

Contents

Division 1	General Requirements
Division 2	Earthwork
Division 3	Aggregate Production and Acceptance
Division 4	Bases
Division 5	Surface Treatments and Pavements
Division 6	Structures
Division 7	Drainage Structures, Storm Sewers, Sanitary Sewers, Water Mains, and Conduits
Division 8	Miscellaneous Construction
Division 9	Materials

Division 1	General Requirements	1-1
1-01	Definitions and Terms	1-1
1-01.1	General	1-1
1-01.2	Abbreviations	1-1
1-01.2(1)	Associations and Miscellaneous	1-1
1-01.2(2)	Items of Work and Units of Measurement	1-3
1-01.3	Definitions	1-4
1-02	Bid Procedures and Conditions	1-10
1-02.1	Prequalification of Bidders	1-10
1-02.2	Plans and Specifications	1-11
1-02.3	Estimated Quantities	1-12
1-02.4	Examination of Plans, Specifications, and Site of Work	1-12
1-02.4(1)	General	1-12
1-02.4(2)	Subsurface Information	1-14
1-02.5	Proposal Forms	1-15
1-02.6	Preparation of Proposal	1-15
1-02.7	Bid Deposit	1-16
1-02.8	Noncollusion Declaration and Lobbying Certification	1-17
1-02.8(1)	Noncollusion Declaration	1-17
1-02.8(2)	Lobbying Certification	1-17
1-02.9	Delivery of Proposal	1-18
1-02.10	Withdrawing, Revising, or Supplementing Proposal	1-19
1-02.11	Combination and Multiple Proposals	1-19
1-02.12	Public Opening of Proposals	1-20
1-02.13	Irregular Proposals	1-20
1-02.14	Disqualification of Bidders	1-21
1-02.15	Pre-Award Information	1-22
1-03	Award and Execution of Contract	1-23
1-03.1	Consideration of Bids	1-23
1-03.1(1)	Identical Bid Totals	1-23
1-03.2	Award of Contract	1-24
1-03.3	Execution of Contract	1-24
1-03.4	Contract Bond	1-24
1-03.5	Failure to Execute Contract	1-25
1-03.6	Return of Bid Deposit	1-25
1-03.7	Judicial Review	1-25

1-04	Scope of the Work	1-26
1-04.1	Intent of the Contract	1-26
1-04.1(1)	Bid Items Included in the Proposal	1-26
1-04.1(2)	Bid Items Not Included in the Proposal	1-26
1-04.2	Coordination of Contract Documents, Plans, Special Provisions, Specifications, and Addenda	1-26
1-04.3	Reference Information	1-27
1-04.4	Changes	1-27
1-04.4(1)	Minor Changes	1-29
1-04.4(2)	Value Engineering Change Proposal (VECP)	1-29
1-04.5	Procedure and Protest by the Contractor	1-33
1-04.6	Variation in Estimated Quantities	1-34
1-04.7	Differing Site Conditions (Changed Conditions)	1-35
1-04.8	Progress Estimates and Payments	1-36
1-04.9	Use of Buildings or Structures	1-36
1-04.10	Use of Materials Found on the Project	1-36
1-04.11	Final Cleanup	1-37
1-05	Control of Work	1-38
1-05.1	Authority of the Engineer	1-38
1-05.2	Authority of Assistants and Inspectors	1-39
1-05.3	Working Drawings	1-39
1-05.4	Conformity With and Deviations From Plans and Stakes	1-40
1-05.5	Tolerances	1-41
1-05.6	Inspection of Work and Materials	1-41
1-05.7	Removal of Defective and Unauthorized Work	1-43
1-05.8	Vacant	1-43
1-05.9	Equipment	1-43
1-05.10	Guarantees	1-43
1-05.11	Final Inspection	1-43
1-05.12	Final Acceptance	1-44
1-05.13	Superintendents, Labor, and Equipment of Contractor	1-44
1-05.13(1)	Emergency Contact List	1-45
1-05.14	Cooperation With Other Contractors	1-45
1-05.15	Method of Serving Notices	1-46

1-06	Control of Material	1-47
1-06.1	Approval of Materials Prior to Use	1-47
1-06.1(1)	Qualified Products List (QPL)	1-47
1-06.1(2)	Request for Approval of Material (RAM)	1-48
1-06.1(3)	Aggregate Source Approval (ASA) Database	1-48
1-06.1(4)	Fabrication Inspection Expense	1-49
1-06.2	Acceptance of Materials	1-50
1-06.2(1)	Samples and Tests for Acceptance	1-50
1-06.2(2)	Statistical Evaluation of Materials for Acceptance	1-51
1-06.3	Manufacturer's Certificate of Compliance	1-56
1-06.4	Handling and Storing Materials	1-57
1-06.5	Owners Manuals and Operating Instructions	1-57
1-06.6	Recycled Materials	1-57
1-07	Legal Relations and Responsibilities to the Public	1-59
1-07.1	Laws to be Observed	1-59
1-07.2	State Taxes	1-60
1-07.2(1)	State Sales Tax: WAC 458-20-171 – Use Tax	1-60
1-07.2(2)	State Sales Tax: WAC 458-20-170 – Retail Sales Tax	1-61
1-07.2(3)	Services	1-61
1-07.3	Fire Prevention and Merchantable Timber Requirements	1-61
1-07.3(1)	Fire Prevention Control and Countermeasures Plan	1-61
1-07.3(2)	Merchantable Timber Requirements	1-62
1-07.4	Sanitation	1-63
1-07.4(1)	General	1-63
1-07.4(2)	Health Hazards	1-63
1-07.5	Environmental Regulations	1-63
1-07.5(1)	General	1-63
1-07.5(2)	State Department of Fish and Wildlife	1-63
1-07.5(3)	State Department of Ecology	1-64
1-07.5(4)	Air Quality	1-65
1-07.5(5)	U.S. Army Corps of Engineers	1-65
1-07.5(6)	U.S. Fish and Wildlife Service and National Marine Fisheries Service	1-65
1-07.6	Permits and Licenses	1-65
1-07.7	Load Limits	1-66
1-07.7(1)	General	1-66
1-07.7(2)	Load-Limit Restrictions	1-67

1-07.8	High-Visibility Apparel	1-69
1-07.8(1)	Traffic Control Personnel	1-69
1-07.8(2)	Non-Traffic Control Personnel	1-70
1-07.9	Wages	1-70
1-07.9(1)	General	1-70
1-07.9(2)	Posting Notices	1-72
1-07.9(3)	Apprentices	1-73
1-07.9(4)	Disputes	1-73
1-07.9(5)	Required Documents	1-73
1-07.9(6)	Audits	1-74
1-07.10	Worker's Benefits	1-74
1-07.11	Requirements for Nondiscrimination	1-75
1-07.11(1)	General Application	1-75
1-07.11(2)	Contractual Requirements	1-75
1-07.11(3)	Equal Employment Opportunity Officer	1-78
1-07.11(4)	Dissemination of Policy	1-78
1-07.11(5)	Sanctions	1-79
1-07.11(6)	Incorporation of Provisions	1-80
1-07.11(7)	Vacant	1-80
1-07.11(8)	Vacant	1-80
1-07.11(9)	Subcontracting, Procurement of Materials, and Leasing of Equipment	1-80
1-07.11(10)	Records and Reports	1-80
1-07.12	Federal Agency Inspection	1-81
1-07.13	Contractor's Responsibility for Work	1-82
1-07.13(1)	General	1-82
1-07.13(2)	Relief of Responsibility for Completed Work	1-82
1-07.13(3)	Relief of Responsibility for Damage by Public Traffic	1-83
1-07.13(4)	Repair of Damage	1-83
1-07.14	Responsibility for Damage	1-83
1-07.15	Temporary Water Pollution Prevention	1-86
1-07.15(1)	Spill Prevention, Control, and Countermeasures Plan	1-86
1-07.16	Protection and Restoration of Property	1-89
1-07.16(1)	Private/Public Property	1-89
1-07.16(2)	Vegetation Protection and Restoration	1-90
1-07.16(3)	Fences, Mailboxes, Incidentals	1-91
1-07.16(4)	Archaeological and Historical Objects	1-91
1-07.16(5)	Payment	1-92

1-07.17	Utilities and Similar Facilities.	1-92
1-07.17(1)	Utility Construction, Removal, or Relocation by the Contractor.	1-92
1-07.17(2)	Utility Construction, Removal, or Relocation by Others	1-93
1-07.18	Public Liability and Property Damage Insurance	1-93
1-07.19	Gratuities	1-96
1-07.20	Patented Devices, Materials, and Processes.	1-97
1-07.21	Rock Drilling Safety Requirements.	1-97
1-07.22	Use of Explosives	1-97
1-07.23	Public Convenience and Safety.	1-97
1-07.23(1)	Construction Under Traffic	1-98
1-07.23(2)	Construction and Maintenance of Detours	1-101
1-07.24	Rights of Way.	1-101
1-07.25	Opening of Sections to Traffic	1-101
1-07.26	Personal Liability of Public Officers.	1-102
1-07.27	No Waiver of State’s Legal Rights.	1-102
1-08	Prosecution and Progress	1-103
1-08.1	Subcontracting	1-103
1-08.1(1)	Prompt Payment, Subcontract Completion and Return of Retainage Withheld	1-105
1-08.2	Assignment	1-107
1-08.3	Progress Schedule.	1-107
1-08.3(1)	General Requirements.	1-107
1-08.3(2)	Progress Schedule Types.	1-108
1-08.3(3)	Schedule Updates.	1-109
1-08.3(4)	Measurement	1-110
1-08.3(5)	Payment.	1-110
1-08.4	Prosecution of Work.	1-110
1-08.5	Time for Completion.	1-111
1-08.6	Suspension of Work	1-112
1-08.7	Maintenance During Suspension	1-113
1-08.8	Extensions of Time	1-114
1-08.9	Liquidated Damages.	1-116
1-08.10	Termination of Contract.	1-117
1-08.10(1)	Termination for Default.	1-117
1-08.10(2)	Termination for Public Convenience	1-119
1-08.10(3)	Termination for Public Convenience Payment Request.	1-119
1-08.10(4)	Payment for Termination for Public Convenience.	1-120
1-08.10(5)	Responsibility of the Contractor and Surety	1-120

1-09	Measurement and Payment	1-121
1-09.1	Measurement of Quantities	1-121
1-09.2	Weighing Equipment	1-123
1-09.2(1)	General Requirements for Weighing Equipment.....	1-123
1-09.2(2)	Specific Requirements for Batching Scales	1-124
1-09.2(3)	Specific Requirements for Platform Scales.....	1-125
1-09.2(4)	Specific Requirements for Belt Conveyor Scales.....	1-125
1-09.2(5)	Measurement	1-125
1-09.2(6)	Payment.....	1-126
1-09.3	Scope of Payment	1-127
1-09.4	Equitable Adjustment.....	1-128
1-09.5	Deleted or Terminated Work.....	1-128
1-09.6	Force Account	1-129
1-09.7	Mobilization.....	1-134
1-09.8	Payment for Material on Hand	1-134
1-09.9	Payments	1-135
1-09.9(1)	Retainage.....	1-136
1-09.10	Payment for Surplus Processed Materials.....	1-137
1-09.11	Disputes and Claims	1-138
1-09.11(1)	Disputes Review Board	1-139
1-09.11(2)	Claims.....	1-148
1-09.11(3)	Time Limitation and Jurisdiction	1-151
1-09.12	Audits	1-151
1-09.12(1)	General.....	1-151
1-09.12(2)	Claims.....	1-152
1-09.12(3)	Required Documents for Audits.....	1-152
1-09.13	Claims Resolution	1-153
1-09.13(1)	General.....	1-153
1-09.13(2)	Nonbinding Alternative Disputes Resolution (ADR).....	1-153
1-09.13(3)	Claims \$250,000 or Less.....	1-154
1-09.13(4)	Claims in Excess of \$250,000.....	1-155

1-10	Temporary Traffic Control	1-156
1-10.1	General.....	1-156
1-10.1(1)	Materials.....	1-156
1-10.1(2)	Description.....	1-156
1-10.2	Traffic Control Management.....	1-158
1-10.2(1)	General.....	1-158
1-10.2(2)	Traffic Control Plans.....	1-160
1-10.2(3)	Conformance to Established Standards.....	1-161
1-10.3	Traffic Control Labor, Procedures, and Devices.....	1-162
1-10.3(1)	Traffic Control Labor.....	1-162
1-10.3(2)	Traffic Control Procedures.....	1-163
1-10.3(3)	Traffic Control Devices.....	1-165
1-10.4	Measurement.....	1-170
1-10.4(1)	Lump Sum Bid for Project (No Unit Items).....	1-170
1-10.4(2)	Item Bids With Lump Sum for Incidentals.....	1-170
1-10.4(3)	Reinstating Unit Items With Lump Sum Traffic Control.....	1-171
1-10.4(4)	Owner-Provided Resources.....	1-171
1-10.5	Payment.....	1-172
1-10.5(1)	Lump Sum Bid for Project (No Unit Items).....	1-172
1-10.5(2)	Item Bids With Lump Sum for Incidentals.....	1-172
1-10.5(3)	Reinstating Unit Items With Lump Sum Traffic Control.....	1-174

Division 2 Earthwork	2-1
2-01 Clearing, Grubbing, and Roadside Cleanup	2-1
2-01.1 Description	2-1
2-01.2 Disposal of Usable Material and Debris	2-1
2-01.2(1) Disposal Method No. 1 – Open Burning	2-1
2-01.2(2) Disposal Method No. 2 – Waste Site	2-1
2-01.2(3) Disposal Method No. 3 – Chipping	2-2
2-01.3 Construction Requirements	2-2
2-01.3(1) Clearing	2-2
2-01.3(2) Grubbing	2-3
2-01.3(3) Vacant	2-3
2-01.3(4) Roadside Cleanup	2-3
2-01.4 Measurement	2-4
2-01.5 Payment	2-4
2-02 Removal of Structures and Obstructions	2-5
2-02.1 Description	2-5
2-02.2 Vacant	2-5
2-02.3 Construction Requirements	2-5
2-02.3(1) Removal of Foundations	2-5
2-02.3(2) Removal of Bridges, Box Culverts, and Other Drainage Structures ..	2-6
2-02.3(3) Removal of Pavement, Sidewalks, Curbs, and Gutters	2-7
2-02.4 Vacant	2-8
2-02.5 Payment	2-8
2-03 Roadway Excavation and Embankment	2-9
2-03.1 Description	2-9
2-03.2 Vacant	2-9
2-03.3 Construction Requirements	2-9
2-03.3(1) Widening of Cuts	2-9
2-03.3(2) Rock Cuts	2-10
2-03.3(3) Excavation Below Subgrade	2-13
2-03.3(4) Sluicing	2-13
2-03.3(5) Slope Treatment	2-13
2-03.3(6) Deposit of Rock for the Contracting Agency’s Use	2-14
2-03.3(7) Disposal of Surplus Material	2-14
2-03.3(8) Wasting Material	2-15
2-03.3(9) Roadway Ditches	2-15
2-03.3(10) Selected Material	2-15
2-03.3(11) Slides	2-16

