obtain the operating speed (in revolutions per minute) and the approximate number of counts required on the cement meter to deliver one 94 pound (43 Kg) bag of cement from the truck manufacturer's mix setting chart. Place at least 40 bags of cement in the cement bin. Place the mixer on a level surface and provide an electrical ground.
 

Adjust the engine throttle to obtain the specified revolutions per minute (rpm). Discharge cement until the belt has made one complete revolution. Stop the belt and reset the cement meter to zero. Discharge approximately one bag of cement into a container while timing the discharge with a stopwatch. Record the number of counts on the cement meter and determine the mass of cement discharged on the Field Calibration form included in this specification. Repeat the process of discharging one bag at a time for a total of six runs. Reset the cement meter to zero each time.

At the end of the six runs, total the number of cement counts, the mass of cement discharged, and the times of each of the runs, in seconds.

Perform the following calculations:

  - a. Mass of cement per cement meter count. Divide the total mass of cement discharged in the six runs by the total number of counts on the meter for the six runs.
  - b. Counts per bag of cement. Divide 94 pounds (43 kg) by the mass of cement per cement meter count.
  - c. Cement discharge rate. Divide the total mass of cement for the six runs by the total of the times for each of the six discharges.
  - d. Discharge time for one bag. Divide 94 pounds (43 kg) by the cement discharge rate.
3. **Latex Throttling Valve.** Clear the latex strainer of any obstructions. Adjust the latex throttling valve to deliver 3.5 gallons (13.2 L) of latex, or 30 pounds (13.3 kg) for each bag, or 94 pounds (43 kg) of cement, using the calculation results from Subsection (2) above where necessary.
 

With the unit operating at the specified rpm, discharge latex into a container for the discharge time for one bag calculated above and determine the weight of the latex discharged. Adjust the valve until the machine discharges 30 lbs. (13.6 kg) in the discharge time for one bag. Verify the accuracy of this setting by repeating the latex discharge three more times.
4. **Water Flow Meter.** Set the water flow meter to flow at the rate of 0.5 gallons (1.9 L) per minute. Collect and weigh the water discharged during one minute with the equipment operating at the specified rpm to verify the discharge rate. Repeat the process with the flow meter adjusted to 1.5 gallons (5.7 L) per minute.
5. **Aggregate Bin Gates.** Set the gate openings to provide aggregate at a rate matching the specified concrete mix proportions.

563.03.5 Concrete Placement

Place concrete in accordance with Section 551.

Install necessary bulkheads to the required grade and profile before placing any concrete. Alternatively, over-pour the end of the overlay by a minimum of 6 inches (152 mm). Saw cut and remove the over-pour from the rest of the overlay.

Dispose of materials that dry out, set, or show evidence of loss of cement paste. Stop overlay placement on discovering those conditions and do the surface preparation again.

Strike off the modified concrete at a level ¼-inch (6.0 mm) above final grade. Complete hand finishing and texturing within 15 feet (4.5 m) of the finishing machine. Float and vibrate the concrete as needed to provide a tight finished surface.

Vibrate concrete more than 3 inches (75 mm) thick internally, in addition to the vibration of the surface screed. After finishing the concrete, check for surface irregularities with a 10 foot (3 m) straight edge. Correct surface areas that vary more than 1/8-inch (3 mm) in that distance.

563.03.6 Curing

Cure the overlay per Subsection 551.03.7.

563.03.7 Acceptance

1. Cast at least one latex modified concrete cylinder for each day's overlay placement. Cure the cylinders with their matching deck segments. Break the cylinders at the end of the dry curing process to demonstrate the strength the overlay concrete has attained.
  2. Correct areas identified by the Project Manager. Correct variations that prevent drainage from any part of the bridge deck. Do not start the process of saw cutting the transverse deck grooves until the Project Manager has approved all of the finished repair work.
  3. A drag-chain survey will be conducted to determine the soundness of bond between the repair and the deck, placing particular emphasis on areas of visible cracking. Remove and replace areas that have debonded. The Project Manager may core the repair to determine depth of cracking. When directed by the Project Manager, seal cracks in repair concrete with a Bridge Deck Crack Sealant listed on the Department's QPL. Apply the product in accordance with the manufacturer's recommendations. In cases of excessive cracking, the Project Manager may require removal and replacement of part of or all of a repair.
- All corrective actions required for acceptance are at Contractor expense.

563.04 METHOD OF MEASUREMENT

Bridge deck overlay is measured by the cubic yard (m3) of Modified – Concrete Overlay placed. Include the cost of trial batches in the unit cost of Modified Concrete Overlay.

Transverse Deck Grooving is measured by the Square Yard (m2) under Subsection 552.04.

563.05 BASIS OF PAYMENT

Payment for the completed and accepted work is made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
Modified – Concrete Overlay	Cubic Yard (m3)

Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract.

564 STRUCTURE TOLERANCES (NEW)

Add new Section 564 Structure Tolerances.

SECTION 564  
STRUCTURE TOLERANCES

564.01 DESCRIPTION

This work is meeting the specified tolerances for the listed structure elements.

564.02 MATERIALS

Vacant

564.03 CONSTRUCTION REQUIREMENTS

Meet the tolerances shown in TABLE 564-1. In case of conflicting tolerances, the tighter tolerance controls. Increase precision as necessary to meet other contract requirements.

TABLE 564-1  
STRUCTURE TOLERANCES

ITEM	TOLERANCE TYPE	TOLERANCE
Substructure: Drilled Shafts	horizontal location	3 in. (75 mm)
	top elevation	+ 1 in. (25 mm), - 3 in. (75 mm)
	diameter	+ 3 in. (75 mm), - 1/2 in. (12 mm)
	deviation from plumb	± 2 percent
Substructure: Walls, Footings, Columns	horizontal location	1 in. (26 mm)
	elevation	
	exposed	± 3/4 in. (19 mm)
	concealed	± 1 in. (25 mm)
	dimensions	+ 1/2 in. (13 mm), - 1/4 in. (6 mm)
	deviation from plumb	± 2 percent
Substructure: Piling	horizontal location	
	bent caps supported by piles	2 in. (50 mm)
	piles capped below final grade	6 in. (150 mm)
	edge cover	4 in. (100 mm), minimum
	vertical (cutoff elevation)	± 1 in. (25 mm)
	deviation from plumb or batter	± 2 percent
Elastomeric Bearings	horizontal location	± 1/4 in. (6 mm)
	thickness	- 0, + 1/8 in. (3mm)
	length, width	- 0, + 1/4 in. (6mm)
Bearing Plates (shoes, masonry, embedded)	horizontal location	± 1/4 in. (6 mm)
	thickness	± 1/16 in. (2 mm)
	length, width	± 1/4 in. (6 mm)
	bevel slope	± 0.002 Radians
	deviation from plane	± 1/16 in. (2 mm)
Beam Seats	deviation from plane	± 1/16 in. (2 mm)
	% Slope, for cast in place deck superstructures	± 0.5 %5
	% Slope, for deck beam superstructures	± 0.2 %
	elevation	+ 0, -1/2 in. (12 mm)
Anchor Bolts		refer to Subsection 552.03.14
Superstructure	dimensions	+ 1 in. (25 mm), - 1/4 in. (6 mm)
	deck form elevation	+ 1/8 in. (3 mm), - 1/4 in. (6 mm)
	deck thickness	+ 1/4 in. (6 mm), - 1/8 in. (3 mm)

ITEM	TOLERANCE TYPE	TOLERANCE
	deck smoothness (parallel to roadway centerline)	± 3/16 in. (5 mm) per 10 ft. (3 m)
Strip Seal Joint Opening	width	± 1/4 in. (6 mm)
Pre-stressed Concrete Beams		refer to Subsection 553.03.15
Steel Beams		refer to Subsection 556.03.10
Non pre-stressed Steel Reinforcement*	cover	- 3/8 in. (10 mm)
	location / spacing	± 1 in. (25 mm)
	drilled shaft top of cage elevation	+ 6 in. (150mm), - 3 in. (75mm)
	longitudinal location of bends in bars and ends of bars	± 2 in. (50 mm)
	embedded length of bars	
	No. 3 through 11 (No. 10 through 36) bar sizes	- 1 in. (25 mm)
	No. 14 through 18 (No. 43 through 57) bar sizes	- 2 in. (50 mm)
	length of bar laps	
	No. 3 through 11 (No. 10 through 36) bar sizes	- 1 in. (25 mm)
	No. 14 through 18 (No. 43 through 57) bar sizes	laps not permitted
Concrete Barrier Rail**	tangents: longitudinal, straight edge deviation	± 1/4 in. (6 mm) per 10 ft. (3 mm)
	curves: longitudinal, deviation from the ideal curve	± 1/4 in. (6 mm) per 10 ft. (3 mm)

\*The Project Manager may approve requests for exceptions as necessary to avoid interference with anchor bolts or other conflicts.

\*\*Curved Concrete Barrier may be constructed of tangent segments, each having a maximum length of 10 feet (3.05 m).

In the event an item does not meet a specified tolerance, the Project Manager may approve an exception if it is determined that there will be no detrimental effect to the structure. If the Project Manager determines that a nonconforming item may be detrimental to the structure, submit a written plan for approval that details corrective action.

#### 564.04 METHOD OF MEASUREMENT

Meeting the listed tolerances is not measured for payment.

#### 564.05 BASIS OF PAYMENT

Meeting listed tolerances is incidental to the work. Include all costs associated with meeting the listed tolerances in the bid item that includes the structure item listed.

Add new Section 565 Bearing Devices:

**SECTION 565  
BEARING DEVICES**

**565.01 DESCRIPTION**

This work is the furnishing and placing of bearing devices.

**565.02 MATERIALS**

Furnish material meeting the following subsection requirements:

A. Elastomeric Devices		
1. Elastomeric Bearing Devices		711.14
2. Steel Laminates		711.14
3. Polytetrafluoroethylene (PTFE)		711.20
4. Stainless Steel Sheets		711.20
B. Fiber Reinforced Pads		
C. Steel Bearing Plates		

**565.03 CONSTRUCTION REQUIREMENTS**

**565.03.1 General**

Submit shop drawings as directed by the contract. Do not fabricate bearings prior to receiving approved drawings.

- A. Packaging. Package and protect the bearings from damage and prevent contamination of the contact surfaces of the sliding elements during handling, transporting, and storage. Replace any bearing damaged by handling, transporting or storage at no cost to the State.
- B. Installation for elastomeric devices. Place bearings on a level surface. Correct any misalignment of the support to form a level surface. The instantaneous temperatures of the sole plates must not exceed 300°F (149°C) when field welding the sole plate to the steel girder or base plates embedded in concrete beams. Replace any bearing damaged during installation at no cost to the State.

**565.03.2 Bearing and Anchorage**

Place masonry bearing plates on bearing areas that meet the contract requirements. Install bearing plates level to provide full bearing on the masonry.

Place masonry bearing plates on fiber reinforced pads meeting Subsection 711.16 requirements that project a minimum ½-inch (13 mm) on all sides of the bearing plate.

Finish the bearing area to a level plane. The surface must not vary by more than 1/16-inch (2 mm) from a straightedge placed in any direction across the area. Extend the bearing area at least 1-inch (25 mm) beyond the bearing contact area. The finished elevation of the bearing surface must not vary by more than 1/8-inch (3 mm) from the specified beam-seat elevation unless otherwise approved by the Project Manager.

- A. Steel Structures. Make allowances for bottom chord elongation due to dead load when setting shoes or bearing plates for steel truss spans.

Install bridge rocker shoes to be vertical under full dead load at 32 °F (0 °C). Raise spans and make adjustments if the rockers are not correctly positioned with the final dead load on spans.

- B. Steel Shims. Use steel shims when necessary to bring the masonry plates up to grade. Use shims of the same size as the masonry plate and a minimum ¼-inch (6 mm) thick.

**565.03.3 PTFE Bearings**

Furnish PTFE bearings composed of pure, unreinforced, Polytetrafluoroethylene fluorocarbon resin sheets bonded to the elastomeric pads. Weld Stainless steel sheets to the sole plates as shown in the contract. Use only new materials for the manufacture of the bearings with no reclaimed material incorporated into a finished bearing. The dimensions of the finished bearings must meet the tolerances as specified in Section 564.

Unless otherwise approved by the Project Manager, furnish bearing assemblies, including the sole plates, as a complete unit from one manufacturing source.

Stainless steel in contact with the PTFE surface must be polished to a mirror bright finish as specified in ASTM A 480, finish No. 8.

Edge weld the stainless steel sheets to the sole plates using E308L or E309L electrodes as specified in ASW A5.4 and Section 624, sized for the stainless steel sheet. Any portion of the weld that extends above the surface of the finish of the stainless steel sheet must be ground to the surface of the sheet. Repair any imperfections in the finish of the stainless steel sheet caused by welding or grinding prior to shipment.

Vulcanize bond steel backing plates and masonry plates, if any, to the elastomeric pad.

**565.04 METHOD OF MEASUREMENT**

Elastomeric devices are measured by each device required for one beam seat.

Fiber Reinforced Pads are not measured for payment.

Steel bearing plates are included in the cost of concrete beams, but are measured under Subsection 556.04 if steel girders are supplied.

565.05 BASIS OF PAYMENT

Payment for the completed and accepted quantities is made under the following:

Pay Item	Pay Unit
Elastomeric Bearing Devices	Each
Elastomeric Bearing Dev –PTFE	Each

Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract.

601 METAL WATER SERVICE LINES Page 277 9-26-13

Rescind Section 601 and replace with the following:

SECTION 601  
WATER SERVICE LINES

601.01 DESCRIPTION

This work is constructing polyethylene, steel, and copper water service lines, ½-inch through 2-inch (13 mm through 50 mm) nominal diameter.

601.02 MATERIALS

Furnish materials meeting the following Subsection requirements:

Copper Pipe	709.10
Seamless Steel Pipe	709.09
Polyethylene Pipe	708.08

601.03 CONSTRUCTION REQUIREMENTS

Install water service lines, make all connections, and pressure test the system meeting the requirements of the Montana Public Works Standard Specifications, and the contract.

Meet the requirements of Section 207 for trench excavation, foundation preparation, and backfilling.

601.04 METHOD OF MEASUREMENT

Water service lines are measured by the foot (meter).

Excavation is measured by the cubic yard (cubic meter) under Subsection 207.04.

601.05 BASIS OF PAYMENT

Payment for the completed and accepted quantities is made under the following:

Pay Item	Pay Unit
Excavation	Cubic Yard (cubic meter)
Water Service Line	Foot (meter)

Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract.

602.04.1 REMOVE PIPE CULVERTS Page 279 9-26-13

Rescind Subsection 602.04.2 and replace with the following:

Pipe culvert removal is measured by the foot (meter) of pipe removed.  
Excavation required to remove pipe culverts is not measured for payment.

603.02 MATERIALS (PIPES, STORM DRAINS, SANITARY SEWER, STOCKPASSES) Page 281 1-16-14

Add the following material to the list of materials:

High Density Polyethylene Pipe.....708.08

Add the following paragraph after the last paragraph:

Aluminized FETS may only be used in conjunction with aluminum pipe or poly coated pipe.

603.03.1 GENERAL (PIPES, STORM DRAINS, SANITARY SEWER, STOCKPASSES) Page 281 6-12-14

Rescind the fifth paragraph (that begins, “ The type and quantity of material...”) and replace with the following:

The type and quantity of material for bidding is listed in the contract in columns under the heading "Basic Bid Items". The information in these columns is what would be required to complete the planned installation using the "Basic Bid Pipe," which is steel, when it is an option. If steel is not an option, concrete pipe is the basic bid pipe. Include terminal sections, and connection hardware, where required.

Rescind the sixth paragraph (that begins, “Each pipe size...”) and replace with the following:

Each pipe size is paid for at the contract unit price and is full compensation for the pipe regardless of the pipe optioned by the Contractor. Only work shown in the "Basic Bid Items" columns on the plans is paid for at a given installation, and the quantities are based on measurements for the basic pipe. Additional work that is required due to field conditions and not associated with the selected pipe is measured and paid for on quantity changes that would result if the basic bid pipe had been installed. All pay items required for installation are measured and paid for based on the basic bid pipe in the contract. Pay items not required for installation of the selected pipe will not be measured and paid for.

603.03.4 BACKFILLING (CULVERTS AND PIPES) Page 284 3-1-07

Delete part B Imperfect Trench Method.

Re-number part C Rock Embankment as part B.

603.03.5 RESTORATION AND MAINTENANCE OF EXISTING PAVEMENT Page 284 9-26-13

Rescind the first paragraph (that begins with "Restore the existing...") and replace with the following"

Restore the existing pavement excavated for pipe installation using material equal to or better than the in place pavement. Restoration includes replacing and compacting excavated aggregate base with materials equal to those in the existing roadway and placing new bituminous surfacing equal to the existing, but not less than 0.25 feet (75 mm) in thickness. Place and compact the replacement bituminous surfacing to match the adjacent pavement providing a smooth riding surface, including the joints.

603.04.3 BEDDING MATERIAL Page 285 12-17-09

Rescind Subsection 603.04.3 and replace with the following:

603.04.3 Bedding Material

Bedding material is measured by the cubic yard (cubic meter) in place for pipes greater than 48 inch (1.2 meter) diameter, and for all sizes of storm drain trunklines. Include the cost of bedding material for pipes 48 inch (1.2 meter) diameter or less in the cost of the pipe.

603.04.5 GRANULAR BEDDING MATERIAL FOR STORM DRAINS Page 285 12-13-12

Add the following Subsection 603.04.5:

603.04.5 Granular Bedding Material for Storm Drains

Granular Bedding material is measured by the cubic yard (cubic meter) in place for storm drain trunklines and laterals.

603.05 BASIS OF PAYMENT Page 285 12-13-12

Add the following paragraph after the last paragraph (that begins with "Payment for All..."):

No additional payment will be made for excavatable flowable fill used as bedding material.

Add the following Pay Item and Pay Unit to the existing table:

<u>Pay Item</u>	<u>Pay Unit</u>
Granular Bedding	Cubic Yard (cubic meter)

606.01 DESCRIPTION (GUARDRAIL) Page 289 10-11-12

Rescind the first paragraph (that begins "The work is...") and replace with the following:

This work is the furnishing, installing, removing, resetting, replacing and revising metal beam guardrail, cable guardrail, box beam guardrail and concrete barrier rail.

606.02 MATERIALS (GUARDRAIL) Page 289 1-12-12

Add the following item to the list of materials under the first paragraph (that begins with "Furnish metal beam..."):

Steel Guardrail Post.....705.01.5

Rescind the second (last) paragraph (that begins "Furnish all new...") and replace with the following:

Furnish all new materials. Do not use refurbished material unless specified in the contract documents.

606.03.1 GENERAL (GUARDRAIL) Page 289 10-11-12

Rescind the fourth and fifth paragraphs of Subsection 606.03.1 (that begins "Correct all...") and replace with the following:

Correct all vertical and horizontal mis-alignment to the specified line and grade at Contractor expense. Optional Terminal Sections must be installed within 12 hours from the time the rail is exposed when conditions prevent completion in one working day. Approved temporary end treatments must be installed to protect blunt ends, ends of barriers, fixed objects, or other obstacles within the clear zone if left for more than 12 hours. Temporary end treatments are not measured for payment. Place, at Contractor expense, object markers at maximum 50-foot (15.2 m) spacing to delineate partial installation areas when work on those installations is not active.

Rescind the eleventh paragraph (that begins "When wood posts...") and replace with the following:

When wood posts and blocks are damaged, cut or bored after treatment, treat the injuries per Subsection 706.04.1.

606.03.2 INSTALLING POSTS Page 290 10-11-12

Rescind the second paragraph (that begins with "Always drive steel...") and replace with the following paragraph:

Always drive steel posts. Wood posts may be placed by excavating and backfilling or by driving.

Rescind the seventh paragraph (that begins "Pilot holes...") and replace with the following:

When driving wood posts, pilot holes approximately 6 inches (155 mm) in diameter may be used when necessary

Delete the last paragraph (that begins with "If furnishing steel..."), and delete lines 1., 2., and 3.

606.03.3 METAL BEAM GUARDRAIL ERECTION Page 290 1-12-12

Add the following paragraph after the fourth paragraph (that begins "Ensure the bolts..."):

Drilling or cutting in the field is only allowed for special connections and sampling. Do not use cutting torches to cut guardrail or make bolt holes. Obtain Project Manager approval prior to drilling bolt holes or cutting guardrail for special connections.

606.03.8 RESET CONCRETE BARRIER RAIL Page 291 10-11-12

Rescind Subsection 606.03.8 and replace with the following:

606.03.8 Reserved

606.03.9 RAISE GUARDRAIL Page 291 5-9-13

Rescind Subsection 606.03.9 and replace with the following:

Unbolt the W-beam and block from the guardrail post, raise and re-bolt through the upper hole of the guardrail post.

606.03.11 REVISE GUARDRAIL ELEMENTS Page 291 10-11-12

Rescind the first paragraph (that begins "Revise the...") and replace with the following:

Revise the guardrail elements as specified. The items include but are not limited to W-beam sections, bridge approach sections and terminal sections.

606.03.13 RESET GUARDRAIL ITEMS Page 291 5-9-13

Add the following Subsection:

606.03.13 Reset Guardrail Items

Reset existing guardrail items to the specified locations in the plans. Meet all the requirements of this section and the Detail Drawings.

Remove the rail elements or cable, and completely remove the post. Backfill and compact the posthole bottom, re-install the posts and compact the backfill around the post meeting 606.03.2, and replace the rail elements or cable to the specified height.

Replace all guardrail materials damaged during the work at Contractor expense.

Correct all horizontal and vertical alignment in the guardrail to the specified line and grade.

---

**606.03.14 OPTIONAL TERMINAL SECTIONS** Page 291 5-9-13

Add the following Subsection:

**606.03.14 Optional Terminal Sections**

Supply the Optional Terminal Section(s) as listed in the Plans meeting the requirements for the specified item. The items include but are not limited to metal guardrail terminal sections and box beam terminal sections. . When new terminal sections tie into existing rail, it may be necessary to raise the existing rail to match the new terminal section height. Transition a minimum of 50 feet (15.24 m).

---

**606.03.15 GUARDRAIL END TERMINAL SECTION WIDENING** Page 291 5-9-13

Add the following Subsection:

**606.03.15 Guardrail End Terminal Section Widening**

Furnish and place embankment material or gravel to widen the roadway to accommodate guardrail extensions or new optional terminal sections as shown in the Plans and Detail Drawings. This work may also include the removal of sanding material and shaping of the existing soils to achieve positive drainage.

Compact widening to a minimum of 90 percent of maximum density with no optimum moisture requirement.

---

**606.04.2 METAL GUARDRAIL TERMINAL SECTIONS** Page 291 5-9-13

Rescind Subsection 606.04.2 and replace with the following:

**606.04.2 Optional Terminal Sections**

Optional terminal sections are measured by the unit as shown in the Detailed Drawings, unless otherwise specified, for each type specified. When transitions are needed to tie into existing rail, the labor and equipment necessary to perform this work is not measured for payment and is to be included in the price for Optional Terminal Sections.

---

**606.04.3 BRIDGE APPROACH SECTIONS** Page 291 10-11-12

Rescind the first paragraph (that begins "Bridge approach...") and replace with the following:

Bridge approach sections, including tapered curbs, are measured by the unit for each type specified as shown in the Detailed Drawings.

---

**606.04.6 BOX BEAM GUARDRAIL TERMINAL SECTIONS** Page 292 10-11-12

Rescind Subsection 606.04.6 and replace with the following:

606.04.6 Reserved

---

**606.04.11 RESET CONCRETE BARRIER RAIL** Page 292 10-11-12

Rescind Subsection 606.04.11 and replace with the following:

606.04.11 Reserved

---

**606.04.15 REMOVE GUARDRAIL** Page 292 10-11-12

Add the following to the end of the first paragraph (that begins "Remove guardrail..."):

Material and equipment necessary for backfill and compaction of post holes is not measured for payment and is to be included in the price for remove guardrail.

---

**606.04.19 RESET GUARDRAIL ITEMS** Page 292 10-10-13

Add the following Subsection:

606.04.19 Reset Guardrail Items

Reset guardrail items are measured by the unit as specified in the contract.  
Material and equipment necessary for backfill and compaction of post holes is not measured for payment and is to be included in the price for reset guardrail.

606.04.20 GUARDRAIL END TERMINAL SECTION WIDENING Page 293 9-26-13

Add the following Subsection:

606.04.20 Guardrail End Terminal Section Widening

Optional terminal section widening is paid by each end section completed. Include the cost of topsoil, seeding and fertilizer used in the widened areas in the unit bid price for Optional Terminal Section Widening.

606.05 BASIS OF PAYMENT (GUARDRAIL) Page 293 5-9-13

Rescind Subsection 606.05 and replace with the following:

606.05 BASIS OF PAYMENT

Payment for the completed and accepted quantities is made under the following.

<u>Pay Item</u>	<u>PayUnit</u>
Metal Guardrail	Foot (meter)
Optional Terminal Section	Each
Guardrail End Terminal Section Widening	Each
Bridge Approach Section	Each
Stiffened Guardrail Sections	Foot (meter)
Box Beam Guardrail	Foot (meter)
Cable Guardrail	Foot (meter)
Cable Guardrail Terminal Section	Each
Concrete Barrier Rail	Each
Impact Attenuators	Each
Concrete Barrier Rail Transition	Each
Concrete Barrier Rail Terminal Section	Each
Raise Guardrail	Foot (meter)
Remove Guardrail	Foot (meter)
Reset Guardrail Items	Unit
Reset Guardrail	Foot (meter)
Remove Concrete Barrier Rail	Each
Nested Guardrail Sections	Foot (meter)

Revise guardrail elements is paid for under the appropriate section.

Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract.

607.02 MATERIALS Page 295 5-9-13

Rescind the following:

Interstate and Farm Fence.....712.02

And replace with:

Wire Fence.....712.02

607.02.1 SNOW FENCE (NEW) Page 295 7-12-12

Add the following new Subsection:

Furnish all timbers, lumber and hardware as specified.

- A. Lumber used must meet the Western Wood Products Association requirements, or equivalent grading rules. Lumber with a nominal thickness of 2 inches will be graded as structural light framing #2 grading or better. Lumber with a nominal thickness of 1-inch will be graded as boards #3 common or better. All lumber must meet ASTM D 245.
- B. All treated material must meet the requirements of Subsection 706.04 or the special provisions.

607.03.4 CONSTRUCTING BARBED AND WOVEN WIRE FENCES Page 297 5-9-13

Rescind the first sentence and replace with the following:

Construct barbed, smooth and woven wire fences meeting the contract requirements and the following.

Add Subsection 607.03.4(C).

C. Fence Panels. Install panels as shown in Detail Drawings.

607.04.1 NEW FENCE Page 298 5-9-13

Rescind the first sentence of the first paragraph and replace with the following:

New fence is measured by the foot (meter).

607.04.2 REMOVE AND RESET FENCE Page 299 5-9-13

Rescind the first sentence of the first paragraph and replace with the following:

Remove and reset fence is measured by the foot (meter).

607.04.3 GATES Page 299 2-10-11

Rescind Subsection 607.04.3 and replace with the following

607.04.3 Gates

Gates are measured by the foot (meter) from center to center of adjacent fence posts.

607.04.4 FENCE PANELS Page 299 5-9-13

Add the following to the end of the first paragraph:

Where Right of Way monuments are set, the construction of the corner gap as shown in the Detail Drawings is not measured for payment. Include the cost of this construction in the adjacent panel(s).

607.04.7 REMOVE FENCE Page 299 10-10-13

Rescind Subsection 607.04.7(B) Without New Fence, and replace with the following:

B. Without New Fence. Remove fence is measured by the foot (meter) in place before removal along the top wire, or on a line parallel thereto, exclusive of gates, cattle guards, and other openings.

Add the following after part (B):

C. Postholes. Backfill and compact the postholes left from post removal using clean material or crushed base. Do not cut off and leave existing posts in place.

607.05 BASIS OF PAYMENT Page 299 5-9-13

Remove the following from the Pay Items and Pay Units List:

<u>Pay Item</u>	<u>Pay Unit</u>
New Fence - Chain Link, Interstate, Farm, Temporary	Foot (meter)
Remove and Reset Fence – Chain Link, Interstate, Farm	Foot (meter)

Add the following to the Pay Items and Pay Units List:

<u>Pay Item</u>	<u>Pay Unit</u>
New Fence	Foot (meter)
Remove and Reset Fence	Foot (meter)

608 CONCRETE SIDEWALKS Page 301 10-10-13

Rescind and replace Section 608 with the following:

SECTION 608  
CONCRETE SIDEWALKS

608.01 DESCRIPTION

This work is the construction of concrete sidewalks and the installation of Detectable Warning Devices at the locations shown in the plans.

608.02 MATERIALS

Furnish materials meeting the following Section and Subsection requirements:

Classes "A" and "D" Portland Cement Concrete.....	551
Reinforcing Steel .....	711.01
Joint Materials .....	707.01

Use Detectable Warning Devices – Type 1 for new sidewalk construction. Detectable Warning Devices - Type 1 are cast directly into sidewalk. Use Detectable Warning Devices - Type 2 for retrofits on existing sidewalks where new concrete is not being placed. Detectable Warning Devices – Type 2 are surface applied on the sidewalk.

Meet all of the Department’s requirements on the qualified products list (QPL) for Detectable Warning Devices – Type 1 and for Detectable Warning Devices – Type 2 . The QPL requirements and list can be found on the Department’s website.

Use Detectable Warning Devices that are a brick red color.

608.03 CONSTRUCTION REQUIREMENTS

Construct concrete sidewalks as specified in the contract and as follows.

608.03.1 Subgrade and Forms

Excavate, shape, and compact the foundation to the specified width and grade.  
Place and compact aggregate base to the specified thickness.  
Use forms and form meeting Section 552 and Subsection 609.03 requirements.

608.03.2 Concrete

Furnish and place concrete meeting Section 551 requirements.  
Place reinforcing steel as specified.  
Dampen the foundation and forms immediately before placing concrete.  
Do not place concrete on a frozen foundation course or subgrade.  
Construct sidewalks meeting Subsections 501.03.18 and 501.03.19 requirements.

608.03.3 Detectable Warning Devices

Install detectable warning devices so they extend the full width of the ramp and the edge of the dome panel is located no more than 6 inches (150 mm) from the back of curb. If the detectable warning device used is embedded in concrete, install so the top of the panel is flush with the adjacent concrete and the domes will protrude above the adjacent surface. If Detectable Warning Devices require cutting, locate non-factory edges on the exterior side of Detectable Warning Device installation.

608.04 METHOD OF MEASUREMENT

Concrete sidewalk is measured by the square yard (square meter), including wheelchair ramps and concrete under Detectable Warning Devices.

Detectable Warning Devices are measured by the square yard (square meter).

- A. Contracts with Sidewalk Work Not in Conjunction with Roadway Reconstruction. Reinforcing steel, expansion joint material, bond breaker, excavation or embankment, crushed gravel base, and disposal of material associated with the work are not measured for payment.
- B. All Other Contracts. Reinforcing steel, expansion joint material, bond breaker, disposal of material, and crushed gravel base are not measured for payment. Excavation or embankment associated with the work is measured by the cubic yard (cubic meter).

608.05 BASIS OF PAYMENT

Payment for the completed and accepted quantities is made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
Sidewalk-Concrete	Square Yard (square meter)
Detectable Warning Devices – Type 1	Square Yard (square meter)
Detectable Warning Devices – Type 2	Square Yard (square meter)

The cost of the concrete used under Detectable Warning Devices – Type 1 is measured and paid for under the item of Sidewalk - Concrete.

- A. Contracts with Sidewalk Work Not in Conjunction with Roadway Reconstruction. The cost of reinforcing steel, expansion joint material, bond breaker, excavation or embankment, crushed gravel base, and disposal of material associated with the work are included in the contract unit price of sidewalk.
- B. All Other Contracts. The cost of reinforcing steel, expansion joint material, bond breaker, crushed gravel base, and disposal of material associated with the work are included in the contract unit price of sidewalk. Excavation or embankment associated with the work is paid for under the specified type of earthwork.

Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract.

609.04 METHOD OF MEASUREMENT (CURBS AND GUTTERS)

Rescind Subsection 609.04 and replace with the following:

Curb, integral curb and gutter, and median concrete curb are measured by the foot (meter) along the face of the curb at the flow line.

Paint and painting is measured by the gallon (Liter) under Subsection 620.04.

- A. Contracts with Curb, Integral Curb and Gutter, Median Curb, and Precast Concrete Curb Work Not in Conjunction with Roadway Reconstruction. Reinforcing Steel, expansion joint material, bond breaker, excavation or embankment, crushed gravel base, emulsified asphalt, backfill and/or necessary plant mix surfacing, and disposal of material associated with the work are not measured for payment.
- B. All Other Contracts. Reinforcing Steel, expansion joint material, bond breaker, disposal of material, and emulsified asphalt are not measured for payment. Excavation or embankment associated with the work is measured by the cubic yard (cubic meter).

