MESA COUNTY

STANDARD CONSTRUCTION SPECIFICATIONS

January 2021

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GENERAL

Sections 101, 106 and Sections 200 through 717 of the Colorado Department of Transportation (CDOT) Standard Specifications for Road and Bridge Construction, latest edition, as re-emphasized, supplemented or amended by these specifications shall govern all construction within the public right-of-way and in all other areas of County jurisdiction or ownership. Sections 102 through 105, and Sections 107 through 109, of the CDOT Standard Specifications are deleted and replaced with the Mesa County General Contract Conditions for County-administered projects.

In cases of any conflicts of meaning between the CDOT specifications or others specifications, the supplements and amendments listed below or in the project Special Provisions shall govern. The Project Special Provisions (if any) contained in the Bid Documents shall have precedence over all other specifications.

The Method of Measurement and Basis of Payment for the items of work specified herein and in the CDOT specifications apply only to County-administered projects and are not required to be used on projects which are administered and paid for by private developers or other agencies.

SECTION 101 - DEFINITIONS AND TERMS

Add the following to the introduction:

Wherever the following terms are used in these Standard Construction Specifications or other contract documents the intent and meaning shall apply to both.

Any reference to CDOT or "Department", shall mean Mesa County Public Works Department except when in reference to CDOT Plans, Specifications and Special Provisions.

Add or revise definitions as follows:

101.01 Abbreviations. Add the following:

APM	Asphalt Pavement Materials (also known as Hot Mix Asphalt or HMA)
CAPA	Colorado Asphalt Pavement Association
LabCAT	Laboratory for Certification of Asphalt Technicians
NICET	National Institute for Certification in Engineering Technologies
WAQCT	Western Alliance for Quality Transportation Construction

101.09 CDOT Resident Engineer. Any reference to CDOT Resident Engineer or Resident Engineer shall mean Mesa County Engineering Division Director or his authorized representative(s).

101.16 Contract. Delete in its Entirety. See Definition in the Mesa County General Conditions.

101.18 Contract Modification Order. Delete in its Entirety. See definition of Change Order in the Mesa County General Conditions.

101.25 County. Mesa County, Colorado.

101.28 Department. Mesa County Public Works Department.

101.29 Engineer. The Engineer, as defined in Mesa County General Conditions, for County-contracted projects. The term "Engineer" may also apply to a Professional Engineer hired by a developer to design and/or administer the construction of public infrastructure in accordance with a development approved by or contracted for/or with the County.

101.37 Inspector. An authorized representative of the County, assigned to inspect and/or test materials furnished or Work performed by the Contractor.

101.39 Laboratory. Any AASHTO accredited testing laboratory approved by the County to make tests of materials and Work involved in the Contract.

101.51 Project Engineer. See Definition of Engineer.

101.58 Regional Transportation Director. All references to the Regional Transportation Director shall mean Public Works Director, Mesa County, Colorado.

101.72 Special Provisions. Additions and revisions to the standard specifications covering conditions specific to an individual project. Also called Project Special Provisions.

101.73 Specifications. Those portion of the Contract Documents consisting of written technical descriptions of materials, equipment, standards and workmanship as applied to the Work. These may consist of Standard Specifications, Special Provisions, and/or notes on the Construction Drawings.

101.76 State. All references to the State or State of Colorado as the Owner shall mean that Mesa County, Colorado is the owner.

SECTION 106 – CONTROL OF MATERIALS

All of Section 106 is deleted and replaced with the following:

106.01 Source of Supply and Quality Requirements. All materials used shall meet all quality requirements of the Contract. The Engineer must approve the source of supply of each of the materials before delivery to the project is started. The Contractor shall notify the Engineer of the proposed sources of materials at least two weeks prior to delivery. If all materials proposed to be used may be tested by the County at any time during their preparation and use. If, after trial, it is found that sources of supply which have been approved do not furnish a uniform product, or if the product from any source proves unacceptable at any time, the Contractor shall furnish approved materials from another source. No material which, after approval, has in any way become unfit for use shall be used in the Work.

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 construe as limiting competition. Products of other manufacturers will be acceptable provided such products are equal to that specified.

Engineer will not accept requests for review of substitute items of material and equipment from anyone other than Contractor. If the name of the product is not followed by the phrase "or approved equal", and Contractor wishes to furnish or use a substitute item of material or equipment, Contractor shall make written application to Engineer for acceptance, certifying the proposed substitute will perform adequately the functions called for by the general design, be similar and of equal substance to that specified and be suited to the same use and capable of performing the same function as that specified. The application will state whether or not acceptance of the substitute for use in the Work will require a change in the Drawings or Specifications to adapt the design to the substitute and whether or not incorporation or use of the substitute in connection with the Work is subject payment of any license fee or royalty. All variations of the proposed substitute from that specified shall be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all costs that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change. Engineer will forward the application to the Engineer of Record for evaluation of the proposed substitution. Engineer may require Contractor to furnish, at Contractor's expense, additional data about the proposed substitute. No substitute will be ordered or installed without the Engineer's prior written acceptance. Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

Engineer will record time required in evaluating substitution proposed by Contractor and in making changes in the Drawings and Specifications occasioned thereby. Whether or not Engineer accepts a proposed substitute, Contractor shall reimburse Owner for the charges of Engineer and Engineer of Record, if any, for evaluating any proposed substitute.

106.02 Material Sources. The Contractor's sources of sand, gravel, borrow, concrete, and hot mix asphalt shall be tested by the Contractor and approved by the Owner prior to incorporation of the material into the project. If the submitted materials do not meet the contract specifications, the Contractor is responsible to re-sample and retest the material. The Contractor will supply the Owner with passing test results from an AASHTO accredited laboratory signed and sealed by a Professional Engineer. The Contractor shall produce materials which meets contract specifications throughout construction of the project.

The cost of sampling, testing, and corrective action by the Contractor will not be paid separately but shall be included in the work.

For each source of imported embankment or topsoil the Contractor shall assure and certify that unacceptable levels of hazardous waste and substances are not incorporated into the project as a result of importing embankment or topsoil materials.

If contractor source material for embankment or topsoil, originating outside of the project limits, is placed on the project and is at any time found to be contaminated with unacceptable levels of hazardous waste or substances, the Contractor shall remove the contaminated material from the project, 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 as specified in the Contract. 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.

On all projects except those funded as a CDOT Local Agency project, materials will be sampled and tested in accordance with the Quality Control and Quality Assurance section of the Mesa County Standard Construction Specifications. 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. Each sample will constitute a lot for determination of acceptance of the represented quantity.

All failing tests shall be retested after the material has been reworked, modified, adjusted, or replaced by the Contractor. The Contractor will be required to remove and replace any work or materials that do not meet test requirements and/or specifications. All materials installed in the work shall be inspected, tested, and approved by the Owner before proceeding to the next phase of construction.

The Contractor shall distribute electronically to the concrete supplier all compressive strength process control (PC) data for the concrete supplied to the project. The Contractor shall distribute the PC compressive strength data within two business days for the 7-day and 28-day compressive strength testing. The data shall include the compressive strength and batch ticket number at a minimum.

Unless otherwise designated, when AASHTO, ASTM, or other specifications, standards, or policies are cited, the reference shall be to the latest edition issued prior to the date of advertisement for bids. 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.

106.04 Qualification of Testing Personnel and Laboratories. All sampling and testing shall be performed by qualified technicians and by an AASHTO accredited testing laboratory. Technicians obtaining samples and conducting field tests on asphalt pavement materials must have the appropriate Colorado Asphalt Pavement Association LabCAT certification. Technicians performing sampling and testing of soils or aggregates shall be NICET Level II or WAQTC certified. Technicians performing sampling and testing of concrete must have the appropriate ACI certification.

106.05 Quality Control. The Contractor is responsible for Quality Control of all work performed and shall implement whatever procedures, methods, testing, surveying, and supervision that are necessary in order to insure that the work conforms to the Plans and Specifications. Initial Quality Control testing shall be

performed, as a minimum, at the beginning of each construction phase in order to identify and correct any procedures resulting in non-compliant work. Sampling and testing shall be done in accordance with the minimum sampling, testing, and inspection schedule shown in Table 106-1 below.

106.06 Quality Assurance. The developer, owner or entity responsible for administering the construction of the public facilities shall provide an Owner's Quality Assurance program. The Quality Assurance program shall include systematic inspection and testing of work and materials during construction to assure the Owner and the County that the Contractor is providing work that is in conformance with the County approved plans and specifications. Sampling and testing shall be done in accordance with the minimum sampling, testing, and inspection schedule shown in Table 106-1 below.

TABLE 106-1
REQUIRED QUALITY ASSURANCE AND QUALITY CONTROL TESTING

TYPE OF TEST	TEST PROCEDURE/ REQUIREMENTS	TEST FREQUENCY
Subgrade & Embankment		
Moisture-Density Curve Soil Classification Gradation Atterberg Limits	From uncompacted fill or stockpile	1 per soil type
Sulfate, pH, chlorides and resistivity (Imported structural backfill for pipes and culverts)	See CDOT Section 206.03(a)3	1 per soil type
Compaction under roadway	AASHTO T 99 and T 310 95% min. relative compaction	1 per 500 SY per lift
Compaction under curbs, gutters, sidewalks and trails	AASHTO T 99 and T 310 95% min. relative compaction	1 per 300 LF
Compaction around structures	AASHTO T 99 and T 310 95% min. relative compaction	1 per 2 ft. of vertical depth per 100 LF of perimeter or per structure
Compaction of trenches	AASHTO T 99 and T 310 95% min. relative compaction under roadway; outside roadway prism density to match surrounding earth but no less than 85%	1 per 400 LF of trench; or 1 per branch if <400 LF, per 2' vertical lift. (First test 2 ft. above pipe, last test at subgrade or 6" below ground surface)
Aggregate Base Course		
Moisture-Density Curve LA Abrasion R-Value		1 per source LA not required unless exposed to surface wearing
Gradation	CDOT Table 703-2 Immediately after pugmill mixing or from windrow	1 per 2500 CY or fraction thereof
Compaction under roadway	AASHTO T 180 and T 310 95% min. relative compaction	1 per 500 SY per lift
Compaction under curbs, gutters and sidewalks	AASHTO T 180 and T 310 95% min. relative compaction	1 per 300 LF
Compaction under concrete fillets and pans	AASHTO T 180 and T 310 95% min. relative compaction	I per fillet and 1 per 75 LF of pan

Asphalt Pavement Materials		
Sampling	AASHTO T168, ASTM D979 and ASTM D3665, CP 41	1/1000 tones or fraction thereof (not less than one test per day)
In-Place Density	AASHTO T166, T238, T230, CP 81 (nuclear), CP 44 (coring) 92% - 96% theoretical. max. specific gravity (joints 90% - 94%)	One test for each 250 lineal feet per lane per lift, and one test per 1,000 lineal feet of joint per lift
Thickness (Core) (when called for in Project Specs.)	ASTM D3549	One test for each 100 lineal feet per lane
Air Voids and VMA	CP-L 5115 A.I. SP-2	1/1000 tones or fraction thereof (not less than one test per day)
Gradation	AASHTO T 27/T 11, CP 31	1/1000 tones or fraction thereof (not less than one test per day)
Binder Content	CP-L 5120, AASHTO T 164 or other methods agreed upon between Owner and Contractor	1/1000 tones or fraction thereof (not less than one test per day)
Maximum Theoretical Specific Gravity (Rice)	AASHTO T 209 (Rice), CP-L 51	1/1000 tones or fraction thereof (not less than one test per day)
Hveem/Marshall Stability As Applicable	CP-L 5016	One per project per mix used
Lottman Stripping, TSR & Dry Density	CP-L 5109	One per project per mix used
Portland Cement Concrete		
Air Content Unit Weight Slump	AASHTO T 152 AASHTO T 199 Taken at point of final discharge	1st three batches at beginning of day and then 1 per set of cylinders
Compressive Strength for structural concrete	AASHTO T 22 & T 23 Test 2 at 7 days and 2 at 28 days, 1 spare	1 set per 50 CY, min. 1 per pour
Compressive Strength for flatwork	AASHTO T 22 & T 23 Test 2 at 7 days and 2 at 28 days, 1 spare	1 set per 1,000 SY, min. 1 per pour
Compressive Strength for PCCP	AASHTO T 22 & T 23 Test 2 at 7 days and 2 at 28 days, 1 spare	1 set per 2500 SY, min. 1 per day
Shotcrete		
Air Content	Point of delivery	1st three batches at beginning of day and then 1 per set of cylinders
Compressive Strength	3 cores from test panel tested at 28 days	1 set per 50 CY, min. 1 per pour

106.07 Storage of Materials. Materials shall be stored to assure the preservation of their quality and fitness for the work. Stored materials, even if conditionally approved before storage, will be subject to inspection and testing prior to incorporation into the work. With prior approval, portions of the right-of-way may be used for storage of materials and equipment. Any additional space required shall be provided at the Contractor's expense. 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.

106.08 Final Inspection and Acceptance. The following shall be submitted to the County as part of the acceptance of all construction within the public right-of-way and easements by the County:

1. Submittal of results of all required quality control and quality assurance tests certified by a Colorado Professional Engineer.
2. Submittal of a copy of the daily inspection reports prepared by the Engineer or his representative.
3. Submittal of a letter signed by the Contractor certifying that all material incorporated into the project met or exceeded project requirements/specifications.
4. Passing a final inspection of the work by the County.
5. Submittal of "As-Built" construction drawings in accordance with Section 625 of these Standard Specifications.

SECTION 202 - REMOVAL OF STRUCTURES AND OBSTRUCTIONS

202.02 General

Revise the seventh paragraph to read as follows:

All other asphalt and concrete material designated for removal may be used to construct embankments in accordance with subsection 203.07 or removed from the job site and disposed of by the Contractor, unless otherwise specified.

Add the following:

When any asbestos cement pipe (ACP) is located, the appropriate Utility owner shall be notified immediately. If removal is required, the Utility shall be responsible for removal and disposal of all ACP and associated asbestos-contaminated soil. If the Contractor is requested to expose the ACP, they shall take care to not damage the pipe so that the pipe remains non-friable (material which when dry may not be crumbled, pulverized, or reduced to powder by hand pressure).

If non-utility owned ACP is encountered within the right-of-way, the Contractor will be responsible for removal and disposal as long as the quantity is less than 260 lineal feet.

During removal and disposal of the ACP below the limits stated above, the Contractor shall:

(1) Adequately wet the surface areas of the non-friable ACP to prevent dust emissions throughout the removal process.
(2) Remove the materials using hand removal methods or power tools that do no subject the material to cutting, grinding, sanding, beadblasting, sandblasting, or otherwise damage the material in such a way as to render it friable (material, when dry, may be crumbled, pulverized, or reduced to powder by hand pressure, and includes previously non-friable material after such previously non-friable material becomes damaged to the extent that when dry it may be crumbled, pulverized, or reduced to powder by hand pressure).
(3) Remove the material carefully with minimal breakage and disturbance. Double wrap and seal the ACP with 6 mil thick polyethylene sheeting or place in leak-tight, waterproof containers.
(4) Affix warning labels to all ACP or their containers, with either of the following warnings:

Danger
Contains Asbestos Fibers
Avoid Creating Dust
Cancer and Lung Disease Hazard
or
Caution
Contains Asbestos
Avoid Opening or Breaking Container
Breathing Asbestos is Hazardous To Your Health.

(5) Contact the Mesa County Regulatory Compliance Manager at (970) 254-4158 minimum of 24 hours in advance of planned delivery to the Mesa County Landfill.

If the quantity of ACP removal exceeds 260 lineal feet, a certified asbestos abatement contractor will be required and all requirements of CDPHE Regulation No. 8 – Part B – Asbestos and subsection 250.07 "Asbestos-Containing Material Management" shall be followed.

202.09 Removal of Asphalt Mat (Planing)

Add the following:

The existing asphalt mat shall be removed by in a manner that minimizes contamination of the removed mat with underlying material.

Joints. Transverse milled butt joints shall be placed in all locations where new asphalt will be joined to existing pavement. The location and width of all butt joints will be designated by the Engineer.

The Contractor shall install asphalt paper joints at all locations where milling the roadway creates a vertical edge greater than 2" in height. The paper joints shall be installed immediately following milling operations and prior to placing traffic on milled surface. The asphalt used in the paper joint shall be removed prior to placing the overlay. The cost of the paper joints shall be included in the unit price for the asphalt items and will not be measured or paid for separately.

Milling at Obstructions. When milling adjacent inlets that have a concrete edge protruding into the street, it shall be the Contractor's responsibility to provide an approved marker or barricade to protect vehicle tires from damage until the overlay is placed. It shall be the Contractors responsibility to ensure millings, tack coat and/or HMA do not enter the storm drain system.

Temporary Pavement Marking Tape. When milled surface is to be overlaid, the Contractor shall be responsible for recording the location of all existing striping prior to planning. The Contractor shall be responsible for furnishing and placing temporary pavement marking tape when existing markings are removed during milling operation. The Contractor shall be responsible for furnishing and placing temporary pavement marking tape prior to the final roller pass. Pavement marking tape shall be placed on the seams of the new asphalt as determined by the record of existing striping. The cost of the marking tape and labor to install will be considered incidental to the work and will not be paid for separately.

202.11 Method of Measurement.

Delete the second paragraph and add the following to the third paragraph:

Removal of existing pavement markings will not be measured and paid separately but is considered incidental to the removal of the asphalt mat, unless otherwise noted. Installation of temporary pavement markings and their removal prior to placement of new asphalt is considered inclusive to the work.

Add the following:

Payment for exposure of Utility owned ACP shall include all work required exposing the pipe and coordinating with the Utility for its removal. Measurement will be made by the cubic yard of material excavated.

Payment for removal of non-Utility owned ACP shall include all work required exposing the pipe, removing, wrapping and sealing the materials, coordination and haul to Mesa County Landfill, and all other incidental work. Measurement will be made by the lineal foot of pipe removed and disposed.

202.12 Basis of Payment

Add the following:

Pay Item	**Pay Unit**
Exposure of AC Pipe	Cubic Yards
Remove & Dispose of AC Pipe	Lineal Foot

SECTION 203 - EXCAVATION AND EMBANKMENT

203.02 Excavation Definitions.

Revise first sentence of (d) Rock Excavation to state:

Rock Excavation shall consist of igneous, metamorphic, and sedimentary rock which cannot be excavated without blasting or with the use of rippers, including all boulders or other detached stones having a volume of three (3) cubic yard or more.

203.03 Embankment Material

Add the following:

Sulfate and pH testing of imported backfill for pipes is not required unless otherwise specified in the project documents.

203.04 General

Add the following:

After completion of clear & grubbing operations, the Contractor will verify the accuracy of the original design cross-sections of all excavation and embankment areas. Any suspected discrepancies in the Contract shall be brought to the Inspector's attention in accordance with item **45. Differing Site Conditions** and item **47. Significant Changes in the Character of Work** of the General Contract Conditions.

Vertical cuts and fills greater than 3 inches resulting from construction operations, including planning, adjacent to traffic lanes, shall be temporarily sloped at a 3:1 or flatter slope and delineated at 50-foot intervals immediately after grading or removal operations in order to safeguard the traveling public.

203. 05 Excavation

Subsection 203. 05(f) *Potholing* be revised as follows:

Potholing shall be considered incidental to the Work. Potholing excavation work shall be performed utilizing hydrovac equipment capable of reaching the required depths necessary to expose buried utility lines located throughout the project. Equipment shall be capable of removing gravel and cobble up to 6" in diameter. The truck shall be capable of containing a sufficient amount of water needed for the work activity as well as any slurry generated for disposal at a location to be determined by the Contractor. Slurry will not be disposed of within the highway right-of-way unless approved by the Inspector.

Contractor shall be responsible for marking, measuring and documenting the elevation and offset of all located utilities during potholing. All utility locate data shall be submitted to the Inspector no later than one working day after the utility has been located. Upon completion of documentation of existing utilities, potholes shall be backfilled with round ¼" minus pea gravel. Surface material shall be replaced to match existing type and thickness.

203.11 Method of Measurement

Add the following to the end of the first paragraph:

Claims for additional quantities based upon discrepancies in the Contract will not be allowed without the Contractor providing detailed survey and volume calculations showing conditions after clear & grubbing and then again after finish embankment and excavation.

The costs associated with the removal and replacement of material to meet benching requirements shall be considered incidental to the work.

Delete Subsection 203.11(e) *Potholing* and the Pay Item "Potholing" in Subsection 203.12 and replace as follows:

203.11 (e) *Potholing.* Potholing will not be measured and paid for separately, but shall be incidental to the work.

Delete Subsection 203.11(f) *Proof Rolling* and the Pay item "Proof Rolling" in Subsection 203.12 and replace as follows:

203.11(f) *Proof Rolling.* Proof Rolling will not be measured and paid for separately, but shall be incidental to the work.

203.12 Basis of Payment

Add the following:

Excavated materials may require multiple handling prior to final placement. There shall be no additional payment for multiple handling.

SECTION 206 - EXCAVATION AND BACKFILL FOR STRUCTURES

206.01 Description.

Add the following:

The work of this section consists of controlling groundwater and storm flows during construction.

206.02 General.

Add the following to (a*) Structure Backfill item* 3. Imported Structure Backfill for Pipes:

a. Granular Stabilization, Bedding and Haunch Backfill Materials. Granular materials required for stabilization of poor subgrade soils, bedding of pipe and haunch backfill around pipe shall meet the following gradation requirements:

Sieve Size	Percent passing, by weight	
	Pipe bedding & haunch (crushed rock) Type A	Granular Stabilization (crushed rock) Type B
2 inch	---	100%
1 inch	100%	---
#4	20% max.	15 % max.

CDOT Structure Backfill (Class 1) material may be substituted for bedding of pipe and haunch backfill.

Imported materials used as bedding, haunch and structural backfill for pipe and culverts shall be tested for sulfates and pH compatibility with the selected pipe material.

Crushed rock shall be the product of crushing rock and/or gravel. The portion of the material retained on a #4 sieve shall contain at least 50 percent of particles having two or more fractured faces when tested in accordance with Colorado Procedure 45. Not over 5 percent shall be pieces that show no fractured faces.

b. Earth Backfill Materials. Earth backfill for pipes shall consist of approved materials developed from project excavations or imported from another source. To be suitable for backfill, materials shall meet the requirements of Structure Backfill (Class 2) with the addition of the maximum size of rock or clod allowed within 12" of any plastic pipe shall be one (1) inch and the maximum size of rock or clod allowed within 12" of a rigid pipe or structure shall be three (3) inches.

Testable materials: Any soil or soil and gravel mixture having at least 70% passing the ¾" sieve and at least 50% passing the #4 sieve.

Pitrun Backfill: Pit-run, crushed asphalt pavement, or other material which is "too rocky to test", the in-place density, shall conform to the following requirements:

Maximum particle dimension	12"
Percent passing #4 sieve	20% min.
Percent passing #200 sieve	20% max.
Plasticity Index (PI)	7 max.

In addition to the above requirements, the Engineer shall have the authority to determine, by visual inspection, if the material delivered to the job site contains a sufficient quantity of fine graded material to fill the voids between the rocks when material is placed and compacted. Material that is segregated, contains too much cobble or otherwise unsuitable for use in backfill, shall be removed from the job site or blended with other suitable material as directed or approved by the Engineer.

When the embankment or backfill material is too rocky to test, the County requires full-time inspection and observation by Quality Control personnel during placement and compaction of the material.

Pit run material shall be sampled and tested for moisture content at the same frequency as specified for compaction testing. Samples for moisture content tests shall be randomly taken from the material being placed. The moisture content of the material shall not deviate from optimum on the dry side by more than two percentage points as determined by AASHTO T 99 or T 180. The Inspector may require proof rolling of the compacted pit-run material to test for deflection. The Contractor shall furnish a rubber-tired, self-propelled vehicle for proof rolling. If while proof rolling, any visible deflection or rutting is observed, additional compaction of the pit run material will be required.

c. Structure backfill (flow-fill). Flowfill may be used to backfill utility trenches, manholes and other structures and excavations. Flow-fill shall not be placed around the bottom half of pipes or structures that could be displaced or damaged by the buoyant forces of the flow-fill. Bleed water shall be drained off or otherwise removed from the surface before additional layers of backfill are placed.

206.03 Structure Excavation and Structure Backfill

Delete the first paragraph and replace with the following:

Unsuitable foundation material shall be removed and wasted in a manner acceptable to the Inspector. Unsuitable foundation material which is suitable for embankments and suitable surplus excavated material may be used in the construction of embankments. Unsuitable material removed below designed elevation shall be replaced with Granular Stabilization (Type B). Over-excavation and the disposal of the over-excavated material will not be measured and paid for separately but shall be considered included in the cost for Granular Stabilization.

Delete the seventh paragraph and replace as follows:

Pipe, culverts, sewers, and other miscellaneous structures outside the roadway prism and not subjected to traffic loads shall be backfilled in layers as described above but shall be compacted to the density of the surrounding earth but in no case less than 85% density.

Add the following:

Dewatering. No groundwatering operation shall begin until a Construction Dewatering Permit has been obtained from the Colorado Department of Health and Environment (CDPHE). In addition to a Construction Discharge Permit, no groundwater shall be discharged to a street, sanitary sewer, storm drainage system, drainage ditch, irrigation ditch, pipe or other facility without written permission from the County and the owner of the receiving facility, if other than the County.