	2-03.3(12)	Overbreak	2-16
	2-03.3(13)	Borrow	2-17
	2-03.3(14)	Embankment Construction	2-17
	2-03.3(15)	Aeration	2-24
	2-03.3(16)	End Slopes	2-25
	2-03.3(17)	Snow Removal	2-25
	2-03.3(18)	Stepped Slope Construction	2-26
	2-03.3(19)	Removal of Pavement, Sidewalks, Curbs, and Gutters	2-26
	2-03.4	Measurement	2-26
	2-03.5	Payment	2-27
2-04	Haul		2-30
	2-04.1	Description	2-30
	2-04.2	Vacant	2-30
	2-04.3	Vacant	2-30
	2-04.4	Measurement	2-30
	2-04.5	Payment	2-31
2-05	Vacant		2-32
2-06	Subgrade Preparation		2-33
	2-06.1	Description	2-33
	2-06.2	Vacant	2-33
	2-06.3	Construction Requirements	2-33
		2-06.3(1) Subgrade for Surfacing	2-33
		2-06.3(2) Subgrade for Pavement	2-34
	2-06.4	Vacant	2-34
	2-06.5	Measurement and Payment	2-34
		2-06.5(1) Subgrade Constructed Under Same Contract	2-34
		2-06.5(2) Subgrade Not Constructed Under Same Contract	2-34
2-07	Watering		2-36
	2-07.1	Description	2-36
	2-07.2	Vacant	2-36
	2-07.3	Construction Requirements	2-36
	2-07.4	Measurement	2-36
	2-07.5	Payment	2-36
2-08	Vacant		2-37

2-09	Structure Excavation	2-38
2-09.1	Description.....	2-38
2-09.2	Materials.....	2-38
2-09.3	Construction Requirements.....	2-38
2-09.3(1)	General Requirements.....	2-38
2-09.3(2)	Classification of Structure Excavation.....	2-41
2-09.3(3)	Construction Requirements, Structure Excavation, Class A	2-42
2-09.3(4)	Construction Requirements, Structure Excavation, Class B	2-47
2-09.4	Measurement.....	2-48
2-09.5	Payment	2-49
2-10	Vacant	2-51
2-11	Trimming and Cleanup	2-52
2-11.1	Description.....	2-52
2-11.2	Vacant.....	2-52
2-11.3	Construction Requirements.....	2-52
2-11.4	Vacant.....	2-52
2-11.5	Payment	2-52
2-12	Construction Geosynthetic	2-53
2-12.1	Description.....	2-53
2-12.2	Materials.....	2-53
2-12.3	Construction Requirements.....	2-53
2-12.3(1)	Underground Drainage	2-54
2-12.3(2)	Separation	2-54
2-12.3(3)	Soil Stabilization	2-55
2-12.3(4)	Permanent Erosion Control and Ditch Lining	2-55
2-12.4	Measurement.....	2-56
2-12.5	Payment	2-56

Division 3	Aggregate Production and Acceptance	3-1
3-01	Production From Quarry and Pit Sites	3-1
3-01.1	Description	3-1
3-01.2	Material Sources, General Requirements	3-1
3-01.2(1)	Approval of Source	3-1
3-01.2(2)	Preparation of Site	3-1
3-01.2(3)	Stripping Quarries and Pits	3-2
3-01.2(4)	Production Requirements	3-2
3-01.2(5)	Final Cleanup	3-3
3-01.3	State Furnished Material Sources	3-3
3-01.3(1)	Quality and Extent of Material	3-3
3-01.3(2)	When More Than One Site is Provided	3-3
3-01.3(3)	Reject Materials	3-3
3-01.3(4)	Surplus Screenings	3-4
3-01.3(5)	Moving Plant	3-4
3-01.4	Contractor Furnished Material Sources	3-5
3-01.4(1)	Acquisition and Development	3-5
3-01.4(2)	Surplus Screenings	3-6
3-01.4(3)	Substitution of Gravel Deposit in Lieu of Ledge Rock or Talus Source Provided by the Contracting Agency	3-6
3-01.4(4)	Gravel Base	3-6
3-01.5	Measurement	3-7
3-01.6	Payment	3-7
3-02	Stockpiling Aggregates	3-8
3-02.1	Description	3-8
3-02.2	General Requirements	3-8
3-02.2(1)	Stockpile Sites Provided by the Contracting Agency	3-8
3-02.2(2)	Stockpile Site Provided by the Contractor	3-8
3-02.2(3)	Stockpiling Aggregates for Future Use	3-8
3-02.2(4)	Stockpiling Aggregates for Immediate Use	3-9
3-02.2(5)	Preparation of Site	3-9
3-02.2(6)	Construction of Stockpiles	3-9
3-02.2(7)	Removing Aggregates From Stockpiles	3-10
3-02.3	Additional Requirements for Specific Aggregates	3-10
3-02.3(1)	Washed Aggregates	3-10
3-02.4	Measurement	3-11
3-02.5	Payment	3-11

3-03	Site Reclamation	3-12
3-03.1	Description	3-12
3-03.2	General Requirements	3-12
3-03.2(1)	Contracting Agency-Provided Sites	3-12
3-03.2(2)	Contractor-Provided Sites	3-12
3-03.2(3)	Out-of-State Sites	3-13
3-03.3	Reclamation Plans	3-13
3-03.3(1)	Contracting Agency-Provided Sites	3-13
3-03.3(2)	Contractor-Provided Sites	3-13
3-03.4	Construction Requirements	3-13
3-03.4(1)	Erosion Control	3-13
3-03.4(2)	Deviations From Approved Reclamation Plans	3-13
3-03.5	Payment	3-14
3-03.5(1)	Contracting Agency-Provided Sites	3-14
3-03.5(2)	Contractor-Provided Sites	3-14
3-04	Acceptance of Aggregate	3-15
3-04.1	Description	3-15
3-04.2	Materials	3-15
3-04.3	Construction Requirements	3-15
3-04.3(1)	General	3-15
3-04.3(2)	Point of Acceptance	3-15
3-04.3(3)	Sampling	3-15
3-04.3(4)	Testing Results	3-16
3-04.3(5)	Nonstatistical Evaluation	3-16
3-04.3(6)	Statistical Evaluation	3-16
3-04.3(7)	Rejected Work	3-17
3-04.3(8)	Price Adjustments for Quality of Aggregate	3-18
3-04.4	Vacant	3-18
3-04.5	Payment	3-19

Division 4 Bases	4-1
4-01 Vacant	4-1
4-02 Gravel Base	4-2
4-02.1 Description.....	4-2
4-02.2 Materials.....	4-2
4-02.3 Construction Requirements.....	4-2
4-02.4 Measurement.....	4-2
4-02.5 Payment	4-2
4-03 Vacant	4-3
4-04 Ballast and Crushed Surfacing	4-4
4-04.1 Description.....	4-4
4-04.2 Materials.....	4-4
4-04.3 Construction Requirements.....	4-4
4-04.3(1) Equipment.....	4-4
4-04.3(2) Subgrade	4-4
4-04.3(3) Mixing.....	4-5
4-04.3(4) Placing and Spreading	4-5
4-04.3(5) Shaping and Compaction	4-6
4-04.3(6) Keystone	4-6
4-04.3(7) Miscellaneous Requirements	4-6
4-04.3(8) Weather Limitations.....	4-7
4-04.3(9) Hauling.....	4-7
4-04.3(10) Hours of Work	4-7
4-04.3(11) Permeable Ballast.....	4-7
4-04.4 Measurement.....	4-8
4-04.5 Payment	4-8

Division 5	Surface Treatments and Pavements	5-1
5-01	Cement Concrete Pavement Rehabilitation	5-1
5-01.1	Description	5-1
5-01.2	Materials	5-1
5-01.3	Construction Requirements	5-2
5-01.3(1)	Vacant	5-2
5-01.3(2)	Material Acceptance	5-3
5-01.3(3)	Vacant	5-4
5-01.3(4)	Replace Cement Concrete Panel	5-4
5-01.3(5)	Partial Depth Spall Repair	5-6
5-01.3(6)	Dowel Bar Retrofit	5-7
5-01.3(7)	Sealing Existing Concrete Random Cracks	5-9
5-01.3(8)	Sealing Existing Longitudinal and Transverse Joint	5-9
5-01.3(9)	Cement Concrete Pavement Grinding	5-9
5-01.3(10)	Pavement Smoothness	5-9
5-01.3(11)	Concrete Slurry and Grinding Residue	5-11
5-01.4	Measurement	5-12
5-01.5	Payment	5-12
5-02	Bituminous Surface Treatment	5-14
5-02.1	Description	5-14
5-02.1(1)	New Construction	5-14
5-02.1(2)	Seal Coats	5-14
5-02.1(3)	Pavement Sealers – Fog Seal	5-14
5-02.2	Materials	5-14
5-02.3	Construction Requirements	5-15
5-02.3(1)	Equipment	5-15
5-02.3(2)	Preparation of Roadway Surface	5-15
5-02.3(3)	Application of Emulsified Asphalt and Aggregate	5-17
5-02.3(4)	Vacant	5-18
5-02.3(5)	Application of Aggregates	5-19
5-02.3(6)	Additional Emulsified Asphalt and Aggregate	5-20
5-02.3(7)	Patching and Correction of Defects	5-20
5-02.3(8)	Progress of Work	5-21
5-02.3(9)	Protection of Structures	5-21
5-02.3(10)	Unfavorable Weather	5-21
5-02.3(11)	Temporary Pavement Markings	5-21
5-02.4	Measurement	5-22
5-02.5	Payment	5-22

5-03	Crack and Joint Sealing	5-24
5-03.1	Description.....	5-24
5-03.2	Materials.....	5-24
5-03.3	Construction Materials.....	5-24
5-03.3(1)	General Requirements.....	5-24
5-03.3(2)	Sealing Bituminous Pavement	5-26
5-03.3(3)	Sealing Cement Concrete Pavement.....	5-27
5-03.4	Measurement.....	5-28
5-03.5	Payment	5-28
5-04	Hot Mix Asphalt	5-30
5-04.1	Description.....	5-30
5-04.2	Materials.....	5-30
5-04.2(1)	How to Get an HMA Mix Design on the QPL.....	5-30
5-04.2(2)	Mix Design – Obtaining Project Approval	5-35
5-04.3	Construction Requirements.....	5-35
5-04.3(1)	Weather Limitations.....	5-35
5-04.3(2)	Paving Under Traffic.....	5-36
5-04.3(3)	Equipment.....	5-36
5-04.3(4)	Preparation of Existing Paved Surfaces	5-40
5-04.3(5)	Producing/Stockpiling Aggregates, RAP, & RAS	5-42
5-04.3(6)	Mixing.....	5-42
5-04.3(7)	Spreading and Finishing	5-43
5-04.3(8)	Aggregate Acceptance Prior to Incorporation in HMA.....	5-43
5-04.3(9)	HMA Mixture Acceptance.....	5-44
5-04.3(10)	HMA Compaction Acceptance.....	5-52
5-04.3(11)	Reject Work.....	5-57
5-04.3(12)	Joints	5-59
5-04.3(13)	Surface Smoothness	5-60
5-04.3(14)	Planing Bituminous Pavement	5-61
5-04.3(15)	Sealing Pavement Surfaces.....	5-61
5-04.3(16)	HMA Road Approaches.....	5-61
5-04.4	Measurement.....	5-62
5-04.5	Payment	5-62

5-05	Cement Concrete Pavement	5-64
5-05.1	Description	5-64
5-05.2	Materials	5-64
5-05.3	Construction Requirements	5-64
5-05.3(1)	Concrete Mix Design for Paving	5-64
5-05.3(2)	Consistency	5-66
5-05.3(3)	Equipment	5-66
5-05.3(4)	Measuring and Batching Materials	5-69
5-05.3(5)	Mixing Concrete	5-72
5-05.3(6)	Surface Preparation	5-73
5-05.3(7)	Placing, Spreading, and Compacting Concrete	5-73
5-05.3(8)	Joints	5-75
5-05.3(9)	Vacant	5-76
5-05.3(10)	Tie Bars and Corrosion Resistant Dowel Bars	5-76
5-05.3(11)	Finishing	5-77
5-05.3(12)	Surface Smoothness	5-79
5-05.3(13)	Curing	5-81
5-05.3(14)	Cold Weather Work	5-83
5-05.3(15)	Concrete Pavement Construction in Adjacent Lanes	5-83
5-05.3(16)	Protection of Pavement	5-83
5-05.3(17)	Opening to Traffic	5-84
5-05.3(18)	Vacant	5-84
5-05.3(19)	Vacant	5-84
5-05.3(20)	Vacant	5-84
5-05.3(21)	Vacant	5-84
5-05.3(22)	Repair of Defective Pavement Slabs	5-85
5-05.4	Measurement	5-86
5-05.5	Payment	5-87
5-05.5(1)	Pavement Thickness	5-89

Division 6 Structures	6-1
6-01 General Requirements for Structures	6-1
6-01.1 Description	6-1
6-01.2 Foundation Data	6-1
6-01.3 Clearing the Site	6-1
6-01.4 Appearance of Structures	6-1
6-01.5 Vacant	6-1
6-01.6 Load Restrictions on Bridges Under Construction	6-1
6-01.7 Navigable Streams	6-2
6-01.8 Approaches to Movable Spans	6-3
6-01.9 Working Drawings	6-3
6-01.10 Utilities Supported by or Attached to Bridges	6-3
6-01.11 Name Plates	6-4
6-01.12 Final Cleanup	6-4
6-01.13 Vacant	6-4
6-01.14 Premolded Joint Filler	6-4
6-01.15 Normal Temperature	6-4
6-01.16 Repair of Defective Work	6-5
6-01.16(1) General	6-5
6-01.16(2) Pre-Approved Repair Procedures	6-6
6-02 Concrete Structures	6-8
6-02.1 Description	6-8
6-02.2 Materials	6-8
6-02.3 Construction Requirements	6-8
6-02.3(1) Classification of Structural Concrete	6-8
6-02.3(2) Proportioning Materials	6-9
6-02.3(3) Admixtures	6-15
6-02.3(4) Ready-Mix Concrete	6-15
6-02.3(5) Acceptance of Concrete	6-19
6-02.3(6) Placing Concrete	6-26
6-02.3(7) Tolerances	6-32
6-02.3(8) Vibration of Concrete	6-33
6-02.3(9) Precast Concrete Units	6-34
6-02.3(10) Bridge Decks and Bridge Approach Slabs	6-39
6-02.3(11) Curing Concrete	6-44
6-02.3(12) Construction Joints	6-49
6-02.3(13) Expansion Joints	6-50
6-02.3(14) Finishing Concrete Surfaces	6-74