609.05 BASIS OF PAYMENT (CURBS AND GUTTERS) Page 304 11-14-13

Rescind Subsection 609.05 and replace with the following:

Payment for completed and accepted quantities is made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
Curb	Foot (meter)
Integral Curb and Gutter	Foot (meter)
Median Concrete Curb	Foot (meter)
Paint	Gallon (liter)

- A. Contracts with Curb, Integral Curb and Gutter, Median Curb, and Precast Concrete Curb Work Not in Conjunction with Roadway Reconstruction. The cost of reinforcing steel, expansion joint material, bond breaker, curing compound, excavation or embankment, crushed gravel base, emulsified asphalt, backfill and/or necessary plant mix surfacing, and disposal of material associated with the work are included in the contract unit price of curb and gutter.
- B. All Other Contracts. The cost of reinforcing steel, expansion joint material, bond breaker, curing compound, emulsified asphalt, and disposal of material associated with the work are included in the contract unit price of curb and gutter. Excavation or embankment associated with the work is paid for under the specified type of earthwork. Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract.

610.01 DESCRIPTION (ROADSIDE REVEGETATION) Page 305 3-12-09

Rescind the first paragraph (that begins with "This work is...") and replace with the following paragraph:

This work is re-establishing vegetative cover on specified areas with salvaged topsoil under Subsection 203.03.6 or furnished topsoil, seeding, planting, fertilizing, mulching, composting, soil retention blankets, and sodding.

610.02 MATERIALS (ROADSIDE REVEGETATION) Page 305 1-12-12

Add the following item to the list of materials under the first paragraph (that begins with "Furnish materials..."):  
Compost.....713.13

610.03.1 TOPSOILING Page 305 3-12-09

Rescind the title of 610.03.1 and replace with the following title:

610.03.1 Furnished Topsoil

Rescind the first sentence of the first paragraph (which begins with "Furnish topsoil and...") and replace with the following sentence:

When Topsoil is a bid item, furnish topsoil and notify the Project Manager of the proposed topsoil source(s) as soon as possible after the contract award.

610.03.2 (A) GENERAL (SEEDING, FERTILIZING, AND MULCHING) Page 305 1-12-12

Within the second paragraph, rescind the second sentence (that begins "Fertilizing, ...") and replace with the following:

Fertilizing, mulching, composting, permanent erosion control blanket placement and seeding are specified in the contract.

Add the following paragraph after the last paragraph (that begins with "Seed all disturbed ...")

After all condition seedbed surface, seeding, and fertilizing work is complete, remove and dispose of any oversized material that protrudes 4-inches (100 mm) or more above the conditioned seedbed surface

610.03.2 (B) SEEDING SEASON (SEEDING, FERTILIZING, AND MULCHING) Page 305 1-12-12

Rescind 610.03.2 (B) and replace with the following:

B. Seeding Season. The seeding season is October 1 through May 15. Obtain the Department Reclamation Specialist's approval to seed outside this period.

610.03.2 (D) SEED DISTRIBUTION (SEEDING, FERTILIZING, AND MULCHING) Page 306 1-12-12

Rescind the first sentence of Subsection 610.03.2 (D)(2) (that begins "Drill seed slopes...") and replace with the following:

Drill seed Area 1 and Area 3 using equipment that regulates the seed application rate and planting depth.

Rescind part (3) "Dry Broadcast Seeding" and replace with the following:

3. Dry Broadcast Seeding. Hand seeding or mechanical seeding of Area 2 is preferred for all areas where drill seeding is not possible or practical. These areas include narrow medians, or areas too small to effectively operate drill seeding equipment.

Rescind the first sentence of part (4) (that begins "Hydraulic seeding...") and replace with the following:

Hydraulic seeding is permissible for Area 2 only if broadcast seeding is not possible due to steep slopes or unstable footing. Do not use hydraulic seeding without the Project Manager's prior approval.

Rescind part (4)(b) (that begins "b. Apply the remaining...") and replace with the following:

b. Apply the remaining mulch, and/or compost, along with fertilizer, if specified. See Subsection 610.03.2(F)(5).

610.03.2 (G) COMPOSTING (SEEDING, FERTILIZING, AND MULCHING) Page 307 1-12-12

Add Subsection 610.03.2 (G) Composting:

G. Composting. Use the compost type specified in the contract. Apply the compost at the rate, method and sequence specified in the contract.

610.04.1 TOPSOIL Page 308 3-12-09

Rescind 610.04.1 and replace with the following:

Topsoil is measured by the cubic yard (cubic meter) of loose material level with the haul vehicle box at the point of use on the project. Strike or level loads when directed. All costs for obtaining and furnishing topsoil are incidental and are not measured separately for payment. Include these costs in the unit bid price for Topsoil.

610.04.2 SEEDING Page 308 10-10-13

Rescind 610.04.2 and replace with the following:

610.04.2 Seeding

Seeding is measured by the acre (hectare), parallel to the ground surface.

610.04.3 FERTILIZING Page 308 10-10-13

Rescind 610.04.3 and replace with the following:

610.04.3 Fertilizing

Fertilizing is measured by the acre (hectare), parallel to the ground surface.

610.04.4 CONDITION SEEDBED SURFACE Page 308 10-10-13

Rescind 610.04.4 and replace with the following:

610.04.4 Condition Seedbed Surface

Condition seedbed surface is measured by the acre (hectare), parallel to the ground surface. Removal of oversized material from the conditioned seedbed surface is not measured separately for payment.

610.04.5(A) VEGETATIVE MULCH AND WOOD CELLULOSE FIBER MULCH Page 308 10-10-13

Rescind 610.04.5(A) and replace with the following:

- A. Vegetative Mulch and Wood Cellulose Fiber Mulch. Vegetative mulch and wood cellulose fiber mulch is measured by the acre (hectare), parallel to the ground surface.

610.04.8 COMPOSTING (METHOD OF MEASUREMENT) Page 309 1-12-12

Add Subsection 610.04.8 Composting:

- 610.04.8 Composting  
Composting is measured by the acre (hectare).

610.05 BASIS OF PAYMENT (ROADSIDE REVEGETATION) Page 309 1-12-12

Add the following "Pay Item" and "Pay Unit" to the line items:

<u>Pay Item</u>	<u>Pay Unit</u>
Compost	Acre (hectare)

Add the following after the "Pay Item" and "Pay Unit" line items:

Include the cost of removing oversize material from the conditioned seedbed surface in the cost of Topsoil-Salvaging and Placing, or Topsoil (furnished), whichever is applicable.

611.02.2 STEEL (CATTLE GUARDS) Page 311 10-7-10

Rescind the second paragraph (that begins with "Furnish low-alloy...") and replace with the following:

Furnish low-alloy weldable steel meeting AASHTO M 270 Grade 36 (250 MPa) or ASTM A 572 (A 572M), Grade 42 (290 MPa) requirements for crossbars.

611.02.3 PAINT (CATTLE GUARDS) Page 311 12-13-12

Rescind 611.02.3 and replace with the following:

- 611.02.3 Paint  
Furnish paint meeting the following Subsection requirements:

Shop (Prime Coat)	710.02(B)(6)
Aluminum Paint (Finish Coat)	710.02(B)(1)
Aluminum Epoxy (Two Coats)	710.02(B)(2)

612 PAINTS AND PAINTING Page 313 4-10-14

Rescind Section 612 and replace with the following:

SECTION 612  
STRUCTURE FINISHES

612.01 DESCRIPTION

This work is the surface preparation, painting, coating and finishing requirements of steel components.

612.02 MATERIALS

Furnish material meeting the applicable requirements of Section 710. Provide coatings from a single manufacturer if multiple products or coats are required. Submit documentation such as catalogue cuts or product brochures for all claimed product compatibilities. Coat powder coated items with a zinc-rich prime coat and a Triglycidyl Isocyanurate (TGIC) Polyester powder top coat. Use Paint materials suitable for the environment in which they will be exposed.

Either the contract or the Project Manager will specify the final coat color.

612.02.1 Paint Coating Systems

- A. New Structural Systems. Furnish the products necessary for a three coat system consisting of inorganic zinc primer, a mid-coat of high build epoxy, and a topcoat of urethane.
- B. Bridge and Pedestrian Rails. Furnish a three coat system or a TGIC powder coat system.
- C. Pipe Piling and Casings. Furnish a two-component self-priming epoxy.
- D. Cattle Guards. Furnish a paint system composed of a prime coat and aluminum finish coat or aluminum epoxy paint.
- E. Existing Structural Steel. If existing steel is to be painted, the contract requirements will specify whether to fully remove the existing paint, or to apply additional paint over an existing coating.
  1. Full Removal of Existing Paint. Apply a Three Coat System
  2. Overcoat. Provide a product that can be applied over the existing coating without causing the existing paint to debond.

- F. Miscellaneous Items. Furnish one of the following: two-component aluminum epoxy paint, two-component self-priming epoxy, zinc phosphate alkyd, leafing aluminum paint, a three coat system or TGIC Powder coating.
- G. Other Paint Systems. Other paint systems will be considered if they are recommended for the purpose intended.

#### 612.03 CONSTRUCTION REQUIREMENTS

Prevent environmental pollution including stream and air pollution caused by paint, paint spray, paint chips, dust, or other harmful materials meeting all Federal, State and local regulations and requirements.

##### 612.03.1 Submittals

Submit the following to the Project Manager for Review:

- A. Paint Products. Submit a written description of the complete coating system to the Project Manager for review at least 30 days before use.
  - Include in the written submittal the manufacturer's product information including but not limited to paint characteristics, surface preparation, film thickness recommendation, safety data, repair procedures and application recommendations.
  - Bring conflicts between the coating system submittal and the specifications to the Project Manager's attention for resolution.
  - Submittals for paints to be applied over existing paint are to be based on successful test applications to the surface being painted.
- B. Pollution Controls. Submit a work plan that meets OSHA and EPA regulations.
  1. Environmental. Design a containment system meeting the Society for Protective Coatings (SSPC) Guide 6, Class 1, 2 or 3 "Guide for Containing Debris Generated during Paint Removal" requirements except that permeable wall materials cannot be used. The containment system may be located on or off the project site.
    - Submit shop drawings and design calculations for containment systems attached to the structure. Include design calculations that address all load conditions on the structure resulting from the containment system including debris. Specify ventilation and negative pressure equipment capacity, layout, and related calculations
  2. Worker Protection. Meet the OSHA lead standards of Title 29, CFR 1926.62. Describe medical surveillance, exposure monitoring, respiratory protection, personal hygiene, employee training, and employee access to records, hazards communication and a compliance program to reduce lead exposure to within the Permissible Exposure limits (PELs). Exposure monitoring must meet the National Institute of Occupational Safety and Health (NIOSH) Method 7028.
  3. Disposal. Submit a work plan detailing how paint scrapings and wastewater will be collected and disposed of.
  4. Staging and Scaffolding. Submit for approval planned use of an existing structure for attachments of scaffolding or staging, or any equipment on the bridge that weighs 20 tons (18.1 MT) or more.

##### 612.03.2 Surface Preparation

Prepare a test area to define the level of surface preparation needed. This area is to be approved by the Project Manager. If the paint manufacturer recommends a higher degree of surface preparation, use the manufacturer's recommendations.

Hand-clean the steel bridge bearing components containing polytetrafluorethylene (PTFE), stainless steel and neoprene pads to prevent surface damage. Remove fins, tears, slivers and burred or sharp edges by grinding and re-clean the area as specified before coating. Remove blast residue from steel surfaces with clean brushes, compressed air (free of oils), or commercial grade vacuum equipped with a brush-type cleaning tool, or by double blowing. Guard angles, pier nose angles, deck expansion joints and other small structural steel elements may be prepared for painting using wire brushed, scrapers, chisels or sand blasting as approved. After cleaning, keep steel dry and dust free and prime within 24 hours after cleaning.

- A. New Structural Steel. Brush-off blast cleaning to SSPC SP-7 requirements all new steel that is not to be painted. Solvent wash to SSPC SP-1 requirements, then commercial blast to SSPC SP6 requirements all new steel that is to be painted except as noted. Solvent wash to SSPC SP-1 requirements, then blast to SSPC SP-10 (near white) all new steel that is to be painted with the Three Coat System. The surface profile for all new steel being painted is to be between 1.5 and 3.5 mils, or as specified by the paint manufacturer.
- B. Steel Pipe Piling and Casings. Solvent wash to SSPC SP-1, then commercial blast to SSPC SP-6 all portions of steel pipe piling that are to be painted.
- C. Existing Structural Steel (no paint present). Remove all loose material including soil, concrete and loose rust in accordance with SSPC-SP2 (hand tool cleaning) or SSPC-SP3 (power tool cleaning) prior to solvent cleaning per SSPC-SP1. Brush-off blast clean to SSPC-SP7 surfaces that are too large for the above methods. Clean to SSPC-SP6 requirements.
- D. Existing Structural Steel (overcoat existing paint). Clean areas of loose paint as described in Subsection 612.03.3(C) Roughen, de-gloss, and clean existing paint surface as recommended by the paint manufacturer.
- E. Existing Structural Steel (Full Paint Removal). Clean to SSPC-SP1 and SSPC-SP6.
- F. Surface Cleanliness and Profile. Clean and establish a surface profile on the steel as if it were new structural steel.
- G. Galvanized Surfaces. Treat galvanized surfaces with phosphoric acid solutions of the zinc phosphate of phosphate chromate types formulated for this use. Dry the treated surface for 20 minutes and rinse with water. Begin painting dry surface within 24 hours.

## 612.03.3 Painting

Protect pedestrian, vehicular and other traffic upon or under the structure, the superstructure and substructure against damage or disfigurement by splatters, splashes, smirches or over-spray of paint material. Clean all surfaces with paint damage at the contractor's expense.

- A. General. Unless otherwise approved by the Project Manager, painting season for structural steel, metal posts or poles and bridge rail is from May 1 to October 31. Apply paint only to dry clean surfaces. Do not paint when weather conditions would cause unsatisfactory results.
- Allow each coat of paint to dry before applying succeeding coats. Follow the manufacturer's recommendations for drying time unless field conditions require longer drying time. The Project Manager may stop painting operations at any time if current or impending weather conditions could cause unsatisfactory coating performance.
- Provide inspectors ready and safe access to work at all times. The Project Manager will suspend work for unsafe or inadequate access to work. Ensure all fabrication inspections are complete prior to painting.
- Thin paint only as recommended by the manufacturer.
- B. Paint Representative. Furnish the services of a painting technical representative from the paint manufacturer at the beginning of paint application to notify the Project Manager that surface preparation is adequate and to provide technical assistance to the Contractor in application methods that may be unique to the particular product used. Keep this technical representative on-call as required during operations.
- Do not apply paint until surface preparation has been approved by the Project Manager. Do not apply additional or subsequent coats of paint without the Project Manager's approval.
- C. Application. If using the three coat system, apply three coats of paint to all new steel work. Unless noted otherwise, apply a minimum of two coats of paint for all other paints listed in subsection 612.02. Paint in a neat and workmanlike manner. Apply paint in full coats by brush or spray, completely covering all surfaces.
- Apply paint by brush or spray following the paint manufacturer's recommendations to produce a uniform coat to the metal or previous paint coat. If using brush painting, thoroughly coat surface irregularities and brush out and smooth to produce an even paint film thickness. Use spray pressure tanks with an agitator to thoroughly stir the paint.
- If surfaces are inaccessible to paint brushes, paint with sprayers or daubers made for that purpose.
- Keep materials painted under cover in damp or cool weather until the paint has dried or weather permits removal of cover.
1. Shop Paint. Apply a shop coat to all metal surfaces unless otherwise specified. Do not paint surfaces in contact with other metal surfaces or concrete, except as noted in subsection 612.03.6A. This includes faying surfaces and contact surfaces of nuts, bolts and washers for bolted connections.
 

Apply shop coat immediately after fabrication, shop inspection and shop cleaning are complete and the work is accepted.

Do not load materials for shipment until paint is dry. Do not apply field coats in the fabrication shop except by written approval of the Project Manager.

Use erection marks for field identification of members on painted surface. Use paint for marking that is compatible with the shop coat and the first field coat. Cover erection marks, fabricator's name and other identification with subsequent coats.
  2. Spot Painting. Field clean masonry and sole plates, bottom of expansion devices and all parts of steel inaccessible for painting after erection as noted above. Spot coat and apply all field coats before erection. Paint on site and allow drying thoroughly before assembling. Handle painted material carefully to prevent damage. Repair and repaint damaged surfaces at no cost to the State.
 

Apply the spot coat after erection and field cleaning is approved by the Project Manager, to the edges of plates, rolled shapes and to the heads of bolts and nuts and areas where the shop coat has been damaged. Where the shop coat is damaged, the Project Manager may require a substantially complete reconditioning or replacement of the shop coat. This painting is considered spot painting and is done at no cost to the State.

Reseal small cracks and cavities not sealed by the first field coat with a zinc paste before the second field coat is applied.

Mix paint as recommended by the paint manufacturer while in original containers. Mix or agitate paint in containers throughout application period. When mixing two-component paint systems, mix each component first, and then mix together. The Project Manager may allow hand mixing when each coat of paint is 5 gallons or less.

Minimum dry film thicknesses (DFT) are shown as follows, unless in conflict with the manufacturer recommendations:

- Three coat system: Primer: 3 mils (above peaks of surface profile) Second coat: 4 mils Finish coat: 2 mils
- Epoxy paint for pipe Piles and casings: First 2 coats with total DFT of 12 mils, final coat: 3 mils
- Epoxy mastics for misc. Structural steel: 3 mils per coat for new steel or existing coatings 5 mils per coat for lightly rusted surfaces
- Two-component Epoxies: 4 mils per coat, 6 mils over light rust
- Calcium Sulfonate Alkyd: 5 mils per coat
- Zinc Phosphate Alkyd : 3 mils for primer coat 1 mil for finished coat
- Aluminum Epoxy Paint: 5 mils per coat

## 612.03.4 Weather Conditions

Apply paint using manufacturer's recommendations for temperature (air, substrate and paint material) and relative humidity or as follows, whichever is more restrictive.

Do not apply paint when ambient temperature is 40 degrees F (4 degree C) or is expected to drop below 40 degrees F within 2 hours. Do not apply paint when rain, snow or condensation is expected within 2 hours after application at the location where paint is applied. Do not apply paint when the relative humidity is greater than 85 % or when temperature and humidity cause condensation on the surface to be painted. Do not apply paint to metal with surface temperatures over 110 degrees F (43 degrees C) or when the surface temperature causes the paint to blister or produce a porous paint film.

Neither weather conditions nor Department acceptance of paint materials negate your responsibility for satisfactory application of paint. If the painting is unsatisfactory, remove paint, thoroughly clean the surfaces and repaint at no cost to the Department. The painting is unsatisfactory if rusting occurs; the paint coat lifts, blisters, wrinkles, has excessive runs or sags, or shows evidence of application under unfavorable conditions; the workmanship is poor; impure or unauthorized paint has been used; or for other reasons determined by the Project Manager.

612.03.5 Steel Components

- A. Metal Bridge Rail. Apply the spot coat and all required field coats to the following contact areas before erection: rail to post contact surface; expansion sleeves; and rail post base plates. Apply required field coats to the rest of the rail after erection, fit-up and final adjustment of the rail to line and grade.
- B. Steel Pipe Piles and Casings. Paint piles and casings as described in 612.03.4. and 559.03.8.
- C. Existing Structural Steel. Apply and undercoat of paint prior to the other field coats to all exposed edges of plates and rolled shapes; the heads of rivets, bolts and nuts; and all surfaces where bare metal is exposed.

612.04 METHOD OF MEASUREMENT

Structure Paint is not measured separately but is incidental to the items being painted.

612.05 BASIS OF PAYMENT

Structure Paint is not paid for separately but is included in the cost of the item painted and includes all materials and resources necessary to complete the work.

613.04.1 RIPRAP Page 320 10-10-13

---

Rescind Subsection 613.04.1 and replace with the following:

613.04.1 Riprap

- A. Handlaid and Random Riprap. Handlaid and random riprap is measured by the cubic yard (cubic meter) complete in place. The volume measured for payment is that bounded by the staked length and height and the plan thickness.  
Excavation is incidental to the riprap and not measured for payment.
- B. Grouted Riprap. Grouted riprap is measured by the square yard (square meter) on the face of the revetment.  
Excavation is incidental to the riprap and not measured for payment.  
Bedding material is measured by the cubic yard (cubic meter).

613.04.2 BANK PROTECTION Page 320 10-10-13

---

Within the first paragraph, rescind the first sentence (that begins, "Bank protection is measured...") and replace with the following:

Bank protection is measured by the cubic yard (cubic meter) complete in place.

613.04.3 CONCRETE SLOPE PROTECTION Page 321 10-10-13

---

Within the first paragraph, rescind the first sentence (that begins, "Concrete slope protection is measured...") and replace with the following:

Concrete slope protection is measured by the square yard (square meter).

614.02 MATERIALS (RETAINING WALLS) Page 323 12-27-07

---

Delete the Subsection requirement for Metal Bin-Type Retaining Walls and replace with the following:  
Metal Bin-Type Retaining Walls ..... 711.17

616.03.1 GENERAL (CONSTRUCTION REQUIREMENTS) Page 327 1-17-13

---

Rescind Subsection 616.03.1 and replace with the following:

616.03.1 General

Install conduit and pull boxes meeting the National Electric Code (NEC) requirements.

Conduit lengths in the contract are estimated, and may require changes, approved by the Project Manager, to avoid underground obstructions. Refer to Subsection 107.18 regarding locating of underground utilities before excavation.

Provide the specified conduit type and size, or substitute a larger size conduit at Contractor expense. Do not change conduit size within any conduit run. Use minimum 2-inch (53 mm) diameter conduit between pull boxes and adjacent standard bases.

Have conduit enter the foundation at least 24 inches (610 mm) below the top. Conduit stubs on structures are specified in the contract.

Place and securely hold in position conduit ends, anchor bolts, and other fittings set in concrete until the concrete sets.

Lay conduit a minimum of 18 inches (460 mm) below the curb grade in sidewalk areas and not less than 24 inches (610 mm) below the finished grade in all other areas.

Install conduits under railroad tracks to railroad company requirements. Notify the Department and the railroad company at least 48 hours before starting work on railroad property.

Terminate conduit in standard or pedestal foundations at least 3 inches (75 mm) above the foundation top. Keep conduit within foundations at least 6 inches (155 mm) from the foundation face. Extend conduit terminating in standards or pedestals above the foundation and slope it towards the handhole opening.

Terminate conduit entering concrete pull boxes 2 inches (50 mm) inside the box wall, at least 2 inches (50 mm) above the bottom, and slope it to aide cable pulling. Locate conduit entrances in pull box bottoms near the end walls leaving most of the box clear. Install conduit outlets in the box from the direction of the run. Seal conduit leading into socket walls, lights, or fixtures below the pull box grade using a watertight sealing compound.

Install a pull wire in all unused conduits over 10 feet (3 m) long. Double at least 2 feet (610 mm) of pull wire back into the conduit at each termination point for runs over 100 feet (30.5 m); double 1-foot (305 mm) back for shorter runs.

Install a conduit expansion joint, detailed in the contract, where the conduit crosses a fixed or structure expansion joint. Equip each expansion fitting with a grounding strap jumper. Thoroughly clean contact areas before clamping grounding straps.

Secure all conduit bonds, lighting bracket anchor bolts, and bridge rail anchor bolts to form a continuous mechanical and electrical system. When not included as part of a new foundation, furnish, install, and pay for all work and materials (such as grounding straps and bare AWG No. 6 wire) necessary to make a continuous grounded system as part of the unit price for conduit.

Clean out existing underground conduit incorporated into new conduit with compressed air and mandrel for size if required.

Install pull boxes and conduits as specified with the pull box covers flush with the concrete facing or as directed.

Compact backfill material for conduit trenches constructed outside of the roadbed sections to the density of the adjacent material.

Restore existing surfaces disturbed by conduit or pull box installations to the original type and condition.

Push or bore conduit under existing roadways. Install conduit that is to be under new surfacing prior to new surfacing being put in place. Keep jacking and drilling pits at least 2 feet (610 mm) away from the roadway surface edge. Do not undermine the roadway surface or soften subgrade when using water.

Open cutting across the existing roadway will be allowed only after three unsuccessful attempts at conduit installation using either a fluid assisted directional boring system with a minimum push and pull back force of 4,946 lbf, or a directional rod pusher with a minimum push and pull back force of 38,217 lbf. The Project Manager may approve cutting small test holes in the roadway surface to locate obstructions.

When approved by the Project Manager, trench across paved roadways without disturbing or injuring the paved surface on both sides of the trench.

Cut asphalt pavements leaving a straight cut face. Excavate, install conduit, and backfill with approved material. Fill the top 1-foot (305 mm) of the trench with compacted plant mix or as directed. Replace all damaged pavement.

Fill open cuts across roadways with flowable fill per the detail on the plans. Furnish and place flowable fill (also known as controlled low-strength material, controlled density fill, flowable mortar and slurry cement backfill) as an alternative to compacted soil to the lines and grades shown on the plans.

Submit two (2) copies of a mix design to the Project Manager for approval fourteen (14) calendar days before start of production.

Provide flowable fill in accordance with all requirements of Section 551.

Payment for all costs associated with furnishing and placing flowable fill is included as part of the conduit bid item.

#### 616.03.2 PLASTIC CONDUIT

Page 327

1-17-13

Rescind the fourth paragraph (that begins "Terminate plastic...").

#### 616.03.3 STEEL CONDUIT

Page 327

1-17-13

Rescind Subsection 616.03.3 and replace with the following:

##### 616.03.3 Steel Conduit

Install rigid conduit meeting the NEC Article 346.

Make field cuts square and true so that the ends join full circumference. Ream the conduit ends to remove burrs and rough edges.

Slip joints or running threads are not permitted for coupling conduit. Use an approved threaded union coupling when a standard coupling cannot be used.

Coat any new threads on conduit with a cold galvanizing compound before making couplings.

Tighten couplings until the conduit ends are brought together making a good electrical connection throughout the entire conduit run.

Paint damaged conduit coating with a cold galvanizing compound.

Thread and cap conduit with standard pipe caps until the wiring is placed. Install insulated grounding bushings when caps are removed.

Connect new steel conduit directly to stubs of existing steel conduit protruding from existing foundations and at nearest coupling points. New threaded joints may be approved by the Project Manager if the above requirements are met. Do not use plastic conduit in the system.

Make conduit field bends having a minimum radius of six times the inside diameter of the conduit. Factory conduit bends must not crimp or flatten the conduit and use the longest practical radius.

616.03.4 PULL BOXES AND MANHOLES

Page 329

9-26-13

Rescind Subsection 616.03.4 and replace with the following:

616.03.4 Pull Boxes and Manholes

Construct and install pull boxes and manholes as specified. The Contractor may install additional pull boxes to aid the work at the Contractor's expense. Install pull boxes and manholes with covers level with curbs, sidewalks, and surrounding ground. Bed the box bottoms in concrete or crushed rock as specified. When replacing or adjusting an existing pull box, adjust conduit stub heights accordingly.

When installing pull boxes in sidewalk, install so water runs away from the pull box lip. When installing pull boxes in open ground, encase pull box in a class D concrete pad extending 12 inches horizontally away from the pull box in all directions and at least 12 inches deep.

Prevent damage to any existing pull box to be re-used on this project. Any pull box damaged by the Contractor is to be replaced by the Contractor at no cost to the project.

This item includes all excavation, gravel base, the concrete pad around the pull box, placement of the pull box, electrical bonding of conduits, backfill, and repair of the surface and surrounding area.

616.04.2 CONDUIT

Page 329

10-10-13

Rescind Subsection 616.04.2 and replace with the following:

616.04.2 Conduit

Conduit is measured by the foot (meter).

617 TRAFFIC SIGNALS AND LIGHTING

Page 331

10-10-13

Rescind Section 617 Traffic Signals and Lighting and replace with the following:

SECTION 617  
TRAFFIC SIGNALS AND  
LIGHTING

617.01 DESCRIPTION

This work is installing or modifying of traffic signal(s), lighting, and other electrical systems.

617.02 MATERIALS

Furnish materials meeting the following Section requirements:

Lighting and Signal Materials.....	703
Class "DD" Portland Cement Concrete.....	551

617.03 CONSTRUCTION REQUIREMENTS

617.03.1 General

Consult with the Project Manager and affected utility companies about the work prior to commencement of work. Obtain daily, safety circuit clearance from the servicing utility before starting work on existing series street lighting circuits. Pull cut-out plugs and place worker signs at cut-out boxes before work is started.

Use rosin core solder in all electrical soldered connections.

Pick up State-furnished material and equipment from the Department of Transportation, Traffic Engineering Section, 2701 Prospect Avenue, Helena, Montana, and transport to the project as part of the contract unit price. Provide the Traffic Signal Engineer at least five business days advance notice before arriving to take delivery. The date/time arranged for equipment pickup will be mutually agreed to and be as close as possible to the contractor's request.

Repair or replace all existing improvements and equipment disturbed, damaged, or removed in performing the work at Contractor expense.

The locations in the contract for signal and light standards, controller pedestals, conduit runs, pull boxes, illuminated signs, and appurtenances are approximate. The Project Manager will establish the exact field locations and elevations.

Furnish and install all incidental parts not specified but necessary to complete or modify the traffic signal, lighting, or other electrical systems at Contractor expense.

Make arrangements with the serving utility for providing service to the project. Work with the serving utility to determine the schedule for and exact location of the service.

Pay all fees and energy costs used for temporary Contractor operations. The Department will pay the energy costs to operate signals and lighting used by the public.

All systems must be complete and operable when the work is completed.

Coordinate all construction activities to ensure all interim and/or permanent pavement markings and all associated signs are in place prior to the signal turn-on. Place new traffic signal installation into 'flash' for a period of three to five days immediately prior to the turn-on. The traffic signal will be put into operation upon approval, and at

the sole discretion, of the traffic signal engineer from the MDT Traffic Engineering Section. The sole discretion of the traffic signal engineer is based on the assurance the project intent has been met, the completeness of the project, and the ability to turn on the traffic signal safely.

Inform the project manager of the desired turn-on date prior to the time the signals are to become operational. Have the project manager inform the Traffic Signal Engineer of the desired turn-on date at least two weeks prior to that date. The date arranged for the signal turn-on will be mutually agreed to and be as close as possible to the contractor's desired turn-on date.

#### 617.03.2 Equipment Lists and Drawings

Submit the following to the Electrical Section of the Traffic and Safety Bureau for approval after award:

1. A complete list of the proposed equipment and material. Include the quantity, description, size, name of the manufacturer, and catalog number of each item. Indicate which items are on the Department's Qualified Products List (QPL).
2. Manufacturer's catalog sheets for each item of equipment and material listed that are not on the Department's QPL. The catalog sheets must have the specific items to be used underlined in red or highlighted, including item specifications.
3. Shop drawings, design calculations, and welding procedures for all metal signal and luminaire standards that are not on the Department's QPL. Check and approve the shop drawings and design calculations before submitting, and show the Contractor's approval on the drawings.
4. Documentation required by the QPL for items that are on the approved QPL list.
5. Certified mill test report's for pole material and the manufacturer's certification that pole material and galvanizing meets specifications.

Materials and equipment listed as approved on the QPL at the time that the list of proposed equipment and materials is submitted, may be accepted as a pre-approved QPL item in lieu of the normal submittal and approval process outlined in this section.

Obtain further information and requirements on the QPL website, located at <http://www.mdt.mt.gov> contracting/consultant link.

The Department has 20 business days after receipt to approve the submittals. Upon receipt of the approved list of equipment and material, immediately order the materials and submit copies of the dated purchase orders for major items. Re-submit any disapproved items for Department review within 20 business days of notification of disapproval.

Submit copies of the invoices showing the shipping dates within 10 calendar days of the invoice dates.

The calendar date or the number of working/calendar days allowed for completion of the contract will be adjusted by the number of days the Department's review of the submittals overran the Department's review time, if the Department's delay effects the Contractor's operation as shown on the most recently reviewed schedule. No additional compensation is allowed for these Department-caused delays.

The Department is not liable for any materials purchased, labor performed, or work delay (except as stated above) before approval of the required submittals.

All material is subject to inspection after delivery to the project and during installation on the project. Failure by the Project Manager to note defective material or faulty workmanship during construction does not relieve the Contractor of responsibility for removing or replacing defective material or redoing work at Contractor expense. Inspection or sampling of certain materials may be made at the factory or warehouse before delivery to the site at the Project Manager's discretion. No material rejected before delivery, is to be delivered to the project, and all material rejected on the project must be removed from the work.

Submit all equipment guaranties and warranties.

Comply with the requirements of Subsection 106.09.

#### 617.03.3 Maintenance of Signals

Maintain existing traffic signals that are moved or modified once work begins.

The responsibility for existing traffic signals continues with the agency normally responsible for the traffic signals until work begins.

Be responsible for new or modified traffic signals placed in service until the project is accepted. Provide in writing the names and phone numbers of the persons responsible for the operability and maintenance to the jurisdictional law enforcement agency and the Project Manager in case of signal malfunction.

#### 617.03.4 Excavating and Backfilling

Excavate for conduit, foundations, other equipment and materials as specified. Excavate trenches to the width necessary to install electrical equipment, materials, and foundations. Saw cut all existing pavements before excavating.

Do not start excavation until the conduit, equipment, and materials are on site.

Place excavated material without obstructing vehicular or pedestrian traffic or surface drainage. Remove and dispose of surplus excavated material at the end of each workday.

