

## SPECIAL PROVISIONS

CITY OF GRAND JUNCTION  
DEPARTMENT OF PUBLIC WORKS AND UTILITIES  
ENGINEERING DIVISION

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**Ranchmen's Ditch Flood Control Project, Phase I**

**SPECIAL PROVISIONS**

**GENERAL:**

The descriptions of the pay items listed in the Bid Schedule for this Project may not agree with those listed in the Standard Specifications. Payment for all Work performed, as required in the Contract Documents, will be in accordance with the items and units listed in the Bid Schedule.

**STANDARD CONTRACT DOCUMENTS FOR CAPITAL IMPROVEMENTS  
CONSTRUCTION:**

The *City of Grand Junction Standard Contract Documents* are hereby modified or supplemented for this Project by the following.

**STANDARD SPECIFICATIONS AND SPECIAL PROVISIONS  
FOR STRUCTURE NO. 2 (PLAN SHEETS ST-01 THROUGH ST-03)**

**INTRODUCTION**

The 2005 *Standard Specifications for Road and Bridge Construction* controls construction of this project. The following special provisions supplement or modify the Standard Specifications and take precedence over the Standard Specifications and plans. When specifications or special provisions contain both English units and SI units, the English units apply and are the specification requirement.

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REVISION OF SECTION 206  
STRUCTURE BACKFILL (SPECIAL)

Section 206 of the Standard Specifications is hereby revised for this project as follows:

Subsection 206.02 (a) shall include the following:

Structure Backfill (Special) shall meet the specifications for Type B Granular Stabilization according to the City Standard Contract Documents.

Subsection 206.03 shall include the following:

Structure Backfill (Special) shall be placed in layers and reinforced with geogrid reinforcement as shown on the plans or directed by the Engineer.

Structure Backfill (Special) shall be compacted to a density of not less than 95 percent of maximum density as determined by observation of compactive effort. Dumping and spreading of Structure Backfill is not permitted. Compactive effort via hydraulic tamping, sheeps-foot wheel, or other methods approved by the Engineer is required.

Subsection 206.06 shall include the following:

Structure Backfill (Special) for Structures No. 2, 3 and 4 will not be measured, but will be incidental to the lump sum payment for each structure.

REVISION OF SECTION 506  
GEOGRID REINFORCEMENT FOR STRUCTURE BACKFILL

Section 506 of the Standard Specifications is hereby revised for this project to include the following:

**DESCRIPTION**

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

**MATERIALS**

Geogrid is a polymer grid structure specifically fabricated for use as a soil reinforcement. Geogrid reinforcement material shall conform to the following:

**GEOGRID**

<b>Physical Properties</b>	<b>Unit</b>	<b>*Characteristic Values</b>	
Roll Length	m (feet)	--	
Roll Width	m (feet)	--	
Roll Weight	kg (lb)	--	
Mass per Unit Area	kg/m <sup>2</sup> (oz/sq yd)	--	
Grid Pitch, Transverse Direction	mm (inch)	1" +/-	
Grid Pitch, Longitudinal Direction	mm (inch)	1" +/-	
<b>Mechanical Properties</b>	<b>Unit</b>	<b>Test Method</b>	<b>*Minimum Value</b>
Peak Tensile Strength	N/m (lb/ft)	ASTM D 4595	825
Tensile Strength at 2% Strain, Machine Direction	N/m (lb/ft)	ASTM D 4595	270
Tensile Strength at 2% Strain, Cross-Machine Direction	N/m (lb/ft)	ASTM D 4595	450
Junction Efficiency	percent	GG2	90

The geogrid reinforcement shall be composed principally of polypropylene or high density polyethylene. The geogrid reinforcement shall contain stabilizers or inhibitors to prevent degradation of properties due to ultraviolet light exposure. The geogrid reinforcement shall be inert to all naturally occurring alkaline and acidic soil conditions. Unless otherwise approved by the Project Engineer, TENSAR BX-1200 Geogrid shall be used for all subgrade reinforcement for structures depicted on ST-sheets.

\* The proposed geogrid reinforcement material shall be submitted for review and approval by the Geotechnical Engineer, before the Contractor orders material and proceeds with the work. The manufacturer shall furnish certified test reports from an independent laboratory indicating

that the material meets the requirements of the specification.

### **CONSTRUCTION REQUIREMENTS**

Geogrid reinforcement shall be installed in accordance with the following:

- (a) **Delivery, Storage, and Handling.** Upon delivery, the Contractor shall check the geogrid to assure the proper material has been received. Special care shall be taken in the handling of geogrids manufactured from polypropylene at temperatures at or below  $-18^{\circ}\text{C}$  ( $0^{\circ}\text{F}$ ).
- (b) **Geogrid Installation.** Geogrid shall be laid on compacted structure backfill at the proper elevation and alignment, and to the extent, as shown on the plans or as directed by the Engineer. The surface of the structure backfill shall be roughened to provide an interlocking effect with the geogrid. Geogrid shall be oriented such that the roll length runs parallel to the channel alignment.

Parallel rolls shall be overlapped 300 mm (1 foot). When a new roll is started, a 600 mm (2 foot) overlap shall be made over the end of the previous roll. Care shall be taken to ensure that geogrid sections do not separate at overlaps during construction.

Placement of geogrid around corners will require cutting of geogrid product and diagonal overlapping of same to ensure that excessive buckling of grid material does not occur.

Geogrid material shall be secured to the ground surface by placement of loose fill at the corners and edges or as directed by the Engineer.

- (c) **Fill Placement Over Geogrid.** Backfill material shall be placed, spread and compacted in a manner that minimizes the development of slack in the geogrid.

Tracked construction equipment shall not operate directly upon the geogrid. A minimum fill thickness of 200 mm (8 inches) is required prior to operation of tracked vehicles over the geogrid. Tracked vehicle turning shall be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid.

Rubber-tire equipment may pass over the geogrid at slow speeds, less than 15 km/h (10 mph), if the underlying material is capable of supporting the loads without excessive rutting or causing damage to the mesh. Operators shall avoid sudden braking or sharp turning.

Fill material shall be back-dumped from trucks riding on top of the reinforced fill and bladed onto the geogrid in such a manner that the fill rolls onto the grid ahead, e.g., by gradually raising dozer blade while moving forward.

Material placed over the geogrid shall be compacted in accordance with the compaction requirements for structure backfill for this project or as directed. Care shall be taken to assure the geogrid reinforcement is not damaged.

### **METHOD OF MEASUREMENT**

Geogrid reinforcement will not be measured, but will be incidental to the lump sum pay item for each structure depicted on the ST-sheets.

REVISION OF SECTION 509  
STRUCTURAL STEEL (SPECIAL)

Section 509 of the Standard Specifications is hereby revised for this project as follows:

Subsection 509.01 shall include the following:

The work for Structural Steel (Special) shall consist of furnishing, fabricating, and erecting all stainless steel members and hardware inside the junction boxes (for weir plates and related components, framing for temporary diversion planks or trash racks, anchor bolts, etc.).

Subsection 509.03 (a), Stainless Steel, shall be added as follows:

Stainless steel for all members shall be Type AISI 304/316. Stainless steel plate shall be in conformance with ASTM A240 and ASTM A480. Stainless steel bars and shapes shall be in conformance with ASTM A276 and ASTM A484.