6-02.3(15)	Date Numerals	6-81
6-02.3(16)	Plans for Falsework and Formwork	6-81
6-02.3(17)	Falsework and Formwork	6-82
6-02.3(18)	Placing Anchor Bolts	6-114
6-02.3(19)	Bridge Bearings	6-114
6-02.3(20)	Grout for Anchor Bolts and Bridge Bearings	6-129
6-02.3(21)	Drainage of Box Girder Cells	6-130
6-02.3(22)	Drainage of Substructure	6-130
6-02.3(23)	Opening to Traffic	6-130
6-02.3(24)	Reinforcement	6-130
6-02.3(25)	Prestressed Concrete Girders	6-146
6-02.3(26)	Cast-In-Place Prestressed Concrete	6-162
6-02.5	Payment	6-180
6-03	Steel Structures	6-182
6-03.1	Description	6-182
6-03.2	Materials	6-182
6-03.3	Construction Requirements	6-183
6-03.3(1)	Vacant	6-183
6-03.3(2)	Facilities for Inspection	6-183
6-03.3(3)	Inspector's Authority	6-183
6-03.3(4)	Rejections	6-183
6-03.3(5)	Mill Orders and Shipping Statements	6-183
6-03.3(6)	Weighing	6-183
6-03.3(7)	Shop Plans	6-184
6-03.3(8)	Substitutions	6-185
6-03.3(9)	Handling, Storing, and Shipping of Materials	6-185
6-03.3(10)	Straightening Bent Material	6-186
6-03.3(11)	Workmanship and Finish	6-186
6-03.3(12)	Falsework	6-186
6-03.3(13)	Fabricating Tension Members	6-186
6-03.3(14)	Edge Finishing	6-186
6-03.3(15)	Planing of Bearing Surfaces	6-187
6-03.3(16)	Abutting Joints	6-188
6-03.3(17)	End Connection Angles	6-188
6-03.3(18)	Built Members	6-188
6-03.3(19)	Hand Holes	6-188
6-03.3(20)	Lacing Bars	6-188
6-03.3(21)	Plate Girders	6-188
6-03.3(22)	Eyebars	6-189
6-03.3(23)	Annealing	6-189

6-03.3(24)	Pins and Rollers	6-189
6-03.3(25)	Welding and Repair Welding	6-190
6-03.3(26)	Screw Threads	6-193
6-03.3(27)	High-Strength Bolt Holes	6-193
6-03.3(28)	Shop Assembly	6-196
6-03.3(29)	Welded Shear Connectors	6-197
6-03.3(30)	Painting	6-197
6-03.3(31)	Alignment and Camber	6-198
6-03.3(32)	Assembling and Bolting	6-198
6-03.3(33)	Bolted Connections	6-200
6-03.3(34)	Adjusting Pin Nuts	6-207
6-03.3(35)	Setting Anchor Bolts	6-207
6-03.3(36)	Setting and Grouting Masonry Plates	6-207
6-03.3(37)	Setting Steel Bridge Bearings	6-208
6-03.3(38)	Placing Superstructure	6-208
6-03.3(39)	Swinging the Span	6-208
6-03.3(40)	Draining Pockets	6-208
6-03.3(41)	Vacant	6-209
6-03.3(42)	Surface Condition	6-209
6-03.3(43)	Castings, Steel Forgings, and Miscellaneous Metals	6-209
6-03.4	Measurement	6-209
6-03.5	Payment	6-210
6-04	Timber Structures	6-212
6-04.1	Description	6-212
6-04.2	Materials	6-212
6-04.3	Construction Requirements	6-212
6-04.3(1)	Storing and Handling Material	6-212
6-04.3(2)	Workmanship	6-213
6-04.3(3)	Shop Details	6-213
6-04.3(4)	Field Treatment of Cut Surfaces, Bolt Holes, and Contact Surfaces	6-213
6-04.3(5)	Holes for Bolts, Dowels, Rods, and Lag Screws	6-213
6-04.3(6)	Bolts, Washers, and Other Hardware	6-213
6-04.3(7)	Countersinking	6-214
6-04.3(8)	Framing	6-214
6-04.3(9)	Framed Bents	6-214
6-04.3(10)	Caps	6-214
6-04.3(11)	Bracing	6-215
6-04.3(12)	Stringers	6-215
6-04.3(13)	Wheel Guards and Railings	6-215

	6-04.3(14)	Single-Plank Floors.....	6-215
	6-04.3(15)	Laminated Floors.....	6-216
	6-04.3(16)	Plank Subfloors for Concrete Decks.....	6-216
	6-04.3(17)	Trusses.....	6-216
	6-04.3(18)	Painting.....	6-216
	6-04.4	Measurement.....	6-217
	6-04.5	Payment.....	6-217
6-05	Piling.....		6-218
	6-05.1	Description.....	6-218
	6-05.2	Materials.....	6-218
	6-05.3	Construction Requirements.....	6-218
	6-05.3(1)	Piling Terms.....	6-218
	6-05.3(2)	Ordering Piling.....	6-220
	6-05.3(3)	Manufacture of Precast Concrete Piling.....	6-221
	6-05.3(4)	Manufacture of Steel Casings for Cast-In-Place Concrete Piles...	6-223
	6-05.3(5)	Manufacture of Steel Piles.....	6-223
	6-05.3(6)	Splicing Steel Casings and Steel Piles.....	6-223
	6-05.3(7)	Storage and Handling.....	6-224
	6-05.3(8)	Pile Tips and Shoes.....	6-224
	6-05.3(9)	Pile Driving Equipment.....	6-225
	6-05.3(10)	Test Piles.....	6-229
	6-05.3(11)	Driving Piles.....	6-230
	6-05.3(12)	Determination of Bearing Values.....	6-234
	6-05.3(13)	Treatment of Timber Pile Heads.....	6-235
	6-05.3(14)	Extensions and Buildups of Precast Concrete Piles.....	6-235
	6-05.3(15)	Completion of Cast-In-Place Concrete Piles.....	6-236
	6-05.4	Measurement.....	6-236
	6-05.5	Payment.....	6-237
6-06	Bridge Railings.....		6-239
	6-06.1	Description.....	6-239
	6-06.2	Materials.....	6-239
	6-06.3	Construction Requirements.....	6-239
	6-06.3(1)	Timber Railings.....	6-239
	6-06.3(2)	Metal Railings.....	6-239
	6-06.4	Measurement.....	6-240
	6-06.5	Payment.....	6-240

6-07	Painting	6-241
6-07.1	Description.....	6-241
6-07.2	Materials.....	6-241
6-07.3	Construction Requirements.....	6-241
6-07.3(1)	Work Force Qualifications	6-241
6-07.3(2)	Submittals	6-242
6-07.3(3)	Quality Control and Quality Assurance.....	6-245
6-07.3(4)	Paint System Manufacturer's Technical Representative.....	6-246
6-07.3(5)	Pre-Painting Conference.....	6-246
6-07.3(6)	Paint Containers, Storage, and Handling	6-247
6-07.3(7)	Paint Sampling and Testing.....	6-247
6-07.3(8)	Equipment.....	6-248
6-07.3(9)	Painting New Steel Structures	6-248
6-07.3(10)	Painting Existing Steel Structures	6-253
6-07.3(11)	Painting or Powder Coating of Galvanized Surfaces.....	6-262
6-07.3(12)	Painting Ferry Terminal Structures.....	6-266
6-07.3(13)	Painting Timber Structures	6-270
6-07.3(14)	Metallic Coatings	6-270
6-07.4	Measurement.....	6-273
6-07.5	Payment	6-273
6-08	Bituminous Surfacing on Structure Decks	6-275
6-08.1	Description.....	6-275
6-08.2	Materials.....	6-275
6-08.3	Construction Requirements.....	6-275
6-08.3(1)	Definitions.....	6-275
6-08.3(2)	Contractor Survey for Grade Controlled Structure Decks.....	6-276
6-08.3(3)	General Bituminous Pavement Removal Requirements.....	6-277
6-08.3(4)	Partial Depth Removal of Bituminous Pavement from Structure Decks	6-277
6-08.3(5)	Full Depth Removal of Bituminous Pavement from Structure Decks	6-277
6-08.3(6)	Repair of Damage due to Bituminous Pavement Removal Operations.....	6-278
6-08.3(7)	Concrete Deck Repair	6-279
6-08.3(8)	Waterproof Membrane for Structure Decks	6-280
6-08.3(9)	Placing Bituminous Pavement on Structure Decks.....	6-281
6-08.3(10)	HMA Compaction on Structure Decks	6-282
6-08.3(11)	Paved Panel Joint Seals and HMA Sawcut and Seals	6-282
6-08.4	Measurement.....	6-282
6-08.5	Payment	6-283

6-09	Modified Concrete Overlays	6-284
6-09.1	Description.....	6-284
6-09.2	Materials.....	6-284
6-09.3	Construction Requirements.....	6-286
6-09.3(1)	Equipment.....	6-286
6-09.3(2)	Submittals	6-290
6-09.3(3)	Concrete Overlay Mixes	6-291
6-09.3(4)	Storing and Handling.....	6-293
6-09.3(5)	Scarifying Concrete Surface.....	6-293
6-09.3(6)	Further Deck Preparation	6-295
6-09.3(7)	Surface Preparation for Concrete Overlay.....	6-297
6-09.3(8)	Quality Assurance.....	6-298
6-09.3(9)	Mixing Concrete For Concrete Overlay	6-299
6-09.3(10)	Overlay Profile and Screed Rails	6-299
6-09.3(11)	Placing Concrete Overlay	6-301
6-09.3(12)	Finishing Concrete Overlay.....	6-303
6-09.3(13)	Curing Concrete Overlay.....	6-303
6-09.3(14)	Checking for Bond	6-303
6-09.3(15)	Sealing and Texturing Concrete Overlay.....	6-304
6-09.4	Measurement.....	6-304
6-09.5	Payment	6-305
6-10	Concrete Barrier	6-306
6-10.1	Description.....	6-306
6-10.2	Materials.....	6-306
6-10.3	Construction Requirements.....	6-306
6-10.3(1)	Precast Concrete Barrier.....	6-307
6-10.3(2)	Cast-In-Place Concrete Barrier	6-308
6-10.3(3)	Removing and Resetting Permanent Concrete Barrier.....	6-308
6-10.3(4)	Joining Precast Concrete Barrier to Cast-In-Place Barrier.....	6-309
6-10.3(5)	Temporary Barrier.....	6-309
6-10.3(6)	Placing Concrete Barrier	6-310
6-10.4	Measurement.....	6-310
6-10.5	Payment	6-311

6-11	Reinforced Concrete Walls	6-313
6-11.1	Description	6-313
6-11.2	Materials	6-313
6-11.3	Construction Requirements	6-313
6-11.3(1)	Submittals	6-313
6-11.3(2)	Excavation and Foundation Preparation	6-314
6-11.3(3)	Precast Concrete Wall Stem Panels	6-314
6-11.3(4)	Cast-In-Place Concrete Construction	6-315
6-11.3(5)	Backfill, Weepholes, and Gutters	6-316
6-11.3(6)	Traffic Barrier and Pedestrian Barrier	6-316
6-11.4	Measurement	6-316
6-11.5	Payment	6-316
6-12	Noise Barrier Walls	6-317
6-12.1	Description	6-317
6-12.2	Materials	6-317
6-12.3	Construction Requirements	6-317
6-12.3(1)	Submittals	6-317
6-12.3(2)	Work Access and Site Preparation	6-318
6-12.3(3)	Shaft Construction	6-318
6-12.3(4)	Trench, Grade Beam, or Spread Footing Construction	6-320
6-12.3(5)	Cast-In-Place Concrete Panel Construction	6-320
6-12.3(6)	Precast Concrete Panel Fabrication and Erection	6-320
6-12.3(7)	Masonry Wall Construction	6-321
6-12.3(8)	Fabricating and Erecting Timber Noise Barrier Wall Panels	6-322
6-12.3(9)	Access Doors and Concrete Landing Pads	6-322
6-12.3(10)	Finish Ground Line Dressing	6-322
6-12.4	Measurement	6-323
6-12.5	Payment	6-323
6-13	Structural Earth Walls	6-325
6-13.1	Description	6-325
6-13.2	Materials	6-325
6-13.3	Construction Requirements	6-325
6-13.3(1)	Quality Assurance	6-325
6-13.3(2)	Submittals	6-326
6-13.3(3)	Excavation and Foundation Preparation	6-329
6-13.3(4)	Precast Concrete Facing Panel and Concrete Block Fabrication ..	6-330
6-13.3(5)	Precast Concrete Facing Panel and Concrete Block Erection	6-332
6-13.3(6)	Welded Wire Faced Structural Earth Wall Erection	6-333
6-13.3(7)	Backfill	6-333

