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TYPE F MIX DESIGN FOR FORT WORTH

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Report 5-5123-01-1

Project 5-5123-01

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DISCLAIMER

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There is no invention or discovery conceived or first actually reduced to practice in the course of or under this contract, including any art, method, process, machine, manufacture, design or composition of matter, or any new useful improvement thereof, or any variety of plant, which is or may be patentable under the patent laws of the United States of America or any foreign country.

ACKNOWLEDGMENTS

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CHAPTER 1

TYPE F LATEX MIXTURE DESIGN

Mixture Design Summary: Type F Mix with 3 % Latex

Date: 5/21/2007

Project: Pumphrey Drive, Westworth Village

From/To: SH183 north to
Entrance to Naval Air Station Joint Reserve Base

CSJ: N/A

Mixture type: Type F Granite

Aggregates: Martin Marietta Materials, Mill Creek, OK
Producer Code 0050433
Surface Aggregate Class (SAC) – A

Stockpiles: F-Rock 55 %
Screenings: 45 %

Asphalt: Valero PG64-22 plus 3 % UP7814 Anionic SBR Polymer
(70 % min. Solid)

Antistripping agent: 1% Akzo Nobel, Kling-Beta 2550

Optimum asphalt content: 6.8 % based on 3.5 % design air voids, overlay tester, and
Hamburg test results

Mixture properties at optimum asphalt content are:

VMA:	18.8 %
Bulk specific gravity:	2.317
Max. specific gravity:	2.399
Boil test, Tex-530-C:	No visual stripping
Overlay test, Tex-248F:	>1200 cycles
Hamburg test, Tex-242F:	10.5 mm @ 20,000 passes (meets PG76-22 requirement)

Design sheets are presented on following pages.

TEXAS DEPARTMENT OF TRANSPORTATION

HMACP MIXTURE DESIGN : COMBINED GRADATION

Refresh Workbook

File Version: 00/15/08 15:18:42

SAMPLE ID:		SAMPLE DATE:	
LOT NUMBER:		LETTING DATE:	
STATUS:		CONTROLLING CSJ:	
COUNTY:		SPEC YEAR:	2004
SAMPLED BY:		SPEC ITEM:	Type F
SAMPLE LOCATION:		SPECIAL PROVISION:	
MATERIAL:	Type F mix	MIX TYPE:	Other
PRODUCER:			
AREA ENGINEER:		PROJECT MANAGER:	
COURSE/LIFT:		STATION:	
		DIST. FROM CL:	
		CONTRACTOR DESIGN # :	

BIN FRACTIONS																					
	Bin No.1		Bin No.2		Bin No.3		Bin No.4		Bin No.5		Bin No.6		Bin No.7								
Aggregate Source:																					
Aggregate Number:	F Rock		Screenings																		
Sample ID:																					
Rap?, Asphalt%:																					
Individual Bin (%)	55.0	Percent	45.0	Percent	0.0	Percent		100.0%													
Sieve Size:	Cum.% Passing	Wtd Cum. %	Cum.% Passing	Cum. % Passing	Total Bin	Lower & Upper Specification Limits	Within Spec's	Restricted Zone	Within Spec's												
1"	100.0	55.0	100.0	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	100.0	Yes			
3/4"	100.0	55.0	100.0	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	100.0	Yes			
1/2"	100.0	55.0	100.0	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0	100.0	100.0	Yes			
3/8"	98.8	54.3	100.0	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	99.3	98.0	100.0	Yes				
No. 4	52.6	28.9	92.6	41.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	70.6	70.0	90.0	Yes				
No. 8	20.6	11.3	72.9	32.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.1	40.0	65.0	Yes				
No. 16	9.8	5.4	55.3	24.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	30.3	20.0	45.0	Yes				
No. 30	4.5	2.5	40.7	18.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.8	10.0	30.0	Yes				
No. 50	2.4	1.3	27.7	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.8	10.0	20.0	Yes				
No. 200	1.1	0.6	11.8	5.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.9	2.0	10.0	Yes				

Not within specifications # Not cumulative

Asphalt Source & Grade:	Valero PG 64-22 plus 3% Latex (70% Solid)	Binder Percent, (%)	6.8	Asphalt Spec. Grav.:	1.025
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Antistripping Agent:	Liquid Antistrip	Percent, (%)	1
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Remarks:

Test Method:	Tested By:	Tested Date:
TX207		
TX226		
TX227		
TX235		
TX242		
TX530		

Reviewed By: _____ Completed Date: _____

Authorized By: _____ Authorized Date: _____

TEXAS DEPARTMENT OF TRANSPORTATION

HMACP MIXTURE DESIGN : SUMMARY SHEET

File Version: 06/15/06 15:19:42

SAMPLE ID:		SAMPLE DATE:	
LOT NUMBER:		LETTING DATE:	
STATUS:		CONTROLLING CSJ:	
COUNTY:		SPEC YEAR:	2004
SAMPLED BY:		SPEC ITEM:	Type F
SAMPLE LOCATION:		SPECIAL PROVISION:	
MATERIAL:	Type F mix	MIX TYPE:	Other
PRODUCER:			
AREA ENGINEER:		PROJECT MANAGER:	

COURSE/LIFT:	STATION:	DIST. FROM CL:	CONTRACTOR DESIGN #:
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Target Density:	96.5	Percent
Number of Gyration:	50	

