



A WOOLPERT COMPANY

April 14, 2023

To: Plan Holders for Improvements to the
St. George Regional Airport
St. George, Utah
AIP Project No. 3-49-0060-045-2023, Inquiry #23-116

Transmitted herewith is Addendum No. 5 to the Issued for Bid Contract Documents, Specifications and Plans dated March 2, 2023, for Improvements to the St. George Regional Airport.

Schedule I (Federal)
Reconstruct Terminal Apron

Schedule II (Federal)
Expand Terminal Apron – North

Schedule III (Federal)
Expand Terminal Apron – South

Schedule IV (Non-Federal)
Reconstruct Terminal Apron

Sincerely,

Jviation, a Woolpert Company

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**ADDENDUM NO. 5
TO
CONTRACT DOCUMENTS, SPECIFICATIONS AND PLANS
FOR IMPROVEMENTS TO THE
ST. GEORGE REGIONAL AIRPORT
ST. GEORGE, UTAH
AIP PROJECT NO. 3-49-0060-045-2023, INQUIRY #23-116**

To All Bidders: You are requested to make all changes and/or additions contained in this addendum to the Bidding Documents. Failure to acknowledge this Addendum in Proposal shall result in rejection of bid. Bidders are informed that the above referenced Contract Documents, Specifications and Plans are modified as follows as of April 14, 2023:

1. CONTRACT DOCUMENTS/SPECIFICATIONS

Division 2, Bid Schedule I, II, III and IV

Replace Bid Schedule I, II, III and IV with the attached Bid Schedule I, II, III and IV.

Items P-154a, P-154b, P-154c, P-154d were changed to P-190a, P-209b, P-209c and P-152d on all schedules with no change in the quantities. Item L-125f on Schedule III was changed from 0 to 1 each.

Item P-152, Excavation, Subgrade, and Embankment

Replace Item P-152 with the attached Item P-152.

Item P-154, Subbase Course

Delete Item P-154, Subbase Course, from the project specifications.

Item P-190, Unstabilized Permeable Subbase Course

Add Item P-190, Unstabilized Permeable Subbase Course, to the project specifications. The unstabilized permeable subbase course may be placed/spread with either a paving machine or a motor grader, see 190-3.1, Equipment, and 190-3.6, Spreading.

Item P-209, Crushed Aggregate Base Course

209-2.4, Separation Geotextile

Replace the section with the following:

Separation geotextile shall be Class 1 or 2 non-woven meeting AASHTO M288 requirements; 0.05 sec-1 permittivity per ASTM D4491; and apparent opening size per ASTM D4751 with 0.43 mm maximum average roll value for Class 1 and 0.60 mm maximum average roll value for Class 2.

Method of Measurement

Add the following paragraph:

P-209-4.2 Separation geotextile shall be measured by the number of square yards of materials placed and accepted by the RPR as complying with the plans and specifications excluding seam overlaps and edge anchoring.

Basis of Payment

Add the following paragraph:

P-209-5.2 Payment shall be made at the contract unit price per square yard for separation geotextile, class 1 or 2. The price shall be full compensation for furnishing all labor, equipment, material, anchors, and necessary incidentals.

Basis of Payment

Add the following items:

Item P-209b	Separation Geotextile, Class 1 Non-Woven – per square yard
Item P-209c	Separation Geotextile, Class 2 Non-Woven – per square yard

The revised P-209 specification will be included with the Issued for Construction documents.

2. PLANS

Sheet C002A, Summary of Approximate Quantities

Change the following items: Item P-154a to P-190a; Item P-154b to P-209b; Item P-154c to P-209c; Item P-154d to Item P-152d. All items have the same quantities on all schedules. See Item 1 above for new Bid Schedules I, II, III and IV.

Change Item L-125f on Schedule III from 0 to 1 each. See Item 1 above for the new Bid Schedule III.

The revised Sheet C002A will be included with the Issued for Construction Plans.

Sheet G052

Replace Sheet G052 with the attached Sheet G052.

Sheet G053

Replace Note 12 with the following:

Prior to acceptance and opening of an area to aircraft, all final grading must be completed. This includes FOD removal and fine grading.

The revised Sheet G053 will be included with the Issued for Construction Plans.

Sheet C220, Pavement Details

Change all “6” Permeable Subbase Course (P-154)” detail callouts to the following:
“6” Unstabilized Permeable Subbase Course (P-190)”.

Change all “Separation Geotextile Class 1 Non-Woven (P-154) Above and Below Geomembrane” detail callouts to the following:
“Separation Geotextile Class 1 Non-Woven (P-209) Above and Below Geomembrane”.

Change all “Separation Geotextile Class 2 Non-Woven (P-154)” detail callouts to the following:
“Separation Geotextile Class 2 Non-Woven (P-209)”.

Change all “40 Mil LLDPE Geomembrane (P-154)” detail callouts to the following:
“40 Mil LLDPE Geomembrane (P-152)”.

Change all “40 Mil LLDPE Geomembrane (P-154) Extend 10’ Min Beyond Asphalt Shoulder on 5% Slope and Embed 2”” detail callouts to the following:
“40 Mil LLDPE Geomembrane (P-152) Extend 10’ Min Beyond Asphalt Shoulder on 5% Slope and Embed 2””.

The revised Sheet C220 will be included with the Issued for Construction Plans.

Sheet C222, Concrete Apron Section B-B

Change all “6” Permeable Subbase Course (P-154)” detail callouts to the following:
“6” Unstabilized Permeable Subbase Course (P-190)”.

Change all “Separation Geotextile Class 1 Non-Woven (P-154) Above and Below Geomembrane” detail callouts to the following:
“Separation Geotextile Class 1 Non-Woven (P-209) Above and Below Geomembrane”.

Change all “Separation Geotextile Class 2 Non-Woven (P-154)” detail callouts to the following:
“Separation Geotextile Class 2 Non-Woven (P-209)”.

Change all “40 Mil LLDPE Geomembrane (P-154)” detail callouts to the following:
“40 Mil LLDPE Geomembrane (P-152)”.

The revised Sheet C222 will be included with the Issued for Construction Plans.

Sheet C223, Concrete Apron Section C-C

Change all “6” Unstabilized Permeable Subbase Course (P-154)” detail callouts to the following:
“6” Unstabilized Permeable Subbase Course (P-190)”.

Change all “Separation Geotextile Class 1 Non-Woven (P-154) Above and Below Geomembrane” detail callouts to the following:
“Separation Geotextile Class 1 Non-Woven (P-209) Above and Below Geomembrane”.

Change all “Separation Geotextile Class 2 Non-Woven (P-154)” detail callouts to the following:
“Separation Geotextile Class 2 Non-Woven (P-209)”.

Change all “40 Mil LLDPE Geomembrane (P-154)” detail callouts to the following:
“40 Mil LLDPE Geomembrane (P-152)”.

The revised Sheet C223 will be included with the Issued for Construction Plans.

Sheet C224, Concrete Apron Section D-D

Change all “6” Permeable Subbase Course (P-154)” detail callouts to the following:
“6” Unstabilized Permeable Subbase Course (P-190)”.

Change all “Separation Geotextile Class 1 Non-Woven (P-154) Above and Below Geomembrane” detail callouts to the following:
“Separation Geotextile Class 1 Non-Woven (P-209) Above and Below Geomembrane”.

Add the following note above the 6” Permeable Subbase Course:
“Separation Geotextile Class 2 Non-Woven (P-209)”.

Change all “40 Mil LLDPE Geomembrane (P-154)” detail callouts to the following:
“40 Mil LLDPE Geomembrane (P-152)”.

The revised Sheet C223 will be included with the Issued for Construction Plans.

Sheet C522, Trench Detail

Change the “6” Unstabilized Permeable Subbase Course (P-154)” callout in the Trench Detail Under Pavement to the following:
“6” Unstabilized Permeable Subbase Course (P-190)”.

The revised Sheet C522 will be included with the Issued for Construction Plans.

3. QUESTIONS

In the Concrete Joint Plans on sheets 51 through 54 of the “SGU-045-Apron Recon-Expand IFB Plans” file what do the arrows denote on the panels? It seems that the arrows are accompanied by joint type, but there aren’t arrows pointing to every joint and some joints don’t have a joint type being called out. Sometimes on the joint line there is a joint type being called out but even that is very inconsistent.

Answer: The arrow means the same joint type for the entire length of the joint or between arrows. When there is a joint designation on the joint line then it is standard joint nomenclature. If there is a D joint callout and then a gap without joint callouts and then another D joint callout, the joints with no callouts will be D joints.

Can you tell me the actual LF of the red SIDA line?

Answer: Total length is 2,160 feet and the quantity is divided into Schedules I, II and III.

