Washington State Department of Transportation - Materials Laboratory
PO Box 47365 Olympia / 1655 2nd Ave. Tumwater / WA 98504
BITUMINOUS SECTION REFERENCE MIX DESIGN VERIFICATION REPORT

TEST OF: AGGREGATE PROPERTIES FOR HMA CLASS: 1/2"

WORK ORDER NO: 007465
REFERENCE NO: 290120
MIX ID NO: G82156

SECTION: GRAND MOUND TO MAYTOWN STAGE ONE - ADD LANES

----------CONTRACTOR'S DESIGN AGGREGATE STRUCTURE AND AGGREGATE TEST DATA----------

				Combined	Specifications	Tolerance
Material:	3/4"-3/8"	3/8"-0	SAND			
Source:	L-268	L-268	J-212			
Ratio:	32%	64%	4%			
1 1/2" square						
1" square						
3/4" square	100.0	100.0	100.0	100	100	99-100
1/2" square	85.0	100.0	100.0	95	90 - 100	90 - 100
3/8" square	44.0	100.0	100.0	82	MAX 90	76 - 88
U.S. No. 4	4.8	77.9	100.0	55		50 - 60
U.S. No. 8	2.2	47.8	94.0	35	28 - 58	31 - 39
U.S. No. 16	1.5	31.2	77.0	24		
U.S. No. 30	1.4	20.7	48.0	16		
U.S. No. 50	1.3	14.1	19.0	10		
U.S. No. 100	1.2	10.5	4.0	7		
U.S. No. 200	1.1	6.8	1.2	4.8	2.0 - 7.0	2.8 - 6.8
Gsb Coarse	2.641	2.625				
Gsb Fine		2.581	2.604			
Gsb Blend	2.641	2.591	2.604	2.607		
Sand Equivalent		66	79	67	45 MIN.	
Uncompacted Voids (FAA)				47	44% MIN.	
Course Agg Frac						
U.S. No. 4	94	99		96	90% Double	Face Fracture

----------STATE MATERIALS LABORATORY AGGREGATE TEST DATA----------

Gsb Coarse	2.649	2.633				
Gsb Fine		2.598	2.560	2.595		
Gsb Blend	2.649	2.606	2.560	**2.618**		
Sand Equivalent		82	80	82	45 MIN.	
Uncompacted Voids (FAA)				48	44% MIN.	
Course Agg Frac						
U.S. No. 4	88	100		91	90% Double	Face Fracture

----------COMMENTS----------

Remarks:

****Note** Increased recommendation of anti-strip percentage since original mix design verification.**

Environmental & Engineering Programs:
- Construction Engineer---------- X
- Accounting Section---------- X
- General File---------- X
- Bituminous Materials Section---------- X

Region: OLYMPIC
- Construction Office--43 ---------- X
- Materials Engineer---43 ---------- X

P.E.: M. NEBERGALL X(2)

T162 - 1
T153 -
T166 -
T172 -
T175 -
T178-

THOMAS E. BAKER P.E.
Materials Engineer
By: Joseph R. DeVol
Bituminous Materials Engineer
(360) 709-5421
Date: 2 / 2 / 2010

Washington State Department of Transportation - Materials Laboratory
PO Box 47365 Olympia / 1655 2nd Ave. Tumwater / WA 98504
BITUMINOUS SECTION REFERENCE MIX DESIGN VERIFICATION REPORT

HMA CLASS:	1/2"	WORK ORDER NO:	007465
DATE RECV'D:	2/2/2010	REFERENCE NO:	290120
REVIEWED BY:	JRD	MIX ID NO:	G82156
SR NO:	5	REFERENCED FROM WORK ORDER NO:	007465
SECTION:	GRAND MOUND TO MAYTOWN STAGE ONE - ADD LANES	CONTRACTOR:	LAKESIDE

THIS REFERENCE MIX DESIGN FOR **3,000 TONS** OF HMA IS BASED ON PREVIOUS USE OF AGGREGATES FROM THE SOURCE LISTED. THIS DESIGN IS IN LIEU OF AN EVALUATION OF CURRENT STOCKPILES AND PRODUCTION

VALID FOR 2010

CONTRACTOR'S MIX DESIGN TEST DATA

						Specifications
Pb		5.1	5.6	6.1		
% Gmm @ Nini:	9	85.0	85.8	86.8	≤	89.0
% Va @ Ndes:	125	5.4	4.0	2.9	Approximate	4.0
% VMA @ Ndes:	125	14.6	14.3	14.3	≥	14.0
% VFA @ Ndes:	125	63	72	80		65 - 75
% Gmm @ Nmax:	205		97.1		≤	98.0
D/A		1.2	1.1	1.0		0.6 - 1.6
Pbe		4.0	4.5	5.0		
Gmm		2.481	2.463	2.451		
Gmb		2.348	2.364	2.380		
Gb		1.033	1.033	1.033		
Gse		2.683	2.682	2.691		

CONTRACT 7465 ONLY

STATE MATERIALS LABORATORY VERIFICATION TEST DATA

						Specifications	Tolerance
Pb		5.1	5.6	6.1			± 0.5%
% Gmm @ Nini:	9	84.4	85.6	86.7	≤	89.0	
% Va @ Ndes:	125	6.5	4.7	3.3	Approximate	4.0	2.5 - 5.5
% VMA @ Ndes:	125	15.7	15.2	15.2	≥	14.0	≥12.5
% VFA @ Ndes:	125	58	69	78		65 - 75	
% Gmm @ Nmax:	205		96.4		≤	98.0	
D/A		1.2	1.0	0.9		0.6 - 1.6	
Pbe		4.1	4.7	5.2			
Gmm		2.489	2.467	2.446			
Gmb		2.327	2.352	2.365			
Gb		1.036	1.036	1.036			
Gse		2.692	2.688	2.684			

VERIFIED

STRIPPING EVALUATION

% Anti-Strip:	0.0%	0.08%	0.17%	0.33%	0.50%
Visual Appearance:	NONE	NONE	NONE	NONE	NONE
% Retained Strength:	90	85	100	96	101

STATISTICAL

STATE MATERIALS LABORATORY RECOMMENDATIONS

Asphalt Binder Supplier	**EXXON**	Remarks:
Asphalt Binder Grade	PG64-22	
Percent Binder (Pb) (By Wt. Total Mix)	5.6	
% Anti-Strip (By Wt. Aggregate)	0.17%	
Type of Anti-Strip	UP-5000	
Mix ID Number	G82156	
Sample Wt. (grams)	4690	(Informational Only)
Sample Height @ Ndes	115.0	(Informational Only)
Ignition Calibration Factor	0.59	(Informational Only)
Optimum Mixing Temperature	311°F	
Compaction Temperature	289°F	
Rice Density (lbs/ft^3)	153.6	