

APPENDIX H

TOWN OF BRECKENRIDGE, COLORADO
PUBLIC WORKS DEPARTMENT
ENGINEERING DIVISION
ROAD AND BRIDGE CONSTRUCTION SPECIFICATIONS

GENERAL STATEMENT

Sections 100 through 717 of the Standard Specifications for Road and Bridge Construction, 2022 edition, or most recent version, published by the Colorado Department of Transportation (CDOT), State of Colorado, supplemented or amended by the State and by these specifications, shall govern all road and bridge construction work within Town jurisdiction or ownership. In cases of conflict between the CDOT specifications and other specifications, the supplements and amendments listed below or in the project Special Provisions shall govern. The Special Provisions (if any) contained in the Bid Documents shall have precedence over all other specifications.

When a reference is made to ASTM, AWWA, AASHTO, or other specifications or methods, it shall be understood to mean the latest edition or revision of said specification as amended and issued at the time of the Invitation to Bid.

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

The Method of Measurement and Basis of Payment will be based on CDOT specification except where modified in these Documents.

The current CDOT Standard Specifications for Road and Bridge Construction can be accessed here:

<https://www.codot.gov/business/designsupport/cdot-construction-specifications/2022-construction-specifications/2022-specs-book/2022-standard-specifications-book>

STANDARD SPECIAL PROVISIONS

All CDOT Standard Special Provisions published at the time of construction commencement shall apply and be included as part of these specifications.

PROJECT SPECIAL PROVISIONS

The following Project Special Provisions apply to this project and shall take precedence over specifications or plans and supplement or amend the CDOT Standard Specifications and the Town modifications listed below:

DIVISION 100
GENERAL PROVISIONS

SECTION 101: DEFINITION AND TERMS

Retain Section 101 and add the following:

Where Department, Department of Transportation, CDOT or any other reference to the Colorado Department of Transportation is used within these Specifications, replace with "Town". Any reference to CDOT engineer, personnel, or form shall be replaced with the appropriate Town engineer, personnel, or form. Town Engineer refers to the Town of Breckenridge Town Engineer or Town Engineering Representative selected by the Town Engineer. Where these Specifications reference Section 100, replace with "Town of Breckenridge General Contract Conditions."

101.01 Abbreviations. Add the following abbreviations:

CAPA	Colorado Asphalt Pavement Association
HMA	Hot Mix Asphalt
SSFRB	Town of Breckenridge Standard Specifications for Road and Bridge Construction (latest edition)
TEDS	Transportation Engineering Design Standards (latest edition)
QAT	Quality Assurance Technician

101.02 Definitions, alphabetically

ADD or REVISE Definitions as Follows:

Award. REPLACE "Department" WITH "Town".

Bidder. In the CDOT definition REPLACE "Department" WITH "Town".

CDOT Resident Engineer. DELETE in its entirety and REPLACE WITH: "Town Engineer".

Contract. DELETE in its entirety. See definition in the *Town General Contract Conditions*.

Contract Modification Order. DELETE in its entirety. See "change order" definition in the *Town General Contract Conditions*.

Contract Time. DELETE in its entirety. See definition in the *Town General Contract Conditions*.

Contractor. DELETE in its entirety. See definition in the *Town General Contract Conditions*.

Department. REVISE to read: "Department of Public Works, Town of Breckenridge, Colorado."

Engineer. DELETE in its entirety and REPLACE WITH "The Project Engineer, who may be a Town employee or hired consultant who has been appointed or authorized by the Town to oversee the technical aspects of the work and to administer the Contract on behalf of the Town. 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 Town."

Force Account Work. REVISE to read: "Work paid for on the basis of actual costs plus approved additives, in accordance with the General Contract Conditions."

Laboratory. REVISE to read: “Any testing laboratory designated by the Engineer.”

Planned Force Account. DELETE in its entirety.

Plans. REPLACE “Department” WITH “Town”.

Pre-construction Conference. DELETE in its entirety. See definition in the *Town General Contract Conditions*.

Project. DELETE in its entirety. See definition in the *Town General Contract Conditions*.

Project Engineer. REPLACE “Chief Engineer’s” WITH “Town’s”. REPLACE “CDOT” WITH “Town”. REPLACE “Resident” with “Town.”

Proposal Form. REVISE to read: “The documents furnished by the Town on which the offer of a bidder is submitted. Also called Bid Proposal or Bid Form.”

Proposal Guaranty. REVISE to read: “Bid guaranty as defined in the *Town General Contract Conditions*.”

Region Transportation Director. DELETE in its entirety.

Shop Drawings. DELETE in its entirety. See definition in the *Town General Contract Conditions*.

Specifications. DELETE in its entirety. See definition in the *Town General Contract Conditions*.

State. DELETE and replace with Town of Breckenridge acting through its authorized representative.

Supplemental Specifications. DELETE in its entirety. See definition of Supplementary Conditions in the *Town General Contract Conditions*.

TOWN. Town of Breckenridge, Colorado.

Work. DELETE in its entirety. See definition in the *Town General Contract Conditions*.

Workplace Violence. REPLACE “CDOT” WITH “Town”.

SECTION 102: BIDDING REQUIREMENTS AND CONDITIONS

Retain Section 102.03

DELETE and REPLACE remainder of Section 102 with the Town of Breckenridge, General Contract Conditions.

SECTION 103: AWARD AND EXECUTION OF CONTRACT

DELETE and REPLACE with the Town of Breckenridge, General Contract Conditions.

SECTION 104: SCOPE OF WORK

DELETE and REPLACE with the Town of Breckenridge, General Contract Conditions.

SECTION 105: CONTROL OF WORK

DELETE and REPLACE with the Town of Breckenridge, General Contract Conditions.

SECTION 106: CONTROL OF MATERIAL

DELETE and REPLACE with the Town of Breckenridge, General Contract Conditions.

SECTION 107: LEGAL RELATIONS AND RESPONSIBILITY TO PUBLIC

DELETE and REPLACE with the Town of Breckenridge, General Contract Conditions.

SECTION 108: PROSECUTION AND PROGRESS

DELETE and REPLACE with the Town of Breckenridge, General Contract Conditions.

SECTION 109: MEASUREMENT AND PAYMENT

109.01 RETAIN and ADD: "Measurement and payment shall be made per the contract and technical specifications. The contractor shall be responsible, in the presence of the Owner, or Owner's representative, for verifying all measurements and quantities required for payment by the unit price method. Contractor shall provide necessary equipment, workers, and survey personnel as required for measurements.

Payment shall not be made for defective work and rejected work.

Items paid by Lump Sum shall not be measured. Unit price shall include all costs to complete all work shown in plans, regardless of whether all items are written in work description.

Quantities stated in the contract are estimated quantities only and it is understood the actual quantities in the field may vary from those estimated. Actual quantities will be measured in the field, unless specified otherwise in the bid item descriptions. Work required in this section includes all expenses to complete the individual bid items per the plans and specifications. Unit bid prices, as quoted in the bid schedule, shall constitute full compensation for materials, labor, equipment, rentals, permits, overhead, profit, incidentals, risk, loss, damage, and all other items of work and expense required for the complete construction of each pay item per the plans and specifications. Any items or like item not specifically mentioned as a bid item is considered incidental to the project and all costs associated with these items must be included in the bid items listed."

DELETE and REPLACE remainder of Section 109 with the Town of Breckenridge, General Contract Conditions.

DIVISION 200 EARTHWORK

SECTION 201: CLEARING AND GRUBBING

201.02 DELETE the first paragraph of 201.02 and replace with “The Contractor shall meet with Town Representative and designate all trees, shrubs, and plants to be removed. Every object not designated for removal shall be protected by Contractor. Any object not designated for removal that is damaged shall be repaired or replaced as directed at the Contractor’s expense.”

ADD: “Trees designated to be cleared, removed or limbed shall be the property of the Contractor.

As the property of the Contractor, all cleared stumps, roots, willows, shrubs, and limbs shall be disposed of by the Contractor.

Hand grubbing may be required in roadway sections to ensure that no organic materials will be present in the road section.

Any tree, shrub, or other object that is designated to remain and is damaged shall be repaired or replaced as directed by the Town Engineer, at the Contractor’s expense. All surface objects, trees, stumps, roots, and other protruding obstructions not designated to remain shall be cleared and grubbed, including mowing, as required. Undisturbed stumps, roots, and nonperishable solid objects located two feet or more below subgrade or embankment slope may remain in place. Except in areas to be excavated, all holes resulting from the removal of obstructions shall be backfilled with suitable material and compacted. No material or debris shall be disposed of within the project limits. Branches or shrubs shall be removed as directed. All trimming shall be done in accordance with good tree surgery practices, and Town of Breckenridge direction.”

SECTION 202: REMOVAL OF STRUCTURES AND OBSTRUCTIONS

202.02 ADD: “Excess material generated by the installation of the drains, sewers and water mains shall be removed and disposed of by the Contractor. Final grade at the trenches shall match subgrade of the road reconstruction.” This work shall be incidental of paying for installation services.

202.03 ADD: Any salvable material, including signs, sign poles, street light poles, luminaires, hydrants, and other materials shall be hauled and delivered by the Contractor to Town’s Public Works Yard at 1095 Airport Road. The Town Representative shall determine if materials encountered during the work are salvable and whether the Town desires to keep the material. The Town reserves the right to retain ownership of any materials encountered, including boulders, excavated material, gold, historic materials, and any other materials, artifacts, or equipment encountered.

202.07 ADD: New concrete shall match existing concrete. The vertical difference between new and existing concrete shall be less than 1/16”. The Contractor shall grind existing concrete where needed to provide a smooth transition with no vertical differences greater than 1/16”. Existing concrete shall be doweled into new concrete.

202.09 ADD: “Milling is the same operation as planing.

The designated asphalt shall be removed and disposed of by the Contractor.

