DATE DRILLED:	April 19, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	---
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND CLASSIFICATION

DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
Silty CLAY, moist	Dark Brown	Stiff	CL	1–2						
Silty SAND, moist	Reddish Brown	Med. Dense	SM	3–4	X	27	12.1	109.6	25.9	
				5–7						
Silty GRAVEL, moist	L. Brown	Dense	GP	8						
Silty CLAY, moist	Light Brown	Stiff	CL	9–10		16				
				11–12						
Sandy GRAVEL, moist	Light Brown	Very Dense	GP	13–14	X	50/5"				
				15						
Total Depth 15 feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A | BORING NO.: R3

DATE DRILLED:	April 19, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	—
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
Silty CLAY, moist	Dark Brown	Stiff	CL	1						
Sandy CLAY, moist	Brown	Stiff	CL	2		10	13.8		40.1	
				3						
Clayey SAND, moist	Brown	Med. Dense	SC	4						
Silty CLAY, moist	Light Brown	Hard	CL	5						
				6						
				7		44				
Silty GRAVEL, moist	Brown	Very Dense	GP GM	8						
				9						
				10						
				11						
Clayey GRAVEL w / sand, moist	Brown	Very Dense	GC	12						
				13						
				14						
				15						
Total Depth 15 feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A

BORING NO.: R4

DATE DRILLED:	April 18, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	—
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND CLASSIFICATION

DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
Silty CLAY, moist	Dark Brown	Firm	CL	1–3						
Silty SAND	Reddish Brown	Med. Dense	SM	3–4		15				
Clayey SILT, moist	Brown	Very Stiff	ML	4–10						
				10–11		16				
GRAVEL w / sand, moist	Brown	Very Dense	GP	11–14						
				14		34/3"				
Total Depth 14 ½ feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A

BORING NO.: R5

DATE DRILLED:	April 18, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	—
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND CLASSIFICATION

DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
Silty CLAY w / gravel	D. Brown	Firm	CL	1						
GRAVEL w / sand, moist	Light Brown	Very Dense	GW	2						
				3		34/4"				
				4						
				5	*					
				6						
Drilling Refusal at 6 feet Total Depth 6 feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A | BORING NO.: R6

DATE DRILLED:	April 18, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	—
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
DESCRIPTION AND CLASSIFICATION										
Silty CLAY, moist	Dark Brown	Firm Stiff	CL	1						
GRAVEL w / sand, moist	Light Brown	Very Dense	GP	2 3 4 5 6 7 8 9	X *	51				
Drilling refusal at 9 feet Total Depth 9 feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A

BORING NO.: R7

DATE DRILLED:	April 18, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	—
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND CLASSIFICATION

DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
GRAVEL w / sand, moist	Brown	Dense	GW	1–3	⊠	35	5.6	121.6	5.7	
Silty SAND, moist	Brown	Med. Dense	SM	4						
Silty CLAY, moist	Brown	Stiff	CL	5–6						
Clayey GRAVEL w / sand, moist	Brown	Med. Dense	GL	7–8		20				
SAND w / silt and gravel, moist	Brown	Dense	SP	9–11	*					
				12–15						
Total Depth 15 feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A | BORING NO.: R8

DATE DRILLED:	April 18, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	---
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND CLASSIFICATION

DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
Silty CLAY, moist	Dark Brown / Light Brown	Stiff	CL	1–4	X	11	26.3		93.3	
GRAVEL w / sand, moist, minor Fe staining	Light Brown	Very Dense	GP	4–8	*	34/2"				
Silty CLAY, moist	Light Brown	Hard	CL	13–14	X	40				
GRAVEL, moist	L. Brown	V. Dense	GP	15						
Gravel, silty CLAY w / sand, moist	Brown	Stiff	CL							
Total Depth 15 ½ feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A | BORING NO.: R9

S:\1506-07 Lowes Riverton LOGS.GPR

DATE DRILLED:	April 18, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	---
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
Silty CLAY, moist	Light Brown	Firm Stiff	CL	1						
				2						
				3		62	26.5	97.0	83.9	
GRAVEL w / sand, moist, minor Fe staining	Light Brown	Very Dense	GP	4						
				5						
				6						
				7						
				8						
				9		50/6"				
				10						
				11						
GRAVEL w / sand, moist	Light Brown	Very Dense	GP	12						
				13						
				14						
				15						
Total Depth 15 feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A

BORING NO.: R10

DATE DRILLED:	April 18, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	---
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND CLASSIFICATION

DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
Silty CLAY, moist	Light Brown / Light Gray	Stiff	CL	1–2						
GRAVEL w / sand, moist	Light Brown	Dense	GP	3–4		42				
				5–12						
				13		50/6"				
				14						
Total Depth 14 feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A | BORING NO.: R11

DATE DRILLED:	April 15, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	---
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND CLASSIFICATION

DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
Sandy CLAY, moist	Brown	Firm	CL	1 2 3	X	17	24.4		78.5	
Sandy GRAVEL, moist	Light Brown	Dense	GP	4 5 6 7 8	* *					
				9 10 11		88				
Lean CLAY, moist, Fe staining	Gray	Stiff	CL	12 13 14	X	44				
Sandy CLAY w/ gravel, moist	R. Brown	Hard	CL	15						
Total Depth 15 feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A

BORING NO.: R12

DATE DRILLED:	April 19, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	—
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE							
Silty CLAY, moist	Dark Brown	Stiff	CL	1 2 3 4 5	BULK					
Total Depth 5 feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A

BORING NO.: RP1

DATE DRILLED:	April 18, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	—
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE							
Top soil. Silty CLAY w / gravel, moist	D.Brown	Firm	CL	1	BULK					
Silty SAND w / gravel	Reddish Brown	Dense	SM	2						
				3						
				4						
				5						
Total Depth 5 feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A | BORING NO.: RP2

DATE DRILLED:	April 19, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	---
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
DESCRIPTION AND CLASSIFICATION										
Silty CLAY, moist	D. Brown	Firm	CL	1						
Clayey SILT, moist	Gray	Stiff	ML	2 3 4						
Fine SAND w / silt, moist	Gray	Med. Dense	SP	5		15				
Silty CLAY w / gravel, moist	Light Brown	Very Stiff	CL	6 7 8 9 10 11	*					
Silty GRAVEL, moist	Brown	Very Dense	GM	12 13 14 15						
Total Depth 15 feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A | BORING NO.: DP1

DATE DRILLED:	April 19, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	—
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND CLASSIFICATION

DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
Silty CLAY, moist	Dark Brown Gray	Stiff	CL	1 2 3 4						
Fine SAND, moist	Gray	Med. Dense	SP	5		23				
Clayey GRAVEL	Light Brown	Very Dense	CL	6 7						
Refusal @ 7 feet Total Depth 7 feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A | BORING NO.: DP2

APPENDIX B

LABORATORY TESTING

APPENDIX B

LABORATORY TESTING

The natural water content and dry unit weight was determined on selected samples and is recorded on the boring logs at the appropriate sample depths.

Eighteen No. 200 sieve tests were performed on selected samples of the subsurface soils to aid in classifying the soils according to the Unified Soil Classification System. Nine dry density tests and eighteen water content tests were performed on selected soils. The results of these tests are presented on the boring logs at the appropriate sample depth.

Four laboratory compaction tests (ASTM D 1557) were performed on a representative bulk samples of the native on-site soils. The results of these tests are presented in Appendix B.

For CBR tests were performed to evaluate the pavement subgrade characteristics of the native on-site soil. The results of these tests are presented in Appendix B.

The pH of the native on-site soil was determined.