Subsection 509.10 (a), Stainless Steel Anchor Bolts, shall be added as follows:

Stainless steel for all members shall be Type AISI 304/316. Stainless steel anchor bolts shall be in conformance with ASTM F593. Stainless steel nuts shall be in conformance with ASTM F594. Stainless steel washers shall be in conformance with ANSI B18.22.1 Type A Plain.

Subsection 509.32 shall include the following:

Structural Steel (Special) for Structures No. 2, 3 and 4 will not be measured, but will be incidental to the lump sum pay item for each structure depicted on the ST-sheets.

June 7, 2007

REVISION OF SECTIONS 106 AND 601  
CONCRETE SAMPLING AND PUMPING

Sections 106 and 601 of the Standard Specifications are hereby revised for this project as follows:

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

Samples will be taken by the Department except that the Contractor shall take samples of Portland Cement Concrete in accordance with CP 61; samples of asphalt cement, in accordance with AASHTO T 40; hot mix asphalt, in accordance with CP 41 and a composite of aggregates for hot bituminous mixtures, in accordance with CP 30. The Engineer will determine the sampling locations, and the samples shall be taken in the presence of the Engineer. The Contractor may retain a split of each sample.

Delete subsection 601.08 and replace with the following:

**601.08 Air Content Adjustment.** When a batch of concrete delivered to the project does not conform to the minimum specified air content, an air entraining admixture conforming to subsection 711.02 may be added in accordance with subsection 601.17. After the admixture is added, the concrete shall be re-mixed for a minimum of 20 revolutions of the mixer drum at mixing speed. The concrete will then be re-tested by QC.

Subsection 601.12(d) shall include the following:

The Contractor shall not use pipes, chutes, troughs, spouts, or tremies that are fabricated of aluminum materials for pumping, conveying, or placing concrete.

Subsection 601.12(g) shall include the following:

When concrete is placed by pumping, the pumping equipment shall be thoroughly cleaned prior to concrete placement. Excess form release agent shall be removed from the hopper. The pump shall be primed at the Contractor's expense by pumping and discarding enough concrete to produce a uniform mix exiting the pump. At least 0.25 cubic yard of concrete shall be pumped and discarded to prime the pump. Water shall not be added directly into the concrete pump hopper after placement has commenced. If water is added to the concrete pump hopper, all concrete in the concrete pump hopper and the line shall be discarded and the pump re-primed at the Contractor's expense.

The pump operator shall have a valid operator's certification from the American Concrete Pumping Association. Boom pumps shall have a current Concrete Pump Manufacturers Association's CPMA27-2000 certification. Equipment added to the pump shall meet the pump manufacturer's specifications. The Contractor shall submit the specifications of the pumping equipment and the qualifications of the operator to the Engineer for review at least two weeks prior to pumping concrete. Equipment and operators rejected by the Engineer shall be replaced at the Contractor's expense.

The pump shall be operated so that a continuous stream of concrete is produced. The pump

equipment shall use a minimum of one of the following to maintain concrete uniformity:

- (1) A 360 degree loop immediately prior to the delivery end of the pump line.
- (2) A minimum one inch reducer installed at the entry to the delivery hose.
- (3) A minimum one inch reducing delivery hose.
- (4) A cable attached to the pump boom creating a minimum 90 degree bend in the steel braded flexible hose. The point of discharge from the flexible hose at the end of the boom shall be at or above the lowest point of the bend.
- (5) On horizontal pours a 10-foot minimum horizontal delivery system placed on the deck.
- (6) Other approved methods.

Metal pump lines or couplings shall not rest directly on epoxy coated reinforcing steel.

The point of discharge of the pump shall be as close to the bridge deck elevation as possible.

Subsection 601.17 shall include the following:

The Contractor shall sample 601 pay items for both QC and QA in accordance with CP 61. The Engineer will witness the sampling and take possession of the QA samples at a mutually agreed upon location.

Delete subsection 601.17(a) and replace with the following:

- (a) *Air Content.* The first three batches at the beginning of production shall be tested by QC and QA for air content. When air content is below the specified limit, it may be adjusted in accordance with subsection 601.08. Successive batches shall be tested by QC and witnessed by the Engineer until three consecutive batches are within specified limits. After the first three batches, CDOT will follow the random minimum testing schedule. Air content shall not be adjusted after a QA test.

At any time during the placement of the concrete, when a QA test on a batch deviates from the minimum or maximum percent of total air content specified, the following procedure will be used to analyze the acceptability of the concrete.

1. A batch that deviates from the specified air content by more than 1 percent and all Class D, DT, HT and H concrete placed in bridge decks with air content exceeding 8 percent will be rejected. Portions of loads incorporated into structures prior to determining test results which indicate rejection as the correct course of action shall be subject to acceptance at reduced price, no payment, or removal as determined by the Engineer.
2. A batch that deviates from the specified air content by 1 percent or less may be accepted at a reduced price using Table 601-3.

November 30, 2006

REVISION OF SECTION 206  
SHORING

Section 206 of the Standard Specifications is hereby revised for this project as follows:

In Subsection 206.01, delete the third paragraph and replace with the following:

Unless otherwise specified, structure excavation shall include all pumping, bailing, draining, and incidentals required for proper execution of the work.

Subsection 206.01 shall include the following:

This work consists of shoring.

Subsection 206.03 shall include the following:

The Contractor shall locate, size, design, and construct shoring which provides all necessary rigidity, and supports the loads imposed to facilitate construction as shown on the plans.

When the height of shoring exceeds 5 feet above the base of the excavation, shoring drawings shall be provided by the Contractor to the Engineer for information only. The drawings shall be prepared, signed, and sealed by the Contractor's Engineer. These drawings shall be approved and signed by the Contractor and provided to the Engineer at least ten days prior to start of work.

Shoring shall be constructed in conformity with the shoring drawings provided to the Engineer. Prior to placing construction or traffic loads on the supported earth, the Contractor's Engineer shall certify in writing that shoring materials and construction have been inspected and that all shoring, materials, and construction are in conformity with the shoring drawings. A copy of this certification shall be submitted in an appropriate form for the Engineer's records.

If the embankment, construction, traffic, or any other surcharge is in excess of what the original shoring was designed for and is to be placed adjacent to any shoring, the Contractor shall provide a signed letter from the Contractor's Engineer prior to the load placement stating that the shoring will support the additional load.

Shoring drawings shall include the following information:

- (1) The size and grade of all structural materials
- (2) Design notes, including design assumptions, and construction details
- (3) Where applicable, restrictions on heavy equipment placement at specific locations adjacent to the shoring

- (4) Areas determined by the Contractor's Engineer where de-watering of the shored excavation will be required, and a description of the requirements (i.e., head added by the pump, flow rate, minimum pump size, etc.) and methods to be used for de-watering.
- (5) All other information determined by the Contractor's Engineer to be pertinent to the design and successful construction of the shoring.

Subsection 206.06 shall include the following:

Shoring will not be measured or paid for separately, but will be incidental to the Structure Pay Item.

