

TABLE OF CONTENTS – 24

Introduction:	(1) Cover Page (2) Introduction (3) Dedication / List of Annual FMM Revisions, Additions & Deletions (4) Comments / Corrections Form CDOT Manuals using "JotForm" (5) Comments / Corrections Form CDOT Manuals using "Adobe Pdf".
Table of Contents	Table of Contents
QA Procedures	Quality Assurance Procedures for Construction and Materials Sampling & Testing
Documentation, SMM/LIMS	SMM / LIMS – Project Materials to Finals Materials
Documentation, Adobe Sign	Adobe Sign instructions for CDOT Form 473/474
Documentation, Design-Build	Design Build Quality Assurance Program, Project Materials to Finals Materials
Documentation, For Maintenance & Local Agency	CDOT Maintenance & Local Agencies
Contractors, Special Notice	Special Notice to Contractors
Schedule (Owner Acceptance)	OA Frequency Guide Schedule for Minimum Materials Sampling, Testing, and Inspection
Schedule (Independent Assurance)	IA Frequency Guide Schedule for Evaluation of OA Sampling & Testing
CP 10	Colorado Procedures 10 CP 10 Qualification of Testing Personnel and Laboratories
CP 11	Colorado Procedures 11 CP 11 Intro to Qualified Manufactured List (QML)/Approved Products List (APL) CP11-1 Asphalt Binder CP11-2 Asphalt Emulsion CP 11-3 Hydraulic Cement CP-11-4 Fly Ash CP 11-5 Hydrated Lime CP 11-6 Steel Reinforcing Bars & Steel Dowel Bars CP-11-7 Epoxy Coaters for Reinforcing Steel CP-11-8 Precast Concrete Structures

CP 12	Colorado Procedures 12
	CP 12A Contractor's Hot Mix Asphalt Process Control Notebook
	CP 12B Contractor's Portland Cement Concrete Paving Process Control Notebook
	CP 12C Contractor's Excavation and Embankment Process Control Notebook
CP 13	Colorado Procedure 13
	CP 13 Check Testing
CP 14	Colorado Procedure 14
	CP 14 F and t-test Statistical Method
CP 15	Colorado Procedure 15
	CP 15 Certification of Consultant Nuclear Moisture/Density Gauges
CP 16	Colorado Procedure 16
	CP 16 Management of CDOT & Consultant Materials Testing
CP 17	Colorado Procedure 17
	CP 17 Hot Mix Asphalt Test Results Verification and Dispute Resolution
CP 20s	Colorado Procedures 20s - Soils
	CP 20 Dry Preparation of Disturbed Soil Samples for Test
	CP 21 Mechanical Analysis of Soils
	CP 23 Determining Maximum Dry Density and Optimum Moisture Content of Soil-Rock Mixtures
	CP 24 Soil Surveys of Constructed Roadbeds
	CP 25 Calculation of Percent Relative Compaction of Soils and Soil-Rock Mixtures
	CP 26 Contractor Approval Process for Subgrade Stabilization
CP 30s	Colorado Procedures 30s - Bases
	CP 30 Sampling of Aggregates
	CP 31 Sieve Analysis of Aggregates
	CP 32 Reducing Field Samples of Soil and Aggregate to Testing Size
	CP 33 Total Evaporable Moisture Content and Surface Moisture Content of Aggregates by Drying
	CP 37 Plastic Fines in Graded Aggregates and Soils by Sand Equivalent Test