CMT ENGINEERING LABORATORIES 25 years

Construction • Materials • Technologies
Geotechnical, Environmental, & Materials Engineering / Testing / Research

May 2, 2005

Wasatch Enviromental
2410 West California Avenue
Salt Lake City, UT 84104

California Bearing Ratio

ASTM D-1883

Job No: 1729

Project: Riverton Lowes

Date Tested: 4/27/2005

Soil Description: Medium brown sandy clay

Lab No: 48028

Proctor Method: D-1557

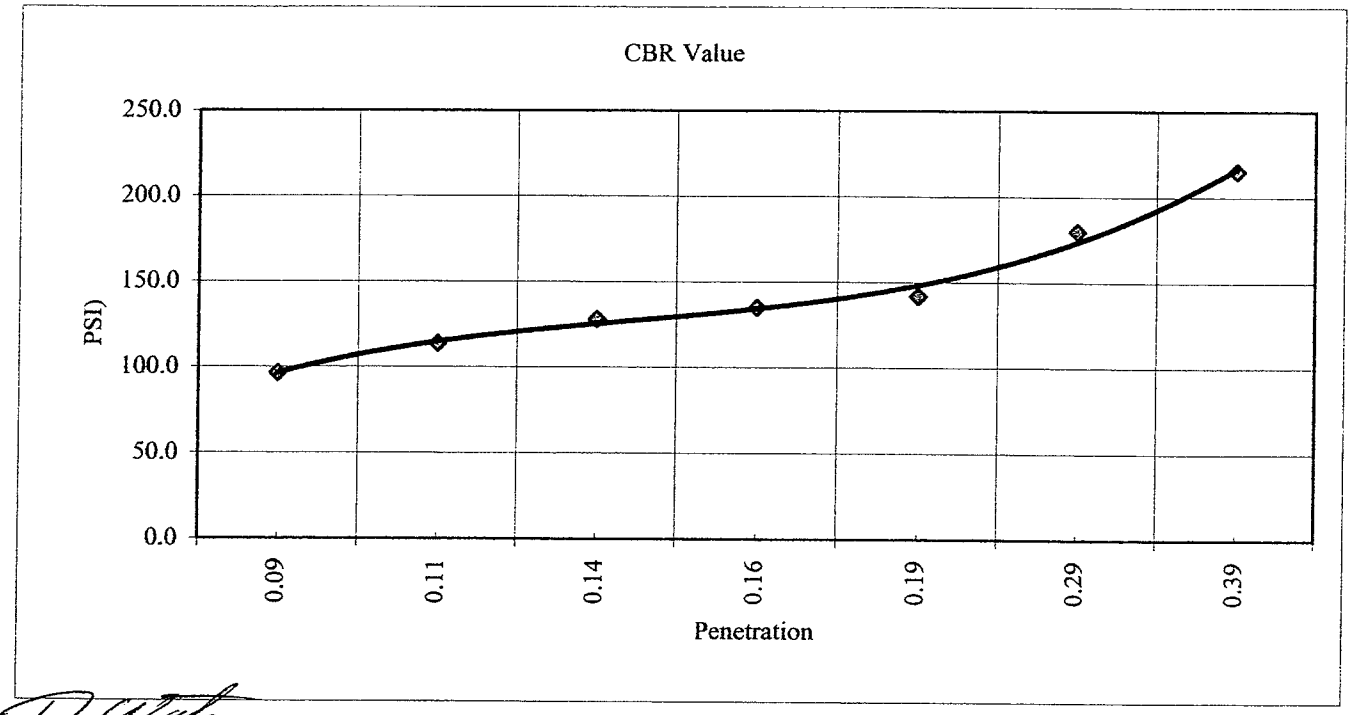
Technician: mj

Location: 1506-7 LP2 @ 0-5'

Proctor Values					
			Dry Density:	113.9	PCF
Maximum Dry Density (pcf):	116.8		Moisture Content:	14.0	%
Optimum Moisture (%):	13.8		Percent Compaction:	97.5	%
Visual Soil Classification:			Surcharge (lbs.):	10	Lbs

CBR Test Results

CBR Value@ 0.1":	10	%
CBR Value@ 0.2":	9	%
% Swell:	0.7%	%



Manager

CMT ENGINEERING LABORATORIES 25 years

Construction • Materials • Technologies
Geotechnical, Environmental, & Materials Engineering / Testing / Research

May 2, 2005

Wasatch Enviromental
2410 West California Avenue
Salt Lake City, UT 84104

California Bearing Ratio

ASTM D-1883

Job No: 1729

Project: Riverton Lowes

Date Tested: 4/27/2005

Soil Description: Gray sandy clay

Lab No: 48030

Proctor Method: D-1557

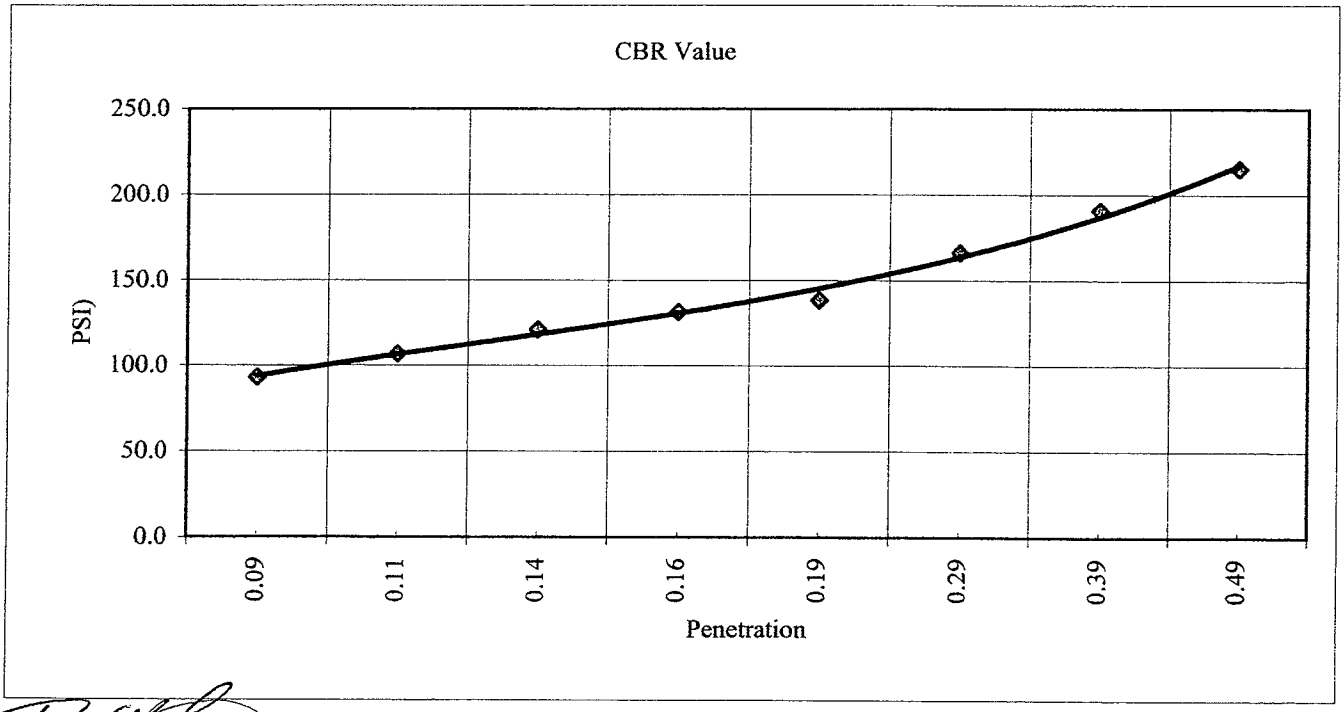
Technician: mj

Location: 1506-7 RP1 @ 0-5'

Proctor Values					
			Dry Density:	109.6	PCF
Maximum Dry Density (pcf):	114.1		Moisture Content:	14.4	%
Optimum Moisture (%):	15.2		Percent Compaction:	96.0	%
Visual Soil Classification:			Surcharge (lbs.):	10	Lbs

CBR Test Results

CBR Value@ 0.1":	10	%
CBR Value@ 0.2":	9	%
% Swell:	0.7%	%



Manager

DATE DRILLED:	April 18, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	---
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND CLASSIFICATION

DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
Silty CLAY, moist	D.Brown	Firm	CL	1	BULK					
Silty SAND w / gravel	Brown	Med. Dense	SM	2						
				3						
				4						
				5						
Total Depth 5 feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A

BORING NO.: RP3

DATE DRILLED:	April 18, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	—
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE							
Silty CLAY, moist	D.Brown	Firm	CL	1						
Silty SAND w / gravel	Brown	Med. Dense	SM	2	*					
				3						
				4						
				5						
Total Depth 5 feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A | BORING NO.: ROW1

