

21.0 Modifications To Standard Specifications

21.1 Construction Requirements

This Section sets forth modifications to the Colorado Department of Transportation (CDOT) Standard Specification for Road and Bridge Construction for design-build projects. The first section contains revisions to Division 100 of the Standard Specifications. The second section contains revisions to Divisions 200 through 700 of the Standard Specifications, Standard Special Provisions, and Project Special Provisions. All references to the "specifications" in this section refer to the CDOT Standard Specifications for Road and Bridge Construction as modified and incorporated into the RFP by the terms of this section.

These Contract Provisions revise the CDOT's Standard Specifications for Road and Bridge Construction, and contain requirements generally applicable to the Work to be performed by the Contractor. In certain cases, provisions in Section 100 of the Standard Specifications for Road and Bridge Construction have been superseded by other provisions of the Contract Documents. For ease of reference, this document uses the same Section numbers as the Standard Specifications for Road and Bridge Construction and identifies provisions of the Contract Documents that have replaced or modified the standard clauses.

The Specifications in this Section (Section 21) refer to "CDOT" in conjunction with "sampling of materials" and/or "testing of materials"; such reference may mean ICQC or OVT. If it is not clear which reference should be used, CDOT will make that decision in its sole discretion. In all cases, regardless of the language, CDOT maintains its acceptance role, and this role cannot be shifted to ICQC.

All references to "Engineer" that are incorporated into this Request for Proposal (RFP) refer to the Contractor's Engineer, unless the context requires or CDOT determines otherwise. Non-capitalized terms, such as "work" that are defined in Book 1, Exhibit A, shall have the meanings defined therein unless the context requires otherwise. References to "approve, approval or approved" shall mean "Approve, Approval or Approved" as defined in Book 1, Exhibit A, when the approval is by CDOT or a division of CDOT. If the interpretation(s) pursuant to this paragraph are not clear, CDOT shall decide, in its sole discretion, how these terms shall be interpreted.

When the specifications describe actions, Materials, means or methods that are required and that are qualified by phrases such as: "as directed by the Engineer", "when directed by the Engineer", "as determined by the Engineer", "with or without permission of the Engineer", "in the opinion of the Engineer", "unless authorized by the Engineer", "satisfactory to the Engineer", "as approved by the Engineer", or "unless another type is specified or is permitted with approval of the Engineer", such phrases pertaining to Contractor actions, materials, operations, and means or methods shall be disregarded. If it is not clear whether a phrase should be disregarded, CDOT will make that decision in its sole discretion.

When the specifications refer to "CDOT", "Department", "Resident Engineer", "Agricultural Engineer", "Bridge, Construction or Maintenance Engineer", "TMC system inspector", "Concrete Engineer", "Project Engineer", "Materials Engineer", "Commissioner", "Structural Metals Engineer", "Department's Lighting Engineer", "Geotechnical Engineer" or any other specific CDOT special engineer, such reference shall mean the CDOT Project Director.

When the specifications use the term Engineer relating to the approval of any activities involving the use of explosives, such term shall mean the CDOT Project Director.

When an approval or authorization of the Engineer or CDOT is required in these specifications for the use of alternative or substituted processes or components, the Engineer shall mean CDOT. If it is not clear whether a phrase involves the use of alternative or substituted processes, CDOT will make that determination in its sole discretion.

When the specifications refer to an approval of any correction or repair that deviates from the Contract requirements, the approval must be by CDOT. If it is not clear whether a specification involves a correction or repair that deviates from the Contract requirements, CDOT will make that determination in its sole discretion.

When the specifications provide that reports, records or other documents shall be submitted to CDOT or to the Engineer, such reports shall be made available to CDOT and do not have to be submitted unless either they are otherwise listed in the deliverables in the Contract Documents, or are required shop drawings, warranties, parts lists, instruction sheets or manufacturer's drawings or specifications. Such documents shall be submitted to CDOT as required by the specifications.

When the specifications require actions, Materials, means, or methods that are "either as indicated in the Plans or as designated by the Engineer," the Contractor shall disregard the phrase "or as designated by the Engineer."

When the specifications refer to the "Engineer" ordering work beyond the scope of work in the Contract, "Engineer" shall mean CDOT. Whenever in these specifications the Engineer may order work that results in additional costs to CDOT, the "Engineer" shall mean CDOT.

Any acceptances on behalf of CDOT or the State shall be performed by CDOT.

Any references to other standards, codes, or criteria, or to the latest version of other standards, codes, or criteria in Book 2 of the Contract Documents shall mean the latest version at the Proposal Due Date unless otherwise indicated.

21.1.1. Modifications to Section 100 of the CDOT Standard Specifications for Road and Bridge Construction

101 - Definitions and Terms

Definitions of terms used herein are set forth in Exhibit A, to Book 1 of the Contract Documents.

102 - Bidding Requirements and Conditions

102.01 - Prequalification of Bidders

Prequalification of Proposers was determined during the evaluation of the Statements of Qualifications.

102.02 - Contents of Proposal Forms

Provisions regarding the contents of Proposal Forms are set forth in the Instructions to Proposers.

102.03 - Interpretation of Quantities in Proposal Form

Not applicable.

102.04 - Interpretation of Plans and Specifications

Provisions regarding the interpretation of plans and specifications are set forth in the Instructions to Proposers.

102.05 - Examination of Plans, Specifications, Special Provisions, and Site or Work

Provisions regarding examination of plans, specifications, special provisions, and Site or Work are set forth in the Instructions to Proposers and in Book 1, Sections 1 and 2, of the Contract Documents.

102.06 - Preparation of Proposal

Provisions regarding preparation of the Proposal are set forth in the Instructions to Proposers.

102.07 - Irregular Proposals

Provisions regarding irregular Proposals are set forth in the Instructions to Proposers.

102.08 - Combination or Conditional Proposals

Not applicable.

102.09 - Anti-Collusion Affidavit

Provisions regarding Anti-Collusion Affidavit are set forth in the Instructions to Proposers.

102.10 - Material Guaranty

Provisions regarding Material Guaranty are set forth in Book 1, Section 21, and Book 2, Section 4.

103 - Award, and Execution of Contract

Provisions regarding award and execution of the Contract are set forth in the Instructions to Proposers and in Book 1 of the Contract Documents.

104 - Scope of Work

104.01 - Intent of Contract

Provisions regarding the intent of contract are set forth in Book 1 of the Contract Documents.

104.02 - Differing Site Conditions, Suspensions or Work, and Significant Changes in the Character of Work

Provisions regarding differing Site conditions and changes in the character of Work are set forth in Book 1, Sections 5 and 13, of the Contract Documents. Provisions regarding limitations to contract price increases are set forth in Book 1, Section 13.5, of the Contract Documents. Provisions regarding Suspensions of Work are set forth in Book 1, Sections 14 and 15.15, of the Contract Documents.

104.03 - Extra Work

Provisions regarding changes are set forth in Book 1, Section 13, of the Contract Documents.

104.04 - Maintaining Traffic

The provisions regarding maintenance of traffic are set forth in Book 2, Sections 17 and 19, of the Contract Documents. Provisions regarding maintenance responsibilities of the Contractor during Suspensions of Work are set forth in Book 1, Section 14, of the Contract Documents.

104.05 - Rights In and Use of Materials Found on the Work

The provisions regarding rights in and use of Materials found on the Work are replaced with the following:

The Contractor shall not excavate or remove any Material from within the Roadway, which is not within the grading limits, as indicated by the slope and grade lines, without written authorization from CDOT.

104.06 - Final Cleaning Up

Provisions regarding final cleaning up before Final Acceptance are fully incorporated herein.

104.07 - Value Engineering Change Proposals by the Contractor

Provisions regarding Value Engineering change proposals by the Contractor are set forth in Book 1, Section 12, of the Contract Documents.

105 - Control of Work

105.01 - Authority of the Engineer

The provisions regarding Control of Work are set forth in Book 1, Section 5, of the Contract Documents. CDOT has the authority by written order to suspend the Work wholly or in part for the reasons delineated in Book 1, Section 14, of the Contract Documents.

105.02 - Plans, Shop Drawings, Working Drawings, Other submittals, and Construction Drawings

Provisions regarding plans, Shop Drawings, Working Drawings, and construction documents are set forth in Book 2, Section 4, of the Contract Documents.

105.03 - Conformity to the Contract

The provisions regarding conformity to the Contract are revised as follows:

1. No incentive payments will be made under this Contract.
2. Paragraph 4 is deleted and replaced with the following: When the Engineer or CDOT finds the Materials furnished, the Work performed, or the finished product does not conform with the Contract Documents, but CDOT determines, in its sole discretion, that reasonably acceptable Work has been produced, CDOT will determine the extent the Work will be Accepted and remain in place. If accepted, the Contractor shall (a) document the basis for Acceptance based on CDOT's determination by Change Order which will provide for an appropriate reduction in the Contract price for such Work or Materials not otherwise provided for in this Subsection, or (b) CDOT will notify the Contractor in writing that the agreed-upon unit price will be reduced in accordance with this Subsection when P is 25 or less, or (c) CDOT may notify the Contractor in writing if there should be no reduction in the Contract Price; or in lieu of a price reduction, CDOT may permit correction or replacement of the finished product, provided the correction or replacement does not adversely affect the Work.
3. For purposes of Nonconforming Work, the Contractor and CDOT will negotiate a unit price for determining the reduction in the Contract Price, with supporting documentation. The unit price is subject to Approval by CDOT. The reduction in Contract Price shall take place as provided in this Section 105.03, based upon the Approved unit price. The Change Order shall be prepared in accordance with this Section 105.03.
4. Paragraph 5 is deleted and replaced with the following: When the Engineer or CDOT finds the Materials furnished, Work performed, or the finished product are not in conformity with the Contract Documents, and CDOT determines, in its sole discretion, that it has resulted in an inferior or unsatisfactory product, the Work or Materials shall be removed and replaced or otherwise corrected by and at the expense of the Contractor.
5. Paragraph 8 is deleted and replaced with the following: Materials or Work will be evaluated for price reduction only when deviations from the requirements of the Contract Documents occur on any of the several individual Tests for the lot. Several individual test values will be averaged, and the percent of price reduction for the lot will be determined by applicable formula and table as shown in Section 105.03.
6. Paragraph 15 is deleted and replaced with the following: Price reduction for those elements which are not included in the Table of Price Reduction Factors, as shown in Section 105.03, will be proposed by the Contractor for Approval by CDOT.
7. Paragraph 16 is deleted and replaced with the following: The Contractor will not have the option of accepting a price reduction in lieu of producing Material that complies with the Contract Documents. Continued production of nonconforming Material will not be permitted. Material which is obviously defective may be isolated and rejected by CDOT without regard to sampling sequence or location within a lot.

105.05 - Conformity to the Contract of Hot Mix Asphalt

The provisions regarding conformity to the Contract of Hot Mix Asphalt are revised as follows:

No incentive payments will be made under this Contract.

105.06 - Conformity to the Contract of Portland Cement Concrete Pavement

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The provisions regarding conformity to the Contract of Portland Cement Concrete Pavement are revised as follows:

No incentive payments will be made under this Contract.

105.07 - Conformity to Roadway Smoothness Criteria

The provisions regarding conformity to Roadway Smoothness Criteria are revised as follows:

Pavement Smoothness Category of HMA shall be MRI Category A for US 160 and MRI Category D for County Roads. See Book 2, Section 11.

No incentive payments will be made under this Contract.

105.08 Document Management and Professional Engineer and Professional Land Surveyor Electronic Seals

Provisions regarding document management, Professional Engineer Seals, and Land Surveyor Seals are set forth in Book 2, Section 4, and Book 2, Section 10, of the Contract Documents.

105.09 - Coordination of Plans, Specifications, Supplemental Specifications, and Special Provisions

Book 1, Section 1.3, of the Contract Documents sets forth the order of precedence of the various Contract Documents.

105.10 - Cooperation by Contractor

Provisions regarding cooperation by the Contractor are set forth in Book 1, Section 2.2, and Book 1, Section 23.0, of the Contract Documents.

105.11 - Cooperation with Utilities

Provisions regarding cooperation with Utilities are fully incorporated herein, except the reference to Extra Work is not applicable, and the provisions for delays are set forth in Book 1, Section 6.2, and Book 2, Section 8, of the Contract Documents.

105.12 - Cooperation Between Contractors

Provisions regarding Cooperation between Contractors are set forth in Book 1, Section 23.0, and in Book 2, Section 17, of the Contract Documents.

105.15 - Duties of the Inspector

Provisions regarding inspection of the Work are set forth in Book 1, Section 5, Book 1, Section 22, and Book 2, Section 4, of the Contract Documents.

105.16 - Inspection and Testing of Work

Provisions regarding Inspection and Testing of the Work are set forth in Book 1, Section 5, Book 1, Section 22, and Book 2, Section 4.

105.17- Removal of Unacceptable Work and Unauthorized Work

Book 1, Section 5.7, of the Contract Documents provides for removal of Nonconforming Work.

105.18 - Load Restrictions

The provisions regarding load restrictions are incorporated herein, except the fourth and fifth paragraphs are replaced with the following:

If a scale ticket from an overweight vehicle is inadvertently accepted and the Material incorporated into the Project, CDOT will adjust the price for the overweight load as follows:

1. The Contract price will be reduced by an amount based upon the pay item quantity represented by the amount of Material in excess of the legal weight according to a unit price to be proposed by the Contractor, with supporting documentation, and Approved by CDOT.

105.19 - Maintenance during Construction

Provisions for maintenance during construction are set forth in Book 1, Section 10, and Book 2, Section 19, of the Contract Documents.

105.20 - Failure to Maintain Roadway or Structure

Provisions for failure to maintain the Roadway or Structure are set forth in Book 2, Section 19, of the Contract Documents.

105.21 - Acceptance

Provisions regarding partial Acceptance and Final Acceptance are set forth in Book 1, Section 20, of the Contract Documents.

105.22, 105.23, and 105.24 - Dispute Resolution, Dispute Review Board, and Claims for Contract Adjustments

Provisions regarding claims for Contract adjustments are set forth in Book 1, Section 1, of the Contract Documents, and provisions regarding Dispute Resolution are set forth in Book 1, Section 19, of the Contract Documents.

106 - Control of Material

106.02 - Material Sources

Provisions regarding Material sources are set forth in Book 2, Section 4, of the Contract Documents. The provisions regarding hazardous Materials are set forth in Book 1, Sections 5.3, 13.11, 18.1, and 18.2 of the Contract Documents.

106.03 - Samples, Tests, Cited Specifications

Provisions regarding quality control and quality assurance are set forth in Book 2, Section 4, of the Contract Documents.

Unless otherwise designated, when American Association of State Highway and Transportation Officials (AASHTO), American Society for Testing and Materials (ASTM), or other specifications, standards, or policies are cited, the reference shall be to the latest edition as revised or updated by approved supplements or interim editions published and issued as of the Proposal Due Date, unless otherwise indicated.

106.07 - Material Inspection at Plant

Provisions regarding Material Inspection at the plant are set forth in Book 2, Section 4, of the Contract Documents.

106.08 - Storage of Materials

Provisions regarding storage of Materials are set forth in Book 2, Section 4, of the Contract Documents.

106.09 - Handling Materials

Provisions regarding the handling of Materials are set forth in Book 2, Section 4, of the Contract Documents.

107 - Legal Relations and Responsibility to Public

107.02 - Permits, Licenses, and Taxes

Provisions regarding Permits, licenses, and taxes are set forth in Book 1, Section 2.2, of the Contract Documents.

107.04 - Restoration of Surfaces Opened by Permit

Provisions regarding restoration of surfaces opened by a Permit to construct or reconstruct a Utility service are set forth in Book 1, Section 6.2, and Book 2, Section 8, of the Contract Documents.

107.05 - Federal Aid Provisions

Provisions regarding Federal Aid Provisions are contained in Book 1, Section 1.10, of the Contract Documents.

107.06 - Safety, Health, and Sanitation and Performance of Safety Critical Work

Provisions regarding Safety, Health, and Sanitation are contained in Book 2, Section 2 of the Contract Documents and in Section 107.06 of the Standard Specifications, which is incorporated.

107.07 - Performance of Safety Critical Work

Provisions regarding Performance of Safety Critical Work are incorporated.

107.08 - Public Convenience and Safety

The Contractor shall conduct the work to minimize obstruction to traffic. The safety and convenience of the public and the protection of persons and property shall be provided as specified in Book 2, Section 17, of the Contract Documents, and in Section 104.04 of the Standard Specifications, which is incorporated.

107.09 - Railroad-Highway Provisions

The Railroad-Highway provisions are incorporated herein with the following revision:

Delete the first paragraph and replace with the following:

If the Contract requires Materials to be hauled across Railroad tracks, the Contractor shall make arrangements with the Railroad for any new crossings required or for the use of any existing crossings.

107.16 - Responsibility for Damage Claims, Insurance Types and Coverage Limits

Provisions regarding responsibility for damage claims are set forth in Book 1, Sections 3.3, 5.6, 9.0, and 11.1 of the Contract Documents.

107.17 - Opening Sections of Project to Traffic

The Provisions regarding opening sections of Project to traffic are deleted except as follows:

1. Opening certain sections of the Work for traffic use shall not constitute acceptance of the Work, or provide a waiver of any provision of the Contract Documents.

107.18 - Contractor's Responsibility for Work

Provisions regarding Contractor's responsibility for Work are set forth in Book 1, Section 2, of the Contract Documents.

107.19 - Furnishing Right of Way

The provisions regarding ROW for the Project are set forth in Book 1, Section 6.1, and Book 2, Section 9, of the Contract Documents.

107.20 - Personal Liability of Public Employees

The provisions regarding personal liability of public employees are revised as follows:

The employees of CDOT or CDOT's authorized representatives are acting solely as agents and representatives of CDOT when carrying out and exercising the power or authority granted to them under the Contract Documents. There shall not be any liability on them either personally or as employees of CDOT.

107.21 - No Waiver of Legal Rights

Provisions regarding no waiver of legal rights are set forth in Book 1, Sections 2, 5, 15, 17, 20, and 24 of the Contract Documents.

107.22 - Third Party Beneficiary

Provisions regarding Third Party beneficiaries are set forth in Book 1, Sections 21.5 and 24.7, of the Contract Documents.

107.23 - Archaeological and Paleontological Discoveries

Provisions regarding archaeological and paleontological discoveries are set forth in Book 1, Sections 5 and 13, and Book 2, Sections 6 and 12, of the Contract Documents.

108 - Prosecution and Progress

108.02 - Notice to Proceed

Provisions for notice to proceed are set forth in Book 1, Sections 4 and 11, of the Contract Documents.

108.03 - Schedule

Provisions regarding progress schedules are set forth in Book 1, Section 4, and Book 2, Section 2, of the Contract Documents.

108.04 - Payment Schedule

Provisions regarding the Contractor's Payment Schedule are set forth in Book 1, Section 11, and Book 2, Section 2, of the Contract Documents.

108.08 - Determination and Extension of Contract Time

Provisions regarding Completion Deadlines are set forth in Book 1, Section 4, of the Contract Documents. Provisions for extensions of such deadlines are set forth in Book 1, Section 13, of the Contract Documents. Provisions regarding time for construction operations are set forth in Book 2, Section 17, of the Contract Documents.

108.09 - Failure to Complete Work on Time

Provisions regarding Damages for late completion are set forth in Book 1, Section 17, of the Contract Documents.

108.10 - Default of Contract

Provisions regarding default of Contract are set forth in Book 1, Section 16, of the Contract Documents.

108.11 - Termination of Contract

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Provisions regarding termination of Contract are set forth in Book 1, Sections 15 and 16, of the Contract Documents.

109 - Measurement and Payment

109.02 - Scope of Payment

Provisions regarding scope of payment are set forth in Book 1, Section 11, and Book 2, Section 2 of the Contract Documents.

109.04 - Compensation for Changes and Force Account Work

Provisions for compensation for changes in the Work are set forth in Book 1, Section 13, of the Contract Documents. With the exception of the following:

Force Account Items
Description

The Department's estimate for force account items not included in the Contract Upset Amount (UA). Force Account work for this Project will only be paid for the Force Account Items listed below; all other work provisions for compensation for changes in work are set forth in Book 1, Section 13.

Basis Of Payment

Payment will be made in accordance with subsection 109.04 for the following Force Accounts only. Payment will constitute full compensation for all work necessary to complete the item.

Force Account Item	Quantity	Amount
F/A DRB	F.A.	\$ 20,000
F/A OJT	F.A.	\$200,000
F/A Project First Program	F.A.	\$ 5,000

Descriptions

F/A DRB - Participation in a Standing DRB between the Contractor and the Department will be in accordance with Section 105 of the Standard Special Provisions.

F/A OJT - Cost of maintaining on-the job-training program in accordance with the Standard Special Provision.

F/A Project First Program - Participation in a Project First Program between the Contractor and the Department will be in accordance with Section 105 of the Standard Special Provisions.

109.05 - Eliminated Items

Provisions regarding eliminated items are set forth in Book 1, Section 13, of the Contract Documents.

109.06 - Partial Payments

Provisions regarding Retainage and securities in lieu of Retainage are fully incorporated herein. Monthly payments will be based on the requirements set forth in Book 1, Section 11, and Book 2, Section 2, of the Contract Documents.

Notwithstanding the provisions of Book 1, Section 11.6, prior estimates and payments made in accordance with this Subsection 109.06(f) shall not be subject to correction in the Final Payment.

No cost adjustments will be made under this Contract.

109.07 - Payment for Material on Hand (Stockpiled Material)

Provisions regarding payment for stockpiled structural steel are fully incorporated herein. Additional provisions regarding payment for Materials on hand (stockpiled Materials) are set forth in Book 1, Section 11, of the Contract Documents.

109.09 - Acceptance and Final Payment

Provisions regarding Acceptance and final payment are set forth in Book 1, Section 11, of the Contract Documents.

109.10 - Compensation for Compensable Delays

Provisions regarding compensation for compensable delays are set forth in Book 1, Section 13, of the Contract Documents.

21.1.2. Modifications to Section 200 to 700 of the CDOT Standard Specifications for Road and Bridge Construction and Standard Special Provisions

21.1.2.1 Modifications to Section 200 to 700 of the CDOT Standard Specifications for Road and Bridge Construction

Sections 200 through 700 are incorporated herein, except as otherwise provided in the Contract Documents, with the following exceptions: (1) in Sections 200 through 600, the method of measurement and basis of payment provisions are superseded by the provisions set forth in Books 1 and 2 of the Contract Documents.

21.1.2.2 Standard Special Provisions

The following Standard Special Provisions are to be used by the Contractor for Design and Construction of the Work. The Standard Special Provisions are Revisions to the 2025 Standard Specifications for Road and Bridge Construction.

Standard Special Provision Index: June 12, 2026

The following Standard Special Provisions are available at the following link:

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<https://www.codot.gov/business/designsupport/cdot-construction-specifications/2025-construction-specifications/rev-ssp>

Standard Special Provisions Revisions to the 2025 Standard Specifications	Date	No. of Pages
Revision of Section 101 - General Provisions	(March 19, 2026)	1
Revision of Section 105 - Project First	(June 11, 2025)	4
Revision of Section 105 - Dispute Resolution, Dispute Review Board and Claims for Unresolved Disputes	(June 11, 2025)	26
Revision of Section 106 - Buy America and Build America Buy America Requirements - Projects with \$500,000 or more in Federal-Aid Highway Funding	(September 11, 2025)	1
Revision of Section 106 - Environmental Product Declarations	(June 11, 2025)	11
Revision of Sections 201 - Clearing and Grubbing	(March 19, 2026)	3
Revision of Section 203 - Excavation and Embankment	(March 19, 2026)	1
Revision of Section 206 - Shoring	(September 11, 2025)	3
Revision of Section 207 - Topsoil	(April 1, 2026)	7
Revision of Section 212 - Soil Amendments, Seeding, and Sodding	(July 1, 2026)	25
Revision of Section 401 - Plant Mix Pavements - General (Subsection 401.17)	(July 1, 2025)	4
Revision of Section 401 - Reclaimed Asphalt Pavement	(July 1, 2025)	2
Revision of Section 401- SafetyEdge	(September 11, 2025)	1
Revision of Section 412 - Repair of Defective Concrete Pavement	(May 28, 2026)	1
Revision of Section 412 - SafetyEdge	(September 11, 2025)	1
Revision of Sections 412 & 601 - Accelerated Pavement Repair Concrete	(June 11, 2025)	5
Revision of Sections 412 & 705 - Preformed Compression Seals	(July 1, 2025)	2
Revision of Section 504 - Walls	(July 1, 2025)	3

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Standard Special Provisions Revisions to the 2025 Standard Specifications	Date	No. of Pages
Revision of Section 509 - Steel Structures	(September 11, 2025)	1
Revision of Section 601 - Low Strength Evaluation	(March 19, 2026)	2
Revision of Section 601 - Pigment in Concrete	(July 1, 2025)	1
Revision of Section 601 - Structural Concrete	(September 11, 2025)	1
Revision of Section 614 - Galvanized Steel Poles	(July 1, 2025)	1
Revision of Section 627 - Pavement Marking Paint	(July 1, 2025)	15
Revision of Section 630 - TCS Trainee	(March 19, 2026)	2
Affirmative Action Requirements Equal Employment Opportunity	(July 1, 2025)	13
Certified Payroll Requirements for Construction Contracts	(July 1, 2025)	1
Minimum Wages, Colorado, U.S. Department of Labor General Decision Number CO20250012, Mod 0, Highway Construction for Alamosa, Archuleta, Chaffee, Conejos, Custer, Delta, Dolores, Fremont, Gunnison, Hinsdale, La Plata, Mineral, Montezuma, Montrose, Ouray, Rio Grande, Saguache, San Juan, and San Miguel counties.	(January 9, 2026)	8
On the Job Training	(July 1, 2025)	6
Required Contract Provisions - Federal-Aid Construction Contracts	(July 1, 2025)	15
Special Construction Requirements, Fire Protection Plan	(July 1, 2025)	2

21.1.2.3 Project Special Provisions

The following Project Special Provisions supplement or modify the CDOT Standard Specifications for Road and Bridge Construction and take precedence over the CDOT Standard Specifications and plans. The Contractor is responsible to have a copy of the CDOT Standard Specifications at all times on the Project Site.

Index of Project Special Provisions

Special Construction Requirements - General (Section 404 Permit, SB40 Wildlife Certification, and New Mexico Meadow Jumping Mouse Habitat Creation)

Revision of Sections 105, 106, and 203 Conformity of the Contract of Embankment

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Revision of Section 105 Segmental Concrete Control Work

Revision of Section 106 Control of Material (Sampling)

Revision of Section 107 Performance of Safety Critical Work

Revision of Section 107 Legal Relations and Responsibility to Public

Revision of Section 202 Removal of Asphalt Mat

Revision of Section 202 Removal of Asphalt Mat (Planing)

Revision of Section 202 Removal of Portions of Present Structure

Revision of Section 202 Plug Culvert

Revision of Section 207 Stream Substrate

Revision of Section 208 Construction Mats

Revision of Section 208 Water Control

Revision of Section 240 Protection of Migratory Birds Biological Work Performed by the Contractor's Biologist.