	6-13.3(8)	Guardrail Placement.....	6-334
	6-13.3(9)	SEW Traffic Barrier and SEW Pedestrian Barrier	6-335
6-13.4		Measurement.....	6-335
6-13.5		Payment	6-336
6-14		Geosynthetic Retaining Walls	6-337
6-14.1		Description.....	6-337
6-14.2		Materials.....	6-337
6-14.3		Construction Requirements.....	6-337
	6-14.3(1)	Quality Assurance.....	6-337
	6-14.3(2)	Submittals	6-338
	6-14.3(3)	Excavation and Foundation Preparation.....	6-339
	6-14.3(4)	Erection and Backfill	6-339
	6-14.3(5)	Guardrail Placement.....	6-340
	6-14.3(6)	Permanent Facing.....	6-341
	6-14.3(7)	Geosynthetic Retaining Wall Traffic Barrier and Geosynthetic Retaining Wall Pedestrian Barrier	6-341
6-14.4		Measurement.....	6-341
6-14.5		Payment	6-342
6-15		Soil Nail Walls	6-343
6-15.1		Description.....	6-343
6-15.2		Materials.....	6-343
6-15.3		Construction Requirements.....	6-343
	6-15.3(1)	General Description.....	6-343
	6-15.3(2)	Contractor's Experience Requirements	6-343
	6-15.3(3)	Submittals	6-344
	6-15.3(4)	Preconstruction Conference.....	6-345
	6-15.3(5)	Earthwork	6-345
	6-15.3(6)	Soil Nailing.....	6-346
	6-15.3(7)	Shotcrete Facing.....	6-347
	6-15.3(8)	Soil Nail Testing and Acceptance	6-348
	6-15.3(9)	Concrete Fascia Panels	6-352
6-15.4		Measurement.....	6-353
6-15.5		Payment	6-353

6-16	Soldier Pile and Soldier Pile Tieback Walls	6-354
6-16.1	Description	6-354
6-16.2	Materials	6-354
6-16.3	Construction Requirements	6-354
6-16.3(1)	Quality Assurance	6-354
6-16.3(2)	Submittals	6-354
6-16.3(3)	Shaft Excavation	6-356
6-16.3(4)	Installing Soldier Piles	6-357
6-16.3(5)	Backfilling Shaft	6-357
6-16.3(6)	Designing and Installing Lagging and Installing Permanent Ground Anchors	6-358
6-16.3(7)	Prefabricated Drainage Mat	6-362
6-16.3(8)	Concrete Fascia Panel	6-362
6-16.4	Measurement	6-362
6-16.5	Payment	6-363
6-17	Permanent Ground Anchors	6-365
6-17.1	Description	6-365
6-17.2	Materials	6-365
6-17.3	Construction Requirements	6-365
6-17.3(1)	Definitions	6-365
6-17.3(2)	Contractor Experience Requirements	6-366
6-17.3(3)	Submittals	6-366
6-17.3(4)	Preconstruction Conference	6-367
6-17.3(5)	Tendon Fabrication	6-368
6-17.3(6)	Tendon Storage and Handling	6-370
6-17.3(7)	Installing Permanent Ground Anchors	6-370
6-17.3(8)	Testing and Stressing	6-372
6-17.3(9)	Permanent Ground Anchor Acceptance Criteria	6-375
6-17.4	Measurement	6-376
6-17.5	Payment	6-376
6-18	Shotcrete Facing	6-377
6-18.1	Description	6-377
6-18.2	Materials	6-377
6-18.3	Construction Requirements	6-377
6-18.3(1)	Submittals	6-377
6-18.3(2)	Mix Design	6-377
6-18.3(3)	Testing	6-378
6-18.3(4)	Qualifications of Contractor's Personnel	6-379
6-18.3(5)	Placing Wire Reinforcement	6-379

	6-18.3(6)	Alignment Control	6-379
	6-18.3(7)	Shotcrete Application	6-379
	6-18.3(8)	Shotcrete Finishing.....	6-380
6-18.4		Measurement.....	6-381
6-18.5		Payment	6-381
6-19	Shafts		6-382
6-19.1		Description.....	6-382
6-19.2		Materials.....	6-382
6-19.3		Construction Requirements.....	6-382
	6-19.3(1)	Quality Assurance.....	6-382
	6-19.3(2)	Shaft Construction Submittal.....	6-384
	6-19.3(3)	Shaft Excavation.....	6-388
	6-19.3(4)	Slurry Installation Requirements	6-395
	6-19.3(5)	Assembly and Placement of Reinforcing Steel.....	6-398
	6-19.3(6)	Contractor Furnished Accessories for Nondestructive QA Testing	6-399
	6-19.3(7)	Placing Concrete.....	6-401
	6-19.3(8)	Casing Removal.....	6-403
	6-19.3(9)	Nondestructive QA Testing of Shafts	6-404
	6-19.3(10)	Engineer’s Final Acceptance of Shafts.....	6-407
6-19.4		Measurement.....	6-407
6-19.5		Payment	6-408
6-20	Buried Structures		6-410
6-20.1		Description.....	6-410
	6-20.1(1)	Definitions.....	6-410
6-20.2		Materials.....	6-411
6-20.3		Construction Requirements.....	6-411
	6-20.3(1)	Design	6-411
	6-20.3(2)	Submittals	6-415
	6-20.3(3)	Tolerances	6-417
	6-20.3(4)	Preconstruction Conference.....	6-418
	6-20.3(5)	Excavation	6-419
	6-20.3(6)	Bedding and Foundations	6-420
	6-20.3(7)	Fabrication.....	6-421
	6-20.3(8)	Placement and Assembly.....	6-422
	6-20.3(9)	Backfilling	6-423
	6-20.3(10)	Wingwalls and Headwalls	6-425
6-20.4		Vacant.....	6-426
6-20.5		Payment	6-426

Division 7	Drainage Structures, Storm Sewers, Sanitary Sewers, Water Mains, and Conduits	7-1
7-01	Drains	7-1
7-01.1	Description	7-1
7-01.2	Materials	7-1
7-01.3	Construction Requirements	7-2
7-01.3(1)	Drain Pipe	7-2
7-01.3(2)	Underdrain Pipe	7-2
7-01.4	Measurement	7-2
7-01.5	Payment	7-3
7-02	Culvert Pipe	7-4
7-02.1	Description	7-4
7-02.2	Materials	7-4
7-02.3	Construction Requirements	7-6
7-02.3(1)	Placing Culvert Pipe – General	7-6
7-02.3(2)	Installation of Metal End Sections	7-6
7-02.3(3)	Headwalls	7-7
7-02.3(4)	Removing and Relaying Culvert Pipes	7-7
7-02.3(5)	Safety Bars for Culvert Pipe	7-7
7-02.4	Measurement	7-7
7-02.5	Payment	7-8
7-03	Vacant	7-9
7-04	Storm Sewers	7-10
7-04.1	Description	7-10
7-04.2	Materials	7-10
7-04.3	Construction Requirements	7-10
7-04.3(1)	Cleaning and Testing	7-11
7-04.4	Measurement	7-13
7-04.5	Payment	7-13
7-05	Manholes, Inlets, Catch Basins, and Drywells	7-14
7-05.1	Description	7-14
7-05.2	Materials	7-14
7-05.3	Construction Requirements	7-14
7-05.3(1)	Adjusting Manholes and Catch Basins to Grade	7-16
7-05.3(2)	Abandon Existing Manholes	7-16
7-05.3(3)	Connections to Existing Manholes	7-16
7-05.3(4)	Drop Manhole Connection	7-16

7-05.4	Measurement.....	7-17
7-05.5	Payment.....	7-17
7-06	Vacant.....	7-19
7-07	Cleaning Existing Drainage Structures.....	7-20
7-07.1	Description.....	7-20
7-07.2	Vacant.....	7-20
7-07.3	Construction Requirements.....	7-20
7-07.4	Vacant.....	7-20
7-07.5	Payment.....	7-20
7-08	General Pipe Installation Requirements.....	7-21
7-08.1	Description.....	7-21
7-08.2	Materials.....	7-21
7-08.3	Construction Requirements.....	7-21
7-08.3(1)	Excavation and Preparation of Trench.....	7-21
7-08.3(2)	Laying Pipe.....	7-23
7-08.3(3)	Backfilling.....	7-26
7-08.3(4)	Plugging Existing Pipe.....	7-27
7-08.4	Measurement.....	7-27
7-08.5	Payment.....	7-28
7-09	Water Mains.....	7-29
7-09.1	Description.....	7-29
7-09.1(1)	Definitions.....	7-29
7-09.2	Materials.....	7-30
7-09.3	Construction Requirements.....	7-31
7-09.3(1)	General.....	7-31
7-09.3(2)	Ungraded Streets.....	7-31
7-09.3(3)	Clearing and Grubbing in Ungraded Streets.....	7-31
7-09.3(4)	Removal of Existing Street Improvements.....	7-31
7-09.3(5)	Grade and Alignment.....	7-32
7-09.3(6)	Existing Utilities.....	7-32
7-09.3(7)	Trench Excavation.....	7-32
7-09.3(8)	Removal and Replacement of Unsuitable Materials.....	7-34
7-09.3(9)	Bedding the Pipe.....	7-34
7-09.3(10)	Backfilling Trenches.....	7-35
7-09.3(11)	Compaction of Backfill.....	7-35
7-09.3(12)	General Pipe Installation.....	7-35
7-09.3(13)	Handling of Pipe.....	7-35

	7-09.3(14)	Cutting Pipe.	7-36
	7-09.3(15)	Laying of Pipe on Curves.	7-36
	7-09.3(16)	Cleaning and Assembling Joint.	7-37
	7-09.3(17)	Laying Ductile Iron Pipe With Polyethylene Encasement	7-37
	7-09.3(18)	Coupled Pipe 4 inches in Diameter and Larger	7-37
	7-09.3(19)	Connections	7-38
	7-09.3(20)	Detectable Marking Tape	7-39
	7-09.3(21)	Concrete Thrust Blocking	7-39
	7-09.3(22)	Blowoff Assemblies	7-39
	7-09.3(23)	Hydrostatic Pressure Test	7-39
	7-09.3(24)	Disinfection of Water Mains.	7-42
	7-09.4	Measurement.	7-45
	7-09.5	Payment	7-46
7-10	Vacant	. . . . .	7-47
7-11	Vacant	. . . . .	7-48
7-12	Valves for Water Mains	. . . . .	7-49
	7-12.1	Description.	7-49
	7-12.2	Materials.	7-49
	7-12.3	Construction Requirements.	7-49
		7-12.3(1) Installation of Valve Marker Post	7-50
	7-12.4	Measurement.	7-50
	7-12.5	Payment	7-50
7-13	Vacant	. . . . .	7-51
7-14	Hydrants.	. . . . .	7-52
	7-14.1	Description.	7-52
	7-14.2	Materials.	7-52
	7-14.3	Construction Requirements.	7-52
		7-14.3(1) Setting Hydrants.	7-52
		7-14.3(2) Hydrant Connections.	7-53
		7-14.3(3) Resetting Existing Hydrants	7-53
		7-14.3(4) Moving Existing Hydrants.	7-53
		7-14.3(5) Reconnecting Existing Hydrants	7-54
		7-14.3(6) Hydrant Extensions	7-54
	7-14.4	Measurement.	7-54
	7-14.5	Payment	7-54

7-15	Service Connections	7-56
7-15.1	Description.....	7-56
7-15.2	Materials.....	7-56
7-15.3	Construction Requirements.....	7-56
	7-15.3(1) Flushing and Disinfection	7-57
7-15.4	Measurement.....	7-57
7-15.5	Payment	7-57
7-16	Vacant	7-58
7-17	Sanitary Sewers	7-59
7-17.1	Description.....	7-59
7-17.2	Materials.....	7-59
7-17.3	Construction Requirements.....	7-59
	7-17.3(1) Protection of Existing Sewerage Facilities	7-59
	7-17.3(2) Cleaning and Testing	7-60
7-17.4	Measurement.....	7-65
7-17.5	Payment	7-65
7-18	Side Sewers	7-66
7-18.1	Description.....	7-66
7-18.2	Materials.....	7-66
7-18.3	Construction Requirements.....	7-66
	7-18.3(1) General.....	7-66
	7-18.3(2) Fittings.....	7-66
	7-18.3(3) Testing	7-66
	7-18.3(4) Extending Side Sewers Into Private Property	7-67
	7-18.3(5) End Pipe Marker.....	7-67
7-18.4	Measurement.....	7-67
7-18.5	Payment	7-67
7-19	Sewer Cleanouts	7-68
7-19.1	Description.....	7-68
7-19.2	Materials.....	7-68
7-19.3	Construction Requirements.....	7-68
7-19.4	Measurement.....	7-68
7-19.5	Payment	7-68

Division 8	Miscellaneous Construction	8-1
8-01	Erosion Control and Water Pollution Control	8-1
8-01.1	Description	8-1
8-01.1(1)	Definitions	8-1
8-01.2	Materials	8-2
8-01.3	Construction Requirements	8-2
8-01.3(1)	General	8-2
8-01.3(2)	Temporary Seeding and Mulching	8-9
8-01.3(3)	Placing Erosion Control Blanket	8-11
8-01.3(4)	Placing Compost Blanket	8-11
8-01.3(5)	Plastic Covering	8-11
8-01.3(6)	Check Dams	8-12
8-01.3(7)	Stabilized Construction Entrance	8-12
8-01.3(8)	Street Cleaning	8-13
8-01.3(9)	Sediment Control Barriers	8-13
8-01.3(10)	Wattles	8-16
8-01.3(11)	Outlet Protection	8-16
8-01.3(12)	Compost Sock	8-16
8-01.3(13)	Temporary Curb	8-17
8-01.3(14)	Temporary Pipe Slope Drain	8-17
8-01.3(15)	Maintenance	8-17
8-01.3(16)	Removal	8-18
8-01.4	Measurement	8-18
8-01.4(1)	Lump Sum Bid for Project (No Unit Items)	8-18
8-01.4(2)	Item Bids	8-19
8-01.4(4)	Items not included with Lump Sum Erosion Control and Water Pollution Prevention	8-20
8-01.5	Payment	8-20
8-01.5(1)	Lump Sum Bid for Project (No Unit Items)	8-20
8-01.5(2)	Item Bids	8-21
8-01.5(3)	Reinstating Unit Items with Lump Sum Erosion Control and Water Pollution Prevention	8-22
8-01.5(4)	Items not included with Lump Sum Erosion Control and Water Pollution Prevention	8-22