Irregularities and distresses on the milled or unfinished surface, such as, but not limited to, delamination, raveling, and potholes that are identified by the Project Manager shall be

repaired as soon as possible. Asphalt identified by the Town Engineer as distressed after milling shall be removed and patched as directed by the Town Engineer. Additional patching shall be paid separately. Milled surfaces shall be drivable and shall not have any vertical drops (temporary asphalt shall be tapered at edges of milled areas). Milled edges shall be clean vertical faces and may require re-milling, saw cutting, or other methods to reestablish vertical edges prior to paving.

New asphalt shall match existing asphalt. The vertical difference between new and existing asphalt shall be less than 1/16". The contractor shall grind existing asphalt pavement where needed to provide a smooth transition with no vertical differences greater than 1/16".

SECTION 203: EXCAVATION AND EMBANKMENT

203.06 DELETE the first paragraph of Section 203.06 and REPLACE with the following:

"When Contractor Process Control is required, the Contractor's Process Control Representative shall be certified with CDOT's Excavation, Embankment, and Soil Inspection certification course."

DELETE the third paragraph of Section 203.06 and REPLACE with the following

"Unless a thickness is otherwise specified in the Contract, the upper 3 inches of the ground surface will be considered topsoil and shall be removed in accordance with Section 207 prior to placement of embankment fill."

203.12 DELETE Pay Item "Blading", "Dozing", and "Proof Rolling". Costs of Blading, Dozing, and Proof Rolling shall not be paid separately. All costs associated this work shall be included in Unclassified Excavation and Embankment Material unit costs.

SECTION 206: EXCAVATION AND BACKFILL FOR STRUCTURES

206.06 DELETE paragraph (b) and replace with the following:

For pipes, a profile will be made along the bottom of the center line extending 18 inches beyond the end of the structure, including end sections. Material excavated between this profile and existing grade will not be measured for payment but shall be included in the pipe unit cost. Backfill placed between the pipe profile and the existing grades will not be measured for payment but shall be included in the pipe unit cost. In embankment sections, fill placed above the existing ground will be paid through the embankment unit cost.

206.07 Delete pay item "Bed Course Material" and "Filter Material". All costs of bed course material and filter material shall be included in the unit cost of the pipe/structure.

SECTION 207: TOPSOIL

RETAIN all sections.

SECTION 208: EROSION CONTROL

208.03 ADD the following:

“The Town Engineer may combine the Environmental pre-construction conference with the project pre-construction meeting”

208.04 DELETE paragraph (c)

208.12 DELETE section in its entirety and replace with the following:

“Erosion Control items will not be paid separately but shall be paid as a Lump Sum. The Erosion Control unit cost shall include all equipment, materials, labor, and other costs to complete all erosion control shown on the plans and to comply with Town and CDPHE standards. Unit cost shall include wattles, silt fence, aggregate bags, erosion logs, vehicle tracking pads, inlet protection, concrete washouts, sweeping, and all other work required.”

SECTION 209: WATERING AND DUST PALLIATIVES

209.07 ADD the following:

“Water will be provided by the Town of Breckenridge Water Division through its bulk water station at 1095 Airport Road, Breckenridge, CO or through a hydrant near the site. If an on-site hydrant is to be used, a hydrant valve and meter shall be obtained from the Town of Breckenridge Water Division. The Contractor will be responsible for obtaining a meter and all paperwork from the Water Division. Water will be metered. Payment shall not be made separately for water.

209.08 DELETE “Water” and “Water (Landscaping)” pay items. Water will not be paid for separately but shall be included in the cost of the work.

SECTION 210: RESET STRUCTURES

210.10 ADD the following:

The Contractor shall replace all valve boxes, manholes, and other structures damaged during construction at the cost of the Contractor. Contractor shall remove and clean any debris that enters valve boxes and manholes during construction.

210.13 ADD the following:

Payment will be made under:

Pay Item	Pay Unit
Adjust Valve Box/ Manhole	Each

Adjustments that include adding, removing, or replacing a manhole cone or barrel section will be paid for under the Section 210 pay item, Modify Manhole.

Cleaning designated valve boxes will be paid for under the Section 202 pay item, Clean Valve Box.

ADD the following section immediately after 210.13:

210.14 Heated Pavement Systems. Heated pavement systems, also referred to as snowmelt systems, damaged or modified from construction, shall be reset and repaired by Contractor. Contractor shall place two layers of welded wire fabric, 25 psi insulation, pex tubing, expansion joint and dowels at connection to existing. Contractor shall charge the system with glycol, pressure test for 24 hours and complete all other concrete and mechanical work required. If the snowmelt system is required to be modified per the contract documents, the work will be paid under repair snowmelt system or heated pavement pay item. If the Contractor damages a snowmelt system not intended for removal, repair, or modification per the contract documents, the Contractor shall be responsible

for all costs of repair. The Contractor shall be responsible for the following mechanical requirements:

1. PEX tubes shall be spliced and pressure tested for a minimum of 24 hours by a licensed mechanical contractor.
2. Pressure test shall be at least 1.5 times operating pressure and 100 psi minimum.
3. Piping and splices shall be per Town Building Code and current edition of International Mechanical Code.
4. Town Engineering and Town Building Divisions to inspect splices and pressure test.
5. Insulation and welded wire fabric to be installed beneath tubing.
6. Snowmelt system to be under pressure during placement and cure of concrete.

SECTION 212: SEEDING, FERTILIZER, SOIL CONDITIONER, AND SODDING

212.05 ADD the following at the end of paragraph (a):

“6” of approved topsoil shall be placed on the prepared ground prior to placing any sod.”

212.06 ADD the following at the end of paragraph (a):

“3” minimum of approved topsoil shall be placed on the prepared ground prior to planting native grass.”

SECTION 213: MULCHING

213.03 ADD the following to paragraph (e):

Wood chip mulch shall be a natural, non-stained, shredded cedar mulch. Non-plastic weed control fabric, 5 oz minimum weight, shall be installed beneath the mulch and included in the unit cost of the mulch.

SECTION 214: PLANTING

214.02 ADD the following:

After delivery of plant material, the Contractor shall contact the Engineer for approval of all plant material. The Contractor shall remove and replace rejected materials immediately from the site at their expense.

214.03 ADD the following to paragraph (a):

Installation of plant materials will not be permitted until earthwork, topsoil and adjacent site improvements are substantially complete.

ADD the following to the end of section 214.03:

No trees shall be removed from the project site until marked for removal with Town Representative. All new landscaping, including trees, shrubs, grass, perennials, and mulch, shall be marked with flags or marking paints and approved by Town Representative prior to planting.

Contractor shall implement weed control measures to prevent and remove weed growth from all disturbed areas throughout the establishment period. Weed control measures may include the following:

- i. Watering topsoil prior to seeding and applying acceptable herbicides to topsoil prior to planting
- ii. Installation of weed control barriers in mulch beds
- iii. Application of localized herbicides to eliminate weed growth
- iv. Mechanical removal of weeds

214.04 DELETE “Establishment period begins immediately and lasts a period of 12 months” and replace with:

”The establishment period shall be two years, or the duration of time from installation until all plant material maintains a healthy and vigorous growing condition, whichever is greater. The warranty period for plantings shall equal the establishment period.”

REPLACE paragraph (1) with the following:

- (1) “Watering in Irrigated Areas. Trees and shrubs planted at all locations on the project shall be watered within four hours of planting and then daily for the first month. After the first month, trees and shrubs shall be watered twice a week until the end of the establishment period. Between the months November through April, watering is not required.”

214.06 DELETE Pay Item “Landscape Maintenance” and add the following:

Landscape maintenance and all associated costs for the establishment period per Section 214 shall be included in the tree, shrub, perennial, or other individual landscape pay item.

SECTION 215: TRANSPLANTING

RETAIN all sections.

SECTION 216: SOIL RETENTION COVERING

RETAIN all sections.

SECTION 217: HERBICIDE TREATMENT

RETAIN all sections.

SECTION 250: ENVIRONMENTAL, HEALTH AND SAFETY MANAGEMENT

RETAIN all sections.

**DIVISION 300
BASES**

SECTION 304: AGGREGATE BASE COURSE

304.04 DELETE AND REPLACE with: "Following utility construction, base materials shall be placed to the minimum depth as shown on the plans. If the required compacted depth of the aggregate base course exceeds 6 inches, it shall be constructed in two or more layers of approximately equal thickness. The maximum compacted thickness of any one layer shall not exceed 6 inches. When vibratory or other approved types of special compacting equipment are used, the compacted depth of a single layer may be increased to 8 inches upon approval of TOB representative, provided that specified density is achieved.

SECTION 306: RECONDITIONING

RETAIN all sections.

SECTION 307: LIME TREATED SUBGRADE

307.04 DELETE and REPLACE the first sentence of the first paragraph so that it reads: "The Contractor shall construct one or more compacted courses of treated material, to the depth specified in the Contract and/or Construction Drawings."

307.12 REPLACE Table 307-1 with the following:

Table 307-1

SCHEDULE FOR MINIMUM SAMPING AND TESTING

In Place Soil Density and Moisture Content	AASHTO T 191 ASTM D 2167	One test for each 1,000 square yards (not less than one test per day).
	AASHTO T 239 AASHTO T 238 ASTM D 2216 AASHTO T 191 and ASTM D 2216	Shall be performed every tenth nuclear method density test
Atterberg Limits	AASHTO T89 & T90	One test per 2,000 tons
Moisture-Density	AASHTO T180	One test per soil type Relationships
Gradation	AASHTO T27 and T11	One test per 2,000 tons
Thickness		One test per 5,000 square yards
Resilient Modulus	AASHTO T 294	Upon request by the Agency

SECTION 308: MECHANICAL STABILIZED SUBGRADE

DESCRIPTION

308.01 Item includes mechanically stabilized subgrade of base, subbase course and/or subgrade improvement in the construction of paved or unpaved roadways. Design details for geogrid reinforcement, such as geogrid type, fill thickness, pavement cross-section and associated details, shall be as shown on the contract drawings. Work consists of:

A. Purpose

The purpose of the work shall be to provide a stabilized paving platform section on which paving materials can be placed. This Item shall not be used to retain moisture in subgrades unless retaining moisture in the section can be assured. This specification shall be used for a construction platform and not as a means of mitigating swell.