CP 40s	Colorado Procedures 40s – Asphalt
CP 41	Sampling Hot Mix Asphalt
CP 42	Estimation of Asphalt Content in Hot Mix Asphalt through Back Calculations Using G_{se}
CP 43	Determining Moisture (Water) or Volatile Distillates Content of HMA
CP 44	Bulk Specific Gravity and Percent Relative Compaction of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens
CP 45	Determining Percent of Particles with Two or More Fractured Faces
CP 46	Determination of Gradation of Aggregate in a Core from Asphalt Pavement
CP 47	Rejuvenating Agent Evaluation Procedure
CP 48	Determination of the Voids in the Mineral Aggregate (VMA)
CP 50s	Colorado Procedures 50s - Asphalt
CP 50	Calculation of Dust to Asphalt Ratio of Bituminous Mixes
CP 51	Determining the Maximum Specific Gravity of HMA
CP 52	Contractor Asphalt Mix Design Approval Procedures
CP 53	Determining Maximum Density of Cold In-Place Recycled Pavement
CP 54	Approval of Asphalt Mix Designs Using Plant Produced Material
CP 55	Reducing Field Samples of Hot Mix Asphalt to Testing Size
CP 56	Guidelines for Using Maximum Specific Gravity (Rice) of Project-Produced HMA to Change the Target Specific Gravity for Compaction Compliance
CP 57	Determining the “Free Moisture” in Cold In-Place Recycled Pavement
CP 58	Detecting and Measuring Temperature Segregation of HMA
CP 59	Warm Mix Asphalt Approval
CP 60s	Colorado Procedures 60s - Concrete
CP 61	Sampling Freshly Mixed Concrete
CP 62	Contractor Concrete Mix Design Approval Procedure
CP 63	The Box Test in Slip Form Paving of Fresh Concrete
CP 65	Evaluating Low Strength Test Results of Concrete Cylinders
CP 66	Delete effective 7-01-2015
CP 67	Determining Adhesion of Joint Sealant to Concrete Pavement
CP 69	Estimating the In-Place Concrete Strength by a Maturity Method
CP 70s	Colorado Procedures 70s - Miscellaneous
CP 71	Determining Quality Level (Percent within Tolerance Limits)
CP 74	Operating Inertial Profilers and Evaluating Pavement Profiles
CP 75	Stratified Random Sampling of Materials
CP 76	Verification of Equipment Used to Field Test Bituminous Mixtures
CP 77	Determination of Macro-Texture of a Pavement Surface
CP 78	Certification of High-Speed Profilers
CP 79	Eval MIT Scan for Dowel Bars

Chapter 500	Structures/Steel/Miscellaneous	PAGE
	Item 502 Piling.....	1
	Item 503 Drilled Shafts.....	1
	Item 504 Soil Nail Walls.....	1
	Item 506 Gabions and Slope Mattress.....	1
	Item 509 Structural Steel.....	2
	Item 509 Structural Steel (Galvanized).....	2
	Item 510 Structural Plate (Galvanized).....	2
	Item 515 Waterproofing Membrane (Bridge Deck).....	2
	CDOT Forms -	3

Chapter 600	Concrete & Item 600	PAGE
	Item 601 Structural Concrete.....	1
	Review of Contractors Mix Design.....	2
	Aggregates.....	2
	Compressive Strength.....	2
	Quality Assurance Program for CDOT Concrete Cylinder Testing.....	3
	Unit Weight, Yield, and Gravimetric Air Content of Concrete.....	7
	Excessive Water Demand.....	7
	Making and Curing Concrete Cylinders in the Field.....	7
	Documentation and Transfer of Concrete Cylinders.....	8
	Technical Complaints.....	9
	Air Entrainment.....	9
	Admixtures.....	10
	Item 602 Reinforcing Steel (Epoxy Coated).....	11
	Item 602 Reinforcing Steel.....	11
	Wire Mesh.....	12
	Corrugated Metal Pipe.....	13
	Spelter Damage Repair.....	13
	Concrete Culvert Pipe.....	13
	Vitrified Clay Pipe.....	14
	Pipe Joint Sealant Compound.....	14
	Item 604 Manholes.....	14
	Item 606 Guard Rail.....	14
	Item 606 End Anchors.....	15
	Item 607 Fence.....	15
	Item 613 Lighting.....	15
	Item 614 Traffic Control Devices.....	15
	Item 618 Post Tensioning Grout.....	16
	Item 624 Drainage Pipe.....	16
	CDOT Forms – Concrete Examples Index.....	17