8-02	Roadside Restoration	8-23
8-02.1	Description.....	8-23
8-02.2	Materials.....	8-23
8-02.3	Construction Requirements.....	8-24
8-02.3(1)	Responsibility During Construction.....	8-24
8-02.3(2)	Work Plans.....	8-24
8-02.3(3)	Weed and Pest Control.....	8-26
8-02.3(4)	Topsoil.....	8-28
8-02.3(5)	Roadside Seeding, Lawn and Planting Area Preparation.....	8-29
8-02.3(6)	Mulch and Amendments.....	8-30
8-02.3(7)	Layout of Planting, Lawn and Seeding Areas.....	8-31
8-02.3(8)	Planting.....	8-32
8-02.3(9)	Seeding, Fertilizing, and Mulching.....	8-34
8-02.3(10)	Lawn Installation.....	8-36
8-02.3(11)	Mulch.....	8-38
8-02.3(12)	Completion of Initial Planting.....	8-39
8-02.3(13)	Plant Establishment.....	8-39
8-02.3(14)	Plant Replacement.....	8-40
8-02.3(15)	Bioengineering.....	8-41
8-02.3(16)	Roadside Maintenance Under Construction.....	8-42
8-02.4	Measurement.....	8-43
8-02.5	Payment.....	8-44
8-03	Irrigation Systems	8-47
8-03.1	Description.....	8-47
8-03.2	Materials.....	8-47
8-03.3	Construction Requirements.....	8-47
8-03.3(1)	Layout of Irrigation System.....	8-47
8-03.3(2)	Excavation.....	8-47
8-03.3(3)	Piping.....	8-48
8-03.3(4)	Jointing.....	8-49
8-03.3(5)	Installation.....	8-49
8-03.3(6)	Electrical Wire Installation.....	8-50
8-03.3(7)	Flushing and Testing.....	8-51
8-03.3(8)	Adjusting System.....	8-52
8-03.3(9)	Backfill.....	8-52
8-03.3(10)	As Built Plans.....	8-52
8-03.3(11)	System Operation.....	8-52
8-03.3(12)	Cross Connection Control Device Installation.....	8-53
8-03.3(13)	Irrigation Water Service.....	8-53
8-03.3(14)	Irrigation Electrical Service.....	8-54

8-03.4	Vacant	8-54
8-03.5	Payment	8-54
8-04	Curbs, Gutters, and Spillways	8-55
8-04.1	Description	8-55
8-04.2	Materials	8-55
8-04.3	Construction Requirements	8-55
8-04.3(1)	Cement Concrete Curbs, Gutters, and Spillways	8-55
8-04.3(2)	Extruded Asphalt Concrete Curbs and Gutters	8-57
8-04.3(3)	Vacant	8-57
8-04.3(4)	Metal Spillways	8-57
8-04.3(5)	Spillways at Bridge Ends	8-57
8-04.4	Measurement	8-58
8-04.5	Payment	8-58
8-05	Vacant	8-60
8-06	Cement Concrete Driveway Entrances	8-61
8-06.1	Description	8-61
8-06.2	Materials	8-61
8-06.3	Construction Requirements	8-61
8-06.4	Measurement	8-62
8-06.5	Payment	8-62
8-07	Precast Traffic Curb	8-63
8-07.1	Description	8-63
8-07.2	Materials	8-63
8-07.3	Construction Requirements	8-63
8-07.3(1)	Installing Curbs	8-63
8-07.3(2)	Painting of Curbs	8-64
8-07.4	Measurement	8-64
8-07.5	Payment	8-64
8-08	Rumble Strips	8-65
8-08.1	Description	8-65
8-08.2	Vacant	8-65
8-08.3	Construction Requirements	8-65
8-08.4	Measurement	8-65
8-08.5	Payment	8-66

8-09	Raised Pavement Markers	8-67
8-09.1	Description.....	8-67
8-09.2	Materials.....	8-67
8-09.3	Construction Requirements.....	8-67
8-09.3(1)	Preliminary Spotting.....	8-67
8-09.3(2)	Surface Preparation	8-67
8-09.3(3)	Marker Preparation	8-68
8-09.3(4)	Adhesive Preparation.....	8-68
8-09.3(5)	Application Procedure.....	8-68
8-09.3(6)	Recessed Pavement Marker	8-69
8-09.3(7)	Tolerances for Pavement Markers.....	8-69
8-09.4	Measurement.....	8-69
8-09.5	Payment	8-69
8-10	Guide Posts	8-70
8-10.1	Description.....	8-70
8-10.2	Materials.....	8-70
8-10.3	Construction Requirements.....	8-70
8-10.4	Measurement.....	8-71
8-10.5	Payment	8-71
8-11	Guardrail	8-72
8-11.1	Description.....	8-72
8-11.2	Materials.....	8-72
8-11.3	Construction Requirements.....	8-72
8-11.3(1)	Beam Guardrail.....	8-72
8-11.4	Measurement.....	8-75
8-11.5	Payment	8-76
8-12	Chain Link Fence and Wire Fence	8-78
8-12.1	Description.....	8-78
8-12.2	Materials.....	8-78
8-12.3	Construction Requirements	8-78
8-12.3(1)	Chain Link Fence and Gates.....	8-79
8-12.3(2)	Wire Fence and Gates.....	8-81
8-12.4	Measurement.....	8-83
8-12.5	Payment	8-83

8-13	Monument Cases	8-85
8-13.1	Description.....	8-85
8-13.2	Materials.....	8-85
8-13.3	Construction Requirements.....	8-85
8-13.4	Measurement.....	8-85
8-13.5	Payment	8-85
8-14	Cement Concrete Sidewalks	8-86
8-14.1	Description.....	8-86
8-14.2	Materials.....	8-86
8-14.3	Construction Requirements.....	8-86
8-14.3(1)	Excavation.....	8-86
8-14.3(2)	Forms	8-86
8-14.3(3)	Placing and Finishing Concrete	8-87
8-14.3(4)	Curing.....	8-87
8-14.3(5)	Detectable Warning Surface.....	8-87
8-14.4	Measurement.....	8-87
8-14.5	Payment	8-88
8-15	Riprap	8-89
8-15.1	Description.....	8-89
8-15.2	Materials.....	8-89
8-15.3	Construction Requirements.....	8-89
8-15.3(1)	Excavation for Riprap.....	8-89
8-15.3(2)	Loose Riprap	8-89
8-15.3(3)	Hand Placed Riprap	8-90
8-15.3(4)	Vacant.....	8-90
8-15.3(5)	Vacant.....	8-90
8-15.3(6)	Quarry Spalls.....	8-90
8-15.3(7)	Filter Blanket.....	8-90
8-15.4	Measurement.....	8-90
8-15.5	Payment	8-91

8-16	Concrete Slope Protection	8-92
8-16.1	Description.....	8-92
8-16.2	Materials.....	8-92
8-16.3	Construction Requirements.....	8-92
8-16.3(1)	Footing and Preparation of Slope	8-92
8-16.3(2)	Placing Semi-Open Concrete Masonry Units	8-92
8-16.3(3)	Poured in Place Cement Concrete.....	8-93
8-16.3(4)	Pneumatically Placed Concrete	8-93
8-16.4	Measurement.....	8-94
8-16.5	Payment	8-94
8-17	Impact Attenuator Systems	8-95
8-17.1	Description.....	8-95
8-17.2	Materials.....	8-95
8-17.3	Construction Requirements.....	8-95
8-17.4	Measurement.....	8-96
8-17.5	Payment	8-96
8-18	Mailbox Support	8-97
8-18.1	Description.....	8-97
8-18.2	Materials.....	8-97
8-18.3	Construction Requirements.....	8-97
8-18.3(1)	Type 3 Mailbox Support	8-98
8-18.4	Measurement.....	8-98
8-18.5	Payment	8-98
8-19	Vacant	8-99
8-20	Illumination, Traffic Signal Systems, Intelligent Transportation Systems, and Electrical	8-100
8-20.1	Description.....	8-100
8-20.1(1)	Regulations and Code	8-100
8-20.1(2)	Industry Codes and Standards	8-101
8-20.1(3)	Permitting and Inspections	8-102
8-20.2	Materials.....	8-102
8-20.2(1)	Equipment List and Drawings.....	8-102
8-20.3	Construction Requirements.....	8-104
8-20.3(1)	General.....	8-104
8-20.3(2)	Excavating and Backfilling.....	8-106
8-20.3(3)	Removing and Replacing Improvements.....	8-106
8-20.3(4)	Foundations.....	8-107
8-20.3(5)	Conduit	8-109

8-20.3(6)	Junction Boxes, Cable Vaults, and Pull boxes	8-117
8-20.3(7)	Messenger Cable, Fittings.	8-118
8-20.3(8)	Wiring.	8-118
8-20.3(9)	Bonding, Grounding.	8-122
8-20.3(10)	Service, Transformer, and Intelligent Transportation System (ITS) Cabinets	8-123
8-20.3(11)	Testing	8-124
8-20.3(12)	Painting	8-125
8-20.3(13)	Illumination Systems	8-125
8-20.3(14)	Signal Systems	8-128
8-20.3(15)	Grout	8-131
8-20.3(16)	Reinstalling Salvaged Material	8-131
8-20.3(17)	“As Built” Plans	8-131
8-20.4	Measurement.	8-131
8-20.5	Payment	8-132
8-21	Permanent Signing	8-133
8-21.1	Description.	8-133
8-21.2	Materials.	8-133
8-21.3	Construction Requirements.	8-133
8-21.3(1)	Location of Signs	8-133
8-21.3(2)	Placement of Signs.	8-133
8-21.3(3)	Sign Covering	8-134
8-21.3(4)	Sign Removal.	8-134
8-21.3(5)	Sign Relocation	8-134
8-21.3(6)	Sign Refacing.	8-135
8-21.3(7)	Sign Message Revision.	8-135
8-21.3(8)	Sign Cleaning.	8-136
8-21.3(9)	Sign Structures	8-136
8-21.3(10)	Sign Attachment	8-141
8-21.3(11)	Multiple Panel Signs.	8-142
8-21.3(12)	Steel Sign Posts.	8-142
8-21.4	Measurement.	8-142
8-21.5	Payment	8-143

8-22	Pavement Marking	8-144
8-22.1	Description	8-144
8-22.2	Materials	8-144
8-22.3	Construction Requirements	8-144
8-22.3(1)	Preliminary Spotting	8-144
8-22.3(2)	Preparation of Roadway Surfaces	8-144
8-22.3(3)	Marking Application	8-145
8-22.3(4)	Tolerances for Lines	8-149
8-22.3(5)	Installation Instructions	8-149
8-22.3(6)	Removal of Pavement Markings	8-150
8-22.4	Measurement	8-150
8-22.5	Payment	8-151
8-23	Temporary Pavement Markings	8-154
8-23.1	Description	8-154
8-23.2	Materials	8-154
8-23.3	Construction Requirements	8-154
8-23.3(1)	General	8-154
8-23.3(2)	Preliminary Spotting	8-154
8-23.3(3)	Preparation of Roadway Surface	8-154
8-23.3(4)	Pavement Marking Application	8-154
8-23.4	Measurement	8-156
8-23.5	Payment	8-156
8-24	Rock and Gravity Block Wall and Gabion Cribbing	8-157
8-24.1	Description	8-157
8-24.2	Materials	8-157
8-24.3	Construction Requirements	8-157
8-24.3(1)	Rock Wall	8-157
8-24.3(2)	Gravity Block Wall	8-159
8-24.3(3)	Gabion Cribbing	8-159
8-24.4	Measurement	8-161
8-24.5	Payment	8-161

8-25	Glare Screen	8-162
8-25.1	Description.....	8-162
8-25.2	Materials.....	8-162
8-25.3	Construction Requirements.....	8-162
8-25.3(1)	Glare Screen Fabric	8-162
8-25.3(2)	Slats	8-162
8-25.3(3)	Posts.....	8-163
8-25.3(4)	Tension Wire	8-163
8-25.4	Measurement.....	8-163
8-25.5	Payment	8-163
8-26	Vacant	8-164
8-27	Vacant	8-165
8-28	Vacant	8-166
8-29	Wire Mesh Slope Protection	8-167
8-29.1	Description.....	8-167
8-29.2	Materials.....	8-167
8-29.3	Construction Requirements.....	8-167
8-29.3(1)	Submittals	8-167
8-29.3(2)	Anchors	8-167
8-29.3(3)	Wire Rope	8-168
8-29.3(4)	Wire Mesh.....	8-168
8-29.4	Measurement.....	8-168
8-29.5	Payment	8-168

Division 9	Materials	9-1
9-00	Definitions and Tests	9-1
9-00.1	Fracture	9-1
9-00.2	Wood Waste	9-1
9-00.3	Test for Mass of Galvanizing	9-1
9-00.4	Sieves for Testing Purposes	9-1
9-00.5	Dust Ratio	9-1
9-00.6	Sand/Silt Ratio	9-1
9-00.7	Galvanized Hardware, AASHTO M232	9-1
9-00.8	Sand Equivalent	9-2
9-00.9	Field Test Procedures	9-2
9-01	Cement	9-3
9-01.1	Types of Cement	9-3
9-01.2	Specifications	9-3
9-01.2(1)	Portland Cement	9-3
9-01.2(2)	Rapid Hardening Hydraulic Cement	9-4
9-01.3	Tests and Acceptance	9-4
9-01.4	Storage on the Work Site	9-5
9-02	Bituminous Materials	9-6
9-02.1	Asphalt Material, General	9-6
9-02.1(1)	Vacant	9-6
9-02.1(2)	Vacant	9-6
9-02.1(3)	Vacant	9-6
9-02.1(4)	Performance Graded (PG) Asphalt Binder	9-6
9-02.1(5)	Vacant	9-7
9-02.1(6)	Cationic Emulsified Asphalt	9-7
9-02.1(7)	Vacant	9-7
9-02.1(8)	Flexible Bituminous Pavement Marker Adhesive	9-8
9-02.2	Sampling and Acceptance	9-8
9-02.2(1)	Certification of Shipment	9-8
9-02.2(2)	Samples	9-9
9-02.3	Temperature of Asphalt	9-9
9-02.4	Anti-Stripping Additive	9-9
9-02.5	HMA Additive	9-9