Backfill excavations meeting Subsection 209.03.6 requirements. Bring excavations up level with the adjacent surface or grade to drain as required until permanent repairs are made.

When construction is suspended each day, clear all equipment and material from the roadway for public use as specified in Section 618.

#### 617.03.5 Removing and Replacing Improvements

Replace or re-construct existing sidewalks, curbs, gutters, pavement, bituminous surfacing, base material, landscaping, and other improvements removed, broken, or damaged by the Contractor with equal or better quality materials.

Cut concrete sidewalk and pavement borders to be removed without damaging the adjacent surface. Whenever a part of the existing concrete sidewalk, driveway or pavement is broken or damaged, remove the entire square or slab and replace the concrete as specified.

Repair or remove and replace all existing improvements damaged by the Contractor at its expense.

## 617.03.6 Foundations

Construct post, standard, controller cabinet, and pull box concrete encasing pad foundations using Class "DD" or better portland cement concrete meeting the applicable requirements of Section 551.

Place the concrete foundation bottoms on undisturbed ground. Mono-lithically pour foundations where practical. Form the exposed faces. Ensure forms are rigid and braced true to line and grade. Finish the footing tops for posts and standards, except special foundations, to the curb or sidewalk grade or as directed. Position and hold in place conduit ends and anchor bolts using a template until the concrete has set. Provide the proper anchor bolt circle for all standards.

Install luminaire and Type 1 signal foundations to ensure that no portion of the foundation or base that is non-breakaway projects more than 4 inches (100 mm) above the ground line. Leave anchor bolts projecting at least 3 inches (75 mm) from the foundation.

Apply an ordinary surface finish to the exposed concrete surfaces meeting Subsection 552.03.12.

Where obstructions prevent the construction of planned foundations, the Contractor may propose an alternate foundation construction method.

Posts, poles, standards, and pedestals may be erected, plumbed and raked after the foundation concrete has cured at least 72 hours.

Concrete quantity increases for foundations to accommodate the standard furnished by the manufacturer are at Contractor expense.

Construct foundations to accommodate the conduit and anchor bolts as specified.

Do not use pancake grounds.

Reinforce foundations with No.4 (#13) hoops at 1-foot (610 mm) centers and with eight No.6 (#19) bars equally spaced around the hoops. Form the top 6 inches (155 mm) of the foundation, beveling the exposed concrete edge 2 inches (50 mm). Electrically bond all steel conduits in each foundation to an anchor bolt using an AWG No.6 copper grounding strap. Connect a bare copper AWG No.6 solid wire between the grounding lug on the standard and the grounding strap.

## 617.03.7 Standards

Field drill other holes for wire entry, mounting pedestrian and vehicle signals, or pedestrian pushbuttons. Treat the holes or threads with a cold galvanizing compound following the manufacturer's recommendations. Seal unused pipe tenons on mast arms with metal caps.

Once the non-breakaway standards, posts, or pedestals are erected and the installation complete, grout the gap between the base and foundation using grout meeting Subsection 713.05. Form or drill a 3/4-inch drain hole in the grout at the lowest point.

Repair all damage to galvanized pole and standard surfaces by applying one coat of cold galvanizing compound to the damaged area.

## 617.03.8 Luminaires

Check luminaires on the ground to insure they provide the specified ANSI/IES light distribution pattern before mounting. Adjust the luminaires at night, as directed, to provide the best roadway light distribution. Notify the Project Manager when the luminaire system is complete. The luminaires may be put into operation when necessary for public use as directed by the Project Manager.

## 617.03.9 Advanced Flashing Beacons

Furnish mounting hardware to mount the traffic signal and sign as shown in the Detail Drawings. Furnish a traffic signal as specified in Subsection 703.08. Payment for the sign and its mounting is covered on the signing plans.

## 617.03.10 Conductors and Cable

Install wiring meeting the National Electric Code requirements.

Neatly arrange and lace wiring in cabinets, junction boxes, and the like.

Run conductors in conduit except inside poles. Remove all dirt and moisture from the conduit runs before pulling wiring. Use powdered soapstone, talc, or other approved lubricant when placing conductors in conduit.

Run signal light conductors without splices from a terminal block located in the cabinet, compartment, or signal head to a similarly located terminal block.

Splice conductors only where specified using approved watertight connectors. Locate connectors in pole bases to be easily accessible through the handhole. Furnish watertight connectors with midget ferrule type fuses.

Leave 4 feet of slack for all cables or conductors entering each cabinet. Prepare cables for connection in the cabinet by removing at least 2 feet (610 mm) of the cable sheath. Coil slack cable and conductor neatly inside the cabinet. Furnish spade type connectors for all of the conductors in each cable. Supply connectors and fuses shown in the contract and required to complete the work. Include the cost of these items in the bid items for cable or conductor.

Leave at least 2 feet (610 mm) of slack for each cable and conductor at each standard and pull box.

Use a conductor separate from the signal light circuit for all 24-volt circuits, such as pedestrian push-button circuits.

When conductors and cables are pulled through conduit, tape the conductor and cable ends to seal out moisture until the splices are made or terminal appliances attached. Tape the ends of spare conductors.

Tag cables at controller cabinets to show routing. Label cable and conductor with the appropriate pole number or as approved by the Project Manager to show individual wire routing.

- A. Detector Loop Shielded Cable. Ground the drain wire at the controller cabinet and dead end where the cable connects to the loop wires. Make cable to loop wire connections within the pull boxes with soldered, waterproof splices.
- B. Emergency Preemption Detector Cable. Run the cable from the detector head to the discriminator. Follow the preemption manufacturer's recommendations for detector cable connections at the discriminator and detector head.
- C. 50 Ohm Coaxial Cable. Use a standard type "N" male connector with silver plated bodies and pins at the end of the cable. Use type "N" connectors manufactured by the coaxial cable manufacturer.

Provide a jumper cable to connect the lightning arrestor to the local radio that meets all of the same specifications as the coaxial cable and type "N" connectors listed above. Provide a jumper cable that is approximately 4.5 feet (1.3 m) in length. A pre-manufactured, super flexible, jumper cable may be used in place of coaxial cable.

Route the cable from the yagi antenna through the traffic signal pole as shown in the details. Field drill a hole in the traffic signal pole of approximately 3/4-inch (19 mm) diameter for cable entrance. Break sharp edges and treat the hole with cold galvanizing compound. Furnish and install a cable-protecting weatherproofing grommet to insure the installation is weather tight. Furnish and install a stainless steel wire mesh grip to provide strain relief for the cable.

Provide approximately 2 feet (.3 to .6 m) of extra cable in the lower right side of the controller cabinet prior to making the connection to the lightning arrestor.

Install coaxial cable in one continuous run from the antenna to the controller cabinet. Do not place stress on the cable during installation such that the cable is twisted or stretched.

#### 617.03.11 Service and Control Assembly

Equip and locate service and control assemblies as shown on the plans. Meet all applicable Codes and local utility company requirements.

Furnish lock and three keys to the lock.

Service pole locations shown in the contract are approximate. The Contractor, Project Manager and serving utility will jointly determine the exact locations. The utility must specify the riser location when the Contractor is to install the lower section of a riser on a utility pole. Include the cost of the 6" x 6" (150 mm x 150 mm) pressure treated wood post, if necessary, as part of the service assembly bid item.

Seat, backfill, and compact around the poles. Compact backfill in 9-inch (230 mm) lifts. Plumb and rake the pole as directed.

Treat injuries, cuts, and holes in poles after treatment with three applications of copper naphthenate solution containing a minimum two percent copper metal or with Chromated Copper Arsenate (CCA) meeting AWPA M4 requirements.

Furnish all steel conduit, ground wire, insulated clevis, service wire, all mounting hardware and fittings required to complete this item of work. Include the cost of these items, if necessary, as part of the service assembly bid item.

Run a bare AWG No.6 solid copper ground wire from the cabinet to a 5/8-inch (16 mm) by 8-foot (2.4 m) copperweld ground rod and clamp, as shown in the plans.

#### 617.03.12 Photoelectric Controls

Wire photoelectric controls to meet the contract requirements.

Mount the control at the top of the standard with the photocell oriented toward the north sky or as directed.

Use a 3 AWG No. 14 signal cable meeting Subsection 703.06.1 between the photoelectric controller and the electrical service. Include the cost of the photoelectric control, if necessary, as part of the service assembly bid item.

#### 617.03.13 Control Cabinet Pedestals

Locate the pedestal as specified or directed. Construct the pedestal, including the concrete work, as specified. Furnish a bare solid copper AWG No. 6 ground wire, ground rod clamp, and 5/8" x 8' copperweld ground rod for the controller cabinet as part of this item.

#### 617.03.14 Traffic and Pedestrian Signals

A. Optical Units. Affix a permanent label, indicating the date of installation, to the back of each LED signal indication installed. The Project Manager must approve the label and method of attachment.

Install signal heads after all other signal equipment is placed and ready for operation, or cover the entire signal head with an opaque covering marked with the words 'Out of Service'.

Use a continuous 7 conductor AWG No. 14 signal cable from the traffic signal side-of-pole terminal compartment mounted on the signal pole shaft to the end of mast arm signal indication. Use a separate continuous 5 conductor AWG No. 14 signal cable from the terminal compartment to the other signal indication closest to the terminal component. Use 5 conductor AWG No. 14 to the other signal heads as necessary. Include the cost of these cables in the price per signal standard. Cables run from the end of mast arm indication to the other signal indications are included in the cost of the signal heads. If not required for signal mounting, install a side-of-pole terminal compartment for wire termination. If not used for signal mounting, include the cost of the terminal compartment in the price per linear foot of signal cable.

Use 1/2-inch (12.5 mm) coarse thread stainless steel bolts to mount traffic signals, pedestrian signals, or terminal compartments to the side of signal poles.

B. Mounting Brackets. Plumb or level all elements, symmetrically arrange, and securely assemble. Conceal all conductors in the poles and assembly. At each signal location, construct a terminal compartment in the bracket system as shown on the plans.

Bracket mounted signals that are post top mounted must have a terminal compartment cast with an integral slip-fitter. Signal heads mounted on luminaire standards or other tall poles must have a side-of-pole terminal compartment to bolt securely to the pole.

C. Signal Head Mounting. Mount signal heads as shown on the plans. Use internally wired plumbing devices for mounting signal heads to mast arms. Use the standard mounting for all three-section mast arm mounted signals, unless 17.5 feet (5.3 m) of roadway clearance cannot be obtained. Use an elevator plumbizer, when necessary, to obtain the 17.5-foot (5.3 m) clearance.

Use an elevator plumbizer to mount all four and five section signals.

Provide positive lock rings and fittings for all signal heads. Use rings and fittings with serrated contacts.

Cooperate with Department personal to aim the signal heads after installation prior to the signal turn-on.

D. LED Retrofit. Replace the existing traffic signal lens and reflector assemblies or existing LEDs with LED modules. Install LED modules and assemblies per manufacturer guidelines and the requirements of this section.

## 617.03.15 Loops

Repair saw cuts through existing pavement markings as directed.

Clean the saw cut slot before placing the loop.

Make loop wire connections in pull boxes or signal standards using soldered, waterproof splices. Excess make-up wire, lead-in or loop wire coils are not permitted. Ensure a minimum of 3 feet (1 m) of insulated conductor is coiled neatly in the bottom of the pull box for each loop.

Tag loop wire in the pull box, or signal standard if spliced there, with a permanent wire marker indicating the approach, loop number, and "input" or "output".

The Department will verify the following loop characteristics prior to accepting the loop.

- Resistance to ground. A resistance of less than 100 Megohms indicates a faulty loop.
- Inductance. An Inductance of less than 100 microhenries indicates a faulty loop.
- Resistance. A resistance of more than 5 ohms indicates a faulty loop.

Repair faulty loops at Contractor expense.

## 617.03.16 Radio Antennas

Furnish and install suitable brackets for mounting the antenna as illustrated on the plans. Be responsible for providing proper fit of the antenna and associated assembly components.

Furnish and install a broadband (125 MHz to 1,000 MHz) flange-mounted surge suppressor utilizing a UL497B listed gas tube. Furnish an arrester that is multi-strike capable and has a maximum turn on time of 2.5 ns for a 2 kV/ns surge. Furnish an arrester with an operating temperature range of -50 °F to 120 °F. Install the surge suppressor in the lower right hand side of the controller cabinet below the incoming power panel or as directed by the Project Manager. Ensure the surge arrester is grounded to the cabinet ground bar.

## 617.03.17 Pedestrian Push Buttons

Install the push button and sign on the crosswalk side of the pole with the arrow pointing in the direction of the crosswalk.

Use ¼-inch (6 mm) coarse (20 threads/inch) stainless steel bolts to mount pedestrian push buttons to the side of signal poles.

- A. Accessible Pedestrian Signals. Any additional hardware, control unit, signal cable or wiring required for operation of each accessible pedestrian signal must be included as part of the accessible pedestrian signals.

At new traffic signal installations, do not activate accessible pedestrian signals until the day of the scheduled signal turn-on. MDT personnel from the traffic engineering section must be present before activation to program accepted sound/volume settings.

At existing traffic signal installations, do not install accessible pedestrian signals until MDT personnel from the traffic engineering section are present. Contact the Traffic Signal Engineer at least two weeks prior to installation to schedule a representative from traffic engineering.

When voice messaging is required, submit a custom voice message detail sheet with the electrical material submittals.

## 617.03.18 Span Wire-mounted Signals

Install span wire suspended signals on overhead guys providing a sag of five percent of the total span distance.

Raise overhead guys with the signals attached, to the specified sag. Adjust the guy mounting height at either or both poles, or the sag, or the rake of steel poles so that the signals are at the specified height with the proper sag and the poles are plumb when completed. Do not pull guys beyond the specified sag.

## 617.03.19 Bonding and Grounding

Make metallic cable sheaths, conduit, and metal poles and pedestals mechanically and electrically secure to form a continuous grounded system. Use copper wire or strap of equal cross sectional area to an AWG No. 6 conductor for bonding and grounding jumpers. Use a No. 6 copper bonding strap, to bond standards and pedestals, attaching it to an anchor bolt and all conduit. Use a bare copper AWG No. 6 solid wire connected between the grounding lug on the standard or pedestal and the bonding strap. Ground one side of the secondary circuit of series-multiple transformers.

Ground conduit and neutrals at service points meeting the Electrical Code or this Section, except use AWG No. 6 conductor or equal for grounding.

Furnish and install nonferrous ground rods or approved equals of at least 5/8-inch x 8 feet (16 mm x 2.4 m) at each service point. Install ground rods meeting the contract and Code requirements. Bond the service equipment to the ground rod using a ground clamp and a bare AWG metal No. 6 solid copper wire or equal enclosed in a ¾-inch (21 mm) diameter schedule 80 plastic conduit.

## 617.03.20 Conduit and Pull Boxes

Refer to Section 616.

## 617.03.21 Field Test

Conduct the following tests on traffic signal and lighting circuits with the Project Manager present before completing the work:

1. Test each circuit for continuity;
2. Test each circuit for grounds;
3. Perform a megger test on each vehicle detector loop between the loop and ground before and after sealing. The megger readings must exceed 10 megohms; and
4. A functional test that demonstrates the system functions as specified.

## 617.03.22 Salvaging and Reinstalling Electrical Equipment

- A. Salvaging Electrical Equipment. Remove, clean, salvage, and stockpile or re-install existing electrical equipment as specified.

Underground conduit, conductors, and foundations not reused are the Contractor's property and must be removed. The materials may, with written approval, be abandoned in place.

Replace all electrical equipment damaged or destroyed during salvage operations at Contractor expense.

- B. Reinstalling Salvaged Electrical Equipment. Furnish and install all necessary materials and equipment to complete the new installation.
- C. Remove and Reset Existing Poles and Standards. Remove the specified poles and standards, including their attachments from the existing locations and reset them at the specified new locations. Demolish the top of foundations to be abandoned to 2 feet (610 mm) below the finished grade. Backfill, compact and re-grade the area to the finished grade. Remove the existing wiring from the poles and standards and replace with new wiring, making all connections. Furnish four high strength anchor bolts, as specified, and two nuts and two washers for each bolt for the new foundation. Ensure the top 12 inches (300 mm) of the bolt is galvanized. Install a new foundation meeting Subsection 703.05 at the specified locations. Meet all the applicable Section 617 requirements for the reset installation.

617.03.23 Road Closure Gate Assemblies

Furnish and install Road Closure Gates as shown on the plans. Include all necessary items and work required to erect the road closure gates as shown in the plans as part of this bid item. The cost of foundations, pull boxes, luminaire assemblies, service assemblies, and conduit & cables/conductors from the service assemblies to the road closure gates are included under separate bid items.

Include the Type 3R cabinet mounted on the road closure gate and internal components thereof as part of this bid item. Furnish a dry type core and coil transformer with 120 volt primary / 12 volt secondary meeting UL standard 506. Size of the transformer is 2.79"(H) x 3.29"(W) x 3.97"(D).

Furnish and install gate arm lights that utilize red light-emitting diodes (LEDs) and have an operating range of 8.5 to 12 VAC (input voltage).

Furnish vehicular traffic signal heads meeting Subsection 703.08.

617.03.24 Overheight Detectors

Install and adjust the detectors on the poles following the manufacturer's recommendations.

Furnish the transmitter, receiver, two poles, anchor bolts, nuts, washers, all necessary wiring and connectors for this item.

617.04 METHOD OF MEASUREMENT

617.04.1 Lump Sum Basis

When a traffic signal and lighting system or portion thereof is specified in the contract on a lump sum basis, the system is measured by the lump sum.

617.04.2 Traffic Signals and Lighting

Measurement for traffic signals and lighting is made as follows:

1. Conduit and pull boxes are measured under Subsection 616.04.
2. Concrete foundations are measured by the cubic yard (cubic meter) based on plan dimensions. Deductions are not made for the concrete displaced by reinforcing steel, anchor bolts, and conduit. Foundation work includes backfill, furnishing reinforcing steel, electrical bonding, and restoring the surface around the foundation.
3. Cables, conductors, and treated timber poles are measured by the foot (meter) in place. Unless otherwise specified, conductors and cables are measured from termination to termination.
4. The following items are measured by the unit:
  - Standards
  - Controller Cabinet Pedestals
  - Controllers
  - Luminaire Assemblies
  - Service and Control Assemblies
  - Photoelectric Controls
  - Traffic Signals
  - Pedestrian Signals
  - Signal Standards
  - Detector Loops
  - Detector Loop Amplifiers
  - Pedestrian Push Buttons
  - Emergency Pre-emption Systems
  - Advanced Warning Flasher
  - Road Closure Gate Assemblies
  - Remove and Reset Existing Pole (foundation measured separately)
  - Overheight Detector
  - Other component parts as specified in the contract

617.05 BASIS OF PAYMENT

Payment for the completed and accepted quantities is made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
Traffic Signal and Lighting System	Lump Sum
Conduit and Pull Boxes	See 616.05
Concrete	Cubic Yard (cubic meter)
Cables	Foot (meter)

Conductors	Foot (meter)
Treated Timber Poles	Foot (meter)
Pull Boxes	Each
Standards	Each
Controller Cabinet Pedestals	Each
Controllers	Each
Luminaire Assemblies	Each
Service and Control Assemblies	Each
Photoelectric Controls	Each
Traffic Signals	Each
Pedestrian Signals	Each
Signal Standards	Each
Detector Loops	Each
Detector Loop Amplifiers	Each
Pedestrian Push Buttons	Each
Emergency Pre-emption Systems	Each
Road Closure Gate Assembly	Each
Remove and Reset Existing Pole	Each
Overheight Detector	Each
Other Components as specified in the contract	Each

Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract and to furnish a complete and operational system.

Rescind Section 618 and replace with the following:

SECTION 618  
TRAFFIC CONTROL

618.01 DESCRIPTION

This work is the furnishing, installing, and maintaining of traffic signs, barricades, lights, signals, pavement markings, and other specified traffic control devices. It includes flagging and pilot car operation and furnishing and applying water for dust control.

618.02 MATERIALS

Furnish materials meeting the contract, the MUTCD, and the following Subsection requirements:

Retro-reflective Sheeting .....	704.01.10
Temporary Striping Tape .....	714.01
Temporary Striping Tabs .....	714.02
Temporary Waterborne Traffic Paint.....	714.03
Signs and Channelizing Devices .....	715.01
Portable Sign Support Assemblies .....	715.02
Advance Warning Arrow Panels .....	715.03
Warning Lights.....	715.04
Flagger Ahead Warning Signs.....	715.05

Furnish work zone traffic control devices that meet the National Cooperative Highway Research Program test report 350 (NCHRP 350) or the AASHTO Manual for Assessing Safety Hardware (MASH) crash test requirements.

618.03 CONSTRUCTION REQUIREMENTS

618.03.1 Purpose and Prosecution of Work Zone Traffic Control

Schedule construction and provide work zone traffic control to accomplish the following:

1. Provide the protection, safety, and convenience for motorists, bicyclists, pedestrians, and other roadway users;
2. Ensure the protection and safety of construction personnel;
3. Advance the project work in the most beneficial manner to the public. and
4. Provide mobility for highway users.

Provide work zone traffic control for all construction activities on the roadway and within the clear construction zone and other specified areas. The construction clear zone is the area within 30 feet (9.2 m) of the edge of a traffic lane.

Furnish work zone traffic control meeting the contract requirements, the MUTCD, and the approved traffic control plan.

618.03.2 Traffic Control Plan

The Detailed Drawings and the Manual of Uniform Traffic Control Devices provide traffic control requirements for the contract.

A. Traffic Control Plan Requirements. Furnish a traffic control plan addressing the proposed operations to take place a minimum of 2 weeks prior to beginning the associated construction activities. Address contingencies in the submitted plan. Deviations or modifications from the submitted traffic control plan may be made to address field

conditions if approved by the Project Manager. Limit inconvenience to the traveling public as much as practicable and account for the safety of both the traveling public and project personnel. The Detailed Traffic Control Plan for the proposed activities must consist of the following:

1. **Contract Specific Drawings.** Provide contract specific traffic control drawings that include proposed traffic control configurations. Provide drawings with the same level of detail as in the MUTCD and the Detailed Drawings. Identify the type and location of work zone traffic control devices proposed for use.
2. **Special Features.** Identify the location and purpose of proposed flaggers, temporary signals, pilot car use, business access signs, authorized vehicle median crossings, temporary median crossings, interchanges, interstate crossovers and detours. Detours not identified in the contract are subject to the approval of the Project Manager.
3. **Sequencing Details.** Provide details for each phase in the sequence of operations and for each type of construction operation. At a minimum, include details for earthwork operations, gravel placement, paving, seal and cover, striping, bridge work, detours, permanent sign installation, guardrail work, temporary blunt end protection, temporary access breaks, equipment crossings, and any other work within the clear zone. Sequence the work such that equipment does not operate against the flow of traffic without the approval of the Project Manager.
4. **Continuous Traffic.** Provide details that ensure the continuous flow of traffic through the work zone. Maintain access to and from the premises of adjacent property owners and approaches at all times. Do not stop traffic in both directions at the same time unless approved by the Project Manager. Identify measures to provide suitable passage of mail delivery and scheduled school bus runs within the project limits. Address traffic control measures for peak travel times on urban projects, signal replacements, and increased traffic due to public events on or near the project.
5. **Off-highway Vehicle Separation.** Identify proposed measures and devices to keep articulated trucks, scrapers, and other off-highway vehicles (OHV) separated from traffic. Separate OHV's from traffic by means of separate haul roads.

Do not operate OHV's faster than 35 mph or the speed limit signed for the traveling public, whichever is lower. If any OHV operator violates this requirement or drives in an unsafe or erratic manner, upon written notice by the Project Manager, this driver must be removed from the project as an OHV operator.

If a separate haul road is not physically possible, submit an alternate plan to the Project Manager for approval. In order to be considered, the plan must meet the following requirements at a minimum:

- The traveling public has the right-of-way.
  - When an OHV approaches vehicles, the OHV must come to a complete stop until all of the vehicles pass, including traffic lines led by pilot cars.
  - The OHV's are equipped with a back-up alarm, back-up camera, and warning light.
6. **Emergency Vehicles/Situations.** Identify proposed measures to manage traffic delays due to incidents within the project limits and to accommodate emergency vehicles into and through the project limits. These measures must be presented to any local governments, tribes, or jurisdictions affected by the project.
  7. **Pedestrian Traffic Control.** Identify proposed measures and routes to maintain pedestrian traffic control if there are any pedestrian facilities within the project limits. Provide ADA compliant temporary measures for pedestrian facilities at all times. Do not close pedestrian routes without Project Manager approval. If closures of pedestrian routes are required, identify the proposed measures to warn, direct, and guide pedestrian traffic.
  8. **Certifications.** Submit a completed Form CSB618\_02 prior to placing traffic control devices. At the Project Manager's request, provide certification that each type of traffic control device in use or to be used on the project meets retro-reflectivity and NCHRP 350 or MASH requirements.
  9. **Written Narrative.** Provide a written narrative that details the proposed traffic control configuration for the project's construction operations. The written narrative must consist of the following:
    - a. Supporting details and explanation for the traffic control configuration proposals.
    - b. Detailed descriptions of the proposed traffic control for each separate operation of work.
    - c. A description of the construction sequence of operations and how the traffic control plan will accommodate each sequence. Ensure that the traffic control sequence of operations corresponds with the project schedule as described in Subsections 108.03.2 and 108.03.3.
    - d. Schedule of maintenance of traffic control devices.

**B. Traffic Control Plan Updates.** Submit an updated traffic control plan that represents proposed activities. If the traffic control plan previously provided to the Project Manager is current and changes to traffic control operations are not anticipated, provide written notification to the Project Manager of this information. Failure to submit an updated traffic control plan on time and in the manner required renders the traffic control plan unacceptable. Submit updates to the traffic control plan to the Project Manager at the following times:

1. On the 1<sup>st</sup> of each month for projects located in the Billings, Glendive, or Great Falls districts. On the 15<sup>th</sup> of each month for projects located in the Butte or Missoula districts.
2. When changes to the original construction operation plan requires a change to the traffic control plan. Coordinate the revision of the traffic control plan with the submission of the project schedule updates per Subsections 108.03.2 and 108.03.3. If the traffic control is not proceeding consistent with the Contractor's most recent traffic control plan, the Project Manager may require that the Contractor submit an updated traffic control plan that accurately reflects the Contractor's construction operations. If a required updated traffic control plan is not received or operations are not being conducted as per the current traffic control plan, the Project Manager may issue a project shut down order. Submit an updated traffic control plan prior to continuing work. Shut down orders due to the failure to meet traffic control requirements will not be considered as justification for additional compensation or contract time.

#### 618.03.3 Traffic Control Conference

Attend a work zone traffic control conference organized by the Project Manager before starting work that alters the public's use of any roadway. The provisions for traffic control proposed for each stage of construction will be reviewed.

#### 618.03.4 Traffic Control Reviews

Designate personnel to be responsible for traffic control work and its continuous surveillance. The designees must be available 24 hours a day to respond to calls concerning damage to traffic control devices from any cause. Provide the names and telephone numbers of the persons responsible for the surveillance.

The Project Manager and the designees will conduct periodic reviews of the traffic control throughout the work to insure compliance with the traffic control plan. The reviews will be conducted at night, during adverse weather conditions, when construction work is active and inactive, and at other times as necessary.

#### 618.03.5 Traffic Control General Requirements

Meet all traffic control plan requirements before starting work affecting the roadway. Use devices that are new or like new in condition.

Properly maintain, clean, and operate devices when in use. Immediately remove the devices when they are no longer applicable to the work.

Install traffic control devices in accordance with manufacturer's recommendations or instructions.

Immediately remove or cover the entire sign face of non-applicable signs. Use coverings that are opaque, non-reflective, and securely fastened to eliminate visibility of the sign face. Cover signs with shapes having a specific meaning, such as STOP and YIELD, from both sides in a manner that masks the shape. Use materials of sufficient durability to resist deterioration due to weathering and atmospheric conditions. Do not use tape, paper, garbage bags, or cardboard for the covering. Do not rotate signs.

Remove portable traffic control devices when not in use.

Immediately remove existing signs and other traffic control devices on the present traveled way or on connecting state or federal routes to be abandoned when they no longer apply. Ensure roadways are always appropriately signed. Turn removed signs over to the Department.

Provide functional traffic lanes with signing and channelizing appropriate to the roadway condition at the close of each work day.

For long-term stationary operations (greater than 3 days), remove pavement markings in the traveled way that are no longer applicable in accordance with Subsection 620.03.10. Minimize pavement scarring when removing pavement marking material. Do not paint over existing pavement markings with black paint or spray with asphalt as a substitute for removal or obliteration.

Provide the traffic an un-obscured view of the traffic control devices at all times.

Store or park construction equipment, vehicles, materials, and debris at least 10 feet (3 m) behind guardrail or outside the clear zone. When this is impractical, use approved warning devices and protective measures to delineate the item. Only equipment and materials for immediate use or incorporation into the work may be placed within the clear zone.

Store unused traffic control devices outside the clear zone.

Contractor furnished traffic control devices are the Contractor's property. Traffic control devices furnished by the Department or installed on a force account basis are the Department's property.

Repair or replace all damaged traffic control devices at Contractor expense.

If the Contractor fails to provide the required traffic control, the Project Manager will provide the work and deduct the costs from monies due or that may become due the Contractor.

#### 618.03.6 Access Breaks

Submit a written proposal on the "Request for Access Break Approval" form, available from the Project Manager, for temporary breaks in Interstate access control or right-of-way fences for approval. See the form for access breaks requiring FHWA approval. Include all information requested on the form. Interstate access breaks used for non-interstate contracts are prohibited.

Provide a written narrative that describes how the traffic control plan addresses traffic safety and minimizes delay to the mainline traffic. Ensure the plan meets the MUTCD and the departments Detailed Drawings requirements.

Do not begin work on the access break until the Department has returned an approved proposal. Obtain the Project Manager's approval for all modifications to the original plan and submit the changes in writing. Excluding traffic control, assume all costs associated with construction, maintenance, removal of the access break, and restoration of the area once the access break is removed.

#### 618.03.7 Crossing, Entering, and Using Roadways

- A. General. Construct temporary approaches and crossings with 10:1 side slopes and include drainage provisions.

Remove all temporary approaches and median crossings once the work is complete. Restore and re-seed disturbed areas.

Do not use areas within the right-of-way as borrow sources or disposal areas for the construction or restoration of temporary approaches.

Provide the means and traffic control devices to allow safe crossings whenever articulated trucks, scrapers, and other off-highway vehicles are crossing the roadway being used by traffic as included in the traffic control plan and approved by the Project Manager in advance of operations. Operate registered and licensed hauling units, such as dump trucks, belly dumps, side dumps, etc. with the flow of traffic. Do not operate any hauling units on roadway shoulders.

- B. Controlled Access and Multiple-lane Roadways. Use frontage roads and interchanges for equipment access to controlled access highways whenever possible.

Do not stop the general traffic on one-way roadways for the convenience of haul units without Department approval. Use interchanges or a series of appropriate lane closures at authorized vehicle median crossings or temporary median crossings for haul-unit operations on one-way roadways.

Haul unit turning movements are restricted to right-turn movements only when there is access to the project by frontage roads or where left-turn movements by hauling units would pose a hazard to the traveling public.

The use of authorized vehicle median crossings or temporary median crossings will not be allowed unless stated in the contract. If the construction of temporary median crossings is allowed as part of the contract, their use will be subject to all requirements of Section 618.

Submit an updated Traffic Control Plan detailing the use of authorized vehicle median crossings or the construction of temporary median crossings, including the following:

1. The distance between any two median crossings, including interchanges, authorized vehicle median crossings, and temporary median crossings must be at least 2 miles (3.2 km) unless a shorter distance is approved by the Department.
  2. Median crossings must be at least 1,000 feet (305 m) from structures and have a minimum 1,500 feet (458 m) of sight distance at 3.5 feet (1.1 m) above the pavement.
  3. Sign median crossings as specified in the contract.
  4. When not in use, protect crossings through median barriers by one of the following methods:
    - a. Place an approved impact attenuator at each end of the barrier opening.
    - b. Close the inside lanes to traffic with a controlled lane closure.
    - c. Close the opening by replacing and pinning the median barrier.
- C. Two-lane Roadways. Always provide at least one functional lane for traffic. Meet Table 618-1 requirements.

TABLE 618-1  
TRAFFIC CONTROL REQUIREMENTS FOR HAULING  
UNITS ENTERING OR CROSSING 2-LANE ROADWAYS

ADT/LOAD FREQUENCY	TRAFFIC CONTROL REQUIREMENT
Less than 2000 ADT	Stop hauling units for traffic
2000 to 5000 ADT/ Less than 50 loads per shift	Stop hauling units for traffic
2000 to 5000 ADT/ More than 50 loads per shift	Provide flaggers to control traffic
More than 5000 ADT	Provide flaggers to control traffic

- Limit the number of locations at which flagging is provided at roadway crossings, entrances or exits to:
1. One location per material source or plant site entrance or exit; or
  2. Roadway crossings approved by the Project Manager in the Traffic Control Plan.

The Project Manager may adjust the ADT or load frequency at which flagging is required in Table 618-1. The Project Manager may add or reduce flagging locations to ensure the safety and mobility of the traveling public and workers within the construction limits.

Where flaggers are not required by Table 618-1, the Contractor may use flaggers and traffic control, with Project Manager approval, at the Contractor's expense.