**** END OF ADDENDUM NO. 5 ****

SCHEDULE I						
Item No.	Description		Units	Estimated Quantity	Unit Price	Total
C-105a	Mobilization (10% Maximum)	at the unit price of: _____ dollars and _____ cents.	LS	1	\$	\$
C-100a	Contractor Quality Control Program (CQCP)	at the unit price of: _____ dollars and _____ cents.	LS	1	\$	\$
C-102a	Temporary Erosion Control	at the unit price of: _____ dollars and _____ cents.	LS	1	\$	\$
P-101a	Full Depth Asphalt Removal	at the unit price of: _____ dollars and _____ cents.	SY	1,800	\$	\$
P-101b	Partial Depth Asphalt Removal	at the unit price of: _____ dollars and _____ cents.	SY	1,200	\$	\$
P-101c	Full Depth Concrete Removal	at the unit price of: _____ dollars and _____ cents.	SY	15,100	\$	\$
P-101d	Pipe Removal	at the unit price of: _____ dollars and _____ cents.	LF	490	\$	\$
P-101e	Catch Basin Removal	at the unit price of: _____ dollars and _____ cents.	EA	6	\$	\$
P-152a	Unclassified Excavation	at the unit price of: _____ dollars and _____ cents.	CY	96,000	\$	\$
P-152b	Conditioned Clay Embankment	at the unit price of: _____ dollars and _____ cents.	CY	27,500	\$	\$
P-152c	On-site Suitable Embankment	at the unit price of: _____ dollars and _____ cents.	CY	49,900	\$	\$
P-152d	40 Mil LLDPE Geomembrane	at the unit price of: _____ dollars and _____ cents.	SY	18,000	\$	\$
P-190a	Unstabilized Permeable Subbase Course	at the unit price of: _____ dollars and _____ cents.	CY	3,300	\$	\$
P-209a	Crushed Aggregate Base Course	at the unit price of: _____ dollars and _____ cents.	CY	3,200	\$	\$
P-209b	Separation Geotextile, Class 1, Non-Woven	at the unit price of: _____ dollars and _____ cents.	SY	36,000	\$	\$

SCHEDULE I						
Item No.	Description		Units	Estimated Quantity	Unit Price	Total
P-209c	Separation Geotextile, Class 2, Non-Woven	at the unit price of: _____ dollars and _____ cents.	SY	17,500	\$	\$
P-401a	Asphalt Surface Course	at the unit price of: _____ dollars and _____ cents.	TON	700	\$	\$
P-403a	Asphalt Mixture Base Course	at the unit price of: _____ dollars and _____ cents.	TON	5,200	\$	\$
P-501a	Concrete Pavement, 15-Inch	at the unit price of: _____ dollars and _____ cents.	SY	14,250	\$	\$
P-501b	Concrete Pavement, 8-Inch	at the unit price of: _____ dollars and _____ cents.	SY	700	\$	\$
P-501c	Bond Breaker Fabric	at the unit price of: _____ dollars and _____ cents.	SY	14,300	\$	\$
P-603a	Emulsified Asphalt Tack Coat	at the unit price of: _____ dollars and _____ cents.	TON	9	\$	\$
P-620a	Temporary Pavement Markings	at the unit price of: _____ dollars and _____ cents.	SF	12,100	\$	\$
P-620b	Permanent Pavement Markings	at the unit price of: _____ dollars and _____ cents.	SF	12,100	\$	\$
P-620c	SIDA Area Markings	at the unit price of: _____ dollars and _____ cents.	SF	1,900	\$	\$
P-620d	Painted Surface Sign	at the unit price of: _____ dollars and _____ cents.	EA	12	\$	\$
P-620e	Pavement Marking Obliteration	at the unit price of: _____ dollars and _____ cents.	SF	500	\$	\$
D-701a	24-Inch HDPE Storm Drain Pipe, DR 32.5	at the unit price of: _____ dollars and _____ cents.	LF	390	\$	\$
D-701c	12-Inch HDPE Storm Drain Pipe, DR 32.5	at the unit price of: _____ dollars and _____ cents.	LF	530	\$	\$
D-701d	8-Inch HDPE Storm Drain Pipe, DR 32.5	at the unit price of: _____ dollars and _____ cents.	LF	40	\$	\$

SCHEDULE I						
Item No.	Description		Units	Estimated Quantity	Unit Price	Total
D-701e	6-Inch Outlet Pipe	at the unit price of: _____ dollars and _____ cents.	LF	420	\$	\$
D-705a	6-Inch Underdrain	at the unit price of: _____ dollars and _____ cents.	LF	1,200	\$	\$
D-751a	Underdrain Cleanout	at the unit price of: _____ dollars and _____ cents.	EA	3	\$	\$
D-751b	Storm Drain Box, Airport Loading	at the unit price of: _____ dollars and _____ cents.	EA	3	\$	\$
D-751c	2-Foot x 2-Foot Storm Drain Box, Highway Loading	at the unit price of: _____ dollars and _____ cents.	EA	2	\$	\$
D-751e	Relocate Existng Storm Drain Box	at the unit price of: _____ dollars and _____ cents.	EA	2	\$	\$
F-162a	Temporary Construction Fence	at the unit price of: _____ dollars and _____ cents.	LF	360	\$	\$
F-162b	Install 7-Foot Chain-Link Fence	at the unit price of: _____ dollars and _____ cents.	LF	350	\$	\$
L-125e	Install L-853 Surface Mounted Retroreflective Marker, Complete	at the unit price of: _____ dollars and _____ cents.	EA	10	\$	\$
L-125j	Install LED Apron Light Fixtures (3 Total per Pole) on Existing Apron Flood Light Pole	at the unit price of: _____ dollars and _____ cents.	EA	4	\$	\$
L-125k	Install Power Wiring for Sponsor Installed Equipment	at the unit price of: _____ dollars and _____ cents.	LS	2	\$	\$
L-125l	Relocate/Re-install Stop/Informational Sign	at the unit price of: _____ dollars and _____ cents.	EA	2	\$	\$

SCHEDULE I TOTAL \$ _____

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SCHEDULE II						
Item No.	Description		Units	Estimated Quantity	Unit Price	Total
C-105a	Mobilization (10% Maximum)	at the unit price of: _____ _____dollars and _____cents.	LS	1	\$	\$
C-100a	Contractor Quality Control Program (CQCP)	at the unit price of: _____ _____dollars and _____cents.	LS	1	\$	\$
C-102a	Temporary Erosion Control	at the unit price of: _____ _____dollars and _____cents.	LS	1	\$	\$
P-101a	Full Depth Asphalt Removal	at the unit price of: _____ _____dollars and _____cents.	SY	5,100	\$	\$
P-101c	Full Depth Concrete Removal	at the unit price of: _____ _____dollars and _____cents.	SY	200	\$	\$
P-101d	Pipe Removal	at the unit price of: _____ _____dollars and _____cents.	LF	120	\$	\$
P-101e	Catch Basin Removal	at the unit price of: _____ _____dollars and _____cents.	EA	2	\$	\$
P-152a	Unclassified Excavation	at the unit price of: _____ _____dollars and _____cents.	CY	82,300	\$	\$
P-152b	Conditioned Clay Embankment	at the unit price of: _____ _____dollars and _____cents.	CY	26,300	\$	\$
P-152c	On-site Suitable Embankment	at the unit price of: _____ _____dollars and _____cents.	CY	49,600	\$	\$
P-152d	40 Mil LLDPE Geomembrane	at the unit price of: _____ _____dollars and _____cents.	SY	17,400	\$	\$
P-190a	Unstabilized Permeable Subbase Course	at the unit price of: _____ _____dollars and _____cents.	CY	3,100	\$	\$
P-209a	Crushed Aggregate Base Course	at the unit price of: _____ _____dollars and _____cents.	CY	3,300	\$	\$
P-209b	Separation Geotextile, Class 1, Non-Woven	at the unit price of: _____ _____dollars and _____cents.	SY	34,800	\$	\$
P-209c	Separation Geotextile, Class 2, Non-Woven	at the unit price of: _____ _____dollars and _____cents.	SY	16,600	\$	\$