Subsection 206.07 shall include the following:

Payment for shoring for structures on ST-sheets will not be made separately. Shoring is incidental to the Structure Pay Item.

REVISION OF SECTIONS 601 AND 701  
STRUCTURAL CONCRETE

Sections 601 and 701 of the Standard Specifications are hereby revised for this project as follows:

The structure depicted on Sheets ST-01 through ST-03 (Structure No. 2, Shlotsky's Junction Box), shall be complete, with lid in place and temporary forms removed prior to backfilling of the excavation surrounding the structure. The structure will not withstand lateral soil loads without the lid completed.

Delete subsection 601.02 and replace with the following:

**601.02 Classification.** The classes of concrete shown in Table 601-1 shall be used when specified in the Contract.

**Table 601-1  
CONCRETE TABLE**

<b>Concrete Class</b>	<b>Required Field Compressive Strength (psi)</b>	<b>Cementitious Content: Minimum or Range (lbs/yd<sup>3</sup>)</b>	<b>Air Content: % Range (Total)</b>	<b>Water Cement Ratio: Maximum or Range</b>
<b>B</b>	3500 at 28 days	565	5 - 8	0.50
<b>BZ</b>	4000 at 28 days	610	N/A	0.50
<b>D</b>	4500 at 28 days	615 to 660	5 - 8	0.44
<b>DT</b>	4500 at 28 days	700	5 - 8	0.44
<b>E</b>	4200 at 28 days	660	4 - 8	0.44
<b>H</b>	4500 at 56 days	580 to 640	5 - 8	0.38 - 0.42
<b>HT</b>	4500 at 56 days	580 to 640	5 - 8	0.38 - 0.42
<b>P</b>	4200 at 28 days	660	4 - 8	0.44
<b>S35</b>	5000 at 28 days	615 to 720	5 - 8	0.42
<b>S40</b>	5800 at 28 days	615 to 760	5 - 8	0.40
<b>S50</b>	7250 at 28 days	615 to 800	5 - 8	0.38

**Class B** concrete is an air entrained concrete for general use. Class D or H concrete may be substituted for Class B concrete. Additional requirements are: The coarse aggregate shall

have a nominal maximum size of 1½ inches or smaller. Approved fly ash may be substituted for portland cement up to a maximum of 20 percent Class C or 30 percent Class F by weight of total cementitious.

**Class BZ** concrete is concrete for drilled piers. Additional requirements are: Entrained air is not required unless specified in the Contract. High range water reducers may be added to obtain desired slump and retardation. Slump shall be a minimum of 5 inches and a maximum of 8 inches. The concrete mix shall be made with AASHTO M 43 size No. 67, No. 7 or No. 8 coarse aggregate. Approved fly ash may be substituted for portland cement up to a maximum of 20 percent Class C or 30 percent Class F by weight of total cementitious.

**Class D** concrete is a dense medium strength structural concrete. Class H may be substituted for Class D concrete. Additional requirements are: An approved water reducing admixture shall be incorporated in the mix. The concrete mix shall be made with AASHTO M 43 sizes No. 57, No. 6 or No. 67 coarse aggregate. When placed in a bridge deck, the concrete mix shall consist of a minimum 55 percent AASHTO M 43 size No. 67 coarse aggregate by weight of total aggregate. Approved fly ash may be substituted for portland cement up to a maximum of 20 percent Class C or 30 percent Class F by weight of total cementitious.

**Class DT** concrete may be used for deck resurfacing and repairs. Class HT may be substituted for Class DT concrete. Additional requirements are: An approved water reducing admixture shall be incorporated in the mix. The concrete mix shall consist of a minimum 50 percent AASHTO M 43 size No. 7 or No. 8 coarse aggregate by weight of total aggregate. Approved fly ash may be substituted for portland cement up to a maximum of 20 percent Class C or 30 percent Class F by weight of total cementitious.

**Class E** concrete may be used for fast track pavements needing early strength in order to open a pavement to service soon after placement. Additional requirements are: Type III cement may be used. The concrete mix shall consist of a minimum 55 percent AASHTO M 43 size No. 357 or No. 467 coarse aggregate by weight of total aggregate. If all transverse joints are doweled, the concrete mix shall consist of a minimum 55 percent AASHTO M 43 sizes No. 57, No. 6, No. 67, No. 357, or No. 467 coarse aggregate by weight of total aggregate. The laboratory trial mix must produce an average 28 day flexural strength of a minimum 650 psi. Class E concrete shall contain a minimum 10 percent to a maximum of 20 percent Class C, or a minimum 10 percent to a maximum 30 percent Class F fly ash by weight of total cementitious.

**Class H** concrete is used for bare concrete bridge decks that will not receive a waterproofing membrane. Additional requirements are: An approved water reducing admixture shall be incorporated in the mix. The concrete mix shall consist of a minimum of 55 percent AASHTO M 43 size No. 67 coarse aggregate by weight of total aggregate. Class H concrete shall contain cementitious materials in the following ranges: 450 to 500 pounds per cubic yard Type II portland cement, 90 to 125 pounds per cubic yard fly ash and 20 to 30 pounds per cubic yard silica fume. The total content of Type II portland cement, fly ash and silica fume shall be 580 to 640 pounds per cubic yard. The laboratory trial mix must not exceed permeability of 2000 coulombs at 56 days (ASTM C 1202) and must not exhibit a crack at or before 14 days in the

cracking tendency test (AASHTO PP 34).

**Class HT** concrete is used as the top layer for bare concrete bridge decks that will not receive a waterproofing membrane. Additional requirements are: An approved water reducing admixture shall be incorporated in the mix. The concrete mix shall consist of a minimum of 50 percent AASHTO M 43 size No. 7 or No. 8 coarse aggregate by weight of total aggregate. Class HT concrete shall contain cementitious materials in the following ranges: 450 to 500 pounds per cubic yard Type II portland cement, 90 to 125 pounds per cubic yard fly ash and 20 to 30 pounds per cubic yard silica fume. The total content of Type II portland cement, fly ash and silica fume shall be 580 to 640 pounds per cubic yard. The laboratory trial mix must not exceed permeability of 2000 coulombs at 56 days (ASTM C 1202) and must not exhibit a crack at or before 14 days in the cracking tendency test (AASHTO PP 34).

**Class P** concrete is used in pavements. Additional requirements are: The concrete mix shall consist of a minimum 55 percent AASHTO M 43 size No. 357 or No. 467 coarse aggregate by weight of total aggregate. If all transverse joints are doweled, the concrete mix shall consist of a minimum 55 percent AASHTO M 43 sizes No. 57, No. 6, No. 67, No. 357, or No. 467 coarse aggregate by weight of total aggregate. The laboratory trial mix must produce an average 28 day flexural strength of a minimum 650 psi. Class P concrete shall contain a minimum 10 percent to a maximum of 20 percent Class C, or a minimum 10 percent to a maximum 30 percent Class F fly ash by weight of total cementitious. Unless acceptance is based on flexural strength, the total weight of cementitious shall not be less than 660 pounds per cubic yard. If acceptance is based on flexural strength, the total weight of cementitious shall not be less than 520 pounds per cubic yard.