**618.03.8 Traffic Control at Drop-off Areas**

When existing slopes are 3:1 or flatter, temporarily fill constructed drop-offs within 30 feet (9.2 m) of the edge of travel lanes used by traffic to a 3:1 slope or flatter at the close of work each day. Furnish and install, at Contractor expense, traffic control devices for slopes not temporarily filled to a 3:1 or flatter.

When existing slopes are steeper than 3:1, temporarily fill constructed drop-offs within 30 feet (9.2 m) of the edge of travel lanes used by traffic that matches or is flatter than the existing slope at the close of work each day. Furnish and install at Contractor expense, traffic control devices for slopes not temporarily filled to match, or that are steeper than the existing slope.

Temporary filling of drop-offs protected by positive barriers is not required. Determine device spacing using the following formula:

$$\text{Factor in Feet (meters)} = \frac{(A \times C \times W)}{(S \times D)}$$

Where:

- A = Average Daily Traffic Adjustment
- C = Degree of Curvature (metric radius factor)
- W = Recoverable Width, 4:1 or flatter, in feet (meters) from the drop-off to the far edge of the adjacent traffic lane(s) with the same direction of traffic
- S = Posted Speed in MPH (km/h)
- D = Average Drop-off Depth in inches (mm)

Use the C factors in Table 618-2 for drop-offs outside of horizontal curves.

TABLE 618-2  
C - FACTORS FOR DROP-OFFS ON THE OUTSIDE OF HORIZONTAL CURVES

DEGREE OF CURVE (ENGLISH RADIUS)	C	METRIC RADIUS	C
Less than 2 (2,865 ft)	5800	Greater than 900m	241,000
2 to less than 4 (2,865 ft to less than 1,433 ft)	5200	900m to more than 450m	218,000
4 to less than 6 (1,433 ft to less than 955 ft)	4900	450m to more than 300m	203,000

6 or greater (955 ft or greater)	4500	300m or less	188,00
-------------------------------------	------	--------------	--------

Use the C - factor for curves with a degree of curve less than 2 (greater than 900 m) for drop-offs on the inside of horizontal curves.

Use the Average Daily Traffic (ADT) adjustment from Table 618-3.

TABLE 618-3  
AVERAGE DAILY TRAFFIC ADJUSTMENT FACTOR

ADT	A
Under 750	1.50
750 - 1499	1.30
1500 - 5999	1.00
Over 6000	0.90

Round the computed spacing to the nearest 10 feet (3 m).

Use Table 618-4 to determine the device type using the spacing factor.

TABLE 618-4  
TRAFFIC CONTROL DEVICE BASED ON SPACING FACTOR

SPACING FACTOR	DEVICE TYPE
400 feet (122 m) or greater	Flexible guideposts or standard delineators
40 FEET (12 M) TO 390 FEET (119 M)	Type 2 object marker
20 feet (6 m) to 30 feet (9 m)	Type C steady burn warning lights on alternate panels
Less than 20 feet (6 m)	Positive barrier, if 48 hours will lapse before filling

Space devices at the spacing factor. If the recoverable width (W) is less than 14 feet (4 m), do not exceed spacing in feet (m) that is double the posted speed in miles per hour.

Do not space Type 2 object markers less than 40 feet (12 m).

618.03.9 Traffic Control for Paving and Milling Operations

Provide flaggers at paving and milling machines. Locate the flagger 100 feet to 150 feet (30 m to 46 m) upstream from the machines.

Meet the following requirements for night paving operations:

- A. Place a 48-inch x 48-inch (1,220 mm x 1,220 mm) "NIGHT PAVING AHEAD" warning sign in advance of each warning sign series.
- B. Ensure all personnel working on or adjacent to traveled lanes are wearing Class 3 apparel in accordance with Subsection 107.06

Apply temporary striping in accordance with Subsection 620.03.5. Place temporary striping at the end of each working day in which a full width section is completed before opening to traffic. Do not use lane closures in place of temporary striping. Traffic control beyond the end of the work day, unless ordered by the Project Manager, is at Contractor expense. The Project Manager may suspend paving operations if a lack of temporary striping results in lane closures longer than the length of a day's paving.

618.03.10 Reserved

618.03.11 Traffic Control for Seal Coat Operations

- A. Two-lane Two-way and Multiple-lane Two-way Roadways. Place "LOOSE GRAVEL" (W8-7), "DO NOT PASS" (R4-1), and "SPEED LIMIT 35" (R2-1) signs, at the beginning of each work zone. Place the same sign combination for each direction of travel at 2-mile (3.2 km) intervals within the work zone. Remove "LOOSE GRAVEL" (W8-7) signs once loose cover material is swept. Leave remaining signs in place until pavement markings within the zone are completed.

Control traffic with pilot cars until initial sweeping is completed for a maximum of 72 hours. The 72-hour period associated with pilot car use for each section begins once the seal and cover has been placed and rolling is complete. For this work, a section is defined as the area of seal coat completed in each day of production.

Traffic control beyond these 72 hours, unless ordered by the Project Manager, is at Contractor expense.

- B. Interstate Highways. Use lane closures and lane control devices for seal and cover operations on Interstate highways. Do not use pilot cars unless approved by the Project Manager.

Place "LOOSE GRAVEL" (W8-7) and "SPEED LIMIT 45" (R2-1) signs at the beginning of each work zone. Sign both sides of the roadway. Place the same sign combination at 2-mile (3.2 km) intervals within the work zone. Remove "LOOSE GRAVEL" (W8-7) and "SPEED LIMIT 45" (R2-1) signs once loose cover material is swept.

Traffic control beyond these 72 hours, unless ordered by the Project Manager, is at Contractor expense.

618.03.12 Traffic Control for Striping Operations

Provide the following traffic control for striping operations not performed under closed lane or pilot car situations.

1. Furnish and operate a shadow vehicle equipped with a truck-mounted attenuator meeting the requirements of Subsection 618.02 conforming to appropriate test levels. Position the truck to follow within 150 feet to 1,000 feet (45 m to 305 m) on pavement marking removal and application. When placing or removing traffic cones that protect the pavement markings, use a vehicle with a truck-mounted attenuator or follow with a shadow vehicle possessing a truck mounted attenuator.
2. Equip shadow vehicles with an arrow board facing rear-approaching traffic.
  - a. On multiple-lane roadways, place the arrow board display in lane shift mode (sequential arrow mode).
  - b. On two-lane two-way roadways, place the arrow board in a hazard warning mode not displaying the lane-shift mode
3. If peak hours are specified in the contract, provide the Project Manager a schedule of striping operations at least 48 hours prior to striping. Perform striping operations during off-peak hours in order to minimize impacts to the traveling public unless approved differently by the Project Manager.
4. Include all costs associated with this work in the striping bid item.
5. If requested by the Project Manager, provide a written narrative identifying the proposed traffic control devices to be used for striping operations. If the Contractor and Project Manager agree that additional traffic control devices not listed in items 1 through 3 are warranted; the additional traffic control devices will be measured and paid in accordance with Subsection 618.04 and 618.05.  
Failure to properly notify the Project Manager or provide adequate traffic control renders the striping operation unacceptable and unauthorized. Unacceptable or unauthorized work will be addressed in accordance with Subsection 105.12.

618.03.13 Traffic Control Device Location and Installation

Lay out the standard distances for traffic control devices to within an accuracy of plus or minus 5 percent. The Project Manager may direct adjustments to the device locations to fit site conditions.

Display all signs with the legend not more than 5 degrees (1 inch per foot) (25 mm per 305 mm) from the horizontal plane.

Display the signs at the required mounting height with the hinged signs closed or non-hinged signs removed when not applicable.

The bottom of signs mounted on barricades or other portable devices must be at least 1-foot (300 mm) above the shoulder of the travelled way.

Use only one type of reflective sheeting in each sequence or group of signs or devices.

Stabilize sign trailers to prevent movement by wind or passing vehicles.

Mount work zone traffic control signs to posts when they are to remain at the same location for more than three consecutive days. Trailer-mounted W20-7a (flagger ahead) signs with generators are excluded from this requirement.

Assure the G20-1 ("ROAD WORK NEXT (X) MILES) and G20-2 (END ROAD WORK) signs do not conflict with other construction signing. Remove these signs when directed.

Install work zone traffic control devices sequentially toward the work area beginning with the device located farthest from the work area. Remove sequentially in the opposite direction.

Use arrow boards in the sequential or flashing-arrow mode to supplement channelizing devices and standard signing when one or more lanes of a multiple-lane roadway are closed.

Do not use arrow boards in the sequential or flashing-arrow mode for lane closures or at flag stations on two-lane two-way roadways.

Do not use flexible guide posts in place of the specified hazard identification devices for shoulder drop-offs or other hazards adjacent to the travel lanes. Refer to Subsection 618.03.8.

Flexible reflectorized warning signs are acceptable for daylight hour use.

Do not use traffic cones for channelization devices.

Do not use steel barrels for work zone traffic control.

Ensure that construction zone and work zone speed limits signs comply with the desired minimum speed limit values in Table 618-5. The Project Manager may direct adjustments to the speed limits or device locations to fit the conditions.

Submit a written recommendation if the Contractor's proposed limits differ from those in Table 618-5. Give the locations and reasons for limits differing from those provided in Table 618-5. Reasons should be based upon the conditions of the roadway and the ability of traffic to flow safely and uniformly through the construction zone or activity area. The Project Manager will provide a written response to the recommendation, detailing the speed limit signs to be used.

TABLE 618-5  
TRAFFIC CONTROL SPEED LIMITS IN CONSTRUCTION ZONES

SPEED LIMIT	ACTIVITY DESCRIPTION
Existing	-Construction activities are 30 feet (9.2 m) beyond the edge of the traveled way and construction vehicles are not crossing the traveled way. -Construction activities suspended during winter shutdown or prolonged periods of time, based upon roadway conditions. -Holiday weekends and No Work Days when work is not in progress and PTW has not been impacted. -Interstate merging tapers. -Survey crew activities not on the PTW or parking shoulder.
65 mph	-Two-lane two-way traffic on Interstates. -One-lane one-way traffic on interstates with no activities in closed lane.

55-65 mph	-One-lane one-way traffic on interstates with activities encroaching on closed lane. -Two-lane two-way non-interstate traffic traveling on non-impacted roadway surfaces when construction activities are suspended or not present, based upon roadway conditions.
45-55 mph	-Interstate crossovers. -Two-lane two-way non-interstate traffic traveling on impacted roadway surfaces when construction activities are suspended or not present, based upon roadway conditions. -Two and four-lane roadways with construction activities within the clear zone but not encroaching on the shoulders and/or driving lanes.
45 mph	-Seal coat operations on interstates, increased to 55 mph once initial brooming roadway is completed. -Interstate roadways with construction activities on shoulders.
35 mph	-Seal coat operations on two-lane two-way and multiple-lane two-way roadways, increased to 45 mph once initial brooming roadway completed. -In advance of flagging stations or temporary traffic signals. -Interstate and multiple-lane roadways with construction activities in closed lane(s), within the work zone only. -Two-lane two-way roadways with construction activities on shoulders.
25 mph	-Temporary diversions on graveled surfaces. -Pilot car queues. -Survey crew activities within the traveled way. (Non-interstate) -Two or multiple-lane roadways in an urban area with construction activity in a lane, within the work zone only.

#### 618.03.14 Flagging Operations

Provide flaggers that are currently certified by the Montana flagger training program, the ATSSA flagger program, or Idaho, Oregon, or Washington state flagger training programs. Flaggers are required to carry proof of flagger certification and present to the Project Manager when requested.

Provide flaggers that are competent and equipped as required in the Department's booklet "Flaggers Handbook" furnished by the Department.

Maintain constant radio contact between flaggers at each end of a work zone and pilot vehicles when visual contact is not possible. Use two-way V.H.F. or U.H.F. FM radios, operable in the terrain.

Place the W20-7a (flagger ahead) warning sign signals so they are visible 2,000 feet (610 m) in advance of the sign. Place and operate the sign only when a flagger is at the flag station.

Provide a second flagger when more than 10 vehicles are stopped at a flag station 50 percent of the time to advise traffic of the delay. Place an additional W20-7a sign 500 feet to 1,000 feet (153 m to 305 m) ahead of the average end of the stopped vehicle line.

A. Nighttime Flagging Requirements. Nighttime flagging operations are those that occur from sunset to sunrise. Provide the following enhancements when nighttime flagging is used:

1. Illuminated Flagging Stations. Use portable light plant(s) or portable balloon light(s) to illuminate flagging stations with a minimum luminance level of 10 foot-candles. Locate the illumination source so as not to create a hazard to the travelling public and to minimize glare to oncoming drivers. Shield light as necessary to prevent overflow onto adjacent properties. When requested by the Project Manager, use a luminance meter with a minimum accuracy of 5%, capable of measuring with a minimum resolution of 0.1 lux to take a luminance measurement at the flagging station. Take the measurement on a horizontal plane three feet above the roadway surface.

2. Illuminated Flagger Paddles. Flagger paddles must be of octagonal shape at least 18 inches wide with letters at least six inches high, fixed to a rigid handle. Use signs having red colored flashing LED lights inside the STOP face and amber colored flashing lights inside the SLOW face, having a flash rate of 50 to 60 flashes per minute. LED arrangement must display an octagonal shape for STOP and a diamond shape for SLOW. The power source must be fully enclosed within the pole section.

3. Garments. Use high visibility safety apparel that meets the Performance Class 3 requirements of the ANSI/SEA 107-2004 publication entitled "American Standard for High Visibility Safety Apparel and Headwear".

4. Flashing Flagger Sign. The W20-7a sign must be illuminated with amber LED lights meeting the requirements of Subsection 715.05(B). Subsection 715.02 requirements apply for mounting the portable signs and the illumination power source.

5. Temporary Transverse Portable Rumble Strips. Place three temporary transverse portable rumble strips 3-4 feet apart at the location of the W3-4 "Be Prepared to Stop" sign. Use temporary transverse portable rumble strips that meet the following:

- a. Provide significant audible and vibratory alerts to drivers;
- b. Dimensions are a minimum of 10 feet long, 1 foot wide and ¾ inches thick;
- c. Maintains position on roadway without the use of adhesives or fasteners;
- d. Maintains rigidity with no curling;
- e. A bevel on the leading edge within the range of 11-13 degrees;
- f. Made of flexible polymer material with a non-slip surface;
- g. Able to function on wet surfaces; and
- h. Capable of being installed and removed without any auxiliary equipment or machinery.

#### 618.03.15 Pilot Car Operations

Use pilot cars as specified. Equip the cars with amber flashing lights, and the G20-4 sign designated in Part VI of the MUTCD. Mount the sign in a conspicuous position on the vehicle with the bottom sign edge at least 6 feet (1.8 m) above the ground.

Schedule and cycle pilot vehicles to depart each flag station at maximum 15-minute intervals.

618.03.16 Water for Dust Control

Furnish, haul, and apply dust control of water using tank trucks equipped with spray systems that uniformly distributes the water over the application area. Discontinue watering as directed.

618.04 METHOD OF MEASUREMENT

The contract quantities for traffic control devices, temporary pavement markings, flagging, and pilot car operation are an estimate only and may vary from the actual quantities used or required in the contract. No additional compensation is considered or allowed due to these quantity differences.

Signs and devices must meet standards outlined in the current ATSSA "Quality Guidelines for Temporary Traffic Control Devices" to be measured for payment. Failure to adequately maintain and clean traffic control devices in use renders the traffic control operation unacceptable.

The contractor, upon receiving written or verbal notification, will be given 24 hours to make the traffic control operation compliant. Traffic Control directly affecting the safety of the public must be attended to immediately. The Project Manager may deduct 10 percent of the daily traffic control units due to traffic control operations not meeting the requirements set forth in Section 618.

Failure to submit an updated traffic control plan on time and in the manner required renders the traffic control plan unacceptable. The Department may withhold 10 percent of each monthly progress estimate for failure to submit an updated traffic control plan on time and in the manner required. Payment withheld for violation of the traffic control plan requirements will be included in the next progress estimate following the Contractor's submission and the Project Manager's approval of the updated traffic control plan.

Providing the traffic control plan is incidental to and included in payment for the traffic control bid item.

618.04.1 Traffic Control - Units

Traffic control devices are measured by the units of traffic control devices used and accepted. A unit of traffic control device is the base value used for establishing the relative value of each type of traffic control device. The relative value of each traffic control device in units is shown in the "Traffic Control Rate Schedule."

618.04.2 Traffic Control - Lump Sum

Traffic control is measured by the Lump Sum. Provide a written request for compensation resulting from a change in scope of work, differing site conditions or additional work. Quantities approved by any requested change will be measured by the units of traffic control devices used and accepted.

618.04.3 Flagging

Flagging is measured by the hour for the actual number of approved flagging hours provided on the project for each flagger used.

Travel time for flaggers to and from the project is not measured for payment.

618.04.4 Pilot Car Operation

Pilot car operation is measured by the hour for the approved number of hours of operation for each properly equipped pilot car.

618.04.5 Vacant

618.04.6 Items Not Eligible for Separate Payment

The following items are not measured or paid for separately:

- Amber flashing or strobe lights on equipment, vehicles, and hauling units;
- Impact attenuators for median barrier openings;
- Permits and costs relating to project access;
- Construction, drainage, maintenance, removal, restoration and reseeded of areas used for temporary roads, approaches, and crossovers;
- Radios for flaggers and pilot vehicles;
- Illumination of work areas;
- ReflectORIZED safety equipment, garments, and headgear;
- Vehicle-mounted arrow boards on stripers and shadow vehicles;
- Replacing temporary pavement marking tabs and tape destroyed by traffic;
- Temporary pavement marking tabs used for seal coat operations;
- Costs to clean and maintain installed traffic control devices;
- Devices not properly maintained.
- Devices placed beyond 1,500 feet (458 meters) of the work termination point for that day.
- Adjustments or moving of devices that were initially installed improperly.
- Adjustments or moving of devices solely to aid contractor operations, such as temporarily relocating devices to allow equipment access.
- Additional traffic control costs resulting from corrective actions on items failing to meet contract requirements.
- Traffic Control at commercial pits; and
- Other miscellaneous materials and equipment required for proper traffic control that are not included in the "Traffic Control Rate Schedule".

618.05 BASIS OF PAYMENT

Payment for the completed and accepted quantities is made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
Traffic Control	Unit
Traffic Control	Lump Sum
Temporary Pavement Markings	Mile (kilometer)

Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract.

618.05.1 Traffic Control - Units

Traffic control devices are paid for at the contract unit price per unit of traffic control devices. The units of each type of traffic control device paid for are calculated by multiplying the measured quantity of each device by the value per each unit shown in the traffic control rate schedule.

Payment for traffic control devices is made for each setup directed by the Project Manager.

Replacing properly installed traffic control devices destroyed by traffic is paid for at the contract unit price per unit of traffic control devices.

Payment for barricades and drums includes the required ballast.

Payment for signs mounted on barricades is made only for the original mounting.

Payment for flashing arrow boards is made only for the actual hours of operation approved by the Project Manager. Payment includes the cost of operating the trucks or trailers on which the arrow boards are mounted.

Store devices in approved staging areas with a maximum of one staging area per three-mile segment of roadway. Detail the staging areas in the traffic control plan submitted for the Project Manager's approval. All devices not stored in the approved staging areas will be paid for at category #2 payment amounts.

Payment for traffic control devices will be made under one of the following two categories:

1. Category #1 - Standard Installation. The following movements constitute a "standard installation":
  - Initial device placement and setup
  - Device relocation and setup requiring the device be loaded into, or hitched to, a truck or vehicle for movement to a new location.
2. Category #2 - Adjustments. The manual moving of a device conducted by dragging, carrying, etc. of the device required to move it to a new location of a traffic control operation.

Payment for traffic control devices will be paid for at the rates listed in Table 618-6 according to the category and device type.

TABLE 618-6  
TRAFFIC CONTROL RATES BASED ON CATEGORY AND DEVICE TYPE

CATEGORY #	DEVICE	PAYMENT AMOUNT PERCENT
1	All Category 1 Devices	100
2	Type III Barricades	25
2	All Other Category 2 Devices	50

618.05.2 Traffic Control - Lump Sum

Payment for all costs associated with performing traffic control is included in the lump sum bid for Traffic Control. Payment for quantities approved by any requested change will be in accordance with the Traffic Control Rate Schedule, and will be paid under Traffic Control - Fixed.

Partial payments for Traffic Control will be monthly based on the lump sum contract price at the rates listed in Table 618-7.

TABLE 618-7  
TRAFFIC CONTROL - LUMP SUM PROGRESS PAYMENTS

PROGRESS ESTIMATE PAYMENT	PERCENT OF LUMP SUM ITEM
First Partial Payment After Start of Contract Work	35
Estimate Paying 25% of Original Contract Amount	25
Estimate Paying 50% of Original Contract Amount	20
Estimate Paying 75% of Original Contract Amount	10
Final Partial Payment After Conditional Final Acceptance	Remainder of Traffic Control Contract Price

619 SIGNS, DELINEATORS, AND GUIDEPOSTS Page 351 5-9-13

Rescind the Title of Section 619 Signs, Delineators, and Guideposts and replace with the following:

SECTION 619  
SIGNS AND DELINEATORS

619.01 DESCRIPTION Page 351 5-9-13

Rescind the first sentence and replace with the following:

This work is furnishing, fabricating, erecting, removing, and resetting signs and delineators.

619.02 MATERIALS (SIGNS, DELINEATORS, AND GUIDEPOSTS) Page 351 5-9-13

Rescind Subsection 619.02 and replace with the following:

619.02 MATERIALS

Furnish materials meeting the Detailed Drawings and the following Subsection requirements:

Signing Material	704.01
Flexible Delineators	704.03
Delineators	Detailed Drawings

619.03.1 DEFINITIONS

Rescind Part (B) and replace with the following:

- B. Reuse Sign Face. Signs designated "Reuse Sign Face" are to be removed from the existing supports and remounted on new supports at the specified locations.

Add the following new paragraph to the end of the Subsection following Part (G):

Furnish new materials for signing work in accordance with Table 619-1.

Table 619-1  
Materials Required for Sign Work

	Alum. Sheeting/ Sign Face	Support (Post)	Breakaway	Foundation
New	X	X	X	X
Reuse Sign Face		X	X	X
Replace	X	X	X	X
Replace Sign Face	X			
Use As-is				
Reset			X	X
Remove				

Note. The materials mentioned above are based on planned operations. Meet the requirements of the contract. If no pay item exists for necessary materials, absorb the costs of these items in other signing components.

619.03.2 DESIGN CALCULATIONS AND SHOP DRAWINGS

Rescind the third paragraph (that begins with "The Department has...") and replace with the following:

The Department has 15 business days upon receipt of the drawings for drawing review. Drawings returned to the Contractor for corrections or additional information must be re-submitted within 15 business days of receipt.

Within the fourth paragraph, rescind the first sentence (that begins with "After the structural...") and replace with the following:

After the structural steel shop drawings and welding procedures have been reviewed and checked by the Department, all required corrections will be returned to the Contractor who must make the corrections and re-submit ten copies of the corrected drawings and welding procedures for final review and approval within 15 business days.

619.03.3 FABRICATION AND ERECTION

Add the following paragraph after the fourth paragraph:

When necessary, use full width piano hinges for all folding signs. Ensure that hinges are capable of withstanding normal dead and live loads applied and be securely fastened by bolting or riveting to the sign. The hinge must meet the requirements of Subsection 704.01.13.

Rescind the seventh paragraph (that begins "The specified...") and replace with the following:

The specified foundation depth for timber posts and poles is a minimum depth. Field cut the poles to the correct length or bury the extra length to provide the specified mounting.

Rescind the eighth paragraph (that begins "Excavate or...") and replace with the following:

Excavate or bore foundation holes for sign supports at least 8 inches (200 mm) larger than the largest diameter of post or pole placed in each hole.

After the ninth paragraph, rescind the fourth bullet (that begins with "Backfill the hole...") and replace with the following:

- Backfill the hole with the soil-cement mixture in 8-inch (200 mm) maximum lifts.

Rescind the tenth paragraph (that begins "Foundation holes...") and replace with the following:

Foundation holes for wooden sign supports may be backfilled with Class "F" portland cement concrete using the specifications for constructing foundations for steel sign posts as follows.

Rescind the eleventh paragraph (that begins "Backfill foundations...") and replace with the following:

Construct foundations for steel sign posts with Class "DD" concrete meeting applicable requirements of Section 551. Finish foundations flush with the adjacent surfaces. Signs may be post mounted after the concrete has set 72 hours.

Rescind the last paragraph (that begins with "Weld metal joints...") and replace with the following:

Weld metal joints and post breaks meeting Section 556 and 624 requirements.

---

**619.03.6 REPLACE, REUSE, AND RESET SIGNS** Page 353 9-26-13

Rescind the title of Subsection 619.03.6 and replace with the following:

619.03.6 Replace, Reuse Sign Face, and Reset

Rescind paragraphs six and seven.

---

**619.03.9 GUIDEPOSTS** Page 353 5-9-13

Rescind Subsection 619.03.9 Guideposts and replace with the following:

619.03.09 Flexible Delineators

Install delineators as specified by the manufacturer's recommendations and at the locations shown in the plans or as directed by the Project Manager.

---

**619.03.12 BREAKAWAY SYSTEM** Page 354 9-26-13

Add the following Subsection:

619.03.12 Breakaway System

Furnish breakaway devices listed on the Department's QPL and meeting the requirements of Subsection 704.01.4(D). Install per manufacturer's recommendations.

---

**619.03.13 REMOVE SIGNS** Page 354 9-26-13

Add the following Subsection:

619.03.13 Remove Signs

Remove foundation material left after removing the existing signs to at least 1-foot (300 mm) below ground-line. Backfill and compact the holes left from removal using clean material or crushed base. Do not cut off and leave existing posts in place.

Existing signs and supports specified for removal are the Contractor's property. Dispose of removed sign materials in accordance with local, state, and federal regulations. Disassemble and store signs specified to remain the Department's property at the designated location.

---

**619.04.1 ALUMINUM AND PLYWOOD SIGNS** Page 354 10-10-13

Rescind Subsection 619.04.1 and replace with the following:

619.04.1 Aluminum and Plywood Signs

Aluminum sheet, aluminum sheet increment, and plywood signs are measured by the square foot (square meter) of sign face.

---

**619.04.2 METAL POSTS** Page 354 3-27-14

Rescind Subsection 619.04.2 and replace with the following:

619.04.2 Metal Posts

Metal posts are measured by the pound (kilogram). The pay weight is calculated by multiplying the nominal weight per foot (meter) by the installed length of each post as noted in the detail drawings. When applicable, the weight of the anchor sleeve will be added to the post weight.

If there is no breakaway system bid item, include with the post weight the weight of the base plates, fuse plate, and stub post or anchor sleeve including the embedment length.

619.04.4 DELINEATORS AND REFERENCE MARKERS Page 354 3-27-14

Rescind Subsection 619.04.4 Delineators and Reference Markers and replace with the following:

619.04.4 Delineators

Delineators of each type specified are measured by the unit and include the reflector, mounting hardware, and post, complete in place.

Removal of the existing delineators is not measured for payment.

619.04.5 GUIDEPOSTS Page 354 5-9-13

Rescind Subsection 619.04.5 Guideposts and replace with the following:

619.04.05 Flexible Delineators

Flexible Delineators of each type specified are measured by the unit.

619.04.6 RESET SIGNS Page 354 9-26-13

Add the following paragraph between paragraphs three and four:

When signs designated as "Reset" require new supports to achieve the proper mounting height, include the costs of the supports in the cost of reset signs.

619.04.9 REUSE SIGNS Page 355 9-26-13

Rescind Subsection 619.04.9 Reuse Signs and replace with the following:

619.04.9 Reuse Sign Face

New material for supports for signs designated "Reuse Sign Face" is measured under Subsections 619.04.2 and 619.04.3.

Removal of existing signs designated "Reuse" is measured under Subsection 619.04.7.

619.04.10 SHEET ALUMINUM OVERLAY Page 355 10-10-13

Rescind Subsection 619.04.10 and replace with the following:

619.04.10 Sheet Aluminum Overlay

Sheet aluminum for signs designated "Sheet Aluminum Overlay" is measured by the square foot (square meter) of sign face complete in place.

619.04.11 LUMP SUM BASIS Page 355 9-26-13

Rescind Subsection 619.04.11 and replace with the following:

619.04.11 Breakaway System

A. Square Tubular Steel Post. Breakaway systems are measured per each and include the breakaway device and all associated hardware required to attach the breakaway device.

B. Structural and Tubular Steel Posts. Breakaway systems are measured per each and include the breakaway device, fuse plate, and all associated hardware required to attach the breakaway device. Include the cost of the concrete anchors to attach the breakaway to the foundation in the cost of the breakaway.

619.05 BASIS OF PAYMENT Page 355 5-9-13

Rescind only the pay items shown from the table:

Sign System	Lump Sum
Delineator and Reference Markers	Each
Guideposts	Each

Add the pay item shown to the table:

Delineator (Type and Design)	Each
------------------------------	------

620 PAVEMENT MARKING APPLICATION Page 357 3-27-14

Rescind Section 620 and replace with the following:

SECTION 620  
PAVEMENT MARKING APPLICATION

## 620.01 DESCRIPTION

This work is the application of temporary striping, interim pavement markings, and final pavement markings.

## 620.02 MATERIALS

Furnish materials meeting the following Subsection requirements:

Temporary Striping Tape	714.01
Temporary Striping Tabs	714.02
Temporary Waterborne Traffic Paint	714.03
Waterborne Traffic Paint	714.04
High Durability Waterborne Traffic Paint	714.05
Epoxy Traffic Paint	714.06
Preformed Plastic Material	714.07
Reflective Glass Beads	714.08

## 620.03 CONSTRUCTION REQUIREMENTS

## 620.03.1 General

Furnish a manufacturer's material certification or data sheet for the product to be used. Do not apply materials that do not meet the contract requirements. The Project Manager may request a manufacturer's sample or take field samples for testing. Furnish a material sample weighing at least 2 pounds (0.91 kg). Furnish temporary waterborne traffic paint, waterborne traffic paint, high durability waterborne traffic paint, epoxy traffic paint, and glass beads listed on the Department's QPL.

## 620.03.2 Layout of Pavement Markings

The Project Manager will lay out the final pavement marking configurations and locations. Notify the Project Manager a minimum of 10 business days before striping in the permanent location is to begin.

Preserve all marking configurations and locations after the initial layout by the Department.

Apply the markings to within  $\pm 1/4$  inch (6 mm) of the specified width.

Apply the centerline and shoulder lines within 0.30 feet (90 mm) of the true line. Ensure the stripe does not deviate by more than 0.15 foot (50 mm) in 500 feet (150 m).

Apply all other markings (words, symbols, stop bars, crosswalks, hash marks, and others) within 0.25 feet (75 mm) of the location marked by the Project Manager.

Apply words, symbols, letters, and/or numeral pavement markings free of gaps and fully solid.

The Project Manager will determine the accuracy of the applied markings.

Remove and replace out of specification pavement markings as directed at Contractor expense.

## 620.03.3 Equipment

Use equipment manufactured to apply the material type. Ensure the equipment prevents paint spray or bead loss outside the specified line width. Equip the pavement-marking machine with a flow meter and totalizer that measures paint quantities in gallons (liters), to the nearest 0.1 gallon (0.1 L). Calibrate the flow meter before use on the project and when directed. Locate the flow meter in the flow line to the spray nozzles. Locate the totalizer where it can be easily read. Ensure the calibration adjustment is accessible without meter removal or using a calibration adjustment device.

Ensure the application equipment is acceptable to the manufacturer.

Submit calibration certificates from an independent agent for the paint tank. Re-certify the tank at the beginning of each year before using the equipment on Department contracts. The Project Manager may inspect the tank before each use and as determined necessary.

Stop bars, crosswalks, and words/symbols may be applied with hand-operated equipment.

Terminate marking application when the equipment fails to apply the markings meeting the contract requirements. Make equipment adjustments and resume striping.

For material paid by the gallon (liter), quantities will be verified by measuring the equipment's paint tank(s), using tank stabs. The Project Manager will visually witness tank stabs at the beginning and end of each work shift, any time additional paint is added to the tank, at the beginning and end of each route/road segment on contracts with multiple route/road segments, at the beginning and end of each certified paint lot, and at other intervals as necessary.

Park the equipment on a level surface approved by the Project Manager for each tank measurement.

## 620.03.4 Surface Preparation and Weather Limitations

A. General. Prepare the surface to be painted meeting the paint manufacturer's recommendations. Remove loose material by sweeping and brooming no more than two days before striping. If not bid separately, the cost of this operation is included with the cost of the striping and is not measured separately for payment. Inform the Project Manager and modify, when required, the surface preparation to ensure optimal bonding of the marking to the surface and to provide the specified marking requirements.

Apply the material following the manufacturer's recommendations.

Apply pavement markings during daylight hours only. Obtain Project Manager approval to apply pavement markings any other time.

Grind all surfaces with existing epoxy pavement markings within 3 calendar days before applying the pavement markings.

Grinding is surface abrasion to provide a roughened surface free of loose paint chips, loose seal aggregate and surface debris. Grind to a depth that completely removes the existing pavement markings. Immediately stop grinding if the depth exceeds that of the existing pavement markings and make adjustments to meet the specified grind depth.