SCHEDULE II						
Item No.	Description		Units	Estimated Quantity	Unit Price	Total
P-401a	Asphalt Surface Course	at the unit price of: _____ _____dollars and _____cents.	TON	1,500	\$	\$
P-403a	Asphalt Mixture Base Course	at the unit price of: _____ _____dollars and _____cents.	TON	4,800	\$	\$
P-501a	Concrete Pavement, 15-Inch	at the unit price of: _____ _____dollars and _____cents.	SY	10,900	\$	\$
P-501c	Bond Breaker Fabric	at the unit price of: _____ _____dollars and _____cents.	SY	10,950	\$	\$
P-603a	Emulsified Asphalt Tack Coat	at the unit price of: _____ _____dollars and _____cents.	TON	11	\$	\$
P-620a	Temporary Pavement Markings	at the unit price of: _____ _____dollars and _____cents.	SF	6,100	\$	\$
P-620b	Permanent Pavement Markings	at the unit price of: _____ _____dollars and _____cents.	SF	3,600	\$	\$
P-620c	SIDA Area Markings	at the unit price of: _____ _____dollars and _____cents.	SF	3,100	\$	\$
P-620d	Painted Surface Sign	at the unit price of: _____ _____dollars and _____cents.	EA	21	\$	\$
P-620e	Pavement Marking Obliteration	at the unit price of: _____ _____dollars and _____cents.	SF	2,500	\$	\$
D-701a	24-Inch HDPE Storm Drain Pipe, DR 32.5	at the unit price of: _____ _____dollars and _____cents.	LF	420	\$	\$
D-701b	18-Inch HDPE Storm Drain Pipe, DR 32.5	at the unit price of: _____ _____dollars and _____cents.	LF	270	\$	\$
D-701d	8-Inch HDPE Storm Drain Pipe, DR 32.5	at the unit price of: _____ _____dollars and _____cents.	LF	90	\$	\$
D-701e	6-Inch Outlet Pipe	at the unit price of: _____ _____dollars and _____cents.	LF	180	\$	\$
D-701f	Loose Riprap, 9-inch D50	at the unit price of: _____ _____dollars and _____cents.	SY	20	\$	\$

SCHEDULE II						
Item No.	Description		Units	Estimated Quantity	Unit Price	Total
D-705a	6-Inch Underdrain	at the unit price of: _____ dollars and _____ cents.	LF	1,320	\$	\$
D-751a	Underdrain Cleanout	at the unit price of: _____ dollars and _____ cents.	EA	5	\$	\$
D-751b	Storm Drain Box, Airport Loading	at the unit price of: _____ dollars and _____ cents.	EA	1	\$	\$
D-751c	2-Foot x 2-Foot Storm Drain Box, Highway Loading	at the unit price of: _____ dollars and _____ cents.	EA	1	\$	\$
D-751d	3-Foot x 3-Foot Storm Drain Box, Highway Loading	at the unit price of: _____ dollars and _____ cents.	EA	1	\$	\$
L-108a	Install #8 AWG, L-824C, 5000V Wire	at the unit price of: _____ dollars and _____ cents.	LF	1,500	\$	\$
L-108b	Install #6 AWG, Bare Copper Counterpoise	at the unit price of: _____ dollars and _____ cents.	LF	1,000	\$	\$
L-108c	Install #10AWG, XHHW, 600V Wire	at the unit price of: _____ dollars and _____ cents.	LF	2,000	\$	\$
L-110a	Install 1-2" PVC Conduit (Direct Earth Buried)	at the unit price of: _____ dollars and _____ cents.	LF	900	\$	\$
L-110b	Install 1-2" PVC Conduit (Concrete Encased)	at the unit price of: _____ dollars and _____ cents.	LF	50	\$	\$
L-110c	Install 4-2" PVC Conduit (Concrete Encased)	at the unit price of: _____ dollars and _____ cents.	LF	100	\$	\$
L-115a	Remove Junction Box Plaza, Complete	at the unit price of: _____ dollars and _____ cents.	EA	1	\$	\$
L-115b	Reinstall Junction Box Plaza, Complete	at the unit price of: _____ dollars and _____ cents.	EA	1	\$	\$
L-115c	Install Handhole, Complete	at the unit price of: _____ dollars and _____ cents.	EA	4	\$	\$
L-125a	Remove Taxiway Light in Pavement, Complete	at the unit price of: _____ dollars and _____ cents.	EA	7	\$	\$

SCHEDULE II						
Item No.	Description		Units	Estimated Quantity	Unit Price	Total
L-125b	Remove Taxiway Light and Install Blank Steel Cover	at the unit price of: _____ _____dollars and _____cents.	EA	2	\$	\$
L-125c	Reinstall Base Mounted L-861T(L) Taxiway Edge Light in Pavement, Complete	at the unit price of: _____ _____dollars and _____cents.	EA	4	\$	\$
L-125d	Reinstall Base Mounted L-861T(L) Taxiway Edge Light in Existing Pavement, Complete	at the unit price of: _____ _____dollars and _____cents.	EA	6	\$	\$
L-125f	Remove L-858 Guidance Sign in Soil, Complete	at the unit price of: _____ _____dollars and _____cents.	EA	2	\$	\$
L-125g	Reinstall L-858 Guidance Sign on New Concrete Pad in Soil, Size 2, 2 Module, Complete	at the unit price of: _____ _____dollars and _____cents.	EA	1	\$	\$
L-125h	Reinstall L-858 Guidance Sign on New Concrete Pad in Soil, Size 2, 3 Module, Complete	at the unit price of: _____ _____dollars and _____cents.	EA	1	\$	\$
L-125i	Install New 60' Apron Flood Light Pole with LED Lumineers, Complete	at the unit price of: _____ _____dollars and _____cents.	EA	3	\$	\$
L-125l	Relocate/Re-install Stop/Informational Sign	at the unit price of: _____ _____dollars and _____cents.	EA	2	\$	\$

SCHEDULE II TOTAL \$ _____

SCHEDULE III						
Item No.	Description		Units	Estimated Quantity	Unit Price	Total
C-105a	Mobilization (10% Maximum)	at the unit price of: _____ _____dollars and _____cents.	LS	1	\$	\$
C-100a	Contractor Quality Control Program (CQCP)	at the unit price of: _____ _____dollars and _____cents.	LS	1	\$	\$
C-102a	Temporary Erosion Control	at the unit price of: _____ _____dollars and _____cents.	LS	1	\$	\$
P-101a	Full Depth Asphalt Removal	at the unit price of: _____ _____dollars and _____cents.	SY	5,600	\$	\$
P-101d	Pipe Removal	at the unit price of: _____ _____dollars and _____cents.	LF	640	\$	\$
P-101e	Catch Basin Removal	at the unit price of: _____ _____dollars and _____cents.	EA	1	\$	\$
P-152a	Unclassified Excavation	at the unit price of: _____ _____dollars and _____cents.	CY	35,300	\$	\$
P-152b	Conditioned Clay Embankment	at the unit price of: _____ _____dollars and _____cents.	CY	8,100	\$	\$
P-152c	On-site Suitable Embankment	at the unit price of: _____ _____dollars and _____cents.	CY	16,000	\$	\$
P-152d	40 Mil LLDPE Geomembrane	at the unit price of: _____ _____dollars and _____cents.	SY	5,700	\$	\$
P-190a	Unstabilized Permeable Subbase Course	at the unit price of: _____ _____dollars and _____cents.	CY	900	\$	\$
P-209a	Crushed Aggregate Base Course	at the unit price of: _____ _____dollars and _____cents.	CY	1,600	\$	\$
P-209b	Separation Geotextile, Class 1, Non-Woven	at the unit price of: _____ _____dollars and _____cents.	SY	11,300	\$	\$
P-209c	Separation Geotextile, Class 2, Non-Woven	at the unit price of: _____ _____dollars and _____cents.	SY	4,900	\$	\$
P-401a	Asphalt Surface Course	at the unit price of: _____ _____dollars and _____cents.	TON	900	\$	\$

SCHEDULE III						
Item No.	Description		Units	Estimated Quantity	Unit Price	Total
P-403a	Asphalt Mixture Base Course	at the unit price of: _____ _____dollars and _____cents.	TON	1,150	\$	\$
P-501a	Concrete Pavement, 15-Inch	at the unit price of: _____ _____dollars and _____cents.	SY	2,900	\$	\$
P-501b	Concrete Pavement, 8-Inch	at the unit price of: _____ _____dollars and _____cents.	SY	250	\$	\$
P-501c	Bond Breaker Fabric	at the unit price of: _____ _____dollars and _____cents.	SY	2,950	\$	\$
P-603a	Emulsified Asphalt Tack Coat	at the unit price of: _____ _____dollars and _____cents.	TON	4	\$	\$
P-620a	Temporary Pavement Markings	at the unit price of: _____ _____dollars and _____cents.	SF	1,600	\$	\$
P-620b	Permanent Pavement Markings	at the unit price of: _____ _____dollars and _____cents.	SF	1,600	\$	\$
P-620c	SIDA Area Markings	at the unit price of: _____ _____dollars and _____cents.	SF	1,600	\$	\$
P-620d	Painted Surface Sign	at the unit price of: _____ _____dollars and _____cents.	EA	12	\$	\$
D-701a	24-Inch HDPE Storm Drain Pipe, DR 32.5	at the unit price of: _____ _____dollars and _____cents.	LF	120	\$	\$
D-705a	6-Inch Underdrain	at the unit price of: _____ _____dollars and _____cents.	LF	700	\$	\$
D-751a	Underdrain Cleanout	at the unit price of: _____ _____dollars and _____cents.	EA	5	\$	\$
D-751b	Storm Drain Box, Airport Loading	at the unit price of: _____ _____dollars and _____cents.	EA	1	\$	\$
D-751d	3-Foot x 3-Foot Storm Drain Box, Highway Loading	at the unit price of: _____ _____dollars and _____cents.	EA	1	\$	\$
L-108a	Install #8 AWG, L-824C, 5000V Wire	at the unit price of: _____ _____dollars and _____cents.	LF	400	\$	\$

