APPENDIX A

(LTPP INPUT VARIABLE RANGES—RIGID PAVEMENTS)

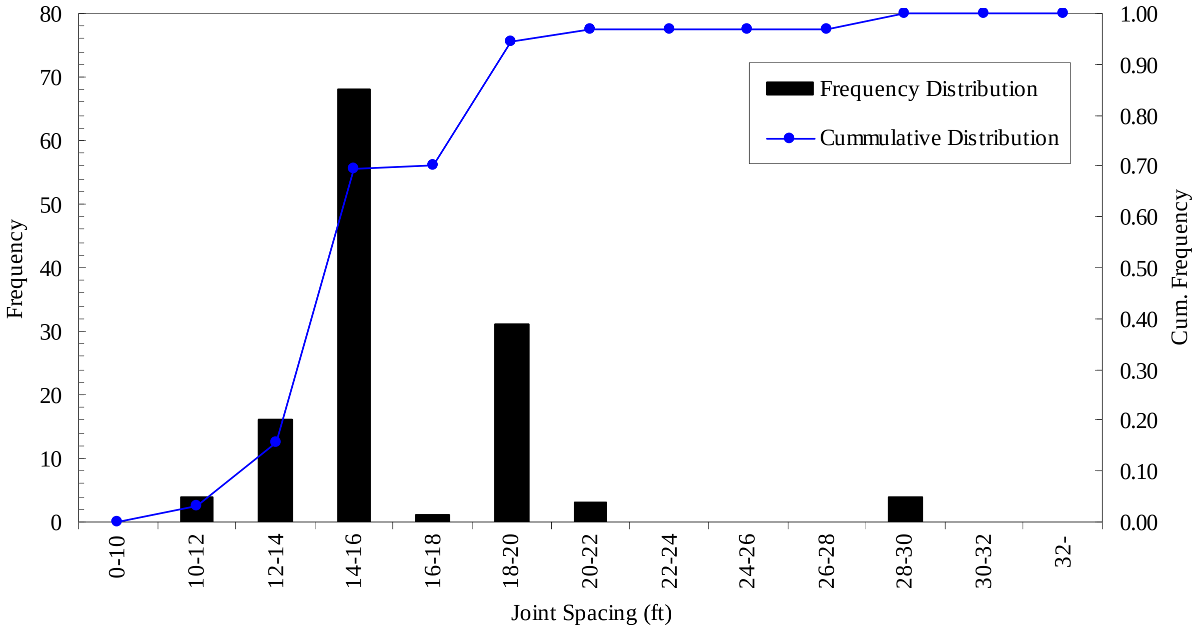

Figure A-1 Distribution of Joint Spacing for GPS-3 Experiment Sections

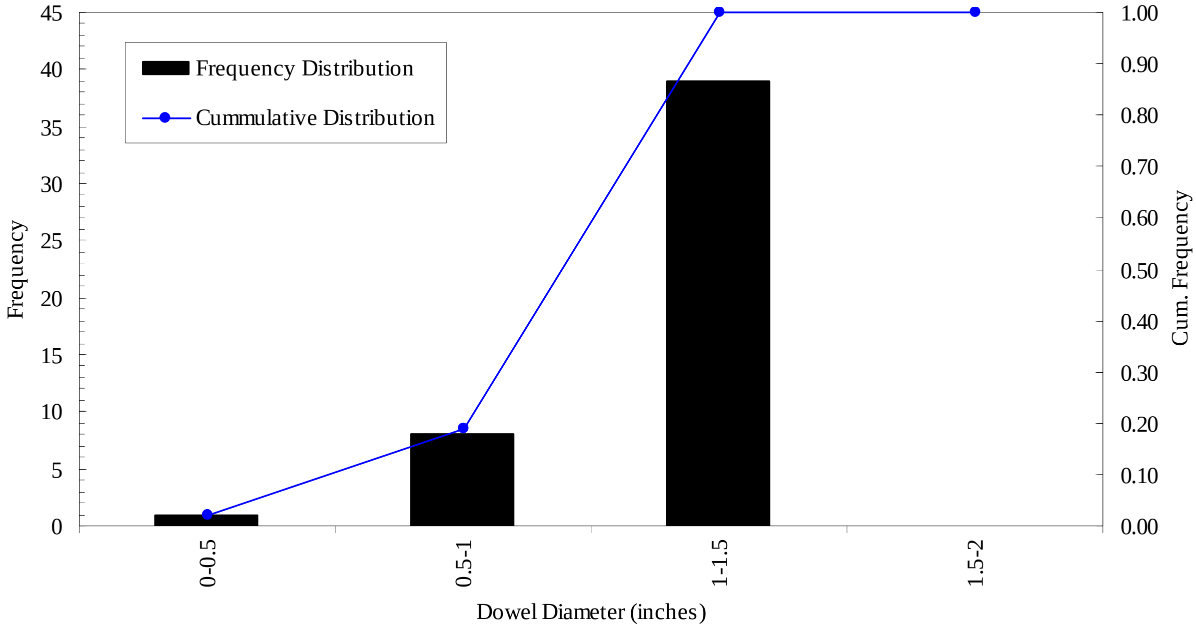

Figure A-2 Distribution of Dowel Diameter for GPS-3 Experiment Sections

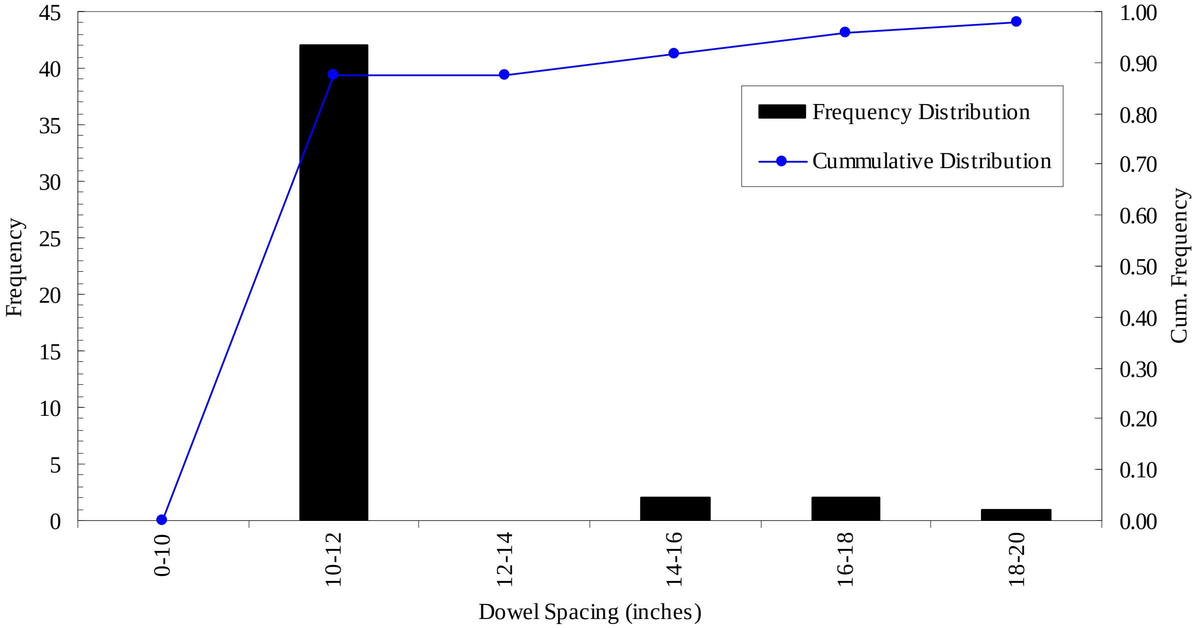

Figure A-3 Distribution of Dowel Spacing for GPS-3 Experiment Sections

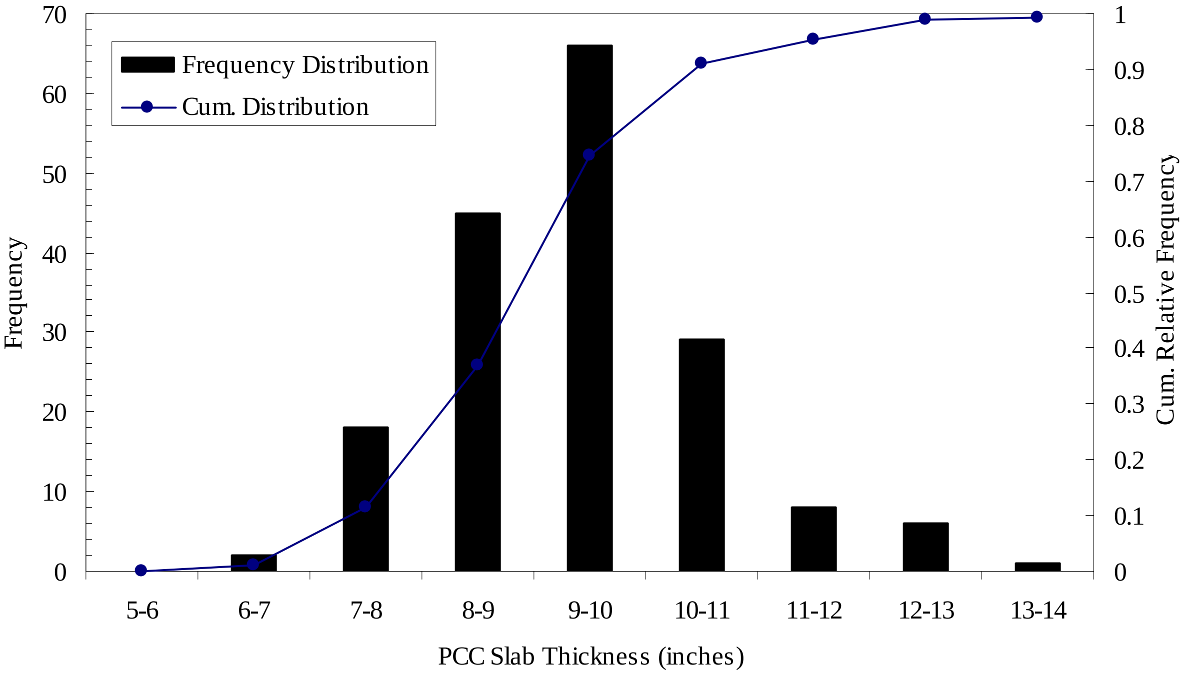

Figure A- 4 Distribution of PCC Slab Thickness for GPS-3 Experiment Sections

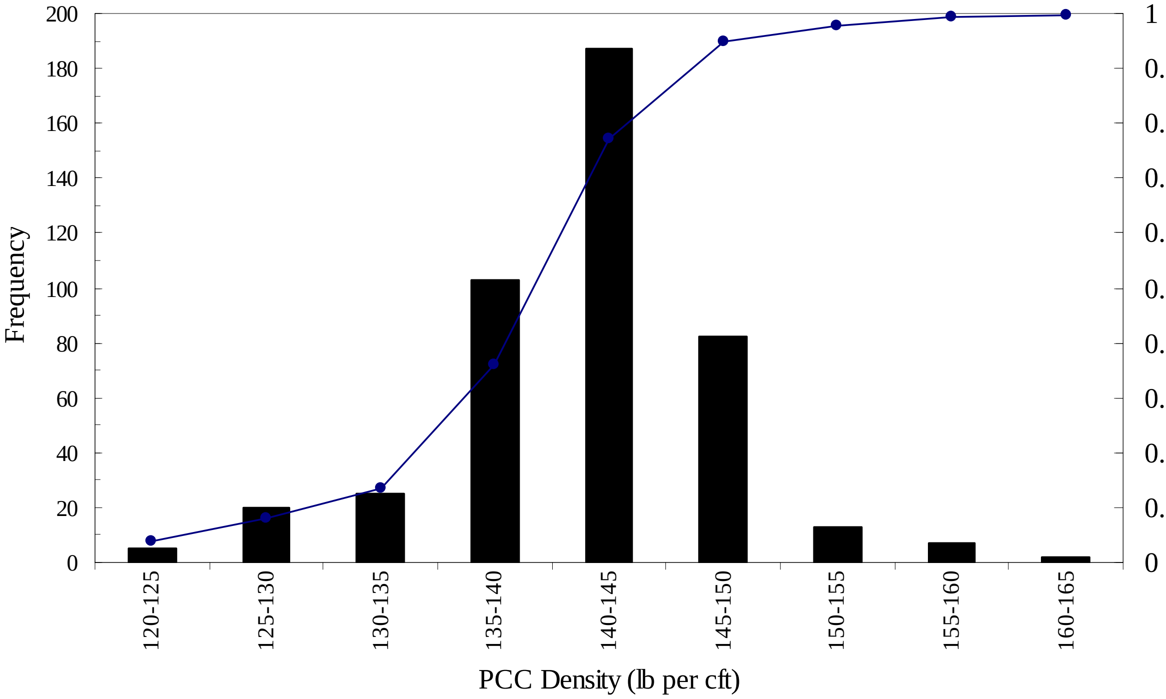

Figure A-5 Distribution of PCC Unit Weight– LTPP Data

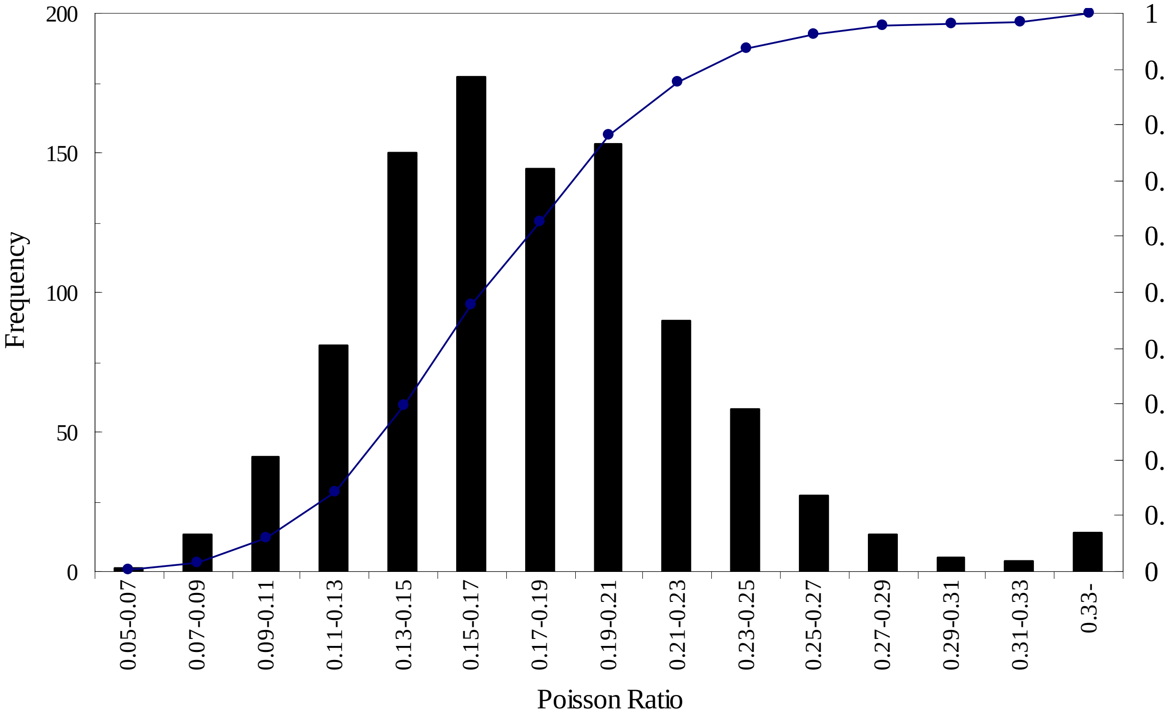

Figure A-6 Distribution of PCC Poisson's Ratio– LTPP Data

Table A- 1 CTE Values for Different Aggregate Types – LTPP Data

Aggregate Type	CTE Statistics				
	Average	Standard Deviation	Min	Max	Count
crushed chert limestone	1.10E-05	7.78E-07	1.04E-05	1.15E-05	2
crushed chert limestone, small coarse aggregate	1.09E-05	N/A	1.09E-05	1.09E-05	1
crushed granite	1.08E-05	N/A	1.08E-05	1.08E-05	1
crushed limestone	1.06E-05	1.03E-06	8.90E-06	1.28E-05	15
crushed limestone and siliceous gravel	1.19E-05	N/A	1.19E-05	1.19E-05	1
crushed limestone/sandstone	9.80E-06	N/A	9.80E-06	9.80E-06	1
crushed siliceous	1.09E-05	5.51E-07	1.03E-05	1.13E-05	3
crushed siliceous gravel	1.10E-05	8.93E-07	1.01E-05	1.23E-05	8
limestone and siliceous gravel	1.12E-05	7.78E-07	1.06E-05	1.17E-05	2
siliceous crushed stone	1.13E-05	1.98E-06	9.90E-06	1.27E-05	2
siliceous gravel	1.12E-05	1.17E-06	9.00E-06	1.41E-05	22
siliceous gravel plus limestone	9.30E-06	N/A	9.30E-06	9.30E-06	1
Unknown Aggregate Type	1.00E-05	1.45E-06	6.60E-06	1.98E-05	733

Table A-2 PCC Mix Design Descriptive Statistics – LTPP Data

Descriptive Statistics	Weight (lb/cu yd.)				w/c	%		Slump	Bulk Sp. Gr.	
	Coarse	Fine	Cement	Water		Alkali Content	Entrained Air		Coarse	Fine
Avg.	1851.5	1252.4	543.6	251.3	0.47	1.99	5.12	1.88	2.64	2.62
Std.	345.1	275.2	71.0	45.5	0.12	10.54	1.46	0.75	0.09	0.05
Min	582	310	258	30	0.06	0	0	0.5	2.35	2.4
Max	2878	2328	781	393	1.29	87.9	9.8	6.5	2.95	2.96
Count	305	305	307	297	297	137	284	235	229	230

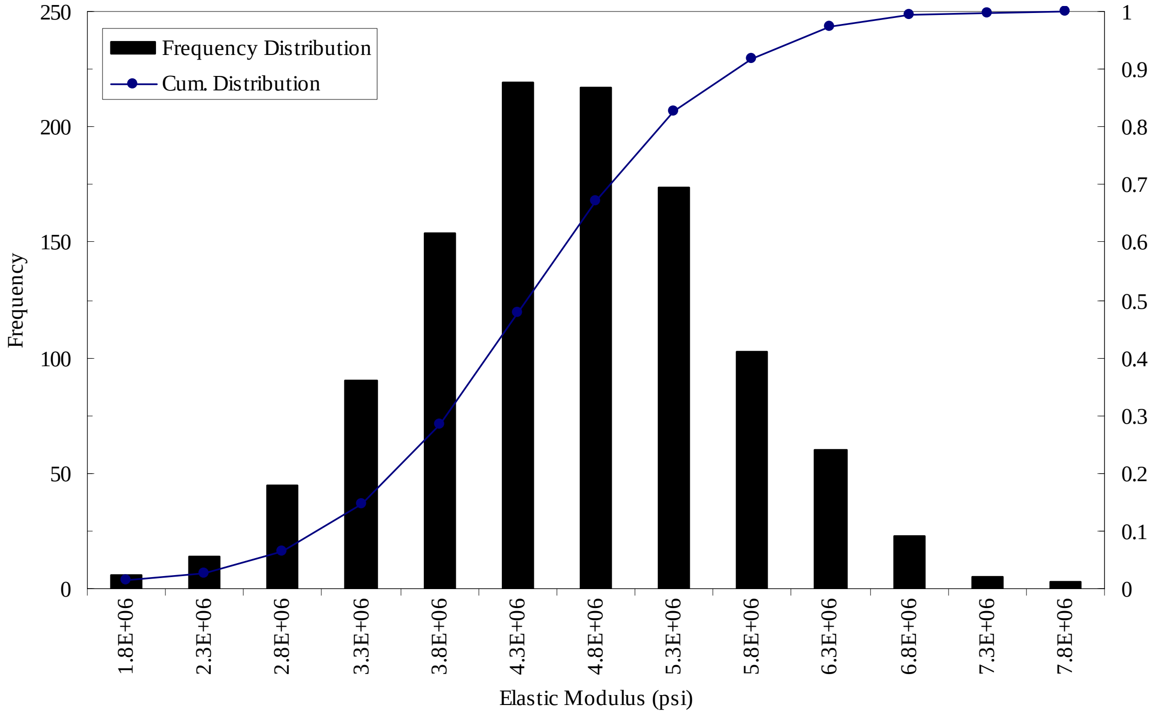

Figure A-7 Distribution of PCC Elastic Modulus (psi) – LTPP Data

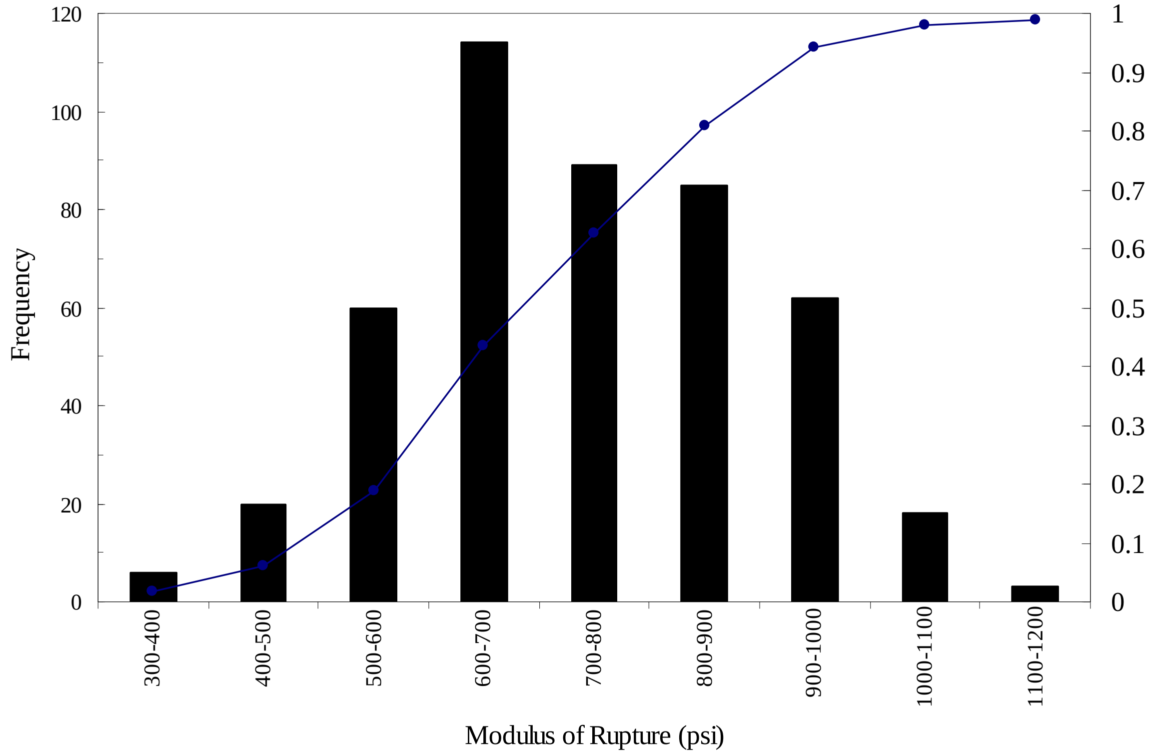

Figure A-8 Distribution of PCC Modulus of Rupture from Coring Data (psi) – LTPP Data

Table A-3 Modulus of Rupture from Inventory LTPP Data

Age	Flexural Strength (psi)				
	Average	Std.	Min.	Max.	Count
3	653	94	586	719	2
4	552	59	510	594	2
5	619	29	575	650	5
6	578	48	510	612	4
7	740	552	453	4665	54
8	586	34	562	610	2
9	645	N/A	645	645	1
10	720	N/A	720	720	1
11	600	N/A	600	600	1
12	583	N/A	583	583	1
13	622	71	545	686	3
14	663	115	488	918	51
15	495	N/A	495	495	1
17	767	N/A	767	767	1
28	632	153	312	964	44
31	730	N/A	730	730	1

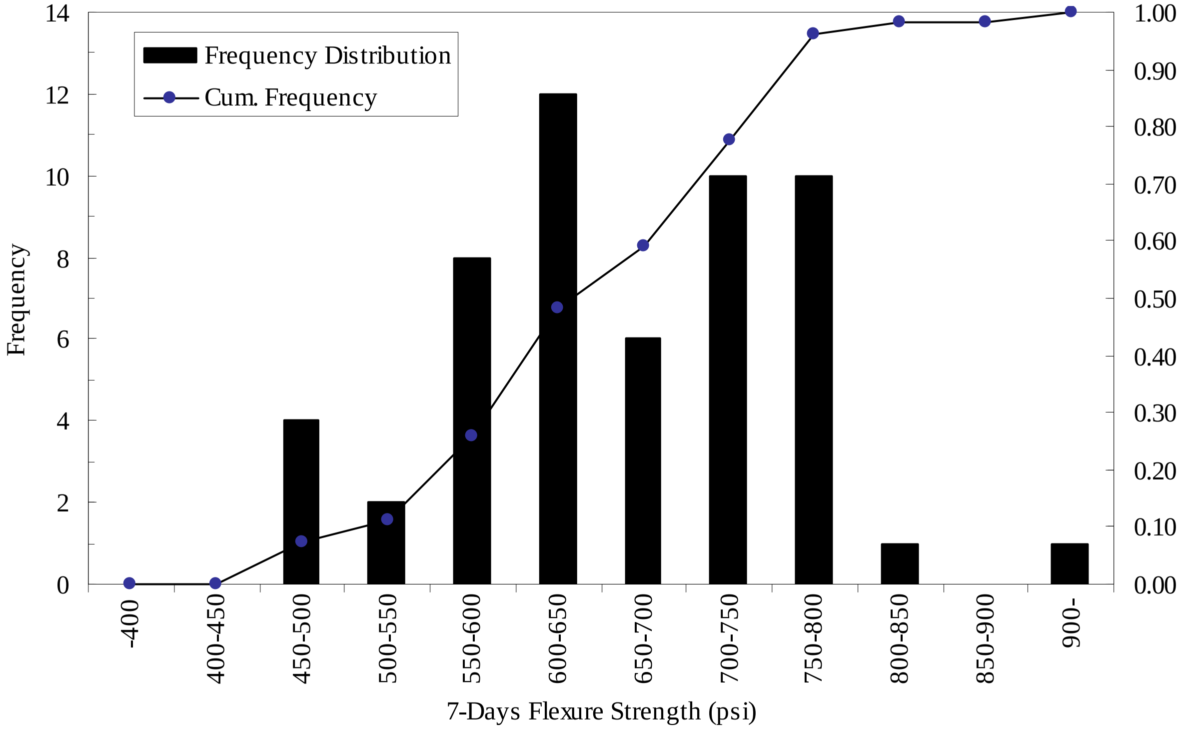

Figure A-9 Distribution of PCC Modulus of Rupture – LTPP Data

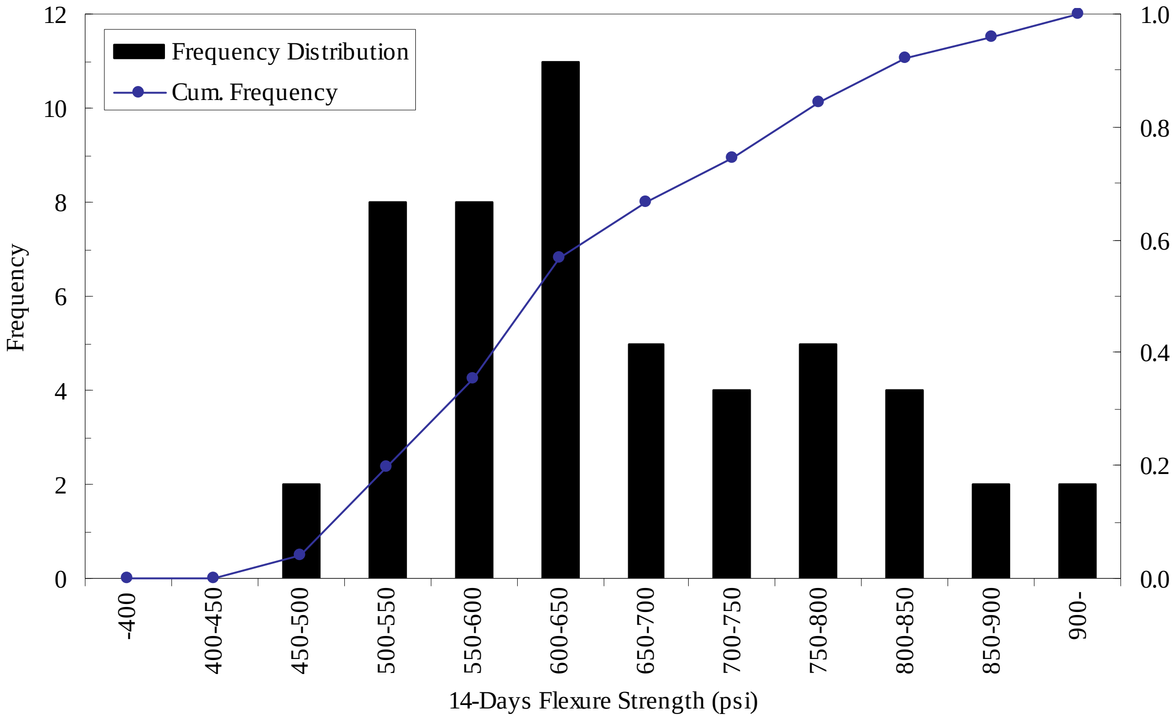

Figure A-10 Distribution of PCC Modulus of Rupture – LTPP Data

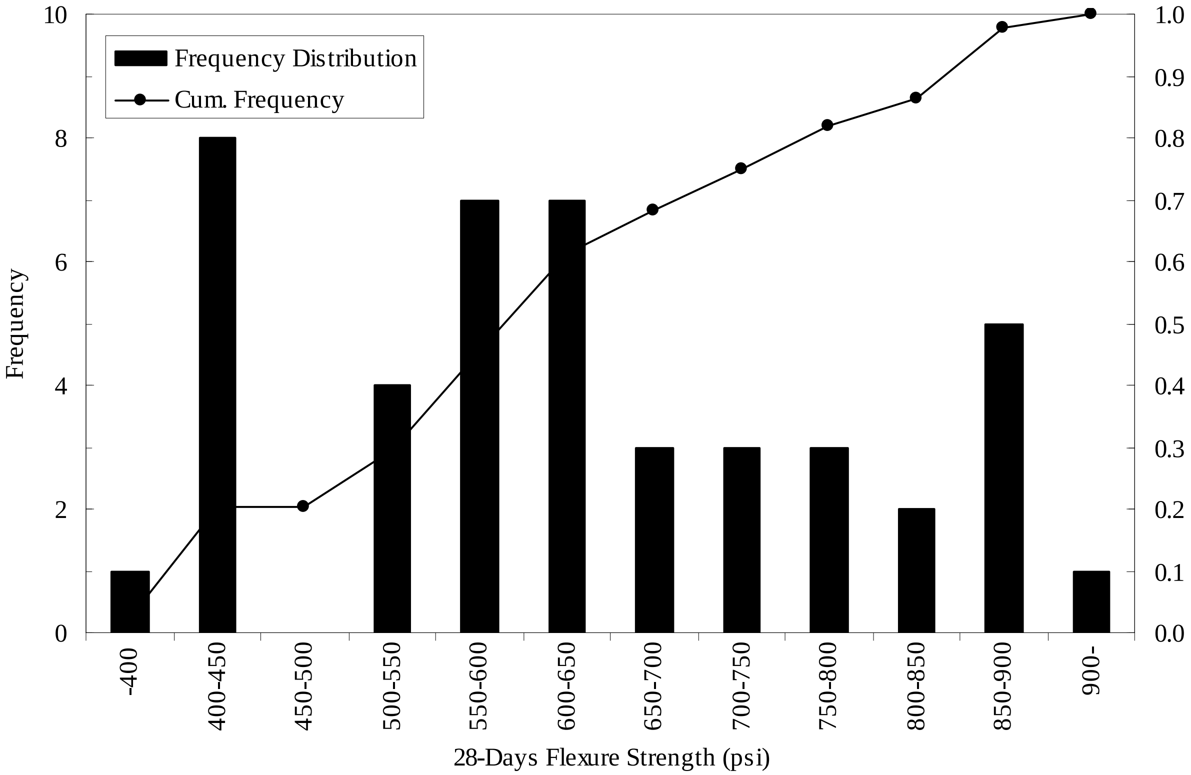

Figure A-11 Distribution of PCC Modulus of Rupture – LTPP Data

Table A-4 Compressive Strength from Inventory LTPP Data

Age	Compressive Strength (psi)				
	Average	Std.	Min.	Max.	Count
3	3568	1333	2625	4510	2
7	3138	1569	384	5668	19
12	3780	N/A	3780	3780	1
14	3302	986	700	5146	15
28	4837	817	1097	6980	147
30	5736	769	5192	6280	2
32	3148	N/A	3148	3148	1
33	4275	N/A	4275	4275	1
39	5107	N/A	5107	5107	1
40	3150	N/A	3150	3150	1
45	8320	N/A	8320	8320	1
60	5304	535	4926	5682	2
62	5160	N/A	5160	5160	1
122	6360	N/A	6360	6360	1
197	6062	N/A	6062	6062	1
200	5693	N/A	5693	5693	1

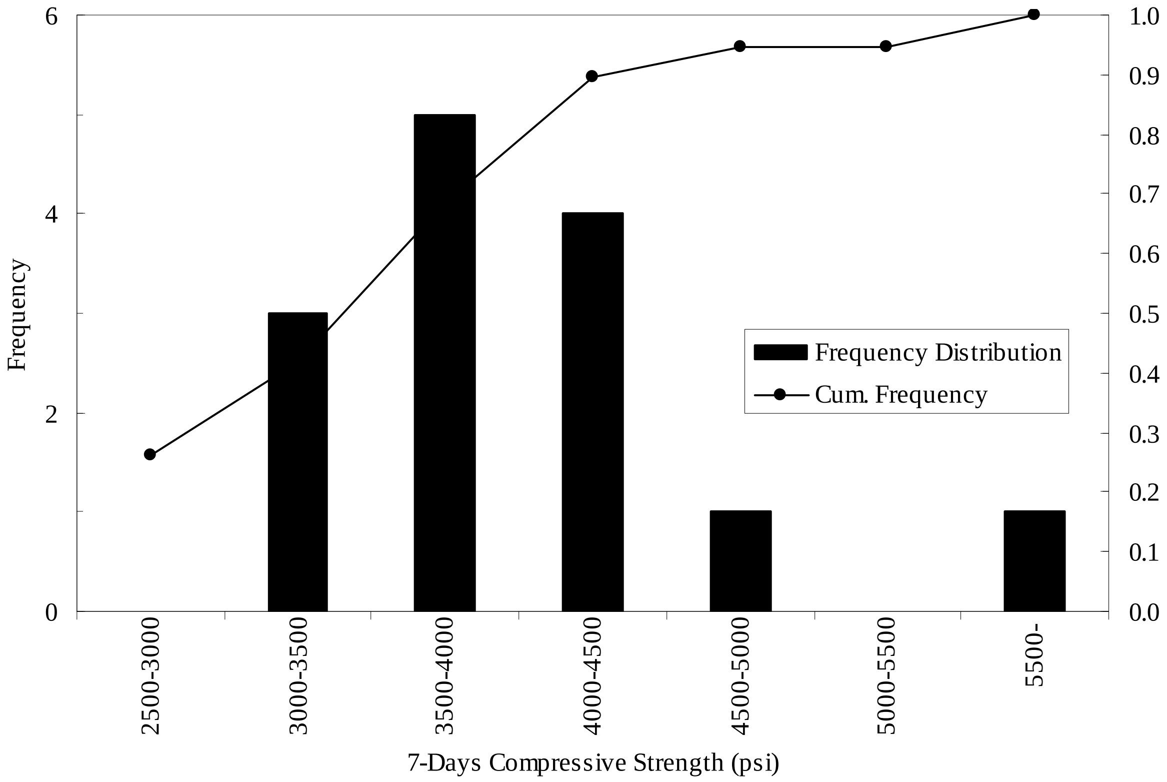

Figure A-12 Distribution of PCC Compressive Strength – LTPP Data

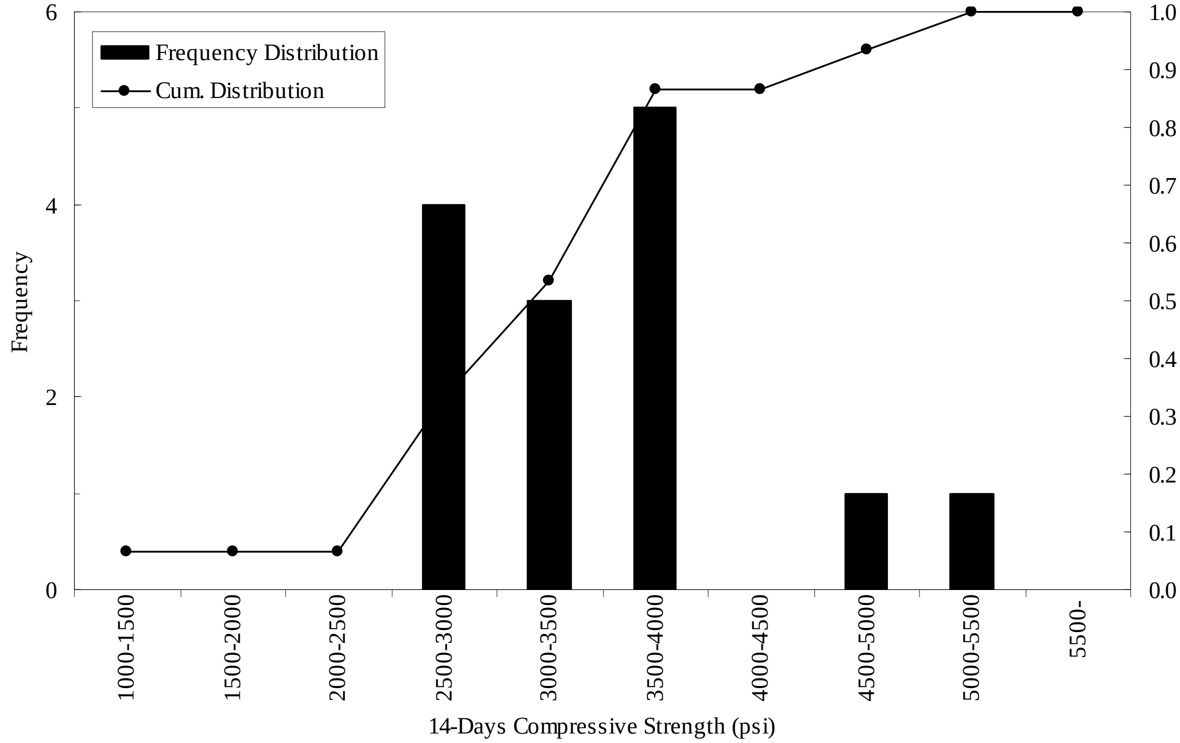

Figure A-13 Distribution of PCC Compressive Strength – LTPP Data

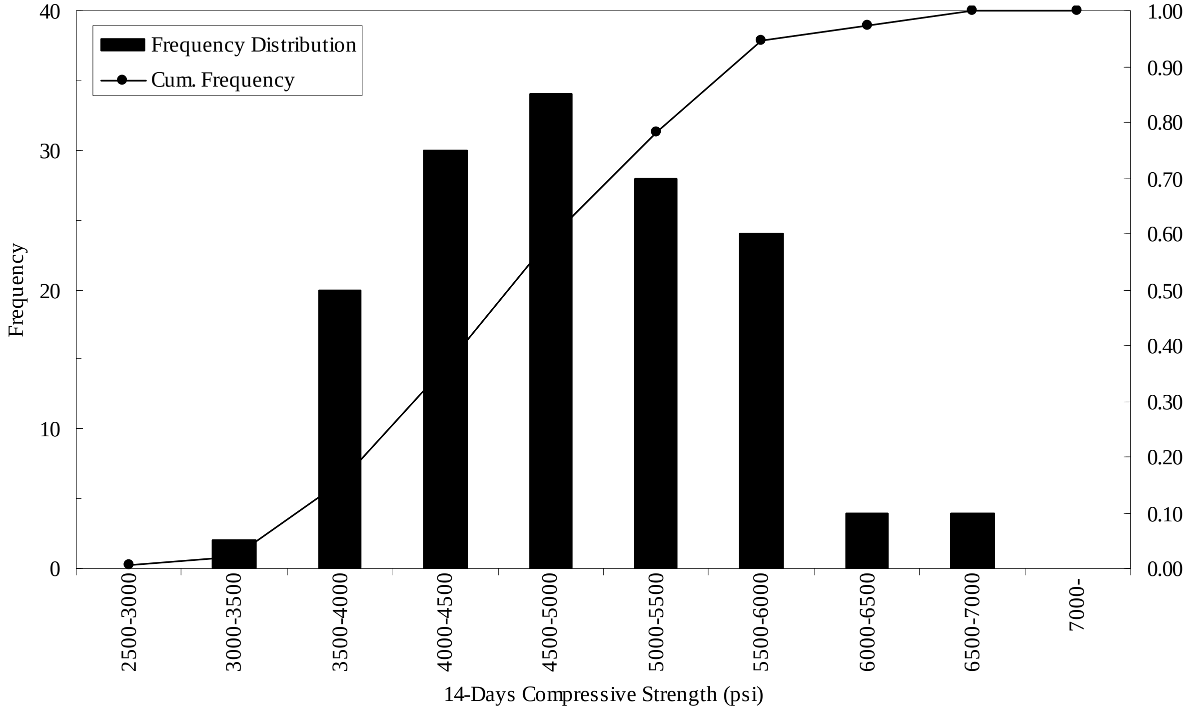

Figure A-14 Distribution of PCC Compressive Strength – LTPP Data

Table A-5 Treated Base Thickness Data for GPS-3 Experiment Sections

Material Code	Description	Mean	Std	Max	Min	Count
331	Cement Aggregate Mixture	4.7	1.1	7.3	2.4	27
339	Soil Cement	5.3	0.9	6.7	4.0	11
334	Lean Concrete	4.7	0.9	6.4	3.4	10
319	HMAC	3.4	1.4	4.8	0.9	9
321	Asphalt Treated Mixture	5.4	1.6	7.6	4.0	4
320	Sand Asphalt	2.9	1.0	3.6	2.2	2
325	Open Graded Hot Laid Concrete Plant Mix	3.4	0.3	3.6	3.2	2
332	Econcrete	4.7	0.5	5.0	4.3	2
322		5.0		5.0	5.0	1
323		3.8		3.8	3.8	1
Total		4.6	1.2	7.6	0.9	69

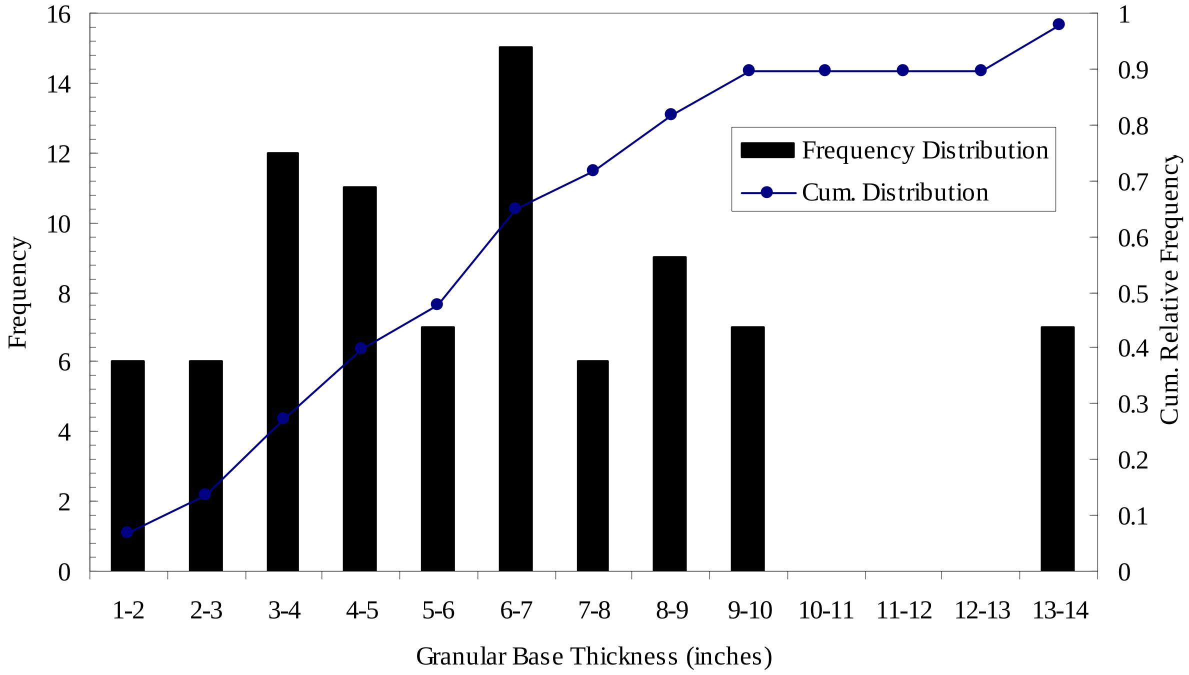

Figure A-15 Granular Base Thickness for GPS-3 Experiment Sections

LTPP INPUT VARIABLE RANGES—FLEXIBLE PAVEMENTS

Table A-6 LTPP experiment pertinent to project

Experiment	Description	Title	Code
SPS-1	The SPS-1 examines the effects of climatic region, subgrade soil (fine- and coarse-grained), and traffic rate (as a covariate) on pavement sections incorporating different levels of structural factors.	Strategic Study of Structural Factors for Flexible Pavements	S1
SPS-3	SPS-3 compares the effectiveness and mechanisms by which the selected maintenance treatments preserve and extend pavement service life, safety and ride quality. The overall goal was not to compare the performance of one treatment to another, but to compare the change in performance of the treated section to the untreated section.	Preventive Maintenance Effectiveness of Flexible Pavements	S3
SPS-5	SPS-5 examines the effects of climatic region, condition of existing pavement (fair and poor) and traffic rate (as a covariate) on pavement sections incorporating different methods of rehabilitation with AC overlays.	Rehabilitation of Asphalt Concrete Pavements	S5
SPS-8	The study of Environmental Effects in the Absence of Heavy Loads examines the effect of climatic factors, subgrade type (frost-susceptible, expansive, fine, and coarse), on pavement sections incorporating different designs of flexible and rigid pavements and subjected to very limited traffic as measured by the ESAL accumulation.	Study of Environmental Effects in the Absence of Heavy Loads	S8
SPS-9	As a part of the Strategic Highway Research Program (SHRP), conducted between 1987 and 1993, an extensive amount of research and development was conducted to improve the performance of AC. These activities conducted under the framework of the Asphalt Research Program investigated the chemical and physical properties of the asphalt binder and also involved the development of accelerated tests for asphalt aggregate mixtures.	Validation of SHRP Asphalt Specification and Mix Design (Superpave)	S9
GPS-1	Sections in this experiment include a dense-graded hot mix asphalt concrete (HMAC) surface layer, with or without other HMAC layers, placed over an untreated granular base.	Asphalt Concrete (AC) on Granular Base	G1
GPS-2	Pavements studied for GPS-2 include a dense-graded HMAC surface layer with or without other HMAC layers, placed over a bound base layer.	AC on Bound Base	G2
GPS-6	The GPS-6 data includes sections which were a part of the original LTPP experimental design for rehabilitated pavements, as well as those which have been added in response to changes in practice. The GPS-6A and 06B experiments are a part of the original design. Sections which are classified as GPS-6C, -6D or -6S have been retained in the LTPP study but do not have an experimental design associated with them.	AC Overlay of AC Pavement	G3