Excavations shall be kept free of water during construction operations by draining, pumping or other approved methods. The water level shall be maintained at least six (6) inches below the trench or excavation bottom throughout the placement of bedding, pipe laying, joining and backfilling operations. The dewatering shall be carried out so that it does not destroy or weaken the strength of the soil under or along the side of the excavation. Surface water from any source shall be prevented from entering the excavation. No additional payment will be made to the Contractor due to an unstable foundation condition caused by surface water entering the trench.

206.06 Method of Measurement.

Add the following:

Pipe excavation, bedding, haunch, and backfill will not be measured and paid for separately but shall be included in the contract unit price bid for each conduit type. When excavated material from the trench is unsuitable for backfill, as determined or agreed to by the Engineer or Inspector, the unsuitable material shall be hauled away and disposed of by the Contractor and suitable backfill material shall be imported. Import material may consist of earth, pit-run aggregate or other suitable material as specified above. The contract unit price for "Imported Trench Backfill" shall include the full compensation for haul and disposal of unsuitable excavated material.

Imported Trench Backfill will be measured from 12" inches above the top of the pipe to the bottom of the roadway section times the trench width shown on the plans multiplied by the length of the backfill to obtain the volume measured for payment. Maximum trench width to be paid is 18" plus the outside diameter of the pipe. If trench boxes are required, the maximum trench width will be measured 18" plus the outside width of the trench box.

When the use of Granular Stabilization material is ordered and authorized by the Engineer, it will be paid for at the contract unit price per cubic yard of material placed and approved. Over-excavation and the disposal of the over-excavated material will not be measured and paid for separately but shall be considered incidental to this item.

Claims for additional quantities based upon discrepancies in the Contract will not be allowed without the Contractor providing the necessary surveyed cross-sections included in Section 203 completed prior to the start of, and at completion of, excavation and fill operations.

Unless otherwise provided for in the plans or Bid Schedule, structure excavation, structure backfill, bed course material, filter material, and haul and disposal of excess or unsuitable excavated material, dewatering and temporary water diversion work will not be measured or paid for separately, but shall be included in the Work.

206.07 Basis of Payment.

Add the following:

Pay Item	**Pay Unit**
Imported Trench Backfill	Cubic Yard
Granular Stabilization Material (Type B)	Cubic Yard

SECTION 207 - TOPSOIL

Delete the section in entirety and replace with the following:

207.01 Description.

This work consists of salvaging topsoil from onsite locations, stockpiling, maintaining, and preparing the subsoils for the placement of the topsoil at locations shown on the plans. It also includes creating seeding media by amending subsoils, and importing offsite topsoil when shown on the plans.

Substitutions from this specification will not be allowed unless submitted in writing to the Engineer and approved.

207.02 Materials.

Topsoil shall be salvaged onsite, imported, or produced as shown on the plans. Topsoil shall be free of refuse and litter along with noxious weed seed and reproductive plant parts, as listed in current State of Colorado A and B Noxious Weed List and local agency weed lists. Topsoil shall not include heavy clay, hard clods, toxic substances, pathogens, or other material, which would be detrimental to growing native vegetation. All required amendments shall be thoroughly incorporated to parent material onsite. All amendments shall conform to Section 212. Topsoil and parent material shall be free of clods, sticks, stones, debris, concrete, and asphalt in excess of 4 inches in any dimension for all material used within the designed clear zone for the project. Topsoil outside of the clear zone may contain rock larger than 4 inches in any dimension. For slopes with no structures being used to protect areas from falling rocks the Contractor shall remove or secure any rocks deemed unstable and could pose a safety hazard.

Topsoil shall be generated from one or more of the following as shown on the plans:

(a) *Topsoil (Onsite).* Topsoil shall consist of the upper 6-inch layer of the A horizon, as defined by the Soil Science Society of America, or at the depths and locations shown on the Stormwater Management Plan (SWMP). It shall consist of loose friable soil, salvaged from onsite and stockpiled or windrowed. Litter and duff (layer of partially decomposed plant material) shall be collected as part of the salvaging of topsoil unless specified to be removed and hauled offsite on the plans.

(b) *Topsoil (Wetland).* Wetland topsoil shall consist of moist, organic soil obtained from delineated wetlands, including any existing wetland vegetation and seeds. Wetland topsoil shall be extracted from the project site at locations shown on the plans or as directed, to a minimum depth of 12 inches or at the depths as shown on the plans.

(c) *Seeding Media.* Seeding Media shall consist of one or all of the following approved materials: sub-soil, overburden, or material generated from rock. Contractor shall select onsite or offsite locations to generate material that meet the requirements of Table 207-1. The Contractor shall provide a Certified Test Report (CTR) confirming that the excavated material conforms to Table 207-1.

(d) *Topsoil (Offsite).* The Contractor shall submit a CTR for Topsoil (Offsite) for approval a minimum of 60 days prior to import. The Contractor shall include with the CTR a complete Soil Nutrient Analysis for the properties listed in Table 207-2 from an independent laboratory that participates in the National Association for Proficiency Testing (NAPT). If topsoil nutrient analysis is deficient, an Amendment Protocol shall be submitted by the Contractor for approval. The Amendment Protocol shall contain a complete list of amendments and associated quantities to produce topsoil that conforms to Table 207-2.

The Contractor shall submit a Certificate of Compliance (COC) for Topsoil (Offsite) for approval a minimum of 60 days prior to import that the source has controlled noxious weeds in accordance with the State of Colorado Noxious Weed Act 35-5.5-115.

Table 207-1
PHYSICAL PROPERTIES OF SEEDING MEDIA

Property	Range	Test
Soil pH (s.u.)	5.6 – 7.5	ASA Mono. #9, Part 2, Method 10-3.2 or TMECC 04.11-A
Soil Electrical Conductivity (EC) (mmhos/cm or ds/m)	< 5.0	ASA Mono. #9, Part 2, Method 10-3.3
Soil SAR (s.u.)	0 - 10	ASA Mono. #9, Part 2, Method 10-3.4
Rock Content (%)	≤ 25	USDA NRCS Rock Fragment Modifier Usage
Trace Contaminants (Arsenic, Cadmium, Copper, Mercury, Selenium, Zinc, Nickel, and Lead)	Meets US EPA, 40 CFR 503 Regulations	TMECC 04.06 or EPA6020/ASA (American Society of Agronomy)
Rock Content (%) greater than 3" diameter	≤ 25	USDA NRCS Rock Fragment Modifier Usage
USDA Soil Texture	No more than 70% clay, silt, and sand by percentage volume of topsoil.	ASA Monograph #9, Part 1, Method 15-4 or ASA 1 43-5
All Particle Sizes	< 6 Inches	
Physical contaminants (man-made inerts) (%)	< 1	TMECC 03.08-C
C:N ratio	<20	TMECC 05.02-A
* Fines % when manufacturing material from rock	>25% material passing through #4 sieve	ASTM D6913

Amendments to the base imported material shall have the quantities of material verified onsite prior to incorporation into parent material, either at the stockpiles or after placement of parent material. Topsoil amended at the stockpiles shall be distributed to the site within seven days.

* Substitute this requirement for USDA Soil Texture requirement when project are approved to use material manufactured from native rock material on site.

Table 207-2
TOPSOIL (OFFSITE) PROPERTIES

Property	Range	Test Methods
Soil pH (s.u)	5.6 – 7.5	ASA Mono. #9, Part 2, Method 10-3.2 or TMECC 04.11-A
Salt by Electrical Conductivity (EC) (mmhos/cm or ds/m)	< 2.0	ASA Mono. #9, Part 2, Method 10-3.3
Soil SAR (s.u.)	0 – 10	ASA Mono. #9, Part 2, Method 10-3.4
Soil OM (%)	3 – 5	Methods of Soil Analysis, Part 3, Method 34
Soil N (NO_3-n, ppm)	≥ 20.0	Methods of Soil Analysis, Part 3. Chemical Methods. Ch. 38 Nitrogen – Inorganic Forms
Soil P (ppm)	≥ 13.0	ASA Mono. #9, Part 2, Method 24-5.4 or others as required based on soil pH
Soil K (ppm)	≥ 80	ASA Mono. #9, Part 2, Method 13-3.5
Rock Content (%) greater than 3" diameter	≤ 25	USDA NRCS Rock Fragment Modifier Usage
Bioassay (seedling emergence and relative vigor)	> 80% of control	TMECC 05.05-A or Approved Germination Test
Soil Texture	No more than 70% clay, silt and sand by percentage volume of topsoil	ASA Mono. #9, Part 1, Method 15-4
Physical contaminants (man-made inerts) (%)	< 1	TMECC 03.08-C
Trace Contaminants (Arsenic, Cadmium, Copper, Mercury, Selenium, Zinc, Nickel, and Lead)	Meets US EPA, 40 CFR 503 Regulations	TMECC 04.06 or EPA6020/ASA (American Society of Agronomy)
All Particle Sizes	< 6 Inches	
C:N ratio	<20	TMECC 05.02-A

The Contractor shall utilize a rod penetrometer for determining subgrade soil preparation and determining looseness of soil after ripping. The penetrometer shall have a psi pressure gage, and shall meet the following requirements:

(1) Steel rod with a minimum diameter of ½ inch with graduations (tick marks) every 6 inches.

(2) The rod shall be made of stainless steel or other metal that will not bend when weight is applied.

(3) The end of the rod shall have a 30-degree cone tip.

(4) The diameter of the cone at its tip shall be no more than 0.1 inch.

(5) The top of the rod shall be a T-handled configuration.

207.03 Site Pre-vegetation Conference.

Prior to the start of the initial Subgrade Soil Preparation for the project, the Contractor shall request a Site Pre-vegetation Conference

The Agenda of the Pre-vegetation Conference shall include the following:

(1) Review of the Topsoil (Offsite) Amendment Protocol, if any

(2) Review of the equipment which will be used for the subgrade soil preparation operations

(3) Review of rod penetrometer which will be used to determine subgrade soil preparation of topsoil

(4) Permanent Stabilization Phasing Plan (identify strategies and site management measures to protect de-compacted, topsoil amended, seeded, and blanketed areas from foot, vehicle loads, and other disturbances).

(5) Seeding. See subsection 212.03 for submittal requirements.

207.04 Topsoil Stockpiling.

Stockpiles of topsoil shall be created as shown on the plans or as approved by the Engineer. All stockpiles of topsoil which are scheduled to remain in place for 14 days or more shall receive interim stabilization in accordance with subsection 208.04. All topsoil stockpiles shall be identified using white pin flags with "TOPSOIL" printed in black letters and shall have their locations shown on the SWMP Plans

Topsoil may be placed in stockpiles or windrowed at the edge of the disturbance. Windrowed topsoil shall not be used as perimeter erosion control or extensively compacted. When topsoil is windrowed, all stockpile requirements still apply.

(1) Upland Topsoil. If included on the plans, stockpiles shall be treated with herbicide, in accordance with Section 217, or as directed.

(2) Wetland Topsoil. Wetland stockpiles shall not be treated with herbicide. Weeds shall be hand pulled. Wetland topsoil shall be placed within 24 hours from excavation, unless otherwise approved by the Engineer. Wetland topsoil shall not be stockpiled for more than six months.

207.05 Subgrade Soil Preparation.

Before placement of topsoil, the subgrade shall be ripped to a minimum depth of 14 inches. Subgrade shall be mostly dry and friable. Subgrade shall crumble without sticking together, yet not be so dry and hard that it does not break apart easily.

Underground utilities shall be located prior to soil preparation.

Subgrade soil preparation equipment shall meet the requirements for either winged tip or parabolic shanks. Operation shall be performed to fracture the soil uniformly without lifting or furrowing the surface excessively.

Winged tip shanks (dozer equipment) shall be a minimum of 6 inches wide and have 2 inches of vertical profile change on the blade with a 40 – 60-degree sweep angle.

The Contractor shall calibrate the subgrade soil preparation equipment using a minimum 30 linear feet of the initial pass. The Contractor shall utilize the rod penetrometer to verify that that de-compaction was successfully done. The Contractor shall take penetration measurements every 6 inches across a transect perpendicular to the direction of the tractor and spanning the width of the subgrade soil preparation. Depths of penetration shall confirm that a minimum of 12 inches can be achieved without reaching 300 psi on the rod penetrometer pressure gage (approximately 30 pounds of pressure on the T-handle).

Existing subgrade shall be de-compacted to a depth of 14 inches. If multiple passes are needed, the subsequent passes shall be positioned so that the ripping equipment (subsoilers) from the previous pass are split by the subsequent pass. Following ripping, the Contractor shall remove all sticks, stones, debris, clods, and all other substances greater than 6 inches in diameter. The Contractor shall restrict motorized vehicle and foot traffic from passing over the ripped area since this would recompact the areas that received subgrade soil preparation.

The first 4 feet from the edge of pavement shall be ripped to a depth of 6 inches. If the project is going to use aggregate base course or recycled asphalt as a shouldering technique, those areas will not require subgrade soil preparation. Depth of soil ripping for the subgrade soil preparation shall be checked with the rod penetrometer.

The Contractor shall verify adequate de-compaction of the entire area to have topsoil placed using a rod penetrometer in the presence of the Engineer. Tests shall be performed at a minimum of ten random locations per each acre as selected by the Engineer. The Test shall verify that a depth of 12 inches of penetration into the soil can be achieved without reaching 300 psi on the rod penetrometer pressure gage (approximately 30 pounds of pressure on the T-handle). If this depth cannot be achieved for 80 percent of the penetrations, the Contractor shall re-rip the area at no additional cost to the Department.

207.06 Placement of Topsoil and Seeding Media.

Topsoil and Seeding Media shall be hauled and placed at the locations disturbed and that will be re-vegetated or as shown on the plans. The contractor shall place a minimum thickness of 6 inches and should only be handled when it is dry enough to work without damaging soil structure. Topsoil and Seeding Media shall be placed a minimum depth of twelve (12) inches when placed over riprap as required on the plans. No Topsoil or Seeding Media shall be placed below ordinary high water mark except as otherwise specified in bio-stabilization bank treatments.

Salvaged topsoil placement deeper than 6 inches is allowed if additional approved material is on-site.

Contractor shall place topsoil in a method that does not re-compact subgrade material using low ground-contact pressure equipment, or by excavators and/or backhoes operating adjacent to it.

The final grade shall be free of all materials greater than 4 inches in diameter within the designed clear zone for the project. Equipment not required for revegetation work will not be permitted in the areas of placed topsoil.

Soil amendments, seedbed preparation, and permanent stabilization mulching shall be accomplished within four working days of placing the topsoil on the de-compacted civil subgrades. If placed topsoil is not mulched with permanent stabilization mulch within four working days, the Contractor shall complete interim

stabilization methods in accordance with subsection 208.04(e), at no additional cost to the County. Time to perform the work may be extended for delays due to weather.

207.07 Method of Measurement.

Topsoil material will be measured by the actual number of cubic yards of topsoil placed and accepted.

Subgrade soil preparation will be measured by the square yards of subgrade which is ripped and accepted for adequate de-compaction.

207.08 Basis of Payment.

The accepted quantities measured will be paid for at the Contract unit price for each of the pay items listed below that appear in the bid schedule.

Payment will be made under:

Pay Item	Pay Unit
Topsoil (Onsite)	Cubic Yard
Seeding Media	Cubic Yard
Topsoil (Offsite)	Cubic Yard
Topsoil (Wetland)	Cubic Yard
Subgrade Soil Preparation	Square Yard

Amendments for Topsoil (Onsite) and Seeding Media will be measured and paid for in accordance with Section 212.

Amendments for Topsoil (Offsite) will not be measured and paid for separately, but shall be included in the work.

Noxious Weed Management will be measured and paid for in accordance with Section 217.

Stockpiling or windrowing of topsoil will not be measured and paid for separately, but shall be included in the work.

Testing of Seeding Medial and Topsoil (Offsite) will not be measured and paid for separately but shall be included in the work.

Rod penetrometer and associated verification testing of random locations will not be measured and paid for separately, but shall be included in the work.

The Site Pre-vegetation Conference will not be paid for separately, but shall be included in the work.

Additional passes with the ripping equipment to achieve the desired de-compaction will not be measured and paid for separately, but shall be included in the work.

Removing of clods, sticks, stones, debris, concrete, and asphalt in excess of 4 inches in any dimension for all topsoil and Seeding Media used within the designed clear zone for the project will not be measured and paid for separely, but shall be included in the work.

SECTION 208 – EROSION CONTROL

Section 208 is hereby deleted and replaced with the following:

208.01. Description.
This work consists of constructing, installing, maintaining, and removing when required, control measures during the life of the Contract to prevent or minimize erosion, sedimentation, and pollution of any State waters.

The Contractor shall be responsible for submitting and obtaining the Colorado Discharge Permit System Stormwater Construction Permit (CDPS-SCP) from the Colorado Department of Public Health and Environment (CDPHE) prior to the start of any construction activities for projects that disturb a total of over one acre. A CDPS-SCP is **not** required for projects with a total disturbed area under one acre. If the project is located within the MS4 urbanized boundary, the Contractor shall also obtain a permit from the Mesa County Stormwater Division. The Contractor shall provide a copy of the CDPS permit certification to the Engineer prior to or at the Pre-construction Conference. No work shall begin until the CDPS permit has been approved by CDPHE, unless otherwise directed by the Engineer. A copy of the permit and application to obtain a permit shall be placed in the project SWMP.

For County-contracted projects, the permit will clearly indicate that the Contractor (as Operator) and Mesa County Public Works (as Owner) will be co-permittees. For development projects, the Developer will be shown as the Owner. The Contractor shall be legally required to also obtain all other permits associated with specific activities within or outside of the right of way, such as borrow pits, concrete or asphalt plant sites, waste disposal sites, or other facilities. Staging areas within a ¼ mile, but not within the right of way shall be considered a common plan of development and permits for these facilities require permitting in the Contractor's name as Owner and Operator. These permits include local agency, federal, or other stormwater permits. It is the Contractor's responsibility to obtain these permits. The Contractor shall consult with the Engineer and contact the CDPHE or other appropriate federal, state, or local agency to determine the need for any permit.

Any stormwater management plan (SWMP) sheets provided in the plan set shows the required control measures needed to achieve final stabilization and reflect the minimum temporary control measures needed during construction. For the duration of the project, and the CDPS-SCP when required, the Contractor will be responsible for the implementation and evolution of the SWMP. Modifications to the SWMP due to Contractors methods and means shall be prepared by Contractor and reviewed by the County.

Stormwater runoff from all disturbed areas and soil storage areas for which permanent or interim stabilization is not implemented, must flow to at least one control measure to minimize sediment in the discharge. This shall be accomplished through filtering, settling, or straining. The control measure shall be selected, designed, installed, and adequately sized in accordance with good engineering, hydrologic, and pollution control practices. The control measures shall contain or filter flows in order to prevent the bypass of flows without treatment and shall be appropriate for stormwater runoff from disturbed areas and for the expected flow rate, duration, and flow conditions (i.e., sheet or concentrated flow).

The Contractor shall coordinate the construction of temporary control measures with the construction of permanent control measures to assure economical, effective, and continuous erosion and sediment control throughout the construction period.

When a provision of this section or an order by the Engineer requires that an action be immediate or taken immediately, it shall be understood that the Contractor shall at once begin affecting completion of the action and pursue it to completion in a manner acceptable to the Engineer.

208.02 Materials.

The materials for control measures shall conform to the following:

(a) *Erosion Bales*. Material for erosion bales shall consist of Certified Weed Free hay or straw. The hay or straw shall be certified under the Colorado Department of Agriculture Weed Free Forage Certification Program and inspected as regulated by the Weed Free Forage Act, Title 35, Article 27.5, CRS. Each certified weed free erosion bale shall be identified by blue and orange twine binding the bales.

The Contractor may obtain a current list of Colorado Weed Free Forage Crop Producers who have completed certification by contacting the:

Colorado Department of Agriculture, Weed Free Forage Program,
305 Interlocken Pkwy, Broomfield, CO 80021

Contact the Weed Free Forage Coordinator at (303) 869-9038. Also available at www.colorado.gov/ag/csd.

Bales shall be approximately 5 cubic feet of material and weigh at least 35 pounds. Stakes shall be wood and shall be 1.5 inch by 1.5 inch by 30 inch actual.

(b) *Silt Fence*. Silt fence posts shall be wood with a minimum length of 46 inches. Wood posts shall be 1.5-inch width by 1.5-inch thickness actual dimensions with 1/8-inch tolerance. Geotextile shall be attached to wood posts with three or more staples per post.

Silt fence geotextile shall conform to the following requirements:

Physical Requirements for Silt Fence Geotextiles

Property	**Wire Fence Supported Requirements**	**Self-Supported Requirements** **Geotextile Elongation <50%**	**Test Method**
Grab Strength, lbs.	90 minimum	124 minimum	ASTM D4632
Permittivity sec-1	0.05	0.05	ASTM D4491
Ultraviolet Stability	Minimum 70% Strength Retained	Minimum 70% Strength Retained	ASTM D4355

Silt Fence (Reinforced). Silt fence posts shall be metal "studded tee" T-post with a minimum length of 66 inches. Metal posts shall be “studded tee” with 0.095-inch minimum wall thickness. Wire fabric reinforcement for the silt fence geotextile shall be a minimum of 14 gauge with a maximum mesh spacing of 6 inches. Geotextile shall be attached to welded wire fabric with ties or nylon cable ties at 12 inches on

center at top, middle and bottom wire. Welded wire fabric shall be attached to the post with a minimum three 12-gauge wire ties per post. Vinyl or rubber safety caps shall be installed on all T-post.

(c) *Temporary Berms*. Temporary berms shall be constructed out of compacted embankment (subsoil) and not out of salvaged topsoil.

(d) *Temporary Slope Drains*. Temporary slope drains shall consist of fiber mats, plastic sheets, stone, concrete or asphalt gutters, half round pipe, metal or plastic pipe, wood flume, flexible rubber, or other materials suitable to carry accumulated water down the slopes. Outlet protection riprap shall conform to Section 506. Erosion control geotextile shall be a minimum Class 2, conforming to Section 712.

(e) *Silt Berm*. Silt berm shall consist of permeable multi-use material consisting of ultraviolet (UV) stabilized high-density polyethylene or other approved material effective in reducing water velocity. Designed and tested system shall be installed on a Turf Reinforcement Mat or Soil Retention Blanket in accordance with Section 216. The segment shall be secured to the ground with either metal or wood stakes. Minimum requirements for securing stakes shall be in accordance with the plans. Dimensions of individual segments shall meet the following criteria:

Width	6 - 11 inches
Height	6 - 10 inches
Weight	> 0.25 lbs./sq. ft.
Percent Open Area	20 – 50%

(f) *Rock Check Dam*. Rock Check dams shall be constructed of stone. Stone shall meet the requirements of Section 506.

(g) *Sediment Trap*. In constructing an excavated sediment trap, excavated soil may be used to construct the dam embankment, provided the soil meets the requirements of Section 203. Outlet protection riprap shall be the size specified in the Contract and shall conform to Section 506. Erosion control geotextile shall be a minimum Class 1, conforming to Section 712.

(h) *Erosion Logs*. Erosion logs shall be one of the following types unless otherwise shown on the plans:

(1) Erosion Log (Type 1) shall consist of cylinder casings filled with curled aspen wood excelsior with a consistent width of fibers evenly distributed throughout the log. The casing shall be seamless, photo-degradable tube netting. The curled aspen wood excelsior shall be fungus free, resin free, and free of growth or germination inhibiting substances.

(2) Erosion Log (Type 2) shall consist of cylinder casings filled with Erosion Log (Type 2) Compost in accordance with Section 212. The compost-wood chip blend may be pneumatically shot into a geotextile cylindrical casing or be pre-manufactured. The geotextile casing shall consist of high density polyethylene (HDPE) or polypropylene mesh (knitted, not extruded) with openings of ⅛ to ⅜ inch and contain the compost-wood chip material while not limiting water infiltration.

(3) Erosion Log (Type 3) shall consist of cylinder casings filled with curled aspen wood excelsior with a

consistent width of fibers evenly distributed throughout the log. The casing shall be seamless, 100 percent natural fiber cylinder netting (compostable) and shall have minimum dimensions as shown in Table 208-1, based on the diameter of the log shown on the plans. Netting shall be a woven cotton or cellulose base mesh that has an approval to compost certification with a maximum mesh size of 0.075 inches and index values as shown in Table 208-2. The curled aspen wood excelsior shall be fungus free, resin free, and free of growth or germination inhibiting substances.

Natural compostable fiber netting shall not contain any synthetic material woven into the netting such as polypropylene, nylon, polyethylene, or polyester dyes. Oxo-degradable or oxo-biodegradable petrochemical-based fiber shall not be part of the netting material. Burlap netting material shall not be used for Erosion Log (Type 3).

Erosion Log (Type 1, Type 2, and Type 3) shall have minimum dimensions as shown in Table 208-1, based on the specified diameter of the log.

