CITY OF ATLANTA

Kasim Reed
Mayor

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DEPARTMENT OF PROCUREMENT
Adam L. Smith, Esq., CPPO, CPPB, CPPM, CPP, CIPC, CISCC, CIGPM, CPPC
Chief Procurement Officer
asmith@atlantaga.gov

March 21, 2016

INTERESTED PROPONENT:

Re: FC-8710, Cargo Expansion Site Preparation at Hartsfield-Jackson Atlanta International Airport

Attached is one (1) copy of **Addendum No. 1**, which is hereby made a part of the above-referenced project.

For additional information, please contact the following personnel for the respective solicitation: FC-8710, Mr. Leslie Page, Contracting Officer, at (404) 382-1297, or via email at lpage@atlantaga.gov.

Sincerely,

Adam L. Smith

ALS:lhp

This Addendum forms a part of the Invitation to Bid and modifies the original solicitation package as noted below:

- Revision to technical specifications
- Questions and answers

Bids are due **Wednesday, April 6, 2016,** and should be time stamped no later than 2:00 p.m. EST on this day, and delivered to the address below:

Adam L. Smith, Esq., CPPO, CPPB, CPPM, CPP
CPIC, CISCC, CIGPM
Chief Procurement Officer
Department of Procurement
55 Trinity Avenue, S.W.
City Hall South, Suite 1900
Atlanta, Georgia 30303

*****All other information remains unchanged*****

Acknowledgement of Addendum No. 1

Proponents must sign below and return this form with its proposal to the Department of Procurement, 55 Trinity Avenue, City Hall South, Suite 1900, Atlanta, Georgia 30303 as acknowledgement of receipt of this addendum on this _____day of _____, 2015.

_____
Legal Company Name of Respondent

_____
Signature of Authorized Representative

_____
Title

_____
Date

MODIFICATIONS ARE INDICATED IN BOLD ITALIC FACE TYPE
PROJECT NUMBER FC-8710 – CARGO EXPANSION SITE PREPARATION

ADDENDUM #1

The following questions and/or clarifications were requested by various Contractors:

1.	Question:	We ordered the bid documents on February 29, but due to illness in the City's office, we didn't receive our drawings until March 8. We request that you postpone the bid day for at least a week.
	Answer:	***Bids are due no later than 2:00 PM on April 6, 2016.***
2.	Question:	On sheet C7.1.1 Demolition Plan, there is a note that calls for existing SIDA fence to be removed and relocated. Since there isn't currently a bid item that matches that description, will you be adding a new bid item?
	Answer:	***No new bid item. The relocation requirement is removed in Rev. 1 drawings, issued as part of this Addendum.***
3.	Question:	It is our understanding that P-155 Lime-Treated Subgrade is intended to be used only as necessary and as directed by the Owner's representative. Is this a correct interpretation?
	Answer:	***Yes.***
4.	Question:	We would like a copy of the Auto Cad files for the earthwork. Can these be made available?
	Answer:	***Yes. It will be available on the City's Procurement Website on March 22, 2016.***
5.	Question:	What is the anticipated written NTP date? The Base Bid Contract Milestone provides 240 calendar days to complete all construction activities through final grading. Any delays could cause weather related impacts to meeting this schedule with LD's.
	Answer:	***The Notice-to-Proceed will be issued following award and execution of the Contract, and is currently anticipated in the early third quarter of 2016.***
6.	Question:	Specification 0220- Building Demolition. Project Conditions 05 b states that the Asbestos report identifies areas with potential asbestos. Please confirm that the City of Atlanta will be the generator of all pre-existing hazardous materials for this project.

	Answer:	***Regarding the bidder's question as to Specification 0220 – Building Demolition and asbestos, as noted on Sheet C7.1.1, the City will perform asbestos abatement in advance of demolition. As to any remaining potentially hazardous materials, please refer to the terms of the Contract attached to the Bid Documents.***
7.	Question:	A note on drawing C5.7.1 Taxilane N cut section references a "trench drain and encasement to be designed by contractor". Please provide additional information in regards to trench drain size, and load rating requirements.
	Answer:	***This information is given on Rev. 1 drawings Sheet C16.13.1, issued as part of this Addendum.***
8.	Question:	East retaining wall cut section shown on C5.7.1 shows a proposed 72" RCP. This is not reflective of what is shown on the drainage plans in this location and 72" RCP is not listed as an owner pay item. Please confirm the size of the pipe shown in this detail.
	Answer:	***Clarification has been made in Rev. 1 drawings to show corrected pipe size, issued as part of this Addendum.***
9.	Question:	Can you define where the P501 and the P504 mix designs are required to be used?
	Answer:	***P-504 is only required inside the Taxiway "R" object free area. P-501 may be used in all other areas.***
10.	Question:	Can you provide the Taxiway Romeo closure requirements?
	Answer:	***This has been provided in Rev. 1 drawings, Sheet C3.2.1 issued as part of this Addendum.***
11.	Question:	Will erosion and sediment control drawings be provided?
	Answer:	***Erosion and sediment control drawings are to be prepared by the Contractor per Section P-156, 02) A.1.***
12.	Question:	What is the anticipated date that the LLWAS 7 Facility will be relocated by?
	Answer:	***The relocation is anticipated to be complete within two hundred and seventy (270) calendar days of issuance of the Construction Notice-to-***

		Proceed.
13.	Question:	Will contractors be allowed to dig a test pit at the borrow site prior to the bid date to validate the geotechnical information provided?
	Answer:	***No, the City cannot arrange for these visits at this time. Bidders should rely on the information furnished with the bid documents.***
14.	Question:	Can you provide additional information regarding the test pit methodology such as: a. Size of equipment used b. Size of the test pits c. Amount of frequency of rock noted in the test pit locations d. Photographs
	Answer:	***See revised test pit documents attached to this Addendum No. 1.***
15.	Question:	What are the anticipated dates for the turnover of the following facilities to the contractor for demolition? a. TSOD/Maintenance b. Gate Gourmet Flight Kitchen
	Answer:	***Turnover of these facilities to the Contractor is anticipated to be within three hundred and thirty (330) calendar days of Notice-to-Proceed.***
16.	Question:	How long following the site preparation of the new RT/ASOS site will the FAA need to install the new equipment before the existing facility can be demolished?
	Answer:	***It is anticipated that the existing site will not be available to the Contractor until three hundred and sixty (360) calendar days after Construction Notice-to-Proceed.***
17.	Question:	What are the grading and E&S requirements of the Global Forwarding Warehouse, Cold Chain Building and Express Warehouse once it is turned over for the building construction by others?
	Answer:	***After the site has been turned over to others for building construction, this Contractor will have no further requirements for grading, erosion and sediment control in the requested areas.***
18.	Question:	Current Boring Locations shown on sheet C28.1.1 do not show borings

		along the 60" RCP trunk line that is detailed on sheet C14.8.1 and sheet C14.11.1. Does the City intend to obtain borings in this area or will it grant access for bidders to obtain this information?
	Answer:	***No. At this time, the City cannot arrange for additional borings, nor arrange for Bidders access.***
19.	Question:	Has the City in their preparation and planning for this work, done an analysis to determine if there is enough material present in the provided borrow pit area to meet required embankment specifications requiring all material placed in the top 6' of embankment shall not have rock or removed pavement of size greater than 4"?
	Answer:	***Based on results from the test pits, the City believes there is adequate material to meet the Specifications.*** ***Paragraph P-152, 02) G) 7) anticipates that the Contractor will have to manage materials coming out of the borrow area in order to meet particle size requirements.***
20.	Question:	5,000 Tons of Lime Treated Subgrade material is listed in the summary of quantities. Will Contractor be allowed to be use lime material as needed throughout the job for treating soil conditions as they occur or only for existing soil conditions?
	Answer:	***No. The lime treatment is only authorized where directed or approved by the Owner/Engineer.***
21.	Question:	Current provided geotechnical data for the test pit sites does not appear to show the moisture content for these locations. Can the City please provide the data showing classifications and moisture content for all locations where geotechnical testing has been conducted?
	Answer:	***See revised test pit documents attached to this Addendum No. 1.***
22.	Question:	A functioning fiber optic line is shown to follow the path of existing Sullivan Road throughout the proposed project. This line is not shown to be relocated in the provided fiber optic relocation plan. What is the City's plan and current status for addressing this fiber optic line

		in regards to the proposed work?
	Answer:	***The City is developing a relocation plan in coordination with the service provider. Work will be performed by others.***
23.	Question:	Drawings and specifications suggest that access for SIDA restricted work will be through Gate 70 (currently being constructed). This could pose some obstacles with regards to equipment access for work within the SIDA restricted areas. Will the City allow the Contractor to create and maintain their own SIDA access gate for construction activities
	Answer:	***The Contractor will be allowed to use Gate 69 for access, subject to the provisions of Note 6, Sheet C2.1.1.***
24.	Question:	Will the city please discuss and provide feedback on what can be done to expedite access through the contractors gate?
	Answer:	***Activity at the Contractor's gate is under the Contractor's control.***
25.	Question:	There are three currently occupied buildings within the project limits. The K-9 Facility, TSOD Maintenance, and Gate Gourmet. These buildings must all be relocated and demolished to complete the proposed project. On what dates will these three building occupants be officially relocated to allow for the demolition of these three buildings?
	Answer:	***Turnover of the TSOD Maintenance and Gate Gourmet to the Contractor is anticipated to occur within three hundred and thirty (330) calendar days of Notice-to-Proceed.*** ***K-9 Facility will be addressed per Allowance Item SP-7-1, K-9 Building Construction.***
26.	Question:	On sheet C14.12.1 multiple structures are shown as a Type "D" Inlet, but it appears the details for a Type "D" inlet are not provided in the current set of plan documents. Will the City please provide the most current details for a Type "D" Inlet structure?
	Answer:	***This detail is provided in Rev. 1 drawings, Sheet C16.12.1, issued as part***

		of this Addendum.
27.	Question:	In order to properly construct an accurate schedule for the proposed work, what does the City anticipate as the NTP date for the proposed project?
	Answer:	***The Notice-to-Proceed will be issued following award and execution of the Contract, and is currently anticipated in the early third quarter of 2016.***
28.	Question:	On sheet C5.7.1 the cross section detail for the East Retaining Wall shows a proposed 72" RCP, but this proposed line does not appear in the grading and drainage plan or the listed quantities. Can the City please address this detail and state whether this will be added to the proposed work through addendum?
	Answer:	***The pipe size has been clarified in Rev. 1 drawings issued as part of this Addendum.***
29.	Question:	In order to increase participation from smaller or newer businesses in the proposed work, what is the anticipated period of time necessary to receive approval of an exception for a business that has an EMR greater than 1?
	Answer:	***The City cannot provide an anticipated time period to review exceptions to its EMR requirements for subcontractors as the review and evaluation process of a company with an EMR higher than 1, as indicated in the City's Construction Safety and Health Plan, involves several stakeholders.***
30.	Question:	The proposed project contains work both within the AOA, SIDA restricted area, as well as work outside the AOA, SIDA restricted area. In regards to insurance requirements, please clarify if a subcontractor that will only be working on a portion of work outside the AOA, SIDA restricted area will be required to provide the $10,000,000 automobile insurance coverage, or just the $2,000,000 automobile insurance coverage.
	Answer:	***The subcontractor must provide the required and proper coverage for the area in which they are contracted to work, as indicated within Exhibit D.***
31.	Question:	After a review of the plans and specifications for this project, there does not seem to be a set of erosion control plans within the provided documents. Would the city please provide the erosion control plans so the contractor can properly bid the Sediment/Erosion Control Lump Sum pay item?

	Answer:	***Section P-156 of the Specifications, re-issued as part of this Addendum, states that Erosion Control Plans are to be prepared by the Contractor.***
32.	Question:	After a review of the plans and specifications for this project, there does not seem to be a set of traffic control plans within the provided documents. Would the city please provide the traffic control plans so the contractor can properly bid the Traffic Control Lump Sum pay item?
	Answer:	***Section SP-4 of the Specification states that the Contractor must prepare the Traffic Control Plan.***
33.	Question:	After a review of the plans and specifications for this project, there does not seem to be a designated staging plan for the taxiway closure within the provided documents. Would the city please provide the proposed staging for this taxiway closure in addition to any required temporary striping that will be required to redirect aircraft traffic?
	Answer:	***This has been provided in Rev. 1 drawing, Sheet C3.2.1, issued as part of this Addendum.***
34.	Question:	The proposed MSE wall is showing a very low coefficient of sliding friction at the base, which, when combined with the "broken back" slope above the wall, require very long reinforcing strips. Would the city establish an undercut pay item in order to get a better coefficient of siding friction?
	Answer:	***The MSE wall is a design-build. Bidders should include all their anticipated costs in their Bid.***
35.	Question:	In the plans there is a 54" line of RCP that runs next to the proposed MSE wall along Gate 70. In the proposal section D-701.02.a.1 states that all RCP pipe shall be class IV pipe unless noted otherwise in the plans. GDOT requires class V pipe if it falls under, within the backfill, or within 5' of an MSE wall face. This line of 54" RCP is not noted to be class V. Will the city please clarify which material will be required?
	Answer:	***All concrete pipes on this project will be class V. Section D-701, Rev. 1, issued as part of this Addendum.***
36.	Question:	Would the city please review the 54" RCP quantity? Our takeoff greatly

		underruns the bid form quantity. This would also carry over to the Pipe Bedding Type C.
	Answer:	***Quantity changes are reflected in Rev. 1, issued as part of this Addendum.***
37.	Question:	Will the city require the contractor to perform post installation inspection of the storm drain lines with the use of low barrel distortion video equipment with laser profile technology?
	Answer:	***No.***

ADDENDUM #1

1. REVISION TO PART 1, INFORMATION AND INSTRUCTIONS TO BIDDERS

Delete: Minimum Qualifications, Section 3.4, in its entirety.

Either the Prime Contractor or Subcontractor performing the underground utility installations must have and submit a Georgia Contractor's Utility License with its Bid.

Replace with: ***The Contractor (Prime or Subcontractor) performing the underground utility installations must have and submit a Georgia Contractor's Utility License with its Bid.***

2. REVISION TO PART II, EXHIBIT "C" QUANTITIES, PRICING AND DATA

Delete: Form A-1, Schedule of Unit & Lump Sum Prices, in its entirety.

Replace with: ***Revised Form A-1, Schedule of Unit & Lump Sum Prices, attached to this Addendum.***

3. REVISION TO PART II, EXHIBIT "D'' OWNER CONTROLLED INSURANCE PROGRAM (OCIP) MANUAL

Addition: ***Insurance Information Forms (Pages 1 & 2), attached to this Addendum No. 1***

4. REVISION TO PART II, EXHIBIT "E'' SCOPE OF WORK AND TECHNICAL SPECIFICATION

Delete: Specification SP-10, Aircraft Movement Area Escorting, in its entirety.

Replace with: ***Specification SP-10, Aircraft Movement Area Escorting, attached to this Addendum No. 1.***

Delete: Specification P-150, Removal of Pavements and Miscellaneous Items, in its entirety.

Replace with: ***Specification P-150, Removal of Pavements and Miscellaneous Items, attached to this Addendum No. 1.***

Delete:	Specification P-156, Temporary Air and Water Pollution, in its entirety.
Replace with:	***Specification P-156, Temporary Air and Water Pollution, attached to this Addendum No. 1.***
Delete:	Specification P-301, Soil Cement Base Course, in its entirety.
Replace with:	***Specification P-301, Soil Cement Base Course, attached to this Addendum No. 1.***
Delete:	Specification D-701, Pipe for Storm Drains, in its entirety.
Replace with:	***Specification D-701, Pipe for Storm Drains, attached to this Addendum No. 1.***
Addition:	***Specification SP-15, Oil Water Separator, attached to this Addendum No. 1.***
Addition:	***Specification P-401, Bituminous Pavement, attached to this Addendum No. 1.***
Addition:	***Specification P-650, Guardrail, attached to this Addendum No. 1.***

5. REVISION TO PART II, EXHIBIT "F'' INDEX OF DRAWINGS

The following drawings were revised or added and attached to this Addendum No. 1:

G0.1.1	***COVER SHEET***	***03/21/2016***
G1.1.1	***DRAWING INDEX & RELEASE STATUS SUMMARY***	***03/21/2016***
G1.2.1	***DRAWING INDEX & RELEASE STATUS SUMMARY***	***03/21/2016***
G1.3.1	***DRAWING INDEX & RELEASE STATUS SUMMARY***	***03/21/2016***
G1.4.1	***DRAWING INDEX & RELEASE STATUS SUMMARY***	***03/21/2016***
CIVIL		
C0.1.1	***SUMMARY OF QUANTITIES***	***03/21/2016***
C3.1.1	***SITE CONSTRAINTS***	***03/21/2016***
C3.2.1	***TAXIWAY R PHASING PLAN***	***NEW SHEET***
C5.6.1	***TYPICAL GRADING SECTIONS LOCATION PLAN***	***03/21/2016***

ADDENDUM #1

C5.7.1	***SPECIAL GRADING SECTIONS***	***03/21/2016***
C5.8.1	***APRON & TAXIWAY TYPICAL SECTION***	***03/21/2016***
C7.1.1	***DEMOLITION PLAN***	***03/21/2016***
C7.2.1	***DEMOLITION PLAN***	***03/21/2016***
C10.8.1	***GATE 70 RD NORTH & ACCESS DR TO VORTAC & GATE 69***	***03/21/2016***
C10.10.1	***SULLIVAN RD RELOCATION PLAN & PROFILE***	***03/21/2016***
C10.12.1	***SULLIVAN RD RELOCATION PLAN & PROFILE***	***03/21/2016***
C10.13.1	***SULLIVAN RD RELOCATION PLAN & PROFILE***	***03/21/2016***
C10.18.1	***TEMPORARY SULLIVAN RD RELOCATION PLAN & PROFILE***	***03/21/2016***
C12.1.1	***PAVING & JOINT PLAN - AIRSIDE***	***03/21/2016***
C12.2.1	***PAVING & JOINT PLAN - AIRSIDE***	***03/21/2016***
C14.2.1	***GRADING & DRAINAGE PLAN***	***03/21/2016***
C14.3.1	***GRADING & DRAINAGE PLAN***	***03/21/2016***
C14.4.1	***GRADING & DRAINAGE PLAN***	***03/21/2016***
C14.5.1	***GRADING & DRAINAGE PLAN***	***03/21/2016***
C14.6.1	***GRADING & DRAINAGE PLAN***	***03/21/2016***
C14.7.1	***GRADING & DRAINAGE PLAN***	***03/21/2016***
C14.8.1	***GRADING & DRAINAGE PLAN***	***03/21/2016***
C14.12.1	***DRAINAGE TABULATION***	***03/21/2016***
C14.13.1	***TYPICAL PAVEMENT GRADES AT TYPE "D" APRON INLET***	***NEW SHEET***
C16.5.1	***DRAINAGE DETAILS IN-PAVEMENT MANHOLE***	***03/21/2016***
C16.8.1	***DRAINAGE DETAILS PRECAST JUNCTION CHAMBER***	***03/21/2016***
C16.9.1	***DRAINAGE DETAIL SLOPE DRAIN***	***03/21/2016***
C16.12.1	***DRAINAGE DETAILS IN-PAVEMENT INLET TYPE 'D'***	***03/21/2016***
C16.13.1	***DRAINAGE DETAILS MISCELLANEOUS***	***NEW SHEET***
C16.14.1	***APRON FIRST WASH SYSTEM***	***NEW SHEET***
C24.1.1	***FENCING PLANS***	***03/21/2016***
C24.2.1	***FENCING PLANS***	***03/21/2016***
C26.1.2	***FLARED ENERGY ABSORBING TERMINAL***	***NEW SHEET***
E2.3.1	***SULLIVAN ROAD RELOCATION LIGHTING PLAN***	***03/21/2016***
E6.2.1	***POLE SCHEDULES***	***03/21/2016***

The following drawings were revised but not re-issued:

C10.3.1	***NLVR RELOCATION PLAN & PROFILE***	***NOTE 1***
C10.7.1	***NLVR RELOCATION PLAN & PROFILE***	***NOTE 1***
C10.11.1	***SULLIVAN RD RELOCATION PLAN & PROFILE***	***NOTE 1***
C10.15.1	***SULLIVAN RD RELOCATION PLAN & PROFILE***	***NOTE 1***
C10.16.1	***SULLIVAN RD RELOCATION PLAN & PROFILE***	***NOTE 1***
C12.3.1	***PAVING & JOINT PLAN - AIRSIDE***	***NOTE 1***
C12.4.1	***PAVING & JOINT PLAN - LANDSIDE***	***NOTE 1***

C12.5.1	***PAVING & JOINT PLAN - LANDSIDE***	***NOTE 1***
C20.3.1	***UNDERDRAIN PLANS***	***NOTE 1***
C20.4.1	***UNDERDRAIN PLANS***	***NOTE 1***
C20.5.1	***UNDERDRAIN PLANS***	***NOTE 1***
C22.4.1	***STRIPING & SIGNAGE PLANS***	***NOTE 1***
C22.7.1	***STRIPING & SIGNAGE PLANS***	***NOTE 1***
C22.9.1	***STRIPING & SIGNAGE PLANS - TEMPORARY***	***NOTE 1***

NOTE 1:
The drawings noted as Note 1 above have had background revisions made to reflect subject matter drawings that have been re-issued with this Addendum. No other revisions have been made to this group of drawings.