Revision of Section 250 Environmental, Health, and Safety Management

Revision of Section 304 Aggregate Base Course

Revision of Sections 304, 403, and 601 Aggregate Base Course, Hot Mix Asphalt, and Concrete Ticket Collection

Revision of Sections 304 and 703 Aggregate Base Course (Special)

Revision of Section 401 Hot Mix Asphalt Compaction

Revision of Section 403 Hot Mix Asphalt

Revision of Section 412 Portland Cement Concrete Pavement

Revision of Section 412 Tie Bar Inspection

Revision of Section 420 Geotextile Mats in Wetland Areas

Revision of Section 420 Geogrid Reinforcement

Revision of Section 502 Drilling Hole to Facilitate Pile Driving

Revision of Section 503 Drilled Caissons

Revision of Section 504 Concrete Panel Facing Phased Built GRS Walls

Revision of Section 506 Riprap

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Revision of Sections 509 and 708 Painting of Aluminum Access Doors for Steel Structures

Revision of Section 513 Bridge Drain

Revision of Section 522 Environmental Stain (Galvanized)

Revision of Section 601 Painting of Aluminum Access Doors for Concrete

Revision of Sections 601 and 708 Structural Concrete Stain

Revision of Section 603 Culvert Lining (UV-CIPP)

Revision of Section 604 Drainage Pipe

Revision of Section 604 Vane Grate Inlet

Revision of Section 604 Manhole (Traffic Management System)

Revision of Section 607 Self Closing Gates

Revision of Section 612 Location Markers

Revision of Sections 613 and 715 LED Roadway Luminaires

Revision of Section 613 ITS Electrical Conduit

Revision of Section 613 ITS Pull Boxes

Revision of Section 614 Grounding and Bonding

Revision of Section 618 Prestressed Concrete

Revision of Section 621 Detour Pavement

Revision of Section 625 Asset Geospatial Data Collection

Revision of Section 630 Uniformed Law Enforcement Coordination

Revision of Section 630 Traffic Signal (Temporary)

Special Construction Requirements - General
(Section 404 Permit, Senate Bill 40 Certification, and New Mexico Meadow Jumping Mouse Habitat Creation)

The proposed work, as shown on the plans, has been permitted by the U.S. Army Corps of Engineers under a Section 404 Nationwide Permit. The Contractor must comply with all special and general conditions attached to the permit. Any questions regarding this permit should be directed to the Project Engineer in coordination with the Region Wetland Specialist (Tim Funk 970-759-5012).

Copies of the Section 404 Permit and Authorization are available from the CDOT Project Office.

The proposed work, as shown on the plans, will require Senate Bill 40 Wildlife Certification from the Colorado Parks and Wildlife. CDOT will coordinate and execute SB 40 Wildlife Certification. The Contractor must comply with all applicable special and general conditions as detailed in the Guidelines for Senate Bill 40 Wildlife Certification. Any questions regarding this permit should be directed to the Project Engineer in coordination with the Region Biologist (Mark Lawler 970.385.8371).

Copies of the Senate Bill 40 Application and Guidelines will be available from the CDOT Project Office.

The proposed project is located within U.S. Fish and Wildlife Service (USFWS) designated critical habitat for the endangered New Mexico meadow jumping mouse (NMMJM). Designated critical habitat includes and bounds the Florida River where it intersects the project area, as well as the river and floodplain upstream and downstream of the project. Due to anticipated adverse effects to both critical habitat for the NMMJM as well as NMMJM individuals that may occupy those wetland and riparian habitats in and near the project, CDOT engaged in Endangered Species Act Section 7 formal consultation to ensure the action would not jeopardize the species. Formal consultation was concluded in April 2025 with the completion of a biological opinion (BO) by the USFWS. The biological opinion details numerous conservation measures, construction requirements, and mitigation intended to offset the impacts to the NMMJM and its critical habitat. Conservation measures developed from formal consultation include:

- Physical alteration to occupied and partially occupied NMMJM habitat resulting from construction activities will be offset through the preservation, creation, protection, enhancement, and/or restoration of the physical and biological features of habitat for this species.
 - Preliminary compensatory habitat creation and restoration for adverse effects will be at a ratio of 1.5:1 for temporary impacts and 2:1 for permanent impacts.
- Specifics of the impacts and location of compensatory habitat creation and restoration will be considered when determining the final acreages.
- Creation and restoration of NMMJM habitat will be within or adjacent to proposed critical habitat Unit.
- If creation or restoration of habitat is not possible within or adjacent to critical habitat Unit 7, enhancement measures will be implemented to improve connectivity with Unit 7. Improved habitat connectivity within Unit 7 would partially offset the temporary and permanent barriers created by the proposed project.
- Culverts and/or small mammal crossings installed within Unit 7 will be single-cell concrete box culverts containing small mammal ledges to facilitate crossing in wet conditions.

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Special Construction Requirements - General
(Section 404 Permit, Senate Bill 40 Certification, and New Mexico Meadow Jumping Mouse Habitat Creation)

- All temporarily disturbed areas will be returned to pre-construction grades and reseeded with appropriate native upland and/or wetland seed mix. Revegetation efforts for reclamation of temporarily disturbed NMMJM habitat will be monitored to ensure success of restoration efforts. Monitoring will occur until upland and wetland foliar cover totals at least 70 percent of preconstruction foliar cover, excluding noxious weeds.
- Habitat creation, restoration, revegetation, and enhancement will be supervised by a biologist experienced in reclamation or habitat restoration.
- The contractor will minimize impacts to existing vegetation by cutting shrubs to ground level, allowing sprout re-growth, and by trimming trees rather than removing them.
- The contractor will limit areas where bare ground exists after clearing and grubbing. If these areas are temporary impacts, reseeded will be promptly initiated.
- Suitable hibernation habitat that would see construction activities after August 15 will be mowed and cleared of shrubs prior to August 15 to discourage NMMJM from hibernating in these areas.
- Noxious weeds will be controlled in all disturbed occupied and partially occupied habitat areas until it is determined that there are no state-listed A noxious weeds and state-listed B and C noxious weeds comprise less than 10 percent of the absolute ground cover.
- Night work will be avoided within 330 feet of suitable NMMJM habitat.
- Permanent and construction lighting will be located to prevent or minimize light-throw into suitable NMMJM habitat.

The BO details the anticipated temporary and permanent impacts to NMMJM habitat and asserts the need to create 4.42 acres of habitat suitable for NMMJM occupation within or adjacent to critical habitat. Additional consultation with the USFWS has removed the need to create habitat to offset temporary impacts, so long as the project improves habitat connectivity for the NMMJM, where the Florida River and riparian corridor intersect US 160. Specifically, the project is required to install a small mammal crossing connecting the riparian habitats bounding the Florida River at STA 243+45. The small mammal crossing shall have a ledge installed in its interior to offer passage for the NMMJM. With the implementation of the required measures to improve habitat connectivity, the total habitat creation required is 3.72 acres.

The created mitigation habitat will need to provide the four biological and physical features of NMMJM critical habitat as described in the BO and the Designation of Critical Habitat for the NMMJM- Final Rule (81 FR 1426414325). The physical and biological features of NMMJM habitat are:

- Riparian communities along waterways that display emergent and scrub-shrub wetlands.
- Flowing water sufficient to saturate soils during the NMMJM active season.
- Sufficiently large areas to allow for the movements of the NMMJM.
- Floodplain and uplands within 330 feet of waterway.

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**Special Construction Requirements - General
(Section 404 Permit, Senate Bill 40 Certification, and New Mexico Meadow Jumping Mouse Habitat
Creation)**

Construction of NMMJM habitat will convert non-habitat into suitable habitat. Creation of mitigation will require extensive excavation and earthwork of the upland location so that it is at elevations and grades that will support wetland grasses and forbs, and woody wetland/riparian vegetation such as willow, alder, and cottonwood. A Mitigation and Monitoring Plan is currently being developed by CDOT for approval by the USFWS. The Mitigation and Monitoring Plan will describe existing site conditions, mitigation goals, implementation plan during construction, management plan, monitoring requirements, and contingency plan.

**Revision of Sections 105, 106, and 203
Conformity to the Contract of Embankment**

Sections 105, 106, and 203 of the Standard Specifications are hereby revised for this project as follows:

Subsection 105.03 shall include the following:

- (c) Conformity to the contract of embankment construction will be determined per the following:
1. Process Control Plan. The Contractor shall be responsible for Process Control (PC) for all embankment material and embankment construction on this project. The Contractor shall submit a written Process Control Plan (PCP), including a methods statement, to the Engineer for acceptance. The PCP shall include, but not be limited to, the following:
 1. Identification of the supervisor and technicians responsible for implementing the PCP throughout construction. The Contractor shall demonstrate that an appropriate number of technicians/inspectors will be present on the project to accommodate the laboratory testing and inspection items that are required to maintain PC requirements specified for daily earthwork operations.
 2. Identification of the laboratory, accredited in accordance with CP-10, to be used throughout the project to conduct PC testing. The CDOT Central lab and the CDOT Regional labs will not be responsible for testing materials submitted to meet Contractor PC Requirements.
 3. Maximum lift thickness not to exceed eight inches as per subsection 203.06 or as directed.
 4. Methods to separate, process, or supply material for embankment fill that meets the material requirements specified in the contract documents.
 5. List of compaction equipment capable of the specified compaction.
 6. Water trucks with an adequate distribution system that will apply water evenly and equipment to evenly incorporate the water into the embankment.
 7. Methods to control and document foundation preparation before placement of embankment fill, which will include clearing and grubbing per Section 201, removal of all topsoil per Section 207, removal and replacement of any unsuitable material identified during excavation or foundation preparation, and scarifying, moisture conditioning, and compaction of the final embankment foundation surfaces using methods appropriate for the material types present.
 8. Methods to control and document that placement, lift thickness, moisture conditioning, compaction equipment and methods, and compaction observation/testing are appropriate for the embankment material types being placed.
 9. Methods to identify and communicate changes in embankment fill being placed require modification of placement, moisture conditioning, compaction methods, observation, and testing.
 10. A plan to notify or communicate in advance when the embankment is ready for OVT testing, to satisfy OVT testing requirements.

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**Revision of Sections 105, 106, and 203
Conformity to the Contract of Embankment**

11. List of all documentation for inspection and materials testing, including worksheets, forms, and procedures utilized by the Contractor per CP-12C.
12. Minimum testing frequency, as per Table 106-4.

The Contractor shall submit the PCP at least ten working days before the start of the work. The Engineer's review of the PCP will not exceed five working days. Work shall not begin until the PCP has been accepted in writing, unless otherwise approved.

2. Documentation. The Contractor shall maintain current records of process control operation activities, observations made, and tests performed. These records shall be in the form shown in the PCP and per CP-12C. The records shall be submitted to the Engineer on a daily basis, documenting any earthwork-related activities from the prior day, and shall include both conforming and defective or deficient features, all test results, inspection reports, and certification reports. Copies of these records and a statement that work incorporated in the project complies with the Contract shall be submitted to the Engineer before payment for the work or upon request. Monthly certification reports shall be stamped with the seal of a Professional Engineer registered in Colorado. Failure to provide the Engineer with the necessary documentation may result in the suspension of work and will result in the suspension of payments on embankment until the documentation has been completed and accepted by the Engineer. CDOT Owner Acceptance testing and documentation shall not be used as supporting documentation for the Contractor's certification.

Add subsection 106.061, immediately following subsection 106.06, as follows:

106.061 Embankment Testing. The supervisor responsible for the direct supervision and implementation of process control sampling and testing shall be identified in the PCP and be qualified according to the requirements of CP-10. The technicians taking samples and performing tests must be qualified according to requirements of CP-10. At least one technician with a minimum of one year of experience with soils testing and inspection of earthwork projects will be designated full-time on the project whenever embankment is being placed. Absence of the process control technician will result in the suspension of work on the embankment until the technician is on site performing process control testing.

The project verification sampling and testing procedures shown in the CDOT Field Materials Manual under the frequency guide schedule for minimum materials sampling, testing, and inspection shall be used for the elements shown in Table 106-4.

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Revision of Sections 105, 106, and 203
Conformity to the Contract of Embankment

Table 106-4 Excavation and Embankment Testing Schedule

-	Element	Minimum Testing Frequency Contractor's Process Control	Minimum Testing Frequency
Soil Embankment with < 30% Retained on ¾-inch Sieve	In-place Density / Relative Compaction	1 per 500 cu yds. or fraction thereof, with one additional test required per change in material type.	1 per 1,000 cu yds. or fraction thereof, with one additional test required per change in material type.
	In-place Density / Relative Compaction within 100 feet of bridge approach.	1 per 250 cu yds. with a minimum of two tests per lift, and one additional test required per change in material type.	1 per 500 cu yds. with minimum one test per lift, and one additional test required per change in material type.
	Moisture Density Curve	1 per 10,000 cu yds. or fraction thereof, with one additional test required per change in material type.	1 per soil type.
	Moisture Density One-Point Verification	1 per 2,000 cu yds. or fraction thereof, with one additional test per change in material type. Minimum of one test per day.	1 per 5,000 cu yds. or fraction thereof.
	Soil Classification (AASHTO M145), Gradation, and Atterberg Limits	1 per 2,000 cu yds, with one additional test per change in material type. Minimum of one test per day.	1 per soil type.

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Revision of Sections 105, 106, and 203
Conformity to the Contract of Embankment

Table 106-4 Excavation and Embankment Testing Schedule (Cont.)

-	Element	Minimum Testing Frequency Contractor's Process Control	Minimum Testing Frequency
Soil Embankment with > 30% Retained on ¾- inch Sieve, Rock Embankment, & Rock Fill	Test Strip Construction and Acceptance	1 test strip required per change in material type.	Observation and acceptance of roller pattern, moisture conditioning, and proof rolling.
	Soil Classification (AASHTO M145), Gradation and Atterberg Limits	1 per 2,000 cu yds, with one additional test per change in material type. Minimum of one test per day.	1 per soil type.
	Slake Durability	1 per 2,000 cu yds, with one additional test per change in material type. Minimum of one test per day (for sedimentary rock only).	1 per stockpile / borrow source and 1 per material type for sedimentary rock only.

Qualifications for testing and personnel are contained in Section 203, Chapter 200 of the CDOT Field Materials Manual, CP-10, CP-13, CP-15, and CP-80, and the CDOT Inspectors Checklist.

Subsection 203.02 (a) shall include the following:

Unclassified Excavation shall include removal of unstable material within the roadway as determined and directed by the Engineer.

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Revision of Sections 105, 106, and 203
Conformity to the Contract of Embankment

Subsection 203.02 (c) shall include the following:

Embankment material containing significantly more than optimum moisture that would become stable if dried shall not be unsuitable material.

In subsection 203.03, delete the third paragraph and replace with the following:

Non-durable bedrock shall be identified and classified using Colorado Procedure - Laboratory (CP-L) 3104. Any material classified as Soil-like Non-durable (S-N) as defined in the procedure shall be pulverized, broken down, and processed to 6-inch maximum particle sizes and a maximum of 30 percent retained on the 3/4-inch sieve before incorporation into embankment fill. These materials shall be placed and compacted as "soil embankment" per subsection 203.07(a). Non-durable bedrock particles in excess of 6 inches shall not be placed into embankment fill. Non-durable bedrock shall not be placed as rock fill or rock embankment.

In subsection 203.07(a) paragraph seven, delete the first sentence and replace with the following:

Non-durable bedrock shall be watered to promote slaking and break down and pulverized or processed to a maximum particle size of 6 inches and a maximum of 30 percent retained on the 3/4-inch sieve.

In subsection 203.07(a), delete the last sentence and replace with the following:

9. Non-durable bedrock shall not be placed within 4 feet of the bottom of the ABC Class 2 Subbase.

Subsection 203.11(b) shall include the following:

The disposal of unsuitable material and replacement of embankment will not be measured and paid for separately but shall be included in the work.

The Contractor's Process Control efforts will not be measured and paid for separately but shall be included in the work.

**Revision of Section 105
Segmental Concrete Control of Work**

Section 105 of the Standard Specifications is hereby revised for the project as follows:

Subsection 105.02 shall include the following:

The Contractor shall submit, as soon as possible, but not more than 120 calendar days following the "Notice to Proceed", complete final plans and computations for review and approval. These final plans must be approved before any approvals will be made on working and shop drawings. Plans and computations will be required for only those portions of the work that are modified, changed, or affected.

The submittal of the computations and drawings will not absolve the Contractor of any responsibility for fabrication plans required under Section 105 or elsewhere in these specifications.

The contract time shall apply. No extensions of these dates will be allowed for preparation, submittal, or approval of plans or computations.

The Contractor shall submit for review the information, which shall include, but not necessarily be limited to, the following:

- (1) Detailed shop drawings in accordance with Section 618.
- (2) Locations and layout drawing of the casting site.
- (3) Method and length of curing. Include complete details of the fabrication system to be used, including the forms, foundations, and geometry controls.
- (4) Details of handling, storing, and transporting segments.
- (5) Schedule of casting and erection of segments with approximate dates; the schedule shall show chronological order of every phase and stage of erection and construction of the superstructure and shall include a detailed plan for handling traffic during erection.
- (6) Concept drawings showing schematic methods for handling and erecting segments; these are not working drawings but are provided for information only. The Contractor shall submit for review, by CDOT, proposed erection details and appropriate calculations showing the methods, equipment, and construction loads analysis involved with the various bridge components. No erection of the precast segments will be permitted until the erection details are approved by the Contractor's Engineer.
- (7) A list of proposed handling and erection equipment. Proposed handling and erection equipment shall be consistent with the concept shown on the plans to assure compatibility with the overall design. The design and construction of special handling and erection equipment is the Contractor's responsibility.

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**Revision of Section 105
Segmental Concrete Control of Work**

- (8) A casting curve prepared in accordance with casting and erection methods and schedule proposed by the Contractor. The casting curve shall be of sufficient accuracy to allow the determination of control point settings for accurately casting the segments. The preparation of the casting curve shall recognize all deviations from straight line and deformations due to the final required alignment and due to dead load, erection loads, post-tensioning stresses, including secondary moments, creep, and shrinkage.

Final Work Plan

It shall be the Contractor's responsibility to submit deflections and camber data for each stage of construction, as required, to construct the structure to its final grade. The procedure used shall account for the effect of time-dependent prestress losses, shrinkage, and creep which occur during the construction phase. The data for the entire bridge shall be submitted for approval by the Contractor's Engineer prior to commencing the erection.

The camber of the structure will be monitored at each stage and corrective actions, as approved by CDOT, shall be performed by the Contractor to assure proper erection of the structure to its final grade.

The final work plan shall include graphs, charts, or tables showing the theoretical location of forming. This data shall be furnished to CDOT for use in checking the erection.

The final work plan shall also include complete details of the system to be used, including all geometry controls.

Design Calculations

Design calculations shall be submitted for falsework, travelers, staging, forms, and any other temporary construction which may be required, and which will be subject to calculated stresses. Calculations also shall be submitted to support the system and method of stressing proposed by the Contractor. The calculations shall be done under the direct supervision of a professional engineer registered in the State of Colorado and shall be approved by him and contain his seal.

**Revision of Section 106
Control of Material (Sampling)**

Section 106 of the Standard Specifications is hereby revised for this project as follows:

In subsection 106.03, delete the fifth paragraph and replace with the following:

Samples will be taken by ICQC and CDOT, except that the Contractor shall sample the following:

- (1) Asphalt cement, asphalt rejuvenating agent, and emulsified asphalt in accordance with AASHTO T 40.
- (2) Hot mix asphalt items 403 in accordance with Colorado Procedure 41 (CP-41), Method B
- (3) A composite of aggregates for hot mix asphalt in accordance with Colorado Procedure 30 (CP-30).
- (4) Plastic Portland cement concrete in accordance with AASHTO T 141 and Colorado Procedure 61 (CP-61). The contractor shall transport the concrete sample to the place of testing.

ICQC will designate the sampling time, location, and sample size. The sampling will be conducted in the presence of CDOT.

**Revision of Section 107
Performance of Safety Critical Work**

Section 107 of the Standard Specifications is hereby revised as follows:

Add subsection 107.061 immediately following subsection 107.06 as follows:

107.061 Performance of Safety Critical Work. The following work elements are considered safety critical work for this project:

- (1) Overhead girder erection
- (2) Removal of portion of bridge P-05-AG
- (3) Temporary works: falsework, shoring that exceeds 5 feet in height, cofferdams, and temporary bridges
- (4) Work requiring the use of cranes or other heavy lifting equipment to set a girder, to make overhead repairs, or includes special provisions for Removal of Portion of Bridge. Also, when construction materials are being lifted that may fall onto active traffic lanes.
- (5) Excavation and embankment adjacent to the roadway, especially if it requires shoring
- (6) Work operations such as pile driving and jack hammering which may create vibration and cause debris to fall into traffic.
- (7) Rockfall mitigation

The Contractor shall submit, for record purposes only, an initial detailed construction plan that addresses safe construction of each of the safety critical elements. When the specifications already require an erection plan, a bridge removal plan, or a removal of portion of bridge plan, it shall be included as a part of this plan. The detailed construction plan shall be submitted two weeks prior to the safety critical element conference described below. The construction plan shall be stamped "Approved for Construction" and signed by the Contractor. The construction plan will not be approved by CDOT.

The Construction Plan shall include the following:

- (1) Safety Critical Element for which the plan is being prepared and submitted.
- (2) Contractor or subcontractor responsible for the plan preparation and the work.
- (3) Schedule, procedures, equipment, and sequence of operations that comply with the working hour limitations
- (4) Temporary works required: falsework, bracing, shoring, etc.
- (5) Additional actions that will be taken to ensure that the work will be performed safely.
- (6) Names and qualifications of workers who will be in responsible charge of the work:
 - A. Years of experience performing similar work
 - B. Training taken in performing similar work
 - C. Certifications earned in performing similar work
- (7) Names and qualifications of workers operating cranes or other lifting equipment
 - A. Years of experience performing similar work
 - B. Training taken in performing similar work
 - C. Certifications earned in performing similar work

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Revision of Section 107
Performance of Safety Critical Work

- (8) The construction plan shall address how the Contractor will handle contingencies such as:
 - A. Unplanned events (storms, traffic accidents, etc.)
 - B. Structural elements that don't fit or line up
 - C. Work that cannot be completed in time for the roadway to be reopened to traffic
 - D. Replacement of workers who don't perform the work safely
 - E. Equipment failure
 - F. Other potential difficulties inherent in the type of work being performed
- (9) Name and qualifications of Contractor's person designated to determine and notify CDOT in writing when it is safe to open a route to traffic after it has been closed for safety critical work.
- (10) Erection plan or bridge removal plan when submitted as required elsewhere by the specifications. Plan requirements that overlap with above requirements may be submitted only once.

A safety critical element conference shall be held two weeks prior to beginning construction on each safety critical element. CDOT, the Contractor, the safety critical element subcontractors, and the Contractor's Engineer shall attend the conference. Required pre-erection conferences or bridge removal conferences may be included as a part of this conference.

After the safety critical element conference, and prior to beginning work on the safety critical element, the Contractor shall submit a final construction plan to CDOT for record purposes only. The Contractor's Engineer shall sign and seal temporary works, such as falsework, shoring etc., related to construction plans for the safety critical elements, (4) Removal of Portion of Bridge and (5) Temporary Works. The final construction plan shall be stamped "Approved for Construction" and signed by the Contractor.

The Contractor shall perform safety critical work only when the Contractor's Engineer is on the project site. The Contractor's Engineer shall be on site to inspect and provide written approval of safety critical work for which he provided signed and sealed construction details. Unless otherwise directed or approved, the Contractor's Engineer need not be on site during the actual performance of safety critical work, but shall be present to conduct inspection for written approval of the safety critical work.

When ordered by CDOT, the Contractor shall immediately stop safety critical work that is being performed in an unsafe manner or will result in an unsafe situation for the traveling public. Prior to stopping work, the Contractor shall make the situation safe for work stoppage. The Contractor shall submit an acceptable plan to correct the unsafe process before CDOT will authorize resumption of the work.

When ordered by the CDOT, the Contractor shall remove workers from the project that are performing the safety critical work in a manner that creates an unsafe situation for the public in accordance with subsection 108.06.

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Revision of Section 107
Performance of Safety Critical Work

Should an unplanned event occur or the safety critical operation deviate from the submitted plan, the Contractor shall immediately cease operations on the safety critical element, except for performing any work necessary to ensure worksite safety, and provide proper protection of the work and the traveling public. If the Contractor intends to modify the submitted plan, they shall submit a revised plan to CDOT prior to resuming operations.

All costs associated with the preparation and implementation of each safety critical element construction plan will not be measured and paid for separately, but shall be included in the work.

Nothing in the section shall be construed to relieve the Contractor from ultimate liability for unsafe or negligent acts or to be a waiver of the Colorado Governmental Immunity Act on behalf of CDOT.

**Revision of Section 107
Legal relations and Responsibilities to the Public**

Section 107 of the Standard Specification is hereby revised for this project as follows:

Subsection 107.24 Air Quality Control shall add the following:

(a) Description

Senate Bill 21-260 was signed by Governor Polis June 17, 2021, and Section 30 of the bill is codified in the Colorado Revised Statute (CRS) 43-1-128. This project has been identified as a Regionally Significant Transportation Capacity Project in the 10 Year Plan and therefore requires compliance with Section 30, Part 4, included below:

4) If a planned transportation capacity project is a regionally significant project, as determined by the department with consideration given to federal law or regulations that define or describe such projects, the department shall, through its environmental study process:

(a) (Section 4a is not applicable for this project)

(b) Develop and implement a particulate matter construction plan to provide continuous monitoring and transparent public reporting of concentrations, public alerts issued as soon as possible when exceedance events occur, and action plans to address emission levels on construction projects prior to exceedances with particular focus on disproportionately impacted communities; and

(c) (Section 4c is not applicable for this project)

Section 4b Construction Requirements applicable to this project

The Contractor shall coordinate with the project engineer to implement the requirements of Part 4(b) of CRS 43-1-128, in compliance with specification 105.12, Cooperation Between Contractors.

Contractor Responsibilities. The Contractor shall:

- Provide phasing and construction information to CDOT Consultant (CDOT Consultant will draft a project specific Air Quality Construction Plan in conjunction with Sections 4b above).
- Implement the Air Quality Construction Plan and Fugitive Dust Control Plan, including mitigating air quality impacts associated with construction activities before an exceedance of the Public Alert Threshold occurs.
- Perform actions in compliance with the terms in the Air Pollution Emissions Notification (APEN) and permit issued by the Colorado Department of Public Health Air Pollution Control Division.
- Perform visual assessment of air conditions at the project site and perform mitigation actions as needed when an Internal Mitigation Alert is received to assure compliance with the permitted emissions guidelines and Regulation 1 and the Air Quality Construction Plan. The limits which trigger an Internal Mitigation Alert are described in Table 1 below. Mitigation actions are expected to consist primarily of spraying water for dust suppression and temporary stabilization of soil.

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**Revision of Section 107
Legal relations and Responsibilities to the Public**

- In the case of exceedances of the Internal Mitigation Alert Threshold and the Public Alert Threshold (as measured by CDOT Consultant), the Contractor must update information on the CDOT Consultant managed / developed log regarding work being performed at the time of the exceedance, observations from visual assessment, as well as mitigation actions completed (e.g. water used for dust suppression), including date and time of visual assessment and mitigation actions completed.
- The Contractor shall accommodate CDOT and the CDOT Consultant in air quality monitoring operations throughout the construction period. This includes providing access and space for monitoring equipment.
- A PDF of the final log shall be submitted to the Engineer, upon project completion for acceptance.

Work Performed by Others (to be performed by CDOT or CDOT Consultant):

- Prepare project-specific Air Quality Construction Plan in coordination with the Contractor, which includes a particulate matter construction plan. This plan defines the actions that will be taken to mitigate air quality impacts on communities adjacent to the project area before an exceedance of the Public Alert Threshold occurs. This plan is expected to have similar mitigation requirements as the Fugitive Dust Control Plan required by the permit issued by the Air Pollution Control Division and Regulation 1..
- Determine the number of sensors and their locations.
- Provide power for air quality sensors.
- Perform the sensor installation, calibration, operation, maintenance, data collection and data validation throughout the project activities.
- Provide notification to the Contractor and CDOT if an Internal Mitigation Alert Threshold and/or Public Alert Threshold is exceeded.
- Notify the project team if the threshold concentrations for the Internal Mitigation Alert shown in Table 1 are met or exceeded.
- Provide interpretation and explanation of air quality monitoring data, including information related to activities occurring adjacent to the project area or regional events that may affect air quality within the project area.
- Provide notification to the public if the Public Alert Thresholds shown in Table 1 are met or exceeded (CDOT Public Information Manager will release the notice to the public).
- Investigate other sources of air quality monitoring data in the vicinity of the project area.
- Create and manage a running log which documents information related to exceedances of the Internal Mitigation Alert Threshold and information required for the Public Alert Threshold exceedance notifications, including information provided by the Contractor as shown above.