Table 208-1
Dimensions of Erosion Logs

Diameter Type 1 & 3 (Inches)	Diameter Type 2 (Inches)	Length (feet)		Weight (minimum) (pounds/foot)	Stake Dimensions (Inches)
		Min.	Max.		
9	8	10	180	1.6	¾ thickness by ¾ width by 18 long
12	12	10	180	2.5	1.5 thickness by 1.25 width by 24 long
20	18	10	100	4.0	1.5 thickness by 1.25 width by 30 long

Wood stake acceptable tolerance +/- 1/8 inch.

Table 208-2
Index Values for Natural Fiber Netting

Property	Requirement	Test Method
Fabric Tensile Strength	>70 lbs.	ASTM D3822
Biodegradable	100%	ASTM D5988
Mesh Pattern	Rib	

Stakes to secure erosion logs shall consist of pinewood or hardwood.

(i) *Silt Dikes*. Silt dikes shall be pre-manufactured flexible sediment barrier that will fully rebound when driven over by heavy equipment. Material shall consist of outer geotextile fabric covering closed cell urethane or polyethylene foam core. The geotextile fabric aprons shall extend beyond the foam core a minimum of 8 inches on both sides.

Table 208-3
Geotextile Requirements

Property	Requirement	Test Method
Water Flow Rate	100-150 gallons per minute/square foot	ASTM D4491
Grab Breaking Load	200 lbs. minimum in each direction	ASTM D4632
Ultraviolet Degradation	70% of original unexposed grab breaking load after 500 hours	ASTM D4595

Each silt dike segment shall have the following dimensions:

Dimension	Length
Vertical height after installation	>5 inches
Geotextile sleeve section to interlock segments	>8 inches

Silt dike segments shall be anchored down using the minimum requirements shown in Table 208-4.

Table 208-4
Silt Dike Segment Requirements

Surface	Nail	Washers
Soil Surface	Installed in 4 inch deep trench with 6 inch nails no more than 4 feet O.C. (on center)	1 inch washers
Hard Surface	1 inch concrete nails no more than 4 feet O.C.	1 inch washers and solvent-free adhesive

(j) *Concrete Washout Structure*. The Contractor shall construct a washout structure that will contain washout from concrete placement, construction equipment cleaning operations, and residue from cutting, coring, grinding, grooving, and hydro-concrete demolition. Embankment required for the concrete washout structure may be excavated material, provided that this material meets the requirements of Section 203 for embankment. If the bottom of the excavated structure is within 5 feet of anticipated high ground water elevation or the soil does not have adequate buffering capacity to meet water quality standards, an impermeable synthetic liner shall be installed with the minimum properties shown in Table 208-5.

Table 208-5
Impermeable Synthetic Liner Requirements

Tested Property	Test Method	Units	Value
Thickness	ASTM D5199	mil	>30 +/- 1.5
Tear Strength	ASTM D1004	lbs.	>8
Low Temperature Impact	ASTM D1790	°F	Pass at -20

(k) *Pre-Fabricated Concrete Washout Structure.* Pre-Fabricated Concrete Washout Structures shall be one of the following types unless otherwise shown on the plans:

(1) Pre-Fabricated Concrete Washout Structure (Type 1). Type 1 portable bins shall be used only when specified in the Contract. It shall consist of a watertight multi-use container designed to contain liquid concrete washout wastewater, solid residual concrete waste from washout operations, and residue from saw cutting, coring, grinding, grooving, and hydro-concrete demolition. Minimum capacity including freeboard shall be 440 gallons.

(2) Pre-Fabricated Concrete Washout Structure (Type 2). Type 2 portable bins shall be used only when specified in the Contract. It shall consist of a watertight one-time use container designed to contain liquid concrete washout wastewater, solid residual concrete waste from washout operations, and residue from saw cutting, coring, grinding, grooving, and hydro-concrete demolition. The structure shall have a system to secure to the ground. Minimum capacity including freeboard shall be 50 gallons.

(l) *Vehicle Tracking Pad (VTP).* Aggregate for the vehicle tracking pad shall be crushed natural aggregate with at least two fractured faces that meets the following gradation requirements:

Sieve size	Percent by weight Passing Square Mesh Sieves
75 mm (3 inch)	100
50 mm (2 inch)	0-25
19.0 mm (¾ inch)	0-15

Recycled crushed concrete or asphalt shall not be used for vehicle tracking pads.

Erosion control geotextile shall be a minimum Class 2, conforming to Section 712.

Pre-Fabricated or manufactured vehicle tracking pads shall only be used if specified in the Contract. Multi-use pads shall consist of industrial grade materials and shall be designed to minimize sediment leaving the project.

Minimum dimensions of the modular systems shall be:

Width	12 feet
Length of pad	35 feet

To accommodate construction traffic turning radii between the tracking pad and a stabilized surface, additional flared sections of approved pads or aggregate in accordance with this specification shall be used at no additional cost to County.

Weight (min.) (lbs./sq. ft.)	8
Crush strength (min.) (psi)	400

If pads weigh less than 8 pounds per square foot, an anchoring system approved by the manufacturer shall be used for pads placed on soil and hard surfaces.

A thin layer of stone, geotextile, or other stable surface may be required to stop rutting under the pad or area where the vehicles mount or dismount the manufactured trackout control device.

(m) *Aggregate Bag*. Aggregate bags shall consist of crushed stone or recycled rubber filled fabric with the following properties:

Diameter (inches)	**Weight (minimum) (pounds per foot)**
6-8	6
10	10
12	15

Rubber used in bags shall be clean, 95 percent free of metal and particulates.

Crushed stone contained in the aggregate bags shall conform to Table 703-1 for Coarse Aggregate No. 6.

The aggregate bag shall consist of a woven geotextile fabric with the following properties:

Property	**Requirement**	**Test Method**
Grab Tensile Strength	90 lbs. min.	ASTM D4632
Trapezoid Tear Strength	25 lbs. min.	ASTM D4533
Mullen Burst	300 psi	ASTM D3786

Ultraviolet Resistance	70%	ASTM D4355

(n) *Storm Drain Inlet Protection*. Storm drain inlet protection shall consist of aggregate filled fabric with the following dimensions:

Storm Drain Inlet Protection Properties	**Protection Types**		
	Type I[1]	**Type II[2]**	**Type III[3]**
Diameter	4 in.	4 in.	N/A
Minimum Section Length	7 ft.	5 ft.	5 ft.
Apron Insert	---	30 in. or sized to grate	30 in or sized to grate
[1]Type I protection shall be used with Inlet Type R. [2]Type II protection shall be used with Combination Inlet. Option A or B [3]Type III protection shall be used with Vane Grate Inlet only. Option A or B Note: Options A and B are shown on Standard Plan M-208-1.			

The Storm Drain Inlet Protection (Type I, II and III) shall consist of a woven geotextile fabric with the following properties:

Property	**Test Method**	**Unit**	**Requirement**
Grab tensile strength	ASTM D4632	lbs.	minimum 150X200
Mullen Burst Strength	ASTM D3786	lbs.	400
Trapezoid Tear Strength	ASTM D4533	lbs.	minimum 60X60
Percent Open Area	COE-22125-86	%	≥20
Water Flow Rate	ASTM D4491	gal./min./sq. ft.	≥100
Ultraviolet Resistance	ASTM D4355	%	≥70

Curb roll for Storm Drain Inlet Protection (Type I and II) shall have a weight >4 pounds per linear foot of device. The device shall be capable of conforming to the shape of the curb. Aggregate contained in the storm drain inlet device shall consist of gravel or crushed stone conforming Table 703-1 for Coarse Aggregate No. 6.

208.03 Project Review, Schedule, and Erosion Control Management.

At the Pre-Construction Conference, the attendees shall discuss the CDPS-SCP requirements (for projects with over one acre of disturbance), the Storm Water Management Plan (SWMP), maintaining water quality standards, any sensitive habitats on site, wetlands, other vegetation to be protected, and the enforcement mechanism for not meeting the requirements of this specification.

Prior to beginning construction, the Contractor shall evaluate the project site for storm water draining into or through the site. When such drainage is identified, control measures shall be used if possible to divert stormwater from running on-site and becoming contaminated with sediment or other pollutants. The diversion may be accomplished with a temporary pipe or other conveyance to prevent water contamination or contact with pollutants. Run-on water that cannot be diverted shall be treated as construction runoff and adequate control measures shall be employed.

The SWMP Administrator shall evaluate all non-stormwater coming onto the site, such as springs, seeps, and landscape irrigation return flow. If such flow is identified, control measures shall be used to protect off-site water from becoming contaminated with sediment or other pollutants.

The SWMP Administrator shall review existing inlets and culverts to determine if inlet protection is needed due to water flow patterns. Prior to beginning construction, inlets and culverts needing protection shall be protected and the location of the implemented control measure added to the SWMP site map.

Prior to construction, the Contractor shall implement appropriate control measures for protection of wetlands, sensitive habitat, and existing vegetation from ground disturbance and other pollutant sources.

When additional control measures are required and approved by the Engineer, the Contractor shall implement the additional control measures and the SWMP Administrator shall record and describe them on the SWMP site map. The approved control measures will be measured and paid for in accordance with Section 208.

(a) *Erosion Control Management (ECM).* Erosion Control Management for all projects shall consist of SWMP Administration and Erosion Control Inspection. All ECM staff shall have working knowledge and experience in construction, and shall have successfully completed the Transportation Erosion Control Supervisory Certificate Training (TECS) as provided by the CDOT or other approved entity. The Superintendent may be permitted to serve in an ECM role, unless otherwise specified in the contract.

1. SWMP Administration. The SWMP shall be maintained by a SWMP Administrator. The name of the SWMP Administrator shall be recorded on the SWMP. The SWMP Administrator shall have full responsibility to maintain and update the SWMP and identify all critical action items needed to maintain water quality standards:

   (1) Complete and maintain the SWMP as described.

   (2) Participate in the Pre-Construction Conference.

   (3) Attend erosion and sediment control meetings.

   (4) Implement necessary actions to reduce erosion or water quality problems, anticipated or presently existing, resulting from construction activities.

   (5) Ensure that all labor, material, and equipment needed to install, maintain, and remove control measures are available as needed.

(6) During construction, the SWMP site map shall be updated to reflect current field conditions and include, at a minimum, the following if applicable:

(i) Limits of Construction (LOC).

(ii) Limits of Disturbance (LDA).

(iii) Areas used for storage of construction materials, equipment, soils, or wastes.

(iv) Location of dedicated asphalt, concrete batch plants, and masonry mixing stations.

(v) Location of construction offices and staging areas.

(vi) Location of work access routes during construction.

(vii) Location of waste accumulation areas, including areas for liquid, concrete, masonry, and asphalt.

(viii) Location of temporary, interim and permanent stabilization.

(ix) Location of outfalls.

(x) Flow arrows that depict stormwater flow directions on-site and runoff direction.

(xi) Location of structural and non-structural control measures.

(xii) Location of springs, streams, wetlands, and other State waters, including areas that require pre-existing vegetation be maintained within 50 horizontal feet of a receiving water, unless infeasible.

(xiii) Location of stream crossings located within the construction site boundary.

(7) Start a new site map before the current one becomes illegible. All site maps shall remain as part of the SWMP.

(8) Install control measures according to CDOT Standard Plans M-208-1, M-216-1, and M-615-1 or details provided in the plans.

(9) Update the Potential Pollutants list in the SWMP and Spill Response Plan throughout construction.

2. Erosion Control Inspection.

The SWMP Administrator shall complete the duties of the ECI. ECI duties shall be as follows:

(i) Inspect initial placement and adherence to approved SWMP and SWMP site plan control measures.

(ii) Assess the adequacy of control measures at the site to identify areas requiring new or modified control measures to minimize pollutant discharges.

(iii) Identify all areas of concern that may impact water quality and, if necessary, implement corrective actions.

(iv) Ensure all other agency Stormwater and inspection requirements are followed unless a waiver or other agreement has been made.

The ECI shall immediately report to the Contractor and Engineer the following instances:

(i) Noncompliance which may endanger health or the environment, regardless of the cause of the incident.

(ii) Spills or discharges which exceeds any water quality standards.

(iii) Upset conditions which cause an exceedance of any water quality standards.

The ECI shall document spills, leaks, or overflows that result in the discharge of pollutants. The ECI shall record the time and date, weather conditions, reasons for spill, and how it was remediated.

For projects requiring a CDPS-SCP or MS4 permits, site inspections shall be conducted in accordance with the CDPS-SCP, using County approved forms, and with one of the following minimum frequencies:

(1) At least one inspection every 7 calendar days or,

(2) At least one inspection every 14 calendar days, if post-storm event inspections are conducted within 24 hours after the end of any precipitation or snowmelt event that caused surface erosion. Post-storm inspections may be used to fulfill the 14-day routine inspection requirement.

(b) Documentation Available on the Project. The following Contract documents and references shall be made available for reference in one location on the project during construction. The following contract documents and reports shall be included or kept maintained (as applicable), and updated in the SWMP under the appropriate items by the SWMP Administrator. For projects with less than one acre disturbed, only items (1) and (2) are required.

(1) SWMP Plan Sheets – Notes, tabulation, site description, sequence of major activities, area of disturbance, existing soil data, existing vegetation percent cover, potential pollutant sources, receiving water, non-stormwater discharges, and environmental impacts.

(2) SWMP Site Maps (if included in the original Contract) - Construction site boundaries ground surface disturbance, limits of cut and fill, flow arrows, structural BMPs, non-structural BMPs, springs, streams, wetlands, and surface water. Also included on the map are the protection of trees, shrubs, and cultural resources.

(3) Specifications – Standard and project special provisions related to stormwater and erosion control.

(4) CDOT Standard Plans M-208-1, M-216-1 and M-615-1.

(5) Control measure details not in Standard Plan m-208-1 – project specific non-standard details.

(6) Spill Response Plan – including reports of reportable spills submitted to CDPHE.

(7) List and Evaluation of Potential Pollutants.

(8) TECS Certifications of the SWMP Administrator, kept current through the life of the project.

(9) All Project Environmental Permits-All Project environmental permits and associated applications and certifications, including, water quality standards, Senate Bill 40, USACE 404, temporary stream

crossings, dewatering and all other permits applicable to the project, including any separate permits obtained by the Contractor for staging area on private property, asphalt or concrete plant, etc.

(c) Weekly Meetings. If applicable, the Contractor shall conduct a weekly meeting with the Engineer and subcontractors to discuss construction activities that could adversely affect water quality, including the following:

(1) Unresolved issues from previous inspections.

(2) Requirements of the SWMP.

(3) Problems that may have arisen in implementing the site specific SWMP or maintaining control measures.

(4) Control measures that are to be installed, removed, modified, or maintained and associated SWMP modifications.

(5) Planned activities that will affect stormwater in order to proactively phase control measures.

208.04 Control Measures for Stormwater.

The SWMP Administrator shall modify the SWMP to clearly describe and locate all control measures implemented at the site to control potential sediment discharges.

Vehicle tracking pads shall be used at all vehicle and equipment exit points from the site to prevent sediment exiting the limits of construction (LOC) of the project site. Access shall be provided only at locations approved by the Engineer. The SWMP Administrator shall record vehicle tracking pad locations on the SWMP site map.

New inlets and culverts shall be protected during their construction. Appropriate protection of each culvert and inlet shall be installed immediately. When riprap is called for at the outlet of a culvert, it shall be installed within 24 hours of completion of each pipe. The Contractor shall remove sediment, millings, debris, and other pollutants from within the newly constructed drainage system, prior to use, at the Contractor's expense. All removed sediment shall be disposed of outside the project limits in accordance with all applicable regulations.

Concrete products wasted on the ground during construction including, but not limited to, excess concrete removed from forms, spills, slop, and all other unused concrete are potential pollutants that shall be removed from the site or contained at a pre-approved containment area that has been identified in the SWMP. The concrete shall be picked up and recycled in accordance with 6 CCR 1007-2 (CDPHE Regulations Pertaining to Solid Waste Sites and Facilities) at regular intervals, as needed, or as directed by the Engineer.

(a) *Unforeseen Conditions*. The Contractor shall design and implement erosion and sediment control measures for correcting conditions unforeseen during the design of the project, or for emergency situations that develop during construction. CDOT's Erosion Control and Stormwater Quality Guide shall be used as a reference document for the purpose of designing erosion and sediment control measures. Measures and methods proposed by the Contractor shall be reviewed and approvednby the Engineer prior to installation.

(b) *Other Agencies*. If CDPHE, US Army Corps of Engineers (USACE), the Environmental Protection Agency (EPA), or Local Agency reviews the project site and requires additional measures to prevent and control erosion, sediment, or pollutants, the Contractor shall cease and desist activities resulting in pollutant discharge and immediately implement these measures. If the work may negatively affect another MS4, the Contractor shall cease and desist activities resulting in the discharge and shall implement appropriate measures to protect the neighboring MS4, including installing additional

measures. Implementation of these additional measures will be paid for at contract unit prices.

(c) *Work Outside the Right of Way*. Disturbed areas, including staging areas, which are outside the ROW and outside easements acquired by County for construction, are the responsibility of the Contractor.

(d) *Stabilization*. Once earthwork has started, the Contractor shall maintain erosion control measures until permanent stabilization of the area has been completed and accepted. Clearing, grubbing and slope stabilization measures shall be performed regularly to ensure final stabilization. Failure to properly maintain erosion control and stabilization methods, either through improper phasing or sequencing will require the Contractor to repair or replace sections of earthwork at the Contractor's expense. The Contractor shall schedule and implement the following stabilization measures during the course of the project:

1. Temporary Stabilization. At the end of each day, the Contractor shall stabilize disturbed areas by surface roughening, vertical tracking, or a combination thereof. Disturbed areas are locations where actions have been taken to alter the existing vegetation or underlying soil of a site, such as clearing, grading, road bed preparation, soil compaction, and movement and stockpiling of sediment and materials. Designated topsoil distributed on the surface or in stockpiles shall not receive temporary stabilization. Other stabilization measures may be implemented, as approved.

2. Interim Stabilization. As soon as it is known with reasonable certainty that work will be temporarily halted for 14 days or more, sediment and material stockpiles and disturbed areas shall be stabilized using one or more of the specified following methods:

   (1) Application of 1.5 tons per acres of mechanically crimped certified weed free hay or straw in combination with an approved organic mulch tackifier.

   (2) Placement of bonded fiber matrix in accordance with Section 213.

   (3) Placement of mulching (hydraulic) wood cellulose fiber mulch with tackifier, in accordance with Section 213.

   (4) Application of spray-on mulch blanket in accordance with Section 213. Magnesium Chloride, Potassium Chloride and Sodium Chloride, or other salt products, shall not be used as a stabilization method.

   (5) Topsoil stockpiles shall receive interim stabilization in accordance with Section 207, unless specified as a different material than the other disturbed areas on-site.

3. Summer and Winter Stabilization. Summer and winter stabilization is defined as stabilization during months when seeding will not be permitted. As soon as the Contractor knows shutdown is to occur, interim stabilization shall be applied to the disturbed area. Protection of the interim stabilization method is required. Reapplication of interim stabilization may be required as directed.

4. Permanent Stabilization. Permanent stabilization is defined as the covering of disturbed areas with topsoil, seeding, mulching with tackifier, soil retention coverings, and such non-erodible methods as riprap, road shouldering, etc., or a combination thereof as required by the Contract. Other permanent stabilization techniques may be proposed by the Contractor, in writing, and shall be used when approved in writing by the Engineer. All permanent stabilization requirements shown on the plans shall be completed within four working days of the placement of the topsoil in accordance with Section 207.

5. Final Stabilization. Final stabilization is achieved when all ground disturbing activities at the site have been completed, and uniform vegetative cover has been established with an individual plant

density of at least 70 percent of pre-disturbance levels, or equivalent permanent physical erosion reduction methods have been employed.

(e) *Maintenance*. Erosion and sediment control practices and other protective measures identified in the SWMP as control measures for stormwater pollution prevention shall be maintained in effective operating condition until Final Acceptance of the project as defined in subsection **Acceptance** of the General Contract Conditions and/or the permit has been transferred to the County. Control measures shall be continuously maintained in accordance with good engineering, hydrologic, and pollution control practices, including removal of collected sediment when silt depth is 50 percent or more of the effective height of the erosion control device.

Maintenance of erosion and sediment control devices shall include replacement of such devices upon the end of their useful service life as recommended by the Contractor and approved by the Engineer. Maintenance of rock check dams and vehicle tracking pads shall be limited to removal and disposal of sediment or addition of aggregate. Damages resulting from failure to maintain control measures shall be repaired at the Contractor's expense.

Site assessments shall be performed to assess the adequacy of control measures at the site and the necessity of changes to those control measures to ensure continued effective performance. Where site assessment results in the determination that new or replacement control measures are necessary, the control measures shall be installed to ensure continuous effectiveness. When identified, control measures shall be maintained, added, modified or replaced as soon as possible, immediately in most cases.

Approved new or replaced control measures will be measured and paid for in accordance with this section. Devices damaged due to the Contractor's negligence shall be replaced at the Contractor's expense.

From the time seeding and mulching work begins until project acceptance the Contractor shall maintain all seeded areas. Damage to seeded areas or to mulch materials shall be immediately restored. If damage is due to Contractor negligence, it shall be restored at the Contractor's expense. Restoration of other damaged areas will be measured and paid for under the appropriate bid item.

Temporary control measures may be removed prior to final acceptance of the project, as determined by the Engineer. If removed, the area in which these control measures were constructed shall be returned to a condition similar to that which existed prior to its disturbance. Removed control measures shall become the property of the Contractor. County Maintenance shall be notified of the locations of any control measures left in place.

If the Contractor fails to complete construction within the approved contract time, the Contractor shall continue erosion and sediment control operations at its expense until acceptance of the work.

Sediment removed during maintenance of control measures and material from street sweeping may be used in or on embankment, provided it meets the requirements of Section 203 and is distributed evenly across the embankment.

Whenever sediment collects on the paved surface, the surface shall be cleaned. Street washing will not be allowed. Storm drain inlet protection shall be in place prior to shoveling, sweeping, or vacuuming. Sweeping shall be completed with a pickup broom or equipment capable of collecting sediment. Sweeping with a kick broom will not be allowed.

Material from pavement saw cutting operations shall be cleaned from the roadway surface during operations using a vacuum. A control measure, such as a berm, shall be placed to contain slurry from joint flushing operations until the residue can be removed from the soil surface. Aggregate bags, erosion logs or other permeable control measures shall not be used. Residue shall not flow into driving lanes. Material containment and removal will not be paid for separately, but shall be included in the work.

208.05 Construction of Control Measures. Control measures shall be constructed in accordance with CDOT Standard Plans M-208-1 and M-216-1 (unless otherwise noted on the Plans) and with the following:

(a) *Seeding, Mulching, Sodding, Soil Retention Blanket*. Seeding, mulching, sodding, and soil retention blanket installation shall be performed in accordance with Sections 212, 213, and 216.

(b) *Erosion Bales*. The bales shall be anchored securely to the ground with wood stakes. Erosion Bales shall be entrenched 4 inches minimum into the soil, tightly abutted with no gaps, staked, and backfilled around the entire outside perimeter. Erosion Bales cannot be used for Check Dams.

(c) *Silt Fence*. Silt fence shall be installed in locations as per M standard plans 208-1 and as specified in the Contract.

(d) *Temporary Berms*. Berms shall be constructed to the dimensions as per M 208-1 standard plans and as shown in the Contract, and sufficiently compacted to prevent erosion or failure. If the berm erodes or fails, it shall be immediately repaired or replaced at the Contractor's expense. Berms must be at least 18 inches tall or high enough to prevent overtopping. Berms must have a minimum of 4 to 6-foot base. Gradient of all receiving area above berm must be less than 2:1, or flatter. Outlets of anticipated flow from captured water behind berms must be designed with additional control measures suitable to control concentrated flow. Maximum drainage area for each outlet must be limited to 2 acres.

(e) *Temporary Diversion*. Diversions shall be constructed to the dimensions as per M standard plans 208-1 and as shown in the Contract and graded to drain to a designated outlet. The berm shall be sufficiently compacted to prevent erosion or failure. If the diversion erodes or fails, it shall be immediately repaired or replaced at the Contractor's expense.

(f) *Temporary Slope Drains*. Temporary slope drains shall be installed prior to installation of permanent facilities or growth of adequate ground cover on the slopes. All temporary slope drains shall be securely anchored to the slope. The inlets and outlets of temporary slope drains shall be protected to prevent erosion. Ensure drainage area for every slope drain is smaller than 5 acres. Ensure pipe or channel is properly sized, and for drainage areas larger than 1 acre the pipe size must be designed by an Engineer to ensure the drainage structure can accommodate the runoff resulting from a 2-year, 24-hour storm event. The use of prefabricated flared inlet sections is recommended.

(g) *Silt Berm*. Prior to installation of silt berms, the Contractor shall prepare the surface of the areas in which the berms are to be installed such that are they free of materials greater than 2 inches in diameter and are suitably smooth for the installation of the silt berms, as approved. See M standard 208-1 for details. Silt berms shall be secured with spikes. The Contractor shall install the silt berm in a manner that will prevent water from going around or under the silt berm. Silt berms shall be installed on top of soil retention blanket or turf reinforcement blanket.

