

Colorado Department of Transportation

Standard Specifications
for
Road And Bridge Construction



No. _____



PREFACE

These standard specifications are to be used on contract work awarded by the Colorado Department of Transportation (CDOT). They may be supplemented or modified to suit specific contracts.

These specifications are expressed in United States Standard Measure (English units). The international System of Units (SI, Modernized Metric) is used only where standardized testing requires metric units. For clarity, aggregate sieve sizes appear in both SI and English Units. The dimensions, measurements, and requirements stated in English units are the specification requirements. All Contractor submittals shall be prepared in English Units. Pay item quantities will be measured in English units.

Unless otherwise identified, forms herein referred to (e.g. Form 605) are CDOT forms. Forms from other organizations or agencies are clearly identified (e.g. FHWA Form 1273).

Use of these specifications by any other organization or individual will be at the user's risk. Organizations or individuals citing these specifications by reference in their contract work will be responsible for furnishing prospective bidders copies of the specifications along with any addenda that may affect their contract.

Copies of this book may be obtained from the Colorado Department of Transportation, Office of Bid Plans, 4201 E. Arkansas Avenue, Denver, CO 80222.

Addenda to these specifications may be issued by the Department to suit its needs. Addenda may be accessed on the CDOT web site and will be available for purchase at prices established by the Department.



**SECTION 100
GENERAL PROVISIONS**

**SECTION 101
DEFINITIONS AND TERMS**

Titles used in these specifications having a masculine gender, such as “workmen” and the pronouns “he” or “his”, are for the sake of brevity and are intended to refer to persons of either sex.

The titles or headings of the sections and subsections herein are intended for convenience of reference and shall not have any bearing on their interpretation.

When the Contract indicates that work is to be “accepted, acceptable, subject to approval, approved, authorized, condemned, considered necessary, contemplated, deemed necessary, designated, determined, directed, disapproved, established, given, indicated, deemed insufficient, subject to interpretation, interpreted, ordered, permitted, rejected, required, reserved, satisfactory, specified, sufficient, suitable, suspended, unacceptable, or unsatisfactory,” it shall be understood that these expressions are followed by the words “By the Engineer,” or “To the Engineer.”

When the Contract indicates that something “shall” be done, the action is required and is not discretionary.

Wherever the following abbreviations or terms are used in these specifications, plans, or other contract documents, the intent and meaning shall be interpreted as follows:

101.01 Abbreviations.

AAN	American Association of Nurserymen
AAR	Association of American Railroads
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AGC	Associated General Contractors of America
AI	Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ANSI	American National Standards Institute, Inc.
ARA	American Railway Association
AREA	American Railway Engineering Association
ARTBA	American Road and Transportation Builders Association
ASCE	American Society of Civil Engineers
ASLA	American Society of Landscape Architects
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials

101.01

ATSSA	American Traffic Safety Services Association
AWG	American Wire Gauge
AWPA	American Wood Preservers' Association
AWS	American Welding Society
AWWA	American Water Works Association
CCA	Colorado Contractors Association
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CFR	Code of Federal Regulations
CP	Colorado Procedure
CP-L	Colorado Procedure - Laboratory
CRS	Colorado Revised Statutes, 1973, as amended
CRSI	Concrete Reinforcing Steel Institute
EIA	Electronic Industries Association
FHWA	Federal Highway Administration
FSS	Federal Specifications and Standards,
IEEE	Institute of Electrical and Electronics Engineers
IES	Illuminating Engineering Society
IMSA	International Municipal Signal Association
IPCEA	Insulated Power Cable Engineers Association
ITE	Institute of Transportation Engineers
MIL	Military Specifications
MUTCD	Manual on Uniform Traffic Control Devices
NCHRP	National Cooperative Highway Research Program
NEC	National Electrical Code
NEMA	National Electrical Manufacturers' Association
NIST	National Institute of Standards and Technology
NSF	National Sanitation Foundation (nSf)
OSHA	Occupational Health and Safety Administration
PCI	Prestressed Concrete Institute
ROW	Right of Way
SAE	Society of Automotive Engineers
UL	Underwriters Laboratories, Inc.

101.02 Advertisement. A public announcement, inviting proposals for work to be performed or materials to be furnished.

101.03 Affected Area. As related to mined land reclamation, the total disturbed surface of a pit or quarry such as sand, gravel, topsoil, or borrow, that is being mined or will be mined. The area includes, but is not limited to, the excavation area, plant, and stockpile areas, parking and storage areas, and the haul roads.

101.04 Award. The acceptance by the Department of a proposal.

101.05 Basis of Payment. The terms under which "work" is paid, as a designated "Pay Item" in accordance with the quantity measured and the "Pay Unit."

101.06 Bidder. An individual, firm, corporation, or other legal entity submitting a proposal for the advertised work. A contractor intending to contract with the Department for performance of prescribed work.

101.07 Bridge. A structure, including supports, erected over a depression or an obstruction, such as water, highway, or railroad, and having a track or passageway for carrying traffic or other moving loads and having a length measured along the center of roadway of more than 20 feet between undercopings of abutments or extreme ends of openings for multiple boxes.

Length. The length of a bridge structure is the over-all length measured along the line of survey stationing back to back of backwalls of abutments, if present, otherwise, end to end of the bridge floor; but in no case less than the total clear opening of the structure.

Roadway Width. The clear width measured at right angles to the longitudinal centerline of the bridge between the bottom of curbs or guard timbers or in the case of multiple height of curbs, between the bottoms of the lower risers.

101.08 Calendar Day. Each and every day shown on the calendar, beginning and ending at midnight. When day is used, it shall mean calendar day unless otherwise defined.

101.09 CDOT Resident Engineer. The Resident Engineer is directly responsible for the overall administration of assigned construction projects. Unless the CDOT Project Engineer is a Professional Engineer, the Resident Engineer is CDOT's full time engineer in responsible charge of the project. The Resident Engineer will delegate authority to Project Engineers consistent with their experience and abilities. Only a CDOT Resident Engineer can approve and sign vouchers for interim and final Contractor pay estimates. Only a CDOT Resident Engineer can authorize and sign changes to the Contract if the Project Engineer is a Consultant Employee.

101.10 Certificate of Compliance. A certification, including a signature by a person having legal authority to act for the manufacturer, stating that the product or assembly to be incorporated into the project was fabricated in accordance with and meets the applicable specifications.

101.11 Certified Invoice. Any invoice or billing endorsed by the Contractor, certifying that material, specialty work, subcontract work, rental, lease, services, etc. were acquired for the project and that the invoiced or billed amount represents the actual costs.

101.12 Certified Test Report. A test report from the manufacturer or an independent testing laboratory, including a signature by a person having legal authority to act for the manufacturer or the independent testing laboratory stating that the test results show that the product or assembly to be incorporated into the project has been sampled and tested and the samples have passed all specified tests.

101.13

| **101.13 Conformity.** Compliance with reasonable and customary manufacturing and construction tolerances where working tolerances are not specified. Where working tolerances are specified, conformity means compliance with such working tolerances.

| **101.14 Construction Drawings.** A complete set of plans, reviewed shop drawings, working drawings, and other submittals kept available on the project site at all times by the Contractor.

| **101.15 Construction Requirements.** Specifications covering performance of work required for proper completion and acceptance.

| **101.16 Contract.** The written agreement between the State of Colorado through the Department of Transportation and the Contractor setting forth the obligations of the parties for the performance of the work and the basis of payment.

The Contract includes the invitation for bids, proposal, contract bonds, standard specifications, supplemental specifications, special provisions, general and detailed plans, notice to proceed, contract modification orders, and authorized extensions of time, all of which constitute one instrument.

| **101.17 Contract Item (Pay Item).** A specifically described unit of work for which a price is provided in the Contract.

| **101.18 Contract Modification Order.** A written order issued to the Contractor by the Department covering contingencies, extra work, increases or decreases in contract quantities, and additions or alterations to the plans or specifications, within the scope of the Contract, and establishing the basis of payment and time adjustments for the work affected by the changes. The Contract Modification Order is the only method authorized for changing the Contract. Contract Modification Orders must be approved as established in subsection 105.13.

| **101.19 Contract Payment Bond.** The security executed by the Contractor and Surety or Sureties and furnished to the Department to guarantee payment of all legal debts of the Contractor pertaining to the Construction of the project.

| **101.20 Contract Performance Bond.** The security executed by the Contractor and Surety or Sureties and furnished to the Department to guarantee completion of the work in accordance with the Contract.

| **101.21 Contract Time.** The number of working days or calendar days allowed for completion of the Contract, including authorized time extensions. Where a calendar date of completion is specified, the Contract shall be completed on or before that date.

| **101.22 Contractor.** The individual, firm, or corporation contracting with the State of Colorado through the Department of Transportation for performance of prescribed work.

101.23 Contractor's Engineer. A professional engineer registered in the State of Colorado who is an employee of either the Contractor, a consulting engineer under contract to the Contractor, or a manufacturer or supplier of materials supplied to the project.

101.24 County. The county in which the work is to be done.

101.25 Culvert. Any structure not classified as a bridge which provides an opening under the roadway.

101.26 Day. See subsection 101.08

101.27 Department. State Department of Transportation. A department within the executive branch of the State of Colorado.

101.28 Engineer. The Chief Engineer of the Department acting directly or through an authorized representative, who is responsible for engineering and administrative supervision of the project.

101.29 Equipment. All machinery, tools, and apparatus together with supplies for upkeep and maintenance, necessary for the proper construction and acceptable completion of the work.

101.30 Extra Work. Work not provided for in the Contract as awarded but found by the Engineer to be essential to the satisfactory completion of the Contract within its intended scope.

101.31 Force Account Work. Work paid for on the basis of actual costs plus approved additives. See subsection 109.04.

101.32 Highway. A general term denoting a public way for purposes of vehicular travel, including the entire area within the right of way.

101.33 Holidays. Holidays recognized by the State of Colorado are:

New Year's Day
Dr. Martin Luther King, Jr.'s Birthday (observed)
Washington-Lincoln Day
Cesar Chavez Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veterans' Day
Thanksgiving Day
Christmas Day

101.33

When New Year's Day, Cesar Chavez Day, Independence Day, or Christmas Day falls on a Sunday, the following Monday shall be considered a holiday. When one of these days falls on a Saturday, the preceding Friday shall be considered a holiday.

Additional legal holidays, when designated by the Governor or the President of the United States will also be recognized by the State.

101.34 Inspector. The Engineer's authorized representative assigned to make detailed inspections of contract performance.

101.35 Invitation for Bids. All documents, whether attached or incorporated by reference, utilized for soliciting proposals. The advertisement will indicate with reasonable accuracy the quantity and location of the work to be done or the character and quantity of the material to be furnished and the time and place of the opening of proposals.

101.36 Laboratory. The testing laboratory of the Department, or any other testing laboratory designated by the Engineer.

101.37 Materials. All components required for use in the construction of the project.

101.38 Method of Measurement. The manner in which a "Pay Item" is measured to conform with the "Pay Unit."

101.39 Notice to Proceed. Written notice to the Contractor to proceed with the contract work including, when applicable, the date of beginning of contract time.

101.40 Original Contract Amount. The sum of the total dollar amounts bid for all the construction pay item quantities. In subsection 626.02 this figure is modified for use in calculating partial payments for mobilization.

101.41 Pavement Structure. The combination of one or more of the following courses placed on a subgrade to support and distribute the traffic load to the roadbed.

- (a) *Subbase.* The layer or layers of specified or selected material placed on a subgrade to support a base course, surface course, or both. Subgrade that has been treated with lime, fly ash, cement kiln dust, or combinations thereof for stabilization will be considered subbase.
- (b) *Base Course.* The layer or layers of specified or selected material placed on a subbase or a subgrade to support a surface course.
- (c) *Surface Course.* One or more layers of a pavement structure designed to accommodate the traffic load, the top layer of which resists skidding, traffic abrasion, and the disintegrating effects of climate. The top layer is sometimes called "Wearing Course."

101.42 Planned Force Account. Items of work, included on the plans, which will be paid for in accordance with subsection 109.04.

101.43 Plans. The drawings, or reproductions, provided by the Department which show the location, character, dimensions, and details of the work to be done.

101.44 Preconstruction Conference. A meeting of CDOT project personnel, Contractor project personnel and other stake holders held prior to the beginning of construction at which topics pertinent to the successful prosecution of the work are discussed.

101.45 Profile Grade. The trace of a vertical plane usually intersecting the top surface of the proposed wearing surface and usually along the longitudinal centerline of the roadbed. Profile grade means either elevation or gradient of such trace according to the context.

101.46 Project. The specific section of the highway on which construction is to be performed as described in the Contract.

101.47 Project Engineer. The Chief Engineer's duly authorized representative who may be a CDOT employee or an employee of a consulting engineer (consultant) under contract to CDOT as defined below:

- (a) *CDOT Project Engineer.* The CDOT employee, assigned by the Resident Engineer, who is the Chief Engineer's duly authorized representative. The CDOT Project Engineer is in direct charge of the work and is responsible for the administration and satisfactory completion of the project under contract.
- (b) *Consultant Project Engineer.* The consultant employee under the responsible charge of the consultant's Professional Engineer who is in direct charge of the work and is responsible for the administration and satisfactory completion of the project. The Consultant Project Engineer's duties are delegated by the CDOT Resident Engineer in accordance with the scope of work in the consultant's contract with CDOT. The Consultant Project Engineer is not authorized to sign or approve Contract Modification Orders.

101.48 Project Special Provisions. See definition for special provisions in subsection 101.66.

101.49 Project Termini. Limits of the Project as shown on the plans.

101.50 Proposal. The offer of a bidder, on the prescribed form, to perform the work at the prices quoted. Also called bid.

101.51 Proposal Form. The documents furnished by the Department on which the offer of a bidder is submitted. Also called bid proposal.

101.52

101.52 Proposal Guaranty. The security furnished with a proposal to guarantee that the bidder will enter into the Contract if the proposal is accepted.

101.53 Record Set. A reproduction of a drawing or set of drawings, design calculations, or other record of engineering work required to be performed by the Contractor's engineer, which is signed and sealed by the Contractor's engineer in accordance with the Rules of Procedures of the State Board of Registration for Professional Engineers and Land Surveyors.

101.54 Region Transportation Director. The Department's representative, responsible for construction, maintenance and safety activities, within the geographical jurisdiction established by the Department. The Region Transportation Director is responsible for acting on written appeals made by the Contractor relating to contract claims for additional compensation or extension of contract time.

101.55 Right of Way. A general term denoting land, property, or interest therein, usually in a strip, acquired for or devoted to a highway.

101.56 Road. A general term denoting a public way for purposes of vehicular travel, including the entire area within the right of way.

101.57 Roadbed. The graded portion of a highway within top and side slopes, prepared as a foundation for the pavement structure and shoulders.

101.58 Roadside. A general term denoting the area adjoining the outer edge of the roadway. Extensive areas between the roadways of a divided highway may also be considered roadside.

101.59 Roadside Development. Those items necessary for the preservation of landscape materials and features. The rehabilitation and protection against erosion of all areas disturbed by construction through seeding, sodding, mulching and the placing of other ground covers. Suitable planting and other improvements as may increase the effectiveness and enhance the appearance of the highway.

101.60 Roadway. The portion of a highway within limits of construction.

101.61 Roadway Prism. The portion of the roadway defined as the prism of embankment situated beneath the shoulders and pavement structure and inside the lines projected downward and outward on a one to one slope from the outside edges of the roadway shoulders to their intersection with the base of the embankment.

101.62 Salvable Material. Material that can be saved or salvaged. Unless otherwise specified in the Contract, all salvable material shall become the property of the Contractor.

101.63 Shop Drawings. A general term that includes drawings, diagrams, illustrations, samples, schedules, calculations, and other data which provide details of

the construction of the work and details to be used by the Engineer for inspection. Shop drawings shall be prepared by the Contractor, subcontractors, manufacturers, suppliers, or distributors. Shop Drawings are submitted to the Engineer for formal review and return to the Contractor in accordance with subsection 105.02(c). Shop drawings include data which illustrates material, equipment, and items which are incorporated in and become part of the permanent work in accordance with the Contract.

101.64 Shoulder. The portion of the roadway contiguous with the traveled way for accommodation of stopped vehicles, for emergency use, and for lateral support of base and surface courses.

101.65 Sidewalk. That portion of the roadway constructed for pedestrian use.

101.66 Special Provisions. Additions and revisions to the standard and supplemental specifications covering conditions specific to an individual project or group of projects. Special provisions fall within one of the two following categories and take precedence as specified in subsection 105.08.

- (a) *Project Special Provisions.* Additions and revisions to the Standard and Supplemental Specifications, specific to the project.
- (b) *Standard Special Provisions.* Additions and revisions to the Standard and Supplemental Specifications, specific to a selected group of projects or which are intended for temporary use.

101.67 Specifications. A general term applied to all directions, provisions and requirements pertaining to performance of the work.

- (a) *Standard Specifications:* The Department's printed book (including errata) for Road and Bridge Construction. The book is divided into three parts namely:
 - (1) General Provisions (Section 100)
 - (2) Construction Details (Section 200 thru 600)
 - (3) Material Details (Section 700)
- (b) *Supplemental Specifications:* Additions and revisions to the Standard Specifications that are adopted subsequent to the issuance of the printed book.

The outline for "Work" items in the Construction Details contains the following:

- (1) Description
- (2) Materials
- (3) Construction Requirements
- (4) Method of Measurement
- (5) Basis of Payment

101.68 Specified Completion Date. The date on which the contract work is specified to be completed.

101.69

101.69 Standard Special Provisions. See definition for Special Provisions, subsection 101.66.

101.70 State. The State of Colorado acting through its authorized representative.

101.71 Street. A general term denoting a public way for purposes of vehicular travel, including the entire area within the right of way.

101.72 Structures. Bridges, culverts, catch basins, drop inlets, retaining walls, cribbing, manholes, endwalls, buildings, storm drains, service pipes, underdrains, foundation drains, fences, guardrail, signs, end sections, traffic signals, light standards, and other features which may be encountered in the work and not otherwise classified.

101.73 Subcontractor. An individual, firm, corporation, or other legal entity to whom the Contractor sublets part of the Contract.

101.74 Subgrade. The top surface of a roadbed upon which the pavement structure, shoulders, and curbs are constructed. Subgrade that has been treated with lime, fly ash, cement kiln dust, or combinations thereof for stabilization will be considered subbase.

101.75 Substructure. All of the structure below the bearings of simple and continuous spans, skewbacks of arches, and tops of footings of rigid frames, together with the backwalls, wingwalls, and wing protection railings.

101.76 Superintendent. The Contractor's authorized employee in responsible charge of the work.

101.77 Superstructure. The entire structure except the substructure, as defined in subsection 101.75.

101.78 Supplemental Specifications. See definition for Specifications, subsection 101.67.

101.79 Surety. The corporation, partnership, or individual, other than the Contractor, executing a bond furnished by the Contractor.

101.80 Traffic Control Plan (TCP). The parts of the contract documents for each project that contain the requirements for the maintenance of traffic during construction of the project.

101.81 Traveled Way. The portion of the roadway for the movement of vehicles, exclusive of shoulders and auxiliary lanes.

101.82 Value Engineering Change Proposal (VECP). A change to contract requirements proposed by the Contractor which will accomplish the project's

functional requirements at less cost or improve value or service at no increase or at a minor increase in cost.

101.83 Wheel Path. Wheel paths are the two sections of each through-traffic lane that bear the wheel loading. The center of each wheel path is located 3 feet from the center of the lane; each wheel path is 2 feet wide.

101.84 Work. The furnishing of all labor, materials, equipment, and incidentals necessary to successfully complete the project according to all duties and obligations imposed by the Contract.

101.85 Working Day. Any day, exclusive of Saturdays, Sundays and holidays, on which weather and other conditions not under the control of the Contractor will permit construction operations to proceed with the normal working force engaged in performing those items controlling the completion of the work.

101.86 Working Drawings. A general term that includes drawings, diagrams, illustrations, samples, schedules, calculations, and other data which illustrate the construction of the work, material, equipment, methods, and items which are necessary to construct the work in accordance with the plans and specifications. Working drawings shall be prepared by the Contractor, subcontractors, manufacturers, suppliers, or distributors. Working drawings are submitted to the Engineer for information only, and are not formally reviewed and returned to the Contractor.

101.87 Workplace Violence. Workplace violence is conduct in the workplace against employees, employers, or outsiders committed by a person who either has an employment related connection with CDOT, or is a contractor working on a CDOT project. This conduct includes:

- (1) Physical acts against persons or their property, or against CDOT or Contractor property that are perceived to be harmful or threatening.
- (2) Veiled or direct verbal threats, profanity, or vicious statements or gestures that are meant to harm or create a threatening or intimidating work environment.
- (3) Written threats, profanity, vicious cartoons or notes that are meant to create a threatening or intimidating environment
- (4) Any other acts that are perceived to be threatening or intended to injure or convey hostility.

102.01

**SECTION 102
BIDDING REQUIREMENTS
AND CONDITIONS**

102.01 Prequalification of Bidders. The bidder shall follow the prequalification and bidding procedures contained in the Rules for Prequalification, Debarment, Bidding, and Work on Colorado Department of Highways' Road, Highway, and Bridge Public Projects, 2 CCR 601-10, ("Rules"), on file with the Colorado Secretary of State. Copies are available upon request in the Contracts and Market Analysis Branch of the Department.

Only prequalified bidders will be allowed to bid on any project. At least ten days prior to opening of proposals, the bidder must file an experience questionnaire and a confidential financial statement on standard forms furnished by the Department.

102.02 Contents of Proposal Forms. Upon request, the Department will furnish the prospective bidder with a proposal form (bid proposal). This form will state the location and description of the contemplated construction and will show the estimate of the various quantities and types of work to be performed or materials to be furnished, and will have a schedule of items for which unit bid prices are invited. The proposal form will state the time in which the project must be completed, the amount of the proposal guaranty, and the date, time and place of the opening of proposals.