S:\1506-07 Lowes Riverton LOGS.CDR

DATE DRILLED:	April 18, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	---
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE							
Silty CLAY, moist	Dark Brown	Stiff	CL	1 2 3 4	BULK					
Silty CLAY w / gravel, moist	Brown	Hard	CL	5						
Total Depth 5 feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A | BORING NO.: ROW2

DATE DRILLED:	April 18, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	—
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND CLASSIFICATION

DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE	DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
Silty CLAY, moist	Dark Brown	Stiff	CL	1 2 3 4 5	BULK					
Total Depth 5 feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A | BORING NO.: ROW3

DATE DRILLED:	April 19, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	---
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE							
Silty CLAY, moist	Dark Brown	Firm	CL	1 2 3 4 5						
Total Depth 5 feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A | BORING NO.: ROW4

DATE DRILLED:	April 19, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	—
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE							
Silty CLAY, moist	Dark Brown	Stiff	CL	1	BULK					
Silty SAND w / gravel	Reddish Brown	Very Stiff	ML	2 3 4						
Clayey SILT	R. Brown	V.Stiff	ML	5						
Total Depth 5 feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A | BORING NO.: ROW5

DATE DRILLED:	April 19, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	---
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE							
Silty CLAY, moist	Dark Brown / Light Brown	Stiff	CL	1 – 2						
Clayey SILT w / sand, moist	Reddish Brown	Very Stiff	ML	3 – 4						
				5						
Total Depth 5 feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A | BORING NO.: ROW6

DATE DRILLED:	April 19, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	---
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE							
Silty CLAY, moist	Dark Brown	Stiff	CL	1						
				2						
				3						
SILT w / sand, moist	Reddish Brown	Very Stiff	ML	4						
				5						
Total Depth 5 feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A | BORING NO.: ROW 7

DATE DRILLED:	April 19, 2005
LOGGED BY:	VJ
REFERENCE ELEVATION:	—
DRILL RIG:	Mobile B61
BORING DIAMETER:	8"
DEPTH TO GROUNDWATER:	Not Encountered

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	BLOWS/FOOT	WATER CONTENT (%)	DRY DENSITY (pcf)	PASSING 200 SIEVE (%)	OTHER
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE							
Silty CLAY, moist	Dark Brown	Stiff	CL	1 2 3 4 5	BULK					
Total Depth 5 feet										

WASATCH ENVIRONMENTAL

Environmental Science and Engineering

BORING LOG

Riverton Lowe's
12600 South Street and Bangerter Highway
Riverton, UT

PROJECT NO.: 1506-07A

BORING NO.: ROW8

CMT ENGINEERING LABORATORIES 25 years

Construction • Materials • Technologies
Geotechnical, Environmental, & Materials Engineering / Testing / Research

May 2, 2005

Wasatch Enviromental
2410 West California Avenue
Salt Lake City, UT 84104

California Bearing Ratio

ASTM D-1883

Job No: 1729

Project: Riverton Lowes

Date Tested: 4/27/2005

Soil Description: Light brown sandy clay

Lab No: 48031

Proctor Method: D-1557

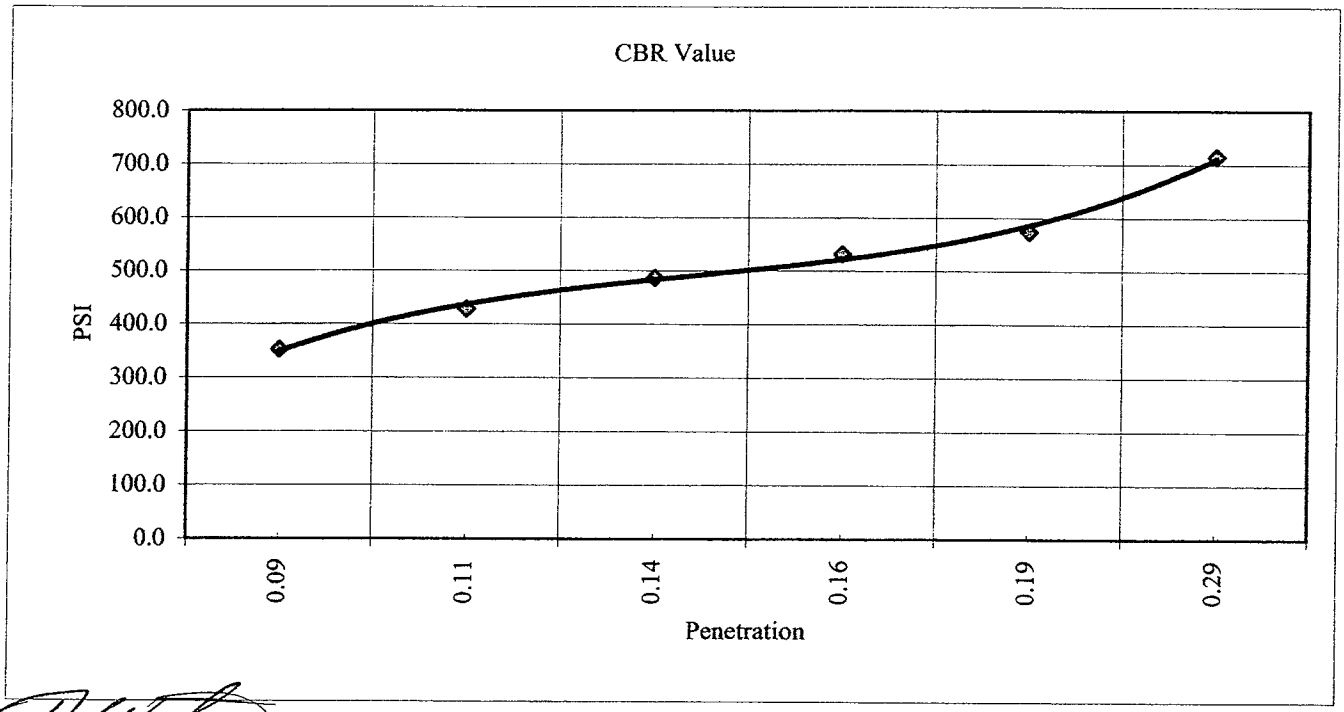
Technician: mj

Location: 1506-ROW5@ 0-5'

Proctor Values					
Maximum Dry Density (pcf):	125.6		Dry Density:	121.5	PCF
Optimum Moisture (%):	10.2		Moisture Content:	10.8	%
Visual Soil Classification:			Percent Compaction:	96.8	%
			Surcharge (lbs.):	10	Lbs