MATERIALS

308.02. Definitions

Mechanically Reinforced: Placement of a geogrid immediately over a soft subgrade soil in order to improve the bearing capacity and mitigate deformation of the subgrade soil. The goal of this application may be to reduce deeper excavation requirements, improve construction efficiency, reduce the amount of aggregate subbase or base material required, provide a stiff working platform for pavement construction, or combination of these.

Geogrid: A biaxial polymeric grid formed by a regular network of integrally connected tensile elements with apertures of sufficient size to allow interlocking with surrounding soil, rock, or earth to function primarily as reinforcement.

Multi-Layer Geogrid: A geogrid product consisting of multiple layers of grid which are not integrally connected throughout.

Extruded Geogrid: A geogrid product formed by extrusion of a polypropylene or polypropylene/polyethylene copolymer sheet followed by its perforation with a precise arrangement of holes and subsequent stretching, or drawing, into the finished product.

Woven Geogrid: A geogrid product formed by weaving discrete strips of polymer into a network. These geogrids usually require a protective coating to protect the polymer from pre-mature degradation.

Minimum Average Roll Value (MARV): Value based on testing and determined in accordance with ASTM D4759-92.

True Initial Modulus in Use: The ratio of tensile strength to corresponding zero strain. The tensile strength is measured via ASTM D6637 at a strain rate of 10 percent per minute. Values shown are MARVs. For multi-layer geogrid products, rib tensile testing shall be performed on the multi-layer configurations, as prescribed by ASTM D6637

Junction Strength: Breaking tensile strength of junctions when tested in accordance with GRI-GG2 as modified by AASHTO Standard Specification for

Highway Bridges, 1997 Interim, using a single rib having the greater of 3 junctions or a minimum 8-inch machine direction sample and tested at a strain rate of 10 percent per minute based on this gauge length. Values shown are MARVs. For multi-layer geogrid products, junction strength testing shall be performed across junctions from each layer of grid individually, and results shall not be assumed as additive from single layers to multiple layers.

Flexural Stiffness (also known as Flexural Rigidity): Resistance to bending force measured via ASTM D1388-96, Option A, using specimen dimensions of 864 millimeters in length by 1 aperture in

width. Values shown are MARVs. For multilayer geogrid products, flexural stiffness testing shall be performed directly on the multi-layer configuration without using any connecting elements other than those used continuously throughout the actual product, and results shall not be assumed as additive from testing performed on a single layer of the multi-layer product.

Aperture Stability Modulus (also known as Torsional Rigidity or Torsional Stiffness): Resistance to in-plane rotational movement measured by applying a 20 kg-cm (2.0 m-N) moment to the central junction of a 9-inch by 9-inch specimen restrained at its perimeter. Values shown are MARVs. For multi-layer geogrid products, torsional stiffness testing shall be performed on each layer of grid individually, and results shall not be assumed as additive from single layers to multiple layers.

Granular Fill Material: The preferred gradation for base reinforcement application is well-graded crushed aggregate fill with a maximum particle size (100 percent passing) of 1 ½ inches, and less than 10% fines (passing the #200 sieve). Recycled concrete may be used as granular fill to stabilize subgrade. Recycled concrete shall have a sulfate content of less than 3000 ppm. Recycled concrete shall be mixed and placed per the contract documents or the guidance of the project geotechnical engineer.

308.03 Manufacturers. All manufacturers will be considered provided they meet the submittal process as per Item 6.6 and per Table 308.04 (All values are minimum average roll values unless a range or characteristic is indicated):

308.04 Geogrid Material Properties

A. Structural Soil Reinforcement Geogrid: The geogrid shall be integrally formed and deployed as a single layer having the following characteristics according to Table 308.04

Table 308.04

Property	Test Method	Units	Type 1	Type 2
Aperture Stability Modulus at 20 cm-kg (2.0 m-N)	Kinney (2001)	m-N/deg	0.32	0.65
Rib Shape	Observation	N/A	Rectangular or Square	Rectangular or Square
Rib Thickness	Calipered	In	0.03	0.05
Nominal Aperture Size	I.D. Calipered	In	1.0 to 1.5	1.0 to 1.5
Junction Strength	GRI-GG2-2000 ¹	ratio	NOTE 1	NOTE 1
Flexural Rigidity	ASTM D1388-96 ²	Mg-cm	250,000	750,000
Minimum Tensile Strength @ 2% Strain:	ASTM D6637-01 ⁴			
- MD ³		Lb/ft	280	410
- CMD ³		Lb/ft	450	620
Minimum Tensile Strength @ 5% Strain:	ASTM D6637-01 ⁴			
- MD ³		Lb/ft	580	810
- CMD ³		Lb/ft	920	1,340

NOTES:

1. The ratio of Junction Strength/Ultimate Tensile Strength must meet or exceed 75%.
2. Resistance to bending force measured via ASTM D-5732-95, using specimens of width two ribs wide, with transverse ribs cut flush with exterior edges of longitudinal ribs (as a "ladder"), and of length sufficiently long to enable measurement of the overhang dimension.
3. MD = machine direction (along roll length); CMD = cross-machine direction (across roll width).
4. True resistance to elongation when initially subjected to a load determined in accordance with ASTM D6637 without deforming test materials under load before measuring such resistance or employing "secant" or "offset" tangent methods of measurement so as to overstate tensile properties.

B. Geotextile materials shall not be considered as an alternate to geogrid materials for subgrade improvement or base or sub-base reinforcement applications. A geotextile may be used in the cross-section to provide separation, filtration or drainage; however, no structural contribution shall be attributed to the geotextile.

308.05 Execution

A. Examination

The CONTRACTOR shall check the geogrid upon delivery to verify that the proper material has been received. The geogrid shall be inspected by the CONTRACTOR to be free of flaws or damage occurring during manufacturing, shipping, or handling.

308.06 Delivery, Storage, and Handling

A. Storage and Protection

Prevent excessive mud, wet concrete, epoxy, or other deleterious materials from coming in contact with and affixing to the geogrid materials.

Store at temperatures above -20 degrees F (-29 degrees C).

Rolled materials may be laid flat or stood on end.

Geogrid materials should not be left directly exposed to sunlight for a period longer than the period recommended by the manufacturer (as per ASTM D4355).

B. Preparation

The subgrade soil elevation shall be prepared at the proper elevation and alignment as directed by the engineer or as indicated on the construction drawings.

C. Installation

The geogrid shall be installed in accordance with the installation guidelines provided by the manufacturer or as directed by the engineer.

The geogrid may be temporarily secured in place with ties, staples, pins, sand bags or backfill as required by fill properties, fill placement procedures or weather conditions or as directed by the engineer.

D. Granular Fill

Compaction – Standard compaction methods may be used unless the soils are very soft. In these cases, static instead of vibratory compaction is prudent, particularly over silty subgrades.

Compaction is then achieved using a light roller. Keeping fill moisture content near optimum will make compaction more efficient. Water spray is most effective with sand fill. Compact aggregate fill to project specifications, after it has been graded smooth and before it is subject to accumulated traffic.

Vehicle Operation Over Geogrids- A minimum loose fill thickness of 6 inches is required prior to operation of vehicles over the geogrid. Turning of vehicles should be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid. When underlying substrate is trafficable with minimal rutting, rubber-tired equipment may pass over the geogrid reinforcement at slow speeds (less than 10 mph) when integrally-formed geogrids are used.

This shall not be allowed with coated geogrids and sharp turning movements shall be avoided.

E. Inspection

The owner or owner's representative may randomly inspect geogrid before, during and after (using test pits) installation.

Any damaged or defective geogrid (i.e. frayed coating, separated junctions, separated layers, tears, etc.) will be repaired/replaced in accordance with Item 308.06F.

F. Repair

Any roll of geogrid damaged before, during and after installation shall be replaced by the CONTRACTOR at no additional cost to the OWNER.

Proper replacement shall consist of replacing the affected area adding 3ft (1m) of geogrid to either side of the affected area.

308.07 Submittals

A. Submittal Procedure – 30 days prior to Notice to Proceed.

1. Submit geogrid product sample approximately 4 inches by 7 inches or larger three days prior to installation.

2. Submit geogrid product data sheet, certification, and/or independent full scale laboratory testing from the manufacturer that the geogrid product supplied meets the requirements of Table 6.4-1
3. Submit manufacturer's installation instructions and general recommendations.
4. A list of 5 comparable projects that are similar in terms of size and application, within the state of Colorado, and where the results of using the specific geogrid material can be verified after a minimum of 1 year of service life.
5. Additional information as requested by the engineer to fully evaluate the product.

B. Quality Assurance

Pre-Construction Conference - Prior to the installation of the geogrid, the CONTRACTOR shall arrange a meeting at the site with the geogrid material supplier and, where applicable, the geogrid installer. The OWNER and the ENGINEER shall be notified at least 3 days in advance of the time of the meeting. A representative of the geogrid supplier shall be available on an "as needed" basis during construction.

308.08 Construction Platform Design

Construction platform design shall be performed under supervision of and signed by a Professional Engineer registered in the State of Colorado. The recommended procedure shall be derived by the Giroud-Han, Method (ASCE, August 2004).