Chapter 700 Paints
 Item 708 Paints..... 1
 Structural Steel Bridge Paints.....1
 Epoxy Coaters for Reinforcing Steel.....1

Chapter 800 Radiological Safety & Nuclear Gauge Operation (Deleted from FMM 2020)
 Note: A copy of Chapter 800 will be located with each CDOT Nuclear Gauge.
 Additional Copies will be maintained with the Region Radiation Safety Officer.
 Added QR Code

Materials Form Materials Forms, Instructions & Examples

Electronic Documents Introduction to Bentley Connection Client ProjectWise Cloud

Job Safety Analysis **PAGE**
 Job Safety Analysis (JSA) – Materials Index
 Table of Contents..... 1

IHS Engineering Workbench Instructions **PAGE**
 Accessing AASHTO/ASTM Online..... 1

Inspections: CDOT Central Laboratory of the Regions **PAGE**

- I. Protocol for Open Laboratory Review of CDOT Materials Testing Laboratory 1
- II. Protocol for the Inspection of Region Materials Laboratories by the Central Materials Laboratory..... 2
 - (a) Report of Central Laboratory to Region Lab Inspection (Form #520) ... 3
 - (b) Equipment Calibration, Verification and Check Information..... 6
 - (c) Calibration/Verification, and Check of Equipment Inventory 7
 - (d) Summary of Tester Qualifications 8
- III. Protocol for Round Robin Materials Testing of CDOT Region & Consultant Laboratories 9
- IV. Protocol for the Audit of Region Materials IA Sampling and Testing Program by the Central Materials Laboratory..... 13
- V. Protocol for the Audit of Region Materials Final Materials Review and Acceptance Process by the Central Materials Laboratory..... 15
- VI. Protocol for the Audit of Local Agency Final Materials Review and Acceptance Process by the Central Materials Laboratory..... 17

Appendix

	PAGE
A - Materials Advisory Committee (MAC) Charter.....	2
A - Independent Assurance (IA) Testers Committee Charter	5
A - Flexible Pavement Operator’s Group (FPOG) Charter.....	8
B - Task Force Management Guide	11
C - Personnel Roster, Staff & Region Materials	14
D - Definitions	20
E - Acronyms	29
F - Significant Publications	30
G- Colorado Procedures - Laboratory <i>Numeric Order</i>	32
H - Metric Conversion Tables.....	34
I - Materials Testing Accuracy Criteria	37
J - Laboratory Test Time.....	39
K - Establishing Lots or Process Control on the Project	39
L - Random Sampling	39
M- Sample Processing Procedure	40
N - Use of Laboratory Check Tests on More than One Project.....	40
O- Environmental Product Declaration Protocol	41

MATERIALS PAY ITEMS NUMERICAL LIST

Item No	Description	Item No	Description
203	Compaction	506	Riprap (Gabions) and Slope Mattress
206	Structure Backfill	507	Slope and Ditch Paving
206	Filter Material	508	Timber Structures
206	Bed Course Material	509	Structural Steel
207	Topsoil	509	Structural Steel (Galvanized)
208	Silt Fence	510	Structural Plate Structures
209	Watering	512	Bearing Device
212	Seeding and Sodding	513	Drainpipe
213	Mulching	514	Pipe Railing
214	Planting	515	Waterproofing Membrane
215	Transplanting	516	Damp proofing
216	Soil Retention System	517	Waterproofing
217	Soil Sterilization	518	Expansion Devices and Water stops
301	Plant Mix Bituminous Base Course	601	Structural Concrete
304	Aggregate Base Course	602	Reinforcing Steel
306	Reconditioning	603	Culverts
307	Lime Treated Subgrade	604	Sewers, Manholes, Inlets, and Meter Vaults
307	Hydrated Lime	605	Underdrains
307	Mineral Fillers	606	Guard Rail
308	Portland Cement Treated Base	607	Fences
308	Portland Cement, Fly Ash	608	Sidewalks
309	Lean Concrete Base	609	Curbing
310	Process Asphalt Mat	610	Median Cover Material
403	Hot Bituminous Pavement	611	Cattle Guard
405	Hot In-Place Recycle	612	Markers
406	Cold Bituminous Pavement (Recycle)	613	Lighting
408	Hot-Poured Joint and Crack Sealer	614	Traffic Control Devices
409	Seal Coat	615	Water Control Devices
409	Cover Coat Material	616	Siphons
411	Bituminous Materials	617	Culvert Pipe
412	Portland Cement Concrete Pavement	618	Pre-stressed Concrete Structures
420	Geotextiles	619	Water Lines
501	Steel Sheet Piling	622	Rest Areas and Buildings
502	Piling	623	Sprinkler System
503	Drilled Caissons	624	Corrosion Resistant Culverts
504	Cribbing	627	Pavement Marking
504	MSE Walls	641	Shotcrete
		708	Paints