SCHEDULE III						
Item No.	Description		Units	Estimated Quantity	Unit Price	Total
L-108b	Install #6 AWG, Bare Copper Counterpoise	at the unit price of: _____ _____dollars and _____cents.	LF	100	\$	\$
L-110a	Install 1-2" PVC Conduit (Direct Earth Buried)	at the unit price of: _____ _____dollars and _____cents.	LF	100	\$	\$
L-125a	Remove Taxiway Light in Pavement, Complete	at the unit price of: _____ _____dollars and _____cents.	EA	4	\$	\$
L-125c	Reinstall Base Mounted L-861T(L) Taxiway Edge Light in Pavement, Complete	at the unit price of: _____ _____dollars and _____cents.	EA	1	\$	\$
L-125f	Remove L-858 Guidance Sign in Soil, Complete	at the unit price of: _____ _____dollars and _____cents.	EA	1	\$	\$
L-125g	Reinstall L-858 Guidance Sign on New Concrete Pad in Soil, Size 2, 2 Module, Complete	at the unit price of: _____ _____dollars and _____cents.	EA	1	\$	\$

SCHEDULE III TOTAL \$ _____

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SCHEDULE IV (NON-FEDERAL)						
Item No.	Description		Units	Estimated Quantity	Unit Price	Total
C-105a	Mobilization (10% Maximum)	at the unit price of: _____ _____dollars and _____cents.	LS	1	\$	\$
C-100a	Contractor Quality Control Program (CQCP)	at the unit price of: _____ _____dollars and _____cents.	LS	1	\$	\$
C-102a	Temporary Erosion Control	at the unit price of: _____ _____dollars and _____cents.	LS	1	\$	\$
P-101c	Full Depth Concrete Removal	at the unit price of: _____ _____dollars and _____cents.	SY	500	\$	\$
P-152a	Unclassified Excavation	at the unit price of: _____ _____dollars and _____cents.	CY	1,800	\$	\$
P-152b	Conditioned Clay Embankment	at the unit price of: _____ _____dollars and _____cents.	CY	300	\$	\$
P-152c	On-site Suitable Embankment	at the unit price of: _____ _____dollars and _____cents.	CY	400	\$	\$
P-152d	40 Mil LLDPE Geomembrane	at the unit price of: _____ _____dollars and _____cents.	SY	300	\$	\$
P-190a	Unstabilized Permeable Subbase Course	at the unit price of: _____ _____dollars and _____cents.	CY	50	\$	\$
P-209a	Crushed Aggregate Base Course	at the unit price of: _____ _____dollars and _____cents.	CY	100	\$	\$
P-209b	Separation Geotextile, Class 1, Non-Woven	at the unit price of: _____ _____dollars and _____cents.	SY	600	\$	\$
P-209c	Separation Geotextile, Class 2, Non-Woven	at the unit price of: _____ _____dollars and _____cents.	SY	300	\$	\$
P-403a	Asphalt Mixture Base Course	at the unit price of: _____ _____dollars and _____cents.	TON	100	\$	\$
P-501a	Concrete Pavement, 15-Inch	at the unit price of: _____ _____dollars and _____cents.	SY	300	\$	\$
P-501b	Concrete Pavement, 8-Inch	at the unit price of: _____ _____dollars and _____cents.	SY	150	\$	\$

SCHEDULE IV (NON-FEDERAL)						
Item No.	Description		Units	Estimated Quantity	Unit Price	Total
P-501c	Bond Breaker Fabric	at the unit price of: _____ _____dollars and _____cents.	SY	300	\$	\$
P-603a	Emulsified Asphalt Tack Coat	at the unit price of: _____ _____dollars and _____cents.	TON	1	\$	\$

SCHEDULE IV TOTAL \$ _____

ITEM P-152 EXCAVATION, SUBGRADE, AND EMBANKMENT

DESCRIPTION

152-1.1 This item covers excavation, disposal, placement, and compaction of all materials within the limits of the work required to construct safety areas, runways, taxiways, aprons, and intermediate areas as well as other areas for drainage, building construction, parking, or other purposes in accordance with these specifications and in conformity to the dimensions and typical sections shown on the plans. This item also includes installing a Linear Low Density Polyethylene (LLDPE) geomembrane on a prepared material as shown on the plans.

152-1.2 CLASSIFICATION. All material excavated shall be classified as defined below:

- a. **Unclassified excavation.** Unclassified excavation shall consist of the excavation and disposal of all material, regardless of its nature which is not otherwise classified and paid for under one of the following items.
- b. **Muck excavation.** Muck excavation shall consist of the removal and disposal of deposits or mixtures of soils and organic matter not suitable for foundation material. Muck shall include materials that will decay or produce subsidence in the embankment. It may consist of decaying stumps, roots, logs, humus, or other material not satisfactory for incorporation in the embankment.
- c. **Borrow excavation.** Borrow excavation shall consist of approved material required for the construction of embankments or for other portions of the work in excess of the quantity of usable material available from required excavations. Borrow material shall be obtained from areas designated by the Resident Project Representative (RPR) within the limits of the airport property but outside the normal limits of necessary grading, or from areas outside the airport boundaries.

152-1.3 UNSUITABLE EXCAVATION. Unsuitable material shall be disposed in designated waste areas as shown on the plans. Materials containing vegetable or organic matter, such as muck, peat, organic silt, or sod shall be considered unsuitable for use in embankment construction. Material suitable for topsoil may be used on the embankment slope when approved by the RPR.

152-1.4 LLDPE GEOMEMBRANE. The geomembrane shall be an impermeable, prefabricated LLDPE geomembrane meeting the property requirements in GRI – GM17 Standard Specification.

Only approved material, conforming to the requirements of this specification, shall be used in the work. A representative preliminary sample of the material shall be submitted by the Contractor, when required, for examination and test. Geosynthetic rolls shall be furnished with suitable packaging to protect from damage prior to placement. Each roll shall be labeled to provide product identification sufficient for inventory and quality control purposes. Rolls shall be stored according to the manufacturer's directions and in a manner that protects them from the elements. If stored outdoors, they shall be elevated and protected with a waterproof cover.

The Contractor shall submit, to the RPR, for approval, prior to ordering, the manufacturers certification and installation procedure for the material supplied verifying the material to be used meets the requirements of this specification. Certified test results for each lot produced shall be delivered to the RPR prior to use.

CONSTRUCTION METHODS

152-2.1 GENERAL. Before beginning excavation, grading, and embankment operations in any area, the area shall be cleared or cleared and grubbed in accordance with Item P-151.

The suitability of material to be placed in embankments shall be subject to approval by the RPR. All unsuitable material shall be disposed of in waste areas as shown on the plans. All waste areas shall be graded to allow positive drainage of the area and adjacent areas. The surface elevation of waste areas shall be specified on the plans or approved by the RPR.

When the Contractor's excavating operations encounter artifacts of historical or archaeological significance, the operations shall be temporarily discontinued and the RPR notified per Section 70, paragraph 70-20. At the direction of the RPR, the Contractor shall excavate the site in such a manner as to preserve the artifacts encountered and allow for their removal. Such excavation will be paid for as extra work.

Areas outside the limits of the pavement areas where the top layer of soil has become compacted by hauling or other Contractor activities shall be scarified and disked to a depth of 4 inches (100 mm), to loosen and pulverize the soil. Stones or rock fragments larger than 4 inches (100 mm) in their greatest dimension will not be permitted in the top 6 inches (150 mm) of the subgrade.

If it is necessary to interrupt existing surface drainage, sewers or under-drainage, conduits, utilities, or similar underground structures, the Contractor shall be responsible for and shall take all necessary precautions to preserve them or provide temporary services. When such facilities are encountered, the Contractor shall notify the RPR, who shall arrange for their removal if necessary. The Contractor, at their own expense, shall satisfactorily repair or pay the cost of all damage to such facilities or structures that may result from any of the Contractor's operations during the period of the contract.

a. Blasting. Blasting shall not be allowed.

152-2.2 EXCAVATION. No excavation shall be started until the work has been staked out by the Contractor and the RPR has obtained from the Contractor, the survey notes of the elevations and measurements of the ground surface. The Contractor and RPR shall agree that the original ground lines shown on the original topographic mapping are accurate, or agree to any adjustments made to the original ground lines.