(h) *Rock Check Dam*. Rock shall be installed at locations shown on the plans. Rock check dams shall conform to the dimensions shown on the plans. The Geotextile Erosion Control shall be Class 2 and conform to the requirements of Section 712, and shall extend up ⅔ of the riprap height with 6inch minimum cover over geotextile. Rock Check Dam shall be installed within a ditch sub excavated 6 inches below the flow line. The ends of the rip rap check dam shall be a minimum of 6 inches higher than the center of the check dam. Stone shall meet the requirements of Section 506. Larger rocks with larger void

spaces should be used on top. See M standard 208-1 for details.

(i) *Riprap Outlet Protection*. Geotextile used shall be protected from cutting or tearing. Overlaps between two pieces of geotextile shall be 1-foot minimum. Riprap size shall be in accordance with Section 506 and as shown on the plans.

(j) *Storm Drain Inlet Protection*. Prior to installation, the Contractor shall sweep the surface of the area in which the storm drain inlet protection devices are to be installed such that the pavement is free of sediment and debris. The ends of the inlet protection Type 1 and Type 2 shall extend a minimum of 1 foot past each end of the inlet.

The Contractor shall remove all accumulated sediment and debris from the surface surrounding all storm drain inlet protection devices after each rain event or as directed. The Contractor shall remove accumulated sediment from each Type II and III containment area when it is more than one third full of sediment, or as directed.

The Contractor shall protect storm drain facilities adjacent to locations where pavement cutting operations involving wheel cutting, saw cutting, sand blasting, or abrasive water jet blasting are to take place.

(k) *Sediment Trap*. Sediment traps shall be installed to collect sediment laden water and to minimize the potential of pollutants leaving the project site. Locations shall be in accordance with M standard 208-1 and as shown on the plans or as directed.

Sediment traps shall be constructed prior to disturbance of upslope areas and shall be placed in locations where runoff from disturbed areas can be diverted into the trap.

The area under the embankment shall be cleared, grubbed, and stripped of any vegetation and roots.

Fill material for the embankment shall be free of roots or other vegetation, organic material, large stones, and other objectionable material.

Sediment shall be removed from the trap when it has accumulated to one half of the wet storage depth of the trap and shall be disposed of in accordance with Section 208.

(l) *Erosion Logs*. Erosion logs shall be embedded 2 inches into the soil. Stakes shall be embedded so that the top of the stake does not extend past the top erosion log more than 2 inches, at the discretion of the Engineer, a shallower stake depth may be permitted if adverse site conditions are encountered, e.g. rock or frozen ground.

The Contractor shall maintain the erosion logs during construction to prevent sediment from passing over or under the logs. See M standard 208-1 for details.

(m) *Silt Dikes*. Prior to installation of silt dikes, the Contractor shall prepare the surface of the areas in which the silt dikes are to be installed such that they are free of materials greater than two inches in diameter and are suitably smooth for the installation of the silt dikes, as approved by the Engineer.

(n) *Concrete Washout Structure*. The concrete washout structure shall meet or exceed the dimensions shown on the plans. See M standard 208-1 for details.

Control measures designed for concrete washout waste shall be implemented. If the bottom of the excavated structure is within 5 feet of anticipated high ground water elevation or the soil does not have adequate buffering capacity to meet water quality standards, an impermeable synthetic liner shall be installed with the minimum properties shown in Table 208-5 or use a prefabricated washout.

The following requirements shall be met:

(1) The structure shall contain all washout water.

(2) Stormwater shall not carry wastes from washout and disposal locations.

(3) The site shall be located a minimum of 50 horizontal feet away from State waters and shall meet all requirements for containment and disposal.

(4) The site shall be signed as "Concrete Washout".

(5) The site shall be accessible to appropriate vehicles.

(6) Freeboard capacity shall be included in the structure design to reasonably ensure the structure will not overtop during or because of a precipitation event.

(7) The Contractor shall prevent tracking of washout material out of the washout structure.

(8) Solvents, flocculants, and acid shall not be added to wash water.

(9) The structure shall be surrounded on three sides by a compacted berm.

(10) Concrete waste, liquid and solid, shall not exceed ⅔ the storage capacity of the washout structure.

(o) *Pre-fabricated concrete washout structures (Type 1 and Type 2).* Structures and sites shall meet the following requirements:

(1) Structure shall contain all washout water. If bins are determined to be leaking, the Contractor shall replace the bin on-site and clean up the spilled material and dispose of it properly.

(2) Structure shall be located a minimum of 50 horizontal feet away from State waters, and shall be confined so that no potential pollutants will enter State waters and other sensitive areas as defined in the Contract. Locations shall be as approved by the Engineer. The pre-fabricated structure shall be signed as "Concrete Washout". Sign can be on portable bin.

(3) The site shall be accessible to appropriate vehicles.

(4) Solvents, flocculants, and acid shall not be added to wash water.

(5) Concrete waste, liquid and solid, shall not exceed ⅔ the storage capacity of the washout structure.

(6) Prefabricated structures cannot be moved when they contain liquid, unless otherwise approved.

(7) The concrete washout structure shall be installed and ready for use prior to concrete placement operations.

(8) Washout areas shall be checked and maintained as required. On-site permanent disposal of concrete washout waste is not allowed.

All liquid and solid wastes, including contaminated sediment and soils generated from concrete washout shall be hauled away from the site and disposed of properly at the Contractor's expense.

(p) *Vehicle Tracking Pad (VTP).* Vehicle tracking pads shall be constructed to the minimum dimensions shown in the Contract, unless otherwise directed by the Engineer. Construction of approved vehicle tracking pads shall be completed before any disturbance of the area.

The Contractor shall maintain each vehicle tracking pad during the entire time that it is in use for the project. The vehicle tracking pad shall be removed at the completion of the project unless otherwise directed by the Engineer.

(q) *Detention Pond*. Permanent detention ponds shown on the construction plans may be used as temporary control measures if all the following conditions are met:
(1) The pond is designated as a construction control measure in the SWMP.

(2) The pond outfall and outlet are designed and implemented for use as a control measure during construction in accordance with good engineering, hydrologic, and pollution control practices. The stormwater discharges from the outfall shall not cause degradation or pollution of State waters, and shall have control measures, as appropriate.

(3) All silt shall be removed and the pond returned to the design grade and contour prior to project acceptance.

(r) *Aggregate Bag*. Aggregate bags shall be placed on a stable surface, consisting of hardscape or compacted gravel. If approved by the Engineer, the aggregate bag may be placed on compacted dirt areas, where bags conform to the surface and can effectively minimize sediment transport. Aggregate bags can be used on frozen ground when other control measures cannot be trenched or staked, but only until the ground is capable of being trenched and staked. Aggregate bags shall not be placed in concentrated flow areas, other than gutter pans. Aggregate bags shall be placed to conform to the surface without gaps to ensure that discharge water does not cause erosion. See M standard 208-1 for details.

(s) *Surface roughening*. Surface roughening creates horizontal grooves along the contour of the slope. Roughening may be accomplished by furrowing, scarifying, ripping, or disking the soil surface to create a 2 to 4-inch minimum variation in soil surface.

(t) *Vertical Tracking*. Vertical tracking involves driving a tracked vehicle up and down the soil surface and creating horizontal grooves and ridges along the contour of the slope. Sandy soils or soils that are primarily rock need not be tracked.

208.06 Materials Handling and Spill Prevention.

The SWMP Administrator shall clearly describe and record on the SWMP, all practices implemented at the site to minimize impacts from procedures or significant material that could contribute pollutants to runoff. Areas or procedures where potential spills can occur shall have a Spill Response Plan in place as specified. Construction equipment, fuels, lubricants, and other petroleum distillates shall not be stored or stockpiled within 50 horizontal feet of any State waters or more if the Contractor determines necessary. Equipment fueling and servicing shall occur only within approved designated areas.

(a) *Bulk storage structures*. Bulk storage structures for petroleum products and other chemicals shall have impervious secondary containment or equivalent adequate protection so as to contain all spills and prevent any spilled material from entering State waters. Secondary containment shall be capable of containing the combined volume of all the storage containers plus at least 10 percent freeboard. For secondary containment that is used and may result in accumulation of stormwater within the containment, a plan shall be implemented to properly manage and dispose of all accumulated stormwater which is deemed to be contaminated (e.g., has an unusual odor or sheen).

(b) *Lubricant Leaks*. The Contractor shall inspect equipment, vehicles, and repair areas daily to ensure petroleum, oils, and lubricants (POL) are not leaking onto the soil or pavement. Absorbent material or containers shall be used to prevent leaking POL from reaching the soil or pavement. The Contractor shall have onsite approved absorbent material or containers of sufficient capacity to contain any POL leak that can reasonably be foreseen. All materials resulting from POL leakage control and cleanup shall become the property of the Contractor and shall be removed from the site. Control, cleanup, and removal of by-products resulting from POL leaks shall be performed at the Contractor's expense.

(c) *Spill Response Plan*. A Spill Response Plan shall be developed and implemented to establish operating procedures for handling potential pollutants and preventing spills.

The Response Plan shall contain the following information:

(1) Locations of areas on the project site where equipment fueling and servicing operations are permitted.

(2) Location of cleanup kits.

(3) Quantities of chemicals and locations stored on site.

(4) Label system for chemicals and Safety Data Sheets (SDS) for products.

(5) Clean up procedures to be implemented in the event of a spill that does not enter State waters or ground water.

(6) Procedures for spills of any size that enter surface waters or ground water, or have the potential to do so.

(7) A summary of the employee training provided.

208.07 Stockpile Management.

Material stockpiles shall be located 50 horizontal feet away from State waters, and shall be confined so that no potential pollutants will enter State waters and other sensitive areas as defined in the Contract. Locations shall be approved by the Engineer.

Erodible stockpiles (including topsoil) shall be contained with acceptable control measures at the toe (or within 20 feet of the toe) throughout construction. Control measures shall be approved by the Engineer. The SWMP Administrator shall describe, detail, and record the sediment control devices on the SWMP.

208.08 Limits of Disturbance.

The Contractor shall limit construction activities to those areas within the limits of disturbance shown on the plans and cross-sections. Construction activities, in addition to the Contract work, shall include the on-site parking of vehicles or equipment, on-site staging, on-site batch plants, haul roads or work access, and all other activities which would disturb existing soil conditions. Staging areas within the LDA shall be as approved by the Engineer. Construction activities beyond the limits of disturbance due to Contractor negligence shall be restored to the original condition by the Contractor at the Contractor’s expense. The SWMP Administrator shall tabulate additional disturbances not identified in the SWMP. If the disturbance at any time exceeds 1 acre (including as part of a common plan of development), the Contractor will need to apply for a Colorado Discharge Permit System-Stormwater Construction Permit (CDPS-SCP) and comply with all of the County’s over one acre specifications.

The Contractor shall pursue stabilization of all disturbances to completion.

208.09 Regulatory Mechanism for Water Quality.

Failure to implement the Stormwater Management Plan is a violation of the Colorado Water Quality Control Act. Penalties may be assessed to the Contractor by the appropriate agencies. All fines assessed to the Department for the Contractor's failure to implement the SWMP will be deducted from monies due the Contractor.

The Contractor shall be subject to liquidated damages for incidents of failure to perform erosion control as required by the Contract. Liquidated damages will be applied for failure to comply with these specifications, including the following:

(1) Failure of the Contractor to implement necessary actions required by the Engineer as required by this section.

(2) Failure to construct or implement erosion control or spill containment measures required by the Contract.

(3) Failure to stabilize disturbed areas as required by this section.

(4) Failure to replace or perform maintenance on an erosion control feature after notice from the Engineer to replace or perform maintenance as required by this section.

(5) Failure to remove and dispose of sediment from control measures as required.

(6) Failure to install and properly utilize a concrete washout structure for containing washout from concrete placement operations.

(7) Failure to perform permanent stabilization as required by this section.

(8) Failure to prevent discharges not composed entirely of stormwater from leaving the construction site.

(9) Failure to provide the survey of Permanent Water Quality features when required on the project in accordance with this section.

The Engineer will immediately notify the Contractor of each incident of failure to perform erosion control in accordance with any water quality standards, specifications, including items (1) through (9). Correction shall be made as soon as possible, immediately in most cases, but no later than 48 hours from the date of notification to correct the failure. The Contractor will be charged liquidated damages in the amount of $970 for each day after the 48-hour period has expired that one or more of the incidents of failure to perform the requirements for each notice remains uncorrected. Liquidated damages will begin at Midnight of the date on which the 48 hours has expired.

This deduction will not be considered a penalty, but will be considered liquidated damages based on estimated additional construction engineering costs. The liquidated damages will accumulate, for each cumulative day that one or more of the incidents remain uncorrected. The number of days for which liquidated damages are assessed will be cumulative for the duration of the project; that is: the damages for a particular day will be added to the total number of days for which liquidated damages are accumulated on the project. The liquidated damages will be deducted from any monies due the Contractor.

If all other failures are not corrected within 48 hours after liquidated damages have begun to be assessed, the Engineer will issue a Stop Work Order in accordance with subsection **"Authority of the Engineer"** of the General Contract Conditions. Work shall not resume until the Engineer has approved a written corrective

action plan submitted by the Contractor that includes measures to prevent future violations and a schedule for implementation.

If the Contractor's corrective action plan and schedule are not submitted and approved within 96 hours of the initial notice, or the unacceptable work is not remedied within the schedule as agreed to in the plan, the Engineer will take action to effect compliance with the Contract and these specifications by utilizing County Maintenance personnel or other non-Contractor forces and deduct the cost from any monies due or to become due to the Contractor pursuant to subsection **"Authority of the Engineer"** of the General Contract Conditions. Delays due to these Stop Work Orders shall be considered non- excusable. The Stop Work Order shall be in place until the project is in compliance.

If the Contractor remains non-responsive to requirements of the on-site meeting, the Engineer will start default or Contract termination procedures in accordance with the Contract.

When a failure meets any one of the following conditions, the Engineer will immediately issue a Stop Work Order in accordance with subsection **"Authority of the Engineer"** of the General Contract Conditions irrespective of any other available remedy:

(1) It may endanger health or the environment.

(2) It consists of a spill or discharge of hazardous substances or oil which may cause pollution of the waters of the state.

(3) It consists of a discharge which may cause a violation of water quality standards.

208.10 Items to Be Completed Prior to Requesting Partial Acceptance of Water Quality Work.

(a) *Reclamation of Washout Areas*. After concrete operations are complete, washout areas shall be reclaimed in accordance with this section at the Contractor's expense.

(b) *Survey*. When Permanent Water Quality (PWQ) control measures are required on the project and once built, the Contractor shall survey the control measures to confirm that the PWQ control measures conform to the configuration, grade, and volume shown on the plans. The survey shall conform to Section 625. The results of the survey shall be submitted in a format acceptable to the County showing both designed and final elevations and configurations. Paper versions of the drawings shall be submitted with the stamp and seal of the Contractor's Surveyor.

PWQ control measures that do not meet the Contract requirements will be identified in writing by the Engineer, and shall be repaired or replaced at the Contractor's expense. Correction surveys shall be performed at the Contractor's expense to confirm the locations, dimensions, and volume certification (for water quality capture volume structures only) of each PWQ control measure. The Engineer and County Stormwater Division staff will perform a walkthrough of the PWQ control measures to confirm conformance to material requirements, locations, and dimensions. Before the walkthrough, the Contractor shall provide the corrected survey to the Engineer and County Stormwater Division.

(c) *Locations of Temporary Control Measures*. The Engineer will identify locations where modification, cleaning, or removal of temporary control measures are required and will provide these in writing to the Contractor. Upon completion of work required, the SWMP Administrator shall modify the SWMP to provide an accurate depiction of control measures to remain on the project site.

All punch list and walkthrough items shall be completed and approved by the Engineer and County Maintenance. Upon approval from Engineer of completion of punch list items, the Contractor shall submit the appropriate form to the CDPHE such that the County or Developer becomes the Operator permittee of the CDPS. Until the transfer of the permit has been approved by the CDPHE, the Contractor shall continue to adhere to all permit and contract requirements. Requirements shall include erosion control inspections,

Control Measure installation, Control Measure maintenance, Control Measure repair, including seeded areas, and temporary Control Measure removal. All documentation shall be submitted to the Engineer and placed in the SWMP notebook.

208.11 Method of Measurement.

Erosion Control Management will not be measured and paid for separately but will be paid by the lump sum, and shall include obtaining required permits; erosion control inspections, documentation, SWMP administration, and the preparation of the SWMP. For projects with less than one acre disturbed, control measures costs are to be included in the lump sum and will not be paid separately.

Partial payments for Erosion Control Management will be made once each month as the work progresses. These partial payments will be made as follows:

(1) When 10 percent of the original contract amount is earned, 25 percent of the amount bid for erosion control will be paid.
(2) When 25 percent of the original contract amount is earned, 50 percent of the amount bid for erosion control will be paid.
(3) When 50 percent of the original contract amount is earned, 75 percent of the amount bid for erosion control will be paid.
(4) Upon completion of all work on the project, the remainder of the amount bid for erosion control will be paid.

Erosion bales and rock check dams will be measured by the actual number installed and accepted.

Silt fence, silt berms, erosion logs, aggregate bags, silt dikes, temporary berms, temporary diversions, and temporary slope drains, will be measured by the actual number of linear feet that are installed and accepted. Measured length will not include required overlap.

Concrete washout structure will be measured by the actual number of structures that are installed and accepted.

Pre-fabricated concrete washout structures will be measured by the actual number of structures delivered to the site. It shall not include structures moved on-site.

Storm drain inlet protection will be measured by linear foot or actual number of devices that are installed and accepted.

Sediment trap quantities will be measured by the actual number installed and accepted.

Vehicle tracking pads will be measured by the actual number constructed and accepted.

Pre-fabricated vehicle tracking pads will be measured by the actual number of pads delivered to the site and set up to the minimum dimensions. It shall not include pads moved on-site.

Removal and disposal of trash and removal of accumulated sediment from, and maintenance of, control measures shall be considered incidental to the work.

208.12 Basis of Payment.

Control measures will be paid for at the Contract unit price for each of the items listed below that appear in the contract.

Payment will be made under:

Pay Item	Pay Unit
Aggregate Bag	Linear Foot
Concrete Washout Structure	Each
Erosion Bales (Weed Free)	Each
Erosion Control Management	Lump Sum
Erosion Log (Type 1) (_____ Inch)	Linear Foot
Erosion Log (Type 2) (_____Inch)	Linear Foot
Erosion Log (Type 3) (_____Inch)	Linear Foot
Pre-Fabricated Concrete Washout Structure (Type 1)	Each
Pre-Fabricated Concrete Washout Structure (Type 2)	Each
Pre-Fabricated Vehicle Tracking Pad	Each
Rock Check Dam	Each
Sediment Basin	Each
Sediment Trap	Each
Silt Berm	Linear Foot
Silt Dike	Linear Foot
Silt Fence	Linear Foot
Silt Fence (Reinforced)	Linear Foot
Storm Drain Inlet Protection (Type__)	Linear Foot
Storm Drain Inlet Protection (Type__)	Each
Sweeping (Sediment Removal)	Hour
Temporary Berm	Linear Foot
Temporary Diversion	Linear Foot
Temporary Slope Drain	Linear Foot
Vehicle Tracking Pad	Each

Modifications to the SWMP due to construction errors or survey errors by the Contractor shall be made at the Contractor's expense.

Surface roughening and vertical tracking (temporary stabilization) will not be measured and paid for separately but shall be included in the work. Payment for each control measure item will be full compensation for all work and materials required to furnish, install, maintain, and remove the control measure when directed.

Payment for concrete washout structure, whether constructed or prefabricated, will be full compensation for all work and materials required to install, maintain, and remove the item. Maintenance and relocation, as required, of these structures throughout the duration of the project will not be measured and paid for separately, but shall be included in the work.

Silt berm spikes and wood spikes will not be measured and paid for separately, but shall be included in the work. When required, soil retention blankets will be measured and paid for in accordance with Section 216.

Compost and wood stakes for Erosion Log (Type 2) will not be measured and paid for separately, but shall be included in the work.

Spray-on mulch blankets required by the Contract, including those used in both interim and final stabilization, will be measured and paid for in accordance with Section 213.

Payment for storm drain inlet protection will be full compensation for all work, materials, and equipment required to complete the item, including surface preparation, maintenance throughout the project, and removal upon completion of the work. Aggregate will not be measured and paid for separately, but shall be included in the work.

Stakes, anchors, connections, geotextile, riprap, and tie downs used for temporary slope drains will not be measured and paid for separately, but shall be included in the work.

Payment for vehicle tracking pad will be full compensation for all work, materials and equipment required to construct, maintain, and remove the entrance upon completion of the work. Aggregate and geotextile will not be measured and paid for separately, but shall be included in the work. If additional aggregate for maintenance of vehicle tracking pads is required, it will be measured by the cubic yard in accordance with Section 304 and will be paid for under this Section as Maintenance Aggregate (Vehicle Tracking Pad).

Seeding, sod, mulching, soil retention blanket, and riprap will be measured and paid for in accordance with Sections 212, 213, 216, and 506.

All work and materials required to perform the permanent control measure survey and furnish the electronic files shall be included in the original unit price bid for surveying. Surveying will be measured and paid for in accordance with Section 625.

Payment will be made for control measures replaced as approved by the Engineer. Temporary erosion and sediment control measures required due to the Contractor’s negligence, carelessness, or failure to install permanent controls as a part of the work as scheduled or ordered by the Engineer or for the Contractor's convenience, shall be performed at the Contractor’s expense. If the Contractor fails to complete construction within the contract time, payment will not be made for Section 208 pay items for the period of time after expiration of the contract time. These items shall be provided at the Contractor's expense.

SECTION 209 - WATERING AND DUST PALLIATIVES

209.05 Dust Palliative.

Replace the first and second paragraphs with the following:

The contractor shall furnish and apply dust palliative on the project, haul roads, and other locations as directed by the Inspector to prevent air borne dust. This shall include prevention of dust generated from the Contractors operations and from windy weather conditions. Dust abatement shall be provided, as needed, throughout the construction period including nights, weekends and holidays.

Dust palliative may consist of water, magnesium chloride, or approved substance. Application of dust palliative shall be done with acceptable sprinkling equipment at an appropriate rate as approved by the Inspector.

209.08 Basis of Payment

Delete and replace with the following:

The furnishing and application of dust palliative will not be measured or paid for separately but shall be included in the work.

SECTION 210 - RESET STRUCTURES

210.04 Fences and Gates.

Delete the first paragraph and replace with the following:

Where fences are reset the Contractor shall supply and install any new materials required to restore the fence to acceptable condition. The fence shall be installed according to typical standards including sufficient concrete bases. The bases shall be backfilled and compacted such that the fence is sturdy and stable.

210.10 Adjust Structure.

Delete the third sentence of the paragraph and add the following:

Structures in the traveled roadway, including manhole covers, shall be adjusted to a tolerance of 1/8 inch to ¼ inch below the paved surface of the roadway or 1 inch above the finish grade of the Aggregate Base Course surface. The Aggregate Base Course shall be feathered around the manhole and/or valve box to provide a smooth travelled surface. Final adjustment of all utility access points shall be completed within seven days from the time the finished roadway surface is completed.

The Contractor shall replace all manhole rims, lids, and valve box sections damaged or misplaced during construction with new materials complying with the requirements of the Utility's specifications.

Manhole rings and covers shall be temporarily replaced with a round steel plate prior to paving with asphalt. Contractor can elect to pave over manhole covers with the use of a sand or paper separation to prevent asphalt from adhering to the cover. After paving, the manhole ring and cover shall then be reset to match the pavement surface using concrete or cast iron grade rings. Contractor will not be allowed to cut the manhole rings to fit existing manhole covers. Contractor shall use an appropriately sized paving ring in all cases. The manhole ring shall be set to final pitch and elevation using shims or other approved method and any spaces shall be filled with quick set grout with a compressive strength of 3000 psi in 1 hour. The roadway pavement around the manhole shall be patched by placing and compacting hot mix asphalt matching the project specified mix in 2 inch layers to the same thickness as the adjacent pavement.

Water valve boxes can be adjusted by the use of cast iron valve box extensions or by digging the valve box out after paving and raising the existing box. The valve box shall be set so that it is plumb over the operating nut of the valve. The roadway pavement around the valve box shall be patched by placing and compacting hot mix asphalt matching the project specified mix in 2 inch layers to the same thickness as the adjacent pavement.

At locations where a water-valve style box encloses a survey monument, the contractor shall supply a riser and adjust the valve box to grade using the same procedure as described above for water valve boxes. At locations where a survey monument is present and but no box or vault is in place, the Owner will supply an appropriate survey monument box. The contractor shall install the box in a manner that does not disturb or destroy the survey monument and the rim and lid are flush with the finished grade.

Adjust Irrigation structure shall be in accordance with the details shown on the plans. Contractor shall construct forms to match existing structure dimensions. All concrete shall be Class B.

Add the following after subsection 210.11

210.11.1 Landscape Restoration.

Landscape appurtenances shall include, but not be limited to, planters, decorative rock, tree bark, wooden and masonry borders and ornamental objects. When designated to be reset, landscape appurtenances shall be removed, stockpiled during construction, protected from damage, and reset as shown on the plans or as directed. When designated for removal, landscape appurtenances shall be disposed of by the Contractor, unless otherwise specified or directed.