**Class S35** concrete is a dense high strength structural concrete. Additional requirements are: An approved water reducing admixture shall be incorporated in the mix. The concrete mix shall be made with AASHTO M 43 sizes No. 57, No. 6, No. 67, No. 7 or No. 8 coarse aggregate. When placed in a bridge deck, the concrete mix shall consist of a minimum 55 percent AASHTO M 43 size No. 67 coarse aggregate by weight of total aggregate. Approved fly ash may be substituted for portland cement up to a maximum of 20 percent Class C or 30 percent Class F by weight of total cementitious.

**Class S40** concrete is a dense high strength structural concrete. Additional requirements are: An approved water reducing admixture shall be incorporated in the mix. The concrete mix shall be made with AASHTO M 43 sizes No. 57, No. 6, No. 67, No. 7 or No. 8 coarse aggregate. When placed in a bridge deck, the concrete mix shall consist of a minimum 55 percent AASHTO M 43 size No. 67 coarse aggregate. Approved fly ash may be substituted for portland cement up to a maximum of 20 percent Class C or 30 percent Class F by weight of total cementitious.

**Class S50** concrete is a dense high strength structural concrete. Additional requirements are: An approved water reducing admixture shall be incorporated in the mix. The concrete mix shall be made with AASHTO M 43 sizes No. 57, No. 6, No. 67, No. 7 or No. 8 coarse aggregate. When placed in a bridge deck, the concrete mix shall consist of a minimum 55 percent AASHTO M 43 size No. 67 coarse aggregate by weight of total aggregate. Approved fly ash may be

substituted for portland cement up to a maximum of 20 percent Class C or 30 percent Class F by weight of total cementitious. The laboratory trial mix must not exhibit a crack at or before 14 days in the cracking tendency test (AASHTO PP 34).

Subsection 601.03 shall include the following:

Where blended hydraulic cement is used the substitution of fly ash for the blended hydraulic cement is not allowed.

Subsection 601.04 shall include the following:

**601.04 Sulfate Resistance.** The Contractor shall provide protection against sulfate attack on concrete structures by providing concrete structures manufactured with requirements according to Table 601-4. The Severity of exposure Class shall be Class 2 unless stated otherwise on the plans. A higher level of requirements may be used for a lower level of exposure.

If the Contractor can provide a test report that shows another class of exposure exists at a structure location, then the Engineer may accept a concrete mix for that location that meets the corresponding sulfate protection requirements in addition to other requirements shown in this section.

**Table 601-4  
REQUIREMENTS TO PROTECT AGAINST DAMAGE TO  
CONCRETE BY SULFATE ATTACK FROM EXTERNAL SOURCES OF SULFATE**

Severity of potential exposure	Water-soluble sulfate (SO <sub>4</sub> ), percent, dry soil	Sulfate (SO <sub>4</sub> ) in water, ppm	Water cement ratio, maximum	Cementitious material requirements
Class 0	0.00 to 0.10	0 to 150	0.50	Class 0
Class 1	0.11 to 0.20	151 to 1500	0.50	Class 1
Class 2	0.21 to 2.00	1501 to 10,000	0.45	Class 2
Class 3	2.01 or greater	10,001 or greater	0.40	Class 3

Cementitious material requirements are as follows:

Class 0 requirements shall be one of the following:

- (1) ASTM C 150 Type I, II or V
- (2) ASTM C 595 Type IP
- (3) ASTM C 1157 Type GU
- (4) ASTM C 150 Type III cement if it is allowed, as in Class E concrete

Class 1 requirements for sulfate resistance shall be one of the following:

- (1) ASTM C 150 Type II or V; Class C fly ash shall not be allowed in the concrete mix
- (2) ASTM C 595 Type IP(MS)
- (3) ASTM C 1157 Type MS
- (4) When ASTM C 150 Type III cement is allowed, as in Class E concrete, it shall have no more than 8 percent C<sub>3</sub>A. Class C fly ash shall not be allowed in the concrete mix

Class 2 requirements for sulfate resistance shall be one of the following:

- (1) ASTM C 150 Type V with a minimum of a 20 percent substitution of Class F fly ash by weight
- (2) ASTM C 150 Type II or III with no more than 0.040 percent expansion at 14 days when tested in accordance with ASTM C 452 with a minimum of a 20 percent substitution of Class F fly ash by weight
- (3) ASTM C 1157 Type HS
- (4) A blend of portland cement meeting ASTM C 150 Type II or III with a minimum of 20 percent Class F fly ash by weight, where the blend has less than 0.05 percent expansion at 6 months or 0.10 percent expansion at 12 months when tested according to ASTM C 1012.

Class 3 requirements for sulfate resistance shall be one of the following:

- (1) A blend of portland cement meeting ASTM C 150 Type II, III, or V with a minimum of a 20 percent substitution of Class F fly ash by weight , where the blend has less than 0.10 percent expansion at 18 months when tested according to ASTM C 1012.
- (2) ASTM C 1157 Type HS having less than 0.10 percent expansion at 18 months when tested according to ASTM C 1012.

When fly ash is used to enhance sulfate resistance, it shall be used in a proportion greater than or equal to the proportion tested in accordance to ASTM C1012 and it shall have a calcium oxide content no more than 2.0 percent greater than the fly ash tested according to ASTM 1012.

Delete subsection 601.05 and replace with the following:

**601.05 Proportioning.** The Contractor shall submit a Concrete Mix Design Report consisting of design mix proportions, laboratory trial mix and aggregate data for each class of concrete being placed on the project. Concrete shall not be placed on the project before the Concrete Mix Design Report has been reviewed and approved by the Engineer. The Concrete Mix Design cannot be approved when the laboratory trial mix data are the results from tests performed more than two years in the past and aggregate data are the results from tests performed more than a year in the past. The design mix proportions shall show the weights and sources of all ingredients including cement, fly ash, aggregates, water, additives and the water cement ratio (w/c). When determining the w/c, cement (c) shall be the sum of the weight of the cement, the weight of the fly ash and the weight of silica fume.

The laboratory trial mix data shall include results of the following:

- (1) AASHTO T 119 (ASTM C 143) Slump of Hydraulic Cement Concrete.
- (2) AASHTO T 121 (ASTM C 138) Weight per Cubic Foot, Yield, and Air Content (Gravimetric) of Concrete. Air content from AASHTO T 152 (ASTM C 231) Air Content of Freshly Mixed Concrete by the Pressure Method may be used in lieu of the air content by the gravimetric method in AASHTO T 121 (ASTM C 138).
- (3) ASTM C 39 Compressive Strength of Cylindrical Concrete Specimens shall be performed with at least two specimens at 7 days and three specimens at 28 days. Three additional specimens tested at 56 days shall be required for Class H and HT concrete.
- (4) Class H and HT concrete shall include a measurement of permeability by ASTM C 1202 Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration. The concrete

test specimens shall be two 2 inch thick disks sawed from the centers of two molded 4 inch diameter cylinders cured 56 days in accordance with ASTM C 192 Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.

- (5) Class H, HT and S50 concrete shall include a measurement of cracking by AASHTO PP 34 Standard Practice for Estimating the Cracking Tendency of Concrete. The ring shall be cured in an indoor room with the temperature maintained 65 to 75 °F and relative humidity not exceeding 40 percent.
- (6) Class E and P concrete shall include AASHTO T 97 (ASTM C 78) Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading) performed with two specimens at seven days and four specimens at 28 days.