CBR Test Results

CBR Value@ 0.1":	39	%
CBR Value@ 0.2":	38	%
% Swell:	0.7%	%



Manager

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May 2, 2005

Wasatch Enviromental
2410 West California Avenue
Salt Lake City, UT 84104

California Bearing Ratio

ASTM D-1883

Job No: 1729

Project: Riverton Lowes

Date Tested: 4/27/2005

Soil Description: Light Brown Sandy Clay

Lab No: 48029

Proctor Method: D-1557

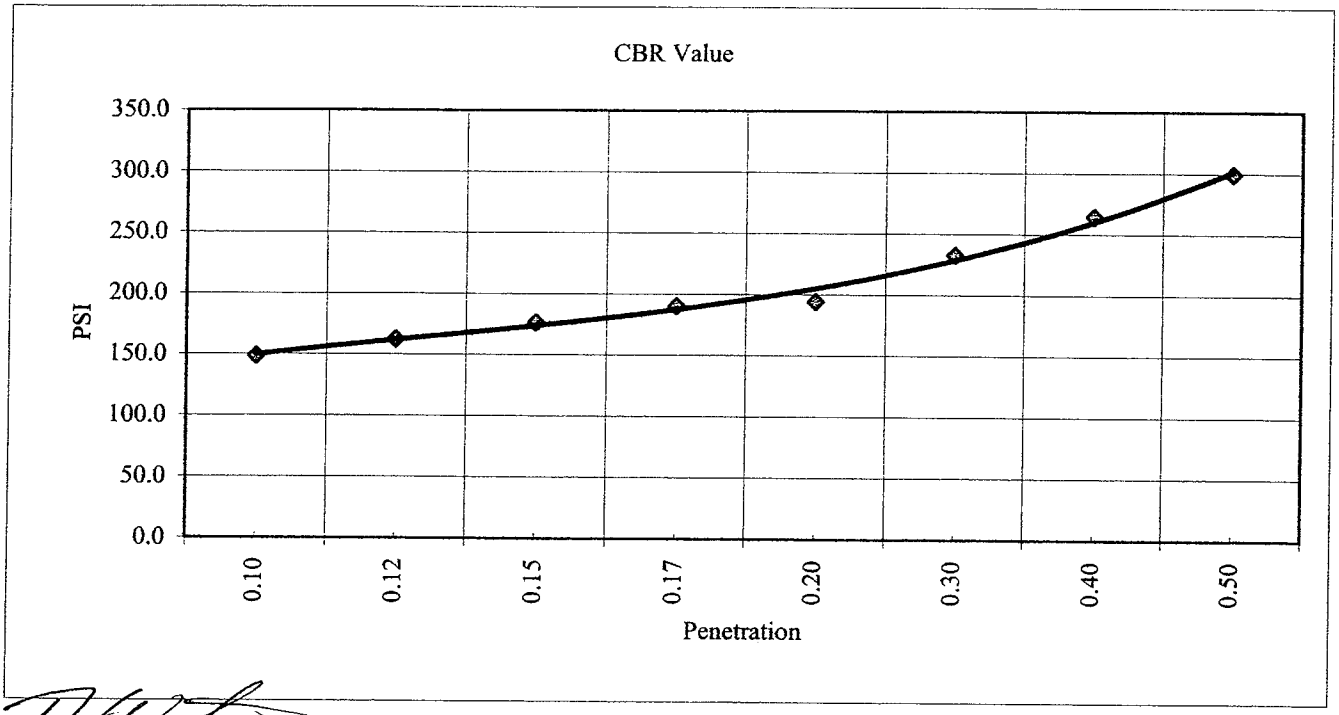
Technician: mj

Location: 1506-7 ROW 8 @0-5'

Proctor Values					
Maximum Dry Density (pcf):	117.7		Dry Density:	112.2	PCF
Optimum Moisture (%):	12.8		Moisture Content:	13.3	%
Visual Soil Classification:			Percent Compaction:	95.3	%
			Surcharge (lbs.):	10	Lbs

CBR Test Results

CBR Value@ 0.1":	15	%
CBR Value@ 0.2":	13	%
% Swell:	0.2%	%



Manager

INORGANIC ANALYSIS REPORT

AMERICAN WEST ANALYTICAL LABORATORIES

463 West 3600 South
Salt Lake City, Utah
84115

(801) 263-8686
T Free (888) 263-8686
Fax (801) 263-8687
mail: awal@awal-Labs.com

Client: Wasatch Environmental
Date Sampled: April 14, 2005
Project: Riverton Lowe's / 1506-07

Contact: Les Pennington
Date Received: April 27, 2005

Lab Sample ID:
L65563-01

Field Sample ID:
LB7 @ 1-3'

Analytical Results	Units	Date Analyzed	Method Used	Reporting Limit	Analytical Result
pH @ 25° C	pH Units	04/27/05 5:30 pm	9045C	0	**8.94** *

* Sample had expired upon receipt.

Kyle F. Gross
Laboratory Director

Peggy McNicol
QA Officer

Released by: _____
Laboratory Supervisor

Report Date: May 4, 2005

APPENDIX C

UDOT SPECIFICATIONS

SECTION 02721

UNTREATED BASE COURSE (UTBC)

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Production, construction and compaction of untreated base course material.

1.2 REFERENCES

A. AASHTO T 11: Materials Finer than 75 μm (no. 200) Sieve in Mineral Aggregates by Washing.

B. AASHTO T 19: Unit Weight and Voids in Aggregate.

C. AASHTO T 27: Sieve Analysis of Fine and Coarse Aggregates.

D. AASHTO T 90: Determining the Plastic Limit and Plasticity Index of Soils.

E. AASHTO T 96: Resistance to Degradation of Small-Sized Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.

F. AASHTO T 180: Moisture-Density Relations of Soils Using a 4.54 kg (10 lb) Rammer and 457 mm (18 in) Drop.

G. AASHTO T 238: Density of Soil and Soil Aggregate (In-Place) by Nuclear Methods (Shallow Depth).

H. AASHTO T 239: Moisture Content of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth).

1.3 DEFINITIONS

A. **Mean of the Deviations:** The sum of the absolute values of the deviations divided by the number of tests in the lot. Refer to Table 2.

1.4 SUBMITTALS

A. Ten days before placement begins, submit a written report on the following:
   1. Aggregate suitability. Refer to this Section, Part 2.
   2. Name of supplier and source.

   3. Job mix gradation including single values for each sieve size based on the dry weight of the aggregate.

B. Resubmit all documents before a day's production starts if a change in source is required.
   1. Changes must fall within bands of Table 4 in this Section, and are subject to approval.
   2. Retroactive changes are allowed only for the first day's production for each construction season.

1.5 QUALITY ASSURANCE

A. Remove products found defective after installation and install acceptable products at no additional cost to the DEPARTMENT.

1.6 ACCEPTANCE

A. ENGINEER will take random sample tests on the grade.

B. Acceptance will be on a lot-by-lot basis where a lot consists of a single layer of not more than 6500 m^2 placed, with five approximately equal sublots of 1300 m^2.
   1. Conduct one random moisture and density test within each sublot. AASHTO T 238, and AASHTO T 239.
   2. The results of five density tests must indicate that the average of 97 percent of maximum laboratory density has been met with no test less than 94 percent. AASHTO T 180, Method D.
   3. Lot Size: One day's production.

C. Do not place additional material on any unaccepted layer.

D. Rework unacceptable material at no additional cost to the DEPARTMENT.

E. Number of samples taken per lot is shown in Table 1.

Table 1

Number of UTBC Samples Per Lot	
Lot Quantity (Megagram)	Number of Samples
Lot > 2500	5
1500 ≤ Lot ≤ 2500	4
Lot < 1500	3