210.11.2 Sprinkler Systems.

Where sprinklers are designated to be reset, the work shall include the temporary relocation of the sprinkler, pipe, fittings, valves and appurtenances as need to place the sprinkler back in service during construction. When sprinklers do not need to be in service during construction, the irrigation lines shall be plugged or capped to allow the remainder of the system to be used by the property owner. Sprinklers, pipe, fittings, valves and appurtenances removed during construction shall be stockpiles and protected from damage. Pipe connections shall be made with new materials. Sprinkler heads, pipe and appurtenances that are damaged during removal and/or storage shall be replaced with new materials of the same or better quality at the Contractor's expense. Sprinklers, pipe, fittings and appurtenances that are not damaged by the Contractor, but are unsuitable for reuse, shall be replaced with new materials. Such materials will be either furnished by the property owner or paid for separately by the County.

210.12 Method of Measurement.

Add the following:

Adjust Structure items to be paid on an "each" basis and includes all work required to move structure, lower each manhole or valve box to below the surface during different phases and then adjusted each manhole or valve box up to final grade after paving operations are complete, cleaned, and accepted.

Reset Structure items to be paid on an "each" or "linear foot" basis and includes all work required to remove and replace structure to a location as identified by the plans and/or Utility.

The quantity of sprinklers being reset will not be measured separately but will be paid under Reset Sprinkler System.

210.13 Basis of Payment

Add the following:

Pay Item	**Pay Unit**
Reset Sprinkler System (per property)	Lump Sum, Each
Reset Landscape Appurtenance (description)	Each, Linear Foot, Square Yard, Lump Sum

SECTION 212 – SEEDING, FERTILIZER, SOIL CONDITIONER AND SODDING

Delete the section in entirety and place with the following:

212.01 Description.

This work consists of application of fertilizer, soil amendments, seedbed preparation, and placing seed and sod.

Substitutions from this specification will not be allowed unless submitted in writing to the Engineer and approved prior to use.

212.02 Seed, Fertilizers, Soil Conditioners, Mycorrhizae, Elemental Sulfur, and Sod.

(a) *Seed.* Seed shall be delivered to the project site in sealed bags tagged by a registered seed supplier conforming to the requirements of the Colorado Seed Act, CRS 35-27-111(1). Seed used on the project shall not be in the Contractor's possession for more than 30 days from the date of pickup or delivery on the seed vendors packing slip. Bags which have been opened or damaged prior to Engineer inspection may be rejected. The State required legal tags shall remain on the bag until opened and the seed is placed in either the drill or hydraulic seeders in the presence of the Engineer. The Engineer shall remove all tags after seed has been planted. Each seed tag shall clearly show the following:

(1) Name and address of the supplier

(2) Botanical and common name for each species

(3) Lot numbers

(4) Percent by weight of inert ingredients

(5) Guaranteed percentage of purity and germination

(6) Pounds of Pure Live Seed (PLS) of each seed species

(7) Total net weight in pounds of PLS in the sealed bag

(8) Calendar month and year of test date

Seeds shall be free from all noxious weed seeds in accordance with Colorado Seed Act (CRS 35-17) prohibited noxious weed seed list.

Weed seed content shall not exceed the requirements in part 7.2 of the Colorado Department of Agriculture's Seed Act Rules and Regulations.

Seed which has become wet, moldy, or damaged in transit or in storage will not be accepted.

Seed and seed labels shall conform to all current State regulations and to the testing provisions of the Association of Official Seed Analysis. Computations for quantity of seed required on the project shall include the percent of purity and percent of germination.

The Contractor shall store seed under dry conditions, at temperatures between 35 °F to 90 °F, under low humidity and out of direct sunlight. The Contractor shall provide the location of where seed is stored and access to stored seed locations to the Engineer. Seed stored by the Contractor for longer than 30 will be rejected.

(b) *Organic Fertilizer*. Fertilizer derived directly from plant or animal sources shall conform to Colorado Revised Fertilizer Rules 8 CCR 1202-4. Fertilizer shall be uniform in composition and shall be delivered to the site in the original, unopened containers, each bearing the manufacturer's name, address, and nutrient analysis. Fertilizer bags (containers) which arrive at the project site opened, damaged, or lacking a label will be rejected. The Contractor shall only use bulk shipments such as tote bags or super sacks that have a manufacture's original label and sealed at the manufacturing facility. Fertilizer which becomes caked or damaged will not be accepted. Fertilizer shall be stored according to manufacturer's recommendations in a dry area where the fertilizer will not be damaged.

Organic fertilizer formulation being submitted for use must be registered with the Colorado Department of Agriculture.

Verification tests may be conducted by the ~~CDOT~~ County on grab samples of organic fertilizer delivered to the site to determine the reliability of bag label analysis and for ingredients which are injurious to plants. If a product of any supplier is found to consistently deviate from the bag level analysis, the acceptance of that product will be discontinued.

Fertilizer shall be supplied in one of the following physical forms:

(1) A dry free-flowing granular fertilizer, suitable for application by agricultural fertilizer spreader.

(2) A homogeneous pellet, suitable for application by agricultural fertilizer spreader. Pellet size shall be 2-3 mm. Smaller may be allowed when Seeding (Native) Hydraulic is shown on the plans.

(3) A soluble form that will permit complete suspension of insoluble particles in water, suitable for application by power sprayer.

The application rate of the organic fertilizer shall be either as high or low nitrogen (N) fertilizer as shown on the plans.

High N organic fertilizer chemical analysis shall conform to Table 212-1.

Table 212-1
Chemical Analysis for High N Fertilizer

Ingredient	Range	Test Method
Nitrogen (N) (%)	6 - 10	AOAC Official Method 993.13 Nitrogen (Total) in Fertilizers Combustion Method
Phosphorus (P) (%)	1 - 8	AOAC Official Method 960.03 Phosphorus (Available) in Fertilizers
Potassium (K) (%)	1 - 8	AOAC Official Method 983.02 Potassium in Fertilizers

Low N organic fertilizer chemical analysis shall conform to Table 212-2.

Table 212-2
Chemical Analysis for Low N Fertilizer

Ingredient	Range	Test Method
Nitrogen (N) (%)	2 -5	AOAC Official Method 993.13 Nitrogen (Total) in Fertilizers Combustion Method
Phosphorus (P) (%)	3 - 8	AOAC Official Method 960.03 Phosphorus (Available) in Fertilizers
Potassium (K) (%)	1 - 8	AOAC Official Method 983.02 Potassium in Fertilizers

Organic fertilizers shall conform to Table 212-3.

Table 212-3
Organic Fertilizer Properties

Criteria	Range
Moisture content by weight	< 6%

(c) *Compost (Mechanically Applied).* Compost shall be suitable for use in Erosion Log (Type 2) and permanent seeding applications. Compost shall not contain visible refuse, other physical contaminants, or substances considered harmful to plant growth. Compost shall be used in accordance with all applicable EPA 40 CFR 503 standards for Class A biosolids including the time and temperature standards. Materials that have been treated with chemical preservatives as a compost feedstock will not be permitted.

The Contractor shall provide material that has been aerobically composted in a commercial facility. Compost shall be from a producer that participates in the United States Composting Council's (USCC) Seal of Testing Assurance (STA) program. The Department will only accept STA approved compost that is tested in accordance with the USCC Test Methods for Examining of Composting and Compost (TMECC) manual.

Verification tests may be conducted by the County on grab samples of compost delivered to the site to determine the gradation and physical properties. Testing may be done for indication of ingredients which are injurious to plants. If a product is found to consistently deviate from the gradation and property analysis, the acceptance of that product will be discontinued.

Compost for permanent seeding soil conditioner locations onsite and application rates shall be as shown on the plans.

Organic matter in compost shall be no more than 2 inches in length.

Compost (Mechanically Applied) for permanent seeding shall meet the gradation and physical properties as shown in Table 212-4 and Table 212-5. The Contractor shall provide a written explanation for compost tested parameters not within the acceptable requirements for review and consideration.

The Contractor shall provide documentation from the composting facility confirming that the material has been tested in accordance with USCC TMECC.

Table 212-4
Gradation for Permanent Seeding Compost

Sieve Size	Percent Passing		Test Method
	Minimum	Maximum	
25.0 mm (1")	100		TMECC 02.02-B, "Sample Sieving for Aggregate Size Classification"
19.0 mm (3/4")	90	100	
6.25 mm (1/4")	70	100	

Note: Compost shall be from a producer that participates in the USCC STA program.

Table 212-5
Properties for Permanent Seeding Compost

Compost Parameters	Reported as	Requirements	Test Method
pH	pH units	6.0 - 8.5	TMECC 04.11-A
Soluble Salts (Electrical Conductivity)	dS/m (mmhos/cm)	< 5.0	TMECC 04.10-A
Moisture Content	%, wet weight basis	25% - 50%	TMECC 03.09-A
Organic Matter Content	%, dry weight basis pounds per cubic yard	20% - 50% >240	TMECC 05.07-A
Carbon to Nitrogen Ratio (C:N)		< 15:1	
Man-made Inert Contamination (plastic, concrete, ceramics, metal, etc.)	%, dry weight basis	< 1%	TMECC 03.08-A
Stability (respirometry)	mg CO_2-C per g TS per day mg CO_2-C per g OM per day	8 or below	TMECC 05.08-B
Select Pathogens and weed free	(PASS/FAIL) Limits: Salmonella < 3 MPN/4 grams of TS, or Coliform Bacteria < 1000 MPN/gram	Pass	TMECC 07.01-B Fecal Coliforms, or 07.02 Salmonella
Trace Metals	(PASS/FAIL) Limits (mg $kg^{-1,}$ dw basis): Arsenic (As) 41, Cadmium (Cd) 39, Copper (Cu)1500, Lead (Pb) 300, Mercury (Hg) 17, Nickel (Ni) 420, Selenium (Se) 100, Zinc (Zn) 2800	Pass	TMECC 04.06
Maturity (Bioassay) Percent Emergence Relative Seedling Vigor	 %, (average) %, (average)	 > 80% > 80%	TMECC 05.05-A
Use the STA Lab bulk density lb/cu ft as received, multiplied by organic matter % as received, multiplied by 27 to calculate pounds per cubic yard of organic matter.			

1. Compost for Erosion Log (Type 2) shall meet the gradation and physical properties as shown in Table 212-6 and Table 212-7.

Table 212-6
Gradation for Erosion Log (Type 2) Compost

Sieve Size	Percent Passing		Test Method
	Minimum	Maximum	
75.0 mm (3")	100		TMECC 02.02-B, "Sample Sieving for Aggregate Size Classification"
25.0 mm (1")	90	100	
9.5 mm (3/8")	10	50	

Note: Organic matter for erosion log compost shall be no more than 4 inches in length. Compost shall be from a producer that participates in the USCC STA program.

Table 212-7
Properties for Erosion Log (Type 2) Compost

Compost Parameters	Reported as	Requirements	Test Method
pH	pH units	6.0 - 8.5	TMECC 04.11-A
Soluble Salts (Electrical Conductivity)	dS/m (mmhos/cm)	< 5.0	TMECC 04.10-A
Moisture Content	%, wet weight basis	< 60%	TMECC 03.09-A
Organic Matter Content	%, dry weight basis	25% - 100%	TMECC 05.07-A
Man-made Inert Contamination (plastic, concrete, ceramics, metal, etc.)	%, dry weight basis	< 0.5%	TMECC 03.08-A
Stability (respirometry)	mg CO_2-C per g TS per day mg CO_2-C per g OM per day	N/A	TMECC 05.08-B
Select Pathogens and weed free	(PASS/FAIL) Limits: Salmonella < 3 MPN/4 grams of TS, or Coliform Bacteria < 1000 MPN/gram	Pass	TMECC 07.01-B Fecal Coliforms, or 07.02 Salmonella
Trace Metals	(PASS/FAIL) Limits (mg $kg^{-1,}$ dw basis): Arsenic (As) 41, Cadmium (Cd) 39, Copper (Cu)1500, Lead (Pb) 300, Mercury (Hg) 17, Nickel (Ni) 420, Selenium (Se) 100, Zinc (Zn) 2800	Pass	TMECC 04.06
Maturity (Bioassay) Percent Emergence Relative Seedling Vigor	 %, (average) %, (average)	 N/A N/A	TMECC 05.05-A

(d) *Biotic Soil Amendments (Hydraulically Applied*). Soil amendments shall be a combination of natural fibers, growth stimulants, and other biologically active material designed to improve seed germination and vegetation establishment as shown in Table 212-8. Biotic soil amendments shall be pre-packaged in ultraviolet and weather resistant packaging and labeled from the manufacturer. Bags (containers) which

arrive at the project site opened, damaged, or lacking a label will be rejected. Bulk shipments such as tote bags will be rejected. Biotic soil amendments shall be stored in locations not exceeding 80 °F. Acceptance of material shall be subject to the requirements of CDOT's Approved Product List (APL).

The application rate of the biotic soil amendments shall be in accordance with the rates shown on the plans. Use of mulch tackifier (Plantago Insularis or pre-gelatinized corn starch polymer) shall be in accordance with Section 213. It shall be used as a wetting agent at a rate of 30 pounds per acre. Biotic soil amendments shall provide a continuous and uniform cover and shall consist of one of the components in Table 212-8 and all of the performance and physical properties in Table 212-9.

Table 212-8
Required Percentage Ranges of Biotic Soil Amendments

Components	Units	Requirement
Professional grade sphagnum peat moss, professional grade reed sedge peat moss or compost that meets the Seal of Testing Assurance Program of the US Composting Council	%, dry weight basis	> 41%
Mechanically processed straw consisting of weed free agricultural straw, flexible flax fiber or rice hulls	%, dry weight basis	< 57%

Table 212-9
Performance and Physical Requirements of Biotic Soil Amendments

Parameters	Reported as	Requirement	Test Method
pH	pH units	5.0 – 7.5	ASTM D1293
Moisture content	%, wet weight basis	10% - 50%	ASTM D 2974
Organic matter content	%, dry weight basis	> 85%	ASTM D586
Carbon Nitrogen Ratio	Ratio C:N	< 38:1	ASTM E1508
Man-made inert contamination	%, dry weight basis	< 1.0%	
Acute Toxicity	(Pass/Fail)	Pass (non-toxic)	ASTM 7101 or EPA Method 2021.0 or EPA Method 2002.0
Vegetative Minimum		> 400%	ASTM 7322
The Contractor shall provide a CTR with independent laboratory analysis for the required parameters in accordance with subsection 106.13.			

(e) *Humate*. The Contractor shall provide a screened dry granular form of organic humic and fulvic acid substance. Humate shall be pre-packaged and labeled from the manufacturer. Bags (containers) which arrive at the project site opened, damaged, or lacking label will be rejected. The Contractor shall only use bulk shipments such as tote bags or super sacks that have a manufacture's original label and sealed at the manufacturing facility. Humate shall be stored in locations not exceeding 80 °F. Humate shall be provided in accordance with the rates shown on the plans. Product shall conform to the parameters in Table 212-10 and Table 212-11.

Table 212-10
Screened Size Requirements for Humate

Seeding Method	Reported as	Requirement
Seeding (Native) Drill, Hydraulic and Broadcast	inches	< 1/4

Table 212-11
Performance and Physical Requirements of Humate

Parameters	Reported as	Requirement	Test Method
Organic Matter	%, dry weight basis	>70%	
Fines (material that is finer than the No. 200 (75-µm) sieve)	%, dry weight basis	<2%	ASTM D7928
pH	pH units	3.0 - 4.5	ASTM D1293
Acute Toxicity	Pass / Fail	Non Toxic	ASTM 7101 or EPA Method 2021 or 2002
Humic and Fulvic Acids	%, dry weight basis	> 70%	A & L Western method; total alkali extractable
Carbon Content	%, dry weight basis	40% - 50%	
Moisture Content	%, dry weight basis	< 20%	
Heavy Metal / Ash Content	%, dry weight basis	< 15%	
The Contractor shall provide a CTR with independent laboratory analysis for the required parameters in accordance with subsection 106.13.			

(f) *Mycorrhizae*. Mycorrhizae shall arrive onsite in original and undamaged packaging. Handling of this material shall follow manufacturer's safety recommendations. Mycorrhizae shall be stored onsite in such a way as to avoid exposure to direct sunlight for more than four hours and to prevent package temperatures to rise above 85 °F. The endo mycorrhizal inoculum shall provide at least 60,000 propagules per pound and shall contain all of the following species and conform to the parameters in Table 212-12:

(1) Glomus intraradices (a.k.a. Rhizophagus intraradices)

(2) Glomus mosseae (a.k.a. Funneliformis mosseae)

(3) Glomus aggregatum (a.k.a. rhizophagus aggregatus)

(4) Glomus etunicatum (a.k.a. Claroideoglomus etunicatum)

Table 212-12
Physical Requirements of Endo Mycorrhizae

Parameters	Reported as	Requirement	Test Method
Acute Toxicity	Pass or Fail	Non Toxic	ASTM 7101 or EPA Method 2021 or 2002
The Contractor shall provide a CTR with independent laboratory analysis has been done on the product for the required parameters in accordance with subsection 106.13.			

The following rates shall be used for Seeding Methods:

(1) For Seeding (Native) Drill, the mycorrhizae product shall be provided as a dry free-flowing granular material, suitable for application by agricultural drill seeder. Application rate shall be 8 pounds per acre.

(2) For Seeding (Native) Hydraulic, the mycorrhizae product shall be provided as a fine granular (< 2 mm) or powdered form (particle size less than 300 microns) that will permit complete suspension and used with hydro-seeder equipment. Application rate shall be 20 pounds per acre.

(3) For Seeding (Native) Broadcast, the mycorrhizae product shall be provided as a dry free-flowing granular material, suitable for application by fertilizer spreader. Application rate shall be 20 pounds per acre.

(g) *Elemental Sulfur.* The Contractor shall provide a free-flowing granular material consistent in size suitable for application by agricultural spreader and conform to the parameters in Table 212-13. Elemental sulfur shall arrive onsite in original and undamaged packaging.

Table 212-13
Physical Requirements of Elemental Sulfur

Parameters	Reported as	Requirement
Guaranteed Analysis of Elemental Sulfur (S)	%	> 90
Bulk Density	Lbs per cu. ft.	> 75

(h) *Sod.* Sod shall be nursery grown and 99 percent weed free. Species shall be as shown on the plans. The 1 percent allowable weeds shall not include undesirable perennial or annual grasses or plants defined as noxious by current State statute or county noxious weed list. Soil thickness of sod cuts shall not be less than ¾ inch or more than 1 inch. Sod shall be cut in uniform strips with minimum dimensions of 18 inches in width and 48 inches in length. The Contractor shall submit a sample of the sod proposed for use, which shall serve as a standard if approved. Sod furnished, whether in place or not, that is not up to the standard of the sample will be rejected. The ~~CDOT~~ Engineer will reject all sod that was cut more than 72 hours prior to installation.

Each load of sod shall be accompanied by a certificate from the grower stating the type of sod and the date and time of cutting. The Contractor shall submit the certificate to the Engineer prior to application of the sod. Only sod that is accompanied by the certificate from the grower will be accepted and paid for.

212.03 Submittals.

The Contractor shall provide the name and contact information of the seeding contractor 30 days prior to start of seeding work. The Contractor shall provide copies of items (1) - (14) listed below to the Pre-vegetation Conference in accordance with Section 207.

(1) Written confirmation from the registered seed supplier that the Contract specified seed has been secured. No substitutions of the contract specified seed will be permitted unless evidence is submitted, from one of the registered seed suppliers that the Contract specified seed is not available and will not become available during the anticipated construction period.

(2) Seed vendor's "seed dealer" endorsement.

(3) A copy of each seed species germination report of analysis that verifies the lot has been tested by a recognized laboratory for seed testing within 13 months prior to the date of seeding.

(4) A copy of each seed species purity laboratory report of analysis that verifies that the lot has been tested by a recognized laboratory for seed testing. The report shall list all identified species, seed count, and date of test.

(5) Manufacturer's documentation stating that the fertilizer meets the Contract requirements.

(6) Organic fertilizer documentation showing manufacturer and chemical analysis.

(7) Permit issued from CDPHE confirming that the vendor can produce or sell compost in accordance with House Bill (HB) 1181.

(8) Documentation from the compost manufacturer that it is a participating member of in the U.S. Composting Council's Seal of Testing Assurance Program (STA).

(9) Results of compost testing on an STA Compost Technical Data Sheet confirming all required test methods are met using the STA Program.

(10) Manufacturer's documentation confirming that biotic soil amendment meets the required physical and performance criteria based on independent testing by the manufacturer.

(11) Manufacturer's documentation confirming that humate meets the required physical and performance criteria based on independent testing by the manufacture.

(12) Manufacturer's documentation confirming that mycorrhizae meets the physical criteria based on independent testing and that the minimum required species is provided.

(13) Pictures and descriptions of seeding equipment proposed to be used on the project. Based on the seeding methods required at a minimum this should include the drill seeder, hydraulic seeder, cultipacker or seed bed roller implements.

(14) Instructions and documentation on how seeders will be calibrated onsite, in accordance with subsection 212.05(a).

212.04 Seeding Seasons. Seeding in areas that are unirrigated shall be restricted according to the parameters in Table 212-14.

Table 212-14
Seeding Seasons

Zone	Spring Seeding	Fall Seeding
Areas other than the Western Slope		
Below 6000’	Spring thaw to June 1	September 15 until consistent ground freeze
6000’ - 7000’	Spring thaw to June 1	September 1 until consistent ground freeze
7000’ - 8000’	Spring thaw to July 15	August 1 until consistent ground freeze
Above 8000’	Spring thaw to consistent ground freeze	
Western Slope		
Below 6000’	Spring thaw to May 1	August 1 until consistent ground freeze
6000’ - 7000’	Spring thaw to June 15	September 1 until consistent ground freeze
Above 7000’	Spring thaw to consistent ground freeze	

(1) "Spring thaw" is the earliest date in a new calendar year in which seed can be buried ½ inch into the surface soil (topsoil) through normal drill seeding methods.

(2) "Consistent ground freeze" is the time during the fall months in which the surface soil (topsoil), due to freeze conditions, prevents burying the seed ½ inch through normal drill seeding operations. Seed shall not be sown, drilled, or planted when the surface soil or topsoil is in a frozen or crusted state.

Seeding accomplished outside the time periods listed above will be allowed only when the Contractor's request is approved by the Engineer in writing. If requested by the Contractor, the Contractor must agree to perform the following work at no cost to the County: reseed, remulch, and repair areas which fail to produce species indicated in the Contract.

If seeding is ordered by the Engineer outside the time periods listed above, the cost to repair areas that fail to produce species will be paid for by the County.

212.05 Native Seeding Methods.

Areas to be seeded shall be installed in accordance with SWMP Permanent Stabilization Plan.

All amendments and seeding shall be applied based on the seeding method and rates specified on the plans.

The State required legal tags shall remain on the bag until opened and the seed placed in either the drill or hydraulic seeders in the presence of the Engineer. Seeding work shall not begin until written approval of the worksheet has been received from the Engineer.

In determining the weight of seed required for each work area, the Contractor shall use the Pure Live Seed (PLS) weight shown on each bag of seed. Calculations based on net weight will not be accepted.

Areas damaged due to the Contractor’s failing to protect the seeded areas from foot, vehicle, or other disturbance shall be repaired at no cost to the County. Seeded areas damaged due to circumstances beyond

the Contractor's control shall be repaired and reseeded as ordered. Payment for corrective work, when ordered, shall be at the Contract prices shown.

The following seeding application methods shall not be implemented during winds which are consistently higher than 20 MPH, or when the ground is frozen, excessively wet, or otherwise untillable. Multiple seeding operations shall be anticipated, based on acceptable seeding conditions. The seeding methods to be implemented shall be one or more of the following, as shown on the plans:

(a) *Seeding (Native) Drill.*

(i) *Fertilizer, Compost, Humates and Elemental Sulfur.* The Contractor shall uniformly apply compost and elemental sulfur on the surface of the topsoil using an agricultural spreader at the rate of application specified on the plans. All competitive, non-native vegetation shall be uprooted and hauled offsite prior to spreading amendments.

The Contractor shall homogenously incorporate the compost and elemental sulfur into the top 6 inches of topsoil. Tillage of the amendments shall be completed using a disc and harrow, field cultivator, vibra-shank, or other method suitable to site conditions. For small areas tillage shall be completed using rotary tillers. No measurable depth of organic amendment shall be present on the surface.

The shanks on the back of a grader or dozer shall not be used for tillage. Tillage may take multiple passes to achieve the desired harmonious incorporation. If multiple passes are required, the Contractor shall cross till the soil with the second pass occurring at a 30-degree angle to the first pass. On slope areas, all tillage shall be parallel to the contour. For project that will utilize aggregate or recycled asphalt shouldering material amendments, tillage is not required under shouldering material. Projects seeding up to the edge of pavement, tillage is not required for first 12" from the edge of pavement.

Once incorporation of compost and elemental sulfur is approved, the Contractor shall uniformly apply fertilizer and humates on the surface of the topsoil using an agricultural spreader, as shown in the Contract documents.