B. Concrete Surfaces. Prepare existing concrete surfaces meeting (A) above. Do not grind or apply final pavement markings on new concrete until 30 calendar days after it has been placed.

- C. Removal Limits. Meet the following removal limits:
  - Do not grind more than 1 inch wider (25 mm) than the existing stripe.
  - Do not grind more than 4 inches (100 mm) from the beginning or end of the stripe being removed.
- D. Disposal. Collect and dispose of all removed material and new traffic marking materials spilled during the work. Process, handle, transport, and dispose of the materials meeting the current applicable solid waste laws and regulations.

#### 620.03.5 Temporary Striping

Temporary striping consist of the centerline markings for two-lane two-way roadways; lane line markings for divided four-lane Interstates, and centerlines and lane lines for two-way undivided three or more lane roadways. Divided roadways are roadways where the paved surface for each direction of travel is physically separated by an unpaved section.

Apply temporary striping for paving and milling operations in accordance to Subsection 618.03.9.

Remove, at Contractor expense, all temporary striping that conflicts with interim or final pavement markings.

Remove conflicting temporary stripe(s) the same day the interim or final pavement markings are applied.

- A. Temporary Waterborne Traffic Paint. Apply a 10 mil  $\pm$  1 mil (0.254 mm  $\pm$  0.025 mm) thick wet film immediately followed by applying at least 6 lbs/gallon (0.72 kg/L) of glass beads to temporary striping.
- B. Tape. Follow the tape manufacturer's recommendations for road surface preparation and installation. Install the tape meeting the contract requirements.
- C. Tabs. Follow the tab manufacturer's recommendations for road surface preparation and installation. Install the tabs meeting the contract requirements.

#### 620.03.6 Interim Pavement Markings

Interim pavement markings consist of all longitudinal striping (centerlines, edge lines (shoulder lines), lane lines, etc.) and words and symbols identical to the final pavement marking configuration. Use the material specified in the contract.

Apply interim pavement markings no later than 10 calendar days after the application of temporary striping on intermediate lifts, and before opening to traffic on top lift. Do not apply Interim Pavement Markings when the ambient air temperature is lower than 40 degrees F.

Stripe newly constructed pavements, including partially completed sections. Apply the interim pavement markings matching the final pavement marking configurations and locations. Interim pavement markings placed prior to chip seal may be offset as approved by the Project Manager.

The Project Manager will suspend all remaining contract work if the interim striping is not applied within the time specified above.

- A. Waterborne Traffic Paint. Apply a 16 mil  $\pm$  1 mil (0.406 mm  $\pm$  0.025 mm) thick wet film immediately followed by applying at least 8 lbs/gallon (0.96 kg/L) of Montana Type 1 or 2 glass beads.
- B. High Durability Waterborne Traffic Paint. Apply a 16 mil  $\pm$  1 mil (0.406 mm  $\pm$  0.025 mm) thick wet film immediately followed by applying at least 8 lbs/gallon (0.96 kg/L) of Montana Type 1 or 2 glass beads.

#### 620.03.7 Final Pavement Markings

Apply final pavement markings a minimum of 30 calendar days, and a maximum of 45 calendar days, after concrete is placed or after seal coat operations through initial sweeping are completed. When final pavement markings are the only remaining item of work on the project, contract time assessment will be suspended until either, beginning final pavement markings application, or 45 calendar days elapse after seal coat operations are completed or concrete placement is completed. The Project Manager may extend the 45 days due to holidays or inclement weather that prevent the application of final pavement markings.

Use the material specified in the contract.

- A. Epoxy or other Polymeric Traffic Paint. Submit a copy of the manufacturer's instructions for surface preparation and material application.

Include in the instructions:

- Equipment Requirements
- Approved Work Methods and Procedures
- Material Application Range
- Ambient & Surface Temperature Requirements
- Weather Limitations
- Precautions
- All other requirements for successful application and material performance.

Do not place materials before furnishing complete instructions to the Project Manager.

Apply a 20-mil  $\pm$  2 mil (0.508 mm  $\pm$  0.051 mm) thick wet film immediately followed by applying at least 25 lbs/gallon (3 kg/L) of Montana Type 2 glass beads to the epoxy.

Ensure application equipment accurately meters the two components and produces and maintains the mixing head temperature, all meeting the epoxy manufacturer's specifications.

Immediately terminate striping application if the applied stripe(s) are less than 18 mils thick. Grind all 18-mil and thinner striping meeting Subsection 620.03.4 and replace the striping meeting the contract requirements at Contractor expense. Correct all deficient striping before continuing with the remaining striping work. The Project Manager will identify deficient stripe thickness by comparing the tank quantities measured and used against the length, width, and application rate of the applied stripe.

Apply the pavement marking material when the pavement is dry and the ambient temperature is 40 °F (4.4 °C) and rising or follow the manufactures surface and temperature requirements, whichever is more restrictive.

- B. Preformed Plastic Materials. Apply pavement markings up to 8 inches (205 mm) wide in a single application to the specified width. Apply pavement markings over 8 inches (205 mm) wide in 6-inch or 8-inch (155 or 205 mm) multiple applications and minimum fractional 4-inch (100 mm) applications.

Apply the marking material at the thickness specified in the contract.

Cut and true the marking material edges.

Apply inlaid plastic materials into the new asphalt pavement just before final compaction and roll it flush with the roadway surface during the final plant mix compaction.

#### 620.03.8 Concrete Curbs

Use the material specified in the contract.

Apply curb paint during the application of the final pavement markings. Clean the concrete surfaces meeting the paint manufacturer's recommendations. Apply paint on concrete a minimum of 30 calendar days after the concrete has been placed.

Paint the tops and traffic sides of curbs at restricted parking locations as specified.

Apply yellow paint to the tops and traffic sides of all island curbs, median curbs, and other similar curbs.

Apply Type 1 or Type 2 reflective glass beads at a minimum rate of 8.0 pounds per gallon (0.96 kilograms per liter) immediately following the application of epoxy to concrete curbs.

#### 620.03.9 Marking Protection

Furnish all traffic control necessary to protect markings until dry. Correct smeared or damaged markings at Contractor expense.

#### 620.03.10 Marking Removal

Remove existing temporary and final pavement markings using any of the following:

- Sand blasting with air or water;
- High-pressure water;
- Steam or super-heated water; or
- Mechanically grinding, sanding, scraping, brushing.

Submit the method or methods to be used. The Contractor may submit written proposals for other removal methods. An approved method may be subsequently disapproved if it damages the marking surface or inadequately removes existing markings.

Remove all pavement markings that would conflict with newly applied striping or markings at contractor expense. Remove conflicting pavement markings the same day new markings are applied.

Remove sand or other material on the surface left by the removal as the work progresses.

Satisfactorily repair surfaces damaged by marking removal at Contractor expense.

### 620.04 METHOD OF MEASUREMENT

#### 620.04.1 Temporary Striping Quantities

Temporary striping is measured by the mile (kilometer) of stripe applied (centerline, whether pass or no pass, is measured once per application).

Only those pavement markings represented by a Manufacturer's Material Certification at the time of application, and actually used and witnessed on the project are eligible for payment.

#### 620.04.2 Interim Pavement Marking Quantities

Interim pavement markings are measured by the gallon (liter).

Only those pavement markings represented by a Manufacturer's Material Certification at the time of application, and actually used and witnessed on the project are eligible for payment.

Should the actual quantity measured by the Project Manager using tank stabs or totalizer exceed the quantity calculated, the lesser quantity will be paid for.

The quantities will be calculated using the application rate (17 mils) times the specified width (without applying the tolerance) times the length of line applied.

#### 620.04.3 Epoxy Traffic Paint

Epoxy is measured by the gallon (liter).

Only those pavement markings represented by a Manufacturer's Material Certification at the time of application, and actually used and witnessed on the project are eligible for payment.

Should the actual quantity measured by the Project Manager using tank stabs or totalizer exceed the quantity calculated using an application rate of 22 mils times the specified width (without applying the tolerance) times the length of line applied, the lesser quantity will be paid for.

#### 620.04.4 Preformed Plastic Materials

Preformed plastic and thermoplastic pavement striping is measured by the foot (meter).

Words and symbols are measured by the square foot (square meter).

#### 620.04.5 Curb Painting

Painting curb is measured by the gallon (liter).

#### 620.04.6 Hand Painted Pavement Markings (Words and Symbols)

Hand painted pavement striping, words and symbols, stop bars, crosswalks, hash marks, and other striping not applied by a striping truck are measured by the gallon (liter). Quantity measurements are based on flow meter/totalizer readings taken before and after each run or if a calibrated tank is used, tank measurements are taken before and after each run. Computerized quantity print outs will be compared against tank stabs and the quantity calculated based on the surface area times the application rate for the product used.

The amount of paint measured for payment is the difference between the startup readings and the end readings. Should the actual quantity measured by the Project Manager using tank stabs or totalizer exceed the quantity calculated using the application rate times the surface area applied, the lesser quantity will be paid for.

All readings that measure paint for payment will be taken by the Project Manager. Provide all necessary assistance to make the readings including sufficient notice before the paint work begins.

620.04.7 Removal of Pavement Markings

If bid separately, pavement striping removal is measured by the foot (meter) based on a 4-inch (100 mm) width, for the actual quantity of striping removed. Lines wider and narrower than 4 inches (100 mm) are converted to the equivalent linear feet (meter) of 4-inch (100 mm) wide line.

Removal of words and symbols is measured by the square foot (square meter) and converted to the equivalent linear feet (meter) of 4-inch (100 mm) wide line.

If not bid separately, removal of pavement markings is incidental to other items and is not measured separately for payment.

620.04.8 Line Control

Establishing line control for pavement markings is not measured for payment.

620.05 BASIS OF PAYMENT

Payment for the completed and accepted quantities is made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
Temporary Striping	Mile (kilometer)
Curb Painting	Gallon (liter)
Words & Symbols	Gallon (liter)
Striping	Gallon (liter)
Plastic Markings	Square Foot (meter) or Linear Foot (meter)
Remove Pavement Markings	Linear Foot (meter) or Square Foot (meter)

Line control is not paid for separately, but is included in the cost of the pavement markings.

Interim stripe applied over temporary stripe is measured and paid for as interim stripe.

The quantity that is paid for marking materials is the lesser of the following quantities:

- Flow meter and totalizer;
- Calibrated tank and measuring device (tank stabs); and
- Surface area times the application rate specified.

Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract.

622.03.2 SEPARATION/STABILIZATION GEOTEXTILE Page 371 1-16-14

Within the second paragraph, after the first sentence (ending with "...the covering operation.") add the following:

Do not place geotextile over frozen material.

Within the second paragraph, rescind the last sentence (that begins "Overlap in accordance...") and replace with the following:

Overlap adjoining edges a minimum of 3 feet (0.9 m) or use sewn seams.

Delete Table 622-1.

Within the fifth paragraph, rescind the sixth sentence (that begins, "Do not blade...").

622.04 METHOD OF MEASUREMENT (GEOTEXTILE) Page 374 5-24-12

Rescind Subsection 622.04 and replace with the following:

Geotextiles are measured by the square yard (square meter) as staked by the Project Manager, except silt fence, which is measured by the yard (meter) of fence. Seams, excavated vertical faces, and laps, including any portion of geotextile keyed into the subgrade or fill material, are not measured for payment. For subsurface drainage filter geotextile, the entire drainage trench perimeter, and the top width, is measured for payment.

623 MAILBOXES Page 375 1-16-14

Rescind Section 623 MAILBOXES and replace with the following:

SECTION 623  
MAILBOXES

623.01 DESCRIPTION

This work is the removal, temporary reset and maintenance, and furnishing and installation of new mailboxes and crash-worthy supports at the specified locations or as directed.

623.02 MATERIALS

Use mailboxes listed on the Department's Qualified Products List (QPL) for Mailbox and Mailbox – Large. The QPL requirements and list can be found on the Department's website. The mailbox carrier service door must be embossed with the following two statements: "U.S. MAIL" in a minimum of 1/2 inch (13mm) high letters and "Approved By The Postmaster General" in a minimum of 3/16 inch (4.8mm) high letters.

Provide permanent address markings on the flag side of the mailbox at least 1 inch (26mm) high and in contrasting color in neat, legible letters and numbers. If the mailboxes are grouped provide address numbers on the mailbox door.

Furnish a crashworthy mailbox support as shown in the Detailed Drawings, a mailbox support identified in the current edition of the AASHTO *Guide for Erecting Mailboxes on Highways*, or other commercially manufactured NCHRP 350 compliant crashworthy mailbox support. If multiple mailboxes are required at one location, furnish and install a multiple box support system in accordance with the current edition of the AASHTO *Guide for Erecting Mailboxes on Highways*.

Furnish a NCHRP 350 compliant crashworthy support for temporary resets of mailboxes. Do not use traffic control devices as mailbox supports.

623.03 CONSTRUCTION REQUIREMENTS

Coordinate with the US postal Service and mailbox owner prior to any activities impacting mailboxes. Reset and maintain all mailboxes specified by the project manager that are removed during construction. Temporary supports and locations must be approved by the Project Manager. Install permanent mailboxes and supports at the locations shown in the plans. Salvage existing mailboxes if requested by landowner. Dispose of non-salvaged mailboxes.

623.04 METHOD OF MEASUREMENT

Mailbox and support are measured as a unit. Removal, temporary resets, salvage, numbering, disposal, and maintenance are not measured for payment.

623.05 BASIS OF PAYMENT

Payment for the completed and accepted quantities is made under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
Mailbox	Each
Mailbox - Large	Each

Payment at the contract unit price is full compensation for all resources necessary to complete the item of work under the contract.

624 WELDING

Add Section 624 WELDING:

SECTION 624  
WELDING

624.01 DESCRIPTION

Weld in accordance with the current edition of the applicable American National Standard Welding Codes.

624.02 MATERIALS

Use welding electrodes meeting AWS, AASHTO and the contract requirements.

624.03 CONSTRUCTION REQUIREMENTS

624.03.1 Contact the Project Manager 5 business days prior to anticipated work (welding or cutting) for scheduling of the Certified Welding Inspector (CWI).

- A. Weld tubular members (including pipe piles and hand or pedestrian rails) to ANSI/AWS D1.1.
- B. Weld on existing structures for repair or strengthening to ANSI/AWS D1.1.
- C. Weld reinforcing steel to ANSI/AASHTO/AWS D1.5.
- D. Weld bridge structural steel to ANSI/AASHTO/AWS D1.5.

624.03.2 Welder Qualification

- A. Have all welders certified by a CWI for each process or procedure performed. Obtain certifications prior to beginning welding for the project.
- B. If Department staff is available, certification testing of welders will be provided by the Department at a cost of \$60.00 per hour. This certification will be provided in Helena at this cost only once per person per project.
- C. An outside agency will be allowed to administer the testing if conducted by an American Welding Society (AWS) CWI, and the process is in accordance with Department procedure.
- D. The welder's qualification will remain in effect for an indefinite period unless the welder has not used the qualified welding process for a period exceeding 6 months or there is some specific reason to question the welder's ability. For the welder to remain qualified, a verification record (continuity) should be kept on file and updated by the Contractor for that welder documenting the performance of the given process and procedure during the previous 6 months.

624.03.3 Submittals

For all employees who will be welding on Department projects and who may have obtained certifications, submit 1 copy of certification record and continuity information to the Project Manager at least 30 days prior to that individual welding. Include the following information;

- Certifying agency, name, address, and phone number
- CWI's stamp and number
- CWI's signature
- Date tested

- Code under which the test was given, i.e. AWS D1.1-96
- Positions qualified
- Base metal designation, i.e. A-36, A252
- Backer use
- Process used
- Manipulation type
- Electrode type, i.e. 7018
- Diameter of electrode
- Operator's name
- Operator's employer at the time of the test

624.04 METHOD OF MEASUREMENT  
Welding is not measured for payment.

701.01 AGGREGATE FOR CONCRETE Page 377 3-27-14

Rescind the first paragraph (that begins with "These specifications...") and replace with the following:

These specifications describe the quality and size of aggregate for hydraulic cement concrete pavements and bases, highway bridges, and incidental structures.

Add the following test method to the list:

Combining Aggregate Gradations.....MT 215

701.01.1 (B) DELETERIOUS SUBSTANCES Page 377 9-9-10

Rescind the second paragraph (that begins with "The material must...") and replace with the following paragraph:

Ensure that the material does not contain other deleterious material.

701.01.2 (B) DELETERIOUS SUBSTANCES Page 379 9-9-10

In table 701-3, Rescind and replace the fourth row under "Substance" with the following:

Thin or elongated aggregate having a length greater than five times average thickness.

Rescind the second paragraph (that begins with "The material must...") and replace with the following paragraph:

Ensure that the material does not contain other deleterious material.

701.01.2 (G) GRADING (COURSE AGGREGATE FOR CONCRETE) (TABLE 701-4) Page 380 1-12-12

In Table 701-4 rescind the measurements for Sieve Size No. 3 [No. 4 to 1 1/2" (4.75 to 37.5mm)] and replace with the following:

3/4" to 1 1/2" (19 to 37.5mm)

701.01.3 OPTIMIZED GRADATIONS FOR CONCRETE Page 380 3-27-14

Add the following Subsection:

701.01.3 Optimized Gradations for Concrete

Optimizing a gradation by combining two or more sizes of aggregate is allowed and may be required for specific classes of concrete. Meet all the specifications listed in Subsections 701.01.1 and 701.01.2 for fine and coarse aggregate respectively except for the gradation requirements. Furnish a combined gradation meeting all the requirements of MT 215. If the combined gradation in the mix design submittal is approved, adhere to the tolerances listed in Table 701-5 during concrete production. The tolerances will be placed on the combined percent passing each sieve as defined in MT 215.

Table 701-5  
Optimized Gradation Requirements

Sieve Size	Production Tolerance
No. 4 or greater (4.75 mm or greater)	± 5%
No. 8 to No. 30 (2.36 mm to 600 µm)	± 4%
No. 50 (300 µm)	± 3%
No. 100 (150 µm)	± 2%
No. 200 or lesser (75 µm or lesser)	± 1.5%

Perform quality control gradations as necessary to control the production of aggregate and concrete. The combined aggregate gradation tests must meet the mix design target gradation and the tolerances listed above.

Do not target a combined percent passing of more than 2.0 percent on the #200 sieve.

701.02.1 GENERAL REQUIREMENTS-(AGGREGATE FOR SURFACING) Page 380 3-12-09

Rescind the first paragraph (that begins with “The following test methods ...”) and replace with the following:

The following test methods are used to evaluate the surfacing aggregate quality:

Sieve Analysis For Fine And Coarse Aggregate.....	MT 202
Wear Test.....	MT 209
Liquid Limit, Plastic Limit, Plasticity Index.....	MT 208
Fracture.....	MT 217
Volume Swell of Bituminous Mixtures.....	MT 305
Sulfate Soundness.....	AASHTO T 104 or ASTM C 88
Micro-Deval.....	MT 233

Rescind the second paragraph (which begins with “Sulfate soundness will be ...”) and replace with the following paragraph:

Passing wear test results are mandatory for Department approval of sources. Micro-Deval or Sulfate soundness tests may be used by the Department for source approval. If Micro-Deval is used and the test fails, the Department will conduct the sulfate soundness test. If the sulfate soundness test fails the Contractor may not use the source to produce coarse surfacing aggregate.

Add the following paragraph after the second paragraph (which begins with “Passing wear test ...”):

- Meet the following Micro-Deval requirements:
- Coarse Aggregate, 18.0 percent loss maximum for acceptance.

Rescind the first sentence of the last paragraph (which begins with “The Department has ...”) and replace with the following sentence:

The Department has 30 calendar days from receipt of the test sample to furnish the test results.

701.02.4 CRUSHED BASE COURSE TYPE “A” Page 382 2-23-12

Rescind Table 701-8 and replace with the following:

TABLE 701-8  
TABLE OF GRADATIONS - CRUSHED BASE COURSE TYPE "A"

PERCENTAGE BY WEIGHT PASSING SQUARE MESH SIEVES		
Sieve Size	Grade 5A	Grade 6A
2 inch (50 mm)	100	
1 1/2 inch (37.5 mm)	94-100	100
3/4 inch (19.0 mm)	70-88	74-96
3/8 inch (9.5 mm)	50-70	40-76
No. 4 (4.75 mm)	34-58	24-60
No. 40 (0.425)	6-30	6-34
No. 200 (0.075)	0-8	0-8

After the second paragraph (that begins “Meet the following...”) rescind part (5) and replace with the following:

5. At least 35 percent by weight of the aggregate retained on the No. 4 sieve has at least one mechanically fractured face.

701.02.7 CRUSHED TOP SURFACING TYPE “B” Page 384 10-11-12

Rescind Table 701-11 and replace with the following:

TABLE 701-11  
TABLE OF GRADATIONS - CRUSHED TOP SURFACING TYPE "B"

PERCENTAGE BY WEIGHT PASSING SQUARE MESH SIEVES			
Sieve Size	Grade 1	Grade 2	Grade 3
1 1/2 inch (37.5 mm)	100		

1 inch (25 mm)		100	
3/4 inch (19.0 mm)			100
1/2 inch (12.5 mm)			
No. 4 (4.75 mm)	40-80	40-80	40-80
No. 10 (2.00 mm)	25-60	25-60	25-60
No. 200 (0.075)	8-20	8-20	8-20

After the second paragraph (that begins "Meet the following...") rescind part (2) and replace with the following:

2. For material passing the No. 40 sieve, the liquid limit must not exceed 35, while the plasticity index must not be below 6 or above 12;

After the second paragraph (that begins "Meet the following...") rescind part (4) and replace with the following:

4. At least 35 percent by weight of the aggregate retained on the No.4 sieve must have one fractured face.

#### 701.02.8 CRUSHED COVER AGGREGATE (COVER MATERIAL)

Page 385

1-16-14

Rescind Subsection 701.02.8 and replace with the following:

#### 701.02.8 Crushed Cover Aggregate - Cover Material

Furnish cover material meeting the gradation requirements of Table 701-12.

TABLE 701-12  
TABLE OF GRADATIONS - COVER MATERIAL

PERCENTAGE BY WEIGHT PASSING SQUARE MESH SIEVES		
Sieve Size	Type 1	Type 2
½-inch (12.5 mm)		100
⅜-inch (9.5 mm)	100	40-100
No. 4 (4.75 mm)	0-15	0-8
No. 200 (0.075 mm)	0-2	0-1

Meet the following requirements:

- The composite aggregate must not have adherent films of clay, vegetable matter, frozen lumps, and other extraneous matter that prevents thorough coating with bituminous material. Bituminous material must remain adhered to the material upon contact with water. No combination of shale, clay, coal, and soft particles can exceed 1.5%;
- The aggregate must have a wear factor not exceeding 30% at 500 revolutions; and
- A minimum of 70% by weight of the coarse aggregate must have at least one fractured face.

#### 701.02.9 AGGREGATE FOR PORTLAND CEMENT TREATED BASE

Page 385

3-12-09

Rescind subtitle "Job Mix Target Limits" and replace with "Percent passing" in TABLE 701-13.

#### 701.03.1 GENERAL REQUIREMENTS (AGGREGATE FOR BIT. MIXTURES)

Page 386

3-27-14

Rescind the first paragraph (that begins with "The following test methods ...") and replace with the following:

The following test methods will be used to evaluate the quality of aggregate to be bituminized:

Table 701-13a  
AGGREGATE REQUIREMENTS

Coarse Aggregate (No. 4 (4.75 mm) and larger)	
Angularity (MT 217 or ASTM D 5821)	See Table 701-13b
Wear (MT 209 or AASHTO T 96)	40% max
	30% max <sup>1</sup>
Flat and Elongated Particles (ASTM D 4791) (3:1 Ratio; by mass; No. 4 (4.75 mm) and larger)	20% max.

Absorption (AASHTO T 85) <sup>2</sup>	2.5% max
Fine Aggregate (All material passing No. 4 (4.75 mm))	
Angularity (AASHTO T 304 Method A)	45% min.
Sand Equivalent (MT 213 or AASHTO T 176) <sup>3</sup>	45% min.

- Notes 1: For ¾-inch (9.5 mm) mixes only  
 2: For warm mixes only  
 3: As determined by alternate method No. 2.

Rescind the second paragraph (which begins with "Sulfate soundness will be ...") and replace with the following paragraphs:

All aggregate must be non-plastic when tested under MT 208 or AASHTO T 89 and T 90. If aggregate cannot meet the Sand Equivalent, it must have a Volume Swell (untreated aggregate) of 10% max when tested under MT 305.

Passing wear and volume swell test results are mandatory for Department approval of bituminized material aggregate sources. Micro-Deval or Sulfate soundness tests may be used by the Department for source approval. If Micro-Deval is used and the test fails, the Department will conduct the sulfate soundness test. If the sulfate soundness test fails the Contractor may not use the source to produce coarse aggregate to be bituminized.

Add the following paragraph after the second paragraph (which begins with "Passing wear and ..."):

- Meet the following Micro-Deval requirements:
- Coarse Aggregate, 18.0 percent loss maximum for acceptance.

Rescind the first sentence of the last paragraph (which begins with "The Department has ...") and replace with the following sentence:

The Department has 30 calendar days from receipt of the test sample to furnish the test results.

701.03.2 AGGREGATE FOR PLANT MIX SURFACING

Rescind Subsection 701.03.2 and replace with the following:

701.03.2 Aggregate for Plant Mix Surfacing

Furnish aggregate for plant mix surfacing, including hydrated lime when required, meeting the following requirements.

TABLE 701-13B  
 GRADE S MIXTURE DESIGN AND PRODUCTION REQUIREMENTS  
 ¾ inch (19 mm), ½ inch (12.5 mm) and ¾ inch (9.5 mm) Nom. Max. Aggregate Size

20 Year Design ESALs <sup>1</sup>		Number of Compactive Gyration			Percent of Rice			Coarse Agg Angularity	VMA %			VFA %	VTM % (Air Voids)	DP (Dust to effective binder ratio) <sup>2</sup>
Total (million)	Daily	Initial (N <sub>ini</sub> )	Design (N <sub>des</sub> )	Max (N <sub>max</sub> )	Max @ N <sub>ini</sub>	Max @ N <sub>des</sub>	Max @ N <sub>max</sub>	1 face / 2 face	Min @ N <sub>des</sub> (¾ in)	Min @ N <sub>des</sub> (½ in)	Min @ N <sub>des</sub> (¾ in)	Range @ N <sub>des</sub>	Range @ N <sub>des</sub>	Range (P0.075/Pbe)
≤ 0.3	≤ 41	7	75	115	91.5	96 to 96.6	98	75/ -	≥ 13.0	≥ 13.5	≥ 15.5	70 to 80	3.4 to 4.0	0.6 to 1.4
0.3 to <10	41 to <1370				90.5			85/80				65 to 78		
≥ 10	≥1370				89			95/90						

Notes:

1. If ESAL's are not specified in the contract, use the 0.3 to 10 million ESAL design requirements in Table 701-13b to develop the mix design, unless otherwise directed by the Project Manager.
2. In addition to meeting the DP requirement at mix design, report the dust/asphalt ratio (D/A) for the mix design target asphalt content.

Table 701-14  
**GRADE S AGGREGATE DESIGN REQUIREMENTS**  
 ¾ inch (19 mm), ½ inch (12.5 mm) and ⅜ inch (9.5 mm) Nominal Maximum Aggregate Size

Percent by Weight Passing Square Mesh Sieves							
Sieve	Gradation Limits						
	¾ in (19.0 mm)		½ in (12.5 mm)		⅜ inch (9.5 mm)		Job Mix Tolerance
	Min	Max	Min	Max	Min	Max	
1 inch (25 mm)	100						
¾ inch (19 mm)	90	100	100				
½ in (12.5 mm)		90	90	100	100		+/- 7
3/8 in (9.5 mm)				90	90	100	+/- 7
4 M (4.75 mm)						90	+/- 7
8 M (2.36 mm)	23	49	28	58	32	67	+/-6
16 M (1.18 mm)							+/- 6
30 M (0.600 mm)							+/- 4
50 M (0.300 mm)							+/- 4
100M (0.150 mm)							+/- 2
200 M (0.075 mm)	2	8	2	10	2	10	+/- 1.5

Notes:

1. Percentage or Quantity of hydrated lime will not be subtracted from the aggregate gradation

Table 701-15  
**HAMBURG WHEEL TRACK REQUIREMENTS**

PG Binder Grade	Water Bath Temperature	Not To Exceed 0.5" (13 mm) Rut in Number of Passes	
		1. Produced Plant Mix	2. Mix Design
PG 58-28	111° F (44° C)	10,000 Passes	15,000 Passes
PG 64-22 and PG 64-28	122° F (50° C)	10,000 Passes	15,000 Passes
PG 70-28	133° F (56° C)	10,000 Passes	15,000 Passes

701-16  
**GRADE "S" SPECIFICATIONS**  
 ¾ inch (19 mm), ½ inch (12.5 mm) and ⅜ inch (9.5 mm) Nominal Maximum Aggregate Size

Property	Job Mix Target Limits			Job Mix Tolerance	Start-up Job Mix Range <sup>3</sup>		
	¾ inch (19 mm)	½ inch (12.5 mm)	3/8 inch (9.5 mm)		¾ inch (19 mm)	½ inch (12.5 mm)	3/8 inch (9.5 mm)
VMA (Voids in Mineral Aggregate)	13.0 to 17.0	13.5 to 18.0	16.1 to 18.4	± 0.6	12.4 to 17.6	12.9 to 18.6	15.5 to 19.0
VFA (Voids Filled with Asphalt)	65 to 80			± 5.0	60 to 85		

VTM (Voids in Total Mix) @ N <sub>des</sub>	3.4 to 4.0			± 1	2.4 to 5.0
D/A (Dust/Asphalt Ratio) <sup>2</sup>	0.6 to 1.2			±0.2	0.6 to 1.4
Commercial Plant Mix Requirements					
VMA (Voids in Mineral Aggregate)	12.4 to 17.6	12.9 to 18.6	15.5 to 19.0	N/A	N/A
VFA (Voids Filled with Asphalt)	60 to 85			N/A	N/A
VTM (Voids in Total Mix) <sup>1</sup>	2.4 to 5.0			N/A	N/A
D/A (Dust/Asphalt Ratio)	0.6 to 1.4			N/A	N/A

Notes:

1. Choose the Design and Production Air Voids target to be the lowest value, within the range in the table above inclusive of 3.4 and 4.0, such that all other criteria are met.
2. Percentages or Quantities of hydrated lime will not be subtracted from the aggregate gradation.
3. Start-up job mix range only applies to production before initial target set. Tolerances do not apply to start up job mix range.

701.04.1 BEDDING MATERIAL (TABLE 701-17)

Page 388

3-1-07

Rescind Table 701-17 and replace with the following:

TABLE 701-17  
TABLE OF GRADATIONS - BEDDING MATERIAL

PERCENTAGE BY WEIGHT PASSING SQUARE MESH SIEVES	
Sieve Size	Percent Passing
1 1/2 inch (37.5 mm)	100
No. 4 (4.75 mm)	24-60
No. 200 (0.075 mm)	12 maximum

Delete the note (that begins with "Use minus 1 1/2-inch ...")

701.04.3 GRANULAR BEDDING MATERIAL

Page 389

9-26-13

Add the following new Subsection:

701.04.3 Granular Bedding Material

Furnish granular bedding material that meets the Table 701-4 No. 2 gradation requirements.

701.11 GLASS CULLET

Page 391

1-31-08

Replace part D (that begins with "Limit the glass ...") and replace with the following:

Limit the glass cullet content to no more than 10 percent of the total blended product.

701.12 DIGOUT AND SUB-EX REPLACEMENT MATERIAL (NEW)

Page 391

5-9-13

Add the following new Subsection:

701.12 Digout and Sub-ex Replacement Material

If crusher reject material is used for digout and sub excavation replacement material, meet the gradation requirements in Table 701-22.

TABLE 701-22  
DIGOUT AND SUB-EX REPLACEMENT MATERIAL (CRUSHER REJECT)

PERCENTAGE BY WEIGHT PASSING SQUARE MESH SIEVE	
Sieve size	Percent Passing
4 inch (100 mm)	100
No. 4 (4.75 mm)	0 - 50
No. 200 ( 0.075 mm)	8 max.

701.13 BRIDGE END BACKFILL (NEW)

Page 391

9-26-13

Add the following new Subsection:

701.13 Bridge End Backfill

Furnish bridge end backfill meeting Table 701-23 gradation requirements.

TABLE 701-23  
TABLE OF GRADATIONS – BRIDGE END BACKFILL

Sieve Size	Percentage By Weight Passing Square Mesh Sieves		
	Type 1'	Type 2	Type 3
4 inch		100	100
2 inch	100	60-100	Modified AASHTO Soil Class A-1-a
1 inch	60 – 80		
1/2 inch	40 – 60		
3/8 inch		25-65	
#4	20 – 40		
#10		10-30	
#40	5 – 20		
#200	0 – 8	0-8	0-8

Notes: 1. Provide a minimum of 35% of the material retained on the #4 sieve having at least one mechanically fractured face.

702 BITUMINOUS MATERIALS

Page 393

10-10-13

Rescind Section 702 and replace with the following:

SECTION 702  
BITUMINOUS MATERIALS

702.01 BITUMINOUS MATERIALS

A. Furnish bituminous materials meeting the requirements of the following tables. The MDT tables are located at the end of this Section.