All papers bound with or attached to the proposal form are considered a part of the proposal and must not be detached or altered when the proposal is submitted.

The plans, specifications, and other documents designated in the proposal form, will be considered a part of the proposal whether attached or not.

The prospective bidder shall pay the Department the sum stated in the Invitation for Bids for each set of plans.

102.03 Interpretation of Quantities in Proposal Form. Except as otherwise provided in this subsection and the method of measurement for individual items, the quantities appearing in the proposal form are estimates prepared for the comparison of proposals. Payment to the Contractor will be made in accordance with the following procedures:

- (a) *Measurement required.* When the Contract requires measurement of work performed or material furnished, payment will be made for actual quantities measured and accepted.
- (b) *Measurement Not Required.* When the Contract does not require quantities of work performed or materials furnished to be measured, payment will be made for the quantities appearing in the Contract.

The estimated quantities of work to be performed and materials to be furnished may be increased, decreased or omitted.

102.04 Interpretation of Plans and Specifications. Any change to proposal forms, plans, or specifications prior to the opening of proposals will be issued by the Department by certified mail to all holders of proposal forms. Certain individuals are named in the project specifications who have authority to provide information, clarification or interpretation to bidders prior to opening of proposals. Information obtained from persons other than those named individuals is invalid and shall not be used for bidding purposes.

102.05 Examination of Plans, Specifications, Special Provisions, and Site of Work. The bidder is expected to examine the site of the proposed work, the proposal, plans, specifications, supplemental specifications, special provisions, and contract forms, before submitting a proposal. The submission of a proposal will be considered conclusive evidence that the bidder has made this examination and is aware of the conditions to be encountered in performing the work according to the Contract.

Boring logs and other records of subsurface investigations, if they exist, are available for inspection by bidders. These logs and records are made available so that all bidders have access to identical subsurface information that is available to the Department, and is not intended as a substitute for personal investigation, interpretation and judgment of the bidders.

The Department does not warrant the adequacy of boring logs and other records of subsurface investigations, and such information is not considered to be a part of the Contract. When a log of test borings is included in the subsurface investigation record, the data shown in the individual log of each test boring apply only to that particular boring and are not intended to be conclusive as to the character of any material between or around test borings. If bidders use this information in preparing a proposal, it is used at their own risk, and bidders are responsible for all conclusions, deductions, and inferences drawn from such information.

Bidders may conduct subsurface investigations at the project site at bidder's expense; the Department will afford them this opportunity prior to public opening of proposals.

If a bidder discovers an apparent error or omission in the proposal form, estimated quantities, plan, or specifications, the bidder shall immediately notify the Engineer to enable the Department to make any necessary revisions. The Department may consider it to be detrimental to the Department for a bidder to submit an obviously unbalanced unit bid price. See subsection 102.07.

102.06 Preparation of Proposal. The bidder shall submit the proposal (bid) upon the forms furnished by the Department in accordance with the "Rules" referenced in subsection 102.01.

102.07

102.07 Irregular Proposals. Proposals (bids) will be considered irregular and may be rejected for any of the following reasons:

- (a) If the proposal is on a form other than that prescribed by the Department, or if the form is altered or any part thereof is detached, or if the form does not contain original signatures.
- (b) If there are unauthorized additions, conditional or alternative proposals, or irregularities of any kind which may tend to make the proposal incomplete, indefinite, or ambiguous.
- (c) If the bidder fails to acknowledge in the proposal the receipt of all revisions current on the date of opening of proposals.
- (d) If the proposal does not contain a unit price for each pay item listed except in the case of authorized alternative pay items, the mathematical products of the respective unit prices and the estimated quantities, and the total amount of the bid obtained by adding such mathematical products.
- (e) If the Department determines that any of the unit bid prices are materially unbalanced to the potential detriment of the Department. There are two types of unbalanced bids: (1) mathematically unbalanced and, (2) materially unbalanced. The mathematically unbalanced bid is a bid containing lump sum or unit pay items which do not reflect reasonable actual costs plus a reasonable proportionate share of the bidder's anticipated profit, overhead costs, and other indirect costs, but not necessarily to the detriment of the Department. These costs should all relate to the performance of the items in question. The materially unbalanced bid is a mathematically unbalanced bid which the Department determines leaves reasonable doubt that award will result in the lowest ultimate cost to the Department, or that award is in the public interest.
- (f) If the Contractor submitting the bid is affiliated with another bidder that has submitted a bid on the same public project.
- (g) If the bidder has been sent a notice of intent to revoke prequalification under Chapter Two of the "Rules."
- (h) If the bidder has been asked in writing to show why it should not be found in default on a Department contract.
- (i) If the bidder has been sent a notice of intent to debar or of suspension under Chapter Three of the "Rules."

The Department reserves the right to reject any or all bids, to waive technicalities or to advertise for new bids, if in the judgment of the Department its best interests will be promoted thereby.

102.08 Combination or Conditional Proposals. If proposal forms are issued for projects in combination and separately, the bidder may submit proposals either on the combination or on separate units of the combination. The Department reserves the right to make awards on combination or separate proposals to the advantage of the Department . Combination proposals will be considered, only when specified.

102.09 Anti-Collusion Affidavit. Every proposal (bid) submitted to the Department shall contain a statement certifying that the bidder has not participated in any collusion or taken any action in restraint of free competitive bidding. This statement shall be in the form of an affidavit provided by the Department and signed by the bidder. The original of the signed anti-collusion affidavit, Form 606, shall be submitted with the proposal. The proposal will be rejected if it does not contain the completed Form 606.

102.10 Material Guaranty. The successful bidder may be required to furnish a complete statement of the origin, composition, and manufacture of materials used in the construction of the work together with samples, which will be tested for conformance with Contract provisions.

103.01

**SECTION 103
AWARD AND EXECUTION
OF CONTRACT**

103.01 Consideration of Proposals. After the proposals (bids) are opened and read, they will be evaluated and the Contract awarded or rejected in accordance with the “Rules” referenced in subsection 102.01.

The low responsible bidder shall submit a completed CONTRACTORS PERFORMANCE CAPABILITY STATEMENT, Form 605, and a completed ASSIGNMENT OF ANTITRUST CLAIMS, Form 621 to the Award Officer prior to 4:30 P.M. on the fifth calendar day after the bid opening. Failure to submit the Forms 605 and 621 may result in the denial of award to the apparent low responsible bidder and forfeiture of the proposal guaranty.

103.02 Award of Contract. If the Contract is awarded, the award will be made within 30 calendar days after the opening of proposals to the lowest bidder whose proposal complies with all the requirements prescribed. The successful bidder will be notified in writing of the acceptance of the proposal and the award of the Contract.

103.03 Requirement of Contract Bonds. At the time of the execution of the Contract, the successful bidder shall furnish a Contract Payment Bond and a Contract Performance Bond. Each bond shall be in a penal sum equal to the nearest integral one hundred dollars in excess of the sum of the original bid items plus all force account items specified in the project special provisions to be included in the payment and performance bonds. The bonds and the security shall be acceptable to the Department.

103.04 Execution and Approval of Contract. The Contract shall be signed and returned by the successful bidder together with the contract bonds, within 15 days after the date of award. If the signed Contract and bonds are returned by the successful bidder within 15 days after award and, if the Contract is not executed by the Department within 30 days from date of award, the bidder shall have the right to withdraw the proposal without penalty. The Contract will not be considered effective until it has been fully executed by all of the parties to the Contract.

SECTION 104 SCOPE OF WORK

104.01 Intent of Contract. The Contractor shall complete the work described and furnish all labor, materials, equipment, tools, transportation, and supplies required to complete the work in accordance with the Contract. Alterations of plans or the nature of the work will not involve or require work beyond the termini of the original project, until a contract modification order has been executed.

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

- (a) *Differing Site Conditions.* During the progress of work, if subsurface or latent physical conditions are encountered at the site differing materially from those indicated in the Contract or if unknown physical conditions of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in the work provided for in the Contract, are encountered at the site, the party discovering such conditions shall promptly notify the other party in writing of the specific differing conditions before the site is disturbed and before the affected work is performed.

Upon written notification, the Engineer will investigate the conditions, and if the Engineer determines that the conditions materially differ and cause an increase or decrease in the cost or time required for the performance of any work under the Contract, an adjustment, excluding anticipated profits, will be made and the Contract modified in writing accordingly. The Engineer will notify the Contractor of the determination whether or not an adjustment of the Contract is warranted. No Contract adjustment which results in a benefit to the Contractor will be allowed unless the Contractor has provided the required written notice.

- (b) *Suspensions of Work Ordered by the Engineer.* If the performance of all or any portion of the work is suspended or delayed by the Engineer in writing for an unreasonable period of time (not originally anticipated, customary, or inherent to the construction industry) and the Contractor believes that additional compensation, contract time, or both are due as a result of such suspension or delay, the Contractor shall submit to the Engineer in writing a request for adjustment within seven calendar days of receipt of the notice to resume work. The request shall set forth the reasons and support for such adjustment.

Upon receipt, the Engineer will evaluate the Contractor's request. If the Engineer agrees that the cost, time required, or both for the performance of the Contract has increased as a result of such suspension and the suspension was caused by conditions beyond the control of and not the fault of the Contractor, its suppliers, or subcontractors at any approved tier, and not caused by weather, the Engineer will make an adjustment (excluding profit) and modify the Contract in writing accordingly. The Engineer will notify the Contractor of the determination

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whether or not an adjustment of the Contract is warranted. No Contract adjustment will be allowed unless the Contractor has submitted the request for adjustment within the time prescribed.

No Contract adjustment will be allowed under this clause to the extent that performance would have been suspended or delayed by any other cause, or for which an adjustment is provided for or excluded under any other term or condition of this Contract.

- (c) *Significant Changes in the Character of Work.* The Engineer reserves the right to make, in writing, at any time during the work, such changes in quantities and such alterations in the work as are necessary to satisfactorily complete the project. Such changes in quantities and alterations shall not invalidate the Contract nor release the surety, and the Contractor agrees to perform the work as altered.

If the alterations or changes in quantities significantly change the character of the work under the Contract, whether such alterations or changes are in themselves significant changes to the character of the work, or by affecting other work cause such other work to become significantly different in character, an adjustment, excluding loss of anticipated profit, will be made to the Contract. The basis for the adjustment shall be agreed upon prior to the performance of the work. If a basis cannot be agreed upon, then an adjustment will be made either for or against the Contractor in such amount as the Engineer may determine to be fair and equitable.

If the alterations or changes in quantities do not significantly change the character of the work to be performed under the Contract, the altered work will be paid for as provided elsewhere in the Contract. The term “significant change” shall be construed to apply only to the following circumstances:

- (1) When the character of the work as altered differs materially in kind or nature from that involved or included in the original proposed construction, or
- (2) When a major item of work is increased in excess of 125 percent or decreased below 75 percent of the original contract quantity. Any allowance for an increase in quantity shall apply only to that portion in excess of 125 percent of original contract item quantity, or in case of a decrease below 75 percent, to the actual amount of work performed. A major item is defined to be any item having an original contract value in excess of 10 percent of the original contract amount.

104.03 Extra Work. The Contractor shall perform unforeseen work, for which there is no price included in the Contract, whenever the extra work is necessary or desirable for contract completion. This work shall be performed in accordance with the Contract and as directed, and will be paid for as provided under subsection 109.04.

104.04 Maintaining Traffic. Unless otherwise provided, the Contractor shall keep the road open to all traffic in accordance with the TrafficControl Plan during the progress of the work. The Contractor shall schedule construction operations so that only one side of the existing roadbed is denied to traffic at any time. The Contractor shall also provide and maintain in a safe condition temporary approaches or crossings and intersections with trails, roads, streets, businesses, parking lots, residences, garages, and farms. The road and the intersections of the access points shall be maintained in a manner that will safely and adequately accommodate traffic.

The Contractor shall not store materials or equipment nor park vehicles on the highway except in designated areas. The Contractor shall not have materials or equipment in the traffic lanes open to traffic at any time unless directed.

Portions of the roadway that are not included in the contract work will be maintained by the Department. Snow removal will be the responsibility of the Department. The Contractor shall be responsible for maintaining all work that is included in the Contract, and maintaining approaches, crossings, intersections, and other features as may be necessary to accommodate traffic without direct compensation, except as provided in the Contract or described in (a) and (b) below.

- (a) *Approved Detours.* The cost of constructing detours and temporary bridges, and the removal of temporary bridges and obliteration of the detour road will be paid for at the appropriate unit bid prices for the items of work involved.

Maintenance requirements, as approved, will be paid for by the appropriate bid item; however, if a bid item does not exist, then payment will be made as provided in subsection 104.03.

- (b) *Maintaining Traffic During Suspension of Work.* During any suspension ordered by the Engineer in accordance with subsection 105.01, the Contractor shall open to traffic the portions of the project as directed. Prior to allowing traffic on the project, the Contractor shall prepare the roadbed so that it will safely and adequately accommodate traffic. During the suspension period, the maintenance of the roadway will be the responsibility of the Department. However, when the suspension is the result of a failure by the Contractor, all costs for maintenance of traffic during the suspension period shall be borne by the Contractor. When the suspension is lifted, the Contractor shall renew any work or replace materials lost or damaged on the project and shall remove, as directed, work or materials used during the suspension. The Contractor shall complete the project as though the prosecution of the work had been continuous and without interference. All additional work caused during the suspensions, for reasons beyond the Contractor's control, will be paid for as provided in subsection 104.02 when contract unit prices exist, or as extra work as provided in subsection 104.03 when no unit price exists.
- (c) *Maintaining Traffic During Free Time.* During the free time period, if provided for in the Contract, the Contractor shall be responsible for maintaining traffic

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control items as long as construction operations interfere with traffic. When construction operations which interfere with traffic cease, the Contractor shall notify the Engineer, in writing, and shall adhere to the same procedures as in paragraph (b) above. The Contractor shall notify the Engineer, in writing, when construction operations which interfere with traffic will resume and shall resume responsibility for maintaining traffic.

- (d) *Maintenance Directed by the Engineer.* If the Engineer directs special maintenance for the benefit of the traveling public, that is not included in the Contract, the Contractor will be paid in accordance with subsection 104.02 when contract unit prices exist, or as extra work, in accordance with subsection 104.03, when no contract unit prices exist. The Engineer will determine the work to be classed as special maintenance.

104.05 Rights in and Use of Materials Found on the Work. The Engineer may authorize the Contractor's use of materials found in the excavation for completing pay items other than excavation. Payment will be made for both the excavation of such materials at the corresponding contract unit price, and for the pay item for which the excavated material is used. The Contractor shall replace the removed material with acceptable material at no additional cost to the Department. The Department will not charge the Contractor royalty or additional cost of select material for the removed material. 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 the Engineer.

Unless otherwise provided, the material from structures designated for removal shall be the Contractor's property and may be used temporarily by the Contractor in the erection of the new structure.

104.06 Final Cleaning Up. Before final acceptance, the highway, material pits, and all ground occupied by the Contractor in connection with the project shall be cleaned of all rubbish, excess materials, temporary structures, and equipment; and all parts of the work shall be left in an acceptable condition. The cost of final cleanup will not be paid for separately but shall be included in the work.

104.07 Value Engineering Change Proposals by the Contractor. The Contractor is encouraged to develop and offer proposals for improved construction techniques, alternative materials and other innovations. Proposals must provide a project comparable to the Department's original design either at lower cost, with improved quality, or both. Bid prices shall not be based on the anticipated approval of a Value Engineering Change Proposal (VECP). Proposals shall be submitted only by the successful bidder after contract award. If a VECP is rejected, the work shall be completed in accordance with the Contract at contract bid prices. The Contractor shall have no claim against the Department for compensable or noncompensable delay to the Contract based on the failure to respond to the proposal.

The Contractor may submit either a full VECP or a preliminary Conceptual VECP, followed by a full proposal. The Engineer will provide timely review of all proposals and advise the Contractor whether the Proposal is complete or incomplete. When the proposal is complete, the Engineer will advise the Contractor of either the approval of the proposal or the reasons for rejection of the proposal.

Cost savings generated to the Contract as a result of VECPs offered by the Contractor and accepted by the Engineer shall be shared equally between the Contractor and the Department.

If the Engineer determines that the time for response indicated in the submittal under item (c)5 below is insufficient for review, the Contractor will be promptly notified. Based on the additional time needed by the Engineer for review and the effect on the Contractor's schedule caused by the added time, the Engineer will evaluate the need for a noncompensable time adjustment to the Contract.

- (a) VECPs that will be considered are those that would produce savings to the Department or provide improved project quality without impairing essential functions and characteristics of the facility. Essential functions include but are not limited to: service life, economy of operation, ease of maintenance, desired appearance, safety, and impacts to the traveling public or to the environment during and after construction.
- (b) *Submittal of Conceptual Proposal.* For VECPs that require a significant amount of design or other development resources, the Contractor may submit an abbreviated Conceptual Proposal for preliminary evaluation. The Engineer will evaluate the information provided and advise the Contractor if any conditions or parameters of the Conceptual Proposal are found to be grounds for rejection. Preliminary review of a conceptual proposal reduces the Contractor's risk of subsequent rejection but does not commit the Department to eventual approval of the full VECP. The following information shall be submitted for each Conceptual Proposal.
 1. A statement that the proposal is submitted as a Conceptual VECP.
 2. A general description of the difference between the existing Contract and the proposed change, and the advantages and disadvantages of each, including effects on cost, service life, economy of operation, ease of maintenance, desired appearance, safety, and impacts to the traveling public or to the environment during and after construction.
 3. A set of conceptual plans and a description of proposed changes to the Contract specifications.
 4. An estimate of the anticipated cost savings or increase.
 5. A statement specifying:

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- (1) when a response to the conceptual proposal from the Department is required to avoid delays to the existing contract prosecution,
- (2) the amount of time necessary to develop the full Proposal,
- (3) the date by which a Contract Modification Order must be executed to obtain maximum benefit from the Proposal, and
- (4) the Proposal's impact on time for completing the Contract.

(c) *Submittal of Full Value Engineering Change Proposal.* The following materials and information shall be submitted with each proposal.

1. A statement that the proposal is submitted as a VECP.
2. A description of the difference between the existing Contract and the proposed change, and the advantages and disadvantages of each, including effects on service life, economy of operation, ease of maintenance, desired appearance, safety, and impacts to the traveling public or to the environment during and after construction.
3. A complete set of plans and specifications showing the proposed revisions relative to the original Contract. This portion of the submittal shall include design notes and construction details. The proposed plans and specifications shall be signed and sealed by the Contractor's engineer.
4. A complete analysis indicating the final estimated costs and quantities to be replaced by the Proposal compared to the new costs and quantities generated by the Proposal. All costs and proposed unit prices shall be documented by the Contractor.
5. A statement specifying the date by which a Contract Modification Order must be executed to obtain the maximum cost reduction during the remainder of the Contract.
6. A statement detailing the effect the Proposal will have on the time for completing the Contract.
7. A description of any previous use or testing of the proposed changes and the conditions and results. If the Proposal was previously submitted on another Department project, the proposal shall indicate the date, Contract number, and the action taken by the Department.
8. An estimate of any effects the VECP will have on other costs to the Department.
9. A statement of life cycle costs, when appropriate. Life cycle costs will not be considered as part of cost savings but shall be calculated for additional support of the Proposal. A discount rate of four percent shall be used for life cycle calculations.

10. A statement specifying when a response from the Owner is required to avoid delays to the prosecution of the Contract.

(d) *Evaluation.* VECPs will be evaluated in accordance with the following:

1. The Engineer will determine if a Proposal qualifies for consideration and evaluation. The Engineer may reject any Proposal that requires excessive time or costs for review, evaluation, or investigations. The Engineer may reject proposals that are not consistent with the Department's design policies and criteria for the project.
2. The Engineer will reject all or any portion of work performed under an approved VECP if unsatisfactory results are obtained. The Engineer will direct the removal of such rejected work and require construction to proceed under the original Contract requirements without reimbursement for work performed under the proposal, or for its removal.
3. VECPs, whether or not approved by the Department, apply only to the ongoing Contracts referenced in the Proposal and become the property of the Department. Proposals shall contain no restrictions imposed by the Contractor on their use or disclosure. The Department has the right to use, duplicate and disclose in whole or in part any data necessary for the utilization of the Proposal. The Department retains the right to utilize any accepted Proposal or part thereof on other projects without obligation to the Contractor. This provision is subject to rights provided by law with respect to patented materials or processes.
4. If the Department is already considering certain revisions to the Contract or has approved certain changes in the Contract for general use that are subsequently proposed in a VECP, the Engineer will reject the Proposal and may proceed to implement these changes without obligation to the Contractor.
5. The Contractor shall have no claim against the Department for additional costs or delays resulting from the rejection or untimely acceptance of a VECP. These costs include but are not limited to: development costs, loss of anticipated profits, increased material or labor costs, or untimely response.
6. Proposals will be rejected if equivalent options are already provided in the Contract.
7. Proposals that only reduce or eliminate contract pay items will be rejected.
8. The savings generated by the Proposal must be sufficient to warrant a review and processing, as determined by the Engineer.

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9. A Proposal changing the type or thickness of the pavement structure or changing the design of a bridge will be rejected.
 10. Additional information needed to evaluate Proposals shall be provided in a timely manner. Untimely submittal of additional information will result in rejection of the Proposal. Where design changes are proposed, the additional information shall include results of field investigations and surveys, design and computations, and changed plan sheets required to develop the design changes.
- (e) *Payment.* If the VECP is accepted, the changes and payment will be authorized by Contract Modification Order. Reimbursement will be made as follows:
1. The changes will be incorporated into the Contract by changes in quantities of unit bid items, new agreed unit price items, or both, as appropriate, under the Contract.
 2. The cost of the revised work as determined from the changes will be paid to the Contractor. The Department will pay the Contractor 50 percent of the savings to the Department upon completion of the value analysis work. The savings to the Department shall be the difference between the cost of the revised work and the cost of the related construction required by the original Contract computed at Contract bid prices.
 3. Costs incurred by the Contractor for development, design, and implementation of the VECPs will not be reimbursed.
 4. When work performed under an approved VECP is modified to fit field or other conditions, the maximum amount paid for the work will be limited to that which would have been paid if the work had been performed under the original contract provisions. The rejection or limitation of reimbursement shall not constitute the basis of any claim against the Department for delay or for other costs except as allowed under the original Contract.