6. REVISION TO REFERENCE DRAWINGS

Delete: Reference Drawings, Test Pit, in its entirety.

Replace with: ***Reference Drawings, Test Pit, attached to this Addendum No. 1.***

CITY OF ATLANTA
DEPARTMENT OF AVIATION
HARTSFIELD-JACKSON ATLANTA INTERNATIONAL AIRPORT

FC-8710
CARGO EXPANSION SITE PREPARATION

EXHIBIT "C"
FORM A-1 SCHEDULE OF UNIT & LUMP SUM PRICES

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
SP-1-1	LUMP SUM	LS, MOBILIZATION, AT _____ _____ PER LUMP SUM				
SP-2-1	***ALLOWANCE***	***AS REQUIRED, PROJECT CONTINGENCY, AT*** ***SEVEN MILLION DOLLARS AND ZERO CENTS*** ***PER ALLOWANCE***			***$7,000,000***	***00***
SP-3-1	1	PERIOD, SUSPENSION TIME (7 HOUR CLOSURE), AT _____ _____ PER PERIOD				
SP-3-2	500	MINUTE, STANDBY TIME, AT _____ _____ PER MINUTE				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
SP-3-3	2	PERIOD, DOWN-TIME (5 HOUR CLOSURE), AT _____ _____ PER PERIOD				
SP-4-1	LUMP SUM	LS, TRAFFIC CONTROL, AT _____ _____ PER LUMP SUM				
SP-5-1	LUMP SUM	**LS, UTILITY COORDINATION AND SCHEDULING, AT** _____ _____ PER LUMP SUM				
SP-5-2	ALLOWANCE	AS REQUIRED, COMMUNICATION LINE RELOCATIONS, AT&T, AT FIFTY THOUSAND DOLLARS AND ZERO CENTS PER ALLOWANCE			$50,000	00
SP-5-3	ALLOWANCE	AS REQUIRED, NATURAL GAS RELOCATIONS, ATLANTA GAS LIGHT, AT ONE MILLION TWO HUNDRED TEN THOUSAND DOLLARS ANS ZERO CENTS PER ALLOWANCE			$1,210,000	00
SP-5-4	ALLOWANCE	AS REQUIRED, POWER RELOCATIONS., AT **TWO MILLION DOLLARS AND ZERO CENTS** _____ PER ALLOWANCE			**$2,000,000**	**00**

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
SP-6-1	1,200	HR., WATERING, AT _____ _____ PER HOUR				
SP-7-1	ALLOWANCE	AS REQUIRED, K-9 BUILDING CONSTRUCTION, AT NINE MILLION DOLLARS AND ZERO CENTS PER ALLOWANCE			$9,000,000	00
SP-8-1	LUMP SUM	LS, AS-BUILTS, AT _____ _____ PER LUMP SUM				
SP-10-1	LUMP SUM	L.S., AIRCRAFT MOVEMENT AREA (AMA) ESCORTING, AT _____ _____ PER LUMP SUM				
SP-12-1	ALLOWANCE	AS REQUIRED, WAYFINDING SIGNAGE INSTALLATION, AT TWENTY THOUSAND DOLLARS AND ZERO CENTS PER ALLOWANCE			$20,000	00
SP-12-2	4	EA, WAYFINDING SIGN RELOCATION, AT _____ _____ PER EACH				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
SP-13-1	LUMP SUM	L.S., ROADWAY LIGHTING, COMPLETE, AT _____ _____ PER LUMP SUM				
SP-14-1	ALLOWANCE	AS REQUIRED, PROJECT CONTINGENCY / EMERGENCY SERVICES , AT ZERO DOLLAR AND ZERO CENT PER ALLOWANCE	___	___	0	00
SP-15-1	***ALLOWANCE***	***AS REQUIRED, OIL WATER SEPERATOR, AT*** ***FOUR HUNDRED THOUSAND DOLLARS*** ***AND ZERO CENT*** ***PER ALLOWANCE***			***$400,000***	***00***
P-150-1	***98,020***	SQ. YD., BITUMINOUS PAVEMENT REMOVAL, AT _____ _____ PER SQUARE YARD				
P-150-2	810	SQ. YD., REMOVAL OF PORTLAND CEMENT CONCRETE AIRFIELD PAVEMENT, 16" THICK, AT _____ _____ PER SQUARE YARD				
P-150-3	950	SQ. YD., PORTLAND CEMENT CONCRETE PAVEMENT REMOVAL, 10" THICK, AT _____ _____ PER SQUARE YARD				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
P-150-4	***10,590***	LIN. FT., CURB AND GUTTER REMOVAL, AT _____ _____ PER LINEAR FOOT				
P-150-5	8,750	LIN. FT., REMOVAL OF PIPES, 15" DIAMETER OR GREATER, AT _____ _____ PER LINEAR FOOT				
P-150-6	98	EA, REMOVAL OF LIGHT POLES, AT _____ _____ PER EACH				
P-150-7	2,010	LIN. FT., REMOVAL OF GUARDRAIL, AT _____ _____ PER LINEAR FOOT				
P-150-8	***7***	***EA, REMOVAL OF CONCRETE LIGHT BASE, AT*** _____ _____ ***PER EACH***				
P-152-1	1,050,000	CU. YD., IN PLACE EMBANKMENT, AT _____ _____ PER CUBIC YARD				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
P-152-2	2,000	CU. YD., BACKFILL, AT _____ _____ PER CUBIC YARD				
P-152-3	***201,130***	SQ. YD., PREPARATION OF SUBGRADE, AT _____ _____ PER SQUARE YARD				
P-152-4	2,000	CU. YD., TRENCH ROCK EXCAVATION, AT _____ _____ PER CUBIC YARD				
P-152-5	1,500	CU. YD., ROCK EXCAVATION, AT _____ _____ PER CUBIC YARD				
P-155-1	5,000	TON, LIME TREATED SUBGRADE, AT _____ _____ PER TON				
P-156-1	LUMP SUM	L.S, SEDIMENT/EROSION CONTROL, AT _____ _____ PER LUMP SUM				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
P-156-2	4,000	SQ. YD., DITCH LINER, AT _____ _____ PER SQUARE YARD				
P-209-1	8,190	CU. YD., CRUSHED AGGREGATE BASE COURSE, AT _____ _____ PER CUBIC YARD				
P-301-1	***153,530***	SQ. YD., SOIL CEMENT BASE COURSE, 9" THICK, AT _____ _____ PER SQUARE YARD				
P-301-2	***15,160***	***BBL, PORTLAND CEMENT FOR SUBGRADE STABILIZATION, AT*** _____ _____ ***PER BBL***				
P-401-1	***4,010***	***TON, BITUMINOUS BASE COURSE, AT*** _____ _____ ***PER TON***				
P-402-1	4,350	TON, RECYC ASPH CONC 12.5 MM SUPERPAVE, GP. 1 OR 2, INCL BIT MATL & H LIME, AT _____ _____ PER TON				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
P-402-2	2,110	TON, RECYC ASPH CONC 19 MM SUPERPAVE, GP. 1 OR 2, INCL BIT MATL & H LIME, AT _____ _____ PER TON				
P-402-3	***14,640***	TON, RECYC ASPH CONC 25 MM SUPERPAVE, GP. 1 OR 2, INCL BIT MATL & H LIME, AT _____ _____ PER TON				
P-501-1	***102,920***	SQ. YD., NON- REINFORCED PORTLAND CEMENT CONCRETE AIRFIELD PAVEMENT, 20" THICK, AT _____ _____ PER SQUARE YARD				
P-501-2	5,540	SQ. YD., REINFORCED PORTLAND CEMENT CONCRETE AIRFIELD PAVEMENT, 20" THICK, AT _____ _____ PER SQUARE YARD				
P-501-3	1,440	SQ. YD., NON-REINFORCED THICKENED EDGE PORTLAND CEMENT CONCRETE AIRFIELD PAVEMENT, 20" – 25" THICK, AT _____ _____ PER SQUARE YARD				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
P-501-4	410	SQ. YD., REINFORCED THICKENED EDGE PORTLAND CEMENT CONCRETE AIRFIELD PAVEMENT, 20" – 25" THICK AT _____ _____ PER SQUARE YARD				
P-501-5	20	CU. YD., LOW-SLUMP LOW-STRENGTH FILL CONCRETE, AT _____ _____ PER CUBIC YARD				
P-501-6	17,090	SQ. YD., NON- REINFORCED PORTLAND CEMENT CONCRETE ROADWAY PAVEMENT, 10" THICK , AT _____ _____ PER SQUARE YARD				
P-501-7	720	SQ. YD., REINFORCED PORTLAND CEMENT CONCRETE ROADWAY PAVEMENT, 10" THICK, AT _____ _____ PER SQUARE YARD				
P-501-8	760	SQ. YD., NON- REINFORCED PORTLAND CEMENT CONCRETE ROADWAY PAVEMENT, 10-12" THICK, AT _____ _____ PER SQUARE YARD				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
P-501-9	240	SQ. YD., REINFORCED PORTLAND CEMENT CONCRETE ROADWAY PAVEMENT, 10-12" THICK, AT _____ _____ PER SQUARE YARD				
P-501-10	***690***	SQ. YD., AIRFIELD PAVEMENT UTILITY SLAB, AT _____ _____ PER SQUARE YARD				
P-501-11	840	SQ. YD., ADJUST AND FINISH EXISTING MANHOLE IN AIRFIELD PAVEMENT UTILITY SLAB, AT _____ _____ PER SQUARE YARD				
P-502-1	1,200	SQ. YD., GRIND CONCRETE PAVEMENT , AT _____ _____ PER SQUARE YARD				
P-504-1	27,890	SQ. YD., HIGH EARLY STRENGTH CEMENT NON-REINFORCED CONCRETE PAVEMENT, 20" THICK, AT _____ _____ PER SQUARE YARD				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
P-504-2	1,270	SQ. YD., HIGH EARLY STRENGTH CEMENT REINFORCED CONCRETE PAVEMENT, 20" THICK, AT _____ _____ PER SQUARE YARD				
P-504-3	2,150	SQ. YD., HIGH EARLY STRENGTH CEMENT CONCRETE PAVEMENT, NON-REINFORCED, VARIABLE THICKNESS, 20" - 25", AT _____ _____ PER SQUARE YARD				
P-504-4	550	SQ. YD., HIGH EARLY STRENGTH CEMENT CONCRETE PAVEMENT, REINFORCED, VARIABLE THICKNESS, 20" - 25" AT _____ _____ PER SQUARE YARD				
P-602-1	***19,760***	GAL., BITUMINOUS PRIME COAT, AT _____ _____ PER GALLON				
P-603-1	***14,280***	GAL., BITUMINOUS TACK COAT, AT _____ _____ PER GALLON				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
P-605-1	***112,900***	LIN. FT., COLD APPLIED SEALANT, CONTRACTION, CONSTRUCTION, AND LONGITUDINAL JOINTS, AT _____ _____ PER LINEAR FOOT				
P-605-2	1,480	LIN. FT., COLD APPLIED SEALANT, EXPANSION JOINTS, AT _____ _____ PER LINEAR FOOT				
P-605-3	5,200	LIN. FT., COLD APPLIED SEALANT, ASPHALT – CONCRETE JOINT INTERFACE, AT _____ _____ PER LINEAR FOOT				
P-615-1	6,510	LIN. FT., CONCRETE CURB AND GUTTER, AT _____ _____ PER LINEAR FOOT				
P-615-2	***100***	CU. YD., CONCRETE DITCH PAVING, AT _____ _____ PER CUBIC YARD				
P-615-3	15	CU. YD., CONCRETE TRANSFORMER PADS, AT _____ _____ PER CUBIC YARD				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
P-621-1	***21,400***	SQ. FT., PAVEMENT STRIPING AND MARKING, AT _____ _____ PER SQUARE FOOT				
P-622-1	116	EACH, RAISED PAVEMENT MARKERS, TYPE 1, YELLOW, AT _____ _____ PER EACH				
P-622-2	232	EACH, RAISED PAVEMENT MARKERS, TYPE 3, CLEAR/RED, AT _____ _____ PER EACH				
P-623-1	450	SQ. FT., RUMBLE STRIPS, AT _____ _____ PER SQUARE FOOT				
P-623-2	1,580	SQ. FT., THERMOPLASTIC TRAFFIC STRIPE, AT _____ _____ PER SQUARE FOOT				
P-623-3	***11,950***	SQ. FT., PREFORMED PLASTIC PAVEMENT MARKINGS, AT _____ _____ PER SQUARE FOOT				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
P-627-1	4,400	SQ. FT., MSE WALL COMPLETE, AT _____ _____ PER SQUARE FOOT				
P-629-1	3,080	GAL., COAL TAR SEALER/REJUVENATOR, AT _____ _____ PER GALLON				
P-650-1	***3,190***	***L.F., GUARDRAIL TYPE "W" (SINGLE FACED), AT*** _____ _____ ***PER LINEAR FOOT***				
P-650-2	***2***	***EA, ENERGY ABSORBING FLARED TERMINAL SECTION, AT*** _____ _____ ***PER EACH***				
D-701-1	***2,130***	L.F., STORM SEWER, RCP, 15" DIAMETER, AT _____ _____ PER LINEAR FOOT				
D-701-2	***3,090***	L.F., STORM SEWER, RCP, 18" DIAMETER, AT _____ _____ PER LINEAR FOOT				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
D-701-3	***2,000***	L.F., STORM SEWER, RCP, 24" DIAMETER, AT _____ _____ PER LINEAR FOOT				
D-701-4	430	L.F., STORM SEWER, RCP, 30" DIAMETER , AT _____ _____ PER LINEAR FOOT				
D-701-5	***2,450***	L.F., STORM SEWER, RCP, 36" DIAMETER , AT _____ _____ PER LINEAR FOOT				
D-701-6	160	L.F., STORM SEWER, RCP, 42" DIAMETER , AT _____ _____ PER LINEAR FOOT				
D-701-7	1,010	L.F., STORM SEWER, RCP, 48" DIAMETER , AT _____ _____ PER LINEAR FOOT				
D-701-8	***800***	L.F., STORM SEWER, RCP, 54" DIAMETER , AT _____ _____ PER LINEAR FOOT				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
D-701-9	***2,470***	L.F., STORM SEWER, RCP, 60" DIAMETER , AT _____ _____ PER LINEAR FOOT				
D-701-10	2	EACH, FLARED END SECTION, 15" DIAMETER, AT _____ _____ PER EACH				
D-701-11	6	EACH, FLARED END SECTION, 18" DIAMETER, AT _____ _____ PER EACH				
D-701-12	3	EACH, FLARED END SECTION, 24" DIAMETER, AT _____ _____ PER EACH				
D-701-13	1	EACH, FLARED END SECTION, 30" DIAMETER , AT _____ _____ PER EACH				
D-701-14	1	EACH, FLARED END SECTION, 36" DIAMETER, AT _____ _____ PER EACH				
D-701-15	200	L.F., SALVAGE AND REUSE EXISTING 18" RCP, AT _____ _____ PER LINEAR FOOT				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
D-701-16	130	L.F., SALVAGE AND REUSE EXISTING 60" RCP, AT _____ _____ PER LINEAR FOOT				
D-701-17	4	EACH, SALVAGE AND REUSE EXISTING 18" RCP FES,AT _____ _____ PER EACH				
D-701-18	2	EACH, SALVAGE AND REUSE EXISTING 30" RCP FES, AT _____ _____ PER EACH				
D-701-19	2	EACH, 54" DIA. 45 DEGREE RCP BEND , AT _____ _____ PER EACH				
D-701-20	3	EACH, 60" DIA. 45 DEGREE RCP BEND, AT _____ _____ PER EACH				
D-701-21	***15,055***	L.F., PIPE BEDDING, TYPE C, AT _____ _____ PER LINEAR FOOT				
D-701-22	LUMP SUM	L.S., TRENCH AND EXCAVATION PROTECTION, AT _____ _____ PER LUMP SUM				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
D-701-23	***100***	***L.F., DIVERSION PIPE, 8" DIAMETER DIP, AT*** _____ _____ ***PER LINEAR FOOT***				
D-701-24	***85***	***L.F., DIVERSION PIPE, 14" DIAMETER DIP,, AT*** _____ _____ ***PER LINEAR FOOT***				
D-705-1	4,900	L.F., 8" PERFORATED UNDERDRAIN PIPE, AT _____ _____ PER LINEAR FOOT				
D-705-2	***20,685***	L.F., 6" PERFORATED UNDERDRAIN PIPE , AT _____ _____ PER LINEAR FOOT				
D-705-3	***500***	L.F., 6" NON-PERFORATED UNDERDRAIN OUTLET PIPE, CONCRETE ENCASED, AT _____ _____ PER LINEAR FOOT				
D-705-4	***61***	EACH, UNDERDRAIN CLEANOUT , AT _____ _____ PER EACH				
D-705-5	***2,540***	C.Y., COARSE AGGREGATE BACKFILL, #89 STONE , AT _____ _____ PER CUBIC YARD				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
D-750-1	170	L.F., SANITARY SEWER 4" DIAMETER DIP, GRAVITY, AT _____ _____ PER LINEAR FOOT				
D-750-2	700	L.F., SANITARY SEWER 6" DIAMETER DIP, GRAVITY, AT _____ _____ PER LINEAR FOOT				
D-750-3	660	L.F., SANITARY SEWER 8" DIAMETER DIP, GRAVITY , AT _____ _____ PER LINEAR FOOT				
D-750-4	1,530	L.F., TYPE "C" BEDDING FOR SANITARY SEWERS , AT _____ _____ PER LINEAR FOOT				
D-750-5	8	EACH, 4' DIAMETER SANITARY SEWER MANHOLE, AT _____ _____ PER EACH				
D-750-6	1	EACH, ADJUST EXISTING SANITARY SEWER MANHOLE TO GRADE, AT _____ _____ PER EACH				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
D-750-7	1	EACH, SANITARY SEWER CLEANOUT, AT _____ _____ PER EACH				
D-750-8	*4*	EACH, 4' DIAMETER SANITARY SEWER MANHOLE WITH DROP CONNECTION, AT _____ _____ PER EACH				
D-751-1	22	EACH, CURB INLET TYPE A , AT _____ _____ PER EACH				
D-751-2	4	EACH, CURB INLET TYPE A2 , AT _____ _____ PER EACH				
D-751-3	*24*	EACH, INLET TYPE B, AT _____ _____ PER EACH				
D-751-4	13	EACH, INLET TYPE B MODIFIED , AT _____ _____ PER EACH				
D-751-5	22	EACH, INLET TYPE D, AT _____ _____ PER EACH				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
D-751-6	2	EACH, STORM SEWER MANHOLE, 4' DIAMETER, AT _____ _____ PER EACH				
D-751-7	1	EACH, JUNCTION CHAMBER 5' DIAMETER, AT _____ _____ PER EACH				
D-751-8	*4*	EACH, JUNCTION CHAMBER 6' DIAMETER, AT _____ _____ PER EACH				
D-751-9	*4*	EACH, JUNCTION CHAMBER 7' DIAMETER, AT _____ _____ PER EACH				
D-751-10	*6*	EACH, JUNCTION CHAMBER 8' DIAMETER , AT _____ _____ PER EACH				
D-751-11	1	EACH, JUNCTION CHAMBER 9' DIAMETER , AT _____ _____ PER EACH				
D-751-12	250	C.Y., MISCELLANEOUS CONCRETE, AT _____ _____ PER CUBIC YARD				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
D-751-13	1	EACH, CONCRETE HEADWALL, 42" DIAMETER, AT _____ _____ PER EACH				
D-751-14	3	EACH, CONCRETE HEADWALL, 54" DIAMETER, AT _____ _____ PER EACH				
D-751-15	2	EACH, CONCRETE HEADWALL, 60" DIAMETER, AT _____ _____ PER EACH				
D-751-16	450	L.F., TRENCH DRAIN, AT _____ _____ PER LINEAR FOOT				
D-752-1	600	L.F., CURED IN PLACE PIPE LINING, 8" DIAMETER, AT _____ _____ PER LINEAR FOOT				
D-755-1	2,400	C.Y., PLAIN STONE RIP RAP, AT _____ _____ PER CUBIC YARD				
D-755-2	420	C.Y., GROUTED STONE RIP RAP, AT _____ _____ PER CUBIC YARD				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
F-162-1	230	L.F., 8' BLACK PVC COATED FENCE WITH EXTENSION ARMS AND 3 STRANDS OF BARBED WIRE ON TOP OF NEW CONCRETE BARRIER, AT _____ _____ PER LINEAR FOOT				
F-162-2	***13,260***	L.F., 8' BLACK PVC COATED FENCE WITH EXTENSION ARMS AND 3 STRANDS OF BARBED WIRE", AT _____ _____ PER LINEAR FOOT				
F-162-3	6	EACH, DOUBLE-LEAF SWING GATE, BLACK PVC-COATED, 24' OPENING, AT _____ _____ PER EACH				
F-162-4	8,620	L.F., REMOVAL OF CHAIN LINK FENCE ON GRADE, AT _____ _____ PER LINEAR FOOT				
F-162-5	3,040	L.F., REMOVAL OF CHAIN LINK FENCE ON CONCRETE BARRIER WALL, AT _____ _____ PER LINEAR FOOT				
F-162-6	1,900	L.F., 8' GALVANIZED TEMPORARY FENCE WITH EXTENSION ARMS AND 3 STRANDS OF BARBED WIRE, AT _____ _____ PER LINEAR FOOT				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
F-162-7	1,050	L.F., 8' GALVANIZED TEMPORARY FENCE WITH EXTENSION ARMS AND 3 STRANDS OF BARBED WIRE ON TOP OF MOVEABLE CONCRETE BARRIER, AT _____ _____ PER LINEAR FOOT				
F-165-1	290	S.F, HIGHWAY SIGNS, TYPE 1 MATERIAL, REFLECTIVE SHEETING TYPE 3, AT _____ _____ PER SQUARE FOOT				
F-165-2	130	S.F, HIGHWAY SIGNS, TYPE 1 MATERIAL, REFLECTIVE SHEETING TYPE 6, AT _____ _____ PER SQUARE FOOT				
F-165-3	270	L.F, GALVANIZED STEEL POSTS, TYPE 7, AT _____ _____ PER LINEAR FOOT				
T-901-1	80	ACRES, SEEDING, AT _____ _____ PER ACRES				
T-901-2	40	ACRES, TEMPORARY SEEDING, AT _____ _____ PER ACRES				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
T-901-3	40	ACRE, SEEDING (PERMANENT SEED), AT _____ _____ PER ACRE				
T-901-4	1,600	HOUR, WATERING FOR GRASSED AREAS AT _____ _____ PER HOUR				
T-904-1	13,590	SQ. YD., SODDING, AT _____ _____ PER SQUARE YARD				
T-908-1	36	ACRE, ASPHALT SPRAY MULCHING, AT _____ _____ PER ACRE				
U-150-1	123	LIN. FT., WATERLINE PIPE, 3 IN DIP, AT _____ _____ PER LINEAR FOOT				
U-150-2	281	LIN. FT., WATERLINE PIPE, 6 IN DIP, AT _____ _____ PER LINEAR FOOT				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
U-150-3	4,700	LIN. FT., WATERLINE PIPE, 12 IN DIP, AT _____ _____ PER LINEAR FOOT				
U-150-4	9	EACH, FIRE HYDRANT, COMPLETE, AT _____ _____ PER EACH				
U-150-5	ALLOWANCE	AS REQUIRED, WATER SYSTEM DESIGN, AT SEVENTY THOUSAND DOLLARS AND ZERO CENTS PER ALLOWANCE			$70,000	00
U-150-6	ALLOWANCE	AS REQUIRED, ADDITIONAL ITEMS OF WATER SYSTEM CONSTRUCTION, AT TWO HUNDRED THOUSAND DOLLARS AND ZERO CENTS PER ALLOWANCE			$200,000	00
L-100-1	LUMP SUM	L.S., ALCMS EQUIPMENT AND SERVICES AT _____ _____ PER LUMP SUM				
L-108-1	5,000	LIN. FT., SINGLE CONDUCTOR CABLE (IN DUCT), #8 AWG, FAA SPECIFICATION L-824, TYPE "C", 5,000 VOLT WITH BLACK INSULATION, AT _____ _____ PER LINEAR FOOT				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
L-108-2	5,000	LIN. FT., SINGLE CONDUCTOR CABLE (IN DUCT), #8 AWG, FAA SPECIFICATION L-824, TYPE "C", 5,000 VOLT WITH RED TRACER INSULATION, AT _____ _____ PER LINEAR FOOT				
L-108-3	4,000	LIN. FT., BARE COPPER CABLE, #6 AWG, COUNTERPOISE, INCLUDING GROUND RODS AND EXOTHERMIC WELDS, AT _____ _____ PER LINEAR FOOT				
L-108-4	200	EACH, CONNECTOR KIT, #8 AWG, 5,000 VOLT CABLE, FAA SPECIFICATION L-823, AT _____ _____ PER EACH				
L-108-5	200	EACH, CABLE MARKER TAG, AT _____ _____ PER EACH				
L-110-1	4,000	LIN. FT., CONCRETE ENCASED, 2" SCHEDULE 80 PVC CONDUIT, AT _____ _____ PER LINEAR FOOT				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
L-110-2	10	EACH, CONNECT CONDUIT TO EXISTING LIGHT BASE, AT _____ _____ PER EACH				
L-110-3	10	EACH, CONNECT CONDUIT TO EXISTING MANHOLE, AT _____ _____ PER EACH				
L-110-4	5,000	EACH, 2-WAY DUCTBANK WITH (2) 1-1/4" INNERDUCTS, AT _____ _____ PER EACH				
L-111-1	5	EACH, ELECTRICAL MANHOLE, AT _____ _____ PER EACH				
L-112-1	LUMP SUM	L.S., PHOTOMETRIC TESTING OF THE LIGHTING SYSTEM, AT _____ _____ PER LUMP SUM				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
L-120-1	50	EACH, L-852C(L) TAXIWAY CENTERLINE LIGHT, BIDIRECTIONAL, STYLE 3, NARROW BEAM, GREEN/GREEN WITH ISOLATION TRANSFORMER ON EXISTING LIGHT BASE, AT _____ _____ PER EACH				
L-120-2	25	EACH, FINISHING RING FOR USE WITH L-868 LIGHT BASES AND CONVERSION RINGS, AT _____ _____ PER EACH				
L-121-1	25	EACH, L-852T(L), SEMI-FLUSH, BLUE, STYLE 3, MEDIUM INTENSITY TAXIWAY EDGE LIGHT, TWELVE INCH (12") DIAMETER, MOUNTED ON NEW BASE CAN AND TRANSFORMER, AT _____ _____ PER EACH				
L-122-1	2	EACH, REMOVE EXISTING TAXIWAY GUIDANCE SIGN, AT _____ _____ PER EACH				
L-122-2	2	EACH, PROVIDE AND INSTALL NEW TAXIWAY GUIDANCE SIGN ON EXPANDED EXISTING CONCRETE BASE AND ISOLATION TRANSFORMER, AT _____ _____ PER EACH				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
L-122-3	2	EACH, PROVIDE AND INSTALL NEW TAXIWAY GUIDANCE SIGN ON NEW CONCRETE BASE AND ISOLATION TRANSFORMER, AT _____ _____ PER EACH				
L-124-1	20	EACH, REMOVAL AND/OR STORAGE OF EXISTING LIGHT AND TRANSFORMER, AT _____ _____ PER EACH				
L-124-2	LUMP SUM	L.S., STORAGE OF DOA FURNISHED EQUIPMENT, AT _____ _____ PER LUMP SUM				
L-124-3	100	EACH, DRILL OUT BROKEN OFF 3/8" STAINLESS STEEL BOLTS AND RE-TAP FOR NEW 3/8" BOLTS, AT _____ _____ PER EACH				
935-1	8,000	LIN. FT., FIBER OPTIC CABLE, SM 144 FIBER, AT _____ _____ PER LINEAR FOOT				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
935-2	2,000	LIN. FT., FIBER OPTIC CABLE, SM 24 FIBER, AT _____ _____ PER LINEAR FOOT				
935-3	8,000	LIN. FT., REMOVAL OF EXISTING FIBER OPTIC CABLE, AT _____ _____ PER LINEAR FOOT				
935-4	ALLOWANCE	AS REQUIRED, ADDITIONAL WORK FOR FIBER OPTIC SYSTEM COMPLETION, AT THIRTY THOUSAND DOLLARS AND ZERO CENTS PER ALLOWANCE			$30,000	00
017419-1	LUMP SUM	L.S., CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL, AT _____ _____ PER LUMP SUM				
02220-1	LUMP SUM	L.S., BUILDING DEMOLITION K-9, AT _____ _____ PER LUMP SUM				