Appropriate partial safety factors shall be applied to results obtained using geogrids having properties or characteristics outside the range of rigorous model validation (Giroud and Han, 2004). This method has been endorsed by numerous Departments of Transportation and Government Agencies such as the Federal Highway Administration and Army Corps of Engineers.

For general guidance purposes only, Table 308.08-1 and 308.08-2 present a guide for estimating subgrade soil strength and minimum construction platform recommendations based on a range of subgrade strengths, respectively. A piping ratio analysis(D15fill/D85subgrade) shall be performed to determine the need of a separation fabric. If the piping ratio is less than 5 then no separation fabric is required. If the piping ratio is greater than 5 then a separation fabric is required below the geogrid. Final determination of construction platform shall be approved by the engineer.

Table 308.08-1

Guide for Estimating Subgrade Soil Strengths (Fine Grained Soils)

Estimate Consistency by:		Test by:				Correlates to:			
Feel	Equipment/Visual	Standard Penetration Test (blows/ft)	Dynamic Cone Penetrometer (mm/blow)			Shear Strength c_u		R Value	CBR
			SC, SM, SP	CL	CH	(kPa)	(tsf)		
Very Soft	Man standing sinks > 3"	< 2	—	—	—	< 12	< 0.125	—	< 0.4
Soft	Man walking sinks = 2 - 3"	2 - 4	—	—	—	12 - 24	0.125 - 0.25	< 0.36	0.4 - 0.8
Medium	Man walking sinks = 1"	4 - 8	—	> 66	—	24 - 48	0.25 - 0.50	0.36 - 2.5	0.8 - 1.6
Stiff	Pickup truck ruts = 1/2 - 1"	8 - 15	> 100	66 - 46	—	48 - 96	0.50 - 1.0	2.5 - 6.8	1.6 - 3.2
Very Stiff	Loaded dump truck ruts = 1 - 3"	15 - 30	100 - 56	46 - 33	> 109	96 - 193	1.0 - 2.0	6.8 - 15.5	3.2 - 6.4
Hard	Insignificant rutting by loaded dump truck	> 30	56 - 27	33 - 23	109 - 54	> 193	> 2.0	> 15.5	> 6.4

References: After Portland Cement Association, E.I. Dupont Literature and McCarthy, David F., "Essentials of Soil Mechanics and Foundations," 1977, and Tensar 1998. Webster, Personal Communication 2001, "DCP vs. CBR Correlations". AASHTO, "1993 Guide for Design of Pavement Structures," Van Till et. al. NCHRP 128.

Table 308.08-2

Recommended Aggregate Fill Thickness Feel / CBR Value with Geogrid Mechanical Reinforcement				
Soil Strength ¹	CBR	Aggregate Fill Thickness (in.) ²		
Feel	approx.	Type 1 Geogrid ³	Type 2 Geogrid ³	Unreinforced
Very Soft	< 0.4	37"	34"	52"
Soft	0.6	30"	26"	42"
Medium	1.2	20"	16"	29"
Stiff	2.5	14"	9"	22"
Very Stiff	4	12"	6"	20"

Notes:

1. Soil Strength is based in Table 308.08-1. The soil strength used is general for these purposes.
2. Results of aggregate fill thickness were derived using the published Giroud-Han (2004) Methodology. Average values for fill thickness are used. Aggregate fill was assumed to have a minimum R-value of 30.
3. Type 1 and Type 2 geogrid structural properties used were a minimum as derived from Table 308.04-1.

308.09 Payment. Payment shall be made at the contract unit price per square yard based upon plan quantities for the stabilization. The price shall be full compensation for furnishing all material and for all preparation of the subgrade, delivering, installation, and incidentals necessary to complete this item. Paving platform found deficient shall be removed and replaced. At the option of the TOWN, the

pavement structural section shall be adjusted to compensate for any deficiency in the paving platform thickness and strength at the CONTRACTOR's expense as noted in Item 308.06F. Granular fill will be paid for at the contract unit price per cubic yard. Unit price will be held constant regardless of deviation from actual quantities.

308.10 Wicking Geotextile

A. Submittals. Submit the following:

1. Certification: The contractor shall provide to the Engineer a certificate stating the name of the manufacturer, product name, style number, and chemical composition of the filaments or yarns and other pertinent information to fully describe the geotextile. The Certification shall state that the furnished geotextile meets MARV requirements of the specification as evaluated under the Manufacturer's quality control program. The Certification shall be attested to by a person having legal authority to bind the Manufacturer. Certifications from Private Label distributors will not be accepted.
2. If an alternate product is submitted full scale performance testing performed by an Independent testing Town shall be completed.
3. Coefficient of Interaction (C_i) test results performed by a lab with GRI accreditation should be provided to confirm conformance to the specified value.
4. Manufacturer's installation Guidelines shall be provided.
5. One 1' x 1'sample shall be provided.
6. Quality Standards: The contractor shall provide to the Engineer the Manufacturer's Quality Control Plan along with their current GAI-LAP and ISO 9001:2015 certificates.
7. Alternate products must be submitted to the Town 15 days prior to bid date and should include information on five similar projects in size and scope.

B. Quality Assurance

Manufacturer Qualifications:

1. The geotextile Manufacturer shall have all the following credentials:
 - a. ISO 9001:2015 Quality Management System
 - b. Geosynthetic Accreditation Institute (GAI) Laboratory Accreditation Program (LAP)
2. The geotextile Manufacturer shall have a GAI-LAP accredited laboratory at the location of production capable of performing the ASTM tests as outlined in the specification.

C. Delivery, Storage, and Handling

1. Geotextile labeling, shipment, and storage shall follow ASTM D4873. Product labels shall be color-coded to specifically identify each product and clearly show the Manufacturer's name, style name, and roll number.
2. Each geotextile roll shall be wrapped with a material that will protect the geotextile from

damage due to shipment, water, sunlight, and contaminants.

3. During storage, geotextile rolls shall be elevated off the ground and adequately covered to protect them from the following: site construction damage, precipitation, extended ultraviolet radiation including sunlight, chemicals that are strong acids or strong bases, flames including welding sparks, excess temperatures, and any other environmental conditions that may damage the physical property values of the geotextile.

D. Products

1. The geotextile shall be woven from super high-tenacity polypropylene yarns in conjunction with wicking yarns with a weave pattern to maximize strength, water flow, soil interaction, wicking capabilities and soil retention. The yarns shall be from high-tenacity long-chain synthetic polymers composed of at least 95 percent by weight of polyolefins or polyamids. They shall form a stable network such that the filaments or yarns retain their dimensional stability relative to each other, including selvages.
2. Geosynthetic must be able to directionally draw water via capillary action.
3. The geotextile shall meet the requirements of Table 1. All numeric values in Table 1 except AOS represent MARV in the specified direction. Values for AOS represent maximum measured opening size.

TABLE 308.10 – SOIL STABILIZATION AND WICKING GEOTEXTILE

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			MD	CD
Wide Width Tensile Strength	ASTM D4595	lbs/ft (kN/m)	5280 (77.0)	5280 (77.0)
Wide Width Tensile Strength @ 2% strain	ASTM D4595	lbs/ft (kN/m)	480 (7.0)	1080 (15.8)
			Maximum Opening Size	
Apparent Opening Size (AOS)	ASTM D4751	U.S. Sieve (mm)	40 (0.425)	
			Minimum Roll Value	
Permittivity	ASTM D4491	sec ⁻¹	0.4	
Flow Rate	ASTM D4491	gal/min/ft ² (l/min/m ²)	30 (1222)	
			Minimum Test Value	
Pore Size (050)	ASTM D6767	microns	85	
Pore Size (095)	ASTM D6767	microns	195	
Wet Front Movement ¹ (24 minutes)	ASTM C1559 ²	inches	6.0 Vertical direction	
Wet Front Movement ¹ (983 minutes) Zero Gradient	ASTM C1559 ²	inches	73.3 Horizontal direction	

¹ 'STP': Standard Temperature and Pressure, Tested Value

² Modified

When sewn, seams are required, refer to Manufacturer's Installation Guidelines for overlap / seam requirements.

E. Quality Control

1. Manufacturing Quality Control: Testing shall be performed at an on-site laboratory accredited by GAI-LAP for tests required for the geotextile, at frequency meeting or exceeding ASTM D4354.

2. Manufacturer's certifications and testing of quality assurance samples obtained using Procedure B of ASTM D4354. A lot size for conformance or quality assurance sampling shall be the shipment quantity of the given product or a truckload of the given product, whichever is smaller.

F. Execution. See Manufacturer's Installation guidelines provided in the submittal.

SECTION 309 FULL DEPTH RECLAMATION

ADD Section 309 Full Depth Reclamation to these specifications.

ADD the following:

DESCRIPTION

309.01 This work consists of pulverizing the existing asphalt mat and mixing the pulverized asphalt mat with the existing base course, to the specified depth, and grading and compacting the mixed material in accordance with, and at locations as shown in the Contract.

CONSTRUCTION REQUIREMENTS

309.02 The Contractor shall develop a written method to maintain the centerline geometry, profile elevations, and cross slope of the existing roadway. The plan shall be submitted to the Engineer for approval a minimum of two weeks prior to starting work. The plan shall include, but is not limited to, the following:

1. Mobilization of equipment to haul and place material
2. The estimated length of roadway (both travel lanes) that can have existing pavement structure removed, embankment cut to new elevation, and placement of Aggregate Base Course material so that the difference in elevation between lanes is 1 inch or less at the end of the work shift
3. Contractor's plan to address stabilization of soft spots
4. Contractor's method to keep the road open for two-way traffic after the pavement and/or base is removed, and before or during a major precipitation event
5. Method of Handling Traffic to be used during the operation
6. Contractor's implementation of Revision of Section 104.04 - Maintaining Traffic

Reclamation of the existing asphalt pavement shall not commence until the Contractor has an approved design mix for Hot Mix Asphalt.