Project compliance is required for the parameters described in **Table 1**

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**Revision of Section 107
Legal relations and Responsibilities to the Public**

Table 1. Air Quality Monitoring Parameters for Regionally Significant, Transportation Capacity Projects

Parameter	During Construction
Pollutants	PM ₁₀ and PM _{2.5} .
Meteorology Parameters	Wind direction ^{See Note 1} , wind speed, temperature, and relative humidity at a minimum.
Duration	Throughout construction
Number of Sensors Per Pollutant	Minimum of 2.
Number of Meteorology Monitors	Minimum 1; CDOT Air Quality Specialist must approve the number and type required.
Location of Air Quality Sensors	CDOT Air Quality Specialist must approve monitoring locations. Monitoring locations should be placed to identify the impact of construction emissions on local air quality, with consideration of impacts to sensitive receptors and DI communities.
Type(s) of Air Quality and Meteorology Sensors	CDOT Air Quality Specialist must approve type(s) used. For particulate matter, FEM or other sensors able to provide high quality, reliable data should be used.
Public Reporting of Monitoring Data	Required.
Method of Public Reporting	Preliminary pollutant monitoring data to a project-specific website in (near) real time. Note on the website that data has not been corrected or validated.
Public Alerts of Exceedances	Alert public of validated exceedances. This may include distributing an email to pre-registered users with a link to the project-specific website or posting the exceedance to a website.
Validating Public Exceedances	If the Public Alert Threshold is exceeded, a team (e.g., communications manager, project engineer, and air quality consultant) will determine if the exceedance is accurate and the public will be notified only of validated exceedances.
Timeframe to Notify Public	Public alerts will be made once per day, within 24 hours of the exceedance of the Public Alert Threshold, unless there is a unique situation as approved by CDOT Air Quality Specialist.
Public Alert Threshold, PM ₁₀	NAAQS Daily Average as AQI ^{See Note 2} ≥ 100
Public Alert Threshold, PM _{2.5}	NAAQS Daily Average as AQI ≥ 100

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**Revision of Section 107
Legal Relations and Responsibilities to the Public**

Parameter	During Construction
Internal Mitigation Alert Threshold, PM ₁₀	135 micrograms per cubic meter (µg/m ³), measured over an 1 hour average.
Internal Mitigation Alert Threshold, PM _{2.5}	31.5µg/m ³ , measured over an 1 hour average.
Public Alert Content	Sensor location, pollutant, concentration, threshold exceeded. May include construction activities, other pollutant sources, wind speed, and wind direction at time of trigger, and mitigation actions taken.
Project-specific Air Quality Construction Plan	Create project-specific plan that addresses CRS plan requirements: particulate matter construction plan (covers monitoring, reports to the public, and public alerts); an action plan, and a plan to mitigate air quality impacts on communities. Also include or refer to the Fugitive Dust Control Plan, if required by APCD.
Primary contact for monitoring contractor(s)	CDOT project or resident engineer.

Note 1 Use a unit-vector algorithm for wind direction per EPA QA Handbook, EPA-454/B-08-002.

Note 2 Public alert thresholds use EPA's 24 hour NAAQS standard of Air Quality Index (AQI) of 100 for particulate matter. "An AQI value of 100 generally corresponds to an ambient air concentration that equals the level of the short-term national ambient air quality standard for protection of public health. AQI values at or below 100 are generally considered to be satisfactory."

Prior to the start of Construction, a conference shall be held with the Contractor's Supervisor, Project Engineer, and the CDOT Environmental Project Manager. This conference will discuss the Contractor's Air Quality Construction Plan and the roles and responsibilities of each entity listed above for air quality monitoring.

The Contractor is responsible for managing dust emissions from project activities in compliance with the APEN Permit, Fugitive Dust Control Plan, and Air Quality Construction Plan, and the requirements under Table 1 above. If construction activities result in a validated air quality exceedance in Table 1, or an order by the Project Engineer via a Form 105 requires that an action be taken immediately, it shall be understood that the Contractor shall at once begin affecting completion of the action and pursue it to completion in a timely manner acceptable to the Project Engineer.

The CDOT Consultant will prepare and submit an indexed Project Site Log at the end of the project. This log will include information related to sensor installation/replacement, calibration, operation, maintenance, data collection and data validation throughout the pre-construction and construction monitoring periods.

**Revision of Section 202
Removal of Asphalt Mat**

Section 202 of the Standard Specifications is hereby revised for this project as follows:

Subsection 202.01 shall include the following:

This work includes removal and disposal of existing asphalt mat within the project limits as shown on the plans or at locations directed by the Engineer.

In subsection 202.02 delete the seventh paragraph and replace with the following:

The existing asphalt mat, which varies in thickness from 2.5 inches to 6 inches, shall be removed in a manner that minimizes contamination of the removed mat with underlying material. The removed mat shall become the property of the Contractor and shall be either disposed of outside the project site or used in one or more of the following ways:

1. Used in embankment construction in accordance with subsection 203.07(c).
2. Placed in bottom of fills as approved by the Engineer.
3. Recycled into the hot mix asphalt.
4. Placed in the subgrade soft spots as directed by the Engineer.

**Revision of Section 202
Removal of Asphalt Mat (Planing)**

Section 202 of the Standard Specifications is hereby revised for this project as follows:

Delete subsection 202.09, and replace it with the following:

202.09 Removal of Asphalt Mat (Planing). The Contractor shall not start the planing operation until the hot mix asphalt (HMA) Mix Design (CDOT Form 43) has been Approved.

Prior to beginning planing operations, the Contractor shall submit a planing plan as part of the QMP. The planing plan shall include at a minimum:

- (1) The number, types, and sizes of planers to be used.
- (2) The width and location of each planing pass.
- (3) The number and types of brooms to be used and their locations with respect to the planers. The contractor shall have at least one back up broom on the project at all times in case one of the operating brooms breaks down.
- (4) The proposed method for planing and wedging around existing structures such as manholes, valve boxes, and inlets.
- (5) The longitudinal and transverse typical sections for tie-ins at the end of the day.
- (6) If requested by CDOT, a plan sheet showing the milling passes.

The QMP shall include, as a minimum:

- (1) The schedule for replacing the cutting teeth.
- (2) The daily preventive maintenance schedule and checklist.
- (3) Proposed use of automatic grade controls.
- (4) The surface testing schedule for smoothness.
- (5) The process for filling distressed areas.
- (6) Corrective procedures if the milled surface does not meet the minimum transverse or longitudinal surface finish when measured with a 10-foot straightedge.

Each planer shall conform to the following:

The planer shall have sufficient power, traction, and stability to maintain an accurate depth of cut. The propulsion and guidance system of the planer shall be maintained in such condition that the planer may be operated to straight and true lines.

Operation with broken or missing teeth will not be allowed. Worn teeth shall be replaced if the planer does not produce a uniform surface.

The planer shall be capable of operating with automatic grade controls (contact or non-contact) on both sides of the machine using a 30-foot averaging system or other approved grade control systems. The use of such controls shall be described in the QMP.

The planer shall be capable of picking up the removed material in a single operation.

A self-loading conveyor shall be an integral part of the planer. Windrows will not be allowed.

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Revision of Section 202
Removal of Asphalt Mat (Planing)

The existing pavement shall be milled to the cross-slope as shown on the plans, and shall have a surface finish that does not vary longitudinally or transversely more than 3/8 inch from a 10-foot straightedge. A 10-foot straightedge shall be supplied by the Contractor.

All milled surfaces shall be broomed with a pick-up broom, unless otherwise specified, before being opened to traffic. A sufficient number of brooms shall be used immediately after planing to remove all milled material remaining in the roadway.

If the Contractor fails to adequately clean the roadway, work shall cease until CDOT has approved the Contractor's revised written proposal to adequately clean the roadway.

At the completion of each day's work, longitudinal vertical edges greater than 1 inch shall be tapered. No transverse vertical edges will be allowed. Longitudinal milled surface tie-ins to existing pavement shall be tapered to not less than a 3:1 slope; transverse milled surface tie-ins to existing pavement shall be tapered to not less than a 50:1 slope. Transverse tapered joints may be tapered with the planing machine, a temporary asphalt ramp, or other methods approved by CDOT. No longitudinal joint between the milled and existing surfaces shall fall between 1 to 5 feet of any lane line.

If the transverse joint is tapered with a temporary asphalt ramp, the milled surface at the joint shall be constructed as a butt joint, the full depth of the lift of asphalt to be placed on the milled surface. The Contractor shall be responsible for maintaining this asphalt ramp until all corresponding HMA is placed.

If the transverse joint is tapered with a planing machine, a butt joint shall be cut into the taper, the full depth of the lift of asphalt to be placed on the milled surface prior to commencement of resurfacing.

Other approved transverse joint tapers shall be maintained at the expense of the Contractor, and at a minimum shall incorporate a butt joint the full depth of the lift of asphalt to be placed on the milled surface prior to commencement of resurfacing.

Distressed or irregular areas identified in the planed surface by CDOT shall be patched.

The roadway shall be left in a safe and usable condition at the end of each workday. The Contractor shall take appropriate measures to ensure that the milled surface does not trap or hold water. All required pavement markings removed by the planing shall be restored before the roadway is opened to traffic.

All milled surfaces to be overlaid with HMA shall be covered with new asphalt within 5 working days.

All planing shall be completed full width and parallel to the travel lanes before resurfacing commences unless otherwise directed by CDOT.

All material generated by the planing operation shall remain the property of the Contractor.

**Revision of Section 202
Removal of Portions of Present Structure**

Section 202 of the Standard Specifications is hereby revised for this project as follows:

Subsection 202.01 shall include the following:

This work shall include the removal of all or portions of the following: Bridge rail on Structures P-06-AM and P-06-AN. Removal operations shall be conducted so that there will be the least interference with public traffic using the structure.

Subsection 202.02 shall include the following:

At least 10 days before beginning bridge removal, the Contractor shall submit to CDOT details of the removal operations showing the methods and sequence of removal and equipment to be used.

Steel Bridge rail post and railings shall be carefully dismantled and stockpiled at locations as designated. The Division will transport the material salvaged from the stockpile site to the maintenance yard. The Contractor will be required to load the material salvaged on the Division's hauling equipment.

All methods and equipment used to accomplish this item shall be approved by the Contractor's Engineer.

Within 24 hours before new concrete is placed, the entire surface upon which new concrete bonds shall be sandblasted to roughen the surface and remove all fractured or loose particles to promote good bond with the new concrete.

**Revision of Section 202
Plug Culvert**

Section 202 of the Standard Specifications is hereby revised for this project as follows:

Delete and replace the eighth paragraph in Subsection 202.02 with the following:

Where culverts are called out in the plans to be left in place and plugged, the Contractor shall plug the lower end of the culvert by a method agreed upon with the Project Engineer and completely fill the entire culvert volume with Flow-fill. The Contractor shall start filling at the lower end and work their way up to the upper end to ensure all voids are filled. Flow-fill shall be in accordance with Subsection 206.02. Plugging of culverts shall include removal of headwalls and other appurtenances where necessary to accommodate the work.

**Revision of Section 207
Stream Substrate**

Section 207 of the Standard Specifications is hereby revised for this project as follows:

Description

207.01 This work consists of excavating stream substrate from onsite locations, stockpiling, maintaining the stockpile, and placement of the stream substrate at location shown on the plans. Substitutions from this specification will not be allowed unless submitted in writing to the Engineer and approved by the Regional Environmental Staff.

Materials

207.02 General. Existing stream substrate, consisting of sand, gravel, cobble, boulders, and/or riprap shall be excavated from the bed of the Florida River where it needs to be excavated for the installation of bridge piers. Broken organic debris, trash, concrete, or asphalt pieces within the existing streambed shall not be salvaged for re-use. Substrate shall be excavated to the depth of where the underlying subsoil is reached or the depth of excavation required for placement of the piers, whichever is shallower.

Construction Requirements

214.03 Stockpiling. A separate stockpile for stream substrate shall be created at a location approved by the Engineer. Stockpiles shall not be located in areas that will damage existing vegetation or trees that are not scheduled to be removed, areas critical to the project completion, or areas having historic or environmental significance. Erosion control measures shall be employed around the stockpile(s) as necessary to prevent fines from washing out of the stockpile. The stream substrate stockpiles shall not be treated with herbicide. Weeds shall be hand pulled. Stockpiles shall not be used as perimeter erosion control or otherwise compacted.

207.04 Subgrade Soil Preparation. Depending on the depth of the existing stream substrate, subsoil may be needed between below the stream substrate to achieve the desired final grade. The subsoil should be compacted as practicable and not be ripped or otherwise de-compacted prior to the installation of the Stream Substrate.

207.05 Placement of Substrate. Upon final placement, the top of the stream substrate shall match the pre-existing grade of the streambed. Stream substrates shall not be mulched, conditioned, or seeded.

**Revision of Section 208
Construction Mats**

Section 208 of the standard specifications is hereby revised for this project to include the following:

Description

208.13 This work consists of furnishing and installing construction mats to support equipment working in wetlands, streams, and other locations designated on the plans while protecting the soils and vegetation beneath from damage.

Materials

208.14 Construction mats shall be capable of supporting the anticipated loads on the types of soil that will be encountered. Larger mats shall be used on soils with low bearing strength (e.g., muck or peat) to spread the weight over a larger area. Construction mats shall be free of leachable preservatives or other constituents harmful to aquatic environments. All treated wood shall contain a quality mark or letter of certification from a third party inspection agency assuring the product meets the minimum American Wood Protection Association (AWPA) Use Category 4A standard. The Contractor may fabricate the mats or use prefabricated mats designed for these purposes.

- (a) **Construction Mats Fabricated by the Contractor.** The construction mats shall be fabricated of wooden cants, sawn dense hardwoods, or round logs fastened together. The mats shall be fabricated of cants or logs of length, width, and thickness to meet anticipated loads, soil strength, and construction equipment sizes. Alternative materials may be used if approved by the Engineer.

The mats shall be capable of being connected using quick links or other heavy-duty connectors if needed for stability or to reduce movement.

The Contractor's mat design shall be submitted to the Engineer for review and approval at least three weeks before the mats are to be used on the project. The design shall include a list of equipment and materials to be placed on the mats and anticipated loading.

Mats that are determined to be inadequate to support the required loads or protect the soil and vegetation beneath shall be removed from the project and replaced with adequate mats at the Contractor's expense.

- (a) **Prefabricated Construction Mats.** Pre-fabricated mats shall be made of natural timber or other material approved by CDOT's Project Engineer. Mats shall be capable of assembly to form appropriate sized mats to be placed directly onto ground surfaces for the purposes of holding or transferring heavy equipment, preventing excessive rutting, and minimizing vegetation disturbance.
- (b) **Hardware.** Construction mats shall be supplied with all necessary hardware, including all bolts with nuts and washers, timber connectors, drift pins, dowels, nails, screws, spikes, metal pile protectors, steel anchor plates, and all other metal fastenings.

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Revision of Section 208
Construction Mats

Construction Requirements

208.15 General. Prior to placement of mats, woody vegetation (willows, shrubs, trees, etc.) shall be cut or trimmed at or slightly above ground level. Vegetation shall not be uprooted, and the root mat of any vegetation shall not be disturbed.

Crossing sites shall be located where stream channel is narrow for the shortest possible clear span and where stream banks are stable and well defined. When feasible on large wetland complexes, structures shall be accessed from opposite sides to avoid crossing the entire wetland.

208.16 Installation. Mats shall be in good condition to ensure proper installation, use, and removal. Mats shall be inspected by the Engineer to ensure they are clean of soil and any invasive plant species seed stock or plant material from previous use. The spread of aquatic nuisance species, including the New Zealand mud snail, shall be prevented. Specifically, if heavy equipment (including mats) is used that was previously working in another stream, river, lake, pond, or wetland, it shall be cleaned using one of the following procedures:

- (1) Remove all mud and debris from equipment (tracks, turrets, buckets, drags, teeth, etc.) and spray/soak equipment with a solution of commercial grade quaternary ammonium disinfectant compound containing at least 8.0 percent active ingredient diluted in solution to achieve at least 0.8 percent concentration (roughly 12 ounces of product per gallon of water). Treated equipment shall be kept moist for at least 10 minutes, managing rinsate as a solid waste in accordance with local, county, state, or federal regulations, or;
- (2) Remove all mud and debris from equipment (tracks, turrets, buckets, drags, teeth, etc.) and spray or soak equipment with water hotter than 140 °F for at least 10 minutes.

Hand tools, boots, and any other equipment that will be used in the water shall be cleaned using option (1) or (2) as well. The equipment shall be dried before use. Equipment shall not be moved from one water body to another without cleaning.

Equipment and associated materials (including mats) shall not be stored, maintained, fueled, or repaired in waters of the U.S. or wetlands.

Operating heavy equipment on mats in wetlands shall be minimized.

Impacts to waters of the U.S. or wetlands areas shall be minimized during installation, use, and removal of construction mats. Mats shall be placed in a location that would minimize the amount needed for crossing the waters of the U.S. or wetlands.

Construction mats shall not be dragged into position. More than one layer of mats may be necessary in areas which are inundated or have deep organic wetland soils.

At crossings where no flow is present or anticipated during project construction, the mats may be placed directly onto the ground in order to prevent excessive rutting, provided stream banks and bottoms are not adversely altered.

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Revision of Section 208
Construction Mats

For further protection, mats may be installed on top of nonwoven geotextile that covers the crossing area.

Construction mats may be used as a temporary bridge over a stream to allow vehicles access to the work site. Mats shall not be placed so that they restrict the natural flow of the stream. When used for flowing water crossings, small sections of mat shall be placed within and along the stream parallel to the flow of water. Mats shall then be placed perpendicular to the stream, resting on top of the initial construction mat supports. It may be necessary to place additional reinforcement for extra stability and to minimize the amount of sediment that could fall between the spaces of each timber.

In most cases, construction mats shall be placed along the travel area so that the individual cants or logs are resting perpendicular to the direction of traffic. Mats shall be placed far enough on either side of the stream or wetland to rest on firm ground.

Adequate erosion and sediment controls shall be installed at approaches to mats to promote a smooth transition to, and minimize sediment tracking onto, construction mats.

Matted crossings of waters of the U.S. or wetlands shall be monitored to ensure correct functioning of the mats. Mats shall be inspected during use for any defects or structural problems. Mats which become covered with soils or construction debris shall be cleaned, and the materials removed and disposed of in an upland location. The material shall not be scraped and shoveled into the resource area. Mats which become embedded shall be reset or layered to prevent mud from covering them or water passing over them.

208.17 Removal. Mats shall be removed by "backing" out of the site, removing mats one at a time. Construction mats shall not be dragged out of position. All other material placed for protection, such as geotextile fabric, straw, etc., shall then be removed. Any rutting or significant indentations identified during mat removal shall be regraded immediately, taking care not to compact soils.

Crossings shall be inspected following mat removal to determine the level of restoration required.

Mats shall be cleaned in an upland area which doesn't drain directly to waters of the U.S. or wetlands before transport to another wetland or stream location. Cleaning methods may include, but are not limited to, shaking or dropping mats in a controlled manner with a piece of machinery to knock off attached soil and debris, spraying with water or air, and sweeping.

208.18 Restoration. Upon removal of the construction mats, the Contractor and the Engineer shall examine the matted area together to determine what restoration, if any, is required. Restoration shall include, but is not limited to, the following:

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Revision of Section 208
Construction Mats

Areas of disturbed soil located near waters of the U.S. or wetlands shall be promptly stabilized. Matted areas within wetlands shall be restored to their original condition and elevation. This may involve natural revegetation from existing root and seed stock of native plant species. Conditions may warrant planting and the broadcast of a wetland seed mix over the matted area to supplement the existing seed and rootstock. Seed mixes and vegetation shall contain only native plant species of the appropriate moisture tolerance regime. The use of mulch in wetlands shall consist of weed free mulch to mitigate the risk of the spread of invasive plant species.

**Revision of Section 208
Water Control**

Section 208 of the Standard Specification is hereby revised for this project as follows:

Subsection 208.01 shall include the following:

Water Control shall include all labor, equipment, materials, permits, and fees required to convey or divert water within the stream channel around or through the active construction area to protect water quality from construction pollutants (concrete, sediments, etc.). This work shall include, but not be limited to, installation of clean water diversions to divert flowing water around, under, or otherwise through areas of active construction so that flowing water does not contact disturbed soils. Depending on the location and nature of the work, this may also include the conveyance of overland surface runoff to prevent it from entering areas of active construction.

Subsection 208.06(c) shall include the following:

The Contractor shall submit a detailed method statement for acceptance that outlines the installation, operation, maintenance, and removal of the Water Quality Control system, 15 days prior to NTP2.

**Revision of Section 240
Protection of Migratory Birds
Biological Work Performed by the Contractor's Biologist**

Section 240 is hereby added to the Standard Specifications for this project as follows:

Description

240.01 This work consists of protecting migratory birds during construction.

Materials And Construction Requirements

240.02 The Contractor shall schedule clearing and grubbing operations and work on structures to avoid taking (pursue, hunt, take, capture, or kill; attempt to take, capture, kill, or possess) migratory birds protected by the Migratory Bird Treaty Act (MBTA). The Contractor shall retain a qualified wildlife biologist for this project. The wildlife biologist shall have a minimum of three years' experience conducting migratory bird surveys and implementing the requirements of the MBTA. The Contractor shall submit documentation of the biologist's education and experience to the Engineer for acceptance. A biologist with less experience may be used by the Contractor, subject to the approval of the Engineer based on review of the biologist's qualifications.

The wildlife biologist shall record the location of each protected nest, bird species, the protection method used, and the date installed. A copy of these records shall be submitted to the Engineer.

(a) Vegetation Removal. When possible, vegetation shall be cleared prior to the time when active nests are present. Vegetation removal activities shall be timed to avoid the migratory bird breeding season, which begins on April 1 and runs to August 31. All areas scheduled for clearing and grubbing between April 1 and August 31 shall first be surveyed within the work limits for active migratory bird nests. The Contractor's wildlife biologist shall also survey for active migratory bird nests within 50 feet outside work limits. Contractor personnel shall enter areas outside CDOT right of way only if a written, signed document granting permission to enter the property has been obtained from the property owner. The Contractor shall document all denials of permission to enter property. The Contractor shall avoid all active migratory bird nests. The Contractor shall avoid the area within 50 feet of the active nests or the area within the distance recommended by the biologist until all nests within that area have become inactive. Inactive nest removal and other necessary measures shall be incorporated into the work as follows:

1. Tree and Shrub Removal or Trimming. Tree and shrub removal or trimming shall occur before April 1 or after August 31 if possible. If tree and shrub removal or trimming will occur between April 1 and August 31, a survey for active nests shall be conducted by the wildlife biologist within the seven days immediately prior to the beginning of work in each area of tree and shrub removal or trimming. The survey shall be conducted for each phase of tree and shrub removal or trimming.

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**Revision of Section 240
Protection of Migratory Birds
Biological Work Performed by the Contractor's Biologist**

If an active nest containing eggs or young birds is found, the tree or shrub containing the active nest shall remain undisturbed and protected until the nest becomes inactive. The nest shall be protected by placing fence (plastic) a minimum distance of 50 feet from each nest to be undisturbed. This buffer dimension may be changed if determined appropriate by the wildlife biologist and approved by the Engineer. Work shall not proceed within the fenced buffer area until the young have fledged or the nests have become inactive.

If the fence is knocked down or destroyed by the Contractor, the Engineer will suspend the work, wholly or in part, until the fence is satisfactorily repaired at the Contractor's expense. Time lost due to such suspension will not be considered a basis for adjustment of time charges, but will be charged as contract time.

2. Grasses and Other Vegetation Management. Due to the potential for encountering ground nesting birds' habitat, if work occurs between April 1 and August 31, the area shall be surveyed by a wildlife biologist within the seven days immediately prior to ground disturbing activities. The undisturbed ground cover to 50 feet beyond the planned disturbance, or to the right of way line, whichever is less, shall be maintained at a height of 6 inches or less beginning April 1 and continuing until August 31 or until the end of ground disturbance work, whichever comes first.

If birds establish a nest within the survey area, an appropriate buffer of 50 feet will be established around the nest by the CDOT biologist. This buffer dimension may be changed if determined appropriate by the CDOT biologist and approved by the Engineer. The Contractor shall install fence (plastic) at the perimeter of the buffer. Work shall not proceed within the buffer until the young have fledged or the nests have become inactive.

If the fence is knocked down or destroyed by the Contractor, the Engineer will suspend the work, wholly or in part, until the fence is satisfactorily repaired at the Contractor's expense. Time lost due to such suspension will not be considered a basis for adjustment of time charges, but will be charged as contract time.

- (b) Work on structures. The Contractor shall prosecute work on structures in a manner that does not result in a taking of migratory birds protected by the Migratory Bird Treaty Act (MBTA). The Contractor shall not prosecute the work on structures during the primary breeding season, April 1 through August 31, unless he takes the following actions:
 - (1) The Contractor shall remove existing nests prior to April 1. If the Contract is not awarded prior to April 1 and CDOT has removed existing nests, then the monitoring of nest building shall become the Contractor's responsibility upon Notice to Proceed.
 - (2) During the time that the birds are trying to build or occupy their nests, between April 1 and August 31, the Contractor shall monitor the structures at least once every three days for any nesting activity.

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**Revision of Section 240
Protection of Migratory Birds
Biological Work Performed by the Contractor's Biologist**

- (3) If the birds have started to build any nests, they shall be removed before the nest is completed. Water shall not be used to remove the nests if nests are located within 50 feet of any surface waters.
- (4) Installation of netting may be used to prevent nest building. The netting shall be monitored and repaired or replaced as needed. Netting shall consist of a mesh with openings that are $\frac{3}{4}$ inch by $\frac{3}{4}$ inch or less.

If an active nest becomes established, i.e., there are eggs or young in the nest, all work that could result in abandonment or destruction of the nest shall be avoided until the young have fledged or the nest is unoccupied as determined by the wildlife biologist and approved by the Engineer. The Contractor shall prevent construction activity from displacing birds after they have laid their eggs and before the young have fledged.

If the project continues into the following spring, this cycle shall be repeated. When work on the structure is complete, the Contractor shall remove and properly dispose of netting used on the structure.

- (c) Bald Eagle Roosting. The wildlife biologist shall conduct dusk and dawn surveys of Bald Eagle roosts within seven days prior to the start of any construction during the winter season, November 15 to March 15. If a Bald Eagle roost is identified, construction activity shall not proceed within 0.25 mile of active nocturnal roost sites between November 15 and March 15.
- (d) Raptor Nesting. The wildlife biologist shall conduct raptor nest surveys within 0.5 mile of the construction site prior to the start of construction and prior to each construction phase from December 15 to July 15. This survey can be done with binoculars. If construction activities are located within the Colorado Parks and Wildlife (CPW) recommended buffer zone for specific raptors, "No Work" zones shall be established around active sites during construction according to the CPW standards or as recommended by the wildlife biologist in consultation with the CPW. The "No Work" zone shall be marked with either fencing or signing. Work shall not proceed within a "No Work" zone until the wildlife biologist has determined that the young have fledged or the nest is unoccupied.
- (e) Taking of a Migratory Bird. The taking of a migratory bird shall be reported to the Engineer. The Contractor shall be responsible for all penalties levied by the U. S. Fish and Wildlife Service (USFWS) for the taking of a migratory bird.