F. Pay Factors: Pay factors for Contract Price adjustment are as follows:

Table 2

Pay Factors for Noncomplying Aggregate Gradation

Mean of The Deviations of Sieve Gradation Results From The Combined Aggregate Target - Expressed in Percentage Points						
SIEVE SIZES	**Pay Factor**	**1 TEST** Max-min	**2 TESTS** Max-Min	**3 TESTS** Max-Min	**4 TESTS** Max-Min	**5 TESTS or More** Max - Min
12.5 mm and larger	1.00	0 - 15	0.0 - 12.1	0.0 - 10.8	0.0 - 10.0	0.0 - 9.5
	0.95	16 - 17	12.2 - 13.9	10.9 - 12.4	10.1 - 11.5	9.6 - 11.0
	0.90	18 - 19	14.0 - 15.1	12.5 - 13.5	11.6 - 12.5	11.1 - 11.9
	0.80	20 - 21	15.2 - 17.2	13.6 - 15.3	12.6 - 14.2	12.0 - 13.5
	0.70	22 - 23	17.3 - 18.8	15.4 - 16.7	14.3 - 15.5	13.6 - 14.7
9.5 mm	1.00	0 - 15	0.0 - 11.5	0.0 - 9.8	0.0 - 8.8	0.0 - 8.0
	0.95	16 - 17	11.6 - 13.3	9.9 - 11.3	8.9 - 10.1	8.1 - 9.2
	0.90	18 - 19	13.3 - 14.4	11.4 - 12.3	10.2 - 11.0	9.3 - 10.0
	0.80	20 - 21	14.5 - 16.3	12.4 - 13.9	11.1 - 12.5	10.1 - 11.4
	0.70	22 - 23	16.4 - 17.9	14.0 - 15.2	12.6 - 13.6	11.5 - 12.4
4.75 mm	1.00	0 - 14	0.0 - 10.5	0.0 - 8.8	0.0 - 7.8	0.0 - 7.0
	0.95	15 - 17	10.6 - 12.1	8.9 - 10.1	7.9 - 9.0	7.1 - 8.0
	0.90	18	12.2 - 13.1	10.2 - 11.0	9.1 - 9.8	8.1 - 8.7
	0.80	19 - 20	13.2 - 14.9	11.1 - 12.5	9.9 - 11.1	8.8 - 10.0
	0.70	21 - 22	15.0 - 16.3	12.6 - 13.6	11.2 - 12.1	10.1 - 10.8
1.18 mm	1.00	0 - 11	0.0 - 8.2	0.0 - 6.9	0.0 - 6.2	0.0 - 5.6
	0.95	12 - 13	8.3 - 9.4	7.0 - 7.9	6.3 - 7.1	5.7 - 6.4
	0.90	14	9.5 - 10.3	8.0 - 8.6	7.2 - 7.8	6.5 - 7.0
	0.80	15 - 16	10.4 - 11.6	8.7 - 9.8	7.9 - 8.8	7.1 - 8.0
	0.70	17	11.7 - 12.7	9.9 - 10.7	11.7 - 12.7	8.1 - 8.7
300 μm	1.00	0 - 9	0.0 - 7.0	0.0 - 6.1	0.0 - 5.5	0.0 - 5.2
	0.95	10	7.1 - 9.0	6.2 - 7.0	5.6 - 6.3	5.3 - 6.0
	0.90	11	9.1 - 8.8	7.1 - 7.6	6.4 - 6.9	6.1 - 6.5
	0.80	12 - 13	8.9 - 10.0	7.7 - 8.7	7.0 - 7.8	6.6 - 7.4
	0.70	14	10.1 - 10.9	8.8 - 9.5	7.9 - 8.5	7.5 - 8.1
75 μm	1.00	0 - 4.5	0.0 - 3.4	0.0 - 2.9	00 - 2.5	0.0 - 2.3
	0.95	4.6 - 5.2	3.5 - 3.9	3.0 - 3.3	2.6 - 2.9	2.4 - 2.6
	0.90	5.3 - 5.6	4.0 - 4.3	3.4 - 3.6	3.0 - 3.1	2.7 - 2.9
	0.80	5.7 - 6.4	4.4 - 4.8	3.7 - 4.1	3.2 - 3.6	3.0 - 3.3
	0.70	6.5 - 7.0	4.9 - 5.3	4.2 - 4.5	3.7 - 3.9	3.5 - 3.6

PART 2 PRODUCTS

2.1 AGGREGATES

A. Clean, hard, tough, durable and sound mineral aggregates that consist of crushed stone, crushed gravel or crushed slag; free of detrimental and organic matter; and complies with the following.

Table 3

Aggregate Properties		
Dry Rodded Unit Weight	Not less than 1200 kg/m³	AASHTO T 19
Material Passing 425 μm Sieve	Non plastic	AASHTO T 90
Aggregate Wear	Not to exceed 50 percent.	AASHTO T 96
Dry Weight Values	Within bands shown in Table 4	
Gradation Limits	Table 4	AASHTO T 11 AASHTO T 27

Table 4

Gradation Limits - Single Value Job-Mix Formula			
Sieve Size	**Percent Passing of Total Aggregate (Dry Weight)**		
	37.5 mm	25 mm	19 mm
37.5 mm	100	--	--
25 mm	--	100	--
19 mm	81 -91	--	100
12.5 mm	67 - 77	79 - 91	--
9.5 mm	--	--	78 - 92
4.75 mm	43 - 53	49 - 61	55 - 67
1.18 mm	23 - 29	27 - 35	28 - 38
75 μm	6 - 10	7 - 11	7 - 11

Untreated Base Course: Based on fine and coarse aggregate having approximately the same bulk specific gravities.

2.2 SOURCE QUALITY CONTROL

A. Aggregate: Comply with AASHTO T 27.
1. Select samples randomly.
2. Determine the suitability of the aggregate source.

3. Document the following.
   a. Date of test analysis.
   b. Sieve Analysis.
   c. Organic impurities.

B. If tests indicate materials do not meet specified requirements, change material source and retest at no additional cost to DEPARTMENT.

PART 3 EXECUTION

3.1 STOCKPILING

A. Stockpile in sufficient quantities for construction, separate different materials and prevent mixing.

B. Maintain optimum moisture content of stockpiles.

C. Prevent erosion or deterioration of stockpiles.

3.2 INSTALLATION

A. Mixing: Provide an optimum moisture content of ±2 percent at the time of placement. AASHTO T 180, Method D.

B. Placing: Place layers in equal thickness and compact each layer to a thickness not to exceed 150 mm in depth. Do not place on a frozen subgrade or a frozen layer.

C. Compacting: Compact to 97 percent of maximum laboratory density. Maintain optimum moisture content ±2 percent. AASHTO T 180, Method D.
   1. Adjacent to back walls of structure abutments and approach slabs, use a hand-operated vibratory compactor or a vibratory roller.

D. Finishing: Uniform line and grade with surface deviations no more than 10 mm ± in 3 m.

END OF SECTION

SECTION 02741

HOT MIX ASPHALT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Products and procedures for mixing, laying, and compacting a surface course of one or more layers of asphalt concrete pavement for standard projects less than 50,000 Mg. (Volumetric - gyratory design)

B. Mix materials at a central mixing plant.

1.2 RELATED SECTIONS

A. Section 01452: Profilograph.

B. Section 02745: Asphalt Material.

C. Section 02746: Hydrated Lime.

D. Section 02748: Prime Coat/Tack Coat.

E. Section 02969: Optional Use of Reclaimed Asphalt Pavement (PG Binder Projects).

1.3 REFERENCES

A. AASHTO T 11: Materials Finer Than 75 μm (No. 200) Sieve in Mineral Aggregates by Washing.

B. AASHTO T 19: Unit Weights and Voids in Aggregate.

C. AASHTO T 27: Sieve Analysis of Fine and Coarse Aggregates.

D. AASHTO T 30: Mechanical Analysis of Extracted Aggregate.

E. AASHTO T 40: Sampling Bituminous Materials.

F. AASHTO T 89: Determining the Liquid Limit of Soils.

G. AASHTO T 90: Determining the Plastic Limit and Plasticity Index of Soils.

H. AASHTO T 96: Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine.

I. AASHTO T 104: Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate.

J. AASHTO T 112: Clay Lumps and Friable Particles in Aggregate.

K. AASHTO T 168: Sampling Bituminous Paving Mixtures.

L. AASHTO T 176: Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test.

M. AASHTO T 195: Determining Degree of Particle Coating of Bituminous-Aggregate Mixtures.

N. AASHTO T 209: Maximum Specific Gravity of Bituminous Paving Mixtures.

O. AASHTO T 255: Total Moisture Content of Aggregate by Drying.

P. AASHTO T 283: Resistance of Compacted Bituminous Mixture to Moisture Induced Damage.

Q. AASHTO T 304: Uncompacted Void Content of Fine Aggregate.

R. Asphalt Institute SP-1.

S. Asphalt Institute SP-2: Compaction of Bituminous Gyratory Specimen.

T. ASTM D 979: Sampling Bituminous Paving Mixtures.

U. ASTM D 2041: Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures.

V. ASTM D 2726: Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures.

W. ASTM D 3549: Thickness or Height of Compacted Bituminous Paving Mixture Specimens.

X. ASTM D 3665: Random Sampling of Construction Materials.

Y. ASTM D 4791: Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

Z. ASTM D 5821: Determining the Percentage of Fractured Particles in Coarse Aggregate.

AA. ASTM D 6307: Asphalt Content of Hot-Mix Asphalt by Ignition Method.

BB. ASTM E 178: Dealing With Outlying Observations.

CC. ASTM E 1274: Measuring Pavement Roughness Using a (California) Profilograph.

DD. Modified GDT-115: Georgia Loaded Wheel.

1.4 ACCEPTANCE

A. Obtain samples for density and thickness.

B. Thickness acceptance based on the average thickness of a lot. ASTM D 3549.
   1. The DEPARTMENT will accept a lot when:
      a. The average thickness of all sublots is not more than 12 mm greater nor 6 mm less than the total thickness specified.
      b. No individual sublot shows a deficient thickness of more than 9 mm.

C. Density: The target density for determining pay adjustment will be 93.5 percent of maximum Rice density. AASHTO T 209.

D. The ENGINEER will conduct the acceptance testing for gradation, asphalt content, VMA, density, and thickness. AASHTO T 30.