ITEM NO.	PRELIMINARY CONSTRUCTION QUANTITY	ITEM WITH UNIT OR LUMP SUM PRICE WRITTEN IN WORDS	UNIT PRICE IN FIGURES		AMOUNT	
			DOLLARS	CENTS	DOLLARS	CENTS
02220-2	LUMP SUM	L.S., BUILDING DEMOLITION TSOD / MAINTENANCE, AT _____ _____ PER LUMP SUM				
02220-3	LUMP SUM	L.S., BUILDING DEMOLITION GATE GOURMET, AT _____ _____ PER LUMP SUM				
		TOTAL BASE BID _____ _____ _____				
	LUMP SUM	ADDITIVE ALTERNATE #1 CONTRACTOR'S INSURANCE COST, AT _____ _____ PER LUMP SUM				

City of Atlanta, Department of Aviation
Atlanta Hartsfield International Airport Expansion Project
Insurance Program

Insurance Information Form (Page 1)

Contractor Name:
Subcontractor To
(if applicable):
Address:
Phone:
Project Name: _____ Contract No.:_____
Contract Amount: _____ Est. Payroll: $ _____
Est. Start Date: _____ Est. End Date:_____

I. Workers' Compensation Information (Project Site Only):
(*See next two pages for classification codes).*

	Classifications	W. C. Code	Current Rate x Payroll Per $100 of Payroll		Premium
1.	_____	_____	$_____	X $_____	= $_____
2.	_____	_____	$_____	X $_____	= $_____
3.	_____	_____	$_____	X $_____	= $_____
4.	_____	_____	$_____	X $_____	= $_____
5.	_____	_____	$_____	X $_____	= $_____

(Attach Worksheet if more than five codes are used)

Totals: $_____ $_____

Experience Modifier: X
Modifier Premium:
Employers' Liability (Coverage One -B): +
Total Modified Premiums: $
Regular Workers' Compensation Insurer:
_Experience Rating Date (Policy Effective Date):
_Interstate Bureau I.D. #
_Federal Employer I.D.#

City of Atlanta, Department of Aviation Atlanta Hartsfield International Airport Expansion Project Insurance Program

Insurance Information Form (Page 2)

Classifications Premium	GL Code	Current Rate x Payroll Per $100/$1000 of Payroll	
II. General Liability:		$ _____ X $_____	= $_____
III. Excess/Umbrella Liability		$ _____ X $_____	= $_____
IV. Completed Operations (Five Years)		$ _____ X $_____	= $_____
V. Lower-Tier Contractor Premium (Excluding Auto):			= $_____
VI. Total Premium (I+II+III+IV+V):			$_____
VII. Overhead and Profit on Insurance Premiums:			+ $
VIII. Total Amount Excluded from Bid (VI + VII):			$

Agreement: Contractor agrees to permit the City of Atlanta or its Agent to inspect the insurance policies and payroll records used in determining the premium cost outlined above. (As per the General Conditions of the Contract).

Signed by:_____ Title:_____

Print Name: _____ Date:_____

Contractor's Insurance Broker or Agent:

Name:_____ Contact: _____

City:_____ Phone: _____
(Include Area Code)

6306	Sewer Construction – All Preparation, and Drivers
Code	**Description**
5538	Sheet Metal Work – Shop and Outside, and Drivers
5703	Shoring (including Sheeting, Bracing, Decking, etc.)
3726	Tank Erection or Repair – Metal – Within Buildings
5445	Wallboard Installation

Other

SECTION SP-10 AIRCRAFT MOVEMENT AREA (AMA) ESCORTING

01) DESCRIPTION

a) This item is intended to compensate the Contractor for all costs incurred in providing aircraft movement area (AMA) escorting and airfield crossing guards as set forth in these specifications.

1. Airfield AMA Escort. Person that is certified to guide construction vehicles into the aircraft movement area. The person is responsible for the approved and safe escorting of construction vehicles along active taxiways. The AMA Escort communicates with the Air Traffic Control Tower for access to construction sites.
2. Airfield Crossing Guard. Person that is staged along a construction haul road at a single taxiway intersection. The person is responsible for the safe crossing of construction vehicles and communicating with the Air Traffic Control Tower to clear or cross the haul road for construction vehicles.

b) When the Contractor is working in the AMA, adjacent to or on active runways and/or taxiways, the Contractor shall arrange for airfield escorting services with an independent Department of Aviation approved contractor ("Escorting Contractor"). The Escorting Contractor must be a separate business entity from the Contractor and must be engaged solely for the purpose of providing escorting services under the Contract and may not provide any other services under the Contract. Contractor may not contract/subcontract with other business entities providing additional services under the Contract unrelated to escort services for the purpose of also providing escort services. For example, if Contractor has engaged the services of ABC Company to provide paving under the Contract, it may not use ABC Company to provide escort services.

c) Only DOA-certified AMA escorts shall provide airfield escorting of all construction vehicles to and from the construction site, regardless of the construction employee having their SIDA and/or a security escort certification. The Contractor shall be responsible for employing sufficient personnel to conduct AMA escorting. Failure to have sufficient AMA-certified airfield escorts on-duty may delay or cancel construction activities located on the AMA.

d) Airfield AMA escorts may escort a maximum of two (2) vehicles at any time. All escorting shall occur only via taxiways; no runway crossings will be permitted. Each operation shall require a specific call to the Air Traffic Control Tower (ATCT). Escort vehicles shall turn on the green strobe light when approval is received from the ATCT and it is safe to proceed. The escort vehicle is to lead the way for the construction vehicles.

e) Prequalification.

1. AMA Escorts shall possess one of the following: (1) currently hold an ATL AMA badge for more than 2 years; (2)currently employed by an airport tenant that requires them to hold an AMA badge for daily access to the AMA. . Regardless of qualifications, a candidate will be disqualified if the candidate has been (1) involved in an airfield "surface incident" or "runway incursion" as defined by the FAA; (2) received a suspension or revocation of

their AMA or Airfield Crossing Guard License; or (3) is unable to pass the examination.

2. Airfield Crossing Guards shall possess one of the following: (1) have previously or currently holds an ATL AMA badge for more than 1 year; (2) have previously or currently holds an ATL Crossing Guard License; (3) employed or previously employed by the FAA as an Air Traffic Controller; or (4) employed or previously employed by an ATL ramp tower and provide ramp controller duties for more than 1 year. Regardless of qualifications, a candidate will be disqualified if the candidate has been (1) involved in an airfield "surface incident" or "runway incursion" as defined by the FAA; (2) received a suspension or revocation of their AMA or Airfield Crossing Guard License; or (3) is unable to pass the examination.

f) Training. The company contracted to provide airfield escorting shall submit potential candidates to the Construction Manager for DOA-Airside Operations Division review and acceptance. Sufficient time should be taken into consideration for qualification review and training. The approved airfield escorting company shall schedule training for potential AMA escorts through the DOA-Airside Operations training course prior to providing airfield escorting duties.

The AMA escort vehicle drivers shall be trained and familiar with requirements of Hartsfield-Jackson Atlanta International Airport within the SIDA and AMA and communicating on both the City radio frequency and the FAA tower frequencies. Each candidate shall successfully pass a written exam accessing their knowledge of the aircraft movement area prior to receiving AMA driving privileges and the appropriate license prior to entering the AMA.

g) Badging Requirements. AMA Escorts shall be badged and trained in accordance with Exhibit "G", Airport Security Requirements for security and ramp driver safety training and receive an ATL SIDA badge with a driving ("D") and escorting ("E"), if applicable, designation. Airfield Crossing Guards shall meet same requirements.

h) Aircraft Movement Area Escort and Crossing Guard Vehicles. Escort vehicles shall be distinctly marked and not mistaken for other construction support vehicles and have:

1. A high-intensity green strobe light mounted on the uppermost part of the vehicle structure capable of being turned on/off and an indication light of its status located within the vehicle;
2. Continuous two-way ground control radio communications with the Air Traffic Control Tower; and
3. A City Motorola radio that will be programmed to operate on the Airport's radio system. See Section SP-1 for description of City radios.