**Revision of Section 250
Environmental, Health, and Safety Management**

The scope of work for this project will encounter documented contamination and regulated materials and will potentially encounter undocumented contamination. These materials require additional sampling, management, and disposal by qualified personnel.

Section 250 of the Standard Specifications is hereby revised for this project to include the following:

Section 250.03

Known areas of contamination that will be encountered during this project include:

Bridge P-05-B

The green paint on the steel I-beams is classified as lead-based paint (LBP).

The gray paint on the steel I-beam is classified as lead-containing paint.

The caulking materials on the utility pipe were sampled and found to be non-detect for asbestos.

31505 East US Highway 160

The abandoned and dilapidated residential home is considered a "Major Asbestos Spill" due to the amount of significantly damaged friable asbestos-containing materials (ACM). Friable ACM includes window caulk, spray on texture, ceiling texture, and joint compound. Approximately 2,113 square feet of friable ACM is present, which exceeds the applicable trigger levels (Colorado Regulation No. 8, Part B). The presence of regulated asbestos contaminated soil (RACS) has not been determined on this property.

Paint on building materials in the residential home, pump house, barn, tank, shed, and other structures at this address have been identified as lead-containing and/or lead-based paint. Results of TCLP sampling indicate that the painted materials are non-hazardous and can be disposed of as construction & demolition (C&D) waste at a solid waste landfill.

Drums of unknown condition and contents were observed at 31505 East US Highway 160.

During all subsurface activities, workers shall be alert for visual and olfactory signs of contamination. If suspect contamination (not identified above) is encountered, work shall stop and procedures established in CDOT 250 spec shall be followed. Any suspect contaminated material shall be properly stored and sampled prior to disposal.

Suspect contamination that may be encountered during this project include surface soil, subsurface soil, groundwater, surface water, painted structures (i.e. cattle guards, light poles etc.), or any other media potentially contaminated with regulated and/or hazardous substances. Contamination may include petroleum products, metals, organic compounds, landfill material/solid waste, heavy metal-based paint, asbestos in building materials, asbestos in soil, or other regulated and/or hazardous substances.

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Revision of Section 250
Environmental, Health, and Safety Management

When known or suspected contaminated materials are encountered, disturbed, or brought to the surface, CDOT Standard Specification 250 and this revised Specification 250 shall be followed.

The Contractor shall retain an environmental firm or provide trained environmental professional to screen for and manage potentially contaminated, hazardous, or otherwise regulated materials. The personnel shall meet the requirements for a Health and Safety Officer (HSO) and Monitoring Technician (MT) as stated in CDOT Standard Specification 250.03. The HSO and MT shall have applicable qualifications, experience, and education to address all activities involving heavy metal-based paint; asbestos containing building materials; soil and groundwater potentially contaminated with petroleum, organic compounds, metals, and inorganic compounds; and other suspect contaminated or regulated materials, if encountered. If regulated asbestos contaminated soil is encountered, personnel shall meet qualifications of CDOT 250.07(d). Qualifications of all personnel shall be provided at the pre-construction meeting and whenever additional/new personnel begin work on this project.

The Contractor shall review the following documents prior to preparation of project deliverables:

Modified Environmental Site Assessment, Elmore's Corner East (20980), La Plata County, CO, prepared for Colorado Department of Transportation (CDOT), prepared by SME Environmental, Inc., April 2025.

Modified Environmental Site Assessment, East Valley Project (20980), La Plata County, CO, prepared for Colorado Department of Transportation (CDOT), prepared by SME Environmental, Inc., April 2025.

Phase I Environmental Site Assessment, Robison Property, La Plata County, Colorado, prepared for Colorado Department of Transportation, prepared by SME Environmental, Inc., July 2025.

Letter to CDOT Region 5, from CDOT Property Management re: Asbestos-Containing Material (ACM) and Lead-Based Paint (LBP) Revalidation for CDOT Bridge P-05-B located at west and eastbound US-160 MM 93.79 over the Florida River east of Loma Linda, Colorado, June 18, 2025.

Lead-Based Paint & TCLP Inspection Report, 31505 E Hwy 160, Durango, CO 81301, prepared by On Point Environmental, presented to SME Environmental, Inc., dated February 15, 2015.

Asbestos Inspection, Jameson Property-Residence, 31505 East US Highway 160, Durango, Colorado, prepared by SME Environmental, Inc., dated February 2026.

Major Asbestos Spill Notification, 31505 Eash US Highway 160, Durango, CO, prepared by Clint Casey, Spill Discovery Date 2/5/2026.

Phase II Environmental Site Assessment, Jameson Property, La Plata County, CO prepared for Colorado Department of Transportation (CDOT), prepared by SME Environmental, Inc., April 2026.

CDOT Hazardous Materials Guidance, March 2025 or most recent version.

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**Revision of Section 250
Environmental, Health, and Safety Management**

A project-specific hazardous materials Health and Safety Plan (HASP) shall be prepared by the HSO. The HASP will identify the appropriate level of worker Personal Protective Equipment (PPE) and procedures to eliminate the exposure pathways from hazardous materials. The HASP shall meet the following requirements: Occupational Safety and Health Administration (OSHA) Publication No. 3142 - Working with Lead in the Construction Industry, OSHA Guidance Manual for Hazardous Waste Site Activities, National Institute for Occupational Safety and Health (NIOSH) Publication No. 85-115, 29 CFR 1926.62, and 29 CFR 1926.1126. Additionally, the requirements of Colorado Regulation 8, Part B for asbestos, CDOT Regulated Asbestos Contaminated Soil (RACS) Standard Operating Procedure (SOP) shall be either included in the HASP or provided by the Colorado Certified General Abatement Contractor (GAC) and referenced in the HASP. The HASP shall also address screening procedures, worker hazards, documentation, and appropriate PPE associated with other potential contaminated and/or regulated materials. The HASP shall be submitted to the Engineer a minimum of 12 days prior to the start of work for acceptance and distributed by the Contractor as stated in 250.03(C).

A project-specific hazardous materials management plan (MMP) shall be prepared. The MMP shall provide details on the management, storage, characterization (sampling), transportation, and disposal/recycling of all contaminated and/or regulated materials (ref. CDOT 250.05 and 250.06).

The MMP shall include the detailed method statement for capturing, testing, and disposing of the heavy metal-based paint on P-09-B (ref. Spec 250.04(b)). The method statement shall discuss how the Contractor will prevent the release of paint and other contaminated materials into the environment and ensure proper waste containerization and disposal. All paint waste (chips, dust, spent abrasives, spent stripper etc.) materials shall be managed by the Contractor in accordance with all federal and state regulations. The heavy metal paint disposal decision document shall be included in the MMP or provided prior to disposal of materials with heavy metal paint (ref. Spec 250.04(c)).

The bridge removal plan (ref. CDOT Spec 202) shall include the above information on capturing, handling, and disposal of contaminated materials or reference the MMP.

The Contractor shall coordinate with the HSO and CDOT to prepare a Demolition Notification Application Form for Bridge P-09-B, the residential structure at 31505 East Highway 160, and other structures as applicable. The Contractor shall submit the form to CDPHE Air Pollution Control Division and pay all applicable fees within the timeframe specified in CDPHE Regulation 8, Part B. The Contractor shall comply with all other regulations related to asbestos abatement as applicable.

The Contractor shall coordinate with a solid waste landfill to obtain a waste manifest or approval for disposal of the painted building materials at 31505 East US Highway 160 (sampled in December 2025 and January 2026).

Additional sampling will likely be required for characterization and disposal of painted components on Bridge P-09-B (TCLP Pb and Cr of paint on P-05-B). Additional sampling may be required to characterize other potentially regulated or hazardous materials for disposal.

The HSO shall prepare a daily log of field activities and provide it to the Engineer at the end of every week that the HSO is used.

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**Revision of Section 250
Environmental, Health, and Safety Management**

A qualified Monitoring Technician (MT) shall be designated to monitor project activities for hazardous substances during work on the project. The MT shall monitor all activities involving heavy metal paint, asbestos in building materials, regulated asbestos contaminated soil, and all other suspect contaminated or regulated hazardous materials. The MT shall prepare a daily log of field activities and provide it to the Engineer at the end of every week that the MT is used.

Groundwater is not anticipated; however, if it is encountered, it shall not be discharged without permit authority from CDPHE. The Contractor shall obtain a Construction Dewatering, Remediation, or Individual Permit from the CDPHE for any dewatering of groundwater during construction in accordance with Water Quality Control Division (WQCD) requirements.

The HSO shall prepare a Final Site Report in accordance with Specification 250. The Final Site Report shall include a discussion of "cradle to grave" generation, management, sampling, and disposal in addition to all supporting documentation for all suspect contaminated, hazardous, and/or regulated materials encountered or generated during the project.

The Contractor shall provide the following deliverables:

Deliverable	Due Date	Reference
Environmental Personnel Qualifications and Certifications	At Pre-Construction Meeting	250.03
Hazardous Materials Monitoring Plan (MMP)	Minimum of 2 Weeks Prior to Beginning Construction	250.03 and HM Guidance Document Section 4.7.4
Site Specific Hazardous Materials Health and Safety Plan (HASP)	Minimum of 12 Days Prior to Beginning Construction	250.03(c) and 250.04
HSO Daily Log of Field Activities	End of every week the MT is used	250.03(a)
MT Daily Log of Field Activities	End of every week the HSO is used	250.03(b)
Dewatering, Remediation, or Individual Permit for Groundwater	4 Weeks Prior to the start of groundwater discharge	250.05
Heavy Metal Paint Disposal Decision	10 Days Prior to Disturbance of Painted Materials	250.04
Final Site Report	As Soon As Possible after Project Completion	250.03(a)

**Revision of Section 304
Aggregate Base Course**

Section 304 of the Standard Specifications is hereby revised for this project as follows:

Subsection 304.02 shall include the following:

Materials for the subbase shall be Aggregate Base Course (Class 2) as shown in subsection 703.03.

Materials for the base course shall be Aggregate Base Course (Class 6) as shown in subsection 703.03.

Aggregate Base Course (RAP) shall not be used as Aggregate Base Course (Class 2) or (Class 6).

The Aggregate Base Course (Class 2) and (Class 6) must meet the gradation requirements and have a resistance value of at least 70 and 78 respectively when tested per AASHTO T-190.

**Revision of Sections 304, 403, and 601
Aggregate Base Course, Hot Mix Asphalt,
and Concrete Ticket Collection**

Sections 304, 403, and 601 of the Standard Specifications are hereby revised for this project as follows:

Subsections 304.08, 403.05, and 601.20 shall include the following:

The Contractor shall collect the scale/batch ticket on each load when it is delivered to the project site, and ensure that the information required in subsection 109.01 is shown on each ticket. Any adjustments to the load represented (i.e., waste, water added, etc.) shall be noted on the submitted ticket. The Contractor shall fill out CDOT Asphalt Paving Inspector's Daily Report (Form 282) as the material is placed.

The scale/batch tickets shall be available on site for CDOT personnel to inspect.

Each day, the Contractor shall provide to CDOT envelopes which contain the previous day's signed tickets, CDOT Form 282, and the following:

1. On each envelope: Project number, date of placement/paving, type of material, daily total, and cumulative total.
2. One of the following:
 - A. Two adding machine tape tabulations of the weight/volume tickets with corresponding totals run and signed by different persons,
 - B. One signed adding machine tape tabulation of the weight/volume tickets that has been checked and signed by a second person,
 - C. Signed check tape of computer scale tickets that have a cumulative total. These scale tickets must be consecutive and without voids adjustments.
3. A listing of any overweight loads on the envelope, including ticket numbers and amount over legal limit.
4. A comparison of the actual yield for each day's placement to the theoretical yield. Theoretical yield shall be based on the actual area placed/paved, the planned thickness, and the actual density of the mixture being placed. Any variance greater than +/- 2.5 percent shall be indicated on the envelope and a written explanation included.

The Contractor shall provide a vehicle identification sheet that contains the following information for each vehicle:

- (1) Vehicle number
- (2) Length
- (3) Tare Weight
- (4) Number of axles
- (5) Distance between extreme axles
- (6) All other information required to determine legal weight
- (7) Legal weight limit

If the Contractor fails to provide CDOT with the required information on a daily basis, placement or paving will not be allowed to resume unless approved by CDOT.

**Revision of Sections 304 and 703
Aggregate Base Course (Special)**

Section 304 of the Standard Specifications is hereby revised for this project as follows:

Subsection 304.01 shall include the following:

The work includes the preparation of the shoulder subgrade by blading to remove vegetation and to slope shoulders away from the edge of the pavement. Shoulder grading shall take place prior to placement of the topmost layer of pavement.

The Contractor shall place Aggregate Base Course (Special) within 3 calendar days of placing pavement materials unless otherwise approved by CDOT. Pavement edge drop-offs 2 inches or greater immediately adjacent to traffic (within 10 feet of the traveled way) shall not be left unprotected overnight without placement of warning signs, drum channelizing devices, and a wedge of adequate material installed as directed by CDOT.

Subsection 304.02 shall include the following:

Acceptable shoulder gravel alternatives are:

- (1) 100 percent asphalt millings that are well graded and a product from an asphalt milling machine.
- (2) 100 percent Aggregate Base Course (Class 6).
- (3) Any combination of #1 and #2 above.

Milled asphalt material used shall be 100 percent passing the 37.5 mm (1-1/2 inch) sieve.

The material shall not contain clay balls, organic matter, or other deleterious material.

Subsection 304.04 shall include the following:

Aggregate Base Course (Special) shall be placed using a device capable of placing this shoulder material in its final position at the required application rate. The device is subject to CDOT's approval prior to beginning the work. Shoulder gravel shall not be placed on the asphalt roadway surface.

Subsection 304.06 shall include the following:

Aggregate Base Course (Special) shall be compacted with rollers or wheel-rolled with equipment in a manner and to the extent deemed acceptable by CDOT.

**Revision of Section 401
Hot Mix Asphalt Compaction**

Section 401 of the Standard Specifications is hereby revised for this project as follows:

Subsection 401.17, first paragraph, shall include the following:

Both steel wheel and pneumatic tire rollers shall be required on this project. If the Contractor has demonstrated to CDOT that all of the manufacturer's recommendations were followed and the pneumatic tire roller is detrimental to the finished surface of the HMA, CDOT, in cooperation with the Contractor and the CDOT region materials engineer, may waive the pneumatic tire roller requirement. Steel wheel rollers shall not be operated in vibratory mode on bridge decks.

**Revision of Section 403
Hot Mix Asphalt**

Section 403 of the Standard Specifications is hereby revised for this project as follows:

Subsection 403.02 shall include the following:

The design mix for hot mix asphalt shall conform to the following:

Table 403-1

Property	Test Method	Value For Grading	
		SX(75)	SX(75) (Patching)
Air Voids, percent at: N (design)	CPL 5115	3.0 - 4.0	3.0 - 4.0
Lab Compaction (Revolutions): N (design)	CPL 5115	75	75
Stability, minimum	CPL 5106	28	28
Aggregate Retained on the 4.75 mm (No. 4) Sieve with at least 2 Mechanically Induced fractured faces, % minimum*	CP 45	60	60
Accelerated Moisture Susceptibility Tensile Strength Ratio (Lottman), minimum	CPL 5109 Method B	80	80
Minimum Dry Split Tensile Strength, kPa (psi)	CPL 5109 Method B	205 (30)	205 (30)
Grade of Asphalt Cement, Top Layer		PG 58-28	PG 58-28
Grade of Asphalt Cement, Layers below Top		PG 58-28	PG 58-28
Voids in the Mineral Aggregate (VMA) % minimum	CP 48	See Table 403-2	See Table 403-2
Voids Filled with Asphalt (VFA), %	AI MS-2	65-80	65-80
Dust to Asphalt Ratio Fine Gradation Coarse Gradation	CP 50	0.60 - 1.20 0.80 - 1.60	0.60 - 1.20 0.80 - 1.60

Note: AI MS-2 = Asphalt Institute Manual Series 2

Note: Mixes with gradations having less than 40% passing the 4.75 mm (No. 4) sieve shall be approached with caution because of constructability problems.

Note: Gradations for mixes with a nominal maximum aggregate size of one inch or larger are considered a coarse gradation if they pass below the maximum density line at the #4 screen.
Gradations for mixes with a nominal maximum aggregate size of 3/4" to 3/8" are considered a coarse gradation if they pass below the maximum density line at the #8 screen.
Gradations for mixes with a nominal maximum aggregate size of #4 or smaller are considered a coarse gradation if they pass below the maximum density line at the #16 screen.

*Fractured face requirements for SF may be waived by RME depending on project conditions.

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Revision of Section 403
Hot Mix Asphalt

All mix designs shall be run with a gyratory compaction angle of 1.25 degrees and properties must satisfy Table 403-1. Form 43 will establish construction targets for Asphalt Cement and all mix properties at Air Voids up to 1.0 percent below the mix design optimum. CDOT will establish the production asphalt cement and volumetric targets based on the Contractor's mix design and the relationships shown between the hot mix asphalt mixture volumetric properties and asphalt cement contents on the Form 429. CDOT may select a different AC content other than the one shown at optimum on the Contractor's mix design in order to establish the production targets as contained on the Form 43. Historically, Air Voids adjustments typically result in asphalt cement increases from 0.1 to 0.5 percent. Contractors bidding the project should anticipate this change and factor it into their unit price bid.

Table 403-2

Minimum Voids in the Mineral Aggregate (VMA)			
Nominal Maximum Size*, mm (inches)	***Design Air Voids **		
	3.5%	4.0%	4.5%
37.5 (1½)	11.6	11.7	11.8
25.0 (1)	12.6	12.7	12.8
19.0 (¾)	13.6	13.7	13.8
12.5 (½)	14.6	14.7	14.8
9.5 (⅜)	15.6	15.7	15.8

- * The Nominal Maximum Size is defined as one sieve larger than the first sieve to retain more than 10%.
- ** Interpolate specified VMA values for design air voids between those listed.
- *** Extrapolate specified VMA values for production air voids beyond those listed.

The Contractor shall prepare a quality control plan outlining the steps taken to minimize segregation of HMA. This plan shall be submitted to CDOT for Acceptance at the pre-paving conference and at a minimum of 30 Days prior to beginning the paving operations. When CDOT determines that segregation is unacceptable, the paving shall stop and the cause of segregation shall be corrected before paving operations will be allowed to resume.

The hot mix asphalt may contain reclaimed asphalt pavement.

CDOT approved Warm Mix Asphalt (WMA) may be allowed on this project in accordance with CP 59. Unique requirements for WMA design, production, and acceptance testing as documented during CDOT WMA approval shall be submitted and approved prior to creation of the Form 43 and before any WMA production on the project. Delays to the project due to WMA submittal and review will be considered within the Contractor's control and will be non-excusable.

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Revision of Section 403
Hot Mix Asphalt

Hot mix asphalt for patching shall conform to the gradation requirements for Hot Mix Asphalt (Grading SX).

A minimum of 1 percent hydrated lime by weight of the combined aggregate shall be added to the aggregate for all hot mix asphalt.

Acceptance samples shall be taken at the location specified in Method B of CP 41.

Hot Mix Asphalt (HMA) sampling according to CP-41 Method B Procedure 8.1 (windrow) will satisfy the split requirements of CP-17 Section 3.2 Blind Split Sample.

Subsection 403.03 shall include the following:

The Contractor shall construct the work such that all roadway pavement placed prior to the time paving operations end for the year, shall be completed to the full thickness required by the plans. The Contractor's Progress Schedule shall show the methods to be used to comply with this requirement.

**Revision of Section 412
Portland Cement Concrete Pavement**

Section 412 of the Standard Specifications is hereby revised for this project as follows:

Subsection 412.13 shall include the following:

(d) Pressure Relief Joints. Pressure relief joints in PCCP, as shown in the Book 4 drawing titled Concrete Expansion Joint Details, shall be installed 1) at a minimum of one per mile increments and 2) immediately adjacent to bridge Structures and installed to the requirements and included Pressure Relief Joint Standard Drawings included herein.

Preformed elastomeric joint seals shall conform to the requirements provided in Table 412-2.

General: This material is a flexible, low density, multicellular homogeneous neoprene foam. It must be designed to create constant compression with the concrete joint faces once it is installed. If there is a possibility that the pavement will contract and the seal will be required to act in tension, an epoxy adhesive must be used to secure the seal to the concrete joint. The joint seal is to be four inches wide and be inserted into a 3 ¾ inch joint gap. The depth and length shall be determined by the manufacturer. The product must conform to AASHTO M 220 and ASTM D 2628 when pertaining to pavement joints, or AASHTO M 297 and ASTM D 3542 if the product is intended for bridge use. Reinforcing steel shall be grade 60.

Table 412-2 Physical Requirements for Preformed Elastomeric Joint Seals

Property	Requirements	ASTM Method
Tensile Strength, min	2000 psi	D 412
Elongation at break, min	250%	D 412
Hardness Type A durometer, points	55 ± 5	D 2240 (modified) ^A
Oven aging, 70h at 212°F		D 573
Tensile Strength loss, max	20% max	
Elongation loss, max	20% max	
Hardness, Type A durometer, points change	0 to + 10	
Oil Swell ASTM Oil 3 70h at 212°F		D 471
Weight change max	45% max	
Ozone resistance		D 1149 (modified) ^B
20% strain 300 pphm in air 70h at 104°F	no cracks	
Low-temperature stiffening 7 Days at 14°F		D 2240
Hardness, Type A durometer, points change	0 to + 15	

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Revision of Section 412
Portland Cement Concrete Pavement

Table 412-2 Physical Requirements for Preformed Elastomeric Joint Seals (Cont.)

Property	Requirements	ASTM Method
Low-temperature recovery, ^C 72h at 14°F, 50% deflection, min	88%	D 2628
Low-temperature recovery, ^C 22h at -20°F, 50% deflection, min	83%	D 2628
High-temperature recovery, ^C 70h at 212°F, 50% deflection, min	85%	D 2628
Compression-deflection at 80% of nominal width, min	3.5 lbf/in	D 2628

^A The term "modified" in the table relates to the specimen preparation. The use of joint seal as the specimen source requires that more plies than specified in either of the modified test procedures be used. Such specimen modification shall be agreed upon by the purchaser and seller prior to testing. The hardness test shall be made with the durometer in a durometer stand as recommended in Method D 2240.

^B Test in accordance with Procedure A of D 518.

^C Cracking, splitting, or sticking of a specimen during a recovery test shall mean that the specimen has failed the test.

All epoxies, adhesives, lubricants, cementing agents, etc., that are required for installation of the seals are to be specified and provided by the manufacturer. All installation is to be in strict accordance with the specified procedures and practices of the seal manufacturer.

Properly package all of these components and provide instructions for safe handling, storage, transport, proper disposal of component and container, emergency procedures, etc. Durable label all containers with name and address of the manufacturer, date of manufacture, shelf life or expiration date if applicable, a unique identifier such as a batch or lot number, and any other relevant information.

Openings for the joint material shall be formed or sawed. Prior to installation of the joint material, the faces of the joint shall be sandblasted, followed by an air blast to clean all dust and debris from the joint face. Sandblasting and air blasting shall be limited to the amount that may be sealed in the same workday. A foam spacer block may be used beneath the seal to provide additional stability, but the foam must be easily compressible, so not to interfere with the joint or the joint seal's compression. Application and installation equipment shall be provided by the manufacturer and shall be inspected to ensure that installation meets the design and manufacturer's requirements.

**Revision of Section 412
Tie Bar Inspection**

Section 412 of the Standard Specifications is hereby revised for this project as follows:

Subsection 412.13(b) 1 shall include the following:

If tie bars are inserted into plastic concrete with a tie bar insertion machine, tie bar location and concrete consolidation shall be subject to the following additional requirements:

Each 2500 linear feet of longitudinal weakened plane joint resulting from the procedure shall have one random location cored where the core intercepts an inserted tie bar. The core shall be six-inch diameter taken in the presence of CDOT.

If non-consolidated concrete is evident above the inserted tie bar, the Contractor shall cease paving operations and submit a corrective action plan in writing for approval. Correction of the joint and further paving shall take place only after written approval of the corrective action plan has been provided by CDOT. Additional coring may be required, as directed by CDOT.

Further failure to consolidate the concrete over the tie-bars will be justification to preclude the use of automatic tie-bar insertion for the remainder of the project.

**Revision of Section 420
Geotextile Mats in Wetland Areas**

Section 420 of the Standard Specifications is hereby revised for this project as follows:

Subsection 420.01 shall include the following:

This work shall include the installation of temporary geotextile mats in the wetland areas temporarily impacted by construction.

Subsection 420.02 shall include the following:

The Contractor shall cut existing vegetation within temporary impact wetland areas in a manner that the roots are left intact. All shrubs in temporary impact areas shall be trimmed to within 2 inches of the ground.

A silt fence and/or exclusion fence shall be installed in accordance with Section 208 to properly delineate the boundary of the temporary impact wetland areas and to protect the surrounding wetland areas.

Subsection 420.07 shall include the following:

The cleared temporary wetland impact areas shall be protected with geotextile (Erosion control)(Class A), followed by a 12-inch layer of loose certified weed-free straw and a minimum of 2 feet of soil. Construction equipment will be allowed to move across the site on top of this fill.

After construction activities are complete, soil, straw, and geotextile shall be carefully removed as directed. The final lift shall be removed using a toothless backhoe. Silt/exclusion fence shall be removed only after all activity in the wetland areas is complete. Straw and geotextile shall become property of the Contractor and shall be removed and disposed of outside of the project limits. All soil shall be removed and disposed of outside the project limits. Excess fill shall not be used in wetland areas.

**Revision of Section 420
Geogrid Reinforcement**

Section 420 of the Standard Specifications is hereby revised for this project to include the following:

Description

This work consists of furnishing and installing biaxial geogrid pavement reinforcement material within and below the pavement subbase, in accordance with these specifications and in conformity with the lines and grades shown on the plans or established.

Materials

Geogrid is a polymer biaxial grid structure specifically fabricated for use as a soil reinforcement. Geogrid reinforcement material shall have ultimate tensile strength, minimum average roll values (MARV), when tested in accordance with ASTM D 6637, of:

- 1,960 lb/ft or greater in the cross-machine direction (XMD)
- 1,300 lb/ft or greater in the machine direction (MD)

Additionally, geogrid shall have tensile strength at 5 percent strain (MARV) of:

- 1,330 lb/ft or greater in the XMD.
- 800 lb/ft or greater in the MD

Geogrid aperture size shall be 1 inch or greater in both the MD and XMD.

Geogrid that does not meet the ASTM requirements above shall be rejected.

The geogrid reinforcement shall contain stabilizers or inhibitors to prevent degradation of properties due to ultraviolet light exposure. The geogrid reinforcement shall be inert to all naturally occurring alkaline and acidic soil conditions.

Submittals

The manufacturer shall furnish certified test reports from an independent laboratory indicating that the material meets the requirements of the specification for the biaxial geogrid specified.

Construction Requirements

Geogrid pavement reinforcement shall be installed in accordance with the following:

- (a) Delivery, Storage, and Handling. Upon delivery, the Contractor shall check the geogrid to ensure the proper material has been received. Special care shall be taken in the handling of geogrids manufactured from polypropylene at temperatures at or below -18 °C (0 °F).
- (b) Geogrid Installation. Geogrid shall be laid at steps and alignment as shown on the Plans or as directed by the Engineer. Geogrid shall be oriented such that the strong direction (XMD) is perpendicular to the roadway alignment. Geogrid material shall be secured to the ground surface by placement of loose fill at the corners and edges or as directed by the Engineer.