E. ENGINEER or designated representative may sample any portion of HMA production that appears non-uniform or defective.

F. Cease production when two days of three consecutive days result in a price reduction.

G. Before production continues, submit a corrective action plan to the ENGINEER indicating the changes in production procedures that will be implemented to correct the deficiencies.

PART 2 PRODUCTS

2.1 ASPHALT CEMENT

A. Refer to Plans Summary Sheet and/or specifications for designated PG Binder.

B. Asphalt material: Refer to Section 02745.

C. Sampling procedure: UDOT Test Procedure 8-209.

2.2 AGGREGATE

A. Refer to the Minimum Testing Requirements.

B. 100 percent crushed virgin aggregate material consisting of crushed stone, gravel, or slag. Conform to Section 02969 for recycled mixes.

C. Use the following requirements, including Table 1, to determine the suitability of the aggregate sources.

1. Coarse aggregates:
   a. Clean, hard, durable, angular, and sound fragments.
   b. Free from organic matter or other detrimental substances.
2. Fine aggregates:
   a. Clean, hard grained, angular.
   b. Passing the 4.75 mm sieve.
   c. Containing no more than 2 percent by mass of organic matter or other detrimental substances. AASHTO T 112
   d. Plasticity Index of 1. AASHTO T 89, and AASHTO T 90.
3. Uniform density and quality with a minimum dry-rodded unit mass of 1200 kg/m^3. AASHTO T 19.
4. Maximum mass loss of 16 percent when subjected to five cycles of sodium sulfate. AASHTO T 104.
5. Maximum mass loss of 35 percent for Category 1 and 40 percent for Category 2 highways on L. A. Wear Test. AASHTO T 96.

Table 1

Aggregate Properties - Hot Mix Asphalt			
Test Method	**Test No.**	**Category 1**	**Category 2**
One Fractured Face	ASTM D 5821	95% min. All three gradations.	85% min. (25.0 and 19.5 mm) 90 % min. (12.5 mm)
Two Fractured Face	ASTM D 5821	90% min. All three gradations	80% min. (25.0 and 19.5 mm) 90 % min. (12.5 mm)
Fine Aggregate Angularity	AASHTO T 304	45 min.	45 min.
Flat and Elongated 1 to 3 ratio	ASTM D 4791 (Based on 9.5 mm and above)	20 % max.	20 % max.
Sand Equivalent	AASHTO T 176	60 min.	45 min.
Natural Fines	None	Not Allowed	10 % max.
Category 1: National Highway System and Truck Routes - Table 4. Category 2: All Other Routes			

D. Meet gradation requirements in Table 2. AASHTO T 30.

Table 2

Aggregate Gradations (Percent Passing by Dry Mass of Aggregate)				
		Hot Mix Asphalt		
Nominal Sieve Size (mm)		25.0	19.0	12.5
Control Sieves	37.5	100.0	-	-
	25	90.0 - 100.0	100.0	-
	19	<90	90.0 - 100.0	100.0
	12.5	-	<90	90.0 - 100.0
	9.5	-	-	<90
	2.36	19.0 - 45.0	23.0 - 49.0	28.0 - 58.0
	0.075	1.0 - 7.0	2.0 - 8.0	2.0 - 10.0
Caution Zone Boundaries (Information only)	4.75	39.5	-	-
	2.36	26.8 - 30.8	34.6	39.1
	1.18	18.1 - 24.1	22.3 - 28.3	25.6 - 31.6
	0.6	13.6 - 17.6	16.7 - 20.7	19.1 - 23.1
	0.3	11.4	13.7	15.5

2.3 HYDRATED LIME

A. Meet the requirements of Section 02746, Part 3, paragraph: Quality Control, Verification.

2.4 JOB-MIX DESIGN REQUIREMENTS

A. Satisfy all the requirements for Superpave Volumetric Mix Design according to Asphalt Institute, SP-1, and SP-2, including:
   1. Lottman
   2. Calibration Factor for Burn Off Oven
   3. Pavement Analyzer
   4. Submit Post Lottman data on HMA, and meet the system Tensile Stress Requirement.
   5. Hamburg Rut Tester (by DEPARTMENT) on production mix, for information only.
   6. Use a Hot Mix Asphalt AASHTO Materials Reference Laboratory (AMRL) accredited lab to perform the mix design, in accordance with Asphalt Institute SP-1, SP-2.
   7. Use a FHWA-protocol approved Superpave Gyratory Compactor in accordance with the Asphalt Institute Superpave Series No. 2 (SP-2).
   8. Meet all volumetric mix design requirements for the selected target gradations.

B. Submit the Volumetric Mix Design data for verification at least 10 working days before beginning paving. Do not begin paving until verification is complete.
   1. Include all information regarding selection of design aggregate structure showing the target values of percent passing on all standard sieves and the design asphalt binder content.
   2. After the design is complete, run 4 sets of 2 Gyratory specimens to verify the optimum asphalt and all other design requirements.
   3. Provide information that job mix gradation meets requirements of Table 1.

C. Submit Lottman test data including both Method A and Method B lime slurry. Refer to Section 02746.
   1. Comply with UDOT Materials Manual 8-957.
   2. Index of retained strength required: minimum 80 percent.
   3. AASHTO T 283.

D. The Region Materials Lab will verify that the Volumetric Mix Design meets all requirements of this Section and Asphalt Institute SP-2.

E. Designate asphalt binder supplier.

F. Comply with limits supplied by the Region Materials Engineer for Gyratory mixing and compaction temperatures.

2.5 SUPERPAVE VOLUMETRIC MIX DESIGN

A. Comply with requirements in Table 3.
1. Hot Plant Mixing Temperature: Set by the ENGINEER.
2. Voids in Mineral Aggregate (VMA) at N_{design} (Laboratory Mix): (Asphalt Institute SP-2, p.45; Equation based on percent of Total Mixture).
   a. 12.0 percent - 14.0 percent for 25.0 mm.
   b. 13.0 percent - 15.0 percent for 19.0 mm.
   c. 14.0 percent - 16.0 percent for 12.5 mm.
3. Pavement Analyzer: < 3.81 mm. (At high temperature of PG Asphalt). Modified GDT-115.
4. Hamburg Rut Test: < 10 mm. (By DEPARTMENT) on production mix, for information.
5. G_{mm}: Maximum Specific Gravity of Rice Mix.
6. 20 years Design ESALS as defined in the plan summary sheets.

B. Prepare and submit 2 sets (5 samples each) of ignition oven calibration samples at the verified design binder content. DEPARTMENT will use these samples to determine the correction factors for the Region and Field lab ignition oven.

Table 3

Superpave Volumetric Mix Design - Hot Mix Asphalt Number of Gyrations Table

20 Years Design ESALS (Million)	Compaction Parameters $N_{initial}$ / % of G_{mm}			Void Villed with Asphalt (VFA) (%)
0.3	6/≤ 91.5	50/96	75/ ≤ 98	70 - 80
0.3 to <3	7/≤ 90.5	75/96	115/ ≤ 98	65 - 78
3 to < 30	8/≤ 89	100/96	160/ ≤ 09	65 - 75
≥30	9/ ≤ 89	125/96	205/ ≤ 98	65 - 75

2.6 CONTRACTOR INITIATED CHANGES IN JOB-MIX DESIGN

A. Submit a field volumetric mix design if changes occur in either or both the target gradation value, or the design asphalt cement content.
1. Field volumetric design to verify volumetric properties consists of six gyratory specimens run a the new gradation or asphalt content.

2. If the field volumetric design does not meet the volumetric requirements, submit a new job mix design from an AMRL-accredited laboratory, allowing at least 4 working days for verification of the new design target values.
3. Use new target values only after verification is complete.

B. Submit a new volumetric mix design if changes occur in either or both the aggregate source, or the asphalt binder source or grade.

C. The ENGINEER will review, and the Region Materials Engineer will verify the submittal. Meet all the requirements of this Section, Part 2, paragraph: Job Mix Design Requirements, and paragraph: Superpave Volumetric Mix Design. Asphalt Institute SP-1, SP-2.

D. The Region Materials Lab will perform up to 2 free volumetric mix design verifications (initial plus one revised) for each project and will charge $2000 for each additional CONTRACTOR initiated change.