The existing asphalt mat shall be cut at neat lines as shown in the plans by the use of a cutting wheel attached to a blade or by another approved method. The existing asphalt mat shall be pulverized and mixed with the existing base course to a specified depth or as directed by the Engineer, with a self-propelled rotary type mixing machine. *Optimal speed for the reclaimer shall be 11.5 feet per minute, and it shall be the responsibility of the Contractor to assure the Town this rate is not exceeded.* Deviations must be made by the Engineer in the field.

The mixing machine shall make as many passes as required to uniformly mix the asphalt and existing base course to the required thickness. Mixing of the different materials shall create a homogenous mixture. The particle size of the pulverized asphalt mat shall be a minimum of 99 percent passing the 1-1/4 inch sieve. When the addition of water is necessary for initial compaction purposes it shall be added through the mixing machine with the capability to uniformly distribute water through the mixed materials.

When proper mixing has been accomplished, the mixture shall then be bladed, shaped, wetted or dried, and rolled to meet a minimum of 95 percent of the maximum wet density determined in accordance with AASHTO T-180 Method D. The soils moisture-density curve will be developed using wet densities and the percent compaction will be calculated using wet density.

The maximum depth to be compacted in one lift is 8 inches. If the depth of the reclaimed material exceeds 8 inches, the Contractor shall remove the material in excess of 8 inches and compact the material in layers not exceeding 8 inches. Thickness will be determined in the field with the Engineer at the beginning of work.

Grading equipment used to establish the final surface elevations shall have automatic controls for transverse slope. The transverse slope controls shall be capable of maintaining the final surface within 0.1 percent of the specified slope. Variations from the subgrade plane shall not be more than ¼ inch. The work shall be maintained and tested for conformance to these requirements immediately prior to placing additional pavement layers.

The minimum quantity for acceptance testing will be based on a random schedule of 1/1000 square yards of reclaimed material. Every 5,000 square yards a verification point will be tested to confirm the accuracy of the moisture-density curve.

The maximum time a portion of the roadway will be unpaved is ten (10) working days unless otherwise specified. The exposed longitudinal joint between the existing asphalt mat and the processed mat shall not remain in place for more than one day unless approved by the Engineer. When additional aggregate base course is imported and placed before processing begins, the full width of the roadway shall be completed daily. Joint construction and maintenance shall conform to subsection 401.16.

METHOD OF MEASUREMENT

309.03 Full Depth Reclamation of Hot Mix Asphalt Pavement will be measured by the square yard of roadway treated, completed and accepted.

BASIS OF PAYMENT

309.04 The accepted quantities of Full Depth Reclamation of Hot Mix Asphalt Pavement will be paid for at the contract unit price per square yard for Full Depth Reclamation of Hot Mix Asphalt Pavement, for the depth shown in the project plans. The depth shown in the plans is based on cores obtained from the existing pavement, and the Contractor should be aware that the depth will vary and, in some locations, will be either less or more than the depth range shown in the plans. The pay item shown in the plans shall be that used for the entire project, regardless of variations discovered during construction.

Pay Item	SY	Pay Unit
Full Depth Reclamation of Hot Mix Asphalt Pavement	SY	Square Yard

Payment for Full Depth Reclamation of Hot Mix Asphalt Pavement will be full compensation for all work necessary to complete the item including cutting of the existing asphalt mat, pulverizing the existing asphalt mat, mixing the pulverized asphalt mat into the existing base course, moving the pulverized material and existing base course, wetting and compacting the mixed pulverized asphalt mat and base course, blading, shaping, haul, water, and maintenance of the riding surface.

DIVISION 400 PAVEMENTS

SECTION 401 PLANT MIX PAVEMENTS - GENERAL

401.07 RETAIN the first paragraph and Table 401-3. DELETE the remainder of Section 401.07 and REPLACE with the following:

“Temporary asphalt ramps shall be placed at all vertical milled edges greater than 1”. The Contractor shall maintain the temporary asphalt throughout the project. Distress in milled surfaces which affects the ride, safety, or serviceability of the road shall receive a temporary asphalt layer. Asphalt shall not placed between November 1st and April 30th. When emergency work requires asphalt placement between November and April the asphalt will be considered temporary and shall be replaced the following year after May 1st.”

401.08 ADD the following sentence to the end of paragraph one:

“Asphalt mixing and storage plant operations shall comply with ASTM D995 for materials storage, control, mixing, and for plant equipment and operation.”

401.11 DELETE AND REPLACE with: “A tack coat shall be applied between pavement courses, at vertical edges of pavement, and at all vertical faces of concrete abutting the pavement at a rate of 0.05 to 0.15 gal/sq. yd. and paid for in accordance with Section 407. A prime coat at the subgrade shall not be required.”

401.12 ADD the following: “All manholes and valve boxes shall be set to ½ inch below final grade prior to paving of streets.”

401.17 Add the following to the end of paragraph one:

“After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Asphalt surface temperature shall be below 160 degrees.

Erect barricade to protect paving from traffic until mixture has cooled and attained its maximum degree of hardness.”

DELETE all references to compaction pavement test section (CTS). ADD the following: “Compaction pavement test section not required. Unless specified by the Contract, pavement cores are only required for longitudinal joints.”

401.20 DELETE and REPLACE entire section with following:

Town representative will inspect paving operations to ensure surface smoothness. On roads below 35 mph, the Town will not inspect small deviations in smoothness. On roads above or equal to 35 mph, Town will inspect smoothness using 10 foot level and measure any deviations greater than 3/16”. Contractor will be required to grind deviations. If smoothness is excessively poor, the Town will require Contractor to mill and replacement pavement.

SECTION 403 HOT MIX ASPHALT

ADD the following Table

Table 403.01

**Minimum Materials Sampling and Testing
for Process Control and Owners Acceptance**

Test	Standard	Minimum Frequency
Sampling	AASHTO T168, ASTM D 979 and ASTM D3665	One test per day, per mix design.
Density (Nuclear Gauge)	AASHTO T 166, T 355	One test every 250 lineal feet, per lane, per mix design.
Total Thickness (Core or non destructive method)	ASTM D3549 or approved non destructive method	IF requested by the AGENCY , not to exceed one test per day.
Gradation	AASHTO T 27, T 11	One test per day, per mix design.
Binder Content	AASHTO T 308 or other methods agreed upon between Agency and Contractor. AASHTO 308	One test per day per mix design.
Maximum Theoretical Specific Gravity (Rice)	AASHTO T 209	One test per day, per mix design.

SECTION 405 HEATING AND SCARIFYING TREATMENT

RETAIN all sections.

SECTION 406 COLD ASPHALT PAVEMENT (RECYCLE)

DELETE Section 406

SECTION 407 PRIME COAT, TACK COAT, AND REJUVINATING AGENT

RETAIN all sections.

SECTION 408 JOINT AND CRACK SEALANT

RETAIN all sections.

SECTION 409 CHIP SEAL

DELETE Section 409

SECTION 410: SLURRY SEAL

DESCRIPTION

410.01 The slurry seal shall consist of a mixture of an approved emulsified asphalt, mineral aggregate, water and specific additives, proportioned, mixed and uniformly spread over a properly prepared surface in accordance with the plans and specifications. The complete slurry seal shall leave a homogeneous mat, adhere firmly to the prepared surface, and have a friction resistant surface texture throughout its service life.

MATERIALS

410.02

A. Emulsified Asphalt

The emulsified asphalt shall conform to Grade SS-1h, CSS-1h, CQS-1h as specified in ASTM D 977, D 2397, AASHTO M 140 and M 208. The cement mixing test is waived. Each load of emulsified asphalt shall be accompanied with a Certificate of Compliance.

Table 410.02-1 Emulsified Asphalt

Test	Quality	Specification
AASHTO T59	Residue after distillation	60% Min.
AASHTO T49 ¹	Penetration at 77° F (25° C)	40 to 90
AASHTO T 59	Saybolt Furol Viscosity 77° F (25° C)	15 to 90 Sec.

¹Test on Residue

B. Aggregate

The aggregate shall be manufactured 100 percent crushed stone such as granite, slag, limestone, chert, or other high quality aggregate, or combination thereof. All aggregates shall have at least two fractured faces.

Table 410.02-2 Aggregates

Test	Quality	Specification
AASHTO T176*	Sand Equivalent	55 Min.
AASHTO T104	Soundness	15% Max. using NA ₂ SO ₄ or 25% Max. using MgSO ₄
AASHTO T96	Abrasion Resistance	25% Max. Grading D

* Moisture condition sample at least 24 hours prior to running the test.

When tested in accordance to AASHTO T 27 and AASHTO T 11, the aggregate gradation (including the mineral filler) shall be within the following bands. Note: Selection of Type II or Type III shall be designated by the Town and shown on the plans.

Table 410.02-3 Aggregate Gradation

Sieve Size	Percent Passing		Job Tolerance
	Type II	Type III	
1/2"	100	100	± 0
No. 4	90 to 100	70 to 90	± 4
No. 8	65 to 90	45 to 70	± 4
No. 16	45 to 70	28 to 50	± 3
No.30	30 to 50	19 to 34	± 3
No. 50	18 to 30	2 to 25	± 3
No. 100	10 to 21	7 to 18	± 3
No 200	5 to 15	5 to 15	± 2

The stockpile shall be accepted based on an average of five gradation tests according to AASHTO T 2. Note requirement of 26.2E.

C. Mineral Filler

Portland cement, hydrated lime, limestone dust, fly ash or other approved filler meeting the requirements of AASHTO M 17 or ASTM D 242 shall be used if required by the mix design. They shall be considered as part of the dry aggregate.

D. Water

The water shall be free of salts and contaminants and shall be tested and conform to AASHTO T 26. Potable water testing is not required.