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Revision of Section 420
Geogrid Reinforcement

- (c) Geogrid shall be placed so that at the back of the excavation, a "tail" of geogrid is left extending beyond the new backfill material, to accommodate attachment between geogrids placed in separate construction sequences, if required. Adjacent sheets of geogrid shall be connected together as one continuous width (longitudinally along the roadway). The Contractor shall submit a connection method and detail a minimum of ten (10) working days prior to the start of geogrid placement for approval by the Engineer.
 - (d) Fill Placement Over Geogrid. Tracked construction equipment shall not operate directly upon the geogrid. A minimum fill thickness of 8 inches is required prior to operation of tracked vehicles over the geogrid. Rubber tire equipment may pass over the geogrid at slow speeds, less than 10 mph, if the underlying material is capable of supporting the loads without excessive rutting or causing damage to the grid. Operators shall avoid sudden braking or sharp turning.
 - (e) Fill material shall be back dumped from trucks riding on top of the reinforced fill and bladed onto the geogrid in such a manner that the fill rolls onto the grid ahead, e.g., by gradually raising dozer blade while moving forward. Material placed over the geogrid shall be compacted in accordance with the compaction requirements for this project or as directed. Care shall be taken to ensure the geogrid reinforcement is not damaged.
 - (f) Fill material shall be compacted in accordance with Section 304.
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**Revision of Section 502
Drilling Holes to Facilitate Pile Driving**

Section 502 of the Standard Specifications is hereby revised for this project as follows:

Subsection 502.06 shall include the following:

When the plans call for drilled holes filled with slurry or mud made from clay or bentonite, the diameter of the drilled holes shall be at least two inches greater than either the pile diameter or the diagonal corner to corner measurement of the pile cross section, unless otherwise designated on the plans. Oversized holes due to sloughing, drifting, over-drilling, or other causes shall be filled with the accepted slurry or mud at the contractor's expense.

The following mixture will yield approximately 1.2 cubic yards of an acceptable slurry or mud:

- (a) 50 lbs. dry bentonite powder
- (b) Approximately 125 gallons of water (or sufficient amount to make a pourable mix)
- (c) 1 cubic yard of sand (approximately 2800 lbs.) reasonably free of material larger than 1/2 inch.

The sand need not be clean. Local soil reasonably free of material larger than 1/2 inch may be substituted for the sand. Cement, lime, flyash, or other pozzolanic or highly alkaline materials shall not be added.

This mixture may be mixed by auger in the drilled hole, by paddle type mortar mixers, by portable or semiportable concrete mixers, or by drum type concrete mixer trucks.

If the mixture is placed or mixed in the hole prior to pile driving, the top two to three feet of the hole may be filled with loose local soil to prevent splashing of the slurry or mud.

**Revision of Section 503
Drilled Caissons**

Revision of Section 503 of the Standard Special Provisions is hereby revised as follows:

Add the following sentence to beginning of the first paragraph of Subsection 503.21:

CSL testing is required for drilled caissons equal to or greater than 4 feet in diameter, at single shaft locations, and at river crossings.

**Revision of Section 504
Concrete Panel Facing Phased Built GRS Wall**

Section 504 of the Standard Specifications is hereby revised for this project to include the following:

Description

504.01 This work consists of constructing a Concrete Panel Facing Geosynthetic Reinforced Soil (GRS) Retaining Wall System at the locations and to the lines and grades shown on the plans. The Phase II (two) concrete panel facing installation can only be commenced till the major portion of Phase I (one) GRS wall settlement completion. Only geosynthetic reinforcement as specified in this specification may be used as GRS reinforcement in the reinforced structure backfill zone. The retained structure backfill zone is the structure backfill retained by the reinforced structure backfill zone, as shown on the plans.

Materials

504.02 Shop Drawings. Unless specified in the plans, shop drawings are only required for panel to wire basket connection of GRS walls with the default reinforcing spaced at 1 foot - 0 inches. If soil reinforcement spacing for phase I (one) wall requirement is not met (or as required to quantify and build the complete wall in one phase as dictated by special site geometry), the shop drawings will include the following.

The shop drawings shall provide the details necessary to demonstrate compliance with the Contract, including:

- (a) Wall Layouts. Wall layouts shall conform to lines and grades on the plans including start, corner, and end stations, leveling pad step breaks, total number of panels, and top and bottom of wall elevations. For walls with rail anchoring slabs, the top of panel elevations shall be within 8 inches of the elevation shown on the plans, measured from the bottom of anchoring slab. The construction batter required to achieve the batter shown on the plans shall be shown on the shop drawings. If temporary walls are required for the construction of permanent wall, the permanent wall vendor shall provide the shop drawings and certified material test reports for temporary walls.
- (b) Phase I Wire Basket Facing and Reinforcement Locations. Unless otherwise shown on the plans, each layer of soil reinforcement is required to form a soil wrap inside of and along the entire height of the basket for wrap around (terminating ~4 feet from the face of the wall). Secondary reinforcement, if required, will be detailed in the plans.

Phase II Panel to Wire Basket connection detail, and limits of special panels at curved wall corner shall be shown. The back of each panel shall be logically numbered with its location.

- (c) Wall Elevations. Except for the top of the leveling pad, wall elevations given on the plans are based on the desirable wall height. The actual panel and reinforcement elevations shall be marked on the shop drawings by taking into account the supplied panel as well as special panel heights for matching the front and top finished grade.

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Revision of Section 504
Concrete Panel Facing Phased Built GRS Wall

- (d) Soil Reinforcement Material. The soil reinforcement type, Minimum Average Roll Value of the Ultimate tensile strength T_{ULT} (MARV) for geosynthetic soil reinforcement, spacing, lengths, elevations, and the corresponding wall design height shall be shown on the shop drawings. The starting and ending stations for change in grade of reinforcement material shall be shown for walls with different grade of reinforcement material at the same elevation. Material grade shall be clearly identified on each roll of reinforcement to avoid errors in placement. Spacing (1'-0" Typ.) of the reinforcement layers shall be as specified in the plans.
- (e) The soil reinforcement length (RL). The soil reinforcement length for phase I wire basket wall shall be measured from front face of wire basket to the end of soil reinforcement as measured to the neat end. Soil reinforcement lengths shall not be less than the lengths specified on the plans.

The Reinforcement Lengths shown on the shop drawings shall be the reinforcement length required for internal stability and pull out only. External Stability (bearing pressure, sliding, and overturning) and global stability shall already be checked by the design Engineer of record.

(f) Panel Size and Soil Reinforcement Spacing.

1. Except for full height panels, the maximum panel size is 50 square feet and the minimum panel height shall be 30 inches.
2. For full height panels, the maximum panel width shall be 10 feet and the maximum panel height shall be 28 feet. Differential deflection between adjacent panels shall be limited to 1/500. The vendor shall supply design calculations regarding panel concrete crack size control during shipment and construction and estimated joint width and differential deflection limits. The use of full height panels with widths greater than 10 feet or heights greater than 40 feet shall be as approved by CDOT.
3. The maximum vertical spacing between layers of adjacent soil reinforcement shall not exceed 12 inches. Except the half height panel used at the top and bottom of wall, including all partial and extended height panels at the top of wall, there shall be at least two connectors per panel/basket interface.
4. Shiplap joints shall be required at horizontal and vertical joints for segmental panel walls and all vertical joints for full height panel walls. The gap between two adjacent panels shall be ½ to 1 inch. Shiplap joints are not required at the vertical joints of segmental and full height panel. A minimum of 12 inches depth of continuous Class 2 Geotextile is installed behind the joints as shown in the plans prior to Class D concrete infill between the Phase I wire basket and the Phase II panel.
5. Geotextile (Class 2) will not be measured and paid for separately but shall be included in the work. Neoprene cushions shall be provided at all horizontal joints as shown in the plans.

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(g) Long Term Design Strength (LTDS) of Reinforcement.

1. The design charts on the plans define the strengths required for the zone of mechanical reinforcement of soil. Based on the total summed LTDS, the reinforcement proposed by the shop drawings for a specific wall height shall meet or exceed the total LTDS shown on the plans. This proposed reinforcement shall allow for a maximum of plus or minus 15 percent variation in each individual layer.
2. Metallic (Inextensible) Soil Reinforcement not allowed.
3. Geosynthetic Soil Reinforcement. Geosynthetic soil reinforcement shall be a woven geotextile. For polyester (PET), polypropylene (PP), and high-density polyethylene (HDPE) reinforcement, the LTDS of material shall be determined using the following K percentages to ensure the required design life. Unless otherwise specified, LTDS shall not exceed the following K percent of its ultimate tensile strength, T_{ULT} (MARV), i.e.

$$LTDS = K * T_{ULT} (MARV)$$

Alternative Text for above equation: L T D S equals K multiplied by T U L T, open parenthesis M A R V close parenthesis.

$$\text{Where } K = \frac{\phi}{RF(ID) \times RF(D) \times RF(CR)}$$

Alternative Text for above equation: K equals phi divided by the product of R F of I D, R F of D, and R F of C R

RF(ID): Installation damage reduction factor

RF(D): Durability reduction factor

RF(CR): Creep reduction factor

Meet AASHTO LRFD and/or FHWA GRS design method for 75 years design life.

(1) Geogrid or Geofabric sheet reinforcement (HDPE, PET, PP):

Products	K (Geogrid)	K (Fabric)
PE & PP	27%	18%
PET	35%	30%

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(2) Woven Geotextile will meet minimum bi-axial MARV of ultimate tensile of 4800 pounds/feet and a minimum tensile strength of 2400 pounds/feet at 5 percent strain based on ASTM D4595.

(3) All products not listed above: Follow AASHTO equations 11.10.6.4.3b-1 & 11.10.6.4.3b-2 using independently certified test results.

- (h) Design Heights and Supplied Reinforcing Material. Unless otherwise defined on the plans, the wall design height shall be measured vertically from the top of the leveling pad to the top of the concrete rail anchoring slab for walls with railing, or to the top of the precast concrete coping for walls without railing. For walls that are in front of a bridge abutment that is founded on a MSE foundation, the design height used to determine the soil reinforcement length shall be measured vertically from the top of the leveling pad to the top of the roadway carried by the bridge and the wall. Bridge approach slabs shall not be considered in the design of the GRS wall.

For geosynthetic reinforcement, if the default geofabric with 1 foot - 0 inches spacing is not used, the required reinforcement LTDS and the supplied LTDS (determined in accordance with the K factors or depletion of material as defined above) with corresponding brand and grade of material shall be marked clearly on the elevation view or in a tabulation summary CDOT approval. The LTDS of the supplied reinforcement grade must meet or exceed the required LTDS corresponding to the reinforcement spacing provided.

- (i) Tiered Walls. For the reinforcement layouts of tiered walls, the overall geometry, the reinforcement length, and the sum of the LTDS provided from all layers in all tiers shall be in close conformity with the retaining wall system shown on the plans in order to ensure that local, global, and internal stability requirements have been met.
- (j) Obstructions. Details for the placement of soil reinforcement around obstructions (i.e., steel piles, concrete piers, concrete boxes, pipes, etc.) shall be shown on the shop drawings. Design calculations shall be provided showing that the internal stability of the wall meets the required safety factors in the area of the obstruction.
- (k) Table of Quantities. **Not Required if default Geofabric with 1 foot - 0 inches spacing is used.** A table comparing the Structural Backfill (Class 1), Mechanically Reinforced Soil (MRS), Geomembrane, and Panel Facing quantities shown on the plans to the quantities shown in the shop drawings and percent difference (positive percent indicates an increase in shop drawing quantities from the plans) shall be shown on the shop drawings. Structure Backfill (Class 1), Geogrid Reinforced Soil, Geomembrane, and Panel Facing quantities shall be calculated in accordance with the Contract.
- (l) Placement Schedule. **Not Required if default Geofabric with 1 foot - 0 inches spacing is used.** Geomembrane placement schedule and clearances to soil reinforcements shall be shown.
- (m) Vertical Slip Joints. Locations of vertical slip joints for differential settlement relief shall be as specified in subsection 504.16.

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504.03 Backfill. Unless otherwise specified on the plans, wall backfill material in the reinforced structure backfill zone and the associated trapezoidal retained structure backfill zone shall conform to the requirements for Structure Backfill (Class 1) of Section 206. For reinforcement tensile stress and associated pullout, a friction angle of 34 degrees shall be assumed for Structure Backfill (Class 1). With the installation of isolation geomembrane, Structure Backfill (Class 1) shall be considered to be non-aggressive soil for corrosion and durability computations. All reinforcing elements shall be designed to ensure a minimum design life of 75 years for permanent structures.

504.04 Leveling Pad. Concrete for the leveling pad shall be Concrete (Class D) conforming to the requirements of Section 601. Unless specified on the plans, the maximum vertical step shall be no greater than 36 inches. The leveling pad shall be reinforced only at the steps. When the toe of wall is founded on slope steeper than 1.5 (H) to 1 (V), the leveling pad shall be constructed with reinforced concrete with same reinforcing schedule as at its steps. Leveling pad concrete shall be cured for at least 12 hours before placement of the concrete panels. To avoid panel cracking from high contact points, a ¼ inch thick expansion joint material with the same thickness as the panels may be installed between the first layer of panels and the leveling pad.

504.05 Geomembrane and Joint. A Geomembrane shall be installed on all walls at the top of the reinforced structure backfill zone and retained structure backfill zone to intercept surface runoff and prevent salt penetration into the backfill of the wall, as shown on the plans. The Geomembrane shall meet the requirements of subsection 712.07 (a) for geomembrane and be LLDPE with a minimum thickness of 30 mils. It shall be spliced with a dual track field seamed joint in accordance with ASTM D4437 or ASTM D5820. For small local coverage areas, less than 30 square feet, the membrane may be spliced using a 6-inch minimum overlap and an adhesive or a single seam portable thermal welding tool, as suggested by the membrane manufacturer and approved by CDOT. Unless otherwise shown on the plans, the membrane shall have a minimum coverage length measured perpendicular to the wall face of at least the wall Design Height (DH) plus Soil Reinforcement Length (RL) plus 1.5 feet. The membrane shall be installed with a slope between 20:1 (minimum) and 10:1 (maximum), as shown in the plans, from the panel facing to a drainage system located at the cut or pre-filled slope as shown on the plans.

The drainage system shall consist of a 12-inch-wide Geo-Composite strip drain inserted into a slot in the Geomembrane, at 10-foot maximum spacing, that collects the water from the membrane and conveys it to a water collector system at the toe of the 1:1 slope as shown on the plans. The water collector system shall consist of a 4-inch diameter perforated collector pipe surrounded by Filter Material Class B and wrapped with Class 1 Geotextile. A 4-inch diameter non-perforated drain pipe, at 100-foot maximum spacing, shall be used to discharge the water in the water collector system out the face of the wall.

For complex geometry (such as structural skew, superelevation, tiered wall, and staged construction), a detailed layout of the membrane and drainage system shall be provided as working drawings in accordance with subsection 105.02 by the Contractor and as approved by CDOT.

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For tiered walls, a Geomembrane shall be installed between the top of the bottom wall and the toe of the top wall as shown on the plans.

504.06 Pre-Cast Concrete Panel Facing Unit and Panel Joint Material. The pre-cast concrete panels shall conform to the requirements shown on the plans and these specifications including the color, texture, dimensions, and pattern. These facing units shall be factory made with Class B Concrete with the following additional requirements:

- (1) Minimum Cementitious Content specified by contract. Approved mix design shall be used per the contract.
- (2) Ambient form temperature: shall be a minimum of 40° F and rising when casting panels.
- (3) Pre-cast panels shall be cured in accordance with NPCA, QC Manual Chapter 4, section 4.5.
- (4) NPCA, QC Manual shall contain: Safety, pre- and post-pour inspection criteria and procedures; applicable ASTM standards for concrete testing procedures, personnel qualifications, certifications, equipment calibrations, and repair procedures for precast units. The NPCA, QC Manual shall be submitted to the governing agency upon request. Proof of conformance to specific federal, state, or local standards shall be maintained on file at the fabrication location.
- (5) Lifting Inserts / Lifting Hardware materials used in precast concrete products shall be verified for capacity, and shall have an adequate factor of safety, taking into account the various forces acting on the device(s), including form release suction, impact, and various positioning of the product during handling. (OSHA 29 CFR 1926.704(d))
- (6) Pre-Pour / Post-Pour Operations inspections shall be performed and documented per the procedures outlined in the Quality Control Manual.
- (7) Hot and Cold Weather Precautions: During hot weather, the concrete temperature, at the time of placement, shall not exceed 90 degrees F. Hot weather is defined as: High ambient temperature, High concrete temperature, Solar radiation, and wind. During cold weather, the concrete temperature, at the time of placement, shall not be less than 50 degrees F. Cold weather is defined as: Average daily temperature is less than 45 degrees F. The ambient temperature is not greater than 50 degrees F. for more than one-half of any 24-hour period.
- (8) Concrete Curing: Moisture retention and control of hydration curing temperatures shall be maintained. The maximum hydration curing temperature shall not exceed 150 degrees F.

Reinforcing steel shall conform to the requirements of Section 602 of the specifications. The concrete in the pre-cast units shall be compacted using a vibrating table, grid vibrator, or screed vibrator. All panels shall be cast face down on flat, level surface.

Panel dimensions and facing treatment shall conform to the architectural requirements shown on the plans. Width of panel from center to center of joint shall be an even whole increment of the pattern dimensions selected to match the architectural treatment. Thickness shall be a minimum of 6 inches plus the depth of rustication. Panel shall be cast to the dimension that accommodates the architectural treatment.

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Panels may be longer than 5 feet, provided their section strength can be shown to accommodate handling and erection without cracking. Soil reinforcement attachment devices shall be within 1 inch of shop drawing locations. All unit dimensions shall be within ¼ inch of plan. Concrete surface for the front face of the wall shall match the architectural treatment requirements and structural concrete color shown on the plans. Squareness determined by the difference between two diagonals, shall not exceed ½ inch. Surface defects on the front face textured surface, shall not exceed $\frac{3}{16}$ inch when measured with a 5-foot straight edge, except when intentionally roughened.

CDOT shall be allowed access to the manufacturer's facilities to inspect and sample units from lots prior to delivery with a minimum of 2 working days' advance notice. CDOT will reject any concrete panels which do not meet the requirements of this specification. Panels shall not be shipped until the concrete strength, at the time of shipping, is greater than 0.9 times f'_c . The Contractor shall notify CDOT in writing at least 3 working days before shipment of panels begins.

At horizontal joints, a cellular type or molded expansion joint material shall be placed and shall be a size suggested by the supplier and approved by CDOT.

504.07 Certifications, Calculations and Testing Reports. The Contractor shall provide the following reports, certifications, calculations, and checklists as needed to accompany the shop drawing submittal. All engineering calculations, as stated in subsections 504.07(f), 504.07(g), 504.07(j), 504.07(k), 504.12(e), 504.12 (f), 504.12(g), and 504.12(i) shall be certified and stamped by a Professional Engineer licensed in the State of Colorado.

- (a) Certification of T_{ULT} (MARV). For geo-synthetic reinforced system only, the Contractor shall submit a certification letter from the manufacturer which provides the T_{ULT} (MARV) and certifies the T_{ULT} (MARV) of the supplied materials have been determined in accordance with ASTM D4595 or ASTM D6637 as appropriate.
- (b) Mill Report for Metallic Reinforcements and Connectors. This includes, but is not limited to, mill certifications on weldability, ultimate tensile, and yield strength.
- (c) Report of The Panel-Reinforcement Connection Test. ****Not required unless proposed soil reinforcement deviates from the standard plans.**** The test report shall be prepared and certified by an independent laboratory. The panel to reinforcement connection test method shall conform to the industrial standards. The report shall provide data on the ultimate as well as service limit state.
- (d) Report for Soil to Reinforcement Interface Pullout Test. ****Not required unless proposed soil reinforcement deviates from the standard plans.**** The test report shall be prepared and certified by an independent laboratory. The soil to reinforcement interface pullout test method shall conform to the requirements of ASTM D6706. Tests shall include the full range of overburden pressures defined by wall design heights.

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- (e) Certification of Facial Panel to Wire Basket Long-Term Connection Strength. ****Not required unless specified in the plans.**** Certification shall include calculations to demonstrate that the facial panel to reinforcement connection meets or exceeds current AASHTO 75 years design life requirements.
- (f) Certification of Reinforcement Pullout. ****Not required unless proposed soil reinforcement deviates from the standard plans.**** Certification shall be provided with detailed calculations to demonstrate that reinforcement pullouts meet or exceed current AASHTO requirements. For metal reinforcement breakage and pullout, calculations shall include a combination of 75 years material depletion of carbon steel and galvanization loss.
- (g) Report and Certification for the Initial Concrete Compression Strength, Shipping and Handling Stress. Cylinder compressive test is acceptable to verify the initial concrete strength of panel at time of shipping. Concrete tensile stress shall not exceed the modulus of rupture. Report shall include calculations of panel cracking stress according to the proposed method of lifting and shipping. Before panel shipping from precast yard to wall site, the Contractor's Engineer will approve the time of shipping, method of lifting, and supporting condition during shipping as well as storage condition at the site before panel installation. Products shall conform to PCI MNL 117, 120, 122, and 127 as applicable.
- (h) Calculations. ****Not required unless proposed soil reinforcement deviates from the standard plans.**** Calculation of the LTDS of reinforcement shall conform to AASHTO LRFD requirements.
- (i) Efflorescence and Air Content Test. Panel shall be visually efflorescence free. Efflorescence control agent shall be used in concrete mix design. When fly ash is used as the efflorescence control agent, the fly ash shall be ASTM C618 Class F fly ash and shall be a minimum of 20 percent by weight of the total cementitious material content. Air Content shall be determined in accordance with AASHTO T152. Concrete shall be tested a minimum of the first three batches each day and then once per five batches for the rest of the day to assure specified air entrainment.
- (j) Submittal Checklist. The Contractor shall submit the Panel Faced MSE (or as approved for GRS) Wall Submittal Checklist, Form 1402 with the Certifications, Calculations and Testing Report submittal package included with the shop drawing submittal.

504.08 Hybrid or Smaller Panel MSE Wall Systems.

Only Micropile A-Frame wall systems are allowed. System is subject to all requirements in this project special provision. Installation of micropiles through fabrics allowed with required pre-installed sacrificial pilot pipes.

The Contractor shall submit the dry cast facing MSE Wall Submittal Checklist, Form 1401 or the wet cast facing MSE Wall Submittal Checklist, Form 1402, with the Certifications, Calculations and Testing Report submittal package included with the shop drawing submittal.

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Construction Requirements

504.09 Approval and Qualifications of GRS (or MSE equivalent) Wall Installer. The job site wall foreman shall have experience in construction of at least five transportation related GRS walls within the last three years. Transportation related GRS walls are walls that carry or are adjacent to vehicular traffic and are constructed with MSE reinforcement in the reinforced structure backfill zone. The foreman must have prior experience or adequate training on the products that the Contractor elects to use in the project. The resume and credentials of the foreman shall be submitted to CDOT for approval prior to the pre-construction meeting. The foreman shall be on the site for 100 percent of time during which the work is being done.

504.10 Wall Test Segment. The wall test segment shall be the first segment of the wall constructed. The wall test segment shall be constructed in the presence of the Technical Representative and CDOT and shall include construction of each of the 5 elements listed in 504.15 below. The minimum length of the wall test segment shall be 40 feet or the full length of the wall if less than 40 feet. A wall test segment shall be constructed for the first wall constructed from each wall product used on the project.

504.11 Technical Representative of Wall Product Supplier. ****Not required unless specified in the plans.**** The Contractor shall arrange for a technical representative (Tech Rep) of the manufacturer of the selected wall products to be present during the construction of each wall test segment. If the selected wall products are supplied from different manufacturers, a Tech Rep from each wall product shall be present. The Tech Rep shall be present for construction of the wall test segment and each of the following elements:

- (1) Placement of a minimum of the first four layers of primary soil reinforcement and backfill,
- (2) If obstructions (i.e., steel piles, concrete piers/abutments, concrete boxes, pipes, etc.) exist, placement of primary soil reinforcement and backfill at obstructions,
- (3) Placement of a minimum of the first two rows of panels or a minimum of a 4-foot wall height,
- (4) If a vertical slip joint is required, construction of the vertical slip joint in a minimum of a two row portion of panels or a minimum of a 4-foot wall height, and
- (5) If corners are required, construction of a corner representative of the corners in the wall in the project, in a minimum of a two row portion of panels, or a minimum of a 4-foot wall height.

Before construction of the wall test segment, the Tech Rep shall provide the Contractor and CDOT the following:

- (1) Technical instructions as required in the construction of the earth retaining wall system.
- (2) Product specific specifications in the placement of the soil reinforcement and backfill in accordance with the wall system.
- (3) Guidelines in placing the facing units and attaching them to the soil reinforcement in accordance with the system requirements.

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(4) Provide technical assistance to the facing unit fabricator.

At the completion of the wall test segment, the Tech Rep shall provide the following:

- (1) Documentation that the wall test segment was constructed in accordance with the product specific specifications. This documentation shall include a location description (starting and ending stations and elevations) of the wall test segment.
- (2) Documentation that the job site wall foreman is familiar with the wall products used to construct the walls on the project.

After completion of the wall test segment, the Tech Rep shall be available whenever there is any special field condition such as change of geological condition, when there are equipment or personnel changes, or when requested by CDOT.

504.12 Facial Panel Quality Control, Placing Plan and Daily Placement Logs. Before the start of wall construction, the Contractor shall provide a panel-placing plan and shall supply daily placement logs to CDOT weekly and at the completion of the wall. The daily placement log shall consist of an elevation view of the wall showing the dates, number of panels placed, and the serial numbers of the panels placed. The panel quality control shall contain multiple submittals if required by subsections 504.12(g) and (h). Panels shall be labeled with serial number for each panel and corresponding certification with one set of random samples tested for each 220 panels or 5500 square foot of wall face.

At least one certification with supporting test results is required for each wall. Test results will be reviewed and pre-approved by CDOT before shipment. The Contractor shall coordinate and mark the panel and backfill placing sequence on the daily placement logs. The log serves as means for CDOT to identify where each panel was placed.

504.13 Wall with Curved Alignments, Tight Curved Corners, and Sections Adjacent To Bridge Abutment. The Contractor shall provide a placement plan that shows curved layouts, special corner panel, sequence of panel placement, and construction offsets as recommended by the manufacturer. For tight curved corners, 8-foot radius or less, and dissimilar foundations such as bridge abutment, to avoid panels with random cracks, the Contractor shall install vertical slip joints as shown on the shop drawings.

504.13 Excavation and Backfill. The base of leveling pad shall receive the same compaction as cut area required by subsection 203.07. The Contractor shall report to CDOT in writing density test results for any unsatisfactory bearing material that does not meet the minimum 90 percent compaction for walls less than 16 feet high and 95 percent of T-180 for walls higher than 16 feet. If the excavation for the placement of the leveling pad exposes an unsatisfactory bearing material, CDOT may require removal and replacement of that material. The removed material shall be replaced with Structure Backfill (Class 1) compacted in conformance with subsection 206.03. CDOT, with the assistance of the geotechnical engineer of record, will provide the limits including the depth of removal. As directed by CDOT, and if required, Structure Backfill (Class 1) shall be reinforced with soil reinforcements in conjunction with wick drains and outlet pipes.

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The Contractor shall grade the foundation for the bottom of the wall for a width equal to or exceeding the limits of the Reinforcement Length (RL) plus 18 inches as shown on the plans. This graded area shall be compacted with an appropriate vibratory roller weighing a minimum of 8 tons for at least five passes or as directed by CDOT. For cut wall with continuous seepage, phasing of foundation construction or a different drainage and foundation improvement plan may be necessary.