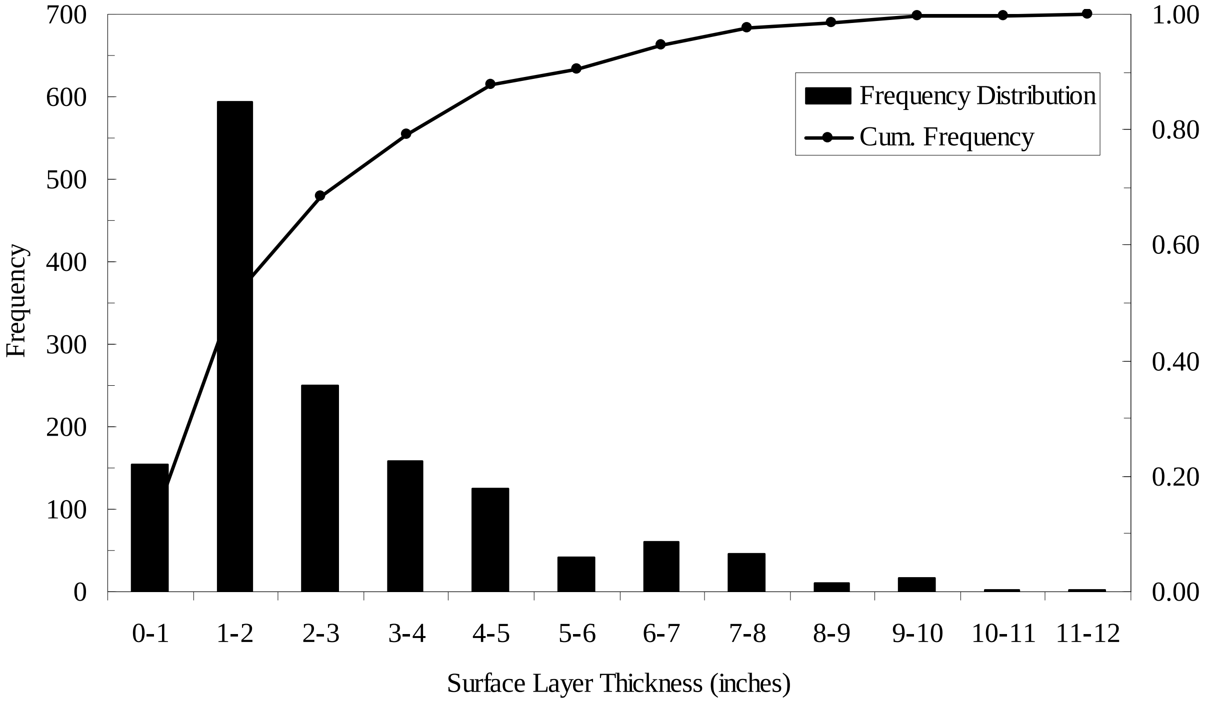

Figure A-16 Asphalt Surface Layer Thickness from LTPP Experiments

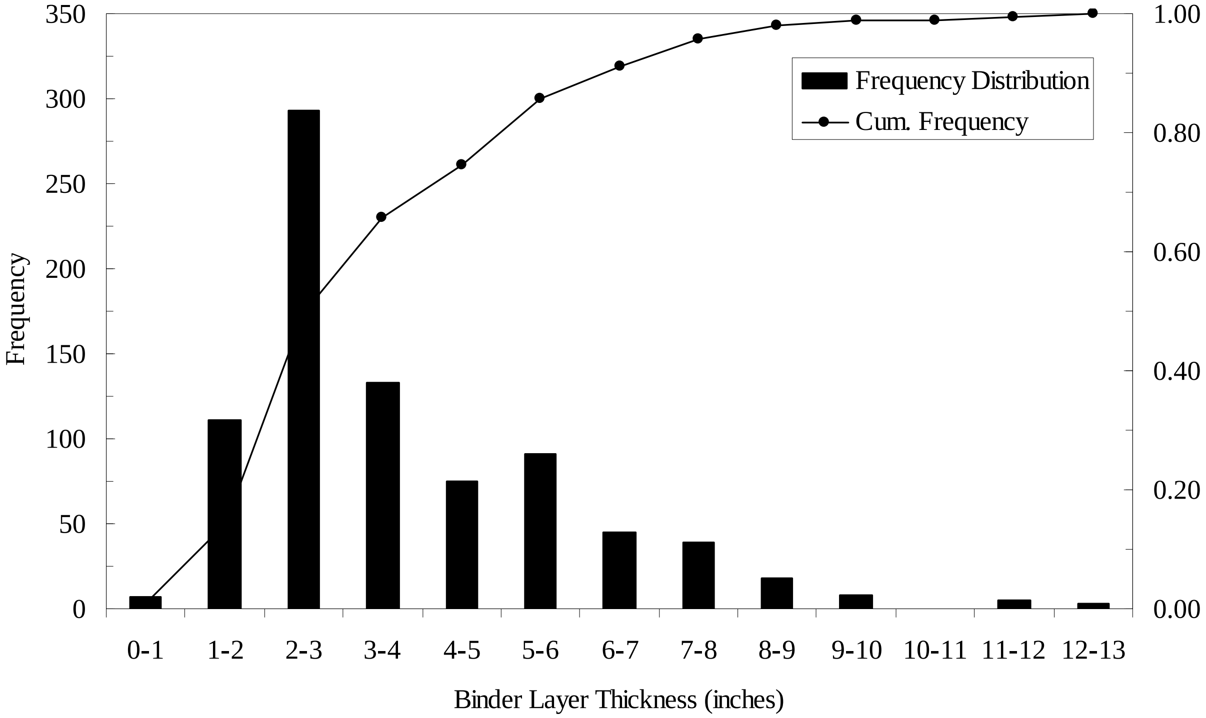

Figure A-17 Asphalt Binder Layer Thickness from LTPP Experiments

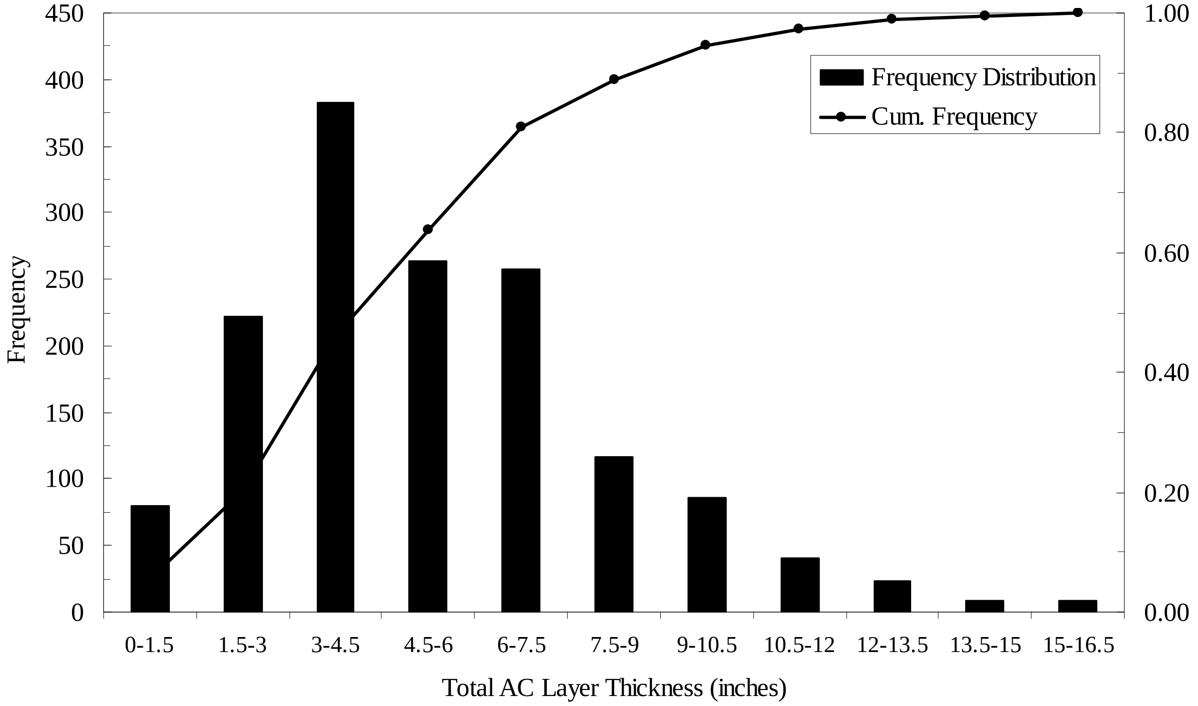

Figure A-18 Total HMA Layer Thickness from LTPP Experiments

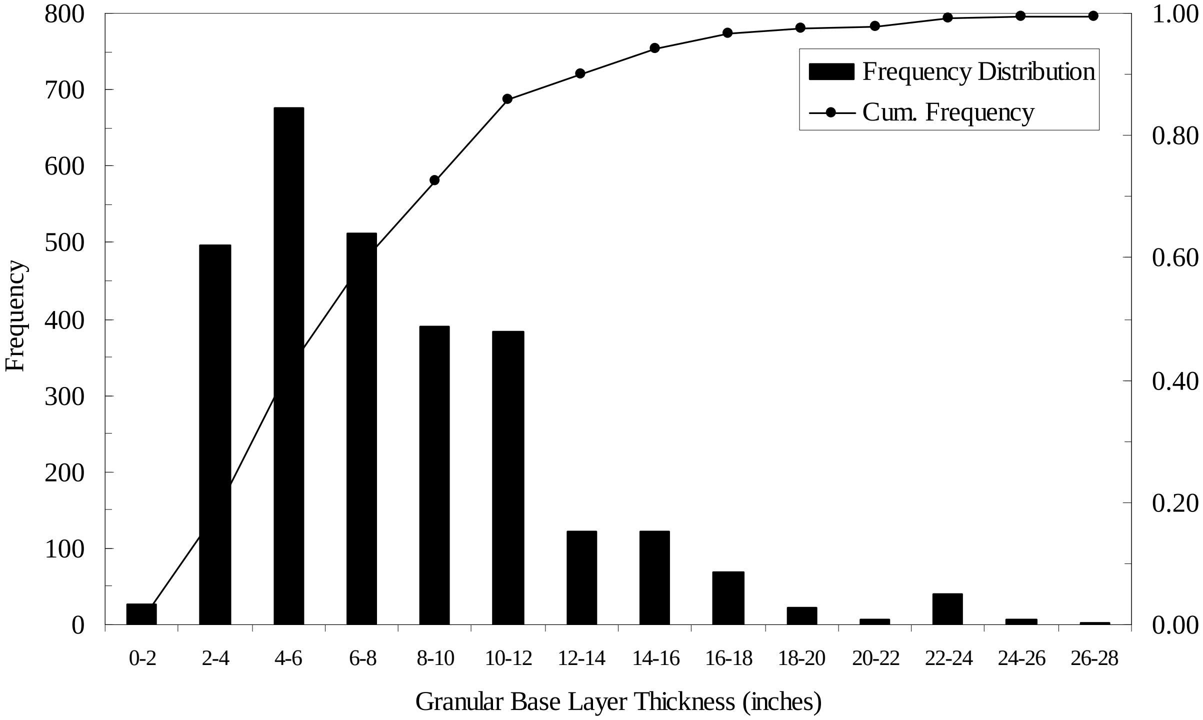

Figure A-19 Granular Base Layer Thickness from LTPP Experiments

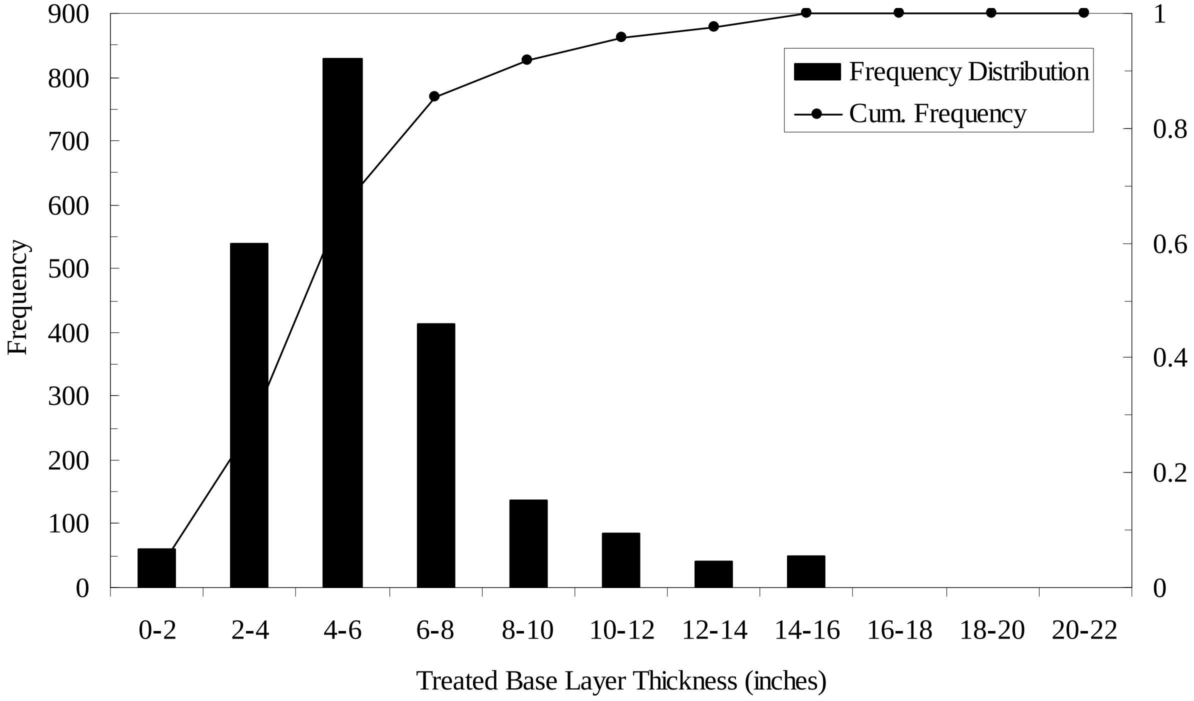

Figure A-20 Asphalt Treated Base Layer Thickness from LTPP Experiments

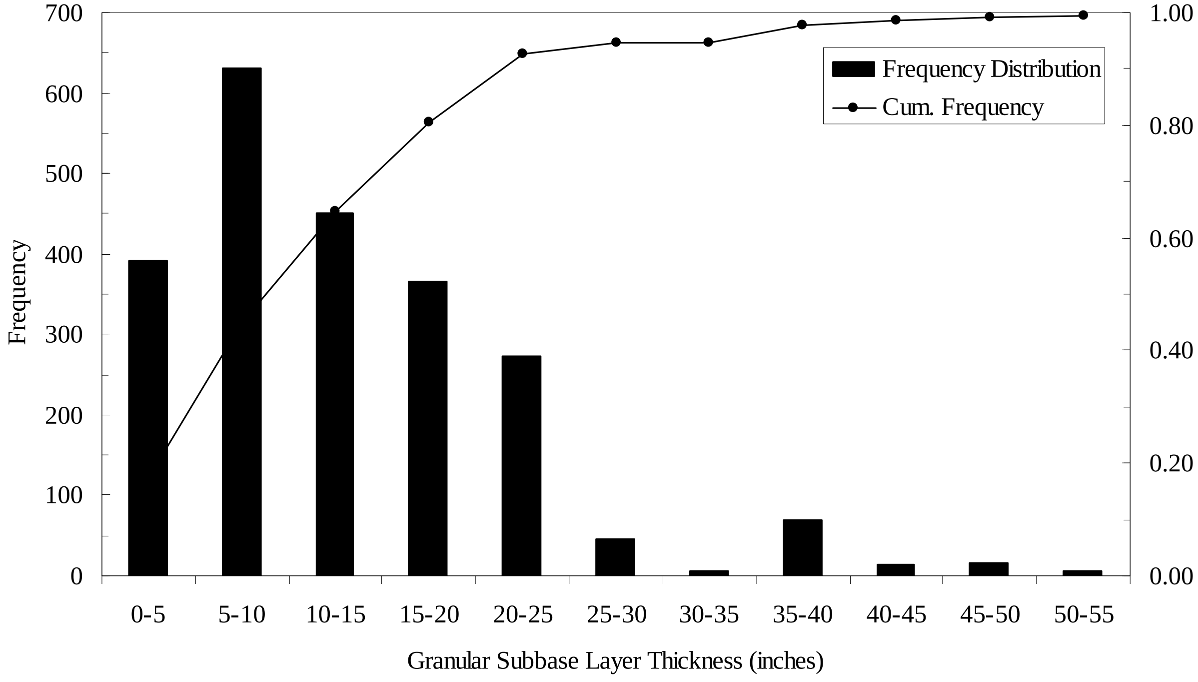

Figure A-21 Granular Subbase Layer Thickness from LTPP Experiments

Table A-7 Treated Base Thickness Data for LTPP Experiments

Material Code	Description	Mean	Std	Max	Min	Count
319	HMAC	7.1	3.2	15.6	0.9	311
331	Cement Aggregate Mixture	5.4	2.1	16.4	0.5	260
325	Open Graded Hot Laid Concrete Plant Mix	4.0	0.6	8.9	2.4	180
334	Lean Concrete	5.4	1.0	7.8	3.0	149
321	Asphalt Treated Mixture	4.6	2.7	13.7	0.0	115
339	Soil Cement	6.1	1.0	8.6	3.9	59
320	Sand Asphalt	5.4	2.8	10.0	1.2	44
326	Open Graded Cold Laid Centeral Plant Mix	4.5	1.5	11.0	4.0	24
350	Others	14.0	2.1	15.2	8.0	16
324	Dense Graded Cold Laid Mixed in Place	4.3	1.0	6.2	2.0	10
332	Econcrete	3.9	0.6	5.0	3.4	8

Table A-8 Treated Subase Thickness Data for LTPP Experiments

Material Code	Description	Average	Std	Max	Min	Count
338	Lime treated soil	9.3	5.2	24.0	2.5	453
340	Pozzolanic aggregate mixture	6.0	0.0	6.0	6.0	40
339	Soil cement	5.6	1.7	11.7	3.5	23
333	Cement treated soil	6.0	0.0	6.0	6.0	18
331	Cement aggregate mixture	9.6	4.4	13.5	2.4	17

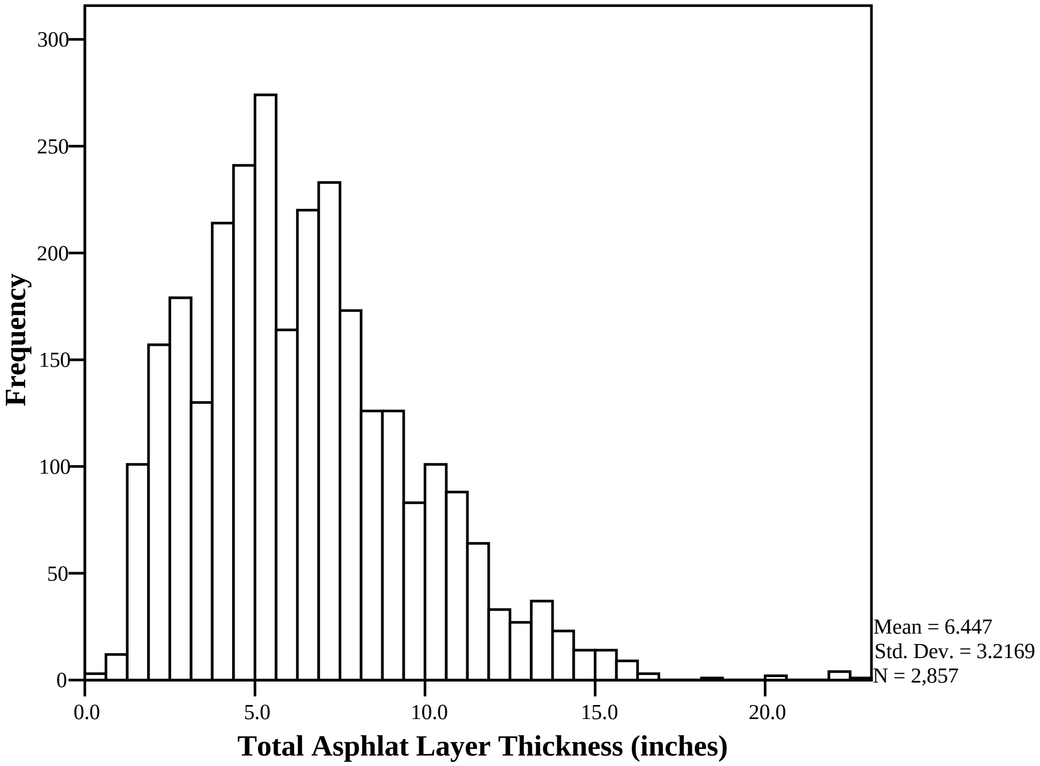

Figure A-22 Distribution of asphalt layer thickness—All Experiments

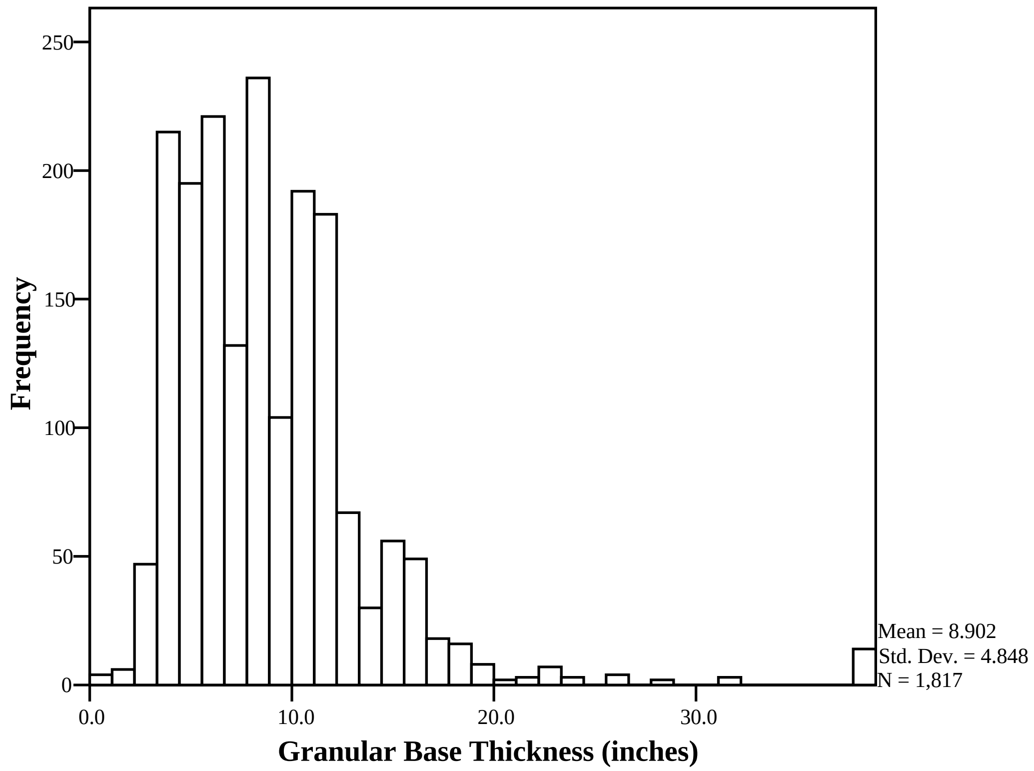

Figure A-23 Distribution of Granular base thickness—All Experiments

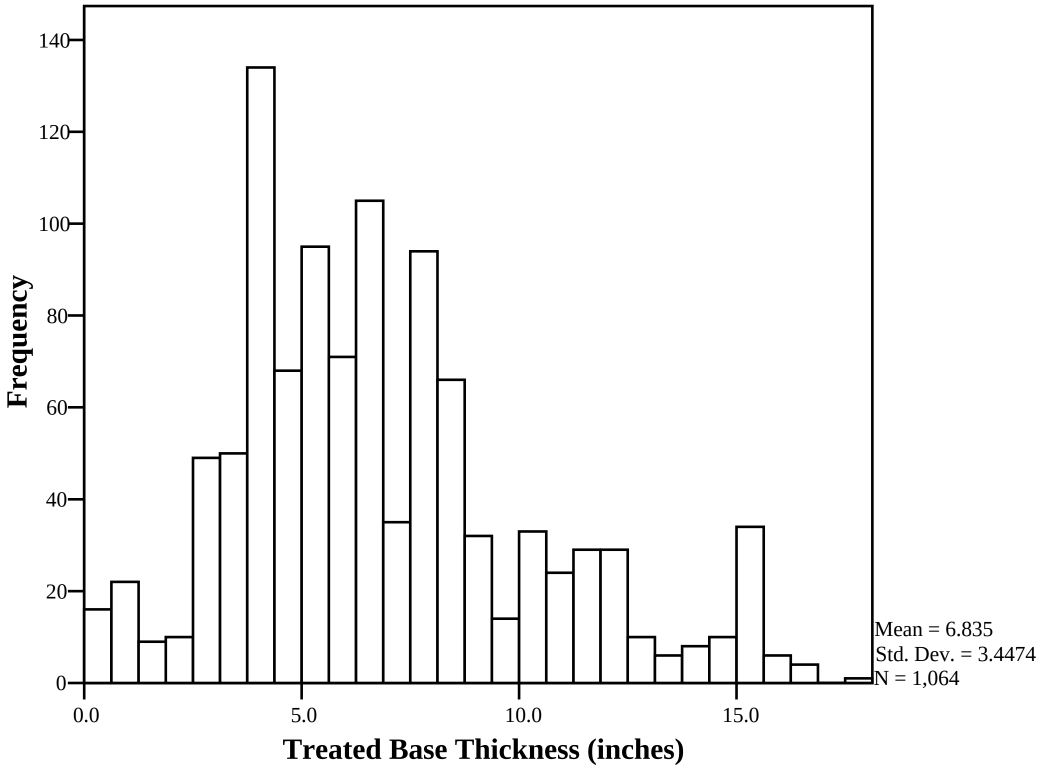

Figure A-24 Distribution of Treated base thickness—All Experiments

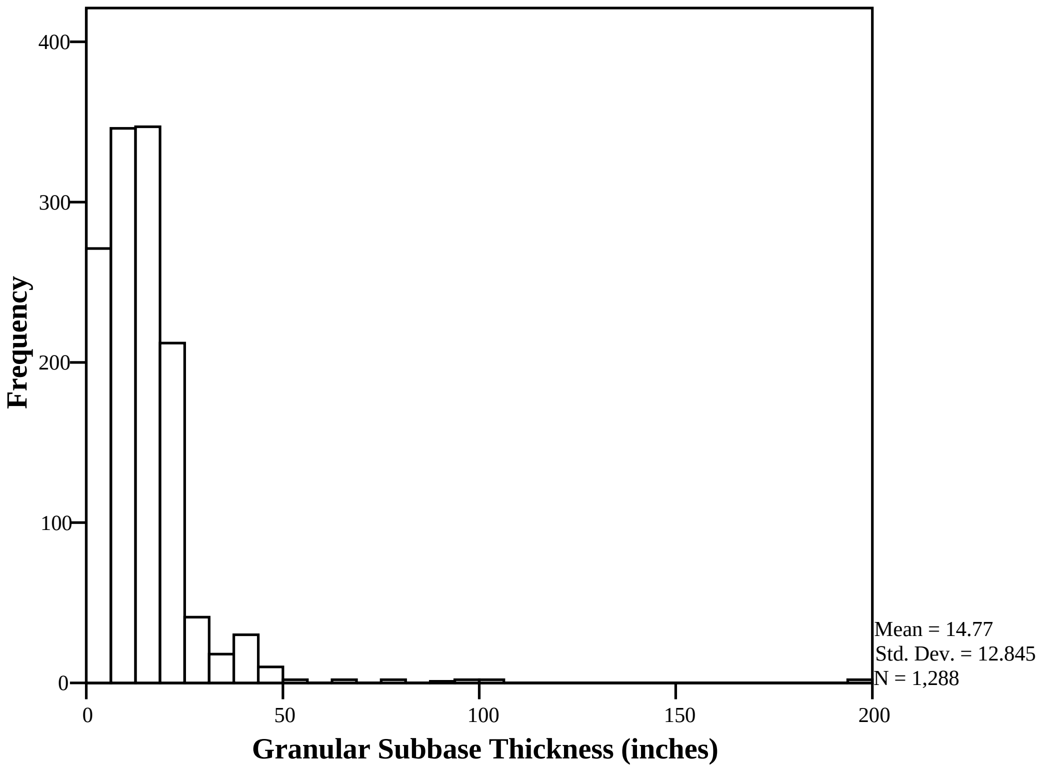

Figure A-25 Distribution of Granular subbase thickness—All Experiments

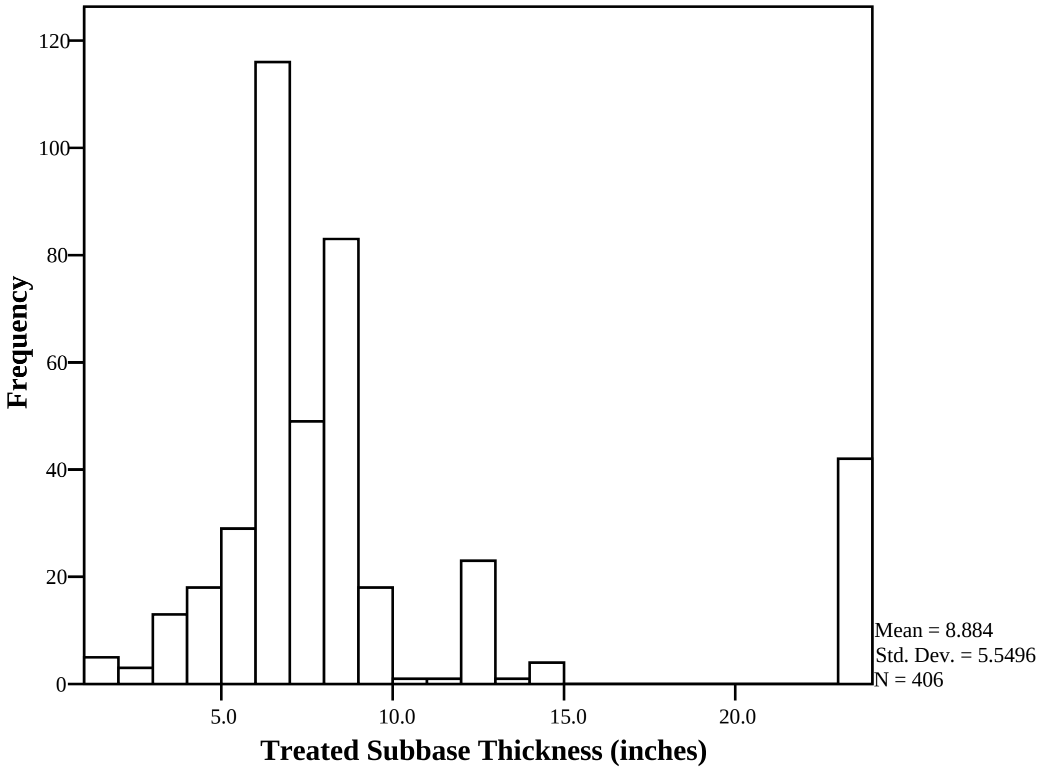

Figure A-26 Distribution of Treated subbase thickness—All Experiments

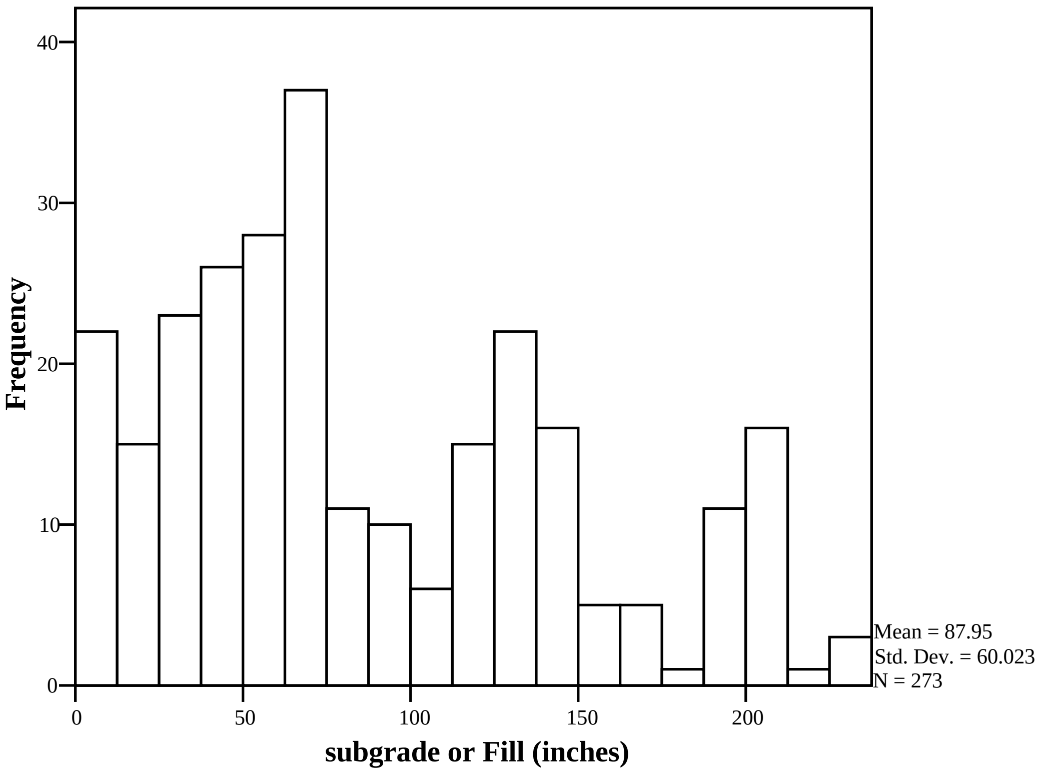

Figure A-27 Distribution of Fill material—All Experiments

Table A-9 Descriptive statistics for all pavement layers — All Experiments

Layer Type	N	Range	Minimum	Maximum	Mean	Std. Deviation
Total Asphalt Layer Thickness (inches)	2857	22.8	.0	22.8	6.447	3.2169
Granular Base Thickness (inches)	1817	37.2	.8	38.0	8.902	4.8480
Granular Subbase Thickness (inches)	1288	199	0	199	14.77	12.845
Treated Base Thickness (inches)	1064	17.9	.0	17.9	6.835	3.4474
Treated Subbase Thickness (inches)	406	22.8	1.2	24.0	8.884	5.5496
subgrade or Fill (inches)	273	231	3	234	87.95	60.023

Table A-10 Descriptive statistics for asphalt layers in all Flexible Pavement LTPP Experiments

LTPP Experiment	Total Asphalt Layer Thickness (inches)					
	Count	Minimum	Maximum	Mean	Median	Standard Deviation
GPS-1	353	1.1	16.0	6.1	5.4	3.3
GPS-2	204	.9	15.4	5.0	4.6	2.9
GPS-6A	90	3.1	22.2	9.1	8.1	4.0
GPS-6B	124	2.4	22.4	7.5	6.9	3.0
GPS-6C	27	1.3	13.4	8.6	8.8	3.2
G6PS-D	16	4.3	16.1	10.3	10.6	3.9
GPS-6S	131	.0	22.8	7.8	7.1	3.8
SPS-1	289	1.0	11.4	5.7	5.5	1.6
SPS-3	916	1.2	16.3	5.9	5.3	3.3
SPS-5	483	2.1	15.6	7.5	7.4	2.9
SPS-8	60	1.4	10.2	5.6	5.3	1.9
SPS-9C	6	7.9	8.5	8.2	8.3	.3
SPS-9J	93	3.0	6.8	5.0	5.4	1.1
SPS-9N	55	2.8	13.4	6.4	5.6	2.4
SPS-9O	91	1.4	14.0	7.8	7.3	2.6

Table A-11 Descriptive statistics for Granular Base Thickness in all Flexible Pavement LTPP Experiments

LTPP Experiment	Granular Base Thickness (inches)					
	Count	Minimum	Maximum	Mean	Median	Standard Deviation
GPS-1	353	1.8	25.8	9.5	8.7	4.6
GPS-2	204	6.5	9.5	7.6	7.7	1.2
GPS-6A	90	2.9	31.4	9.0	8.1	6.0
GPS-6B	124	1.8	19.6	9.2	8.1	4.6
GPS-6C	27	3.6	28.0	13.1	12.0	7.6
GPS-6D	16	2.9	25.6	10.7	9.6	7.4
GPS-6S	131	1.7	25.6	7.8	7.3	4.2
SPS-1	289	.8	13.5	7.4	7.8	3.4
SPS-3	916	2.8	38.0	9.5	8.4	5.6
SPS-5	483	2.8	20.7	7.6	6.0	3.8
SPS-8	60	3.0	12.7	8.5	8.0	2.6
SPS-9C	6	3.7	4.2	4.0	4.1	.2
SPS-9J	93	4.0	12.5	6.2	4.9	2.7
SPS-9N	55	1.0	28.0	9.9	8.5	5.7
SPS-9O	91	7.0	13.0	10.5	10.8	1.5

Table A-12 Descriptive statistics for Treated Base Layers in all Flexible Pavement LTPP Experiments

LTPP Experiment	Treated Base Thickness (inches)					
	Count	Minimum	Maximum	Mean	Median	Standard Deviation
GPS-1	353	7.3	10.0	8.9	10.0	1.5
GPS-2	204	1.8	16.4	7.6	7.2	3.0
GPS-6A	90	1.9	6.2	4.6	5.0	1.4
GPS-6B	124	1.8	15.1	6.7	6.6	2.8
GPS-6C	27	4.8	10.4	7.2	6.6	1.6
GPS-6D	16	1.9	6.6	4.6	4.4	1.8
GPS-6S	131	3.0	15.0	7.3	6.6	3.2
SPS-1	289	2.5	17.9	8.0	8.0	3.8
SPS-3	916	1.2	15.2	6.1	6.1	3.1
SPS-5	483	0.0	15.6	6.5	5.5	3.9
SPS-8	60	.	.	.	.	.
SPS-9C	6	.	.	.	.	.
SPS-9J	93	.5	7.3	2.8	3.0	1.7
SPS-9N	55	3.2	12.1	6.4	5.3	3.5
SPS-9O	91	4.5	7.4	6.1	6.2	.7

Sensitivity Analyses Results for Rigid Pavement

Table A-13 Final M-E Pavement Design Guide Input Variables Ranges — Traffic Data

Inputs		**Data**	Mean, μ	Std, σ	μ−2σ	μ−1σ	μ	μ+1σ	μ+2σ
Main		Initial two-way AADTT			100		12000		25000
		Number of lanes in design direction					2		
		Percent of trucks in design direction (%)					50		
		Percent of trucks in design lane (%)					90		
Traffic Volume Adjustment Factors	Monthly Adjustment	Load monthly adjustment factors (MAF) (sum of the MAF of all months for each class must equal 12)					1		
		Level 1: Site specific distribution					1		
		Level 2: Regional Distribution					1		
		Level 3: Default Distribution (National Avg.)					1		
	Vehicle Class Distribution	AADTT distribution by vehicle class (%)					TTC 1		
		Level 1: Site specific distribution					TTC 1		
		Level 2: Regional Distribution					TTC 1		
		Level 3: Default Distribution (National Avg.)					TTC 1		
	Hourly Distribution	Hourly truck traffic distribution by period beginning	National Average						
		Level 1: Site specific distribution							
		Level 2: Regional Distribution							
		Level 3: Default Distribution (National Avg.)							
	Traffic Growth Factors	Vehicle-class specific traffic growth in percent or Default growth function (all classes) (no growth, linear growth, compound growth)					5		
Axle Load Distribution Factors		Axle factors by axle type (percent of axles (single, tandem, tridem, and quad) in weight categories for each vehicle class for each month) Level 1: Site specific distribution Level 2: Regional Distribution Level 3: Default Distribution (National Avg.)	National Average						

Table A-13 Final M-E Pavement Design Guide Input Variables Ranges — Traffic Data (continued…)

Inputs		**Data**	Mean, μ	Std, σ	μ−2σ	μ−1σ	μ	μ+1σ	μ+2σ
General Traffic Inputs	Lateral Traffic Wander	Mean wheel location (inches from the lane marking)			0		18		36
		Traffic wander standard deviation (in.)			7		10		13
		Design lane width (ft) ***Software Range: 10 to 13]***			10		12		13
	Number Axles/Truck	Average number of single, tandem, tridem and quad axles per truck	National Average						
		Level 1: Site specific distribution							
		Level 2: Regional Distribution							
		Level 3: Default Distribution (National Avg.)							
	Axle Configuration	Average axle width (edge-to-edge) outside dimension (ft)			8		9		10
		Dual tire spacing (in.)			0		12		24
		Tire Pressure for single and dual tires (psi) ***[Software Range: 120]***			80		120		140
		Axle spacing (in.) for: Tandem Tridem Quad			24 24 24		51 51 51		144 144 144
	Wheelbase	Average axle spacing (ft) for: Short trucks Medium trucks Long trucks			10 12 15		12 15 18		15 18 22
		Percents of truck for: Short trucks Medium trucks Long trucks					33 33 34		

Table A-14 Final M-E Pavement Design Guide Input Variables Ranges — Structure Data for Rigid Pavement

Inputs		**Data**	Mean, μ Median	Std, σ Range	μ−2σ 25th	μ−1σ 37.5th	μ 50th	μ+1σ 62.5th	μ+2σ 75th
Design Feature		Permanent curl/warp effective temperature difference (°F)[1] ***[Software Range: -30 to 0]***	-	-	-	-	-10	-	-
		Joint spacing (ft) ***[Software Range: 10 to 20]***	15	3.5	10		15		25
		Sealant type (None, Liquid, Silicone, or Preformed)			None	Liquid	Silicone	Performed	
		Dowel diameter (in.) and spacing (in.) ***[Software Range: 1 to1.75*** ***[Software Range: 10 to 14]]***	1.2 12	0.2 2	1 10		1.25 12		1.5 15
		Edge support (Tied PCC shoulder and/or Widened slab) LTE	-	-	Tied 80%		Asphalt 40%		Widened 14 ft
		PCC-Base Interface (bonded or unbounded)	-	-		-	Unbonded	-	Bonded
		Erodibility index (Extremely resistant (1) through Very erodable (5))	-	-	Very Erodable		Erosion Resistant		Extremely Resistant
		Loss of bond age (months) ***[Software Range: 0 to120]***	-	-	0		60		120
Drainage and Surface Properties		Surface shortwave absorptivity ***[Software Range: 0.5 to 1]***	-	-	0.5		0.7		1
		Infiltration (Negligible (0%) through Extreme (100%))	-	-	0		50		100
		Drainage path length (ft) (not for Negligible infiltration) ***[Software Range: 5 to 25]***	-	-	5		15		25
		Pavement cross slope (%) (not for Negligible infiltration) ***[Software Range: 0 to 5]***	-	-	0		2		5
Layers - PCC Material Properties	Thermal	PCC material	-	-	-	-	JPCP	-	-
		Layer thickness (in.) ***[Software Range: 1 to 20]***	9	1	7	8	9	11	14
		Unit weight (pcf) ***[Software Range: 140 to 160]***	139	14			140		
		Poisson's ratio ***[Software Range: 0.1 to 0.3]***	0.18	0.07			0.2		
		CTE (per °F x 10-6) ***[Software Range: $2*10^{-6}$ to $10*10^{-6}$]***	$5.56×10^{-6}$	$8.03×10^{-7}$	$4×10^{-6}$		$5.56×10^{-6}$		$7.18×10^{-6}$
		Thermal conductivity (BTU/hr-ft-°F) ***[Software Range: 0.2 to 2]***	-	-	0.2		1.25		2
		Heat capacity (BTU/lb-°F)	-	-	0.2		0.28		0.5
	Mix	Cement type (Type I, Type II or Type III)	-	-	-	-	Type I	-	-
		Cementitious material content (lb/yd^3) ***[Software Range: 400 to800]***	544	71	402		544		686
		Water/cement ratio ***[Software Range: 0.3 to 0.7]***	0.47	0.12	0.22		0.47		0.72
		Aggregate type					Limestone		
		PCC zero-stress temperature (°F) ***[Software Range: 50 to 125]***			70		98		125
		Ultimate shrinkage at 40% R.H. (microstrain) ***[Software Range: 300 to 1000]***			300		639		1000
		Reversible shrinkage (% of ultimate shrinkage) ***[Software Range: 30 to 80]***			30		50		80
		Time to develop 50% of ultimate shrinkage (days) ***[Software Range: 30 to 50]***			30		35		50
		Curing method (curing compound or wet curing)					Curing Compound		

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[1] Default value

Table A-14 Final M-E Pavement Design Guide Input Variables Ranges — Structure Data for Rigid Pavement (continued…)

Inputs		**Data**	Mean, μ Median	Std, σ Range	μ−2σ 25th	μ−1σ 37.5th	μ 50th	μ+1σ 62.5th	μ+2σ 75th
Layers - PCC Material Properties	Strength	Level 1 - Elastic Modulus (psi) and Modulus of Rupture (psi) at 7 – days ***[Software Range: 1 to 7x10^6] [Software Range: 300 to 1000]***			$1x10^6$		$3.8x10^6$		$7x10^6$
			662	98	465		662		858
		14 – days *[Same as above]*					$4x10^6$		
			663	115	433		663		894
		28 – days *[Same as above]*					$5.1x10^6$		
			632	153	327		632		937
		90 – days *[Same as above]*					$5.2x10^6$		
					300		650		1000
		Ratio 20 Year/28 Day ***[Software Range: 0 to10] [Software Range: 0 to 10]***			1		1.2		10
		Level 2 - Compressive strength (psi) at 7 – days ***[Software Range: 2000 to 10000]***	3671	5284	2000		3671		10000
		14 – days ***[Software Range: 2000 to 10000]***	3240	4446	2000		3240		10000
		28 – days ***[Software Range: 2000 to 10000]***	4837	817	2000		4837		10000
		90 – days ***[Software Range: 2000 to 10000]***			2000		6000		10000
		Ratio 20 Year/28 Day ***[Software Range: 0 to10]***			1		1.2		10
		Level 3 28-day PCC Compressive Strength (psi) ***[Software Range: 3000 to 8000]***	5370	13000	3000		5370		8000
		28-day PCC Modulus of Rupture (psi) ***[Software Range: 450 to 1200]***	730	9220	450		730		1200
		28-day PCC Elastic Modulus (psi)	4.6E+06	1.1E+06	2.4E+06		4.6E+06		6.8E+06
Layers- Chemically Stabilized Material		Material type			Cement Stabilized		Lime Cement Fly Ash		Lime Stabilized
		Layer thickness (in.) ***[Software Range: 2 to 24]***	4.6	1.2	0		5		8
		Unit weight (pcf) ***[Software Range:50 to 200]***			50		125		200
		Poisson's ratio ***[Software Range:0.15 to 0.45]***			0.15		0.3		0.45
		Elastic/Resilient Modulus (psi) ***[Software Range: 0.5 to 4x10^6]***			$0.5x10^6$		$2x10^6$		$4x10^6$
		Minimum Elastic/Resilient Modulus (psi)							
		Modulus of rupture (psi)							
		Thermal conductivity (BTU/hr-ft-oF) ***[Software Range: 0.1 to 4]***			0.1		2		4
		Heat capacity (BTU/lb-oF) ***[Software Range: 0 to 1]***			0		0.5		1

Table A-14 Final M-E Pavement Design Guide Input Variables Ranges — Structure Data for Rigid Pavement (continued…)

Inputs		**Data**	Mean, μ Median	Std, σ Range	μ–2σ 25th	μ–1σ 37.5 th	μ 50 th	μ+1σ 62.5 th	μ+2σ 75 th
Layers - Unbound Layer **Base/Subbase**	General	Unbound Material					Crush Stone		
		Thickness (in.) ***[Software Range: 1 to 100]***	7	4	2		7		10
	Strength Properties	Poisson's ratio ***[Software Range: 0.1 to 0.4]***			0.25		0.35		0.4
		Coefficient of lateral pressure, Ko ***[Software Range: 0.2 to 3]***					0.5		
		Level 2 (Seasonal or Representative Input) – Modulus (psi) ***[Software Range: 38,500 to 42,000]***			38,500		40,000		42,000
		Level 3 (Representative Input only) - Modulus (psi) ***[Software Range: 38,500 to 42,000]***			38,500		40,000		42,000
	ICM	Plasticity Index ***[Software Range: 0 to 6]***			0		3		6
		Passing #200 sieve (%)***[Software Range: 0 to15]***			0		8		15
		Passing #4 sieve (%)***[Software Range: 0 to 100]***			0		50		100
		D60 (mm) ***[Software Range: 2 to 25]***			2		13		25
		Compacted unbound material or Uncompacted/Natural unbound material							
Layers - Unbound Layer **Subgrade**	General	Unbound Material			A-7-6 MR = 8000		A-4 MR = 15000		A-1-a MR = 40000
		Thickness (in.) ***[Software Range: 1 to 100]***							
	Strength Properties	Poisson's ratio ***[Software Range: 0.1 to 0.4]***			0.3		.4		0.5
		Coefficient of lateral pressure, Ko ***[Software Range: 0.2 to 3]***					0.5		
		Level 3 (Representative Input only) - Modulus (psi) ***[Software Range: 38,500 to 42,000]***			3,500		15,000		29,000
	ICM	Plasticity Index ***[Software Range: 0 to 10]***[2]			0		5		10
		Passing #200 sieve (%)***[Software Range: 36 to100]***			36		68		100
		Passing #4 sieve (%)***[Software Range: 0 to 100]***			0		50		100
		D60 (mm) ***[Software Range: 0.001 to 25]***			.001		12		25
		Compacted unbound material or Uncompacted/Natural unbound material							

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[2] Default range depends on the soil type

Table A-15 List of Sensitive Input Variables from Preliminary Sensitivity—JPCP

Cluster		**Surrogated Variable**	**Levels**	**Remarks**
Traffic		• AADTT	Low, Medium and High	
		• Axle Load Spectra	Low, Medium and High	
		• Monthly Adjustment Factors	Low, Medium and High	
		• Hourly Adjustment Factors	Low, Medium and High	
Design		• Joint Spacing (ft)	10, 15 and 25	
		• Edge Support	Tied, Asphalt and Widened	
		• Dowel Diameter (in)	***1, 1.25 and 1.5***	
		• Dowel Spacing (in)	***10, 12 and 15***	
Surface Properties		• Surface Shortwave Absorptivity	?	
Materials	PCC	• PCC Slab Thickness	7, 9 and 14	
		• CTE (per ^{o}F)	4×10^{-6}, 5.5×10^{-6} and 7×10^{-6}	
		• Thermal Conductivity (BTU/hr-ft-^{o}F)	***0.2, 1.25 and 2***	
		• PCC Zero-stress Temperature (^{o}F)	***70, 98 and 125***	
		• *fc'* (Compressive Strength, psi)	3000, 5000 and 8000	
		• MOR (Modulus of Rupture, psi)	***450, 750 and 1200***	
		• Elastic Modulus (psi)	2×10^{6}, 4×10^{6} and 6×10^{6}	
	Base/Subbase	• Base Type	Granular Base and Asphalt Treated	
		• Base Thickness (in)	***2, 6 and 10***	
		• Passing # 200	***0, 8 and 15***	
		• Plasticity Index	***0, 3 and 6***	
	Subgrade	• Soil Type	A-7-6, A-4 and A-1-a	
		• Passing # 200	***30, 60 and 90***	
		• Plasticity Index	***0, 5 and*** $\boldsymbol{10^{2}}$	
Environmental		• Different Climatic Regions	Extreme and Moderate	

Table A-16 Input Variable Levels for Final Design Matrix for Task 3 Sensitivity (Interaction) — Traffic Data

Inputs		**Data**	Level 1	Base	Level 2
Main		Initial two-way AADTT		12000	
		Number of lanes in design direction		2	
		Percent of trucks in design direction (%)		50	
		Percent of trucks in design lane (%)		90	
Traffic Volume Adjustment Factors	Monthly Adjustment	Load monthly adjustment factors (MAF) (sum of the MAF of all months for each class must equal 12)		1	
		Level 1: Site specific distribution		1	
		Level 2: Regional Distribution		1	
		Level 3: Default Distribution (National Avg.)		1	
	Vehicle Class Distribution	AADTT distribution by vehicle class (%)		TTC 1	
		Level 1: Site specific distribution		TTC 1	
		Level 2: Regional Distribution		TTC 1	
		Level 3: Default Distribution (National Avg.)		TTC 1	
	Hourly Distribution	Hourly truck traffic distribution by period beginning			
		Level 1: Site specific distribution			
		Level 2: Regional Distribution			
		Level 3: Default Distribution (National Avg.)			
	Traffic Growth Factors	Vehicle-class specific traffic growth in percent or Default growth function (all classes) (no growth, linear growth, compound growth)		5	
Axle Load Distribution Factors		Axle factors by axle type (percent of axles (single, tandem, tridem, and quad) in weight categories for each vehicle class for each month) Level 1: Site specific distribution Level 2: Regional Distribution Level 3: Default Distribution (National Avg.)			
General Traffic Inputs	Lateral Traffic Wander	Mean wheel location (inches from the lane marking)		18	
		Traffic wander standard deviation (in.)		10	
		Design lane width (ft) ***Software Range: 10 to 13]***		12	
	Number Axles/Truck	Average number of single, tandem, tridem and quad axles per truck Level 1: Site specific distribution Level 2: Regional Distribution Level 3: Default Distribution (National Avg.)			
	Axle Configuration	Average axle width (edge-to-edge) outside dimension (ft)		9	
		Dual tire spacing (in.)		12	
		Tire Pressure for single and dual tires (psi) ***[Software Range: 120]***		120	
		Axle spacing (in.) for:			
		Tandem		51	
		Tridem		51	
		Quad		51	
	Wheelbase	Average axle spacing (ft) for:			
		Short trucks		12	
		Medium trucks		15	
		Long trucks		18	
		Percents of truck for:			
		Short trucks		33	
		Medium trucks		33	
		Long trucks		34	

Table A-17 Input Variable Levels for Final Design Matrix for Task 3 Sensitivity (Interaction) — Structure Data for Rigid Pavement

Inputs		**Data**	Level 1	Base	Level 2
Design Feature		Permanent curl/warp effective temperature difference (°F)[3] ***[Software Range: -30 to 0]***		-10	
		Joint spacing (ft) *[Software Range: 10 to 20]*	**15**		**18**
		Sealant type (None, Liquid, Silicone, or Preformed)		Silicone	
		Dowel diameter (in.) and spacing (in.) ***[Software Range: 1 to1.75 [Software Range: 10 to 14]]***		1.25 12	
		Edge support (Tied PCC shoulder and/or Widened slab) LTE	**Tied**		**Asphalt**
		PCC-Base Interface (bonded or unbounded)		Unbonded	
		Erodibility index (Extremely resistant (1) through Very erodable (5))		Erosion Resistant	
		Loss of bond age (months) ***[Software Range: 0 to120]***		60	
Drainage and Surface Properties		Surface shortwave absorptivity ***[Software Range: 0.5 to 1]***		0.7	
		Infiltration (Negligible (0%) through Extreme (100%))		50	
		Drainage path length (ft) (not for Negligible infiltration) ***[Software Range: 5 to 25]***		15	
		Pavement cross slope (%) (not for Negligible infiltration) ***[Software Range: 0 to 5]***		2	
Layers - PCC Material Properties	Thermal	PCC material		JPCP	
		Layer thickness (in.) *[Software Range: 1 to 20]*	**9**		**14**
		Unit weight (pcf) ***[Software Range: 140 to 160]***		140	
		Poisson's ratio ***[Software Range: 0.1 to 0.3]***		0.2	
		CTE (per °F x 10-6) *[Software Range: $2*10^{-6}$ to $10*10^{-6}$]*	**5.56×10^{-6}**		**7×10^{-6}**
		Thermal conductivity (BTU/hr-ft-°F) ***[Software Range: 0.2 to 2]***		1.25	
		Heat capacity (BTU/lb-°F)		0.28	
	Mix	Cement type (Type I, Type II or Type III)		Type I	
		Cementitious material content (lb/yd^3) ***[Software Range: 400 to800]***		544	
		Water/cement ratio ***[Software Range: 0.3 to 0.7]***		0.47	
		Aggregate type		Limestone	
		PCC zero-stress temperature (°F) ***[Software Range: 50 to 125]***		98	
		Ultimate shrinkage at 40% R.H. (microstrain) ***[Software Range: 300 to 1000]***		639	
		Reversible shrinkage (% of ultimate shrinkage) ***[Software Range: 30 to 80]***		50	
		Time to develop 50% of ultimate shrinkage (days) ***[Software Range: 30 to 50]***		35	
		Curing method (curing compound or wet curing)		Curing Compound	