E. Additives

Liquid additives may be used to accelerate or retard the break-set of the slurry seal, or improve the resulting finished surface. The use of liquid additives in the slurry mix (or individual materials) shall be made initially in quantities predetermined by the mix design with field adjustments if required, after approval by the Town.

410.03 Mix Design

The CONTRACTOR shall submit to the Town, for approval, a mix design prepared and signed by a Professional Engineer registered in the State of Colorado, performed by a laboratory who has experience in designing Emulsified Asphalt Slurry Seal Surfacing. Compatibility of the aggregate, emulsion, mineral filler, and other additives shall be verified by the mix design. The mix design shall be made with the same materials and gradation that the CONTRACTOR will provide on the project. After the mix design has been approved, no substitution will be permitted. Minimum requirements are as follows:

Table 410.03-1 Recommended Mix Properties

Test	Description	Specification
ISSA T106	Slurry Seal Consistency	--
ISSA TB-139 (for quick-set systems)	Wet Cohesion 30 minutes Min. (set) 4 hour Min. (traffic)	12 kg-cm Min. 20 kg-cm Min.
ISSA TB-139 (for quick- traffic systems)	Wet Cohesion 60 minutes Min	20 kg-cm Min.
ISSA TB-109	Excess Asphalt by LWT Sand Adhesion	50 g/ft ² Max.
ISSA TB-114	Wet Stripping 10 minutes boiling water	Pass (90% Min.)
ISSA TB-100	Wet Track Abrasion Loss One hour soak 6-Day soak	50 gm ² Max. 75 g/ft ² Max.
ISSA TB-113	Mix Time	*
Residual Asphalt	6.5% to 12.0%	---
Mineral Filler	0.5% to 2.0%	

*The mixing test and set time test shall be done to anticipate the highest temperatures expected during construction. This will include 180 seconds mix time at 77° F and 70 seconds mix time minimum at 100° F.

The laboratory shall also report the quantitative effects of moisture content on the unit weight of the aggregate (bulking effect). The report must clearly show the proportions of aggregate, mineral filler (minimum and maximum), water (minimum and maximum), additive(s) (usage), and asphalt emulsion based on the dry weight of the aggregate. The report shall be sealed and signed by a Professional Engineer registered in the State of Colorado.

410.04 Equipment

A. General

All equipment, tools, and machines used in performance of this work shall be maintained in satisfactory working condition at all times to ensure a high quality product.

B. Mixing Equipment

The machine shall be specifically designed and manufactured to lay slurry seal. The material shall be mixed by a self-propelled slurry seal mixing machine of either truck mounted or continuous run design. Continuous run machines are those that are equipped to self load materials while continuing to lay slurry seal. Either type machine shall be able to accurately deliver and proportion the aggregate, emulsified asphalt, mineral filler, control setting additive, and water to a revolving mixer and discharge the mixed product on a continuous flow basis.

The machine shall have sufficient storage capacity for aggregate, emulsified asphalt, mineral filler, control additive and water to maintain an adequate supply to the proportioning controls. If continuous run equipment is used, the machine shall be equipped to allow the operator to have full control of the forward and reverse speed during application of the slurry seal. It shall be equipped with a self-loading device, opposite side driver stations, and forward and reverse speed controls.

C. Proportioning Devices

Individual volume or weight controls for proportioning each material to be added to the mix (i.e. aggregate, mineral filler, emulsified asphalt and additive) shall be provided and property marked.

The proportioning devices are required to be in working order and shall be capable of determining the material output at any time.

D. Spreading Equipment

The mixture shall be spread uniformly by means of a conventional surfacing spreader box attached to the mixer and equipped to agitate and spread the material evenly throughout the box. A front seal shall be provided to ensure no loss of the mixture at the road contact point. The rear seal shall act as final strike-off and shall be adjustable. The spreader box and rear strike-off shall be so designed and operated that a uniform consistency is achieved to produce a free flow of material to the rear strike-off. The spreader box shall have suitable means provided to side shift the box to compensate for variations in the pavement geometry. A burlap drag or other approved screed may be attached to the rear of the spreader box to provide a uniform, highly textured mat. The drag pulled behind the spreader box shall not be stiffened or hardened by slurry or asphalt.

E. Auxiliary Equipment

Suitable surface preparation equipment, traffic control equipment, hand tools, power brooms, sweepers, and any other support equipment shall be provided as necessary to perform the work.

Equipment shall be approved by the TOWN. All equipment and machinery shall be kept in good working order, free of leaks and properly muffled. All taxes, licenses and fees shall have been paid and proper licenses and permits shall be posted as required by law.

410.05 Calibration

Each mixing unit to be used in performance of the work shall be calibrated in the presence of the engineer prior to construction. Previous calibration documentation covering the exact materials to be used may be acceptable, provided they were made during the calendar year. A one-point calibration check may be required at the start of production. The documentation shall include an individual calibration of each material at various settings, which can be related to the machine's metering devices. No machine will be allowed to work on the project until the calibration has been completed and/or accepted.

A. Verification

Test strips will be made by each machine after calibration and prior to construction. Test strips shall be a portion of the project. Samples of the slurry seal will be taken and verification made as to mix consistency and proportioning. Verification of rate of application will also be made. Upon failure of any of these tests, additional test strips, at no cost to the TOWN, will be required until each unit is authorized to work. Any unit failing to pass the tests after the third trial, will not be permitted to work on the project. Test strips must be accepted or rejected within 24 hours after application.

410.06 Weather Limitations

The slurry seal shall not be applied if either the pavement or air temperature is below 50° F and falling, but may be applied when both pavement and air temperature are above 45° F and rising. No slurry seal shall be applied when there is danger that the finished product will freeze before 24 hours. The mixture shall not be applied when weather conditions prolong opening to traffic beyond a reasonable time.

410.07 Surface Preparation

A. General

Immediately prior to applying the slurry seal the surface shall be cleared of all loose material, oil spots, vegetation, and other objectionable material. Any standard cleaning method will be acceptable. If water is used, cracks shall be allowed to dry thoroughly before slurry surfacing.

Manholes, valve boxes, drop inlets and other service entrances shall be protected from the slurry seal by a suitable method. The TOWN shall approve the surface preparation prior to surfacing.

B. Tack Coat

If a tack coat is required it should consist of one part emulsified asphalt and three parts water. The emulsified asphalt should be the same as used in the mix. The distributor shall be capable of applying the dilution evenly at a rate of 0.05 to 0.10 gallons per square yard (0.15 to 0.35 liters per square meter). The tack coat shall be allowed to cure before application of the slurry seal.

C. Joint and Crack Sealant

Joints and crack shall be sealed in accordance with the requirements in Item 23.

410.08 Application

The slurry seal mixture shall be of proper consistency at all times so as to provide the application rate required by the surface condition. The average application rate shall be 18 to 30 pounds per square yard (8.16 to 13.6 kgs/m²).

Application rates are affected by the unit weight of the aggregate, the gradation of the aggregate and the demand of the surface to which the slurry seal is being applied.

A. General

When required by local conditions, the surface shall be pre wetted by fogging ahead of the spreader box.

The rate of application of the fog spray shall be adjusted during the day to suit temperatures, surface texture, humidity, and dryness of the pavement.

The slurry seal shall be of the desired consistency upon leaving the mixer. A sufficient amount of material shall be carried in all parts of the spreader at all times so that a complete coverage is obtained. Overloading of the spreader shall be avoided.

No lumping, balling, or unmixed aggregate shall be permitted.

No streaks, such as those caused by oversized aggregate shall be left in the finished surface. If excess oversize develops, the job will be stopped until the CONTRACTOR proves to the engineer that the situation has been corrected.

Some situations may require screening the aggregate just prior to loading it into the units going from the stockpile area to the laydown operations.

410.09 Joints

No excess buildup, uncovered areas, or unsightly appearance shall be permitted on longitudinal or transverse joints. The CONTRACTOR shall provide suitable width spreading equipment to produce a minimum number of longitudinal joints throughout the project. When possible, longitudinal joints shall be placed on lane lines. Half passes and odd width passes will be used only in minimum amounts. If half passes are used, they shall not be the last pass of any paved area. A maximum of 4 inches (152 mm) shall be allowed for overlap of longitudinal lane line joints. The paper shall be used at transverse joints to ensure a straight line.

410.10 Mix Stability

The slurry seal shall possess sufficient stability so that premature breaking of the material in the spreader box does not occur. The mixture shall be homogeneous during and following mixing and spreading. It shall be free of excess water and emulsion and free of segregation of the emulsion and aggregate fines from the coarser aggregate.

Spraying of additional water into the spreader box or addition of excess water will not be

permitted.

410.11 Hand Work

Areas which cannot be reached with slurry seal machines shall be surfaced using hand squeegees to provide complete and uniform coverage. The area to be hand worked shall be lightly dampened prior to mix placement and the slurry worked immediately. Care shall be exercised to leave no unsightly appearance from handwork. The same type finish as applied by the spreader box shall be required. Handwork shall be completed during machine applying process.

410.13 Lines

Care shall be taken to ensure straight lines along shoulders. No runoff on these areas will be permitted. Lines at intersections will be kept straight to provide good appearance.

410.14 Rolling

At the option of the TOWN, the roadway shall be rolled by a self propelled 10 ton pneumatic roller with a tire pressure of 50 psi (3.4 atms.) and equipped with a water spray system. The surfaced areas shall be subjected to a minimum of two full coverage passes by the roller.

Rolling should not commence until the slurry has cured enough so that it will not pick up on the tires of the roller.

410.15 Clean-up

All areas, such as manways, gutters and intersections, shall have the slurry seal removed as specified by the Town. The CONTRACTOR shall remove any debris associated with the performance of the work on a daily basis.

410.16 Tolerances

Tolerances for individual materials as well as the slurry seal mixture are as follows:

After the designed residual asphalt content is determined, a plus or minus one percentage point variation will be permitted.