9-03	Aggregates	9-10
9-03.1	Aggregates for Concrete	9-10
9-03.1(1)	General Requirements.....	9-10
9-03.1(2)	Fine Aggregate for Concrete	9-11
9-03.1(3)	Vacant.....	9-12
9-03.1(4)	Coarse Aggregate for Concrete	9-12
9-03.1(5)	Combined Aggregate Gradation for Concrete.....	9-14
9-03.2	Aggregate for Job-Mixed Portland Cement or Blended Hydraulic Cement Mortar .	9-15
9-03.2(1)	Grading for Surface Finishing Applications	9-15
9-03.2(2)	Grading for Masonry Mortar Applications	9-15
9-03.3	Vacant.....	9-16
9-03.4	Aggregate for Bituminous Surface Treatment	9-16
9-03.4(1)	General Requirements.....	9-16
9-03.4(2)	Grading and Quality.....	9-16
9-03.5	Vacant.....	9-17
9-03.6	Vacant.....	9-17
9-03.7	Vacant.....	9-17
9-03.8	Aggregates for Hot Mix Asphalt.....	9-17
9-03.8(1)	General Requirements.....	9-17
9-03.8(2)	HMA Test Requirements	9-18
9-03.8(3)	Grading.....	9-19
9-03.8(4)	Vacant.....	9-20
9-03.8(5)	Mineral Filler	9-20
9-03.8(6)	HMA Proportions of Materials.....	9-20
9-03.8(7)	HMA Tolerances, Specification Limits and Adjustments	9-20
9-03.9	Aggregates for Ballast and Crushed Surfacing.....	9-21
9-03.9(1)	Ballast.....	9-21
9-03.9(2)	Permeable Ballast.....	9-22
9-03.9(3)	Crushed Surfacing	9-23
9-03.9(4)	Maintenance Rock	9-24
9-03.10	Aggregate for Gravel Base.....	9-24
9-03.11	Streambed Aggregates.....	9-25
9-03.11(1)	Streambed Sediment	9-25
9-03.11(2)	Streambed Cobbles	9-26
9-03.11(3)	Streambed Boulders.....	9-27
9-03.11(4)	Habitat Boulders.....	9-27

9-03.12	Gravel Backfill	9-28
9-03.12(1)	Gravel Backfill for Foundations	9-28
9-03.12(2)	Gravel Backfill for Walls	9-28
9-03.12(3)	Gravel Backfill for Pipe Zone Bedding	9-29
9-03.12(4)	Gravel Backfill for Drains	9-29
9-03.12(5)	Gravel Backfill for Drywells	9-30
9-03.13	Backfill for Sand Drains	9-30
9-03.13(1)	Sand Drainage Blanket	9-30
9-03.14	Borrow	9-31
9-03.14(1)	Gravel Borrow	9-31
9-03.14(2)	Select Borrow	9-31
9-03.14(3)	Common Borrow	9-32
9-03.14(4)	Gravel Borrow for Structural Earth Wall	9-32
9-03.15	Native Material for Trench Backfill	9-33
9-03.16	Vacant	9-33
9-03.17	Foundation Material Class A and Class B	9-33
9-03.18	Foundation Material Class C	9-34
9-03.19	Bank Run Gravel for Trench Backfill	9-34
9-03.20	Test Methods for Aggregates	9-34
9-03.21	Recycled Material	9-34
9-03.21(1)	General Requirements	9-34
9-04	Joint Sealing Materials	9-41
9-04.1	Premolded Joint Fillers	9-41
9-04.1(1)	Asphalt Filler for Contraction and Longitudinal Joints in Concrete Pavements	9-41
9-04.1(2)	Premolded Joint Filler for Expansion Joints	9-41
9-04.1(3)	Vacant	9-41
9-04.1(4)	Elastomeric Expansion Joint Seals	9-41
9-04.2	Joint Sealants	9-42
9-04.2(1)	Hot Poured Joint Sealants	9-42
9-04.2(2)	Poured Rubber Joint Sealer	9-42
9-04.2(3)	Single-Component Polyurethane Sealant	9-43
9-04.3	Joint Mortar	9-43

9-04.4	Pipe Joint Gaskets	9-44
9-04.4(1)	Rubber Gaskets for Concrete Pipes and Precast Manholes	9-44
9-04.4(2)	Vacant.	9-44
9-04.4(3)	Gaskets for Aluminum or Steel Culvert or Storm Sewer Pipe	9-44
9-04.4(4)	Rubber Gaskets for Aluminum or Steel Drain Pipe	9-44
9-04.4(5)	Protection and Storage	9-44
9-04.5	Flexible Plastic Gaskets	9-44
9-04.6	Expanded Polystyrene	9-45
9-04.7	Expanded Rubber	9-45
9-04.8	Flexible Elastomeric Seals	9-45
9-04.9	Solvent Cements	9-45
9-04.10	Butyl Rubber and Nitrile Rubber	9-45
9-04.11	Butyl Rubber Sealant	9-45
9-04.12	External Sealing Band.	9-45
9-05	Drainage Structures and Culverts	9-46
9-05.0	Acceptance and Approval of Drainage Structures, and Culverts.	9-46
9-05.1	Drain Pipe.	9-46
9-05.1(1)	Concrete Drain Pipe.	9-46
9-05.1(2)	Zinc Coated (Galvanized) or Aluminum Coated (Aluminized) Corrugated Iron or Steel Drain Pipe	9-46
9-05.1(3)	Corrugated Aluminum Alloy Drain Pipe	9-47
9-05.1(4)	Vacant.	9-47
9-05.1(5)	PVC Drain Pipe, Couplings, and Fittings.	9-47
9-05.1(6)	Corrugated Polyethylene Drain Pipe, Couplings, and Fittings (Up to 10 inch)	9-47
9-05.1(7)	Corrugated Polyethylene Drain Pipe, Couplings, and Fittings (12 inch Through 60 inch).	9-47
9-05.2	Underdrain Pipe	9-48
9-05.2(1)	Vacant.	9-48
9-05.2(2)	Perforated Concrete Underdrain Pipe	9-48
9-05.2(3)	Vacant.	9-48
9-05.2(4)	Zinc Coated (Galvanized) or Aluminum Coated (Aluminized) Corrugated Iron or Steel Underdrain Pipe	9-48
9-05.2(5)	Perforated Corrugated Aluminum Alloy Underdrain Pipe	9-48
9-05.2(6)	Perforated PVC Underdrain Pipe.	9-49
9-05.2(7)	Perforated Corrugated Polyethylene Underdrain Pipe (Up to 10 inch)	9-49
9-05.2(8)	Perforated Corrugated Polyethylene Underdrain Pipe (12-Inch Through 60-Inch Diameter Maximum), Couplings, and Fittings.	9-49

9-05.3	Concrete Culvert Pipe	9-50
	9-05.3(1) Plain Concrete Culvert Pipe	9-50
	9-05.3(2) Reinforced Concrete Culvert Pipe	9-50
	9-05.3(3) Beveled Concrete End Sections	9-51
9-05.4	Steel Culvert Pipe and Pipe Arch	9-52
	9-05.4(1) Elliptical Fabrication	9-52
	9-05.4(2) Mitered Ends	9-52
	9-05.4(3) Protective Treatment	9-52
	9-05.4(4) Asphalt Coatings and Paved Inverts	9-53
	9-05.4(5) Polymer Protective Coating	9-53
	9-05.4(6) Spun Asphalt Lining	9-54
	9-05.4(7) Coupling Bands	9-54
	9-05.4(8) Steel Nestable Pipe	9-55
	9-05.4(9) Steel End Sections	9-55
9-05.5	Aluminum Culvert Pipe	9-56
	9-05.5(1) Elliptical Fabrication	9-56
	9-05.5(2) Mitered Ends	9-56
	9-05.5(3) Vacant	9-56
	9-05.5(4) Vacant	9-56
	9-05.5(5) Coupling Bands	9-56
	9-05.5(6) Aluminum End Sections	9-56
9-05.6	Structural Plate Pipes, Arches and Boxes	9-56
	9-05.6(1) Steel Structural Plate Structures	9-56
	9-05.6(2) Aluminum Structural Plate Structures	9-57
9-05.7	Concrete Storm Sewer Pipe	9-57
	9-05.7(1) Plain Concrete Storm Sewer Pipe	9-57
	9-05.7(2) Reinforced Concrete Storm Sewer Pipe	9-57
	9-05.7(3) Concrete Storm Sewer Pipe Joints	9-57
	9-05.7(4) Testing Concrete Storm Sewer Pipe Joints	9-57
9-05.8	Vitrified Clay Sewer Pipe	9-58
9-05.9	Steel Spiral Rib Storm Sewer Pipe	9-59
	9-05.9(1) Continuous Lock Seam Pipe	9-59
	9-05.9(2) Vacant	9-59
	9-05.9(3) Coupling Bands	9-60
9-05.10	Steel Storm Sewer Pipe	9-60
	9-05.10(1) Coupling Bands	9-60
	9-05.10(2) Basis for Acceptance	9-60
9-05.11	Aluminum Storm Sewer Pipe	9-61
	9-05.11(1) Coupling Bands	9-61
	9-05.11(2) Basis for Acceptance	9-61

9-05.12	Polyvinyl Chloride (PVC) Pipe	9-61
9-05.12(1)	Solid Wall PVC Culvert Pipe, Solid Wall PVC Storm Sewer Pipe, and Solid Wall PVC Sanitary Sewer Pipe	9-61
9-05.12(2)	Profile Wall PVC Culvert Pipe, Profile Wall PVC Storm Sewer Pipe, and Profile Wall PVC Sanitary Sewer Pipe	9-61
9-05.13	Ductile Iron Sewer Pipe	9-62
9-05.14	ABS Composite Sewer Pipe	9-62
9-05.15	Metal Castings.	9-63
9-05.15(1)	Manhole Ring and Cover.	9-63
9-05.15(2)	Metal Frame, Grate, and Solid Metal Cover for Catch Basins or Inlets	9-63
9-05.15(3)	Cast Metal Inlets.	9-64
9-05.16	Grate Inlets and Drop Inlets	9-64
9-05.17	Aluminum Spiral Rib Storm Sewer Pipe.	9-64
9-05.17(1)	Continuous Lock Seam Pipe	9-65
9-05.17(2)	Coupling Bands.	9-65
9-05.18	Safety Bars for Culvert Pipe	9-65
9-05.19	Corrugated Polyethylene Culvert Pipe, Couplings, and Fittings	9-65
9-05.20	Corrugated Polyethylene Storm Sewer Pipe, Couplings, and Fittings	9-66
9-05.21	Steel Rib Reinforced Polyethylene Culvert Pipe	9-66
9-05.22	Steel Rib Reinforced Polyethylene Storm Sewer Pipe.	9-67
9-05.23	High-Density Polyethylene (HDPE) Pipe.	9-67
9-05.24	Polypropylene Culvert Pipe, Polypropylene Storm Sewer Pipe, and Polypropylene Sanitary Sewer Pipe	9-68
9-05.24(1)	Polypropylene Culvert Pipe and Storm Sewer Pipe	9-69
9-05.24(2)	Polypropylene Sanitary Sewer Pipe.	9-69
9-05.30	Vacant.	9-69
9-05.40	Vacant.	9-69
9-05.50	Precast Concrete Drainage Structures	9-69
9-05.50(1)	Fabrication Tolerances and Requirements	9-69
9-05.50(2)	Manholes.	9-70
9-05.50(3)	Precast Concrete Catch Basins	9-70
9-05.50(4)	Precast Concrete Inlets	9-71
9-05.50(5)	Precast Concrete Drywells	9-71
9-05.50(6)	Vacant.	9-71
9-05.50(7)	Vacant.	9-71
9-05.50(8)	Vacant.	9-71
9-05.50(9)	Synthetic Fibers for Precast Units.	9-71
9-05.50(10)	Synthetic Structural Fibers for Precast Units.	9-71

9-06	Structural Steel and Related Materials	9-73
9-06.1	Structural Carbon Steel	9-73
9-06.2	Structural Low Alloy Steel	9-73
9-06.3	Structural High-Strength Steel	9-73
9-06.4	Vacant	9-73
9-06.5	Bolts and Rods	9-73
	9-06.5(1) Unfinished Bolts	9-73
	9-06.5(2) Vacant	9-73
	9-06.5(3) High-Strength Bolts	9-73
	9-06.5(4) Anchor Bolts and Anchor Rods	9-75
9-06.6	Vacant	9-76
9-06.7	Vacant	9-76
9-06.8	Steel Castings	9-76
9-06.9	Gray Iron Castings	9-76
9-06.10	Malleable Iron Castings	9-76
9-06.11	Steel Forgings and Steel Shafting	9-76
9-06.12	Bronze Castings	9-76
9-06.13	Vacant	9-76
9-06.14	Ductile Iron Castings	9-77
9-06.15	Welded Shear Connectors	9-77
9-06.16	Roadside Sign Structures	9-77
9-06.17	Noise Barrier Wall Access Door	9-79
9-06.18	Metal Bridge Railing	9-79
9-06.19	Strip Seal and Modular Expansion Joint System Components	9-80
	9-06.19(1) Strip Seal Expansion Joint System Components	9-80
	9-06.19(2) Modular Expansion Joint System Components	9-80
9-06.20	Vacant	9-81
9-06.21	Vacant	9-81
9-06.22	Bolts, Washers, and Other Hardware	9-81

9-07	Reinforcing Steel	9-82
9-07.1	General	9-82
9-07.1(1)	Acceptance by Manufacturer's Certification	9-82
9-07.1(2)	Bending	9-83
9-07.1(3)	Lengths	9-84
9-07.1(4)	Vacant	9-84
9-07.2	Deformed Steel Bars	9-84
9-07.2(1)	Headed Steel Reinforcing Bar	9-84
9-07.3	Epoxy-Coated Steel Reinforcing Bars	9-84
9-07.4	Plain Steel Bars	9-85
9-07.5	Dowel Bars (for Cement Concrete Pavement)	9-85
9-07.5(1)	Dowel Bars for Cement Concrete Pavement Rehabilitation	9-85
9-07.5(2)	Corrosion Resistant Dowel Bars (for Cement Concrete Pavement and Cement Concrete Pavement Rehabilitation)	9-86
9-07.6	Tie Bars (for Cement Concrete Pavement)	9-87
9-07.7	Welded Wire Reinforcement	9-87
9-07.8	Deformed Wire	9-87
9-07.9	Cold Drawn Wire	9-88
9-07.10	Prestressing Reinforcement Strand	9-88
9-07.11	Prestressing Reinforcement Bar	9-88
9-08	Paints and Related Materials	9-90
9-08.1	Paint	9-90
9-08.1(1)	Description	9-90
9-08.1(2)	Paint Types	9-90
9-08.1(3)	Working Properties	9-92
9-08.1(4)	Storage Properties	9-92
9-08.1(5)	Fineness of Grinding	9-92
9-08.1(6)	Test Methods	9-92
9-08.1(7)	Acceptance	9-93
9-08.1(8)	Standard Colors	9-93
9-08.2	Powder Coating Materials for Coating Galvanized Surfaces	9-93
9-08.3	Concrete Surface Treatments	9-94
9-08.3(1)	Pigmented Sealer Materials	9-94
9-08.3(2)	Exposed Aggregate Concrete Coatings and Sealers	9-94
9-08.3(3)	Permeon Treatment	9-95
9-08.4	Abrasive Blast Materials	9-95
9-08.4(1)	Abrasive Blast Media	9-95
9-08.4(2)	Lead Abatement Additive	9-95