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[3] Default value

Table A-17 Input Variable Levels for Final Design Matrix for Task 3 Sensitivity (Interaction) — Structure Data for Rigid Pavement (continued…)

Inputs		**Data**	Level 1	Base	Level 2
Layers - PCC Material Properties	Strength	Level 1 - Elastic Modulus (psi) and Modulus of Rupture (psi) at 7 – days ***[Software Range: 1 to 7x10^6] [Software Range: 300 to 1000]***		$3.8x10^6$	
				662	
		14 – days *[Same as above]*		$4x10^6$	
				663	
		28 – days *[Same as above]*		$5.1x10^6$	
				632	
		90 – days *[Same as above]*		$5.2x10^6$	
				650	
		Ratio 20 Year/28 Day ***[Software Range: 0 to10] [Software Range: 0 to 10]***		1.2	
		Level 2 - Compressive strength (psi) at 7 – days ***[Software Range: 2000 to 10000]***		3671	
		14 – days ***[Software Range: 2000 to 10000]***		3240	
		28 – days ***[Software Range: 2000 to 10000]***		4837	
		90 – days ***[Software Range: 2000 to 10000]***		6000	
		Ratio 20 Year/28 Day ***[Software Range: 0 to10]***		1.2	
		Level 3 28-day PCC Compressive Strength (psi) ***[Software Range: 3000 to 8000]***		5370	
		28-day PCC Modulus of Rupture (psi) ***[Software Range: 450 to 1200]***	**450**		**1200**
		28-day PCC Elastic Modulus (psi)		4.6E+06	
Layers- Chemically Stabilized Material		Material type		Lime Cement Fly Ash	
		Layer thickness (in.) ***[Software Range: 2 to 24]***		5	
		Unit weight (pcf) ***[Software Range:50 to 200]***		125	
		Poisson's ratio ***[Software Range:0.15 to 0.45]***		0.3	
		Elastic/Resilient Modulus (psi) ***[Software Range: 0.5 to 4x10^6]***		$2x10^6$	
		Minimum Elastic/Resilient Modulus (psi)			
		Modulus of rupture (psi)			
		Thermal conductivity (BTU/hr-ft-oF) ***[Software Range: 0.1 to 4]***		2	
		Heat capacity (BTU/lb-oF) ***[Software Range: 0 to 1]***		0.5	

Table A-17 Input Variable Levels for Final Design Matrix for Task 3 Sensitivity (Interaction — Structure Data for Rigid Pavement (continued…)

Inputs		**Data**	Level 1	Base	Level 2
Layers - Unbound Layer **Base/Subbase**	General	**Unbound Material**	**DGAB**		**ATB**
		Thickness (in.) ***[Software Range: 1 to 100]***		7	
	Strength Properties	Poisson's ratio ***[Software Range: 0.1 to 0.4]***		0.35	
		Coefficient of lateral pressure, Ko ***[Software Range: 0.2 to 3]***		0.5	
		Level 2 (Seasonal or Representative Input) – Modulus (psi) ***[Software Range: 38,500 to 42,000]***		40,000	
		Level 3 (Representative Input only) - Modulus (psi) ***[Software Range: 38,500 to 42,000]***		40,000	
	ICM	Plasticity Index ***[Software Range: 0 to 6]***		3	
		Passing #200 sieve (%)***[Software Range: 0 to15]***		8	
		Passing #4 sieve (%)***[Software Range: 0 to 100]***		50	
		D60 (mm) ***[Software Range: 2 to 25]***		13	
		Compacted unbound material or Uncompacted/Natural unbound material			
Layers - Unbound Layer **Subgrade**	General	**Unbound Material**	**A-1-a**		**A-7-6**
		Thickness (in.) ***[Software Range: 1 to 100]***			
	Strength Properties	Poisson's ratio ***[Software Range: 0.1 to 0.4]***		.4	
		Coefficient of lateral pressure, Ko ***[Software Range: 0.2 to 3]***		0.5	
		Level 3 (Representative Input only) - Modulus (psi) ***[Software Range: 38,500 to 42,000]***		15,000	
	ICM	Plasticity Index ***[Software Range: 0 to 10]***[4]		5	
		Passing #200 sieve (%)***[Software Range: 36 to100]***		68	
		Passing #4 sieve (%)***[Software Range: 0 to 100]***		50	
		D60 (mm) ***[Software Range: 0.001 to 25]***		12	
		Compacted unbound material or Uncompacted/Natural unbound material			

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[4] Default range depends on the soil type

Table A-18 Average cracking (% Slab Cracked) after 10 years service life

Joint Spacing	Edge Support	Slab Thickness	Subgrade	Base Type	CTE (10^{-6})/MOR				Overall
					5.5		7		
					450	1200	450	1200	
15	Asphalt	9	Coarse	ATB	48.5	0.0	99.6	0.0	37.0
				DGAB	85.3	0.0	99.8	0.1	46.3
			Fine	ATB	79.0	0.0	98.7	0.0	44.4
				DGAB	93.4	0.0	99.7	0.0	48.3
		14	Coarse	ATB	0.3	0.0	11.5	0.0	3.0
				DGAB	0.2	0.0	8.1	0.0	2.1
			Fine	ATB	0.0	0.0	2.4	0.0	0.6
				DGAB	0.0	0.0	1.6	0.0	0.4
	Tied	9	Coarse	ATB	17.9	0.0	87.8	0.0	26.4
				DGAB	63.2	0.0	98.2	0.0	40.4
			Fine	ATB	44.0	0.0	90.6	0.0	33.7
				DGAB	75.8	0.0	97.8	0.0	43.4
		14	Coarse	ATB	0.1	0.0	4.3	0.0	1.1
				DGAB	0.1	0.0	2.9	0.0	0.8
			Fine	ATB	0.0	0.0	1.2	0.0	0.3
				DGAB	0.0	0.0	0.7	0.0	0.2
18	Asphalt	9	Coarse	ATB	85.4	0.0	99.9	0.7	46.5
				DGAB	97.7	0.2	100.0	3.8	50.4
			Fine	ATB	95.8	0.0	100.0	0.2	49.0
				DGAB	99.1	0.1	100.0	0.8	50.0
		14	Coarse	ATB	14.9	0.0	86.7	0.0	25.4
				DGAB	11.6	0.0	84.1	0.0	23.9
			Fine	ATB	3.4	0.0	65.5	0.0	17.2
				DGAB	2.5	0.0	58.7	0.0	15.3
	Tied	9	Coarse	ATB	59.2	0.0	99.5	0.1	39.7
				DGAB	90.2	0.0	100.0	0.7	47.7
			Fine	ATB	81.7	0.0	99.7	0.0	45.4
				DGAB	95.6	0.0	100.0	0.1	48.9
		14	Coarse	ATB	6.3	0.0	72.0	0.0	19.6
				DGAB	4.8	0.0	66.9	0.0	17.9
			Fine	ATB	1.6	0.0	49.4	0.0	12.8
				DGAB	1.1	0.0	41.5	0.0	10.7
Overall					39.3	0.0	66.5	0.2	26.5

Table A-19 Average cracking after 20 years service life

Joint Spacing	Edge Support	Slab Thickness	Subgrade	Base Type	CTE (10^{-6})/MOR				Overall
					5.5		7		
					450	1200	450	1200	
15	Asphalt	9	Coarse	ATB	86.1	0.0	100.0	0.0	46.5
				DGAB	97.8	0.0	100.0	0.3	49.5
			Fine	ATB	96.4	0.0	99.9	0.0	49.1
				DGAB	99.1	0.0	100.0	0.0	49.8
		14	Coarse	ATB	1.0	0.0	33.5	0.0	8.6
				DGAB	0.6	0.0	25.4	0.0	6.5
			Fine	ATB	0.1	0.0	8.7	0.0	2.2
				DGAB	0.1	0.0	5.6	0.0	1.4
	Tied	9	Coarse	ATB	51.5	0.0	98.7	0.0	37.6
				DGAB	90.3	0.0	99.9	0.0	47.6
			Fine	ATB	80.0	0.0	99.1	0.0	44.8
				DGAB	94.4	0.0	99.8	0.0	48.6
		14	Coarse	ATB	0.3	0.0	14.7	0.0	3.8
				DGAB	0.2	0.0	10.3	0.0	2.6
			Fine	ATB	0.0	0.0	4.3	0.0	1.1
				DGAB	0.0	0.0	2.7	0.0	0.7
18	Asphalt	9	Coarse	ATB	98.4	0.0	100.0	2.7	50.3
				DGAB	99.8	0.9	100.0	14.8	53.9
			Fine	ATB	99.7	0.0	100.0	0.6	50.1
				DGAB	99.9	0.2	100.0	3.1	50.8
		14	Coarse	ATB	41.2	0.0	96.4	0.0	34.4
				DGAB	34.5	0.0	96.0	0.0	32.6
			Fine	ATB	12.0	0.0	88.4	0.0	25.1
				DGAB	8.9	0.0	85.1	0.0	23.5
	Tied	9	Coarse	ATB	91.0	0.0	100.0	0.3	47.8
				DGAB	99.1	0.2	100.0	3.0	50.6
			Fine	ATB	97.7	0.0	100.0	0.2	49.5
				DGAB	99.6	0.0	100.0	0.6	50.1
		14	Coarse	ATB	21.1	0.0	91.2	0.0	28.1
				DGAB	16.6	0.0	89.4	0.0	26.5
			Fine	ATB	5.7	0.0	79.5	0.0	21.3
				DGAB	4.0	0.0	73.7	0.0	19.4
Overall					50.8	0.0	75.1	0.8	31.7

Table A-20 Average cracking after 30 years service life

Joint Spacing	Edge Support	Slab Thickness	Subgrade	Base Type	CTE (10^{-6})/MOR				Overall
					5.5		7		
					450	1200	450	1200	
15	Asphalt	9	Coarse	ATB	97.1	0.0	100.0	0.0	49.3
				DGAB	99.6	0.0	100.0	0.7	50.1
			Fine	ATB	99.4	0.0	100.0	0.0	49.9
				DGAB	99.9	0.0	100.0	0.1	50.0
		14	Coarse	ATB	2.8	0.0	58.2	0.0	15.3
				DGAB	1.7	0.0	48.5	0.0	12.6
			Fine	ATB	0.3	0.0	20.5	0.0	5.2
				DGAB	0.2	0.0	13.8	0.0	3.5
	Tied	9	Coarse	ATB	80.1	0.0	99.8	0.0	45.0
				DGAB	97.6	0.0	100.0	0.0	49.4
			Fine	ATB	94.2	0.0	99.9	0.0	48.5
				DGAB	98.7	0.0	100.0	0.0	49.7
		14	Coarse	ATB	0.9	0.0	32.1	0.0	8.3
				DGAB	0.5	0.0	23.8	0.0	6.1
			Fine	ATB	0.1	0.0	10.9	0.0	2.8
				DGAB	0.1	0.0	6.9	0.0	1.8
18	Asphalt	9	Coarse	ATB	99.8	0.1	100.0	7.1	51.8
				DGAB	100.0	2.7	100.0	34.5	59.3
			Fine	ATB	100.0	0.0	100.0	1.7	50.4
				DGAB	100.0	0.7	100.0	8.4	52.3
		14	Coarse	ATB	66.2	0.0	98.7	0.0	41.2
				DGAB	59.9	0.0	98.8	0.0	39.7
			Fine	ATB	27.1	0.0	95.5	0.0	30.7
				DGAB	21.2	0.0	94.3	0.0	28.9
	Tied	9	Coarse	ATB	98.3	0.0	100.0	0.8	49.8
				DGAB	99.9	0.5	100.0	8.3	52.2
			Fine	ATB	99.7	0.0	100.0	0.4	50.0
				DGAB	99.9	0.1	100.0	1.5	50.4
		14	Coarse	ATB	42.6	0.0	96.7	0.0	34.8
				DGAB	35.6	0.0	96.2	0.0	33.0
			Fine	ATB	14.1	0.0	91.5	0.0	26.4
				DGAB	10.3	0.0	88.6	0.0	24.7
Overall					57.7	0.1	80.5	2.0	35.1

Table A-21 Average faulting (inches) after 10 years service life

Joint Spacing	Edge Support	Slab Thickness	Subgrade	Base Type	CTE (10^{-6})/MOR				Overall
					5.5		7		
					450	1200	450	1200	
15	Asphalt	9	Coarse	ATB	0.04	0.08	0.11	0.16	0.09
				DGAB	0.06	0.11	0.13	0.19	0.12
			Fine	ATB	0.08	0.10	0.14	0.19	0.13
				DGAB	0.10	0.13	0.18	0.23	0.16
		14	Coarse	ATB	0.07	0.05	0.13	0.11	0.09
				DGAB	0.10	0.08	0.15	0.14	0.12
			Fine	ATB	0.10	0.06	0.16	0.12	0.11
				DGAB	0.13	0.11	0.18	0.17	0.14
	Tied	9	Coarse	ATB	0.03	0.06	0.07	0.13	0.07
				DGAB	0.05	0.09	0.11	0.17	0.10
			Fine	ATB	0.06	0.09	0.13	0.16	0.11
				DGAB	0.09	0.12	0.16	0.20	0.14
		14	Coarse	ATB	0.06	0.04	0.12	0.09	0.08
				DGAB	0.09	0.07	0.14	0.13	0.11
			Fine	ATB	0.09	0.02	0.15	0.11	0.09
				DGAB	0.12	0.10	0.17	0.16	0.14
18	Asphalt	9	Coarse	ATB	0.05	0.12	0.11	0.23	0.13
				DGAB	0.06	0.16	0.14	0.27	0.16
			Fine	ATB	0.09	0.15	0.17	0.27	0.17
				DGAB	0.11	0.19	0.20	0.31	0.20
		14	Coarse	ATB	0.10	0.10	0.17	0.18	0.14
				DGAB	0.12	0.13	0.19	0.21	0.16
			Fine	ATB	0.13	0.12	0.20	0.20	0.17
				DGAB	0.16	0.16	0.22	0.24	0.20
	Tied	9	Coarse	ATB	0.04	0.10	0.09	0.20	0.11
				DGAB	0.05	0.14	0.13	0.24	0.14
			Fine	ATB	0.08	0.14	0.16	0.25	0.15
				DGAB	0.10	0.17	0.19	0.29	0.19
		14	Coarse	ATB	0.09	0.09	0.16	0.16	0.12
				DGAB	0.11	0.12	0.18	0.20	0.15
			Fine	ATB	0.13	0.11	0.20	0.19	0.16
				DGAB	0.15	0.15	0.22	0.23	0.19
Overall					0.09	0.11	0.15	0.19	0.14

Table A-22 Average faulting (inches) after 20 years service life

Joint Spacing	Edge Support	Slab Thickness	Subgrade	Base Type	CTE (10^{-6})/MOR				Overall
					5.5		7		
					450	1200	450	1200	
15	Asphalt	9	Coarse	ATB	0.07	0.14	0.17	0.23	0.15
				DGAB	0.10	0.17	0.18	0.26	0.18
			Fine	ATB	0.12	0.17	0.21	0.26	0.19
				DGAB	0.15	0.20	0.24	0.30	0.22
		14	Coarse	ATB	0.11	0.10	0.17	0.16	0.13
				DGAB	0.14	0.13	0.21	0.20	0.17
			Fine	ATB	0.14	0.12	0.20	0.19	0.16
				DGAB	0.17	0.16	0.23	0.22	0.20
	Tied	9	Coarse	ATB	0.06	0.12	0.13	0.20	0.13
				DGAB	0.09	0.15	0.16	0.24	0.16
			Fine	ATB	0.11	0.15	0.19	0.25	0.18
				DGAB	0.14	0.18	0.22	0.28	0.21
		14	Coarse	ATB	0.10	0.09	0.16	0.15	0.12
				DGAB	0.13	0.12	0.19	0.18	0.16
			Fine	ATB	0.13	0.04	0.19	0.18	0.13
				DGAB	0.16	0.15	0.22	0.21	0.19
18	Asphalt	9	Coarse	ATB	0.08	0.19	0.17	0.30	0.18
				DGAB	0.11	0.22	0.20	0.33	0.21
			Fine	ATB	0.14	0.23	0.23	0.35	0.24
				DGAB	0.16	0.26	0.26	0.38	0.26
		14	Coarse	ATB	0.14	0.15	0.22	0.23	0.19
				DGAB	0.17	0.18	0.25	0.26	0.22
			Fine	ATB	0.18	0.18	0.25	0.27	0.22
				DGAB	0.21	0.21	0.28	0.29	0.25
	Tied	9	Coarse	ATB	0.07	0.17	0.15	0.28	0.17
				DGAB	0.10	0.20	0.19	0.31	0.20
			Fine	ATB	0.13	0.21	0.22	0.33	0.22
				DGAB	0.15	0.24	0.25	0.37	0.25
		14	Coarse	ATB	0.13	0.14	0.21	0.22	0.18
				DGAB	0.16	0.17	0.23	0.25	0.20
			Fine	ATB	0.17	0.17	0.25	0.26	0.21
				DGAB	0.20	0.21	0.27	0.28	0.24
Overall					0.13	0.17	0.21	0.26	0.19

Table A-23 Average faulting (inches) after 30 years service life

Joint Spacing	Edge Support	Slab Thickness	Subgrade	Base Type	CTE (10^{-6})/MOR				Overall
					5.5		7		
					450	1200	450	1200	
15	Asphalt	9	Coarse	ATB	0.10	0.17	0.21	0.26	0.19
				DGAB	0.13	0.20	0.22	0.29	0.21
			Fine	ATB	0.16	0.21	0.24	0.30	0.23
				DGAB	0.18	0.23	0.27	0.33	0.25
		14	Coarse	ATB	0.14	0.13	0.22	0.20	0.17
				DGAB	0.20	0.17	0.28	0.25	0.22
			Fine	ATB	0.18	0.15	0.25	0.23	0.20
				DGAB	0.24	0.20	0.31	0.27	0.25
	Tied	9	Coarse	ATB	0.09	0.16	0.17	0.25	0.16
				DGAB	0.12	0.19	0.20	0.28	0.20
			Fine	ATB	0.15	0.19	0.23	0.29	0.22
				DGAB	0.17	0.22	0.26	0.32	0.24
		14	Coarse	ATB	0.13	0.12	0.20	0.19	0.16
				DGAB	0.18	0.16	0.25	0.23	0.20
			Fine	ATB	0.16	0.06	0.23	0.22	0.17
				DGAB	0.21	0.18	0.28	0.25	0.23
18	Asphalt	9	Coarse	ATB	0.12	0.22	0.21	0.33	0.22
				DGAB	0.14	0.25	0.23	0.36	0.25
			Fine	ATB	0.17	0.26	0.27	0.39	0.27
				DGAB	0.20	0.29	0.30	0.41	0.30
		14	Coarse	ATB	0.19	0.19	0.28	0.28	0.24
				DGAB	0.24	0.24	0.34	0.33	0.29
			Fine	ATB	0.23	0.22	0.32	0.31	0.27
				DGAB	0.29	0.26	0.37	0.35	0.32
	Tied	9	Coarse	ATB	0.10	0.21	0.19	0.32	0.20
				DGAB	0.13	0.24	0.22	0.35	0.23
			Fine	ATB	0.16	0.25	0.26	0.37	0.26
				DGAB	0.19	0.28	0.29	0.40	0.29
		14	Coarse	ATB	0.18	0.18	0.26	0.27	0.22
				DGAB	0.22	0.22	0.31	0.31	0.26
			Fine	ATB	0.22	0.21	0.30	0.30	0.25
				DGAB	0.26	0.25	0.35	0.34	0.30
Overall					0.17	0.20	0.26	0.30	0.23

Table A-24 Average IRI (inch/mile) after 10 years service life

Joint Spacing	Edge Support	Slab Thickness	Subgrade	Base Type	CTE (10^{-6})/MOR				Overall
					5.5		7		
					450	1200	450	1200	
15	Asphalt	9	Coarse	ATB	123.20	105.40	202.40	145.10	144.03
				DGAB	164.00	121.60	211.60	166.30	165.88
			Fine	ATB	178.40	127.50	230.50	172.00	177.10
				DGAB	205.80	143.80	251.50	191.50	198.15
		14	Coarse	ATB	101.30	87.50	140.00	118.90	111.93
				DGAB	114.60	107.50	149.40	139.40	127.73
			Fine	ATB	124.20	106.20	157.20	138.50	131.53
				DGAB	140.30	128.80	171.20	161.60	150.48
	Tied	9	Coarse	ATB	93.60	97.20	174.90	132.00	124.43
				DGAB	143.20	111.70	202.80	151.90	152.40
			Fine	ATB	147.00	118.80	218.30	159.10	160.80
				DGAB	182.90	136.70	239.20	181.10	184.98
		14	Coarse	ATB	96.30	83.40	128.00	111.30	104.75
				DGAB	111.50	101.90	141.20	132.30	121.73
			Fine	ATB	120.10	82.30	151.40	131.70	121.38
				DGAB	136.20	123.70	165.80	155.50	145.30
18	Asphalt	9	Coarse	ATB	154.00	117.90	195.80	164.20	157.98
				DGAB	172.50	131.90	209.20	183.10	174.18
			Fine	ATB	191.30	141.20	230.70	191.60	188.70
				DGAB	207.10	155.40	248.00	208.60	204.78
		14	Coarse	ATB	120.50	105.60	208.80	140.60	143.88
				DGAB	126.90	121.40	214.60	153.60	154.13
			Fine	ATB	135.10	126.80	216.90	163.10	160.48
				DGAB	143.90	144.20	219.80	178.20	171.53
	Tied	9	Coarse	ATB	131.10	108.50	189.40	150.40	144.85
				DGAB	161.70	123.80	200.90	170.20	164.15
			Fine	ATB	178.00	133.30	226.50	180.90	179.68
				DGAB	199.60	148.70	241.60	199.60	197.38
		14	Coarse	ATB	110.40	101.00	192.90	134.80	134.78
				DGAB	118.20	117.40	196.80	149.00	145.35
			Fine	ATB	131.40	121.90	201.30	157.60	153.05
				DGAB	140.50	139.80	203.30	173.60	164.30
Overall					143.90	119.46	197.87	158.98	155.05

Table A-25 Average IRI (inch/mile) after 20 years service life

Joint Spacing	Edge Support	Slab Thickness	Subgrade	Base Type	CTE (10^{-6})/MOR				Overall
					5.5		7		
					450	1200	450	1200	
15	Asphalt	9	Coarse	ATB	175.90	138.40	237.50	182.10	183.48
				DGAB	199.60	154.70	244.50	202.40	200.30
			Fine	ATB	231.60	174.60	277.90	225.80	227.48
				DGAB	255.10	187.70	301.40	239.10	245.83
		14	Coarse	ATB	125.90	114.00	185.40	150.00	143.83
				DGAB	140.20	134.00	193.30	168.10	158.90
			Fine	ATB	158.10	147.60	198.30	184.40	172.10
				DGAB	179.60	166.20	216.40	200.50	190.68
	Tied	9	Coarse	ATB	140.80	129.20	216.40	173.80	165.05
				DGAB	194.50	142.90	243.10	188.80	192.33
			Fine	ATB	219.90	163.20	277.80	212.80	218.43
				DGAB	238.10	184.30	287.30	234.60	236.08
		14	Coarse	ATB	117.70	110.00	161.10	145.00	133.45
				DGAB	137.50	127.60	176.60	160.30	150.50
			Fine	ATB	153.70	104.70	189.80	179.10	156.83
				DGAB	173.80	161.60	207.20	195.20	184.45
18	Asphalt	9	Coarse	ATB	184.80	149.10	224.50	199.30	189.43
				DGAB	196.50	162.20	237.20	222.30	204.55
			Fine	ATB	230.10	186.00	272.00	239.60	231.93
				DGAB	248.60	195.80	292.60	252.10	247.28
		14	Coarse	ATB	164.70	130.80	242.70	166.20	176.10
				DGAB	172.10	144.20	255.40	178.90	187.65
			Fine	ATB	173.70	165.10	269.30	201.70	202.45
				DGAB	184.40	178.70	279.40	214.00	214.13
	Tied	9	Coarse	ATB	180.80	138.10	224.00	185.40	182.08
				DGAB	190.70	155.30	230.30	205.70	195.50
			Fine	ATB	231.60	176.70	274.30	229.40	228.00
				DGAB	244.20	190.70	287.90	244.70	241.88
		14	Coarse	ATB	144.50	127.00	233.40	161.60	166.63
				DGAB	152.30	140.10	243.20	173.30	177.23
			Fine	ATB	168.20	160.30	261.00	196.70	196.55
				DGAB	178.60	173.70	267.50	208.40	207.05
Overall					183.99	153.58	240.90	197.54	194.00

Table A-26 Average IRI (inch/mile) after 30 years service life

Joint Spacing	Edge Support	Slab Thickness	Subgrade	Base Type	CTE (10^{-6})/MOR				Overall
					5.5		7		
					450	1200	450	1200	
15	Asphalt	9	Coarse	ATB	208.60	165.80	264.90	202.50	210.45
				DGAB	225.10	180.60	270.20	228.90	226.20
			Fine	ATB	269.60	213.60	315.00	265.00	265.80
				DGAB	296.90	217.70	343.50	269.30	281.85
		14	Coarse	ATB	154.90	131.80	239.40	169.90	174.00
				DGAB	175.20	158.10	255.70	198.80	196.95
			Fine	ATB	191.70	154.30	245.90	217.50	202.35
				DGAB	231.70	197.90	280.80	236.00	236.60
	Tied	9	Coarse	ATB	187.50	157.70	245.50	203.80	198.63
				DGAB	230.90	162.70	276.20	209.20	219.75
			Fine	ATB	273.70	196.30	322.90	247.10	260.00
				DGAB	277.10	222.60	324.30	273.50	274.38
		14	Coarse	ATB	138.40	131.00	200.00	167.30	159.18
				DGAB	172.40	146.60	229.30	183.50	182.95
			Fine	ATB	185.60	131.10	230.20	212.20	189.78
				DGAB	220.60	191.50	261.90	227.70	225.43
18	Asphalt	9	Coarse	ATB	207.20	173.10	247.80	226.60	213.68
				DGAB	218.10	186.60	259.80	261.70	231.55
			Fine	ATB	263.00	221.40	305.60	275.50	266.38
				DGAB	287.00	223.00	331.70	283.20	281.23
		14	Coarse	ATB	215.00	147.60	282.40	187.50	208.13
				DGAB	233.60	167.20	307.60	210.00	229.60
			Fine	ATB	221.80	195.10	315.60	234.00	241.63
				DGAB	241.60	214.20	339.30	253.80	262.23
	Tied	9	Coarse	ATB	214.10	156.20	254.50	203.80	207.15
				DGAB	213.00	179.40	253.70	233.80	219.98
			Fine	ATB	272.40	206.20	315.00	258.90	263.13
				DGAB	283.20	218.50	327.50	273.00	275.55
		14	Coarse	ATB	189.40	143.00	271.20	180.50	196.03
				DGAB	203.80	160.20	292.00	199.30	213.83
			Fine	ATB	213.80	186.90	313.30	224.70	234.68
				DGAB	231.50	203.60	331.80	241.60	252.13
Overall					223.39	179.42	282.95	226.88	228.16

Table A-27 ANOVA results for cracking (% slab cracked) after 10 years service life

Dependent Variable: ln_crack_10

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1071.385(a)	28	38.264	53.674	.000
Intercept	13.290	1	13.290	18.642	.000
JointSpacing	35.654	1	35.654	50.013	.000
EdgeSupport	3.055	1	3.055	4.285	.041
SlabThickness	105.793	1	105.793	148.399	.000
CTE106	29.765	1	29.765	41.753	.000
MOR	770.208	1	770.208	1080.397	.000
BaseType	.238	1	.238	.334	.564
Subgrade	2.613	1	2.613	3.666	.058
JointSpacing * EdgeSupport	.155	1	.155	.217	.642
JointSpacing * SlabThickness	11.453	1	11.453	16.065	.000
JointSpacing * CTE106	.105	1	.105	.147	.702
JointSpacing * MOR	16.220	1	16.220	22.753	.000
JointSpacing * BaseType	.140	1	.140	.197	.658
JointSpacing * Subgrade	.309	1	.309	.433	.512
EdgeSupport * SlabThickness	.001	1	.001	.002	.966
EdgeSupport * CTE106	.057	1	.057	.080	.778
EdgeSupport * MOR	.242	1	.242	.340	.561
EdgeSupport * BaseType	.000	1	.000	.000	.989
EdgeSupport * Subgrade	.164	1	.164	.231	.632
SlabThickness * CTE106	7.983	1	7.983	11.197	.001
SlabThickness * MOR	69.587	1	69.587	97.612	.000
SlabThickness * BaseType	1.300	1	1.300	1.823	.180
SlabThickness * Subgrade	1.082	1	1.082	1.518	.221
CTE106 * MOR	14.116	1	14.116	19.801	.000
CTE106 * BaseType	.005	1	.005	.007	.934
CTE106 * Subgrade	.276	1	.276	.387	.535
MOR * BaseType	.273	1	.273	.383	.538
MOR * Subgrade	.427	1	.427	.598	.441
BaseType * Subgrade	.165	1	.165	.231	.632
Error	70.576	99	.713		
Total	1155.251	128			
Corrected Total	1141.962	127			

a R Squared = .938 (Adjusted R Squared = .921)

Table A-28 ANOVA results for cracking (% slab cracked) after 20 years service life

Dependent Variable: ln_crack_20

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1087.903(a)	28	38.854	35.352	.000
Intercept	57.739	1	57.739	52.535	.000
JointSpacing	44.195	1	44.195	40.211	.000
EdgeSupport	2.994	1	2.994	2.724	.102
SlabThickness	92.620	1	92.620	84.272	.000
CTE106	32.879	1	32.879	29.915	.000
MOR	852.475	1	852.475	775.642	.000
BaseType	.603	1	.603	.549	.461
Subgrade	4.823	1	4.823	4.389	.039
JointSpacing * EdgeSupport	.176	1	.176	.160	.690
JointSpacing * SlabThickness	5.679	1	5.679	5.167	.025
JointSpacing * CTE106	.009	1	.009	.008	.928
JointSpacing * MOR	6.677	1	6.677	6.076	.015
JointSpacing * BaseType	.734	1	.734	.668	.416
JointSpacing * Subgrade	.012	1	.012	.011	.916
EdgeSupport * SlabThickness	.031	1	.031	.029	.866
EdgeSupport * CTE106	.062	1	.062	.056	.813
EdgeSupport * MOR	5.49E-005	1	5.49E-005	.000	.994
EdgeSupport * BaseType	.058	1	.058	.053	.818
EdgeSupport * Subgrade	.255	1	.255	.232	.631
SlabThickness * CTE106	5.303	1	5.303	4.825	.030
SlabThickness * MOR	26.746	1	26.746	24.336	.000
SlabThickness * BaseType	2.028	1	2.028	1.845	.177
SlabThickness * Subgrade	.705	1	.705	.641	.425
CTE106 * MOR	6.496	1	6.496	5.911	.017
CTE106 * BaseType	.101	1	.101	.091	.763
CTE106 * Subgrade	.002	1	.002	.002	.963
MOR * BaseType	1.546	1	1.546	1.407	.238
MOR * Subgrade	.511	1	.511	.465	.497
BaseType * Subgrade	.181	1	.181	.165	.685
Error	108.807	99	1.099		
Total	1254.449	128			
Corrected Total	1196.710	127			

a R Squared = .909 (Adjusted R Squared = .883)

Table A-29 ANOVA results for cracking (% slab cracked) after 30 years service life

Dependent Variable: ln_crack_30

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1093.253(a)	28	39.045	29.015	.000
Intercept	108.112	1	108.112	80.341	.000
JointSpacing	48.369	1	48.369	35.945	.000
EdgeSupport	3.757	1	3.757	2.792	.098
SlabThickness	82.041	1	82.041	60.967	.000
CTE106	32.132	1	32.132	23.878	.000
MOR	897.013	1	897.013	666.594	.000
BaseType	1.167	1	1.167	.867	.354
Subgrade	5.792	1	5.792	4.304	.041
JointSpacing * EdgeSupport	.119	1	.119	.089	.766
JointSpacing * SlabThickness	1.177	1	1.177	.874	.352
JointSpacing * CTE106	.065	1	.065	.048	.826
JointSpacing * MOR	1.310	1	1.310	.973	.326
JointSpacing * BaseType	1.408	1	1.408	1.047	.309
JointSpacing * Subgrade	.027	1	.027	.020	.888
EdgeSupport * SlabThickness	.090	1	.090	.067	.797
EdgeSupport * CTE106	.009	1	.009	.007	.934
EdgeSupport * MOR	.061	1	.061	.045	.832
EdgeSupport * BaseType	.187	1	.187	.139	.710
EdgeSupport * Subgrade	.044	1	.044	.032	.858
SlabThickness * CTE106	2.326	1	2.326	1.729	.192
SlabThickness * MOR	6.550	1	6.550	4.868	.030
SlabThickness * BaseType	3.016	1	3.016	2.242	.138
SlabThickness * Subgrade	.423	1	.423	.314	.576
CTE106 * MOR	2.536	1	2.536	1.885	.173
CTE106 * BaseType	.052	1	.052	.039	.844
CTE106 * Subgrade	.079	1	.079	.059	.809
MOR * BaseType	2.836	1	2.836	2.108	.150
MOR * Subgrade	.375	1	.375	.278	.599
BaseType * Subgrade	.291	1	.291	.216	.643
Error	133.221	99	1.346		
Total	1334.586	128			
Corrected Total	1226.474	127			

a R Squared = .891 (Adjusted R Squared = .861)

Table A-30 ANOVA results for faulting (inch) after 10 years service life

Dependent Variable: 10_Faulting

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.419(a)	28	.015	433.927	.000
Intercept	2.336	1	2.336	67802.529	.000
JointSpacing	.065	1	.065	1886.019	.000
EdgeSupport	.006	1	.006	183.671	.000
SlabThickness	.000	1	.000	3.375	.069
CTE106	.179	1	.179	5185.308	.000
MOR	.026	1	.026	757.718	.000
BaseType	.032	1	.032	938.118	.000
Subgrade	.038	1	.038	1089.523	.000
JointSpacing * EdgeSupport	2.11E-005	1	2.11E-005	.613	.435
JointSpacing * SlabThickness	.001	1	.001	32.400	.000
JointSpacing * CTE106	.002	1	.002	61.787	.000
JointSpacing * MOR	.011	1	.011	328.707	.000
JointSpacing * BaseType	9.45E-005	1	9.45E-005	2.744	.101
JointSpacing * Subgrade	.001	1	.001	21.511	.000
EdgeSupport * SlabThickness	.000	1	.000	10.000	.002
EdgeSupport * CTE106	.000	1	.000	3.157	.079
EdgeSupport * MOR	.000	1	.000	6.099	.015
EdgeSupport * BaseType	3.40E-005	1	3.40E-005	.988	.323
EdgeSupport * Subgrade	8.00E-006	1	8.00E-006	.232	.631
SlabThickness * CTE106	.002	1	.002	70.098	.000
SlabThickness * MOR	.047	1	.047	1356.652	.000
SlabThickness * BaseType	1.25E-005	1	1.25E-005	.363	.548
SlabThickness * Subgrade	.002	1	.002	45.105	.000
CTE106 * MOR	.002	1	.002	61.787	.000
CTE106 * BaseType	3.61E-005	1	3.61E-005	1.049	.308
CTE106 * Subgrade	.001	1	.001	16.530	.000
MOR * BaseType	.002	1	.002	44.300	.000
MOR * Subgrade	.001	1	.001	37.010	.000
BaseType * Subgrade	.000	1	.000	5.102	.026
Error	.003	99	3.45E-005		
Total	2.758	128			
Corrected Total	.422	127			

a R Squared = .992 (Adjusted R Squared = .990)

Table A-31 ANOVA results for faulting (inch) after 20 years service life

Dependent Variable: 20_Faulting

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.530(a)	28	.019	319.764	.000
Intercept	4.668	1	4.668	78814.837	.000
JointSpacing	.077	1	.077	1293.198	.000
EdgeSupport	.006	1	.006	104.256	.000
SlabThickness	.004	1	.004	67.439	.000
CTE106	.227	1	.227	3828.185	.000
MOR	.051	1	.051	857.114	.000
BaseType	.032	1	.032	533.486	.000
Subgrade	.049	1	.049	821.183	.000
JointSpacing * EdgeSupport	.000	1	.000	1.745	.190
JointSpacing * SlabThickness	.001	1	.001	24.733	.000
JointSpacing * CTE106	.001	1	.001	21.001	.000
JointSpacing * MOR	.012	1	.012	200.551	.000
JointSpacing * BaseType	.000	1	.000	3.252	.074
JointSpacing * Subgrade	.001	1	.001	13.763	.000
EdgeSupport * SlabThickness	4.63E-005	1	4.63E-005	.782	.379
EdgeSupport * CTE106	3.45E-006	1	3.45E-006	.058	.810
EdgeSupport * MOR	4.88E-005	1	4.88E-005	.823	.366
EdgeSupport * BaseType	5.91E-005	1	5.91E-005	.998	.320
EdgeSupport * Subgrade	5.70E-006	1	5.70E-006	.096	.757
SlabThickness * CTE106	.004	1	.004	72.824	.000
SlabThickness * MOR	.059	1	.059	991.099	.000
SlabThickness * BaseType	.000	1	.000	2.061	.154
SlabThickness * Subgrade	.003	1	.003	55.906	.000
CTE106 * MOR	.001	1	.001	24.278	.000
CTE106 * BaseType	3.72E-005	1	3.72E-005	.628	.430
CTE106 * Subgrade	.000	1	.000	6.327	.014
MOR * BaseType	.000	1	.000	4.133	.045
MOR * Subgrade	.001	1	.001	22.283	.000
BaseType * Subgrade	7.05E-005	1	7.05E-005	1.191	.278
Error	.006	99	5.92E-005		
Total	5.204	128			
Corrected Total	.536	127			

a R Squared = .989 (Adjusted R Squared = .986)

Table A-32 ANOVA results for faulting (inch) after 30 years service life

Dependent Variable: 30_Faulting

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.619(a)	28	.022	291.478	.000
Intercept	6.999	1	6.999	92283.025	.000
JointSpacing	.094	1	.094	1243.111	.000
EdgeSupport	.009	1	.009	113.561	.000
SlabThickness	.000	1	.000	2.507	.117
CTE106	.261	1	.261	3441.169	.000
MOR	.038	1	.038	500.350	.000
BaseType	.049	1	.049	644.800	.000
Subgrade	.050	1	.050	655.150	.000
JointSpacing * EdgeSupport	6.05E-005	1	6.05E-005	.798	.374
JointSpacing * SlabThickness	.005	1	.005	66.915	.000
JointSpacing * CTE106	.001	1	.001	19.045	.000
JointSpacing * MOR	.010	1	.010	133.394	.000
JointSpacing * BaseType	7.81E-005	1	7.81E-005	1.030	.313
JointSpacing * Subgrade	.001	1	.001	8.782	.004
EdgeSupport * SlabThickness	.000	1	.000	4.717	.032
EdgeSupport * CTE106	2.28E-005	1	2.28E-005	.300	.585
EdgeSupport * MOR	1.53E-006	1	1.53E-006	.020	.887
EdgeSupport * BaseType	1.25E-007	1	1.25E-007	.002	.968
EdgeSupport * Subgrade	1.01E-005	1	1.01E-005	.133	.716
SlabThickness * CTE106	.002	1	.002	23.338	.000
SlabThickness * MOR	.088	1	.088	1157.333	.000
SlabThickness * BaseType	.004	1	.004	57.323	.000
SlabThickness * Subgrade	.004	1	.004	55.494	.000
CTE106 * MOR	.001	1	.001	9.771	.002
CTE106 * BaseType	1.13E-005	1	1.13E-005	.149	.701
CTE106 * Subgrade	.000	1	.000	1.533	.219
MOR * BaseType	2.28E-005	1	2.28E-005	.300	.585
MOR * Subgrade	.001	1	.001	19.761	.000
BaseType * Subgrade	4.51E-005	1	4.51E-005	.595	.442
Error	.008	99	7.58E-005		
Total	7.626	128			
Corrected Total	.627	127			

a R Squared = .988 (Adjusted R Squared = .985)

Table A-33 ANOVA results for IRI (inch/mile) after 10 years service life

Dependent Variable: 10_IRI

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	188533.960(a)	28	6733.356	76.074	.000
Intercept	3077308.361	1	3077308.361	34767.645	.000
JointSpacing	12529.445	1	12529.445	141.559	.000
EdgeSupport	3327.240	1	3327.240	37.591	.000
SlabThickness	28459.015	1	28459.015	321.532	.000
CTE106	69919.301	1	69919.301	789.953	.000
MOR	32086.778	1	32086.778	362.519	.000
BaseType	10018.201	1	10018.201	113.186	.000
Subgrade	21783.063	1	21783.063	246.107	.000
JointSpacing * EdgeSupport	44.888	1	44.888	.507	.478
JointSpacing * SlabThickness	1478.320	1	1478.320	16.702	.000
JointSpacing * CTE106	602.045	1	602.045	6.802	.011
JointSpacing * MOR	142.383	1	142.383	1.609	.208
JointSpacing * BaseType	424.861	1	424.861	4.800	.031
JointSpacing * Subgrade	33.008	1	33.008	.373	.543
EdgeSupport * SlabThickness	211.151	1	211.151	2.386	.126
EdgeSupport * CTE106	.165	1	.165	.002	.966
EdgeSupport * MOR	106.580	1	106.580	1.204	.275
EdgeSupport * BaseType	53.303	1	53.303	.602	.440
EdgeSupport * Subgrade	16.245	1	16.245	.184	.669
SlabThickness * CTE106	145.778	1	145.778	1.647	.202
SlabThickness * MOR	3248.180	1	3248.180	36.698	.000
SlabThickness * BaseType	259.350	1	259.350	2.930	.090
SlabThickness * Subgrade	1509.751	1	1509.751	17.057	.000
CTE106 * MOR	1671.865	1	1671.865	18.889	.000
CTE106 * BaseType	114.761	1	114.761	1.297	.258
CTE106 * Subgrade	11.640	1	11.640	.132	.718
MOR * BaseType	30.615	1	30.615	.346	.558
MOR * Subgrade	302.580	1	302.580	3.419	.067
BaseType * Subgrade	3.445	1	3.445	.039	.844
Error	8762.559	99	88.511		
Total	3274604.880	128			
Corrected Total	197296.519	127			

a R Squared = .956 (Adjusted R Squared = .943)

Table A-34 ANOVA results for IRI (inch/mile) after 20 years service life

Dependent Variable: 20_IRI

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	242986.181(a)	28	8678.078	66.852	.000
Intercept	4817524.401	1	4817524.401	37112.299	.000
JointSpacing	10420.266	1	10420.266	80.274	.000
EdgeSupport	2594.701	1	2594.701	19.989	.000
SlabThickness	40765.832	1	40765.832	314.044	.000
CTE106	81390.994	1	81390.994	627.004	.000
MOR	43538.316	1	43538.316	335.402	.000
BaseType	8484.159	1	8484.159	65.359	.000
Subgrade	44123.064	1	44123.064	339.907	.000
JointSpacing * EdgeSupport	90.283	1	90.283	.696	.406
JointSpacing * SlabThickness	4295.486	1	4295.486	33.091	.000
JointSpacing * CTE106	617.322	1	617.322	4.756	.032
JointSpacing * MOR	358.116	1	358.116	2.759	.100
JointSpacing * BaseType	396.563	1	396.563	3.055	.084
JointSpacing * Subgrade	24.238	1	24.238	.187	.667
EdgeSupport * SlabThickness	.619	1	.619	.005	.945
EdgeSupport * CTE106	2.850	1	2.850	.022	.883
EdgeSupport * MOR	5.080	1	5.080	.039	.844
EdgeSupport * BaseType	29.934	1	29.934	.231	.632
EdgeSupport * Subgrade	44.533	1	44.533	.343	.559
SlabThickness * CTE106	47.409	1	47.409	.365	.547
SlabThickness * MOR	1865.841	1	1865.841	14.374	.000
SlabThickness * BaseType	28.975	1	28.975	.223	.638
SlabThickness * Subgrade	2252.044	1	2252.044	17.349	.000
CTE106 * MOR	1339.678	1	1339.678	10.320	.002
CTE106 * BaseType	70.954	1	70.954	.547	.461
CTE106 * Subgrade	10.294	1	10.294	.079	.779
MOR * BaseType	11.701	1	11.701	.090	.765
MOR * Subgrade	171.356	1	171.356	1.320	.253
BaseType * Subgrade	5.569	1	5.569	.043	.836
Error	12851.128	99	129.809		
Total	5073361.710	128			
Corrected Total	255837.309	127			

a R Squared = .950 (Adjusted R Squared = .936)

Table A-35 ANOVA results for IRI (inch/mile) after 30 years service life

Dependent Variable: 30_IRI

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	308926.233(a)	28	11033.080	64.589	.000
Intercept	6663303.283	1	6663303.283	39008.039	.000
JointSpacing	10700.016	1	10700.016	62.640	.000
EdgeSupport	3044.926	1	3044.926	17.825	.000
SlabThickness	30040.069	1	30040.069	175.859	.000
CTE106	91629.454	1	91629.454	536.413	.000
MOR	80065.013	1	80065.013	468.713	.000
BaseType	12738.075	1	12738.075	74.571	.000
Subgrade	65716.719	1	65716.719	384.716	.000
JointSpacing * EdgeSupport	18.529	1	18.529	.108	.743
JointSpacing * SlabThickness	7776.604	1	7776.604	45.525	.000
JointSpacing * CTE106	274.073	1	274.073	1.604	.208
JointSpacing * MOR	500.466	1	500.466	2.930	.090
JointSpacing * BaseType	295.549	1	295.549	1.730	.191
JointSpacing * Subgrade	15.332	1	15.332	.090	.765
EdgeSupport * SlabThickness	189.394	1	189.394	1.109	.295
EdgeSupport * CTE106	18.075	1	18.075	.106	.746
EdgeSupport * MOR	16.032	1	16.032	.094	.760
EdgeSupport * BaseType	8.768	1	8.768	.051	.821
EdgeSupport * Subgrade	113.063	1	113.063	.662	.418
SlabThickness * CTE106	677.580	1	677.580	3.967	.049
SlabThickness * MOR	4.766	1	4.766	.028	.868
SlabThickness * BaseType	589.532	1	589.532	3.451	.066
SlabThickness * Subgrade	3072.300	1	3072.300	17.986	.000
CTE106 * MOR	1173.096	1	1173.096	6.867	.010
CTE106 * BaseType	7.851	1	7.851	.046	.831
CTE106 * Subgrade	27.844	1	27.844	.163	.687
MOR * BaseType	5.001	1	5.001	.029	.864
MOR * Subgrade	189.881	1	189.881	1.112	.294
BaseType * Subgrade	18.226	1	18.226	.107	.745
Error	16911.053	99	170.819		
Total	6989140.570	128			
Corrected Total	325837.287	127			

a R Squared = .948 (Adjusted R Squared = .933)

Traffic Data Analysis for MDOT Sites Using TrafLoad Software

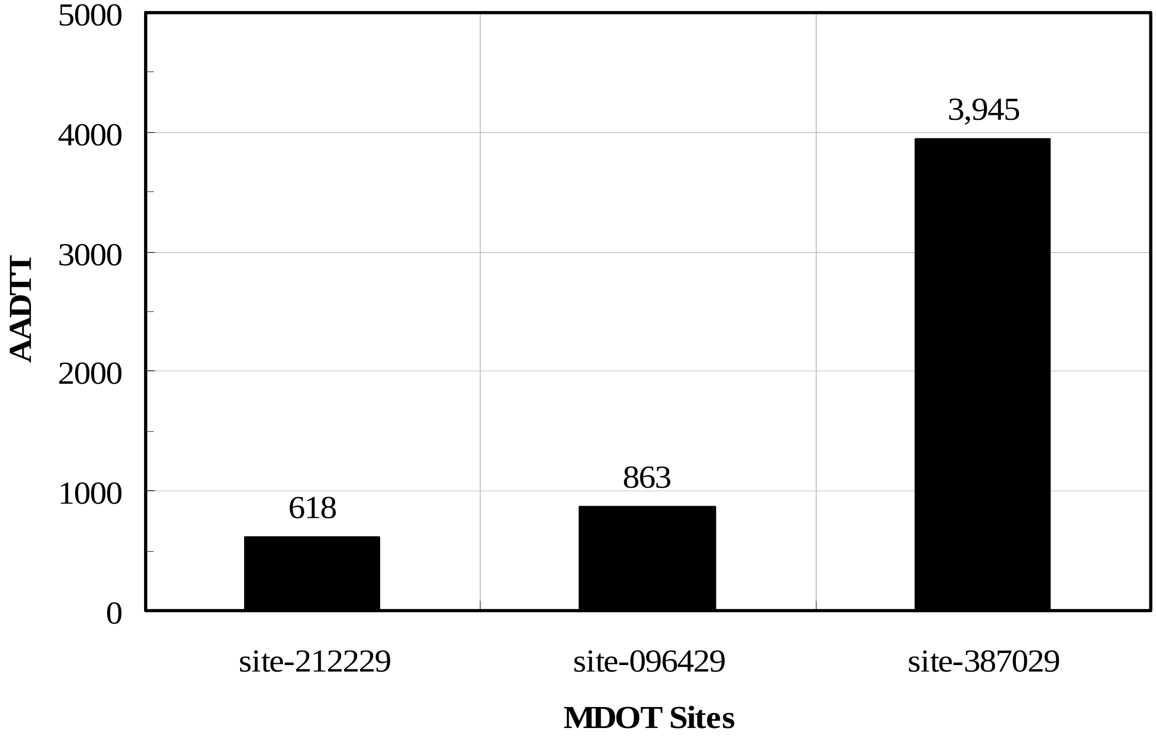


Figure A-28 Average Annual Daily Truck Traffic for Three MDOT Locations

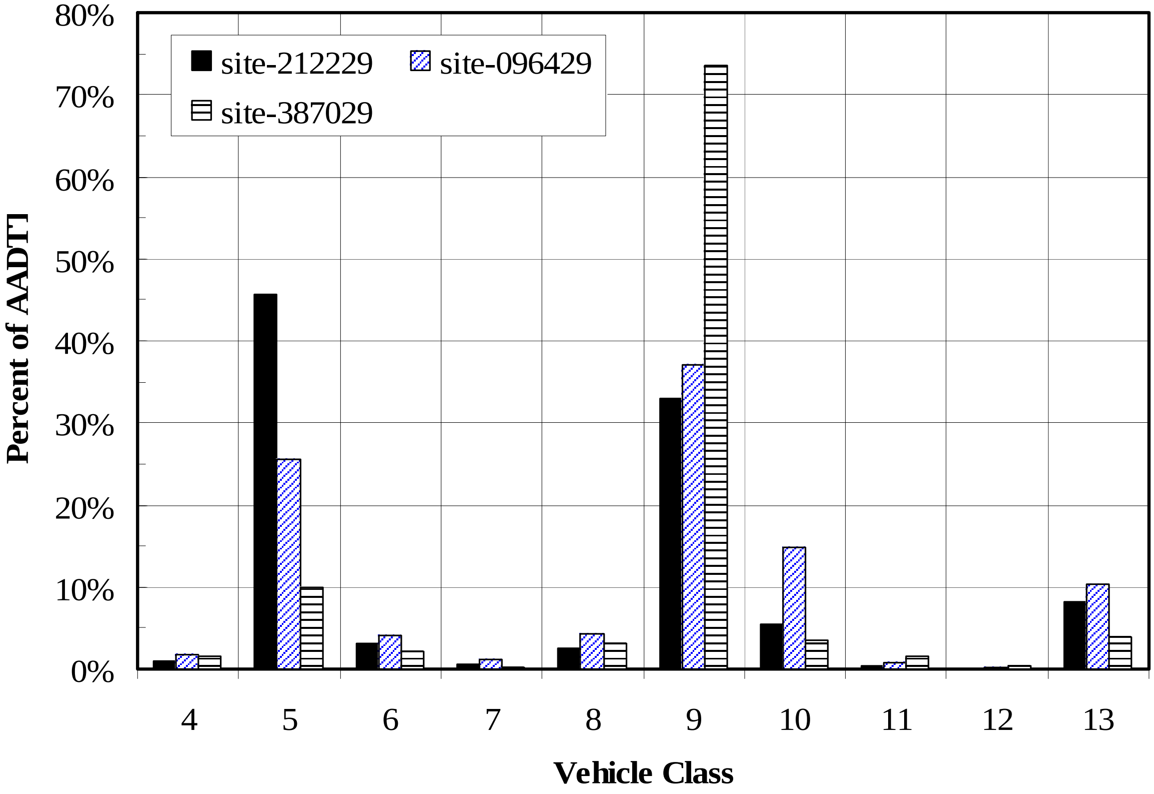


Figure A-29 Average Annual Daily Truck Traffic Percent per Class for Three MDOT Locations