Prior to placement of Class E concrete, the Contractor shall provide the Engineer a report of maturity relationships in accordance with CP 69. The Contractor shall provide maturity meter and all necessary wire and connectors. The Contractor shall be responsible for the placement and maintenance of the maturity meter and wire. Placement shall be as directed by the Engineer.

Except for class BZ concrete, the maximum slump of the delivered concrete shall be the slump of the approved concrete mix design plus 1½ inch. Except for class H and HT concrete, the laboratory trial mix must produce an average 28 day compressive strength at least 115 percent of the required 28 day field compressive strength. The laboratory trial mix for Class H or HT concrete must produce an average 56 day compressive strength at least 115 percent of the required 56 day field compressive strength.

The laboratory trial mix shall have a relative yield of 0.99 to 1.02. When Portland Cement Concrete Pavement is paid with a volumetric pay quantity, the relative yield of the concrete produced on the project shall be 0.99 to 1.02.

If the relative yield of the produced concrete does not conform to this range for two consecutive yield determinations, concrete production shall cease and the Contractor shall present a plan to correct the relative yield to the Engineer.

Aggregate data shall include the results of the following:

- (i) AASHTO T 11 (ASTM C 117) Materials Finer Than 75 um (No. 200) Sieve in Mineral Aggregates by Washing.
- (ii) AASHTO T 19 (ASTM C 29) Unit Weight and Voids in Aggregate.
- (iii) AASHTO T 21 (ASTM C 40) Organic Impurities in Fine Aggregate for Concrete.
- (iv) AASHTO T 27 (ASTM C 136) Sieve Analysis of Fine and Coarse Aggregates.
- (v) AASHTO T 84 (ASTM C 128) Specific Gravity and Absorption of Fine Aggregate.
- (vi) AASHTO T 85 (ASTM C 127) Specific Gravity and Absorption of Coarse Aggregate.
- (vii) AASHTO T 96 (ASTM C 131) Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

- (viii) AASHTO T 104 (ASTM C 88) Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.
- (ix) AASHTO T 176 (ASTM D 2419) Plastic Fines in Graded Aggregates and Soils by use of the Sand Equivalent Test
- (x) ASTM C 535 Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- (xi) CP-L 4201 Determining the Potential Alkali Reactivity of Aggregates (Accelerated Mortar-Bar Method)

Any aggregate with an expansion of 0.10 percent or more at 16 days after casting as tested by CP-L 4201 shall not be used unless mitigative measures are included in the mix design. Mitigative measures shall be tested using CP-L 4202 and exhibit an expansion not exceeding 0.10 percent at 16 days after casting by one of the following methods:

- (1) Combined Aggregates. The mix design sources of aggregates, cement and mitigative measures shall be tested. The proportions of aggregates and mitigative measures shall be those used in the mix design.
- (2) Individual Aggregates. Each source and size of individual aggregates shall be tested. The source of cement and mitigative measures shall be those used in the mix design. The highest level of mitigative measures for any individual aggregate shall be the minimum used in the mix design.

The Concrete Mix Design Report shall include Certified Test Reports showing that the cement, fly ash and silica fume admixture meet the specification requirements and supporting this statement with actual test results. The certification for silica fume shall state the solids content if the silica fume admixture is furnished as slurry.

Where the Contractor's use of fly ash results in any delay, necessary changes in admixture quantities or source, or unsatisfactory work, the cost of such delays, changes or corrective actions shall be borne by the Contractor.

The Contractor shall submit a new Concrete Mix Design Report meeting the above requirements when a change occurs in the source, type, or proportions of cement, fly ash, or aggregate. The Contractor shall submit a new Mix Design Report meeting the above requirements when a change occurs in the source of approved admixtures.

The use of approved accelerating, retarding or hydration stabilizing admixtures to existing mix designs will be permitted at the discretion of the Engineer when documentation includes the following:

- (1) Manufacturers recommended dosage of the admixture

- (2) A letter stamped by the Concrete Mix Design Engineer approving the changes to the existing mix design. Unless otherwise permitted by the Engineer, the product of only one type of portland cement from one mill of any one brand shall be used in a concrete mix design.

Review and approval of the Concrete Mix Design by the Engineer does not constitute acceptance of the concrete. Acceptance will be based solely on the test results of concrete placed on the project.

Delete subsection 701.01 and replace with the following:

**701.01 Hydraulic Cement.** Hydraulic cement shall conform to the requirements of the following specifications for the type specified or permitted:

Portland Cement	ASTM C 150
Blended Hydraulic Cement	ASTM C 595
Hydraulic Cement	ASTM C 1157

In addition to the standard chemical requirements for portland cement in ASTM C 150, the maximum percent of equivalent alkalis ( $\text{Na}_2\text{O} + 0.658 \text{K}_2\text{O}$ ) shall not exceed 0.90 percent.

All concrete, including precast, prestressed and pipe shall be constructed with one of the following hydraulic cements unless permitted otherwise.

ASTM C 150 Type I  
ASTM C 150 Type II  
ASTM C 150 Type V  
ASTM C 595 Type IP consisting of no less than 70 percent portland cement,  
ASTM C 595 Type IP(MS) consisting of no less than 70 percent portland cement,  
ASTM C 1157 Type GU,  
ASTM C 1157 Type MS  
ASTM C 1157 Type HS consisting of no less than 20 percent Class F fly ash by weight

Cement shall be from a preapproved source listed on the Department's Approved Products List. The cement intended for use on the project shall have been tested and accepted prior to its use. Certified Test Reports showing that the cement meets the specification requirements and supporting this statement with actual test results shall be submitted to the Engineer prior to the tested material being incorporated into the project.

The cement shall be subject to sampling and testing by the Department. Test results that do not meet the physical and chemical requirements may result in the suspension of the use of the cement until the corrections necessary have been taken to insure that the material meets the specifications.

The Contractor shall provide suitable means for storing and protecting the cement against dampness. Cement which, for an reason, has become partially set or which contains lumps of caked cement shall not be used.

Cement salvaged from discarded or used bags shall not be used.

## **SPECIAL PROVISIONS FOR ALL OTHER PLAN SHEETS**

The *City of Grand Junction Standard Contract Documents for Capital Improvements Construction* are hereby modified or supplemented for the Detention Basin portion of the Project by the following:

### **SECTION 210 – RESET STRUCTURES**

*Add the following to Section 210*

1. Where fences are reset, the Contractor shall supply and install any new materials required to restore the fence to acceptable condition including new posts. Payment for resetting of fences and gates shall be per lineal foot removed and reset and shall not exceed that reasonably needed to provide access for trench excavation and backfilling. Fence outside of excavation limits shall not be removed unless approved in advance by the Inspector or Engineer.