The reinforced structure backfill zone and the retained structure backfill zone portion immediately behind the wall, as defined on the plans, shall be Structure Backfill (Class 1). Recycled asphalt, recycled concrete, and flow-fill material shall not be substituted for Structure Backfill (Class 1). Each compacted layer of backfill within a distance equal to the reinforcement spacing away from the back of the panels shall not exceed 4 inches. The triangular or trapezoidal portion behind the concrete panels and above the spill of backfill, as shown on the plans, shall be filled with $\frac{3}{8}$ " inch crushed rock, filter aggregates with filter fabric, or wall system specific fill as approved by CDOT.

Density tests behind and parallel to the wall in the triangular or trapezoidal portion above the backfill spill zone are not required. Each compacted layer of backfill shall be in even increments up to 8 inches thick. The fill and compaction operation shall start 3 feet from the wall back face and progress toward the end of the reinforcement. All Structure Backfill (Class 1), including fill material under the wall and on-site material as allowed by subsection 504.08, shall be compacted to a density of at least 95 percent of the maximum density according to AASHTO T 180. For on-site foundation material containing more than 30 percent retained on the $\frac{3}{4}$ inch sieve, a method of compaction consisting of a conventional heavy vibratory roller, starting with minimum 5 passes, shall be used to establish the number of passes required to exceed the 95 percent T180.

At least 6 inches of material shall be in place prior to operation of tracked vehicles over soil with reinforcement. Only power operated roller or plate compaction equipment weighing less than 1,000 pounds is allowed within 3 feet of the front of the wall face. The reinforcement shall not be connected to the wall until the compacted fill is at or slightly higher than the location of the connector.

Backfill containing frost or frozen lumps shall not be used. Backfill that has been placed and becomes frozen shall be removed and replaced at the Contractor's expense. If cold weather conditions prevent the placement of Structure Backfill (Class 1), the Contractor may use Filter Material Class B as backfill without compaction at the Contractor's expense and approved by CDOT. The Contractor shall provide a test report, prepared and certified by an independent laboratory, that the internal friction angle of soil for the Filter Material Class B meets or exceeds that shown on the plans.

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The Contractor shall place additional panels, including partial height panels and properly compacted fill material, to return the finished grade to the plan elevations if settlement, as determined by CDOT, has occurred. A final inspection before the installation of rail anchoring slab will be made after construction settlement, if any, has occurred or 30 days after the completion of the wall. The Contractor shall provide immediate temporary storm water protection and wind erosion control at the end of each day during construction. If settlement occurs as the result of loss of backfill due to wind or water erosion, nonconforming backfill such as frozen fill or over-saturated fill, or if the backfill does not meet compaction requirements, the Contractor shall remove the backfill, wash the soil reinforcement, and bring the elevation to the finished grade at the Contractor's expense. Before final project acceptance, the Contractor shall repair any backfill losses due to wind and water erosion.

To avoid the foundation of the leveling pad being washed out by rain, the area in front of the wall and around the leveling pad shall be backfilled as soon as practicable.

504.15 Reinforcement. Geosynthetic reinforcement shall be slightly pre-tensioned. The minimum coverage ratio for woven fabric reinforcement shall be 100 percent and an overlap between rolls is not required. Soil reinforcement shall not be cut to avoid obstruction unless shown on the shop drawings. Equivalent strength geogrid may be used above the waterproofing membrane.

504.16 Leveling Pad. The foundation of the leveling pads shall meet the requirement of subsection 504.09 for steel and concrete. The leveling pad shall be level within the tolerance of $\frac{1}{8}$ inch for any two points along the length of a panel, and within $\frac{1}{4}$ inch for any two points 10 feet apart. If the wall is not level, the panels will bind against each other causing spall of the edges and corners.

Cushion or shimming material (Expansion Joint Material, Concrete Mortar Grout, Roofing Felt, or Geosynthetic Reinforcement) shall be used to support panels directly founded on the leveling pad. Before starting a new course of panels, the Contractor shall take steps to ensure that the wall elevations are matched at the neighboring panels. Cushion or shimming material shall be used to obtain necessary panel elevations at next leveling pad step. No more than 2 shims (each 3/16-inch-thick) should be required to level the panels on the leveling pad.

504.17 Wooden Wedges. Wooden wedges are used to help to hold the panels at the correct batter during the backfill operation. The wooden wedges shall be made from hard wood (such as oak, maple, or ash). Wooden wedges shall be removed as soon as the precast panels above the wedged panels are completely erected and backfilled. There shall not be more than three rows of wooden wedges in place at one time. Panels that crack or spall due to failure to remove the wooden wedges shall be repaired or replaced.

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504.18 Panel Facing. For walls that support a roadway, the wall layout line at the leveling pad shall be setback and pre-measured with appropriate batter (5 to 8 percent) from the top of the panels according to the offset with respect to the centerline of the road. For walls adjacent to a roadway, the wall layout line at the leveling pad shall be directly offset from the centerline of the road. An overall negative batter (wall face leaning outward) between the bottom and the top of the wall is not allowed. Unless otherwise noted on the plans for battered walls, the final wall face shall be vertical, or have a positive batter of not greater than 5 percent for construction control purpose. The surface of the wall face shall be tested with a 10-foot straightedge laid along the surface in horizontal and vertical directions. Except as necessary for horizontal alignment of the wall, convex deviation of the wall face from the straightedge (belly wall) shall not be allowed, and concave deviation from the straightedge shall be less than $\frac{1}{2}$ inch.

Walls without a rail-anchoring slab, cast-in-place reinforced concrete coping with uniform exposed height is required to match the required finished elevations as well as to retain the panels' lateral deformation. For walls with rail anchoring slabs, the top of panel elevations shall be within 8 inches of the bottom of the anchoring slab. Cast-in-place concrete or saw-cut partial height panels may be used to accomplish this.

Where the Geomembrane for drainage interferes with the continuation of reinforcement, the panels beyond the termination shall be reinforced with the same grade of additional soil reinforcing material to maintain the total amount of reinforcement per panel. To avoid leaking or soil erosion through the joint, a filter fabric at least 12 inches wide shall be glued to the panels behind all vertical joints.

As shown on the plans, facing panels directly exposed to spray from deiced pavements and indirect windborne spray shall have three coats of water resistant or repellant concrete sealer applied to the front face of the wall before the wall is opening to traffic.

For completed wall or parts of completed wall, before final payment, any damages including blemish and discoloring of panel shall be replaced or repaired. Sand blasting may be used if accepted by CDOT.

504.19 Fill under Leveling Pad. For walls requiring fill under the planned elevation of the leveling pad, the Contractor may lower the elevation of the leveling pad as approved by CDOT, except that the finished elevation at the top of the wall shall not be altered. As requested by the Contractor, and with CDOT's approval, the higher wall shall be redesigned with longer reinforcement length and revised reinforcement schedule.

Revision of Section 506
Riprap

Section 506 of the Standard Specifications is hereby revised for this project as follows:

Subsection 506.02, first paragraph, delete the third sentence and replace with the following:

The stone shall have a minimum specific gravity of 2.25. Where the specific gravity used in design is greater than the minimum, the stone shall meet the requirements of the design specific gravity.

Subsection 506.02, second paragraph, shall include the following:

Shale shall not be used as riprap.

Subsection 506.02, fourth paragraph, delete the first sentence and replace with the following:

The Contractor shall ensure the final placed product meets the gradation requirement. Control of gradation will be by Wolman count. For source approval, test individual riprap size by Wolman Count according to FLH T 521.

Riprap that segregates during transport shall require mixing or re-mixing on-site.

Subsection 506.03, first paragraph, delete the first sentence and replace with the following:

Place riprap to achieve gradation.

**Revision of Sections 509 and 708
Painting of Aluminum Access Doors for Steel Structures**

Sections 509 and 708 of the Standard Specifications are hereby revised for this project as follows:

Subsection 509.24 shall include the following:

Aluminum access doors shall receive a solvent cleaning to remove grease, oil, etc. (SSPC-SPI), followed by a brush blast to provide a profile similar to the structural steel. The access doors shall receive one coat of primer as described in the Revision of Section 708.03.

Subsection 708.03 shall include the following:

If Alternate 1, Alkyd System, is to be used on the structural steel, the aluminum access doors shall receive one coat of vinyl wash primer conforming to Mil-P-15328. Following the application of this primer, the doors will be painted the same as the structural steel (one field coat of primer followed by the top coat). Coating thicknesses shall be the same as specified for the structural steel.

If Alternate 2, Inorganic Zinc-Rich Polyurethane System, is used on the structural steel, the aluminum access doors shall receive one coat of vinyl wash primer conforming to Mil-P-15328. Following application of the vinyl wash primer, the same polyurethane top coat as used on the structural steel shall be applied to the access doors (minimum 3.0 mils dry film thickness).

The manufacturer of the primer shall certify in writing, that the primer used is compatible with the cleaned aluminum access doors and the polyurethane top coat to be used on the structural steel.

**Revision of Section 513
Bridge Drain**

Section 513 is hereby added to the Standard Specifications for this project as follows:

Description

513.01 This work shall consist of furnishing and placing bridge drains in accordance with the details shown on the plans and the specifications.

Materials

513.02 Pipe for bridge drains shall meet the requirements of ASTM A53 and shall be standard weight.

Down spout pipe shall be hot dipped galvanized after fabrication. Galvanizing shall meet the requirements of AASHTO M111.

Metal used in the manufacture of castings shall meet the requirements of ASTM A48 Class 35B.

Construction Requirements

513.03 Bridge drains shall be placed and secured at the locations shown on the plans prior to placement of concrete.

Prior to fabrication of this item, two sets of working drawings which comply with the requirements of Section 105 shall be submitted to CDOT for information only. The working drawings will not be approved or returned.

**Revision of Section 522
Environmental Stain (Galvanized)**

Section 522 of the Standard Specifications is hereby revised for this project to include the following.

Description

This work consists of applying an environmentally and animal safe, non-caustic, non-pigment based surface stain to all visible galvanized steel surfaces including galvanized steel supports to achieve the specified color, as shown on the Plans.

Materials

Environmental surface stain shall consist of a clear, soluble solution of natural elements and soft, buffered organic acids. No pigment based colorants shall be added to achieve the desired color. The stain shall react with the target surface over a period of 7 - 21 days to produce a consistent color and matte finish as specified on the plans, and as approved by CDOT. The stain shall be resistant to fading in the sun and have a minimum life expectancy of 25 years.

In all situations involving the approval of submittals, the Contractor shall coordinate with CDOT.

Construction Requirements

The Contractor shall submit a copy of the manufacturer's product Safety Data Sheet for all related products (including cleaning agents) together with instructions for application of stain a minimum of 5 days prior to staining the sample section. Proposed methods to control overspray, spillage, and protection of adjacent surfaces shall be submitted in writing for approval by CDOT. Staining shall not begin until written approval of these methods has been received.

- (a) **Stain Sample.** The Contractor shall apply stain to a minimum 12-inch sample section of galvanized metal. If staining will occur onsite, the Contractor shall stain the sample in the presence of CDOT. The Contractor shall notify CDOT a minimum of 7 days prior to staining the sample section. The Contractor shall prepare and stain the sample section with the same materials, tools, equipment, and methods to be used in staining final surfaces. The applied stain shall be allowed to cure for a minimum of 21 days. The sample shall be submitted to CDOT for approval. The cost of materials and labor necessary to achieve the accepted sample shall be included in the price of the work. In the event more than one sample section is required, each additional sample shall be included in the price of the work. The Contractor shall use the approved sample as the standard of comparison in determining acceptability of staining.
- (b) **Stain Application.** Prior to application of the stain onto the metal surface, excessive oils, dirt, and other contaminants shall be cleaned with cleaning agents conforming to the manufacturer's recommendations and approved by CDOT. All surfaces shall be dry before application of stain.

Stain shall be applied in accordance with manufacturer's recommendations to achieve a color consistent with the approved sample.

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Revision of Section 522
Environmental Stain (Galvanized)

If spray application is used, the Contractor shall follow manufacturer's recommendations. The Contractor shall minimize overspray on undesired surfaces and protect adjacent surfaces from overspray. Spray application shall not be performed under windy or rainy conditions. Stain shall be applied uniformly, free from sags, runs, or defects of any kind. Irregularities shall be corrected according to the stain manufacturer's recommendations. Stained surfaces shall be kept dry for a period of 5 days following the application of stain.

If Immersion application is used, the Contractor shall immerse the structure in a controlled area following manufacturer's recommendations. The Contractor shall minimize splashing, dripping, and runoff on surfaces not intended for stain application. The structure shall have a uniform appearance, free from sags, runs, or defects of any kind. Irregularities shall be corrected according to the manufacturer's recommendations. Stained surfaces shall be kept dry for a period of 5 days following the application of stain.

- Multiple applications, per manufacturers' recommendations, may be required to achieve the color of the approved stain sample.
 - Final approval of products by CDOT will occur when stain has achieved the color of the approved stain sample.
 - All substandard items not achieving the color of the approved stain sample will be rejected.
- (a) Storage of Materials. Stained surfaces shall be stored properly at the construction yard after delivery, before, and up to the time of installation. If components stack (e.g., guardrail), spacers shall be placed between rows to allow for necessary airflow. Items shall be stacked perpendicular to the ground, sloped to allow for proper drainage. Items shall be elevated so they do not come into direct contact with soil or plant matter. The Contractor shall also conform to other standard storage procedures and manufacturer recommendations regarding storage. It is the responsibility of the Contractor to ensure that all components are stored properly on site.
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**Revision of Section 601
Painting of Aluminum Access Doors
For Concrete Structures**

Section 601 of the Standard Specifications is hereby revised for this project as follows:

Subsection 601.14(b)4 shall include the following:

Aluminum access doors shall receive a solvent cleaning to remove grease and oil (SSPC-SPI) followed by a brush blast.

The aluminum access doors shall receive one coat of vinyl wash primer conforming to Mil-P-15328. Following the application of this primer, the doors will be coated with Structural Concrete Coating conforming to Revision of Section 601 Structural Concrete Coating.

The manufacturer of the primer shall certify in writing, that the primer used is compatible with the cleaned aluminum access doors and the Structural Concrete Coating to be used on the Structural Concrete.

**Revision of Sections 601 And 708
Structural Concrete Stain**

Sections 601 and 708 of the Standard Specifications are hereby revised to include the following:

Subsection 601.01 is revised to include the following:

This work consists of: (1) Class 1 ordinary surface finish of concrete to receive Concrete Stain; (2) sandblasting to remove form release agents and other deleterious material (3) providing and applying an opaque structural concrete stain to all concrete surfaces previously designated in the Contract to receive a structure concrete stain; and (4) provide up to 5-gallons of pre-mixed touch-up stain in aerosol spray cans.

The structural concrete stain shall be one of the following products or approved equals:

1. RAINSTOPPER RS400 - Semi Transparent Stain
Textured Coatings of America
Pro-Coat Systems, Inc.
5775 Stapleton Drive North
Denver, Colorado 80216
303-322-9009
2. "Acrylic" Structural Concrete Stain
Anchor Paint Co. of Denver, Inc.
641 South Jason
Denver, Colorado 80223-2305
303-744-2361
3. Bridge and Highway Concrete Sealer, B97-Series
The Sherwin-Williams Company
543A Santa Fe Drive
Denver, Colorado 80204
303-893-1303

Subsection 601.03 is revised to include the following:

Structural Concrete Stain as specified in subsection 708.08.

Subsection 601.09(f) is revised to include the following:

All concrete forms shall be treated with a water based concrete form release agent prior to placing reinforcement for surfaces to which structural concrete stain is to be applied.

Subsection 601.14(b)4 is deleted and replaced with the following:

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**Revisions of Sections 601 And 708
Structural Concrete Stain**

Unless otherwise shown in the Contract, the structural concrete stain shall be applied to all exposed concrete elements of the structure above the ground line, and shall extend 1 foot below the finished ground line. Bridge bearing devices, curb and barrier cover plates, fence, and steel bridge rail components shall be masked or otherwise protected to prevent structural concrete stain from coming into contact with them.

For Bridges, structural concrete stain (or paint for steel Structures) shall be applied to surfaces for each Structure and applied to exposed surfaces of bridge rails, exterior edges decks, deck overhangs, exterior girder outside and exposed flanges, exposed bottom flanges on interior girders, abutments to 1 foot below grade, pier columns to 1 foot below grade and wingwalls to 1 foot below grade. Stain limits on bridge rails shall apply to railings on approach slabs. All other visible, exposed, and accessible concrete surfaces shall have a surface treatment of structural concrete coating. Retaining walls, noise walls, and slope paving shall receive structural concrete coating unless noted otherwise.

The color of the Structural Concrete Stain shall have the written approval of CDOT prior to final batching and application on the project. The final color of the approved structural concrete stain shall be determined as follows:

1. The test panels shall be produced on the actual concrete surface on which the final product will be placed, at a location recommended by the Contractor and approved by CDOT. The stain shall be applied to the test panels by the same methods to be used in the final field application. CDOT will be allowed three business days for the stain to dry after stain application to the test panels.

Concrete finishing and curing shall be completed in accordance with the specification prior to the application of the Stain. The concrete finish to which the structural concrete stain is to be applied shall be a Class 1 Ordinary Finish, except as modified below:

1. Following curing of the concrete in accordance with Subsection 601.13, all projections and bulges shall be removed and the surface sandblasted. Sandblasting shall profile the concrete surface, remove all form release agents, and all other deleterious materials that would inhibit the bond of the Structural Concrete Stain. The profile of the sandblasted concrete surface shall be equivalent to Concrete Surface Profile Three (CSP 3) as defined in Technical Guideline No. 03732, "Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays" by the International Concrete Repair Institute. The Contractor shall provide a CSP 3 chip for use on the project.

A mortar mix, proportioned by volume, consisting of one part portland cement, two to three parts sand (conforming to the requirements of ASTM C 144), and an approved bonding agent shall be used to patch all holes produced by form ties, honeycombing, voids 1/2 inch or larger in any dimension, broken corners and edges, and other defects. The mortar mix shall include an approved bonding agent. The quantity and application procedure of the bonding agent shall be in accordance with the recommendations of the manufacturer of the bonding agent. Areas to be patched shall be moistened with water before the mortar is applied.

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**Revisions of Sections 601 And 708
Structural Concrete Stain**

2. Patched area shall be float finished and left flush with the concrete surface without checking or cracking of patches. Patching shall be done when the ambient temperature is at least 40°F. Holes deeper than 3/4 inch shall be filled in layers that do not exceed 1/2 inch in thickness.
3. Within 24 hours prior to applying structural concrete stain, the concrete surface to be coated shall be cleaned by water blasting at a minimum pressure of 3,000 psi and at a rate of 4 to 14 gallons/minute, to remove dust, dirt, and other materials that would inhibit bonding of the coating. If the surface is contaminated before application of the coating, it shall be re-cleaned as required prior to application of the coating.

New concrete shall be at least 28 Days old or as approved in writing by the stain manufacturer before it is applied.

Two coats of stain shall be applied. Each coat shall be applied at a rate of 200 to 250 square feet per gallon. (Approximately 3 mils dry film thickness.) The second coat shall not be applied until at least 12 hours after the application of the first coat

If the surface is contaminated between coats, it shall be re-cleaned as stated above prior to application of the next coat.

The stain shall be mixed mechanically and applied by spraying. Workmanship shall be such that the final stained surface is colored uniformly and presents a pleasing appearance. Any areas determined by CDOT to be insufficiently stained shall be re-stained.

The stain shall be applied only when the ambient temperature is between 40°F and 90°F, and is anticipated to remain above 40°F for a minimum of twenty-four hours. The surface to be stained shall be dry and free of frost.

Subsection 708.08 is revised to include the following:

708.08 Structural Concrete Stain. The Stain shall be a one-component, non-vapor barrier, solvent based acrylic resin. No sand or other texturing agents will be permitted.

Physical Properties

Solid by Weight: 51 percent, plus or minus 2 percent

Solids by Volume: 34 percent, plus or minus 2 percent

A material safety data sheet (MSDS) prepared in accordance with Federal Standard 313 and a complete set of manufacturers' mixing and application instructions shall be submitted to CDOT before the Contractor begins applying the Stain.

Revision of Section 603
Culvert Lining (UV-CIPP)

Section 603 of the Standard Specifications is hereby revised for this project as follows:

Subsection 603.01 shall include the following:

This work consists of furnishing and placing UV Cured-in-Place Pipe (UV-CIPP) as shown on the plans or as directed by the Engineer.

This practice covers the procedures for the lining of conduits by the pulled-in place installation of a resin-impregnated, glass fiber tube into an existing conduit followed by its inflation with compressed air pressure to expand it firmly against the wall surface of the host structure. The photo-initiated resin system in the tube is then cured by exposure to ultraviolet (UV) light. When cured, the finished UV cured-in-place pipe will be a continuous and tight-fitting pipe within a pipe.

Materials

Subsection 603.02 shall include the following:

Complete physical properties of the UV-CIPP pipe liner system shall comply with ASTM D578, ASTM F2019, ASTM F1216, and all applicable standards.

Construction Requirements

Subsection 603.03 shall include the following:

The Contractor shall submit UV-CIPP Design Calculations for liner wall thickness, installation, and cure plan stamped by a Colorado Licensed Professional Engineer to the Project Engineer prior to 10-days prior to work beginning, including at minimum:

UV-CIPP liner:

- a) Verify the size of the existing culvert shown on the plans with multiple measurements through the host pipe alignment prior to ordering any material for work.
- b) Proposed liner thickness to carry the roadway loading (HL-93) without the support of the host pipe.
- c) If proposed UV-CIPP liner thickness is greater than ½ inch, provide approval by manufacturer and example projects the UV light method will cure the proposed liner thickness for performance as specified.

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Revision of Section 603
Culvert Lining (UV-CIPP)

- 1) Installation Plan:
 - a. Include plan for inlet and outlet works for mobilizing and installing UV-CIPP
 - b. Demonstrate the proposed method is within working limits to withstand pulling and installation forces.
 - c. Void filling plan to include method of placement and method to seal holes in host pipe per manufacturer's recommendations for performance of the UC-CIPP liner.
 - d. Plan to include at minimum: access, materials, equipment, corrective actions to contain and remediate any accidental release of styrene-resin, and any other information as requested by Project Engineer.
 - e. The UV-CIPP liner will be continuous over the entire length of host pipe. Any deviation from a continuous liner will be submitted to the Project Engineer for approval.
 - f. Plan to protect UV-CIPP liner from damage caused by host pipe.
- 2) Cure plan:
 - a. Required pressure and methods to tightly fit liner to host pipe
 - b. Proposed UV-light timing
- 3) Restoration plan.
- 4) Any other information as requested by Project Engineer.
- 5) Size of the existing culvert pipe shall be shown on the plans. The Contractor shall measure the existing pipe at appropriate intervals throughout the length of the pipes and verify that the liner proposed on the plans will fit through the host pipe prior to ordering materials. It is the responsibility of the Contractor to verify the stationing/location of pipe dimensions and provide material and placement of the UV-CIPP accordingly. A minimum of 10 days prior to start of pipe preparation, the Contractor shall submit an outline of the methodology for performing the preparation work and the lining including the manufacturer's installation instructions. Work shall not begin until approval is received from the Project Engineer.

Prior to beginning any UV-CIPP sliplining work, the Contractor shall submit documentation to the Project Engineer certifying that individuals overseeing or performing the installation have successfully performed UV-CIPP work on at least five prior independent installations.

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Revision of Section 603
Culvert Lining (UV-CIPP)

The Contractor shall coordinate and perform an inspection of the existing condition of the pipes with the Project Engineer available to view results. After inspection of the existing pipes, the Contractor shall develop a methods statement describing the planned operations to repair and clean the pipes, if necessary. At a minimum, the proposal shall describe perforations of existing culvert to be lined, their extent, and methods proposed for correction by the Contractor, including:

- Necessary void grouting and backfilling
- Cutting or removing any intrusions or sharp ends in the host pipe before installation. Cut host pipe bolts flush with the nut or as per manufacturer's recommendation.
- Pre-lining if groundwater is present. The proposal shall describe conditions found that may prevent proper installation of the pipe liner (such as any sharp or protruding appurtenances), and methods proposed by the Contractor for correction of the conditions. In addition, the proposal shall describe perforations of the existing culvert to be lined, their extent, and methods proposed for correction by the Contractor. The proposal shall describe the Contractor's proposed procedures and schedules for installing the pipe liner. Cost of preparing and submitting this proposal shall be included in the work. The proposal shall be reviewed and approved by the Project Engineer prior to work beginning.

During the installation of the UV-CIPP liner pipe, the Contractor shall provide all necessary protection to prevent damage to the UV-CIPP liner pipe and the existing culvert. UV-CIPP liner shall be installed per product manufacturer's requirements.

It shall be the Contractor's responsibility to take immediate and appropriate corrective actions to contain and remediate any accidental release of styrene-resin materials, effluent, or condensate into the environment in accordance with applicable local, state, or federal regulations. The cost for such remediation shall be at the Contractor's expense.

The Contractor shall provide for the control and diversion of flows in the existing culvert being rehabilitated. The bypass system shall be of adequate capacity and size to handle the flow. The bypass flow shall not cause additional erosion upstream and downstream of the culvert. Prior to beginning any flow diversion work, the Contractor shall submit a plan showing the intended work, any calculations supporting the sizing of the system, and a schedule indicating the duration of the flow diversion to the Project Engineer for approval.

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Revision of Section 603
Culvert Lining (UV-CIPP)

The existing culvert to be lined shall be cleaned thoroughly prior to inserting the UV-CIPP liner. Cost of capturing and removing earthy material, trash, cuttings, and other waste materials from the existing culvert shall not be paid for separately but shall be included in the cost of the Clean Culvert item. All culverts shall be inspected prior to installing the UV-CIPP liner using a CCTV camera, and the inspection recorded shall be in an electronic documentation as approved by the Engineer.

The Contractor shall obtain the approval of the Project Engineer prior to beginning any repair work.

Any work necessary, as determined by the Project Engineer, to repair the host pipe prior to CIPP lining beyond the preparation described above will be measured and paid for with existing bid items or as extra work as provided in Section 109.04 of the Standard Specifications.

The entire UV-CIPP liner shall be inspected for defects (i.e., tears) and addressed prior to installation.

UV-CIPP liner will be cut at the inlet and outlet to conform to host pipe configuration.

Post Installation Inspection

The interior of the finished UV-CIPP liner shall be inspected by the Contractor by CCTV cameras.

The completed inspections shall certify that the installation has been performed in accordance with these specifications. A copy of the certification report, including any electronic documentation, shall be submitted to the Engineer prior to project acceptance of the UV-CIPP liner. Format of the electronic documentation shall be as approved by the Engineer.

The finished UV-CIPP liner shall be continuous over the entire length of the culvert and shall be free from visual defects such as foreign inclusions, concentrated ridges, discoloration, pitting, pin holes, cracking, and other deformities, as is commercially practicable. The liner shall be fabricated to a size that, when installed, will neatly fit the internal circumference of the existing culvert specified.

The bond between UV-CIPP layers shall be strong and uniform. All layers, after cure, must form one homogenous structural pipe wall with no indication that any part of the tube has less than 100 percent resin saturation.

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Revision of Section 603
Culvert Lining (UV-CIPP)

Post Installation Repairs

Holes, tears, delaminating areas, or concentrated ridges or defects that would affect the performance of the UV-CIPP liner, as determined by the Engineer, shall be repaired at the Contractor's expense. A repair plan shall be submitted to the Engineer for approval.