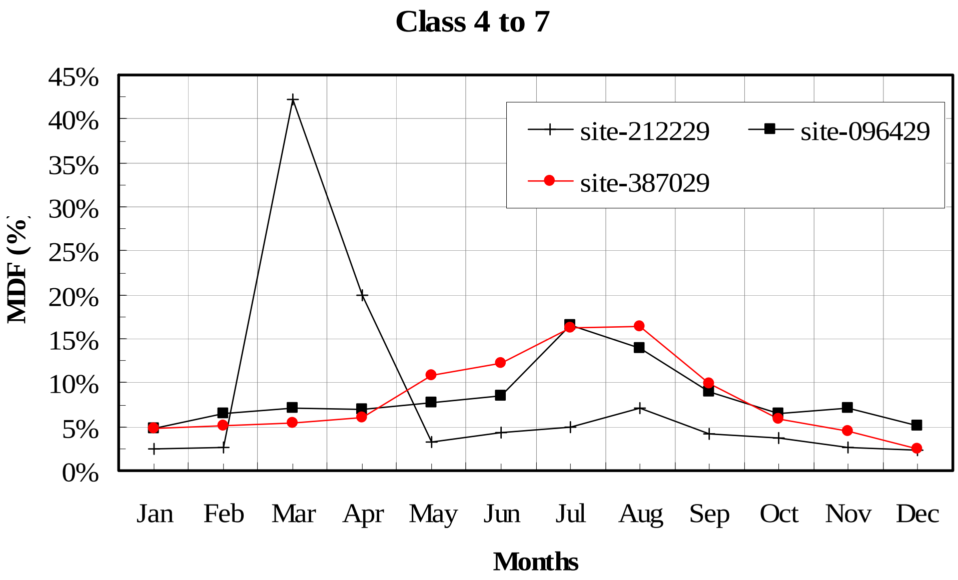


Figure A-30 Monthly Adjustment Factors for Classes 4 to 7 for Three MDOT Locations

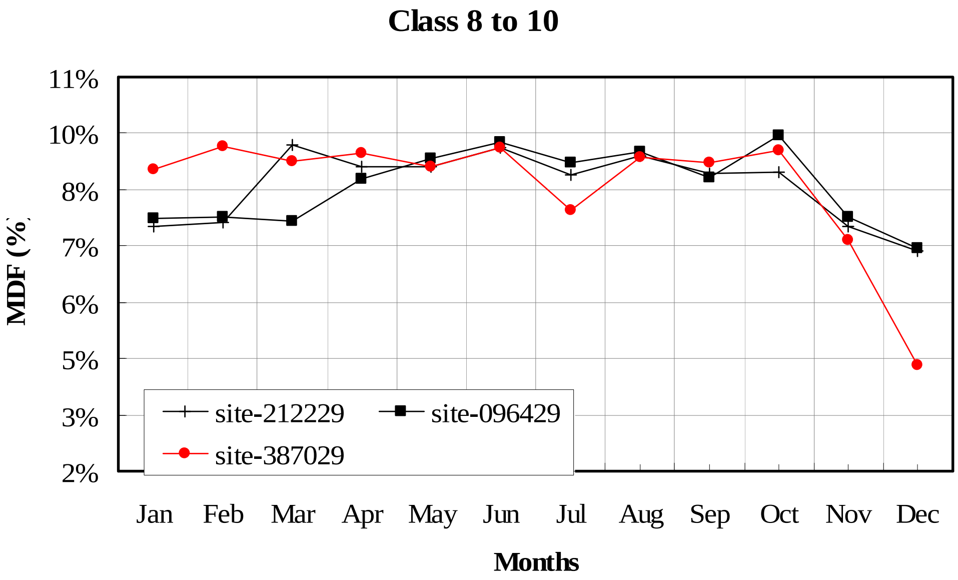


Figure A-31 Monthly Adjustment Factors for Classes 8 to 10 for Three MDOT Locations

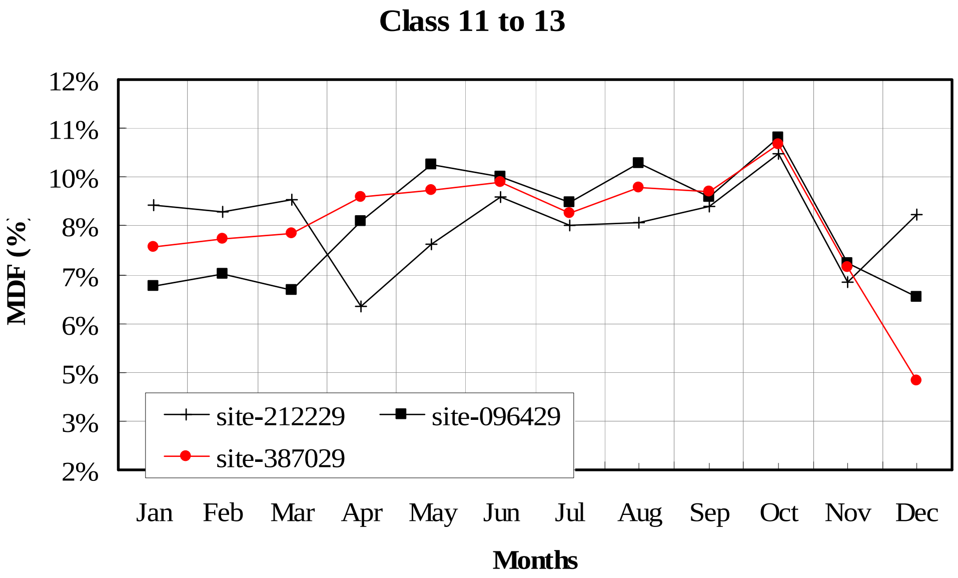


Figure A-32 Monthly Adjustment Factors for Classes 11 to 13 for Three MDOT Locations

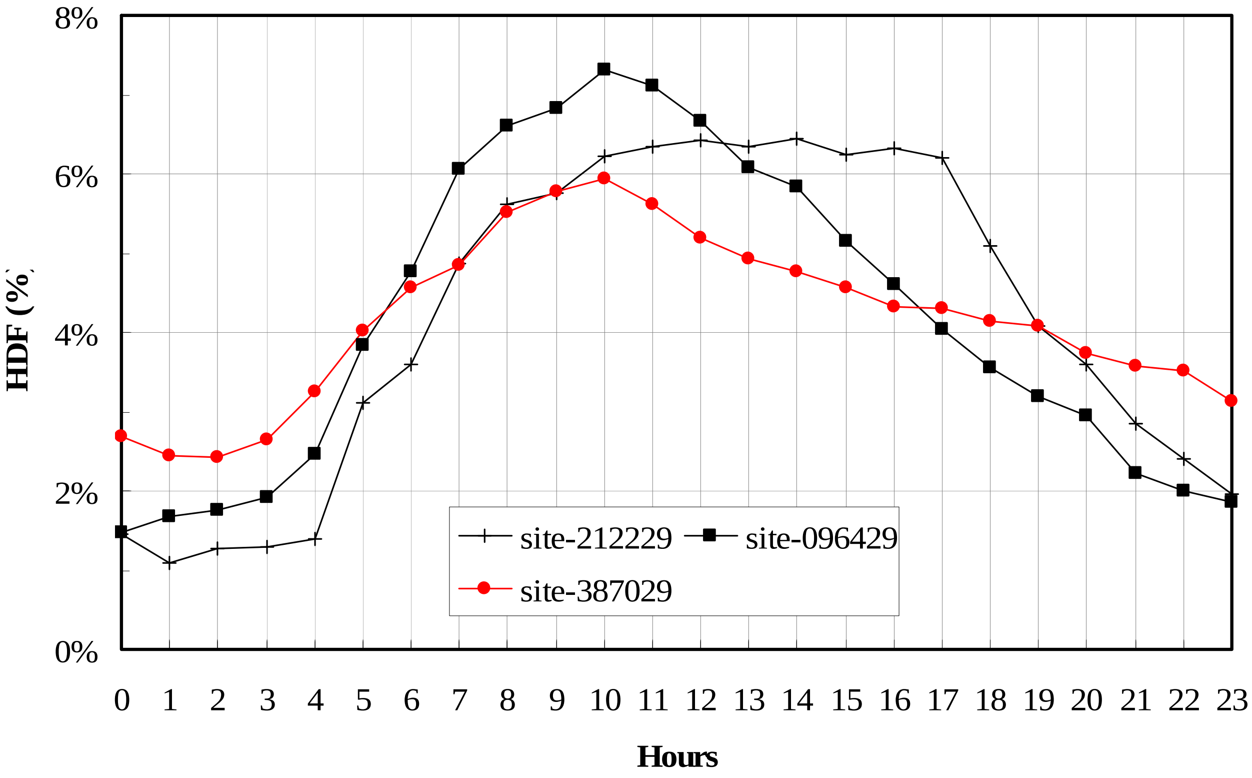


Figure A-33 Hourly Distribution Factors for Three MDOT Locations

Data Analyses Tables—Mean performance (% slab cracked, faulting and IRI) of Rigid pavements at 5, 10, 15 and 20 years

Table A-36 Fatigue cracking (% slab cracked) in rigid pavements after 5 years

Slab Thickness	CTE	Joint Spacing			Average
		12	16	20	
9	4	3.3	27.9	55.9	29.0
	5	4.3	43.2	78.3	41.9
	6.5	6.4	70.3	96.9	57.9
12	4	0.0	0.0	0.1	0.0
	5	0.0	0.0	1.2	0.4
	6.5	0.1	4.3	70.4	24.9
14	4	0.0	0.0	0.0	0.0
	5	0.0	0.0	0.6	0.2
	6.5	0.0	2.9	61.5	21.5
Average		1.6	16.5	40.5	19.5

Table A-37 Fatigue cracking (% slab cracked) in rigid pavements after 10 years

Slab Thickness	CTE	Joint Spacing			Average
		12	16	20	
9	4	24.3	77.5	93.2	65.0
	5	31.5	93.3	99.8	74.9
	6.5	71.0	99.9	100.0	90.3
12	4	0.0	0.1	3.8	1.3
	5	0.0	2.1	71.5	24.5
	6.5	0.7	65.6	99.6	55.3
14	4	0.0	0.0	0.2	0.1
	5	0.0	0.1	21.6	7.2
	6.5	0.1	17.4	97.0	38.2
Average		14.2	39.6	65.2	39.6

Table A-38 Fatigue cracking (% slab cracked) in rigid pavements after 15 years

Slab Thickness	CTE	Joint Spacing			Average
		12	16	20	
9	4	50.3	92.0	98.7	80.3
	5	61.6	99.1	100.0	86.9
	6.5	94.1	100.0	100.0	98.0
12	4	0.0	0.3	13.8	4.7
	5	0.0	7.7	91.8	33.2
	6.5	2.3	87.8	99.9	63.3
14	4	0.0	0.0	0.9	0.3
	5	0.0	0.3	50.7	17.0
	6.5	0.2	37.3	99.1	45.5
Average		23.2	47.2	72.8	47.7

Table A-39 Fatigue cracking (% slab cracked) in rigid pavements after 20 years

Slab Thickness	CTE	Joint Spacing			Average
		12	16	20	
9	4	69.4	96.7	99.7	88.6
	5	80.7	99.8	100.0	93.5
	6.5	98.5	100.0	100.0	99.5
12	4	0.0	0.8	28.5	9.8
	5	0.1	16.6	96.8	37.8
	6.5	4.8	94.5	100.0	66.4
14	4	0.0	0.0	2.2	0.7
	5	0.0	0.7	70.8	23.8
	6.5	0.3	55.3	99.6	51.7
Average		28.2	51.6	77.5	52.4

Table A-40 Faulting (mm) in rigid pavements after 5 years

Slab Thickness	CTE	Joint Spacing			Average
		12	16	20	
9	4	0.20	0.36	0.41	0.32
	5	0.41	0.69	0.81	0.64
	6.5	0.86	1.50	1.88	1.41
12	4	0.28	0.66	0.94	0.63
	5	0.53	1.17	1.63	1.11
	6.5	1.09	2.16	3.07	2.11
14	4	0.20	0.71	1.14	0.69
	5	0.43	1.22	1.91	1.19
	6.5	0.99	2.18	3.30	2.16
Average		0.56	1.18	1.68	1.14

Table A-41 Faulting (mm) in rigid pavements after 10 years

Slab Thickness	CTE	Joint Spacing			Average
		12	16	20	
9	4	0.46	0.71	0.81	0.66
	5	0.84	1.32	1.52	1.23
	6.5	1.65	2.62	3.18	2.48
12	4	0.58	1.24	1.63	1.15
	5	1.07	1.98	2.59	1.88
	6.5	1.96	3.30	4.34	3.20
14	4	0.48	1.32	1.93	1.24
	5	0.94	2.06	2.90	1.96
	6.5	1.80	3.30	4.50	3.20
Average		1.09	1.98	2.60	1.89

Table A-42 Faulting (mm) in rigid pavements after 15 years

Slab Thickness	CTE	Joint Spacing			Average
		12	16	20	
9	4	0.69	1.07	1.17	0.97
	5	1.22	1.85	2.11	1.73
	6.5	2.29	3.43	4.04	3.25
12	4	0.89	1.70	2.13	1.57
	5	1.50	2.57	3.20	2.42
	6.5	2.54	3.99	5.05	3.86
14	4	0.79	1.83	2.51	1.71
	5	1.37	2.64	3.53	2.51
	6.5	2.39	3.96	5.21	3.85
Average		1.52	2.56	3.22	2.43

Table A-43 Faulting (mm) in rigid pavements after 20 years

Slab Thickness	CTE	Joint Spacing			Average
		12	16	20	
9	4	0.91	1.37	1.50	1.26
	5	1.57	2.29	2.57	2.14
	6.5	2.79	4.04	4.65	3.83
12	4	1.17	2.08	2.57	1.94
	5	1.85	3.00	3.68	2.84
	6.5	3.00	4.50	5.59	4.36
14	4	1.04	2.24	3.02	2.10
	5	1.75	3.12	4.09	2.99
	6.5	2.84	4.50	5.82	4.39
Average		1.88	3.01	3.72	2.87

Table A-44 Roughness development (IRI, m/km) in rigid pavements after 5 years

Slab Thickness	CTE	Joint Spacing			Average
		12	16	20	
9	4	1.22	1.56	1.91	1.56
	5	1.31	1.86	2.30	1.82
	6.5	1.52	2.45	2.80	2.26
12	4	1.19	1.28	1.31	1.26
	5	1.29	1.43	1.49	1.40
	6.5	1.52	1.79	2.74	2.02
14	4	1.15	1.29	1.35	1.26
	5	1.25	1.44	1.54	1.41
	6.5	1.47	1.78	2.67	1.97
Average		1.33	1.65	2.01	1.66

Table A-45 Roughness development (IRI, m/km) in rigid pavements after 10 years

Slab Thickness	CTE	Joint Spacing			Average
		12	16	20	
9	4	1.69	2.41	2.59	2.23
	5	1.93	2.80	2.85	2.53
	6.5	2.78	3.28	1.96	2.67
12	4	1.41	1.54	1.61	1.52
	5	1.60	1.80	2.72	2.04
	6.5	1.97	3.02	3.51	2.84
14	4	1.36	1.56	1.63	1.52
	5	1.54	1.79	2.14	1.82
	6.5	1.90	2.39	3.51	2.60
Average		1.80	2.29	2.50	2.20

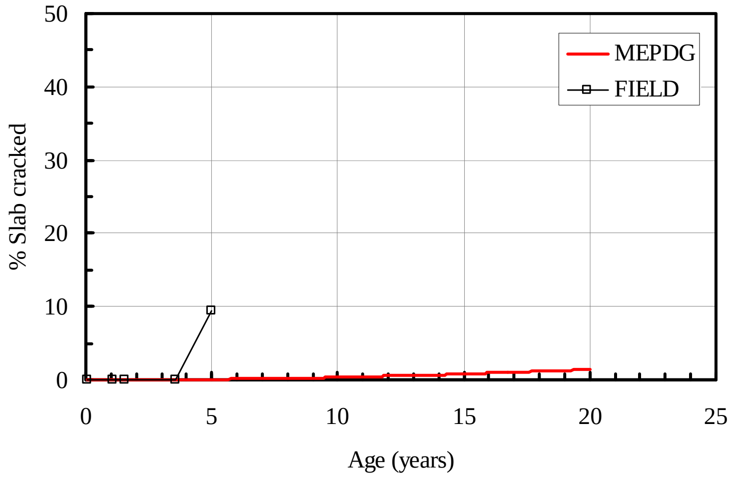
Table A-46 Roughness development (IRI, m/km) in rigid pavements after 15 years

Slab Thickness	CTE	Joint Spacing			Average
		12	16	20	
9	4	2.23	2.82	2.86	2.64
	5	2.59	3.15	3.11	2.95
	6.5	3.45	3.64	2.29	3.13
12	4	1.63	1.78	1.96	1.79
	5	1.87	2.14	3.23	2.41
	6.5	2.32	3.62	3.79	3.24
14	4	1.56	1.80	1.87	1.74
	5	1.81	2.05	2.76	2.21
	6.5	2.22	2.93	3.80	2.98
Average		2.19	2.66	2.85	2.57

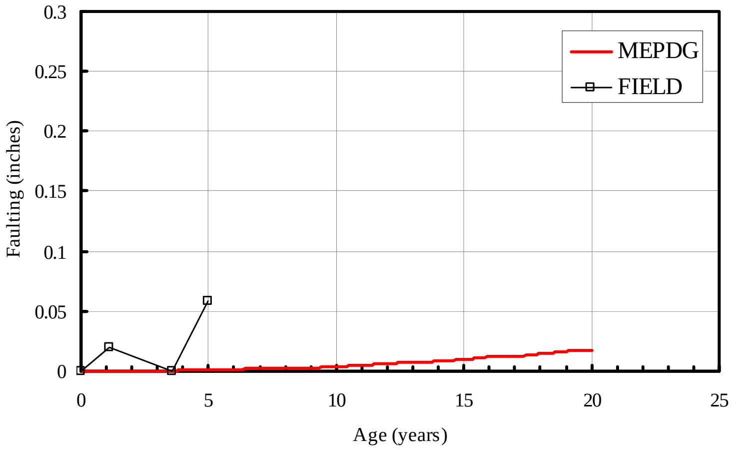
Table A-47 Roughness development (IRI, m/km) in rigid pavements after 20 years

Slab Thickness	CTE	Joint Spacing			Average
		12	16	20	
9	4	2.71	3.11	3.10	2.97
	5	3.12	3.43	2.06	2.87
	6.5	3.85	2.67	2.58	3.03
12	4	1.85	2.02	2.37	2.08
	5	2.13	2.50	3.53	2.72
	6.5	2.65	3.97	4.03	3.55
14	4	1.77	2.03	2.11	1.97
	5	2.06	2.31	3.26	2.54
	6.5	2.51	3.43	4.06	3.33
Average		2.52	2.83	3.01	2.79

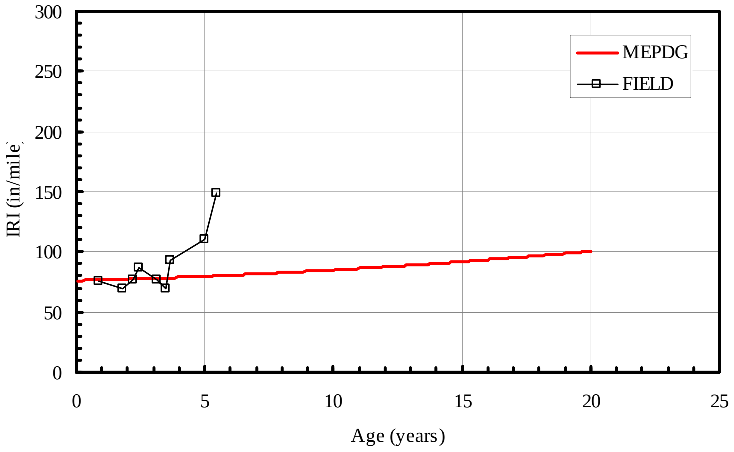
Predicted versus Observed Pavement Performance for the SPS-2 Test Sections in Michigan



(a) Cracking (% slab cracked)

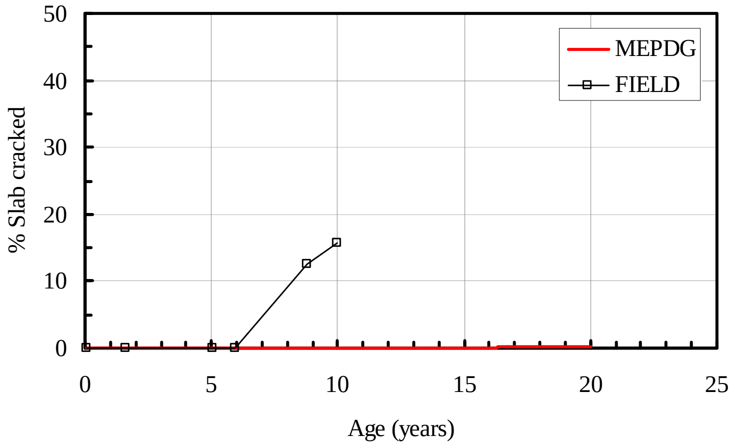


(b) Joint faulting (mm)

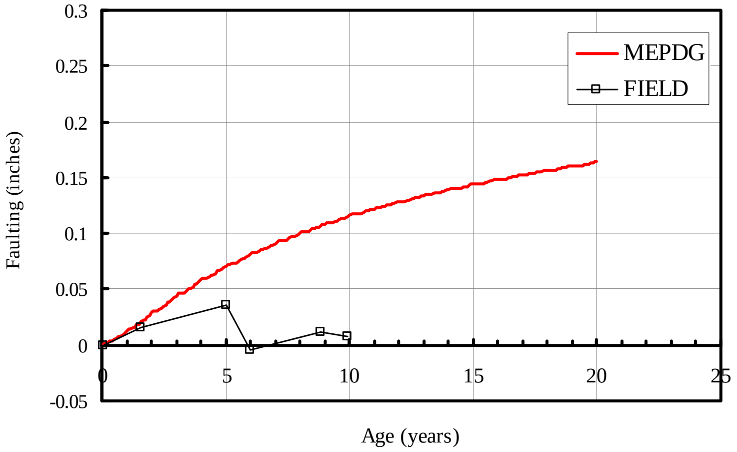


(c) Roughness in terms of IRI (inch/mile)

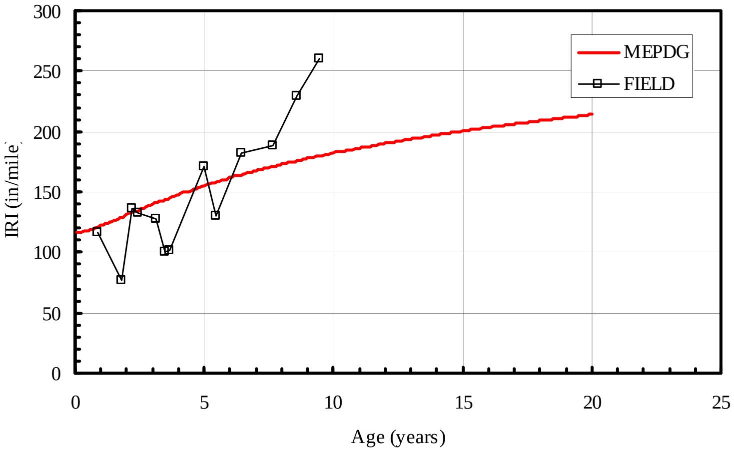
Figure A-34 Observed versus predicted performance of JPCP—SPS-2 Section 26-0213



(a) Cracking (% slab cracked)

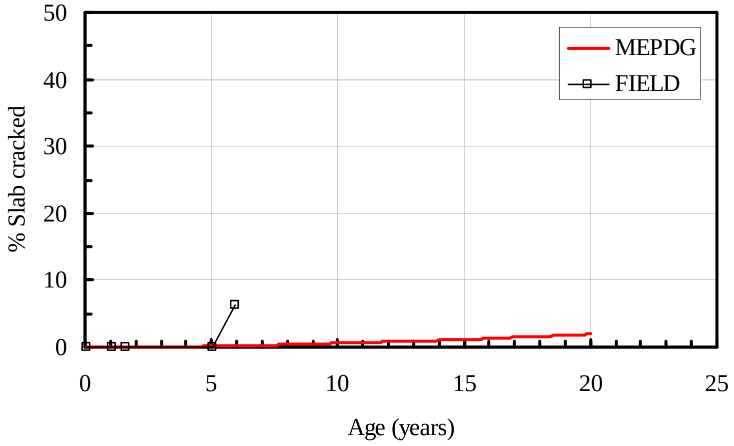


(b) Joint faulting (mm)

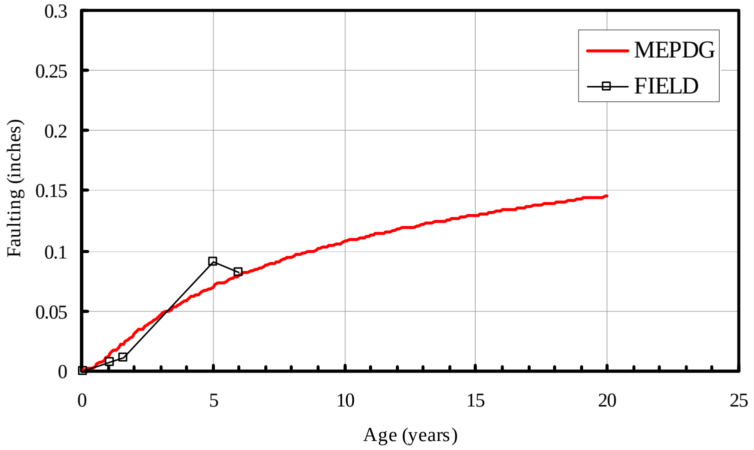


(c) Roughness in terms of IRI (inch/mile)

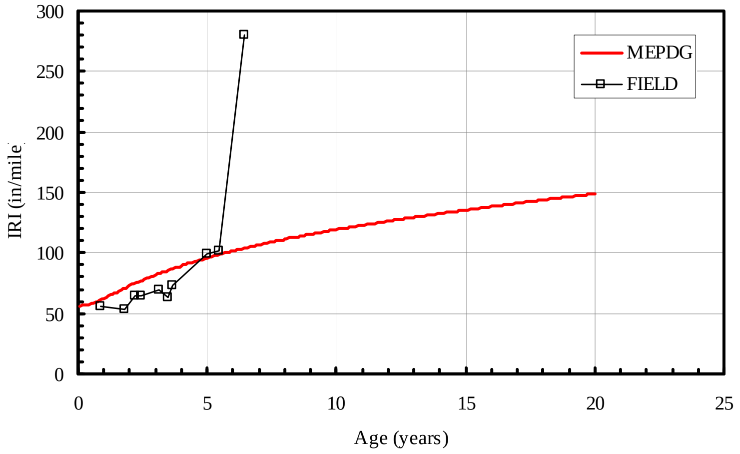
Figure A-35 Observed versus predicted performance of JPCP—SPS-2 Section 26-0214



(a) Cracking (% slab cracked)

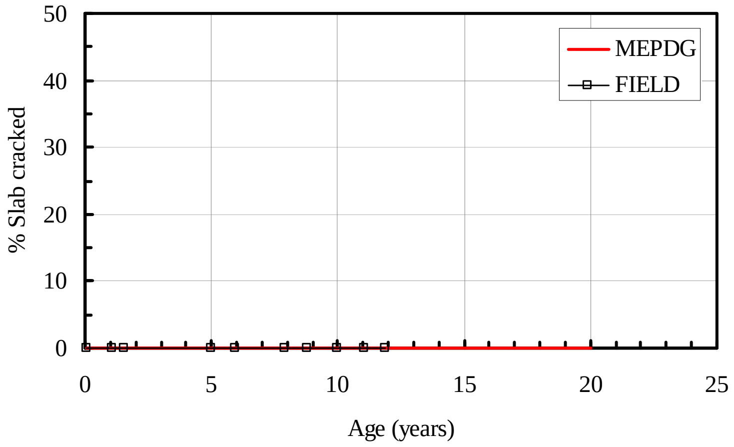


(b) Joint faulting (mm)

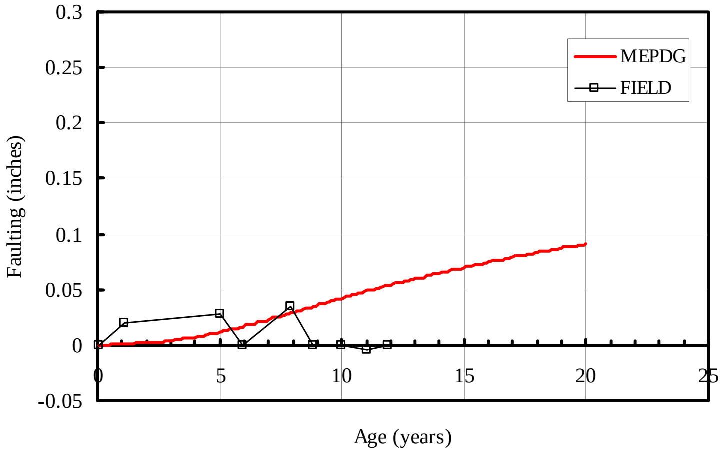


(c) Roughness in terms of IRI (inch/mile)

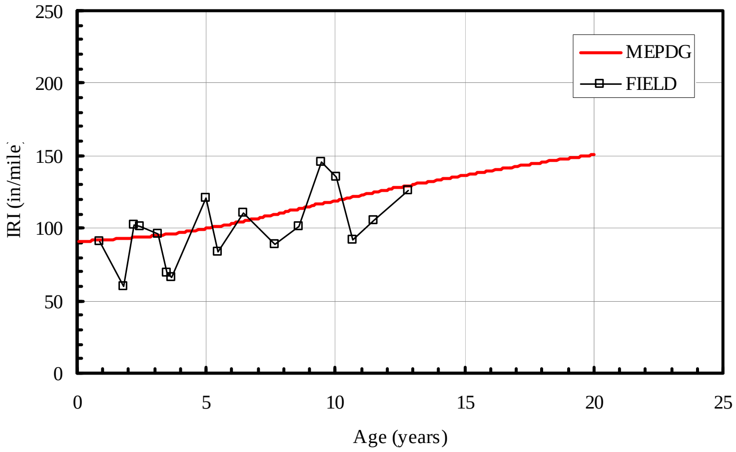
Figure A-36 Observed versus predicted performance of JPCP—SPS-2 Section 26-0215



(a) Cracking (% slab cracked)

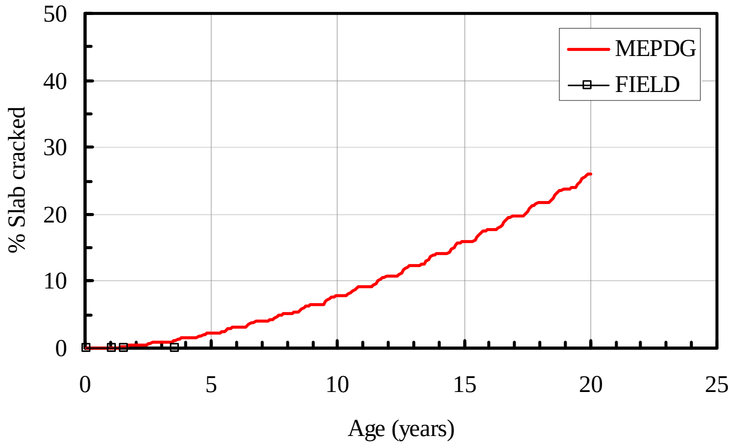


(b) Joint faulting (mm)

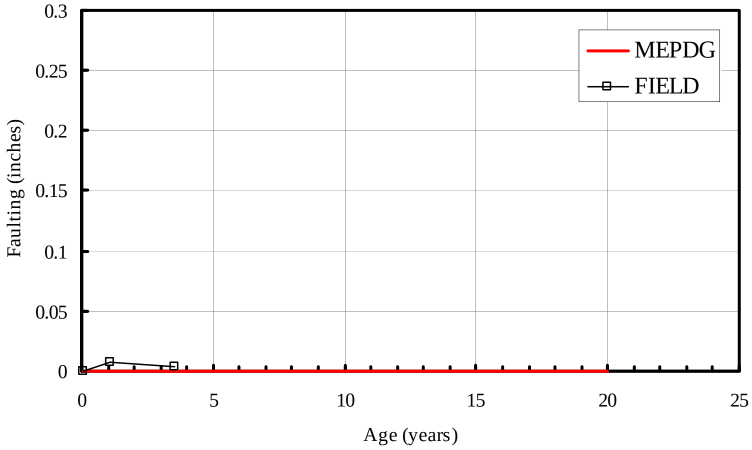


(c) Roughness in terms of IRI (inch/mile)

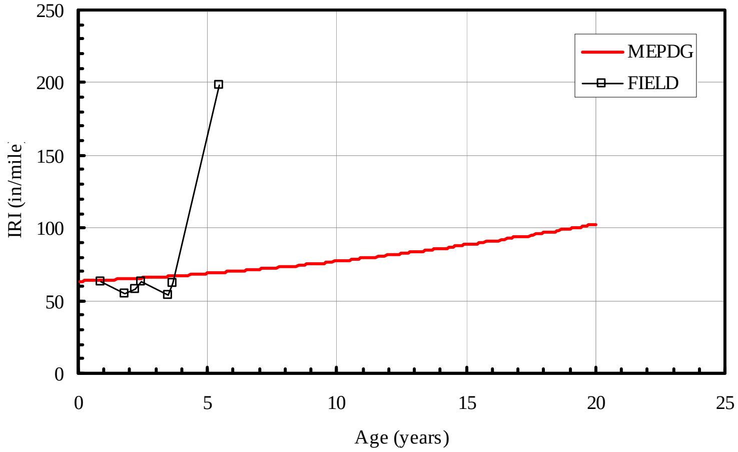
Figure A-37 Observed versus predicted performance of JPCP—SPS-2 Section 26-0216



(a) Cracking (% slab cracked)

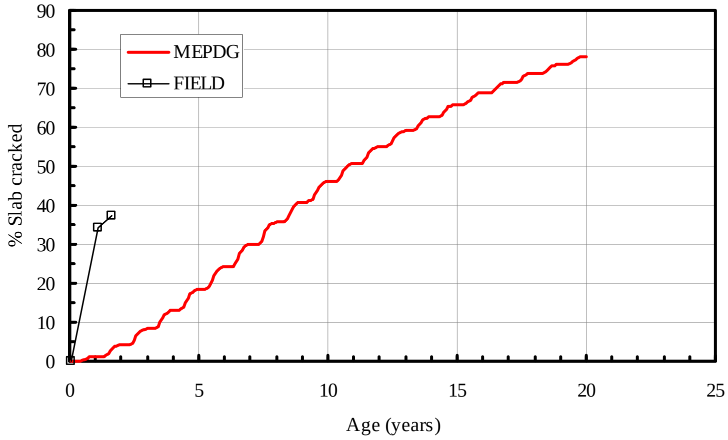


(b) Joint faulting (mm)

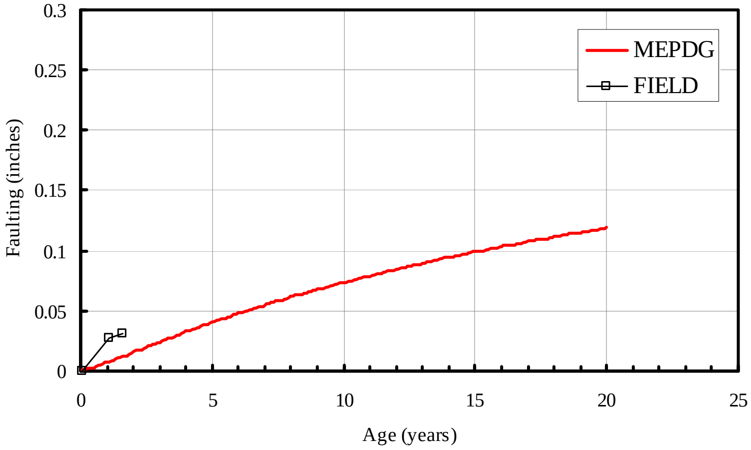


(c) Roughness in terms of IRI (inch/mile)

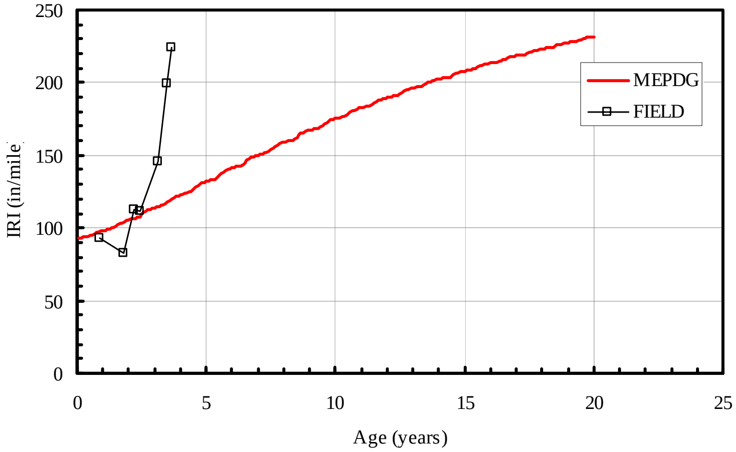
Figure A-38 Observed versus predicted performance of JPCP—SPS-2 Section 26-0217



(a) Cracking (% slab cracked)

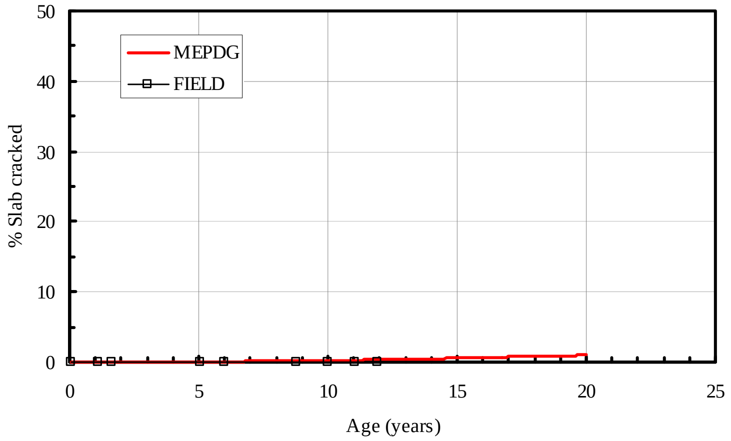


(b) Joint faulting (mm)

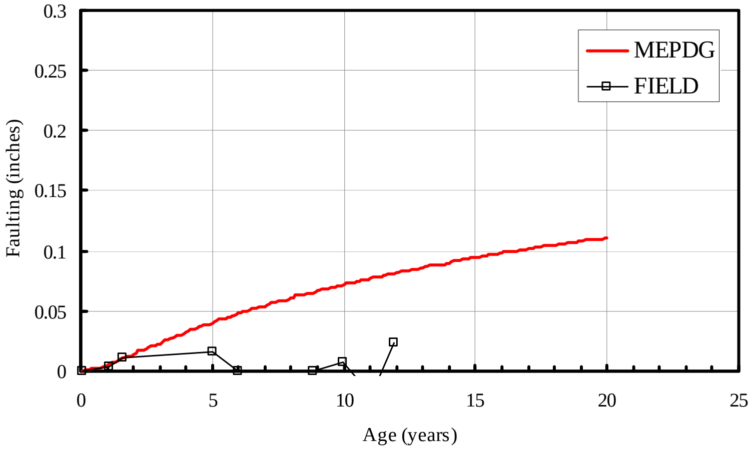


(c) Roughness in terms of IRI (inch/mile)

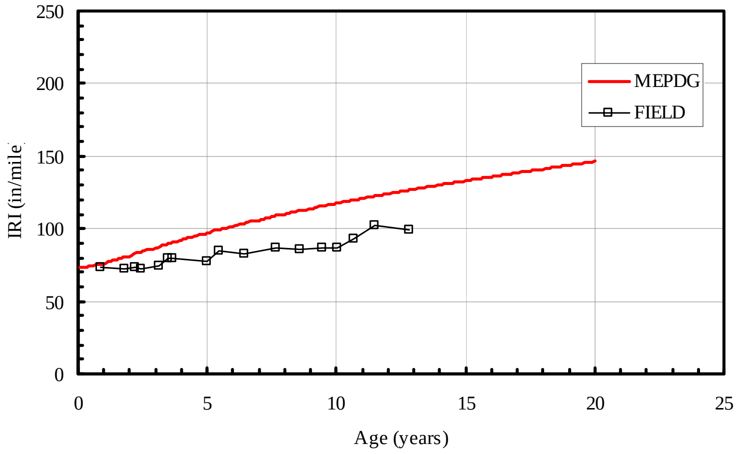
Figure A-39 Observed versus predicted performance of JPCP—SPS-2 Section 26-0218



(a) Cracking (% slab cracked)

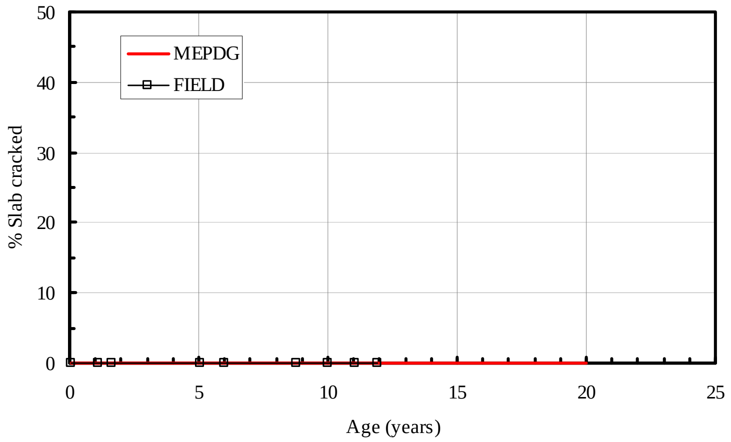


(b) Joint faulting (mm)

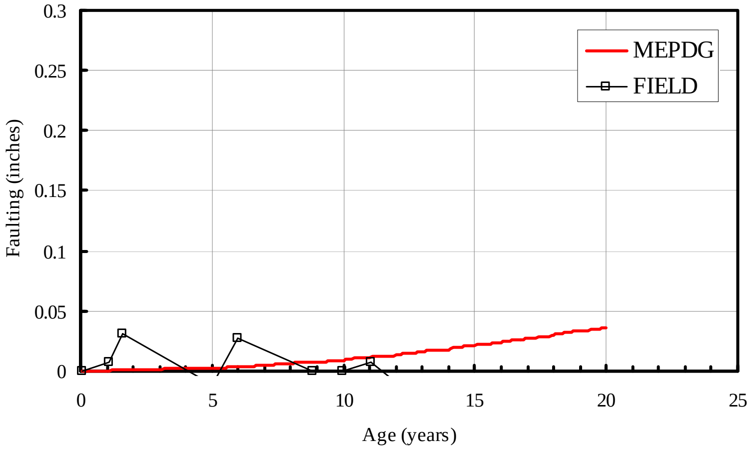


(c) Roughness in terms of IRI (inch/mile)

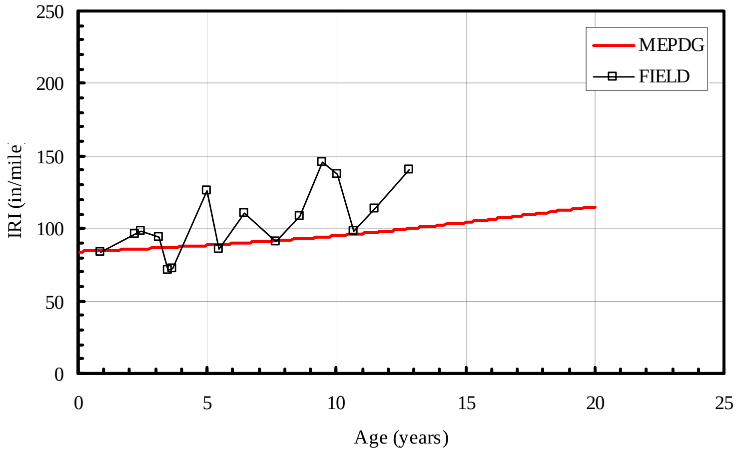
Figure A-40 Observed versus predicted performance of JPCP—SPS-2 Section 26-0219



(a) Cracking (% slab cracked)

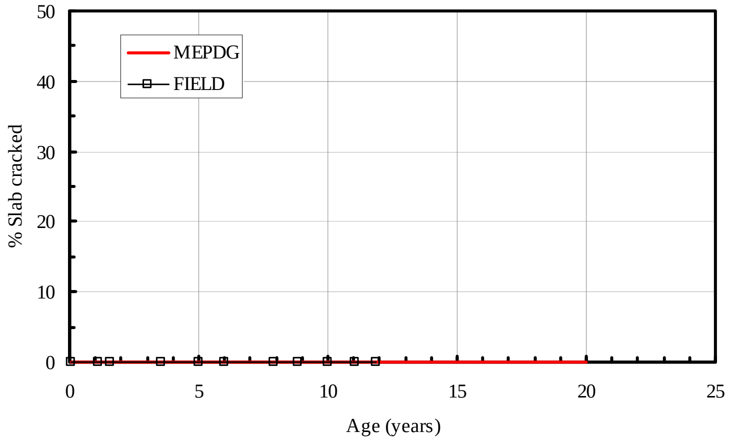


(b) Joint faulting (mm)

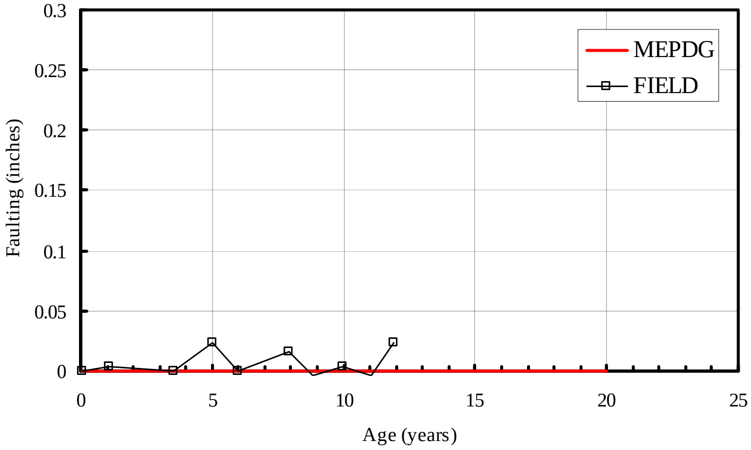


(c) Roughness in terms of IRI (inch/mile)

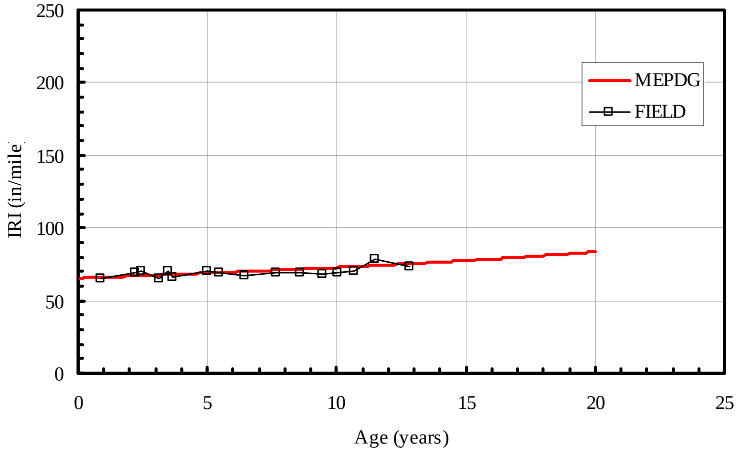
Figure A-41 Observed versus predicted performance of JPCP—SPS-2 Section 26-0220



(a) Cracking (% slab cracked)

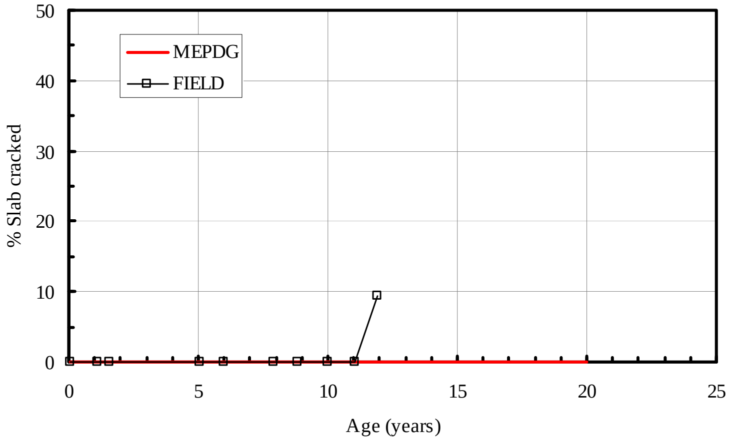


(b) Joint faulting (mm)

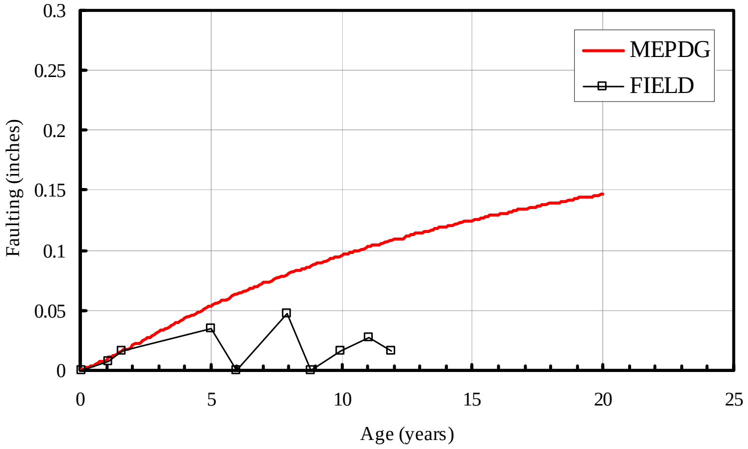


(c) Roughness in terms of IRI (inch/mile)