Asphalt Content (%)	Specific Gravity Of Specimen (G _a)	Maximum Specific Gravity (G _r)	Effective Gravity (G _e)	Theo. Max. Specific Gravity (G _t)	Density from G _t (Percent)	VMA (Percent)	Mixture Evaluation @ Optimum Asphalt Content	
							Indirect Tensile Strength (psi)	Hamburg Wheel Tracking Test
							Number of cycles	Rut depth (mm)
6.0	2.249	2.441	2.677	2.428	92.6	20.5		
6.5	2.308	2.410	2.660	2.410	95.8	18.9		
7.0	2.326	2.388	2.654	2.393	97.2	18.7		
7.5	2.313	2.369	2.651	2.376	97.3	19.6		
			0.000	0.000		0.0		

Effective Specific Gravity:	2.660
-----------------------------	-------

Estimated Percent of Stripping, %:	
------------------------------------	--

Optimum Asphalt Content :	6.8
VMA @ Optimum AC:	18.8

Interpolated Values	
Specific Gravity (G _a):	2.317
Max. Specific Gravity (G _r):	2.399
Theo. Max. Specific Gravity (G _t):	2.401

Remarks:

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CHAPTER 2
TYPE F CRUMB RUBBER MIXTURE DESIGN

Mixture Design Summary: Type F Mix with Crumb Rubber

Date: 7/9/2007

Project: Pumphrey Drive, Westworth Village

From/To: SH183 north to
Entrance to Naval Air Station Joint Reserve Base

CSJ: N/A

Mixture type: Type F Granite

Aggregates: Martin Marietta Materials, Mill Creek, OK
Producer Code 0050433
Surface Aggregate Class (SAC) – A

Stockpiles: F-Rock 55 %
Screenings: 45 %

Asphalt: Valero PG64-22 plus 7 % Crumb Rubber from Bridges
Pavement Solution Inc.

Antistripping agent: N/A

Optimum asphalt content: 6.8 % based on overlay tester and Hamburg test results

Mixture properties at optimum asphalt content are:

Max. specific gravity:	2.398
Overlay test, Tex-248F:	>1200 cycles
Hamburg test, Tex-242F:	<12.5 mm @ 20,000 passes (meets PG76-22 requirement)

Special note: Special instruction for mix design has been provided by Bridges Pavement Solutions Inc. and this instruction should be followed during mix production in the plant. Otherwise, the performance of this mix may change.

The detailed aggregate gradation sheet is presented on the following page.

TEXAS DEPARTMENT OF TRANSPORTATION

HMCP MIXTURE DESIGN : COMBINED GRADATION

Refresh Workbook

File Version: 06/15/08 15:19:42

SAMPLE ID:		SAMPLE DATE:	
LOT NUMBER:		LETTING DATE:	
STATUS:		CONTROLLING CSJ:	
COUNTY:		SPEC YEAR:	2004
SAMPLED BY:		SPEC ITEM:	Type F
SAMPLE LOCATION:		SPECIAL PROVISION:	
MATERIAL:	Type F mix	MIX TYPE:	Other
PRODUCER:			
AREA ENGINEER:		PROJECT MANAGER:	
COURSE/LIFT:		STATION:	
		DIST. FROM CL:	
		CONTRACTOR DESIGN #:	

BIN FRACTIONS																				
	Bin No.1		Bin No.2		Bin No.3		Bin No.4		Bin No.5		Bin No.6		Bin No.7							
Aggregate Source:																				
Aggregate Number:	F Rock		Screenings																	
Sample ID:															Combined Gradation					
Rap?, Asphalt%:																Total Bin				
Individual Bin (%):	55.0	Percent	45.0	Percent	0.0	Percent		100.0%												
Sieve Size:	Cum.% Passing	Wtd Cum. %	Cum. % Passing	Wtd Cum. %	Lower & Upper Specification Limits	Within Spec's	Restricted Zone	Within Spec's												
1"	100.0	55.0	100.0	45.0		0.0		0.0		0.0		0.0		0.0	100.0	100.0	100.0	Yes		
3/4"	100.0	55.0	100.0	45.0		0.0		0.0		0.0		0.0		0.0	100.0	100.0	100.0	Yes		
1/2"	100.0	55.0	100.0	45.0		0.0		0.0		0.0		0.0		0.0	100.0	100.0	100.0	Yes		
3/8"	98.8	54.3	100.0	45.0		0.0		0.0		0.0		0.0		0.0	99.3	98.0	100.0	Yes		
No. 4	52.6	28.9	92.6	41.7		0.0		0.0		0.0		0.0		0.0	70.6	70.0	90.0	Yes		
No. 8	20.6	11.3	72.9	32.8		0.0		0.0		0.0		0.0		0.0	44.1	40.0	65.0	Yes		
No. 16	9.8	5.4	55.3	24.9		0.0		0.0		0.0		0.0		0.0	30.3	20.0	45.0	Yes		
No. 30	4.5	2.5	40.7	18.3		0.0		0.0		0.0		0.0		0.0	20.8	10.0	30.0	Yes		
No. 50	2.4	1.3	27.7	12.5		0.0		0.0		0.0		0.0		0.0	13.8	10.0	20.0	Yes		
No. 200	1.1	0.6	11.8	5.3		0.0		0.0		0.0		0.0		0.0	5.9	2.0	10.0	Yes		

Not within specifications # Not cumulative

Asphalt Source & Grade:	Valero PG 64-22 plus 7% Crumb Rubber	Binder Percent, (%):	6.8	Asphalt Spec. Grav.:	1.025
Antistriping Agent:	Liquid Antistrip	Percent, (%):	1		

Remarks:

Test Method:	Tested By:	Tested Date:
TX207		
TX226		
TX227		
TX235		
TX242		
TX530		

Reviewed By: _____ Completed Date: _____

Authorized By: _____ Authorized Date: _____