All airfield escort vehicles shall be in compliance for insurance, marking and access in accordance with this contract. The airfield escort vehicle shall be distinctively marked and not mistaken for other construction support vehicles.

i) Ground Control Radios. The Contractor shall be required to obtain and maintain 2-way radios equipped to operate on the ground control frequency used by the FAA's Air Traffic Control Tower. This frequency shall be monitored at all times by the contractor's vehicle escorts while controlling construction traffic across aircraft movement areas to assure proper coordination and safety. The Contractor shall

supply one ground control radio for each escort vehicle. Contractor shall utilize Atlanta Communications to purchase and program radios. Contact for Atlanta Communications can be found in SP-1 paragraph 01)e.

These radios shall become the property of the City upon completion of the project. Contractor shall submit ground control radios to the Engineer. The Contractor is advised that normal delivery time is approximately 4-6 weeks.

Ground control radios shall meet the following requirements:

1. Radio units for communication with the FAA Air Traffic Control Tower shall be ICOM-A110 or approved equal. Radio should be specifically designed for vehicle mounting and providing a minimum of 30 watts PEP transmit power from a 12 volt power supply. Radios must be capable of operating at full output across the aviation band spectrum. Power connections to the radio must be modified for use with a 12 volt vehicle power outlet.

2. External antennas must be a vehicle magnetic mount type with the antenna element tuned specifically for efficient operation across the aviation band spectrum. The antenna unit must include sufficient coaxial cable length to allow connection to the radio in a normal installation position inside the vehicle and must include a connector compatible with the antenna connector on the chosen radio unit. Contractor must supply one antenna unit per radio purchased.

j) Prior to conducting any airfield escorting duties, DOA will establish an approved construction haul route to be utilized by the escorts to escort the contractors' vehicles to the construction site. Escorts may not alter, amend or create construction haul routes. Escorts are not authorized to close any portion of the AMA for any purpose. All requests shall be made through the project's Construction Manager.

02) BASIS OF PAYMENT

a) Partial payments will be made as follows:

Month after Issuance of the NTP	Cumulative Percent of the Price to be Paid
1	33%
2	67%
3	100%

b) Payment will be made under:

Item SP-10-1 – Aircraft Movement Area (AMA) Escorting – Per Lump Sum.

END OF SECTION SP-10

SECTION SP-15 OIL WATER SEPARATOR

01) DESCRIPTION

This item shall consist of furnishing and installing an underground oil water separator suitable for treating limited quantities of stormwater runoff from the proposed aircraft apron. The separator shall be the coalescing type, cross flow, flat parallel plate, gravity displacement.

The separator shall be designed for gravity separation of sand, grit, settleable solids and lightweight hydrocarbon oils from stormwater runoff. Access from the ground surface shall be supplied.

Separator shall be constructed of a double wall steel tank and shall include hold down straps and anchoring system, lifting lugs, hydrostatic leak detection system, manway extensions, and inlet, outlet and vent piping, sludge removal connections and piping, plus all other incidentals required for a complete, functioning installation.

The separator shall be capable of managing an intermittent, variable or continuous inflow up to 550 gallons per minute, with an effluent quality of 15 mg/L oils and 100 mg/L total suspended solids, in normal operating mode. Inflow and outflow pipes shall be 8 inch diameter. The above criteria shall be met without the use of a secondary plastic coalescer.

The separator tank construction, and all of the related components, shall be designed to withstand the earth load indicated on the drawings (approx. 16 feet from top of tank to finished grade), live load (Highway H-20), and hydrostatic pressures while operating or empty. Soil density may be assumed at 120 lb/cu.ft.

All performance criteria and characteristics listed above must be met or exceeded. Basis of Design is the underground separator systems manufactured by Mercer International of New Jersey.

02) CONSTRUCTION

The Contractor shall coordinate with the separator manufacturer to prepare drawings suitable for fabrication and installation. Include operating manuals or literature describing the manufacturer's recommended maintenance practices. Submit design calculations to demonstrate that the efficiency of the primary coalescer meets the minimum standards.

The contractor will be responsible for all other work required for oil/water separator installation, including excavation, bedding, backfill, concrete ballast, flow testing.

When the shop drawings are complete, the Owner may provide supplementary sketches or drawings for any related incidental sitework that may be required,

such as curbing, concrete skirts at manways or vents, and a short maintenance driveway from the Gate 70 area.

03) MEASUREMENT AND PAYMENT

No direct measurement for payment will be made for work under this section.

04) BASIS OF PAYMENT

Payment for the various items of work described above shall be made under a project allowance.

Payment will be made under:

Item SP-15-1 – Oil Water Separator – Per Allowance

END OF SECTION SP-15

SECTION P-150 REMOVAL OF PAVEMENTS AND MISCELLANEOUS ITEMS

01) DESCRIPTION

a) This section consists of miscellaneous demolition and removal items, which will consist of the breaking up and removal of pavements of all types, including curb and gutter, and placement of the removed items in the proposed embankment. This scope also includes the removal and disposal of all types of storm drains, concrete drainage structures of any description, channel riprap, guardrails, utility service lines and mains and all associated appurtenances and hardware.

b) The contractor shall accomplish the demolition and disposal in accordance with all local, state, and federal regulations and laws in regard to hazardous or toxic materials and shall obtain any permits required to accomplish the work.

02) CONSTRUCTION

a) Pavement removal shall consist of breaking up and removal of all types of bituminous and concrete pavements, driveways, sidewalks, islands, including base courses, as indicated on the plans or as directed by the Engineer.

b) Removal of all types of utilities shall consist of entire removal of the items and all associated utility appurtenances and hardware, such as but not limited to, valves, meters, vaults, transformer pads and incidentals and disposal of all materials. If an existing pipe or utility is encountered which is not shown on the plans, the Contractor shall notify the Engineer and receive approval prior to removal of the pipe.

d) All existing pipes less than 15" diameter shall be removed or abandoned as designated on the plans or as directed by the Engineer. Such pipes to be abandoned shall be capped with concrete at both ends or as otherwise directed by the Engineer. Salvaged pipe shall become the contractor's property and shall be disposed of off airport property.

e) Existing pipes 15" in diameter or greater shall be removed or filled with flowable hydraulic material. If hydraulic material is used, the material shall consist of a pumpable mixture of sand and fly ash and may include a pumping aid or bentonite. There are no strength requirements for the hydraulic fill mix other than it shall be generally suitable to fill the conduit void and prevent settlement or collapse and shall not contain excessive moisture content. Salvaged pipe shall become the contractor's property and shall be disposed of off airport property.

f) Removal of curb and gutter shall consist of the breaking out and removal of the full curb and gutter section.

g) Removal of drainage structures involves the demolition and removal of such items as inlets, manholes, slope drain inlets or outlets where so indicated on the plans. Frames, grates, or other hardware appurtenant to the items to be removed shall remain the property of the City and be delivered to the Department of Aviation maintenance area or disposed of off airport property as directed by the Engineer. This work will not be paid separately and will be considered incidental to other items of construction.

03) METHOD OF MEASUREMENT

a) Removal of pavements will be measured by the square yard.

b) Removal of miscellaneous drainage structures, including headwalls, manholes, inlets, slope drain inlets or outlets, shall not be counted or measured for payment.

c) Removal of pipes, 15" diameter or greater, will be measured for payment by the linear foot. Removal or abandonment of pipe with diameters less than fifteen inches will not be measured for payment.

d) Removal of curb and gutter, will be measured for payment by the linear foot, with no distinction made as to pavement type or thickness.

e) Each light pole removed and accepted by the engineer will be counted for payment, with no distinction made as to size, height, or type.

f) Removal of channel riprap will not be separately measured for payment. This item shall be incidental to earthwork items.

g) Removal of guardrail, will be measured for payment by the linear foot.

h) Each concrete light base removed and accepted by the engineer will be counted for payment, with no distinction made as to size, height, or type.

04) BASIS OF PAYMENT

a) Payment shall be made at the Contract unit price per square yard for removal of pavements. This price shall be full compensation for sawing, breaking up, and all incidental work necessary to complete the removal.

b) Payment shall be made at the Contract unit price per linear foot for curb and gutter removal. This price shall be full compensation for all labor, tools, equipment and incidentals necessary to complete the work.

c) Payment shall be made at the Contract unit price per linear foot for pipe removal, in sizes of 15 inch diameter or greater. This price shall be full compensation for all labor, tools, equipment and incidentals necessary to complete the work.

d) Payment shall be made at the Contract unit price for each light pole removed and accepted by the engineer.

e) No separate payment will be made for channel riprap removal.

f) Payment shall be made at the Contract unit price per linear foot for removal of guardrail. This price shall be full compensation for all labor, tools, equipment and incidentals necessary to complete the work.

g) ***Payment shall be made at the Contract unit price for each concrete light base removed and accepted by the engineer.***

Payment will be made under:

Item P-150 -1-Bituminous Pavement Removal - Per Square Yard.
Item P-150 -2-Removal of Portland Cement Concrete Airfield Pavement, 16" Thick – Per Square Yard.
Item P-150 -3-Removal of Portland Cement Concrete Roadway Pavement, 10" Thick– Per Square Yard.
Item P-150 -4-Curb and Gutter Removal - Per Linear Foot.
Item P-150 -5-Removal of Pipes, 15" Diameter or Greater - Per Linear Foot.
Item P-150 -6-Removal of Light Poles - Per Each.
Item P-150 -7-Removal of Guardrail - Per Linear Foot.
Item P-150 -8-Removal of Concrete Light Base – Per Each.

END OF SECTION P-150

SECTION P-156 TEMPORARY AIR AND WATER POLLUTION, SOIL EROSION AND SILTATION CONTROL

01) DESCRIPTION

This section shall consist of all work necessary to protect the environment and control erosion and sedimentation at the project site for the duration of the contract in accordance with the provisions of these specifications and the Contractor's approved protection and control plan.

02) CONSTRUCTION METHODS

A. Environmental Protection. The Contractor shall comply with all Federal, State, and local laws and regulations controlling pollution of the environment. He shall take necessary precautions to prevent soil erosion, pollution of streams, lakes, ponds, and reservoirs with fuels, oils, bitumens, chemicals, or other harmful materials and to prevent pollution of the atmosphere from particulate and gaseous matter.

1. Storm Water Discharge.

All discharged storm water, associated with construction activities, to the waters of the State of Georgia shall be in accordance with the limitations, monitoring requirements and other conditions set forth in the provisions of the Georgia Water Quality Control Act (Georgia Laws 1964, p.416 as amended), The Federal Clean Water Act (33 U.S.C. 1251 et seq., as amended) and the Rules and Regulations promulgated to these acts. These requirements include preparation of a detailed, phased erosion control plan prepared by the Contractor, stamped and sealed by a Georgia Registered Engineer. Site Disturbance cannot proceed until this plan is prepared and approved.

2. Soil Erosion.

Prior to construction, submit to Engineer, for acceptance: schedules and methods for accomplishment of temporary erosion and pollution control work, through the various construction phases of the project; proposed method of erosion control on haul roads and borrow sites and plan for disposal of waste materials or erosion control details for other potential sources of pollution.

Include provisions for the periodic removal or accommodation of accumulated sediments in storm sewers, ditches and channels constructed under this contract and similar downstream existing facilities, to the extent necessary to maintain adequate drainage of the construction site and areas upstream thereof and also as required to prevent construction sediments from exiting the airport boundaries via existing water courses.

Plans will also be submitted to the Engineer for acceptance detailing the removal of all sediments from the storm sewers, sediment traps and basins, ponds, and channels constructed under this Contract, as a part of the Contractor's final cleanup, prior to acceptance.

The Contractor will be required to complete all permanent erosion control features at the earliest practicable time. Temporary pollution and erosion control measures shall be used to correct unforeseen conditions that occur during construction or those that are needed prior to completion of permanent measures. These shall include possible use of temporary grass cover and check dams for erosion control. In the event of unforeseen conditions as described above, supplementary payment may be granted if, in the opinion of the Engineer, the conditions were completely outside of the contractors' control. This may include unusually severe weather conditions (greater than a 25-year storm event), or conditions created by airport operations or other contractors.

In the event that temporary erosion and pollution control measures are required due to the Contractor's negligence, carelessness, or failure to install permanent controls in a timely manner, such work will be performed by the Contractor at his own expense. This work is considered a part of the Contractor's obligation to maintain his approved erosion control plan, and is included in the lump sum pay item for Sediment and Erosion Control. In case of repeated failures on the part of the Contractor to control erosion/pollution, right is reserved by the Engineer to employ outside assistance to provide the necessary corrective measures. Such incurred costs, plus related engineering costs, will be charged to the Contractor and appropriate deductions made from the Contractor's progress payments. The erosion control features installed by the Contractor shall be acceptably maintained by the Contractor during the time that construction work is being performed.

3. Pollutants such as fuels, lubricants, bitumen, raw sewage and other harmful materials shall not be discharged into or near rivers, streams and impoundments or into natural or manmade channels leading thereto. Wash water or waste from concrete mixing or curing operations will not be allowed to enter live streams.

4. Burning of combustible materials will not be allowed within the project limits.

5. Emissions Control

a. The contractor shall perform work in compliance with local, state and federal requirements.

b. For all nonroad equipment used on the job producing between 100 and 750 horsepower, the Contractor shall use low emission vehicles that conform, at a minimum, to the federal Tier 3 emissions standards. Please visit https://www3.epa.gov/otaq/standards/nonroad/index.htm for additional guidance pertaining to the federal government's nonroad vehicle emissions tier standards.

c. Diesel combustion engines on the construction equipment not in active use shall be turned off.

d. The contractor shall provide a list of all equipment and vehicles to be used to complete the work including type, manufacturer name model number, serial number, horsepower rating, and model year for approval prior to commencing work.

03) MATERIALS

A. Silt Fence.

1. Posts.

a. Steel posts may be used. Otherwise, posts shall be wood, at least 3 inches in diameter, and at least 6 feet long and straight enough to provide a fence without notable misalignment.

2. Wire Fabric.

a. Wire fence fabric shall be at least 32 inches high and shall have at least 6 horizontal wires. Vertical wires shall be spaced 12 inches apart. The top and bottom wires shall be at least 10 gauge. All other wires shall be at least 12 gauge.

3. Filter Fabric.

Burlap. Burlap shall weigh at least 6.7 ounces per square yard, and shall have a minimum width of 36 inches.

Synthetic Fabrics. The fabric shall be composed of strong rot-proof synthetic fibers forming a fabric of either the woven or non-woven type. Either type of fabric shall be free of any treatment or coating which might significantly alter its physical properties after installation. The fabric shall contain stabilizers and/or inhibitors to make the filaments resistant to deterioration resulting from exposure to sunlight or heat. The fabric shall be pervious sheet of synthetic fibers oriented into a stable network so that the fibers retain their relative position with respect to each other. The dyes of the fabric shall be finished to prevent the outer yarn from pulling away from the fabric. The fabric shall be free of defects or flaws which significantly affect its physical and/or filtering properties. Sheets of fabric may be sewn or bonded together. No deviation from any physical requirements will be permitted due to the presence of the seam. During all periods of shipment and storage, the fabric shall be wrapped in a heavy-duty protective covering which will protect the fabric from sunlight, mud, dust, dirt, and debris. The fabric shall not be exposed to temperatures greater than 140°F. After the protective covering has been removed, the fabric shall not be left uncovered under any circumstances for longer than 3 days.

The fabric shall meet the following physical requirements:

Physical Property	Test Method	Requirements
Tensile Strength	ASTM D4632	Warp-120 Fill-100 for Type A&B 180 for Type C
Elongation	ASTM D4632	40% max.
AOS (Apparent Opening Size)	ASTM D4751	No. 30 Sieve, Max
Flow Rate (Gal/Min/Sq.Ft.)	GDT-87	25 for Type A&B 70 for Type C
Ultraviolet Stability	ASTM D4632 After 300 hours weathering in accordance with D4355	80
Bursting Strength	ASTM D3786 Diaphragm Bursting Strength Tester.	175-psi min.

The Contractor shall furnish certified test reports with each shipment of material attesting that the fabric meets the requirements of this provision.

4. Installation and Removal.

The silt fence shall be constructed at the locations shown on the plans or at locations directed by the Engineer.

Posts shall be installed so that no more than 3 feet of the post shall protrude above the ground. Fabric shall be attached to the wire fence fabric by wire or other acceptable means.

The Contractor shall maintain the silt fence and shall remove and dispose of silt accumulation at the silt fence when so directed by the Engineer. Fabric shall be removed and replaced whenever it has deteriorated to such extent that it reduces the effectiveness of the silt fence.

Silt fence shall remain in place unless the Engineer directs that it be removed. Silt fence that has been removed will remain the property of the Contractor and may be used at other locations provided it is in a condition acceptable to the Engineer.

B. Filter Stone.

1. Filter stone shall consist of quarry stone that is sound, tough, dense, resistant to the action of air and water, and suitable in all other respects for the purpose intended. The stone shall meet the requirements of #467

stone or #57 as indicated on the plans and as specified in ASTM Standard C-33. The gradation requirements of #467 and #57 stone are as follows:

#467 Stone
Percent of Total Passing, by Weight

Size	2"	1-1/2"	3/4"	3/8"	#4	#200
Percent Passing	100	95-100	35-70	10-30	0-5	0-1

#57 Stone
Percent of Total Passing, by Weight

Size	1-1/2"	1"	1/2"	#4	#8	#200
Percent Passing	100	95-100	25-60	0-10	0-5	0-1

C. Ditch Liner.

1. Ditch liner shall be organic material fiber blankets for ditches and channels which shall be installed and shall be capable of meeting the requirements of the Georgia Department of Transportation Standard Specifications Section 713.

D. Matting for Erosion Control.

1. Erosion control mats or blankets for steep slopes (steeper than 3:1) shall be composed of materials such as excelsior, coconut, or bituminous treated roving installed over previously seeded areas, in accordance with the requirements of Georgia Department of Transportation Standard Specifications Section 713, except that hydraulically applied wood fiber blanket, type II shall not be allowed.

04) METHOD OF MEASUREMENT

A. Sediment/Erosion Control is a lump sum and shall not be directly measured for payment. This lump sum will include development and implementation of the Contractor's erosion control plan and all phased or interim measures to implement that plan.

B. Ditch liner will be measured for payment by the Square Yard, measured in plan view without slope correction, completed and accepted.

05) BASIS OF PAYMENT

A. Payment will be made at the contract lump sum price bid for Sediment/Erosion Control. This price shall be full compensation for design, permitting and conformance with the requirements of Section P-156 (02)(A)(1). This price shall be full compensation for furnishing and installing all materials required to complete the Contractor's phased erosion control plan, including additional silt fences, temporary slope drains, temporary or permanent silt basins, washed filter stone, check dams and other related and incidental items.
Partial payments shall be made as follows:

1. Fifteen percent (15%) of the contract item will be paid when the complete Erosion/Sediment plan has been approved.

2. Seventy-five percent (75%) of the contract item will be prorated on each partial payment in respect to the percent complete of all work on the contract.

3. The final ten percent (10%) will be paid when all work is complete and all reports have been submitted.

B. Payment will be made at the contract unit price per Square Yard for "Ditch Liner". This price shall be full compensation for furnishing all material, labor, equipment, tools and incidentals necessary to complete the item.