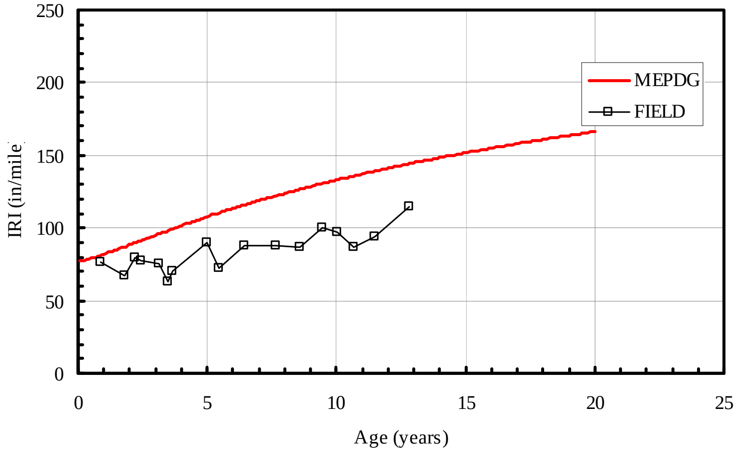
Figure A-42 Observed versus predicted performance of JPCP—SPS-2 Section 26-0221



(a) Cracking (% slab cracked)

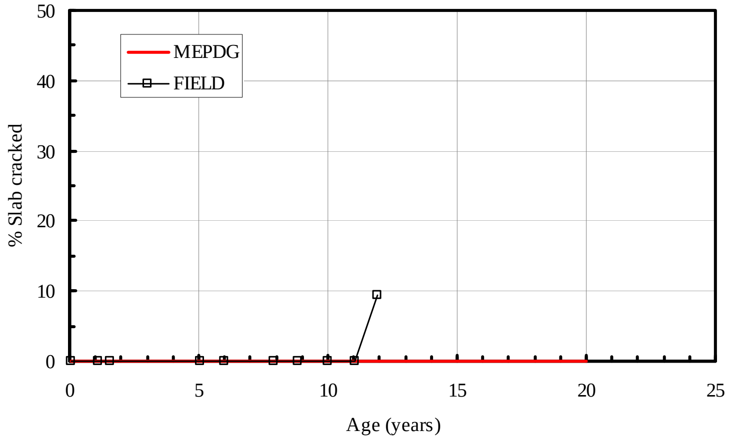


(b) Joint faulting (mm)

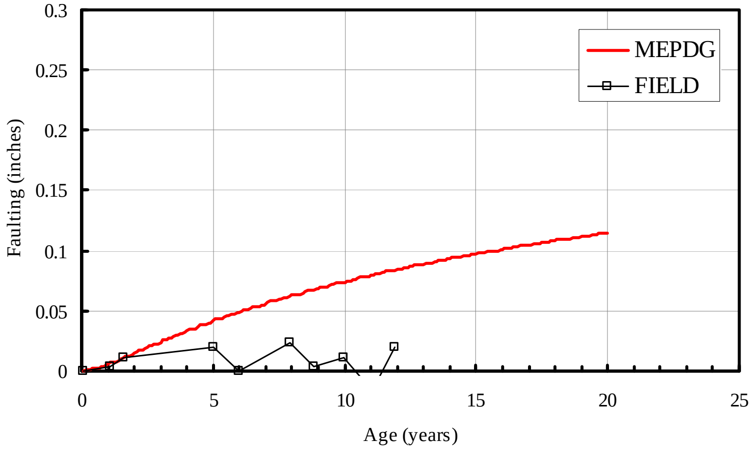


(c) Roughness in terms of IRI (inch/mile)

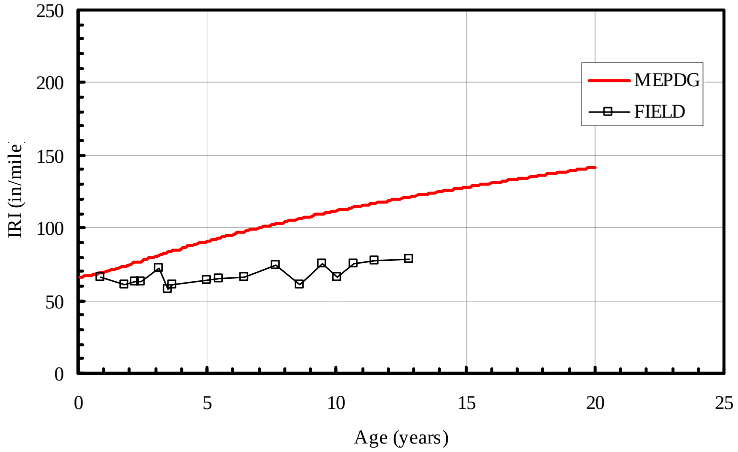
Figure A-43 Observed versus predicted performance of JPCP—SPS-2 Section 26-0222



(a) Cracking (% slab cracked)

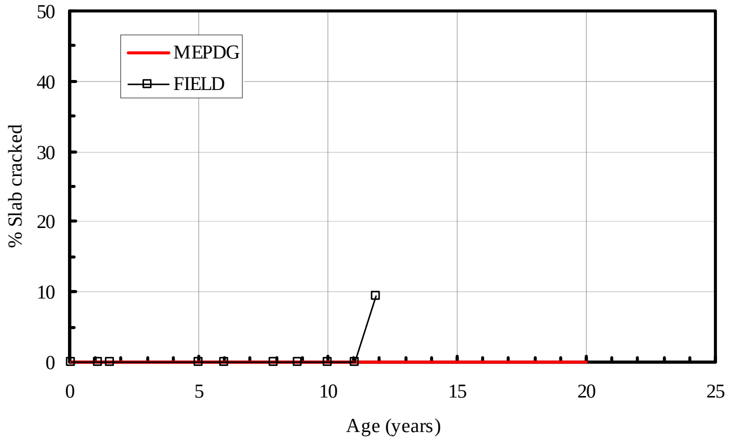


(b) Joint faulting (mm)

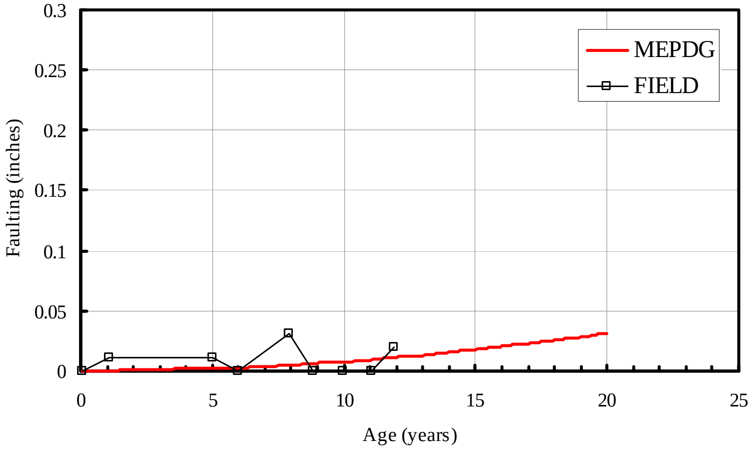


(c) Roughness in terms of IRI (inch/mile)

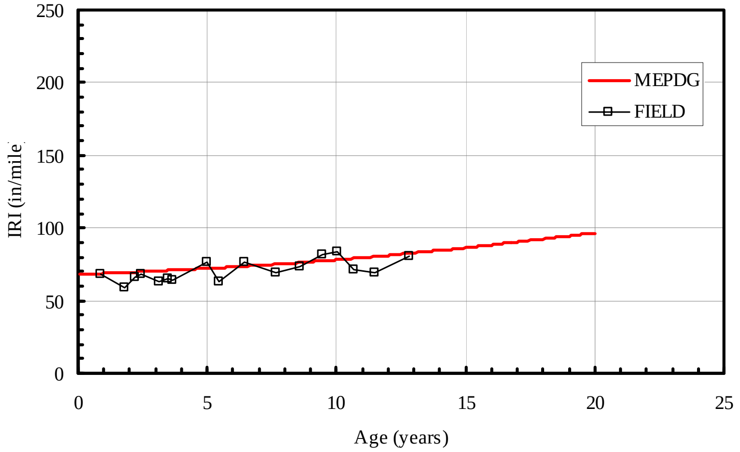
Figure A-44 Observed versus predicted performance of JPCP—SPS-2 Section 26-0223



(a) Cracking (% slab cracked)



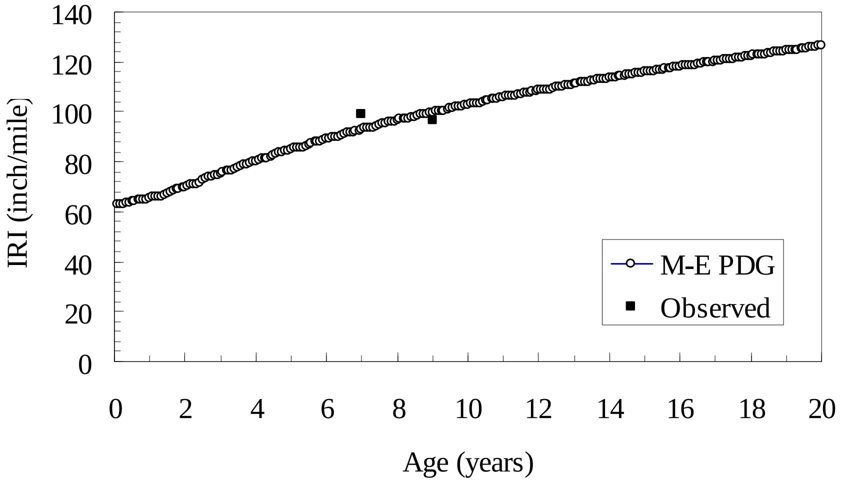
(b) Joint faulting (mm)



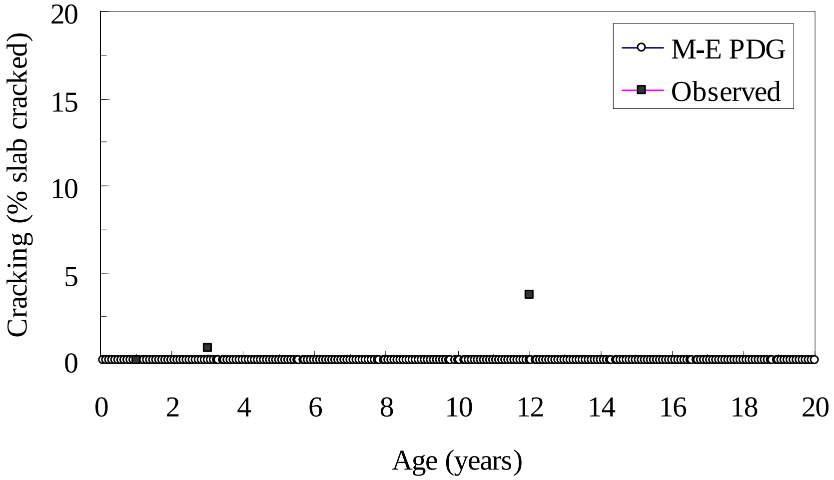
(c) Roughness in terms of IRI (inch/mile)

Figure A-45 Observed versus predicted performance of JPCP—SPS-2 Section 26-0224

Predicted versus Observed Pavement Performance for the MDOT sections

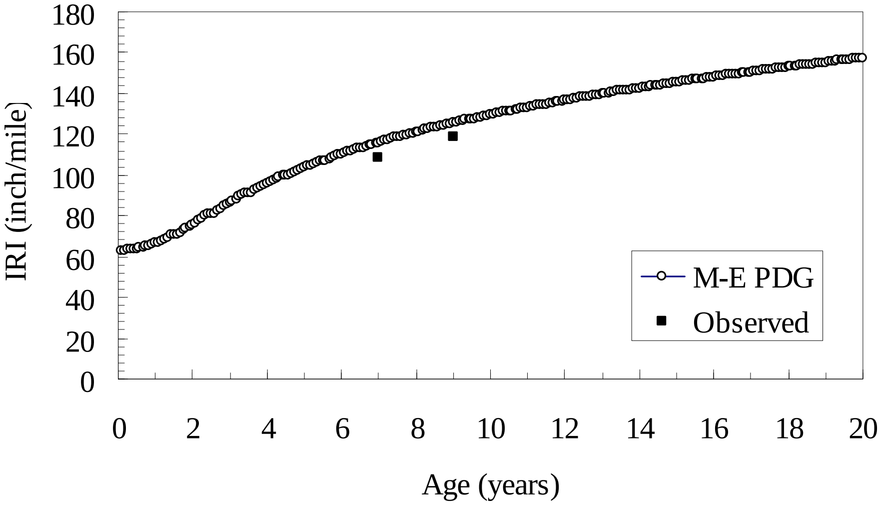


(a) Roughness in IRI

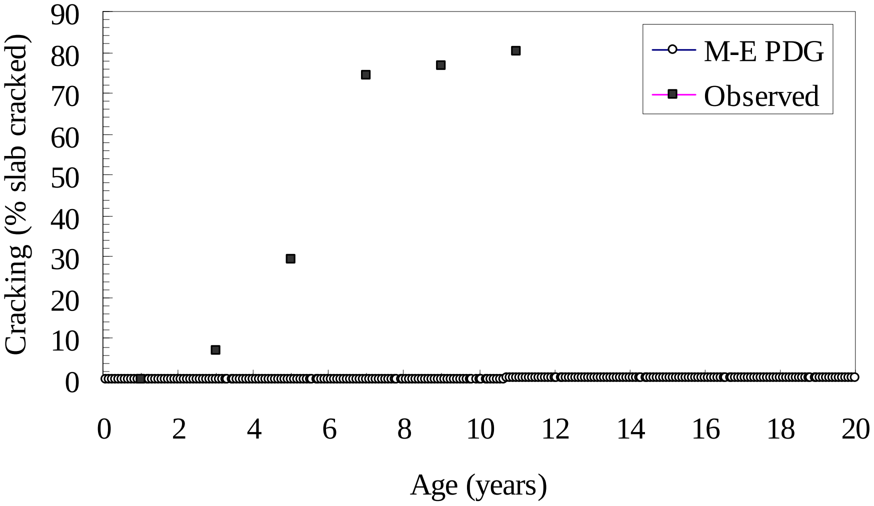


(b) % Slab cracked

Figure A-46 Observed versus predicted performance of JPCP—MDOT Section 36003E

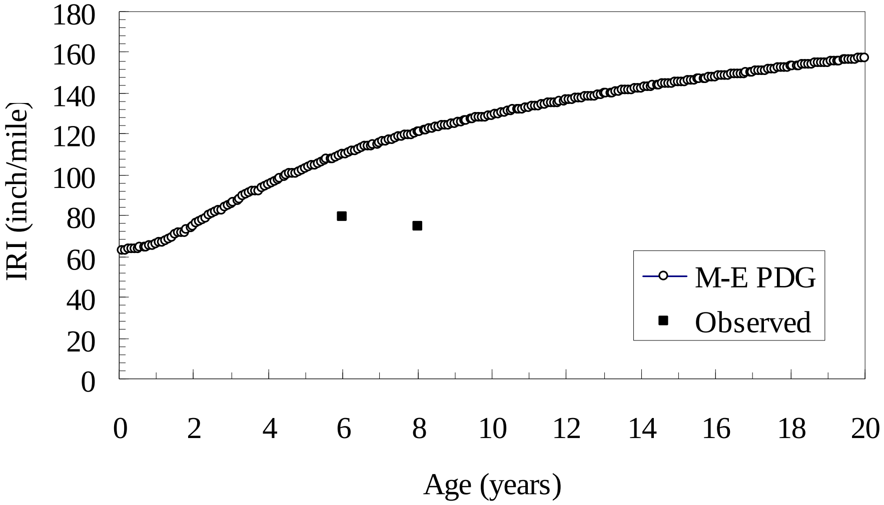


(a) Roughness in IRI

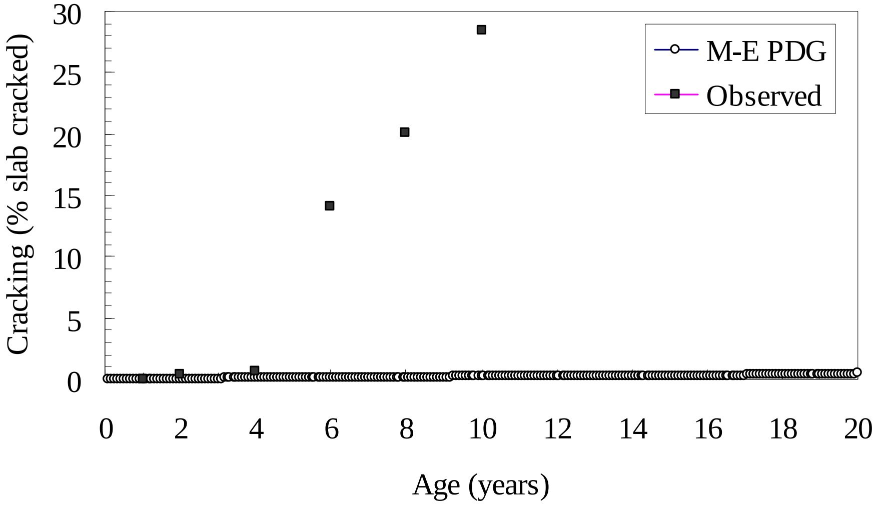


(b) % Slab cracked

Figure A-47 Observed versus predicted performance of JPCP—MDOT Section 32516E

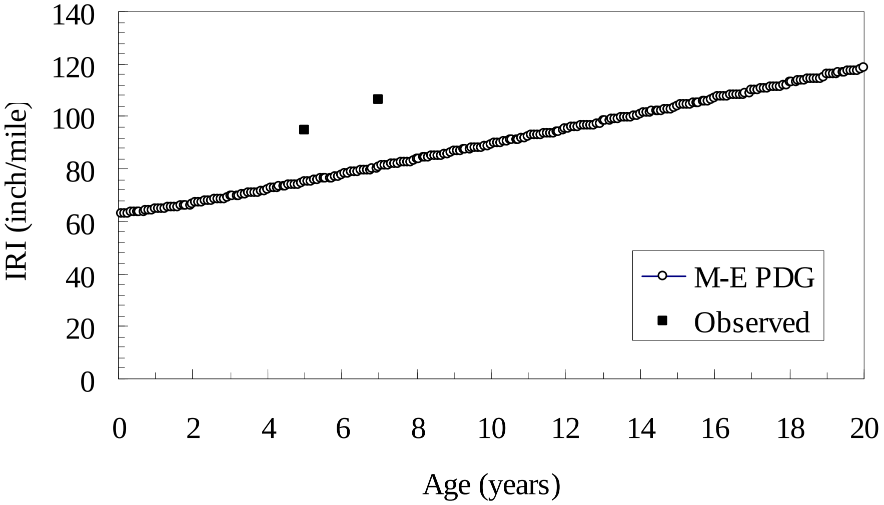


(a) Roughness in IRI

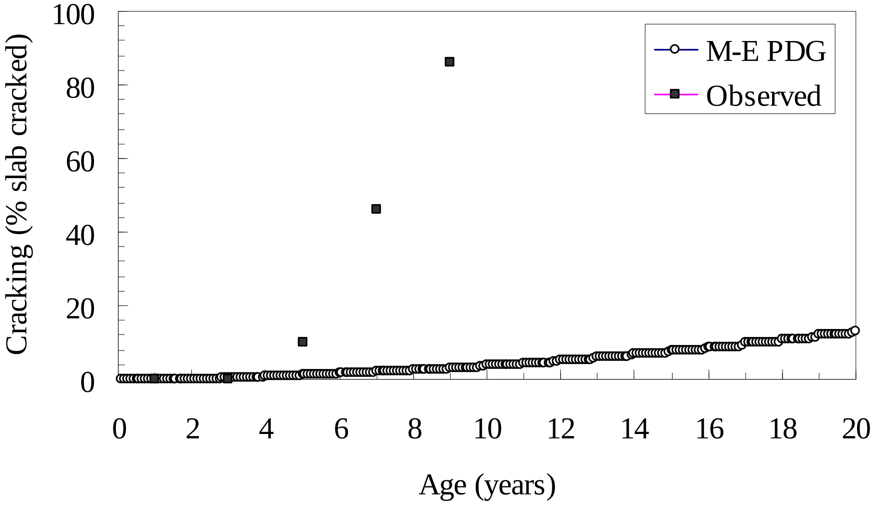


(b) % Slab cracked

Figure A-48 Observed versus predicted performance of JPCP—MDOT Section 32516W

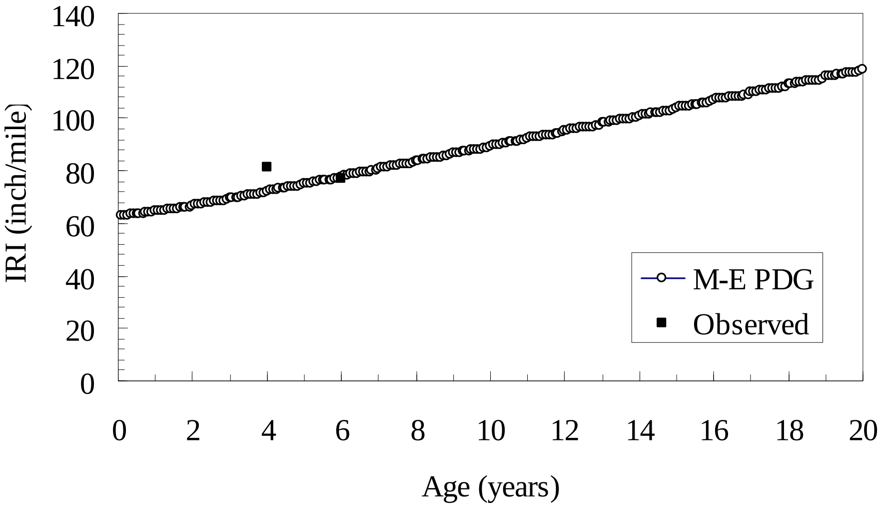


(a) Roughness in IRI

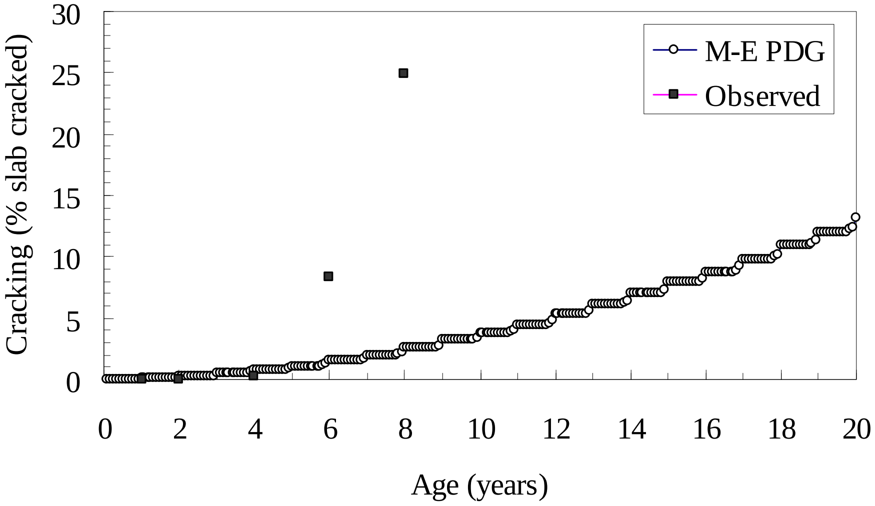


(b) % Slab cracked

Figure A-49 Observed versus predicted performance of JPCP—MDOT Section 28215E



(a) Roughness in IRI



(b) % Slab cracked

Figure A-50 Observed versus predicted performance of JPCP—MDOT Section 28215W

Appendix B-1
Input Summary for Base Case

Project: SensAnal - 0001 base case

General Information

Description:

Design Life	20 years
Base/Subgrade construction:	August, 2006
Pavement construction:	October, 2006
Traffic open:	October, 2006
Type of design	Flexible

Analysis Parameters

Performance Criteria

	Limit	Reliability
Initial IRI (in/mi)	63	
Terminal IRI (in/mi)	172	90
AC Surface Down Cracking (Long. Cracking) (ft/mile):	2000	90
AC Bottom Up Cracking (Alligator Cracking) (%):	25	90
AC Thermal Fracture (Transverse Cracking) (ft/mi):	1000	90
Chemically Stabilized Layer (Fatigue Fracture)	25	90
Permanent Deformation (AC Only) (in):	0.25	90
Permanent Deformation (Total Pavement) (in):	0.75	90

Location:
Project ID:
Section ID:

Date:	9/19/2006

Station/milepost format:
Station/milepost begin:
Station/milepost end:

Traffic direction:	East bound

Default Input Level

Default input level	Level 3, Default and historical agency values.

Traffic

Initial two-way aadtt:	2000
Number of lanes in design direction:	2
Percent of trucks in design direction (%):	50
Percent of trucks in design lane (%):	90
Operational speed (mph):	55

Traffic -- Volume Adjustment Factors

Monthly Adjustment Factors

(Level 3, Default MAF)

	Vehicle Class									
Month	**Class 4**	**Class 5**	**Class 6**	**Class 7**	**Class 8**	**Class 9**	**Class 10**	**Class 11**	**Class 12**	**Class 13**
January	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
February	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
March	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
April	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
May	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
June	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
July	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
August	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
September	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
October	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
November	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
December	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Vehicle Class Distribution

(Level 3, Default Distribution)

AADTT distribution by vehicle class

Class 4	1.8%
Class 5	24.6%
Class 6	7.6%
Class 7	0.5%
Class 8	5.0%
Class 9	31.3%
Class 10	9.8%
Class 11	0.8%
Class 12	3.3%
Class 13	15.3%

Hourly truck traffic distribution

by period beginning:

Midnight	2.3%	Noon	5.9%
1:00 am	2.3%	1:00 pm	5.9%
2:00 am	2.3%	2:00 pm	5.9%
3:00 am	2.3%	3:00 pm	5.9%
4:00 am	2.3%	4:00 pm	4.6%
5:00 am	2.3%	5:00 pm	4.6%
6:00 am	5.0%	6:00 pm	4.6%
7:00 am	5.0%	7:00 pm	4.6%
8:00 am	5.0%	8:00 pm	3.1%
9:00 am	5.0%	9:00 pm	3.1%
10:00 am	5.9%	10:00 pm	3.1%
11:00 am	5.9%	11:00 pm	3.1%

Traffic Growth Factor

Vehicle Class	Growth Rate	Growth Function
Class 4	4.0%	Compound
Class 5	4.0%	Compound
Class 6	4.0%	Compound
Class 7	4.0%	Compound
Class 8	4.0%	Compound
Class 9	4.0%	Compound
Class 10	4.0%	Compound
Class 11	4.0%	Compound
Class 12	4.0%	Compound
Class 13	4.0%	Compound

Traffic -- Axle Load Distribution Factors

Level 3:	Default

Traffic -- General Traffic Inputs

Mean wheel location (inches from the lane marking):	18
Traffic wander standard deviation (in):	10
Design lane width (ft):	12

Number of Axles per Truck

Vehicle Class	Single Axle	Tandem Axle	Tridem Axle	Quad Axle
Class 4	1.62	0.39	0.00	0.00
Class 5	2.00	0.00	0.00	0.00
Class 6	1.02	0.99	0.00	0.00
Class 7	1.00	0.26	0.83	0.00
Class 8	2.38	0.67	0.00	0.00
Class 9	1.13	1.93	0.00	0.00
Class 10	1.19	1.09	0.89	0.00
Class 11	4.29	0.26	0.06	0.00
Class 12	3.52	1.14	0.06	0.00
Class 13	2.15	2.13	0.35	0.00

Axle Configuration

Average axle width (edge-to-edge) outside dimensions,ft):	8.5
Dual tire spacing (in):	12

Axle Configuration

Tire Pressure (psi) :	120

Average Axle Spacing

Tandem axle(in: 51.6

Tridem axle(in): 49.2

Quad axle(in): 49.2

Climate

icm file:

C:\DG2002\Sens Anal 3\Lansing.icm

Latitude (degrees.minutes) 42.47

Longitude (degrees.minutes) -84.35

Elevation (ft) 882

Depth of water table (ft) 20

Structure--Design Features

Structure--Layers

Layer 1 -- Asphalt concrete

Material type: Asphalt concrete

Layer thickness (in): 6

General Properties

General

Reference temperature (F°): 70

Volumetric Properties as Built

Effective binder content (%): 10

Air voids (%): 8.3

Total unit weight (pcf): 145.4

Poisson's ratio: 0.35 (user entered)

Thermal Properties

Thermal conductivity asphalt (BTU/hr-ft-F°): 0.75

Heat capacity asphalt (BTU/lb-F°): 0.3

Asphalt Mix

Cumulative % Retained 3/4 inch sieve: 11.62

Cumulative % Retained 3/8 inch sieve: 35.3

Cumulative % Retained #4 sieve: 52.64

% Passing #200 sieve: 7.28

Asphalt Binder

Option: Superpave binder grading

A 11.7870 (correlated)

VTS: -3.9810 (correlated)

High temp. °C	Low temperature, °C						
	-10	-16	-22	-28	-34	-40	-46
46	▨	▨	▨	▨			
52							
58			🟩				
64							▨
70							▨
76						▨	▨
82						▨	▨

Layer 2 -- A-1-b

Unbound Material:	A-1-b
Thickness(in):	10

Strength Properties

Input Level:	Level 3
Analysis Type:	ICM inputs (ICM Calculated Modulus)
Poisson's ratio:	0.35
Coefficient of lateral pressure,Ko:	0.5
Modulus (input) (psi):	35500

ICM Inputs

Gradation and Plasticity Index

Plasticity Index, PI:	6
Liquid Limit (LL)	14
Compacted Layer	Yes
Passing #200 sieve (%):	13.4
Passing #40	37.6
Passing #4 sieve (%):	74.2
D10(mm)	0.01398
D20(mm)	0.1895
D30(mm)	0.3103
D60(mm)	1.582
D90(mm)	17.77

Sieve	Percent Passing
0.001mm	
0.002mm	
0.020mm	
#200	13.4
#100	
#80	20.8
#60	
#50	
#40	37.6
#30	
#20	
#16	
#10	64
#8	
#4	74.2
3/8"	82.3
1/2"	85.8
3/4"	90.8
1"	93.6
1 1/2"	96.7
2"	98.4
2 1/2"	
3"	
3 1/2"	99.4
4"	99.4

Calculated/Derived Parameters	
Maximum dry unit weight (pcf):	120.0 (user input)
Specific gravity of solids, Gs:	2.70 (user input)
Saturated hydraulic conductivity (ft/hr):	0.0023 (user input)
Optimum gravimetric water content (%):	9.1 (user input)
Calculated degree of saturation (%):	60.8 (calculated)

Soil water characteristic curve parameters: User input

Parameters	Value
a	13.68
b	0.7928
c	2.724
Hr.	260.8

Layer 3 -- A-5

Unbound Material:	A-5
Thickness(in):	Semi-infinite

Strength Properties

Input Level:	Level 3
Analysis Type:	ICM inputs (ICM Calculated Modulus)
Poisson's ratio:	0.35
Coefficient of lateral pressure,Ko:	0.5
Modulus (input) (psi):	15500

ICM Inputs

<u>Gradation and Plasticity Index</u>

Plasticity Index, PI:	5
Liquid Limit (LL)	45
Compacted Layer	No
Passing #200 sieve (%):	54.3
Passing #40	74.3
Passing #4 sieve (%):	86.9
D10(mm)	0.0003384
D20(mm)	0.001145
D30(mm)	0.003876
D60(mm)	0.1234
D90(mm)	9.109

Sieve	Percent Passing
0.001mm	
0.002mm	
0.020mm	
#200	54.3
#100	
#80	66.2
#60	
#50	
#40	74.3
#30	
#20	
#16	
#10	82.6
#8	
#4	86.9
3/8"	90.2
1/2"	91.9
3/4"	94.1
1"	95.9
1 1/2"	97.5
2"	98.5

2 1/2"	
3"	
3 1/2"	99.5
4"	99.5

Calculated/Derived Parameters

Maximum dry unit weight (pcf):	119.2 (derived)
Specific gravity of solids, Gs:	2.70 (derived)
Saturated hydraulic conductivity (ft/hr):	9.256e-007 (derived)
Optimum gravimetric water content (%):	11.4 (derived)
Calculated degree of saturation (%):	74.4 (calculated)

Soil water characteristic curve parameters: Default values

Parameters	Value
a	65.233
b	1.0338
c	0.49936
Hr.	500

Distress Model Calibration Settings - Flexible

AC Fatigue	Level 3 (Nationally calibrated values)
k1	0.007566
k2	3.9492
k3	1.281

AC Rutting	Level 3 (Nationally calibrated values)
k1	-3.35412
k2	1.5606
k3	0.4791
Standard Deviation Total Rutting (RUT):	0.24*POWER(RUT,0.8026)+0.001

Thermal Fracture	Level 3 (Nationally calibrated values)
k1	1
Std. Dev. (THERMAL):	-0.0899 * THERMAL + 636.97

CSM Fatigue	Level 3 (Nationally calibrated values)
k1	1
k2	1

Subgrade Rutting

Level 3 (Nationally calibrated values)

Granular:

k1	2.03

Fine-grain:

k1	1.67

AC Cracking

AC Top Down Cracking

C1 (top)	7
C2 (top)	3.5
C3 (top)	0
C4 (top)	1000
Standard Deviation (TOP)	200 + 2300/(1+exp(1.072-2.1654*log(TOP+0.0001)))

AC Bottom Up Cracking

C1 (bottom)	1
C2 (bottom)	1
C3 (bottom)	0
C4 (bottom)	6000
Standard Deviation (TOP)	1.13+13/(1+exp(7.57-15.5*log(BOTTOM+0.0001)))

CSM Cracking

C1 (CSM)	1
C2 (CSM)	1
C3 (CSM)	0
C4 (CSM)	1000
Standard Deviation (CSM)	CTB*1

IRI

IRI HMA Pavements New

C1(HMA)	40
C2(HMA)	0.4
C3(HMA)	0.008
C4(HMA)	0.015

IRI HMA/PCC Pavements

C1(HMA/PCC)	40.8
C2(HMA/PCC)	0.575
C3(HMA/PCC)	0.0014
C4(HMA/PCC)	0.00825

Appendix B-2

LTPP Input Variable Ranges—Flexible Pavements

List of Figures

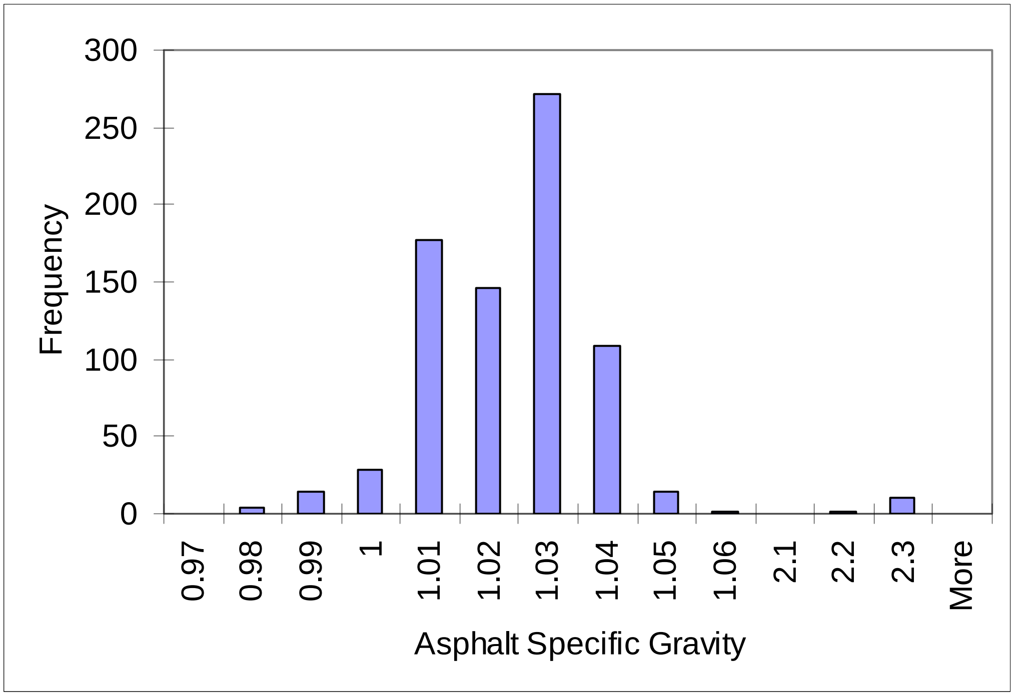


Figure B-1: Distribution of Asphalt Specific Gravity

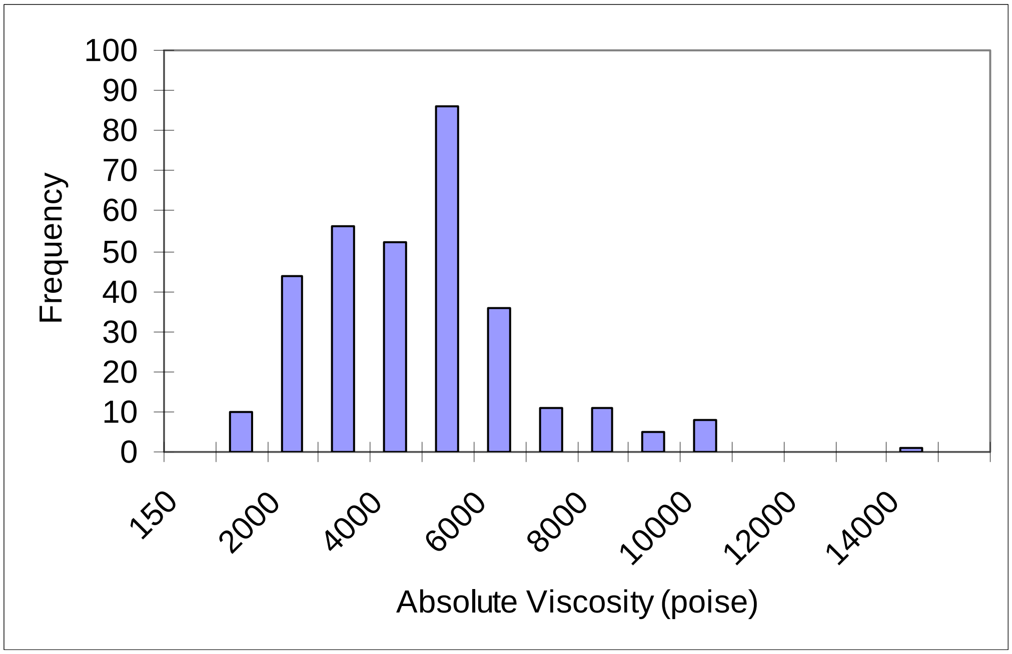


Figure B-2: Distribution of Absolute Viscosity

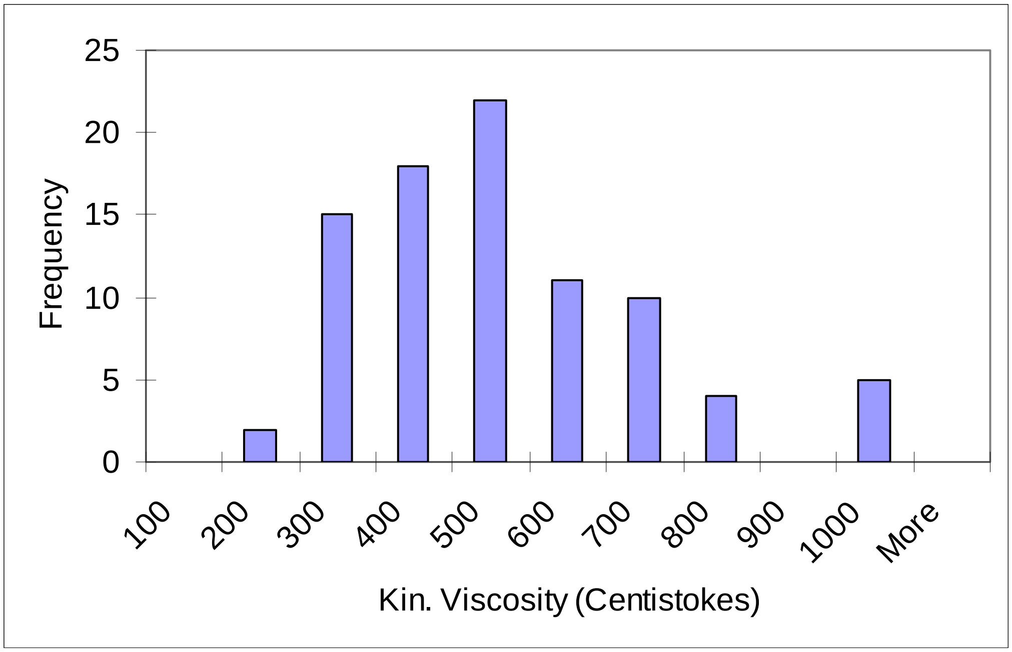


Figure B-3: Distribution of Asphalt Kinematic viscosity

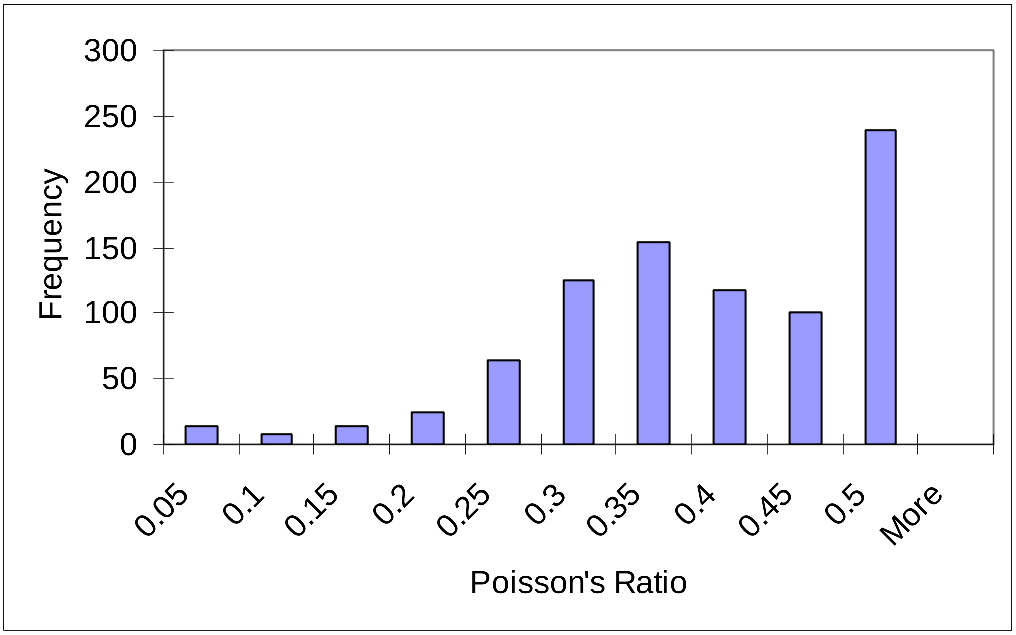


Figure B-4: Distribution of Asphalt Mix Poisson’s Ratio

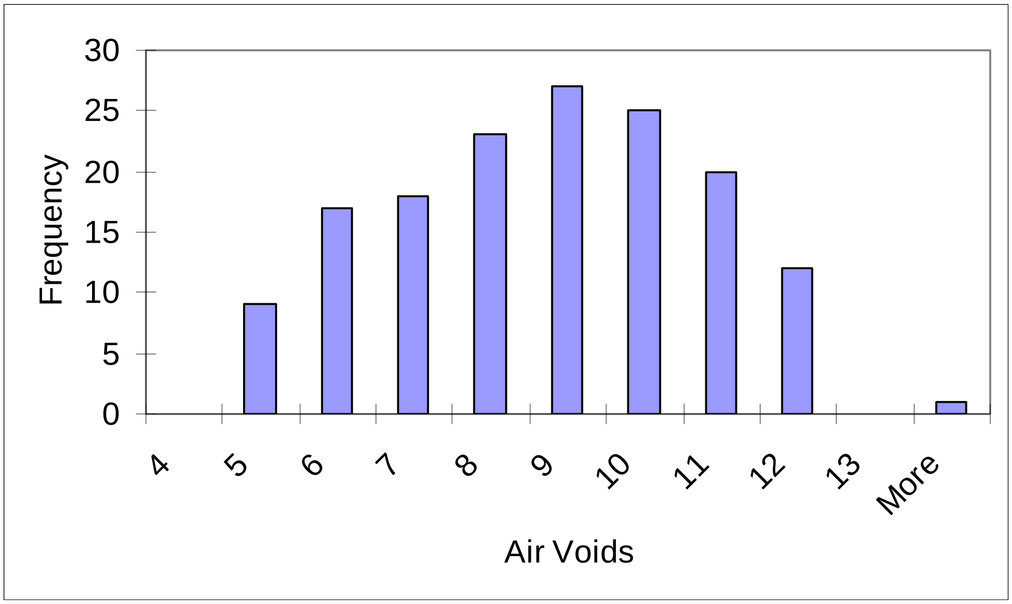


Figure B-5: Distribution of Field Air Voids

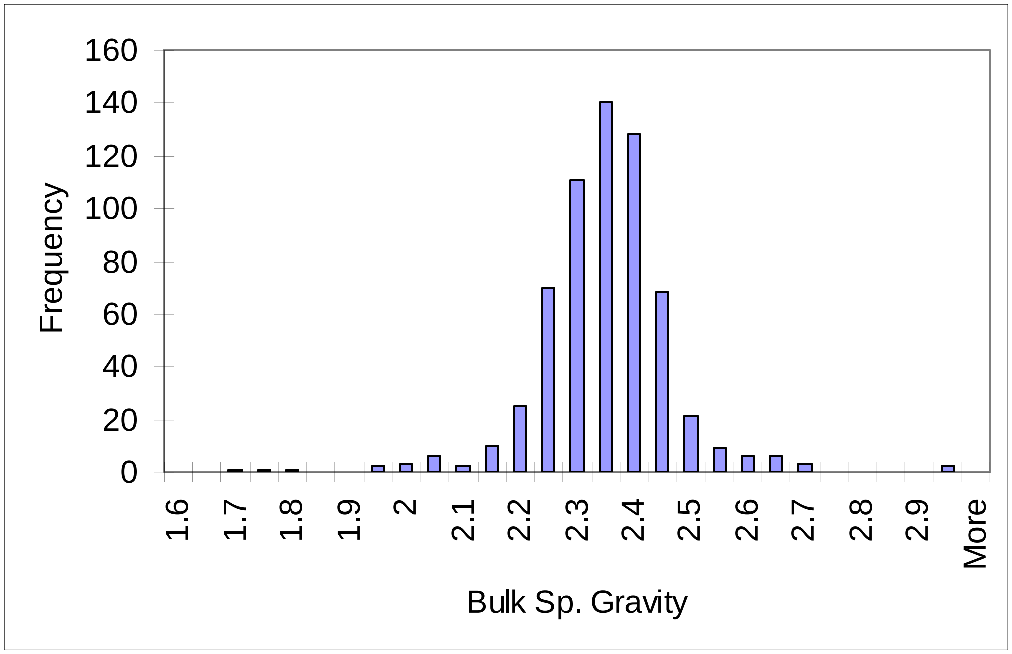


Figure B-6: Distribution of Asphalt Mix Bulk Specific Gravity

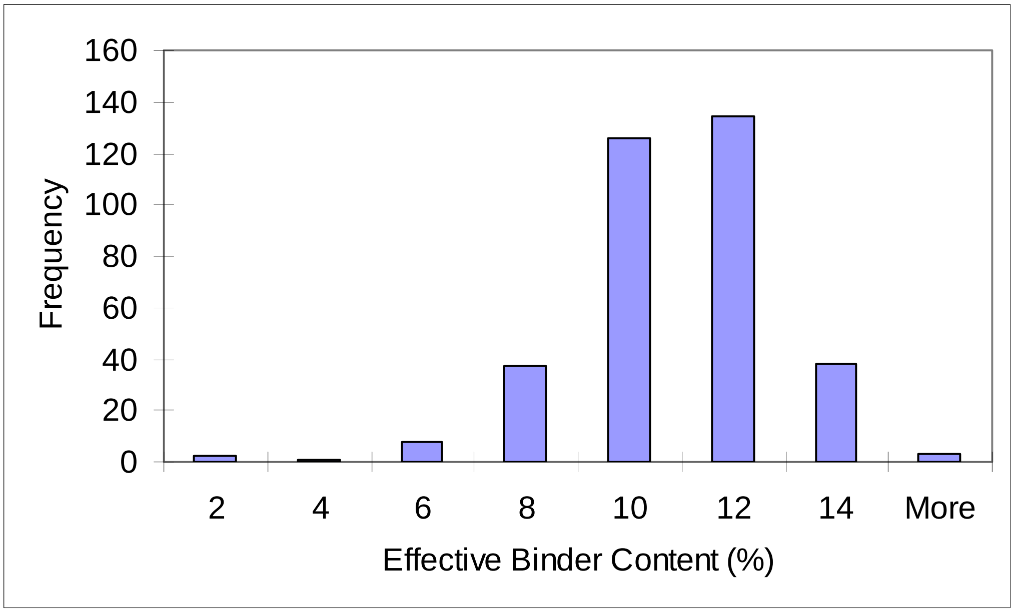


Figure B-7: Distribution of effective binder content by volume

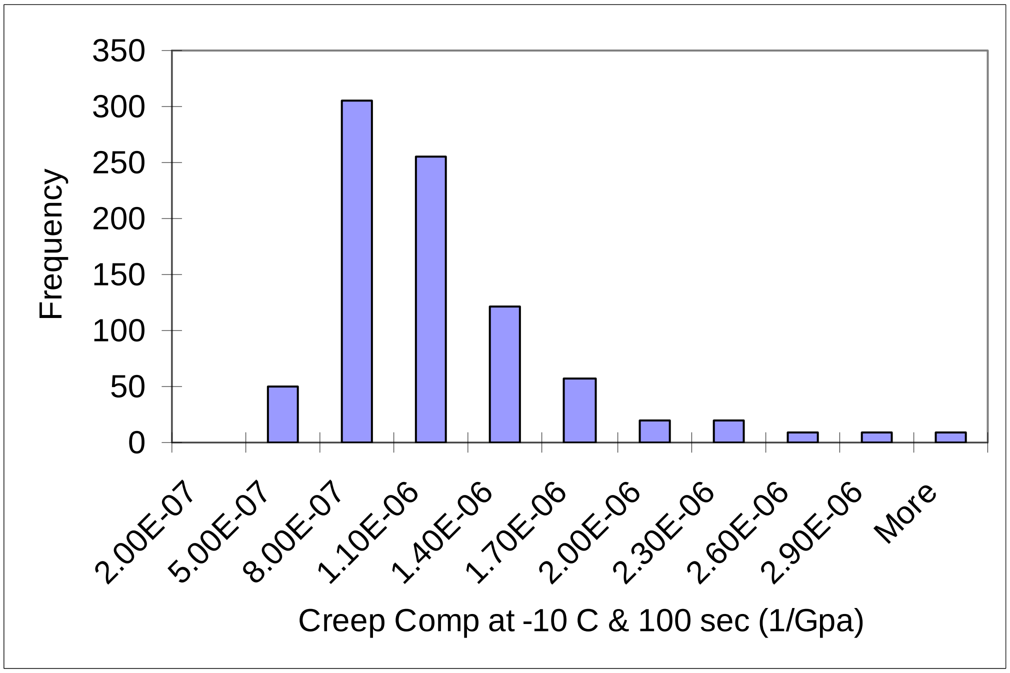


Figure B-8: Distribution of asphalt mix creep compliance at -10 C and 100 sec time

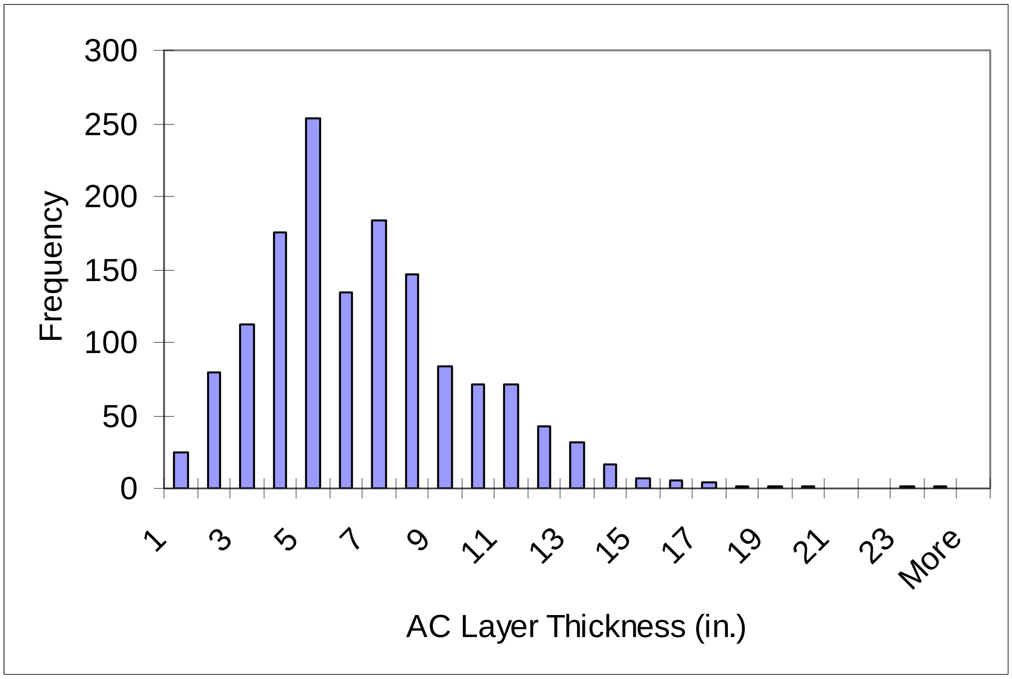


Figure B-9: Distribution of asphalt mix layer thickness

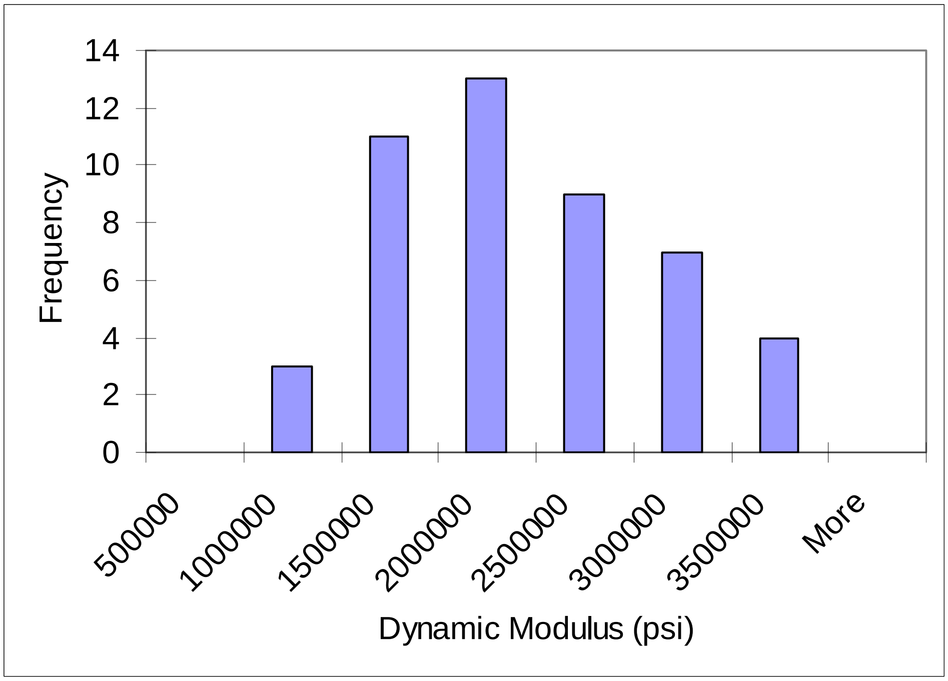


Figure B-10: Distribution of asphalt mix dynamic modulus at 0 F

Appendix B – 3

Inputs for SPS-1 Sections

Project: MI SPS1 - 0117.dgp

General Information

Description:

Design Life	20 years
Base/Subgrade construction:	October, 1993
Pavement construction:	January, 1994
Traffic open:	January, 1994
Type of design	Flexible

Analysis Parameters

Performance Criteria

	Limit	Reliability
Initial IRI (in/mi)	63	
Terminal IRI (in/mi)	172	90
AC Surface Down Cracking (Long. Cracking) (ft/mile):	2000	90
AC Bottom Up Cracking (Alligator Cracking) (%):	25	90
AC Thermal Fracture (Transverse Cracking) (ft/mi):	1000	90
Chemically Stabilized Layer (Fatigue Fracture)	25	90
Permanent Deformation (AC Only) (in):	0.25	90
Permanent Deformation (Total Pavement) (in):	0.75	90
Reflective cracking (%):	100	

Location:
Project ID:
Section ID:

Date:

Station/milepost format:
Station/milepost begin:
Station/milepost end:
Traffic direction:

Default Input Level

Default input level	Level 3, Default and historical agency values.