SECTION 105 CONTROL OF WORK

105.01 Authority of the Engineer. The Engineer will decide all questions regarding the quality and acceptability of materials furnished, work performed, and the rate of progress of the work; all interpretation of the plans and specifications; and the acceptable fulfillment of the Contract.

The Engineer will, in writing, suspend the work, wholly or in part:

- (1) when the Contractor fails to correct conditions unsafe for the workmen or the general public
- (2) for failure to carry out Contract provisions
- (3) for failure to carry out orders
- (4) for periods of unsuitable weather
- (5) for conditions unsuitable for the prosecution of the work
- (6) for any other condition or reason determined to be in the public interest

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

- (a) *Plans.* The Contract plans will show lines, grades, typical cross sections of the roadway, location and design of all structures, and summary of items appearing on the proposal. Only general features will be shown for steel and prestressed concrete bridges.
- (b) *Shop drawings, Working Drawings, and Other Submittals - General.* All work shall be performed in accordance with the plans, reviewed shop drawings, working drawings, or other submittals. Specific requirements for the required shop drawings, working drawings, and other submittals for this project are contained in the specifications.

The Contractor shall be responsible for the accuracy of all dimensions and quantities shown on the shop drawings, working drawings, and other submittals. The Contractor shall correlate all information in the Contract, in the submittals, and in all revisions at the project site to insure that there are no conflicts and that the work can be constructed as shown. The Contractor shall be responsible for all information that pertains to the fabrication processes and methods of construction.

Shop drawings, working drawings, and other submittals shall be delivered to the Engineer. The Contractor shall notify the Engineer, in writing, at the time of submittal of shop drawings, working drawings, and other submittals, of any information submitted that deviates from the requirements of the plans and specifications. In addition, specific notation of the deviations or changes from the plans and specifications shall be placed on the shop drawing, working drawing, or other submittal.

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The first sheet or page of each set of shop drawings, working drawings, and other submittals shall be stamped “Approved for Construction” and signed by the Contractor. Submittals shall be made in complete packages which will allow the Engineer to properly review them for general compliance with the Contract and to effectively evaluate the proposed methods of construction. The allowed time for review shall not begin until such submittals are complete.

The format of the shop drawings, working drawings, and other submittals shall be as follows:

1. All manually drafted shop drawings and working drawings shall be 34 inches long by 22 inches wide overall. There shall be a 2-inch margin on the left side of the sheet and a ½ inch margin on the other three sides. A blank space, 6 inches long by 3 inches wide, shall be left available near the lower right-hand corner of shop drawings, for the Engineer’s review stamp. Computer drafted 11 inch by 17 inch drawings may be submitted.
2. There shall be a title block in the lower right-hand corner of each sheet. The title block shall show the project number, structure number, the location of the structure, the contents of the sheet, designer/engineer, sheet number, and revision number.
3. Design notes, calculations, lists, reports, descriptions, catalog cuts, and other non-drawing submittals shall be submitted on 8½ inch by 11 inch sheets.
4. Unless otherwise specified, seven sets of shop drawings, and other submittals shall be submitted to the Engineer. One additional set of shop drawings shall be submitted for each railroad company.
5. Unless otherwise specified, two sets of working drawings shall be submitted to the Engineer.
6. The shop drawings, working drawings, other submittals and all revisions shall be signed and sealed for the Contractor, by a professional engineer registered in the state of Colorado when required by the specifications. Submittals without the required signature and seal will not be accepted and will be returned to the Contractor without action.

Table 105-1 which summarizes the minimum required submittals is included at the end of this subsection. Table 105-1 lists submittals in one location for information. The table clarifies the type of submittal and whether the Contractor’s Engineer must sign and seal the submittal. Table 105-1 may not be all inclusive. The Contractor shall provide all submittals required by the Contract, including those not listed in the table.

- (c) *Shop Drawings.* The Contractor shall provide shop drawings to adequately control the work. The Contractor shall submit shop drawings to the Engineer for formal review.

The Engineer will review the shop drawings to evaluate that general conformance with the design concept and that general compliance with the information given in the plans and specifications has been achieved. The review does not extend to accuracy of dimensions, means, methods, techniques, sequences, schemes, procedures of construction, or to safety precautions. The review by the Engineer is not a complete check. Review of the shop drawings does not relieve the Contractor of the responsibility for the correctness of the shop drawings. All work done prior to the Engineer’s review of shop drawings shall be at the Contractor’s sole risk.

The Engineer may request additional details and require the Contractor to make changes in the shop drawings which are necessary to conform to the provisions and intent of the plans and specifications without additional cost to the Department.

After review, the Engineer will return two sets of shop drawings, for use by the Contractor and the Fabricator or Supplier. Returned shop drawings will be stamped with the Engineer’s review stamp to indicate one of the following:

Reviewed, no exception taken	Shop drawings have been reviewed and do not require resubmittal
Reviewed, revise as noted	Shop drawings have been reviewed and the Contractor shall incorporate the comments noted in the shop drawings into the work. The shop drawings do not require resubmittal.
Resubmit, revise as noted	Shop drawings require correction or redrawing and shall be resubmitted for review. If shop drawings are returned for correction or redrawing, corrections shall be made and the shop drawings shall be resubmitted by the Contractor in the same manner as the first submittal. Specific notation shall be made on the shop drawing to indicate the revisions

The time required for the Engineer’s review of each submittal will not exceed four weeks after a complete submittal of shop drawings is received by the Engineer. It is the intent of these specifications that no more than two submittals of shop drawings shall be required for any one particular item. If additional submittals are required by actions of the Contractor, resulting delays shall be the responsibility of the Contractor. If additional submittals are required by the Engineer’s actions or if shop drawing review is delayed by the Engineer, the Contractor may request an extension of time as provided in subsection 108.07.

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All revisions made to the shop drawings after the Engineer's initial review process will require resubmittal.

- (d) *Working Drawings.* The Contractor shall supplement the plans with working drawings to detail the construction or to provide the Engineer with information on the proposed methods of construction.

Unless otherwise specified, the Contractor shall submit two sets of working drawings to the Engineer for information only. These drawings will not be formally reviewed by the Engineer. The Contractor shall submit working drawings to the Engineer ten days before the start of work. Working drawings will not be returned to the Contractor.

- (e) *Other Submittals.* Other submittals shall be prepared and submitted by the Contractor as defined for working drawings. Unless otherwise specified two copies shall be submitted to the Engineer for information only. The plans or specifications will indicate which submittals require formal review by the Engineer.

One record set of all design work performed by the Contractor's Engineer shall be submitted to the Project Engineer.

- (f) *Construction Drawings.* The Contractor shall keep one set of plans, reviewed shop drawings, working drawings, and other submittals available on the project site at all times. This set shall be defined as the "construction drawings." The Contractor shall note on these construction drawings all changes and deviations from the work shown on the plans, shop drawings, working drawings, and other submittals. The construction drawings shall be kept current as the work progresses and notations shall be made within seven days of the change or deviation.

The first sheet or page of each set of construction drawings shall be stamped "As Constructed" and signed by the Contractor.

Upon completion of the work and prior to final payment, the construction drawings shall be submitted to the Engineer.

- (g) Furnishing the shop drawings, working drawings, construction drawings, and other submittals will not be measured and paid for separately, but shall be included in the work.
- (h) Failure of the Contractor to comply with the requirements for shop drawings, working drawings, other submittals, and construction drawings may be considered unsatisfactory contract progress. Monthly progress payments may be withheld until the requirements are met.
- (i) Except as specifically noted, all time required for review of shop drawings, working drawings, and other submittals shall be included in the work and shall not be the basis for any claim for a time extension or monetary adjustment except as provided for herein.

**Table 105-1
SUMMARY OF CONTRACTOR SUBMITTALS**

Section No.	Description	Type	Contractor P.E. Seal Required?
504	MSE Walls (Contractor Alternative)	Shop Drawing	Yes
504	MSE Walls (Default Design)	Shop Drawing	No
508	Timber Structures	Shop Drawing	No
509	Steel Structures	Shop Drawing	No
512	Bearing Devices Type II	Shop Drawing	No
512	Bearing Devices Type III	Shop Drawing	Yes
514	Pedestrian and Bikeway Railing	Working Drawing	No
518	Expansion Devices: 0-4"	Working Drawing	No
518	Expansion Devices: 0-6", 9", 12"...	Shop Drawing	Yes
601 & 618	Precast Panel Deck Forms	Working Drawing	No
601	Permanent Steel Bridge Deck Forms	Working Drawing	Yes
601	Falsework	Working Drawing	Yes
602	Reinforcing Steel	Working Drawing	No
606	Bridge Railing	Working Drawing	No
607	Sound Barriers (Alternative)	Shop Drawing	Yes
607	Sound Barriers (Default Design)	Working Drawing	No
613	Light Standards (Low Mast)	Working Drawing	Yes
613	Light Standards (High Mast)	Working Drawing	Yes
614	Overhead Sign Structures	Shop Drawing	Yes*
614	Traffic Signal Pole (Mast Arm)	Shop Drawing	No
614	Traffic Signal Pedestal Pole	Working Drawing	No
614	Traffic Signal Equipment	Working Drawing	No
618	Prestressed Concrete (Pre-tensioned)	Shop Drawing	Yes*
618	Prestressed Concrete (Post-tensioned)	Shop Drawing	Yes*
618	Steel Diaphragms between Prestressed Girders	Working Drawing	No
628	Pre-fabricated Pedestrian Bridges	Shop Drawing	Yes

*A PE seal is required where the Contractor has provided the design for the item, or performed engineering to modify the details shown on the plans. The PE seal is not required where complete details are provided on the plans.

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105.03 Conformity to the Contract. All work performed and all materials furnished shall conform to the lines, grades, cross sections, dimensions, and material requirements, including tolerances, shown in the Contract.

For those items of work where working tolerances are not specified, the Contractor shall perform the work in a manner consistent with reasonable and customary manufacturing and construction practices.

When the Engineer finds that the materials furnished, the work performed, or the finished product does not conform with the Contract but that reasonably acceptable work has been produced, the Engineer will determine the extent the work will be accepted and remain in place. If accepted the Engineer will (1) document the basis for acceptance by Contract Modification 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 (2) notify the Contractor in writing that the Contract unit price will be reduced in accordance with this subsection when P is 25 or less, or (3) in lieu of a price reduction, permit correction or replacement of the finished product provided the correction or replacement does not adversely affect the work.

When the Engineer finds the materials furnished, work performed, or the finished product are not in conformity with the Contract and 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.

If asphalt cement testing demonstrates that asphalt cement was acid modified or alkaline modified, the supplier will be automatically decertified. In addition, all material placed containing the acid modified or alkaline modified asphalt cement shall be removed and replaced with specification material at no cost to the Department.

Materials will be sampled and tested by the Department in accordance with the sampling and testing schedules and procedures contained in the Department's Field Materials Manual. The approximate maximum quantity represented by each sample will be as set forth in the schedules. An additional number of samples in relation to the quantity of material represented may be selected and tested at the Engineer's discretion. The quantity represented by five consecutive random samples will constitute a lot whenever production schedules and material continuity permit. The Engineer may establish a lot consisting of the quantity represented by any number of consecutive random samples from one to seven inclusive when it is necessary to represent short production runs, significant material changes, or other unusual characteristics of the work. Tests that are determined to have sampling or testing errors will not be used.

Materials or work will be evaluated for price reduction only when deviations from specifications occur on any of the several individual tests for the lot. The several individual test values will be averaged and the percent of price reduction for the lot will be determined by applicable formula.

The formula in (a) and (b) below will be used only when the lot is represented by three to seven tests inclusive.

- (a) The formula, $P = (X_n + aR - T_u)F$, will be used if a maximum limit only is specified or; when the average of the several test values is above the mid point of the specification band or above the job-mix formula value.
- (b) The formula, $P = (T_L + aR - X_n)F$, will be used if a minimum limit only is specified or; when the average of the several test values is below the mid point of the specification band or below the job-mix formula value.
- (c) When the lot is represented by fewer than three tests, the materials will be evaluated for price reduction by the following procedure: Lots represented by two tests will be divided into two separate lots represented by one test each, as determined by the Engineer. Each lot which deviates from the specifications will be price reduced by one of the following formulas. When a maximum limit only is specified or the test value is above the maximum specified limit, the formula $P = 0.76(T_o - T_u)F$ will be used. When a minimum limit only is specified or the test value is below the minimum specified limit, the formula $P = 0.76(T_L - T_o)F$ will be used. When a lot is represented by one test only, the materials will be evaluated for price reduction as described in this paragraph.

Where:

- P is the percent of reduction in contract price,
 X_n is the average of the several test values from samples taken from the lot, with "n" indicating the number of values,
 a is a variable factor to be used in "n" changes according to the following: when n is 3, a = 0.45; n is 4, a = 0.38; n is 5, a = 0.33; n is 6, a = 0.30; and n is 7, a = 0.28.
 R is the difference between the highest and lowest values in the group of several test results from the lot,
 T_u is the upper or maximum tolerance limit permitted by the specifications,
 T_L is the lower or minimum tolerance limit permitted by the specifications, and
 T_o is the test value of the test which deviates from the specifications,
 F is price reduction factor to be applied for each element as shown in the following table:

TABLE OF PRICE REDUCTION FACTORS

Element	Factor "F"
100 percent size sieve	1
12.5 mm (½") sieve and larger	1
150 µm (No. 100) sieve to 9.5 mm (3/8") sieve inclusive (except 100 percent size sieve)	3
75 µm (No. 200) sieve	6
75µm (No. 200) sieve (cover coat material)	25
Compaction, bituminous mixtures (Section 403)	7
Liquid Limit	3
Plasticity Index	10
Asphalt content, (all asphalt- aggregate mixtures)	20
Asphalt penetration	1
Asphalt residue	3
Portland Cement Concrete Pavement Fine Aggregate Sand Equivalent	0.3
Hydrated Lime Gradation	0.3
Toughness, inch-pounds, minimum	0.8
Tenacity, inch-pounds, minimum	0.8
Elastic Recovery, 25 °C, percent minimum	1.25
Ductility, 4 °C (5cm/min) cm, minimum	1.25

If P is less than 3, or a negative quantity, the material will be accepted as being in conformity. In cases where one or more elements show a positive P value, such positive values will be added and the resulting sum will be used to determine whether the material is in conformity. If the total P value is between 3 and 25, the Engineer may require correction or may accept the material at a reduced price. If P is greater than 25, the Engineer may: (1) require complete removal and replacement with specification material at no additional cost to the Department; (2) require corrective action to bring the material into conformity at no additional cost to the Department; or (3) where the finished product is found to be capable of performing the intended purpose and the value of the finished product is not affected, permit the Contractor to leave the material in place with an appropriate price reduction to be based on engineering evaluation but not to be less than that which would have occurred had a reduction been made where P = 25.

If the P for aggregate gradation for Items 206 or 304 is 3 or greater the reduction will apply to the contract price multiplied by the Multipliers (M) listed in the following table.

Multiplier for Price Reductions for Miscellaneous Items

Item Number-Name	Element	Multiplier (M)
206- Structural Backfill	Gradation	0.60
304-Aggregate Base Course	Gradation	0.60

If the P for gradation, asphalt cement content, or compaction for Items 301 or 403 is 3 or greater and asphalt cement is not paid for separately, the reduction will apply to the contract price multiplied by the following Multiplier (M) listed in the following table:

Multiplier for HMA Price Reductions

Where Asphalt Cement is not paid for separately:

Item Number-Name	Element	Multiplier (M)
403-Stone Matrix Asphalt	Gradation, Asphalt Cement Content, or Compaction	0.60
403-Hot Mix Asphalt*	Hydrated Lime Gradation	0.60

* The P value for hydrated lime shall be applied to the price of the HMA item. Lime gradation P values will not be combined with Pay Factors for other elements.

The following equation shows how the Multiplier is used to determine the price reduction.

Price reduction = $(P/100) \cdot \text{Multiplier} \cdot \text{Price per Unit} \cdot \text{Quantity}$.

If no multiplier is listed no adjustment to the computed P is required. This is equivalent to a multiplier of one.

Price reduction for those elements which are not included in the Table of Price Reduction Factors will be determined by the Engineer.

The Contractor will not have the option of accepting a price reduction in lieu of producing specification material. Continued production of non-specification material will not be permitted. Material which is obviously defective may be isolated and rejected without regard to sampling sequence or location within a lot.

105.04 Conformity to the Contract of Superpave Performance Graded Binders.

Superpave Performance Graded binders shall be price reduced according to the following if the requirements of subsection 702.01 are not met:

(1) High Service Temperature Requirements from Table 702-1

The Dynamic Shear ($G^*/\sin\theta$, kPa) of Rolling Thin Film Oven (RTFO) residue will be measured at the appropriate temperature for the binder type, as specified in Table 702-1. If the Dynamic Shear of the RTFO aged binder is less than 2.20 kPa, the temperature at which $G^*/\sin\theta = 2.20$ kPa will be determined. A "P" of 3 shall be applied for each degree C the material temperature must be lowered below the specified temperature to achieve a Dynamic shear of 2.20 kPa. Price adjustments for high service temperature properties will be calculated as follows:

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$$P(\text{high}) = 3 \cdot [T_{\text{spec}} - T_{\text{DS}}],$$

Where T_{DS} = Temperature in °C where $G^*/\sin\theta = 2.20$ kPa

T_{spec} = Appropriate test temperature in °C for binder specified from Table 702-1

- (2) Low Service Temperature Requirements from Table 702-1:

The m-value of Pressure Aging Vessel (PAV) aged binder will be measured at the appropriate temperature (T_{spec}) as specified in Table 702-1. If the m-value is less than 0.300, the test temperature at which the m-value = 0.300 will be determined. A “P” of 3 shall be applied for each degree C the material temperature must be raised above the specified test temperature to achieve an m-value of 0.300. Price adjustments for low service temperature properties will be calculated as follows:

$$P(\text{low}) = 3 \cdot [T_m - T_{\text{spec}}]$$

Where T_m = Temperature in °C where m-value = 0.300

T_{spec} = Appropriate test temperature in °C for binder specified from Table 702-1

- (3) The price reductions will be cumulative. When the binder is included in the contract unit price for HMA, the total price reduction will be calculated as follows:

$$P(\text{total}) = P(\text{low}) + P(\text{high})$$

$$\text{Amount of Reduction} = [P(\text{total})] \cdot [(1/100) \cdot (\text{Invoice price for PG Binder})]$$

When binder is paid for separately, the total price reduction will be calculated as follows:

$$P(\text{total}) = P(\text{low}) + P(\text{high})$$

$$\text{Amount of Reduction} = [P(\text{total})] \cdot [(1/100) \cdot (\text{Contract Unit price for PG Binder})]$$

- (4) Price reductions based on the “F” factors in the Table of Price Reduction Factors will be added to the P (low) and P (high) price reductions described in 105.03. Other binder requirements listed in Table 702-1 will be tested, but will not be considered for price reduction calculations. However, the Contractor shall not be allowed to continue to produce mix with out of specification Superpave PG asphalt binder. If two consecutive samples fail to meet all requirements listed in 702-1, the Contractor shall take corrective action before being allowed to continue production of Hot Bituminous Pavement. If proper corrective measures cannot be readily determined, the Engineer will suspend the use of such material until the Engineer can determine from Laboratory tests that the Contractor can provide material that is in compliance with Table 702-1.

The Contractor will not have the option of accepting a price reduction in lieu of producing specification material. Continued production of non-specification material will not be permitted. Material which is obviously defective may be isolated and rejected without regard to sampling sequence or location within a lot.

105.05 Conformity to the Contract of Hot Mix Asphalt. Conformity to the Contract of all Hot Mix Asphalt, Item 403, except Hot Mix Asphalt (Patching) and temporary pavement will be determined by tests and evaluations of elements that include asphalt content, gradation, in-place density, and joint density in accordance with the following:

All work performed and all materials furnished shall conform to the lines, grades, cross sections, dimensions, and material requirements, including tolerances, shown in the Contract.

When the Engineer finds the materials or work furnished, work performed, or the finished product are not in conformity with the Contract and has resulted in an inferior or unsatisfactory product, the work or material shall be removed and replaced or otherwise corrected at the expense of the Contractor.

Materials will be sampled randomly and tested by the Department in accordance with subsection 106.05 and with the applicable procedures contained in the Department's Field Materials Manual. The approximate maximum quantity represented by each sample will be as set forth in subsection 106.05. Additional samples may be selected and tested as set forth in Section subsection 106.05 at the Engineer's discretion.

A process will consist of either a single test value or a series of values resulting from related tests of an element of the Contractor's work and materials. An element is a material or workmanship property that can be tested and evaluated for quality level by the Department approved sampling, testing, and analytical procedures. All materials produced will be assigned to a process. A change in process is defined as a change that affects the element involved. For any element, with the exception of the joint density element, a process normally will include all produced materials associated with that element prior to a change in the job mix formula (Form 43). For joint density, a new process will be established for each new layer of pavement or for changes in joint construction. Density measurements taken within each compaction test section will be a separate process. The Engineer may separate a process in order to accommodate small quantities or unusual variations.

Evaluation of materials for pay factors (PF) will be done using only the Department's acceptance test results. Each process will have a PF computed in accordance with the requirements of this Section. Test results determined to have sampling or testing errors will not be used.