- Performance Graded Asphalt Binder Table 702-2
- Polymer-Modified Cationic Emulsified Asphalt Table 702-3
- Medium Curing Liquid Asphalt (MC) Table 702-4
- High Float Emulsions Table 702-5
- Emulsified Asphalt AASHTO M 140\*, Table 1
- Cationic Emulsified Asphalt AASHTO M 208\*, Table 1

\*Cement Mixing test does not apply when SS-1 or CSS-1 emulsion is used for spray or tack application.

Meet the requirements for bituminous materials specified in the contract.

B. Polymerize CRS-2P emulsions using at least 3 percent polymer by weight (mass) of the asphalt binder.

702.02 TESTING AND ACCEPTANCE

Bituminous materials are accepted on the test results of samples selected and tested by the Department or its authorized representative. Collect samples as specified in Subsection 402.03.2 and tested using the applicable AASHTO method. The Project Manager may permit using bituminous materials before the test results are available, if the test results of material previously furnished by the refiner have consistently been satisfactory. The use of bituminous materials before receipt of the test results as permitted by the Project Manager does not waive the Department's right to accept or reject materials under these specifications.

Asphalt cement penetration is sampled and accepted under Subsections 402.03.2 and 402.03.5(B).

TABLE 702-1  
BASIS FOR ACCEPTANCE OF BITUMINOUS MATERIALS

SAMPLE TESTED	SPECIFICATION LIMITS		REMARKS
	Test Results Within Limits	Test Results Outside Limits	
Original Sample	Accept Material	Test Retained Sample	Retained samples may be tested by the Department at any time.
Retained Sample	Accept Material	Accept Material at Reduced Price or Reject <sup>2</sup>	

## Notes:

1. See specification for bituminous materials.
2. Pay adjustments will be applied under QA.

If test results of both the original and retained samples are not within the specification limits, the average of the two values will determine the basis for acceptance of the material.

Exception: If either of the two test values are outside the applicable ASTM Repeatability Range, then the test value numerically nearest the specification requirement will be used as the basis for acceptance. In the event a material fails more than one test requirement, that requirement with the greatest violation will determine the basis for acceptance. See Subsection 402.03.5(C) for the method of calculating price reductions.

TABLE 702-2  
SPECIFICATION FOR PERFORMANCE GRADED ASPHALT BINDER<sup>1</sup>

Property		Test Method: AASHTO	Requirements by Performance Grade			
			58-28	64-22	64-28 <sup>2</sup>	70-28 <sup>2</sup>
ORIGINAL						
Flash Point, ° C		T48	230 min.	230 min.	230 min.	230 min.
Rotational Viscosity, Pa·s	135° C	T316	3.0 max.	3.0 max.	3.0 max.	3.0 max.
Dynamic Shear, kPa (G*/sin δ, 10 rad./sec)		T315	1.00 min.	1.00 min.	1.00 min.	1.00 min.
Test Temperature			58°C	64°C	64°C	70°C
RTFO RESIDUE		T240				
Mass Change, %		T240	1.00 max.	1.00 max.	1.00 max.	1.00 max.
Dynamic Shear, kPa (G*/sin δ, 10 rad./sec.)		T315	2.20 min.	2.20 min.	2.20 min.	2.20 min.
Test Temperature			58°C	64°C	64°C	70°C
Ductility, cm	25°C	T51	-	-	30 min.	30 min.
PAV RESIDUE		R28	100° C, 20 hrs, 300 psi			
Dynamic Shear, kPa (G* · sin δ, 10 rad./sec.)		T315	5000 max.	5000 max.	5000 max.	5000 max.
Test Temperature			19°C	25°C	22°C	25°C
Creep Stiffness, MPa		T313	300 max.	300 max.	300 max.	300 max.
Test Temperature			-18°C	-12°C	-18°C	-18°C
M-Value		T313	0.300 min.	0.300 min.	0.300 min.	0.300 min.
Direct Tension, % Strain		T314	-	-	-	-

## Notes:

1. For Performance Graded Asphalt Binders not shown in Table 702-2, refer to AASHTO M 320, Table 1.
2. Pull Rate is established at 5 cm/minute.

Use PG 64-28 asphalt cement if not specified elsewhere in the contract.

TABLE 702-3  
LATEX OR POLYMER MODIFIED CRS-2 EMULSIFIED ASPHALT

PROPERTY	TEST METHOD	CRS-2P
Viscosity at 122 °F (50 °C), sec.	AASHTO T-59	70-400
Sieve, percent	AASHTO T-59	0.3 max.
Settlement, 5 days, percent	AASHTO T-59	5 max.
Demulsibility, percent	AASHTO T-59	40 min.
Storage Stability Test, 1 day, percent	AASHTO T-59	1 max.
Particle Charge	AASHTO T-59	Positive
Ash Content, percent	AASHTO T-111	0.2 max.
TESTS ON RESIDUE BY EVAPORATION: PERCENT RESIDUE <sup>1</sup> PENETRATION, 100 G, 5 SEC. AT 77 °F (25 °C), DMM DUCTILITY AT 77 °F (25 °C), 5 CM PER MINUTE, CM ELASTIC RECOVERY, PERCENT	AASHTO T-59 AASHTO T-49 AASHTO T-51 AASHTO T-301	65 min. 90-250 75 min. 58 min.

Note:

1. AASHTO T59 Residue By Evaporation will be used to obtain samples for all residue testing requirements. AASHTO T59 is modified by deleting note 8.

TABLE 702-4  
SPECIFICATION FOR MEDIUM CURING LIQUID ASPHALTS

	MC-30		MC-70		MC-250		MC-800		MC-3000	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
Kinematic Viscosity at 140 °F (60 °C), centistokes <sup>1</sup>	30	60	70	140	250	500	800	1600	3000	6000
Flash Point (tag, open-cup), °F (°C)	100 (38)	—	100 (38)	—	150 (66)	—	150 (66)	—	150 (66)	—
Water, percent	—	0.2	—	0.2	—	0.2	—	0.2	—	0.2
Distillation Test: Distillate, percentage by volume of total distillate to 680 °F (360 °C) to 437 °F (225 °C) to 500 °F (260 °C) to 600 °F (315 °C)	— 40 75	25 70 93	0 20 65	20 60 90	0 15 60	10 55 87	— 0 45	— 35 80	— 0 15	— 15 75
Residue from distillation to 680 °F (360 °C) volume percentage of sample by difference	50	—	55	—	67	—	75	—	80	—
Tests on residue from distillation: Penetration, 100 g, 5 sec. at 77 °F (25 °C), dmm Ductility, 5 cm/min, cm <sup>2</sup> Solubility, percent	120 100 99	250 — —	120 100 99	250 — —	120 100 99	250 — —	120 100 99	250 — —	120 100 99	250 — —
SPOT TEST	NEGATIVE FOR MC-3000 ONLY									

Notes:

1. As an alternate, Saybolt-Furol viscosities may be specified as follows:  
Grade MC-70 - Furol viscosity at 122 °F (50 °C) - 60 to 120 sec.  
Grade MC-30 - Furol viscosity at 77 °F (25 °C) - 75 to 150 sec.  
Grade MC-250 - Furol viscosity at 140 °F (60 °C) - 125 to 250 sec.

- Grade MC-800 - Furol viscosity at 180 °F (82.2 °C) - 100 to 200 sec.  
 Grade MC-3000 - Furol viscosity at 180 °F (82.2 °C) - 300 to 600 sec.
- If the ductility at 77 °F (25 °C) is less than 100, the material will be acceptable if its ductility at 60 °F (15.5 °C) is more than 100.

TABLE 702-5  
 SPECIFICATIONS FOR HIGH FLOAT EMULSIONS

GRADE	HF-100	
	Min.	Max.
Tests on emulsions: Viscosity Saybolt Furol at 122 °F (50 °C), sec. Storage Stability 24 hr., % Sieve Test, % Demulsibility, 50 ml. 5.55 g/L CaCl <sub>2</sub> , % by mass Distillation: Residue, % Oil Distillate, by volume of emulsion, %	50 — — 30 65 —	400 1 0.1 — — 2
Tests on residue from distillation test: Penetration at 77 °F (25 °C), 100 g, 5 sec., dmm Ductility at 77 °F (25 °C), 5 cm per min., cm Solubility, percent Float Test at 140 °F (60 °C), sec.	100 40 95.5 1200	170 — — —

703 LIGHTING AND SIGNAL MATERIALS

Rescind Section 703 Lighting and Signal Materials and replace with the following:

SECTION 703  
 LIGHTING & SIGNAL MATERIALS

703.01 GENERAL

Furnish all electrical equipment that meets the contract and the following requirements:

- National Electrical Manufacturers Association (NEMA);
- The National Electrical Code (referred to as the Code);
- The standards of the American Society for Testing Materials (ASTM);
- The American National Standards Institute (ANSI); and
- All state and local laws or ordinances that may apply.

References to the above codes or standards are the current editions of the code, order, or standard at the time the contract is let and governs throughout the life of the contract.

Furnish galvanized parts and meeting ASTM A153, B454 (Class 50), or other applicable ASTM galvanizing specifications. Galvanize the top 12 inches (300 mm) of anchor bolts. Galvanized bolts and nuts must thread together without damaging the coating.

703.02 CONDUIT

703.02.1 Plastic Conduit

Furnish rigid polyvinyl chloride (PVC) meeting UL 651, or continuous length high density polyethylene (HDPE) meeting UL 651B, schedule 80, 150 °F (66 °C) wire rated, direct bury type.

703.02.2 Steel Conduit

Furnish galvanized rigid steel conduit and fittings of mild steel meeting UL 6 and ANSI C 80.1 requirements.

703.03 PULL BOXES

703.03.1 Concrete Pull Boxes

Furnish concrete pull boxes, extensions, and covers made of reinforced concrete. Use Class "DD" concrete meeting Section 551 requirements. Use reinforcing steel meeting Section 555 requirements.

Meet the pull box size and details specified in the contract.

Inscribe reinforced concrete covers for signal systems and/or lighting systems with the words "ELECTRIC".

Furnish a steel cover designed to withstand AASHTO H-20 loads for pull boxes subject to vehicular traffic loads.

Furnish metal frames and covers for boxes or vaults formed in the concrete. Inscribe covers with the wording specified in the contract. Assure gasket surfaces form a true plane. Install a 1/8-inch (3 mm) one-piece neoprene gasket on the frame or cover for the seal.

703.03.2 Composite Pull Boxes

Furnish pull boxes and covers made of polymer concrete with fiberglass reinforcement. Furnish pull boxes having continuous fiberglass cloth reinforcement on the inside and outside perimeters. Furnish covers having a minimum of two layers of fiberglass cloth reinforcement.

Ensure the pull boxes and covers comply with all test provisions of the most current ANSI/SCTE 77 for tier 15 applications. Furnish pull boxes and covers that have been tested and certified by a nationally recognized third party independent testing firm such as UL or Intertek Testing Services (ETL) verifying that the boxes and covers meet all test provisions of the ANSI/SCTE 77.

Furnish pull boxes that have markings showing the tier 15 rating labeled or stenciled on the inside and outside of the box. Furnish covers that have markings showing the tier 15 rating embossed in the top surface of the cover. Furnish covers having pull slots rated for a minimum pull out of 3,000 pounds (1,360 kg).

Furnish 3/8-inch by 7-inch (M10 – 178mm) lag thread hex head bolts to secure the cover to the pull box.

#### 703.04 STANDARDS AND POSTS

##### 703.04.1 General

Furnish standards fabricated and inspected meeting Section 556 and designed to the 1994 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals".

Use a minimum luminaire dead load of 77 lb, and a minimum luminaire projected area of 3.3 ft<sup>2</sup> for design purposes. Use a design wind velocity for all standards of 90 miles per hour. Include on the shop drawings the following reaction data at the base of the pole, reported as reactions normal to the standard global coordinate system:

- Moment X (MX) Ft.-Lb.
- Moment Y (MY) Ft.-Lb.
- Torsion Z (MZ) Ft.-Lb.
- Shear Force X (VX) Lb.
- Shear Force Y (VY) Lb.
- Axial Load (P) Lb.

Fabricate all standards from steel. Meet the standard manufacturer's requirements for the anchor bolt placement in the foundation.

##### 703.04.2 Type 1 Signal Standards

Furnish standards as specified in the contract.

Furnish a cast aluminum base with an internal ground lug and handhole with removable cover. Plumb bases with factory-made shims.

Furnish four high strength steel anchor bolts with each base. Furnish "L" shaped anchor bolts with a minimum 6 inches (155 mm) of the bolt threaded at the top. Furnish a nut and washer with each anchor bolt for the base.

Follow the manufacturer's recommendations for anchor bolt size.

All accessories welded to the shaft must be factory-welded to the shaft before galvanizing.

##### 703.04.3 Type 2 and 3 Signal Standards

Furnish a single steel section shaft formed into a round, continuous taper with a single, automatic electrically welded seam, or an approved equal.

Show the type of steel used for the shafts on the shop drawings.

Furnish four high-strength steel anchor bolts with each shaft. Furnish each anchor bolt with two nuts and two washers over and under the shaft base to adjust rake and plumb.

All accessories welded to the shaft must be factory-welded before galvanizing.

Furnish rain tight metal covers for the top of Type 2A and 3A signal standards.

##### 703.04.4 Type 10 Luminaire Standards

Shafts must be a single section formed into a round, continuous taper with a single, automatic electrically welded seam, or approved equal. Steel shafts must be a minimum No. 11 Manufacturer's Standard Gauge.

Show the type of steel on the manufacturer's shop drawings.

Furnish rain-tight metal covers for the top of each shaft.

Shafts not mounted on transformer bases must have a handhole with removable cover and an internal grounding lug, as shown on the plans. Locate the handhole in the same quadrant as the mast arm.

Shafts mounted on transformer bases do not require a handhole or grounding lug.

The shaft base (anchor or breakaway) to be used is specified in the contract.

The shaft base plate must be a one-piece plate circumferentially welded to the shaft for anchor and breakaway base types.

For anchor bases, the base plate must attach directly to the anchor bolts. Furnish each anchor bolt with two nuts and two washers for plumbing and raking the shaft.

For breakaway bases, the plate must be attached to a breakaway device that attaches to the anchor bolts.

Use breakaway bolt couplings unless they do not function with the approved luminaire standard. The bolt coupling must meet the AASHTO publication, "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals" requirements.

Use frangible transformer bases where bolt couplings cannot be used. Transformer bases must have an access door, grounding lug, and factory-made shims for plumbing. Provide each anchor bolt with one nut and one washer.

Furnish four high strength steel anchor bolts with each shaft. Furnish "L" shaped anchor bolts with a minimum 6 inches (155 mm) of the bolt threaded at the top. Size the anchor bolt following the shaft manufacturer's recommendations.

Anchor bolts used with breakaway bolt couplings must project out of the foundation the length recommended by the coupling manufacturer. Furnish the breakaway bolt coupling, washer, nut and bolt covering that enclose the area between the base plate and foundation.

Anchor bolts used with transformer bases must project at least 3 inches (75 mm) from the foundation.

Provide a mounting base where the mast arm connects to the shaft. Provide an opening in the base for running wire from the shaft to the mast arm.

All accessories welded to the shaft must be factory-welded before galvanizing.

##### 703.04.5 Mast Arms - Signal and Luminaire

Traffic signal mast arms up to 50 feet in length must be single tapered members. Traffic signal mast arms over 50 long may be two piece tapered members.

Luminaire mast arm ends must have a 2-inch (50 mm) slip-fitter tenon at least 6 inches (155 mm) long.

All accessories welded to the mast arm must be factory-welded before galvanizing.

Mast arm lengths and mounting heights are shown on the plans.

#### 703.04.6 Welding Steel

Meet the requirements of Section 624 and the following:

Ensure that all Nondestructive Testing is performed by personnel qualified in conformance with the American Society for Nondestructive Testing Recommended Practice No. SNT-TC-1A to minimum Testing Level II for the individual methods. Provide ASNT certifications and procedures before testing. Meet all the applicable AASHTO and AWS welding inspection requirements including those modified as follows:

1. Circumferential Weld Splices. Perform radiographic testing or ultrasonic testing as approved by the Project Manager meeting AWS D1.1, Structural Welding Code, Section 6.
2. Longitudinal Seams. Inspect 100 percent of all Full Penetration Groove welds using Radiography or testing may be by Ultrasonic test methods AWS D1.1, Structural Welding Code Ultrasonic, Section 6, both of the above test methods to be approved by the Project Manager before use.  
Randomly test 25 percent of all Partial Penetration welds and fillet welds per component using Magnetic particle test methods.
3. Base Connection Welds. Randomly inspect 25% of all base connection welds and all fillet welds using Magnetic-Particle testing specified in AWS D 1.1, Structural Welding Code, Section 6.

#### 703.04.7 Reserved

#### 703.04.8 Finish

Furnish standards galvanized inside and out. A primer finish is not acceptable. Use stainless steel or zinc, cadmium, or galvanized coated fasteners. Provide galvanized nuts, washers, and shims for anchor bolts.

#### 703.04.9 Wire Protection

Use insulated bushings or grommets to prevent wire abrasion at all wire openings and inlets.

#### 703.04.10 Inspection

All standards will be inspected at the project before they are erected and may be inspected where fabricated.

### 703.05 CONDUCTORS AND CABLE

#### 703.05.1 Conductors

Furnish conductors of solid or stranded copper of the gauge shown in the contract.

Insulation for conductors must be Type THW, XHHW, USE, RHH, RHW, THWN, or THHN.

All insulation must be designed for 600 volts and meet the code requirements.

#### 703.05.2 Signal Cable

Furnish cable meeting the International Municipal Signal Association (IMSA) Specification No.19-1 or 20-1.

Individual conductors must be stranded copper.

#### 703.05.3 Detector Loop Shielded Cable

Use Detector Loop Shielded cable as a lead-in between the loop pull box and the loop detector as specified.

Furnish with an aluminum-polyester shield with two AWG No.14 stranded, tinned, polyethylene-insulated copper conductors, a stranded and tinned copper AWG No.18 or 16 drain wire, all encased in a black polyethylene jacket meeting IMSA Specification No. 50-2.

#### 703.05.4 Emergency Preemption Detector Cable

Use cable recommended by the manufacturer for the emergency preemption system.

#### 703.05.5 Communication Cable

Furnish BJFC 6 pair AWG No. 19 copper cable meeting REA specification PE 39.

#### 703.05.6 50-Ohm Coaxial Cable

Furnish 3/8-inch (10 mm) or 1/2-inch (13 mm), super flexible, low loss, foam filled, watertight, coaxial cable. Furnish coaxial cable with the following characteristics:

1. Impedance of 50 ohms,  $\pm 1$  ohm.
2. Maximum attenuation of 13.0 dB/100 m at 900 MHz.
3. Outer conductor of bonded aluminum tape and an overall braid of tinned copper with an inner conductor of copper-clad aluminum.
4. Foam polyethylene dielectric.
5. UV protected black polyethylene jacket.
6. Minimum bending radius of 1-inch (25 mm) for installation, 4 inches (100 mm) for repeated bending, for 3/8-inch (10 mm). Minimum bending radius of 2 inches (50 mm) for 1/2-inch (13 mm) cable.

Furnish coaxial cable that is compatible with type "N" connector.

### 703.06 SERVICE AND CONTROL ASSEMBLY

Furnish cabinets meeting NEMA Type 3, 3R, or 12, made of aluminum or code-grade steel having a hinged, lockable door.

Include a terminal strip having the number of attaching points for the required conductors with the service and control assembly. Assure the terminal strip has the capacity equal to an AWG No. 6 conductor.

## 703.07 CONTROL EQUIPMENT

## 703.07.1 Flasher

Furnish a solid-state dual circuit, plug-in type electronic flasher producing between 50 and 60 flashes per minute with equal on-and-off time intervals meeting all NEMA Type 3 requirements and conforming to part 4B-18 of the MUTCD.

## 703.07.2 Loop Detectors

Furnish two channel loop detectors of the rack mount type.

The loop detectors must be solid-state digital using external power. The front panel must contain sensitivity controls, mode selector switch, and an actuation indicator LED.

The loop detectors cannot use more than 150 MA of current at 24 volts DC. The output must be by relay and plug mounted. The relay must be normally energized providing fail-safe functioning should the power fail. Furnish loop detectors meeting all NEMA temperature requirements. Use a 44 pin edge card connector to make all electrical connections.

## 703.08 TRAFFIC AND PEDESTRIAN SIGNALS

- A. Optical Units. Furnish vehicular signal indications which utilize light-emitting-diodes (LEDs) in accordance with the latest issue of the I.T.E. Vehicle Traffic Control Signal Heads (VTSCH) specification. Furnish 12-inch (305 mm) circular and arrow signal indications that have clear polycarbonate lenses. The lens must be diffused or the module must have some other method of achieving the appearance of an incandescent lamp (smooth and non-pixelated). Furnish bi-modal "GREEN/YELLOW" arrow indications that utilize LEDs.

Furnish pedestrian signal indications which utilize light-emitting-diodes (LEDs) in accordance with the latest issue of the I.T.E. Pedestrian Traffic Control Signal Indication (PTCSI) specification and the MUTCD. Furnish 16-inch by 18-inch (400 mm by 450 mm) pedestrian indications that utilize LEDs for the UPRaised HAND symbol, the WALKING PERSON symbol and the countdown display. Furnish indications that have the countdown display and pedestrian displays in the same housing. Furnish indications with a countdown display that is at least 9 inches in height. Furnish indications that have filled in symbols to give the appearance of an incandescent indication. Furnish indications that are compatible with the pedestrian signal housing.

Supply LED indications that have a guarantee to be replaced or repaired if a signal indication fails to function as intended due to workmanship or material defects within the first 60 months of operation. Furnish LED indications that work with a conflict monitor utilizing NEMA-plus functions, specifically DUAL INDICATION.

- B. Signal Housing. Assemble the signal head housing sections together in a watertight assembly. Each section must house an individual optical unit complete with a one-piece hinged door, a mounting for the lens and other optical system parts, watertight gaskets, and a non-corrodible door-lock.

Construct the optical system so the individual components swing open for access or removal. Assure sections are interchangeable and constructed so sections can be added or removed. Each section must have a round opening in the bottom and top to receive a 1 ½-inch (38 mm) supporting pipe frame. The housing, including the doors and end plates must be die-cast aluminum, clean and smooth, free from flaws, cracks, blow holes, or other imperfections. Hinges, pins, lens clips, and locking devices must be non-corroding metal.

Mount a terminal block inside at the back of the housing. Wire all sockets with a white wire connected to the socket shell and a black wire to the bottom or end terminal of the socket. Connect these wires to the terminal block mounted in the housing.

The terminal block must have studs to terminate all field wires and lamp wires independently. Permanently identify the terminals.

Use paint meeting Section 710. Factory-enamel signal heads and fittings black or dark olive-green as to not require painting in the field. Apply one coat of primer and two coats of enamel to signal heads and other components.

Use the same color for like components in the same intersection.

Furnish with each section of each vehicle signal head, a removable tunnel visor (open bottom) of the appropriate size made from at least 0.050 inch (1.3 mm) thick aluminum. Apply two coats of flat black enamel to visor interiors.

- C. Back Plates. Furnish and install back plates on all traffic signal heads to form a 5-inch (130 mm) border around the signals. Make backplates from at least 0.058 inch (1.5 mm) sheet aluminum. Apply two coats of flat black enamel to front faces of backplates. Furnish backplates with a 2-inch (50 mm) wide yellow strip of Type IX retro-reflective sheeting. Apply the sheeting around the outer edge of the backplate.

- D. Mounting Brackets. Mount signal heads using brackets made from 1 ½-inch (38 mm) standard steel pipe and malleable iron or brass pipe fittings. The slip fitter must fit over a 4-inch (105 mm) standard pipe. Provide each slip-fitter with two rows of three set screws in each row to plumb the assembly. Provide cadmium plated set screws.

Provide each compartment with a terminal block with twelve terminals, each with two pressure type connectors. Size each connector to accommodate at least five No. 14 conductors.

Provide the terminal compartment with an access opening to the terminal block with a rain-tight cover. All slip-fitters and terminal compartments must be made of non-frangible metal.

- E. Optically-programmed Traffic Signals. The traffic signals must be optically-programmed and visible only to a specific area of the intersection. Meet all other contract requirements for construction or signal heads.

Use LED Programmable Visibility modules for optically-programmed signals that are compatible with the signal heads.

### 703.09 LOOPS

Furnish preformed and prefilled detector loops constructed from conduit. Use one continuous length of stranded No. 12 XHHW or stranded No. 14 THHN or TFFN conductor from the pull box, through the loops and returning back to the pull box. Construct loops using continuous  $\frac{3}{8}$ -inch (9.5 mm) conduit for No. 14 conductor or  $\frac{3}{4}$ -inch (19 mm) conduit for No. 12 conductor. Completely fill the conduit with hot rubberized asphalt or an approved flexible sealant to prevent incursion of moisture, and to set the turns of wire firmly in place.

Encase lead-in wires in a non-conductive 2250 psi (15,500 kPa) flex hose constructed with a seamless extruded polyester fiber braid reinforcement and a non-conductive, seamless extruded urethane non-perforated jacket. Fill the lead-in hose completely with hot rubberized asphalt or flexible sealant. Twist wires in all lead-ins a minimum of two turns per foot for the entire length of the lead-in. Attach lead-ins to loop heads with a schedule 80 CPVC tee and a CPVC adapter bushing. Supply loops with sufficient lead-in to reach adjacent pull boxes. Use a continuous conductor without splices throughout the entire loop and lead-in hose.

### 703.10 PEDESTRIAN PUSH BUTTONS

Furnish tamper-proof pedestrian push buttons using a piezo type switch meeting ADA requirements. The push button must be flush with the housing and be at least 2 inches (50 mm) in the smallest dimension. The push button housing must be weatherproof, and electrically insulated to prevent shock under all weather conditions. Furnish a dark olive green housing back plate to fit the pole curvature and, when required, provide saddles to make a near fit. Furnish push button signs shown on the plans.

#### 703.10.1 Accessible Pedestrian Signals (APS) (Tactile Push Buttons)

Furnish APS that include the pedestrian pushbutton and housing combination. The pushbutton must meet the requirements of Subsection 703.10. The housing must have a locator tone to indicate the location of the button. The volume of the locator tone must be adjustable by digital means and must automatically adjust to ambient noise level. The volume over ambient noise level must be adjustable in increments of 5 decibels (dB). The button must have a raised arrow, which can be adjusted to point toward the appropriate crosswalk. The button and housing combination must also provide feedback that a call for service has been placed. The feedback must be in the form of a lit LED and an audible indication. The accessible signal must also provide vibro-tactile information, in the form of the button vibrating during the appropriate Walk signal. The pedestrian signals must operate without any additional equipment in the signal cabinet, or additional signal conductors from the cabinet.

When voice messaging is required, provide accessible pedestrian signal stations with custom voice messages that provide location information on a button push, and street crossing message when the appropriate walk signal activates. The voice messages will be in the following format:

- Voice on location (VOL): Wait to cross (Street to be crossed) at (Intersecting Street).
- Walk Message: (Street name being crossed). Walk sign is on to cross (Street name to be crossed).

### 703.11 LUMINAIRES

Furnish and install luminaires and lamps meeting these specifications and the contract requirements.

Wire all luminaires for 240-volt operation.

Furnish and install clear high pressure sodium vapor lamps having a 24,000 hour rated life. Meet the following wattage and initial lumens requirements:

- 200 Watt: 22,000 initial lumens
- 250 Watt: 27,500 initial lumens
- 400 Watt: 50,000 initial lumens

Ballasts and luminaire must be integral, with the ballast providing -20 °F (-29 °C) starting capacity. Multiple ballasts must be 240 volt regulated lag type, 0.90 power factor, with an operating range of  $\pm 10$  percent. Starting and open circuit volt-amperes must not exceed operating values.

Furnish the unit with an independent, replaceable starting board.

The luminaire assemblies must be slip-fitter type, end mounted on a 2-inch (50 mm) pipe tenon.

Furnish ANSI/IES full-cutoff (flat lens), medium, type III distribution luminaires.

### 703.12 PHOTOELECTRIC CONTROLS

Furnish photoelectric control units of the twist-lock type.

Furnish units that turn on at  $1.3 \pm 0.5$  foot candles, have a turn-on/off ratio in the range of 1:2 to 1:5, and are rated for a minimum of 1,000 watts at 120 volts.

Incorporate a time delay mechanism into the control preventing operation during brief light condition changes.

Provide a fail-safe that leaves the load on or becomes energized if the control fails.

### 703.13 RADIO ANTENNAS

#### 703.13.1 Master Antenna

Furnish an omnidirectional antenna with the following specifications:

1. Frequency range of 890 MHz to 960 MHz;
2. Gain of 6 dBd;
3. Impedance of 50 ohms;
4. Termination with a type "N" connector, and;
5. Wind survival rating of 125 mph (200 kph).

#### 703.13.2 Yagi Antenna

Furnish a yagi antenna for mounting on traffic signal poles as shown in the detail drawings that meets the following specifications:

1. Frequency range of 896 MHz to 960 MHz;
2. Front to back ratio of 20 dB;
3. Nominal gain of 10 dBd, and;
4. Bandwidth of 90 MHz.

Provide an antenna that will withstand wind speeds of 100 mph (160 kph), plus a 1.3 gust factor. Construct the antenna of rust resistant, corrosive free materials. Provide an antenna that has 3/8-inch (10 mm) coaxial cable meeting Subsection 703.05.6 integrally attached by the manufacturer.

**703.14 CLASS 4 TREATED TIMBER POLES**

Furnish the pole length and place as specified in the contract.

Furnish ANSI Class 4 poles as specified in the contract. Full length pressure-treat poles with a five percent solution of pentachlorophenol or Copper Napthenate (CuN) meeting AWWA Standards and Commodity specification D and use category 4A.

**703.15 OVERHEIGHT DETECTOR**

An overheight detector consists of a transmitter and receiver each mounted on an adjustable metal pole. Furnish detectors meeting the following requirements:

- Operating Voltage: 115 AC ± 10%
- Operating Temperature Range: -40 °F (-40 °C) to 130 °F (54 °C)
- Detector Beam: infrared or visible-red light-emitting-diodes (LED)
- Alarm Output Adjustment: 5 to 30 second duration

Ensure the detector can discern the vehicles direction of travel and is able to detect vehicles traveling between 2 mph (3.2 km/h) and 90 mph (145 km/h).

The transmitter and receiver must mount on metal poles that permit adjusting the detector height from 10 to 16 feet (3.1 m to 4.9 m).

**704.01.1 SHEET ALUMINUM**

Rescind Table 704-1 and replace with the following:

**TABLE 704-1  
SINGLE POST MOUNTING**

SIGN SIZE inches (mm)	THICKNESS inches (mm)
<b>REGULATORY SERIES WITHOUT BACK BRACING</b>	
0 to 33 (0 to 838) wide, inclusive	0.080 (2)
34 to 41 (864 to 1,041) wide, inclusive	0.100 (2.54)
42 to 51 (1,067 to 1,295) wide, inclusive	0.125 (3.17)
<b>WARNING SERIES WITHOUT BACK BRACING</b>	
30 x 30 (762 x 762) or smaller	0.080 (2)
36 x 36 (914 x 914)	0.080 (2)
48 x 48 (1,219 x 1,219)	0.100 (2.54)
60 x 60 (1,524 x 1,524)	0.125 (3.17)
<b>DELINEATOR REFLECTORS</b>	
All sizes	0.063 (1.6)
<b>ALL SIGNS WITH BACK BRACING</b>	
Maximum Back Brace Spacing	Sign Sheet Thickness
≤ 32 (813)	0.080 (2)
≤ 40 (1,016)	0.100 (2.54)
≤ 50 (1,270)	0.125 (3.17)

Add the following to the end of the second paragraph, (that begins with, "Use the sheet..."):

Make all signs not listed above from 0.080" thickness sheeting.

**704.01.4 ALUMINUM AND STEEL POSTS**

Add the following sentence to the beginning of part (B)(4) prior to the first sentence (that begins "Furnish square..."):

Ensure that all square tubular perforated and non-perforated steel post telescoping devices meet the velocity change criteria of the current AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals."

Add the following part (D) Breakaways. to Subsection 704.01.4:

- D. Breakaways.
  - 1. Structural and Tubular Steel. Furnish frangible bolt devices and reduced section (or perforated) fuse

plates. Use devices commercially manufactured and designed in accordance with AASHTO's current edition of "Standard Specifications for Structural Steel Support for Highway Signs, Luminaires and Traffic Signals," crash tested and approved for use by the Federal Highway Administration.