Traffic

Initial two-way AADTT:	2420
Number of lanes in design direction:	1
Percent of trucks in design direction (%):	100
Percent of trucks in design lane (%):	100
Operational speed (mph):	60

Traffic -- Volume Adjustment Factors

Monthly Adjustment Factors (Level 3, Default MAF)

	Vehicle Class									
Month	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10	Class 11	Class 12	Class 13
January	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
February	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
March	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
April	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
May	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
June	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
July	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
August	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
September	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
October	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
November	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
December	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Vehicle Class Distribution

(Level 3, Default Distribution)

AADTT distribution by vehicle class

Class 4	3.1%
Class 5	31.6%
Class 6	3.8%
Class 7	0.5%
Class 8	6.4%
Class 9	36.3%
Class 10	2.9%
Class 11	0.8%
Class 12	0.5%
Class 13	14.1%

Hourly truck traffic distribution

by period beginning:

Midnight	2.3%	Noon	5.9%
1:00 am	2.3%	1:00 pm	5.9%
2:00 am	2.3%	2:00 pm	5.9%
3:00 am	2.3%	3:00 pm	5.9%
4:00 am	2.3%	4:00 pm	4.6%
5:00 am	2.3%	5:00 pm	4.6%
6:00 am	5.0%	6:00 pm	4.6%
7:00 am	5.0%	7:00 pm	4.6%
8:00 am	5.0%	8:00 pm	3.1%
9:00 am	5.0%	9:00 pm	3.1%
10:00 am	5.9%	10:00 pm	3.1%
11:00 am	5.9%	11:00 pm	3.1%

Traffic Growth Factor

Vehicle Class	Growth Rate	Growth Function
Class 4	2.0%	Compound
Class 5	2.0%	Compound
Class 6	2.0%	Compound

Class 7	2.0%	Compound
Class 8	2.0%	Compound
Class 9	2.0%	Compound
Class 10	2.0%	Compound
Class 11	2.0%	Compound
Class 12	2.0%	Compound
Class 13	2.0%	Compound

Traffic -- Axle Load Distribution Factors

Level 3: Default

Traffic -- General Traffic Inputs

Mean wheel location (inches from the lane marking): 18

Traffic wander standard deviation (in): 10

Design lane width (ft): 12

Number of Axles per Truck

Vehicle Class	Single Axle	Tandem Axle	Tridem Axle	Quad Axle
Class 4	1.80	0.20	0.00	0.00
Class 5	1.89	0.01	0.00	0.00
Class 6	1.00	1.00	0.00	0.00
Class 7	1.07	0.22	0.52	0.33
Class 8	2.27	0.75	0.00	0.00
Class 9	1.29	1.85	0.00	0.00
Class 10	1.70	1.27	0.17	0.49
Class 11	4.99	0.00	0.00	0.00
Class 12	3.99	1.00	0.00	0.00
Class 13	2.28	2.11	0.09	0.59

Axle Configuration

Average axle width (edge-to-edge) outside dimensions,ft): 8.5

Dual tire spacing (in): 12

Axle Configuration

Tire Pressure (psi) : 120

Average Axle Spacing

Tandem axle(psi): 51.6

Tridem axle(psi): 49.2

Quad axle(psi): 49.2

Climate

icm file: E:\MSU\Evaluation of MEPDG\Task 5\SPS1 MI site.icm

Latitude (degrees.minutes)	42.99
Longitude (degrees.minutes)	-84.52
Elevation (ft)	810
Depth of water table (ft)	8

Structure--Design Features

HMA E* Predictive Model:	NCHRP 1-37A viscosity based model.
HMA Rutting Model coefficients:	NCHRP 1-37A coefficients
Endurance Limit (microstrain):	None (0 microstrain)

Structure--Layers

Layer 1 -- Asphalt concrete

Material type:	Asphalt concrete
Layer thickness (in):	1.7

General Properties

General

Reference temperature (F°):	70

Volumetric Properties as Built

Effective binder content (%):	11.4
Air voids (%):	8.5
Total unit weight (pcf):	148

Poisson's ratio:	0.35 (user entered)

Thermal Properties

Thermal conductivity asphalt (BTU/hr-ft-F°):	0.67
Heat capacity asphalt (BTU/lb-F°):	0.23

Asphalt Mix

Cumulative % Retained 3/4 inch sieve:	3.7
Cumulative % Retained 3/8 inch sieve:	29.7
Cumulative % Retained #4 sieve:	59.7
% Passing #200 sieve:	5.2

Asphalt Binder

Option:	Superpave binder grading
A	11.7870 (correlated)
VTS:	-3.9810 (correlated)

High temp. °C	Low temperature, °C						
	-10	-16	-22	-28	-34	-40	-46
46	▨	▨	▨	▨			
52							
58			🟩				
64							▨
70							▨
76						▨	▨
82						▨	▨

Thermal Cracking Properties

Average Tensile Strength at 14ºF:	345.41
Mixture VMA (%)	19.9
Aggreagate coeff. thermal contraction (in./in.)	0.000005
Mix coeff. thermal contraction (in./in./ºF):	0.000013

Load Time (sec)	Low Temp. -4ºF (1/psi)	Mid. Temp. 14ºF (1/psi)	High Temp. 32ºF (1/psi)
1	2.05E-07	3.86E-07	5.54E-07
2	2.29E-07	4.58E-07	7.29E-07
5	2.65E-07	5.73E-07	1.05E-06
10	2.95E-07	6.78E-07	1.38E-06
20	3.29E-07	8.04E-07	1.81E-06
50	3.8E-07	1.01E-06	2.6E-06
100	4.24E-07	1.19E-06	3.42E-06

Layer 2 -- Asphalt concrete

Material type:	Asphalt concrete
Layer thickness (in):	1.5

General Properties

General

Reference temperature (F°):	70

Volumetric Properties as Built

Effective binder content (%):	9
Air voids (%):	8.5
Total unit weight (pcf):	148

Poisson's ratio:	0.35 (user entered)

Thermal Properties
Thermal conductivity asphalt (BTU/hr-ft-F°): 0.67
Heat capacity asphalt (BTU/lb-F°): 0.23

Asphalt Mix

Cumulative % Retained 3/4 inch sieve: 3.7
Cumulative % Retained 3/8 inch sieve: 29.7
Cumulative % Retained #4 sieve: 59.7
% Passing #200 sieve: 5.2

Asphalt Binder

Option: Superpave binder grading
A 11.7870 (correlated)
VTS: -3.9810 (correlated)

High temp. °C	Low temperature, °C						
	-10	-16	-22	-28	-34	-40	-46
46	▨	▨	▨	▨			
52							
58			🟩				
64							▨
70							▨
76						▨	▨
82						▨	▨

Layer 3 -- Asphalt concrete

Material type: Asphalt concrete
Layer thickness (in): 3.2

General Properties

General
Reference temperature (F°): 70

Volumetric Properties as Built
Effective binder content (%): 9
Air voids (%): 8.5
Total unit weight (pcf): 148

Poisson's ratio: 0.35 (user entered)

Thermal Properties
Thermal conductivity asphalt (BTU/hr-ft-F°): 0.67
Heat capacity asphalt (BTU/lb-F°): 0.23

Asphalt Mix

Cumulative % Retained 3/4 inch sieve: 5

Cumulative % Retained 3/8 inch sieve: 27.7

Cumulative % Retained #4 sieve: 55

% Passing #200 sieve: 5.3

Asphalt Binder

Option: Superpave binder grading

A 11.7870 (correlated)

VTS: -3.9810 (correlated)

High temp. °C	Low temperature, °C						
	-10	-16	-22	-28	-34	-40	-46
46	▨	▨	▨	▨			
52							
58			🟩				
64							▨
70							▨
76						▨	▨
82						▨	▨

Layer 4 -- Asphalt concrete

Material type: Asphalt concrete

Layer thickness (in): 5.2

General Properties

General

Reference temperature (F°): 70

Volumetric Properties as Built

Effective binder content (%): 6

Air voids (%): 8.5

Total unit weight (pcf): 148

Poisson's ratio: 0.35 (user entered)

Thermal Properties

Thermal conductivity asphalt (BTU/hr-ft-F°): 0.67

Heat capacity asphalt (BTU/lb-F°): 0.23

Asphalt Mix

Cumulative % Retained 3/4 inch sieve: 12

Cumulative % Retained 3/8 inch sieve: 32

Cumulative % Retained #4 sieve: 47

% Passing #200 sieve: 10.7

Asphalt Binder

Option:	Superpave binder grading
A	11.7870 (correlated)
VTS:	-3.9810 (correlated)

High temp. °C	Low temperature, °C						
	-10	-16	-22	-28	-34	-40	-46
46	▨	▨	▨	▨			
52							
58			🟩				
64							▨
70							▨
76						▨	▨
82						▨	▨

Layer 5 -- Crushed stone

Unbound Material:	Crushed stone
Thickness(in):	4

Strength Properties

Input Level:	Level 3
Analysis Type:	ICM inputs (ICM Calculated Modulus)
Poisson's ratio:	0.35
Coefficient of lateral pressure,Ko:	0.5
Modulus (input) (psi):	30000

ICM Inputs

Gradation and Plasticity Index

Plasticity Index, PI:	1
Liquid Limit (LL)	6
Compacted Layer	No
Passing #200 sieve (%):	10.7
Passing #40	20
Passing #4 sieve (%):	53
D10(mm)	0.04864
D20(mm)	0.425
D30(mm)	1.285
D60(mm)	6.564
D90(mm)	20.19

Sieve	Percent Passing
0.001mm	
0.002mm	
0.020mm	
#200	10.7
#100	

#80	15
#60	
#50	
#40	20
#30	
#20	
#16	
#10	34
#8	
#4	53
3/8"	68
1/2"	74
3/4"	88
1"	97
1 1/2"	100
2"	100
2 1/2"	
3"	
3 1/2"	100
4"	100

Calculated/Derived Parameters

Maximum dry unit weight (pcf):	127.0 (derived)
Specific gravity of solids, Gs:	2.70 (derived)
Saturated hydraulic conductivity (ft/hr):	0.0188 (derived)
Optimum gravimetric water content (%):	7.5 (derived)
Calculated degree of saturation (%):	61.7 (calculated)

Soil water characteristic curve parameters: Default values

Parameters	Value
a	4.7836
b	1.2624
c	0.7211
Hr.	121.4

Layer 6 -- A-4

Unbound Material:	A-4
Thickness(in):	Semi-infinite

Strength Properties

Input Level:	Level 3
Analysis Type:	ICM inputs (ICM Calculated Modulus)
Poisson's ratio:	0.35
Coefficient of lateral pressure,Ko:	0.5
Modulus (input) (psi):	16500

ICM Inputs

Gradation and Plasticity Index

Plasticity Index, PI:	5
Liquid Limit (LL)	21
Compacted Layer	No
Passing #200 sieve (%):	67.1
Passing #40	88
Passing #4 sieve (%):	97
D10(mm)	0.0002682
D20(mm)	0.0007194
D30(mm)	0.001929
D60(mm)	0.03723
D90(mm)	0.7122

Sieve	Percent Passing
0.001mm	
0.002mm	
0.020mm	
#200	67.1
#100	
#80	77
#60	
#50	
#40	88
#30	
#20	
#16	
#10	94
#8	
#4	97
3/8"	98
1/2"	99
3/4"	99
1"	99
1 1/2"	100
2"	100
2 1/2"	
3"	100
3 1/2"	100
4"	100

Calculated/Derived Parameters

Maximum dry unit weight (pcf):	117.6 (derived)
Specific gravity of solids, Gs:	2.70 (derived)
Saturated hydraulic conductivity (ft/hr):	9.329e-006 (derived)
Optimum gravimetric water content (%):	12.2 (derived)

Calculated degree of saturation (%):	76.1 (calculated)
Soil water characteristic curve parameters:	Default values

Parameters	Value
a	72.183
b	0.96641
c	0.45377
Hr.	500

Project: MI SPS1 - 0115.dgp (Partial Inputs)

Structure--Layers

Layer 1 -- Asphalt concrete

Material type: Asphalt concrete
Layer thickness (in): 1.7

General Properties

General
Reference temperature (F°): 70

Volumetric Properties as Built
Effective binder content (%): 11.4
Air voids (%): 8.5
Total unit weight (pcf): 148

Poisson's ratio: 0.35 (user entered)

Thermal Properties
Thermal conductivity asphalt (BTU/hr-ft-F°): 0.67
Heat capacity asphalt (BTU/lb-F°): 0.23

Asphalt Mix

Cumulative % Retained 3/4 inch sieve: 3.7
Cumulative % Retained 3/8 inch sieve: 29.7
Cumulative % Retained #4 sieve: 59.7
% Passing #200 sieve: 5.2

Asphalt Binder

Option: Superpave binder grading
A 11.7870 (correlated)
VTS: -3.9810 (correlated)

High temp. °C	Low temperature, °C						
	-10	-16	-22	-28	-34	-40	-46
46	▨	▨	▨	▨			
52							
58			🟩				
64							▨
70							▨
76						▨	▨
82						▨	▨

Thermal Cracking Properties

Average Tensile Strength at 14ºF: 345.41
Mixture VMA (%) 19.9

Aggreagate coeff. thermal contraction (in./in.)	0.000005
Mix coeff. thermal contraction (in./in./ºF):	0.000013

Load Time (sec)	Low Temp. -4ºF (1/psi)	Mid. Temp. 14ºF (1/psi)	High Temp. 32ºF (1/psi)
1	2.05E-07	3.86E-07	5.54E-07
2	2.29E-07	4.58E-07	7.29E-07
5	2.65E-07	5.73E-07	1.05E-06
10	2.95E-07	6.78E-07	1.38E-06
20	3.29E-07	8.04E-07	1.81E-06
50	3.8E-07	1.01E-06	2.6E-06
100	4.24E-07	1.19E-06	3.42E-06

Layer 2 -- Asphalt concrete

Material type:	Asphalt concrete
Layer thickness (in):	1.6

General Properties

General

Reference temperature (F°):	70

Volumetric Properties as Built

Effective binder content (%):	9
Air voids (%):	8.5
Total unit weight (pcf):	148

Poisson's ratio:	0.35 (user entered)

Thermal Properties

Thermal conductivity asphalt (BTU/hr-ft-F°):	0.67
Heat capacity asphalt (BTU/lb-F°):	0.23

Asphalt Mix

Cumulative % Retained 3/4 inch sieve:	3.7
Cumulative % Retained 3/8 inch sieve:	29.7
Cumulative % Retained #4 sieve:	59.7
% Passing #200 sieve:	5.2

Asphalt Binder

Option: Superpave binder grading
A 11.7870 (correlated)
VTS: -3.9810 (correlated)

High temp. °C	Low temperature, °C						
	-10	-16	-22	-28	-34	-40	-46
46	▨	▨	▨	▨			
52							
58			🟩				
64							▨
70							▨
76						▨	▨
82						▨	▨

Layer 3 -- Asphalt concrete

Material type: Asphalt concrete
Layer thickness (in): 2.6

General Properties

General

Reference temperature (F°): 70

Volumetric Properties as Built

Effective binder content (%): 9
Air voids (%): 8.5
Total unit weight (pcf): 148

Poisson's ratio: 0.35 (user entered)

Thermal Properties

Thermal conductivity asphalt (BTU/hr-ft-F°): 0.67
Heat capacity asphalt (BTU/lb-F°): 0.23

Asphalt Mix

Cumulative % Retained 3/4 inch sieve: 3.7
Cumulative % Retained 3/8 inch sieve: 29.7
Cumulative % Retained #4 sieve: 59.7
% Passing #200 sieve: 5.2

Asphalt Binder

Option: Superpave binder grading
A 11.7870 (correlated)
VTS: -3.9810 (correlated)

High temp.	Low temperature, °C

°C	-10	-16	-22	-28	-34	-40	-46
46	▨	▨	▨	▨			
52							
58			🟩				
64							▨
70							▨
76						▨	▨
82						▨	▨

Layer 4 -- Asphalt concrete

Material type: Asphalt concrete
Layer thickness (in): 9.6

General Properties

General
Reference temperature (F°): 70

Volumetric Properties as Built
Effective binder content (%): 6
Air voids (%): 8.5
Total unit weight (pcf): 148

Poisson's ratio: 0.35 (user entered)

Thermal Properties
Thermal conductivity asphalt (BTU/hr-ft-F°): 0.67
Heat capacity asphalt (BTU/lb-F°): 0.23

Asphalt Mix

Cumulative % Retained 3/4 inch sieve: 12
Cumulative % Retained 3/8 inch sieve: 32
Cumulative % Retained #4 sieve: 47
% Passing #200 sieve: 10.7

Asphalt Binder

Option: Superpave binder grading
A 11.7870 (correlated)
VTS: -3.9810 (correlated)

High temp. °C	Low temperature, °C						
	-10	-16	-22	-28	-34	-40	-46
46	▨	▨	▨	▨			
52							
58			🟩				
64							▨
70							▨

76		
82		

Layer 5 -- A-4

Unbound Material:	A-4
Thickness(in):	12

Strength Properties

Input Level:	Level 3
Analysis Type:	ICM inputs (ICM Calculated Modulus)
Poisson's ratio:	0.35
Coefficient of lateral pressure,Ko:	0.5
Modulus (input) (psi):	16500

ICM Inputs

Gradation and Plasticity Index

Plasticity Index, PI:	5
Liquid Limit (LL)	21
Compacted Layer	No
Passing #200 sieve (%):	67.1
Passing #40	88
Passing #4 sieve (%):	97
D10(mm)	0.0002682
D20(mm)	0.0007194
D30(mm)	0.001929
D60(mm)	0.03723
D90(mm)	0.7122

Sieve	Percent Passing
0.001mm	
0.002mm	
0.020mm	
#200	67.1
#100	
#80	77
#60	
#50	
#40	88
#30	
#20	
#16	
#10	94
#8	
#4	97
3/8"	98
1/2"	99
3/4"	99

1"	99
1 1/2"	100
2"	100
2 1/2"	
3"	100
3 1/2"	100
4"	100

Calculated/Derived Parameters

Maximum dry unit weight (pcf):	117.6 (derived)
Specific gravity of solids, Gs:	2.70 (derived)
Saturated hydraulic conductivity (ft/hr):	9.329e-006 (derived)
Optimum gravimetric water content (%):	12.2 (derived)
Calculated degree of saturation (%):	76.1 (calculated)

Soil water characteristic curve parameters: Default values

Parameters	Value
a	72.183
b	0.96641
c	0.45377
Hr.	500

Layer 6 -- A-4

Unbound Material:	A-4
Thickness(in):	Semi-infinite

Strength Properties

Input Level:	Level 3
Analysis Type:	ICM inputs (ICM Calculated Modulus)
Poisson's ratio:	0.35
Coefficient of lateral pressure,Ko:	0.5
Modulus (input) (psi):	16500

ICM Inputs

Gradation and Plasticity Index

Plasticity Index, PI:	5
Liquid Limit (LL)	21
Compacted Layer	No
Passing #200 sieve (%):	67.1
Passing #40	0
Passing #4 sieve (%):	97
D10(mm)	0.0002682
D20(mm)	0.0007194
D30(mm)	0.001929
D60(mm)	0.03723

D90(mm) 0.7122

Sieve	Percent Passing
0.001mm	
0.002mm	
0.020mm	
#200	67.1
#100	
#80	77
#60	
#50	
#40	88
#30	
#20	
#16	
#10	94
#8	
#4	97
3/8"	98
1/2"	99
3/4"	99
1"	99
1 1/2"	100
2"	100
2 1/2"	
3"	100
3 1/2"	100
4"	100

Calculated/Derived Parameters

Maximum dry unit weight (pcf):	117.6 (derived)
Specific gravity of solids, Gs:	2.70 (derived)
Saturated hydraulic conductivity (ft/hr):	9.236e-006 (derived)
Optimum gravimetric water content (%):	12.2 (derived)
Calculated degree of saturation (%):	76.1 (calculated)

Soil water characteristic curve parameters: Default values

Parameters	Value
a	72.183
b	0.96641
c	0.45377
Hr.	500

Project: MI SPS1 - 0116.dgp

Structure--Design Features

HMA E* Predictive Model:	NCHRP 1-37A viscosity based model.
HMA Rutting Model coefficients:	NCHRP 1-37A coefficients
Endurance Limit (microstrain):	None (0 microstrain)

Structure--Layers

Layer 1 -- Asphalt concrete

Material type:	Asphalt concrete
Layer thickness (in):	1.8

General Properties

General

Reference temperature (F°):	70

Volumetric Properties as Built

Effective binder content (%):	11.4
Air voids (%):	8.5
Total unit weight (pcf):	148

Poisson's ratio:	0.35 (user entered)

Thermal Properties

Thermal conductivity asphalt (BTU/hr-ft-F°):	0.67
Heat capacity asphalt (BTU/lb-F°):	0.23

Asphalt Mix

Cumulative % Retained 3/4 inch sieve:	3.7
Cumulative % Retained 3/8 inch sieve:	29.7
Cumulative % Retained #4 sieve:	59.7
% Passing #200 sieve:	5.2

Asphalt Binder

Option:	Superpave binder grading
A	11.7870 (correlated)
VTS:	-3.9810 (correlated)

High temp. °C	Low temperature, °C						
	-10	-16	-22	-28	-34	-40	-46
46	▨	▨	▨	▨			
52							
58			🟩				

64		
70		
76		
82		

Thermal Cracking Properties

Average Tensile Strength at 14ºF:	345.41
Mixture VMA (%)	19.9
Aggreagate coeff. thermal contraction (in./in.)	0.000005
Mix coeff. thermal contraction (in./in./ºF):	0.000013

Load Time (sec)	Low Temp. -4ºF (1/psi)	Mid. Temp. 14ºF (1/psi)	High Temp. 32ºF (1/psi)
1	2.05E-07	3.86E-07	5.54E-07
2	2.29E-07	4.58E-07	7.29E-07
5	2.65E-07	5.73E-07	1.05E-06
10	2.95E-07	6.78E-07	1.38E-06
20	3.29E-07	8.04E-07	1.81E-06
50	3.8E-07	1.01E-06	2.6E-06
100	4.24E-07	1.19E-06	3.42E-06

Layer 2 -- Asphalt concrete

Material type:	Asphalt concrete
Layer thickness (in):	2.1

General Properties

General

Reference temperature (F°): 70

Volumetric Properties as Built

Effective binder content (%):	9
Air voids (%):	8.5
Total unit weight (pcf):	148

Poisson's ratio: 0.35 (user entered)

Thermal Properties

Thermal conductivity asphalt (BTU/hr-ft-F°):	0.67
Heat capacity asphalt (BTU/lb-F°):	0.23

Asphalt Mix

Cumulative % Retained 3/4 inch sieve: 3.7
Cumulative % Retained 3/8 inch sieve: 29.7
Cumulative % Retained #4 sieve: 59.7
% Passing #200 sieve: 5.2

Asphalt Binder

Option: Superpave binder grading
A 11.7870 (correlated)
VTS: -3.9810 (correlated)

High temp. °C	Low temperature, °C						
	-10	-16	-22	-28	-34	-40	-46
46	▨	▨	▨	▨			
52							
58			🟩				
64							▨
70							▨
76						▨	▨
82						▨	▨

Layer 3 -- Asphalt concrete

Material type: Asphalt concrete
Layer thickness (in): 12

General Properties

General
Reference temperature (F°): 70

Volumetric Properties as Built
Effective binder content (%): 6
Air voids (%): 8.5
Total unit weight (pcf): 148

Poisson's ratio: 0.35 (user entered)

Thermal Properties
Thermal conductivity asphalt (BTU/hr-ft-F°): 0.67
Heat capacity asphalt (BTU/lb-F°): 0.23

Asphalt Mix

Cumulative % Retained 3/4 inch sieve: 12
Cumulative % Retained 3/8 inch sieve: 32
Cumulative % Retained #4 sieve: 47

% Passing #200 sieve: 10.7

Asphalt Binder

Option: Superpave binder grading

A 11.7870 (correlated)

VTS: -3.9810 (correlated)

High temp. °C	Low temperature, °C						
	-10	-16	-22	-28	-34	-40	-46
46	▨	▨	▨	▨			
52							
58			🟩				
64							▨
70							▨
76						▨	▨
82						▨	▨

Layer 4 -- A-4

Unbound Material: A-4

Thickness(in): 12

Strength Properties

Input Level: Level 3

Analysis Type: ICM inputs (ICM Calculated Modulus)

Poisson's ratio: 0.35

Coefficient of lateral pressure,Ko: 0.5

Modulus (input) (psi): 16500

ICM Inputs

<u>Gradation and Plasticity Index</u>

Plasticity Index, PI: 5

Liquid Limit (LL) 21

Compacted Layer No

Passing #200 sieve (%): 67.1

Passing #40 88

Passing #4 sieve (%): 97

D10(mm) 0.0002682

D20(mm) 0.0007194

D30(mm) 0.001929

D60(mm) 0.03723

D90(mm) 0.7122

Sieve	Percent Passing
0.001mm	
0.002mm	
0.020mm	
#200	67.1

#100	
#80	77
#60	
#50	
#40	88
#30	
#20	
#16	
#10	94
#8	
#4	97
3/8"	98
1/2"	99
3/4"	99
1"	99
1 1/2"	100
2"	100
2 1/2"	
3"	100
3 1/2"	100
4"	100

Calculated/Derived Parameters

Maximum dry unit weight (pcf):	117.6 (derived)
Specific gravity of solids, Gs:	2.70 (derived)
Saturated hydraulic conductivity (ft/hr):	9.329e-006 (derived)
Optimum gravimetric water content (%):	12.2 (derived)
Calculated degree of saturation (%):	76.1 (calculated)

Soil water characteristic curve parameters: Default values

Parameters	Value
a	72.183
b	0.96641
c	0.45377
Hr.	500

Layer 5 -- A-4

Unbound Material: A-4

Thickness(in): Semi-infinite

Strength Properties

Input Level:	Level 3
Analysis Type:	ICM inputs (ICM Calculated Modulus)
Poisson's ratio:	0.35
Coefficient of lateral pressure,Ko:	0.5

Modulus (input) (psi): 16500

ICM Inputs

Gradation and Plasticity Index

Plasticity Index, PI:	5
Liquid Limit (LL)	21
Compacted Layer	No
Passing #200 sieve (%):	67.1
Passing #40	0
Passing #4 sieve (%):	97
D10(mm)	0.0002682
D20(mm)	0.0007194
D30(mm)	0.001929
D60(mm)	0.03723
D90(mm)	0.7122

Sieve	Percent Passing
0.001mm	
0.002mm	
0.020mm	
#200	67.1
#100	
#80	77
#60	
#50	
#40	88
#30	
#20	
#16	
#10	94
#8	
#4	97
3/8"	98
1/2"	99
3/4"	99
1"	99
1 1/2"	100
2"	100
2 1/2"	
3"	100
3 1/2"	100
4"	100

Calculated/Derived Parameters

Maximum dry unit weight (pcf):	117.6 (derived)
Specific gravity of solids, Gs:	2.70 (derived)
Saturated hydraulic conductivity (ft/hr):	9.236e-006 (derived)

Optimum gravimetric water content (%): 12.2 (derived)
Calculated degree of saturation (%): 76.1 (calculated)

Soil water characteristic curve parameters: Default values

Parameters	Value
a	72.183
b	0.96641
c	0.45377
Hr.	500

Rest of the sections also have very similar inputs. Therefore, those inputs have not been listed here for the sake of brevity.

Appendix B - 4

Inputs for MDOT Sections

Project: 18890.dgp

General Information

Description:

Design Life	20 years
Base/Subgrade construction:	August, 1988
Pavement construction:	September, 1989
Traffic open:	November, 1989
Type of design	Flexible

Analysis Parameters

Performance Criteria

	Limit	Reliability
Initial IRI (in/mi)	63	
Terminal IRI (in/mi)	172	90
AC Surface Down Cracking (Long. Cracking) (ft/mile):	2000	90
AC Bottom Up Cracking (Alligator Cracking) (%):	25	90
AC Thermal Fracture (Transverse Cracking) (ft/mi):	1000	90
Chemically Stabilized Layer (Fatigue Fracture)	25	90
Permanent Deformation (AC Only) (in):	0.25	90
Permanent Deformation (Total Pavement) (in):	0.75	90
Reflective cracking (%):	100	

Location:	Ludington, Mason, MI
Project ID:	
Section ID:	18890N
Date:	9/27/2007
Station/milepost format:	
Station/milepost begin:	
Station/milepost end:	
Traffic direction:	North bound

Default Input Level

Default input level	Level 3, Default and historical agency values.

Traffic

Initial two-way AADTT:	2225
Number of lanes in design direction:	2
Percent of trucks in design direction (%):	50
Percent of trucks in design lane (%):	85
Operational speed (mph):	70

Traffic -- Volume Adjustment Factors

Monthly Adjustment Factors (Level 3, Default MAF)

	Vehicle Class									
Month	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10	Class 11	Class 12	Class 13
January	0.94	0.94	0.94	0.94	0.75	0.75	0.75	0.85	0.85	0.85
February	1.14	1.14	1.14	1.14	0.76	0.76	0.76	0.71	0.71	0.71
March	0.84	0.84	0.84	0.84	0.79	0.79	0.79	0.68	0.68	0.68
April	0.71	0.71	0.71	0.71	0.84	0.84	0.84	0.71	0.71	0.71
May	0.82	0.82	0.82	0.82	0.87	0.87	0.87	0.70	0.70	0.70
June	0.86	0.86	0.86	0.86	0.88	0.88	0.88	0.87	0.87	0.87
July	0.87	0.87	0.87	0.87	0.83	0.83	0.83	0.97	0.97	0.97
August	0.88	0.88	0.88	0.88	0.92	0.92	0.92	0.91	0.91	0.91
September	0.80	0.80	0.80	0.80	0.86	0.86	0.86	0.92	0.92	0.92
October	0.79	0.79	0.79	0.79	0.91	0.91	0.91	1.17	1.17	1.17
November	0.70	0.70	0.70	0.70	0.83	0.83	0.83	0.81	0.81	0.81
December	0.64	0.64	0.64	0.64	0.75	0.75	0.75	0.70	0.70	0.70

Vehicle Class Distribution

(Level 3, Default Distribution)

AADTT distribution by vehicle class

Class 4	1.6%
Class 5	33.3%
Class 6	7.7%
Class 7	1.8%
Class 8	5.1%
Class 9	33.3%
Class 10	11.5%
Class 11	0.1%
Class 12	0.0%
Class 13	5.6%

Hourly truck traffic distribution

by period beginning:

Midnight	1.0%	Noon	7.4%
1:00 am	0.9%	1:00 pm	6.8%
2:00 am	0.9%	2:00 pm	6.2%
3:00 am	1.6%	3:00 pm	5.3%
4:00 am	2.0%	4:00 pm	4.4%
5:00 am	3.8%	5:00 pm	3.4%
6:00 am	5.0%	6:00 pm	2.7%
7:00 am	6.7%	7:00 pm	2.2%
8:00 am	8.4%	8:00 pm	1.9%
9:00 am	8.9%	9:00 pm	1.7%
10:00 am	8.1%	10:00 pm	1.6%
11:00 am	7.9%	11:00 pm	1.2%

Traffic Growth Factor

Vehicle Class	Growth Rate	Growth Function
Class 4	2.0%	Compound
Class 5	2.0%	Compound
Class 6	2.0%	Compound

Class 7	2.0%	Compound
Class 8	2.0%	Compound
Class 9	2.0%	Compound
Class 10	2.0%	Compound
Class 11	2.0%	Compound
Class 12	2.0%	Compound
Class 13	2.0%	Compound

Traffic -- Axle Load Distribution Factors

Level 3: Default

Traffic -- General Traffic Inputs

Mean wheel location (inches from the lane marking):	18
Traffic wander standard deviation (in):	10
Design lane width (ft):	12

Number of Axles per Truck

Vehicle Class	Single Axle	Tandem Axle	Tridem Axle	Quad Axle
Class 4	1.78	0.22	0.00	0.00
Class 5	2.00	0.04	0.00	0.00
Class 6	1.00	1.00	0.00	0.00
Class 7	1.00	0.00	0.70	0.30
Class 8	2.34	0.66	0.00	0.00
Class 9	1.24	1.87	0.00	0.00
Class 10	1.26	1.01	0.21	0.74
Class 11	5.00	0.00	0.00	0.00
Class 12	3.96	1.02	0.00	0.00
Class 13	1.69	1.49	0.36	0.64

Axle Configuration

Average axle width (edge-to-edge) outside dimensions,ft):	8.5
Dual tire spacing (in):	12

Axle Configuration

Tire Pressure (psi) :	120

Average Axle Spacing

Tandem axle(psi):	51.6
Tridem axle(psi):	49.2
Quad axle(psi):	49.2

Climate

icm file: E:\MSU\Evaluation of MEPDG\Task 5\MI Sites\Ludington

	18890N.icm
Latitude (degrees.minutes)	43.57
Longitude (degrees.minutes)	-86.26
Elevation (ft)	617
Depth of water table (ft)	8

Structure--Design Features

HMA E* Predictive Model:	NCHRP 1-37A viscosity based model.
HMA Rutting Model coefficients:	NCHRP 1-37A coefficients
Endurance Limit (microstrain):	None (0 microstrain)

Structure--Layers

Layer 1 -- Asphalt concrete

Material type:	Asphalt concrete
Layer thickness (in):	7.5

General Properties

General

Reference temperature (F°):	70

Volumetric Properties as Built

Effective binder content (%):	10.4
Air voids (%):	9
Total unit weight (pcf):	151
Poisson's ratio:	0.35 (user entered)

Thermal Properties

Thermal conductivity asphalt (BTU/hr-ft-F°):	0.67
Heat capacity asphalt (BTU/lb-F°):	0.23

Asphalt Mix

Cumulative % Retained 3/4 inch sieve:	0
Cumulative % Retained 3/8 inch sieve:	16
Cumulative % Retained #4 sieve:	35
% Passing #200 sieve:	4.8

Asphalt Binder

Option:	Conventional penetration grade
Viscosity Grade	Pen 120-150
A	11.0897 (correlated)
VTS:	-3.7252 (correlated)

Thermal Cracking Properties

Average Tensile Strength at 14ºF:	437.914
Mixture VMA (%)	19.4
Aggreagate coeff. thermal contraction (in./in.)	0.000005
Mix coeff. thermal contraction (in./in./ºF):	0.000013

Load Time (sec)	Low Temp. -4ºF (1/psi)	Mid. Temp. 14ºF (1/psi)	High Temp. 32ºF (1/psi)
1	2.1E-07	4.01E-07	5.91E-07
2	2.34E-07	4.75E-07	7.77E-07
5	2.71E-07	5.95E-07	1.12E-06
10	3.02E-07	7.05E-07	1.47E-06
20	3.37E-07	8.36E-07	1.93E-06
50	3.9E-07	1.05E-06	2.77E-06
100	4.35E-07	1.24E-06	3.65E-06

Layer 2 -- Crushed gravel

Unbound Material:	Crushed gravel
Thickness(in):	4

Strength Properties

Input Level:	Level 3
Analysis Type:	ICM inputs (ICM Calculated Modulus)
Poisson's ratio:	0.35
Coefficient of lateral pressure,Ko:	0.5
Modulus (input) (psi):	25000

ICM Inputs

Gradation and Plasticity Index

Plasticity Index, PI:	1
Liquid Limit (LL)	6
Compacted Layer	No
Passing #200 sieve (%):	6
Passing #40	26.6
Passing #4 sieve (%):	62.6
D10(mm)	0.105
D20(mm)	0.2435
D30(mm)	0.5647
D60(mm)	4.232

D90(mm) 15.08

Sieve	Percent Passing
0.001mm	
0.002mm	
0.020mm	
#200	6
#100	
#80	
#60	
#50	
#40	
#30	
#20	
#16	
#10	
#8	47
#4	
3/8"	78
1/2"	
3/4"	96
1"	100
1 1/2"	
2"	
2 1/2"	
3"	
3 1/2"	
4"	

Calculated/Derived Parameters

Maximum dry unit weight (pcf):	125.9 (derived)
Specific gravity of solids, Gs:	2.70 (derived)
Saturated hydraulic conductivity (ft/hr):	0.01202 (derived)
Optimum gravimetric water content (%):	8.0 (derived)
Calculated degree of saturation (%):	64.1 (calculated)

Soil water characteristic curve parameters: Default values

Parameters	Value
a	5.3738
b	1.9977
c	0.78515
Hr.	112

Layer 3 -- A-3

Unbound Material: A-3

Thickness(in): 18

Strength Properties

Input Level:	Level 3
Analysis Type:	ICM inputs (ICM Calculated Modulus)
Poisson's ratio:	0.35
Coefficient of lateral pressure,Ko:	0.5
Modulus (input) (psi):	13500

ICM Inputs

Gradation and Plasticity Index

Plasticity Index, PI:	0
Liquid Limit (LL)	11
Compacted Layer	Yes
Passing #200 sieve (%):	3
Passing #40	34.7
Passing #4 sieve (%):	73.4
D10(mm)	0.1036
D20(mm)	0.1699
D30(mm)	0.3171
D60(mm)	2.061
D90(mm)	13.4

Sieve	Percent Passing
0.001mm	
0.002mm	
0.020mm	
#200	3
#100	18
#80	
#60	
#50	
#40	
#30	
#20	
#16	
#10	
#8	
#4	
3/8"	
1/2"	
3/4"	
1"	100
1 1/2"	
2"	
2 1/2"	
3"	100
3 1/2"	

4"

Calculated/Derived Parameters

Maximum dry unit weight (pcf):	120.0 (user input)
Specific gravity of solids, Gs:	2.70 (derived)
Saturated hydraulic conductivity (ft/hr):	0.01275 (derived)
Optimum gravimetric water content (%):	9.6 (derived)
Calculated degree of saturation (%):	64.1 (calculated)

Soil water characteristic curve parameters: Default values

Parameters	Value
a	5.9465
b	2.0251
c	0.85917
Hr.	100

Layer 4 -- A-4

Unbound Material:	A-4
Thickness(in):	Semi-infinite

Strength Properties

Input Level:	Level 3
Analysis Type:	ICM inputs (ICM Calculated Modulus)
Poisson's ratio:	0.35
Coefficient of lateral pressure,Ko:	0.5
Modulus (input) (psi):	4000

ICM Inputs

Gradation and Plasticity Index

Plasticity Index, PI:	5
Liquid Limit (LL)	21
Compacted Layer	No
Passing #200 sieve (%):	67.1
Passing #40	88
Passing #4 sieve (%):	97
D10(mm)	0.0002682
D20(mm)	0.0007194
D30(mm)	0.001929
D60(mm)	0.03723
D90(mm)	0.7122

Sieve	Percent Passing
0.001mm	
0.002mm	
0.020mm	

#200	67.1
#100	
#80	77
#60	
#50	
#40	88
#30	
#20	
#16	
#10	94
#8	
#4	97
3/8"	98
1/2"	99
3/4"	99
1"	99
1 1/2"	100
2"	100
2 1/2"	
3"	100
3 1/2"	100
4"	100

Calculated/Derived Parameters

Maximum dry unit weight (pcf): 117.6 (derived)

Specific gravity of solids, Gs: 2.70 (derived)

Saturated hydraulic conductivity (ft/hr): 9.329e-006 (derived)

Optimum gravimetric water content (%): 12.2 (derived)

Calculated degree of saturation (%): 76.1 (calculated)

Soil water characteristic curve parameters: Default values

Parameters	Value
a	72.183
b	0.96641
c	0.45377
Hr.	500

Project: 29581W.dgp

General Information

Description:

Design Life	20 years
Base/Subgrade construction:	May, 1995
Pavement construction:	August, 1995
Traffic open:	October, 1995
Type of design	Flexible

Analysis Parameters

Performance Criteria

	Limit	Reliability
Initial IRI (in/mi)	63	
Terminal IRI (in/mi)	172	90
AC Surface Down Cracking (Long. Cracking) (ft/mile):	2000	90
AC Bottom Up Cracking (Alligator Cracking) (%):	25	90
AC Thermal Fracture (Transverse Cracking) (ft/mi):	1000	90
Chemically Stabilized Layer (Fatigue Fracture)	25	90
Permanent Deformation (AC Only) (in):	0.25	90
Permanent Deformation (Total Pavement) (in):	0.75	90
Reflective cracking (%):	100	

Location:	Lansing, Eaton, MI
Project ID:	
Section ID:	29581W
Date:	9/27/2007
Station/milepost format:	
Station/milepost begin:	
Station/milepost end:	
Traffic direction:	West bound

Default Input Level

Default input level	Level 3, Default and historical agency values.

Traffic

Initial two-way AADTT:	2225
Number of lanes in design direction:	2
Percent of trucks in design direction (%):	50
Percent of trucks in design lane (%):	85
Operational speed (mph):	70

Traffic -- Volume Adjustment Factors

Monthly Adjustment Factors

(Level 3, Default MAF)

	Vehicle Class									
Month	**Class 4**	**Class 5**	**Class 6**	**Class 7**	**Class 8**	**Class 9**	**Class 10**	**Class 11**	**Class 12**	**Class 13**
January	0.70	0.70	0.70	0.70	0.82	0.82	0.82	0.74	0.74	0.74
February	0.76	0.76	0.76	0.76	0.88	0.88	0.88	0.76	0.76	0.76
March	0.83	0.83	0.83	0.83	0.89	0.89	0.89	0.78	0.78	0.78
April	0.63	0.63	0.63	0.63	0.64	0.64	0.64	0.62	0.62	0.62
May	0.78	0.78	0.78	0.78	0.86	0.86	0.86	0.90	0.90	0.90
June	0.98	0.98	0.98	0.98	0.90	0.90	0.90	0.96	0.96	0.96
July	0.84	0.84	0.84	0.84	0.75	0.75	0.75	0.84	0.84	0.84
August	1.01	1.01	1.01	1.01	0.87	0.87	0.87	0.91	0.91	0.91
September	0.96	0.96	0.96	0.96	0.86	0.86	0.86	0.93	0.93	0.93
October	0.92	0.92	0.92	0.92	0.89	0.89	0.89	1.03	1.03	1.03
November	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.86	0.86	0.86
December	0.73	0.73	0.73	0.73	0.81	0.81	0.81	0.69	0.69	0.69

Vehicle Class Distribution

(Level 3, Default Distribution)

AADTT distribution by vehicle class

Class 4	1.7%
Class 5	16.8%
Class 6	3.1%
Class 7	0.3%
Class 8	5.1%
Class 9	60.4%
Class 10	6.5%
Class 11	2.2%
Class 12	0.6%
Class 13	3.3%

Hourly truck traffic distribution

by period beginning:

Midnight	2.2%	Noon	6.2%
1:00 am	1.9%	1:00 pm	6.1%
2:00 am	1.9%	2:00 pm	5.8%
3:00 am	2.1%	3:00 pm	5.6%
4:00 am	2.8%	4:00 pm	4.9%
5:00 am	3.7%	5:00 pm	4.4%
6:00 am	4.1%	6:00 pm	3.8%
7:00 am	4.6%	7:00 pm	3.3%
8:00 am	5.4%	8:00 pm	2.9%
9:00 am	6.2%	9:00 pm	2.9%
10:00 am	6.5%	10:00 pm	3.1%
11:00 am	6.5%	11:00 pm	2.9%

Traffic Growth Factor

Vehicle Class	Growth Rate	Growth Function
Class 4	2.0%	Compound
Class 5	2.0%	Compound
Class 6	2.0%	Compound

Class 7	2.0%	Compound
Class 8	2.0%	Compound
Class 9	2.0%	Compound
Class 10	2.0%	Compound
Class 11	2.0%	Compound
Class 12	2.0%	Compound
Class 13	2.0%	Compound

Traffic -- Axle Load Distribution Factors

Level 3: Default

Traffic -- General Traffic Inputs

Mean wheel location (inches from the lane marking):	18
Traffic wander standard deviation (in):	10
Design lane width (ft):	12

Number of Axles per Truck

Vehicle Class	Single Axle	Tandem Axle	Tridem Axle	Quad Axle
Class 4	1.60	0.40	0.00	0.00
Class 5	2.00	0.02	0.00	0.00
Class 6	1.00	1.00	0.00	0.00
Class 7	1.10	0.10	0.63	0.27
Class 8	2.18	0.83	0.00	0.00
Class 9	1.24	1.88	0.00	0.00
Class 10	1.81	1.01	0.23	0.54
Class 11	5.00	0.00	0.00	0.00
Class 12	4.00	1.00	0.00	0.00
Class 13	2.21	1.48	0.29	0.63

Axle Configuration

Average axle width (edge-to-edge) outside dimensions,ft):	8.5
Dual tire spacing (in):	12

Axle Configuration

Tire Pressure (psi) : 120

Average Axle Spacing

Tandem axle(psi):	51.6
Tridem axle(psi):	49.2
Quad axle(psi):	49.2

Climate

icm file: E:\MSU\Evaluation of MEPDG\Task 5\MI Sites\Lansing.icm

Latitude (degrees.minutes)	42.47
Longitude (degrees.minutes)	-84.35
Elevation (ft)	882
Depth of water table (ft)	8

Structure--Design Features

HMA E* Predictive Model:	NCHRP 1-37A viscosity based model.
HMA Rutting Model coefficients:	NCHRP 1-37A coefficients
Endurance Limit (microstrain):	None (0 microstrain)

Structure--Layers

Layer 1 -- Asphalt concrete

Material type:	Asphalt concrete
Layer thickness (in):	11.75

General Properties

General

Reference temperature (F°):	70

Volumetric Properties as Built

Effective binder content (%):	10.6
Air voids (%):	6.4
Total unit weight (pcf):	150

Poisson's ratio:	0.35 (user entered)

Thermal Properties

Thermal conductivity asphalt (BTU/hr-ft-F°):	0.67
Heat capacity asphalt (BTU/lb-F°):	0.23

Asphalt Mix

Cumulative % Retained 3/4 inch sieve:	15
Cumulative % Retained 3/8 inch sieve:	37
Cumulative % Retained #4 sieve:	60
% Passing #200 sieve:	5.2

Asphalt Binder

Option:	Conventional penetration grade
Viscosity Grade	Pen 85-100
A	10.8232 (correlated)
VTS:	-3.621 (correlated)

Thermal Cracking Properties

Average Tensile Strength at 14ºF:	409.9
Mixture VMA (%)	17
Aggreagate coeff. thermal contraction (in./in.)	0.000005
Mix coeff. thermal contraction (in./in./ºF):	0.000013

Load Time (sec)	Low Temp. -4ºF (1/psi)	Mid. Temp. 14ºF (1/psi)	High Temp. 32ºF (1/psi)
1	2.7E-07	4.36E-07	5.96E-07
2	2.96E-07	5.07E-07	7.56E-07
5	3.33E-07	6.18E-07	1.04E-06
10	3.64E-07	7.18E-07	1.32E-06
20	3.98E-07	8.34E-07	1.67E-06
50	4.48E-07	1.02E-06	2.29E-06
100	4.9E-07	1.18E-06	2.91E-06

Layer 2 -- Crushed gravel

Unbound Material:	Crushed gravel
Thickness(in):	7.75

Strength Properties

Input Level:	Level 3
Analysis Type:	ICM inputs (ICM Calculated Modulus)
Poisson's ratio:	0.35
Coefficient of lateral pressure,Ko:	0.5
Modulus (input) (psi):	25000

ICM Inputs

<u>Gradation and Plasticity Index</u>

Plasticity Index, PI:	1
Liquid Limit (LL)	6
Compacted Layer	No
Passing #200 sieve (%):	7
Passing #40	28.1
Passing #4 sieve (%):	62.1
D10(mm)	0.09595
D20(mm)	0.2181
D30(mm)	0.4958
D60(mm)	4.254

D90(mm) 15.59

Sieve	Percent Passing
0.001mm	
0.002mm	
0.020mm	
#200	7
#100	
#80	
#60	
#50	
#40	
#30	
#20	
#16	
#10	
#8	49
#4	
3/8"	75
1/2"	
3/4"	96
1"	100
1 1/2"	
2"	
2 1/2"	
3"	
3 1/2"	
4"	

<u>Calculated/Derived Parameters</u>

Maximum dry unit weight (pcf):	126.0 (derived)
Specific gravity of solids, Gs:	2.70 (derived)
Saturated hydraulic conductivity (ft/hr):	0.009239 (derived)
Optimum gravimetric water content (%):	8.0 (derived)
Calculated degree of saturation (%):	63.9 (calculated)

Soil water characteristic curve parameters: Default values

Parameters	Value
a	5.6895
b	1.9003
c	0.79298
Hr.	114

Layer 3 -- A-3

Unbound Material: A-3

Thickness(in):	10

Strength Properties

Input Level:	Level 3
Analysis Type:	ICM inputs (ICM Calculated Modulus)
Poisson's ratio:	0.35
Coefficient of lateral pressure,Ko:	0.5
Modulus (input) (psi):	13500

ICM Inputs

Gradation and Plasticity Index

Plasticity Index, PI:	0
Liquid Limit (LL)	11
Compacted Layer	Yes
Passing #200 sieve (%):	3
Passing #40	34.7
Passing #4 sieve (%):	73.4
D10(mm)	0.1036
D20(mm)	0.1699
D30(mm)	0.3171
D60(mm)	2.061
D90(mm)	13.4

Sieve	Percent Passing
0.001mm	
0.002mm	
0.020mm	
#200	3
#100	18
#80	
#60	
#50	
#40	
#30	
#20	
#16	
#10	
#8	
#4	
3/8"	
1/2"	
3/4"	
1"	100
1 1/2"	
2"	
2 1/2"	
3"	100
3 1/2"	

4"

Calculated/Derived Parameters

Maximum dry unit weight (pcf):	120.0 (user input)
Specific gravity of solids, Gs:	2.70 (derived)
Saturated hydraulic conductivity (ft/hr):	0.01275 (derived)
Optimum gravimetric water content (%):	9.6 (derived)
Calculated degree of saturation (%):	64.1 (calculated)

Soil water characteristic curve parameters: Default values

Parameters	Value
a	5.9465
b	2.0251
c	0.85917
Hr.	100

Layer 4 -- A-4

Unbound Material:	A-4
Thickness(in):	Semi-infinite

Strength Properties

Input Level:	Level 3
Analysis Type:	ICM inputs (ICM Calculated Modulus)
Poisson's ratio:	0.35
Coefficient of lateral pressure,Ko:	0.5
Modulus (input) (psi):	3500

ICM Inputs

Gradation and Plasticity Index

Plasticity Index, PI:	5
Liquid Limit (LL)	21
Compacted Layer	No
Passing #200 sieve (%):	67.1
Passing #40	88
Passing #4 sieve (%):	97
D10(mm)	0.0002682
D20(mm)	0.0007194
D30(mm)	0.001929
D60(mm)	0.03723
D90(mm)	0.7122

Sieve	Percent Passing
0.001mm	
0.002mm	
0.020mm	

#200	67.1
#100	
#80	77
#60	
#50	
#40	88
#30	
#20	
#16	
#10	94
#8	
#4	97
3/8"	98
1/2"	99
3/4"	99
1"	99
1 1/2"	100
2"	100
2 1/2"	
3"	100
3 1/2"	100
4"	100

Calculated/Derived Parameters

Maximum dry unit weight (pcf):	117.6 (derived)
Specific gravity of solids, Gs:	2.70 (derived)
Saturated hydraulic conductivity (ft/hr):	9.329e-006 (derived)
Optimum gravimetric water content (%):	12.2 (derived)
Calculated degree of saturation (%):	76.1 (calculated)

Soil water characteristic curve parameters: Default values

Parameters	Value
a	72.183
b	0.96641
c	0.45377
Hr.	500

Project: MI 17761N-2.dgp

General Information

Description:

Design Life	20 years
Base/Subgrade construction:	May, 1983
Pavement construction:	July, 1983
Traffic open:	January, 1984
Type of design	Flexible

Analysis Parameters

Performance Criteria

	Limit	Reliability
Initial IRI (in/mi)	63	
Terminal IRI (in/mi)	172	90
AC Surface Down Cracking (Long. Cracking) (ft/mile):	2000	90
AC Bottom Up Cracking (Alligator Cracking) (%):	25	90
AC Thermal Fracture (Transverse Cracking) (ft/mi):	1000	90
Chemically Stabilized Layer (Fatigue Fracture)	25	90
Permanent Deformation (AC Only) (in):	0.25	90
Permanent Deformation (Total Pavement) (in):	0.75	90
Reflective cracking (%):	100	

Location:	Michigan, Mescosta, Big Rapids
Project ID:	
Section ID:	17761N
Date:	9/27/2007
Station/milepost format:	
Station/milepost begin:	
Station/milepost end:	
Traffic direction:	East bound

Default Input Level

Default input level	Level 3, Default and historical agency values.