Except for density measurements taken within a compaction test section, any test result for an element greater than the distance 2 times V (see Table 105-2) outside the tolerance limits will be designated as a separate process and the pay factor will be

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calculated in accordance with subsection 105.05(a). A pay factor less than zero shall be zero. The calculated PF will be used to determine the Incentive or Disincentive Payment (I/DP) for the process.

In the case of in-place density or joint density, the Contractor will be allowed to core the exact location (or immediately adjacent location for joint density) of a test result more than 2 times V outside the tolerance limit. The core must be taken and furnished to the Engineer within eight hours after notification by the Engineer of the test result. The result of this core will be used in lieu of the previous test result. Cores not taken within eight hours after notification by the Engineer will not be used in lieu of the test result. All costs associated with coring shall be at the Contractor's expense.

- (a) *Representing Small Quantities.* When it is necessary to represent a process by only one or two test results, PF will be the average of PFs resulting from the following:

If the test result is within the tolerance limits then $PF = 1.00$

If the test result is above the maximum specified limit, then

$$PF = 1.00 - [0.25(T_o - T_u)/V]$$

If the test result is below the minimum specified limit, then

$$PF = 1.00 - [0.25(T_L - T_o)/V]$$

Where: PF = pay factor.
V = V factor from Table 105-2.
T_o = the individual test result.
T_u = upper specification limit.
T_L = lower specification limit.

The calculated PF will be used to determine the I/DP for the process.

- (b) *Determining Quality Level.* Each process with three or more test results will be evaluated for a quality level (QL) in accordance with Colorado Procedure 71.
- (c) *Gradation Element.* Each specified sieve, with the exception of 100 percent passing sieves, will be evaluated for QL separately. The lowest calculated QL for a sieve will be designated as the QL for gradation element for the process.
- (d) *Joint Density Element.* Joint Density will be tested according to subsection 401.17.
- (e) *Process Pay Factor.* Using the calculated QL for the process, compute the PF as follows: The final number of random samples (Pn) in each process will determine the final pay factor. As test values are accumulated for each process, Pn will change accordingly. When the process has been completed, the number

of random samples it contains will determine the computation of PF, based on Table 105-3 and formula (1) below. When Pn is from 3 to 9, or greater than 200, PF will be computed using the formulas designated in Table 105-3. Where Pn is equal to or greater than 10 and less than 201, PF will be computed by formula (1):

$$PF = \frac{PF_1 + PF_2}{2} + \left[\frac{PF_2 + PF_3}{2} - \frac{PF_1 + PF_2}{2} \right] \bullet \frac{(Pn_2 - Pn_x)}{(Pn_2 - Pn_3)} \text{ formula (1)}$$

Where, when referring to Table 105-3:

- PF₁= PF determined at the next lowest Pn formula using process QL
- PF₂= PF determined using the Pn formula shown for the process QL
- PF₃= PF determined at the next highest Pn formula using process QL
- Pn₂= the lowest Pn in the spread of values listed for the process Pn formula
- Pn₃= the lowest Pn in the spread of values listed for the next highest Pn formula
- Pn_x= the actual number of test values in the process

When evaluating the item of Furnish Hot Mix Asphalt, the PF for the element of In-Place Density shall be 1.0.

Regardless of QL, the maximum PF in relation to Pn is limited in accordance with Table 105-3.

As test results become available, they will be used to calculate QL and PF numbers for each process. The process I/DP's will then be calculated and accumulated for each element and for the item. The test results and the accumulated calculations will be made available to the Contractor upon request.

Numbers from the calculations will be carried to significant figures and rounded according to AASHTO Standard Recommended Practice R-11, Rounding Method.

- (f) *Evaluation of Work.* When the PF of a process is 0.75 or greater, the finished quantity of work represented by the process will be accepted at the appropriate pay factor. If the PF is less than 0.75, the Engineer may:
1. Require complete removal and replacement with specification material at the Contractor's expense; or
 2. Where the finished product is found to be capable of performing the intended purpose and the value of the finished product is not affected, permit the Contractor to leave the material in place.

If the material is permitted to remain in place, the PF for the process will not be greater than 0.75. When condition red, as described in subsection 106.05(g), exists for any element, resolution and correction will be in accordance with Section 106. Material which the Engineer determines is defective may be

105.05

isolated and rejected without regard to sampling sequence or location within a process.

**Table 105-2
“W”AND “V” FACTORS FOR VARIOUS ELEMENTS**

Hot Mix Asphalt		
Element	V Factor	W Factor
2.36 mm (No. 8) mesh and larger sieves	2.80	N/A
600 μm (No. 30) mesh sieve	1.80	N/A
75 μm (No. 200) mesh sieve	0.80	N/A
Gradation	N/A	15
Asphalt Content	0.20	25
In-place Density	1.10	45
Joint Density	1.60	15

**Table 105-3
FORMULAS FOR CALCULATING PF BASED ON Pn**

Pn	When Pn as shown at left is 3 to 9, or greater than 200, use designated formula below to calculate Pay Factor, PF = ...,when Pn is 10 to 200, use formula (1) above:	Maximum PF
3	$0.31177 + 1.57878 (QL/100) - 0.84862 (QL/100)^2$	1.025
4	$0.27890 + 1.51471 (QL/100) - 0.73553 (QL/100)^2$	1.030
5	$0.25529 + 1.48268 (QL/100) - 0.67759 (QL/100)^2$	1.030
6	$0.19468 + 1.56729 (QL/100) - 0.70239 (QL/100)^2$	1.035
7	$0.16709 + 1.58245 (QL/100) - 0.68705 (QL/100)^2$	1.035
8	$0.16394 + 1.55070 (QL/100) - 0.65270 (QL/100)^2$	1.040
9	$0.11412 + 1.63532 (QL/100) - 0.68786 (QL/100)^2$	1.040
10 to 11	$0.15344 + 1.50104 (QL/100) - 0.58896 (QL/100)^2$	1.045
12 to 14	$0.07278 + 1.64285 (QL/100) - 0.65033 (QL/100)^2$	1.045
15 to 18	$0.07826 + 1.55649 (QL/100) - 0.56616 (QL/100)^2$	1.050
19 to 25	$0.09907 + 1.43088 (QL/100) - 0.45550 (QL/100)^2$	1.050
26 to 37	$0.07373 + 1.41851 (QL/100) - 0.41777 (QL/100)^2$	1.055
38 to 69	$0.10586 + 1.26473 (QL/100) - 0.29660 (QL/100)^2$	1.055
70 to 200	$0.21611 + 0.86111 (QL/100)$	1.060
≥ 201	$0.15221 + 0.92171 (QL/100)$	1.060

(g) *Process I/DP Computation.*

$$I/DP = (PF - 1)(QR)(UP)(W/100)$$

Where: I/DP	=	Incentive or Disincentive Payment
PF	=	Pay Factor
QR	=	Quantity in Tons of HMA Represented by the Process
UP	=	Unit Bid Price of Asphalt Mix
W	=	Element factor from Table 105-2

When AC is paid for separately UP shall be:

$$UP = [(Ton_{HMA})(UP_{HMA}) + (Ton_{AC})(UP_{AC})] / Ton_{HMA}$$

Where: Ton _{HMA}	=	Tons of Asphalt Mix
UP _{HMA}	=	Unit Bid Price of Asphalt Mix
Ton _{AC}	=	Tons of Asphalt Cement
UP _{AC}	=	Unit Bid Price of Asphalt Cement

For the joint density element:

$$UP = UP_{HMA}$$

Where: UP_{HMA} is as defined above

When AC is paid for separately UP shall be:

$$UP = [(BTon_{HMA})(BUP_{HMA}) + (BTon_{AC})(BUP_{AC})] / BTon_{HMA}$$

Where: BTon _{HMA}	=	Bid Tons of Asphalt Mix
BUP _{HMA}	=	Unit Bid Price of Asphalt Mix
BTon _{AC}	=	Bid Tons of Asphalt Cement
BUP _{AC}	=	Unit Bid Price of Asphalt Cement

- (h) *Element I/DP.* The I/DP for an element shall be computed by accumulating the process I/DPs for that element.
- (i) *I/DP for a Mix Design.* The I/DP for a mix design shall be computed by accumulating the process I/DPs for the asphalt content, in-place density, and gradation elements for that mix design. The accumulated quantities of materials for each element must be the same at the end of I/DP calculations for a mix design.
- (j) *Project I/DP.* The I/DP for the project shall be computed by accumulating the mix design I/DPs and the joint density I/DPs. The accumulated quantities of materials for each element must be the same at the end of I/DP calculations for the project.

105.06

105.06 Conformity to Contract of Portland Cement Concrete Pavement.

Conformity to the Contract of all Portland Cement Concrete Pavement, Item 412, will be determined in accordance with the following:

When the Engineer finds that the materials furnished, the work performed, or the finished product does not conform with the Contract, or the Pay Factor (PF) for an element's process is less than 0.75 but that reasonably acceptable work has been produced, the Engineer will determine the extent of the work that will be accepted and remain in place. The Engineer will use a Contract Modification Order to document the justification for allowing the work to remain in place and the price adjustment that will be applied.

When the Engineer finds the materials furnished, work performed, or the finished product is not in conformity with the Contract, or the PF for an element's process is less than 0.75 and has resulted in an inferior or unsatisfactory product, the work or material shall be removed and replaced or otherwise corrected by and at the expense of the Contractor. When the PF for any process is 0.75 or greater, the finished quantity of work represented by the process will be accepted at the calculated pay factor.

Materials will be sampled and tested by the Contractor and the Department in accordance with subsection 106.06 and with procedures contained in the Department's Field Materials Manual. The approximate quantity represented by each sample will be as set forth in subsection 106.06, Tables 106-2 and 106-3. Additional samples may be selected and tested at the Engineer's discretion.

- (a) Incentive and Disincentive Payments (I/DP) will be made based on a statistical analysis that yields Pay Factors (PF) and Quality Levels (QL). The PF and QL will be made based on test results for the three elements of compressive strength, sand equivalent, and pavement thickness (compressive strength criteria) or the two elements of flexural strength and pavement thickness (flexural strength criteria). The Contractor shall choose whether compressive strength or flexural strength criteria will be used and indicate the choice in writing to the Engineer when the initial proposed mix design is submitted to the Engineer. Once the selection of acceptance criteria is made, they shall remain the acceptance criteria for all processes for the duration of the project.

Incentive or Disincentive payment will not be made for thickness of concrete pavement furnished by the Contractor and placed by others.

If the Contractor chooses compressive strength criteria then the QL will be calculated for the elements of compressive strength, sand equivalent and pavement thickness on a process basis. If the Contractor chooses flexural strength criteria, then the QL will be calculated for the elements of flexural strength and pavement thickness on a process basis. A separate process will be established for an element when a change in the process affects that element. A process will consist of the test results from a series of random samples. Test results determined to have sampling or testing errors will not be used. All materials produced will be assigned to a

process. A change in process is defined as a change that affects the element involved. Changes in mix design, material source, design pavement thickness, or the method being utilized to place the pavement are considered changes in process. The following is provided to clarify changes in processes for each element:

1. Construction of mainline pavement, including the shoulders if placed with the mainline, is a single process, providing there are no changes in process as described above.
 2. Construction of ramps, acceleration and deceleration lanes, shoulders placed separately and areas requiring hand work are considered separate processes.
 3. A change in the mix design is a process change for the compressive strength element or the flexural strength element, but is not a process change for the pavement thickness element.
- (b) When it is necessary to represent material by one or two tests, each individual test shall have a PF computed in accordance with the following:

If the value of the test is at or above the lower tolerance limit, then $PF = 1.000$.
If the value of the test is below the lower tolerance limit, then:

$$PF = 1.00 - [0.25(T_L - T_0)/V]$$

where: PF = pay factor.
V = V factor from Tables 105-6 and 105-7.
T₀ = the individual test value.
T_L = lower tolerance limit.

- (c) The following procedures will be used to compute Incentive and Disincentive Payments (I/DP), quality levels (QL), and pay factors (PF) for processes represented by three or more tests:
1. Quality Level (QL) will be calculated according to CP-71.
 2. Compute the PF for the process. When the process has been completed, the number of tests (Pn) it includes shall determine the formula to be used to compute the final pay factor in accordance with the following:

A. For compressive strength and pavement thickness:

When $3 \leq Pn \leq 5$

If $QL \geq 85$, then $PF = 1.00 + (QL - 85)0.001333$

If $QL < 85$, then $PF = 1.00 + (QL - 85)0.005208$

When $6 \leq Pn \leq 9$

If $QL \geq 90$, then $PF = 1.00 + (QL - 90)0.002000$

If $QL < 90$, then $PF = 1.00 + (QL - 90)0.005682$

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When $10 \leq P_n \leq 25$

If $QL \geq 93$, then $PF = 1.00 + (QL - 93)0.002857$

If $QL < 93$, then $PF = 1.00 + (QL - 93)0.006098$

When $P_n \geq 26$

If $QL \geq 95$, then $PF = 1.00 + (QL - 95)0.004000$

If $QL < 95$, then $PF = 1.00 + (QL - 95)0.006757$

B. For flexural strength:

When $3 \leq P_n \leq 5$

If $QL \geq 85$, then $PF = 1.00 + (QL - 85)0.002000$

If $QL < 85$, then $PF = 1.00 + (QL - 85)0.005208$

When $6 \leq P_n \leq 9$

If $QL \geq 90$, then $PF = 1.00 + (QL - 90)0.003000$

If $QL < 90$, then $PF = 1.00 + (QL - 90)0.005682$

When $10 \leq P_n \leq 25$

If $QL \geq 93$, then $PF = 1.00 + (QL - 93)0.004286$

If $QL < 93$, then $PF = 1.00 + (QL - 93)0.006098$

When $P_n \geq 26$

If $QL \geq 95$, then $PF = 1.00 + (QL - 95)0.006000$

If $QL < 95$, then $PF = 1.00 + (QL - 95)0.006757$

C. For sand equivalent:

When $3 \leq P_n \leq 5$

If $QL \geq 85$, then $PF = 1.00 + (QL - 85)0.000667$

If $QL < 85$, then $PF = 1.00 + (QL - 85)0.005208$

When $6 \leq P_n \leq 9$

If $QL \geq 90$, then $PF = 1.00 + (QL - 90)0.001000$

If $QL < 90$, then $PF = 1.00 + (QL - 90)0.005682$

When $10 \leq P_n \leq 25$

If $QL \geq 93$, then $PF = 1.00 + (QL - 93)0.001429$

If $QL < 93$, then $PF = 1.00 + (QL - 93)0.006098$

When $P_n \geq 26$

If $QL \geq 95$, then $PF = 1.00 + (QL - 95)0.002000$

If $QL < 95$, then $PF = 1.00 + (QL - 95)0.006757$

3. Compute the I/DP for the process:

$$I/DP = (PF-1)(QR)(UP)$$

where: QR = Quantity Represented by the process.
UP = Unit Price bid for the Item.

The total I/DP for an element shall be computed by accumulating the individual I/DP for each process of that element.

- (d) As acceptance test results become available, they will be used to calculate accumulated QL and Incentive and Disincentive Payments (I/DP) for each element and for the item. The Contractor's test results and the accumulated calculations shall be made available to the Engineer upon request. The Engineer's test results and the calculations will be made available to the Contractor as early as reasonably practical. Numbers from the calculations shall be carried to significant figures and rounded according to AASHTO Standard Recommended Practice R-11, Rounding Method.

I/DP will be made to the Contractor in accordance with subsection 412.24(a). During production, interim I/DP will be computed for information only. The Pn will change as production continues and test results accumulate. The Pn at the time an I/DP is computed shall determine the formula to be used.

- (e) The Contractor will not have the option of accepting a price reduction or disincentive in lieu of producing specification material. Continued production of non-specification material will not be permitted. Material which is obviously defective may be isolated and rejected without regard to sampling sequence or location within a process.

Table 105-4
“V” FACTORS AND INCENTIVE PAYMENTS
COMPRESSIVE STRENGTH CRITERIA

Element	V Factor	Maximum Incentive Payment	Lower Tolerance Limit, T _L
Compressive Strength	400 psi	2.00%	28 day strength, Table 601-1
Pavement Thickness	0.4 inch	2.00%	Plan Thickness-0.4”
Sand Equivalent	4%	1.00%	80%

Table 105-5
“V” FACTORS AND INCENTIVE PAYMENTS
FLEXURAL STRENGTH CRITERIA

Element	V Factor	Maximum Incentive Payment	Lower Tolerance Limit, T _L
Flexural Strength	50 psi	3.00%	570 psi
Pavement Thickness	0.4 inch	2.00%	Plan Thickness-0.4”

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105.07 Conformity to Roadway Smoothness Criteria. Roadway smoothness shall be tested as described below. Roadway smoothness testing will not be measured and paid for separately, but shall be included in the work.

- (a) Transverse Pavement Surface Smoothness. The finished transverse surface elevation of the pavement will be measured using a 10 foot straightedge.

The Contractor shall furnish an approved 10 foot straightedge and depth gauge and provide an operator to aid the Engineer in testing the finished pavement surface. Areas to be measured shall be as directed by the Engineer. Areas showing high spots of more than $\frac{3}{16}$ inch in ten feet shall be marked and diamond ground until the high spot does not exceed $\frac{3}{16}$ inch in ten feet. Additional diamond grinding shall be performed as necessary to extend the area ground in each lateral direction so that the lateral limits of grinding are at a constant offset from and parallel to the nearest lane line or pavement edge, and in each longitudinal direction so that the grinding begins and ends at lines normal to the pavement centerline within the ground area. All ground areas shall be neat rectangular areas of uniform surface.

- (b) Longitudinal Pavement Surface Smoothness. Pavement surfaces shall be tested and evaluated for longitudinal smoothness as described herein.

1. Testing Procedure (General). The longitudinal surface smoothness of the pavement shall be tested using the profilograph method described below.

The Contractor shall determine a Profile Index (PI) in inches per mile for each section of finished pavement surface. A pavement section is defined as a continuous area of finished pavement 0.1 mile in length and one lane 12 feet in width. A partial section resulting from an interruption of the continuous pavement surface is subject to the same evaluation as a whole section.

Each profilograph shall be certified in accordance with CP 73 and have a certification sticker which includes the date of certification, the type of filter, and the filter setting used when the profilograph was certified.

The Project Engineer may require a profilograph to be recertified at any time. If the profilograph being recertified meets the criteria for certification on the first try the costs of recertification will be paid as extra work. If not, the cost of the recertification shall be borne by the Contractor.

The Contractor shall provide, operate, and maintain on the project, an approved profilograph that meets the following requirements:

The profilograph shall be equipped with:

- (1) A microcomputer capable of automatically reducing the recorded profilograph data and downloading it to a disk. The data on the disk shall be

formatted to permit evaluation of the data by the Engineer. If software is required for this evaluation, the Contractor shall provide copies of the software for the Engineer's use.

- (2) A printer compatible with the microcomputer that prints a profilogram with the required data.

The Contractor shall demonstrate to CDOT project personnel the calibration, operation and maintenance of the profilograph that will be used on the project. The demonstration shall be conducted on the project prior to measurement.

The profilograph shall be operated at a speed recommended by the Manufacturer. To ensure that these speeds are maintained, the profilograph may be propelled by a motorized vehicle which is capable of maintaining the correct speed. The motorized vehicle shall propel the profilograph in accordance with the Manufacturer's recommendations without interfering with traffic or the operation of the profilograph.

The profilograph shall be calibrated after transportation and before each day's use in accordance with the manufacturer's instructions.

As directed by the Engineer, additional profiles shall be taken to retest paved surfaces that have received corrective work, to check previously submitted data or to identify the limits of irregularities.

The profile shall include transverse joints when pavement is placed on both sides of the joint. When pavement is placed on only one side of the joint the profile shall begin 25 feet from the joint. One sided joints shall be profiled to determine conformity to the bump specification.

The Contractor shall notify the Engineer prior to beginning each profilograph operation.

A Department employee or designated representative will:

- (1) Witness and document the calibration of the profilograph prior to each test.
- (2) Accompany the Contractor's operator during the entire profilograph testing procedure.
- (3) Immediately take possession of the profilogram and disk containing the results and document the inspection by signing the profilogram report.
- (4) Document that the testing has been completed in accordance with the specification.

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Each profilogram shall include the following information:

- (1) Project subaccount number.
- (2) Project number.
- (3) Project location.
- (4) Date.
- (5) Lane and wheel path profiled.
- (6) Operator's signature.
- (7) Profile Index in inches per mile for each 0.1 mile section.

Each profilogram trace shall be marked by the computer or the Contractor to indicate the following:

- (1) Beginning and ending stations.
- (2) Intermittent reference stations every 0.1 mile.
- (3) Beginning and ending reference points.
- (4) Horizontal equations stations.
- (5) Construction joints.
- (6) Location of bridge abutments.
- (7) Net total linear feet of each lane.
- (8) Net square yards of each lane.
- (9) Bumps: when the perpendicular distance from a 25 foot baseline to the profile exceeds 0.4 inch.

The Contractor shall determine a Profile Index for each 0.1 mile section of completed pavement. The Profile Index shall consist of two profiles taken 3 feet from and parallel to the edge of each lane. The two profiles for each section shall be averaged to determine the Profile Index.

The entire length of each through lane, climbing lane and passing lane including bridge approaches and bridge decks from the beginning to the end of the project shall be profiled. Shoulders, ramps, tapers, turn slots, acceleration lanes, deceleration lanes, and medians shall not be profiled and will not be subject to incentive/ disincentive adjustments. The profile of the entire length of a lane may be taken at one time or the lane may be profiled in increments. Profiles may be taken with or against stationing.