C. Payment will be made under:

Item P-156 -1- Sediment/Erosion Control -Per Lump Sum.
Item P-156 -2 - Ditch Liner - Per Square Yard

END OF SECTION P-156

SECTION P-301 SOIL CEMENT BASE COURSE

01) DESCRIPTION

(a) This item shall consist of constructing a cement-stabilized subgrade by uniformly mixing together soil, Portland cement, and water. Also, it shall consist of spreading, shaping, and compacting the mixture in accordance with the requirements of this specification and it shall conform to the dimensions and typical cross sections shown on the plans and to the lines and grades established by the Engineer.

(b) The Contractor is cautioned that underground facilities will be installed under other sections of this contract. These facilities shall be protected at all times during construction. The Contractor shall use construction methods that will minimize potential damage. After the curing is completed, the Contractor will be required to demonstrate, by a method acceptable to the Engineer, that the underground facilities are undamaged.

02) MATERIALS

(a) Portland Cement: Portland cement shall be a standard brand and shall conform to the latest standard requirements of AASHTO M-85 for the type specified. Air-entrained Portland cement shall conform to the latest standard requirements of AASHTO M-134 for the type specified.

Contractor may use bulk cement, subject to the Engineer's approval of the apparatus for handling, weighing, applying the cement, and performance.

(b) Water: The water for the subgrade shall be clean and free from sewage, oil, acid, strong alkalis, or vegetable matter, and it shall be in sufficient supply for mixing and curing. Water of questionable quality shall be tested in accordance with the requirements of AASHTO T-26. The amount of water used in the mix will vary with the moisture content of the soil.

(c) Soil: The soil used in the subgrade stabilization shall be material remaining after Selective Grading and Preparation of Subgrade operations have been completed.

(d) Bituminous Material: The bituminous material used for curing the soil cement shall meet the following conditions:

1) Cutback asphalt – RC-70

2) Specification – AASHTO M-81

3) Application Temperature

(e) Unsuitable Material: Unsuitable material shall be as defined in Section P-152, 01) (d) 2.

03) DEFINITIONS

(a) Laboratory Soil Test: Prior to subgrade construction, the Contractor shall perform laboratory tests on the various types of soils for use as subgrade to determine the quantity of cement

required to provide satisfactory results. Satisfactory materials for the soil cement mix designs shall be obtained from an approved source.

1) The specimens containing various amounts of cement are to be compacted in accordance with AASHTO T-134, and the optimum moisture for each amount of cement is to be determined. Samples of the optimum moisture shall be subjected to the wet-dry and the freeze-thaw test in accordance with AASHTO T-135 and T-136, respectively. Test specimens of the approved mix shall be capable of consistent field compressive strength of 600 psi when tested at seven days, with gain in strength thereafter.

2) The specified cement content for construction shall be that at which the weight loss of the specimens subjected to 12 cycles of either the wet-dry or the freeze-thaw is not more than 14% for granular soils, 10% for the more plastic granular and silty soils, and 7% for clay soils.

3) The compressive strength of soaked specimens should increase both with age and with increase in cement content.

4) The soil cement mix designs shall be submitted to the Engineer for his review well in advance of the required use in the field.

04) CONSTRUCTION METHODS

(a) Weather Limitations. The soil cement subgrade shall be not be mixed or placed while the atmospheric temperature is below 35°F or when conditions indicate that the temperature may fall below 35°F within 24 hours, or when the weather is foggy or rainy, or when the soil or subgrade is frozen. The temperature requirement may be waived, but only when so directed by the Engineer.

(b) Equipment. The soil cement may be constructed with any equipment that will meet the requirements for soil pulverizations, cement application, mixing, water application, incorporation of materials, compaction, finishing and curing specified herein.

1) The methods to be employed in performing the work, and equipment and tools to be used for handling the materials and executing the work, shall be subject to the approval of the Engineer before the work is started. Whenever corrections are necessary, changes shall be made. All equipments, tools, machinery, and plant must be maintained in a satisfactory working conditions..

2) The Contractor shall be required to install a hood device over the cement spreader bar to contain the cement dust and prevent discharge into the air, or at his option, mix the soil, cement and water by the central mix method.

(c) Preparation. The area designated for stabilization shall be graded, compacted, and shaped under the excavation and embankment operations described herein before.

(d) Pulverization. The soil for the subgrade shall be so pulverized that at the completion of moist mixing, 100% by dry weight passes a two inch sieve and a minimum of 80% passes a No. 2 sieve, exclusive of gravel or stone retained on the No. 2 sieve.

(e) Mixing and Spreading. Mixing of the soil, cement, and water shall be accomplished by the mixed-in-place method.

1) MIXED-IN-PLACE Method. Prior to the addition of cement, approximately four (4) passes shall be made with the mixer, or as many additional passes as required to pulverize the soils to eliminate soil clods and assure thorough mixing of cement. The specified quantity of cement shall be spread uniformly on the soil.

2) The percentage of moisture in the soil, at the time of cement application, shall not exceed the quantity that will permit a uniform and intimate mixture of soil and cement during mixing operations, and it shall not exceed the specified optimum moisture content for the soil cement mixture.

   i. Cement that has been displaced shall be replaced before mixing is started. After the cement has been applied, it shall be mixed with the soil. Mixing shall continue until the cement has been sufficiently blended with the soil to prevent the formation of cement balls when water is applied.

   ii. Immediately after the soil and cement have been mixed, water shall be incorporated into the mixture. Excessive concentrations of water on or near the surface shall be avoided. Water supply and pressure distributing equipment shall be provided that will assure the application of water within three hours of all mixing on the section being processed. After all mixing water has been applied, mixing shall continue until a uniform and intimate mixture of soil, cement, and water has been applied.

(f) Compaction. At the start of compaction, the percentage of moisture in the mixture and in unpulverized soil lumps, based on oven-dry weights, shall not be below or more than two percentage points above the specified optimum moisture content and shall be less than that quantity which will cause the soil cement mixture to become unstable during compaction and finishing.

1) The specified optimum moisture content and density shall be determined in the field by the moisture-density test, specified in AASHTO T-134, performed on representative samples of soil cement mixture obtained from the area being processed at the time compaction begins.

2) The density shall be 100% of the density determined in the field by the moisture-density test, specified in AASHTO T-134. During construction, one test shall be made for each 1,000 square yard of each area of soil cement placed and compacted. In order to monitor quality control, the Engineer shall have the Contractor's testing laboratory prepare molded samples in accordance with AASHTO T-134 and cure the samples and have them tested at seven days to determine the compressive strength.

3) Compaction equipment used on all soil cement shall include pad type compactors such as Vibro Plue Model C.A. 25 PD, Caterpillar Tractor Company, Model 815, or approved equal.

4) Prior to the beginning of compaction, the mixture shall be in a loose condition for its full depth. The loose mixture shall then be uniformly compacted to the specified density within two hours. During compaction operations, shaping may be required to obtain uniform compaction and required grade and cross section.

(g) Finishing. After compaction, the surface of the soil cement shall be shaped to the required lines, grades and cross section. If necessary, during shaping operations, the surface of the base shall be lightly scarified to remove any tire imprints or smooth surfaces left by equipment. The resulting surface shall then be compacted to the specified density. Rolling shall be supplemented by broom-dragging, if required.

1) The moisture content of the surface material must be maintained at its specified optimum content during finishing operations. Surface compaction and finishing shall produce a smooth dense surface, free of compaction planes, cracks, ridges, or loose material.

2) Any portion of the soil cement that has a density of five pounds or more below that specified shall be corrected or replaced prior to final set to meet these specifications.

   The contractor shall submit his methods for correcting the in-place mix for review and approval by the engineer prior to commencing any corrective action. The application of any additional cement, re-mixing, or other action required shall be at no additional cost to the City.

(h) Construction Joints. At the end of each day's run, a transverse construction joint shall be formed by a header or by cutting back into the compacted material to form a true transverse vertical face.

1) The protection provided for construction joints shall permit the placing, spreading, and compacting of base material without injury to the work previously laid.

   Where it is necessary to operate or turn any equipment on the completed subgrade, sufficient protection and cover shall be provided to prevent damage to the finished surface. A supply of mats or wooden planks shall be maintained and used as approved and directed by the Engineer.

2) Care shall be exercised to insure thorough compaction of the subgrade material immediately adjacent to all construction joints. When spreading or compacting subgrade material adjacent to a previously construction lane, care shall be taken to prevent injury to the work already constructed.

(i) Protection and Curing. After the subgrade has been finished as specified herein, it shall be protected against drying for a period of seven days by the application of bituminous material or other acceptable methods. The curing method shall begin immediately after final finishing and trimming. The finished subgrade shall be kept moist continuously until the curing material is placed.

1) The bituminous material specified shall be uniformly applied to the surface of the completed subgrade at the rate of approximately 0.4 gallon per square yard with approved heating and distributing equipment. The Contractor shall prepare a test section using a rate and temperature of application mutually agreed upon. Upon acceptance of the rate and temperature of application on the test section by the Engineer, the Contractor shall use those rates on the subgrade material.

2) At the time the bituminous material is applied, the surface shall be dense, free of any loose and extraneous material, and shall contain sufficient applied in sufficient quantity to fill the surface voids immediately before the bituminous curing material is applied.

3) No construction equipment or other traffic shall ride on the completed subgrade until the subgrade has cured for a minimum of three days, when temperatures are continuously above 40 °F., and five days when the temperature drops below 40 °F. at any time during the curing period. Additional cement may be added to decrease the above cure times.

4) The curing material shall be maintained and applied as needed by the Contractor during the seven (7) day protection period so that all of the soil cement will be covered effectively during this period.

5) Finished portions of soil cement that are used by equipment in constructing an adjoining section shall be protected to prevent equipment from marring or damage the completed work.

6) When the air temperature may be expected to reach the freezing point, sufficient protection from freezing shall be given the soil cement for seven days after its construction and until it has hardened.

7) No additional payment will be made for curing materials; all costs thereof will be included in the contract unit price for its associated item.

j) Construction Limitations. When any of the operations after the application of cement are interrupted for more than 30 minutes or when the uncompacted soil cement mixture is wetted by rain so that the moisture content is exceeded by a small amount, the decision to reconstruct the portion affected shall rest with specified moisture content tolerance, the Contractor shall reconstruct, at his expense, the portion affected. All material along the longitudinal or transverse construction joints not properly compacted shall be removed and replaced, at the Contractor's expense, with properly moistened and mixed soil cement compacted to specified density.

k) Surface Test. The finished surface shall not vary more than 3/8" when tested with a 16-foot straightedge applied parallel with, or at right angles to, the longitudinal axis of the pavement. Any variations in excess of this tolerance shall be corrected by the Contractor, at his own expense, and in a manner satisfactory to the Engineer.

1) The elevations, as determined by the Engineer, of the top of the subgrade shall not vary more than ½", plus or minus, from the proposed elevations.

(l) Thickness. The thickness of the soil cement subgrade shall be verified from measurements, taken by the Engineer, in the trenches excavated through this layer for the placement of underdrains. The thickness of the soil cement subgrade shall be within ½" of the thickness shown on the plans. Where the thickness shown by the measurements is not within the tolerance given, the Engineer shall evaluate the area and determine if, in his opinion, it shall be reconstructed at the Contractor's expense of the deficiency or deducted from the total material in-place.

(m) Maintenance. The Contractor shall be required to maintain, at his own expense, the entire subgrade within the limits of his contract in a condition satisfactory to the Engineer from the time he starts work until all the work has been completed. Maintenance shall include immediate repairs of any defects that may occur either before or after the cement is applied. The work shall be done by the Contractor at his own expense and repeated as often as necessary to keep the area intact at all times. Repairs shall be made in a manner that will insure restoration of a uniform surface and the durability of the part repaired. Faulty work must be replaced for the full depth of treatment. Any low areas shall be remedied by replacing the material for the full depth of treatment. Any low areas shall be remedied by replacing the material for the full depth of treatment rather than by adding a thin layer of soil cement to the completed work.

(n) Repair. The contractor shall repair all soil cement that may be damaged by construction operations. The damaged area of soil cement shall be removed full depth and replaced with

structural concrete meeting the requirements of specification Section P-501. Repairs to the soil-cement base course shall be incidental to the construction of the base course.

05) METHOD OF MEASUREMENT

(a) The yardage of soil cement subgrade to be paid for shall be the number of square yards of completed and accepted subgrade.

(b) The amount of portland cement to be paid for shall be the number of barrels (376lb/barrel) of cement actually used and authorized.

(c) No payment will be made for soil cement used in areas outside the limits shown on the plans.

06) BASIS OF MEASUREMENT

(a) Payment shall be made at the contract unit price per square yard for soil cement subgrade. This price shall be full compensation for furnishing all materials, except Portland Cement, and for all preparation, delivering, placing, and mixing of these materials, and for all labor, equipment, tools, and incidentals necessary to completed the item.

(b) Payment for furnishing Portland Cement shall be made at the contract unit price per ton of material.

(c) Payment will be made under:

Item P-301-1 Soil Cement Base Course, 9" thick – Per Square Yard.

Item P-301-2 Portland Cement for Subgrade Stabilization – Per Barrel

TEST AND MATERIAL REQUIREMENTS
Test and Short Title

AASHTO T-26 – Quality of Water

AASHTO T-27 – Sieve Analysis for Fine and Coarse Aggregate

AASHTO T-134 – Moisture-Density Relations of Soil-Cement Mixtures

AASHTO T-135 – Wetting-and-Drying Test of Compacted Soil-Cement Mixtures

AASHTO T-136 – Freezing-and-Thawing Test of Compacted Soil-Cement Mixtures Material and Short Title

AASHTO M-81 – Asphalt RC

AASHTO M-85 – Portland Cement

AASHTO M-134 – Air Entrained Portland Cement

1/SS-A-674 – Asphalt Emulsion

END OF SECTION P-301

SECTION P-401

BITUMINOUS PAVEMENT

01) DESCRIPTION

(a) This section shall consist of base courses composed of mineral aggregate and bituminous material mixed in a central mixing plant and placed on a prepared course in accordance with these specifications and shall conform to the lines, grades, thickness and typical cross-sections shown on the plans. Bituminous bases constructed under this section shall be limited to the areas shown on sheet C3.2.1.

1) Each course shall be constructed to the depth, typical section or elevation required by the plans and shall be rolled, finished and approved by the Engineer before the placement of the next course.

02) MATERIALS

(a) Aggregate. Aggregates shall consist of crushed stone with or without sand or other inert finely divided mineral aggregate. The portion of materials retained on the No. 8 sieve shall be known as coarse aggregate, the portion passing the No. 8 sieve and retained on the No. 200 sieve as fine aggregate and the portion passing the No. 200 sieve as mineral filler.

1) Coarse Aggregate. Coarse aggregate shall consist of sound, tough, durable particles, free from adherent films of matter that would prevent thorough coating with the bituminous material. It shall have a percentage of wear not greater than 50% for base course material and 47% for surface course material when tested in accordance with AASHTO T-96, nor shall the sodium sulfate soundness loss exceed 9%, after five cycles, when tested in accordance with AASHTO T-104.

i. Crushed aggregate shall contain at least 50% by weight of crushed pieces having 2 or more fractured faces and 65% having at least one fractured face. The area of each face shall be equal to at least 75% of the smallest midsectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 50 degrees to count as two fractured faces.

ii. The aggregate shall not contain more than 8%, by weight, of flat or elongated pieces. A flat particle is one having a ratio of width to thickness greater than five, an elongated particle is one having a ratio of length to width greater than five.

2) Fine Aggregate. Fine aggregate shall consist of clean, sound, durable, angular particles produced by crushing stone that meets the requirements for wear and soundness specified for coarse aggregate. The aggregate particles shall be free from coatings of clay, silt, or other objectionable matter and shall contain no clay balls. The fine aggregate, including any blended filler, shall have plasticity index of not more than six when tested in accordance with AASHTO T-90, and a liquid limit of not more than 25 when tested in accordance with AASHTO T-89.

i. The amount of natural sand that may be used in the bituminous mixes shall have the approval of the Engineer but shall not exceed 20% of the weight of the base course aggregate nor 15% of the weight of the surface course aggregate. The natural sand shall consist of grains of quartz or other hard, durable rock, and shall be free of lumps of clay, loam, organic matter, and other foreign matter.

3) Sampling and Testing. All testing of aggregate samples shall be performed by the Contractor. Unless otherwise directed ASTM Standard D-75 shall be used in sampling of coarse aggregate and fine aggregate, and ASTM Standard C-183, Paragraphs 3 and 4, shall be used in sampling mineral filler. Sampling will be observed and supervised by the Engineer when deemed necessary. No aggregate shall be used in the production of mixtures without prior approval.

4) Sources of Aggregates. Sources of the aggregate shall be selected well in advance of the time the materials are required in the work. When the aggregates are obtained from a previously approved source or an existing source producing aggregates that has a satisfactory service record in bituminous pavement construction for at least five (5) years, samples shall be tested prior to use. An inspection of the producer's operation will be made by the Engineer if deemed necessary. When new sources are to be developed, the Contractor shall indicate the sources and shall submit his plan for operation thirty (30) days in advance of starting production. Approval of the source of aggregate does not relieve the Contractor in any way of the responsibility for delivery at the job site of aggregates that meet the requirements specified herein.

5) Samples of Aggregates. Samples of the aggregates shall be tested by the Contractor at the start of production and at intervals during production of bituminous mixtures. The samples shall be obtained at the processing plant, from railroad cars, truck, stockpiles, and other points in the process of production, transportation, and storage of aggregates. The intervals and points of sampling will be as designated elsewhere herein. The samples will be the basis of approval of specific lots of aggregates from the standpoint of the quality requirements of this paragraph. Samples of aggregates shall be obtained from the hot bins by trial runs the day before the start of production of paving mixture and from the hot bins at intervals during production of paving mixtures. The tested samples will be the basis of approval of specific lots of aggregates from the standpoint of gradation requirements specified hereinafter. Tested samples will also be the basis of approval from the standpoint of paving mixture requirements.

(b) Filler. If filler, in addition to that naturally present in the aggregate, is necessary, it shall consist of stone dust, loess, Portland cement, or other approved mineral matter. The filler material shall meet the requirements of AASHTO M-17.

(c) Bituminous Material.

1) The types, grades, controlling specifications and mixing temperatures for the bituminous materials are given below. The Contractor may use either the viscosity graded or the penetration graded asphalt cement but will not be

allowed to change from one type to the other without the approval of the Engineer. If a change is approved, a new job mix formula will be required and the cost will be borne by the Contractor.

TYPE AND GRADE	SPECIFICATION	MIXING TEMPERATURE (F)
Asphalt Cement – Performance Grade PG76-22	AASHTO M-320	285^0 - 335^0 [1]

1. Mixing, storage, and compaction temperatures at lab, plant, and site shall be in accordance with recommendations of the binder manufacturer.

2) The Contractor shall furnish vendor's certified test reports for each tankload or equivalent of bitumen shipped to the project. The report shall be delivered to the Engineer before permission is granted for use of the material. The furnishing of the vendor's certified test report for the bituminous material shall be the basis for final acceptance.

03) COMPOSITION

(a) Composition of Mixtures. The bituminous plant mixes shall be composed of a mixture of aggregate, filler if required, and bituminous material. The several aggregate fractions shall be sized, uniformly graded, and combined in such proportions that the resulting mixture meets the grading requirements of the applicable job mix formula.