9-08.5	Surface Cleaning Materials	9-95
9-08.5(1)	Bird Guano Treatment	9-95
9-08.5(2)	Fungicide Treatment	9-95
9-08.5(3)	Water	9-95
9-08.6	Filter Fabric	9-96
9-08.7	Single-Component Polyurethane Sealant	9-96
9-08.8	Foam Backer Rod	9-96
9-09	Timber and Lumber	9-97
9-09.1	General Requirements	9-97
9-09.2	Grade Requirements	9-97
9-09.2(1)	Structures	9-98
9-09.2(2)	Guardrail Posts and Blocks	9-98
9-09.2(3)	Signposts, Mileposts, Sawed Fence Posts, and Mailbox Posts	9-99
9-09.3	Preservative Treatment	9-99
9-09.3(1)	General Requirements	9-99
9-10	Piling	9-101
9-10.1	Timber Piling	9-101
9-10.1(1)	Untreated Piling	9-101
9-10.1(2)	Creosote Treated Piling	9-102
9-10.1(3)	Timber Composite Piling	9-102
9-10.1(4)	Peeling	9-102
9-10.2	Concrete Piling	9-102
9-10.2(1)	Concrete	9-102
9-10.2(2)	Reinforcement	9-102
9-10.3	Cast-In-Place Concrete Piling	9-103
9-10.4	Steel Pile Tips and Shoes	9-103
9-10.5	Steel Piling	9-103
9-11	Waterproof Membrane	9-104
9-11.1	Asphalt for Waterproofing	9-104
9-11.2	Primer for Waterproof Membrane	9-104
9-12	Masonry Units	9-105
9-12.1	Concrete Blocks	9-105
9-12.2	Concrete Brick	9-105

9-13	Riprap, Quarry Spalls, Slope Protection, and Rock for Erosion and Scour Protection and Rock Walls	9-106
9-13.1	Riprap and Quarry Spalls	9-106
9-13.1(1)	General	9-106
9-13.1(2)	Heavy Loose Riprap	9-106
9-13.1(3)	Light Loose Riprap	9-106
9-13.1(4)	Hand Placed Riprap	9-107
9-13.1(5)	Quarry Spalls	9-107
9-13.2	Vacant	9-107
9-13.3	Vacant	9-107
9-13.4	Rock for Erosion and Scour Protection	9-107
9-13.4(1)	Suitable Shape of Rock for Erosion and Scour Protection	9-107
9-13.4(2)	Grading Requirements of Rock for Erosion and Scour Protection	9-108
9-13.5	Concrete Slope Protection	9-108
9-13.5(1)	Semi-Open Concrete Masonry Units Slope Protection	9-108
9-13.5(2)	Poured Portland Cement or Blended Hydraulic Cement Concrete Slope Protection	9-109
9-13.5(3)	Pneumatically Placed Portland Cement or Blended Hydraulic Cement Concrete Slope Protection	9-109
9-13.6	Vacant	9-109
9-13.7	Rock for Rock Wall	9-109
9-13.7(1)	Rock for Rock Walls and Chinking Material	9-109
9-13.7(2)	Backfill for Rock Wall	9-110
9-14	Erosion Control and Roadside Planting	9-111
9-14.1	Materials Submittals and Acceptance	9-111
9-14.2	Topsoil	9-113
9-14.2(1)	Topsoil Type A	9-113
9-14.2(2)	Topsoil Type B	9-113
9-14.2(3)	Topsoil Type C	9-113
9-14.3	Seed	9-113
9-14.4	Fertilizer	9-114
9-14.5	Mulch and Amendments	9-114
9-14.5(1)	Straw	9-114
9-14.5(2)	Hydraulically Applied Erosion Control Products (HECPs)	9-115
9-14.5(3)	Bark or Wood Chip Mulch	9-117
9-14.5(4)	Wood Strand Mulch	9-117
9-14.5(5)	Agricultural Grade Dolomite Lime	9-118

	9-14.5(6)	Agricultural Grade Gypsum	9-118
	9-14.5(7)	Tackifier	9-118
	9-14.5(8)	Compost	9-118
	9-14.5(9)	Horticultural Grade Perlite	9-120
9-14.6		Erosion Control Devices	9-120
	9-14.6(1)	Polyacrylamide (PAM)	9-120
	9-14.6(2)	Biodegradable Erosion Control Blanket	9-121
	9-14.6(3)	Plastic Covering	9-122
	9-14.6(4)	Check Dams	9-122
	9-14.6(5)	Wattles	9-123
	9-14.6(6)	Compost Socks	9-123
	9-14.6(7)	Coir Log	9-124
	9-14.6(8)	High Visibility Fencing	9-124
	9-14.6(9)	High Visibility Silt Fence	9-124
9-14.7		Plant Materials	9-124
	9-14.7(1)	Description	9-124
	9-14.7(2)	Quality	9-125
	9-14.7(3)	Handling and Shipping	9-127
	9-14.7(4)	Sod	9-127
9-14.8		Stakes, Guys, and Wrapping	9-128
9-15		Irrigation System	9-129
9-15.1		Pipe, Tubing, and Fittings	9-129
	9-15.1(1)	Galvanized Pipe and Fittings	9-129
	9-15.1(2)	Polyvinyl Chloride Pipe and Fittings	9-129
	9-15.1(3)	Polyethylene Pipe	9-129
9-15.2		Drip Tubing	9-130
9-15.3		Automatic Controllers	9-130
9-15.4		Irrigation Heads	9-131
9-15.5		Valve Boxes	9-131
9-15.6		Gate Valves	9-131
9-15.7		Control Valves	9-131
	9-15.7(1)	Manual Control Valves	9-131
	9-15.7(2)	Automatic Control Valves	9-131
	9-15.7(3)	Automatic Control Valves With Pressure Regulator	9-132
9-15.8		Quick Coupling Equipment	9-132
9-15.9		Drain Valves	9-132
9-15.10		Hose Bibs	9-132
9-15.11		Cross Connection Control Devices	9-133
9-15.12		Check Valves	9-133

9-15.13	Pressure Regulating Valves	9-133
9-15.14	Three-Way Valves	9-133
9-15.15	Flow Control Valves	9-133
9-15.16	Air Relief Valve.....	9-133
9-15.17	Electrical Wire and Splices.....	9-134
9-15.18	Detectable Marking Tape.....	9-134
9-15.19	Wye Strainers	9-134
9-16	Fence and Guardrail	9-135
9-16.1	Chain Link Fence and Gates	9-135
	9-16.1(1) General.....	9-135
9-16.2	Wire Fence and Gates	9-137
	9-16.2(1) General.....	9-137
9-16.3	Beam Guardrail	9-140
	9-16.3(1) Rail Element.....	9-140
	9-16.3(2) Posts and Blocks.....	9-140
	9-16.3(3) Galvanizing	9-141
	9-16.3(4) Hardware.....	9-141
	9-16.3(5) Anchors	9-141
	9-16.3(6) Inspection and Acceptance.....	9-142
9-16.4	Wire Mesh Slope Protection.....	9-142
	9-16.4(1) General.....	9-142
	9-16.4(2) Wire Mesh.....	9-142
	9-16.4(3) Wire Rope	9-143
	9-16.4(4) Hardware.....	9-143
	9-16.4(5) Fasteners and Lacing Wire	9-143
	9-16.4(6) Ground Anchors	9-143
9-16.5	Vacant.....	9-144
9-16.6	Glare Screen.....	9-144
	9-16.6(1) General.....	9-144
	9-16.6(2) Glare Screen Fabric	9-144
	9-16.6(3) Posts.....	9-144
	9-16.6(4) Tension Wire	9-145
	9-16.6(5) Vacant.....	9-145
	9-16.6(6) Tension Wire Attachments	9-145
	9-16.6(7) Slats	9-145
	9-16.6(8) Fittings.....	9-145
	9-16.6(9) Fabric Bands and Stretcher Bars	9-146
	9-16.6(10) Tie Wire and Hog Rings.....	9-146

9-17	Flexible Guide Posts	9-147
9-17.1	General	9-147
	9-17.1(1) Dimensions	9-148
	9-17.1(2) Reflective Sheeting	9-148
9-17.2	Ultraviolet Resistance Test Procedure (Laboratory Test)	9-148
	9-17.2(1) Acceptance	9-149
9-17.3	Field Impact Test Procedure	9-149
	9-17.3(1) Test Observations	9-150
	9-17.3(2) Acceptance	9-150
9-17.4	Pre-approval	9-150
9-18	Precast Traffic Curb	9-152
9-18.1	Precast Traffic Curb	9-152
	9-18.1(1) Aggregates and Proportioning	9-152
	9-18.1(2) Mixing	9-152
	9-18.1(3) Forms	9-153
	9-18.1(4) Placing Concrete	9-153
	9-18.1(5) Removal of Forms	9-153
	9-18.1(6) Curing Concrete	9-153
	9-18.1(7) Finish	9-154
	9-18.1(8) Surface Treatment	9-154
	9-18.1(9) Dimensions and Shape	9-154
	9-18.1(10) Curb Lengths	9-154
	9-18.1(11) Defective Curb	9-154
	9-18.1(12) Repairing Curb	9-155
	9-18.1(13) Identification Marking	9-155
	9-18.1(14) Shipping	9-155
	9-18.1(15) Sampling and Inspection	9-156
9-18.2	Vacant	9-156
9-18.3	Vacant	9-156
9-18.4	Water Repellent Compound	9-156
9-18.5	Sodium Metasilicate	9-156
9-19	Vacant	9-157
9-20	Concrete Patching Material, Grout, and Mortar	9-158
9-20.1	Patching Material for Cement Concrete Pavement	9-158
	9-20.1(1) Patching Mortar	9-158
	9-20.1(2) Patching Mortar Extended With Aggregate	9-158
	9-20.1(3) Aggregate	9-159
	9-20.1(4) Water	9-159

9-20.2	Patching Material for Concrete Structure Repair	9-159
9-20.3	Grout	9-159
9-20.3(1)	Grout Type 1 for Post-Tensioning Applications	9-160
9-20.3(2)	Grout Type 2 for Nonshrink Applications	9-160
9-20.3(3)	Grout Type 3 for Unconfined Applications	9-160
9-20.3(4)	Grout Type 4 for Multipurpose Applications	9-160
9-20.4	Mortar	9-161
9-20.4(1)	Fine Aggregate for Mortar	9-161
9-20.4(2)	Mortar Type 1 for Concrete Surface Finish	9-161
9-20.4(3)	Mortar Type 2 for Masonry Applications	9-161
9-20.4(4)	Mortar Type 3 for Concrete Repair	9-161
9-20.5	Bridge Deck Repair Material	9-161
9-21	Raised Pavement Markers (RPM)	9-162
9-21.1	Raised Pavement Markers Type 1	9-162
9-21.1(1)	Physical and Chemical Properties	9-162
9-21.2	Raised Pavement Markers Type 2	9-162
9-21.2(1)	Standard Raised Pavement Markers Type 2	9-162
9-21.2(2)	Abrasion Resistant Raised Pavement Markers Type 2	9-162
9-21.3	Raised Pavement Markers Type 3	9-163
9-22	Monument Cases	9-164
9-22.1	Monument Cases, Covers, and Risers	9-164
9-23	Concrete Curing Materials and Admixtures	9-165
9-23.1	Sheet Materials for Curing Concrete	9-165
9-23.2	Liquid Membrane-Forming Concrete Curing Compounds	9-165
9-23.3	Vacant	9-165
9-23.4	Vacant	9-165
9-23.5	Burlap Cloth	9-165
9-23.6	Chemical Admixtures for Concrete	9-165
9-23.6(1)	Air-Entraining Admixtures	9-165
9-23.6(2)	Type A Water-Reducing Admixtures	9-165
9-23.6(3)	Type B Retarding Admixtures	9-166
9-23.6(4)	Type C Accelerating Admixtures	9-166
9-23.6(5)	Type D Water-Reducing and Retarding Admixtures	9-166
9-23.6(6)	Type E Water-Reducing and Accelerating Admixtures	9-166
9-23.6(7)	Type F Water-Reducing, High Range Admixtures	9-166
9-23.6(8)	Type G Water-Reducing, High Range, and Retarding Admixtures	9-166
9-23.6(9)	Type S Specific Performance Admixtures	9-166

9-23.7	Vacant	9-166
9-23.8	Waterproofing	9-167
9-23.9	Fly Ash	9-167
	9-23.9(1) Tests and Acceptance	9-167
9-23.10	Ground Granulated Blast Furnace Slag	9-167
	9-23.10(1) Tests and Acceptance	9-168
9-23.11	Microsilica Fume	9-168
9-23.12	Natural Pozzolan	9-168
9-23.13	Blended Supplementary Cementitious Material	9-168
9-24	Plastic Waterstop	9-169
9-24.1	Material	9-169
	9-24.1(1) Tests of Material	9-169
9-25	Water	9-170
9-25.1	Water for Concrete	9-170
9-25.2	Water for Plants	9-170
9-26	Epoxy Resins	9-171
9-26.1	Epoxy Bonding Agents	9-171
	9-26.1(1) General	9-171
	9-26.1(2) Packaging and Marking	9-171
	9-26.1(3) Certification	9-172
	9-26.1(4) Rejection	9-172
	9-26.1(5) Acceptance	9-172
9-26.2	Epoxy Adhesive for Lane Markers	9-172
	9-26.2(1) General	9-172
	9-26.2(2) Packaging and Marking	9-172
	9-26.2(3) Certification	9-172
	9-26.2(4) Rejection	9-172
	9-26.2(5) Acceptance	9-172
9-26.3	Epoxy Grout/Mortar/Concrete	9-173
	9-26.3(1) General	9-173
	9-26.3(2) Packaging and Marking	9-173
	9-26.3(3) Certification	9-173
	9-26.3(4) Rejection	9-173
	9-26.3(5) Acceptance	9-173