All other longitudinal pavement surfaces will be measured using a 10 foot straightedge. The Contractor shall furnish an approved 10 foot straightedge and depth gauge and provide an operator to aid the Engineer in testing the finished pavement surface. Areas to be measured shall be as directed by the Engineer. Areas showing high spots of more $\frac{3}{16}$ inch in ten feet shall be marked and diamond ground until the high spot does not exceed $\frac{3}{16}$ inch in ten feet. Additional diamond grinding shall be performed as necessary to extend the area ground in each lateral direction so that the lateral limits of grinding are at a constant offset from and parallel to the nearest lane line or pavement edge, and in each longitudinal direction so that the grinding begins

and ends at lines normal to the pavement centerline within the ground area. All ground areas shall be neat rectangular areas of uniform surface.

When both new pavement and a new bridge are being constructed on a project, the profile of the area 25 feet each side of every bridge expansion device (joint) shall be deleted from the profile before the Profile Index (PI) is determined. Incentive and disincentive payments will not be made for this area. All bumps that exceed 0.4 inch in 25 feet shall be diamond ground until the bump does not exceed 0.4 inch in 25 feet. Diamond grinding will not be measured and paid for separately, but shall be included in the work.

For all other projects, the profile of the area 25 feet each side of every bridge expansion device (joint) shall be deleted from the profile before the Profile Index (PI) is determined. Incentive and disincentive payments will not be made for this area. If the Engineer determines that corrective work is required in this area, payment will be made in accordance with subsection 109.04.

2. Smoothness testing procedures. The Contractor shall profile the surface of the pavement placed on the second day of paving as soon as possible after completion of this paving. Production shall be suspended if:
 - (1) The Profile Index for any 0.1 mile section exceeds the Profile Index which requires corrective work on pavements subject to Inches/Mile requirements; or
 - (2) The Profile Index for any 0.1 mile section exceeds the original Profile Index on pavements subject to Percent Improvement (%I) requirements.

Production shall remain suspended until the problem is identified and corrected. Each time production is suspended, corrective actions shall be proposed in writing by the Contractor and approved in writing by the Engineer before production may resume.

When production is resumed, the Contractor shall profile the pavement placed on the first day of paving after paving resumes and the conditions above for suspension of work shall apply.

The Contractor shall take sufficient profiles during construction to control the paving process.

The Contractor shall profile the finished pavement surface and determine a Profile Index using a 0.1 inch blanking band.

When incentive and disincentive payments are based on percent improvement, the Contractor shall also profile the original pavement surface and determine a Profile Index for each 0.1 mile section, before commencing work, using a 0.1 inch blanking band.

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3. Bumps. All bumps that exceed 0.4 inch in 25 feet shall be diamond ground until the bump does not exceed 0.4 inch in 25 feet. Additional diamond grinding shall be performed as necessary to extend the area ground in each lateral direction so that the lateral limits of grinding are at a constant offset from and parallel to the nearest lane line or pavement edge, and in each longitudinal direction so that the grinding begins and ends at lines normal to the pavement centerline within the ground area. All ground areas shall be neat rectangular areas of uniform surface.

The exact location of each bump shall be determined with a profilograph and the location marked on the pavement before diamond grinding commences. The area that is diamond ground shall also be checked with a profilograph after grinding is complete to ensure that the area now meets specifications.

Diamond grinding of bumps, including all necessary traffic control, shall be completed at the Contractor's expense.

On asphalt pavements, the diamond grinding shall not reduce planned pavement thickness by more than 0.3 inches and the entire ground area shall be covered with a fog seal coat when grinding is complete.

When longitudinal tining is required on concrete pavement, the pavement shall be grooved to restore the longitudinal texture, whenever the length of the ground area exceeds 45 feet. It will not be necessary to groove ground areas that are less than 45 feet in length.

When bump grinding on concrete pavement occurs where a core for determining pavement thickness has been previously taken, another core shall be taken after the bump grinding has been completed. Joint sealant that has been damaged by bump grinding on concrete pavement shall be repaired or replaced at the Contractor's expense in accordance with Standard Plan M-412-1 and subsection 412.18

4. Corrective Work. When the Contract specifies pavement smoothness based on inches per mile or the criteria for determining if corrective work is required is specified in Table 105-6. For asphalt pavements, when the Contract specifies pavement smoothness based on percent improvement, the criteria for determining if corrective work is required is specified in Table 105-7.

If the first Profile Index for a 0.1 mile section taken on the finished pavement surface exceeds the specified limit for corrective work, the lane shall be reprofiled and another Profile Index determined after all bumps exceeding 0.4 inch in 25 feet have been diamond ground. Corrective work will be required if the Profile Index still exceeds the specified limit.

If corrective work is required, the Contractor shall submit a written corrective work proposal to the Engineer, which shall include the methods, and procedures that will be used. The Contractor shall not commence corrective work until the methods and procedures have been approved in writing by the Engineer.

The Engineer's approval shall not relieve the Contractor of the responsibility of producing work in conformity with the specifications.

When longitudinal tining is required on concrete pavement, the pavement shall be grooved to restore the longitudinal texture, whenever the length of the ground area exceeds 45 feet. It will not be necessary to groove ground areas that are less than 45 feet in length.

Use of a rotomill, diamond grinder, feathering, scab patching, or any combination thereof will not be permitted for corrective work on asphalt pavements.

Corrective work on asphalt pavements shall consist of an approved overlay or removal and replacement. Corrective work on asphalt pavements shall conform to the following conditions:

- A. Removal and replacement. The pavement in areas requiring corrective work shall be removed the full width of the lane and the full thickness of the course in accordance with subsection 202.09 Removal of Asphalt Mat (Planing).

The removal area shall begin and end with a transverse butt joint which shall be constructed with a transverse saw cut perpendicular to centerline. All replacement shall be made with approved hot bituminous mixtures that meet all contract requirements. Replacement material shall be placed in sufficient quantity so the finished surface will conform to grade and smoothness requirements. The corrective area shall be compacted to the specified density.

- B. Overlay. The overlay shall cover the full width of the pavement including shoulders. The area overlaid shall begin and end with a transverse butt joint which shall be constructed with a transverse saw cut and asphalt removal. All material shall be approved hot bituminous mixtures that meet all contract requirements. The overlay shall be placed so the finished surface will conform to grade and smoothness requirements. The overlaid area shall be compacted to the specified density. The overlay thickness shall be equivalent to that of the final pass made in accordance with the plans and specifications.

When the corrective work is complete, the Contractor shall profile the corrective work area and determine a Profile Index for each 0.1 mile section. Bumps which exceed 0.4 inch in 25 feet shall be diamond ground in the corrective work area.

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If the first Profile Index for a 0.1 mile section taken on the finished pavement surface in the corrective work area exceeds the specified limit for corrective work, the lane shall be reprofiled and another Profile Index for each 0.1 mile section determined after all bumps exceeding 0.4 inch in 25 feet have been diamond ground. Additional corrective work in accordance with this specification will be required if the Profile Index for a 0.1 mile section exceeds the specified limit.

Regardless of the corrective method used, the final product shall provide a pavement surface equal to adjacent sections not requiring corrective work.

All corrective work, including all necessary traffic control, shall be at the Contractor's expense.

When any corrective work on concrete pavement occurs where a core for determining pavement thickness has been previously taken, another core shall be taken after the corrective work has been completed. Joint sealant that has been damaged by bump grinding on concrete pavement shall be repaired or replaced at the Contractor's expense in accordance with Standard Plan M-412-1 and subsection 412.18.

- 5 Final acceptance and incentive and disincentive payments for pavement smoothness will be made on a square yard basis in accordance with the following:

- A. When the pavement is subject to an incentive/disincentive payment for pavement smoothness based on inches per mile the following applies:

Incentive payments will be based on the Profile Index (PI) for each 0.1 mile section using a 0.1 inch blanking band before diamond grinding of bumps or any corrective work has been done.

Disincentive payments will be based on the Profile Index (PI) for each 0.1 mile section using a 0.1 inch blanking band after the bumps that exceed 0.4 inch in 25 feet have been diamond ground and before any other corrective work has been completed.

Incentive and disincentive payments for Pavement Smoothness will be made in accordance with Table 105-6.

**Table 105-6
PAVEMENT SMOOTHNESS
(INCHES PER MILE)
0.1 INCH BLANKING BAND**

Pavement Smoothness Category ¹	Incentive Payments ²			Disincentive Payments ³			Corrective Work Required ^{4, 5}
	PI (in./mi.)	Asphalt \$/Sq. Yd.	Concrete \$/Sq. Yd.	PI (in./mi.)	Asphalt \$/Sq. Yd.	Concrete \$/Sq. Yd.	
I RURAL INTERSTATE	8 or less	\$0.16	\$1.40	22.1-24	-\$0.16	-\$1.40	24.1 or more
	8.1-10	\$0.12	\$1.05	20.1-22	-\$0.12	-\$1.05	
	10.1-12	\$0.08	\$0.70	18.1-20	-\$0.08	-\$0.70	
	12.1-14	\$0.04	\$0.35	16.1-18	-\$0.04	-\$0.35	
	14.1-16	\$0.00	\$0.00				
II ALL OTHER HIGHWAYS WITH SPEED LIMITS EQUAL TO OR GREATER THAN 45 MPH	8 or less	\$0.16	\$1.40	25.6-28	-\$0.16	-\$1.40	28.1 or more
	8.1-10.6	\$0.12	\$1.05	23.1-25.5	-\$0.12	-\$1.05	
	10.7-13.3	\$0.08	\$0.70	20.6-23	-\$0.08	-\$0.70	
	13.4-16	\$0.04	\$0.35	18.1-20.5	-\$0.04	-\$0.35	
	16.1-18	\$0.00	\$0.00				
III ⁶ ALL HIGHWAYS WITH SPEED LIMITS LESS THAN 45 MPH	8 or less	\$0.16	\$1.40	29.1-34	-\$0.16	-\$1.40	34.1 or more
	8.1-11.7	\$0.12	\$1.05	26.1-29	-\$0.12	-\$1.05	
	11.8-15.4	\$0.08	\$0.70	23.1-26	-\$0.08	-\$0.70	
	15.5-18.0	\$0.04	\$0.35	20.1-23	-\$0.04	-\$0.35	
	18.1-20	\$0.00	\$0.00				

Footnotes on page 52

Footnotes for Table 105-6

- ¹The pavement smoothness category will be shown on the plans.
- ²Incentive Payments will be based on the Profile Index (PI) for each 0.1 mile section before diamond grinding of bumps or any corrective work has been done.
- ³Disincentive payments will be based on the Profile Index (PI) for each 0.1 mile section after bumps have been diamond ground and before any other corrective work has been completed.
- ⁴Asphalt pavement - A disincentive of \$0.16/sq. yd. will be applied in addition to the corrective work.
- ⁵Concrete pavement - A disincentive of \$1.40/sq. yd. will be applied in addition to the corrective work
- ⁶a. This category applies to the following asphalt pavement construction: (1) new construction; (2) complete reconstruction, including replacement of existing curb and gutter; (3) construction of more than one layer; (4) construction of one layer over an intermediate treatment; and (5) urban construction where smoothness is not affected by existing curb and gutter or numerous intersections. All other asphalt pavement construction where the speed limit is less than 45 mph is subject to percent improvement incentive or disincentive in accordance with Table 105-7. b. This category applies to the following concrete pavement construction: (1) new construction; and (2) complete reconstruction. All other concrete pavement construction where the speed limit is less than 45 mph is not subject to incentive or disincentive; however, all bumps that exceed 0.4 inch/25 feet must be diamond ground until they are less than 0.4 inch/25 feet in accordance with these specifications.

- B. When the pavement is subject to an incentive or disincentive payment for asphalt pavement smoothness based on the Percentage of Improvement (%I), the following applies:

Incentive payments will be based on the %I of the Profile Index (PI) for each 0.1 mile section on the final paved surface before diamond grinding of bumps or any corrective work has been done compared to the Profile Index (PI) for each 0.1 mile section of the original surface.

Disincentive payments will be based on the %I of the Profile Index (PI) for each 0.1 mile section on the final paved surface after the bumps that exceed 0.4 inch in 25 feet have been diamond ground and before any other corrective work has been completed compared to the Profile Index (PI) for each 0.1 mile section of the original surface.

The %I will be calculated as follows:

$$\%I = \frac{(\text{PI OF ORIGINAL SURFACE} - \text{PI OF FINAL SURFACE}) \cdot 100}{\text{PI OF ORIGINAL SURFACE}}$$

Incentive and disincentive payments for Pavement Smoothness will be made in accordance with Table 105-7.

Disincentives and corrective work will not be required for a 0.1 mile section if the final Profile Index (PI) after grinding bumps and before any other corrective action is equal to or less than the PI shown in Table 105-8.

**Table 105-7
ASPHALT PAVEMENT SMOOTHNESS
PERCENT IMPROVEMENT (%I)
0.1 INCH BLANKING BAND**

Incentive Payments ¹		Disincentive Payments ²		Corrective Work Required ³ %I
%I	\$/Sq.Yd.	%I	\$/Sq.Yd.	
More than 75.0	\$0.16	20.1-26.2	-\$0.16	20.0 OR LESS
70.1-75.0	\$0.12	26.3-32.5	-\$0.12	
65.1-70.0	\$0.08	32.6-38.8	-\$0.08	
55.1-65.0	\$0.04	38.9-45.0	-\$0.04	
45.1-55.0	\$0.00			

¹Incentive payments will be based on the Profile Index (PI) for each 0.1 mile section before diamond grinding of bumps or any corrective work has been done.²Disincentive payments will be based on the Profile Index (PI) for each 0.1 mile section after bumps have been diamond ground and before any other corrective work has been completed.³A disincentive of \$0.16/sq. yd. will be applied in addition to the corrective work.

**Table 105-8
PI FOR NO DISINCENTIVE OR CORRECTIVE WORK
FOR PERCENT IMPROVEMENT (%I)**

Pavement Smoothness Category	Description	PI
I	Rural Interstate	16 inches/mile
II	All other highways with speed limits greater than or equal to 70 km/hour (45 MPH)	28 inches/mile
III	All highways with speed limits less than 70 km/hour (45 MPH)	20 inches/mile

- (c) Smoothness Requirements for the work items: Removal of Asphalt Mat (Planing), Heating and Scarifying, Cold Bituminous Pavement Recycle, Heating and Repaving, and Heater Remixing.

105.07

1. Testing procedures. A Profile Index (PI) for each 0.1 mile section shall be determined on the original pavement surface prior to beginning the work, using a 0.2 inch blanking band in accordance with CP 64.

A Profile Index (PI) for each 0.1 mile section shall be determined on the pavement surface after the work is complete using a 0.2 inch blanking band.

2. Final pavement smoothness acceptance will be made as follows:

0.1 mile sections with a final Profile Index (PI) that is greater than the Profile Index prior to performing the work shall be corrected by a method approved in writing by the Engineer. Corrective work shall be such that the resulting final PI is equal to or less than the initial PI. All corrective work shall be at the Contractor's expense, and shall include traffic control, and all additional hot bituminous pavement required.

105.08 Coordination of Plans, Specifications, Supplemental Specifications, and Special Provisions. These specifications, the supplemental specifications, the plans, special provisions, and all supplementary documents are essential parts of the Contract, and a requirement occurring in one is as binding as though occurring in all. They are intended to be complementary and to describe and provide for a complete work.

In case of discrepancy the order of precedence is as follows:

- (a) Special Provisions
 1. Project Special Provisions
 2. Standard Special Provisions
- (b) Plans
 1. Detailed Plans
 2. Standard PlansCalculated dimensions will govern over scaled dimensions.
- (c) Supplemental Specifications
- (d) Standard Specifications

The Contractor shall not take advantage of any apparent error or omission in the Contract. If the Contractor discovers an error or omission, the Engineer shall immediately be notified. The Engineer will make corrections and interpretations as necessary to fulfill the intent of the Contract.

105.09 Cooperation by Contractor. The Contractor will be supplied with a minimum of six sets of contract documents.

The Contractor shall give the work the constant attention necessary to facilitate progress and shall cooperate with the Engineer, inspectors, and other contractors.

The Contractor shall have on the project, at all times that work is being performed, a competent superintendent capable of reading and understanding the contract documents and experienced in the type of work being performed. The superintendent will receive instructions from the Engineer and shall be authorized to act for the Contractor on the project and to execute orders or directions of the Engineer without delay. The superintendent shall promptly supply, irrespective of the amount of work sublet, materials, equipment, tools, labor, and incidentals to complete the Contract.

105.10 Cooperation with Utilities. The Department will notify all utility companies, pipe line owners, or other parties affected, and have all necessary adjustments of the public or private utility fixtures, pipe lines, and other appurtenances within or adjacent to the limits of construction made as soon as practicable.

Water lines, gas lines, wire lines, service connections, meter and valve boxes, light standards, cableways, signals, and all other utility facilities within the limits of the proposed construction are to be relocated or adjusted at the owner's expense unless otherwise provided in the Contract. The Contractor shall cooperate with the utility owners in their removal and relocation operations, so that progress is expedited, duplication of work is minimized and service interruptions are avoided.

The Contract will indicate those utility items which are to be relocated or adjusted by the utility owner or which are to be relocated or adjusted by the Contractor. The Contractor shall consider in the bid proposal all of the permanent and temporary utility facilities in their present or relocated positions as shown in the Contract and as revealed by site investigation. Utility delays due to changes which are the responsibility of the Contractor will be considered nonexcusable delays. The Contractor and the Engineer shall meet with the utility owners as often as necessary to coordinate and schedule relocations or adjustments. Additional compensation will not be allowed for foreseeable coordination, inconvenience, or damage sustained due to interference from the utility facilities or the removal or relocation operations as indicated in the Contract. Delays shall be dealt with in accordance with subsection 108.07.

If utility facilities or appurtenances are found that are neither identified in the Contract, nor revealed by site investigation, the Engineer will determine whether adjustment or relocation of the utility is necessary. The Engineer will make arrangements with either the utility owner or the Contractor to accomplish necessary adjustments or relocations when not otherwise provided for in the Contract. Extra work will be considered for payment in accordance with subsection 104.03. Consideration for delays shall be in accordance with subsection 108.07(d).

Where the Contractor's operations are adjacent to properties of railroad, telegraph, telephone, power, or other utility companies, to which damage might result in considerable expense, loss, or inconvenience, work shall not commence until arrangements for the protection of the utilities have been made.

105.10

If water or utility services are interrupted, the Contractor shall promptly notify the owner and shall cooperate in the restoration of service. Repair work shall be continuous until the service is restored. Work shall not be undertaken around fire hydrants until provisions for continued service have been approved by the local fire authority.

105.11 Cooperation Between Contractors. The Department reserves the right to contract for and perform other or additional work on or near the work covered by the Contract.

When separate contracts are let within the limits of any one project, each Contractor shall conduct the work without interfering or hindering the progress or completion of the work being performed by other Contractors. Contractors working on the same project shall cooperate with each other as directed.

Each Contractor involved shall assume all liability, financial or otherwise, in connection with the Contract and shall protect and save harmless the Department from any and all damages or claims that may arise because of inconvenience, delay, or loss because of the presence and operations of Contractors working within the limits of the same or adjacent project.

105.12 Construction Stakes, Lines and Grades. Construction work shall not be performed until adequate lines and grades have been established by the Department or by the Contractor.

- (a) *Contractor Surveying.* When the bid schedule contains pay item 625, Construction Surveying, the Department will provide control points and bench marks as described in the Contract. The Contractor shall furnish and set construction stakes establishing lines and grades in accordance with the provisions of Section 625. The Engineer may order extra surveying which will be paid for at the established rate of \$100 per hour.
- (b) *Department Surveying.* When the bid schedule does not contain pay item 625, Construction Surveying, the Engineer will furnish one set of construction stakes and marks establishing lines and grades as described below for proper prosecution of the work.

Roadway staking will include stakes for; fence, centerline, slopes, grades (bluetops), curb and gutter, sidewalk, and median barrier. Grade stakes for finished subgrade will not be set until the grade established by the slope stakes is constructed to within 0.3 foot of the finished subgrade elevation.

Minor structures and retaining wall staking will be limited to stakes establishing line and grade by using offset line and grade stakes.

Major structures staking and references will be limited to centerlines (or work lines or control lines) as shown on the plans, appropriate offset lines and grades;

and elevations set for footings, piers, pier caps, abutments, bottom of deck grades and finish deck screed grades.

It will be the responsibility of the Contractor to use these references and marks and establish any additional control and layout necessary for the proper prosecution of the work in its final location. The Contractor shall be responsible for the accuracy of all the vertical and horizontal control it transfers and establishes. The Contractor shall, when required, provide access to abutments, piers or other locations, and shall furnish working platforms that meet applicable safety requirements so the Engineer's duties can be performed.

The Contractor shall be held responsible for the preservation of all stakes and marks, and if any are destroyed, disturbed or removed by the Contractor, subcontractors, or suppliers, the cost of replacing them will be charged against the Contractor and will be deducted from the payment for the work at the rate of \$100 per hour.

It is the responsibility of the Contractor to perform all required layout work which shall include, but will not be limited to the following:

- (1) Piling locations and cut off elevation.
- (2) Girder seats on piers and abutments.
- (3) Bolt locations and patterns.
- (4) Construction sign locations.
- (5) Guardrail.

The Engineer reserves the right to inspect all staking and work in place to insure conformance with the Contract. A minimum of two working days will be required as advance notice to the Engineer to provide project control staking.

105.13 Authority and Duties of the Project Engineer. The Project Engineer has immediate charge of the administration and engineering details of each construction project. The Project Engineer has the authority to exercise all duties and responsibilities of the Engineer contained in the Contract, except those specifically retained by the Chief Engineer. The CDOT Project Engineer and the CDOT Resident Engineer are the only representatives of the Chief Engineer authorized to sign Contract Modification Orders. The Project Engineer is responsible for initial decisions relating to Contractor claims for additional compensation or extension of contract time filed pursuant to subsection 105.21.