PART 3 EXECUTION

3.1 ADDING HYDRATED LIME

A. Method A, Lime Slurry; or Method B, Lime Slurry Marination: Refer to Section 02746. AASHTO T 283.
1. Comply with UDOT Materials Manual 8-957.
2. Incorporate (1 percent for Method A and 1 ½ percent for Method B) minimum hydrated lime by dry weight of aggregate into all mixtures.
3. Perform Lottman tests to determine if additional hydrated lime is required.
4. Minimum retained strength: 80 percent.

3.2 HOT MIX ASPHALT (HMA)

A. Dry aggregate to an average moisture content of not more than 0.2 percent by weight. AASHTO T 255. Do not allow damage or soot contamination.

B. Maintain temperature of the HMA between established limits.
1. Do not overheat the materials or cause thermal damage to the asphalt cement.
2. DEPARTMENT will reject and CONTRACTOR will remove materials heated over the established limits.

C. Coat with asphalt cement 100 percent of the particles passing and 98 percent of the particles retained on the 4.75 mm sieve.
1. AASHTO T 195.

2. Discontinue operation and necessary corrections if material is not properly coated.

3.3 HMA PLANTS

A. Provide:
1. Positive means to determine the moisture content of aggregate.
2. Positive means to sample all material components.
3. Sensors to measure the temperature of the hot mixture at discharge.
4. The ability to maintain discharge temperature of the mix in accordance with the mix design.

B. Asphalt Storage Tanks:
1. Provide calibrated tanks so the quantity of material remaining in the tank can be determined at any time.
2. Provide a positive means of sampling the asphalt cement from the tanks.

3.4 SURFACE PREPARATION

A. Locate, reference, and protect all utility covers, monuments, curb and gutters, and other components affected by the paving operations.

B. Remove all moisture, dirt, sand, leaves, and other objectionable material from the prepared surface before placing the mix.

C. Complete spot leveling 48 hours before placing pavement courses.
1. Place, spread, and compact leveling mix on portions of the existing surface.
2. Fill and compact any localized potholes more than 25 mm deep.

D. Apply prime coat/tack coats following Section 02748.

E. Allow sufficient cure time for prime coat/tack coat prior to placing HMA.

3.5 SURFACE PLACEMENT

A. When full-width or echelon paving is impractical and more than one pass is required, provide a 1:3 (vertical to horizontal) sloped edge adjacent to the next lane to be paved.

B. Adjust the production of the mixing plant and material delivery until a steady paver speed is maintained.

C. Offset longitudinal joints 150 mm to 300 mm in succeeding courses.
1. Place top course joint within 300 mm of the centerline or lane line.

2. If the previous pass has cooled below 80 degrees C, tack the longitudinal edge before placing the adjacent pass.

D. Offset transverse construction joints at least 2 m longitudinally to avoid a vertical joint through more than one course.

E. Do not allow construction vehicles, general traffic, or rollers to pass over the uncompacted end or edge of freshly placed mix until the mat temperature drops to a point where damage or differential compaction will not occur.

F. Taper the end of a course subjected to traffic at approximately 1:50 (vertical to horizontal).
1. Make a transverse joint by saw or wheel cutting and removing the portion of the pass that contains the tapered end.
2. Tack the contact surfaces just before fresh mix is placed against the compacted mix.

G. Use a motor grader, spreader box, or other approved spreading methods for projects under 150 m^2, irregular areas, or for miscellaneous construction such as sidewalks, and leveling courses.

3.6 COMPACTION

A. Use a hand-operated vibratory compactor or small vibratory roller in addition to normal rolling at the end of structures, and at locations inaccessible to regular rollers.

B. Operate in a transverse direction next to the back wall and approach slab.

C. Operate in a direction parallel to other structures.

3.7 LIMITATIONS

A. Do not place hot mix asphalt on frozen base or subbase.

B. Use a UDOT approved release agent for all equipment and hand tools used in mixing, hauling and placing of the hot mix asphalt. Refer to UDOT Products Acceptability Listing (PAL).

C. Do not place hot mix asphalt during adverse climatic conditions, i.e. precipitation, or when roadway surface is icy or wet.

D. Place hot mix asphalt only between April 15 and October 15, and when the air temperature in the shade and the roadway surface temperature is above 10 degrees C and rising.

3.8 GRADATION, ASPHALT CONTENT, VMA, AND POST LOTTMAN TESTS

A. Conform to AASHTO T 11, AASHTO T 27, AASHTO T 30 and ASTM D 6307.

B. The pay adjustment for each lot is the lowest adjustment among the individual measurement adjustments.

C. A lot equals the number of megagrams of mix placed during each production day.

D. The DEPARTMENT will:
1. Take random samples generated from random numbers table as the mix is being placed.
2. Take samples behind the paver before any further compaction is allowed.
   a. Circular or square samples, distributed randomly.
   b. Representative of all the material in the lot.
   c. Take samples large enough for acceptance.
   d. Meet requirements of ASTM D 979 and ASTM D 3665.
3. Inform the CONTRACTOR of the time and place for the sample not more than 15 minutes prior to the sampling.
4. Add the lot to the next day's production if appropriate samples cannot be taken, and evaluate with the appropriate sample size.
5. Add the lot to the previous day's production if four samples cannot be taken, and evaluate pay adjustment with the appropriate sample size.

E. Sampling and Testing conducted by the ENGINEER: UDOT Test Method 8-957.
1. Asphalt content: Four samples and four tests per lot using burn-off oven.
2. Aggregate gradation: Four samples and four tests per lot on the residue of the burn-off oven tests.
3. VMA: Three samples and three tests per lot.
4. Post Lottman: One random sample per week for information only. AASHTO T 283.

F. Acceptance and pay adjustment: Refer to Section 02741: Hot Mix Asphalt, in Methods of Measurement and Basis of Payment in the Supplemental Specifications (Bid Book).
1. Asphalt content and aggregate gradations: Table 1.
2. VMA: Table 2.
3. Post Lottman: Table 3.
4. Take the lowest adjustment among the individual measurement adjustments for the pay adjustment for each lot for gradation and asphalt content. Lowest adjustment is a lower bonus and higher deduction value.

3.9 DENSITY TESTS

A. ENGINEER will determine location of core samples:
1. A lot equals the number of megagrams placed each production day.
2. Divide the lot into five sublots of approximately equal sizes.
3. Conduct a minimum of two density tests (random numbers table) for each sublot.
4. If the random location for density cores falls within 0.5 meter of the edge of the overall pavement section (outer part of shoulders), then move transversely to a point 0.5 meter from the edge of the pavement.
5. Take a minimum of one core (random numbers table) per sublot from the longitudinal joint for density tests at the joint. The core density will be used for information only.

B. Take ten cores per lot randomly as instructed, and in the presence of the ENGINEER.
1. Take the cores within two days after the pavement is placed.
2. DEPARTMENT will take possession of the cores immediately, and will begin testing the cores within 24 hours for density acceptance and payment.
3. Fill in the core holes with an acceptable asphalt mixture and compact.
4. Comply with ASTM D 979 and D 2726.

C. ENGINEER will take three Rice samples for each lot. One Rice result is two replicates.

D. ENGINEER will use current consecutive running average of up to 5 lots for the day adjustment computation.

E. Pay adjustment: Refer to Section 02741, Tables 1, 4, 5, and 6 in Methods of Measurement and Basis of Payment in the Supplemental Specifications (Bid Book).

3.10 THICKNESS TESTS

A. Core samples:
1. ENGINEER will determine location.
2. Use the density lots and sublots for thickness lots and sublots.
3. The same core samples taken for density may be used for thickness verification.
4. Take a minimum of two randomly selected thickness tests within each sublot.

B. Place additional materials in lots or sublots that are deficient in thickness. The minimum depth of compacted surface for correcting deficient thickness is 3 times the nominal maximum aggregate size.

C. The ENGINEER may allow excess thickness to remain in place or may order its removal. Remove and replace the entire depth of the course, if it is necessary to remove portions of the course.

D. The thickness tolerances established above do not apply to leveling courses, overlays, and cushion courses shown; however, final surfaces in stage construction will be checked for thickness.