MATERIALS PAY ITEMS ALPHABETICAL LIST

Description	Item No	Description	Item No
Aggregate Base Course	304	Median Cover Material.....	610
Anchor Bolts.....	613	Mineral Fillers, Etc.	307
Arch Pipe (Plate)	510	Mulching (Straw)	213
Asphalt Cement	411	Mulching (Wood Cellulose)	213
Bearing Device	512	PG Binder.....	411
Bed Course Material	206	Paints	708
Bituminous Base (Plant Mix).....	301	Pavement Marking	627
Bituminous Materials	411	Piling	502
Caissons (Drilled)	503	Piling (Steel Sheet).....	501
Cattle Guard.....	611	Pipe (Culvert).....	617
Cold Bituminous Pavement (Recycle).....	406	Pipe (Drain).....	513
Compaction.....	203	Pipe Railing	514
Concrete (Structural)	601	Plant Mix Bituminous Base Course.....	301
Concrete Units (Pre-stressed).....	618	Planting.....	214
Copper (Sheet).....	511	Plate Pipe (Structural)	510
Corrosion Resistant Culverts	624	Polyethylene Sheeting.....	610
Cover Coat Material.....	409	Portland Cement	308
Cover Material (Median)	610	Portland Cement Concrete Pavement.....	412
Cribbing.....	504	Preform. Bridge Compression Joint Sealer	518
Culverts.....	603	Pre-stressed Concrete Structures.....	618
Culvert Pipe.....	617	Process Asphalt Mat	310
Curbing.....	609	Railing (Pipe).....	514
Damp proofing.....	516	Reconditioning.....	306
Drainpipe	513	Reinforcing Steel	602
Drilled Caissons.....	503	Rest Areas and Buildings	622
Emulsion	411	Riprap	506
Expansion Devices and Water stops.....	518	Seal Coat.....	409
Filter Material	206	Seeding And Sodding.....	212
Gabions	506	Sewers, Manholes, Inlets, Meter Vaults.....	604
Galvanized Structural Steel.....	509	Shotcrete	641
Geotextiles.....	420	Sidewalks.....	608
Guard Rail	606	Silt Fence	208
Hot Bituminous Pavement.....	403	Soil Retention System.....	216
Hot In-Place Recycle	405	Siphons	616
Hot Poured Joint and Crack Sealer	408	Slope and Ditch Paving	507
Humus.....	214	Slope Mattress.....	506
Hydrated Lime	307	Sprinkler System.....	623
Inlets	604	Steel (Reinforcing)	602
Joint Seal (Preformed)	518	Steel Sheet Piling.....	501
Lean Concrete Base	309	Steel (Structural).....	509
Lighting	613	Structural Concrete	601
Lime Treated Subgrade.....	307	Structural Plate Pipe.....	510
Liquid Asphalt	411	Structural Steel.....	509
MSE Wall.....	504	Structural Steel Galvanized	510
Manholes	604	Structure Backfill	206
Markers.....	612	Topsoil	207

Timber Structures	508	Watering.....	209
Traffic Control Devices.....	614	Water Lines.....	619
Trash Guards.....	616	Waterproofing.....	517
Underdrains	605	Waterproofing Membrane	517
Water Control Devices.....	615		