105.14 Duties of the Inspector. Inspectors employed by the Department are authorized to inspect all work done and materials furnished. This inspection may extend to all or any part of the work and to the preparation, fabrication or manufacture of the materials to be used. The inspector is not authorized to alter or waive the provisions of the Contract. The inspector is not authorized to issue instructions contrary to the provisions of the Contract or to act as foreman for the Contractor.

105.15

105.15 Inspection and Testing of Work. All materials and each part or detail of the work shall be subject to inspection by the Engineer. The Engineer shall be allowed access to all parts of the work and shall be furnished with information and assistance by the Contractor as required to make a complete and detailed inspection.

Before final acceptance of the work, the Contractor shall remove or uncover such portions of the finished work, as directed. After examination, by the Engineer, the Contractor shall restore the work to the standard required by the Contract. If the work thus exposed or examined proves acceptable, the uncovering, removing, or restoring the work will be paid for as extra work. If the work exposed or examined proves unacceptable, the uncovering, removing, or restoring the work shall be at the Contractor's expense.

Any work done or materials used without inspection by an authorized Department representative may be ordered uncovered, removed, or restored at the Contractor's expense.

When any unit of government or political subdivision, utility, or railroad corporation is to pay a portion of the cost of the work covered by a highway Contract, its respective representatives shall have the right to inspect the work. This inspection shall not make any unit of government or political subdivision, utility, or railroad corporation a party to the Contract, and shall not interfere with the rights of either party.

All inspections and all tests conducted by the Department are for the convenience and benefit of the Department. These inspections and tests do not constitute acceptance of the materials or work tested or inspected, and the Department may reject or accept any work or materials at any time prior to the inspection pursuant to subsection 105.20(b) whether or not previous inspections or tests were conducted by the Engineer or authorized representative.

105.16 Removal of Unacceptable Work and Unauthorized Work. Unacceptable work is work that does not conform to the requirements of the Contract.

Unacceptable work, resulting from any cause, found to exist prior to the final acceptance of the work, shall be removed and replaced in an acceptable manner at the Contractor's expense. The fact that the Engineer or an inspector may have overlooked the unacceptable work shall not constitute an acceptance of any part of the work.

Unauthorized work is work that was done without adequate lines and grades having been established by the Engineer or by the Contractor, work done contrary to the instructions of the Engineer, work done beyond the lines shown on the plans, or extra work done without the Engineer's authorization. Unauthorized work will not be paid for under the provisions of the Contract, and may be ordered removed or replaced at the Contractor's expense.

If the Contractor fails to comply with any order of the Engineer made under the provisions of this subsection, the Engineer will have authority to cause unacceptable

work to be remedied or removed and replaced, and unauthorized work to be removed. The Engineer will deduct the costs from any monies due or to become due the Contractor.

105.17 Load Restrictions. The Contractor shall comply with all legal load restrictions in the hauling of equipment or materials on public roads beyond the limits of the project. A special permit will not relieve the Contractor of liability for damage resulting from the moving of equipment or material.

The operation of equipment or hauling loads which cause damage to structures, the roadway or any other construction will not be permitted. Hauling of materials over the base course or surface course under construction shall be limited by the Contractor to methods and equipment that will prevent damage to the pavement structure. Loads will not be permitted on a concrete pavement or structure before the expiration of the curing period. The Contractor shall be responsible for the repair of all damage and related expense resulting from hauling equipment and construction operations.

If a vehicle's gross weight exceeds the legal limit, and the material transported by the vehicle is delivered to the project, the material and the scale ticket (certificate of correct weight) will not be accepted.

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

- (1) The pay item quantity represented by the amount of material in excess of the legal weight will not be paid for.
- (2) A price reduction will be assessed for the overweight portion of the load based on the following schedule.

Overweight (Pounds)	Price Reduction (Dollars)	Overweight cont. (Pounds)	Price Reduction cont. (Dollars)
0 - 3000	20	8,001 - 9,000	582
3001 - 4000	40	9,001 - 10,000	842
4001 - 5,000	82	Over 10,000	\$870 plus \$164 for each 1,000 lbs over 10,000 lbs
5,001 - 6,000	130		
6,001 - 7,000	226		
7,001 - 8,000	376		

105.18 Maintenance During Construction. The Contractor shall maintain all work that is included in the Contract during construction and until final written acceptance, except as otherwise specified in subsection 107.17. This maintenance shall constitute continuous and effective work prosecuted with adequate equipment and forces so the roadway or structures are kept in satisfactory condition at all times.

105.18

In the case of a Contract involving the placement of material on or utilization of, a previously constructed subgrade, pavement structure or structure, the Contractor shall maintain the previously constructed work during all construction operations.

All cost of maintaining the contract work during construction and before final written acceptance will not be paid for separately, but shall be included in the work, except as otherwise specified in subsection 107.17.

105.19 Failure to Maintain Roadway or Structure. If the Contractor fails to comply with the provisions of subsection 105.18, the Engineer will immediately notify the Contractor of such noncompliance. If the Contractor fails to remedy unsatisfactory maintenance within 24 hours after receipt of such notice, the Engineer may immediately proceed to maintain the project, and the entire cost of this maintenance will be deducted from monies due or to become due the Contractor on the Contract.

105.20 Acceptance.

- (a) *Partial Acceptance.* If, during the prosecution of the project, the Contractor satisfactorily completes a unit or portion of the project, such as a structure, an interchange, or a section of road or pavement that can be used advantageously for traffic, the Engineer may make final inspection of that unit. If the Engineer finds that the unit has been satisfactorily completed in compliance with the Contract, the Contractor may be relieved of further responsibility for that unit except as otherwise provided in subsection 107.16. Partial acceptance shall not void or alter any of the terms of the Contract.
- (b) *Final Acceptance.* Upon notice from the Contractor of presumptive completion of the entire project, the Engineer will make an inspection. If the work provided for by the Contract has been satisfactorily completed, that inspection shall constitute the final inspection and the Engineer will notify the Contractor in writing of final acceptance indicating the date on which the project was inspected and accepted.

If the inspection discloses any unsatisfactory work, the Engineer will give the Contractor a written list of the work needing correction. Upon correction of the work, another inspection will be made. If the work has been satisfactorily completed, the Engineer will notify the Contractor in writing of the date of final inspection and acceptance. Final acceptance under this subsection does not waive any legal rights contained in subsection 107.21.

105.21 Disputes and Claims for Contract Adjustments. When the Project Engineer is a Consultant Project Engineer, actions, decisions, and determinations specified herein as made by the Project Engineer may be made by the Resident Engineer.

- (a) Disputes include, but are not limited to, any disagreement resulting from a change, a delay, a change order, another written order, or an oral order from the Project Engineer, including any direction, instruction, interpretation, or determination by the Project Engineer. When a dispute occurs, the Contractor shall pursue resolution through the process set forth in this subsection. The Contractor shall:
1. Provide a written notice of protest to the Project Engineer before doing the work;
 2. Supplement the written protest within 15 calendar days with a written statement providing the following:
 - (1) The date of the protested order;
 - (2) The nature of the order and circumstances which caused the protest;
 - (3) The contract provisions supporting the protest;
 - (4) The estimated dollar cost, if any, of the protested work and documentation supporting the estimate; and
 - (5) An analysis of the progress schedule showing the schedule change or disruption if the Contractor is asserting a schedule change or disruption; and
 3. Supplement the information provided in 2. above as necessary during the time the dispute continues.

Throughout protested work, the Contractor shall keep complete records of extra costs and time incurred. The Contractor shall permit the Project Engineer access to these and all other records needed for evaluating the protest as determined by the Project Engineer.

The Project Engineer will evaluate all protests. If the Project Engineer determines that a protest is valid, the Project Engineer will adjust payment for work or time by an equitable adjustment in accordance with subsection 108.07, 109.04, or 109.10. If the Project Engineer fails to provide satisfactory resolution, the Contractor may pursue the more formalized method for submitting a claim, as outlined below.

- (b) All claims filed by the Contractor based upon: (1) work or materials not clearly defined in the Contract, (2) extra work not ordered by the Engineer in accordance with subsection 104.03, (3) extensions of time made pursuant to subsection 108.07, or (4) any other cause, resulting in requests for additional compensation or time, shall be governed by this subsection.

The Contractor and the Department agree that the dispute resolution process set forth in this subsection shall be exhausted in its entirety prior to initiation of litigation.

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Failure to comply with the requirements set forth in this subsection shall bar the Contractor from any further administrative, equitable, or legal remedy.

- (c) Upon discovery of any facts which formulate the basis of a potential claim, or upon unsatisfactory resolution of a dispute, the Contractor shall give written notice to the Project Engineer to enable the Department to obtain its independent evidence of these facts.

Within seven calendar days after the discovery of the facts giving rise to a claim, or after unsatisfactory resolution of a dispute, the Contractor shall notify the Project Engineer in writing of the intent to file a claim as described in subsection 105.21(b), unless written notice of protest was given in accordance with subsection 105.21(a). The Contractor's formal notification of intent to file a claim shall describe the contractual and legal basis of the claim and factual evidence supporting the claim.

If notice of protest or notice of intent to file claim are not properly given by the Contractor according to these specifications, the Contractor shall not be entitled to any additional compensation or extension of time for any cause related to the claim, including any act or failure to act by the Engineer. Any such claim based upon any cause will be considered invalid and will be denied by the Project Engineer on the basis that proper notifications, as required herein, were not given. The Contractor's prior and formal notifications of intent to file a claim and subsequent Department acknowledgment of those notifications shall not be construed as proving or substantiating the validity of the Contractor's claim as related to the contractual basis of the claim, factual information related to the claim, or cost, or amount of time extension related to the claim.

- (d) When the Contractor provides written notification of intent to file a claim pursuant to subsection 105.21(c), the claim will be reviewed by the Project Engineer who will render a written decision to the Contractor to either affirm the claim as valid or deny the claim, in whole or in part, in accordance with the following procedure:

- 1. Within 60 days after project acceptance, the Contractor shall submit to the Project Engineer a complete claim package which represents the final position the Contractor wishes to have considered by the Department. The submitted claim package shall include all documents supporting such claim, regardless of whether such documents have been provided previously to the Department. All claims filed by the Contractor shall be in writing and in sufficient detail to enable the Engineer to ascertain the basis and amount of claim. As a minimum, the following information must accompany each claim submitted:

- A. A claim certification containing the following language:

CONTRACTOR’S CLAIM CERTIFICATION

Under penalty of law for perjury or falsification, the undersigned, (name) _____, (title) _____, of _____ (company) hereby certifies that the claim of \$ _____ for extra compensation and ____ Days additional time, made herein for work on this contract is a true statement of the actual costs and time incurred, and is fully documented herein and supported under the contract between the parties.

This claim package contains all documents which support the claims made herein and I understand that no further data, other than data provided for clarification purposes, may be presented by me.

Dated _____/s/
Subscribed and sworn before me this _____ day of

NOTARY PUBLIC
My Commission Expires:

- B. A detailed factual statement of the claim for additional compensation, time, or both, providing all necessary dates, locations, and items of work affected by the claim.
- C. The date on which facts were discovered which gave rise to the claim.
- D. The name, title, and activity of all known CDOT, Consultant, and other individuals who may be knowledgeable about facts giving rise to such claim.
- E. The name, title, and activity of all known Contractor, subcontractor, supplier and other individuals who may be knowledgeable about facts giving rise to such claim.
- F. The specific provisions of the Contract which support the claim and a statement of the reasons why such provisions support the claim.
- G. If the claim relates to a decision of the Engineer which the Contract leaves to the Engineer’s discretion, the Contractor shall set out in detail all facts supporting its position relating to the decision of the Engineer.
- H. The identification of any documents and the substance of any oral communications that support the claim.
- I. Copies of all known documents that support the claim.

- J. If an extension of contract time is sought, the documents required by subsection 108.07(d).
- K. If additional compensation is sought, the exact amount sought and a breakdown of that amount into the following categories:
- (1) These categories represent the only costs that are recoverable by the Contractor. All other costs or categories of costs are not recoverable:
 - (i) Actual wages and benefits, including FICA, paid for additional non-salaried labor;
 - (ii) Costs for additional bond, insurance and tax;
 - (iii) Increased costs for materials;
 - (iv) Equipment costs calculated in accordance with subsection 109.04(c) for Contractor owned equipment and based on invoice costs for rented equipment;
 - (v) Costs of extended job site overhead;
 - (vi) Subcontractor's claims (the same level of detail as specified herein is required for all subcontractor's claims)
 - (vii) An additional 10 percent will be added to the total of items (i), (ii), (iii), (iv), (v), and (vi) as compensation for items for which no specific allowance is provided, including profit and home office overhead.
 - (2) In adjustment for the costs as allowed above, the Department will have no liability for the following items of damages or expense:
 - (i) Profit in excess of that provided in (1) above;
 - (ii) Loss of profit;
 - (iii) Additional cost of labor inefficiencies in excess of that provided in (1) above;
 - (iv) Home office overhead in excess of that provided in (1) above;
 - (v) Consequential damages, including but not limited to loss of bonding capacity, loss of bidding opportunities, and insolvency;
 - (vi) Indirect costs or expenses of any nature in excess of that provided in (1) above;
 - (vii) Attorneys fees, claim preparation fees, and expert fees.

The time period within which the Contractor is to provide such written documentation may be extended by the Project Engineer if requested by the Contractor and if the Project Engineer determines an extension would enhance the claim record and improve the potential for resolution of the claim. If the Contractor fails to provide such written documentation within 60 days after project acceptance, or within an extended time period authorized by the Project Engineer, the Project Engineer will base the decision upon the information previously submitted in the Contractor's

notification of intent to file a claim and pertinent specification and contract documents. Requests of time extension to submit documentation shall be submitted in writing prior to final acceptance of the project. The Engineer's approval or disapproval of the extension will be given to the Contractor in writing prior to final acceptance.

The Contractor shall keep full and complete records of the costs and additional time incurred for each claim. All Contractor's records and the records of all subcontractors on the Contract shall be open to inspection or audit by representatives of the Department during the life of the Contract and for a period of not less than three years after the date of final payment. The Contractor, subcontractors, and lower tier subcontractors shall provide adequate facilities, acceptable to the Engineer, for the audit during normal business hours. The Contractor shall permit the Engineer or Department auditor to examine and copy those records and all other records required by the Engineer to determine the facts or contentions involved in the claim. The audit may be performed for any claim, and is mandatory for all claims with amounts greater than \$250,000.

2. The Project Engineer: (1) will review the information in the Contractor's written notification of intent to file a claim, (2) will review all written documents as submitted by the Contractor in support of the claim, and (3) may consider any other information available in rendering a decision. The Project Engineer will assemble and maintain a claim record comprised of all written documents submitted by the Contractor in support of the claim and all other written documents considered by the Project Engineer in reaching a decision. All documentation the Contractor wants considered shall be made available to the Project Engineer and will be made a part of the claim record during the review of the claim. Once the claim record has been assembled by the Project Engineer, the submission of additional information, other than clarification and data supporting previously submitted documentation, at any subsequent levels of review by anyone, will not be permitted. The Project Engineer will provide a copy of the complete claim record along with the written decision to the Contractor describing the contractual basis and factual information considered by the Project Engineer in reaching a decision.
3. The Project Engineer will render a written decision to the Contractor within 60 days from the receipt of the Contractor's submission of all written documentation supporting the claim. If more than one claim has been filed by the Contractor on the Project, the Project Engineer will have the right to consolidate all related claims and issue one decision on all such claims provided that consolidation of claims does not extend the time period within which the Project Engineer is to render a decision. Consolidation of unrelated claims will not be made. If the Project Engineer fails to render a written decision to the Contractor within the specified 60 day time period, or within any extended time period as agreed to by both, the Contractor must either: (1) accept this as a denial of the claim, or (2) appeal the claim to the

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Region Transportation Director, in the same manner as if the Project Engineer had denied the Contractor's claim, according to subsection 105.21(e).

- (e) If the Contractor disagrees with the written decision of the Project Engineer, the Contractor must either: (1) accept the Project Engineer's decision as final, (2) file a one-time written appeal to the Project Engineer with the submission of additional information, or (3) file a written appeal to the Region Transportation Director based upon all information previously submitted and made a part of the claim record. The Contractor's written appeal shall be made within 60 days from the receipt of the Project Engineer's written decision. The Contractor hereby agrees that if a written appeal is not properly filed within this specified 60 day time period, the claim shall be settled in the same manner as if the Contractor had accepted the Project Engineer's written decision as final. Failure by the Contractor to properly file a written appeal, according to these specifications, shall bar the Contractor from any further administrative equitable or legal remedy for said claim under the Contract.
- (f) When the Contractor properly files a written appeal to the Project Engineer pursuant to subsection 105.21(e), the Project Engineer will review all new submissions made by the Contractor and render a decision to the Contractor pursuant to subsection 105.21(d). When a written appeal to the Region Transportation Director is properly filed by the Contractor pursuant to subsection 105.21(e), the Project Engineer will provide the complete claim record, as defined by subsection 105.21(d), to the Region Transportation Director. The claim will be reviewed by the Region Transportation Director who will render a written decision to the Contractor to either affirm, overrule, or modify the Project Engineer's decision, in whole or in part, in accordance with the following procedure:
 - 1. For the purpose of this subsection, Region Transportation Director shall be understood to mean the Region Transportation Director or the Region Transportation Director's designated representative.
 - 2. The Region Transportation Director will maintain the claim record during the review of the claim. The Contractor's written appeal to the Region Transportation Director will be made a part of the claim record. Either the Contractor or the Department may request an oral hearing of the claim before the Region Transportation Director. When an oral hearing is requested by either party, both the Project Engineer and the Contractor's representative shall be present and the hearing shall be conducted at a time which is convenient to all parties. The Region Transportation Director will consider all written documents in the claim record and all oral presentations in support of that record made by the Contractor and the Project Engineer. The Region Transportation Director will not consider any written documents or oral arguments, which have not previously been made a part of the claim record, other than clarification and data supporting previously submitted documentation.

3. The Region Transportation Director will render a written decision to the Contractor within 60 days from the receipt of the Contractor's written appeal, unless both parties agree to an extension of time. If the Region Transportation Director fails to render a written decision to the Contractor within the specified 60 day time period, or within any extended time period as agreed by both parties, the Contractor must either: (1) accept this as a denial of the claim, or (2) appeal the claim to the Chief Engineer, in the same manner as if the Region Transportation Director had denied the Contractor's claim, according to subsection 105.21(g).
- (g) If the Contractor disagrees with the written decision of the Region Transportation Director, the Contractor must either: (1) accept the Region Transportation Director's decision as final, or (2) file a written appeal to the Chief Engineer within 60 days from the receipt of the Region Transportation Director's written decision. The Contractor hereby agrees that if a written appeal is not properly filed within this specified 60 day time period, the claim shall be settled in the same manner as if the Contractor had agreed with and accepted the Region Transportation Director's written decision as final. Failure by the Contractor to properly file a written appeal according to these specifications shall bar the Contractor from any further administrative, equitable, or legal remedy for said claim under the Contract.
- (h) When the Contractor properly files a written appeal to the Chief Engineer pursuant to subsection 105.21(g), the complete claim record as maintained by the Region Transportation Director will be provided to the Chief Engineer. The Chief Engineer or his duly authorized delegate will review said claim and will render a written decision to the Contractor to either affirm, overrule, or modify the Region Transportation Director's decision, in whole or in part, in accordance with the following procedure:
1. The Contractor's written appeal to the Chief Engineer will be made a part of the claim record. Either the Contractor or the Chief Engineer may request that arbitration be commenced to review the claim and provide a recommendation to the Chief Engineer. Arbitration will not be convened when the value of the claim is less than \$20,000. Arbitration shall be in accordance with subsection 105.21(i).
 2. When arbitration is not requested by either the Contractor or the Chief Engineer, the Chief Engineer will render a decision within 60 days after reviewing the information contained in the claim record. The Chief Engineer will not consider any written documents or oral arguments, which have not previously been made available to the Region Transportation Director and properly made a part of the claim record, other than clarification and data supporting previously submitted documentation.
 3. When arbitration is requested by either the Contractor or the Chief Engineer, it shall be convened pursuant to subsection 105.21(i). Either the Chief

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Engineer or his duly authorized delegate will attend the arbitration. The Chief Engineer or his duly authorized delegate will consider the entire administrative claim record, including the arbitrator's written recommendation. The Chief Engineer or his duly authorized delegate will not consider any written documents or oral arguments which have not been made available to arbitration and made a part of the claim record. The Chief Engineer or his duly authorized delegate will not be bound by the recommendation of the arbitration.

- (i) When requested by either the Contractor or the Chief Engineer, pursuant to subsection 105.21(h), arbitration shall consist of independent arbitrators who shall consider the claim in accordance with the following procedures:
1. The Chief Engineer shall contact an independent arbitration organization such as the American Arbitration Association (AAA) which shall appoint arbitrators according to their internal procedures. Arbitrators shall not be employed by, affiliated with, or have consultive or business connection with the claimant Contractor. Arbitrators shall not have assisted either in the evaluation, preparation, or presentation of the claim case either for the Contractor or the Department or have rendered an opinion on the merits of the claim for either party, and shall not do so during the proceedings of arbitration. The costs and reasonable expenses of arbitration shall be directly paid by the Department. The Department will subtract one-half of the cost of the arbitration from the Contractor's final payment.
 2. Once established, the arbitrators shall serve until the final recommendation is made to the Chief Engineer or his duly authorized delegate. The entire claim record will be made available to the arbitrators by the Chief Engineer.

The independent arbitrators shall administer the process pursuant to the CDOT modified version of AAA's Construction Industry Arbitration Rules, established for its construction claims, except to the extent that such rules conflict with the specifications, in which case the specifications shall control. A copy of the modified AAA rules is made a part of the Contract by special provision. Unless both parties agree otherwise one arbitrator shall be used for claims less than \$250,000 and three arbitrators shall be used for claims \$250,000 and greater. The arbitrators shall consider the facts of the claim and preside over an informal hearing on the claim. The hearing will be transcribed by a court recorder. Either party may have an attorney present at the arbitration hearing. Attorneys licensed in the State of Colorado may participate in the claim presentation. Unless both parties agree otherwise all hearings shall be held in Denver.