(b) Job Mix Formulas. No bituminous mixture for payment shall be produced until job mix formulas, as required, have been approved by the Engineer. The formulas shall be submitted in writing by the Contractor to the Engineer at least 30 days prior to the start of paving operations and shall indicate the definite percentage of each sieve fraction of aggregate, the percentage of bitumen, and the temperature of the completed mixture when discharged from the mixer. All test data used to develop the job formulas shall also be submitted. The job mix formula for each mixture shall be in effect until modified in writing by the Engineer. Should a change in sources of materials be made, a new job formula shall be established by the procedure specified hereinafter before the new material is used.

1) Each bituminous mixture shall be designed and shall meet the requirements hereinafter described when tested in accordance with standard Corps of Engineers test methods, described in Appendix V to the Corps of Engineers Manual EM 1110-45-302, covering Marshall procedures, bulk-impregnated specific gravity, and immersion/compression tests. The mixtures, when prepared in accordance with the standard Corps of Engineers Marshall procedures, shall have the following test properties:

For nonabsorptive aggregate. When the water absorption value of the entire blend of aggregate does not exceed 2.5% as determined in accordance with AASHTO Standards T-84 and T-85, the aggregate is designated as nonabsorptive. The apparent specific gravity will be used in computing the voids and voids filled with asphalt, and the mixtures shall meet the following requirements:

NONABSORPTIVE-AGGREGATE MIXTURES

Test Property	Bituminous Base Course	Bituminous Leveling Course	Bituminous Surface Course
Number of Blows	75	75	50
Stability, minimum, pounds	3000	3000	1800
Flow, 1/100 inch units	8 min., 12 max	8 min., 12 max	8 min., 16 max
Voids total mix, percent	3-5	3-5	3-5
Voids filled with bitumen, percent	50-70*	50-70*	70-80

*The Engineer may permit deviation from the limits specified for voids filled with bitumen in order to stay within the limits specified for voids total mix

For absorptive aggregate. When the water absorption value of the entire blend of aggregate exceeds 2.5% as determined in accordance with AASHTO Standards T-84 and T-85, the aggregate is designated as absorptive. The bulk-impregnated specific gravity determined in accordance with the standard Corps of Engineers method will be used in computing the percentages of voids total mix and voids filled with asphalt, and the mixture shall meet the following requirements:

ABSORPTIVE - AGGREGATE MIXTURES

Test Property	Bituminous Base Course	Bituminous Leveling Course	Bituminous Surface Course
Number of Blows	75	75	50
Stability, minimum, pounds	3000	3000	1800
Flow, 1/100 inch units	8 min., 12 max	8 min., 12 max	8 min., 16 max
Voids total mix, percent	3-5	3-5	2-4
Voids filled with bitumen, percent	55-75**	55-75*	75-85

**The Engineer may permit deviation from the limits specified for voids filled with bitumen in order to stay within the limits specified for voids total mix.

Immersion/Compression Tests. The composite mixture composed of the aggregate and bitumen to be used shall conform to the requirements hereinafter specified when subjected to the standard Corps of Engineers

immersion test. If the index of retained stability of the specimens of the composite mixture is less than 75, the aggregates shall be rejected or the asphalt shall be treated with an approved anti-stripping agent. The amount of antistripping agent to be added to the asphalt shall be sufficient to produce an index of retained stability of not less than 75 when specimens of the mixture conforming to the proposed job mix formula using the treated asphalt are treated in accordance with the above immersion/compression

test. No additional payment will be made to the Contractor for any addition of antistripping agent that may be required.

2) *The mineral aggregate shall be of such size that the percentage composition by weight, as determined by laboratory screens, will conform to the gradation of gradations specified by Table I. Tests for gradation of the coarse and fine aggregate shall be in conformance with AASHTO Standards T-11 and T-27. The gradations shown represent the extreme limits that will determine suitability of aggregate for use from all sources of supply. The aggregates as finally selected for use in the work shall have a gradation within the limits designated in the table and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve, or vice versa, but shall be uniformly graded from coarse to fine. The table is based on aggregates of uniform specific gravity, and the percentages passing the various sieves will be subject to the appropriate correction by the Engineer when aggregates of varying specific gravities are used.*

TABLE I - AGGREGATE - BITUMINOUS PAVEMENTS

Percentage by Weight Passing Sieves			
Sieve Size	Bituminous Base Course	Bituminous Leveling Course	Bituminous Surface Course
	1-1/2" Max	3/4" Max	3/4" Max
1-1/2 inch	100	----	----
1 inch	75-100	----	----
3/4 inch	68-87	100	100
1/2 inch	59-77	82-100	82-100
3/8 inch	53-70	75-90	75-90
No. 4	39-55	60-73	60-73
No. 10	27-42	43-57	43-57
No. 20	17-30	29-43	29-43
No. 40	13-23	19-33	19-33
No. 80	7-15	10-20	10-20
N0. 200	3-7	3-6	3-6
Bitumen Percent	4-6	5-7.5	5-7.5

The selection of either of the gradations shown for the bituminous surface course in Table I shall be such that the maximum size aggregate used shall be

not more than one-half the thickness of the layer of the surface course being constructed.

3) *After the job mix formula is established, the mixtures furnished for the project shall conform within the applicable following tolerances:*

TABLE II - JOB MIX FORMULA TOLERANCES

Tolerance - Plus or Minus

Material	Bituminous Base Course	Bituminous Leveling Course	Bituminous Surface Course
Aggregate passing No. 4 sieve or larger	5%	4%	4%
Aggregate passing No. 10, 20, 40, and 80 sieves	4%	3%	3%
Aggregate passing No. 200 sieve	1.5%	1.5%	1.5%
Bitumen	0.25%	0.25%	0.25%
Temperature of mixing	25^0 F	25^0 F	25^0 F

The aggregate gradation may be adjusted within the limits of the tables specified herein, as directed, without adjustments in the Contract unit prices. The percentages of each sieve fraction in the job mix formula will be restricted to values such that application of the aforementioned tolerances will not cause limits in the gradation tables to be exceeded.

4) *Sampling and testing of bituminous mixtures will be accomplished by representatives of the Contractor, and submitted to the Engineer for his review. Testing for conformance with the specified test properties will be done by the Contractor for all mix design submittals. In the event that the initial mix design submittal is not approved, the Contractor shall redesign the mix and resubmit it to the Engineer. Mixtures that do not conform to the specified test properties will be rejected as directed. No payment will be made to the Contractor for mixture rejected or for pavements or portions of pavement removed.*

5) *JOB MIX FORMULA CHECKLIST*

The Contractor shall submit the following data prior to evaluation and approval of the asphaltic concrete mix design:

i) General

A) Project and project number.
B) Type of bituminous mixture.
C) Type and source of aggregates.
D) Type and source of asphaltic cement.

ii) Aggregate

A) Sieve analysis of each aggregate to be used in mixture.
B) Physical tests of aggregates.
C) Specific gravity and absorption of each type aggregate.
D) Proportion used of each type aggregate.
E) Theoretical gradation of combined proportions of aggregates.

iii) Bituminous Materials.

A) Type and penetration.
B) Specific gravity.

iv) Bitumen Content Determination

A) Resistance to plastic flow of bituminous mixtures.

1) Mixing and compacting temperatures for specimen.
2) Compactive effort (number of blows applied to specimen each, face).
3) Actual specific gravity and unit weight of each specimen.
4) Percent, asphalt cement in each specimen.
5) Theoretical specific gravity of each specimen.
6) Graph of stabilities versus asphalt cement contents.
7) Graph of flow values versus asphalt cement contents.
8) Graph of voids filled versus asphalt cement contents.
9) Graph of air voids versus asphalt cement contents.
10) Graph of unit weight versus asphalt cement contents.

v) Summation of Established Job Mix Formula

A) Combined gradation of aggregates.
B) Optimum asphalt cement content from graphs.
C) Specified job mix tolerance range.

vi) Summation of the Characteristics of the Mixture of Optimum Asphalt Cement Content

A) Stability, pounds
B) Flow value, hundredths of an inch.
C) Actual specific gravity of laboratory compacted mixture.
D) Theoretical specific gravity of laboratory mixture.
E) Total voids (air), percent, in laboratory compacted mixture.
F) Voids filled with bitumen, percent, in laboratory compacted mixture.
G) Actual unit weight, PCF, of laboratory compacted mixture.
H) Specifications for above, where applicable.

6) Test Section. Prior to full production, the Contractor shall prepare a quantity of bituminous mixture according to the job mix formula. The amount of mixture should be sufficient to construct a test section 50' long and 20' wide, or other appropriate dimensions as directed by the Engineer, placed in two sections and shall be of the same depth specified for the construction of the course which it represents. The underlying grade or pavement structure upon

which the test section is to be constructed shall be the same as the remainder of the course represented by the test section. The equipment used in construction of the test section shall be the same type and weight to be used on the remainder of the course represented by the test section.

As soon as the test section pavement cools sufficiently, samples of finished pavement, including samples that span the longitudinal joint shall be taken and tested to determine conformance to density, gradation, bitumen content, and other specified requirements.

A sample of paving mixture adequate for the preparation of four (4) test specimens shall be obtained from the truckload of mixture used for the test strip. Four specimens shall be compacted and tested in accordance with standard procedures cited previously. Determination shall be made that these data conform to final design data at the same bitumen content within reasonable tolerances before full plant production is allowed. Maximum tolerances that are considered reasonable are shown in Table III. In no case, however, will the plant-produced mix be considered acceptable if the mix properties do not meet the requirements of design criteria.

TABLE III

Test	Tolerances
Stability	10%
Flow	2 points
Unit Weight	1.5 pounds

In the event tests indicate the pavement does not conform to specification requirements, necessary adjustments to plant operation and/or rolling procedures shall be made. Additional test sections shall be constructed and sampled to determine conformance to specification requirements as directed. In no case shall the Contractor start full production without approval of the Engineer. In the event the test sections do not conform to specification requirements, the Contractor shall remove the pavement as directed at no expense, and no payment will be made for materials and labor employed either in placement or removal of the test pavement.

The plant will not be placed in continuous operation until the variations in test properties are within allowable tolerance. Once the plant has been placed in continuous operations, test specimens shall be prepared at least two times daily. The test conducting shall include stability, flow, unit weight, voids in the total mix and percent voids filled with bitumen. Tolerances cited above are applicable for the continuation of plant production.

7) ASPHALT PLANT CONTROL

The following items will be monitored continuously during placement of asphaltic materials. The Contractor's testing laboratory shall test to obtain

and record the following information and submit it to the Engineer:

i) Plant Hot Bin Gradation Analyses. (At least twice daily during normal operations.)

A) Sieve analysis of aggregates in each hot bin.
B) Proportions of aggregate types extracted from each hot bin.
C) Theoretical gradation of combined proportions of aggregates.

ii) Batch Plant Tabulations. (At least twice daily during normal operations.)

A) Weights of asphalt and each hot bin aggregate in a weigh batch plant, or
B) Data used to ascertain correct proportions of materials in a continuous mix plant.

iii) Quantitative Extraction of Bitumen From Bituminous Paving Mixtures. (At least twice daily during normal operations.)

A) Correction for the mineral aggregate passing filter ring.
B) Correction for the mineral aggregate passing filter ring with extract.
C) Total corrected amount of bitumen.
D) Mechanical analysis of extracted aggregates.

iv) Characteristics of Paving Mixture. (At least twice daily during normal operations.)

A) Resistance to plastic flow of bituminous mixture.

1) Compactive effort (number of blows applied to specimens, each face).
2) Stability of laboratory compacted mixture, pounds.
3) Flow value, hundredths of an inch.

v) Temperatures. (At least six times daily during normal operations.)

A) Aggregates, hot elevator.
B) Bitumen, storage tank.
C) Mixture in truck, plant.
D) Mixture spreader, job site.

vi) Completed Bituminous Pavement. (At least four times daily during normal operations.)

A) Field density.
B) Percent of laboratory density (show standard used).
C) Core thickness. (Additional cores for thickness measurements shall be taken at the rate of one (1) per 200 tons of pavement placed.)
D) Extraction analysis (asphalt content and aggregate gradation).

vii) Amount of Asphaltic Concrete Placed.

A) Previously placed.
B) Placed on data report.
C) Total tonnage placed.

viii) Job Mix Design Tolerances for Above, Where Applicable.

04) CONSTRUCTION METHODS

(a) Weather and Seasonable Limitations. Bituminous mixtures shall be constructed only upon a dry surface, when the atmospheric temperature is above 40°F, and when the weather is not foggy or rainy. The temperature requirements may be waived, but only when so directed by the Engineer.

(b) Bituminous Mixing Plant. Plants used for the preparation of bituminous mixtures shall conform to the requirements of AASHTO M-156 with the following changes:

1) Requirements for all plants.

i. Truck scales. The bituminous mixture shall be weighed on approved scales furnished by the Contractor, or on public scales at the Contractor's expense. Such scales shall be inspected and sealed as often as the Engineer deems necessary to assure their accuracy. Scales shall conform to the following requirements.

Scales for weighing materials which are required to be proportioned by weight shall be furnished, erected, and maintained by the Contractor, or be certified permanently installed commercial scales.

Scales shall be accurate within one-half percent of the correct weight throughout the range of use. The Contractor shall have the scales checked under the observation of the inspector before beginning work and at such other times as requested. The intervals shall be uniform in spacing throughout the graduated or marked length of the beam or dial and shall not exceed one-tenth of one percent of the nominal rated capacity of the scale, but not less than one pound. The use of spring balances will not be permitted.

Beams, dials, platforms, and other scale equipment shall be so arranged that the operator and inspector can safely and conveniently view them.

Scale installations shall have available 10 standard fifty-pound weights for testing the weighing equipment or suitable weights and devices for other approved equipment.

Scales must be tested for accuracy and serviced before use at a new site. Platform scales shall be installed and maintained with the platform level and rigid bulkheads at each end. Scales "overweighing" (indicating more than correct weight) will not be permitted to operate and all materials received subsequent to the last previous correct weighing-accuracy-test will be reduced by the percentage of error in excess of one-half of one percent.

In the event inspection reveals the scales have been "underweighing" (indicating less than correct weight) they shall be adjusted.

All costs in connection with furnishing, installing, certifying, testing, and maintaining scales; for furnishing check weights and scale house; and for all other items specified in this subsection, for the weighing of materials for proportioning, shall be included in the amount bid.

ii. Testing laboratory. The Contractor or producer shall provide facilities for a testing laboratory for control and acceptance testing functions during periods of mix production, sampling, and testing and whenever materials subject to the provisions of these specifications are being supplied or tested. The laboratory shall provide adequate equipment, space, and utilities as required for the performance of the specified tests.

iii. Inspection of plant. The Engineer or his authorized representative shall have access, at all times, to all parts of the plant for checking adequacy of equipment; inspecting operation of the plant: verifying weights, proportions, and character of materials; and checking the temperatures maintained in the preparation of the mixtures.

iv. Storage bins and surge bins. Use of surge bins or storage bins for temporary storage of hot bituminous mixtures will be permitted as follows:

(a) The bituminous mixture may be stored in surge bins for period of time not to exceed 3 hours.

(b) The bituminous mixture may be stored in insulated storage bins for a period of time not to exceed 24 hours, provided an inert gas atmosphere is maintained in the bin during the storage period.

The bins shall be such that mix drawn from the bin meets the same requirements as mix loaded directly into trucks.

If the Engineer determines that there is an excessive amount of heat loss, segregation and/or oxidation of the mixture due to temporary storage, no overnight storage will be allowed.

(c) Hauling Equipment. Trucks used for hauling bituminous mixtures shall have tight, clean, smooth metal beds. To prevent the mixture from adhering to them, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other approved material. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary, so that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated and covers shall be securely fastened.

(d) Bituminous Pavers. Bituminous pavers shall be self-contained, powerpropelled units with an activated screed or strike-off assembly, heated if necessary, and shall be capable of spreading and finishing courses of bituminous plant mix materials which will meet the specified thickness, smoothness, and grade. Pavers used for roadways, shoulders and similar construction shall be capable of spreading and finishing

courses of bituminous plant mix material in widths shown on the plans.

The paver shall have a receiving hopper of sufficient capacity to permit a uniform spreading operation. The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed. The screed or strike-off assembly shall effectively produce a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture.

The paver shall be capable of operating at forward speeds consistent with satisfactory laying of the mixture.

Automatic grade control devices shall be used. The paver shall be equipped with a control system capable of automatically maintaining the screed elevation as specified herein. The control system shall be automatically actuated from either a reference line or surface through a system of mechanical sensors or sensor-directed mechanisms or devices which will maintain the paver screed at a predetermined transverse slope and at the proper elevation to obtain the required surface. The transverse slope controller shall be capable of maintaining the screed at the desired slope within plus or minus 0.1 percent.

The controls shall be capable of working in conjunction with any of the following attachments:

1) *Ski-type device of not less than 30 feet in length or as directed by the Engineer.*

2) *Taut stringline (wire) set to grade.*

3) *Short ski or shoe.*

(e) *Rollers. Rollers may be of the vibratory, steel wheel, or pneumatic-tired type. They shall be in good condition, capable of reversing without backlash, and operating at slow speeds to avoid displacement of the bituminous mixture. The number, type, and weight of rollers shall be sufficient to compact the mixture to the required density without detrimentally affecting the compacted material. The use of equipment which results in excessive crushing of the aggregate will not be permitted.*

(f) *Preparation of Bituminous Material. The bituminous material shall be heated in a manner that will avoid local overheating and provide a continuous supply of the bituminous material to the mixer at a uniform temperature. The temperature of the bituminous material delivered to the mixer shall be sufficient to provide a suitable viscosity for adequate coating of the aggregate particles but shall not exceed 325°F.*

(g) *Preparation for Mineral Aggregate. The aggregate for the mixture shall be dried and heated at a paving plant before entering the mixer. When introduced into the mixer, the combined aggregate shall contain no more than 0.5% moisture if asphalt, or more than 1% if tar mixtures. Water in the aggregate shall be removed by heating to the extent that there is no subsequent foaming in the mixture prior to the placing of the material. The aggregate shall be heated to the temperature designated by the job formula within the job tolerance specified. The maximum temperature and rate of heating shall be such that no permanent damage occurs to the aggregates. Particular*

care shall be taken that aggregates high in calcium or magnesium content are not damaged by overheating. The aggregate shall be screened to specified sizes and conveyed into separate bins ready for mixing with bituminous material.

(h) *Preparation of Bituminous Mixture. Before delivery, the aggregate shall be mixed with the bituminous material at a central mixing plant. The mixture shall be prepared at a temperature shown in 02(c) above.*

The dry aggregates, prepared as prescribed in 03(g) above, shall be combined in the plant in the proportionate amounts of each fraction of aggregate required to meet the specified gradation. The quantity of aggregate for each batch shall be determined, measured and conveyed into the mixer. In case of volumetric proportioning, the size of the gate openings shall be determined, and the gates locked in position.