(ii) *Seedbed Preparation.* Amended topsoil shall be cultivated to a firm but friable seedbed using cultipacker or seed bed roller implements. Crusted hard soils shall be broken up and all areas shall be free of clods, sticks, stones, debris, concrete, and asphalt in excess of 4 inches in any dimension in accordance with Section 207. Areas shall be left in a rough and uncompacted condition with a surface variance of 2 to 4 inches.

(iii) *Seed and Mycorrhizae.* Prior to seeding, the finished grade of the soil shall be 1 inch below the top of all curbs, junction and valve boxes, walks, drives and other structures. Seeding shall be done within two days of seedbed preparation efforts (tilling or scarifying). If a rain event occurs that compacts or erodes the seedbed prior to performing seeding, the seedbed shall be re-prepared as directed by the Engineer.

Areas shall be seeded by mechanical power drawn drills suitable for area soils, topography, and size followed by packer wheels. Mechanical power drawn drills shall have furrow openers and depth bands set to maintain a planting depth of at least ¼ inch and not more than ½ inch and shall be set to space the rows not more than 8 inches apart. Seeding equipment shall have a double disk opener, seed box agitator, and seed metering device.

The seeder shall be calibrated by collecting seed from a single drop tube in the presence of the Engineer based on the following procedure. The Contractor shall provide the tape measure, scale, collection cup, and seed bag with complete label from the supplier. The Contractor may submit an alternative method for approval at the site Pre-vegetation Conference.

(1) Measure the total width (W) of the drill seeder in feet.

(2) Count the number of drill rows (N) on the seeder.

(3) On drill seeders that the tire drives the seeding mechanism, measure the tire circumference (C) in feet.

(4) Calculate the number of rotations the tire will complete per acre using the following equation:

A =	one acre or 43,560 square feet (SF)
A /W =	feet (F) the drill seeder needs to travel for each acre
F/C =	number of rotations (R) of the tire per acre

(5) Reduce the amount of tire rotations by one tenth.

.90R = # Tire rotations to calibrate seeder (RCS)

(6) Find the seeding rate (LBS PLS / Acre) on the Stormwater Management Plan.

(7) Using the information from the seed tag, convert the PLS seed rate to a bulk seeding rate using the following equations:

% PLS = (% purity (in decimal form) from seed label) x (% germination (in decimal form) from seed label)

(LBS PLS / Acre) from the SWMP / % PLS = Required bulk seed per acre in LBS

(8) Reduce the required bulk seed per acre based on the number of seeder tubes.

Required bulk seed per acre / N = Weight in LBS of bulk seed from one tube

(9) Reduce the required bulk seed rate from the tube by one tenth.

0.90 x Weight of bulk seed from one tube = Collected bulk seed weight (CBS) in LBS

(10) Set the drill seeder to the correct seeding rate using the manufacturer's recommendation.

(11) With the collection cup under one tube and the driving wheel jacked up, rotate the tire the RCS amount of times. Use the value stem to count the rotations.

(12) Using the scale, weigh the seed in the collection cup.

(13) Adjust the drill calibration until the weight of bulk seed in the collection cup equals the CBS in LBS.

Drill seeders shall be recalibrated every time the drill is mobilized onsite. The Contractor shall submit a written statement that the equipment is calibrated, and shall provide the correct depth based on conditions before seeding actions are initiated. The Contractor shall continuously monitor equipment to ensure that it is providing a uniform seed application.

If mycorrhizae is called for on the plans, the granules shall be included with the seed in the drill seeder such that the mycorrhizae is placed at or below the seed.

The distance between furrows produced using the drill shall not be more than 8 inches. If rows on the drill exceed 8 inches, the Contractor shall drill the areas twice (if achievable at 30-degree angles to each other) at no additional cost to the Department.

After seeding, the furrows that were created by the drill shall be maintained in place. Construction traffic, other than what is needed to mulch the areas, shall not be permitted on the areas completed.

Permanent stabilization mulching shall be accomplished within 24 hours of drill seeding.

(b) *Seeding (Native) Hydraulic.*

This method utilizes water as the carrying agent and mixes biotic soil amendments, seed, organic fertilizer, humates, mycorrhizae and elemental sulfur into a single slurry for hydraulic application. The Contractor shall furnish and place combined slurry with a hydro-seeder that will maintain a continuous agitation and apply homogenous mixture through a spray nozzle. The pump shall produce enough pressure to maintain a continuous, non-fluctuating spray that will reach the extremities of the seeding area. Water tanks shall have a means of measuring volume in the tank. Seed shall be added to the slurry onsite, no more than 60 minutes before starting application. Slurry shall be applied from a minimum of two opposing directions to achieve complete soil coverage.

The application of the single slurry shall be applied within four hours of adding Mycorrhizae.

The Contractor shall prevent seed, fertilizer, and mulch from falling or drifting onto areas occupied by rock base, rock shoulders, plant beds, or other areas where grass is detrimental. The Contractor shall remove material that falls on plants, roadways, gravel shoulders, structures, and other surfaces where material is not specified.

(i) *Seedbed Preparation.* All areas shall be loosened to at least 6 inches, leaving the surface in rough condition with a surface variance of 6 to 8 inches. On steep slopes, tillage shall be accomplished with appropriate equipment as the slope is constructed. Soil areas shall be tilled to produce loose and friable surfaces with crusted hard soils broken up. All slopes shall be free of clods, sticks, stones, debris, concrete, asphalt and all other materials in excess of 4 inches in any dimension. All competitive, non-native vegetation shall be uprooted and hauled offsite prior to spreading amendments. Under no circumstances shall the ground surface be smooth and compacted.

(ii) *Biotic Soil Amendment, Fertilizer, Humate, Mycorrhizae and Seed*. The Contractor shall assemble all materials for proposed areas to hydro-seed and review quantities with area of coverage with the Engineer. For the verification process, the Contractor shall provide the Engineer with all documentation for materials in unopened packaging.

The hydro-seeder shall be filled with water to 1/3 of its required volume. Following this, water and biotic soil amendments shall be added to the hydro-seeder at a consistent rate. The ratio of water to Biotic Soil Amendments shall be in accordance with manufacturer's recommendations. Fertilizer, humates and mycorrhizae shall then be added until the tank has reached 3/4 of its required volume. The tank shall then be filled with water to the required volume. Uniform slurries shall be agitated or mixed for a minimum of ten minutes after all water and materials are in the tank.

Hydraulic seeding equipment shall include a pump capable of being operated at 100 gallons per minute and at 100 pounds per square inch pressure. The equipment shall have a nozzle adaptable to hydraulic seeding requirements. Storage tanks shall have a means of estimating the volume used or remaining in the tank.

Seed shall be added to the slurry onsite no more than 60 minutes before starting application. The Contractor shall increase the Seed Plan rates (LBS PLS / Acre) as shown on the plans by 1.5 times at

no additional cost to the Department. The Contractor may be required to apply slurry using multiple hoses to ensure uniform application to all areas of the site. Coverage rates shall be based on the volume of material in the tank, as verified by the Engineer. Areas of lighter applications (covering more area than what is calculated) will require additional application, as directed.

An appropriate curing period shall be in accordance with manufacturer's recommendations, and shall consider forecasted weather conditions.

Permanent stabilization mulching shall be accomplished within 24 hours of hydraulic application of native seed.

(c) *Seeding (Native) Broadcast.*

This method utilizes hand equipment to broadcast spread amendments and seed over prepared seedbeds.

(i) *Fertilizing, Compost, Humate and Elemental Sulfur.* The Contractor shall uniformly apply compost and elemental sulfur on the surface of the placed topsoil using an agricultural spreader at the rate of application specified on the plans. All competitive non-native vegetation shall be uprooted and hauled offsite prior to spreading amendments.

The Contractor shall homogenously incorporate the Compost into the top 6 inches of soil. Tillage of the amendments shall be completed using appropriate tools depending on the size of the area to be worked. Contractor shall use hand tillers or approved small space implements.

Once incorporation of compost and elemental sulfur is approved, the Contractor shall uniformly apply organic fertilizer and humates on the surface of the topsoil using an agricultural spreader.

(ii) *Seedbed Preparation.* Amended topsoil shall be cultivated to a firm but friable seedbed using tractor implements. Crusted hard soils shall be broken up and all areas shall be free of clods, sticks, stones, debris, concrete, and asphalt in excess of 4 inches in any dimension in accordance with Section 207. Areas shall be left in a rough condition with a surface variance of 2 to 4 inches. Under no circumstances shall the ground surface be smooth and compacted.

(iii) *Seed and Mycorrhizae.* Prior to seeding, the finished grade of the soil shall be 1 inch below the top of all curbs, junction and valve boxes, walks, drives and other structures. Seeding shall be accomplished within two days of seedbed preparation efforts (tilling or scarifying) to make additional seedbed preparation unnecessary. If a rain event occurs that compacts or erodes the seedbed prior to performing seeding, the seedbed shall be re-prepared as directed.

Areas shall be seeded by broadcast-type seeders (cyclone or approved mechanical seeders). The Contractor shall increase the Seed Plan rates (LBS PLS / Acre) as shown on the plans by 1.5 times at no additional cost to the Department.

After seeding, mycorrhizae shall be evenly hand-distributed across the area. Seed and mycorrhizae shall be covered by hand raking and covering with ¼ to ½ inch of topsoil. To ensure seeds have a firm contact with the soil the Contractor shall use a heavy roller as approved in the Site Pre-vegetation Conference. Mycorrhizae shall not be exposed to sunlight for more than four hours. Using equipment with continuous cleat tracks (cat-tracking) to cover seed is not permitted.

Permanent stabilization mulching shall be accomplished within 24 hours of broadcast seed application of native seed.

212.06 Seeding (Temporary).

Areas of topsoil shall be seeded with annual grasses in accordance with SWMP Interim Site Maps or as directed by the Engineer.

Seeding may take place at any time during the year as long as the ground is not covered in snow and topsoil is not frozen. Topsoil may be placed in a stockpile or distributed on-grade after receiving subgrade soil preparation.

Interim stabilization for areas that receive temporary seeding shall be in accordance with subsection 208.04(e)2. Seed shall not be included with interim hydraulic mulch applications.

The Contractor shall wait to amend topsoil until the area is ready for permanent seeding with native seed mix shown on the SWMP. The Contractor shall use either the drill, hydraulic, or broadcast method of seeding. Seeding rates (LBS PLS / Acre) shall be increased by 1.5 times for hydraulic and broadcast methods at no additional cost to the Department.

Seed shall meet the requirements of 212.02(a) and shall be selected from Table 212-1 based on the application time.

Table 212-1
Temporary Seed Mixes

Common Name	Botanical Name	Application Time	Seeding Rates (LBS PLS / Acre)	Planting Depth (inches)
Oats	Avena sativa	October 1 - May 1	35	1 - 2
Foxtail Millet	Setaria italica	May 2 - September 30	30	1/2 - 3/4

The Contractor shall restrict motorized vehicle and foot traffic from areas that have received temporary seeding.

212.07 Seeding (Lawn).

Lawn grass seeding shall be accomplished in the seeding seasons in accordance with subsection 212.03.

(a) *Fertilizing and Soil Conditioning.* The first application of fertilizer, soil conditioner, or both shall be incorporated into the soil immediately prior to seeding, and shall consist of a soil conditioner, commercial fertilizer, or both as designated in the Contract. Fertilizer called for on the plans shall be worked into the top 4 inches of soil at the rate specified in the Contract. Biological nutrient, culture, or humate based material called for on the plans shall be applied in a uniform application onto the soil service. Organic amendments shall be applied uniformly over the soil surface and incorporated into the top 6 inches of soil.

The second application of fertilizer shall consist of a fertilizer having an available nutrient analysis of 20-10-5 applied at the rate of 100 pounds per acre. It shall be uniformly broadcast over the seeded area three weeks after germination or emergence. The area shall then be thoroughly soaked with water to a depth of 1 inch.

Fertilizer shall not be applied when the application will damage the new lawn.

(b) *Seedbed Preparation.* In preparation of seeding lawn grass, irregularities in the ground surface, except the saucers for trees and shrubs, shall be removed. Measures shall be taken to prevent the formation of low places and pockets where water will stand.

Immediately prior to seeding, the ground surface shall be tilled or hand worked into an even and loose seedbed to a depth of 6 inches, free of clods, sticks, stones, debris, concrete, and asphalt in excess of 2 inches in any dimension, and brought to the desired line and grade.

(c) *Seeding.* Seed shall be drilled with mechanical landscape type drills. Broadcast type seeders or hydraulic seeding will be permitted only on small areas not accessible to drills. Seed shall not be drilled or broadcast during windy weather or when the ground is frozen or untillable.

212.08 Sodding.

(a) *Fertilizing and Soil Conditioning*. Prior to laying sod, the 4 inches of subsoil underlying the sod shall be treated by tilling in fertilizer, compost, or humates as specified on the plans. Amendments shall be applied uniformly over the soil surface and incorporated into the top 6 inches of soil.

After laying the sod, it shall be fertilized with a fertilizer having a nutrient analysis of 20-10-5 at the rate of 200 pounds per acre. Fertilizer shall not be applied when the application will damage the sod.

(b) *Soil Preparation.* Prior to sodding, the ground shall be tilled or hand worked into an even and loose sod bed to a depth of 6 inches, and irregularities in the ground surface shall be removed. Sticks, stones, debris, clods, asphalt, concrete, and other material more than 2 inches in any dimension shall be removed. Depressions or variances from a smooth grade shall be corrected. Areas to be sodded shall be smooth before sodding occurs.

(c) *Sodding.* Sod shall be placed by staggering joints with all edges touching. On slopes, the sod shall run approximately parallel to the slope contours. Where the sod abuts a drop inlet, the subgrade shall be adjusted so that the sod shall be 1-½ inches below the top of the inlet.

Within one hour after the sod is placed and fertilized it shall be watered. After watering, the sod shall be permitted to dry to the point where it is still wet enough for effective rolling. The Contractor shall roll the sod in two directions with a lawn roller capable of applying between 50 - 80 pounds per square inch of surface pressure to eliminate air pockets.

212.09 Method of Measurement.

The quantities of lawn seeding and the three native seeding types will not be measured but shall be the quantities designated in the Contract, except that measurements will be made for revisions requested by the Engineer, or for discrepancies of plus or minus five percent of the total quantity designated in the Contract.

The quantity of sod will be by the actual number of square feet, including soil preparation, water, fertilizer, and sod, completed and accepted.

Organic Fertilizer, Compost (Mechanically Applied), Humates, Mycorrhizae soil amendments for Seeding (Native) methods drill, hydraulic, and broadcast will be measured by the actual quantity of material applied and accepted.

Measurement for acres will be by slope distances.

212.10 Basis of Payment.

The accepted quantities of lawn seeding, native seeding, soil conditioning, and sod will be paid for at the contract unit price for each of the pay items listed below that appear in the bid schedule. Rejected seed that has been stored longer than 30 days shall be re-ordered at the expense of the Contractor.

Payment will be made under:

Pay Item	Pay Unit
Organic Fertilizer	Pound
Compost (Mechanically Applied)	Cubic Yard
Biotic Soil Amendments (Hydraulic Applied)	Pound
Humate	Pound
Mycorrhizae	Pound
Elemental Sulfur	Pound
Seeding (Native) Drill	Acre
Seeding (Native) Hydraulic	Acre
Seeding (Native) Broadcast	Acre
Seeding (Wetland) Drill	Acre
Seeding (Wetland) Hydraulic	Acre
Seeding (Wetland) Broadcast	Acre
Seeding (Temporary)	Acre
Seeding (Lawn)	Acre
Sod	Square Foot

Topsoil preparation including incorporating and applying amendments, seedbed preparation, water, and seed mix (LBS PLS / Acre) will not be measured and paid for separately but shall be included in the work.

Calibrating, adjusting, or readjusting seeding or fertilizing equipment will not be measured and paid for separately but shall be included in the work.

No additional cost will be accepted for approved substitution of specified seed mix.

Additional seedbed preparation prior to seeding to correct compaction or erosion from storm events will not be measured and paid for separately but shall be included in the work.

Additional mobilizations as needed to complete seeding within allowed seeding seasons will not be measured and paid for separately but shall be included in the work.

Removal of all competitive, non-native vegetation prior to spreading amendments will not be measured and paid for separately but shall be included in the work.

SECTION 250 - ENVIRONMENTAL, HEALTH AND SAFETY MANAGEMENT

250.01 Description

Add the following:

Projects within the Grand Junction urban area may involve work with radioactive soils associated with Uranium Mine Tailings Act (UMTRA) Supplemental Standards Sites. If mill tailings are identified in the project area, the Contractor shall review and abide by the "Uranium Mill Tailings Management Plan- for Managing Uranium Mill Tailings Encountered During Construction Activities in Western Colorado" (CDPHE, updated May 2015). A copy of this plan is available on the CDPHE website.

The Contractor shall be responsible for identification of contaminated materials, worker health and safety, materials management, and if needed, disposal according to state and federal regulations. The Contractor's Monitoring Technician (MT) shall be on site as necessary throughout the excavation to ensure the safety of workers and proper management of potentially contaminated materials, as detailed in the CDOT Standard Specification 250.03(b). The MT's daily monitoring diary shall be submitted to Catherine Venting (CDOT Environmental) at the completion of the project for reporting to Colorado Department of Public Health and Environment (CDPHE).

250.03 General

Add the following:

In addition to the required Health and Safety Plan (HASP), as specified in 250.03(c), the Contractor shall provide a site specific Materials Management Plan (MMP). It will detail radiological survey methods, construction methods, and special handling requirements to minimize dust and erosion; and if required it will specify stockpile, transportation, and disposal methods for encountered contaminants. The MMP shall provide specific details regarding the methods, logistics, and timing of environmental monitoring and survey activities for excavation activities. The plan shall identify the Contractor's representative responsible for environmental compliance and include a contingency plan for addressing unanticipated conditions. The locations of contaminants and avoidance measures shall also be included in the plan. The MMP and the HASP shall be submitted either prior to, or at the Pre-Construction Conference for review and approval by the Engineer.

250.05 Material Handling

Add the following to paragraph *(b) Solid Waste Disposal*:

Gamma detections at or above 20 *u*R/H shall be considered contaminated with radioactive tailings. Over excavation of tailings shall be avoided at all times, therefore only equipment appropriate for the job size will be permitted. The MT shall visibly mark contaminated areas (e.g. spray paint) for the machine operator, as needed. Uncontaminated material shall be segregated and stockpiled separately from contaminated material. Stockpiled material shall be fenced from public access and fully encapsulated. Radioactive tailings shall be re-buried in the same location from which they were removed as soon as possible with a minimum cover of 6-inches of non-radioactive soil. Over excavation of uncontaminated material to accommodate tailings burial will be paid for as Unclassified Excavation. Workers and equipment shall be decontaminated and frisked according to the CDPHE management plan. If on-site replacement of tailings is not feasible, off-site disposal of radioactive tailings shall be coordinated with the CDPHE Environmental Protection Specialist and

approved by the Engineer. Work shall cease when the MT or Engineer determines that the procedures are not or cannot be followed (e.g. high winds or worker non-cooperation).

250.10 Basis of Payment

Add the following:

The cost of the Materials Management Plan will be included in the lump sum of the Environmental Health and Safety Management Pay Item. The management, transport, and disposal of radioactive tailings outside the project area in lieu of stockpile and re-burial shall be paid for under the Materials Handling (Stockpile) unit bid price.

Pay Item	**Pay Unit**
Environmental Health and Safety Management Plan	Lump Sum
Monitoring Technician	Hour
Materials Handling (Stockpile)	Cubic Yard

SECTION 304 - AGGREGATE BASE COURSE

304.02 Aggregate.

Add the following:

Testing of wear (Los Angeles test, T 96) for coarse aggregate for Aggregate Base Course (Class 4, 5, 6 and 7) is not required unless the material is placed as the surface wear course.

If Aggregate Base Course (Class 4, 5, and 6) is placed as the wearing course, the percentage of wear shall not be more than 50.

The aggregate base course (Class 6) shall have a resistance value of at least 78 when tested by the Hveem Stabilometer method.

304.04 Placing.

Add the following:

Shouldering gravel shall not be dumped on asphalt pavement and bladed to the shoulders. The gravel shall be dumped directly on the shoulders by side dump equipment or other methods approved by the Inspector.

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.

SECTION 401 - PLANT MIX PAVEMENTS - GENERAL

401.01 Description.

Add the following:

This work shall consist of providing a Hot Mix Asphalt (HMA) to be placed as shown on the plans, or as directed by the Engineer. The Contractor shall be responsible for Process Control (PC) of the HMA; including the design and control of the quality of the material incorporated into the project.

401.02 Composition of Mixtures.

Delete subparagraph (a) *Mix Design* and replace with the following:

A Job Mix Formula (JMF) design shall be submitted for each mixture required, at least 10 calendar days prior to placing any mix on the project, for acceptance by the Engineer. JMF's previously approved by CDOT within the past six months may be utilized. The JMF design shall be determined using AASHTO T-312 or CP-L 5115 for the Method of Mixture Design. Grading ST, SX, and S shall be designed using 100mm molds. The job mix gradation shall be wholly within the Master Range Table in subsection 703.04 before the tolerances shown in this section are applied.

Designs shall be developed and performed in a materials laboratory that meets the requirements set forth by AASHTO Materials Reference Laboratory (AMRL) for all testing procedures. The design shall be stamped and signed by a Professional Engineer licensed in the State of Colorado. In addition, the Contractor shall submit, as part of the mixture design, laboratory data documents to verify the following:

- Gradation, specific gravity, source and description of individual aggregate and properties, and the final blend.
- Aggregate physical properties.
- Source and Grade of the Performance Graded Binder.
- Proposed Design Job Mix: aggregate and additive blending, final gradation, optimum binder content.
- Mixing and compaction temperatures used.
- Mixture properties shall be determined with a minimum of four binder contents.

The JMF for each mixture shall establish a single percentage of aggregate passing each required sieve size, a single percentage of asphalt cement to be added to the aggregate, and a single temperature for the mixture at the discharge point of the plant.

The Engineer reserves the right to verify the asphalt supplier's mix design for each JMF design utilizing materials produced and stockpiled. The asphalt supplier shall provide, at no cost, a sufficient quantity of each aggregate, mineral filler, Recycled Asphalt Pavement (RAP), and additive for the required laboratory tests, as well as all Certificates of Conformance/Compliance at any time on any material used. The Asphalt Supplier shall provide copies of quality control testing results during the production of HMA used within one business day from the sampling date.

Mixture design of HMA shall meet the requirements of Table 403-1 and Table 403-2 in the Revision to Section 403. For mixes requiring a design gyration of 100 (ESALs greater than 3 million) the Project Special Conditions should be used. This gyration is not recommended for the majority of roads within Mesa County.

Delete subparagraph *(b) Mixtures Furnished to the Project* and replace with the following:

Production verification shall occur prior to, or during, the start of the project. Volumetric properties of the mix shall be verified by LabCAT Level C Certified Technicians. If the mix was produced for another project within the last 90 days, data from that project can be submitted for verification. All mixtures furnished for the project shall conform within the ranges of tolerance listed in Table 401.02A. The mix verification test reports shall be submitted to the Engineer prior to mix placement.

TABLE 401.02A
Production Mix Tolerances

Property	Tolerance
Asphalt Cement Content	± 0.3%
VMA	± 1.2%
Air Voids	± 1.2%

Verification testing for binder content, gradation and physical properties shall be performed at the frequencies listed in Table 401.23-1.

There shall be no substitutions of materials allowed during production, unless approved in advance by the Engineer. All substitutions will require checkpoint verification. If the checkpoint differs from the Job Mix Formula (JMF), a new mix design will be required. Upon request of the Engineer, the binder grade may be changed by one available binder grade level without requiring a new mix design.

Should a change in the source of any material used in the production of HMA (aggregate, mineral filler, lime, or performance graded asphalt binder) occur, a one point verification test (at optimum binder content) of the mix must be performed to verify that the applicable criteria shown on Table 403-1 (HMA) and Table 403-2 (VMA) of Revision to Section 403 are still met. If this testing shows noncompliance, the Contractor shall establish a new job mix design and obtain approval by the Engineer before the new HMA is used.

Add the following new subparagraphs:

(c) *Reclaimed Asphalt Pavement (RAP).* RAP shall be allowed in HMA up to a maximum binder replacement of 23 percent, unless otherwise specified in the contract, and provided that all the specifications for the HMA are met. Fine Aggregate Angularity requirements shall apply only to the virgin fraction of the fine aggregate. RAP shall be of uniform quality and gradation with a maximum size no greater than the nominal aggregate size of the mix. RAP shall not contain clay balls, vegetable matter, or other deleterious substances.

The Contractor shall have an approved mix design for the amount of RAP to be used. The AC content of the RAP utilized in the Contractor RAP mix design shall be the average AC content determined in accordance with 1B or 1C, below, or alternatively, a minimum of five samples of the Contractors RAP stockpile may be sampled and the average AC content of the RAP be determined using AASHTO T-164, Method A or B, or in accordance with 1C below. The Contractor shall determine the total binder replaced by the binder in the RAP pursuant to the following equation:

Total Binder Replaced = (A x B) x 100/E
Where:

A = RAP % Binder Content *
B = RAP % in Mix *
E = Total Effective Binder Content *
* in decimal format (i.e. 2% is 0.02)

The Total Binder Replaced by the binder in the RAP shall not exceed 23 percent of the effective binder content of either the mix design or the produced mix.