Digital terrain model (DTM) files of the existing surfaces, finished surfaces and other various surfaces were used to develop the design plans.

Existing grades on the design cross sections or DTM's, where they do not match the locations of actual spot elevations shown on the topographic map, were developed by computer interpolation from those spot elevations. Prior to disturbing original grade, Contractor shall verify the accuracy of the existing ground surface by verifying spot elevations at the same locations where original field survey data was obtained as indicated on the topographic map. Contractor shall recognize that, due to the interpolation process, the actual ground surface at any particular location may differ somewhat from the interpolated surface shown on the design cross sections or obtained from the DTM's. Contractor's verification of original ground surface, however, shall be limited to verification of spot elevations as indicated herein, and no adjustments will be made to the original ground surface unless the Contractor demonstrates that spot elevations shown are incorrect. For this purpose, spot elevations which are within 0.1 foot (30 mm) of the stated elevations for ground surfaces, or within 0.04 foot (12 mm) for hard surfaces (pavements, buildings, foundations, structures, etc.) shall be considered "no change". Only deviations in excess of these will be considered for adjustment of the original ground surface. If Contractor's verification identifies discrepancies in the topographic map, Contractor shall notify the RPR in writing at least two weeks before disturbance of existing grade to allow

sufficient time to verify the submitted information and make adjustments to the design cross sections or DTM's. Disturbance of existing grade in any area shall constitute acceptance by the Contractor of the accuracy of the original elevations shown on the topographic map for that area.

All areas to be excavated shall be stripped of vegetation and topsoil. Topsoil shall be stockpiled for future use in areas designated on the plans or by the RPR. All suitable excavated material shall be used in the formation of embankment, subgrade, or other purposes as shown on the plans. All unsuitable material shall be disposed of as shown on the plans.

The grade shall be maintained so that the surface is well drained at all times. When the volume of the excavation exceeds that required to construct the embankments to the grades as indicated on the plans, the excess shall be used to grade the areas of ultimate development or disposed as directed by the RPR. When the volume of excavation is not sufficient for constructing the embankments to the grades indicated, the deficiency shall be obtained from borrow areas.

- a. **Selective grading.** When selective grading is indicated on the plans, the more suitable material designated by the RPR shall be used in constructing the embankment or in capping the pavement subgrade. If, at the time of excavation, it is not possible to place this material in its final location, it shall be stockpiled in approved areas until it can be placed. The more suitable material shall then be placed and compacted as specified. Selective grading shall be considered incidental to the work involved. The cost of stockpiling and placing the material shall be included in the various pay items of work involved.
- b. **Undercutting.** Rock, shale, hardpan, loose rock, boulders, or other material unsatisfactory for safety areas, subgrades, roads, shoulders, or any areas intended for turf shall be excavated to a minimum depth of 12 inches (300 mm) below the subgrade or to the depth specified by the RPR. Muck, peat, matted roots, or other yielding material, unsatisfactory for subgrade foundation, shall be removed to the depth specified. Unsuitable materials shall be disposed of at locations shown on the plans. This excavated material shall be paid for at the contract unit price per cubic yard (per cubic meter) for unclassified excavation. The excavated area shall be backfilled with suitable material obtained from the grading operations or borrow areas and compacted to specified densities. The necessary backfill will constitute a part of the embankment. Where rock cuts are made, backfill with select material. Any pockets created in the rock surface shall be drained in accordance with the details shown on the plans. Undercutting will be paid as unclassified excavation.
- c. **Over-break.** Over-break, including slides, is that portion of any material displaced or loosened beyond the finished work as planned or authorized by the RPR. All over-break shall be graded or removed by the Contractor and disposed of as directed by the RPR. The RPR shall determine if the displacement of such material was unavoidable and their own decision shall be final. Payment will not be made for the removal and disposal of over-break that the RPR determines as avoidable. Unavoidable over-break will be classified as "Unclassified Excavation."
- d. **Removal of utilities.** The removal of existing structures and utilities required to permit the orderly progress of work will be accomplished by the Contractor as indicated on the plans. All existing foundations shall be excavated at least 2 feet (60 cm) below the top of subgrade or as indicated on the plans, and the material disposed of as directed by the RPR. All foundations thus excavated shall be backfilled with suitable material and compacted as specified for embankment or as shown on the plans.

152-2.3 BORROW EXCAVATION. Borrow areas within the airport property are indicated on the plans. Borrow excavation shall be made only at these designated locations and within the horizontal and vertical

limits as staked or as directed by the RPR. All unsuitable material shall be disposed of by the Contractor as shown on the plans. All borrow pits shall be opened to expose the various strata of acceptable material to allow obtaining a uniform product. Borrow areas shall be drained and left in a neat, presentable condition with all slopes dressed uniformly. Borrow areas shall not create a hazardous wildlife attractant.

152-2.4 DRAINAGE EXCAVATION. Drainage excavation shall consist of excavating drainage ditches including intercepting, inlet, or outlet ditches; or other types as shown on the plans. The work shall be performed in sequence with the other construction. Ditches shall be constructed prior to starting adjacent excavation operations. All satisfactory material shall be placed in embankment fills; unsuitable material shall be placed in designated waste areas or as directed by the RPR. All necessary work shall be performed true to final line, elevation, and cross-section. The Contractor shall maintain ditches constructed on the project to the required cross-section and shall keep them free of debris or obstructions until the project is accepted.

152-2.5 PREPARATION OF CUT AREAS OR AREAS WHERE EXISTING PAVEMENT HAS BEEN REMOVED. In those areas on which a subbase or base course is to be placed, or under any areas to be paved, the top 8 inches (300 mm) of subgrade shall be compacted to not less than 100 % of maximum density for non-cohesive soils, and 95% of maximum density for cohesive soils as determined by ASTM D1557. As used in this specification, "non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by ASTM D4318.

152-2.6 PREPARATION OF EMBANKMENT AREA. All sod and vegetative matter shall be removed from the surface upon which the embankment is to be placed. The cleared surface shall be broken up by plowing or scarifying to a minimum depth of 6 inches (150 mm) and shall then be compacted per paragraph 152-2.10.

Sloped surfaces steeper than one (1) vertical to four (4) horizontal shall be plowed, stepped, benched, or broken up so that the fill material will bond with the existing material. When the subgrade is part fill and part excavation or natural ground, the excavated or natural ground portion shall be scarified to a depth of 12 inches (300 mm) and compacted as specified for the adjacent fill.

No direct payment shall be made for the work performed under this section. The necessary clearing and grubbing and the quantity of excavation removed will be paid for under the respective items of work.

152-2.6.1 PREPARATION OF UNDERLYING COURSE – LLDPE GEOMEMBRANE. In addition to meeting all smoothness and density requirements of this specification, the suitable embankment shall be inspected prior to installation of the geomembrane to ensure the suitable embankment is smooth and free of any protrusions or sharp rocks which could damage or tear the geomembrane. No stones or other hard objects that will not pass through a 3/8-inch screen shall be present in the top 1-inch of the suitable embankment surface.

152-2.7 CONTROL STRIP. The first half-day of construction of subgrade and/or embankment shall be considered as a control strip for the Contractor to demonstrate, in the presence of the RPR, that the materials, equipment, and construction processes meet the requirements of this specification. The sequence and manner of rolling necessary to obtain specified density requirements shall be determined. The maximum compacted thickness may be increased to a maximum of 12 inches (300 mm) upon the Contractor's demonstration that approved equipment and operations will uniformly compact the lift to the specified density. The RPR must witness this demonstration and approve the lift thickness prior to full production.

Control strips that do not meet specification requirements shall be reworked, re-compacted, or removed and replaced at the Contractor's expense. Full operations shall not begin until the control strip has been accepted by the RPR. The Contractor shall use the same equipment, materials, and construction methods for the remainder of construction, unless adjustments made by the Contractor are approved in advance by the RPR.

152-2.8 FORMATION OF EMBANKMENTS. The material shall be constructed in lifts as established in the control strip, but not less than 6 inches (150 mm) nor more than 12 inches (300 mm) of compacted thickness.

When more than one lift is required to establish the layer thickness shown on the plans, the construction procedure described here shall apply to each lift. No lift shall be covered by subsequent lifts until tests verify that compaction requirements have been met. The Contractor shall rework, re-compact and retest any material placed which does not meet the specifications.

The lifts shall be placed, to produce a soil structure as shown on the typical cross-section or as directed by the RPR. Materials such as brush, hedge, roots, stumps, grass and other organic matter, shall not be incorporated or buried in the embankment.