9-27	Cribbing	9-174
9-27.1	Vacant	9-174
9-27.2	Vacant	9-174
9-27.3	Gabion Cribbing	9-174
9-27.3(1)	Gabion Fabric	9-174
9-27.3(2)	Gabion Baskets	9-174
9-27.3(3)	Gabion Mattresses	9-175
9-27.3(4)	Fasteners for Basket Assembly	9-176
9-27.3(5)	Nonraveling Construction	9-176
9-27.3(6)	Stone	9-176
9-28	Signing Materials and Fabrication	9-177
9-28.1	General	9-177
9-28.2	Manufacturer's Identification and Date	9-177
9-28.3	Corner Radius	9-177
9-28.4	Extruded Windbeams and "Z" Bar	9-178
9-28.5	Letter and Spacing Formula	9-178
9-28.6	Destination Sign Messages	9-178
9-28.7	Process Colors	9-178
9-28.8	Sheet Aluminum Signs	9-179
9-28.9	Fiberglass Reinforced Plastic Signs	9-179
9-28.9(1)	Mechanical Properties	9-180
9-28.9(2)	Physical Properties	9-180
9-28.10	Digital Printing	9-181
9-28.11	Hardware	9-182
9-28.12	Reflective Sheeting	9-183
9-28.12(1)	Application	9-186
9-28.12(2)	Edge Treatment	9-186
9-28.12(3)	Splices and Color Matching	9-187
9-28.13	Demountable Prismatic Reflectorized Message and Borders	9-187
9-28.14	Sign Support Structures	9-188
9-28.14(1)	Timber Sign Posts	9-188
9-28.14(2)	Steel Structures and Posts	9-188
9-28.14(3)	Aluminum Structures	9-189
9-28.15	Vacant	9-189

9-29	Illumination, Signal, Electrical	9-190
9-29.1	Conduit, Innerduct, and Outerduct	9-190
9-29.1(1)	Rigid Metal Conduit, Galvanized Steel Outerduct, and Fittings . . .	9-190
9-29.1(2)	Rigid Metal Conduit Fittings and Appurtenances	9-190
9-29.1(3)	Flexible Metal Conduit	9-191
9-29.1(4)	Non-Metallic Conduit	9-191
9-29.1(5)	Innerduct and Outerduct	9-192
9-29.1(6)	Detectable Underground Warning Tape	9-194
9-29.1(7)	Steel Casings	9-194
9-29.1(8)	Drilling Fluid	9-195
9-29.1(9)	Repair	9-195
9-29.1(10)	Pull Tape	9-195
9-29.1(11)	Foam Conduit Sealant	9-195
9-29.2	Junction Boxes, Cable Vaults, and Pull Boxes	9-195
9-29.2(1)	Junction Boxes	9-195
9-29.2(2)	Cable Vaults and Pull Boxes	9-198
9-29.2(3)	Structure Mounted Junction Box	9-200
9-29.2(4)	Cover Markings	9-201
9-29.2(5)	Testing Requirements	9-201
9-29.3	Fiber Optic Cable, Electrical Conductors, and Cable	9-204
9-29.3(1)	Fiber Optic Cable	9-204
9-29.3(2)	Electrical Conductors and Cable	9-206
9-29.3(3)	Wire Marking Sleeves	9-207
9-29.4	Messenger Cable, Fittings	9-208
9-29.5	Vacant	9-208
9-29.6	Light and Signal Standards	9-208
9-29.6(1)	Steel Light and Signal Standards	9-209
9-29.6(2)	Slip Base Hardware	9-209
9-29.6(3)	Timber Light Standards, Timber Strain Poles, Timber Service Supports	9-209
9-29.6(4)	Welding	9-210
9-29.6(5)	Foundation Hardware	9-210
9-29.7	Luminaire Fusing and Electrical Connections at Light Standard Bases, Cantilever Bases, and Sign Bridge Bases	9-210
9-29.7(1)	Unfused Quick-Disconnect Connector Kits	9-210
9-29.7(2)	Fused Quick-Disconnect Kits	9-211
9-29.8	Vacant	9-211
9-29.9	Ballast, Transformers	9-212
9-29.9(1)	Ballast	9-212
9-29.9(2)	Transformers	9-213

9-29.10	Luminaires	9-213
9-29.10(1)	Conventional Roadway Luminaires	9-214
9-29.10(2)	Vacant.....	9-216
9-29.10(3)	Vacant.....	9-216
9-29.10(4)	Underdeck and Wall Mount Luminaires	9-216
9-29.11	Control Equipment	9-217
9-29.11(1)	Time Clock Controls.....	9-217
9-29.11(2)	Photoelectric Controls.....	9-217
9-29.12	Electrical Splice Materials	9-217
9-29.12(1)	Illumination Circuit Splices	9-217
9-29.12(2)	Traffic Signal Splice Material.....	9-218
9-29.12(3)	Splice Enclosures	9-218
9-29.12(4)	Re-Enterable Splice Enclosure	9-218
9-29.12(5)	Vinyl Electrical Tape for Splices	9-218
9-29.13	Control Cabinet Assemblies	9-218
9-29.13(1)	Environmental, Performance, and Test Standards for Solid-State Traffic Controller Assemblies	9-218
9-29.13(2)	Traffic Signal Controller Assembly Testing	9-219
9-29.13(3)	Traffic Signal Controller.....	9-220
9-29.13(4)	Traffic-Signal Controller Software	9-220
9-29.13(5)	Flashing Operations.....	9-224
9-29.13(6)	Emergency Preemption.....	9-224
9-29.13(7)	Wiring Diagrams.....	9-225
9-29.13(8)	Generator Transfer Switch	9-225
9-29.13(9)	Vacant.....	9-225
9-29.13(10)	NEMA, Type 170E, 2070 Controllers and Cabinets	9-226
9-29.13(11)	Traffic Data Accumulator and Ramp Meters	9-235
9-29.13(12)	Type 331L ITS Cabinet	9-238
9-29.14	Vacant.....	9-240
9-29.15	Flashing Beacon Control	9-240
9-29.16	Vehicular Signal Heads, Displays, and Housing	9-240
9-29.16(1)	Optically Programmed, Adjustable Face, and Programmable Array 12-Inch Traffic Signal.....	9-240
9-29.16(2)	Conventional Traffic Signal Heads.....	9-243
9-29.16(3)	Polycarbonate Traffic Signal Heads.....	9-245
9-29.16(4)	Traffic Signal Cover	9-245
9-29.17	Signal Head Mounting Brackets and Fittings	9-246

9-29.18	Vehicle Detector	9-247
9-29.18(1)	Induction Loop Detectors	9-247
9-29.18(2)	Magnetometer Detectors	9-247
9-29.19	Pedestrian Push Buttons	9-248
9-29.20	Pedestrian Signals	9-248
9-29.21	Flashing Beacon	9-250
9-29.22	Vacant	9-250
9-29.23	Vacant	9-250
9-29.24	Service Cabinets	9-250
9-29.24(1)	Vacant	9-251
9-29.24(2)	Electrical Circuit Breakers and Contactors	9-252
9-29.25	Amplifier, Transformer, and Terminal Cabinets	9-252
9-30	Water Distribution Materials	9-254
9-30.1	Pipe	9-254
9-30.1(1)	Ductile Iron Pipe	9-254
9-30.1(2)	Polyethylene Encasement	9-254
9-30.1(3)	Vacant	9-254
9-30.1(4)	Steel Pipe	9-255
9-30.1(5)	Polyvinyl Chloride (PVC)	9-255
9-30.1(6)	Polyethylene (PE) Pressure Pipe (4 inches and Over)	9-255
9-30.2	Fittings	9-256
9-30.2(1)	Ductile Iron Pipe	9-256
9-30.2(2)	Vacant	9-256
9-30.2(3)	Vacant	9-256
9-30.2(4)	Steel Pipe	9-256
9-30.2(5)	Polyvinyl Chloride (PVC) Pipe	9-256
9-30.2(6)	Restrained Joints	9-257
9-30.2(7)	Bolted, Sleeve-Type Couplings for Plain End Pipe	9-257
9-30.2(8)	Restrained Flexible Couplings	9-257
9-30.2(9)	Grooved and Shouldered Joints	9-257
9-30.2(10)	Polyethylene (PE) Pipe (4 inches and Over)	9-257
9-30.2(11)	Fabricated Steel Mechanical Slip-Type Expansion Joints	9-257
9-30.3	Valves	9-258
9-30.3(1)	Gate Valves (3 to 16 inches)	9-258
9-30.3(2)	Vacant	9-258
9-30.3(3)	Butterfly Valves	9-258
9-30.3(4)	Valve Boxes	9-258

	9-30.3(5)	Valve Marker Posts.....	9-258
	9-30.3(6)	Valve Stem Extensions.....	9-259
	9-30.3(7)	Combination Air Release/Air Vacuum Valves.....	9-259
	9-30.3(8)	Tapping Sleeve and Valve Assembly.....	9-259
9-30.4		Vacant.....	9-259
9-30.5		Hydrants.....	9-259
	9-30.5(1)	End Connections.....	9-259
	9-30.5(2)	Hydrant Dimensions.....	9-260
	9-30.5(3)	Hydrant Extensions.....	9-260
	9-30.5(4)	Hydrant Restraints.....	9-260
	9-30.5(5)	Traffic Flange.....	9-260
	9-30.5(6)	Guard Posts.....	9-260
9-30.6		Water Service Connections (2 inches and Smaller).....	9-261
	9-30.6(1)	Saddles.....	9-261
	9-30.6(2)	Corporation Stops.....	9-261
	9-30.6(3)	Service Pipes.....	9-261
	9-30.6(4)	Service Fittings.....	9-262
	9-30.6(5)	Meter Setters.....	9-262
	9-30.6(6)	Bronze Nipples and Fittings.....	9-262
	9-30.6(7)	Meter Boxes.....	9-262
9-31		Fabricated Bridge Bearing Assemblies.....	9-263
	9-31.1	Steel Plates and Bars.....	9-263
	9-31.2	Stainless Steel.....	9-263
	9-31.3	Bearing Blocks and Keeper Rings.....	9-263
	9-31.4	Pin Assembly.....	9-263
	9-31.5	Welded Shear Connectors.....	9-264
	9-31.6	Bolts, Nuts and Washers.....	9-264
	9-31.7	Anchor Array Rods, Nuts and Washers.....	9-264
	9-31.8	Bearing Pads.....	9-264
		9-31.8(1) Elastomeric Pads.....	9-264
		9-31.8(2) Polytetrafluoroethylene (PTFE).....	9-265
		9-31.8(3) Pre-formed Fabric Pad.....	9-265
	9-31.9	Polyether Urethane.....	9-265
	9-31.10	Silicone Grease.....	9-266
	9-31.11	Epoxy Gel.....	9-266
	9-31.12	Resin Filler.....	9-266

9-32	Mailbox Support	9-267
9-32.1	Steel Posts	9-267
9-32.2	Bracket, Platform, and Anti-Twist Plate	9-267
9-32.3	Vacant	9-267
9-32.4	Wood Posts	9-267
9-32.5	Fasteners	9-267
9-32.6	Snow Guard	9-267
9-32.7	Type 2 Mailbox Support	9-267
9-32.8	Concrete Base	9-267
9-32.9	Steel Pipe	9-268
9-32.10	U-Channel Post	9-268
9-33	Construction Geosynthetic	9-269
9-33.1	Geosynthetic Material Requirements	9-269
9-33.2	Geosynthetic Properties	9-270
9-33.2(1)	Geotextile Properties	9-270
9-33.2(2)	Geotextile Properties for Retaining Walls and Reinforced Slopes	9-272
9-33.2(3)	Prefabricated Drainage Mat	9-273
9-33.3	Aggregate Cushion of Permanent Erosion Control Geotextile	9-273
9-33.4	Geosynthetic Material Approval and Acceptance	9-274
9-33.4(1)	Geosynthetic Material Approval	9-274
9-33.4(2)	Vacant	9-274
9-33.4(3)	Acceptance Samples	9-275
9-33.4(4)	Acceptance by Certificate of Compliance	9-276
9-33.4(5)	Approval of Seams	9-276
9-34	Pavement Marking Material	9-277
9-34.1	General	9-277
9-34.2	Paint	9-277
9-34.2(1)	Vacant	9-277
9-34.2(2)	Color	9-277
9-34.2(3)	Prohibited Materials	9-278
9-34.2(4)	Low VOC Solvent Based Paint	9-278
9-34.2(5)	Low VOC Waterborne Paint	9-279
9-34.2(6)	Temporary Pavement Marking Paint	9-281

9-34.3	Plastic	9-281
9-34.3(1)	Type A – Liquid Hot Applied Thermoplastic.....	9-281
9-34.3(2)	Type B – Pre-Formed Fused Thermoplastic.....	9-282
9-34.3(3)	Type C – Cold Applied Pre-Formed Tape	9-282
9-34.3(4)	Type D – Liquid Cold Applied Methyl Methacrylate.....	9-283
9-34.4	Glass Beads for Pavement Marking Materials	9-284
9-34.5	Temporary Pavement Marking Tape.....	9-286
9-34.5(1)	Temporary Pavement Marking Tape – Short Duration (Removable).....	9-286
9-34.5(2)	Temporary Pavement Marking Tape – Long Duration (Non-Removable)	9-286
9-34.6	Temporary Flexible Raised Pavement Markers.....	9-286
9-34.7	Field Testing.....	9-286
9-34.7(1)	Requirements	9-286
9-35	Temporary Traffic Control Materials.....	9-288
9-35.0	General Requirements	9-288
9-35.1	Stop/Slow Paddles	9-288
9-35.2	Construction Signs	9-289
9-35.3	Wood Sign Posts.....	9-289
9-35.4	Sequential Arrow Signs	9-290
9-35.5	Portable Changeable Message Signs.....	9-290
9-35.6	Barricades.....	9-291
9-35.7	Traffic Safety Drums.....	9-292
9-35.8	Vacant.....	9-292
9-35.9	Traffic Cones	9-292
9-35.10	Tubular Markers.....	9-292
9-35.11	Warning Lights and Flashers.....	9-292
9-35.12	Transportable Attenuator.....	9-293
9-35.12(1)	Truck-Mounted Attenuator.....	9-293
9-35.12(2)	Trailer-Mounted Attenuator	9-293
9-35.12(3)	Submittal Requirements	9-293
9-35.13	Tall Channelizing Devices	9-294
9-35.14	Portable Temporary Traffic Control Signal	9-294

9-36	Shaft-Related Materials	9-296
9-36.1	Shaft Casing.....	9-296
9-36.1(1)	Permanent Casing	9-296
9-36.1(2)	Temporary Casing.....	9-296
9-36.2	Shaft Slurry.....	9-296
9-36.2(1)	Mineral Slurry	9-296
9-36.2(2)	Synthetic Slurry.....	9-297
9-36.2(3)	Water Slurry	9-297
9-36.3	Steel Reinforcing Bar Centralizers	9-297
9-36.4	Access Tubes and Caps	9-298
9-36.5	Grout for Access Tubes	9-298