### **SECTION 212 – SEEDING, FERTILIZER, SOIL CONDITIONER, AND SODDING**

*Add the following to Section 212*

1. Seeding shall be performed as soon as possible upon completion of construction.
2. The seed mix shown in Table 1 shall be applied to disturbed areas not planted with sod or otherwise revegetated or covered with landscaping as Pay Item 735. Seeding shall be performed via broadcast methods at the rates shown, following preparation of the soil consisting of: chaining, broadcast fertilization with a 18-46-0 fertilizer mix at 100 lbs/acre, and a second chaining to blend soil and fertilizer. Following broadcast fertilization, seeding shall be performed using hydraulic application equipment conforming to 212.04(c) (hydroseeding) followed by a hydromulch application containing SuperTack guar-based tackifier at 60 lbs/acre and virgin wood fiber mulch at 2000 lbs/acre. Hydromulch shall be applied the same day the seed is applied. A small amount of hydromulch shall be included during seed application to provide a visual indicator of coverage. During seed application, the Contractor shall be responsible for varying nozzle and application direction to fully cover the ground and prevent shadowing resulting from stumps, clumps of soil, or other surface irregularities. Blading, chaining/raking, fertilizer application, seed application, and hydromulch application shall all be included under Pay Item 735 and shall be paid per square yard. Measurement will be by approximated areas measured with a tape or surveyed by City surveyor.

**Table 1. Hydroseeding Seed Mix, Pay Item 735.**

<b>Species</b>	<b>Preferred Variety</b>	<b>Rate (lbs/acre)</b>
Crested wheatgrass ( <i>Agropyron cistatum</i> )	Fairway	3
Siberian wheatgrass ( <i>Agropyron fragile</i> )	P-27	3
Russian wildrye ( <i>Psathyrostachys juncea</i> )	Vinal	4
Tall wheatgrass ( <i>Elytrigia elongata</i> )	Jose	10
Thickspike wheatgrass ( <i>Elymus lanceolatus</i> )	Critana	4
Four-wing saltbush ( <i>Atriplex canescens</i> )	Wytana	12
Shadscale ( <i>Atriplex confertifolia</i> )	None	6
Alkali sacaton	None	0.2

The labels, including seed mix and weight, from each back of seed (and fertilizer) used on the project shall be collected and submitted to the Engineer to document adherence to specified application rates prior to application for payment.

## **SECTION 420 - GEOSYNTHETICS**

*Add the following to Section 420.02*

1. A biaxial geogrid consisting of Tensar BX 1100 shall be used to reinforce soft subgrade at the bottom of trench excavations receiving pipe installation when directed by the Engineer or Inspector. Tensar BX 1200 shall be used for foundation reinforcement beneath the reinforced concrete junction boxes designated Structure 2. When used in trench-bottom installations geogrid shall be installed beneath the Type B Granular Stabilization Material. For extremely soft trench bottoms, the Engineer or Inspector may also direct the Contractor to install geogrid at the top of the Type B Stabilization. When geogrid is called for by the Engineer or Inspector, it shall be underlain at the bottom of the trench by a Class A nonwoven geotextile (Mirafi 170N or Contech C70NW unless otherwise approved by the Engineer)
2. The geogrid shall be placed in the transverse direction (long grids perpendicular to the alignment of the pipe). Geogrid shall be inspected and accepted by the Engineer or Inspector prior to placement.

3. Payment for Geogrid shall be measured as the area of excavation bottom covered by the geogrid. Overlaps shall be installed as per manufacturer's specifications and shall not be paid for separately.

**The following modifications to Section UU of the Standard Contract Documents are applicable to all utility work performed during this project :**

## **SECTION 102 – MATERIALS**

*Add the following to Section 102:*

The Contractor shall have the option of choosing to install 90" and 96" storm sewer constructed of reinforced concrete, or constructed of polymer-coated double wall corrugated metal manufactured by Contech and marketed as SmoothCor. The Contractor shall make a selection regarding which material is to be installed and shall then enter unit and extended prices accordingly. If RCP is to be installed, the Contractor shall enter unit and extended prices for Pay Items with the "**-RCP ONLY**" extension; those pay items with the "**-CMP ONLY**" extension should not be completed.

If SmoothCor is to be installed, the Contractor shall enter unit and extended prices for Pay Items with the "**-CMP ONLY**" extension; those pay items with the "**-RCP ONLY**" extension should not be completed.

## **CONCRETE PIPE**

*The following modifications to Sections UU-102/108.2 are applicable to concrete pipe installed on the project :*

Concrete Pipe installed in the Project shall be manufactured in accordance with UU-102 and CDOT Section 706. Pipe shall be of size and class as specified in the Construction Drawings.

Concrete Pipe and gaskets shall be manufactured in accordance with ASTM C 76 and ASTM C 443. Concrete used to manufacture the pipe shall conform to the requirements of CDOT Class 2 sulfate-resistance, specified in Table 601-4 of Special Provisions of these Bid Documents.

The Contractor shall adhere to pipe manufacturer's requirements for construction loads and minimum cover. Prior to exposing installed pipe to HS-20 loads, the pipe shall be backfilled with a minimum of 1.5 ft of backfill (above crown of pipe) compacted as per specifications, or the pipe shall be backfilled to final subgrade with temporary or permanent driving surface installed and compacted as per specifications. For construction equipment exceeding HS-20 loads, a minimum of 3 ft of construction fill shall be in place, compacted as per normal backfill specifications.

Pipe installation and handling shall conform to ASTM C1479-01. When Contract Documents specify installation and/or handling practices other than those provided in C1479-01, specifications in the Contract Documents shall superseded those of C1479-01.

The maximum joint gap between sticks of installed pipe shall be 1.0 inch measured on the inside of the pipe. Joints exceeding this gap shall be grouted for the entire length of the gap exceeding 1.0". Grout shall be Recrete 20, FastSet Repair Mortor, or Octcrete Patching Compound. The surface of RCP that is to be grouted shall be saturated with water (but no standing water) and coated with acrylic fortifier bonding agent prior to placement of the grout.

Pipe shall be installed, bedded, haunched, and backfilled as shown in the typical sections. Bedding and haunching material shall be incidental to the cost of installing the pipe. Approved materials for haunching are as follows:

- Type A bedding and haunching material as defined in the Standard Contract Documents,
- Chat with the following gradation specification:

<u>Sieve Size</u>	<u>Percent Passing</u>
3/8"	100%
#4	60-97%
#8	0-40%
#200	2% max.

Chat must have 90% fractured faces. Chat shall be compacted to a minimum density corresponding to 70% of the Density Index as determined in accordance with ASTM D 4253 and ASTM D 4254. Density testing for quality control and quality assurance shall be at the same frequency as specified in the Standard Contract Documents.

- Natural Fines with the following gradation specification:

<u>Sieve Size</u>	<u>Percent Passing</u>
3/4"	100%
#4	60-85%
#8	50-75%
#200	12% max.

When Natural Fines are used for haunching, Class A nonwoven getotextile shall be installed between the Natural Fines and the underlying Type A bedding material and shall be incidental to the cost of the pipe installation.

Overexcavation and granular stabilization (Type B) shall be paid for separately. Up to two (2) feet of overexcavation and granular stabilization is anticipated in some areas. Overexcavation and granular stabilization may not be required in all locations. The Contractor and inspector/engineer shall jointly determine the locations and amount of granular stabilization, and when and where geogrid and Class A nonwoven geotextile are required beneath the granular stabilization by performing field tests of the subgrade using methods such as proof rolling, test-placement and surcharge loading of pipe, or other suitable methods.