Traffic

Initial two-way AADTT:	1198
Number of lanes in design direction:	2
Percent of trucks in design direction (%):	50
Percent of trucks in design lane (%):	85
Operational speed (mph):	70

Traffic -- Volume Adjustment Factors

Monthly Adjustment Factors

(Level 3, Default MAF)

	Vehicle Class									
Month	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10	Class 11	Class 12	Class 13
January	1.16	1.16	1.16	1.16	0.80	0.80	0.80	0.66	0.66	0.66
February	1.18	1.18	1.18	1.18	0.74	0.74	0.74	1.56	1.56	1.56
March	0.94	0.94	0.94	0.94	0.81	0.81	0.81	1.04	1.04	1.04
April	0.69	0.69	0.69	0.69	0.86	0.86	0.86	0.78	0.78	0.78
May	0.72	0.72	0.72	0.72	0.89	0.89	0.89	0.76	0.76	0.76
June	0.74	0.74	0.74	0.74	0.93	0.93	0.93	0.80	0.80	0.80
July	0.75	0.75	0.75	0.75	0.84	0.84	0.84	0.79	0.79	0.79
August	0.77	0.77	0.77	0.77	0.88	0.88	0.88	0.80	0.80	0.80
September	0.71	0.71	0.71	0.71	0.86	0.86	0.86	0.77	0.77	0.77
October	0.68	0.68	0.68	0.68	0.84	0.84	0.84	0.75	0.75	0.75
November	0.74	0.74	0.74	0.74	0.78	0.78	0.78	0.69	0.69	0.69
December	0.90	0.90	0.90	0.90	0.77	0.77	0.77	0.61	0.61	0.61

Vehicle Class Distribution

(Level 3, Default Distribution)

AADTT distribution by vehicle class

Class 4	1.3%
Class 5	34.4%
Class 6	3.4%
Class 7	1.3%
Class 8	3.4%
Class 9	44.5%
Class 10	4.7%
Class 11	1.7%
Class 12	0.1%
Class 13	5.2%

Hourly truck traffic distribution

by period beginning:

Midnight	2.1%	Noon	5.6%
1:00 am	1.9%	1:00 pm	5.2%
2:00 am	1.9%	2:00 pm	5.1%
3:00 am	2.6%	3:00 pm	4.8%
4:00 am	2.9%	4:00 pm	4.9%
5:00 am	4.0%	5:00 pm	4.6%
6:00 am	4.4%	6:00 pm	4.4%
7:00 am	5.6%	7:00 pm	3.7%
8:00 am	6.3%	8:00 pm	3.3%
9:00 am	6.7%	9:00 pm	2.8%
10:00 am	6.4%	10:00 pm	2.5%
11:00 am	6.0%	11:00 pm	2.3%

Traffic Growth Factor

Vehicle Class	Growth Rate	Growth Function
Class 4	2.0%	Compound
Class 5	2.0%	Compound
Class 6	2.0%	Compound

Class 7	2.0%	Compound
Class 8	2.0%	Compound
Class 9	2.0%	Compound
Class 10	2.0%	Compound
Class 11	2.0%	Compound
Class 12	2.0%	Compound
Class 13	2.0%	Compound

Traffic -- Axle Load Distribution Factors

Level 3: Default

Traffic -- General Traffic Inputs

Mean wheel location (inches from the lane marking):	18
Traffic wander standard deviation (in):	10
Design lane width (ft):	12

Number of Axles per Truck

Vehicle Class	Single Axle	Tandem Axle	Tridem Axle	Quad Axle
Class 4	1.70	0.30	0.00	0.00
Class 5	2.00	0.01	0.00	0.00
Class 6	1.00	1.00	0.00	0.00
Class 7	1.16	0.16	0.71	0.13
Class 8	2.33	0.71	0.00	0.00
Class 9	1.23	1.88	0.00	0.00
Class 10	1.68	0.99	0.32	0.46
Class 11	4.99	0.00	0.00	0.00
Class 12	4.00	1.00	0.00	0.00
Class 13	1.83	1.16	0.32	0.69

Axle Configuration

Average axle width (edge-to-edge) outside dimensions,ft):	8.5
Dual tire spacing (in):	12

Axle Configuration

Tire Pressure (psi) :	120

Average Axle Spacing

Tandem axle(psi):	51.6
Tridem axle(psi):	49.2
Quad axle(psi):	49.2

Climate

icm file: E:\MSU\Evaluation of MEPDG\Task 5\17761N.icm

Latitude (degrees.minutes)	43.42
Longitude (degrees.minutes)	-85.29
Elevation (ft)	659
Depth of water table (ft)	8

Structure--Design Features

HMA E* Predictive Model:	NCHRP 1-37A viscosity based model.
HMA Rutting Model coefficients:	NCHRP 1-37A coefficients
Endurance Limit (microstrain):	None (0 microstrain)

Structure--Layers

Layer 1 -- Asphalt concrete

Material type:	Asphalt concrete
Layer thickness (in):	7.25

General Properties

General

Reference temperature (F°):	70

Volumetric Properties as Built

Effective binder content (%):	10
Air voids (%):	9
Total unit weight (pcf):	148

Poisson's ratio:	0.35 (user entered)

Thermal Properties

Thermal conductivity asphalt (BTU/hr-ft-F°):	0.67
Heat capacity asphalt (BTU/lb-F°):	0.23

Asphalt Mix

Cumulative % Retained 3/4 inch sieve:	0
Cumulative % Retained 3/8 inch sieve:	15
Cumulative % Retained #4 sieve:	40
% Passing #200 sieve:	5.5

Asphalt Binder

Option:	Conventional penetration grade
Viscosity Grade	Pen 120-150
A	11.0897 (correlated)
VTS:	-3.7252 (correlated)

Thermal Cracking Properties

Average Tensile Strength at 14ºF:	468.39
Mixture VMA (%)	19
Aggreagate coeff. thermal contraction (in./in.)	0.000005
Mix coeff. thermal contraction (in./in./ºF):	0.000013

Load Time (sec)	Low Temp. -4ºF (1/psi)	Mid. Temp. 14ºF (1/psi)	High Temp. 32ºF (1/psi)
1	1.93E-07	3.76E-07	5.59E-07
2	2.16E-07	4.46E-07	7.36E-07
5	2.49E-07	5.58E-07	1.06E-06
10	2.78E-07	6.61E-07	1.39E-06
20	3.1E-07	7.84E-07	1.83E-06
50	3.59E-07	9.82E-07	2.62E-06
100	4E-07	1.16E-06	3.45E-06

Layer 2 -- Crushed gravel

Unbound Material:	Crushed gravel
Thickness(in):	4

Strength Properties

Input Level:	Level 3
Analysis Type:	ICM inputs (ICM Calculated Modulus)
Poisson's ratio:	0.35
Coefficient of lateral pressure,Ko:	0.5
Modulus (input) (psi):	25000

ICM Inputs

Gradation and Plasticity Index

Plasticity Index, PI:	1
Liquid Limit (LL)	6
Compacted Layer	No
Passing #200 sieve (%):	6
Passing #40	26.1
Passing #4 sieve (%):	61.6
D10(mm)	0.1059
D20(mm)	0.2508
D30(mm)	0.594
D60(mm)	4.426

D90(mm) 15.26

Sieve	Percent Passing
0.001mm	
0.002mm	
0.020mm	
#200	6
#100	
#80	
#60	
#50	
#40	
#30	
#20	
#16	
#10	
#8	46
#4	
3/8"	77
1/2"	
3/4"	96
1"	100
1 1/2"	
2"	
2 1/2"	
3"	
3 1/2"	
4"	

<u>Calculated/Derived Parameters</u>

Maximum dry unit weight (pcf):	126.0 (derived)
Specific gravity of solids, Gs:	2.70 (derived)
Saturated hydraulic conductivity (ft/hr):	0.01283 (derived)
Optimum gravimetric water content (%):	8.0 (derived)
Calculated degree of saturation (%):	63.9 (calculated)

Soil water characteristic curve parameters: Default values

Parameters	Value
a	5.3492
b	2.0059
c	0.77984
Hr.	112

Layer 3 -- A-3

Unbound Material: A-3

Thickness(in):	18

Strength Properties

Input Level:	Level 3
Analysis Type:	ICM inputs (ICM Calculated Modulus)
Poisson's ratio:	0.35
Coefficient of lateral pressure,Ko:	0.5
Modulus (input) (psi):	13500

ICM Inputs

Gradation and Plasticity Index

Plasticity Index, PI:	0
Liquid Limit (LL)	11
Compacted Layer	Yes
Passing #200 sieve (%):	3
Passing #40	25.9
Passing #4 sieve (%):	69.8
D10(mm)	0.1769
D20(mm)	0.3067
D30(mm)	0.5316
D60(mm)	2.769
D90(mm)	14.42

Sieve	Percent Passing
0.001mm	
0.002mm	
0.020mm	
#200	3
#100	7
#80	
#60	
#50	
#40	
#30	
#20	
#16	
#10	
#8	
#4	
3/8"	
1/2"	
3/4"	
1"	100
1 1/2"	
2"	
2 1/2"	
3"	
3 1/2"	

4"

Calculated/Derived Parameters

Maximum dry unit weight (pcf):	120.0 (user input)
Specific gravity of solids, Gs:	2.70 (derived)
Saturated hydraulic conductivity (ft/hr):	0.03087 (derived)
Optimum gravimetric water content (%):	9.0 (derived)
Calculated degree of saturation (%):	59.9 (calculated)

Soil water characteristic curve parameters: Default values

Parameters	Value
a	3.9018
b	2.5767
c	0.91151
Hr.	100

Layer 4 -- A-4

Unbound Material:	A-4
Thickness(in):	Semi-infinite

Strength Properties

Input Level:	Level 3
Analysis Type:	ICM inputs (ICM Calculated Modulus)
Poisson's ratio:	0.35
Coefficient of lateral pressure,Ko:	0.5
Modulus (input) (psi):	4200

ICM Inputs

Gradation and Plasticity Index

Plasticity Index, PI:	5
Liquid Limit (LL)	21
Compacted Layer	No
Passing #200 sieve (%):	67.1
Passing #40	88
Passing #4 sieve (%):	97
D10(mm)	0.0002682
D20(mm)	0.0007194
D30(mm)	0.001929
D60(mm)	0.03723
D90(mm)	0.7122

Sieve	Percent Passing
0.001mm	
0.002mm	
0.020mm	

#200	67.1
#100	
#80	77
#60	
#50	
#40	88
#30	
#20	
#16	
#10	94
#8	
#4	97
3/8"	98
1/2"	99
3/4"	99
1"	99
1 1/2"	100
2"	100
2 1/2"	
3"	100
3 1/2"	100
4"	100

Calculated/Derived Parameters

Maximum dry unit weight (pcf):	117.6 (derived)
Specific gravity of solids, Gs:	2.70 (derived)
Saturated hydraulic conductivity (ft/hr):	9.329e-006 (derived)
Optimum gravimetric water content (%):	12.2 (derived)
Calculated degree of saturation (%):	76.1 (calculated)

Soil water characteristic curve parameters: Default values

Parameters	Value
a	72.183
b	0.96641
c	0.45377
Hr.	500

Project: MI 20233N.dgp

General Information

Description:

Design Life	20 years
Base/Subgrade construction:	January, 1986
Pavement construction:	July, 1986
Traffic open:	October, 1986
Type of design	Flexible

Analysis Parameters

Performance Criteria

	Limit	Reliability
Initial IRI (in/mi)	63	
Terminal IRI (in/mi)	172	90
AC Surface Down Cracking (Long. Cracking) (ft/mile):	2000	90
AC Bottom Up Cracking (Alligator Cracking) (%):	25	90
AC Thermal Fracture (Transverse Cracking) (ft/mi):	1000	90
Chemically Stabilized Layer (Fatigue Fracture)	25	90
Permanent Deformation (AC Only) (in):	0.25	90
Permanent Deformation (Total Pavement) (in):	0.75	90
Reflective cracking (%):	100	

Location:	Reed City, Osceola, Michigan
Project ID:	
Section ID:	20233N
Date:	9/27/2007
Station/milepost format:	
Station/milepost begin:	
Station/milepost end:	
Traffic direction:	North bound

Default Input Level

Default input level	Level 3, Default and historical agency values.

Traffic

Initial two-way AADTT:	1198
Number of lanes in design direction:	2
Percent of trucks in design direction (%):	50
Percent of trucks in design lane (%):	85
Operational speed (mph):	70

Traffic -- Volume Adjustment Factors

Monthly Adjustment Factors

(Level 3, Default MAF)

	Vehicle Class									
Month	**Class 4**	**Class 5**	**Class 6**	**Class 7**	**Class 8**	**Class 9**	**Class 10**	**Class 11**	**Class 12**	**Class 13**
January	1.16	1.16	1.16	1.16	0.80	0.80	0.80	0.66	0.66	0.66
February	1.18	1.18	1.18	1.18	0.74	0.74	0.74	1.56	1.56	1.56
March	0.94	0.94	0.94	0.94	0.81	0.81	0.81	1.04	1.04	1.04
April	0.69	0.69	0.69	0.69	0.86	0.86	0.86	0.78	0.78	0.78
May	0.72	0.72	0.72	0.72	0.89	0.89	0.89	0.76	0.76	0.76
June	0.74	0.74	0.74	0.74	0.93	0.93	0.93	0.80	0.80	0.80
July	0.75	0.75	0.75	0.75	0.84	0.84	0.84	0.79	0.79	0.79
August	0.77	0.77	0.77	0.77	0.88	0.88	0.88	0.80	0.80	0.80
September	0.71	0.71	0.71	0.71	0.86	0.86	0.86	0.77	0.77	0.77
October	0.68	0.68	0.68	0.68	0.84	0.84	0.84	0.75	0.75	0.75
November	0.74	0.74	0.74	0.74	0.78	0.78	0.78	0.69	0.69	0.69
December	0.90	0.90	0.90	0.90	0.77	0.77	0.77	0.61	0.61	0.61

Vehicle Class Distribution

(Level 3, Default Distribution)

AADTT distribution by vehicle class

Class 4	1.3%
Class 5	34.4%
Class 6	3.4%
Class 7	1.3%
Class 8	3.4%
Class 9	44.5%
Class 10	4.7%
Class 11	1.7%
Class 12	0.1%
Class 13	5.2%

Hourly truck traffic distribution

by period beginning:

Midnight	2.1%	Noon	5.6%
1:00 am	1.9%	1:00 pm	5.2%
2:00 am	1.9%	2:00 pm	5.1%
3:00 am	2.6%	3:00 pm	4.8%
4:00 am	2.9%	4:00 pm	4.9%
5:00 am	4.0%	5:00 pm	4.6%
6:00 am	4.4%	6:00 pm	4.4%
7:00 am	5.6%	7:00 pm	3.7%
8:00 am	6.3%	8:00 pm	3.3%
9:00 am	6.7%	9:00 pm	2.8%
10:00 am	6.4%	10:00 pm	2.5%
11:00 am	6.0%	11:00 pm	2.3%

Traffic Growth Factor

Vehicle Class	**Growth Rate**	**Growth Function**
Class 4	2.0%	Compound
Class 5	2.0%	Compound
Class 6	2.0%	Compound

Class 7	2.0%	Compound
Class 8	2.0%	Compound
Class 9	2.0%	Compound
Class 10	2.0%	Compound
Class 11	2.0%	Compound
Class 12	2.0%	Compound
Class 13	2.0%	Compound

Traffic -- Axle Load Distribution Factors

Level 3: Default

Traffic -- General Traffic Inputs

Mean wheel location (inches from the lane marking):	18
Traffic wander standard deviation (in):	10
Design lane width (ft):	12

Number of Axles per Truck

Vehicle Class	Single Axle	Tandem Axle	Tridem Axle	Quad Axle
Class 4	1.70	0.30	0.00	0.00
Class 5	2.00	0.01	0.00	0.00
Class 6	1.00	1.00	0.00	0.00
Class 7	1.16	0.16	0.71	0.13
Class 8	2.33	0.71	0.00	0.00
Class 9	1.23	1.88	0.00	0.00
Class 10	1.68	0.99	0.32	0.46
Class 11	4.99	0.00	0.00	0.00
Class 12	4.00	1.00	0.00	0.00
Class 13	1.83	1.16	0.32	0.69

Axle Configuration

Average axle width (edge-to-edge) outside dimensions,ft):	8.5
Dual tire spacing (in):	12

Axle Configuration

Tire Pressure (psi) : 120

Average Axle Spacing

Tandem axle(psi):	51.6
Tridem axle(psi):	49.2
Quad axle(psi):	49.2

Climate

icm file: E:\MSU\Evaluation of MEPDG\Task 5\MI Sites\20233N.icm

Latitude (degrees.minutes)	43.52
Longitude (degrees.minutes)	-85.3
Elevation (ft)	1030
Depth of water table (ft)	8

Structure--Design Features

HMA E* Predictive Model:	NCHRP 1-37A viscosity based model.
HMA Rutting Model coefficients:	NCHRP 1-37A coefficients
Endurance Limit (microstrain):	None (0 microstrain)

Structure--Layers

Layer 1 -- Asphalt concrete

Material type:	Asphalt concrete
Layer thickness (in):	7.25

General Properties

General

Reference temperature (F°):	70

Volumetric Properties as Built

Effective binder content (%):	10.4
Air voids (%):	5
Total unit weight (pcf):	148

Poisson's ratio:	0.35 (user entered)

Thermal Properties

Thermal conductivity asphalt (BTU/hr-ft-F°):	0.67
Heat capacity asphalt (BTU/lb-F°):	0.23

Asphalt Mix

Cumulative % Retained 3/4 inch sieve:	3
Cumulative % Retained 3/8 inch sieve:	20
Cumulative % Retained #4 sieve:	39
% Passing #200 sieve:	5.5

Asphalt Binder

Option:	Conventional penetration grade
Viscosity Grade	Pen 120-150
A	11.0897 (correlated)
VTS:	-3.7252 (correlated)

Thermal Cracking Properties

Average Tensile Strength at 14ºF:	430.18
Mixture VMA (%)	14.3
Aggreagate coeff. thermal contraction (in./in.)	0.000005
Mix coeff. thermal contraction (in./in./ºF):	0.000013

Load Time (sec)	Low Temp. -4ºF (1/psi)	Mid. Temp. 14ºF (1/psi)	High Temp. 32ºF (1/psi)
1	2.25E-07	3.31E-07	4.29E-07
2	2.47E-07	3.86E-07	5.53E-07
5	2.78E-07	4.73E-07	7.72E-07
10	3.04E-07	5.51E-07	9.94E-07
20	3.33E-07	6.43E-07	1.28E-06
50	3.76E-07	7.88E-07	1.79E-06
100	4.11E-07	9.18E-07	2.3E-06

Layer 2 -- Crushed gravel

Unbound Material:	Crushed gravel
Thickness(in):	4

Strength Properties

Input Level:	Level 3
Analysis Type:	ICM inputs (ICM Calculated Modulus)
Poisson's ratio:	0.35
Coefficient of lateral pressure,Ko:	0.5
Modulus (input) (psi):	25000

ICM Inputs

<u>Gradation and Plasticity Index</u>

Plasticity Index, PI:	1
Liquid Limit (LL)	6
Compacted Layer	No
Passing #200 sieve (%):	7
Passing #40	24.1
Passing #4 sieve (%):	55.1
D10(mm)	0.1017
D20(mm)	0.2804
D30(mm)	0.7732
D60(mm)	6.072

D90(mm) 16.63

Sieve	Percent Passing
0.001mm	
0.002mm	
0.020mm	
#200	7
#100	
#80	
#60	
#50	
#40	
#30	
#20	
#16	
#10	
#8	41
#4	
3/8"	69
1/2"	
3/4"	95
1"	100
1 1/2"	
2"	
2 1/2"	
3"	
3 1/2"	
4"	

Calculated/Derived Parameters

Maximum dry unit weight (pcf):	127.1 (derived)
Specific gravity of solids, Gs:	2.70 (derived)
Saturated hydraulic conductivity (ft/hr):	0.01685 (derived)
Optimum gravimetric water content (%):	7.4 (derived)
Calculated degree of saturation (%):	61.6 (calculated)

Soil water characteristic curve parameters: Default values

Parameters	Value
a	5.4684
b	1.9872
c	0.74315
Hr.	114

Layer 3 -- A-3

Unbound Material: A-3

Thickness(in):	18

Strength Properties

Input Level:	Level 3
Analysis Type:	ICM inputs (ICM Calculated Modulus)
Poisson's ratio:	0.35
Coefficient of lateral pressure,Ko:	0.5
Modulus (input) (psi):	13500

ICM Inputs

<u>Gradation and Plasticity Index</u>

Plasticity Index, PI:	0
Liquid Limit (LL)	11
Compacted Layer	Yes
Passing #200 sieve (%):	3
Passing #40	25.9
Passing #4 sieve (%):	69.8
D10(mm)	0.1769
D20(mm)	0.3067
D30(mm)	0.5316
D60(mm)	2.769
D90(mm)	14.42

Sieve	Percent Passing
0.001mm	
0.002mm	
0.020mm	
#200	3
#100	7
#80	
#60	
#50	
#40	
#30	
#20	
#16	
#10	
#8	
#4	
3/8"	
1/2"	
3/4"	
1"	100
1 1/2"	
2"	
2 1/2"	
3"	
3 1/2"	

4"

Calculated/Derived Parameters

Maximum dry unit weight (pcf):	120.0 (user input)
Specific gravity of solids, Gs:	2.70 (derived)
Saturated hydraulic conductivity (ft/hr):	0.03087 (derived)
Optimum gravimetric water content (%):	9.0 (derived)
Calculated degree of saturation (%):	59.9 (calculated)

Soil water characteristic curve parameters: Default values

Parameters	Value
a	3.9018
b	2.5767
c	0.91151
Hr.	100

Layer 4 -- A-4

Unbound Material:	A-4
Thickness(in):	Semi-infinite

Strength Properties

Input Level:	Level 3
Analysis Type:	ICM inputs (ICM Calculated Modulus)
Poisson's ratio:	0.35
Coefficient of lateral pressure,Ko:	0.5
Modulus (input) (psi):	4200

ICM Inputs

Gradation and Plasticity Index

Plasticity Index, PI:	5
Liquid Limit (LL)	21
Compacted Layer	No
Passing #200 sieve (%):	67.1
Passing #40	88
Passing #4 sieve (%):	97
D10(mm)	0.0002682
D20(mm)	0.0007194
D30(mm)	0.001929
D60(mm)	0.03723
D90(mm)	0.7122

Sieve	Percent Passing
0.001mm	
0.002mm	
0.020mm	

#200	67.1
#100	
#80	77
#60	
#50	
#40	88
#30	
#20	
#16	
#10	94
#8	
#4	97
3/8"	98
1/2"	99
3/4"	99
1"	99
1 1/2"	100
2"	100
2 1/2"	
3"	100
3 1/2"	100
4"	100

Calculated/Derived Parameters

Maximum dry unit weight (pcf):	117.6 (derived)
Specific gravity of solids, Gs:	2.70 (derived)
Saturated hydraulic conductivity (ft/hr):	9.329e-006 (derived)
Optimum gravimetric water content (%):	12.2 (derived)
Calculated degree of saturation (%):	76.1 (calculated)

Soil water characteristic curve parameters: Default values

Parameters	Value
a	72.183
b	0.96641
c	0.45377
Hr.	500

APPENDIX B – 5

INTERACTION OF EFFECTS OF INPUT VARIABLES ON PERFORMANCE

List of Tables

Table 1: Interaction effects of input variables on IRI

Input Variables				IRI					Mean Differences				
1	2	Levels1	Levels2	1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
Climate	AC Layer Thickness	Lansing	1	87.49	189.59	260.6	339.3	421.2	12.51	87.17	147	213.3	282.5
			2	74.98	102.42	113.6	126	138.7					
		Detroit	1	87.69	189.68	264.3	346.2	430.4	12.45	87.52	150.8	220.1	291.4
			2	75.24	102.16	113.5	126.1	139					
		Pellston	1	87.54	193.32	268.6	349.8	435.4	12.44	89.65	153.7	222.3	295
			2	75.1	103.67	114.9	127.5	140.4					
Climate	AC Agg Gradation	Lansing	1	80.66	140.08	176.4	216.6	258.2	-1.15	-11.84	-21.4	-32.2	-43.6
			2	81.81	151.92	197.8	248.8	301.8					
		Detroit	1	81.05	138.8	176.9	218.8	261.4	-0.83	-14.24	-24	-34.8	-46.6
			2	81.88	153.04	200.9	253.6	308					
		Pellston	1	80.86	140.84	178.8	220.6	263.4	-0.92	-15.31	-25.9	-36.1	-49.1
			2	81.78	156.15	204.7	256.7	312.5					
Climate	AC Eff.Binder	Lansing	1	81.02	162.22	218.5	280.9	346.4	-0.44	32.44	62.8	96.5	132.9
			2	81.46	129.78	155.7	184.4	213.5					
		Detroit	1	81.45	161.75	220.5	286	353.3	-0.04	31.66	63.1	99.7	137.2
			2	81.49	130.09	157.4	186.3	216.1					
		Pellston	1	81.19	166.58	226.1	291	359.7	-0.26	36.17	68.6	104.6	143.6
			2	81.45	130.41	157.5	186.4	216.1					

Input Variables		Levels1	Levels2	IRI					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_{5}	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
Climate	SPV Binder	Lansing	PG 64-34	81.82	143.75	186.4	234.3	283.2	1.16	-4.5	-1.4	3.3	6.4
			PG 58-22	80.66	148.25	187.8	231	276.8					
		Detroit	PG 64-34	82.08	143.14	187.8	237.1	287.3	1.22	-5.56	-2.2	1.9	5.2
			PG 58-22	80.86	148.7	190	235.2	282.1					
		Pellston	PG 64-34	81.96	146.92	191.7	240.5	291.3	1.28	-3.15	-0.1	3.7	6.7
			PG 58-22	80.68	150.07	191.8	236.8	284.6					
Climate	AC Air Voids	Lansing	1	79.93	116.6	131.8	148.3	165.2	-2.62	-58.8	-110.6	-168.7	-229.6
			2	82.55	175.4	242.4	317	394.8					
		Detroit	1	80.23	115.05	131	147.8	165	-2.48	-61.74	-115.8	-176.8	-239.4
			2	82.71	176.79	246.8	324.6	404.4					
		Pellston	1	80.09	117.84	133.7	150.4	167.8	-2.46	-61.31	-116.1	-176.5	-240.3
			2	82.55	179.15	249.8	326.9	408.1					
Climate	Base Thickness	Lansing	1	81.56	148.55	191.7	239.4	289.1	0.64	5.1	9.2	13.5	18.2
			2	80.92	143.45	182.5	225.9	270.9					
		Detroit	1	81.81	148.6	193.7	243.4	294.4	0.69	5.36	9.6	14.5	19.4
			2	81.12	143.24	184.1	228.9	275					
		Pellston	1	81.65	151.48	196.9	246.2	298	0.66	5.97	10.3	15	20.1
			2	80.99	145.51	186.6	231.2	277.9					
Climate	Base Material	Lansing	1	82.19	162.55	218.3	280.4	344.9	1.9	33.1	62.3	95.5	129.8
			2	80.29	129.45	156	184.9	215.1					
		Detroit	1	82.41	163.59	222.1	287.2	353.8	1.89	35.34	66.4	102.1	138.2

Input Variables		Levels1	Levels2	IRI					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
			2	80.52	128.25	155.7	185.1	215.6					
		Pellston	1	82.27	166.31	225.6	290.3	358.3	1.9	35.63	67.7	103.3	140.7
			2	80.37	130.68	157.9	187	217.6					
Climate	Subabase Thickness	Lansing	1	82.73	153.98	200.1	251	304.1	2.99	15.95	26	36.7	48.2
			2	79.74	138.03	174.1	214.3	255.9					
		Detroit	1	82.97	154.09	202.1	254.9	309.2	3.01	16.34	26.4	37.4	49
			2	79.96	137.75	175.7	217.5	260.2					
		Pellston	1	82.85	156.87	205.3	257.9	313.1	3.06	16.75	27.1	38.4	50.4
			2	79.79	140.12	178.2	219.5	262.7					
Climate	Subabase Material	Lansing	1	82.66	157.59	207.3	262.5	319.9	2.85	23.17	40.4	59.7	79.8
			2	79.81	134.42	166.9	202.8	240.1					
		Detroit	1	82.94	158	210.2	267.8	326.7	2.95	24.16	42.5	63.2	84
			2	79.99	133.84	167.7	204.6	242.7					
		Pellston	1	82.76	160.53	213.2	270.3	330.2	2.88	24.07	42.8	63.2	84.5
			2	79.88	136.46	170.4	207.1	245.7					
Climate	Subgrade Material	Lansing	1	86.98	161.21	207.1	257.5	309.7	11.48	30.42	40	49.6	59.4
			2	75.5	130.79	167.1	207.9	250.3					
		Detroit	1	87.3	161.56	209.5	261.9	315.5	11.66	31.28	41.2	51.5	61.6
			2	75.64	130.28	168.3	210.4	253.9					
		Pellston	1	87.1	164.17	212.5	264.4	318.7	11.56	31.35	41.4	51.5	61.5
			2	75.54	132.82	171.1	212.9	257.2					

Input Variables		Levels1	Levels2	IRI					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
AC Layer Thickness	AC Agg Gradation	1	1	86.92	177.84	241.6	311.7	383.6	-1.31	-26.04	-45.8	-66.8	-90.8
			2	88.23	203.88	287.4	378.5	474.4					
		2	1	74.79	101.97	113.2	125.5	138.3	-0.63	-1.56	-1.6	-2	-2.1
			2	75.42	103.53	114.8	127.5	140.4					
AC Layer Thickness	AC Eff.Binder	1	1	87.61	223.58	328.4	444.7	566	0.07	65.43	127.8	199.1	274
			2	87.54	158.15	200.6	245.6	292					
		2	1	74.82	103.46	114.9	127.2	140.3	-0.57	1.42	1.8	1.3	1.8
			2	75.39	102.04	113.1	125.9	138.5					
AC Layer Thickness	SPV Binder	1	PG 64-34	88.23	190.3	266.7	350.7	437.6	1.31	-1.13	4.4	11.2	17.1
			PG 58-22	86.92	191.43	262.3	339.5	420.5					
		2	PG 64-34	75.67	98.91	110.6	123.9	136.9	1.12	-7.67	-6.8	-5.3	-4.9
			PG 58-22	74.55	106.58	117.4	129.2	141.8					
AC Layer Thickness	AC Air Voids	1	1	85.74	133.32	154.3	175.9	197.9	-3.67	-115.09	-220.4	-338.4	-462.2
			2	89.41	248.41	374.7	514.3	660.1					
		2	1	74.42	99.67	110.1	121.8	134.1	-1.38	-6.15	-7.9	-9.5	-10.6
			2	75.8	105.82	118	131.3	144.7					
AC Layer Thickness	Base Thickness	1	1	88.13	196.05	273.9	359.1	447.8	1.11	10.37	18.8	27.9	37.6
			2	87.02	185.68	255.1	331.2	410.2					
		2	1	75.21	103.05	114.4	127	139.9	0.21	0.6	0.8	0.9	1
			2	75	102.45	113.6	126.1	138.9					
AC Layer	Base Material	1	1	89.24	225.08	329.4	444.7	564.4	3.33	68.43	129.8	199.1	270.7

Input Variables		Levels1	Levels2	IRI					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
Thickness			2	85.91	156.65	199.6	245.6	293.7					
		2	1	75.34	103.21	114.6	127.3	140.3	0.46	0.93	1.2	1.5	1.8
			2	74.88	102.28	113.4	125.8	138.5					
AC Layer Thickness	Subabase Thickness	1	1	89.72	204.11	286.8	377.4	471.7	4.29	26.49	44.6	64.5	85.3
			2	85.43	177.62	242.2	312.9	386.4					
		2	1	75.98	105.85	118.2	131.8	145.9	1.74	6.2	8.3	10.5	13.1
			2	74.24	99.65	109.9	121.3	132.8					
AC Layer Thickness	Subabase Material	1	1	89.88	212.83	304.4	405	509.7	4.6	43.93	79.8	119.8	161.4
			2	85.28	168.9	224.6	285.2	348.3					
		2	1	75.7	104.58	116.1	128.7	141.5	1.18	3.67	4.1	4.3	4.2
			2	74.52	100.91	112	124.4	137.3					
AC Layer Thickness	Subgrade Material	1	1	95	213.04	295.4	385.1	478.3	14.84	44.36	61.8	80	98.5
			2	80.16	168.68	233.6	305.1	379.8					
		2	1	79.26	111.59	124	137.4	151	8.3	17.68	19.9	21.7	23.2
			2	70.96	93.91	104.1	115.7	127.8					
AC Agg Gradation	AC Eff.Binder	1	1	80.7	154.59	205.4	261.7	320	-0.32	29.37	56	86.2	118
			2	81.02	125.22	149.4	175.5	202					
		2	1	81.74	172.45	237.9	310.2	386.3	-0.17	37.49	73.5	114.3	157.8
			2	81.91	134.96	164.4	195.9	228.5					
AC Agg Gradation	SPV Binder	1	PG 64-34	81.56	137	175.9	219.2	262.9	1.4	-5.81	-2.9	1.1	3.9
			PG 58-22	80.16	142.81	178.8	218.1	259					

Input Variables		Levels1	Levels2	IRI					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
		2	PG 64-34	82.34	152.21	201.4	255.4	311.6	1.03	-2.99	0.5	4.8	8.3
			PG 58-22	81.31	155.2	200.9	250.6	303.3					
AC Agg Gradation	AC Air Voids	1	1	79.77	114.33	129.5	145.4	161.9	-2.18	-51.15	-95.8	-146.5	-198.2
			2	81.95	165.48	225.3	291.9	360.1					
		2	1	80.4	118.66	134.9	152.3	170.1	-2.85	-70.09	-132.5	-201.5	-274.7
			2	83.25	188.75	267.4	353.8	444.8					
AC Agg Gradation	Base Thickness	1	1	81.22	142.54	181.9	225.2	269.7	0.72	5.27	9.1	13.1	17.4
			2	80.5	137.27	172.8	212.1	252.3					
		2	1	82.12	156.55	206.4	260.8	318	0.59	5.69	10.5	15.6	21.1
			2	81.53	150.86	195.9	245.2	296.9					
AC Agg Gradation	Base Material	1	1	81.71	154.2	204	259.5	316.1	1.7	28.59	53.3	81.7	110.2
			2	80.01	125.61	150.7	177.8	205.9					
		2	1	82.87	174.1	240	312.5	388.6	2.09	40.79	77.7	119	162.3
			2	80.78	133.31	162.3	193.5	226.3					
AC Agg Gradation	Subabase Thickness	1	1	82.35	147.38	189.3	235.5	282.9	2.98	14.95	23.9	33.7	43.9
			2	79.37	132.43	165.4	201.8	239					
		2	1	83.36	162.57	215.7	273.7	334.7	3.07	17.73	29.1	41.3	54.5
			2	80.29	144.84	186.6	232.4	280.2					
AC Agg Gradation	Subabase Material	1	1	82.22	150.53	195.6	245.5	296.6	2.72	21.25	36.5	53.7	71.2
			2	79.5	129.28	159.1	191.8	225.4					
		2	1	83.35	166.88	224.8	288.2	354.7	3.06	26.35	47.3	70.3	94.5

Input Variables		**Levels1**	**Levels2**	**IRI**					**Mean Differences**				
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
			2	80.29	140.53	177.5	217.9	260.2					
AC Agg Gradation	Subgrade Material	1	1	86.55	154.95	197.2	243.3	290.5	11.38	30.09	39.7	49.4	59
			2	75.17	124.86	157.5	193.9	231.5					
		2	1	87.7	169.68	222.2	279.2	338.8	11.75	31.95	42.1	52.3	62.7
			2	75.95	137.73	180.1	226.9	276.1					
AC Eff. Binder	SPV Binder	1	PG 64-34	81.94	162.83	223.5	290.4	359.9	1.44	-1.38	3.7	8.9	13.5
			PG 58-22	80.5	164.21	219.8	281.5	346.4					
		2	PG 64-34	81.96	126.37	153.8	184.2	214.6	0.99	-7.44	-6.1	-3	-1.3
			PG 58-22	80.97	133.81	159.9	187.2	215.9					
AC Eff. Binder	AC Air Voids	1	1	79.86	119.06	135.8	153.8	172.5	-2.72	-88.91	-171.7	-264.4	-361.3
			2	82.58	207.97	307.5	418.2	533.8					
		2	1	80.31	113.93	128.6	143.9	159.5	-2.31	-32.32	-56.5	-83.6	-111.5
			2	82.62	146.25	185.1	227.5	271					
AC Eff. Binder	Base Thickness	1	1	81.59	167.58	229	296.9	368	0.74	8.12	14.7	21.9	29.7
			2	80.85	159.46	214.3	275	338.3					
		2	1	81.76	131.51	159.3	189.1	219.7	0.58	2.84	4.8	6.8	8.9
			2	81.18	128.67	154.5	182.3	210.8					
AC Eff. Binder	Base Material	1	1	82.24	189.44	271.3	362.5	457.4	2.04	51.84	99.3	153.1	208.5
			2	80.2	137.6	172	209.4	248.9					
		2	1	82.34	138.86	172.7	209.5	247.3	1.75	17.53	31.7	47.6	64
			2	80.59	121.33	141	161.9	183.3					

Input Variables		Levels1	Levels2	IRI					Mean Differences				
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
AC Eff. Binder	Subabase Thickness	1	1	82.73	173.85	239.4	311.9	387.8	3.03	20.67	35.5	51.9	69.3
			2	79.7	153.18	203.9	260	318.5					
		2	1	82.97	136.1	165.6	197.3	229.8	3.01	12.02	17.5	23.2	29.1
			2	79.96	124.08	148.1	174.1	200.7					
AC Eff. Binder	Subabase Material	1	1	82.66	180.29	252.6	332.7	416.3	2.88	33.54	61.9	93.4	126.3
			2	79.78	146.75	190.7	239.3	290					
		2	1	82.92	137.12	167.9	201	234.9	2.91	14.05	22	30.6	39.3
			2	80.01	123.07	145.9	170.4	195.6					
AC Eff. Binder	Subgrade Material	1	1	86.97	181.22	246.5	318.4	393.3	11.5	35.4	49.7	64.8	80.3
			2	75.47	145.82	196.8	253.6	313					
		2	1	87.28	143.41	172.9	204.2	236	11.63	26.64	32.1	36.9	41.5
			2	75.65	116.77	140.8	167.3	194.5					
SPV Binder	AC Air Voids	PG 64-34	1	80.67	112.23	128	145.4	162.9	-2.56	-64.75	-121.2	-183.8	-248.7
			2	83.23	176.98	249.2	329.2	411.6					
		PG 58-22	1	79.5	120.77	136.3	152.3	169.1	-2.47	-56.48	-107.1	-164.1	-224.1
			2	81.97	177.25	243.4	316.4	393.2					
SPV Binder	Base Thickness	PG 64-34	1	82.34	147.66	194	245.1	297.7	0.78	6.11	10.7	15.6	20.9
			2	81.56	141.55	183.3	229.5	276.8					
		PG 58-22	1	81.01	151.44	194.3	240.9	289.9	0.55	4.86	8.8	13.1	17.5
			2	80.46	146.58	185.5	227.8	272.4					
SPV Binder	Base Material	PG 64-34	1	83	162.94	223.1	290	358.7	2.1	36.68	68.9	105.4	142.8

Input Variables		Levels1	Levels2	IRI					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
			2	80.9	126.26	154.2	184.6	215.9					
		PG 58-22	1	81.58	165.35	220.9	282	346	1.69	32.69	62.1	95.3	129.7
			2	79.89	132.66	158.8	186.7	216.3					
SPV Binder	Subbase Thickness	PG 64-34	1	83.51	153.08	202.5	256.9	313.1	3.12	16.95	27.7	39.2	51.7
			2	80.39	136.13	174.8	217.7	261.4					
		PG 58-22	1	82.19	156.88	202.5	252.2	304.5	2.91	15.75	25.3	35.7	46.7
			2	79.28	141.13	177.2	216.5	257.8					
SPV Binder	Subbase Material	PG 64-34	1	83.51	157.01	210.4	269.4	330.1	3.12	24.81	43.5	64.2	85.6
			2	80.39	132.2	166.9	205.2	244.5					
		PG 58-22	1	82.07	160.4	210	264.3	321.2	2.67	22.78	40.3	59.9	80.1
			2	79.4	137.62	169.7	204.4	241.1					
SPV Binder	Subgrade Material	PG 64-34	1	87.87	160.38	209.5	263.4	318.7	11.85	31.55	41.8	52.2	62.8
			2	76.02	128.83	167.7	211.2	255.9					
		PG 58-22	1	86.38	164.25	209.8	259.1	310.6	11.29	30.49	39.9	49.4	58.9
			2	75.09	133.76	169.9	209.7	251.7					
AC Air Voids	Base Thickness	1	1	80.37	117.42	133.5	150.5	167.9	0.58	1.85	2.6	3.3	3.8
			2	79.79	115.57	130.9	147.2	164.1					
		2	1	82.98	181.67	254.8	335.6	419.7	0.75	9.11	16.9	25.5	34.6
			2	82.23	172.56	237.9	310.1	385.1					
AC Air Voids	Base Material	1	1	80.69	119.25	136.4	154.7	173.5	1.22	5.51	8.5	11.7	15
			2	79.47	113.74	127.9	143	158.5					

Input Variables		Levels1	Levels2	IRI					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_{5}	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
		2	1	83.89	209.05	307.6	417.3	531.2	2.57	63.87	122.5	188.9	257.6
			2	81.32	145.18	185.1	228.4	273.6					
AC Air Voids	Subbase Thickness	1	1	81.48	120.91	138	155.9	174.4	2.79	8.83	11.6	14.1	16.8
			2	78.69	112.08	126.4	141.8	157.6					
		2	1	84.22	189.05	267.1	353.3	443.2	3.24	23.87	41.5	60.9	81.6
			2	80.98	165.18	225.6	292.4	361.6					
AC Air Voids	Subbase Material	1	1	81.35	120.76	137.6	155.5	173.8	2.54	8.52	10.8	13.3	15.6
			2	78.81	112.24	126.8	142.2	158.2					
		2	1	84.22	196.65	282.8	378.2	477.5	3.24	39.07	72.9	110.8	150.1
			2	80.98	157.58	209.9	267.4	327.4					
AC Air Voids	Subgrade Material	1	1	85.63	128.54	146.2	164.5	183	11.1	24.09	28	31.2	34
			2	74.53	104.45	118.2	133.3	149					
		2	1	88.62	196.09	273.2	358.1	446.3	12.03	37.95	53.7	70.5	87.7
			2	76.59	158.14	219.5	287.6	358.6					
Base Thickness	Base Material	1	1	82.39	166.12	225.7	291.5	359.8	1.43	33.15	63.1	97	131.9
			2	80.96	132.97	162.6	194.5	227.9					
		2	1	82.19	162.18	218.3	280.5	344.9	2.36	36.23	67.9	103.7	140.6
			2	79.83	125.95	150.4	176.8	204.3					
Base Thickness	Subbase Thickness	1	1	83.21	158.56	209.1	264.5	322.1	3.07	18.03	30	42.9	56.5
			2	80.14	140.53	179.1	221.6	265.6					
		2	1	82.5	151.4	195.9	244.7	295.5	2.97	14.67	23	32.1	41.9

Input Variables		**Levels1**	**Levels2**	**IRI**					**Mean Differences**				
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	**$\Delta_{1/12}$**	**Δ_5**	**Δ_{10}**	**Δ_{20}**	**$\Delta_{1/12}$**
			2	79.53	136.73	172.9	212.6	253.6					
Base Thickness	Subabase Material	1	1	83.2	163.33	218.6	279.5	342.7	3.05	27.57	49	73	97.7
			2	80.15	135.76	169.6	206.5	245					
		2	1	82.38	154.08	201.8	254.2	308.5	2.74	20.03	34.8	51.1	67.9
			2	79.64	134.05	167	203.1	240.6					
Base Thickness	Subgrade Material	1	1	87.63	166.12	216.4	271.1	327.8	11.92	33.15	44.5	56.2	67.9
			2	75.71	132.97	171.9	214.9	259.9					
		2	1	86.62	158.51	203	251.4	301.5	11.22	28.89	37.2	45.5	53.8
			2	75.4	129.62	165.8	205.9	247.7					
Base Material	Subabase Thickness	1	1	83.85	174.44	239.5	311.4	386.1	3.12	20.58	35	50.8	67.6
			2	80.73	153.86	204.5	260.6	318.5					
		2	1	81.85	135.52	165.5	197.8	231.5	2.91	12.11	18	24.2	30.8
			2	78.94	123.41	147.5	173.6	200.7					
Base Material	Subabase Material	1	1	83.85	180.83	252.3	331.6	413.7	3.12	33.36	60.6	91.2	122.8
			2	80.73	147.47	191.7	240.4	290.9					
		2	1	81.73	136.58	168.1	202.1	237.5	2.67	14.23	23.1	32.8	42.8
			2	79.06	122.35	145	169.3	194.7					
Base Material	Subgrade Material	1	1	88.21	182.27	247.3	319	393	11.84	36.24	50.6	66	81.4
			2	76.37	146.03	196.7	253	311.6					
		2	1	86.05	142.36	172.1	203.6	236.2	11.31	25.8	31.1	35.8	40.3
			2	74.74	116.56	141	167.8	195.9					

Input Variables		**Levels1**	**Levels2**	**IRI**					**Mean Differences**				
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
Subbase Thickness	Subbase Material	1	1	83.8	166.3	223	285.4	350.3	1.89	22.64	41	61.6	83
			2	81.91	143.66	182	223.8	267.3					
		2	1	81.78	151.11	197.4	248.3	300.9	3.89	24.96	42.8	62.4	82.6
			2	77.89	126.15	154.6	185.9	218.3					
Subbase Thickness	Subgrade Material	1	1	90.25	177.15	232.9	293.7	356.6	14.8	44.34	60.8	78.2	95.6
			2	75.45	132.81	172.1	215.5	261					
		2	1	84	147.48	186.4	228.9	272.6	8.33	17.7	20.8	23.6	26
			2	75.67	129.78	165.6	205.3	246.6					
Subbase Material	Subgrade Material	1	1	88.93	177.29	235.8	299.8	365.9	12.29	37.17	51.2	65.9	80.6
			2	76.64	140.12	184.6	233.9	285.3					
		2	1	85.32	147.34	183.6	222.7	263.3	10.85	24.87	30.6	35.8	41
			2	74.47	122.47	153	186.9	222.3					