E. For pay adjustments and partial payment: Refer to Section 02741, Quantity Adjustments in Methods of Measurement and Basis of Payment in the Supplemental Specifications (Bid Book).

3.11 SMOOTHNESS TESTS

A. Determine pavement lane smoothness factor using a Profilograph as described in Section 01452. Calibrate, certify and verify the profilograph prior to use.

3.12 REFEREE TESTS

A. Allow asphalt cement content, gradation, density, thickness, VMA, and post Lottman measurements.

B. CONTRACTOR or ENGINEER may request referee testing up to 5 working days after the acceptance test results have been issued.

C. Use the results of the referee testing in place of the previous acceptance testing to determine the pay. Retest the entire lot if an individual test from a sublot is deemed an outlier based on ASTM E 178.

D. Referee testing will be performed by an independent, accredited laboratory.
1. May use UDOT Central Laboratory as the referee lab.
2. Submit AASHTO accreditation documentation for an independent, private lab to the ENGINEER for verification.
3. DEPARTMENT will not accept referee test data from a non-verified accredited lab.
4. Submit all test data and paperwork to the DEPARTMENT immediately after test conclusion. All original test data and paperwork will become the property of the DEPARTMENT.
5. The ENGINEER may request copies of the test data at any point in the testing procedure. Failure to produce original paperwork or test data immediately will disqualify the testing lab and the referee test in question.

E. Pay for the referee test if the referee test results in lower or equal pay adjustment. The DEPARTMENT will pay for the referee test if the pay adjustment improves.

F. For asphalt cement content and gradation: Use the referee samples taken during production.
1. DEPARTMENT will establish a new set of random numbers.
2. Take a minimum of four samples for gradation and asphalt content for each lot.
3. DEPARTMENT will retain sample for no less than 5 working days after the acceptance results are issued.

G. For density and thickness.
1. Take two random cores from each sublot in the presence of the ENGINEER for referee testing.
2. Use the referee test results to determine pay adjustments.

3.13 SMALL QUANTITIES TESTING

A. To reduce over-testing of small quantity production days, i.e. ramps, bridgework, etc., the ENGINEER may, in concurrence with the CONTRACTOR, choose to combine production from several days to form a single lot.

3.14 NATIONAL HIGHWAY SYSTEM AND TRUCK ROUTES

Table 4

National Highway System and Truck Routes Category 1		
Interstate Routes	**Beginning**	**Ending**
I-15	Arizona State Line	Idaho State Line
I-70	Jct I-70 - Cove Fort	Colorado State Line
I-80	Nevada State Line	Wyoming State Line
I-84	Idaho State Line	Jct I-80 - Coalville
I-215	Jct I-80 - Parleys Canyon	Jct I -15 - North Salt Lake
US Routes		
US-6	Nevada State Line	Jct US-50 - Delta
US-6	Jct I-15 - Spanish Fork	Jct I-70 - Green River
US -40	Jct I-80 - Park City	Colorado State Line
US-50	Jct US-6 - Delta	Jct I-15 - Holden
US -89	Arizona State Line	Jct I-70 - Sevier
US -89	Jct I-70 - Salina	Jct SR-28 - Gunnison
US-89	Jct US-6 - Spanish Fork	Jct SR-73 - Lehi
US-89	Jct I-15 - Draper, Exit 295	Jct SR-269 - 5th and 6th South
US-89	Jct I-15 - Farmington	Jct I-80 - Uintah
US-89	Jct I-84 - Uintah	Jct SR-134 - North Ogden
US-89	Jct US-91 - Logan	Idaho State Line
US-91	Jct I-15 - Brigham City	Jct US-89 - Logan
US-189	Jct I-15 - South Provo	Jct US-40 - Heber City
US-191	Arizona State Line	Jct I-70 - Thompson
US-666	Jct US-191 - Monticello	Colorado State Line

State Routes	Beginning	Ending
SR-9 - Zions Park		
SR-10 - Castle Valley	Jct I-70 - Fremont Jct	Jct US-6 - Price
SR-12 - Bryce Canyon	Jct US-89 - Panguitch	Jct SR-63 - Bryce Canyon
SR-26 - Riverdale Road	Uct I-15 - Exit 342	Jct US-89 - Ogden
SR-28 - Levan Desert	Jct US-89 - Gunnison	Jct I-15 - South Nephi
SR-31 - Huntington	Mile Post 33	Mile Post 49
SR-36 - Tooele Access	Jct entrance - Tooele Army Depot	Jct I-80 - Tooele Interchange
SR-39 - 20th and 21st Odgen	Jct I-15 - Exit 344	Jct SR-203 - Harrison Blvd
SR-52 - 8th North, Orem	Jct I-15 - Orem	Jct US -189 - Olmstead Jct
SR-57 - Orangeville Bypass	Jct SR-10 - Hunter Power Plant	Entrance - Wilberg Coal Mine
SR-71 - 7th and 9th East Street Salt Lake City	Jct SR0-209 - 90th South Street	Jct SR-186 - 4th South Street
SR-73 - Lehi Connection	Jct I-15 - South Lehi	Jct US-89 - South Lehi
SR-79 - 12th Street Ogden	Jct I-15 - Exit 347	Jct SR-203 - Harrison Blvd.
SR-96 - Scofield Access	Mile Post 3	Mile Post 4
SR-111 - Bacchus Highway	Jct SR-48 - Bingham Highway	Jct SR-201 - 21st South Expressway
SR-134 - 2700 North	Jct I-15 - North Ogden, Exit 352	Jct US-89 - North Ogden
SR-152 - Van Winkle Expressway	Jct SR-71 - 9th East Street	Jct I-215 - East (Exit 8)
SR-154 - Bangerter Highway	Jct I-15 - Draper	Jct I-80 - Salt Lake Intl Airport
SR-171 - 33rd and 35th South Salt Lake City	Jct SR-172 - 56th West Street	Jct I-215 - East, Exit 3
SR-172 - 56th West Street Salt Lake City	Jct 6200 South - Kearns	Jct I-80 - International Center
SR-186 Foothill Blvd	Jct SR-71 - 7th East Street, SLC	Jct I-215 - East (Exit 1)
SR-190 - Big Cottonwood	Jct I 215 - East, Exit 7, SLC	Jct SR-210 - Little Cottonwood
SR-201 - 21st South Expressway	Jct I-80 - Lake Point	Jct I-15 - South Salt Lake
SR-203 - Harrison Blvd	Jct US-89 - South Ogden	Jct SR-39 - 12th Street
SR-209 - 90th & 94th South	Jct SR-68 - Redwood Road (SLC)	Jct SR-210 - Little Cottonwood

SR-210 - Little Cottonwood	Jct SR-190 - Big Cottonwood	Jct SR-209 - 90th and 96th South
SR-264 - Skyline Mine Road	Mile Post 12	Mile Post 15
SR-265 - University Parkway	Jct I-15 - Exit 272	Jct I-215 East, Exit 5
SR-266 - 45th & 47th South Taylorsville	Jct I-215 - West, Exit 15	Jct I-215 - East, Exit 5
SR-269 - 5th & 6th South Salt Lake City	Jct I-215, Exit 310	Jct SR-71 - 7th East Street

END OF SECTION

SECTION 02742

HOT MIX ASPHALT - THIN LIFTS

Maintenance Only

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Products and procedures for mixing, laying, and compacting a surface course of one or more layers of asphalt concrete pavement for thin lift projects of (50 mm or less).

B. Mix materials at a central mixing plant.

1.2 RELATED SECTIONS

A. Section 01452: Profilograph.

B. Section 02745: Asphalt Material.

C. Section 02746: Hydrated Lime.

D. Section 02748: Prime Coat/Tack Coat.

E. Section 02969: Optional Use of Reclaimed Asphalt Pavement (PG Binder Projects).

1.3 REFERENCES

A. AASHTO T 30: Mechanical Analysis of Extracted Aggregate.

B. AASHTO T 96: Resistance to Abrasion of Small Size Coarse Aggregate by Use of the Los Angeles Machine.

C. AASHTO T 176: Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test.

D. AASHTO T 209: Maximum Specific Gravity of Bituminous Paving Mixtures.

E. AASHTO T 304: Uncompacted Void Content of Fine Aggregate.

F. ASTM D 4791: Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.