The quantity of bituminous material for each batch or calibrated amount for continuous mixer shall be approved by the Engineer. It shall be measured by weight and introduced into the mixer at the specified temperature, using the lowest range possible for adequate mixing and spreading. For batch mixers, all mineral aggregates shall be in the mixer before the bituminous material is added. The exact temperature within the specified range shall be approved by the Engineer. In no case shall aggregate be introduced into the mixture at a temperature more than 25° F above the temperature of the bituminous material. As approved by the Engineer, the mixing shall continue for the time necessary to coat all particles uniformly. This time is dependent upon the mix design and the type of mixing equipment used. To compute the mixing time in a continuous mixer, the weight of its contents at operating level is divided by the weight of the mixture delivered per second by the mixer:

$$\text{Mixing time in seconds} = \frac{\text{Pugmill dead capacity in pounds}}{\text{Output in pounds per second}}$$

(i) *Transporting, Spreading, and Finishing. The mixture shall be transported from the mixing plant to the point of use in vehicles described in Paragraph 03(c) above. Deliveries shall be scheduled so that spreading and rolling of all mixture prepared for one day's run can be completed during daylight, unless adequate artificial lighting is provided. Hauling over freshly placed material shall not be permitted until the material has been compacted, as specified, and allowed to cool to atmospheric temperature.*

Immediately before placing the bituminous mixture, the underlying course shall be cleared of all loose or deleterious material. A power sweeper equipped with a blower shall be used, supplemented with hand brooms if necessary, or the material shall be removed by other means as directed by the Engineer.

The mixture shall be laid only upon an approved underlying course which is dry and in suitable condition, and when weather conditions are favorable. No mixture shall be placed when the air temperature in the shade and away from artificial heat is 40°F., or lower, unless so directed by the Engineer. The Engineer may permit work to continue when overtaken by sudden rains only to provide for laying that material which is in transit from the plant, provided the mixture is within the temperature limits specified. The mixture shall be placed at a temperature between 150°F. and 225°F., when tar is used and between 250°F. and 300°F., when asphalt cement is used. When the mixture is being placed during warm weather and the Engineer has determined that satisfactory results can be obtained at lower temperatures, he may direct that the

mixture be mixed and delivered at the lower temperature.

Grade control between the edges of the pavement shall be accomplished by grade stakes or steel pins placed in lanes parallel to the centerline of the pavement and at intervals sufficiently close that string lines may be stretched between stakes or pins.

Placing shall commence at the point(s) farthest from the mixing plant and progress continuously toward the plant, unless otherwise ordered by the Engineer.

Upon arrival, the mixture shall be spread to the full width by an approved bituminous paver. It shall be struck off in a uniform layer of such depth that, when the work is completed, it shall have the required thickness and shall conform to the grade and contour indicated. The speed of the paver shall be regulated to eliminate pulling and tearing of the bituminous mat. Unless otherwise directed, placing shall begin along the centerline of areas to be paved on a crowned section or on the high side of areas with a one-way slope. The mixture shall be placed in consecutive adjacent strips having a minimum width of 10 feet, except where edge lanes require strips less than 10 feet to complete the area. The longitudinal joint in one layer shall offset that in the layer immediately below by at least 2 feet; however, the joint in the top layer shall be at the centerline of the pavement. A 16-foot straightedge shall be placed across the longitudinal joints between adjacent lanes to determine if the surface conforms to the grade and contour requirements.

Transverse joints in one layer shall be offset by at least 2 feet from transverse joints in the previous layer. Transverse joints in adjacent lanes shall be offset a minimum of 10 feet.

Exposed vertical edges of paved strips shall be free of all accumulations of dirt or other foreign material before any mixture is spread in an adjacent lane. The contact surfaces shall be given a brush coat of asphalt.

In lieu of painting the contact surface, the Contractor may use a joint heater approved by the Engineer. If the spreading machine should drift from an adjacent lane during construction, the unfilled space shall be carefully filled with fresh hot mixture obtained from the truck or the hopper of the spreading machine. Stealing mixture from that already spread to fill up these area shall not be permitted.

In areas where, because of irregularities or unavoidable obstacles, the use of mechanical spreading and finishing equipment is impractical, the mixture may be hand spread.

When hand spreading is permitted, the mixture shall be dumped on approved dump sheets outside of the area upon which it is to be spread, and then distributed into place immediately with hot shovels. It shall be spread with hot rakes in a uniformly loose layer to the full width required and of such depth that, when the work is completed, it will have the required thickness and will conform to the grade and surface contour shown on the plans.

(j) *Compaction of Mixture. After spreading, the mixture shall be thoroughly and uniformly compacted with power rollers, as directed by the Engineer. Rolling of the mixture shall begin as soon after spreading as it will bear the roller without undue displacement or hair checking. Rolling shall be initiated with the drive wheel toward*

the paving machine. The sequence of rolling for the first paving lane should be to first roll the lower edge (with reference to the transverse slope) of the lane and then roll the upper edge. The interior of the lane should then be rolled from the lower side toward the upper with overlapping roller paths. On adjoining paving lanes rolling shall begin by overlapping the joint (with the previous lane) by 6 to 8 inches and then rolling the outside edge of the new lane. The interior is rolled from the outside edge toward the compacted joint with overlapping wheel paths. Alternate paths of the roller shall be of slightly different lengths.

The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot mixture. Any displacement occurring as a result of reversing the direction of the roller, or from any other cause, shall be corrected at once by rakes and fresh mixture.

Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until all roller marks are eliminated, the surface is of uniform texture and true to grade and cross section, and a field density is obtained of at least 98% and not more than 100% of the density of laboratory specimens (prepared by the method herein before referenced) molded from a sample taken from the same truck-load as the in-place density sample.

The Contractor shall utilize a nuclear device to monitor rolling patterns and density during compaction. Acceptance testing is to be performed as described elsewhere herein.

The Contractor will obtain a test core for each 200 tons of asphalt construction for thickness measurements. Test cores may be procured at joints if directed. The holes for the cores shall be refilled with like material that same day.

To prevent adhesion of the mixture to the roller, the wheels shall be kept properly moistened, but excessive water will not be permitted. Pneumatic tired rollers may not require the use of water. In areas not accessible to the roller, the mixture shall be thoroughly compacted with hot hand tampers.

Any mixture which becomes loose and broken, mixed with dirt, or in any way defective shall be removed and replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work will be done at the Contractor's expense. Skin patching shall not be allowed, unless specifically approved by the Engineer.

(k) *Joints. The formation of all joints shall be made in such a manner as to ensure a continuous bond between old and new sections of the course. All joints shall present the same texture, density, and smoothness as other sections of the course.*

The roller shall not pass over the unprotected end of the freshly laid mixture except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course, in which case the edge shall be cut back to its full depth and width on a straight line to expose a vertical face. In both methods all contact surfaces shall be given a tack coat of bituminous material before placing any fresh mixture against the joint.

Longitudinal joints which are irregular, damaged, or otherwise defective shall be cut back to expose a clean, sound surface for the full depth of the course.

All contact surfaces shall be given a tack coat of bituminous material prior to placing any fresh mixture against the joint.

(l) *Shaping edges. While the surface is being compacted and finished, the Contractor shall carefully trim the outside edges of the pavement to the proper alignment. Edges so formed shall be leveled while still hot with the back of a rake or a smoothing iron and thoroughly compacted by tampers or by other satisfactory methods.*

(m) *Surface Tests. Tests for conformity with specified crown and grade shall be made by the Contractor immediately after initial compression. Any variation shall be corrected by the removal or addition of materials and by continuous rolling.*

The finished surface shall not vary more than 1/4 inch for the surface course when tested with a 16 foot straightedge applied parallel with, or at right angles to, the centerline.

After the completion of final rolling, the smoothness of the course shall again be tested; humps or depressions exceeding the specified tolerances or that retain water on the surface shall be immediately corrected by removing the defective work and replacing with new material, as directed by the Engineer. This shall be done at the Contractor's expense.

The finished surfaces of bituminous courses shall not vary from the grade line, elevations and cross sections shown on the Contract drawings by more than 1/4 inch. The Contractor shall correct pavement areas varying in excess of this amount by removing and replacing the defective work. No additional payment shall be made for this corrective work. Skin patching will not be permitted.

(n) *Sampling Pavement. Core samples for determination of composition, compaction, thickness, and density of completed pavements shall be obtained by the Contractor. The size, number, and locations of the samples will be as directed by the Engineer. Samples shall be taken for each day or fraction thereof and shall be neatly cut with a saw, core drill, or other approved equipment. The Contractor shall furnish all tools, labor, and materials for replacing pavement at no additional payment. If the pavement is deficient in composition, compaction, or thickness satisfactory correction shall be made.*

(o) *Bituminous and Aggregate Material Contractor's Responsibility. Tests of the bituminous and aggregate material that the Contractor proposes to use, together with a statement of their source and character, must be submitted and approval must be obtained before use of such material begins. The Contractor shall require the manufacturer or producer of the bituminous and aggregate materials to furnish material subject to this and all other pertinent requirements of the Contract. Only those material which have been tested and approved for the intended use shall be accepted.*

1) *The Engineer or his authorized representative shall have access, at all times, to all parts of the paving plant for the purpose of inspecting the equipment, the conditions and operations of the plant, for the verification of weights or*

proportions and character of materials, and to determine the temperatures maintained in the preparation of the mixtures.

2) The Contractor shall furnish vendor's certified tests for each carload or equivalent of bitumen shipped to the project. The report shall be delivered to the Engineer before permission is granted for use of the material. The furnishing of the vendor's certified test report for the bituminous material shall not be interpreted as a basis for final acceptance. All such test reports shall be subject to verification by testing sample materials received for use on the project.

05) METHOD OF MEASUREMENT

(a) The tonnage of plant mix bituminous pavements to be paid for shall be the number of tons of bituminous mixture of the gradations specified herein and used in the accepted work. The bituminous pavement materials shall be weighed after mixing and no deduction shall be made for the weight of bituminous material in the mixtures.

No payment will be made for materials placed in excess of 1/4" additional thickness above the plan requirements. Deductions will be made for excesses and/or deficiencies in thickness based on the individual lots of 50 tons of bituminous material placed, as determined by the cores. All bituminous material placed outside the neatlines of the section shown on the plans will be deducted, with the exception of a one-to-one wedge at the free edge(s).

(b) No distinction will be made between bituminous base courses placed using recycled pavements and those placed using all new materials.

06) BASIS OF PAYMENT

(a) Payment shall be made at the Contract unit price per ton for bituminous base course. The price shall be full compensation for furnishing all materials, for all preparation, mixing, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

(b) Payment will be made under:

Item P-401-1 Bituminous Base Course – Per Ton.

TESTING REQUIREMENTS

AASHTO T-96	Abrasion
AAASHTO T-104	Soundness
AASHTO T-19	Slag
AASHTO T-89	Liquid Limit
AASHTO T-90	Plastic Limit and Plasticity Index
AASHTO T-101	Swell
AASHTO T-182	Striping
ASTM D-75	Aggregate, Sampling
ASTM C-189	Hydraulic Cement, Sampling
AASHTO T-11 and T-17	Gradation
AASHTO T-84 and T-85	Specific Gravity
AASHTO T-30	Mechanical Analysis of Extracted Aggregate
ASTM C-29	Unit Weight of Aggregate
ASTM C-88	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C-131	Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine
ASTM C-136	Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C-183	Sampling Hydraulic Cement
ASTM D-75	Sampling Aggregates
ASTM D-423	Liquid Limit of Soils
ASTM D-424	Plastic Limit and Plasticity Index of Soils
ASTM D-995	Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures
ASTM D-1075	Effect of Water on Cohesion of Compacted Bituminous Mixtures

ASTM D-1188	Bulk Specific Gravity of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
ASTM D-1559	Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
ASTM D-2172	Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
ASTM D-2489	Degree of Particle Coating of Bituminous-Aggregate Mixtures
ASTM D-2726	Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens
ASTM D-2950	Density of Bituminous Concrete in Place by Nuclear Method
ASTM D-3665	Random Sampling of Paving Materials
ASTM D-3666	Inspection and Testing Agencies for Bituminous Paving Materials
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MATERIAL REQUIREMENTS

AASHTO M-17	Filler
AASHTO M-20	Asphalt Cement
AASHTO M-52	Tar
ASTM D-242	Mineral Filler for Bituminous Paving Mixtures
ASTM D-490	Tar
ASTM D-946	Asphalt Cement for Use in Pavement Construction
ASTM D-3381	Viscosity-Graded Asphalt Cement for Use in Pavement Construction
ASTM M-226	Viscosity Graded Asphalt Cement

END OF SECTION P-401

SECTION P-650 GUARDRAIL

01) DESCRIPTION

A. This work shall consist of furnishing and erecting guardrail, and appurtenances, in accordance with the plans and specifications and in reasonably close conformity with the lines, grades, and locations shown on the plans, or as directed by the Engineer.

B. Guardrail shall include appurtenant materials and work in making connections with other guardrail or structures as may be required to complete the construction indicated on the plans.

02) MATERIALS

A. Materials shall conform to Section 641 - Guardrail of Georgia DOT Standard Specifications.

03) CONSTRUCTION

A. Construction shall conform to Section 641 - Guardrail of Georgia DOT Standard Specifications.

04) METHOD OF MEASUREMENT

A. New guardrail will be measured in linear feet and will include terminal sections when installed.

05) BASIS OF PAYMENT

A. Guardrail complete in place, including posts, offset blocks, and hardware will be paid for at the contract unit price per linear foot. Price shall be full compensation for all material, labor, equipment, tools, and incidentals necessary to construct the guardrail.

B. Payment will be made under:

Item P-650-1 – Guardrail, Type "W" (Single Faced) - Per Linear Foot.
Item P-650-2 – Energy Absorbing Flared Terminal Section - Per Each

END OF SECTION P-650

SECTION D-701 PIPE FOR STORM DRAINS

01) DESCRIPTION

(a) This item shall consist of pipe of the types, classes, sizes and dimensions required on the plans, furnished and installed at the places designated on the plans and profiles, or by the Engineer, in accordance with these specifications and with the lines and grades given.

1) The item shall include the furnishing and installation of pipe in place, all excavation and backfill, furnishing and installing all trench bracing, all fittings required to complete the pipe drain as shown on the plans and the material for the making of all joints, including all connections to existing drainage pipe and structures.

(b) The Contractor shall submit detailed shop drawings for the pipe laying plan to the Engineer for approval. Include pipe strength class, joint lengths, and trench types.

(c) This item shall also include all work associated with the protection of all trenches and excavations required to perform the work under all sections of the specifications, including procedures, inspections, reports, installations, modifications and all else required to complete the work.

02) MATERIALS

Materials shall meet the requirements shown on the plans and as specified below.

(a) General.

1) All reinforced ***concrete*** pipe shall be strength Class ***V*** unless noted otherwise on the plans. Pipe strength classes are referenced to ASTM C-76. Gaskets for joints shall be as specified in Article 02(e) of this section.

2) Reinforced concrete pipe shall be furnished in six-foot minimum laying lengths, except that two-foot spacer lengths shall be used as required to orient tee sections in the correct locations where these are specified on the plans. Two-foot sections shall also be used in making connections to drainage structures.

3) In addition to strength testing, all pipe and pipe joints on reinforced concrete pipe 48" diameter and smaller shall be certified as having been tested in accordance with ASTM Designation C-76 and C-443, respectively, for absorption and joint leakage. At least 1% of the pipe lengths and joints of each diameter from a given pipe run by a given manufacturer and not less than two pipe lengths or two joints of each diameter and run shall be so tested and certified. No runs of pipe failing to meet the absorption and leakage test requirements will be accepted.

4) Lift holes will not be permitted on concrete pipe. The Contractor shall make other arrangements for lifting and handling pipe sections.

5) Ductile iron pipe (DIP) for storm sewers and diversion pipes shall meet the requirements of AWWA C151, pressure class 350.

6) Pipe. The pipe shall be of the type called for on the plans or in the proposal and shall be in accordance with the following appropriate requirements:

Reinforced Concrete Pipe	ASTM C 76
Standard Specification for Corrugated Steel Pipe, Metallic Coated for Sewers and Drains	ASTM A 760
Standard Specification for Post-Applied Coatings, Pavings, and Linings for Corrugated Steel Sewer and Drainage Pipe	ASTM A 849

(b) Concrete. All concrete shall conform to Class A as defined in Section 500 of the Georgia DOT Standard Specifications.

(c) Mortar. Mortar for connections to other drainage structures shall be composed of one part, by volume, of portland cement and 2 parts of mortar sand. The portland cement shall conform to the requirements of AASHTO M-85, Type 1. The sand shall conform to the requirements of AASHTO M-45. Hydrated lime may be added to the mixture of sand and cement in an amount equal to 15% of the weight of cement used. The hydrated lime shall meet the requirements of ASTM C-6.

(d) Rubber Gasket Joints. Rubber-type gaskets for concrete nonpressure pipe shall conform to the requirements of ASTM C-443.

1) Gaskets shall be "O" ring or profile type, Neoprene, fuel resistant. ***Note, the fuel resistant requirement may be waived for pipes not connected to the apron drainage system.***

2) All gaskets proposed as fuel resistant equals shall be tested for swelling in the presence of petroleum products in accordance with Federal Standard 601, Method 6001 and 6211. When the latter method is used with No. 3 oil for 70 hours at 212^{0}F, the swelling shall not exceed 100 percent by volume.

(e) Pipe Fittings. Pipe fittings for reinforced concrete pipe shall be fabricated from standard lengths of reinforced concrete pipe of the specified class. All fabricated connections of the reinforcing steel cages shall be connected by welding. Pipe fittings shall be as follows:

1) Tees shall be furnished with groove-end on the branch of the tee.

2) Reducing Section shall be furnished with the groove-end on the smaller diameter end.

(f) Bedding material for unstable trench excavation shall meet the requirements for No. 89 Coarse Aggregate Underdrain Backfill as specified in Section 800.2.01 of Georgia DOT Specifications for Construction of Transportation Systems.

03) CONSTRUCTION METHODS

(a) Equipment. All equipment necessary and required for the proper construction of storm sewers and culverts shall be on the project, in first-class working condition and approved by the Engineer before construction is permitted to start.

The Contractor shall provide appropriate hoisting equipment to handle the pipe while

unloading and placing it in its final position without damaging the pipe.

The Contractor shall provide hand tampers and pneumatic tampers to obtain the required compaction of the pipe bed and the backfill, as specified.

(b) Excavation. The width of the pipe trench shall be sufficient to permit satisfactory jointing of the pipe and thorough tamping of the bedding material under the pipe and of the backfill around the pipe, but shall not be less than the external diameter of the pipe plus 6" on each side. The trench walls shall be approximately vertical below the top of the pipe, unless otherwise approved by the Engineer. The maximum allowable width of the trench shall not exceed 18" on each side of the pipe when placed, unless otherwise approved by the Engineer.

Where rock, hardpan, or other unyielding material is encountered at the bottom of pipe trench, such material shall be removed below the foundation grade for a depth of at least 12" or 1/2" for each foot of fill over the top of the pipe, whichever is greater, but not more than 3/4 of the nominal diameter of the pipe. The material shall be removed across the full width of the trench and replaced with suitable granular material obtained from excavation within the project, compacted and shaped to fit the lower 1/4 of the pipe diameter.

Where a firm foundation is not encountered at the grade established, due to soft, spongy, or other unstable soil or from buried trash, rubble or garbage, the unstable soil or unsuitable material shall be removed and replaced with suitable granular material obtained from excavation for the full trench width. The limits of excavation of unstable material shall be as directed by the Engineer, but in no case will the required depth of excavation of unstable material below the bottom of the pipe exceed 1/2 the inside diameter of the pipe being installed, or 24" whichever is the lesser. All trash encountered at and below the pipe invert shall be removed and replaced. The Contractor shall dispose of trash, rubble and garbage removed from the trench outside Airport boundaries.