Earthwork operations shall be suspended at any time when satisfactory results cannot be obtained due to rain, freezing, or other unsatisfactory weather conditions in the field. Frozen material shall not be placed in the embankment nor shall embankment be placed upon frozen material. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. The Contractor shall drag, blade, or slope the embankment to provide surface drainage at all times.

The material in each lift shall be within $\pm 2\%$ of optimum moisture content before rolling to obtain the prescribed compaction. The material shall be moistened or aerated as necessary to achieve a uniform moisture content throughout the lift. Natural drying may be accelerated by blending in dry material or manipulation alone to increase the rate of evaporation.

The Contractor shall make the necessary corrections and adjustments in methods, materials or moisture content to achieve the specified embankment density.

The RPR will take samples of excavated materials which will be used in embankment for testing and develop a Moisture-Density Relations of Soils Report (Proctor) in accordance with ASTM D 1557. A new Proctor shall be developed for each soil type based on visual classification.

Density tests will be taken by the RPR for every 2,400 square yards of compacted embankment for each lift which is required to be compacted, or other appropriate frequencies as determined by the RPR.

If the material has greater than 30% retained on the 3/4-inch (19.0 mm) sieve, follow AASHTO T-180 Annex Correction of maximum dry density and optimum moisture for oversized particles.

Rolling operations shall be continued until the embankment is compacted to not less than 100% of maximum density for non-cohesive soils, and 95% of maximum density for cohesive soils as determined by ASTM D1557. Under all areas to be paved, the embankments shall be compacted to a depth of 8-inches and to a density of not less than 95 percent of the maximum density as determined by ASTM D1557. The conditioned clay embankment shall be compacted to not less than 90% and not more than 95% of the maximum density as determined by ASTM D 698 and shall be 0 to +4% of optimum moisture content. As used in this specification, "non-cohesive" shall mean those soils having a plasticity index (PI) of less than 3 as determined by ASTM D4318.

On all areas outside of the pavement areas, no compaction will be required on the top 4 inches.

The in-place field density shall be determined in accordance with ASTM D1556 or ASTM 6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938.

The RPR shall perform all density tests. If the specified density is not attained, the area represented by the test or as designated by the RPR shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

Compaction areas shall be kept separate, and no lift shall be covered by another lift until the proper density is obtained.

During construction of the embankment, the Contractor shall route all construction equipment evenly over the entire width of the embankment as each lift is placed. Lift placement shall begin in the deepest portion of the embankment fill. As placement progresses, the lifts shall be constructed approximately parallel to the finished pavement grade line.

When rock, concrete pavement, asphalt pavement, and other embankment material are excavated at approximately the same time as the subgrade, the material shall be incorporated into the outer portion of the embankment and the subgrade material shall be incorporated under the future paved areas. Stones, fragmentary rock, and recycled pavement larger than 4 inches (100 mm) in their greatest dimensions will not be allowed in the top 12 inches (300 mm) of the subgrade. Rockfill shall be brought up in lifts as specified or as directed by the RPR and the finer material shall be used to fill the voids forming a dense, compact mass. Rock, cement concrete pavement, asphalt pavement, and other embankment material shall not be disposed of except at places and in the manner designated on the plans or by the RPR.

When the excavated material consists predominantly of rock fragments of such size that the material cannot be placed in lifts of the prescribed thickness without crushing, pulverizing or further breaking down the pieces, such material may be placed in the embankment as directed in lifts not exceeding 2 feet (60 cm) in thickness. Each lift shall be leveled and smoothed with suitable equipment by distribution of spalls and finer fragments of rock. The lift shall not be constructed above an elevation 4 feet (1.2 m) below the finished subgrade.

There will be no separate measurement of payment for compacted embankment. All costs incidental to placing in lifts, compacting, discing, watering, mixing, sloping, and other operations necessary for construction of embankments will be included in the contract price for excavation, borrow, or other items.

152-8.1 PLACEMENT – LLDPE GEOMEMBRANE. Geomembrane shall be placed over the prepared subgrade in such a manner as to assure minimum handling. Only those rolls of material, which can be seamed together that same day, and covered within two days, shall be unrolled and placed in position.

Installation should be started at the prevalent upwind side of the area and proceed downwind. The leading edge of previously unrolled geomembrane shall be secured by means of ballast spaced every 3-ft to hold it down during unexpected high winds. Material shall not be unrolled when high winds are forecast during the timeframe that the geomembrane will be uncovered.

The Contractor shall submit a geomembrane placement plan to the RPR for approval prior to placing geomembrane. The placement plan shall depict roll placement and phasing showing that the geomembrane can be placed and covered in an orderly and efficient manner with minimal tracking over uncovered geomembrane.

Seaming shall be accomplished according to the manufacturer's recommendations. The liner shall be clean and free of dirt or debris prior to seaming. Cold weather installations should follow guidelines as outlined in GRI - GM9.

All seams shall be non-destructively tested to check seam continuity the full length using an air pressure or vacuum test.

Destructive seam tests at a frequency of one sample per 500 feet of seam shall be performed to evaluate bonded seam strength.

All defects shall be repaired by patching, grinding and rewelding, spot welding, flap welding, capping or topping per the manufacturer's requirements.

152-2.9 PROOF ROLLING. Not Used.

152-2.10 COMPACTION REQUIREMENTS. The subgrade under areas to be paved shall be compacted to a depth of 8 inches (300 mm) and to a density of not less than 100 percent of the maximum dry density as determined by ASTM D1557. The subgrade in areas outside the limits of the pavement areas shall be compacted to a depth of 8 inches (300 mm) and to a density of not less than 95 percent of the maximum density as determined by ASTM D698.

The material to be compacted shall be within $\pm 2\%$ of optimum moisture content before being rolled to obtain the prescribed compaction (except for expansive soils). When the material has greater than 30 percent retained on the $\frac{3}{4}$ inch (19.0 mm) sieve, follow the methods in ASTM D1557. Tests for moisture content and compaction will be taken at a minimum of 1 test for each 1,000 S.Y. of subgrade. All quality assurance testing shall be done by the RPR.

The in-place field density shall be determined in accordance with ASTM D1556 or ASTM D6938 using Procedure A, the direct transmission method, and ASTM D6938 shall be used to determine the moisture content of the material. The machine shall be calibrated in accordance with ASTM D6938 within 12 months prior to its use on this contract. The gage shall be field standardized daily.

Maximum density refers to maximum dry density at optimum moisture content unless otherwise specified.

If the specified density is not attained, the entire lot shall be reworked and/or re-compacted and additional random tests made. This procedure shall be followed until the specified density is reached.

All cut-and-fill slopes shall be uniformly dressed to the slope, cross-section, and alignment shown on the plans or as directed by the RPR and the finished subgrade shall be maintained.

152-2.11 FINISHING AND PROTECTION OF SUBGRADE. Finishing and protection of the subgrade is incidental to this item. Grading and compacting of the subgrade shall be performed so that it will drain readily. All low areas, holes or depressions in the subgrade shall be brought to grade. Scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade shaped to the lines and grades shown on the plans. All ruts or rough places that develop in the completed subgrade shall be graded, re-compacted, and retested. The Contractor shall protect the subgrade from damage and limit hauling over the finished subgrade to only traffic essential for construction purposes.

The Contractor shall maintain the completed course in satisfactory condition throughout placement of subsequent layers. No subbase, base, or surface course shall be placed on the subgrade until the subgrade has been accepted by the RPR.

152-2.11.1 MAINTENANCE – LLDPE GEOMEMBRANE. The geomembrane shall be kept free of dirt, rocks, and debris until the overlying layer is placed.

The equipment used to place the overlying layer will not be allowed to operate on the geomembrane. No equipment or traffic will be allowed on the geomembrane until the overlying layer has been placed. Any damage to the geomembrane as a result of traffic shall be repaired by the Contractor prior to placing the overlying layer.

152-2.12 HAUL. All hauling will be considered a necessary and incidental part of the work. The Contractor shall include the cost in the contract unit price for the pay of items of work involved. No payment will be made separately or directly for hauling on any part of the work.

The Contractor's equipment shall not cause damage to any excavated surface, compacted lift or to the subgrade as a result of hauling operations. Any damage caused as a result of the Contractor's hauling operations shall be repaired at the Contractor's expense.

The Contractor shall be responsible for providing, maintaining and removing any haul roads or routes within or outside of the work area, and shall return the affected areas to their former condition, unless otherwise authorized in writing by the Owner. No separate payment will be made for any work or materials associated with providing, maintaining and removing haul roads or routes.

152-2.13 SURFACE TOLERANCES. In those areas on which a subbase or base course is to be placed, the surface shall be tested for smoothness and accuracy of grade and crown. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be scarified to a depth of at least 3 inches (75 mm), reshaped and re-compacted to grade until the required smoothness and accuracy are obtained and approved by the RPR. The Contractor shall perform all final smoothness and grade checks in the presence of the RPR. Any deviation in surface tolerances shall be corrected by the Contractor at the Contractor's expense.