The percentage of aggregate passing each sieve shall be within stockpile tolerance range as stated and within the master range of Table 26.2B-2.

The percentage of aggregate passing shall not go from the high end to the low end of the specified range of any two successive sieves.

The slurry consistency shall not vary more than +/-0.5 cm from the job mix formula after field adjustments.

The rate of application once determined by the engineer shall not vary more than +2 pounds per square yard, while remaining within the design application rate.

If any two successive tests fail on the stockpile material, the job shall be stopped. It is the responsibility of the CONTRACTOR, at his own expense, to prove to the TOWN that the conditions have been corrected. If any two successive tests on the mix from the same machine fail, the use of the machine shall be suspended. It will be the responsibility of the CONTRACTOR, at his own expense, to prove the TOWN that the problems have been corrected and that the machine is working properly.

410.17 Measurement

The area of slurry seal shall be measured by the square yard per plan quantities completed in place and accepted.

410.18 Testing and Inspection

Testing and inspection shall be performed in accordance with Table 410.18-1.

Table 410.18-1 Schedule for Minimum Slurry Seal Materials Sampling and Testing

Test Type	Test Standard	Minimum Frequency of Tests
Residue after distillation	AASHTO T 59	One test each 5,000 square yards of slurry seal
Extraction and Gradation	AASHTO T 164 AASHTO T 30	One test each 5,000 square yards of slurry seal
Application Rate		One test each 5,000 square yards of slurry seal

410.19 Payment

The slurry seal shall be measured and paid for by the contract unit price per square yard (SY). The price shall be full compensation for furnishing all materials and for preparation, mixing and applying these materials, and for all labor, equipment, tools, test design, clean-up and incidentals necessary to complete and warrant the job as specified herein.

SECTION 411 ASPHALT MATERIALS

DELETE Section 411.05 and REPLACE with the following: "Asphalt cement, emulsified asphalt, and other asphalt materials will not be paid separately but shall be included in the unit price for TONS of Hot Mix Asphalt or other appropriate mix."

SECTION 412 PORTLAND CEMENT CONCRETE PAVEMENT

- 412.17 REVISE as follows "Roadway smoothness will not be tested on roads with speed limits below 35 mph. On roads at or above 35 mph, Town shall use a ten foot level to measure high spots greater than 3/16". Contractor shall diamond grind areas exceeding 3/16".
- 412.21 DELETE and REPLACE with the following: "Pavement thickness shall be measured by Town measuring the depth prior to placement of pavement. Contractor shall assist with setting string lines, forms, and other methods to measure thickness. Cores shall not be used unless requested by the Engineer."

SECTION 420 GEOSYNTHETICS

- 420.02 DELETE the first sentence and replace with the following: "Geotextiles and geomembranes shall meet the applicable requirements of subsection 308."

**DIVISION 500
STRUCTURES**

SECTION 501 STEEL SHEET PILING

RETAIN all sections.

SECTION 502 PILING

RETAIN all sections.

SECTION 503 DRILLED SHAFTS

RETAIN all sections.

SECTION 504 WALLS

ADD the following to Section 504.01: "For stone or boulder walls, Contractor shall deliver samples of stone to the site for approval by Town. Contractor shall construct a short section of wall as a mockup for Town review and approval. If mockup does not meet requirements of contract documents, the Contractor shall removal and replace wall at their expense."

SECTION 506 RIPRAP

RETAIN all sections.

SECTION 507 SLOPE AND DITCH PAVING

RETAIN all sections.

SECTION 508 TIMBER STRUCTURES

RETAIN all sections.

SECTION 509 STEEL STRUCTURES

RETAIN all sections.

SECTION 510 STRUCTURAL PLATE STRUCTURES

RETAIN all sections.

SECTION 512 BEARING DEVICE

RETAIN all sections.

SECTION 514 PEDESTRIAN AND BIKEWAY RAILING

RETAIN all sections.

SECTION 515 WATERPROOF MEMBRANE

RETAIN all sections.

SECTION 516 DAMPPROOFING

RETAIN all sections.

SECTION 517 WATERPROOFING

RETAIN all sections.

SECTION 518 WATERSTOPS AND EXPANSION JOINTS

RETAIN all sections.

DIVISION 600
MISCELLANEOUS CONSTRUCTION

SECTION 601 STRUCTURAL CONCRETE

ADD the following to Section 601.02: "w/cm ratio for Concrete Class B,D, and P shall be 0.38 to 0.42."

SECTION 602 REINFORCING STEEL

RETAIN all sections

SECTION 603 CULVERTS AND SEWERS

ADD the following to Section 603.01: "For any sanitary sewer work, delete Section 603 in its entirety and replace with the Upper Blue Sanitation District Sewer Standards."

ADD the following to Section 603.13: "Structure excavation and backfill shall not be paid separately, but shall be included in the cost of the pipe."

SECTION 604 MANHOLES, INLETS, AND METER VAULTS

RETAIN all sections

SECTION 605 SUBSURFACE DRAINS

RETAIN all sections

SECTION 606 GUARDRAIL

RETAIN all sections

SECTION 607 FENCES

RETAIN all sections

SECTION 608 SIDEWALKS AND BIKEWAYS

ADD the following to Section 608.03: "All concrete sidewalk shall be a minimum of 5" thick. Control joints shall be placed at 6' intervals and shall be sawcut joints. Joints shall be sawcut immediately after curing. Expansion joint shall be added between new concrete sidewalk and existing concrete sidewalk"

SECTION 609 CURB AND GUTTER

RETAIN all sections

SECTION 610 MEDIAN COVER MATERIAL

RETAIN all sections

SECTION 611 CATTLE GUARDS

RETAIN all sections

SECTION 612 DELINEATORS AND REFLECTORS

RETAIN all sections

SECTION 613 LIGHTING

RETAIN all sections

SECTION 614 TRAFFIC CONTROL DEVICES

RETAIN all sections

SECTION 615 WATER CONTROL DEVICES

RETAIN all sections

SECTION 616 SIPHONS

RETAIN all sections

SECTION 618 PRESTRESSED CONCRETE

RETAIN all sections

SECTION 619 WATER LINES

DELETE and REPLACE with the following: "Water lines and appurtenances shall be constructed in accordance with the Town of Breckenridge Water Construction Standards."

SECTION 620 FIELD FACILITIES

RETAIN all sections

SECTION 622 REST AREAS AND BUILDINGS

DELETE Section 622 in its entirety.

SECTION 623 IRRIGATION SYSTEMS

RETAIN all sections

SECTION 624 DRAINAGE PIPE

624.02 ADD "High Density Polyethylene Corrugated Pipe with Smooth Interior" to the list of pipe materials under the Plastic Heading. ADD the abbreviation as HDPE.

Table 624-1. ADD ⁷ to the Table: "Plastic Pipe and fittings shall be manufactured from high density polyethylene resin which shall meet or exceed the requirements of Type III, Category 4 or 5, Grade P33 or P34, Class C per ASTM D1248. HDPE storm pipe shall be ADSN-12 WT-1B (water tight or approved equal.)"

SECTION 625 CONSTRUCTION SURVEYING

RETAIN all sections

SECTION 626 MOBILIZATION

RETAIN all sections

SECTION 627 PAVEMENT MARKING

RETAIN all sections

SECTION 629 SURVEY MONUMENTATION

RETAIN all sections

SECTION 630 CONSTRUCTION ZONE TRAFFIC CONTROL

ADD the following to Section 630.01:

"Construction Under Traffic

Contractor shall maintain a minimum of one lane of traffic to greatest extent possible. When one lane cannot safely be maintained, the length and duration of the full road closure shall be minimized to the extent possible and shall be approved by the Town Engineer.

Two lanes of traffic shall be reopened during evenings and weekends. Full road closures during nights and weekends shall be submitted for review and approval by Town Engineer. Access to all residences and businesses shall be maintained at all times during construction. Flaggers shall be used to assist with construction access and pedestrian traffic control.

Pedestrian traffic shall be maintained through the construction zones. Temporary curb ramps shall be installed consisting of compacted base course. Pedestrian routes shall be a minimum of 5' wide, meet ADA requirements, and be separated from traffic by approved barriers.

Flaggers shall be used to assist with construction access and pedestrian traffic control.

The Contractor shall provide to the Town a detailed phasing plan, schedule, Traffic Control Plan and MHT for each anticipated phase of construction.

Flagging

The contractor shall provide competent certified flaggers to direct traffic when work is being done in the street ROW or intersection that is open to traffic. The Contractor shall provide a minimum of one flagger while construction activities are occurring. The flaggers will be required to direct vehicular traffic and construction vehicles. Pedestrian and vehicular traffic shall be the priority of the "minimum" required flaggers. Certified flaggers, additional to the "minimum" required, may be utilized at the Contractor's discretion to assist with the Contractor construction activities. Flagging shall conform to the requirements of the MUTCD. The cost of the "minimum" flaggers and additional flaggers utilized by the Contractor shall be included in the unit price of the bid item, Traffic Control.

Traffic Control Supervisor (TCS)

When required by the Contract, the contractor shall provide a competent CCA or ATSSA certified Traffic Control Supervisor (TCS) on site for any set up, moving, reconfiguration, and removal of all traffic control devices required for the project. The TCS may be utilized as a flagger, and be recognized as one of the "minimum" required flaggers if the work is contained within a reasonable work zone length. The TCS shall monitor and make repairs and adjustments to the traffic control devices daily. The Traffic Control Supervisor shall conform to the requirements of the MUTCD, and will be included in the cost of the bid item, Traffic Control

Traffic Control Devices

The Contractor shall furnish, erect, and maintain all barricades, construction signing, lights, and other traffic control devices in conformity to the Manual of Uniform Traffic Control Devices for Streets and Highways and as called for in the plans and drawings. All signs and barricades to be paid for by the owner shall be in good condition and acceptable to the project engineer. All required traffic control devices, signs and flaggers shall be in place through the construction area prior to beginning and work.