Imported pit run shall be used for backfill only when suitable site-derived material is not available in

sufficient quantity. Imported pit run shall be paid for under Pay Item 361 and shall include the cost of haul and disposal of all unsuitable and/or excess excavated material not used for backfill.

All shop-fabricated structures and appurtenances associated with concrete pipe, such as manhole tees, lateral tees, cross-flow chambers, etc., shall have shop drawings prepared and stamped by a Licensed Professional Engineer and submitted to the Project Engineer prior to installation.

All closures of existing openings/penetrations in concrete structures (manholes and conduits) of 24" diameter or larger, and all joining of concrete conduit via fabricated tees in which the smaller conduit is 24" diameter or larger, shall include welded wire reinforcing. For closures of penetrations in which a conduit is being removed, the welded wire reinforcing shall span the entire opening to be closed and shall be welded to the reinforcing in the main. For new fabricated tees, the reinforcing of the smaller conduit/structure shall be welded to the reinforcing of the larger conduit structure. The exception to this specification shall be the reinforced junction boxes designated Structure 3 and Structure 4.

Closure of openings larger than 6" diameter shall be made using the a concrete mix design submitted to and approved by the Project Engineer. Sealing of tees at circumferential joints for diameters greater than 18" shall also be made using an approved concrete mix design. All other seals and closures shall be made using grout conforming to requirements specified in UU-102.

Payment for concrete pipe shall be per LF installed.

### **SMOOTHCOR PIPE (CMP)**

*The following modifications to Sections UU-102/108.2/CDOT-107 are applicable to CONTECH SmoothCor Polymer-Coated double-wall corrugated metal pipe installed on the project :*

SmoothCor Pipe installed in the Project shall be double-wall pipe manufactured with a corrugated external shell of 12-gauge steel with 3"x1" corrugations and an inner liner of 16-gauge steel. Both steel layers shall be fabricated and coated on both sides with polymer coating in accordance with ASTM A 742. Pipe shall be manufactured in accordance with ASTM A 762. Any and all holidays present or created in the polymer coating shall be repaired by painting on polymer coating to a thickness equal to or greater than the original coating.

Installations practices shall adhere to ASTM A 798, unless otherwise modified here. Pipe shall not be handled with any metal tools or otherwise handled in a manner that causes any damage to the polymer coating.

Pipe shall be installed only with match-marked ends joining one another, unless otherwise approved by the Engineer.

Bands for joining sticks of pipe shall be 16-gauge polymeric 10/10 coating x 27.25" wide and shall conform to ASTM A 742. Angles for closing bands shall be 2"x2"x3/16" punched for bolt holes and galvanized. Angles shall adhere to ASTM B 633. Bolts for closing bands shall be 1/2"x8"

galvanized with 1/2" nuts. Bolts and nuts shall adhere to ASTM A 307.

Gaskets for sealing beneath the bands at joints shall be 1 1/2" thick x 24" wide neoprene gaskets conforming to ASTM D 1056-78.

Construction load minimum cover shall conform to manufacturer requirements. At a minimum, no construction equipment shall operate above installed SmoothCor pipe with less than 3 ft of compacted backfill above the crown of the pipe.

Prior to exposing installed pipe to HS-20 loads, the pipe shall be backfilled with a minimum of 1.5 ft of backfill (above crown of pipe) compacted as per specifications, or the pipe shall be backfilled to final subgrade with temporary or permanent driving surface installed and compacted as per specifications.

Pipe shall be installed, bedded, haunched, and backfilled as shown in the typical section shown in the Construction Drawings. Bedding, haunching and backfill material shall be incidental to the cost of installing the pipe. Type A bedding material shall be installed at a depth of 6" immediately below the pipe. The Contractor shall ensure that one to two inches of haunching material is placed between the base of the pipe and the Type A bedding to ensure protection of the polymer coating. Approved materials for haunching and backfilling of the SmoothCor pipe include Chat and Natural Fines. Chat or Natural Fines shall be used for backfill to a level at least one foot above the crown of the pipe. Specifications for Chat and Natural Fines are as follows:

- Chat with the following gradation specification:

<u>Sieve Size</u>	<u>Percent Passing</u>
3/8"	100%
#4	60-97%
#8	0-40%
#200	2% max.

Chat must have 90% fractured faces. Chat shall be compacted to a minimum density corresponding to 70% of the Density Index as determined in accordance with ASTM D 4253 and ASTM D 4254. Density testing for quality control and quality assurance shall be at the same frequency as specified in the Standard Contract Documents.

- Natural Fines with the following gradation specification:

<u>Sieve Size</u>	<u>Percent Passing</u>
3/4"	100%
#4	60-85%
#8	50-75%
#200	12% max.

When Natural Fines are used for haunching, Class A nonwoven geotextile shall be installed between the Natural Fines and the underlying Type A bedding material and shall be incidental to the cost of the pipe installation. Natural fines used as haunching material shall

be compacted as per standard specifications in the Standard Contract Documents.

The contractor shall ensure that no compaction equipment that can not be controlled with extreme care is used to compact haunching below the or near the springline of the pipe. Any holidays in the polymer coating created by use of compaction equipment shall be immediately repaired as noted above. If contractor practices are regularly creating holidays in the polymer coating, the Engineer or Inspector shall dictate the contractor change to a different compaction method. Haul and disposal of excess excavated material shall be incidental to the cost of pipe installation and imported backfill pay items.

Overexcavation and granular stabilization (Type B) shall be paid for separately. Up to two (2) feet of overexcavation and granular stabilization is anticipated in some areas. Overexcavation and granular stabilization may not be required in all locations. The Contractor and inspector/engineer shall jointly determine the locations and amount of granular stabilization, and when and where geogrid and/or Class A nonwoven geotextile is required beneath the granular stabilization by performing field tests of the subgrade using methods such as proof rolling, test-placement and surcharge loading of pipe, or other suitable methods. Spoil material from overexcavation not suitable for use as backfill shall be disposed of at a site of the Contractor's choosing. Haul and disposal of excess or unsuitable excavated material shall be incidental to the Granular Stabilization Pay Item.

Imported pit run shall not be used for backfill except at elevations greater than one foot above the crown of the pipe and only when suitable site-derived material is not available in sufficient quantity. Imported pit run shall be paid for under Pay Item 361 and shall include the cost of haul and disposal of all unsuitable and/or excess excavated material not used for backfill. Excess and unsuitable excavated material shall be hauled and disposed of at a site of the Contractor's choosing.

The cost of the riser and inlet grates and frames to be fabricated and installed on each barrel of 90" pipe (just west of 25 ½ Rd.) shall be paid for under Pay Item 283. The contractor shall submit shop drawings detailing the construction of the riser and frame; the assembly shall generally adhere to the details shown on Sheet SC-17C. Shop drawings shall be stamped by a licensed Professional Engineer.