2. Square Tubular Steel Posts. Furnish slip base breakaway devices that meet the requirements of the Detail Drawings. Assure the breakaway device meets the velocity change criteria in accordance with AASHTO's current edition of "Standard Specifications for Structural Steel Support for Highway Signs, Luminaires and Traffic Signals," for both single tube and telescoping installations

**704.01.5 TREATED SAWN TIMBER POSTS** Page 422 5-9-13

Rescind Subsection 704.01.5 and replace with the following:

704.01.5 Reserved

**704.01.6 TREATED WOOD POSTS AND POLES** Page 423 10-11-12

Rescind Subsection 704.01.6 Treated Timber Poles and replace with the following:

Timber poles are specified by the top diameter. Meet the Table 704-2 top diameter limits:

TABLE 704-2  
TIMBER POLE - TOP DIAMETER LIMITS

SPECIFIED TOP DIAMETER inch (mm)	DIAMETER LIMITS inch (mm)	
	Min.	Max.
3 (75)	3 (75)	4 (100)
4 (100)	4 (100)	5 (130)
5 (130)	5 (130)	6 (150)
6 (150)	6 (150)	7 (180)

Furnish posts and poles 10 feet (3 m) in length or less free of crooks and sweeps greater than 3/4-inch (19 mm) from the post centerline. The maximum offset from centerline for posts and poles longer than 10 feet (3 m) is 3/4-inch (19 mm) plus 1/16-inch (2 mm) per additional foot of length. The centerline is defined as a straight line from the center of the tip to the center of the butt. Gain and chamfer posts and poles as required in the Detailed Drawings. Perform all machining before treatment. Full length pressure-treat all timber posts and poles per Subsection 706.04.1, regardless of length.

Treat round posts and poles meeting AWPAs Standards for Commodity Specification B and Use Category 4A, regardless of length. Supply round posts and poles meeting the AWPAs minimum penetration requirements specified for natural posts and poles, with a penetration of at least 3/8-inch (9 mm). Posts and Poles must have sufficient sapwood to provide the 3/8-inch (9 mm) minimum penetration.

Gain each post and pole on the sign face at least 2 inches (50 mm) in width as specified in the Detailed Drawings.

Use construction grade 2-inch x 4-inch (50 x 105 mm), pressure treated per 706.04, in S4S for back bracing.

**704.01.7 BARN POLES** Page 423 9-1-07

Rescind Subsection 704.01.7 Barn Poles.

**704.01.8 OVERHEAD STRUCTURES** Page 423 9-26-13

Rescind Subsection 704.01.8 and replace with the following:

Furnish overhead sign structures meeting the current AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, including fatigue requirements in section 11, including any amendments and the contract requirements.

Include fatigue design requirements for all sign structures as follows:

- Design Life: 50 years
- Fatigue Category: 1
- Galloping: Cantilevered structures only
- Truck-Induced Gusts: Posted speed limit
- Natural Wind Gusts

**704.01.10 RETRO-REFLECTIVE SHEETING** Page 423 12-13-12

Rescind and replace Subsection 704.01.10 with the following:

704.01.10 Retro-reflective Sheeting

- A. General. Furnish the type of retro-reflective sheeting and color specified in the contract. Use traffic control sheeting that meets the ASTM retro-reflective sheeting requirements on the traffic control devices specified in Table 704-3.  
The following traffic control devices in the Traffic Control Rate schedule require ASTM designated Retro-Reflective sheeting as specified. Provide orange sheeting that is fluorescent. All other sign colors need not be fluorescent:

TABLE 704-3  
ASTM RETRO-REFLECTIVE SHEETING REQUIREMENTS

Traffic Control Rate Schedule Group No.	Specification	Type
1-15, 18 (sign panel), 19, 25 (panel) and all other work zone sign faces (e.g. flag person paddles, pilot car signs, etc.)	ASTM 4956	XI, X, IX VIII, VII or VI
17, 23, 27, 28 and all cones and tubular markers	ASTM 4956	III or V

Reflective sheeting may only be overlaid on reflective sheeting of the same color. Remove any existing legend prior to overlaying.

- B. Letters – Direct Applied. Furnish letters, numerals, symbols, and borders from Type III sheeting, permanently adhered to the sign face reflective sheeting.  
Apply the letters, numerals, symbols, and borders following the sheeting manufacturer's recommendations. Follow the size, series, and spacing in the Federal Highway Administration's Standard Alphabets proportion and spacing requirements.  
Use finished pieces that are clean cut, free of ragged borders.
- C. Acceptance. Submit manufacturer's certification that the retro-reflective sheeting used meets the designated ASTM TYPE Retro-Reflective requirement specified.  
The Department may take sheeting samples for analysis and testing. The Project Manager may visually compare the sheeting's diffuse day color in the field using standard color charts and test the signs retro-reflectivity using a retro-reflectometer.  
Replace rejected material at Contractor expense.

704.01.11 LETTERS,SYMBOLS, AND ACCESSORIES Page 424 12-13-12

Rescind Subsection 704.01.11 Letters, Symbols, And Accessories.

704.01.13 HARDWARE Page 425 9-26-13

Rescind Part (A) and replace with the following:

- A. Miscellaneous. Use bolts, washers, nuts, lock washers, incidental hardware, and angles for erecting aluminum sheet and plywood signs that are:
  1. Galvanized meeting ASTM A 153 or ASTM B 633 specifications; or
  2. Aluminum alloy meeting ASTM B 211 for alloy 2024-T4.

Rescind Part (B) and replace with the following:

- B. Hinges. Use only non-rusting hardware of like material. When mounting on Aluminum sheeting for folding signs, use hinges that are:
  1. Aluminum alloy meeting ASTM B 211 for alloy 2024-T4; or
  2. Stainless steel meeting ASTM A 276.

704.03 FLEXIBLE DELINEATORS (NEW) Page 425 9-26-13

Add Subsection 704.03 Flexible Delineators.

704.03 Flexible Delineators

Furnish delineators material that is impact resistant within a temperature range of -30 °F to +130 °F (-34.4 °C to +54.4 °C). Assure the material from which the vertical tube post is fabricated flexes upon impact and results in little or no damage to impacting vehicles. Use a delineator that is ultra violet stabilized and resistant to ozone and hydrocarbons. Ensure the delineator design allows for quick and easy removal and replacement of delineator tube with only the use of common hand tools. Use delineators that are listed on the Department's QPL and meet NCHRP 350 or MASH requirements.

Ensure the delineator is flexible, self-erecting to original position and capable of withstanding numerous impacts from a direction without splitting, breaking or detachment from the base or the surface to which the base is attached.

Use delineators with a minimum height of 36 inches (914 mm) and width configuration that allows a minimum of 46.5 square inches (300 cm<sup>2</sup>) of retro-reflective sheeting to be affixed at the top of the post. Place retro-reflective

sheeting completely within the top 9 inches (229 mm) of the delineator. Ensure color, area and configuration of retro-reflective sheeting equals that required by the standard drawings for the type of delineator specified. Use a post color that matches the attached sheeting.

Provide the mounting as specified in the contract.

- A. Surface Mount Flexible Delineators. Ensure base material is flexible, high impact composite material with a maximum of 72 square inches (464 cm<sup>2</sup>) surface area and capable of being mechanically attached to the mounting surface.
- B. Driveable Flexible Delineators. Ensure anchor is made of rigid materials and cannot collapse or buckle when driven into dense soil. Metallic materials must be galvanized. Ensure anchor is driveable with manual or common installation tools.

---

705 GUARDRAIL AND GUIDE POSTS

Page 427

11-14-13

Rescind the title of Section 705 only and replace with the following:

SECTION 705  
GUARDRAIL

---

705.01.2 WOOD POSTS AND BLOCKOUTS

Page 427

1-12-12

Rescind the first paragraph (that begins "Furnish wood posts...") and replace with the following:

Furnish wood posts and blockouts made from Douglas fir, Hemlock, Ponderosa Pine, Spruce, Larch, Southern Yellow Pine, or Lodgepole pine. Furnish posts that are straight, sound, free from defects, and meet the dimensions specified in the contract.

Rescind the second paragraph (starting with "Meet the Western Wood Products Association...") and replace with the following:

Meet the Western Wood Products Association requirements or equivalent grading rules for #2 grading or better, all of which must meet ASTM D 245.

Rescind the third sentence of the third paragraph (that begins with "Ensure the wood posts ...") and replace with the following sentence:

Ensure the wood posts and blockouts are seasoned to accept the specified treatment requirements of Subsection 705.03.1.

Delete the fourth sentence of the third paragraph (starting with "Furnish wood posts and blocks...").

Delete the fifth sentence of the third paragraph (starting with "The minimum penetration depth...").

---

705.01.5 STEEL POSTS

Page 428

9-26-13

Rescind the first paragraph (that begins with "Furnish steel posts...") and replace with the following:

Furnish steel posts for cable guardrail meeting the contract requirements. Spot paint all bruised, broken, scaled, or damaged coating on steel posts with two coats of cold galvanizing compound following the paint manufacturer's recommendations.

Rescind the third paragraph (that begins with "Ensure that steel...") and replace with the following:

Ensure that steel guardrail posts and associated hardware meets the AASHTO Guide to Standardized Highway Barrier Hardware (Task Force 13 Report) and the NCHRP 350 or MASH crashworthy requirements.

---

705.03.1 WOOD TREATMENT

Page 428

9-26-13

Rescind Subsection 705.03.1 Wood Treatment and replace with the following:

Furnish wood posts and blocks pressure treated meeting Subsection 706.04.1 using commodity specification A with retention specifications from commodity specification B, use category 4B. Chamfer and perform other required framing and boring of bolt holes before post treating. Plug drill holes used for determining preservative penetration depth with tight fitting treated wood plugs.

---

705.04 GUIDE POSTS

Page 428

5-9-13

Rescind Subsection 705.04 Guide Posts

706.04 TREATED TIMBER AND LUMBER

Page 429

9-1-07

Rescind the paragraph in 706.04 (starting with "Furnish structural timber...") and replace with the following:

Furnish structural timber and lumber treated with a wood preservative specified as follows.

706.04.1 TREATING

Page 429

10-11-12

Rescind Subsection 706.04.1 Treating and replace with the following:

Furnish timber and lumber that is pressure treated meeting the preservative retention and penetration requirements found in AWPA Standards U1 and T1, Commodity Specification A, B or D, use category 4A, appropriate for the application of material.

Use one of the following preservatives:

- 5 percent by weight solution of Pentachlorophenol meeting AWPA Standards P35 using solvent meeting AWPA P9 Type A
- Chromated Copper Arsenate (CCA), Type C meeting AWPA Standard P23.
- Copper Naphthenate (CuN). solution meeting AWPA Standard P36 using solvent meeting AWPA P9 Type A.

Treated timber or lumber to receive paint must permit the paint to adhere to the treated surface without discoloration.

Meet AASHTO M 133 requirements for all preservatives and their sampling and testing methods.

Treat injuries, cuts, and holes in wood after treatment with three applications of copper naphthenate solution containing a minimum of two percent copper metal or with Chromated Copper Arsenate (CCA) meeting AWPA M4 requirements.

706.04.2 INCISING

Page 429

10-11-12

Rescind Subsection 706.04.2 Incising and replace with the following:

Mechanically incise timber and lumber as specified in Section 8 of Commodity Specification A, part 12 of AWPA Standard T1 having a nominal thickness of 2 inches (actual 38 mm thickness) or greater before treating.

Incise timber and lumber 3 inches (63 mm actual thickness) thick or greater on all four sides. Incise timber and lumber less than 3 inches (63 mm actual thickness) thick on the wide faces only, unless otherwise specified.

Ensure incision depth and pattern for all material are dense enough to achieve uniform depth of penetration as specified in Section 8 of Commodity Specification A, part 12 of AWPA standard T1. Incise Intermountain Douglas Fir then treat to refusal with preservative and retention requirements meeting AWPA standards listed in 706.04.1. Refusal being specified as the pressure and temperature shall be maintained constant or be increased within a range with good practice for the material being treated until the quantity of preservative absorbed in each of any two consecutive half hours in not more than 2 percent of the amount already injected. 1 1/2-inch (38 mm actual dimension) center-matched material used for flumes, boxes, etc., does not need to be incised.

Ensure incised wood meets the penetration and retention requirements appropriate for identified Use Category Commodity Specification.

706.04.3 INSPECTION

Page 430

9-1-07

Rescind Subsection 706.04.3 Inspection and replace with the following:

Wood products will be inspected by the method outlined in MT 404. Only wood products with worm holes and any staining due to fungus will be inspected in the white along with the moisture content of Intermountain Douglas Fir. For inspecting wood in the white a minimum of 72 hours advanced notice must be given and must be traceable from inspection in the white to inspection of the treated product. If stain is present in the wood use only material with blue stain. The correct moisture content for Intermountain Douglas Fir is 22 percent plus or minus 2 percent and the method to obtain this moisture content is outlined in the AWPA standards.

The acceptance of any material or finished members by the Inspector does not prevent their rejection if found defective. Replace rejected material and work at Contractor expense.

706.05 TIMBER PILES

Page 430

6-27-13

Rescind Section 706.05 TIMBER PILES in its entirety.

707.01.2 CONCRETE STRUCTURES OTHER THAN PAVEMENT

Page 431

5-9-13

Rescind the first paragraph and replace with the following:

- A. Expansion Joint Filler. Furnish Type II cork pre-formed expansion joint filler meeting AASHTO M 153 requirements.
- B. Expansion Joint System. Furnish expansion joint system as designated in the contract.
- C. Silicone Joint Seal. Furnish silicone joint seal as designated in the contract.

- D. Fabric Reinforced Neoprene Joint Seal. Furnish fabric reinforced neoprene joint seal as designated in the contract.
- E. Expansion Joint Asphalt Plug. Furnish expansion joint asphalt plug as designated in the contract.

707.01.3 CONCRETE CURBS, GUTTERS, AND SIDEWALKS Page 431 5-9-13

Rescind the first paragraph and replace with the following:

Use preformed expansion joint filler for concrete curbs, gutters, and sidewalks meeting AASHTO M 213 requirements.

707.02.1 RUBBER GASKETS Page 431 12-13-12

Rescind the first paragraph and replace with the following:

Furnish ring gaskets meeting ASTM C 1619 requirements.

707.02.2 FLEXIBLE PLASTIC GASKETS Page 431 12-13-12

Rescind Subsection 707.02.2 and replace with the following:

707.02.2 Flexible Joint Sealers

Furnish flexible joint sealants meeting ASTM C 990 requirements.

707.03.3 PLASTICS Page 433 10-11-12

Rescind Table 707-3 and replace with the following:

TABLE 707-3  
PROPERTIES AND TEST METHODS - FINISHED PLASTIC WATERSTOP

ASTM STANDARD	PROPERTY	REQUIREMENT
D 2240	Hardness	78 ± 3
D 638	Tensile Strength, min.	2000 psi (14 MPa)
D 638	Ultimate Elongation, min.	300%
D 746 Procedure B	Low Temperature Brittleness at -37 °C	No Failure

708.07 POLYETHYLENE CORRUGATED DRAINAGE PIPE OR TUBING Page 436 9-26-13

Rescind Subsection 708.07 and replace with the following:

708.07 CORRUGATED POLYETHYLENE DRAINAGE PIPE

Furnish heavy duty corrugated polyethylene drainage pipe or tubing and fittings meeting AASHTO M 252 (Type S – non-perforated or Type SP – perforated) requirements for nominal diameters 3 through 10 inches (76 through 254 mm) and AASHTO M 294 for nominal diameters 12 through 48 inches (305 through 1220 mm).

708.08 HIGH DENSITY POLYETHYLENE PIPE Page 436 9-26-13

Add the following Subsection:

708.08 HIGH DENSITY POLYETHYLENE PIPE

Furnish and install polyethylene pipe and fittings manufactured from a PE 3408, PE 3608, or PE 4710 resin that meets ASTM D 3350. Molded and fabricated butt fusion fittings must meet ASTM D 3261 and have at least the same pressure rating as the pipe.

708.08.1 Pressurized Polyethylene Pipe

Furnish pressure rated polyethylene pipe less than or equal to 2" diameter in accordance with ASTM D 2737. Use a class 200 with a DR of 7 for polyethylene pipe.

708.08.2 Solid Wall Polyethylene Pipe

Furnish solid wall polyethylene pipe greater than 2" in diameter in accordance with ASTM F 714.

709.01.1 DUCTILE IRON WATER PIPE

Page 437

9-26-13

Rescind the Subsection title (709.01.1 Ductile Iron Water Pipe) and replace with the following:

709.01.1 Ductile Iron Pipe

709.03 STEEL STRUCTURAL PLATE PIPE AND PIPE ARCHES

Page 438

10-7-10

Rescind the third paragraph (that begins with "Meet AASHTO...") and replace with the following:

Meet AASHTO M 167 requirements for allowable tolerance in span and rise for pipe arches.

710.01 PIGMENTS, VEHICLES, AND THINNERS

Page 441

9-26-13

Rescind Subsection 710.01 and replace with the following:

710.01 PIGMENTS, VEHICLES, AND THINNERS

Ensure all materials from which paints are made and formulated meet the following specifications:

Zinc Oxide Pigments	ASTM D 79
Calcium Carbonate Pigments	ASTM D 1199
Titanium Dioxide Pigments	ASTM D 476
Bone Black Pigment	ASTM D 210
Carbon Black Pigment	ASTM D 561
Black Synthetic Iron Oxide Pigment	ASTM D 769
Red and Brown Iron Oxide Pigments	ASTM D 3722
Ochre (Ferrous Earthy Pigments)	ASTM D 85
Raw and Burnt Umber Pigments	ASTM D 763
Raw and Burnt Sienna Pigments	ASTM D 765
Chrome Oxide Green Pigment	ASTM D 263
Chrome Yellow and Chrome Orange Pigments	ASTM D 211
Yellow Iron Oxide Pigment-hydrated	ASTM D 768
Aluminum Pigments	ASTM D 962
Zinc Dust (Pigment)	ASTM D 520
Magnesium Silicate Pigments	ASTM D 605
Mica Pigment	ASTM D 607
Petroleum Spirits (Mineral Spirits)	ASTM D 235
Lampblack Pigments	ASTM D 209
Liquid Paint Driers	ASTM D 600

710.02.3 PAINT COATING SYSTEMS FOR STRUCTURES

Page 445

3-1-07

Rescind the first sentence of part C (that begins with "C. Finish Coat. Provide ...") and replace with the following:

C. Finish Coat. Provide a urethane paint meeting Table 710-6 requirements.

710.03 POWDER COATING PREQUALIFICATION AND CERTIFICATION

Page 445

12-13-12

Add the following subsection to Section 710:

710.03 POWDER COATING PREQUALIFICATION AND CERTIFICATION.

Provide certified test results of the tests shown in Table 710-7 for powder coated material. Submit certified test results and samples for approval. Only coatings approved are permitted to be used.

TABLE 710-7  
CERTIFIED TEST RESULTS

Test Name	ASTM Designation	Specification Limits
Salt Spray Test	D 1654 (B 117)	Rating Number Minimum 6 (from Table 1) after 1000 hours
Impact Test	D 2794	Minimum 80 in.-lbs
Cross Hatch Adhesion Test	D 3359	5A or 5B Minimum
Hardness Test	D 3363	2H
Bend Test	D 522	180 degree Bend ½ inch diameter mandrel with No Breaks Flaking or Cracks
UV Exposure	G 154	1,000 hours No Film Failure
Thickness	G 12	3 mil Minimum
Abrasion Taber Abraser	D 4060	1,000 gram 1,000 cycles 100 mg maximum weight loss

Submit two 4 inch by 4inch by 24 gage coupons along with the test results of the coated material used to the Project Manager. The coating must be representative of expected quality and color of coatings from a production line.

710.04 ANTI-GRAFFITI COATING- PERMANENT Page 445 9-26-13

Add the following Subsection:

**710.04 ANTI-GRAFFITI COATING- PERMANENT**

Furnish a permanent, non-sacrificial siloxane-based anti-graffiti coating capable of withstanding multiple cleanings which is listed on the Department's QPL. Coating must allow graffiti to be removed through the use of a water pressure washer and without detergents or chemicals. Product must be approved by the manufacturer for use on the intended material or surface and have a finished dry film thickness of not less than 6 mils (150µ). Remove any graffiti prior to application of an anti-graffiti coating. Prepare the substrate surface, apply, cure, and maintain coating in accordance with the manufacturer's recommendations.

711.01.2 EPOXY-COATED REINFORCING BARS Page 447 9-26-13

Rescind Subsection 711.01.2 and replace with the following:

Furnish epoxy-coated reinforcing bars meeting ASTM A615 and the contract requirements. Epoxy-coating on reinforcing bars must meet ASTM A775 or ASTM A934.

Ensure the bars are coated by an applicator plant listed on the Department's QPL and certified under the Concrete Reinforcing Steel Institute's (CRSI) Epoxy Coating Plant Certification program for Fusion-bonded Epoxy Applicator Plants.

711.02 STRUCTURAL STEEL Page 447 12-13-12

Rescind Part (B) and replace (that begins "Other Applications...") with the following:

- B. Other applications meeting AASHTO M 270.

711.03 STRUCTURAL STEEL TUBING Page 447 9-23-10

Rescind and replace the first sentence of the first paragraph (that begins with "Furnish structural steel...") with the following sentence:

Furnish structural steel tubing meeting ASTM A 500, Grade B, requirements for cold-formed welded seamless carbon steel structural tubing in rounds and shapes.

711.09 WELDED STUD SHEAR CONNECTORS Page 448 11-17-11

Rescind the first paragraph (that begins with "Furnish shear connector...") and replace with the following:

Furnish shear connector studs meeting the AWS D1.5 Section 7 specification for "Stud Welding" and the contract requirements.

711.10 STEEL PILING Page 448 2-23-12

Rescind Subsection 711.10.1 and replace with the following:

**711.10.1 Structural Steel Piles**

Furnish new steel H piles, melted and manufactured in the USA, meeting AASHTO M270 Grade 345 MPa (50 ksi) and contract requirements.

Rescind Subsection 711.10.2 and replace with the following:

**711.10.2 Steel Pipe Piles**

Furnish new steel pipe piles, melted and manufactured in the USA, meeting ASTM A 252, Grade 2 requirements with a minimum yield strength of 310 Mpa (45 ksi). Steel pipe diameter and wall thickness is specified in the contract.

711.12.3 DRAINAGE STRUCTURE CASTINGS Page 448 1-12-12

Rescind Subsection 711.12.3 and replace with the following:

Furnish structural drainage castings meeting the Detailed Drawing and AASHTO M 306 – HS 25 requirements.

711.13 BEARING ASSEMBLY ANCHOR BOLTS FOR BRIDGES Page 449 12-13-12

Rescind Subsection 711.13 and replace with the following:

Furnish anchor bolts sized as specified and meeting AASHTO M 314 requirements.

711.14 ELASTOMERIC BEARING DEVICES Page 449 3-27-14

Add the following sentence to the end of Subsection 711.14:

For reinforced elastomeric devices, furnish steel laminates that meet AASHTO M 270 Grade 36 or ASTM A 1011.

711.18 MECHANICAL REBAR CONNECTORS Page 450 11-14-13

Add Subsection 711.18 Mechanical Rebar Connectors:

711.18 Mechanical Rebar Connectors

Furnish any type mechanical connector meeting a yield strength minimum of 125% of the reinforcement and be of a type commonly used and readily available. Splice epoxy coated reinforcement with epoxy coated mechanical connectors.

Submit 4 copies of the product data sheet for the proposed type of connector with the specified performance criteria to the Project Manager prior to installation.

711.19 METRIC PLATE SUBSTITUTION Page 450 3-27-14

Add Subsection 711.19 METRIC PLATE SUBSTITUTION:

Define the requirements for substituting standard inch-sized steel plate for metric steel plate. This applies to AASHTO M 270 Grade 250 steel plate used in the following applications;

- Bridge rail
- Pre-stressed concrete beams
- Bridge guard angles
- Bridge pier protection anchors and plates
- Fixed shoe bearing devices

This does not apply to AASHTO M 270 Grades 345 through 690.

Show the metric plate thickness and add a table to the shop drawings similar to Table 711-1:

Table 711-1  
Steel Plate Substitutions

Plate Thickness (inch)	Allowable Substitute Plate Thickness (mm)
1/8*	3
3/16	5
1/4	5 or 6
5/16	8
3/8	10
1/2	12 or 13
5/8	16
3/4	19 or 20
7/8	22
1	25
1 1/4	30
1 1/2	38 or 40

\* 10 gage ASTM A 1011 sheet may also be substituted for 3 mm shim plates

711.20 POLYTETRAFLUOROETHYLENE (PTFE)

Page 450

11-14-13

Add Subsection 711.20 Polytetrafluoroethylene (PTFE):

## 711.20 Polytetrafluoroethylene (PTFE)

Furnish PTFE resin meeting ASTM D 4894 and ASTM D 4895 requirements. Use PTFE sheets consisting of pure PTFE resin, molded by pressure and heat and skived into sheets of  $1/16$ -inch (1.5 mm) thick. Finished sheets must conform to the following properties:

TABLE 711-2  
PTFE SHEET PROPERTIES

ASTM Test	Physical Property	Requirement
D 4894	Tensile Strength	2800 psi (19.3 MPa)
D 4895	Tensile Elongation	200%

Furnish stainless steel sheets, if applicable, meeting ASTM A 167 or ASTM A 240 Type 304.

712.01.1 GENERAL (CHAIN LINK FENCE)

Page 451

10-9-08

Rescind section 712.01.1 and replace with the following:

Meet AASHTO M 181 requirements, as modified herein. Use one of the following fence fabrics, as specified in the contract:

- Type 1 Class C Zinc-coated Steel
- Type 2 Aluminum-coated Steel
- Type 3 Aluminum Alloy

Zinc-5 Percent Aluminum-Mischmetal alloy meeting the requirements of ASTM B 750 may be substituted for zinc coating (hot-dipped) at a Class 2, or 1.0 oz/ft<sup>2</sup> (305 g/m<sup>2</sup>), coating thickness as specified by ASTM F 1345.

Use zinc-coated steel for all Type 1 and Type 2 fabric fence parts; including posts, rails, gate frames, expansion sleeves, wire ties, fabric ties, hog rings, tension wire, miscellaneous fittings, and hardware. Use aluminum alloy for these same Type 3 fabric fence parts. Use either zinc-coated steel or aluminum alloy for these Type 4 fabric fence parts.

712.01.3 POSTS, RAILS, AND BRACES

Page 451

2-23-12

Rescind Subsection 712.01.3 and replace with the following:

Meet ASTM F 1043 and the contract length requirements. Furnish all posts with a watertight cap that fits securely over the outside post top and supports the top rail.

712.01.5 FABRIC BANDS AND STRETCHER BARS

Page 451

11-17-11

Rescind the first bullet item (that begins with "Steel - a minimum...") and replace with the following:

- Steel - a minimum 1/8-inch (3 mm) thick by 1-inch (25 mm) wide.

712.01.6 TIE WIRE (FENCE)

Page 451

10-9-08

Rescind the first paragraph (that begins with "Furnish 9-gauge galvanized...") and replace with the following:

Furnish 9-gauge galvanized steel tie wire meeting AASHTO M 279 (ASTM A 116) requirements. Furnish 11-gauge; Class 1 galvanized steel hog ring fasteners meeting AASHTO M 279 (ASTM A 116) requirements.

712.01.7 TENSION WIRE (FENCE)

Page 451

10-9-08

Rescind the first paragraph (that begins with "Furnish 7-gauge galvanized...") and replace with the following paragraph:

Furnish 7-gauge galvanized coiled spring steel tension wire. Meet AASHTO M 279 (ASTM A 116), Class 1 galvanizing requirements.

712.01.8 GATES

Page 452

2-23-12

Rescind the first sentence under part A (that begins with "Construct gate frames from steel...") and replace with the following:

Construct gate frames from steel sections meeting ASTM F 900 requirements.

Rescind the first sentence under part B (that begins with "Construct gate frames from aluminum...") and replace with the following:

Construct gate frames from aluminum sections meeting ASTM F 900 requirements.

Rescind Table 712-1.

712.02 INTERSTATE AND FARM FENCE

Page 454

10-10-13

Just prior to Subsection 712.02.1 Woven Wire, add the following Subsection title:

## 712.02 WIRE FENCE

712.02.1 WOVEN WIRE (FENCE)

Page 454

5-9-13

Rescind 712.02.1 and replace with the following:

Furnish woven wire meeting AASHTO M 279 (ASTM A 116) requirements and either of the Table 712-1 designations.

TABLE 712-1  
WOVEN WIRE REQUIREMENTS

Specification	Grade	Design Number	Metallic Coating
AASHTO M279 (ASTM A116)	No. 12 ½ Grade 60	832-6-12 ½*	Type Z, Class 1 or Type ZA, Class 20
AASHTO M279 (ASTM A116)	No. 14 Grade 125	832-6-14*	Type Z, Class 3 or Type ZA, Class 40

\*For use with Type C fence.

Provide a 6-inch (155 mm) stay spacing. Match the fence height and mesh dimensions of the fence being replaced if not specified.

712.02.2 BARBED WIRE (FENCE)

Page 454

10-9-08

Rescind 712.02.2 and replace with the following:

Use 2-point 12 1/2 or 13 1/2-gauge barbed wire meeting AASHTO M 280 (ASTM A 121) requirements. Space barbs at a 4-inch nominal (105 mm) or a 5-inch nominal (130 mm) spacing. Provide the Project Manager Certification that the wire meets AASHTO M 280 (ASTM A 121) requirements.

712.02.7 METAL POSTS AND ASSEMBLIES

Page 454

5-9-13

Rescind 712.02.7 and Table 712-3 and replace with the following:

## 712.02.7 Metal Posts and Assemblies

Provide metal fence posts and assemblies meeting AASHTO M 281 requirements, modified as follows:

- Section 7 and Tables 3 and 4 of AASHTO M 281 apply to finished posts and assemblies after fabrication, punching, drilling, and finish coating.

Galvanize or paint posts, braces, and anchor plates. Meet AASHTO M 111 galvanizing requirements. Furnish nuts, bolts, fittings, and other hardware meeting ASTM A 153 or B 695 (Class 50) galvanizing requirements. Paint following the paint manufacturer's recommendations.

Furnish fence posts and braces of the lengths in Table 712-2.

TABLE 712-2  
POST LENGTHS

POST TYPE	BRACES, BRACE RAILS AND PANEL POSTS	LINE POSTS
Metal	--	6 feet 6 inch (2.0 m)
Wood	8 feet (2.4 m)	7 feet (2.1 m)

Use Tee, Channel, U, or Y bar section line posts with corrugations, knobs, notches, holes, or studs placed to engage the fence line wires.

Attach a steel anchor plate to each line post so that the anchor top is 2 inches to 3 inches (50 mm to 75 mm) below ground line when the post is set to the specified depth.

## 712.02.8 WOOD FENCE POSTS AND BRACE RAILS

Page 455

5-9-13

Rescind Subsection 712.02.8 Wood Fence Posts and Brace Rails and replace with the following:

- A. General. Make fence posts and brace rails from well-seasoned, sound, and straight-grained Western Larch, Lodgepole Pine, Ponderosa Pine, Southern Yellow Pine, or Douglas Fir. Remove all bark from the posts. Taper round posts, to be driven, from 6 to 12 inches (155 to 305 mm) up from the bottom to a 1-inch  $\pm$  1/2-inch (25 mm  $\pm$  12 mm) point. Bevel the edges of post tops to produce a flat surface with a diameter 1-inch  $\pm$  1/2-inch (25 mm  $\pm$  12 mm) less than post diameter. These taper lengths are included in the specified post lengths. Perform all machining before treatment.
- Furnish posts and rails 10 feet (3 m) in length or less free of crooks and sweeps greater than 3/4-inch (19 mm) from the post centerline. The maximum offset from centerline for posts and rails longer than 10 feet (3 m) is 3/4-inch (19 mm) plus 1/16-inch (2 mm) per additional foot of length. The centerline is defined as a straight line from the center of the tip to the center of the butt.
- Treat round posts and rails meeting AWPA Standards for Commodity Specification B and Use Category 4A. Supply round posts and rails meeting the AWPA minimum penetration requirements specified for natural posts, with a penetration of at least 3/8-inch (9 mm). Posts and rails must have sufficient sapwood to provide the 3/8-inch (9 mm) minimum penetration. Treat the S4S post as specified in Subsection 706.04.
- Treat injuries, cuts, and holes in timber pile after treatment per Subsection 706.04.
- B. Line Posts. Furnish line posts and brace rails from a minimum 4-inch (105 mm) diameter round, or a minimum 4-inch x 4-inch (105 mm x 105 mm) square sawn. Furnish corner, end, gate, and pull posts from a minimum 5-inch (130 mm) diameter round post or a 5 x 5-inch (130 mm x 130 mm) square sawn post.

## 712.02.10 GATES FOR INTERSTATE FENCE

Page 456

3-22-12

Rescind the fourth paragraph (that begins "The approximate weight ...") and replace with the following:

The approximate weight of the gate frames (less fabric) must meet Table 712-3 requirements.

Rescind the title of table 712-4, Approximate Gate Frame Weights, and replace with the following:

TABLE 712-3  
APPROXIMATE GATE FRAME WEIGHTS

## 713.03 CALCIUM CHLORIDE

Page 457

9-26-13

Rescind Subsection 713.03 and replace with the following:

## 713.03 CHLORIDES

- A. Magnesium Chloride. Furnish liquid magnesium chloride meeting the requirements in Table 713-1. Products will be tested as received under MT-532.