- a. **Smoothness.** The finished surface shall not vary more than $\pm \frac{1}{2}$ inch (12 mm) when tested with a 12-foot (3.7-m) straightedge applied parallel with and at right angles to the centerline. The straightedge shall be moved continuously forward at half the length of the 12-foot (3.7-m) straightedge for the full length of each line on a 50-foot (15-m) grid.
- b. **Grade.** The grade and crown shall be measured on a 50-foot (15-m) grid and shall be within ± 0.05 feet (15 mm) of the specified grade.

On safety areas, turfed areas and other designated areas within the grading limits where no subbase or base is to be placed, grade shall not vary more than 0.10 feet (30 mm) from specified grade. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping.

152-2.14 TOPSOIL. When topsoil is specified or required as shown on the plans or under Item T-905, it shall be salvaged from stripping or other grading operations. The topsoil shall meet the requirements of Item T-905. If, at the time of excavation or stripping, the topsoil cannot be placed in its final section of finished construction, the material shall be stockpiled at approved locations. Stockpiles shall be located as shown on the plans and the approved CSPP, and shall not be placed on areas that subsequently will require any excavation or embankment fill. If, in the judgment of the RPR, it is practical to place the salvaged topsoil at the time of excavation or stripping, the material shall be placed in its final position without stockpiling or further re-handling.

Upon completion of grading operations, stockpiled topsoil shall be handled and placed as shown on the plans and as required in Item T-905. Topsoil shall be paid for as provided in Item T-905. No direct payment will be made for topsoil under Item P-152.

METHOD OF MEASUREMENT

152-3.1 Measurement for payment specified by the cubic yard (cubic meter) shall be computed by the average end areas of design cross sections. The end area is that bound by the original ground line established by field cross-sections and the final theoretical pay line established by cross-sections shown on the plans, subject to verification by the RPR.

152-3.2 The quantity of unclassified excavation to be paid for shall be the number of cubic yards (cubic meters) measured in its original position. Measurement shall not include the quantity of materials excavated without authorization beyond normal slope lines, or the quantity of material used for purposes other than those directed.

152-3.3 The quantity of embankment in place shall be the number of cubic yards (cubic meters) measured in its final position.

152-3.4 LLDPE geomembrane shall be measured by the number of square yards of material placed and accepted by the RPR as complying with the plans and specifications excluding seam overlaps and edge anchoring.

BASIS OF PAYMENT

152-4.1 Unclassified excavation payment shall be made at the contract unit price per cubic yard (cubic meter). This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

152-4.2 For embankment in place, payment shall be made at the contract unit price per cubic yard (cubic meter). This price shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

152-4.3 Payment shall be made at the contract unit price per square yard for LLDPE geomembrane. The price shall be full compensation for furnishing all labor, equipment, material, anchors, and necessary incidentals.

Payment will be made under:

Item P-152a	Unclassified Excavation - per cubic yard (cubic meter)
Item P-152b	Conditioned Clay Embankment – per cubic yard (cubic meter)
Item P-152c	On-site Suitable Embankment – per cubic yard (cubic meter)
Item P-152d	40 Mil LLDPE Geomembrane - per square yard

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

American Association of State Highway and Transportation Officials (AASHTO)	
AASHTO T-180	Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop
ASTM International (ASTM)	
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³ (600 kN-m/m ³))
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³ (2700 kN-m/m ³))
ASTM D6938	Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
Advisory Circulars (AC)	
AC 150/5370-2	Operational Safety on Airports During Construction Software
Software	
FAARFIELD	– FAA Rigid and Flexible Iterative Elastic Layered Design
U.S. Department of Transportation	
FAA RD-76-66	Design and Construction of Airport Pavements on Expansive Soils
Geosynthetic Research Institute (GRI)	
GRI – GM9	Standard Practice for Cold Weather Seaming of Geomembranes
GRI – GM 17	Standard Specification for Test Methods, Test Properties and Testing Frequency for Linear Low Density Polyethylene (LLDPE) Smooth and Textured Geomembranes

****END OF ITEM P-152****

ITEM P-190 UNSTABILIZED PERMEABLE SUBBASE COURSE

DESCRIPTION

190-1.1 This item shall consist of constructing an unstabilized permeable subbase course consisting of non-stabilized aggregates. The aggregate materials shall be blended in a continuous or batch type plant and hauled to the project site and spread in a uniform thickness over a previously constructed aggregate or geotextile separator layer.

MATERIALS

190-2.1 MATERIALS. Aggregates shall be hard, durable material. As a minimum, the aggregate should have at least two fractured faces as determined by the material retained on the No. 4 sieve and shall consist of 98% crushed stone. The material shall meet the requirements in Table 1 below.

Table 1 - Unstabilized Permeable Subbase Course Material Requirements

Material Test	Requirement	Standard
Percentage of Fractured Particles	Minimum 90% by weight of particles with at least two fractured faces and 98% with at least one fractured face ¹	ASTM D5821
Resistance to Degradation	45% maximum	ASTM C131
Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate	Loss after 5 cycles: 12% maximum using Sodium sulfate or 18% maximum using magnesium sulfate	ASTM C88
Plasticity Index	Material passing No. 40 Sieve - Non-plastic	AASHTO T90
Coefficient of Uniformity	Greater than 4	
CBR	20% Minimum	ASTM D1883
Permeability	1,000 ft/day Minimum	ASTM D2434
Effective Porosity	0.25	

¹The area of each face shall be equal to at least 75 percent of the smallest mid-sectional area of the piece. When two fractured faces are contiguous, the angle between the planes of fractures shall be at least 30° to count as two fractured faces.

a. Gradation. The Job Mix Gradation of the final mixture shall conform to the following gradation requirements when tested in accordance with ASTM C 136.

25 **Table 2 – Unstabilized Permeable Subbase Course Gradation Requirements ¹**

Sieve Size	Design Range (% by Weight Passing Sieve)	Job Mix Tolerances (Percent)	Job Mix Gradation (% Passing)
1-1/2 in.	100	0	100
1 in.	95-100	±6	--
1/2 in.	60-80	±6	--
No. 4	40-55	±6	--
No. 8	5-25	±6	--
No. 16	0-8	+0, -5	--
No. 50	0-5	+0, -5	--

26 ¹ The above Design Range gradation can be obtained using a blend of AASHTO
 27 Gradations No. 57 and No. 9 in an approximate 1:1 ratio.

28
 29 **190-2.2 Mix Design.** The Contractor shall submit for approval a Mix Design for the material and a statement
 30 naming the source of the material.

31
 32 The job mix formula shall establish the percentage of dry weight of aggregate passing each sieve size. The Job
 33 Mix formula shall be in effect until a modification is approved.

34
 35 The mix design shall be such that when the component sieve sizes are blended together and compacted per
 36 ASTM D4253 and tested for permeability, its permeability shall meet the requirements in Table 1 above.

37
 38 **190-2.3 Verification of Mix Design.** At least 15 days prior to the production of the unstabilized permeable
 39 subbase materials, the Contractor shall submit to the RPR for approval, a mix design having the required
 40 permeability.

41
 42 The Contractor shall also submit one test result for each property listed in Table 1 and a minimum of two (2)
 43 test results for gradation per Table 2.

44
 45 If unsatisfactory results for any specified characteristic of the work make it necessary, the Contractor may
 46 establish a new mix design for approval by the RPR. In such instances, if the Contractor fails to take corrective
 47 action, the RPR reserves the right to require an appropriate adjustment.

48
 49 In the event a new material source is necessary or materials from a previously tested and approved source are
 50 different in appearance or composition from the approved materials tested, as determined by the RPR, the
 51 Contractor shall conduct the same test procedures as specified above and submit these test results to the RPR
 52 for approval prior to delivering or using the material for the project.

53 54 55 **CONSTRUCTION METHODS**

56
 57 **190-3.1 EQUIPMENT.** All equipment necessary to mix, transport, place, compact, and finish the unstabilized
 58 permeable subbase shall be on the project and approved before work will be permitted to start. Such equipment
 59 shall include a stationary or portable continuous or batch type pugmill mixer equipped with batching or
 60 metering devices for proportioning the blend or other approved units capable of producing a blended material
 61 consistently meeting the gradation requirements. An asphalt paver shall be provided that is capable of

maintaining a uniform rate of travel while spreading and laying a lift of uniform consistency and thickness with proper grade control. Motor graders or smooth drum steel wheel rollers and other equipment and tools shall be provided as necessary to perform the work in a satisfactory manner.

190-3.2 PREPARATION OF UNDERLYING COURSE. The underlying material shall be checked and approved by the RPR far enough in advance of spreading the unstabilized permeable subbase to permit one day's operation, exception being permitted at the discretion of the RPR.