Defects that are not repairable will be cause for rejection of the installation. At the discretion of the Engineer, in lieu of UV-CIPP liner replacement, concentrated ridges may be ground to conform to the dimensions of the UV-CIPP liner, provided that the Contractor can demonstrate that the proposed repair does not compromise the structural integrity of the UV-CIPP liner. The remaining surface of the concentrated ridge area shall be coated with a compatible resin approved by the manufacturer. Residue generated from the grinding operation shall be removed at the end of each day's work and shall be disposed of as approved by the Engineer and in accordance with state and federal environmental and solid waste/hazardous waste regulations. Internal repairs may be made to the UV-CIPP liner in accordance with the manufacturer's recommendations and approval by the Engineer. Internal repairs may be made using approved fabric and epoxy or epoxy-vinyl ester resins to restore strength and integrity.

**Revision of Section 604
Drainage Pipe**

Subsection 624.03 shall include the following:

The Contractor shall provide a mockup for any connection between varying pipe and structure materials (i.e., HDPE pipe and concrete drainage facilities) for CDOT Review and Acceptance prior to construction.

Joint systems for cross drains and storm drains shall be watertight. All storm drain and cross drain segments between junction structures, including inlets, and between the ends of cross drains must be video or television (TV) inspected following installation and backfill. Video/TV inspection shall be sufficient to clearly inspect the circumference of each joint to verify joint construction is in accordance with the manufacturer's recommendations and Contract Documents. The Contractor shall provide a DVD of videos and inspection reports for each inspected segment. Reports shall identify the location of any discovered deficiencies and the proposed method of correction. Prior to construction, the Contractor must submit a Method Statement for constructing watertight joints for Approval by CDOT. Construction and inspection of joints shall be performed by the Contractor in accordance with methods approved by CDOT. Should any installations fail to meet the requirements, it shall be corrected at the Contractor's expense so that inspection requirements are satisfied.

Joints for all circular and elliptical reinforced pipes shall be made with confined rubber gaskets. Reinforced concrete collars shall be required at all nonstandard joints (not tongue and groove or bell and spigot), and at all connections to existing pipe.

All welding of HDPE pipe and fittings shall be performed by qualified and certified personnel. Certifications shall be provided to CDOT prior to performing any welding for the Project.

**Revision of Section 604
Vane Grate Inlet**

Section 604 of the Standard Specifications is hereby revised for this project as follows:

Description

This work includes the furnishing and placing of approach slab vane grate inlets special in accordance with details shown on plans and specifications.

Materials

All vane grate inlet special, grates, and castings shall be grey cast iron class 35, meeting the requirements of ASTM A48-83, AASHTO M105-82.

Construction Requirements

Vane grate inlet special shall be installed at the location shown on the plans.

Prior to fabrication and construction of the Vane Grate Inlet Special item, two sets of working drawings which comply with requirements of section 105 shall be submitted to CDOT for information only. The working drawings will not be approved or returned.

**Revision of Section 604
Manhole (Traffic Management System)**

Section 604 of the Standard Specifications is hereby revised for this project to include the following:

Description

Manhole (Traffic Management System) shall include the installation of manholes for the Traffic Management System at locations approved by CDOT.

Materials

Manhole (Traffic Management System) shall be pre-cast concrete, circular or square, with a base and cast iron frame ring and cover. Each manhole, frame, and cover shall conform to American Association of State Highway and Transportation Officials (AASHTO) HL-93.

Pre-cast units shall be provided with factory-installed knockouts that will permit the installation of a minimum of six two-inch conduits. The factory-installed knockouts shall be at a depth of three feet below the top of the manhole. The manhole shall have a detachable cover that has a skid-resistant surface and have the words "CDOT COMM" physically impressed on its top. The cover shall be attached to the manhole body by screw-in, tamper resistant bolts.

Each Manhole shall include all hangers and hooks that accommodate all proposed fiber and communication cabling. Fiber management hangers and hooks for fiber coils and splice canisters shall be of sufficient quantity to hang each backbone and lateral cable installed in the manhole separately on its own set of hangers.

Each Manhole shall include a removable access ladder. The access ladder shall be engineered to support 300 pounds. An engineered hook support for the access ladder shall be secured to the wall of the manhole.

Construction Requirements

The Contractor shall neatly excavate the site of manhole installation. A minimum of 12 inches of $\frac{3}{4}$ inch granite-gravel shall be placed below the manhole.

In pavement and sidewalks, the top of the manhole shall be flush with the existing grade. The Contractor shall restore pavement and sidewalks to match the existing conditions. Outside of pavement and sidewalks, the top of the manhole shall be two inches above existing grade.

Backfill around the manhole excavation shall conform to Section 206, Structure Backfill (Class 2).

After conduit installation into manhole, the contractor shall grout both the inside and outside of the factory-installed knockouts around the conduits. The finished conduits shall extend 5 to 7 inches past the inner wall of the manhole. If hangers are not factory installed in the manhole, the bolts shall be installed in the manhole walls by means of either an epoxy compound or expansion type fitting. Conduit that enters the manhole base shall have sweeps attached so conduit entrance is elevated a minimum of six inches above the bottom of the manhole.

As-built locations of manholes shall conform to project survey requirements requiring Pointman.

**Revision of Section 607
Self Closing Gate**

Section 607 of the Standard Specification is hereby revised for this project as follows

Description

607.01 This work consists of furnishing, constructing, and installing self-closing gates.

Materials

607.02 Gate assemblies shall be fabricated from durable, corrosion resistant materials suitable for outdoor use and conditions.

Construction Requirements

607.03 Self-Closing Mechanism. The gate shall be equipped with a self-closing mechanism capable of automatically returning the gate to the fully closed position after opening without the use of electricity or solar power. The mechanism shall operate smoothly without slamming and shall function under all expected environmental conditions. The self-closing mechanism shall return the gate to the closed position from any open position and latch shall engage automatically when the gate closes. The gate shall open with a maximum opening force of 5 lbf (pound force), measured at the latch edge of the gate.

607.04 Geometry and Clearance.

- a) The gate opening shall provide a minimum clear horizontal width of 48-inches when the gate is in the open position at 90 degrees.
- b) The gate opening shall provide a minimum vertical clearance of 80-inches.
- c) The maximum longitudinal grade through the gate opening shall not exceed 5 percent. The cross slope through the gate opening shall not exceed 2 percent.
- d) The surface within the gate opening and the immediate approach shall be firm, stable and slip resistant meeting PROWAG surfacing requirements. Maneuvering clearance must be provided for both directions of travel.

607.05 Gates

- a) Gates shall be installed plumb, level and square to ensure proper operation.
- b) Gate shall open freely without binding or interference.
- c) Gate shall not remain open at any point during normal operation.

**Revision of Section 612
Location Markers**

Section 612 of the Standard Specifications is hereby revised for this project to include the following:

Description

Contractor shall furnish and install location markers for identifying fiber optic conduit and other utility conduit at locations shown on the plans.

Materials

Location Marker (Fiber Optic) (Dome) shall be made of non-conductive high-density polymer, and shall be integrally white in color with an orange cap. All colors shall be stabilized against ultraviolet light such that they will not fade under continuous exposure to direct sunlight and conform to the American Public Works Association (APWA) Uniform Color Code for delineating underground utility lines. The marker shall retain dimensional stability in temperatures ranging from -40° F to 175° F. In some instances, when markers are installed on National Forest Service Lands, the location marker may need to be brown (Federal Standard Color 20059 or approved by CDOT) in color, if required by the project.

The Location Marker (Fiber Optic) (Dome) shall include a label with CDOT contact information and the designation of "Fiber Optic Cable". The label shall have black lettering on an orange background. The label shall include the highway milepost of the Pull Box or Manhole (TMS). The mile post shall be to the nearest hundredth mile. This label shall be placed below the "Fiber Optic Cable" warning label. When markers are installed on National Forest Service Lands, the dome marker label may be required to have black lettering on a brown (Federal Standard Color 20059 or approved by CDOT) background. The Contractor shall provide the label submittal to CDOT for approval.

Location Marker (Utility) (Flat Slat) shall be made of fiberglass reinforced composite and shall be orange or red in color. The marker shall retain dimensional stability in temperatures ranging from -40° F to 175° F. In some instances, when markers are installed on National Forest Service Lands, the location marker may be required to be brown (Federal Standard Color 20059 or approved by CDOT) in color.

The Location Marker (Utility) (Flat Slat) shall include a label with CDOT contact information and the designation of "Electrical Cable" or "Telephone Cable". The label shall have black lettering on a red background for electrical and black lettering on an orange background for telephone. In some instances, when markers are installed on Forest Service Lands, the flat marker label may be required to have black lettering on a brown (Federal Standard Color 20059 or approved by CDOT) background. The Contractor shall provide the label submittal to CDOT for approval.

Concrete or a precast polymer concrete footing for dome marker shall be 18 inches x 18 inches x 12 inches per project detail. Concrete footing shall be Concrete Class B and shall be in accordance with Section 601. The gap between the concrete or precast polymer concrete footing and dome marker shall be a maximum of 1/4 inch.

The pre-cast polymer concrete footing shall be skid-resistant, non-metallic, non-conductive, and UV resistant, and shall include two lifting slots for placement in the field. The precast polymer concrete footing shall be similar nominal dimensions of the concrete footing shown on the Plans.

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Revision of Section 612
Location Markers

Construction Requirements

Location Marker (Fiber Optic) (Dome) shall be installed at all fiber backbone Pull Box and Manhole (Traffic Management System) locations that contain fiber optic cable. Intermediate markers shall be installed at 1000-foot spacing along each conduit run. At manholes containing splices, the contractor shall use outdoor rated orange reflective tape to create two 1-inch-wide stripes below the mile point label.

Location Marker (Utility) (Flat Slat) shall be installed at utility pull box and manhole locations and utility point of service to identify both electric and telephone communication lines. Contractor shall designate the utility line with a marker installed mid-point between the utility point of service and the device.

**Revisions of Sections 613 and 715
LED Roadway Luminaires**

Sections 613 and 715 of the Standard Specifications are hereby revised for this Project as follows:

In subsection 613.02, delete (f) and replace with the following:

- (f) Luminaire. A complete luminaire includes the housing, lens, Light Emitting Diode (LED) luminaire, luminaire housing, ballast or power generator, slip-fitting clamp or approved manufacturer mounting, all necessary internal wiring, and photoelectric control. Luminaires shall operate at either 120 VAC, 60 Hz or 277 VAC, 60 Hz. Luminaires shall meet electrical utility company requirements.

In subsection 613.02(l), delete (4), (6), (7), and (8) and replace with the following:

- (4) Luminaire manufacturer's product information, including data in Illuminating Engineering Society of North America (IESNA) format, IESNA photometric distribution type for vertical and lateral distribution (example: full cutoff, Type III), and a photograph or line drawing.
- (6) Luminaire Lumen Range shall be no less than 8500 lumens and no greater than 10,500 lumens LED Driver or Power Supply.
- (7) Lighting Control Centers and Photoelectric Control Devices.

Subsection 613.02 shall include the following:

- (p) LED Luminaire Warranty. The Contractor shall ensure that the LED Roadway Luminaire has a minimum standard warranty of 10 years for all parts, materials, and shipping required to repair or replace the luminaire.

The warranty shall cover all failures including:

- a. Failure in luminaire housing, wiring, connections, drivers, and photoelectric control devices.
- b. More than 10 percent decrease in lumen output
- c. Significant change in color.

The warranty shall begin upon the date of receipt. Bill of lading shall be provided to the department prior to final payment of the lighting.

- (q) Technical Support. During the warranty period, technical support shall be available from the manufacturer via telephone within 24 hours of the time the call is made from the Department, and this support shall be made available from factory certified personnel or factory certified installers at no additional charge to the Department.

In subsection 613.06, delete the first paragraph and replace with the following:

613.06 Luminaires and Lamps. Roadway Luminaires shall be mounted on the mast arm by a slip-fitter clamp or other approved device. Luminaires shall be adjusted vertically and horizontally to provide the required orientation and maximum light distribution on the roadway and to meet Illuminating Engineering Society of North America (IESNA) TM-15 U0.

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Revisions of Sections 613 and 715
LED Roadway Luminaires

In subsection 613.06, delete the fourth paragraph and replace with the following:

Luminaires of the specified type and lumen output shall be installed as shown on the plans. The type and lumen output shall be marked on each luminaire or pole in accordance with ANSI specifications. ANSI approved tags shall be provided and installed by the contractor.

In subsection 715.04(a), delete 2. and 4. and replace with the following:

2. Optical Chamber. The luminaire distribution shall be equal to or less than an Illuminating Engineering Society of North America (IES) TM15-11 Backlight Uplight and Glare (BUG) ratings listed below in Table 715-1 based on initial lumens or Light Loss Factor (LLF) = 1.0. Luminaires with a U value greater than U0 shall not be accepted. The optical chamber shall be completely sealed from the housing, or the housing shall be completely sealed. A seamless one piece memory-retentive gasket shall seal the optical chamber or housing against the luminaire lens door. All wires entering the optical chamber shall be gasketed at their point of entry. Socket mountings, rivets used in the construction or support of the reflector system, and all other penetrations into the optical chamber shall be completely sealed. The optical chamber shall be water tight when the luminaire door is closed.

Table 715-1: Backlight, Uplight and Glare (BUG) Values

Luminaire Mounting Location	Minimum Initial Luminaire Lumen Range	Backlight (B) Rating Maximum	Uplight (U) Rating Maximum	Glare (G) Rating Maximum
Non median-mounted	Less than 5,000	B2	U0	G1
	5,000 - 22,000	B3	U0	G2
	Above 22,000*	B3	U0	G3
Median mounted	Less than 5,000	B3	U0	G1
	5,000 - 22,000	B4	U0	G2
	Above 22,000*	B4	U0	G3
	*By special application only.			

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Revisions of Sections 613 and 715
LED Roadway Luminaires

In subsection 715.04, delete (b) through (e) and replace with the following:

- (b) Roadway Luminaires. Roadway luminaires shall be LED type with integral driver, flat lens, aluminum housing, and be UL Listed for wet locations. All luminaires for the project shall be the same type and design unless the plans specify otherwise.
- (1) The luminaire and all components shall be UL or Intertek Testing Services (ETL) listed for Wet Location and shall have minimum Ingress Protection Rating of IP66.
 - (2) Light source shall be comprised of LED modules connected to a non-integrated driver and ready for connection to a production line luminaire. Luminaires utilizing integrated driver LED light sources, screw-based, or panel retrofit products shall not be accepted.
 - (3) The luminaire shall have a Type II or III distribution for non-median mounted luminaires, and Type II, III, IV, or V for median mounted luminaires.
 - (4) Transmissive optical components shall be applied in accordance with LED manufacturer's Original Equipment Manufacturer (OEM) design guidelines to ensure suitability for the environment in which the luminaire is installed.
 - (5) Luminaires shall utilize an adjustable slipfitter-type mounting system for installation on 1.25- inch (1.66-inch o.d.) to 2-inch (2.375-inch o.d.) outside diameter pipe tenons. Slipfitter shall consist of a two-piece clamp and four 9/16-inch hex bolts. Slipfitter shall allow for a vertical tilt adjustment of ± 5 percent in order to mount luminaire plumb for a U0 rating. Luminaires shall be equipped with integrated leveling bubble.
 - (6) Access to all internal parts requiring replacement shall not require tools (i.e., "tool-less entry").
 - (7) The luminaire housing shall be constructed of aluminum alloy.
 - (8) Power Supply/Driver shall be provided in compliance with section 715.05(a). Driver must be internal and thermally separated from LED compartment.
 - (9) Dimming photocell receptacle shall conform to (d) below.
 - (10) Luminaire finish shall be corrosion resistant Super triglycidyl isocyanurate TGIC polyester powdercoat. Color shall be gray.
 - a. Powder coat: Super TGIC polyester powder coat 2.5 mil nominal thickness.
 - b. Finish shall exceed a rating of six (6) per ASTM D1654 after 1000 hours of testing per ASTM B117.
 - c. The coating shall exhibit no greater than 30 percent reduction of gloss per ASTM D523, after 500 hours of QUV testing at ASTM G154 Cycle 6.
 - (11) Effective Projected Area (EPA) for wind-loading calculations shall be no greater than 1.2 square feet.
 - (12) Luminaire weight shall not exceed 45 pounds.

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**Revisions of Sections 613 and 715
LED Roadway Luminaires**

- (13) Luminaire shall be tested in accordance with IES LM79 and TM21, certifying photometric performance and rated life, respectively. LM79 (performance) and TM21 (predicted life at 55°C) testing shall both be for the same luminaire's operating drive current as specified.
 - (14) Luminaire shall have a maximum Backlight rating as shown in Table 715-1, an Uplight rating of U0, and a maximum Glare rating as shown in Table 715-1.
 - (15) Luminaire system efficacy shall be no less than 68 luminaire lumens per input watt.
 - (16) Luminaire shall have an external label per ANSI C136.15 and internal label per ANSI C136.22.
- (c) Light Sources. LED luminaires shall not be retrofit to existing luminaire housing; the contractor shall replace housing along with the luminaire as a single unit. Light sources shall be compatible with dimmable drivers supplied with the luminaires in which they are to be installed. All light sources of a similar type shall be provided by the same manufacturer.
- LED light sources shall meet or exceed the following requirements:
- (1) CCT, CRI, and Flux:
 - a. Correlated Color Temperature (CCT) - All LED light sources shall emit white light and have a CCT no less than 2700K and no greater than 4000K nominal in accordance with ANSI C78.277.
 - b. Color Rendering Index (CRI) - All LED light sources shall have a minimum Color Rendering Index (CRI) of 70 per the LM79 test results.
 - c. Luminous Flux - LED light sources shall not exceed the junction temperature recommended by the LED manufacturer. Luminous flux differences between LEDs shall not exceed 10 percent.
 - (2) LEDs shall have a minimum rated life of 70,000 hours per IES TM-21 at 55°C at the normal operating driver current for the specific luminaire. The lumen output shall be maintained at 70 percent of initial rated lumens (L70) or greater at the rated life of the luminaire.
 - (3) LEDs shall be temperature rated for operation and storage within the range of -40°C to +50°C, and shall withstand low and high frequency vibration (ANSI C136.31 Vibration Level 3G) over the rated life of the light source.
 - (4) Cooling System
 - a. Mechanical design of protruding external surfaces (e.g., heat sink fins) shall facilitate hose-down cleaning and discourage debris accumulation.
 - b. The cooling system must be passive utilizing heat sinks, convection, or conduction.
 - c. Fans, diaphragms, pumps, or liquids shall not be acceptable.

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Revisions of Sections 613 and 715
LED Roadway Luminaires

(d) Photocontrol Receptacle.

- a. Each roadway luminaire shall be furnished with a multi-contact twist-lock outdoor lighting dimming receptacle in accordance with ANSI C136.41.

**Revision of Section 613
ITS Electrical Conduit**

Section 613 of the Standard Specifications is hereby revised for this project to include the following:

Description

This work includes furnishing and installing new High-Density Polyethylene (HDPE) and Polyvinyl Chloride (PVC) electrical conduit and fittings for use with fiber optic cable, electrical conductors, and communications cabling.

Materials

All materials furnished, assembled, fabricated, or installed under this item shall be new, Underwriters Laboratories (UL) listed, corrosion resistant, and National Electric Code (NEC) compliant. Materials shall be submitted to CDOT for approval.

Electrical conduit shall be Schedule 80. Electrical conduit and fittings shall be UL listed.

HDPE conduit and fittings shall be certified by the manufacturer as meeting American National Standards Institute (ANSI) ANSI/UL 651A. PVC conduit and fittings shall be certified by the manufacturer as meeting ANSI/UL 651. The manufacturers shall be International Organization for Standards (ISO) ISO 9001 compliant.

All HDPE conduit shall be factory lubricated, low-friction, high-density conduit constructed of virgin high-density polyethylene resin. HDPE conduit shall be capable of being coiled on reels in continuous lengths, transported, stored outdoors, and subsequently used for installation, without affecting its properties or performance.

Each conduit shall be equipped with a pull tape. The pull tape shall have a minimum tensile strength of 1800 pounds and be of a design and manufacture that prevents cutting or burning into the conduit during cable installation. The pull tape shall include a continuous 22 gauge tracer wire. Splices in the pull tape and tracer wire may occur inside manholes and pull boxes and shall not be permitted inside conduit.

A minimum 12 gauge tracer wire shall be included in each group of conduits that are in a common trench or bore.

Construction Requirements

All conduit and fittings installation shall conform to the NEC.

Electrical conduit that is installed using a trenchless technology such as boring shall be HDPE. Electrical conduit that is installed using direct burial methods such as plowing, open trenching, or other excavation methods shall be PVC or HDPE.

Prior to construction, the Contractor shall submit a trenching and boring plan to CDOT for approval. The plan shall show the limits of the planned work areas and the areas of anticipated disturbance. All disturbances outside the planned work areas created by Contractor's operations shall be restored to their original condition at the Contractor's expense.

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Revision of Section 613
ITS Electrical Conduit

During construction operations, the contractor shall maintain boring logs that include the depth at specific distances along the bore. Boring logs shall be submitted on a weekly basis.

Excavations and conduit installation shall be performed in a continuous operation. All trenches shall be backfilled by the end of each shift. Material from trenching operations shall be placed in a location that will not cause damage or obstruction to vehicular or pedestrian traffic or interfere with surface drainage.

The Contractor shall be responsible for damage due to over-excavating a trench and heaving damage to the existing asphalt and concrete mat caused by equipment directly and by dislodging rocks or boulders. All damage from over-excavation and heaving shall be repaired at the Contractor's expense. The Contractor shall bear the cost of backfilling all over-excavated areas with the appropriate backfill material approved by CDOT.

The Contractor shall restore all surface materials to their original condition or better, including but not limited to pavement, sidewalks, sprinkler systems, landscaping, shrubs, sod, and native vegetation that is disturbed by the conduit installation operation. All repairs shall be included in the cost of the conduit.

The Contractor shall use UL listed splice couplings that comply with the NEC. The coupling technology used to connect conduit ends shall require no special tools and form a watertight, airtight seal. The breaking force between segments shall exceed 250 pounds. Conduit splices shall be kept to a minimum and all such locations shall be approved and inspected by CDOT and the authority having jurisdiction. Additional pull boxes shall not be substituted for conduit splices.

Conduit plugs that are watertight, removable, mechanical, and equipped with a tie rope for connection to a pull rope and pull tape shall be supplied and installed in all open conduit ends immediately following conduit installation. Conduit shall be plugged at all termination points including, but not limited to pull boxes, manholes, controller cabinets, structures, poles, and node buildings. Conduits containing cable shall be plugged with durable and reusable split type plugs, fabricated without metallic parts. The plugs shall allow easy removal and reinstallation around in-place cables. Split type plugs shall provide a watertight and airtight seal of at least 22 pounds per square inch. They shall be installable by hand without using tools and without damaging the cable. All plugs shall be correctly sized to fit the conduit being plugged.

All conduits shall use sweeps to elevate the buried conduits to the final grade within a pull box or manhole. The sweeps shall be terminated within the pull boxes and manholes to allow for easy installation and removal of conduit plugs. The sweeps shall be set above the ground surface of the inside of the pull box at a height that does not interfere with coiling of the fiber optic cable.

All conduits terminating in a pole or sign structure shall extend to a point 6 inches below the handhole in the pole or structure.

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Revision of Section 613
ITS Electrical Conduit

All conduit runs containing fiber optic cable shall have a limited number of bends. The sum of the individual bends on a single conduit run between any two pull points shall not exceed 270 degrees. No individual bend shall exceed 90 degrees. All conduit bends shall have a minimum acceptable radius of 48 inches for 90-degree bends and for conduit containing fiber optic cable, and 24 inches for all other bends. HDPE conduit minimum bending radius shall conform to Table 354.24 in the NEC.

New conduits may be installed into existing CDOT pull boxes, manholes, and cabinet bases, and the Contractor shall carefully excavate around the existing facility and install the new conduit as shown on the plans. The Contractor shall not damage the existing facility or its contents. If the existing conduit, pull box, lid, and concrete collars are damaged during conduit installation, the Contractor shall restore the damaged item or section to current CDOT requirements at no additional cost to the project.

Conduit shall always enter a pull box, manhole, cabinet base, or any other type structure from the direction of the run only.

All conduit ends shall be free from sharp edges and burrs.

As-built locations of conduit shall conform to project survey requirements requiring Pointman.

**Revision of Section 614
ITS Pull Boxes**

Section 614 of the Standard Specifications is hereby revised for this project to include the following:

Description

Contractor shall furnish and install fiberglass reinforced, polymer concrete pull boxes and concrete aprons.

Materials

Pull boxes shall be verified by a 3rd Party Nationally Recognized Independent Testing Laboratory as meeting all test provisions of American National Standards Institute/Society of Cable Telecommunications Engineers (ANSI/SCTE) 77, 2013 Specification for Underground Enclosure Integrity, Tier 22 rating. Pull boxes shall be Underwriters Laboratories (UL) listed. Certification documents shall be submitted with material submittals.

Each pull box shall have an Electrical Marker System (EMS) locator disk manufactured into the lid for communication line locating. The locator disk shall be compatible with a CDOT cable locator and utilize the APWA Uniform Color Code standard for visual reference, if disk is observable on the exterior of the lid. The locator disk shall utilize the proper locate frequency for the pull box type.

Pull boxes 24 inches by 36 inches and larger shall have removable split lids with a removable metal center support beam. Lid segment weight shall not exceed 100 pounds.

Pull box removable lids shall be provided with a skid-resistant surface and have the words "CDOT Comm" or "CDOT Elec", as well as "EMS Marker Embedded In Cover" and the tier level rating cast into the surface. Painting of words shall not be accepted. The cover shall be attached to the pull box body by means of tamper resistant stainless steel bolts.

One piece lids shall have a minimum of two lift slots per lid, while split lids shall have a minimum of one lift slot per lid. Lift slots shall be rated for 3000 pounds.

Test point locations shall be integrated into the pull box lids to provide for attachment of test leads of various connector types for underground conduit tracing. The minimum number of test point locations shall equal the number of conduit banks entering the pull box, up to a maximum of five test points. Pull boxes with split lids shall have the test points on one split lid section only. Pull box lids shall be furnished with 3/8 inch x 1/16 inch deep recesses at locations adjoining each test point for the application of direction arrow symbols indicating the direction of underground conduit exiting the pull box. Recesses shall be thoroughly cleaned with alcohol prior to applying arrow symbols.

Wire mesh shall be installed in a manner to completely surround the box. The wire mesh shall meet the material standard ANSI/American Society of Testing and Materials (ANSI/ASTM) A555-79 and made of T-304 stainless steel, 0.025 inch wire diameter minimum, and shall have a spacing of 10 mesh per inch.

Pull boxes installed in dirt or landscaped areas shall have a Class B concrete apron or a pre-cast polymer concrete apron. Class B concrete shall be in accordance with Section 601.

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Revision of Section 614
ITS Pull Boxes

The pre-cast polymer concrete apron shall be non-metallic, non-conductive, and UV resistant, and shall include two lifting slots for placement in the field. The pre-cast polymer concrete apron shall be a minimum of 4 inches deep and shall extend a minimum of 11 inches from each side of the pull box. The gap between the pre-cast polymer concrete apron and outer wall of the pull box shall be a maximum of ½ inch.

Construction Requirements

A minimum of 12 inches of ¾ inch granite-gravel shall be installed as a base for the pull box. The granite-gravel shall be free of dirt and debris and spread evenly to facilitate a level base for the pull box. The Contractor shall ensure that sufficient compaction is met prior to the installation of granite-gravel to alleviate future settling.

Wire mesh shall be installed to completely surround the box. The wire mesh shall be installed prior to the installation of the pull box above the bed of ¾ inch granite-gravel and extending one foot past the outer edges of the concrete apron. The wire mesh shall be gently cut to allow only the entrance of the conduit through at the bottom of the box. All openings cut in the wire mesh that are larger than the diameter of the conduit shall be covered with additional wire mesh in a manner to completely surround the pull box with wire mesh.