TABLE 713-1  
LIQUID MAGNESIUM CHLORIDE REQUIREMENTS

	Requirement
Assay	$\geq 28.5\%$ MgCl <sub>2</sub> by Mass
Sulfate	$\leq 3.0\%$ by Mass SO <sub>4</sub>
Alkali Chlorides	$\leq 5.0\%$ by Mass NaCl
Magnesium Hydroxide	$\leq 0.2\%$ by Mass Mg(OH) <sub>2</sub>
Settleable Solids	$\leq 1.0\%$
Arsenic	$\leq 5.0$ mg/Kg

Barium	≤100.0 mg/Kg
Cadmium	≤0.2 mg/Kg
Chromium	≤1.0mg/Kg
Copper	≤1.0 mg/Kg
Lead	≤1.0 mg/Kg
Mercury	≤0.05 mg/Kg
Selenium	≤5.0 mg/Kg
Zinc	≤10.00 mg/Kg
Phosphorous	≤2500.0 mg/Kg
Cyanide	≤0.20 mg/Kg

B. Calcium Chloride.

1. Furnish liquid calcium chloride meeting the requirements in Table 713-2. Products will be tested as received under MT-531.
2. Furnish dry calcium chloride meeting the requirements in Table 713-2 and ASTM D98 Type S.

TABLE 713-2  
LIQUID CALCIUM CHLORIDE REQUIREMENTS

	Requirement
Assay	≥30.0% CaCl <sub>2</sub> by Mass
Magnesium	≤0.5% by Mass MgCl <sub>2</sub>
Alkali Chlorides	≤6.0% by Mass NaCl
Calcium Hydroxide	≤0.2% by Mass Mg(OH) <sub>2</sub>
Settleable Solids	≤1.0%
Arsenic	≤5.0 mg/Kg
Barium	≤100.0 mg/Kg
Cadmium	≤0.2 mg/Kg
Chromium	≤1.0mg/Kg
Copper	≤1.0 mg/Kg
Lead	≤1.0 mg/Kg
Mercury	≤0.05 mg/Kg
Selenium	≤5.0 mg/Kg
Zinc	≤10.00 mg/Kg
Phosphorous	≤2500.0 mg/Kg
Cyanide	≤0.20 mg/Kg

713.06 MINERAL FILLER

Page 458

1-16-14

Rescind Subsection 713.06 and replace with the following:

713.06 Reserved

713.07 CONCRETE CURING AND PROTECTIVE COATINGS

Page 458

11-14-13

Rescind Subsection 713.07 and replace with the following:

713.07 Reserved

713.08 SEED

Page 458

9-26-13

Rescind Subsection 713.08 and replace with the following:

713.08 Reclamation Seed

Furnish all seed that meets and is labeled under Montana Seed Law and meeting the contract requirements.

Furnish seed originating from the North American Continent above 41 degrees latitude. Make written request for waivers of the above requirements to the Project Manager who will work with the Department Agronomist. Do not furnish seed, grown or originating, from production fields outside of North America.

Furnish seed free of prohibited noxious weed seed with restricted weed seed not exceeding Montana Seed Law. Wet, moldy, or otherwise damaged seed will be rejected.

Calculations of "pure live seed" may be made based on either a germination test or a tetrazolium test, in addition to the purity analysis.

Submit a purity analysis and germination test of the seed proposed for use. A germination test must have been performed within 12 months of the seeding date.

Apply seed on a "pure live seed" basis. The quantity of "pure live seed" per 100 pounds (45.4 kg) of seed is determined as follows:

$$\% \text{ Pure Live Seed} = \text{Germination \%} \times \text{Purity} \times 100$$

$$\text{Bulk Seed Needed} = \text{Total Lbs. Pure Live Seed Required} / \% \text{ Pure Live Seed} \times 100$$

Submit a written notification of the seed source and the approximate date the seeding is planned to begin. Do not begin seeding until the germination and purity test results are known and a Department seed blend report is furnished to the Project Manager.

Store all seed under weather-proof cover until time of seeding. Seed bags exposed to rain or snow will be rejected.

### 713.09 FERTILIZER

Page 459

9-26-13

Rescind Subsection 713.09 and replace with the following:

#### 713.09 Fertilizer

Furnish fertilizer in accordance with all applicable laws, rules, and regulations. Furnish the product data sheet to the Project Manager upon delivery. Contaminated or damaged fertilizer will be rejected.

### 713.10 MULCH

Page 459

9-26-13

Rescind Subsection 713.10 and replace with the following:

#### 713.10 Mulch

Furnish mulch listed on the Department's QPL, as specified in the contract and meeting the requirements of this Subsection.

##### 713.10.1 Vegetative Mulch

Vegetative mulch is dried cereal grain or oilseed crop straw, cornfield residue, or grass hay with the majority of stems and leaves at least 4 inches (100 mm) in length.

Mulch will be rejected for any of the following reasons:

1. Chopped or ground mulch;
2. Mulch that is musty, moldy, rotted, or contains noxious weed or grass seed-bearing stalks;
3. Mulch containing stones, dirt, roots, stumps, and other foreign material, or;
4. Harvested or stored for over 2 years.

##### 713.10.2 Hydraulic Mulch

- A. Wood Fiber. Wood fiber hydraulic mulch is specially prepared wood fibers free of growth or germination inhibiting materials that forms a homogeneous slurry when combined with water, tackifiers, fertilizer, and other specified additives and remains uniformly suspended under agitation. The mulch may be colored with a water-soluble, nontoxic dye to aide visual metering during application. Apply the mulch to produce a uniform mat-like cover on the seeded ground.

At least 30 percent of the mulch fibers must average 0.15 inches (4 mm) or longer with 50 percent or more retained on a Clark Fiber Classifier 24-mesh screen.

- B. Straw Fiber. Straw fiber hydraulic mulch is specially manufactured and prepared straw stems that are packaged and commercially sold specifically as hydraulic mulch. Straw hydraulic mulch can be formulated as 100% straw or combined with other types of mulch and tackifier products during the manufacturing process. The contract will specify the rate, type and formulation of straw fiber hydraulic mulch to be used.
- C. Multi-Fiber. Multi-fiber hydraulic mulches are composed of various types and percentages of natural fibers and tackifiers. The contract will specify the type of multi-fiber mulches allowed.

### 713.11 SOD

Page 460

9-26-13

Rescind Subsection 713.11 and replace with the following:

#### 713.11 Sod

Furnish commercially manufactured sod that is a living, vigorous growth of grass of the type and thickness specified.

Sod that shows signs of stress from mishandling or lack of water will be rejected.

Provide sod adapted to the general locality of the project, having a dense root system, is free of noxious weeds, and other foreign substances harmful to the development and maintenance of the sod.

Furnish a product data sheet to the Project Manager prior to delivery specifying the origin of the sod.

Cut the sod when the grass length is approximately 2 inches (50 mm) high but not exceeding 3 inches (75 mm). Ensure the sod is free of debris before cutting.

Wet the sod to permit cutting, rolling, and hauling without crumbling or breaking.

Water the sod using water and equipment free of contaminants, from a municipal, domestic, or other source suitable for irrigation. Trucks previously used for application of salt solutions are prohibited for use as watering vessels, unless approved by the Project Manager.

### 713.12 SOIL RETENTION/EROSION CONTROL BLANKETS AND MATS

Page 461

9-26-13

Rescind Subsection 713.12 and replace with the following:

#### 713.12 Rolled Erosion Control Products

Furnish erosion blankets listed on the Department's QPL, as specified in the contract and meeting the requirements of this Subsection. Furnish natural fiber netting consisting of woven 100% biodegradable natural fibers such as coir, jute or sisal. Furnish blankets designed to stabilize and hold previously applied mulch or compost on slopes as well as newly constructed stream banks and slopes.

Natural fiber netting is available in various fiber types, strengths, weights and mesh-opening sizes.

- A. Short Term Blankets. An erosion control blanket composed of processed natural fibers mechanically bound together with 100% biodegradable threading and natural fiber nettings to form a continuous matrix. The fiber matrix can be composed of straw, coir, cotton, wool, curled wood or other approved product. Thread and netting material must be non-synthetic, generally of plied coir, jute or cotton. Meet the requirements for Type II blankets as specified in Table 713-4.
- B. Long Term Blankets. . An erosion control blanket composed of one of the following materials:
  - 1. Processed slow degrading natural or polymer fibers mechanically-bound together between two slow degrading synthetic or natural fiber nettings to form a continuous matrix.
  - 2. An open weave textile composed of processed slow degrading natural or polymer yarns or twines woven into a continuous matrix. Meet the requirements for Type III-B blanket as specified in Table 713-4.

TABLE 713-4  
TEMPORARY ROLLED EROSION CONTROL

Property	Type II				Type III		Type IV	Test Method
	A <sup>1</sup>	B	C	D	A <sup>1</sup>	B		
Typical Functional Longevity <sup>2</sup> (months)	12				24		36	N/A
Minimum Tensile Strength <sup>3</sup> lbs/ft <sup>2</sup> (kg/m <sup>2</sup> )	5 (24.4)	50 (244.1)	75 (366.2)	25 (122.1)	100 (488.2)	125 (610.3)	ASTM D 4595	
Maximum "C" <sup>4</sup> Factor <sup>4</sup>	0.10 at 1V:5H	0.10 at 1V:4H	0.10 at 1V:3H	0.10 at 1V:2H	0.10 at 1V:5H	0.25 at 1V:1.5H	0.25 at 1V:1H	ASTM D 6459
Minimum Permissible Shear Stress <sup>5,6</sup> psf (Pa)	.25 (12)	.50 (23.9)	1.50 (71.8)	1.75 (83.8)	.25 (12)	2.00 (95.8)	2.25 (107.7)	ASTM D 6460

Notes:

1. Obtain max "C" factor and allowable shear stress for mulch control nettings with the netting used in conjunction with pre-applied mulch material.
  2. Functional longevities are for guidance only. Actual functional longevities may vary based on site and climatic conditions.
  3. Minimum average roll values, machine direction.
  4. "C" factor calculated as ratio of soil loss from rolled erosion control product protected slope (tested at specified or greater gradient, v:h) to ratio of soil loss from unprotected (control) plot in large-scale testing. These performance test values should be supported by periodic bench scale testing under similar test conditions and failure criteria using Erosion Control Technology Council (ECTC) Test Method #2.
  5. Minimum shear stress the rolled erosion control product (un-vegetated) can sustain without physical damage or excess erosion (> 1/2-inch soil loss) during a 30-minute flow event in large-scale testing. These performance test values should be supported by periodic bench scale testing under similar test conditions and failure criteria using ECTC Test Method #3.
  6. The permissible shear stress levels established for each performance category are based on historical experience with products characterized by Manning's roughness coefficients in the range of 0.01 to 0.05.
- C. Permanent Turf Reinforcement Mat (TRM)
- 1) Synthetic Fiber Matrix. Furnish a web of mechanically bonded synthetic fibers that are entangled to form a strong and dimensionally stable mat. Place fibers between 2 or 3 high-strength, biaxially oriented nets mechanically bound together by stitching with polyolefin thread. The netting material must be resistant to biological, chemical, and ultra-violet degradation.

TABLE 713-5  
SYNTHETIC FIBER TRM

Property	Value	Test Method
Matrix material 100% synthetic fibers	Minimum 10 oz/yd <sup>2</sup> (339 g/m <sup>2</sup> )	N/A
Top, bottom and center netting	Polypropylene, Polyethylene or Nylon Minimum 5 lbs/1000 ft <sup>2</sup> (2.44 kg/100 m <sup>2</sup> )	N/A
Minimum tensile strength – TD	400 lbs/ft (5.84 kN/m)	ASTM D 6818
Minimum tensile strength – MD	300 lbs/ft (4.38 kN/m)	ASTM D 6818
UV stability (minimum % tensile retention)	80%	ASTM D 4355 (1000-hour exposure)

Minimum thickness (inches)	¼-inch (6 mm)	ASTM D 6525
Minimum Shear Stress	Minimum 10 lbs/ft (.15 kN/m)	ASTM D 6525

- 2) Natural Fiber Matrix. . Furnish a natural fiber matrix constructed of two or three nets of heavy-duty polypropylene, polyethylene or nylon. The internal matrix fiber is composed of a natural fiber such as curled wood, straw or coconut.

TABLE 713-6  
NATURAL FIBER TRM

Property	Value	Test Method
Matrix material 100% biodegradable	70% straw/30% coconut, or 100% coconut fiber, or 100% Curled wood fiber. Minimum 0.5 lbs/yd <sup>2</sup> (.27 kg/m <sup>2</sup> )	N/A
Top and bottom netting	Synthetic fiber – minimum 5.0 lbs/1,000 ft <sup>2</sup> (2.44 kg/100m <sup>2</sup> )	N/A
Center net	Synthetic fiber – minimum 24.0 lbs/1,000 ft <sup>2</sup> (11.72 kg/100m <sup>2</sup> )	N/A
Minimum tensile strength – TD	737 lbs/linear ft (10.76 kN/m)	ASTM D 6818
Minimum tensile strength – MD	620 lbs/linear ft (9.05 kN/m)	ASTM D 6818
UV stability (minimum % tensile retention)	100%	ASTM D4355 (1000-hour exposure)
Minimum thickness	0.7 inches (17.5 mm)	ASTM D6525

713.13 COMPOST

Add the following Subsection to Section 713:

713.13 Compost

Compost is the soil amendment product resulting from the controlled decomposition of organic materials also known as feedstock material. Acceptable compost feedstock material consist of agricultural vegetative residuals, leaf/yard trimmings, manure, domestic livestock carcasses, wood residue, municipal biosolids (sewage sludge), or food waste. If biosolids are used as a feedstock, compliance with USEPA 40 CFR Part 503 is required.

Furnish compost meeting Table 713-4 requirements.

TABLE 713-4  
COMPOST  
PHYSICAL AND CHEMICAL PROPERTIES

PROPERTY	REQUIREMENT	Method
Particle Size	90% (by volume) passing 1 inch (25 mm) screen	<sup>1</sup> TMECC 05.08-B
% Moisture	30% to 55%	TMECC 03.09-A
% Organic Matter	30% minimum	TMECC 05.07-A
pH	5.0 to 8.5	TMECC 04.11-A
C/N Ratio	10:1 to 30:1	TMECC 05.02-A
Inert Material	<1%	TMECC 03-02-A
Maturity	Stable, ≥5 using Solvita test	Solvita Test Kit
Soluble Salt Concentration (electrical conductivity)	11.0 mmhos/cem maximum	TMECC 04.10-A

Notes:

1. TMECC – Test Methods for Evaluating Compost and Composting

Provide a manufacturer's certification attesting that the material meets these specifications.

714 PAVEMENT MARKING MATERIALS

Rescind Section 714 and replace with the following:

SECTION 714  
PAVEMENT MARKING MATERIALS

714.01 TEMPORARY STRIPING TAPE

Furnish temporary striping tape that is 4-inch (105 mm) wide, retro-reflective, pressure-sensitive tape specifically manufactured for use as pavement striping. The tape must be available in white and yellow.

714.02 TEMPORARY STRIPING TABS

Furnish temporary striping tabs meeting the following:

1. Types I and II: "L" shaped, extruded polyurethane, at least 4 inches (105 mm) wide by 2 inches (50 mm) high with a reflectorized strip meeting requirement No. 2 below; attached horizontally across the top of the vertical portion of the tab; an adhesive strip meeting requirement No. 3 below:
  - a. Type I tabs: white reflectorized tape on both sides with white bodies;
  - b. Type II tabs: yellow reflectorized tape on both sides with yellow bodies;
2. Reflective flexible sheeting meeting ASTM D 4956 Type V or better;
3. An adhesive strip at least 3/4-inch wide x 1/8-inch thick (19 mm x 3 mm) on the tabs underside, and;
4. A cover protecting the reflective strip that does not come off under traffic but is manually removable.

714.03 TEMPORARY WATERBORNE TRAFFIC PAINT

Furnish temporary waterborne traffic paint that meeting the requirements of Table 714-1.

TABLE 714-1  
TEMPORARY WATERBORNE TRAFFIC PAINT COMPOSITION

Test	Specification	Test Method
Color (x, y, Y)	Meet Requirements of ASTM D 6628	ASTM D 6628 and ASTM D 7585
Antimony	≤20.0 mg/Kg	MT 544
Arsenic	≤20.0 mg/Kg	
Cadmium	≤4.0 mg/Kg	
Chromium	≤5.0 mg/Kg	
Cobalt	≤20.0 mg/Kg	
Lead	≤20.0 mg/Kg	
Mercury	≤1.00 mg/Kg	
Tin	≤20.0 mg/Kg	

714.04 WATERBORNE TRAFFIC PAINT

Furnish waterborne traffic paint that meeting the requirement of Table 714-2. Where the NTPEP method is specified, recorded NTPEP results must be within the specifications shown.

TABLE 714-2  
WATERBORNE TRAFFIC PAINT COMPOSITION

Test	Specification	Method
Color (x, y, Y)	Meet Requirements of ASTM D 6628	ASTM D 6628 and ASTM D 7585
Durability (Wheel)	Minimum of 6 at 12 months	NTPEP
Luminance	White: ≥30 at 12 months Yellow: ≥20 at 12 months	NTPEP
Viscosity (Krebs Stormer), K.U. at 77 °F (25 °C)	80-95	ASTM D 562
Density Deviation	Maximum of ±0.30lbs/gallon from density target	ASTM D 1475
Contrast Ratio	0.92	MT 545
Dry No Track	90 Seconds	NTPEP
Freeze-Thaw Stability	Δ10KU	ASTM D 2243
Static Heat Stability	Δ10KU	MT 548
Bleeding Ratio	0.95 Minimum	ASTM D 969
Skinning and Lumps	Pass	MT 549
Settling	Pass	MT 549
Skinning	Pass	MT 549
NTPEP Lab Test Verification	Must Match NTPEP	NTPEP and MT 543
Antimony	≤20.0 mg/Kg	MT 544
Arsenic	≤20.0 mg/Kg	
Cadmium	≤4.0 mg/Kg	
Chromium	≤5.0 mg/Kg	
Cobalt	≤20.0 mg/Kg	
Lead	≤20.0 mg/Kg	
Mercury	≤1.00 mg/Kg	
Tin	≤20.0 mg/Kg	

714.05 HIGH DURABILITY WATERBORNE TRAFFIC PAINT

Furnish high durability waterborne traffic paint that meeting the requirements of Table 714-3. Where the NTPEP method is specified, recorded NTPEP results must be within the specifications shown.

TABLE 714-3  
HIGH DURABILITY WATERBORNE TRAFFIC PAINT COMPOSITION

Test	Specification	Method
Color (x, y, Y)	Meet Requirements of ASTM D 6628	ASTM D 6628 and ASTM D 7585
Durability (Wheel)	Minimum of 8 at 24 months	NTPEP
Luminance	White: $\geq 30$ at 12 months Yellow: $\geq 20$ at 12 months	NTPEP
Viscosity (Krebs Stormer), K.U. at 77 °F (25 °C)	80-95	ASTM D 562
Density Deviation	Maximum of $\pm 0.30$ lbs/gallon from density target	ASTM D 1475
Contrast Ratio	0.92	MT 545
Dry No Track	10 minutes Maximum	NTPEP
Freeze-Thaw Stability	$\Delta 10$ KU	ASTM D 2243
Static Heat Stability	$\Delta 10$ KU	MT 548
Bleeding Ratio	0.95 Minimum	ASTM D 969
Skinning and Lumps	Pass	MT 549
Settling	Pass	MT 549
Skinning	Pass	MT 549
NTPEP Lab Test Verification	Must Match NTPEP	NTPEP and MT 543
Antimony	$\leq 20.0$ mg/Kg	MT 544
Arsenic	$\leq 20.0$ mg/Kg	
Cadmium	$\leq 4.0$ mg/Kg	
Chromium	$\leq 5.0$ mg/Kg	
Cobalt	$\leq 20.0$ mg/Kg	
Lead	$\leq 20.0$ mg/Kg	
Mercury	$\leq 1.00$ mg/Kg	
Tin	$\leq 20.0$ mg/Kg	

#### 714.06 EPOXY OR OTHER POLYMERIC TRAFFIC PAINT

Furnish epoxy or other polymeric traffic paint that meeting the requirements of Table 714-4. Where the NTPEP method is specified, recorded NTPEP results must be within the specifications shown.

TABLE 714-4  
EPOXY OR OTHER POLYMERIC TRAFFIC PAINT COMPOSITION

Test	Specification	Method
Color (x, y, Y)	Meet Requirements of ASTM D 6628	ASTM D 6628 and ASTM D 7585
Durability (Wheel)	Minimum of 7 at 36 months	NTPEP
Luminance	White: $\geq 30$ at 36 months Yellow: $\geq 15$ at 36 months	NTPEP
Dry No Track	45 minutes Maximum	NTPEP
NTPEP Lab Test Verification	Must Match NTPEP	NTPEP and MT 543
Antimony	$\leq 20.0$ mg/Kg	MT 544
Arsenic	$\leq 20.0$ mg/Kg	
Cadmium	$\leq 4.0$ mg/Kg	
Chromium	$\leq 5.0$ mg/Kg	
Cobalt	$\leq 20.0$ mg/Kg	
Lead	$\leq 20.0$ mg/Kg	
Mercury	$\leq 1.00$ mg/Kg	
Tin	$\leq 20.0$ mg/Kg	

#### 714.07 PREFORMED PLASTIC PAVEMENT MARKING MATERIAL

##### 714.07.1 Composition Requirements

Furnish preformed plastic pavement marking material consisting of plastics and plasticizers, pigments, and reflective glass beads combined and proportioned to meet the following:

1. Available in both yellow and white color;
2. The total pigment in white marking material a minimum 20 percent by weight titanium dioxide;
3. The total pigment in yellow marking material a minimum 18 percent by weight medium chrome yellow;
4. Marking material colors that match the Federal Standard Highway Color # 595 A, 33538 for yellow, 37925 for white;
5. Non-yellowing white material;
6. Non-fading yellow material during the expected life of the materials; and
7. Having reflective glass beads meeting Subsection 714.08 requirements uniformly distributed throughout the entire material.

##### 714.07.2 Adhesive Requirements

Furnish material having a pre-coated pressure-sensitive adhesive on the base to adhere to bituminous and portland cement concrete pavements. The adhesive must:

1. Be sufficiently free of tack so the material can be handled or repositioned on the pavement before being permanently fixed in position;
2. Mold to the pavement contours, breaks, faults under traffic at normal pavement temperatures;
3. Reseal itself so that, under normal use, it fuses with itself and previously applied markings of similar composition;
4. Capable of being inlaid in pavement at temperatures up to 275 °F (135 °C); and
5. Not lose its adhesive and reflective properties when exposed to water used in rolling operations.

714.07.3 Dimensional Requirements

Furnish the pavement marking material in standard manufactured widths of 4-inch, 6-inch, 8-inch, 12-inch, and 24-inch (105 mm, 155 mm, 205 mm, 305 mm, and 610 mm).

Furnish the material for words and symbols in pre-cut configurations matching the shapes and dimensions specified in the Detail Drawings.

Furnish the pavement marking material in the thickness specified in the contract.

714.07.4 Physical Requirements

- A. Tensile Strength. Furnish plastic material having a minimum tensile strength of 40 psi (276 kPa) when tested under ASTM D 638. The break resistance is based on an average of at least 3 samples tested at a temperature of 70 °F to 80 °F (21 °C to 27 °C) using a jaw speed of 0.25-inch (6 mm) per minute.
- B. Plastic Pull Test. A 1-inch by 6-inch (25 mm x 155 mm) sample of the plastic material must support a dead weight of 0.66 pounds per 0.01 inch (1.2 kg per mm) of material thickness for at least five minutes at a temperature of 70 °F to 80 °F (21 °C to 27 °C).
- C. Bend Test. At 80 °F (27 °C) bend a 3-inch by 6-inch (75 mm x 155 mm) sample over a 1-inch (25 mm) diameter mandrel until the end faces are parallel and 1-inch (25 mm) apart. The sample must not show any fracture lines in the uppermost surface under unassisted visual inspection.
- D. Skid Resistance. The plastics surface friction properties must be at least 35 BPN when tested under ASTM E 303.
- E. Reseal Test. The plastic must re-seal itself without adhesives when tested as follows: Overlap two 1-inch x 3-inch (25 mm x 75 mm) pieces face-to-face forming a single 1-inch x 5-inch (25 mm x 130 mm) piece with a 1 square inch (645 square mm) overlap in the center. Place the 1-inch x 5-inch (25 mm x 130 mm) piece on a hard surface with a 1000-gram weight resting uniformly on the entire overlap area and maintain at 140 °F to 190 °F (60 °C to 88 °C) for 2 hours. Maintain the temperature within the specified range. Cool to room temperature. The pieces must not separate without tearing.
- F. Reflectivity. Meet the reflective values listed in Table 714-5. Reflective values are measured on a 2-foot x 2 ½-foot (610 mm x 762 mm) panel under the Instrumental Photometric Measurements of Retro-reflective Materials and Retroreflective Devices, Federal Test Method Standard 370.

TABLE 714-5  
MINIMUM SIA<sup>1</sup> (CANDELAS PER FOOTCANDLE PER SQUARE FOOT (m<sup>2</sup>))  
PLASTIC PAVEMENT MARKING MATERIAL

OBSERVATION ANGLE	ENTRANCE ANGLE	WHITE	YELLOW
0.2°	86°	0.20 (2.1)	0.15 (1.6)
0.5°	86°	0.15 (1.6)	0.10 (1.0)

Notes:

1. SIA - Specific Intensity Per Unit Area

714.07.5 Samples

Submit a 4-inch by 1-foot (105 mm x 305 mm) sample from each lot of material proposed for use on the project to the Materials Bureau for approval. Obtain approval before using in the work.

714.07.6 Certification

Submit the manufacturer's certification meeting Subsection 106.03. Include evidence from the manufacturer that the material proposed for use in the work has performed successfully under similar climatic conditions and traffic usage. This evidence of successful use is required for the product to be approved for use.

714.08 REFLECTIVE GLASS BEADS

- A. General. Provide glass beads for reflectorizing traffic pavement markings that are spherical, transparent, have a smooth, lustrous surface, meet AASHTO M 247 requirements except as modified below and the pavement marking manufacturer's recommendations. Ensure the delivered beads are free from extraneous material and bead clumps easily break up while handling and distributing onto the stripe.
- B. Imperfections. Ensure the glass beads do not contain more than 25 percent irregularly shaped particles when tested under ASTM D 1155.
- C. Color. Ensure the glass beads do not impart a noticeable daytime hue to white pavement markings.
- D. Chemical Stability. Ensure the beads can withstand refluxing in distilled water in a Soxhlet extractor for 90 hours without noticeable dulling of the surface luster and not more than 2.5 percent loss in weight.
- E. Gradation. Meet Table 714-6 gradations, tested using ASTM D 1214.

TABLE 714-6  
REFLECTIVE GLASS BEAD GRADATION

SIEVE NUMBER	PERCENT PASSING	
	MONTANA TYPE 1	MONTANA TYPE 2
20 (0.850 mm)	100	90 – 97
30 (0.600 mm)	75 - 95	50 - 75
40 (0.425 mm)	-----	15 - 45
50 (0.300 mm)	15 - 35	0 - 15
80 (0.180 mm)	-----	0 - 5
100 (0.150 mm)	0 - 5	-----

- F. Packaging and Marking. Package glass beads in moisture-proof containers marked to identify the contents, manufacturer, lot number, batch number and net weight.
- G. Samples. Furnish a sample of the beads upon request. The Department will furnish the containers.
- H. Heavy Metals. Ensure the glass beads contain no more than 200 ppm of lead or arsenic when tested under EPA method 6010C. The beads will be prepared by EPA method 3052.

**715.01 SIGNS AND CHANNELIZING DEVICES**

Page 475

4-8-10

Rescind Subsection 715.01 and replace with the following:

**715.01 SIGNS AND CHANNELIZING DEVICES**

Meet the Detailed Drawings and MUTCD requirements. Adjust signs within specified distances to prevent obstruction from or to existing signs.

Mount signs so they are vertical and stable. Posts must not extend more than two feet above the top of signs.

Construction signs may be horizontally hinged at the midpoint of the sign face provided the hinge gap does not exceed 1/2-inch (13 mm) and the sign legend is legible.

**715.02 PORTABLE SIGN SUPPORT ASSEMBLIES**

Page 475

4-8-10

Rescind Subsection 715.02(A) and replace with the following:

- A. Use wood members with a maximum 16 square inch (10,325 square mm) cross section for base construction and 8 square inch (5,160 square mm) cross section for uprights and braces. Provide wood members that are free of bark.

Rescind Subsection 715.02(B) and replace with the following:

- B. Use tubular metal members with a maximum 9 square inch (5,805 square mm) cross section.

**715.05 ADVANCE FLAGGER AHEAD WARNING SIGNS**

Page 475

7-12-12

Rescind and replace Subsection 715.05 with the following:

**715.05 ADVANCE FLAGGER AHEAD WARNING SIGNS**

Equip the W20-7a (advance flagger ahead) sign to meet one of the following:

A. Furnish signs equipped with:

- Two 12-inch (305 mm) amber signals, each mounted 36 inches (915 mm) from the center of the sign panel on a line 45 degrees above horizontal.
- Equip each lens with a 22-inch x 22-inch (560 x 560 mm) square backplate with a dull black finish and a 12-inch (305 mm) cut-away tunnel visor.
- Use 116-watt traffic signal light bulbs.
- Furnish 115/120 V.A.C. electrical current to the flasher unit.
- Set signals to flash alternately and continuously at a rate of 50 to 60 times per minute. The illuminated period of each flash must be not less than one-half nor more than two-thirds of the total flash cycle.

B. Furnish sign equipped with:

- Eight high-power, 1 watt, amber Light Emitting Diodes (LEDs) on the face of the W20-7a.
- Mount a LED in each corner of the sign with an additional LED spaced equally between the corners.
- Mount the LEDs one inch from the outside edge of the sign panel.
- Wire all LEDs in a string to activate simultaneously with a flashing output of 50 to 60 times per minute with a 100 to 500 millisecond flash duration.
- Power the LEDs using a solar panel, battery power, or combination of these.

Meet Subsection 715.02 requirements for mounting portable sign support assemblies and the illumination power source. All W-20-7a (advanced flagger ahead) signs are required to meet the requirements of part B above beginning January 1, 2014.

Rescind only the rows shown (Puncture Strength) in Tables 716-1 and 716-2 and replace with the following:

TABLE 716-1  
GEOTEXTILE STRENGTH PROPERTY REQUIREMENTS

Puncture Strength	ASTM D 6241	lbs.	495	310	619	433
-------------------	-------------	------	-----	-----	-----	-----

TABLE 716-1 (METRIC)  
GEOTEXTILE STRENGTH PROPERTY REQUIREMENTS

Puncture Strength	ASTM D 6241	N	2200	1375	2750	1925
-------------------	-------------	---	------	------	------	------

Add the following Section 717 CONCRETE SEALANTS:

SECTION 717  
CONCRETE SEALANTS

717.01 CONCRETE CURING MATERIALS

717.01.1 Curing and Protective Coverings

Furnish protective cover materials for curing concrete meeting the requirements of ASTM C 171, Sheet Materials for Curing Concrete, excluding curing paper.

717.01.2 Burlap Cloth

Furnish burlap cloth meeting the requirements of AASHTO M 182, Class 3. In lieu of the minimum weight (mass) specified, ensure that a sample dried in an oven at a temperature of 215°F to 225°F (102°C to 107°C) has a weight not less than 8.0 ounces per square yard (270 g/m<sup>2</sup>).

717.01.3 Liquid Membrane-Forming Concrete Curing Compounds

Furnish liquid membrane-forming compounds for curing concrete meeting the requirements of ASTM C 309 Type 1-D, clear or translucent and containing a fugitive dye, or Type 2, white pigmented.

717.02 BRIDGE DECK SEALANTS

717.02.1 Silane Sealer

Furnish a Silane Sealant listed on the Department's QPL.

717.02.2 High Molecular Weight Methacrylate (HMWM)

Furnish a low viscosity, non-fuming, HMWM resin conforming to the following physical property requirements and listed on the Department's QPL.

TABLE 717-1  
HMWM PROPERTIES

Physical Property Requirements for HMWM Resin	
Viscosity:	1.4 x 10 <sup>-3</sup> lb/in-s (25 centipoises) maximum (Brookfield Model RVT Viscometer, No. 1 Spindle at 60 RPM)
Specific Gravity:	0.90 minimum at 77°F (25°C)
Tensile Elongation:	30% minimum (ASTM D 638)
Odor:	Low
Vapor Pressure:	0.02 psi at 77°F (140 Pa at 25°C) maximum
Flash Point:	175°F (80°C) minimum (ASTM D 3278)
Solids Content:	100%
Performance Properties of HMWM Resin	
Cure Speed	-
Bulk Cure	less than 3 hours at 73°F (25°C)
Surface Cure	less than 8 hours at 73°F (25°C)
	less than 24 hours at application temperature
Gel Time	25-75 min. at application temperature, 1.7 fl. oz. (50 ml) sample

717.02.3 Epoxy Bridge Deck Crack Sealant

Furnish epoxy bridge deck crack sealant listed on the Department's QPL.

717.02.4 Deck Sealant Sand

Furnish silica or garnet sand containing less than 0.5 % moisture and meeting the following gradation:

TABLE 717-2  
DECK SEALANT-SAND GRADATIONS

Sieve Size	Percent Passing
No. 8 (2.36 mm)	100
No. 16 (1.18 mm)	80-100
No. 50 (0.30 mm)	0-7