The use of Type "A" low intensity warning lights shall be as shown in the contract and are incidental to the price of each barricade.

All construction signing shall be black on reflective orange and per MUTCD standards unless otherwise specified.

Maintenance

The Traffic Control Supervisor shall conduct daily inspections (three times per day minimum on working days) of all traffic control devices to ensure proper placement and condition of all signs, barricades and channelization devices, and shall log placement, inspection, maintenance, and replacement of all traffic control devices. Copies of the contractor's daily traffic control logs shall be given to the engineer once per week.

All construction signing, barricades, channelization devices, temporary pavement markings, and other construction traffic control devices shall be kept clean, legible, visible, and in proper position at all times. Damaged traffic control devices shall be repaired or replaced immediately.

Method of Handling Traffic (MHT)

To implement the Traffic Control Plan the Contractor will prepare and submit a Method of Handling Traffic (MHT) to the Engineer for approval at least one week prior to commencement of any demolition work. The Contractor shall implement the MHT in accordance with the plans and specifications. Any variance from those plans will require the approval of the Engineer.

The MHT shall be drawn specific to each project. The MHT shall be drawn reasonably close to scale and shall show representative project landmarks, streets and salient features. The Engineer, upon

request from the Contractor, will furnish to the Contractor base mapping for preparation of the MHT. An individual MHT shall be submitted for each phase of work.

The MHT shall include the following as a minimum:

1. Detailed diagrams showing the size and location of all proposed traffic control devices.
2. Access plan for all businesses.
3. Access plan for pedestrians.
4. Emergency vehicle access plan.
5. Supporting documentation as required.
6. Flagger number and locations.

The key elements of the Contractor's method of handling traffic (MHT) are outlined in subsection 630.10(a).

The components of the TCP for this project are included in Subsection 104.04 and Section 630 of the specifications.

Unless otherwise approved by the Engineer, the Contractor's equipment shall follow normal and legal traffic movements. The Contractor's ingress and egress of the work area shall be accomplished with as little disruption to traffic as possible. Traffic control devices shall be removed by picking up the devices in a reverse sequence to that used for installation. This may require moving backwards through the work zone. When located behind barrier or at other locations shown on approved traffic control plans, equipment may operate in a direction opposite to adjacent traffic.

SECTION 641 SHOTCRETE

RETAIN all sections

DIVISION 700
MATERIALS DETAILS

SECTION 701 HYDRAULIC CEMENT

Add the following to Section 701.02:

Fly ash or natural pozzolans shall conform to ASTM C618, for Class C, F, N, or AASHTO M321 for High Reactivity Pozzolans. Class C fly ash may only be used for Class 0 sulfate resistance and if the calcium oxychloride is determined to be less than 15g CaOXY/100g cementitious paste in accordance with AASHTO T 365.

SECTION 702 BITUMINOUS MATERIALS

RETAIN all sections

SECTION 703 AGGREGATES

703.07 DELETE and REPLACE Paragraph (a) as follows: “(a) Bed course material for curbing, sidewalks and bike/pedestrian paths shall be 6 inches of aggregate base course Class 6 unless otherwise approved by the Engineer.”

SECTION 704 MASONRY UNITS

RETAIN all sections

SECTION 705 JOINT, WATERPROOFING AND BEARING MATERIAL

705.01 ADD the following to paragraph (a) JOINT SEALANT WITH BACKER ROD:

“The following sealants are approved for sealing concrete joints:

Sika Group - Sikaflex-1c SL

Dow Corning - Dow 890-SL

Pecora Corporation - Pecora 300 SL

Tremco incorporated - Spectrem 900-SL

Sonneborn – Sonalastic SL1

The color of the joint sealant shall match the color of the concrete unless otherwise specified or approved.”

ADD the following to paragraph (b) PREFORMED JOINT FILLERS:

“Prefomed joint fillers conforming to AASHTO M 153 Type IV – Polyurethane bonded recycled rubber, are approved.”

SECTION 706 CONCRETE AND CLAY PIPE

RETAIN all sections

SECTION 707 METAL PIPE

RETAIN all sections

SECTION 708 PAINTS

RETAIN all sections

SECTION 709 REINFORCING STEEL AND WIRE ROPE

RETAIN all sections

SECTION 710 FENCE AND GUARDRAIL

RETAIN all sections

SECTION 711 CONCRETE CURING MATERIALS AND ADMIXTURES

711.01 ADD the following: "Liquid membrane-forming curing compound shall be a V.O.C. compliant, dissipating resin, conforming to AASHTO M-148, Type 2 for uncolored concrete or Type 1 (clear) for colored concrete. The following curing compounds are approved:

Dayton Superior - Day-Chem White Pigmented Cure (J-10-W)
Dayton Superior - White Dissipating Cure EF
Euclid – Kurez DR VOX"

711.03 ADD the following:

"Accelerating Admixtures: Set accelerating admixtures shall be non-chloride liquid conforming the ASTM C 494 Type C. The following accelerating admixtures are approved:

BASF Chemical Company - Pozzolith NC 534
Grace Construction Products - Daraset 200, 400 or HES
Euclid Chemical Company – Eucon NCA or Eucon ACN

Evaporation Retardants. The following evaporation retardants are approved:

BASF Chemical Company - CONFILM
Dayton Superior - Sure Film J-74
Euclid Chemical Company - EucoBar

Color Additive for Colored Concrete shall be manufactured by DAVIS Colors, 3700 East Olympic Blvd., Los Angeles, CA or an approved substitute.

SECTION 712 MISCELLANEOUS

712.13 ADD paragraph (e) and include the following:

“High Density Polyethylene Corrugated Pipe with Smooth Interior for Storm Sewers, Culverts, and Drains.

- (1) ASTM F-405: Standard Specification for Corrugated Polyethylene Tubing and Fittings
- (2) ASTM F-667: Large Diameter Corrugated Polyethylene Tubing
- (3) AASHTO M 252-851: Standard Specifications for Corrugated Polyethylene Drainage Tubing
- (4) AASHTO M 294-851: Corrugated Polyethylene Pip, 12 to 24 inch Diameter
- (5) The nominal size of the pipe is based on the nominal inside diameter of the pipe.
- (6) The tolerance on the specified inside diameter shall be +3%, -1.5%, or ½ inch, whichever is less. Lengths shall be no less than 99% of stated quantity.
- (7) Pipe shall be joined by split corrugated couplings at least 7 corrugations wide and exceeding the soil tightness requirements of the AASHTO Standard Specification for Highway Bridges, Section 23 (2.23.3).

(8) Pipe Stiffness

The pipe shall have a minimum pipe stiffness at 5% deflection as follows:

Diameter (inches)	Pipe Stiffness (PSI)
12	45
15	42
18	40
24	34

Tests shall be in accordance with ASTM D2412 with a minimum one diameter sample length, a loading rate of 0.5"/min., and readings at 5% deflection.

(9) Hydraulics

The pipe shall have a minimum tested Mannings "n" value of 0.012.

(10) Perforations

Where perforated pipe is specified, the perforations shall conform to the requirements of Class 1, unless otherwise specified in the order. Class 1 perforations are for pipe intended to be used for subsurface drainage or combination storm and underdrain. The perforations shall be cleanly cut so as not to restrict the inflow of water. Pipe connected by couplings or bands may be unperforated within 4 inches (100 mm) of each end of each length of pipe.

- A. Class I Perforations: The perforations shall be approximately circular and shall have nominal diameters of not less than 3/16 inch (4.8 mm) nor greater than 3/8 inch (9.5 mm) and shall be arranged in rows parallel to the axis of the pipe.

The perforations shall be located in the external valleys with perforations in each row for each corrugation. The rows of perforations shall be arranged in two equal groups placed symmetrically on either side of the lower unperforated segment corresponding to the flow line of the pipe. The spacing of the rows shall be uniform. The distance between the center lines of the rows shall not be less than 1 inch (25 mm).

(11) Retest and Rejection

If any failure to conform to these specifications occurs, the pipe or fittings may be retested to establish conformity in accordance with agreement between the purchaser and seller. Individual results, not averages, constitute failure.”

SECTION 713 TRAFFIC CONTROL MEASURES

RETAIN all sections

SECTION 714 PRESTRESSED UNIT MATERIALS

RETAIN all sections

SECTION 715 LIGHTING AND ELECTRICAL MATERIALS

ADD the following to Section 715.03:

“Light poles shall meet the following requirements:

Manufacturer: Mountain States Lighting or Approved Equal

Part#: 9SRS-3.5-NO TENON-11.50” BOLT CIRCLE-BLACK or Approved Equal

Height: 9’ Pole or 12’ Pole (near intersections)

Base: 44” Slipover decorative base cover, Die-Cast Aluminum Alloy 356HMLC, High Strength, Copper Free, 10” Hex, 10 ¾” Point to Point, Separate Anchor Bolt Covers

Handhole: 2” x 5” Handhole opening in base of pole

Ladder Rest: 4” OD, 3.5” ID ladder rest, black finish, per Town Details

ADD the following to Section 715.04:

Luminaires and Lamps shall be one of the following per the Contract Documents:

PROV-T3-32LED-3K-700-LDL-HSS-PCA-T (Providence or Approved Equal)

F660-GX919-40-277-T2 or T5 (Newport, Welsbach, or Approved Equal)

PRMD2-72L-335-3K7-3-BLT-FTG-TRA5D-MOD 4.5” (Promenade or Approved Equal)

SECTION 716 WATER LINE MATERIALS

DELETE Section 716 in its entirety and REPLACE with the Town of Breckenridge Water Construction Standards

SECTION 717 REST AREA AND BUILDING MATERIALS

DELETE Section 717 in its entirety.