Tracer wire shall be attached to the trace test points on the underside of the pull box lid. Each trace wire shall be attached to an individual trace point; no two wires shall be attached to the same point. The Contractor shall coil an additional 6 feet of tracer wire inside the pull box to ensure that the tracer wire will not disconnect from test points when the lids are removed.

At pull boxes installed in dirt and landscaped areas, the Contractor shall install a concrete apron or a pre-cast polymer concrete apron around the edges of the pull box. Three sides of the concrete apron shall measure 12 inches wide by 6 inches deep, and one side shall measure 18 inches wide by 6 inches deep. The apron side measuring 18 inches wide by 6 inches deep shall be located on the edge of the pull box furthest from the roadway, and shall contain a 4-inch diameter round knockout for fiber optic marker installation. Pull boxes shall not be installed above the grade of the apron. The concrete apron shall have a 1 percent slope away from the top of pull box to allow for drainage.

As-built locations of pull boxes shall conform to project survey requirements requiring Pointman.

**Revision of Section 614
Grounding And Bonding**

Section 614 of the Standard Specifications is hereby revised for this project as follows:

Description

This work consists of grounding and bonding requirements at the relocated advanced flashing beacon. The work covered in this section consists of labor, materials, and services required for a functional and unobtrusive grounding system.

1. General: Provide comprehensive grounding and bonding for ITS related equipment. CDOT's target resistance to ground value is equal to or less than 10 Ω .
2. Applicable Documents: Work performed in this section shall comply with the most current edition of the following codes and standards:
 1. IEEE 81 - Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System,
 2. IEEE C2 - National Electrical Safety Code,
 3. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings,
 4. NFPA 70 - National Electrical Code,
 5. NFPA 70E - Standard for Electrical Safety in the Workplace,
 6. NFPA 780 - Standard for the Installation of Lightning Protection Systems,
 7. TIA-607 - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises,
 8. UL 96 - Lightning Protection Components,
 9. UL 96A - Installation Requirements for Lightning Protection Systems, and
 10. UL 467 - Grounding and Bonding Equipment.
3. Identify to CDOT any conflicts between the requirements of codes/standards development organizations and the specifications for this project.
4. Submittals:
 1. Provide cut-sheets of each type of product proposed for approval by CDOT prior to commencement of work.
 2. Provide a system plan, conductor routing, supports, connectors, and ground rods along with connection, mounting, and splicing details.

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Revision of Section 614
Grounding And Bonding

Materials

Components.

1. Grounding electrodes (driven rods): Provide ground rods that meet or exceed the following requirements:
 - A. Preferred: Copper-clad steel ground rods (pointed) shall not be less than 0.625 inch diameter and a minimum of eight feet in length. It shall be UL certified and have a minimum plating thickness of 10 mil copper cladding.
 - B. Other Alternatives: Other ground rod types, such as chemical ground electrodes, may be considered based on site soil chemistry, adjacent electrically bonded structures, or if the installation must occur in a corrosive area. The Contractor shall obtain written permission from CDOT prior to using the previously mentioned alternatives.
2. Grounding Electrode Conductor: The grounding electrode conductor shall be solid or stranded copper with a minimum size of #6 AWG, unless otherwise specified. The Contractor shall size the grounding electrode conductor in accordance with Article 250.66 of the NEC. Bare and insulated grounding electrode conductors shall be permitted, as approved by CDOT. Insulated grounding electrode conductors shall be Type THWN and conform to the requirements of Article 310 of the NEC. Insulated grounding electrode conductors shall utilize a green jacket color. The grounding electrode conductor run shall be installed in one continuous run without a splice or joint, except as permitted in accordance with Article 250.64(C) of the NEC.
 - A. For bonding between a cabinet frame and busbar, a braided ground strap shall be utilized. The braided ground strap shall consist of non-insulated tinned copper flat braid wire with a minimum width of 0.5 inches and a thickness of 0.07 inches (based on estimated #6 AWG equivalence).
3. Grounding Connectors: Grounding connectors shall be provided for attachment to grounding electrodes, ground bus, and ground lugs. Grounding and bonding connections shall be made by means of a compression connector, a mechanical connector, or an exothermic weld. Mechanical and compression connectors shall have only one conductor installed unless designed or UL-listed for more conductors. Mechanical connections shall only be permitted when a compression or exothermic connection cannot be made. Provide exothermically welded connections or UL467 listed mechanical connections below grade and in areas exposed to visible moisture. Ground rings shall only use exothermic welded connections.
4. Ground Bus: Provide copper bar stock grounding busbar. The minimum size shall be 0.25 inch thick by 2 inches high by 6 inches wide and positions for five lugs, unless otherwise specified by CDOT. Hole patterns on the busbar shall accommodate two-hole lugs in accordance with TIA-607 and hole spacing should not be less than 0.75 inch. Busbar must be wall mountable and UL certified. Stand-off brackets shall also be included and brackets shall be manufactured from 300 series stainless steel with stainless steel bolts and lock washers.

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**Revision of Section 614
Grounding And Bonding**

Construction Requirements

General: Install equipment, materials, and devices in accordance with equipment manufacturer's written instructions and in compliance with applicable installation standards.

1. Connections:

- A. Provide exothermically welded connections or UL467 listed mechanical below grade and in areas exposed to visible moisture.
- B. Provide heavy duty, bolted clamped connections, UL listed, above grade, and in areas where safety to personnel and structures dictate.

2. Installation:

- A. Install one grounding electrode. Each grounding electrode shall be installed such that at least the entire length is in contact with the soil. Where a rock bottom is encountered, the grounding electrode installation shall conform to the requirements of Article 250.53(G) of the NEC. The grounding electrode system shall be installed within CDOT right-of-way.
- B. Leave top of grounding electrode exposed for testing and for verifying quantities. Upon acceptance of testing and quantity verification, drive ground flush with grade.
- C. Measure the resistance of the installed grounding electrode with respect to the surrounding soil using an earth ground resistance tester.
- D. If the results exceed 10 Ω , install a second grounding electrode a minimum of one electrode length away from the first grounding electrode. The bonding jumper used to connect grounding electrodes shall be installed and sized in accordance with Article 250.53(C) of the NEC.
- E. Measure the resistance of the installed grounding electrode system with respect to the surrounding soil using an earth ground resistance tester.
- F. Record and report results to CDOT in writing. CDOT's target resistance to ground is equal to or less than 10 Ω ; however, after installing two grounding electrodes, a resistance to ground value equal to or less than 25 Ω will be accepted by CDOT. The Contractor shall be responsible for confirming the resistance to ground requirements with the various manufacturers of the equipment it procures for this project. Where manufacturers have more stringent resistance to ground requirements for operational performance and warranties, the Contractor shall be required to adhere to the manufacturer's requirements for acceptance by CDOT.

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**Revision of Section 614
Grounding And Bonding**

- G. In the absence of low resistance soil conditions, CDOT, at their sole discretion, may allow the use of the following: bentonite to fill the ground rod hole; chemical electrodes; or ground enhancement material. The Contractor shall obtain written permission from CDOT prior to using the previously mentioned materials.

3. Surface Preparation

- A. **Ground Bus:** An abrasive pad shall be used to remove any dirt, grease, oil, and oxidation from the ground bus. A thin coating of antioxidant compound shall be applied to the connection point on the ground bus. Using stainless steel hardware, the Contractor shall tighten and torque to the value specified for the hardware grade, material, and size. Only one lug shall be installed per a two-hole mounting on a bonding surface. Lugs shall not overlap or use the same mounting holes on a bonding surface. Due to thermal cycling anticipated in the field environment, the lock washer shall be substituted with flat washers and a cupped spring washer (i.e., Belleville washer), with the cup against the head of the bolt.
- B. **Other Surfaces:** Clean the surface thoroughly where the grounding lug is to be connected. The grounding surface shall be clean of any paint, dirt, grease, oil, rust, and other oxidation. A thin coating of antioxidant compound shall be applied to the connection point on the surface. Using stainless steel or silicon bronze hardware, the Contractor shall tighten and torque to the value specified for the hardware material and size. Lugs shall not overlap or use the same mounting holes on a bonding surface. The lock washer shall be substituted with flat washers and a cupped spring washer, with the cup against the head of the bolt.
- C. **Ground Attachment to Structures and Poles:** The grounding electrode conductor shall be connected to the ground stud on a structure or within a pole using stainless steel nuts and cupped spring washers. The connector type for the grounding electrode conductor shall be a full circle connector sized appropriately for the diameter of the ground stud and the wire gauge of the conductor.
- D. **Where a ground stud does not exist on a structure or within a pole,** the Contractor shall install a tapped and threaded hole to accommodate the grounding electrode conductor and screw. The connector type for the grounding electrode conductor shall be a full circle connector sized appropriately for the diameter of the screw and the wire gauge of the conductor. Stainless steel screws and cupped spring washers shall be included.

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**Revision of Section 614
Grounding And Bonding**

- E. Grounding Connectors: The lug size, configuration, and material for compression connectors shall be selected based on the grounding electrode conductor size and fastening conditions. The insulation shall be trimmed back so that the bared grounding electrode conductor is slightly longer than the barrel. After applying an antioxidant compound on the exposed grounding electrode conductor, insert the conductor so that it touches the end of the barrel as viewed through the inspection port. Ensure the grounding electrode conductor remains at the end of the barrel before making the first crimp nearest the tongue end and working toward the conductor with the remaining crimps. The lug manufacturer's instructions shall be followed for the number of crimps and their location on the barrel.

For exothermic welds to the grounding electrode conductor, select the mold and weld metal applicable to the conductor size and lug configuration. Clean and dry (using a torch) the grounding electrode conductor and the mold. Insert the conductor and lug into the mold. Close the handle clamp, lock the mold, and then insert the disk into the mold. Pour the weld metal into the mold and apply the starting material over the weld metal and on the lip of the mold. Close the cover and ignite using a flint igniter. After the reaction is complete, wait a minimum of 15 seconds and then open the mold and remove the finished lug connection. Clean any slag from the finished lug connection.

**Revision of Section 618
Prestressed Concrete**

Section 618 of the Standard Specifications is hereby revised for this project as follows:

Delete subsection 618.06(d)6 and replace with the following:

6. Product camber and length measurements shall be submitted to the QA Representative a minimum of seven calendar days prior to shipping. Deviation from this requirement shall require advance written notification to the QA Representative.

In subsection 618.07(a)9 delete the first paragraph and replace with the following:

Hold-down devices shall be placed: within a 20-inch horizontal tolerance from the locations shown on the plans if placement is moved toward the center of the girder; or within a 40-inch horizontal tolerance from the locations shown on the plans if placement is moved toward the girder ends. If minimum or maximum placement locations are shown on the plans, the placement tolerances shall not encroach beyond those locations.

Delete subsection 618.07(c)2(A) and replace with the following:

Alternative anchorage systems, including all associated anchor zone reinforcing steel associated with the alternative anchorage system, and all details of the alternative anchorage system shall be shown on approved shop drawings and signed and sealed by a Professional Engineer who is registered in the State of Colorado and who is an employee of the post-tensioning system supplier or anchorage supplier.

**Revision of Section 621
Detour Pavement**

Section 621 is hereby added to the Standard Specifications for this project and shall include the following:

Description

This work shall consist of designing and submitting a phasing plan for Review and Acceptance; constructing, maintaining, and removal of detour; and all required traffic shifts as required to maintain two-lane traffic on US 160 during construction. This item shall include all work and materials necessary to provide a detour roadway meeting or exceeding the requirements of Book 2, Section 17. The detour roadway shall be constructed so as to meet or exceed minimum design standards of A Policy on Geometric Design of Highways and Streets, 7th Edition (PGDHS, 2018).

Materials

The Contractor shall be responsible for quality control required to assure adequate detour construction. This includes, but is not limited to, embankments, subgrade, subbase, and Hot Mix Asphalt used in the construction of the detour.

Construction Requirements

The contractor shall complete and submit a detailed detour phasing plan consistent with the Transportation Management Plan per Book 2, Section 17 for CDOT Review and Acceptance. The Contractor's plan shall be submitted to CDOT a minimum of 14 Days prior to any detour construction activities. Any deviations from the Contractor's Accepted phasing plans and these specifications must be submitted to CDOT for Review and Acceptance.

The minimum lane width shall be per Book 2, Section 17.

The minimum thickness of Hot Mix Asphalt shall be 4 inches. If the materials used require that the Contractor provide thickness greater than the minimums to serve the life of the detour, these shall be provided at no additional cost. The Contractor shall utilize the existing pavement surface to the maximum extent practical. All pavement markings and other traffic control devices shall be provided in accordance with the traffic control plan. When it is no longer needed to maintain traffic, the Contractor shall remove and dispose of the detour pavement and return the ground to its original state or reconstruct the area in the manner as shown in the Final Design Documents.

Maintenance of Detour

The Contractor shall maintain detours per Book 2, Section 18.

**Revision of Section 625
Asset Geospatial Data Collection**

Section 625 of the Standard Specifications is hereby revised for this project as follows:

Description

Subsection 625.04 shall include the following:

The Contractor's surveyor shall conduct an as-constructed survey, as defined below, of all assets installed or relocated on this project within the project limits.

Construction Requirements

The Contractor's surveyor shall conduct an as-constructed survey of the following items: Installed or relocated utility lines as shown on the utility plans, including those installed or relocated by the Contractor or by others.

- (1) Installed or relocated water lines, sanitary sewer lines, culverts, conduit, inlets, or other drainage features.
- (2) Traffic signal heads, poles, pushbutton assemblies, and controller cabinets.
- (3) ITS fiber vaults, splice points, conduit, interfaces, nodes, and other assets.
- (4) Lighting, including pull boxes, conduit, meters, and light standards.

The as-constructed survey shall be completed in accordance with the CDOT Survey Manual, Chapter 6, Section 6.14. Item 4 is hereby deleted and replaced with:

4. Three-dimensional (containing northings, eastings, and elevations) data is to be submitted to CDOT's PointMan utility database. The Contractor's surveyor shall collect observations in accordance with all sections below. Accuracy requirements, projections, coordinate systems, and equipment requirements are outlined in Table 1 and Sections 1.1 - 1.4 below. Points and polylines shall be collected with the appropriately named survey codes identified in Table 3 below. Each observed point shall contain a description of what each point represents.

1.1. All utility and hydraulic installations within CDOT right of way shall be collected using CDOT's mobile application, PointMan. Download the PointMan mobile application from the Apple Store (iOS) or Google Play (Android). If required, please contact CDOT at cdotpointman@gmail.com in order to obtain new login and password information.

1.2. High-accuracy equipment requirement:

The Contractor shall use a device designed specifically for capturing GPS coordinates that is listed as compatible with CDOT's mobile application. Deviation from CDOT's list of accepted GNSS receivers must be requested and approved by the department in writing prior to submission of as-built data:

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Asset Geospatial Data Collection

Table 1: Compatible Devices

Trimble R1, R2, R10-2, R12, R12i (Android & iOS)-RTK Compatible	Emlid Reach RS2 and RS3
Trimble R8, R8s, R10, R580 (Android)-RTK Compatible	Leica Zeno FLX100 & GG04 Plus (Android & iOS)
Trimble SPS986, SPS985 and R780	JAVAD TRIUMPH 3-NR (Android)- RTK Compatible
Juniper Geode, GNS2, GNS3, GNS3M (Android & iOS)- RTK Compatible	ArduSimple (Android&iOS)-RTK Compatible
Topcon HiPer VR (Android)- RTK Compatible	Trimble Catalyst DA1 (Android), DA2 (Android & iOS)
Trimble SPS985, SPS986 (Android)	Bad Elf Flex & Flex Mini (Android & iOS) - RTK Compatible

Projections and Coordinate Systems

Horizontal Datum: The North American Datum of 1983, 2011 Adjustment (NAD 83) and the Geodetic Reference System of 1980 (GRS80). Please note that when project control diagrams are available, the project must be site calibrated within PointMan prior to starting data collection.

Vertical Datum: The North American Vertical Datum of 1988 (NAVD 88) RTK GPS is an acceptable method to derive NAVD 88 elevations and is the vertical datum to be used for all CDOT projects. Use the latest Geoid model from NGS to compute orthometric heights.

1.3. Positional Accuracy Specification

CDOT requires positional accuracy Level(s) 1, 2, or 3 for all Horizontal and Vertical positions collected for utilities and ITS assets installed within CDOT right of way. Accuracy level designations are shown in Table 1 below. Other assets may be collected at accuracies not to exceed 5. Utilizing CDOT's mobile application pedigree (survey record) will assist in determining the accuracy levels that must be assigned to the specific permitted installation by the utility company representative responsible for collection of as-built data.

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Table 2: Positional Accuracy Requirements

Positional Accuracy Level	Positional Accuracy (English Units)	Positional Accuracy (SI Units)
1	0.1 ft	25 mm
2	0.2 ft	50 mm
3	0.3 ft	100 mm
4	1 ft	300 mm
5	3 ft	1000 mm
0	indeterminate	indeterminate

At the 95 percent confidence level, use the root-mean-square error in accordance with FGDC-STD-007.3-1998. Positional accuracy is in direct reference to the actual geodetic positional coordinates referenced to the National Spatial Reference System maintained by the National Oceanic and Atmospheric Administration National Geodetic Survey. Geodetic positional coordinates (latitude, longitude, and orthometric heights) reference the official United States datum, currently the North American Datum of 1983 and the North American Vertical.

Datum of 1988. GPS coordinates shall be delivered in latitudes and longitudes, in decimal degree format.

Rigid above-ground features are subject to the same positional accuracy requirements as underground features. The positional accuracy of suspended aerial cables and wires is variable due to environmental factors, and therefore shall be classified as Level 0, except at the points where they are anchored to support structures such as poles.

For linear features, the depicted position must meet the tolerances as specified in Table 2 at every position along the length of the feature in order to be designated that accuracy level. Since survey-collected data and resulting 3D models are usually chorded, the point spacing must be close enough so that the true location and depicted location meet the tolerance along its entire length.

Documentation verifying the type of GPS unit being proposed for use, and the specifications of the unit, shall be provided to the Project Engineer for review prior to data gathering. The Contractor shall supply complete information for each device. For data collection, the Contractor shall use a fixed RTK/RTX correction solution only.

Please be advised that any deviation from using the department's approved mobile technology, including a GPS-collecting device, requires prior approval from the Project Engineer.

Any data collected outside of the department's approved mobile technology must be submitted to the Project Engineer as an ArcView/ArcGIS shape file.

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Asset Geospatial Data Collection

2.0 Utilities Collected

Table 3: Data Dictionary Codes

Utility Type	Feature Code	Description of Utilities
Test hole	5950	Point - Test hole physically locating X,Y,Z underground facility location.
Proposed running line/Bore log data	6001 or 6075	Line segment code 6001 - surface elevation of proposed HDD bore. Point - 6075 location bore log depth required for each observed
Communication	4210, 4410 4211	Line segment - all communication facilities, including fiber optic (4211), copper (4210), coaxial (4410), including appurtenances within defined size parameter.
Gas	4510, 4511	Line segment - low pressure (4510), high pressure (4511), natural gas transmission, distribution, service lines, and appurtenances within defined size parameter.
Electric	4310	Line segment - secondary electric or higher voltage.
Pipe (Oil)	4610 or 4611	Line segment - pipeline facilities including crude oil, refined oil, and all other types of oil pipeline transmission, distribution, service lines, and appurtenances within defined size parameter.
Propane	4512	Line segment - propane transmission, distribution, and service lines, and appurtenances within defined size parameter.
Sanitary Sewer	4811	Line segment - sanitary sewer facilities including all mains, collection system, force mains, services and leads, including appurtenances within defined size parameter. Combined sewer is classified as sanitary sewer.
Surface Elevation	6075	Point - X,Y,Z single observation for surface elevation.
Storm Sewer	2712	Line segment - storm sewer facilities including all mains and collection system, and appurtenances within defined size parameter. (Excludes underdrain).
Water	4710	Line segment - water transmission, distribution, service lines, and appurtenances within defined size parameter. (Excludes irrigation systems).
Unknown	6075 or 6001	Point and Line segment - this designation can be used for those facilities not covered by the feature codes above, including but not limited to industrial facilities of all types, and discovered utilities where the type of utility is unknown.

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Asset Geospatial Data Collection

2.1 A. All primary transmission, distribution, and collector system lines:

- a. Start and end points.
- b. A minimum of every 25 feet and at all points of intersection, with the following additional points:
 - i. Deviations in installation alignment (horizontal and vertical), including, but not limited to:
 - a. Intentional changes in geometry, such as directional shifts to circumvent obstacles.
 - b. Fittings, such as elbows (horizontal and vertical).
 - ii. Changes in facility characteristics (e.g., alterations in size, material, number of pairs, encasement size, or material).
 - iii. Start and end points for vaults.

B. Appurtenances installed concurrently with new main installations, defined as service leads and stubs:

- a. Tap-in at the main and at (or near) the right-of-way line.

C. New appurtenances from existing mains:

- a. All size and material types shall be meticulously documented for each utility type.
- b. Tap-in at the main and at (or near) the right-of-way line.

D. Transverse utility crossings installed via trenchless methods:

- a. All qualified utilities crossing roads at safe intervals outside the travel roadway template.
- b. 25-foot intervals across pavement sections when safely achievable.

For all transverse utility crossings installed using methods that permit direct survey observation, readings must be taken at intervals of no more than 25 feet when traversing a paved area. Furthermore, all utilities installed via methods allowing direct observation must be directly observed.

Utilities installed using trenchless technologies necessitate direct observation at the ground surface, directly above the installed utility. The depth to the utility must be recorded, and the "top of utility" elevation calculated from the most reliable depth readings, typically those obtained from the bore head during installation. The precision of these depth readings will vary based on the equipment employed during installation. Please utilize code 6075 - "Terrain Single Point Bore log" to document bore depth and associated attribute information.

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Revision of Section 625
Asset Geospatial Data Collection

Direct survey observations are mandatory at all utility exposure points, including but not limited to tie-in locations, bore pits, hand holes, gate valves, storm inlets, fire hydrants, pull boxes, light poles, pedestals, meters, and any other unlisted above-ground infrastructure. Both alignment and depth must be documented during boring operations at the specified intervals. A method of field witnessing should be employed to mark the horizontal location and depth of the utility, based on readings from the equipment in use. Subsequently, the utility company can survey each marked location and calculate the elevation of the installed facility using the recorded depth readings at each surveyed point.

As a minimum requirement, alignment and depths must be physically documented at intervals not exceeding 25 feet, and at every change in horizontal and vertical alignment. A greater number of survey observations along a utility line will result in a more accurate representation of its true three-dimensional alignment. For instance, long and deep bores may create a parabolic curve, which would not be accurately depicted with point spacing at 25 feet. Therefore, professional judgment should be exercised to collect additional points at closer intervals to generate a more representative geometry of the utility.

Upon completion of the project, the Professional Land Survey shall certify as follows:

Colorado Professional Land Surveyors Certification:

I (**Colorado Professional Land Surveyor Name**), hereby certify that this survey fieldwork was done in accordance with CDOT's Revision of the 625-Construction Survey Specifications and that all accuracy levels have been achieved.

Survey Seal of Professional Land Surveyor in Responsible Charge

**Revision of Section 630
Uniformed Law Enforcement Coordination**

Section 630.01 shall include the following:

The Contractor shall employ off-duty police officers to provide traffic control and traffic enforcement throughout the Project as required.

This work consists of scheduling, coordinating, and furnishing a uniformed police agency officer from the Colorado State Patrol (CSP) to perform uniformed traffic control (UTC) for traffic control Activities designated by the Contractor.

Any Uniformed law enforcement personnel conducting law enforcement shall be duly appointed and designated to enforce the law by a government agency with jurisdiction over the project. Uniformed Law Enforcement as performed by uniformed law enforcement personnel, shall be performed as described in the latest edition of part VI of the MUTCD as adopted by CDOT.

Uniformed law enforcement personnel are expected to enforce the laws of the Roadway throughout the Work zone to ensure an additional level of safety for the construction workers. Citations for any traffic violation within the Work zone shall be at the discretion of law enforcement personnel. Each law enforcement personnel shall be equipped with a law enforcement vehicle to be supplied by the law enforcement agency. Vehicles shall meet the requirements of an emergency vehicle as defined by the Colorado Revised Statute 42-4-213.

**Revision of Section 630
Traffic Signal (Temporary)**

Section 630 of the Standard Specifications is hereby revised for projects as follows:

In subsection 630.01 shall include the following:

This work consists of furnishing and installing, temporary, portable traffic signals to control one lane alternating traffic as shown on the Contractor's approved plans or MHTs. The work includes all equipment, labor, signage, and materials to install and maintain a complete and operational system that accommodates the variations in traffic flow and removal of the installation.

The Contractor shall develop a maximum of six traffic signal timing plans based on current traffic count data, for review and approval by CDOT, and shall be responsible for implementing the timing and maintaining the traffic signals. Timing plans shall include provisions for weekend and weekday traffic variations and provide sufficient clearance time for vehicles through the work zone.

Subsection 630.04 shall include the following:

The Traffic Signal (Temporary) shall consist of a pair of portable traffic signals capable of radio communication, microwave or video vehicle detection for actuation, hardwire or CDOT approved interconnect method, multiple timing plans, manual operation, and a paging system. The signals shall operate by connection to a local power line with a transfer switch connecting the load to the power line when energized and disconnecting from the power line when power fails and connecting to the solar or generator power operation with battery back-up that will provide a minimum of five days of continuous operation. All electrical wiring, including connectors and switch controls necessary to allow all signal functions required by the specification shall be provided with each system. The Contractor shall maintain one operating and parts manual, wiring diagrams, and troubleshooting guide for each system. The portable traffic signal system shall be capable of maintaining operations at a temperature range of -60 degrees Celsius to 200 degrees Celsius.

The Traffic Signal (Temporary) shall be in satisfactory operating condition prior to installation. The Contractor shall demonstrate the satisfactory operating condition by operating the system prior to closing the road to one lane of traffic. The Contractor shall maintain and replace the Traffic Signal (Temporary) if the unit fails to operate satisfactorily to CDOT and shall be retested until a satisfactorily operating Traffic Signal (Temporary) is obtained and installed. The unit shall be kept in satisfactory operating condition during the duration of its use. The unit shall remain in place or remain available until all the work is completed at each location that requires one-lane operation or as deemed necessary by CDOT. The Traffic Signal (Temporary) shall include adequate spare parts and a source of replacement components such that the system is in operation continuously.

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Revision of Section 630
Traffic Signal (Temporary)

Subsection 630.10 shall include the following:

4. MHT's detailing the portable traffic signals for one-lane alternating traffic, shall include provisions for the CDOT prequalified traffic signal contractor to be onsite during initial operation until traffic is serviced to the satisfaction of CDOT. The signal systems shall also be checked a minimum of daily for proper operation. Vehicle queue lengths shall not exceed 1000 feet and queued vehicles should clear the signal within two (2) cycles. The Contractor shall be on-site during both Friday and Sunday afternoons from 12 pm to 8 pm, or as directed by CDOT, during the first month of one-lane alternating traffic for observation, maintenance, and troubleshooting, including timing plan adjustments and queue dissipation by manual override. If issues continue beyond the first month, the contractor shall be onsite as listed above until the issues are resolved to the satisfaction of CDOT. The Contractor shall also provide two signs (24 inches x 36 inches) that shall be placed near each signal that provides a 7-day, 24-hour number that can be called if the signal malfunctions. The Contractor shall respond to signal malfunctions and arrive on-site within 1 hour of notification and shall establish traffic control with the use of flaggers. Flagger control of the site shall remain in place until the traffic signal has been restored and demonstrates satisfactory operation.

Flaggers shall control traffic during initial turn on of the signal. The flaggers shall remain on standby for 2 hours after the signal is turned on and operating properly.