Any ruts or soft yielding places caused by improper drainage conditions, hauling, or any other cause shall be corrected as approved by the RPR at the Contractor's expense before the unstabilized permeable subbase course is placed.

190-3.3 MIXING. The crushed aggregates shall be blended together in the proper proportions as specified in the mix design.

Surge hoppers shall be used to supply aggregates for blending to meet the required gradation. The blending shall be handled in such a manner as to prevent contamination, degradation, and segregation.

190-3.4 QUALITY CONTROL TESTING.

- a. **Conformance to the Job Mix Formula.** Conformance to the mix design gradation will be determined on the basis of samples taken by the Contractor at the construction site after placement and tested in accordance with ASTM C 136.
- b. **Sampling and Testing.** Samples for gradation shall be taken at a rate of one (1) sample per every 4,800 square yards placed. Sampling shall be per ASTM D75 and tested per ASTM C136 and ASTM C117. The producer shall have a quality control technician available at the plant to immediately correct any deficiency in the product. In the event samples are in non-conformance with Table 2, one permeability test per lot shall be conducted in accordance with 190-2.1, to determine acceptability of the samples. The cost of the permeability tests required for acceptance shall be borne by the Contractor.

190-3.5 TRANSPORTATION OF THE MIXTURE. The blended material shall be hauled to the site in vehicles that will prevent contamination, degradation, and segregation of the material. Any equipment causing excessive segregation of the mixture, or that leaks and/or causes delays shall be removed from the work until such conditions are corrected.

Loads shall not be sent out so late in the day as to prevent completion of the spreading and compaction of the mixture during daylight, unless sufficient artificial light is provided.

Plant production and the number of trucks used for transportation shall be such as to ensure delivery of the mixture in sufficient quantities and at such intervals to permit continuous placement of the material with minimal stopping and starting of the spreading operation. Failure to maintain such delivery shall be cause to suspend the work.

190-3.6 SPREADING. The plant mixed unstabilized permeable subbase aggregates shall be delivered to the prepared course and spread as uniformly as possible with a minimum of manipulation to prevent segregation. The aggregate shall be placed in compacted lifts not to exceed 6 inches. An asphalt laydown machine with automatic grade control or a motor grader shall be used.

190-3.7 COMPACTION. Compaction shall be performed using a self-propelled 5- to 10-ton smooth drum steel wheel roller to achieve proper densification of the unstabilized permeable subbase course. Vibratory rollers can be used with care. Over-rolling can cause degradation of the aggregate material and a subsequent loss of

permeability. The number of roller passes to be made to achieve compaction shall be determined by the control strip as outlined in 190-3.8 below.

The Contractor shall notify the RPR at least 1 hour in advance of compacting the unstabilized permeable subbase course. If, in the opinion of the RPR, the degree of compaction changes, a new control strip shall be constructed at the Contractor's expense to establish a new Average Reference Maximum Density as described in 190-3.8 below. The Contractor shall submit copies of all test results daily to the RPR.

190-3.8 CONTROL STRIPS. One or more control strips shall be constructed at the beginning of work for the purpose of determining the project's compaction requirements. An additional control strip shall be constructed when a change is made in the type or source of aggregate material, whenever a change occurs in the composition of the material from the same source or as directed. Each control strip shall consist of an area of not more than 400 square yards and shall be constructed of the same material as that specified for the construction of the project.

The control strip shall be compacted by a minimum of two passes of the compaction equipment. Compaction shall continue until no appreciable increase in density is obtained by additional passes without crushing the aggregate. Density of the control strip shall be determined in accordance with the current provisions of ASTM D 6938 using the gage in the backscatter mode.

Upon completion of compaction, a minimum of ten (10) tests shall be taken by the RPR at random locations to determine the average in-place density of the control strip. The average value shall be the Reference Maximum Density for the unstabilized permeable subbase material from the same source used elsewhere on the project.

190-3.9 COMPACTION ACCEPTANCE SAMPLING AND TESTING. For purposes of monitoring conformance to the compaction requirements, the unstabilized permeable subbase constructed on the project shall be divided into lots consisting of approximately 2,400 square yards or less of area.

The RPR shall determine the average lot density of five (5) randomly selected locations in the lot. This average density shall not be less than 95% of the Average Reference Maximum Density in the control strip. If a lot fails to meet requirement, it shall be recompacted by the contractor at his/her expense and shall be resubmitted for acceptance. The RPR shall determine the new average lot density. If this density fails, the lot shall be removed and replaced at the Contractor's expense.

190-3.10 SHAPING AND FINISHING. After the unstabilized permeable subbase aggregate material has been compacted, the surface shall be shaped to the required cross-sections.

190-3.11 TOLERANCES.

a. **Surface Variation.** The surface tolerance shall be within $\pm 3/8"$. Low areas shall be corrected by adding material, grading and compacting.

b. **Thickness.** The thickness tolerance shall be within $\pm 1/2"$. Thin areas shall be corrected by adding material, grading and compacting at no additional cost.

Thickness acceptance shall be determined by survey before and after placement of the course. Survey points and/or red heads shall be set at intervals not to exceed 50 feet longitudinally and transversely. Copies of the field notes shall be immediately furnished to the RPR by the Contractor prior to covering the course.

190-3.12 MAINTENANCE UNDER TRAFFIC. Maintenance of the unstabilized permeable subbase shall be performed during its construction and until the Contractor has entirely covered the course with the next layer of material. It shall be the Contractor's responsibility to maintain drainage of the job site such that any fine material is not allowed to wash into and clog any part of the drainage system. Any area of the unstabilized permeable subbase that becomes clogged shall be reconstructed as approved by the RPR. Equipment used in the construction of an adjoining section may not be routed over completed sections of the unstabilized permeable subbase.

No equipment, except for that required for spreading and compaction, shall be allowed on the unstabilized permeable subbase until a minimum of 6 inches of material is covering the unstabilized permeable subbase.

In no case shall the edges of the unstabilized permeable subbase be left unprotected and subject to infiltration. The unstabilized permeable subbase shall be completely covered by the next layer of material within two (2) weeks following its completion.

METHOD OF MEASUREMENT

190-4.1 Unstabilized permeable subbase course shall be measured by the number of cubic yards (cubic meters) of unstabilized permeable subbase course material placed and compacted to specified density and plan thickness requirements in the completed course. The quantity of subbase course material shall be measured in final position based upon survey of the completed work computed from elevations to the nearest 0.01 foot (3 mm). Subbase materials shall not be included in any other excavation quantities.

BASIS OF PAYMENT

190-5.1 Payment shall be made at the contract unit price per cubic yard for unstabilized permeable subbase course. This price shall be full compensation for furnishing all materials; for all preparation, hauling, and placing of these materials; and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item P-190a	Unstabilized Permeable Subbase Course – per cubic yard
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REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM C 29	Unit Weight of Aggregate
ASTM C 88	Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	Standard Test Method for Materials Finer than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C 131	Resistance to Degradation of Small Size Course Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D75	Standard Practice for Sampling Aggregates

215	ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil
216		Using Standard Effort (12,400 ft-lbf/ft ³ (600 kN-m/m ³))
217	ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the
218		Sand-Cone Method
219	ASTM D1557	Standard Test Methods for Laboratory Compaction Characteristics of Soil
220		Using Modified Effort (56,000 ft-lbf/ft ³ (2,700 kN-m/m ³))
221	ASTM D 1883	CBR (California Bearing Ratio) of Laboratory Compacted Soils
222	ASTM D 2167	Density and Unit Weight of Soil in Place by the Rubber Balloon Method
223	ASTM D2434	Permeability of Granular Soils (Constant Head)
224	ASTM D2487	Standard Practice for Classification of Soils for Engineering Purposes
225		(Unified Soil Classification System)
226	ASTM D 3017	Water Content of Soil and Rock in Place by Nuclear Methods (Shallow
227		Depth)
228	ASTM D 3665	Random Sampling of Construction Materials
229	ASTM D4253	Standard Test Methods for Maximum Index Density and Unit Weight of
230		Soils Using a Vibratory Table
231	ASTM D4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index
232		of Soils
233	ASTM D4759	Practice for Determining the Specification Conformance of Geosynthetics
234	ASTM D 4791	Flat or Elongated Pieces
235	ASTM D 5821	Determining the Percentage of Fractured Particles in Course Aggregate
236	ASTM D6938	Standard Test Method for In-Place Density and Water Content of Soil and
237		Soil-Aggregate by Nuclear Methods (Shallow Depth)
238		
239	American Association of State Highway and Transportation Officials (AASHTO)	
240	M 288	Geotextile Specification for Highway Applications
241	T-90	Determining the Plastic Limit and Plasticity Index of Soils
242		
243		
244		**END OF ITEM P-190**