The Contractor shall have an approved Quality Control (QC) Plan that details how the RAP will be processed and controlled. The QC plan shall address the following:

1. RAP Processing Techniques. This requires a schematic diagram and narrative that explains the processing (crushing, screening, and rejecting) and stockpile operation for this specific project.

2. Control of RAP Asphalt Binder Content (AASHTO T-164, Method A or B). RAP Asphalt Binder Content may also be determined in accordance with CP-L 5120, provided an RAP AC content correction factor is determined through correlation testing with AASHTO T-164, Method A or B. The correction factor shall be determined by performing correlation testing on the first five samples of the RAP AC content, then at a frequency of one for every five AC content tests thereafter. The correction factor shall be determined by calculating the average difference in AC content between CP-L 5120 and AASHTO T-164, Method A or B, and applying the correction to the AC content determined in accordance with CP-L 5120 :
   Frequency: 1 per 1000 tons of processed RAP material (minimum five tests)

3. (Alternate) The Contractor may propose a RAP asphalt content correction factor to be used in conjunction with CP-L 5120. The proposed CP-L 5120 RAP asphalt content correction factor shall be used with all RAP asphalt contents tested for the mixture design and quality control sampling and testing. The methodology of the proposed CP-L 5120 RAP asphalt content correction factor shall be outlined in detail in the approved RAP QC Plan. At a minimum, the proposed CP-L 5120 correction factor shall identify the principal source locations of the RAP aggregate, gradation of the material tested, and specific ignition oven serial number used in all the RAP asphalt content testing. The RAP source locations, material gradation, and specific equipment used shall substantiate the CP-L 5120 asphalt content correction factor used for the testing. The substantiation must be from data gathered from historical information or specific asphalt content correction data obtained from tests performed on similar virgin aggregate sources, virgin material gradations, and the specific equipment used.

4. Control of RAP Gradation (CP31 or AASHTO T-30):
   Frequency: 1 per1000 tons of processed RAP material (minimum three tests, sampling from belt feed and not stockpile)

5. Process Control Charts shall be maintained for binder content and each screen listed in Table 401.2C, during addition of any RAP material to the stockpile. The Contractor shall maintain separate control charts for each RAP stockpile. The control charts shall be displayed and shall be made available, along with RAP AC extraction testing laboratory reports to the Engineer upon request.

The processed RAP must be 100 percent passing the 31.5 mm (1¼ inch) sieve. The aggregate obtained from the processed RAP shall be 100 percent passing the 25.0 mm (1 inch) sieve. The aggregate and binder obtained from the processed RAP shall be uniform in all the measured parameters in accordance with the following:

Table 401.2C
RAP Binder & Aggregate Uniformity Tolerances

Element	StandardDeviation
Binder Content	0.5
% Passing ¾"	4.0
% Passing ½"	4.0
% Passing 3/8"	4.0
%Passing #4	4.0
% Passing #8	4.0
% Passing #30	3.0
% Passing #200	1.5

(d) *Warm Mix Asphalt (WMA) Technology.* The Contractor may choose to use a WMA Technology that is included on the CDOT approved products list. https://www.codot.gov/business/apl/asphalt-warm-mix.html).

WMA technologies (additive or foaming) used shall be identified on the mix design, indicating usage as a workability additive and/or anti-strip additive. WMA shall be submitted and approved by the Engineer for use on a project.

The addition of WMA additives during production, including foaming, shall be controlled by a calibrated metering system interlocked with the plant's controls per the manufacturers' recommendation. Additives may be added at the asphalt terminal at the dosage rate recommended by the WMA technology provider. The foaming process mixes water and binder to create microscopic steam bubbles. Typical water injection rate is ≤ 2% of binder flow rate or per manufacturers' recommendation.

(e) *Anti-Strip Additives.* Anti-Strip shall be added into the HMA. Anti-Strip agents may be liquids (added to the binder), lime (added to the aggregates) or other products, and shall be submitted for approval by the Engineer.

The minimum value for Tensile Strength Ratio (TSR) tested in accordance with Table 401.21-1 shall be 80% for the mix design and 70% during production.

There are various types of liquid Anti-Strips. Amine and Organo-silane type liquid Anti-Strip additives are physically mixed with the asphalt binder. Liquid Anti-Strip agents shall be added per the manufactures recommendations. Typical product dosages are provided in Table 401.2E-1.

TABLE 401.2E-1
Liquid Anti-Strip Dosage Rates

Type	Typical Dosage Rate
Amine	0.4% to 0.8%
Organo-silane	0.05% to 0.15%

WMA chemical products which display Anti-Stripping characteristics will be classified, and identified on the mix design, as a liquid Anti-Strip additive.

When a liquid Anti-Strip additive is used, the Contractor shall include the following information with the mix design submission:

- Information on the type of liquid Anti-Strip additive to be supplied, including product name, product manufacturer/supplier
- Additive rate
- TSR values for the treated mixes
- The proposed method for incorporating the additive into the plant produced mix

401.03 Aggregates.

Add the following:

The percentage of fractured faces shall be as shown in Table 403.1 of the Revision to Section 403.

Grading ST (3/8" nominal) mixes may be used for leveling, maintenance, bike paths, sidewalks and thin lift overlays. Grading SX (1/2" nominal) mixes shall be used on top and bottom lifts, accesses, and for patching. Grading S (3/4" nominal) mixes may be used for bottom lifts.

401.05 Hydrated Lime.

Add the following:

Hydrated lime shall not be used as an anti-strip agent.

401.06 Asphalt Cement.

Revise the second paragraph to read as follows:

The asphalt cement shall meet the applicable requirements of subsection 702.01.

Add the following:

The Contractor shall provide to the Engineer acceptable 'Certifications of Compliance' of each applicable asphalt binder grade from the supplier. Should testing or certificate show nonconformance with the specifications, the asphalt binder may be rejected. When production begins, the Contractor shall, upon request, provide to the Engineer a one quart can of each specified asphalt binder for analysis. Additionally, the Contractor shall provide the refinery test results that pertain to the asphalt binders used during production.

Based on climatic conditions and reliability, binder grades approved for use in Mesa County are as follows in Table 401.06A-1:

TABLE 401.06A-1
Recommended Performance Graded Binders

Condition	Non-modified Binder	Modified Binder
Low volume local roads (ex. subdivisions), bike paths, and sidewalks	PG 58-28	
Free flowing traffic loads and 300,000 to 1 million 18K ESAL	PG 64-22	
Free flowing traffic loads and 300,000 to 1 million 18K ESAL, plus above 6000 elevation	PG 58-28	
Slow moving or standing trucks, major street intersections and/or 10,000,000 18K ESAL		PG 76-28 (top lift only)

Binder grades other than those shown above shall not be used unless the proposed binder and the mix design are approved in writing by the Engineer. The asphalt cement shall meet the requirements of subsection 702.01

401.07 Weather Limitations and Placement Temperatures.

Revise as follows:

Surface temperatures shall be used to determine placement of APM. APM produced with documented WMA will be allowed a reduction in minimum surface temperatures for placement as provided in Table 401.07A-1. Ambient temperatures and other weather conditions shall be considered prior to placement.

TABLE 401.07A-1
Minimum Surface Temperatures for placement of APM

Compacted Layer Thickness (in.)	Minimum Surface Temperature (ºF)			
	Top Layer		Layers Below the Top Layer	
Product	APM	with WMA	APM	with WMA
<1½	60	50	50	40
1½ - <3	50	45	40	35
3 or more	45	40	35	35

If the Contractor modifies the placement and compaction processes when ambient temperatures are below minimum surface temperatures in Table 401.07A-1, they shall demonstrate to the Engineer the required in-place density has been achieved. APM cooling software such as PaveCool, or MultiCool can be used to determine placement and compaction times available.

401.08 Asphalt Mixing Plant.

Delete the last paragraph of the subsection.

401.09 Hauling Equipment.

Add the following:

The Engineer may reject any HMA which demonstrates it has been contaminated from a petroleum distillate release agent. The Engineer may reject any uncovered HMA which demonstrates it has been impacted by contamination and/or weather.

401.10 Asphalt Pavers.

Delete the twelve paragraph and replace with the following:

Contractor shall submit for and receive approval of the screed control devices to be utilized on the paver prior to use for placing HMA on the project.

Add the following:

A Material Transfer Vehicle (MTV) or Material Transfer Device (MTD) may be required for placement of the HMA when specified in the contract documents. The MTV shall be a self-propelled unit with on board storage of material. An MTD is a non-self-propelled unit. Both MTV and MTD are capable of receiving material from trucks or from the ground, transferring the material from the unit to a paver hopper insert via a conveyor system.

Safety Edges will be required on the outside edge of all county roads that do not butt up to a finished concrete edge. A Safety Edge will also be required on any longitudinal joints that will be opened to traffic at the end of the work shift prior to paving the adjacent pass.

401.11 Tack Coat.

Delete and replace with the following:

A tack coat shall be applied between pavement course and to all existing concrete and asphalt surfaces per Section 407. Tack coat is considered incidental to the cost of the HMA.

401.15 Mixing.

Add the following:

If a WMA technology (additive or foaming) is used, the discharge temperatures may be lowered during production at the discretion of the Contractor provided all specifications are achieved. Mix design is to indicate revised allowable discharge temperatures with WMA usage.

401.16 Spreading and Finishing.

Revise as follows:

Joints in the top layer of new pavement shall be located on lane lines unless otherwise shown on the plans. Longitudinal joints shall be minimized with wide paving pulls. Transverse joints shall be formed by cutting back on the previous run to expose the full depth of the course. Tack coat material shall be applied to contact surfaces of all joints before additional mixture is placed against the previously compacted material.

Allowable lift thickness to be placed is a minimum of 3 time, and maximum of 5 times, the nominal aggregate size for the mix unless otherwise approved by the Engineer.

401.17 Compaction.

Revise as follows:

Equipment used for compaction of the HMA will be at the discretion of the Contractor. The number, weight, and type of rollers furnished shall be sufficient to obtain the required density and surface texture.

All joints shall be compacted to 92% of maximum theoretical specific gravity (Rice), taken six inches offset from the joint. The allowable variance shall be ±2%. Joint density will be determined using nuclear density equipment.

Delete paragraphs six through eight, and paragraphs eleven to the end of the subsection and replace with the following:

Cores may be used to verify compaction results. The Contractor shall core the pavement, as required by the Engineer**;** in accordance with AASHTO T 230, Method B, or for field calibration of nuclear density equipment in accordance with the ASTM D 2950. At a minimum, cores for nuclear density equipment correlation shall be taken at the beginning of placement of each project or change of mixture materials or gradation, unless otherwise approved by the Engineer. If the correlation cores were produced for another project within the last 90 days, data from that project can be submitted for verification, if no change in materials or gradation has occurred. When cores are used, the Contractor shall provide all labor and equipment for the coring and repair of the holes.

Along forms, curbs, headers, walls, and all other places not accessible to the rollers, the mixture shall meet all project compaction specifications. Any mixture that is defective, shall be corrected to meet the project specifications at the expense of the Contractor.

401.20 Surface Smoothness.

Delete and replace with the following:

The finish surface elevation of the pavement shall be measured using a 10-foot straightedge both transverse and longitudinal. The Contractor shall furnish provide an operator to aid the Inspector in testing the finished pavement surface. Areas to be measured shall be as directed by the Inspector. Surface smoothness shall be verified immediately following the finish roller pass. Surface variation shall not exceed 3/16 inch in 10 feet for full lane width paving. For patching, the variation shall not exceed 3/8 inch in 10 feet. The final pavement surface shall not vary from the specified cross section by more than one inch at any point. Transverse measurements for variations shall exclude breaks in the crown sections. If the surface tolerance exceeds 3/16" across transverse joints, measured in at least three locations, the Contractor shall make corrections to the joint before proceeding. All corrections shall be made at the Contractor's expense.

The final surface pavement adjacent to curb and gutter shall be finished from 1/8-inch to 3/8-inches above the lip for catch curb and shall not extend above the lip for spill curb.

The Contractor shall adjust all manholes, valve boxes, and survey range boxes 1/8 to 1/4-inch below final grade and adjusted to match the slope of the roadway. Valve boxes and manholes are to be maintained fully accessible at all times for emergency and maintenance operations. The cost of adjusting valve boxes,

manholes, and survey range boxes shall be included in the work, unless otherwise specified. The Contractor shall be responsible for any cost incurred by the County or Utility Owner to provide access to the covered manholes or valve boxes. Final adjustment of all utility access points shall be completed within seven days of from the time the HMA was placed.

Add the following new subsections:

401.23 Testing and Inspection

The Contractor shall assume full responsibility for controlling all operations and processes to meet the Specifications. The Contractor shall perform all tests necessary for process control purposes on all elements at the frequency listed. The Contractor shall maintain a log of all process control testing. Test results that have sampling or testing errors shall not be used. Process control testing shall be performed at the expense of the Contractor.

Laboratories shall be accredited by AASHTO Materials Reference Laboratory (AMRL) for the tests being performed. Technicians obtaining samples and conducting compaction tests must have a LabCAT Level A certification. Technicians conducting tests of asphalt content and gradation must have a LabCAT Level B certification. Technicians performing volumetric testing must have a LabCAT Level C certification. Equivalent NICET certification for all technicians is acceptable.

When requested by the Engineer, the Contractor shall submit a quality control plan that addresses production, sampling, testing, and qualifications of testing personnel, timing, and methods for making adjustments to meet the specifications. The Contractor will provide a process or schedule for making corrections for material that was placed but does not meet specifications as well as obtain a follow up sample immediately after corrective actions are taken to assess the adequacy of the corrections. In the event the follow-up process control sample also fails to meet Specification requirements; the Contractor shall cease production of the asphalt mixture until the problem is adequately resolved to the satisfaction of the Engineer.

Field control testing of dense graded asphalt mixes for the above tests shall meet the requirements of Table 1 included in the Process Control and Owner Acceptance section of these Specifications and Table 403-2 in the Revision to Section 403.

401.24 Acceptance

If any materials furnished, or work performed, fails to meet the specification requirements, such deficiencies shall be documented and reported to the Engineer. Copies of all process control tests shall be delivered to the Engineer within one business day. Test results that cannot be completed within one day shall be provided to the Engineer no later than three days after the sample was obtained.

Owners Acceptance (OA) test results, if any, and/or Process Control (PC) test results will be evaluated to determine acceptability. If the Contractor does not meet the project specifications, but acceptable work has been produced, the Engineer shall determine the extent of the work to be accepted. If the Engineer determines the work is not acceptable, the Contractor shall correct the work, as approved by the Engineer, at the expense of the Contractor.

SECTION 403 – HOT MIX ASPHALT

403.02 Materials

Delete and replace with the following:

The materials shall conform to the requirements of subsections 401.2 of the Revised Section 401 above.

The design mix for hot mix asphalt (HMA) shall conform to the following Table 403-1 and Table 403-2:

Table 403-1
Mixture Properties for Hot Mix Asphalt

Property	Test Method	Value
Air Voids, percent at: N (design)	AASHTO T-132, CPL 5115	3.0-4.0
Lab Compaction (Revolutions): N (design)	CPL 5115	75
Hveem Stability, (Grading ST, SX & S only)	CPL 5106	28 min.
Aggregate Retained on the 4.75 mm (No. 4) Sieve for S, SX and SG, and on the 2.36mm (No. 8) Sieve for ST and SF with at least 2 Mechanically Induced fractured faces	CP 45	80% min.
Accelerated Moisture Susceptibility Tensile Strength Ratio (Lottman)(for S & SX mixes)	AASHTO T-283 Method B, CPL 5109 Method B	80 min.
Minimum Dry Split Tensile Strength, kPa (psi)	CPL 5109 Method B	205 (30) min.
Voids in the Mineral Aggregate (VMA) % minimum	CP 48, AI-SP2	See Table 403-2
Voids Filled with Asphalt (VFA)	AI MS-2	65-80%
Dust to Asphalt Ratio: Fine Gradation Coarse Gradation	CP 50	 0.6 – 1.2 0.8 – 1.6

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

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

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

Table 403-2
Minimum Voids in Mineral Aggregate (VMA)

Nominal Maximum Size*, mm (inches)	***Design Air Voids **		
	3.0%	**3.5%**	**4.0%**
19.0 (¾)	13.5	13.6	13.7
12.5 (½)	14.5	14.6	14.7
9.5 (⅜)	15.5	15.6	15.7

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

403.03 Construction Requirements

Delete the first paragraph and replace with the following:

The construction requirements shall be as prescribed in subsections 401.3 through 401.14 of the Revised Section 401 above.

403.04 Method of Measurement

Delete and replace with the following:

Hot Mix Asphalt will be measured by the ton or the square yard. Batch weights will not be permitted as a method of measurement when measured by the ton. The tonnage shall be the weight used in the accepted pavement.

403.05 Basis of Payment

Delete and replace with the following:

The accepted quantities of hot mix asphalt will be paid for in accordance with subsection 401.22, at the contract unit price per ton or square yard for the asphalt mixture.

Payment will be made under:

Pay Item	**Pay Unit**
Hot Mix Asphalt (Grading __)(PG___)	Ton
Hot Mix Asphalt (Grading __)(PG ___)(___")	Square Yard
Hot Mix Asphalt (Patching)	Square Yard

Aggregate, asphalt cement, asphalt recycling agent, additives, hydrated lime, tack coat, and all other work necessary to complete each hot mix asphalt items will not be paid for separately but shall be included in the unit price bid.

Excavation, preparation, and tack coat of areas to be patched will not be measured and paid for separately, but shall be included in the work.

SECTION 407 – PRIME COAT, TACK COAT, AND REJUVENATING AGENT

407.01 Description

Add the following:

Prior to placement of APM, a tack coat shall be applied to all existing concrete and asphalt surfaces which will be in contact with new APM.

407.02 Asphalt Material.

Add the following:

The tack coat shall meet the specification for emulsified asphalt, consisting of CSS-1h or SS-1h, and conform to AASHTO M208 or M140.

407.07 Application of Asphalt Material.

Add the following:

The tack coat shall be applied at the rates specified in Table 407-1. The surface receiving the tack coat shall be dry and clean, and dust, debris, and foreign matter shall be removed. Tack coat shall be applied uniformly. The Contractor shall allow the tack coat to cure (dehydrate) prior to the placement of APM. If the tack becomes contaminated during construction, it shall be cleaned, and if necessary, additional tack coat shall be reapplied and allowed to cure before paving resumes.

TABLE 407-1
Tack Coat Application
Rates

Pavement Condition	Application Rate (gal/yd^2)		
	Residual	Undiluted	Diluted (1:1)
New asphalt	0.03 - 0.04	0.05 – 0.07	0.10 – 0.13
Oxidized asphalt	0.04 – 0.06	0.07 – 0.10	0.13 – 0.20
Milled Surface (asphalt)	0.06 – 0.08	0.10 – 0.13	0.20 – 0.30
Milled Surface (PCC)	0.06 – 0.08	0.10 – 0.13	0.20 – 0.30
Portland Cement Concrete	0.04 – 0.06	0.07 – 0.10	0.13 – 0.20

407.09 Method of Measurement and Basis of Payment.

Delete and replace with the following:

Tack Coat will not be measured and paid separately but shall be considered included in the work for Section 401 – Asphalt Pavement Materials.

SECTION 412 – PORTLAND CEMENT CONCRETE PAVEMENT

412.17 Surface Smoothness Test.

Delete and replace the following:

Roadway smoothness shall be tested as described below. Testing will not be measured and paid for separately, but shall be included in the work.

The finished surface elevation of the pavement will be measured using a 10 foot straightedge both transversely and longitudinally. The Contractor shall furnish provide an operator to aid the Inspector in testing the finished pavement surface. Areas to be measured shall be as directed by the Inspector. Areas showing high spots of more than 3/16 inch in 10 feet shall be marked and diamond ground until the high spot does not exceed 3/16 inch in 10 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 the line 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.

SECTION 420 – GEOSYNTHETICS

420.02 Materials.

Add the following:

Geogrids used for reinforcement of aggregate base course or for subgrade stabilization/separation shall meet the minimum strength and other physical properties specified in the project contract documents and shall be approved by the Engineer prior to placement.

420.10 Basis of Payment.

Add the following:

Geogrid for stabilization will be paid for under:

Pay Item	**Pay Unit**
Geogrid	Square Yard

SECTION 601 – STRUCTURAL CONCRETE

601.02 Classification.

Add the following:

Concrete for construction of curbs, gutters, sidewalks, curb ramps, driveway approaches, corner filets, drainage pans, median cover and trails shall be Class B unless otherwise noted in plans or Project Special Provisions.

601.03 Materials.

Add the following:

Calcium chloride shall not be used in any concrete. All cement, flyash, admixtures, and curing materials shall be from the CDOT Approved Product List.

601.09 Forms, 601.12 Placing Concrete, and 601.13 Curing Concrete Other Than Bridge Decks.

Revise as follows:

Field-cured cylinders may be used in lieu of maturity meters for determining concrete compressive strength for form removal, loading, opening to traffic, backfilling, or curing, unless otherwise specified in the plans or Project Special Provisions.

601.12 Placing Concrete.

Add the following to subsection (a) *General:*

Hand finishing concrete will be permitted only when performed under the direct supervision of a craftsman holding the following certificate: ACI Concrete Flatwork Finish and Technician or other similar approved certification program.

601.14 Finishing Hardened Concrete Surfaces.

Add the following to subsection (b) 4. Structural Concrete Coating.

Structural Concrete Coating material shall be from the CDOT Approved Product List with color matching Tammscoat Adobe with Fine White texture.

601.17 Acceptance and Pay Factors.

Revise as follows:

These provisions apply to all concrete utilized in Mesa County including curb, gutter and sidewalks.

SECTION 602 – REINFORCING STEEL

602.08 Basis of Payment.

Add the following:

Dowel bars, tie bars and reinforcing steel required in curb, gutter, sidewalk, drainage pans, fillets, concrete pavement and miscellaneous concrete items will not be measured or paid for separately, but shall be included in the Work.

SECTION 603 – CULVERTS AND SEWERS

603.02 Materials.

Add the following:

Materials for sewer lines shall meet the requirements of the entity who owns and maintains the sewer line.

The Contractor will be held responsible for the safe storage and protection of all pipe and materials delivered to the work site. The interiors of all pipe and fittings shall be kept free from dirt and foreign matter at all times. Gaskets for pipe joints shall be stored in a cool location out of direct sunlight.

603.04 Excavation.

Add the following:

The length of open trench shall be kept to a minimum and shall not exceed the length necessary to accommodate pipe laying and backfilling operations unless otherwise approved by the Inspector. The Contractor shall be responsible for covering or barricading unattended trenches and excavations as necessary for protection of the public and the work. Any open trench left open overnight shall have the entire perimeter of the excavation fenced, lighted and barricaded with construction equipment and/or jersey barriers. No traffic lane shall be blocked by an open excavation, piece of equipment of other obstruction without a proper lane closure, road closure or other approved traffic control.

603.05 Bedding.

Delete and replace with the following:

Unless otherwise directed or specified in the plans or Project Special Provisions, all trenches shall be excavated to at least six (6) includes below the pipe grade and backfilled to grade with approved granular bedding material in accordance with Section 206. The bedding material shall be hand shaped and graded until the trench bottom is uniform and free from rocks, bumps and depressions. A coupling or bell hole shall be dug at each pipe joint with sufficient length, width and depth to permit assembly of the joint and provide a minimum clearance of two (2) inches between the coupling and the trench bottom.

After the pipe is joined, pipe bedding material shall be placed and tamped under each pipe joint until all voids are filled. Care shall be taken not to displace the pipe from its line and grade.

603.06 Placing Conduit.

Add the following:

Sewer line construction shall meet the requirements of the entity who owns and maintains the sewer line.

Variance from the design slope shall be maintained within +/- 0.04% of the design slope. At no point however, shall the slope be permitted to drop less than the allowed minimum positive slope of 0.40%.

The inside of the pipe and jointing surfaces shall be kept clean and free from mud, soil, gravel, groundwater, and other foreign material. When pipe laying is not in progress, the upgrade end of the pipe shall be kept closed with a tightly fitting cap or plug.

603.09 Backfilling.

Delete the third paragraph and replace as follows:

Sanitary sewer lines, when completed, shall be tested in accordance with the requirements of the entity who owns and maintains the sewer line, before any backfill is placed. Deflection and alignment testing shall be completed prior to paving.

Add the following:

Cutoff walls shall be installed along every utility line to inhibit the movement of ground water through the screened rock bedding. Cutoff walls shall be 5 to 10 feet long and consist of native material or imported material that has a permeability rate the same or less than that of the native material. Cutoff walls shall be installed at intervals not exceeding 200 feet on pressurized lines. On gravity flow lines, cutoff walls shall be installed on every line, 10 to 20 feet upstream of every manhole or box.

Jetting or water soaking trenches to achieve compaction of the backfill will not be permitted.

A minimum of 24 inches of compacted backfill shall be placed over the top of all plastic pipe before vehicles or heavy equipment are allowed to pass over the pipe. Less cover may be allowed only when flow-fill is used for the initial backfill over the pipe spring line.

603.10 Deflection Testing of Metal and Plastic Pipe.

Revise the fourth sentence to read as follows:

Measurement shall be made after backfilling to subgrade but prior to paving.