The arbitrators shall consider all written information available in the claim record and all oral presentations in support of that record by the Contractor and the Department. The arbitrators shall not consider any written documents or oral arguments which have not previously been made a part of the claim

record, other than clarification and data supporting previously submitted documentation. The arbitrators shall not consider an increase in the amount of the claim, or any new claims.

3. After complete review of the facts associated with the claim, the arbitrators shall render a written explanation of its recommendation, based upon its findings of fact, to the Chief Engineer or his authorized delegate who will retain authority over disposition of the claim. When three arbitrators are used, and only two arbitrators agree then the recommendation of the two arbitrators and the recommendation of the third arbitrator shall be given to the Chief Engineer or his authorized delegate. The arbitrator's recommendation shall include: (1) a summary of the issues and factual evidence presented by the Contractor and the Department concerning the claim, (2) recommendations concerning the validity of the claim, (3) recommendations concerning the value of the claim as to cost and time impacts if the claim is determined to be valid, (4) the contractual and factual bases supporting the recommendations made, (5) detailed and supportable calculations which support any recommendation made. The arbitrators shall act only in an advisory capacity to the Chief Engineer or his authorized delegate, with no direct authority for resolution of the claim. Recommendations which are not supported by the plans, the specifications or other portions of the Contract will not be considered by the Chief Engineer or his authorized delegate. The arbitrators shall not consider Contractor's claims for legal or consultant preparation fees or anticipated profit. Recommendations concerning the value of the claim as to cost and time impacts will not be considered by the Chief Engineer or his authorized delegate if not supported by the required documents from subsection 105.21(d).
4. Upon receipt of the recommendation of the arbitration, the Chief Engineer or his authorized delegate will render a final decision within 60 days pursuant to subsection 105.21(h).

The decision of the Chief Engineer, or the Chief Engineer's authorized delegate, shall constitute final agency action by the Department pursuant to C.R.S. § 24-4-106 and Colorado Rule of Civil Procedure 106(a)(4). In the Contractor disagrees with the Department's final agency action, Contractor's sole remedy is judicial review pursuant to C.R.S. § 24-4-106. The conclusions and recommendations of the arbitration panel shall not be admissible in any court of law. Any offer made by the Contractor or the Department at any stage of the claims process, other than the Department's final agency action, as set forth in this subsection shall be deemed an offer of settlement pursuant Colorado Rules of Evidence 408 and therefore inadmissible in any litigation.

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SECTION 106 CONTROL OF MATERIAL

106.01 Source of Supply and Quality Requirements. All materials used shall meet all quality requirements of the Contract. The Contractor shall comply with the requirements of the special notice to contractors contained in the Department's Field Materials Manual, including notifying the Engineer of the proposed sources of materials at least two weeks prior to delivery.

When alternative materials are permitted for an item in the Contract, the Contractor shall state at the preconstruction conference the material that will be furnished for that item.

Reference in the Contract to a particular product, or to the product of a specific manufacturer, followed by the phrase "or approved equal" is intended only to establish a standard of quality, durability and design, and shall not be construed as limiting competition. Products of other manufacturers will be acceptable provided such products are equal to that specified.

106.02 Material Sources. Where practicable, borrow pits, gravel pits, and quarry sites shall be located so that they will not be visible from the highway.

- (a) *Available Source.* When the Contract shows a location that may be used by the Contractor as a source of sand, gravel, or borrow material, the location will be known as an available source. The Department will have an agreement with the property owner which allows removal of material under certain conditions and for a stated price.

Conditions of this agreement which concern use of this material on the project and pit construction and reclamation requirements for the available source will be included in the Contract.

The Contract will indicate whether the Department has or has not obtained the necessary County or City Zoning Clearance and the required permit from Colorado Mined Land Reclamation Division needed to explore and remove materials from the available source. If the Department did not obtain the necessary clearances or permits, the Contractor shall obtain them. Any delays to the project or additional expenses that are incurred while these clearances or permits are being obtained shall be the responsibility of the Contractor. The Contractor shall ensure that the requirements of the permits do not conflict with the pit construction and reclamation requirements shown in the Contract for the available source.

The Department will investigate and obtain samples from the various available sources. These samples are not intended to indicate the full extent and composition of an entire deposit. These samples will be tested by the

Department and may be combined with various materials such as mineral fillers and additives for further testing, especially for testing aggregate sources to obtain a satisfactory design mix. The Contract will show the location of the test holes where samples were obtained, test results, and amounts and kinds of any added materials utilized in the testing to obtain a satisfactory product. If the Contractor uses an available source, all material shall meet contract specifications. The Department will not be responsible for the material as produced by the Contractor.

All costs of producing specification material shall be borne by the Contractor.

- (b) *Contractor Source.* Sources of sand, gravel, or borrow other than available sources will be known as contractor sources. The material from a contractor source must be approved by the Engineer prior to incorporation of the material into the project. The Contractor shall produce material which meets contract specifications throughout construction of the project.

The Contractor shall obtain all permits and agreements necessary to explore and remove material from a contractor source. The Contractor shall also be responsible for any costs or delays associated with obtaining these permits and agreements.

For each source of imported embankment or topsoil the Contractor shall provide the following certification. The Contractor shall assure and certify that unacceptable levels of hazardous waste and substances; including but not limited to those defined in the Code of Federal Regulations, 40 CFR Part 261 Subparts C and D, and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 101(14) as amended; are not incorporated into the project as a result of importing embankment or topsoil materials. The Contractor shall submit such certification to the Engineer, signed and stamped (or sealed) by either a certified industrial hygienist (CIH), certified hazardous materials manager (CHMM), registered professional engineer (PE), Certified Safety Professional (CSP), or Registered Environmental Manager (REM) for each contractor source outside of the project limits.

If contractor source material for embankment or topsoil, originating outside of the project limits, is placed on the project and is at anytime found to be contaminated with unacceptable levels of hazardous waste or substances, the Contractor shall remove the contaminated material from the Department's right of way, dispose of it in accordance with applicable laws and regulations, and make necessary restoration.

The cost of complying with these requirements, including sampling, testing, and corrective action by the Contractor, shall be included in the work.

106.03 Samples, Tests, Cited Specifications. All materials or the finished product in which the materials are used, will be inspected and tested by the Engineer, or by

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others if specified in the Contract. The Engineer will furnish copies of test results that indicate out of specification material, to the Contractor, promptly as the test results become available. Acceptance will be based on the applicable requirements of Section 105. Any work in which untested and uninspected materials are used shall be performed at the Contractor's risk and may be considered as unacceptable and unauthorized work.

Unless otherwise designated, when AASHTO, 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 prior to the date of advertisement for bids.

Sampling and testing will be done in accordance with the Department's minimum sampling, testing, and inspection schedule; the special notice to contractors; and the Colorado procedures; all contained in the Department's Field Materials Manual.

Where the method of test is not cited, the applicable procedure shall be in accordance with the Standard AASHTO Method which was current on the date of advertisement for bids.

Samples will be taken by the Department except that the Contractor shall take samples of asphalt cement, in accordance with AASHTO T 40; hot mix asphalt, in accordance with Colorado Procedure 41 and a composite of aggregates for hot bituminous mixtures, in accordance with Colorado Procedure 30. The Engineer will determine the sampling locations, and the samples shall be taken in the presence of the Engineer. The Contractor may retain a split of each sample.

All materials being used are subject to inspection and testing at any time prior to or during incorporation into the work. Tests will be made by and at the expense of the Department.

106.04 Qualification of Testing Personnel and Laboratories. Personnel performing tests used in mix design or the acceptance, rejection, or price adjustment decision, and the laboratories in which those tests are performed, shall be qualified in accordance with Colorado Procedure 10.

106.05 Sampling and Testing of Hot Mix Asphalt. All HMA, Item 403, except HMA (Patching) and temporary pavement shall be tested in accordance with the following program of process control testing and acceptance testing:

- (a) Process Control Testing. The Contractor shall be responsible for process control testing on all elements listed in Table 106-1. Process control testing shall be performed at the expense of the Contractor. The Contractor shall develop a quality control plan (QCP) in accordance with the following:
 1. Quality Control Plan. For each element listed in Table 106-1, the QCP must provide adequate details to ensure that the Contractor will perform process

control. The Contractor shall submit the QCP to the Engineer at the preconstruction conference. The Contractor shall not start any work on the project until the Engineer has approved the QCP in writing.

- A. Frequency of Tests or Measurements. The QCP shall indicate a random sampling frequency, which shall not be less than that shown in Table 106-1. The process control tests shall be independent of acceptance tests.
 - B. Test Result Chart. Each process control test result, the appropriate tonnage and the tolerance limits shall be plotted. For in-place density tests, only results after final compaction shall be shown. The chart shall be posted daily at a location convenient for viewing by the Engineer.
 - C. Quality Level Chart. The Quality Level (QL) for each element used to calculate incentive or disincentive in Table 106-1 and each required sieve size shall be plotted. The QL will be calculated in accordance with the procedure in CP 71 for Determining Quality Level (QL). The QL will be calculated on tests 1 through 3, then tests 1 through 4, then tests 1 through 5, then thereafter the last five consecutive test results. The tonnage of material represented by the last test result shall correspond to the QL. For in-place density tests, only results after final compaction shall be shown. The chart shall be posted daily at a location convenient for viewing by the Engineer.
2. Elements Not Conforming to Process Control. The QL of each discrete group of five test results, beginning with the first group of five test results, shall be a standard for evaluating material not conforming to process control. When the group QL is below 65, the process shall be considered as not conforming to the QCP. In this case, the Contractor shall take immediate action to bring the process back into control. Except where the cause of the problem is readily apparent and corrected without delay, production shall be suspended until the source of the problem is determined and corrected. A written explanation of actions taken to correct control problems shall accompany the test data and be submitted to the Engineer on the day the actions are taken.
 3. Point of Sampling. The material for process control testing shall be sampled by the Contractor using approved procedures. Acceptable procedures are Colorado Procedures, AASHTO and ASTM. The order of precedence is Colorado Procedures, AASHTO procedures and then ASTM procedures. The location where material samples will be taken shall be indicated in the QCP.
 4. Testing Standards. The QCP shall indicate which testing standards will be followed. Acceptable standards are Colorado Procedures, AASHTO and ASTM. The order of precedence is Colorado Procedures, AASHTO procedures and then ASTM procedures.

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5. Testing Supervisor Qualifications. The person responsible for the process control sampling and testing shall be identified in the QCP and be qualified according to the requirements of CP 10
 6. Technician Qualifications. Technicians taking samples and performing tests must be qualified according to the requirements of CP 10.
 7. Testing Equipment. All of the testing equipment used to conduct process control testing shall conform to the standards specified in the test procedures and be in good working order. Nuclear testing devices used for process control testing of in-place density do not have to be calibrated on the Department's calibration blocks.
 8. Reporting and Record Keeping. The Contractor shall report the results of the process control tests to the Engineer in writing at least once per day. The Contractor shall make provisions such that the Engineer can inspect process control work in progress, including sampling, testing, plants, and the Contractor's testing facilities at any time.
- (b) *Acceptance Testing.* Acceptance testing is the responsibility of the Department and shall not be addressed in the QCP. The Department will determine the locations where samples or measurements are to be taken. The maximum quantity of material represented by each test result and the minimum number of test results will be in accordance with Table 106-1. The location or time of sampling will be based on a stratified random procedure as described in CP 75. Acceptance sampling and testing procedures will be in accordance with the Schedule for Minimum Materials Sampling, Testing and Inspection in the Department's Field Materials Manual. Samples for project acceptance testing shall be taken by the Contractor in accordance with the designated method. The samples shall be taken in the presence of the Engineer. Where appropriate, the Contractor shall reduce each sample to the size designated by the Engineer. The Contractor may retain a split of each sample which cannot be included as part of the QCP.

All materials being used are subject to inspection and testing at any time prior to, during, or after incorporation into work. Acceptance tests will be made by and at the expense of the Department, except when otherwise provided.

- (c) *Check Testing Program (CTP).* Prior to, or in conjunction with, placing the first 500 tons of asphalt pavement, under the direction of the Engineer, a CTP will be conducted between acceptance testing and process control testing programs. The CTP will consist of testing for asphalt content, HMA 4.75 mm (#4) sieve, HMA 2.36 mm (#8) sieve, HMA 75 mm (#200) sieve, voids in the mineral aggregate, air voids, in-place density, and joint density in accordance with CP 13. If the Contractor intends to test to determine air voids and VMA, check testing for these tests is recommended. The CTP will be continued until the acceptance and process control test results are within the acceptable limits shown in Table 13-1

of CP 13. For joint density, the initial check test will be a comparison of the seven cores tested by CDOT and the seven cores tested by the Contractor. These are the cores from the compaction test section used for nuclear gauge calibration and test section payment.

During production, a split sample check will be conducted at the frequency shown in Table 106-1. Except for joint density, the split samples will be from an acceptance sample obtained in accordance with subsection 106.05(b). The acceptance test result will be compared to the process control test result obtained by the Contractor using the acceptable limits shown in Table 13-1 of CP 13. For joint density, the comparison sample for testing by the Contractor will be obtained by taking a second core adjacent to the joint density acceptance core. The acceptance test result will be compared to the process control test result obtained by the Contractor using the acceptable limits as shown in Table 13-1 of CP13 and following the check testing procedure given in CP 13.

If production has been suspended and then resumed, the Engineer may order a CTP between process control and acceptance testing persons to assure the test results are within the acceptable limits shown in Table 13-1 of CP 13. Check test results shall not be included in process control testing. The Region Materials Engineer shall be called upon to resolve differences if a CTP shows unresolved differences beyond the values shown in Table 13-1 of CP 13.

- (d) *Stability Verification Testing.* After the mix design has been approved and production commences, the Department will perform a minimum of three stability verification tests to verify that the field produced HMA conforms to the approved mix design:

The test frequency shall be one per day unless otherwise directed by the Engineer.

The test results will be evaluated and the Contractor shall make adjustments if required in accordance with the following:

1. The minimum value for stability will be the minimum specified in Table 403-1 of the specifications. There will be no tolerance limit.
2. Quality Level. Calculate a QL for stability.

If the QL for stability is less than 65, then production shall be halted and the Contractor shall submit a written proposal for a mix design revision to the Engineer. The Engineer shall give written approval to the proposed mix design revision before production continues.

After a new or revised mix design is approved, three additional stability tests will be performed on asphalt produced with the new or revised mix design. The test frequency shall be one per day unless altered by the Engineer.

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If the stability QL is less than 65, then production shall be halted until a new mix design has been completed and approved using plant produced material or the Contractor shall submit a written proposal for a mix design revision to the Engineer. The Engineer shall give written approval to the proposed mix design revision before production continues.

3. New or Revised Mix Design. Whenever a new or revised mix design is used and production resumes, three additional stability field verification tests shall be performed and the test results evaluated in accordance with the above requirements. The test frequency shall be one per day unless altered by the Engineer.
4. Field Verification Process Complete. When the field verification process described above is complete and production continues, the sample frequency will revert back to 1 per 10,000 tons.

(e) *Mix Verification Testing.* After the mix design has been approved and production commences, the Department will perform a minimum of three volumetric verification tests for each of the following elements to verify that the field produced HMA conforms to the approved mix design:

- (1) Air Voids
- (2) Voids in Mineral Aggregate (VMA)
- (3) Asphalt Content (AC)

The test frequency shall be one per day unless otherwise directed by the Engineer.

The test results will be evaluated and the Contractor shall make adjustments if required in accordance with the following:

1. Target Values. The target value for VMA will be the average of the first three volumetric field test results on project produced HMA or the target value specified in Table 403-1 and Table 403-2 of the specifications, whichever is higher. The target value for VMA will be set no lower than 0.5 percent below the VMA target on Form 43 prior to production. The target values for the test element of air voids and AC shall be the mix design air voids and mix design AC as shown on Form 43.
2. Tolerance Limits. The tolerance limits for each test element shall be:

AC	± 0.3 percent
Air Voids	± 1.2 percent
VMA	± 1.2 percent
3. Quality Levels. Calculate an individual QL for each of the elements using the volumetric field verification test results.

4. Total Quality Level. Add the three individual QLs and divide by three to determine the Total Quality Level (TQL).
 - A. If TQL is 90 or greater, then no change is required and production can continue.
 - B. If TQL is 65 or greater and less than 90 and the QL for the test element of air voids is 70 or greater, then no change is required and production can continue.
 - C. If TQL is 65 or greater and less than 90 and the QL for the test element of air voids is less than 70 or the TQL is less than 65, then production shall be halted and the Contractor shall submit a written proposal for a mix design revision to the Engineer. Production shall not resume until the Engineer has approved a revised mix design.

After a new or revised mix design is approved, three additional volumetric field verification tests will be performed on asphalt produced with the new or revised mix design. The test frequency shall be one per day unless altered by the Engineer.

- (1) If TQL is 90 or greater, then no change is required and production can continue.
- (2) If TQL is 65 or greater and less than 90 and the QL for the test element of air voids is 70 or greater, then no change is required and production can continue.
- (3) If TQL is 65 or greater and less than 90 and the QL for the test element of air voids is less than 70 or the TQL is less than 65, then production shall be halted until a new mix design has been completed in accordance with CP 52 or CP 54, a new Form 43 issued, and the Contractor demonstrates capability of producing a mixture meeting the verification requirements in accordance with (i) or (ii) below:
 - (i) The Contractor shall produce material that shall not be placed on CDOT projects. A minimum of 48 hours notice is required, along with the approval of the Engineer, prior to placement. Three samples will be tested for volumetric properties. If the TQL is equal or greater than 65 and the QL for the element of air voids is equal or greater than 70, full production may resume or;
 - (ii) The Contractor may construct a 500 ton test strip on the project. Three samples in the last 200 tons will be tested for volumetric properties. After construction of the test section, production shall be halted until the testing is complete and element QLs and a new TQL are calculated. If the TQL is equal or greater than 65 and the QL for the element of air voids is equal or greater than 70, full

production may resume. If the TQL is less than 65 or the QL for the elements of air voids or VMA is less than 70, the material shall be removed and replaced at the Contractor's expense. The time count will continue, and any delay to the project will be considered to have been caused by the Contractor and will not be compensable. The costs associated with mix designs shall be solely at the Contractor's expense.

If the Contractor fails to verify the new mix design in accordance with (i) or (ii), then production shall be halted until a new mix design has been completed in accordance with CP 52 or CP 54, a new Form 43 issued, and the Contractor demonstrates capability of producing a mixture meeting the verification requirements in accordance with (i) or (ii).

5. **New or Revised Mix Design.** Whenever a new or revised mix design is used and production resumes, three additional volumetric field verification tests shall be performed and the test results evaluated in accordance with the above requirements. The test frequency shall be one per day unless altered by the Engineer.
 6. **Field Verification Process Complete.** When the field verification process described above is complete and production continues, the sample frequency will revert back to a minimum of 1 per 10,000 tons. The Engineer has the discretion to conduct additional verification tests at any time.
- (f) *Testing Schedule.* Process control and project acceptance testing frequency shall be in accordance with Table 106-1.
- (g) *Reference Conditions.* Three reference conditions can exist determined by the Moving Quality Level (MQL). The MQL will be calculated in accordance with the procedure in CP 71 for Determining Quality Level (QL). The MQL will be calculated using only acceptance tests. The MQL will be calculated on tests 1 through 3, then tests 1 through 4, then tests 1 through 5, then thereafter on the last five consecutive test results. The MQL will not be used to determine pay factors. The three reference conditions and actions that will be taken are described as follows:
1. Condition green will exist for an element when an MQL of 90 or greater is reached, or maintained, and the past five consecutive test results are within the specification limits.
 2. Condition yellow will exist for all elements at the beginning of production or when a new process is established because of changes in materials or the job-mix formula, following an extended suspension of work, or when the MQL is less than 90 and equal to or greater than 65. Once an element is at condition green, if the MQL falls below 90 or a test result falls outside the specification limits, the condition will revert to yellow or red as appropriate.

3. Condition red will exist for any element when the MQL is less than 65. The Contractor shall be notified immediately in writing and the process control sampling and testing frequency increased to a minimum rate of 1 per 250 tons for that element. The process control sampling and testing frequency shall remain at 1 per 250 tons until the process control QL reaches or exceeds 78. If the QL for the next five process control tests is below 65, production will be suspended.

If gradation is the element with MQL less than 65, the Department will test one randomly selected sample in the first 1250 tons produced in condition red. If this test result is outside the tolerance limits, production will be suspended. (This test result will not be included as an acceptance test.)

After condition red exists, a new MQL will be started. Acceptance testing will stay at the frequency shown in Table 106-1. After three acceptance tests, if the MQL is less than 65, production will be suspended.

Production will remain suspended until the source of the problem is identified and corrected. Each time production is suspended, corrective actions shall be proposed in writing by the Contractor and approved in writing by the Engineer before production may resume.

Upon resuming production, the process control sampling and testing frequency for the elements causing the condition red shall remain at 1 per 250 tons. If the QL for the next five process control tests is below 65, production will be suspended again. If gradation is the element with MQL less than 65, the Department will test one randomly selected sample in the first 1250 tons produced in condition red. If this test result is outside the tolerance limits, production will be suspended.