Excavated material that is neither required nor acceptable for backfill shall be disposed of by the Contractor as directed by the Engineer. Common excavation shall not be carried below the required depth; but when it is, the trench shall be backfilled at the Contractor's expense with material approved by the Engineer and compacted to a density of not less than 90% of the maximum dry density for the material as determined by AASHTO T-180. The excavation for pipes that are placed in embankment fill shall not be made until the embankment has been completed to a height above the top of the pipe as shown on the plans. The bed for the pipe shall be so shaped that at least the lower quarter of the pipe circumference shall be in continuous contact with the bottom of the trench.

(c) Trench and Excavation Protection. The Contractor shall do such trench bracing, sheathing, or shoring necessary to perform and protect the excavation as required for safety and conformance to governing laws. The bracing, sheathing, or shoring shall not be removed in one operation but shall be done in successive stages as determined by the Engineer to prevent overloading of the pipe during backfilling operations. The Contractor shall submit an excavation plan, certifying that the excavation methods conform to all appropriate governing laws. The plan shall be prepared by a Professional Engineer registered in the State of Georgia.

The Contractor shall employ the services of a Professional Engineer registered in the State of Georgia to inspect the various trenches and excavations on the project on at least a weekly basis and certify as to meeting all the appropriate laws. A report will be promptly submitted to the Engineer detailing the results of the inspections. If problem areas are observed, the inspections shall be conducted on a daily basis until such time as the

trenches and excavations meet all the appropriate governing laws. No work is to be accomplished until the problem areas are corrected.

If changes in the planned pipe gradients are directed by the Engineer, which result in trenching depths more than 12" greater or lesser than the planned trench depth, the increased or decreased cost of the work shall be provided for in a supplemental agreement. Changes of a lesser extent will be considered incidental to the contract, without lesser or additional compensation.

(d) Bedding. The pipe bedding shall conform to the class specified on the plans. When no bedding class is specified or detailed on the plans, the requirements for Class C bedding shall apply.

1) Rigid Pipe.

i. Class B or C Bedding shall consist of bedding the pipe in a granular foundation in accordance with details shown on the plans. The bed shall be shaped to fit the pipe and shall have recesses shaped to receive the bell of bell and spigot pipe.

ii. Bedding details shown on the plans are an integral part of the pipe design, with respect to load bearing capacity of the various sizes and classes of pipe. The contractor has the option of constructing these beddings in accordance with the details shown on the plans, or alternatively may produce his own designs for bedding and concrete pipe systems that will meet the D-load requirements of ASTM C-76, for the given fill heights and weights. If this second option is chosen, these designs are to be prepared, signed and sealed by a professional engineer registered in the state of Georgia, and submitted to the Owner for review and approval. Imperfect backfill will not be considered as an alternative to a conventional trench-type bedding and/or special design pipe.

2) Flexible Pipe.

For flexible pipe, the bed shall be roughly shaped to fit the pipe and a bedding blanket of sand or fine granular material shall be provided as follows:

Pipe Corrugation Depth Inches	Minimum Bedding Depth Inches
½	1
1	2
2	2-1/2

3) PVC and Polyethylene Pipe. For PVC and polyethylene pipe, the bedding material shall consist of coarse sands and gravels with a maximum particle size of ¾ inch. For pipes installed under paved areas, no more than 12% of the material shall pass the #200 sieve. For all other areas, no more than 50% of the material shall pass the #200 sieve. The bedding shall have a thickness of at least 6 inches below the bottom of the pipe and extend up around the pipe for a depth of not less than 50% of its vertical outside diameter.

(e) Laying and Installing Pipe.

1) Concrete Pipe. The Contractor shall provide the necessary mason's lines and supports to insure installation of the pipe to line and grade. The Contractor`s facilities for lowering the pipe into the trench shall be such that neither the pipe nor the trench will be damaged or disturbed.

i. The Engineer shall inspect all pipe before it is laid, and reject any section that is damaged by handling or is defective to a degree which will materially affect the function and service of the pipe.

ii. The laying of the pipe in the finished trench shall be started at the lowest point and laid upgrade. When bell and spigot pipe is used, the bell shall be laid upgrade.

iii. The pipe shall be firmly and accurately set to line and grade so that the invert will be smooth and uniform. The pipe shall be protected from water during placing and until the mortar in the joints has thoroughly set.

iv. When bell and spigot pipes are used, spaces for the pipe bells shall be dug in the pipe subgrade to accommodate the bells. The spaces shall be deep enough to insure that the bells do not bear the load of the pipe; they shall not be excessively wide in relation to the longitudinal direction of the trench. When the pipes are laid, the barrel of each section of pipe shall be in contact with the quadrant-shaped bedding throughout its full length, exclusive of the bell, to support the entire load of the pipe.

v. Pipe shall not be laid on frozen ground.

vi. When placing concrete pipe constructed with elliptical reinforcing, the pipe shall be oriented in accordance with the manufacturer`s markings of top or bottom.

vii. The upgrade end of pipelines not terminating in a structure shall be plugged or capped as approved by the Engineer.

viii. Pipe which is not true in alignment, or which shows any settlement after laying, shall be taken up and relaid without extra compensation.

ix. The Contractor shall provide, as may be necessary, for the temporary diversion of stream flow in order to permit the installation of the pipe under dry conditions.

x. The Contractor shall lay tee sections to set the tee risers at the location shown on the plans, using spacer length of pipe as required. A tolerance of 1.0` will be required in the plan location of the riser tee branch, measured along the pipe centerline, within areas to be paved.

xi. The proposed storm sewer pipe alignments will pass under existing storm sewer lines, and other utilities as shown on the plans. The Contractor shall support in place those existing utilities, which must remain in service during the construction process. At the Contractor`s option, existing storm sewers may be removed and replaced by the Contractor in lieu of supporting these facilities in place. The Contractor is advised that existing watermains will be required to

remain under pressure at all times.

xii. The Contractor shall replace in kind with new materials any pipe or other existing facility damaged as a result of his work or furnish any new fittings required to make the system whole.

2) Corrugated Metal Pipe. Corrugated steel pipe shall be laid with separate gasket sections jointed firmly together with 3/8 inch thick by 7 inch wide Neoprene gasket and coupling bands conforming to Fed. Spec. WW-P-405, with outside laps of circumferential joints pointing upgrade, and with longitudinal laps on the sides.

i. Proper facilities shall be provided for lowering the pipe when it is to be placed in a trench. The pipe shall be laid carefully and true to lines and grades on a bed that is uniformly firm throughout its length. Any pipe which is not in true alignment, or which shows any undue settlement after being laid or is damaged, shall be taken up and re-laid without extra compensation.

ii. The pipe shall be placed so that the element of the cylindrical pipe constituting the centerline of the paved section shall coincide with the flow line of the culvert or sewer. Sections of paved pipe shall be laid so that the flow line is smooth and continuous across joints.

iii. All pipe shall be handled so as to prevent bruising, or breaking on the spelter coating or the bituminous coating. All spots on the pipe where the spelter or bituminous coating has been damaged or destroyed shall be painted with two coats of asphaltic paint, or otherwise repaired in a satisfactory manner.

(f) Joining Pipe.

1) Concrete Pipe. Concrete pipe may be either bell and spigot or tongue and groove. The method of joining pipe sections shall be such that the ends are fully entered and the inner surfaces are reasonably flush and even.

Joints shall be made with rubber gaskets or plastic gaskets.

i. Rubber Gasket Joints. The gasket shall be installed in accordance with the manufacturer`s instructions.

ii. Composition Gasket Joints. The gasket shall be installed in accordance with the manufacturer`s instructions.

a. Bell and Spigot Pipe. The first pipe shall be bedded to the established grade line, placing the bell end upstream. The interior surface of the bell shall be carefully cleaned with a wet brush, and the lower portion of the bell filled with mortar to such a depth as to bring the inner surfaces of the abutting pipe flush and even. The spigot end of each subsequent pipe shall be cleaned with a wet brush and uniformly matched into the bell so that the sections are closely fitted. After each section is laid, the remainder of the joint shall be filled with mortar and a bead shall be formed around the joint with a sufficient amount of additional mortar. The cement mortar shall be protected from rapid drying from exposure to sun or

wind by suitable covering such as damp burlap kept moist for at least 24 hours. If the mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint should be wrapped or bandaged with cheesecloth to hold the mortar in place.

b. Tongue and Groove Pipe. The first pipe shall be bedded carefully to the established grade line with the groove upstream. A shallow excavation shall be made underneath the pipe at the joint and filled with mortar to provide a bed for the second pipe. The grooved end of the first pipe shall be carefully cleaned with a wet brush, and a layer of soft mortar applied to the lower half of the groove. The tongue of the second pipe shall be cleaned carefully with a wet brush and while in a horizontal position, a layer of soft mortar shall be applied to the upper half of the tongue. The tongue end of the second pipe shall then be inserted in the grooved end of the first pipe until mortar is squeezed out on the interior and exterior surfaces. Sufficient mortar shall be used to completely fill the joint and to form a bead on the outside. The cement mortar shall be protected from rapid drying from exposure to sun or wind by suitable covering such as damp burlap kept moist for at least 24 hours. If the mortar is not sufficiently stiff to prevent appreciable slump before setting, an acceptable method shall be provided to hold the mortar in place.

2) Metal Pipe. Metal pipe shall be firmly joined by form fitting bands conforming to the requirements of ASTM A 760 for steel pipe and AASHTO M 196 for aluminum pipe.

3) PVC and Polyethylene Pipe. Fittings for PVC pipe shall conform to the requirements of ASTM D3034. Fittings for polyethylene pipe shall conform to the requirements of AASHTO M252.

(g) Backfilling. All trenches and excavations shall be backfilled within a reasonable time after the pipes are installed, unless other protection of the pipe is directed. Pipes shall be inspected before any backfill is placed, and any found to be out of alignment, unduly settled, or damaged, shall be removed, relaid or replaced at the Contractor`s expense.

Materials for backfill shall be fine, readily compactible soil or granular material selected from the excavation or an approved source. It shall not contain frozen lumps, stones that would be retained on a 2" sieve, chunks of highly plastic clay, or other objectionable material. Granular backfill material shall have not less than 95% passing a 1/2" sieve and not less than 95% retained on a No. 4 sieve.

When the top of the pipe is even with or below the top of the trench, backfill shall be compacted in layers, not exceeding 6" on both sides of the pipe and to an elevation of one foot above the top of the pipe or to natural ground level whichever is greater. Care shall be exercised to thoroughly compact the backfill material under the haunches of the pipe. Backfilling shall be done in a manner to avoid injurious top or side pressure on the pipe. Material shall be brought up evenly on both sides of the pipe. When the top of the pipe is above the top of the trench, the backfill shall be compacted in layers not exceeding 6" and shall be brought up evenly on both sides of the pipe to an elevation one foot above the top of the pipe. The width of backfill on each side of the pipe for the portion above the top of the trench shall be equal to twice the diameter of the pipe or 12 feet whichever is less.

For PVC and polyethylene pipe the backfill shall be placed in two stages; one to the top of the pipe and the other at least 12" over the top of the pipe. The backfill material shall meet the requirements as specified above.

All backfill shall be compacted to a density of not less than 90% of the maximum dry density as determined for the material by AASHTO Designation T-180. Density tests shall be taken, by the Owner's representative, at the frequency of one (1) per every other lift per 100 L.F. of trench or fraction thereof. The movement of construction machinery over a culvert shall be at the Contractor's risk. Any pipe damaged thereby shall be replaced at the expense of the Contractor.

(h) Connections. Where the plans call for connections to existing or proposed structures, these connections shall be watertight and made so that a smooth uniform flow line will be obtained throughout the drainage system.

(i) Cleaning and Restoration of Site. After the backfill is completed, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site. Surplus dirt may be deposited in embankment, shoulders, or as ordered by the Engineer. The Contractor shall restore all disturbed areas to their original condition.

1) After all work is completed, the Contractor shall remove all tools and other equipment, leaving the entire site free, clean and in good condition.

2) Performance of the work described in this section is not payable directly, but shall be considered as subsidiary obligation of the Contractor covered under the contract unit price for the pipe.

3) The Contractor shall note that there is an existing drainage system constructed in the area of this project. The proposed drainage system will be connected to this existing system. The Contractor and the Engineer will inspect the existing drainage system prior to the start of work and record its condition and again at the completion of the work to assure that the system is clean and operable. The Contractor will be required to maintain the existing drainage system at all times during construction, and clean and/or rehabilitate to its prior condition at no additional cost to the contract.

(j) Inspection. Prior to final approval of the drainage system, the Engineer, accompanied by the Contractor`s representative, shall make a thorough inspection, by an appropriate method, of the entire installation. Any indication of defects in material or workmanship or obstruction to flow in the pipe system shall be further investigated and corrected. Defects due to the Contractor`s negligence shall be corrected by the Contractor without additional compensation and as directed by the Engineer.

04) METHOD OF MEASUREMENT

(a) The length of pipe to be paid for shall be the number of linear feet of pipe in place, completed and approved. It shall be measured along the centerline of the pipe, from end to inside face of structure to the end or inside face of structure, whichever is applicable. The several types and sizes shall be measured under the appropriate item without distinction as to pipe strength class. All ***bends and other*** fittings shall be included in the footage as typical pipe sections in the pipeline being measured, ***except where provision has been made in the contract unit items to specifically pay for certain fittings.***

(b) The length of Class B or C Pipe Bedding to be paid for shall be the number of linear feet of pipe bedding, without regard to the pipe diameter, actually shaped, compacted and backfilled in accordance with these specifications and approved by the Engineer.

(c) Trench and excavation protection will not be directly measured for payment.

05) BASIS OF PAYMENT

(a) Payment for storm sewer pipe, complete and installed as planned and/or directed, will be made at the contract unit price per linear foot for pipe, without distinction as to pipe strength class. If the contractor elects to utilize his own designs for concrete pipe, and or different beddings than those shown on the plans, those other designs will be paid for under the unit price items listed below for the various pipe diameters and bedding types. These prices shall be full compensation for furnishing all materials and for all preparation, excavation, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

1) No separate payment will be made for demolishing portions of walls of existing structures to make connection with new pipe.

2) Hauling and placement of excess material removed in the pipe trench excavation process and not used as backfill will not be measured for payment under this item. Payment for this work will be made under the appropriate embankment item as specified.

3) No separate payment will be made for common trench excavation, or trench backfill, including select backfill. The cost of this work will be considered incidental to the construction of the storm sewer pipe.

4) No separate payment will be made for any sheeting, shoring, bracing, pumping and counter-floatation measures which are required during construction, whether or not such work is indicated on the plans.

5) No separate payment will be made for the cost of removing and abandoning existing storm sewers, existing manholes, existing inlets and other drainage structures. The costs of this work will be considered incidental to the storm sewer construction.

6) Separate payment will be made for constructing concrete pipe collars for the purpose of joining two pipes. This will be paid under the item for "Miscellaneous Concrete".

7) No separate payment will be made for the removal and replacement or support of existing utilities necessary during the construction of storm sewers. The cost of this work will be considered incidental to the construction of the storm sewer pipe.

8) No separate payment will be made for exceptional costs incurred by the Contractor in conforming to construction schedules established in the plans or for duplicated work required by these schedules. The cost of this work will be considered incidental to the storm sewer item.

9) No separate payment will be made for the removal and disposal of trash, rubble

and garbage removed from the pipe trench, or for replacement backfill. All costs, therefor, shall be included in the prices bid for the pipe item.

10) No separate payment will be made for fittings except where established in the contract unit prices.

11) Payment for Pipe Bedding completed and accepted will be made at the contract unit price per linear foot, which price shall be full compensation for furnishing and placing all material and for all labor, equipment, tools and incidentals necessary to complete the item.

12) Payment will be made at the contract lump sum price for Trench and Excavation Protection. This price shall be full compensation for furnishing and placing all material and for all labor, equipment, tools and incidentals necessary to complete the item. Partial payments shall be made as follows:

1) Fifteen percent (15%) of the contract item will be paid when the complete excavation and protection plan is approved.

2) Seventy-five percent (75%) of the contract item will be pro-rated on each partial payment in respect to the percent complete of all work on the contract, less allowances.

3) The final ten percent (10%) will be paid when all work is complete, and all reports have been submitted.

(d) Payment will be made under:

Item D-701-1- Storm Sewer, RCP, 15" Diameter - Per Linear Foot.
Item D-701-2- Storm Sewer, RCP, 18" Diameter - Per Linear Foot.
Item D-701-3- Storm Sewer, RCP, 24" Diameter - Per Linear Foot.
Item D-701-4- Storm Sewer, RCP, 30" Diameter - Per Linear Foot.
Item D-701-5- Storm Sewer, RCP, 36" Diameter - Per Linear Foot.
Item D-701-6- Storm Sewer, RCP, 42" Diameter - Per Linear Foot.
Item D-701-7- Storm Sewer, RCP, 48" Diameter - Per Linear Foot.
Item D-701-8- Storm Sewer, RCP, 54" Diameter - Per Linear Foot.
Item D-701-9- Storm Sewer, RCP, 60" Diameter - Per Linear Foot.
Item D-701-10- Flared End Section, 15" Diameter - Per Each.
Item D-701-11- Flared End Section, 18" Diameter - Per Each.
Item D-701-12- Flared End Section, 24" Diameter - Per Each.
Item D-701-13- Flared End Section, 30" Diameter - Per Each.
Item D-701-14- Flared End Section, 36" Diameter - Per Each.
Item D-701-15- Salvage and Reuse Existing 18" RCP - Per Linear Foot.
Item D-701-16- Salvage and Reuse Existing 60" RCP - Per Linear Foot.
Item D-701-17-Salvage and Reuse Existing 18" RCP FES- Per Each.
Item D-701-18- Salvage and Reuse Existing 30" RCP FES- Per Each.
Item D-701-19- 54" Dia. 45 Degree RCP Bend - Per Each.
Item D-701-20- 60" Dia. 45 Degree RCP Bend - Per Each.
Item D-701-21- Pipe Bedding, Type C - Per Linear Foot.
Item D-701-22- Trench and Excavation Protection- Per Lump Sum.
Item D-701-23- Diversion Pipe, 8" Diameter DIP - Per Linear Foot.
Item D-701-24- Diversion Pipe, 14" Diameter DIP - Per Linear Foot.

TESTING AND MATERIAL REQUIREMENTS

Test and Short Title	Material and Short Title
ASTM A 760	Standard Specification for Corrugated Steel Pipe, Metallic Coated for Sewers and Drains
ASTM A 849	Standard Specification for Post-Applied Coatings, Pavings, and Linings for Corrugated Steel Sewer and Drainage Pipe
ASTM C 6	Hydrated Lime
AASHTO M 45	Sand
ASTM C 76	RC Pipe
ASTM C 443	Rubber Gasket
AASHTO M 85	Portland Cement
AASHTO M 157	Ready-Mix Concrete
AASHTO M 173	Joint Sealer
AASHTO M 198	Gaskets
AASHTO M 219	Aluminum Structural Plate
Fed. Std. 601	Gasket Swell
1/HH-G-156	Flexibility

Note: Others as required by referenced specifications.

1/ Federal Specifications

END OF SECTION D-701