Installation of jumper cables and welds for electrical continuity shall be overseen continuously for the first two days of pipe installation by a certified corrosion control specialist that has Operator Qualified certification from the National Association of Corrosion Engineers. Jumper cables shall also be installed on any/all laterals, tees, cross-flow chambers and any/all other CMP appurtenances not connected via a metal-metal weld. Afterwards, the OC-specialist shall observe electrical continuity installation work 2 hours per week. All inspections and oversight by the OC-specialist shall be documented in written reports provided to the Engineer within 24 hours of observation of the work. Prior to completing backfilling/burial of each stick of pipe, resistivity/continuity testing shall be performed, by constructing a circuit between the mag-anode wire and the joint edge of the pipe to be buried. Resistivity in this circuit shall be less than 5 ohms.

All lateral connections for storm drain laterals, flow-through boxes, diversion structures (at C&F gas station), shall be fabricated via the same CONTECH SmoothCor (same gage and polymer

coating) CMP and attached via welded connection, made by a CONTECH-certified welder. Complete welds shall be treated inside and out with liquid-based polymer coating as per ASTM A 742. To transition from CMP laterals to existing or new concrete or PVC pipe, a butt joint shall be formed with a reinforced concrete collar (as per details shown in Construction Drawings) around the outside of the butted ends, and a smooth grout seal placed on the inside of the butted pipe. Grout shall be of the same type specified for use with concrete pipe in the previous section. Butt joints required solely due to the use of SmoothCor pipe shall not be paid for separately, but shall be incidental to the cost of the SmoothCor storm sewer.

Flow-Through Boxes, Pay Item 282, shall have edges formed with 6" radius corners at all four edges where the cross-flow chamber joins the north barrel. All joints shall be welded along both inner and outer pipe sections, and shall be coated with liquid polymer coating, inside and out. Flow-through boxes shall be constructed with one foot of open space beneath the box during construction. After installation is complete, the one-foot space beneath the chamber shall be filled with structure backfill (flowfill). Cost of the flowfill for this application shall be incidental to the cost of the SmoothCor. Flow-Through Boxes constructed of SmoothCor shall be reinforced or capped in concrete to withstand dead and live loads associated with H-20 loading. Reinforcing/capping drawing shall be stamped by a licensed Professional Engineer and submitted to the Project Engineer prior to construction/installation.

A french drain consisting of 8" CONTECH A-2000 perforated pipe shall be installed as shown on Sheet SC-15B and shall be incidental to the cost of installing the SmoothCor pipe. The french drain shall be connected to and thru the east wall of Structure No. 2. Cost for the connection is incidental to cost of installing the SmoothCor pipe.

Payment for SmoothCor pipe shall be per LF installed.

*Add the following to Section 102.10:*

For Pay Items 258 through 264 associated with the restoration of lawn and landscaping irrigation components and systems:

- Contractor shall locate and record the location, size, type, make, and model of all irrigation sprinkler heads and other components prior to any excavation or other demolition.
- Contractor shall save and reinstall the original sprinkler heads, or shall purchase and install identical new heads at no extra cost.
- All conduit shall be of the same or larger size and same or larger grade (schedule 40/80) as existing.
- Prior to burial of installed irrigation components, the contractor shall measure and record quantities with the City Inspector in attendance. Quantities not measured with the inspector prior to burial shall not be paid for.
- Prior to dismantling irrigation components, and prior to the shut-off of irrigation water in November, the Contractor shall meet with each affected landowner and test the irrigation system and document any inoperable elements. The Contractor shall be responsible for restoring to operable condition, all elements not identified as inoperable during this testing procedure. The City Inspector shall be present during testing. Written record of inoperable

elements shall be submitted to the Engineer within 3 days of testing.

## **SECTION 103 – REMOVALS, EXCAVATION, BACKFILLING AND RESTORATION**

*Add the following to Section 103:*

1. Trench wall support is mandatory when installing all new pipeline and subsurface structures. The Contractor shall provide trench boxes, sheet piles and bracing, or other approved method of supporting trench walls that will limit the top width of any trench to 2.5 feet outside the outer wall of the pipe. Asphalt removal and replacement shall extend 2 ft beyond either trench wall. Surface disturbances for conventional manholes shall be 8 ft square, centered on the manhole. Payment for trench shoring shall be included in the lineal foot pipe price for all pipe installed in this contract. Bracing/shoring for manholes shall be included in the price of the manhole.
2. Clay cutoff walls shall be installed every 400 feet and 10 ft upstream of each manhole and shall be incidental to the cost of installation of the pipe. Clay cutoff walls shall extend the full width of the trench, shall begin at the base of the trench, and shall extend upwards to a level of 1.5 ft above the top of the pipe for sanitary sewer and shall extend to the springline for storm sewer.

## **SECTION 210 – RESET STRUCTURES**

*Add the following to Section 210*

Pay Item 132 provides for resetting (removal and reinstallation) of a manhole for City Fiber Optic lines at the center of 25 Rd. on the south side of the trench. Included in this pay item is:

- Excavation of the line extending out either side of the manhole to traffic signal poles at the southwest and southeast corners of the intersection;
- Removal of the manhole, including separating the manhole barrel section(s) from the base and splitting of the base to free the fiber optic line and conduits;
- City crews shall be notified in advance and will move the conduit to the side of excavation and reinstall temporary conduit around the fiber line. The conduit will not protect the line from vehicle traffic. The contractor shall either stage the work to avoid driving over the line, or shall install temporary drive over protection consisting of channel steel and road base.
- Upon completion of the 25 Rd. crossing, the contractor shall coordinate with City Crews for the resetting of the manhole.
- The Contractor shall provide a new manhole base for the fiber manhole, and reinstall the barrel section(s) (field verify manhole diameter prior to removal and ordering of new base).
- The Contractor shall coordinate backfilling of the storm sewer trench so as to allow City Crews to install new conduit and place the conduit and fiber line for burial, or the contractor shall re-excavate the backfilled trench along the alignment of the fiber line to facilitate placement of the conduit and lines by City Crews.
- The Contractor shall bed the line in Type A rock and backfill with suitable native or imported trench backfill meeting standard specifications.

## **SECTION 420 – GEOSYNTHETICS**

*The following modifications to Section 420 are applicable to all Geogrid, Pay Item 658, installed for subgrade stabilization beneath the stormwater culverts:*

When subgrade conditions are such that the Contractor and Inspector or Engineer deem two layers of Geogrid are required to provide a stable foundation on which to install the stormwater culverts, the installation shall be as follows:

- Install nonwoven drainage geotextile at the bottom of the excavation as shown in the Construction Drawings.
- Install geogrid above the nonwoven drainage geotextile.
- Install the required thickness of Type B Granular Stabilization Material.
- Install a second layer of geogrid such that it is positioned between the top of the Type B material and at the base of the Type A bedding layer.

Geogrid shall not be “wrapped” up the sides of the excavation in order to fold it over the top of the granular stabilization lift.

## **SECTION 620 – REMOVALS, EXCAVATION, BACKFILLING AND RESTORATION**

*Add the following to Section 620:*

Portable Sanitary Facilities (Pay Item 901) shall be provided by the Contractor. Payment shall be made per facility, per day, for up to three locations at which crews are working and separated from other crews/sanitary facilities by a minimum of 800 feet. Payment shall not be made for more than three separate locations. Payment shall not be made for facilities at locations where workers are not installing improvements for 5 consecutive work days or more.