603.12 Method of Measurement

Delete the first paragraph and replace with the following:

Unless otherwise specified, conduit of the various sizes, types and classes shown on the Bid Schedule will be paid at the contract unit price per linear foot along the centerline of the accepted conduit from end to end. The footage of conduit to be paid will include the lengths of wyes, fittings, valve vaults and manholes in line with the pipe but will not include the length of storm drain inlet boxes, culvert end sections or other structures in line with or connected to the pipe. Conduit terminating at a manhole shall be measured from (or to) the point of intersection with the center of the manhole.

603.13 Basis of Payment

Delete the third paragraph and add the following:

The contract unit price for each conduit type shall include excavation, bedding, pipe installation, native material backfill and compaction, cutoff walls, deflection testing, and pressure testing of sewer lines.

When native material from the trench is unsuitable for backfill, as determined or agreed to by the Engineer, "Imported Trench Backfill" will be paid in accordance with Section 206.

SECTION 604 – MANHOLES, INLETS, AND METER VAULTS

603.02 Materials.

Add the following:

Materials for sewer manholes and water meter vaults shall meet the requirements of the entity who owns and maintains the sewer or water lines.

The Contractor will be held responsible for the safe storage and protection of all pipe and materials delivered to the work site.

604.04 Manholes, Inlets and Meter Vaults.

Add to the following:

(b) *Manholes*. Flat top lid slabs will not be allowed for manholes located in an asphalt road section, unless otherwise shown on the plans.

There shall be no visible infiltration into any sanitary sewer manhole after construction. If there is visible infiltration, the manhole shall be repaired to stop visible infiltration at the Contractor's expense.

The manhole ring and cover shall be set to match the adjacent ground or pavement surface. Concrete grade rings shall be dry stacked to within 2" of the bottom of the cast iron grade ring elevation. The cast iron manhole ring shall be set to the final pitch and elevation with shims or other approved devices. The space between the top grade ring and the manhole ring shall be filled with quick set grout with a compressive strength of 3000 psi in 1 hour.

Structures in the traveled roadway, including manhole covers, shall be adjusted to a tolerance of 1/8" to ¼" below the paved surface of the roadway or 1 inch above the finish grade of the Aggregate Base Course surface.

(c) *Inlets*. All grates and frames in traffic areas shall be bicycle safe and shall be designed to withstand HS-20 loading.

604.05 Backfilling.

Add to the following:

Cast-in-place manholes, inlets and other concrete structures shall not be backfilled until the concrete and mortar therein has attained a minimum compressive strength of 2000 psi and can sufficiently support the loads imposed by the backfill. Each layer of backfill shall not exceed 8 inches before compacting to the required density and before successive layers are placed. All backfill placed within two (2) feet measured horizontally from any structure shall be compacted with hand operated mechanical equipment.

SECTION 608 – SIDEWALKS AND BIKEWAYS

608.02 Materials and 703.07 Bed Course Materials (a).

Revise as follows:

Base course materials for sidewalks and bikeways shall meet the requirements of subsection 703.03, Class 6 aggregate base course.

Color concrete for median islands shall be Davis Color Terra Cotta (10134) or approved equal.

Add the following:

Detectable warnings on curb ramps shall be truncated domes of the dimensions shown on the plans or on Standard Plan M-608-1 Curb Ramps.

Unless specified otherwise in the Contract, the color of the domes and their underlying surface shall be yellow conforming to Federal Color Standard 33538.

Material for the truncated domes shall be embeddable surface plates. The domes shall be prefabricated by the manufacturer as a pattern on embeddable surface plates. Plates shall be one of the plates allowed for use as detectable warnings listed on CDOT's Approved Products List. Prior to the start of work, the Contractor shall submit appropriate documentation from the manufacturer verifying that the required contrast has been met, along with a sample plate to the Engineer for approval.

608.03 Concrete Sidewalks and Bikeways.

(a) ***Excavation.***

Add the following:

The subgrade under base course material for all concrete shall be adjusted to optimum moisture content and uniformly compacted to no less than 95 percent of the maximum density determined in accordance with AASHTO T-99. Bed course material shall be placed on prepared subgrade to the dimensions shown on the plans and compacted to a minimum of 95 percent of the maximum density determined in accordance with AASHTO T-180.

(b) ***Forms.***

Add the following:

Where concrete curbs, gutters, drainage pans or fillets are to be removed and replaced adjacent to asphalt pavement, the existing pavement edge may be used as a face form for the new concrete if the pavement edge is not damaged, straight, and level with the new concrete grade.

(c) ***Placing Concrete.***

Add the following:

The concrete shall be thoroughly consolidated by tamping and spading, vibrating, or other acceptable methods. Concrete shall not be placed on frozen ground or on frozen bed course.

(d) ***Finishing.***

Add the following:

Hand finishing concrete will be permitted only when performed under the direct supervision of a craftsman holding the following certificate: ACI Concrete Flatwork Finish and Technician or other similar approved certification program.

No water shall be placed on concrete surfaces during finishing operations. The Contractor shall keep plastic sheeting or other waterproof covering available on the job site to cover and protect the surface of freshly placed concrete against rain and/or dust storms.

Surface finishing shall be minimized to prevent dilution and weakening of the concrete mixture at the surface. Finishing with steel trowels will not be allowed.

It shall be the Contractors responsibility to protect new concrete against vandalism, vehicular damage and defacement of any kind until it has been accepted by the County. All damaged or deface concrete shall be repaired or replaced, as directed, at the Contractor's expense.

(e) ***Joints.***

Revise as follows:

Transverse expansion joints shall be placed in sidewalk at both ends of intersection radii, and at other locations shown on the plans. The maximum spacing of expansion joints in continuous sidewalk shall be 500 feet. Isolation expansion joints shall be placed around all appurtenances such as manholes, utility poles, sign posts, etc. and between new concrete and any fixed structure such as a building or bridge.

Contraction joints shall be installed at a uniform spacing of a maximum of 10 feet, or 1.5 times the width, whichever is less, and a minimum of 5 feet. Contraction joints may be formed with a jointing tool or by saw cutting after the concrete has hardened. Sawed joints shall be installed immediately after the concrete has hardened and before irregular shrinkage cracks form in the concrete. When contraction joints are saw cut, hand tooled contraction joints shall be installed at intervals not to exceed (50) fifty feet to prevent shrinkage cracking before the remaining joints are cut.

When new concrete is placed adjacent to existing concrete, the joint type and spacing shall match those in the existing concrete.

(f) ***Curing.***

Revise as follows:

Curing shall be in accordance with Section 601.13 except that minimum curing period shall be three days and maturity meters are not required.

Vehicular traffic shall not be allowed on new concrete until 5 days after placement or until the concrete reaches a compressive strength greater than or equal to 80 percent of design strength.

Add the following paragraphs:

(g) ***Surface Tolerance.*** Concrete shall be finished to a smooth and uniform surface, which shall at no point deviate from plan elevation more than ¼ inch. On sidewalks and path, no low spots or depressions shall be detectable when tested with a 10 foot straight edge laid transverse to the longitudinal centerline. Sections of sidewalk on which water ponds or does not drain from the surface, shall be removed and replaced at Contractor's expense.

(h) ***Detectable Warnings for curb ramps.*** Prior to installation of the plates, concrete conforming to subsection 608.02 shall be installed and consolidated as a base for the plates. The concrete shall be placed to a thickness that will allow the base surface of the plates to be at the same elevation as the adjacent concrete. The plates shall be embedded into the plastic concrete in accordance with the manufacturer's specifications.

608.05 Method of Measurement.

Add the following:

Curb ramp pay area, including detectable warning surface, will be measured in accordance with CDOT M-608-1, Sheet 1 of 10.

608.06 Basis of Payment

Add the following:

The following items are considered incidental to the various concrete items and will not be measured or paid for separately: saw cutting joints, cure and seal compounds, joint materials, tie bars, dowel bars, reinforcing steel and insulating blankets or heating required for concrete protection.

Detectable warnings on curb ramps, including plates and all other work and materials necessary for fabrication, transport, and installation will not be measured and paid for separately, but shall be included in the work for Curb Ramp.

SECTION 609 – CURB AND GUTTER

609.02 Materials and 703.07 Bed Course Materials (a).

Revise as follows:

Materials shall meet the requirements of Section 601.03.

Base course materials for curb and gutter shall meet the requirements of 703.03, Class 6 aggregate base course.

609.03 Cast-in-Place Concrete Curb.

(a) Excavation.

Add the following:

The subgrade under base course material for all concrete shall be adjusted to optimum moisture content and uniformly compacted to no less than 95 percent of the maximum density determined in accordance with AASHTO T-99. Bed course material shall be placed on prepared subgrade to the dimensions shown on the plans and compacted to a minimum of 95 percent of the maximum density determined in accordance with AASHTO T-180.

(b) ***Forms.***

Add the following:

Where concrete curbs, gutters, drainage pans or fillets are to be removed and replaced adjacent to asphalt pavement, the existing pavement edge may be used as a face form for the new concrete if the pavement edge is not damaged, straight, and level with the new concrete grade. Asphalt may be cut and removed to the extent necessary for form placement and will be restored by the Contractor as part of the work. Asphalt patching must be completed before overlaying a road and will not be paid for as a separate item.

(d) ***Sections.***

Add the following:

When new concrete is placed adjacent to existing concrete, the joint type and spacing shall match those in the existing concrete.

(e) ***Expansion Joints.***

Add the following:

Expansion joints shall be placed in curb and gutter at both ends of intersection radii, and at other locations shown on the plans. The maximum spacing of expansion joints in continuous curb and gutter shall be 500 feet. Isolation expansion joints shall be placed around all appurtenances such as manholes, utility poles, sign posts, etc. and between new concrete and any fixed structure such as a building or bridge.

(f) ***Curing.***

Revise as follows:

Curing shall be in accordance with subsection 601.13 except that minimum curing period shall be three days and maturity meters are not required.

Vehicular traffic shall not be allowed on new concrete until 5 days after placement or until the concrete reaches a compressive strength greater than or equal to 80 percent of design strength.

609.06 Method of Measurement

Add the following:

Concrete at intersections, including curb gutters and filets, will be measured in accordance with CDOT M-609, Sheet 1 of 4.

The following items are considered incidental to the various concrete items and will not be measured or paid for separately: saw cutting joints, cure and seal compounds, joint materials, tie bars, dowel bars, reinforcing steel and insulating blankets or heating required for concrete protection.

SECTION 614 – TRAFFIC CONTROL DEVICES

614.02 Sign Posts and Sign Structures.

Revise as follows:

Sign posts installed within the County right-of-way shall be steel U-channel posts, 3#/ft., painted green, unless otherwise noted on the plans. Lengths provided shall be as follows:

1. 12' long posts shall be used for:
   a. Single signs up to 7 sq. ft. wind loading area
   b. Double post mounting signs for signs up to 8 sq. ft. wind loading area

2. 14' long posts shall be used for:
   a. Warning sign assembly (2 signs) up to 9 sq. ft. wind loading area
   b. Single square or diamond shaped signs up to 9 sq. ft. wind loading area
   c. Double post mounting signs for signs 10-16 sq. ft. wind loading area

3. 8' long posts shall be used for:
   a. End of road markers
   b. Object markers

The use of concrete for mount stabilization will not be allowed. If a stable mount cannot be achieved at minimum sign mounting heights, greater driven depths must be used in conjunction with longer channel posts.

614.04 Sign Panels.

Revise as follows:

Within the County right-of-way, sign panels shall be constructed with 6 inch white letters on a green background with a 3/8 inch white border. Sign dimensions shall be a minimum of 9 inches high by 30 inches wide. The font shall be Highway Gothic "E". Sign substrate shall be aluminum alloy with 3M High Intensity Prismatic sheeting, 3M DG Cubed sheeting, or approved equal. Sign blanks shall be .080 inch thick except for street name signs which are to be .100 inch.

Object Markers for ends of roadways shall be Type OM4-2 per the Manual of Uniform Traffic Control Devices (MUTCD) Section 2C.63 and 66.

All sign panels, except street name signs, shall be mounted on the wide, or open, side of the channel post with 5/16" dia. Grade 5 bolts with nylon lock-nuts and 1-1/2" diameter fender washers. Bolts shall protrude beyond the lock nut by at least a full thread after assembly, and care should be exercised when tightening the bolts so as not to create a "dimple" in the aluminum sign.

Street name signs shall be mounted with cast aluminum brackets with 6" slots and 5/16" set screws attached to the channel posts with 1" x 5/16" set screws. Street name sign blades up to 36 inch long can be mounted using 6" brackets. 42 inch long and larger blades, or blades 12" tall, will have 12" brackets.

614.09 Construction Requirements.

Revise as follows:

Traffic sign installation shall conform to the mounting height and lateral clearance restrictions illustrated in the MUTCD, Part IIA. Street name signs shall be mounted at a height of 9 ft. min. and 9.5 ft. max., as measured from the bottom of the sign to the roadway surface.

SECTION 619 - WATERLINES

619.02 Materials.

Revise as follows:

Materials shall met the requirements of the entity who owns and maintains the waterline.

The Contractor will be held responsible for the safe storage and protection of all pipe and materials delivered to the work site. The interiors of all pipe and fittings shall be kept free from dirt and foreign matter at all times. Gaskets for pipe joints shall be stored in a cool location out of direct sunlight

619.03. General

Add the following:

Water line construction shall meet the requirements of the entity who owns and maintains the water line. Waters lines shall be tested in accordance with the requirements of the entity who owns and maintains the water line.

Unless otherwise directed or specified in the Special Provisions, all trenches shall be excavated to at least six (6) includes below the pipe grade and backfilled to grade with approved granular bedding material. The bedding material shall be hand shaped and graded until the trench bottom is uniform and free from rocks, bumps and depressions. A coupling or bell hole shall be dug at each pipe joint with sufficient length, width and depth to permit assembly of the joint and provide a minimum clearance of two (2) inches between the coupling and the trench bottom.

After the pipe is joined, pipe bedding material shall be placed and tamped under each pipe joint until all voids are filled. Care shall be taken not to displace the pipe from its line and grade.

Cutoff walls shall be installed along every utility line to inhibit the movement of ground water through the screened rock bedding. Cutoff walls shall be 5 to 10 feet long and consist of native material or imported material that has a permeability rate the same or less than that of the native material. Cutoff walls shall be installed at intervals not exceeding 200 feet on pressurized lines.

Jetting or water soaking trenches to achieve compaction of the backfill will not be permitted.

A minimum of 24 inches of compacted backfill shall be placed over the top of all plastic pipe before vehicles or heavy equipment are allowed to pass over the pipe. Less cover may be allowed only when flow-fill is used for the initial backfill over the pipe spring line.

619.05 Basis of Payment

Delete the third paragraph and add the following:

The contract unit price for each waterline shall include excavation, bedding, pipe installation, native material backfill and compaction, cutoff walls, all disinfecting operations, pressure testing, tracing wire for PVC pipe, and tracing wire continuity testing. The contract unit price for water pipe (ductile iron) shall include polyethylene encasement of the pipe.

When native material from the trench is unsuitable for backfill, as determined or agreed to by the Engineer, "Imported Trench Backfill" will be paid in accordance with Section 206.'

SECTION 625 - CONSTRUCTION SURVEYING

625.03 General.

Delete and replace with the following:

The Engineer will provide the necessary information for the Contractor's Surveyor to determine proper horizontal and vertical control necessary to construct the project. Upon request, the Engineer will provide an electronic copy of the plans, in an AutoCAD compatible format, to the Contractor's Surveyor to assist in project staking.

All construction surveying, as well as field verification of the survey monuments and control points, will be the responsibility of the Contractor. Construction surveying will be considered a subsidiary obligation under this Contract. Control line and stationing shall be maintained by the Contractor at all times.

625.04 Contractor Surveying.

Delete the third sentence of the first paragraph.

625.10 Pay Quantities Measurements.

Delete and replace with the following:

The Engineer will perform all interim and final measurements deemed necessary by the County, with assistance from the Contractor, to determine contract pay quantities except for those requiring cross-sectioning by survey as required by Sections 203 & 206. Contractor will provide required cross-sections and volume calculations in accordance with those sections.

625.11 Survey Records.

Add the following:

As-Built Drawings and Survey. As the work progresses and throughout the duration of the project, the Contractor and/or its Surveyor shall prepare and maintain a current set of As-Built Drawings showing all changes and deviations from the drawings that were made in the constructed improvements. This shall include all changes in horizontal location and vertical elevation of all construction improvements, both underground and on the surface. The As-Built drawings shall be available to the Engineer and Inspector at the job site during working hours.

The Contractor's Surveyor shall provide as-built surveys of with the following items:

1. All newly constructed pipelines (including pipe fittings and bends), culverts, utilities (installed or potholed by Contractor), appurtenances and structures, inverts in and out of structures, and the center of top of structures, shall be surveyed vertically and horizontally. Sanitary sewer and water line top of pipe locations will be surveyed at all service wyes, 45° bends, and clean-out prior to backfill. Water and irrigation lines horizontally and vertically information shall be required on all service lines and fittings. Water line information shall also identify type of material and outside diameter of all water lines tied into. The pipe elevations, along with the northing and easting coordinates in accordance with the plan datum and baseline coordinates, shall be recorded on the As-Built Drawings.

2. Ditch grades (to assure proper drainage without ponding) at min. of 50' intervals with high and low points identified.
3. Unknown, underground structures or lines discovered during construction that are to remain.
4. Any other items constructed in different location than that shown on the design plans.

All as-built surveys shall:

1. Be tied to the same primary and secondary control monuments as that of the construction staking.

2. Meet the same minimum construction horizontal and vertical accuracy tolerance as that of the construction staking, except that only changes of greater than +/- 0.10 feet need to be noted on the as-builts.

3. Be performed with the same survey instruments types, methods and procedures as that of the construction staking.

4. Have information obtained transferred onto the As-Built Drawings. Point files and notes alone will not suffice.

As-Built Drawing information shall be neatly written or drawn in red ink on a clean set of plans. All plan set sheets shall be included in the as-built submittal, including those not changed or revised. Prior to Final Acceptance, the results of the as-built survey and the As-Built Drawings shall be provided electronically to the County in PDF format, plus any point files and survey notes, along with a printed 11x17 paper copy of the As-Built Drawings.

625.13 Basis of Payment.

Add the following to the fourth paragraph:

(3) As-built survey point files, survey notes and As-Built Drawings.

SECTION 627 - PAVEMENT MARKING

627.01 Description.

Add the following:

Modified Epoxy Pavement Marking Material shall be used on all permanent lane, edge and centerline striping. Preformed Thermoplastic Pavement Marking Material shall be used on all crosswalks, stop lines, legends and symbol markings.

627.03 General.

Delete the second and third paragraphs of (d) *Temporary Pavement Markings* item 2 and replace with the following:

Temporary markings consisting of 2 foot long segments of retroreflective pavement marking tape, or raised pavement markers, shall be in place prior to opening to traffic. Temporary markings shall be at same spacing as existing permanent markings. Temporary markings should not remain in place for more than 14 days, unless otherwise approved by the Inspector.

627.05 Modified Epoxy Pavement Marking.

Add the following:

Two coats of markings shall be applied at the specified rate. The second coat of pavement markings shall not be applied until a minimum of 7 days after completion of the new asphalt pavement.

627.09 Preformed Thermoplastic Pavement Marking.

Add the following:

Preformed Thermoplastic Pavement Marking stencils shall have a thickness of 125 mils. Marking shall be able to be applied at ambient and surface temperatures down to 32ºF without any preheating of the pavement, special storage, preheating or treatment of the material before application. The top surface of the stencils (the same side as the factory applied surface beads) shall have an indicator system for the Contractor and inspector to properly gauge the correct amount of heat to apply during installation. The indicator system shall have a positive visual indication, such as indents closing together when the material has reached the correct installation temperature. The indicator system must also provide a positive, visual indication if the material has not reached the correct installation temperature.

All stencils shall have beads on the surface of the stencil. No reversible stencils will be allowed. All leading edges of stencils shall be beveled at a 45º angle. Stencil installation shall conform to manufacturer's recommendations.

The Contractor shall be required to provide on-site training prior to installation of the first stencil. The training shall be conducted by an authorized manufacture representative. All crew members on the work site shall be certified by the stencil manufacturer. The training shall include surface preparation and stencil installation for both hot bituminous pavement and concrete pavement. The training shall be coordinated with,

and attended by the Engineer and Inspector. All costs associated with providing this training will not be measured and paid for separately, but shall be included in the work.

The Inspector may waive the training requirement if the specific crew members working on this project have extensive experience installing Preformed Thermoplastic Pavement Markings per these specifications. The Contractor must submit a list of the crew members and proof of their prior experience to the Inspector in order for the training requirement to be waived.

SECTION 630 - CONSTRUCTION ZONE TRAFFIC CONTROL

630.10 Transportation Management Plan.

Delete and replace with the following:

The Contractor shall manage the work zone impacts in accordance with the Traffic Control Plan (TCP) included in the contract documents, when available. When a TCP is not included in the contract documents, the Contractor shall submit for approval a TCP prepared by an American Traffic Safety Services Association (ATSSA) certified individual or a professional traffic engineer, consistent with the M.U.T.C.D. The proposed TCP shall be approved in writing by the Engineer or County before the Contractor begins the corresponding phase of construction. The initial TCP shall be submitted prior to, or at, the pre-construction meeting. The contractor shall use the approved TCP for the Method of Handling Traffic (MHT).

When a TCP is included in the contract documents, the Contractor shall develop and submit a Method of Handling Traffic (MHT) for each different phase of construction which shows the Contractor's proposed construction phasing and proposed traffic control devices consistent with the TCP. If at any time, the Contractor desires to change the MHT, it shall be considered a different phase requiring a new MHT. Each proposed MHT shall be approved before the corresponding phase of construction will be allowed to begin.

The proposed MHT shall include as a minimum the following:

(1) A detailed diagram which shows the location of all traffic control devices, including advance construction signs and speed limit signs; method and time duration for lane closures; and location of flaggers and time duration of flagging operation. Lane closures shall be kept to a minimum in both length and duration, and cause a minimum of interference to the traveling public, consistent with the work being performed.
(2) An access maintenance plan for all properties requiring access during construction. This plan shall also indicate the areas where equipment will be stored, vehicles parked, and construction materials stored, if within the project limits.
(3) A plan for maintaining and controlling pedestrians, bicycle, and other non-vehicular traffic.
(4) A plan for emergency vehicle access.
(5) When the project includes a road closure, the TCP shall include the placement of a variable message board to operate for a week prior to the road closure to notify the public of the road closure.

630.11 Traffic Control Management.

The first paragraph shall be modified as follows:

During periods of static traffic control when there are not any changes in traffic control devices or operations, the inspection of traffic control devices and generation of the traffic control diary can be accomplished by the Contractor's Superintendent or others serving in similar supervisory capacities. These individuals shall have completed a CDOT-approved two-day Traffic Control Supervisor training as offered by Colorado Contractor Association (CCA). Diaries may be submitted weekly documenting the daily inspections that have occurred during that week.

Whenever traffic control is revised or flagging operations are conducted, a certified worksite traffic supervisor (ATSSA or CCA), with a current CDOT flaggers certificate, will be required. All other duties of the Traffic Control Supervisor remain as specified.

630.14 Flagging and Pilot Car Operations.

Modify as follows:

Temporary portable rumble strips, meeting the requirements of subsection 630.07(c), shall be used in advance of any flagger operation, when directed by the Inspector or shown on the plans. Contractor's TCP shall show the use of three temporary rumble strips arranged in array and include warning signs of the presence of the rumble strips. Temporary portable rumble strips shall be removed at the end of each work day or when flagger operations are removed.

Delete all reference to reimbursement for flagging. Flagging will be considered incidental to the amount bid for Traffic Control.

630.17 Method of Measurement.

Delete in its entirety and replace with the following:

No separate measurements will be made in this item except for Temporary Portable Rumble Strips when included on the Bid Schedule.

630.18 Basis of Payment.

Delete in its entirety and replace with the following:

Payment shall be full compensation for furnishing, erecting, cleaning, maintaining, moving, removing, and disposing of construction traffic control devices; flagging; pilot cars; and Traffic Control Management necessary to complete the work and in accordance with the Traffic Control Plan, Method of Handling Traffic and any approved revisions.

Traffic Control will be paid for as follows:

- 30 percent of the lump sum bid price upon first utilization,
- an additional 30 percent of the lump sum bid price when 50 percent of the original contract amount has been earned,
- an additional 30 percent of the lump sum bid price when 80 percent of the original contract amount has been earned, and
- the final 10 percent when the Project is substantially completed.

If traffic control diaries are not generated and submitted as required, the amount owed the Contractor will be reduced by 25%.

Payment for Temporary Portable Rumble Strips will be full compensation for all work and material required to complete the item including: cleaning the roadway surface, installing the rumble strip, maintaining the strip through the duration of each day's use (including cleaning and resetting of the strip if it slides), removal at the end of each work day, and final removal. Signing required for the rumble strip will be paid for under the lump sum for Traffic Control.

Payment will be made under:

Pay Item	**Pay Unit**
Traffic Control	Lump Sum
Temporary Portable Rumble Strips (Set of 3)	Each