**Table 106-1
SCHEDULE FOR MINIMUM SAMPLING AND
TESTING FOR HMA**

Element	Process Control	Acceptance	Check (CTP)
Asphalt Content	1/500 tons	1/1000 tons	1/10,000 tons
Gradation	1/Day	1/2000 tons	1/20,000 tons
In-Place density	1/500 tons	1/500 tons	1/5000 tons
Joint Density	1 core/2500 linear feet of joint	1 core/5000 linear feet of joint	1 core/50,000 linear feet of joint
Aggregate Percent Moisture ³	1/2000 tons or 1/Day if less than 2000 tons	1/2000 tons	Not applicable
Percent Lime ^{3 4}	1/Day	Not applicable	Not applicable

Notes for Table 106-1:

- 1 The minimum number of acceptance tests will be: 5 asphalt content, 3 gradation, 10 in-place density, and 5 joint density for all projects.
- 2 When unscheduled job mix formula changes are made (Form 43) acceptance of the elements, except for in-place density, will be based on the actual number of samples that have been selected up to that time, even if the number is below the minimum listed in the schedule. At the Engineer's discretion, additional random in-place density tests may be taken in order to meet scheduled minimums, provided the applicable pavement layer is available for testing under safe conditions. Beginning with the new job mix formula, the quantity it will represent shall be estimated. A revised schedule of acceptance tests will be based on that estimate.
- 3 Not to be used for incentive or disincentive pay. Test according to CP 60B and report results from Form 106 or Form 565 on Form 6.
- 4 Verified per Contractor's QC Plan.

106.06 Sampling and Testing of Portland Cement Concrete Paving. All Portland Cement Concrete Paving, Item 412, shall be tested in accordance with the following process control and acceptance testing procedures:

- (a) *Process Control Testing.* The Contractor shall be responsible for process control testing of all elements listed in Table 106-2 or 106-3. Process control testing shall be performed at the expense of the Contractor. If the Contractor chooses flexural strength criteria, then the Quality Control testing for flexural strength shall be performed at the expense of the Contractor. The Contractor shall develop a quality control plan (QCP) in accordance with the following:

1. Quality Control Plan. For each element listed in Tables 106-2 or 106-3, the QCP must provide adequate details to ensure that the Contractor will perform process control. The Contractor shall submit the QCP to the Engineer at the preconstruction conference. The Contractor shall not start any work on the project until the Engineer has approved the QCP in writing.
 - A. Frequency of Tests or Measurements. The QCP shall indicate a random sampling frequency, which shall not be less than that shown in Table 106-2 or 106-3. The process control tests shall be independent of acceptance tests.
 - B. Test Result Chart. Each process control test result, the appropriate area, volume and the tolerance limits shall be plotted. The chart shall be posted daily at a location convenient for viewing by the Engineer.
 - C. Quality Level Chart. The QL for each element in Table 106-2 or 106-3 shall be plotted. The QL will be calculated in accordance with the procedure in CP 71 for Determining Quality Level. The QL will be calculated on tests 1 through 3, then tests 1 through 4, then tests 1 through 5, then thereafter the last five consecutive test results. The area of material represented by the last test result shall correspond to the QL.
 - D. F-test and t-test Charts. If the Contractor chooses flexural strength criteria, then the results of F-test and t-test analysis between the Department's verification tests of flexural strength and the Contractor's quality control tests of flexural strength shall be shown on charts. The F-test and t-test will be calculated in accordance with standard statistical procedures using all verification tests and quality control tests completed to date. When a verification test is completed, the F-test and t-test calculations will be redone. The area of material represented by the last test result shall correspond to the F-test and t-test. A warning value of 5 percent and an alert value of 1 percent shall be shown on each chart. The chart shall be posted daily at a location convenient for viewing by the Engineer.
2. Point of Sampling. The material for process control testing shall be sampled by the Contractor using approved procedures. Acceptable procedures are Colorado Procedures, AASHTO and ASTM. The order of precedence is Colorado Procedures, AASHTO procedures and then ASTM procedures. The location where material samples will be taken shall be indicated in the QCP.
3. Testing Standards. The QCP shall indicate which testing standards will be followed. Acceptable standards are Colorado Procedures, AASHTO and ASTM. The order of precedence is Colorado Procedures, AASHTO procedures and then ASTM procedures.

The compressive strength test for process control will be the average strength of two test cylinders cast in plastic molds from a single sample of concrete, cured under standard laboratory conditions, and tested three to seven days after molding. The trial mix proposed and conducted by the Contractor for mix design approval shall include compressive strength data including the curing time for compressive strength process control tests. CDOT may participate in the process control testing for compressive strength at a frequency determined by the Engineer.

4. Testing Supervisor Qualifications. The person in charge of and responsible for the process control testing shall be identified in the QCP. This person shall be present on the project and possess one or more of the following qualifications:
 - A. Registration as a Professional Engineer in the State of Colorado.
 - B. Registration as an Engineer in Training in the State of Colorado with two years of paving experience.
 - C. A Bachelor of Science in Civil Engineering or Civil Engineering Technology with three years of paving experience.
 - D. National Institute for Certification in Engineering (NICET) certification at level III or higher in the subfields of Transportation Engineering Technology, Highway Materials or Construction Materials Testing Engineering Technology, Concrete and four years of paving experience.
5. Technician Qualifications. Technicians performing tests, if other than the person in responsible charge, shall meet the requirements of Colorado Procedure 10.
6. Testing Equipment. All of the testing equipment used to conduct process control testing shall conform to the standards specified in the test procedures and be in good working order. If the Contractor chooses flexural strength criteria, then the Contractor shall provide the following equipment and supplies which will not be paid for separately but shall be included in the work:
 - A. A separate, temperature controlled facility of at least 300 square feet usable space. This facility shall be used exclusively for the molding, storage and testing of concrete test specimens as required. This facility shall be provided in addition to other facilities required in Section 620. The storage facility shall have sufficient water storage capacity for curing all required test specimens. The storage facility shall provide separate storage tanks for each type of required testing. Each storage tank shall have a continuously recording thermometer and sufficient blank charts for the project. Temperatures of each storage tank shall be recorded for the duration of the project.
 - B. A machine for testing flexural strength of concrete specimens. The machine shall be used only for flexural strength tests. Both the Contractor and the Engineer will use this machine for testing concrete specimens. The machine shall meet the requirements of AASHTO T 97

and T 22 and the following: The machine and the flexural strength assembly shall be of a rigid construction. The applied vertical load shall be uniformly distributed to the third points and uniformly across the width of the beam (transverse distribution). Uniform distribution of the load is defined as less than a 3 percent variation in the load between each of the nine strain gages placed in the middle third section of the tension face for loads from 1,000 to 10,000 pounds. The Engineer must approve the firm prior to assessing the machine. The machine shall be ready for use and calibration two days before paving begins. After the machine has been calibrated and accepted by the Engineer it shall not be moved until all portland cement concrete paving and flexural strength acceptance tests have been completed.

- C. Beam molds for molding all test specimens required. This shall include all testing described in subsection 106.06.
7. Reporting and Record Keeping. The Contractor shall report the results of the tests to the Engineer in writing at least once per day. The Contractor shall make provisions such that the Engineer can inspect quality control work in progress, including sampling, testing, plants, documentation and the Contractor's testing facilities at any time.
- (b) *Acceptance Testing.* Acceptance testing frequencies shall be in accordance with Table 106-2 or Table 106-3. Except for flexural strength, acceptance tests will be conducted by and at the expense of the Department. Acceptance sampling and testing procedures will be in accordance with the Department's Field Materials Manual with the following exceptions and inclusions:

A split sample from an acceptance test shall not be used for a process quality control test. The Engineer shall designate the location where samples are to be taken. Samples shall be taken by the Contractor. The Engineer will be present during the sampling and take possession of all acceptance samples. Samples transported in different containers will be combined and mixed before molding specimens. All materials are subject to inspection and testing at all times.

Pavement thickness acceptance will be determined by cores.

The compressive strength test for acceptance will be the average compressive strength of three test cylinders cast in plastic molds from a single sample of concrete and cured under standard laboratory conditions prior to testing. If the compressive strength of any one specimen differs from the average by more than 10 percent, that specimen will be deleted and the average strength will be determined using the remaining two specimens. Each set of three cylinders will be tested at 28 days after molding.

Acceptance tests for flexural strength shall be the Contractor's quality control tests. The flexural strength tests shall be the average flexural strength of four test beams. The test beams shall be prepared according to AASHTO T 23 with the following

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additional requirements: Specimens shall be consolidated by internal vibration without the vibrator being inserted in the center six inches of the specimen's long dimension. After the initial curing, specimens shall be stored in a moist condition at $73.4\text{ }^{\circ}\text{F} \pm 3\text{ }^{\circ}\text{F}$. The flexural strength of each specimen shall be measured according to AASHTO T 97 with the following additional requirements: If the flexural strength of only one specimen differs from the average by more than 10 percent, that specimen shall be deleted and the average strength shall be determined using the remaining three specimens. If the flexural strength of more than one specimen differs from the average by more than 10 percent, the test value shall be the average of all four specimens. Each set of four beams shall be tested at 28 days after molding. Specimens shall be properly centered in the machine for each test. Leather shims shall be used in each test. The loading rate shall remain constant after the initial loading of a maximum of 1000 pounds has been applied.

- (c) *Verification Testing.* Verification testing will be used only when the Contractor chooses flexural strength criteria and is the responsibility of the Department. The Department will determine the locations where samples or measurements are to be taken. The maximum quantity of material represented by each test result and the minimum number of test results shall be in accordance with Table 106-2. The location of sampling shall be based on a stratified random procedure.

Verification sampling and testing procedures will be in accordance with Sections 105, 106, 412 and the Schedule for Minimum Materials Sampling, Testing and Inspection in the Department's Field Materials Manual, and CP 13. Samples for verification and acceptance testing shall be taken by the Contractor in accordance with the designated method and shall be taken in the presence of the Engineer.

An analysis of test results will be performed after all test results are known using the t-test and F-test statistical methods using an alpha value set at 0.05. If either the above t-test and F-test analysis shows a significant difference then the following items shall be checked; comparison of beam fracture locations and types, computations and flexural testing machine outputs, curing tank temperature charts, slump and air contents, plant batch tickets for major changes, review of sampling, molding, testing procedures, along with IAT check tests and any other investigations that may clarify the significant differences. If after a review of the data no reasons can be determined for the significant difference, the Department's test data shall be used for determining Quality Levels and Incentive or Disincentive according to the methods in this Section.

- (d) *Check Testing.* The Contractor and the Engineer shall conduct a check testing program (CTP) prior to the placement of any concrete pavement. The check testing program will include a conference directed by the Region Materials Engineer of the Contractor's testers and the Department's testers concerning methods, procedures and equipment for compressive or flexural strength testing. Check testing shall be completed before any portland cement concrete pavement is placed. A set of three cylinders or four beams will be molded by both the Contractor and the Department's project testers from a split sample. The

specimens will be sampled, molded and cured for seven days and tested for compressive or flexural strength according to the procedures of Section 106. The Department's Independent Assurance Tester will also mold, cure and test a set of three cylinders or four beams, but the Independent Assurance Test results will not be entered in the check testing analysis. If the results of the check tests do not meet the following criteria, then the check testing will be repeated until the following criteria are met:

1. The average of the Contractor's test results and the average of the Department's test results shall be within 10 percent of the average of all test results.
2. Each specimen test result shall be within 15 percent of the average of all test results.

When the compressive strength criteria is chosen, a check test must also be conducted on the sand equivalent test. A set of 5 sand equivalents will be run by both the Contractor's and the Department's project tester, from a split sample. The average of the absolute differences between the process control and the acceptance testing personnel will be compared to the acceptable limits shown in Table 13-1 of CP-13. The CTP will be continued until the acceptance and process control test results are within the permissible ranges shown in Table 13-1 of CP-13.

During production, split samples of randomly selected acceptance tests will be compared to the permissible ranges shown in Table 13-1 of CP 13. The minimum frequency will be as shown in Table 106-3.

If production has been suspended and then resumed, the Engineer may order a CTP between process control and acceptance testing persons to assure the test results are within the permissible ranges shown in Table 13-1 of CP 13. Check test results shall not be included in process control testing. The Region Materials Engineer shall be called upon to resolve differences if a CTP shows unresolved differences beyond the ranges shown in Table 13-1 of CP 13.

- (e) Independent Assurance Tests (IAT) for flexural strength will be performed at a frequency of 1 per 50,000 sq. yds. The sample for the IAT will be a split sample of the Contractor's quality control test. The Department's representative performing verification tests shall also use a split sample of the Contractor's quality control test and participate in the IAT. The IAT for flexural strength will be the average flexural strength of four test beams prepared according to the requirements of Section 106 and cured for seven days.
- (f) *Testing Schedule.* All samples used to determine Incentive or Disincentive payment by quality level formulas in accordance with Section 105, will be selected by a stratified random process.

Table 106-2
TESTING SCHEDULE -
ITEM 412 PORTLAND CEMENT CONCRETE
PAVEMENT, FLEXURAL STRENGTH CRITERIA

Element	Minimum Testing Frequency Contractor's Process Control	Minimum Testing Frequency CDOT Acceptance Testing
Aggregate Gradation and Sand Equivalent	For the first five days, 1/10,000 sq. yds. or one/day if less than 10,000 sq. yds. are placed in a day. After 5 days, 1/40,000 sq. yds.	None
Slump	First three loads each day, then as needed for control.	Witness by the Engineer.
Water Cement Ratio	First three loads each day, then 1/500 cu. yds.	First three loads each day, then 1/2000 cu. yds.
Air Content and *Yield	1/2500 sq. yds. or one/day if less than 2500 sq. yds. are placed in a day. tests.	Minimum of 1/day. If the project total <50,000 sq. yds. then a minimum of ten tests. If the project total ≥ 50,000 sq. yds. then 1/5000 sq. yds.
Flexural Strength	1/2500 sq. yds. or one/day if less than 2500 sq. yds. are placed in a day.	One verification test per four quality control tests performed by the Contractor. (Approximately 1/10,000 sq. yds.).
Compressive Strength	1/10,000 sq. yds.	None
Pavement Thickness	In accordance with subsection 412.21.	Minimum of 1/day. If the project total < 50,000 sq. yds. then a minimum of ten tests. If the project total ≥ 50,000 sq. yds. then 1/5000 sq. yds.
Pull Test Joints	Minimum of six transverse and six longitudinal joint locations in each 2500 linear feet.	Witness by the Engineer.
Load Transfer Dowel Bar Placement	Minimum of six transverse joint locations in each 2500 linear feet.	Witness by the Engineer.
Tining Depth	1 per 528 linear feet in each lane and shoulder wider than 8 feet.	Witness by the Engineer.
*Yield is for information only.		

**Table 106-3
TESTING SCHEDULE -
ITEM 412 PORTLAND CEMENT CONCRETE
PAVEMENT, COMPRESSIVE STRENGTH CRITERIA**

Element	Minimum Testing Frequency Process Control	Minimum Testing Frequency CDOT Acceptance Testing
Aggregate Gradation and Fractured Faces	1/10,000 sq. yds. or one/day if less than 10,000 sq. yds. are placed in a day	None
Slump	First three loads each day, then as needed for control.	Witness by the Engineer.
Compressive Strength, Air Content, *Yield, and Sand Equivalent	1/2500 sq. yds. or one/day if less than 2500 sq. yds. are placed in a day.	Minimum of 1/day. If the project total < 50,000 sq. yds. then a minimum of ten tests. If the project total \geq 50,000 sq. yds., then 1/5,000 sq. yds.
Pavement Thickness	In accordance with subsection 412.21.	Minimum of 1/day. If the project total < 50,000 sq. yds. then a minimum of ten tests. If the project total \geq 50,000 sq. yds. then 1/5000 sq. yds.
Pull Test Joints	Minimum of six transverse and six longitudinal joint locations in each 2500 linear feet.	Witness by the Engineer.
Load Transfer Dowel Bar Placement	Minimum of six transverse joint locations in each 2500 linear feet.	Witness by the Engineer.
Tining Depth	1 per 528 linear feet in each lane and shoulder wider than 8 feet.	Witness by the Engineer.
*Yield is for information only.		

106.07 Material Inspection at Plant. If the Engineer inspects the materials at the source, the following conditions shall be met:

- (1) The Engineer shall have the cooperation and assistance of the Contractor and the materials producer.
- (2) The Engineer shall have full entry to all parts of the plant necessary for the manufacture or production of the materials being furnished.
- (3) Adequate safety measures shall be provided and maintained.

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The Department reserves the right to retest all materials which have been previously tested or inspected. The retesting may be prior to or after incorporation of the materials into the work. Those materials inspected and tested after delivery on the project or after incorporation into the work, that do not meet the requirements of the Contract will be rejected, or accepted with an adjustment in price in accordance with the requirements of subsection 105.03.

106.08 Storage of Materials. Materials shall be stored to assure the preservation of their quality and fitness for the work. Stored materials, even though conditionally approved before storage, will be subject to inspection and testing prior to incorporation into the work. Stored materials shall be located to facilitate prompt inspection. With prior approval portions of the right of way may be used for storage of materials and equipment, and for the Contractor's plant. Any additional space required shall be provided at the Contractor's expense. Stored materials will be paid for in accordance with subsection 109.07. Private property shall not be used for storage purposes without written permission of the owner or lessee. If requested, copies of such written permission shall be furnished to the Engineer. All storage sites shall be restored to their original condition at the Contractor's expense.

106.09 Handling Materials. All materials shall be handled so their quality and fitness for the work is preserved. Aggregates shall be transported to the work in vehicles constructed to prevent loss or segregation of materials.

106.10 Department Furnished Materials. Material furnished by the Department will be made available to the Contractor at the points specified in the Contract.

The cost of handling and placing materials after they are made available to the Contractor shall be included in the contract price for the item.

The Contractor will be held responsible for all material received until it is incorporated into the work and accepted.

Demurrage charges resulting from the Contractor's failure to accept the material at the designated time and point of delivery will be deducted from monies due the Contractor.

106.11 Buy America Requirements. All manufacturing processes, including the application of a coating, for all steel and iron products permanently incorporated in the work shall have occurred in the United States of America. All manufacturing processes are defined as "processes required to change the raw ore or scrap metal into the finished, in-place steel or iron product". This requirement will not prevent a minimal use of foreign steel or iron provided the total project delivered cost of all such steel and iron which includes the cost of delivering the steel and iron to the project, does not exceed one-tenth of one percent of the total contract cost or \$2,500, whichever is greater.

With every steel or iron product that requires pre-inspection, pretesting, certified test results, or certificate of compliance, the Contractor shall provide a certification by each supplier, distributor, fabricator, and manufacturer that has handled the steel or

iron product that every process, including the application of a coating, performed on the steel or iron product either has or has not been carried out in the United States of America. These certifications shall create a chain of custody trail that includes every supplier, distributor, fabricator, and manufacturer that handles the steel or iron product. The lack of these certifications will be justification for rejection of the steel or iron product. Upon completion of the project, the Contractor shall certify in writing of compliance with this requirement and provide evidence of the project delivered cost of all foreign steel or iron permanently incorporated into the project.

106.12 Certificates of Compliance. The Contract will designate products and assemblies that can be incorporated in the work, if accompanied by Certificates of Compliance. Each certificate shall include:

- (1) The Department's project number
- (2) Manufacturer's name
- (3) Address of manufacturing facility
- (4) Laboratory name & address
- (5) Name of product or assembly
- (6) Complete description of the material
- (7) Model, catalog, stock no. (if applicable)
- (8) Lot, heat, or batch number identifying the material delivered
- (9) Date(s) of the laboratory testing
- (10) Listing of all applicable specifications required by the Department for this particular product or assembly. Certificates shall reference the actual tests conducted on samples taken from the same lot, heat, or batch, and shall include a statement that the product or assembly to be incorporated into the project was fabricated in accordance with and meets the applicable specifications.
- (11) The following certification, signed by a person having legal authority to act for the Contractor:

I hereby certify under penalty of perjury that the material listed in this Certificate of Compliance represents _____ (quantity) of pay item _____ (pay item number and Description) for installation on project number _____.

Contractor

Date

The Certificate of Compliance shall be an original document, not a facsimile, with an original signature (including corporate title) by a person having legal authority to act for the manufacturer. It shall state that the product or assembly to be incorporated into the project has been sampled and tested, and the samples have passed all specified tests. One copy of the Certificate of Compliance shall be furnished to the Engineer at the time of material delivery. Failure to comply may result in delays to the project or rejection of the materials.

Each product or assembly delivered to the project must contain the lot, heat, or batch number identical to that on the accompanying Certificate of Compliance.

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Products or assemblies furnished on the basis of Certificates of Compliance may be sampled and tested by the Department and if determined not to meet the applicable specifications will be rejected or accepted according to subsection 105.03.

106.13 Certified Test Report. The Contract will designate products and assemblies that can be incorporated in the work if accompanied by Certified Test Reports. Each report shall include:

- (1) The Department's project number
- (2) Manufacturer's name
- (3) Address of manufacturing facility
- (4) Laboratory name & address
- (5) Name of product or assembly
- (6) Complete description of the material
- (7) Model, catalog, stock no. (if applicable)
- (8) Lot, heat, or batch number identifying the material delivered
- (9) Date(s) of the laboratory testing
- (10) All test results are required to verify that the material furnished conforms to all applicable Department specifications. Test results shall be from tests conducted on samples taken from the same lot, heat, or batch.
- (11) The following certification, signed by a person having legal authority to act for the Contractor:

I hereby certify under penalty of perjury that the material listed in this Certified Test Report represents _____ (quantity) of pay item _____ (pay item number and Description) for installation on project number _____.

Contractor

Date

The Certified Test Report shall be an original document, not a facsimile, with an original signature (including corporate title) by a person having legal authority to act for the manufacturer or the independent testing laboratory. It shall state that the test results show that the product or assembly to be incorporated into the project has been sampled and tested, and the samples have passed all specified tests. One copy of the Certified Test Report shall be furnished to the Engineer at the time of material delivery. Failure to comply may result in delays to the project or rejection of the materials.

Each product or assembly delivered to the project must contain the lot, heat, or batch number identical to that on the accompanying Certified Test Report.

Products or assemblies furnished on the basis of Certified Test Reports may be sampled and tested by the Department and if determined not to meet the applicable specifications will be rejected or accepted according to subsection 105.03.