Table 2: Interaction effects of input variables on rutting

Input Variables		Levels1	Levels2	Rutting					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_{5}	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
Climate	AC Layer Thickness	Lansing	1	0.5902	1.3471	1.5541	1.7034	1.8207	0.2912	0.661	0.7686	0.8455	0.9072
			2	0.299	0.6861	0.7855	0.8579	0.9135					
		Detroit	1	0.5944	1.3789	1.5898	1.7456	1.8643	0.289	0.6823	0.7926	0.8743	0.9371
			2	0.3054	0.6966	0.7972	0.8713	0.9272					
		Pellston	1	0.5912	1.3906	1.6031	1.7569	1.8779	0.2893	0.6967	0.8083	0.8891	0.9534
			2	0.3019	0.6939	0.7948	0.8678	0.9245					
Climate	AC Agg Gradation	Lansing	1	0.4322	0.9795	1.1242	1.2282	1.3091	-0.0248	-0.0741	-0.0912	-0.1049	-0.116
			2	0.457	1.0536	1.2154	1.3331	1.4251					
		Detroit	1	0.4415	1.0012	1.1491	1.259	1.3405	-0.0169	-0.073	-0.0889	-0.0989	-0.1106
			2	0.4584	1.0742	1.238	1.3579	1.4511					
		Pellston	1	0.4368	0.997	1.1451	1.2538	1.3361	-0.0195	-0.0905	-0.1077	-0.1172	-0.1302
			2	0.4563	1.0875	1.2528	1.371	1.4663					
Climate	AC Eff.Binder	Lansing	1	0.4332	0.9812	1.1259	1.2298	1.3109	-0.0228	-0.0708	-0.0878	-0.1017	-0.1123
			2	0.456	1.052	1.2137	1.3315	1.4232					
		Detroit	1	0.4431	1.0055	1.1532	1.2629	1.3443	-0.0137	-0.0645	-0.0806	-0.0912	-0.1029
			2	0.4568	1.07	1.2338	1.3541	1.4472					
		Pellston	1	0.4372	1.0162	1.1655	1.2723	1.3563	-0.0187	-0.0521	-0.0669	-0.0802	-0.0897
			2	0.4559	1.0683	1.2324	1.3525	1.446					
Climate	SPV Binder	Lansing	PG 64-34	0.4572	1.0312	1.1861	1.2994	1.3873	0.0251	0.0293	0.0326	0.0375	0.0404

Input Variables		Levels1	Levels2	Rutting					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
			PG 58-22	0.4321	1.0019	1.1535	1.2619	1.3469					
		Detroit	PG 64-34	0.4632	1.0527	1.2106	1.3275	1.4167	0.0265	0.0299	0.0342	0.0381	0.0418
			PG 58-22	0.4367	1.0228	1.1764	1.2894	1.3749					
		Pellston	PG 64-34	0.4604	1.0573	1.2158	1.331	1.4212	0.0278	0.0301	0.0336	0.0372	0.0401
			PG 58-22	0.4326	1.0272	1.1822	1.2938	1.3811					
Climate	AC Air Voids	Lansing	1	0.4218	0.9411	1.0761	1.1725	1.2472	-0.0456	-0.1509	-0.1874	-0.2163	-0.2398
			2	0.4674	1.092	1.2635	1.3888	1.487					
		Detroit	1	0.4292	0.9628	1.1004	1.2012	1.2767	-0.0415	-0.1498	-0.1862	-0.2145	-0.2382
			2	0.4707	1.1126	1.2866	1.4157	1.5149					
		Pellston	1	0.4257	0.9685	1.1067	1.2057	1.2824	-0.0416	-0.1475	-0.1846	-0.2133	-0.2375
			2	0.4673	1.116	1.2913	1.419	1.5199					
Climate	Base Thickness	Lansing	1	0.452	1.034	1.1906	1.303	1.3907	0.0147	0.0348	0.0416	0.0447	0.0472
			2	0.4373	0.9992	1.149	1.2583	1.3435					
		Detroit	1	0.4579	1.057	1.2158	1.3326	1.4211	0.0159	0.0385	0.0446	0.0482	0.0507
			2	0.442	1.0185	1.1712	1.2844	1.3704					
		Pellston	1	0.4543	1.0621	1.222	1.337	1.4271	0.0155	0.0397	0.0461	0.0492	0.0519
			2	0.4388	1.0224	1.1759	1.2878	1.3752					
Climate	Base Material	Lansing	1	0.4632	1.0635	1.2233	1.3396	1.4299	0.0372	0.0938	0.107	0.1179	0.1257
			2	0.426	0.9697	1.1163	1.2217	1.3042					
		Detroit	1	0.4682	1.0852	1.2478	1.3684	1.4597	0.0366	0.095	0.1086	0.1199	0.1278
			2	0.4316	0.9902	1.1392	1.2485	1.3319					

Input Variables		Levels1	Levels2	Rutting					Mean Differences				
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	**$\Delta_{1/12}$**	**Δ_{5}**	**Δ_{10}**	**Δ_{20}**	**$\Delta_{1/12}$**
		Pellston	1	0.465	1.0905	1.2541	1.373	1.4658	0.037	0.0965	0.1103	0.1212	0.1293
			2	0.428	0.994	1.1438	1.2518	1.3365					
Climate	Subabase Thickness	Lansing	1	0.4809	1.1151	1.2818	1.3995	1.4915	0.0726	0.197	0.2239	0.2377	0.2488
			2	0.4083	0.9181	1.0579	1.1618	1.2427					
		Detroit	1	0.4865	1.1374	1.3056	1.4275	1.5201	0.0732	0.1994	0.2241	0.238	0.2486
			2	0.4133	0.938	1.0815	1.1895	1.2715					
		Pellston	1	0.4836	1.1472	1.3171	1.4379	1.5322	0.0741	0.2099	0.2362	0.251	0.2621
			2	0.4095	0.9373	1.0809	1.1869	1.2701					
Climate	Subabase Material	Lansing	1	0.4782	1.106	1.2714	1.3905	1.483	0.0671	0.1789	0.2032	0.2197	0.2318
			2	0.4111	0.9271	1.0682	1.1708	1.2512					
		Detroit	1	0.4846	1.1302	1.2992	1.423	1.5163	0.0694	0.185	0.2114	0.229	0.2411
			2	0.4152	0.9452	1.0878	1.194	1.2752					
		Pellston	1	0.4803	1.1336	1.3032	1.4251	1.5199	0.0675	0.1827	0.2084	0.2254	0.2375
			2	0.4128	0.9509	1.0948	1.1997	1.2824					
Climate	Subgrade Material	Lansing	1	0.5869	1.3138	1.5035	1.6385	1.743	0.2846	0.5944	0.6674	0.7158	0.7518
			2	0.3023	0.7194	0.8361	0.9227	0.9912					
		Detroit	1	0.5944	1.3421	1.5336	1.6725	1.7776	0.2889	0.6087	0.6801	0.7281	0.7636
			2	0.3055	0.7334	0.8535	0.9444	1.014					
		Pellston	1	0.5896	1.3455	1.5386	1.676	1.7823	0.2861	0.6065	0.6793	0.7272	0.7623
			2	0.3035	0.739	0.8593	0.9488	1.02					
AC Layer	AC Agg	1	1	0.5794	1.3139	1.5123	1.6581	1.7685	-0.0251	-0.1166	-0.1401	-0.1545	-0.1716

Input Variables		**Levels1**	**Levels2**	**Rutting**					**Mean Differences**				
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	**$\Delta_{1/12}$**	**Δ_5**	**Δ_{10}**	**Δ_{20}**	**$\Delta_{1/12}$**
Thickness	Gradation		2	0.6045	1.4305	1.6524	1.8126	1.9401					
		2	1	0.2942	0.6713	0.7667	0.8359	0.8886	-0.0158	-0.0417	-0.0516	-0.0596	-0.0663
			2	0.31	0.713	0.8183	0.8955	0.9549					
AC Layer Thickness	AC Eff.Binder	1	1	0.5807	1.3299	1.5291	1.6735	1.7851	-0.0225	-0.0846	-0.1065	-0.1236	-0.1384
			2	0.6032	1.4145	1.6356	1.7971	1.9235					
		2	1	0.2949	0.672	0.7673	0.8365	0.8893	-0.0144	-0.0404	-0.0504	-0.0584	-0.0649
			2	0.3093	0.7124	0.8177	0.8949	0.9542					
AC Layer Thickness	SPV Binder	1	PG 64-34	0.6044	1.3856	1.5977	1.7529	1.8737	0.0249	0.0268	0.0307	0.0351	0.0388
			PG 58-22	0.5795	1.3588	1.567	1.7178	1.8349					
		2	PG 64-34	0.3161	0.7085	0.8106	0.8857	0.9431	0.028	0.0327	0.0362	0.0401	0.0427
			PG 58-22	0.2881	0.6758	0.7744	0.8456	0.9004					
AC Layer Thickness	AC Air Voids	1	1	0.5662	1.278	1.4648	1.5996	1.7033	-0.0515	-0.1884	-0.2351	-0.2715	-0.302
			2	0.6177	1.4664	1.6999	1.8711	2.0053					
		2	1	0.285	0.637	0.724	0.7868	0.8342	-0.0342	-0.1104	-0.137	-0.1578	-0.175
			2	0.3192	0.7474	0.861	0.9446	1.0092					
AC Layer Thickness	Base Thickness	1	1	0.6047	1.4022	1.6178	1.7735	1.8946	0.0255	0.06	0.0709	0.0763	0.0806
			2	0.5792	1.3422	1.5469	1.6972	1.814					
		2	1	0.3047	0.6999	0.8012	0.8749	0.9313	0.0052	0.0154	0.0174	0.0185	0.0192
			2	0.2995	0.6845	0.7838	0.8564	0.9121					
AC Layer Thickness	Base Material	1	1	0.6231	1.4547	1.6777	1.8413	1.9679	0.0623	0.165	0.1907	0.2119	0.2272
			2	0.5608	1.2897	1.487	1.6294	1.7407					

Input Variables				**Rutting**					**Mean Differences**				
1	**2**	**Levels1**	**Levels2**	**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	**$\Delta_{1/12}$**	**Δ_5**	**Δ_{10}**	**Δ_{20}**	**$\Delta_{1/12}$**
		2	1	0.3079	0.7047	0.8058	0.8794	0.9357	0.0115	0.0251	0.0266	0.0275	0.0279
			2	0.2964	0.6796	0.7792	0.8519	0.9078					
AC Layer Thickness	Subabase Thickness	1	1	0.6435	1.5098	1.7382	1.9009	2.0279	0.1031	0.2752	0.3117	0.3311	0.3472
			2	0.5404	1.2346	1.4265	1.5698	1.6807					
		2	1	0.3238	0.7567	0.8647	0.9424	1.0013	0.0434	0.1291	0.1444	0.1534	0.1592
			2	0.2804	0.6276	0.7203	0.789	0.8421					
AC Layer Thickness	Subabase Material	1	1	0.6452	1.5087	1.7379	1.9043	2.0329	0.1065	0.273	0.3111	0.3379	0.3572
			2	0.5387	1.2357	1.4268	1.5664	1.6757					
		2	1	0.3169	0.7378	0.8446	0.9215	0.98	0.0296	0.0913	0.1042	0.1116	0.1165
			2	0.2873	0.6465	0.7404	0.8099	0.8635					
AC Layer Thickness	Subgrade Material	1	1	0.7749	1.7569	2.0164	2.2014	2.3441	0.3659	0.7694	0.8681	0.9321	0.9796
			2	0.409	0.9875	1.1483	1.2693	1.3645					
		2	1	0.4057	0.9107	1.0341	1.1234	1.1912	0.2072	0.437	0.4832	0.5154	0.539
			2	0.1985	0.4737	0.5509	0.608	0.6522					
AC Agg Gradation	AC Eff.Binder	1	1	0.4277	0.9661	1.1066	1.2088	1.2863	-0.0183	-0.053	-0.0658	-0.0763	-0.0845
			2	0.446	1.0191	1.1724	1.2851	1.3708					
		2	1	0.448	1.0358	1.1898	1.3012	1.388	-0.0185	-0.0719	-0.0911	-0.1057	-0.1189
			2	0.4665	1.1077	1.2809	1.4069	1.5069					
AC Agg Gradation	SPV Binder	1	PG 64-34	0.4526	1.0137	1.1632	1.2733	1.3569	0.0316	0.0422	0.0474	0.0527	0.0567
			PG 58-22	0.421	0.9715	1.1158	1.2206	1.3002					
		2	PG 64-34	0.4679	1.0804	1.2451	1.3653	1.4599	0.0214	0.0173	0.0195	0.0225	0.0248

Input Variables		Levels1	Levels2	Rutting					Mean Differences				
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	$\Delta_{1/12}$	Δ_{5}	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
			PG 58-22	0.4465	1.0631	1.2256	1.3428	1.4351					
AC Agg Gradation	AC Air Voids	1	1	0.4179	0.929	1.0602	1.1554	1.227	-0.0379	-0.1272	-0.1585	-0.1832	-0.2031
			2	0.4558	1.0562	1.2187	1.3386	1.4301					
		2	1	0.4333	0.986	1.1285	1.2309	1.3105	-0.0479	-0.1716	-0.2137	-0.2462	-0.2739
			2	0.4812	1.1576	1.3422	1.4771	1.5844					
AC Agg Gradation	Base Thickness	1	1	0.4453	1.0129	1.1633	1.2725	1.3555	0.0169	0.0406	0.0476	0.0511	0.0539
			2	0.4284	0.9723	1.1157	1.2214	1.3016					
		2	1	0.4641	1.0892	1.2557	1.3759	1.4704	0.0138	0.0348	0.0406	0.0437	0.0459
			2	0.4503	1.0544	1.2151	1.3322	1.4245					
AC Agg Gradation	Base Material	1	1	0.4539	1.0369	1.19	1.3028	1.3879	0.0342	0.0886	0.1011	0.1116	0.1187
			2	0.4197	0.9483	1.0889	1.1912	1.2692					
		2	1	0.477	1.1225	1.2935	1.4179	1.5157	0.0396	0.1015	0.1162	0.1278	0.1365
			2	0.4374	1.021	1.1773	1.2901	1.3792					
AC Agg Gradation	Subabase Thickness	1	1	0.473	1.0905	1.2508	1.3655	1.4528	0.0723	0.1958	0.2226	0.2371	0.2484
			2	0.4007	0.8947	1.0282	1.1284	1.2044					
		2	1	0.4944	1.176	1.3521	1.4777	1.5764	0.0743	0.2084	0.2335	0.2474	0.2579
			2	0.4201	0.9676	1.1186	1.2303	1.3185					
AC Agg Gradation	Subabase Material	1	1	0.469	1.0794	1.2381	1.354	1.4414	0.0644	0.1736	0.1972	0.2141	0.2257
			2	0.4046	0.9058	1.0409	1.1399	1.2157					
		2	1	0.493	1.1672	1.3444	1.4717	1.5715	0.0715	0.1908	0.2181	0.2353	0.248
			2	0.4215	0.9764	1.1263	1.2364	1.3235					

Input Variables		Levels1	Levels2	Rutting					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
AC Agg Gradation	Subgrade Material	1	1	0.5779	1.2876	1.4713	1.6032	1.7026	0.2821	0.59	0.6636	0.7125	0.7481
			2	0.2958	0.6976	0.8077	0.8907	0.9545					
		2	1	0.6027	1.38	1.5792	1.7215	1.8327	0.291	0.6164	0.6877	0.7349	0.7704
			2	0.3117	0.7636	0.8915	0.9866	1.0623					
AC Eff. Binder	SPV Binder	1	PG 64-34	0.4529	1.0203	1.1698	1.2789	1.3629	0.0301	0.0386	0.0432	0.0478	0.0514
			PG 58-22	0.4228	0.9817	1.1266	1.2311	1.3115					
		2	PG 64-34	0.4677	1.0739	1.2386	1.3597	1.4539	0.0229	0.0209	0.0238	0.0274	0.0301
			PG 58-22	0.4448	1.053	1.2148	1.3323	1.4238					
AC Eff. Binder	AC Air Voids	1	1	0.4194	0.9395	1.0715	1.1663	1.2387	-0.0368	-0.1229	-0.1534	-0.1774	-0.197
			2	0.4562	1.0624	1.2249	1.3437	1.4357					
		2	1	0.4317	0.9755	1.1173	1.22	1.2989	-0.049	-0.1758	-0.2187	-0.252	-0.2799
			2	0.4807	1.1513	1.336	1.472	1.5788					
AC Eff. Binder	Base Thickness	1	1	0.4462	1.0214	1.172	1.2805	1.3641	0.0167	0.0409	0.0476	0.051	0.0538
			2	0.4295	0.9805	1.1244	1.2295	1.3103					
		2	1	0.4632	1.0807	1.247	1.3679	1.4619	0.014	0.0345	0.0407	0.0438	0.0461
			2	0.4492	1.0462	1.2063	1.3241	1.4158					
AC Eff. Binder	Base Material	1	1	0.4553	1.046	1.1995	1.3115	1.3973	0.035	0.0901	0.1026	0.113	0.1202
			2	0.4203	0.9559	1.0969	1.1985	1.2771					
		2	1	0.4757	1.1135	1.284	1.4092	1.5063	0.0389	0.1001	0.1146	0.1264	0.1349
			2	0.4368	1.0134	1.1694	1.2828	1.3714					
AC Eff.	Subabase	1	1	0.4741	1.1015	1.2621	1.3762	1.4641	0.0725	0.2011	0.2277	0.2424	0.2538

Input Variables		Levels1	Levels2	Rutting					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
Binder	Thickness		2	0.4016	0.9004	1.0344	1.1338	1.2103					
		2	1	0.4932	1.165	1.3409	1.467	1.5651	0.074	0.2031	0.2284	0.242	0.2525
			2	0.4192	0.9619	1.1125	1.225	1.3126					
AC Eff. Binder	Subabase Material	1	1	0.4704	1.0889	1.2485	1.3637	1.4518	0.0651	0.1759	0.2006	0.2174	0.2292
			2	0.4053	0.913	1.0479	1.1463	1.2226					
		2	1	0.4917	1.1577	1.334	1.462	1.561	0.071	0.1885	0.2147	0.232	0.2444
			2	0.4207	0.9692	1.1193	1.23	1.3166					
AC Eff. Binder	Subgrade Material	1	1	0.5794	1.2991	1.4824	1.613	1.7127	0.2831	0.5963	0.6684	0.716	0.7511
			2	0.2963	0.7028	0.814	0.897	0.9616					
		2	1	0.6012	1.3684	1.5681	1.7117	1.8225	0.29	0.61	0.6829	0.7314	0.7674
			2	0.3112	0.7584	0.8852	0.9803	1.0551					
SPV Binder	AC Air Voids	PG 64-34	1	0.44	0.973	1.1118	1.2126	1.2897	-0.0406	-0.1481	-0.1847	-0.2135	-0.2374
			2	0.4806	1.1211	1.2965	1.4261	1.5271					
		PG 58-22	1	0.4112	0.942	1.077	1.1738	1.2479	-0.0452	-0.1506	-0.1874	-0.2158	-0.2395
			2	0.4564	1.0926	1.2644	1.3896	1.4874					
SPV Binder	Base Thickness	PG 64-34	1	0.4691	1.0685	1.2293	1.3463	1.4369	0.0177	0.0429	0.0503	0.0539	0.057
			2	0.4514	1.0256	1.179	1.2924	1.3799					
		PG 58-22	1	0.4402	1.0335	1.1897	1.3021	1.3891	0.0129	0.0324	0.038	0.0409	0.0429
			2	0.4273	1.0011	1.1517	1.2612	1.3462					
SPV Binder	Base Material	PG 64-34	1	0.4802	1.0966	1.2609	1.3819	1.4752	0.0399	0.0991	0.1135	0.1252	0.1336
			2	0.4403	0.9975	1.1474	1.2567	1.3416					

Input Variables		Levels1	Levels2	Rutting					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
		PG 58-22	1	0.4508	1.0628	1.2226	1.3388	1.4284	0.034	0.091	0.1038	0.1142	0.1215
			2	0.4168	0.9718	1.1188	1.2246	1.3069					
SPV Binder	Subabase Thickness	PG 64-34	1	0.498	1.1485	1.3185	1.4406	1.5351	0.0755	0.2029	0.2286	0.2426	0.2534
			2	0.4225	0.9456	1.0899	1.198	1.2817					
		PG 58-22	1	0.4693	1.118	1.2845	1.4026	1.4941	0.071	0.2014	0.2275	0.2418	0.2529
			2	0.3983	0.9166	1.057	1.1608	1.2412					
SPV Binder	Subabase Material	PG 64-34	1	0.4967	1.1421	1.3125	1.4365	1.532	0.0729	0.1901	0.2166	0.2344	0.2472
			2	0.4238	0.952	1.0959	1.2021	1.2848					
		PG 58-22	1	0.4653	1.1044	1.2701	1.3892	1.4808	0.063	0.1742	0.1987	0.215	0.2263
			2	0.4023	0.9302	1.0714	1.1742	1.2545					
SPV Binder	Subgrade Material	PG 64-34	1	0.607	1.3531	1.5477	1.6879	1.7955	0.2934	0.6121	0.6871	0.7371	0.7742
			2	0.3136	0.741	0.8606	0.9508	1.0213					
		PG 58-22	1	0.5736	1.3145	1.5028	1.6369	1.7398	0.2797	0.5943	0.6642	0.7104	0.7443
			2	0.2939	0.7202	0.8386	0.9265	0.9955					
AC Air Voids	Base Thickness	1	1	0.4327	0.9751	1.1152	1.2156	1.2925	0.0142	0.0352	0.0416	0.0449	0.0474
			2	0.4185	0.9399	1.0736	1.1707	1.2451					
		2	1	0.4767	1.127	1.3038	1.4328	1.5335	0.0165	0.0402	0.0467	0.0499	0.0525
			2	0.4602	1.0868	1.2571	1.3829	1.481					
AC Air Voids	Base Material	1	1	0.4404	0.9974	1.14	1.2435	1.3224	0.0297	0.0798	0.0912	0.1006	0.1072
			2	0.4107	0.9176	1.0488	1.1429	1.2152					
		2	1	0.4905	1.1621	1.3435	1.4772	1.5812	0.0441	0.1104	0.1261	0.1388	0.1479

Input Variables		Levels1	Levels2	Rutting					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_{5}	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
			2	0.4464	1.0517	1.2174	1.3384	1.4333					
AC Air Voids	Subbase Thickness	1	1	0.4604	1.0542	1.2041	1.3102	1.3914	0.0696	0.1934	0.2194	0.234	0.2452
			2	0.3908	0.8608	0.9847	1.0762	1.1462					
		2	1	0.507	1.2123	1.3988	1.5331	1.6378	0.077	0.2108	0.2367	0.2505	0.2611
			2	0.43	1.0015	1.1621	1.2826	1.3767					
AC Air Voids	Subbase Material	1	1	0.4571	1.0437	1.1929	1.3001	1.3817	0.0631	0.1724	0.197	0.2139	0.2258
			2	0.394	0.8713	0.9959	1.0862	1.1559					
		2	1	0.5049	1.2029	1.3896	1.5256	1.6311	0.0729	0.192	0.2183	0.2355	0.2478
			2	0.432	1.0109	1.1713	1.2901	1.3833					
AC Air Voids	Subgrade Material	1	1	0.5642	1.2489	1.4215	1.544	1.637	0.2773	0.5829	0.6542	0.7016	0.7364
			2	0.2869	0.666	0.7673	0.8424	0.9006					
		2	1	0.6164	1.4186	1.629	1.7807	1.8983	0.2958	0.6234	0.6971	0.7458	0.7821
			2	0.3206	0.7952	0.9319	1.0349	1.1162					
Base Thickness	Base Material	1	1	0.4677	1.0874	1.2513	1.3705	1.4625	0.026	0.0727	0.0836	0.0926	0.0991
			2	0.4417	1.0147	1.1677	1.2779	1.3634					
		2	1	0.4633	1.0721	1.2322	1.3502	1.4411	0.0479	0.1175	0.1337	0.1468	0.1561
			2	0.4154	0.9546	1.0985	1.2034	1.285					
Base Thickness	Subbase Thickness	1	1	0.4916	1.1549	1.3281	1.4505	1.5452	0.0738	0.2078	0.2372	0.2526	0.2644
			2	0.4178	0.9471	1.0909	1.1979	1.2808					
		2	1	0.4757	1.1116	1.2749	1.3928	1.484	0.0727	0.1965	0.219	0.2319	0.2419
			2	0.403	0.9151	1.0559	1.1609	1.2421					

Input Variables		**Levels1**	**Levels2**	**Rutting**					**Mean Differences**				
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	**$\Delta_{1/12}$**	**Δ_5**	**Δ_{10}**	**Δ_{20}**	**$\Delta_{1/12}$**
Base Thickness	Subabase Material	1	1	0.49	1.1451	1.3163	1.4398	1.5347	0.0706	0.1881	0.2136	0.2312	0.2435
			2	0.4194	0.957	1.1027	1.2086	1.2912					
		2	1	0.472	1.1015	1.2662	1.3859	1.4781	0.0653	0.1763	0.2017	0.2182	0.2301
			2	0.4067	0.9252	1.0645	1.1677	1.248					
Base Thickness	Subgrade Material	1	1	0.6022	1.3624	1.559	1.6985	1.8057	0.295	0.6228	0.699	0.7486	0.7855
			2	0.3072	0.7396	0.86	0.9499	1.0202					
		2	1	0.5785	1.3051	1.4915	1.6262	1.7295	0.2783	0.5835	0.6522	0.6988	0.7329
			2	0.3002	0.7216	0.8393	0.9274	0.9966					
Base Material	Subabase Thickness	1	1	0.503	1.1844	1.3602	1.4865	1.5839	0.075	0.2094	0.2369	0.2523	0.2642
			2	0.428	0.975	1.1233	1.2342	1.3197					
		2	1	0.4643	1.0821	1.2427	1.3567	1.4452	0.0715	0.1949	0.2192	0.2321	0.242
			2	0.3928	0.8872	1.0235	1.1246	1.2032					
Base Material	Subabase Material	1	1	0.5012	1.1768	1.3528	1.4809	1.5791	0.0714	0.1942	0.2221	0.2411	0.2546
			2	0.4298	0.9826	1.1307	1.2398	1.3245					
		2	1	0.4608	1.0697	1.2297	1.3448	1.4337	0.0645	0.1701	0.1932	0.2083	0.2189
			2	0.3963	0.8996	1.0365	1.1365	1.2148					
Base Material	Subgrade Material	1	1	0.6112	1.3874	1.5865	1.7299	1.8396	0.2914	0.6153	0.6895	0.7391	0.7756
			2	0.3198	0.7721	0.897	0.9908	1.064					
		2	1	0.5694	1.2802	1.464	1.5948	1.6956	0.2817	0.5911	0.6618	0.7083	0.7428
			2	0.2877	0.6891	0.8022	0.8865	0.9528					
Subabase	Subabase	1	1	0.5051	1.1992	1.3767	1.5035	1.6011	0.0429	0.1319	0.1505	0.1637	0.1731

Input Variables		Levels1	Levels2	Rutting					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_{5}	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
Thickness	Material		2	0.4622	1.0673	1.2262	1.3398	1.428					
		2	1	0.4569	1.0474	1.2058	1.3222	1.4117	0.0931	0.2325	0.2648	0.2857	0.3005
			2	0.3638	0.8149	0.941	1.0365	1.1112					
Subabase Thickness	Subgrade Material	1	1	0.6662	1.5264	1.7407	1.891	2.0064	0.3651	0.7863	0.8785	0.9387	0.9836
			2	0.3011	0.7401	0.8622	0.9523	1.0228					
		2	1	0.5144	1.1412	1.3097	1.4337	1.5289	0.208	0.4201	0.4726	0.5087	0.5349
			2	0.3064	0.7211	0.8371	0.925	0.994					
Subabase Material	Subgrade Material	1	1	0.6326	1.4516	1.6601	1.8089	1.9224	0.3032	0.6566	0.7377	0.7921	0.832
			2	0.3294	0.795	0.9224	1.0168	1.0904					
		2	1	0.548	1.216	1.3903	1.5158	1.6129	0.2699	0.5498	0.6134	0.6553	0.6866
			2	0.2781	0.6662	0.7769	0.8605	0.9263					

Table 3: Interaction effects of input variables on fatigue cracking

Input Variables		**Levels1**	**Levels2**	**Fatigue Cracking**					**Mean Differences**				
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	$\Delta_{1/12}$	Δ_{5}	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
Climate	AC Layer Thickness	Lansing	1	1.10121	35.1569	45.7269	52.8291	58.0327	1.09473	34.6624	44.724	51.2517	55.8657
			2	0.00648	0.4945	1.0029	1.5774	2.167					
		Detroit	1	1.14442	35.7485	46.3161	53.4736	58.6507	1.13614	35.0701	44.9766	51.4131	55.8894
			2	0.00828	0.6784	1.3395	2.0605	2.7613					
		Pellston	1	1.11282	35.7653	46.4212	53.4949	58.712	1.10533	35.1058	45.1127	51.4945	56.0246
			2	0.00749	0.6595	1.3085	2.0004	2.6874					
Climate	AC Agg Gradation	Lansing	1	0.43809	16.5446	21.9686	25.7341	28.5771	-0.2315	-2.5623	-2.7926	-2.9384	-3.0455
			2	0.66961	19.1069	24.7612	28.6725	31.6226					
		Detroit	1	0.46359	17.0898	22.6408	26.6051	29.5378	-0.2255	-2.2472	-2.3741	-2.3239	-2.3363
			2	0.68912	19.337	25.0149	28.929	31.8741					
		Pellston	1	0.45807	17.0821	22.6341	26.5536	29.4788	-0.2042	-2.2607	-2.4614	-2.3881	-2.4418
			2	0.66224	19.3428	25.0955	28.9417	31.9206					
Climate	AC Eff.Binder	Lansing	1	0.8974	22.7915	28.4891	32.4498	35.4575	0.6871	9.9316	10.2485	10.4931	10.7153
			2	0.2103	12.8599	18.2406	21.9567	24.7422					
		Detroit	1	0.94192	23.3417	29.1756	33.3337	36.4241	0.73113	10.2566	10.6955	11.1333	11.4362
			2	0.21079	13.0851	18.4801	22.2004	24.9879					
		Pellston	1	0.91017	23.338	29.2448	33.3047	36.4207	0.70003	10.2511	10.7599	11.1141	11.442

Input Variables		**Levels1**	**Levels2**	**Fatigue Cracking**					**Mean Differences**				
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	$\Delta_{1/12}$	Δ_{5}	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
			2	0.21014	13.0869	18.4849	22.1906	24.9787					
Climate	SPV Binder	Lansing	PG 64-34	0.66356	18.3901	23.9176	27.7674	30.6654	0.21943	1.1288	1.1054	1.1283	1.131
			PG 58-22	0.44413	17.2613	22.8122	26.6391	29.5344					
		Detroit	PG 64-34	0.69335	18.8395	24.5265	28.5316	31.5295	0.23399	1.2521	1.3973	1.5291	1.647
			PG 58-22	0.45936	17.5874	23.1292	27.0025	29.8825					
		Pellston	PG 64-34	0.67814	18.8344	24.5515	28.4889	31.4913	0.23597	1.244	1.3734	1.4825	1.5833
			PG 58-22	0.44217	17.5904	23.1781	27.0064	29.908					
Climate	AC Air Voids	Lansing	1	0.02733	3.9464	7.7072	11.3036	14.4557	-1.053	-27.759	-31.315	-31.799	-31.288
			2	1.08036	31.705	39.0226	43.1029	45.744					
		Detroit	1	0.03063	4.3761	8.4037	12.2659	15.5451	-1.0915	-27.675	-30.848	-31.002	-30.322
			2	1.12208	32.0507	39.252	43.2682	45.8669					
		Pellston	1	0.02833	4.3799	8.465	12.2493	15.5576	-1.0637	-27.665	-30.8	-30.997	-30.284
			2	1.09198	32.045	39.2646	43.246	45.8418					
Climate	Base Thickness	Lansing	1	0.58628	18.4825	24.0856	27.9526	30.8685	0.06487	1.3136	1.4414	1.4987	1.5373
			2	0.52141	17.1689	22.6442	26.4539	29.3312					
		Detroit	1	0.61246	18.8897	24.58	28.5714	31.548	0.07222	1.3526	1.5043	1.6087	1.684
			2	0.54024	17.5371	23.0757	26.9627	29.864					
		Pellston	1	0.59403	18.8862	24.6104	28.5271	31.5124	0.06775	1.3475	1.4911	1.5589	1.6254
			2	0.52628	17.5387	23.1193	26.9682	29.887					

Input Variables		**Levels1**	**Levels2**	**Fatigue Cracking**					**Mean Differences**				
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
Climate	Base Material	Lansing	1	0.8521	22.3647	27.9335	31.7764	34.6498	0.59651	9.0779	9.1373	9.1463	9.0998
			2	0.25559	13.2868	18.7962	22.6301	25.55					
		Detroit	1	0.88991	22.9402	28.6022	32.5596	35.4581	0.62711	9.4536	9.5487	9.5851	9.5042
			2	0.2628	13.4866	19.0535	22.9745	25.9539					
		Pellston	1	0.86203	22.949	28.6617	32.5542	35.477	0.60375	9.4732	9.5938	9.6131	9.5546
			2	0.25828	13.4758	19.0679	22.9411	25.9224					
Climate	Subabase Thickness	Lansing	1	0.61767	18.9442	24.7024	28.6787	31.6766	0.12764	2.2369	2.6751	2.9509	3.1535
			2	0.49003	16.7073	22.0273	25.7278	28.5231					
		Detroit	1	0.64065	19.3499	25.1925	29.2772	32.32	0.1286	2.273	2.7293	3.0203	3.2281
			2	0.51205	17.0769	22.4632	26.2569	29.0919					
		Pellston	1	0.62436	19.3541	25.2387	29.2611	32.3117	0.12841	2.2833	2.7478	3.0269	3.2241
			2	0.49595	17.0708	22.4909	26.2342	29.0876					
Climate	Subabase Material	Lansing	1	0.67677	20.0264	25.8092	29.8015	32.8043	0.24585	4.4014	4.8886	5.1965	5.4089
			2	0.43092	15.625	20.9206	24.605	27.3954					
		Detroit	1	0.70636	20.4678	26.3844	30.5214	33.5678	0.26001	4.5087	5.1131	5.5087	5.7236
			2	0.44635	15.9591	21.2713	25.0127	27.8442					
		Pellston	1	0.68868	20.4581	26.4202	30.4933	33.5594	0.25705	4.4913	5.1108	5.4912	5.7194
			2	0.43163	15.9668	21.3094	25.0021	27.84					
Climate	Subgrade	Lansing	1	0.62999	18.5302	24.2213	28.2108	31.2367	0.15229	1.4089	1.7128	2.015	2.2737

Input Variables		**Levels1**	**Levels2**	**Fatigue Cracking**					**Mean Differences**				
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
	Material												
			2	0.4777	17.1213	22.5085	26.1958	28.963					
		Detroit	1	0.65597	18.9509	24.7392	28.8425	31.9117	0.15923	1.475	1.8227	2.1509	2.4114
			2	0.49674	17.4759	22.9165	26.6916	29.5003					
		Pellston	1	0.64222	18.9656	24.7688	28.797	31.8701	0.16413	1.5064	1.808	2.0987	2.3408
			2	0.47809	17.4592	22.9608	26.6983	29.5293					
AC Layer Thickness	AC Agg Gradation	1	1	0.8996	33.1571	43.5404	50.6361	55.7859	-0.4398	-4.7996	-5.2286	-5.2595	-5.3585
			2	1.33937	37.9567	48.769	55.8956	61.1444					
		2	1	0.0069	0.6539	1.2886	1.9591	2.61	-0.001	0.0862	0.1433	0.1592	0.1428
			2	0.00794	0.5677	1.1453	1.7999	2.4672					
AC Layer Thickness	AC Eff.Binder	1	1	1.82101	45.3008	55.9321	62.9811	68.0742	1.40305	19.4878	19.5547	19.4306	19.2182
			2	0.41796	25.813	36.3774	43.5505	48.856					
		2	1	0.01198	1.0134	2.0076	3.0776	4.1273	0.00912	0.8051	1.5813	2.3963	3.1774
			2	0.00286	0.2083	0.4263	0.6813	0.9499					
AC Layer Thickness	SPV Binder	1	PG 64-34	1.34686	36.6045	47.1539	54.2273	59.395	0.45475	2.0952	1.9984	1.923	1.8597
			PG 58-22	0.89211	34.5093	45.1555	52.3043	57.5353					
		2	PG 64-34	0.00985	0.7715	1.5098	2.2979	3.0625	0.00486	0.3214	0.5857	0.8369	1.0479
			PG 58-22	0.00499	0.4501	0.9241	1.461	2.0146					
AC Layer	AC Air	1	1	0.05518	8.1952	15.871	23.1395	29.4387	-2.1286	-54.723	-60.567	-60.253	-58.053

Input Variables		Levels1	Levels2	Fatigue Cracking					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
Thickness	Voids												
			2	2.18379	62.9186	76.4384	83.3922	87.4915					
		2	1	0.00235	0.2731	0.5129	0.7397	0.9335	-0.0101	-0.6754	-1.4081	-2.2795	-3.2101
			2	0.01249	0.9485	1.921	3.0192	4.1436					
AC Layer Thickness	Base Thickness	1	1	1.18738	36.8594	47.5507	54.6789	59.8768	0.13579	2.605	2.7919	2.8261	2.8233
			2	1.05159	34.2544	44.7588	51.8528	57.0535					
		2	1	0.0078	0.6463	1.3	2.0219	2.7425	0.00077	0.071	0.166	0.2848	0.4078
			2	0.00703	0.5753	1.134	1.7371	2.3347					
AC Layer Thickness	Base Material	1	1	1.72679	44.6952	55.2113	62.1727	67.1583	1.21461	18.2765	18.1131	17.8137	17.3864
			2	0.51218	26.4187	37.0982	44.359	49.7719					
		2	1	0.00923	0.8074	1.587	2.4208	3.2316	0.00363	0.3932	0.7401	1.0827	1.386
			2	0.0056	0.4142	0.8469	1.3381	1.8456					
AC Layer Thickness	Subabase Thickness	1	1	1.24625	37.6745	48.5823	55.8252	61.085	0.25353	4.2352	4.8552	5.1187	5.2397
			2	0.99272	33.4393	43.7271	50.7065	55.8453					
		2	1	0.00887	0.7575	1.5068	2.3195	3.1206	0.0029	0.2934	0.5797	0.88	1.1641
			2	0.00597	0.4641	0.9271	1.4395	1.9565					
AC Layer Thickness	Subabase Material	1	1	1.37225	39.8208	50.7968	58.0783	63.323	0.50553	8.5277	9.2842	9.625	9.7158
			2	0.86672	31.2931	41.5126	48.4533	53.6072					

Input Variables		**Levels1**	**Levels2**	**Fatigue Cracking**					**Mean Differences**				
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	**$\Delta_{1/12}$**	**Δ_5**	**Δ_{10}**	**Δ_{20}**	**$\Delta_{1/12}$**
		2	1	0.00895	0.8141	1.6124	2.4658	3.298	0.00306	0.4066	0.7908	1.1726	1.5189
			2	0.00589	0.4075	0.8216	1.2932	1.7791					
AC Layer Thickness	Subgrade Material	1	1	1.27491	36.7924	47.4963	54.6962	59.9391	0.31085	2.471	2.6832	2.8607	2.9479
			2	0.96406	34.3214	44.8131	51.8355	56.9912					
		2	1	0.01054	0.8387	1.6566	2.5373	3.4066	0.00625	0.4558	0.8792	1.3157	1.736
			2	0.00429	0.3829	0.7774	1.2216	1.6706					
AC Agg Gradation	AC Eff.Binder	1	1	0.74168	22.0795	27.8448	31.9181	34.9949	0.57686	10.3481	10.8606	11.2411	11.594
			2	0.16482	11.7314	16.9842	20.677	23.4009					
		2	1	1.09131	24.2347	30.0949	34.1406	37.2066	0.83531	9.9449	10.2754	10.5858	10.8016
			2	0.256	14.2898	19.8195	23.5548	26.405					
AC Agg Gradation	SPV Binder	1	PG 64-34	0.55605	17.4741	23.0636	27.041	30.0222	0.20561	1.1373	1.2982	1.4869	1.6486
			PG 58-22	0.35044	16.3368	21.7654	25.5541	28.3736					
		2	PG 64-34	0.80065	19.9019	25.6001	29.4842	32.4353	0.25399	1.2793	1.2859	1.273	1.259
			PG 58-22	0.54666	18.6226	24.3142	28.2112	31.1763					
AC Agg Gradation	AC Air Voids	1	1	0.02396	3.6188	7.1585	10.6706	13.7458	-0.8586	-26.573	-30.512	-31.254	-30.904
			2	0.88254	30.1921	37.6705	41.9246	44.65					
		2	1	0.03357	4.8495	9.2254	13.2086	16.6264	-1.2802	-28.826	-31.464	-31.278	-30.359
			2	1.31374	33.675	40.6889	44.4868	46.9852					

Input Variables		**Levels1**	**Levels2**	**Fatigue Cracking**					**Mean Differences**				
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	$\Delta_{1/12}$	Δ_{5}	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
AC Agg Gradation	Base Thickness	1	1	0.48851	17.594	23.1867	27.1166	30.0603	0.07052	1.3771	1.5444	1.638	1.7248
			2	0.41799	16.2169	21.6423	25.4786	28.3355					
		2	1	0.70667	19.9116	25.6639	29.5842	32.559	0.06603	1.2987	1.4135	1.4729	1.5064
			2	0.64064	18.6129	24.2504	28.1113	31.0526					
AC Agg Gradation	Base Material	1	1	0.68587	21.4141	27.0138	30.915	33.7821	0.46524	9.0173	9.1985	9.2349	9.1684
			2	0.22063	12.3968	17.8153	21.6801	24.6137					
		2	1	1.05016	24.0885	29.7845	33.6785	36.6078	0.75301	9.6525	9.6547	9.6615	9.604
			2	0.29715	14.436	20.1298	24.017	27.0038					
AC Agg Gradation	Subabase Thickness	1	1	0.51268	18.0108	23.7382	27.7585	30.7611	0.11887	2.2107	2.6473	2.9219	3.1264
			2	0.39381	15.8001	21.0909	24.8366	27.6347					
		2	1	0.74244	20.4213	26.351	30.3861	33.4445	0.13757	2.3181	2.7876	3.0768	3.2774
			2	0.60487	18.1032	23.5634	27.3093	30.1671					
AC Agg Gradation	Subabase Material	1	1	0.55738	19.2587	25.0743	29.1511	32.167	0.20827	4.7064	5.3196	5.7071	5.9382
			2	0.34911	14.5523	19.7547	23.444	26.2288					
		2	1	0.82382	21.3762	27.3349	31.393	34.454	0.30033	4.2279	4.7554	5.0905	5.2965
			2	0.52349	17.1483	22.5795	26.3025	29.1575					
AC Agg Gradation	Subgrade Material	1	1	0.52487	17.8108	23.507	27.5514	30.5821	0.14324	1.8106	2.1849	2.5077	2.7684

Input Variables		**Levels1**	**Levels2**	**Fatigue Cracking**					**Mean Differences**				
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	**$\Delta_{1/12}$**	**Δ_5**	**Δ_{10}**	**Δ_{20}**	**$\Delta_{1/12}$**
			2	0.38163	16.0002	21.3221	25.0437	27.8137					
		2	1	0.76058	19.8203	25.6459	29.6821	32.7636	0.17385	1.1162	1.3774	1.6687	1.9156
			2	0.58673	18.7041	24.2685	28.0134	30.848					
AC Eff. Binder	SPV Binder	1	PG 64-34	1.09964	23.7502	29.6528	33.8098	36.9607	0.36629	1.1862	1.3659	1.5608	1.7199
			PG 58-22	0.73335	22.564	28.2869	32.249	35.2408					
		2	PG 64-34	0.25706	13.6258	19.011	22.7155	25.4967	0.09331	1.2303	1.2182	1.1991	1.1876
			PG 58-22	0.16375	12.3955	17.7928	21.5164	24.3091					
AC Eff. Binder	AC Air Voids	1	1	0.04556	6.5544	12.2987	17.4065	21.5786	-1.7419	-33.205	-33.342	-31.246	-29.044
			2	1.78743	39.7597	45.641	48.6523	50.6229					
		2	1	0.01197	1.9139	4.0853	6.4727	8.7936	-0.3969	-22.194	-28.633	-31.287	-32.219
			2	0.40885	24.1074	32.7185	37.7592	41.0123					
AC Eff. Binder	Base Thickness	1	1	0.97344	23.9114	29.7449	33.8499	36.9758	0.11389	1.5086	1.5501	1.6411	1.7501
			2	0.85955	22.4028	28.1948	32.2088	35.2257					
		2	1	0.22174	13.5943	19.1058	22.8508	25.6435	0.02267	1.1673	1.4078	1.4698	1.4811
			2	0.19907	12.427	17.698	21.381	24.1624					
AC Eff. Binder	Base Material	1	1	1.40832	27.5966	33.3401	37.5429	40.6768	0.98365	8.8791	8.7405	9.027	9.1521
			2	0.42467	18.7175	24.5996	28.5159	31.5247					
		2	1	0.32771	17.906	23.4582	27.0506	29.7132	0.2346	9.7907	10.1127	9.8693	9.6205

Input Variables		Levels1	Levels2	Fatigue Cracking					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
			2	0.09311	8.1153	13.3455	17.1813	20.0927					
AC Eff. Binder	Subabase Thickness	1	1	1.0191	24.3667	30.4137	34.6437	37.838	0.20521	2.4192	2.8877	3.2286	3.4745
			2	0.81389	21.9475	27.526	31.4151	34.3635					
		2	1	0.23602	14.0654	19.6755	23.5009	26.3676	0.05122	2.1095	2.5472	2.77	2.9293
			2	0.1848	11.9559	17.1283	20.7309	23.4383					
AC Eff. Binder	Subabase Material	1	1	1.12759	25.6322	31.7095	35.9989	39.2161	0.42219	4.9503	5.4793	5.939	6.2307
			2	0.7054	20.6819	26.2302	30.0599	32.9854					
		2	1	0.25361	15.0026	20.6997	24.5452	27.405	0.08641	3.984	4.5957	4.8586	5.0041
			2	0.1672	11.0186	16.104	19.6866	22.4009					
AC Eff. Binder	Subgrade Material	1	1	1.05237	24.1566	30.2289	34.5088	37.7465	0.27175	1.9991	2.5181	2.9589	3.2915
			2	0.78062	22.1575	27.7108	31.5499	34.455					
		2	1	0.23308	13.4745	18.924	22.7246	25.5992	0.04534	0.9278	1.0442	1.2174	1.3925
			2	0.18774	12.5467	17.8798	21.5072	24.2067					
SPV Binder	AC Air Voids	PG 64-34	1	0.03703	4.66	8.8618	12.7884	16.1669	-1.2827	-28.056	-30.94	-30.949	-30.124
			2	1.31968	32.716	39.8019	43.7369	46.2906					
		PG 58-22	1	0.0205	3.8083	7.5221	11.0908	14.2053	-0.8561	-27.343	-31.035	-31.584	-31.139
			2	0.8766	31.1512	38.5575	42.6746	45.3446					

Input Variables		Levels1	Levels2	Fatigue Cracking					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
SPV Binder	Base Thickness	PG 64-34	1	0.72712	19.3518	25.067	29.0436	32.0574	0.09754	1.3276	1.4702	1.562	1.6573
			2	0.62958	18.0242	23.5968	27.4816	30.4001					
		PG 58-22	1	0.46806	18.1538	23.7837	27.6571	30.5619	0.03902	1.3482	1.4877	1.5489	1.5739
			2	0.42904	16.8056	22.296	26.1082	28.988					
SPV Binder	Base Material	PG 64-34	1	1.05221	23.371	29.0606	33.0133	35.9507	0.74772	9.366	9.4574	9.5013	9.4439
			2	0.30449	14.005	19.6032	23.512	26.5068					
		PG 58-22	1	0.68381	22.1316	27.7377	31.5802	34.4392	0.47052	9.3038	9.3958	9.3951	9.3285
			2	0.21329	12.8278	18.3419	22.1851	25.1107					
SPV Binder	Subabase Thickness	PG 64-34	1	0.76075	19.8863	25.7668	29.8417	32.9106	0.16479	2.3966	2.8698	3.1582	3.3637
			2	0.59596	17.4897	22.897	26.6835	29.5469					
		PG 58-22	1	0.49437	18.5458	24.3223	28.3029	31.295	0.09164	2.1322	2.565	2.8405	3.0401
			2	0.40273	16.4136	21.7573	25.4624	28.2549					
SPV Binder	Subabase Material	PG 64-34	1	0.82847	20.8509	26.8029	30.9402	34.0309	0.30024	4.3258	4.9421	5.3551	5.6044
			2	0.52823	16.5251	21.8608	25.5851	28.4265					
		PG 58-22	1	0.55273	19.7839	25.6063	29.6039	32.5901	0.20836	4.6084	5.133	5.4425	5.6303

Input Variables		**Levels1**	**Levels2**	**Fatigue Cracking**					**Mean Differences**				
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	$\Delta_{1/12}$	Δ_{5}	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
			2	0.34437	15.1755	20.4733	24.1614	26.9598					
SPV Binder	Subgrade Material	PG 64-34	1	0.76671	19.3568	25.1797	29.2777	32.3819	0.17672	1.3376	1.6957	2.0301	2.3063
			2	0.58999	18.0192	23.484	27.2476	30.0756					
		PG 58-22	1	0.51874	18.2743	23.9732	27.9558	30.9638	0.14037	1.5892	1.8667	2.1463	2.3777
			2	0.37837	16.6851	22.1065	25.8095	28.5861					
AC Air Voids	Base Thickness	1	1	0.03078	4.5358	8.7396	12.6783	16.0718	0.00403	0.6033	1.0952	1.4774	1.7714
			2	0.02675	3.9325	7.6444	11.2009	14.3004					
		2	1	1.1644	32.9699	40.1111	44.0224	46.5475	0.13252	2.0727	1.8627	1.6334	1.4598
			2	1.03188	30.8972	38.2484	42.389	45.0877					
AC Air Voids	Base Material	1	1	0.0413	6.2435	11.6893	16.5457	20.4952	0.02507	4.0187	6.9946	9.2122	10.6182
			2	0.01623	2.2248	4.6947	7.3335	9.877					
		2	1	1.69472	39.2591	45.109	48.0478	49.8947	1.19316	14.6511	11.8586	9.6842	8.1542
			2	0.50156	24.608	33.2504	38.3636	41.7405					
AC Air Voids	Subabase Thickness	1	1	0.03332	4.9095	9.3764	13.4915	16.985	0.00911	1.3507	2.3689	3.1039	3.5978
			2	0.02421	3.5588	7.0075	10.3876	13.3872					
		2	1	1.2218	33.5226	40.7127	44.6531	47.2205	0.24732	3.1781	3.066	2.8948	2.8059
			2	0.97448	30.3445	37.6467	41.7583	44.4146					

Input Variables		**Levels1**	**Levels2**	**Fatigue Cracking**					**Mean Differences**				
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	**$\Delta_{1/12}$**	**Δ_{5}**	**Δ_{10}**	**Δ_{20}**	**$\Delta_{1/12}$**
AC Air Voids	Subabase Material	1	1	0.03527	5.4782	10.3882	14.8318	18.5262	0.01301	2.4881	4.3924	5.7844	6.6801
			2	0.02226	2.9901	5.9958	9.0474	11.8461					
		2	1	1.34593	35.1567	42.021	45.7123	48.0949	0.49558	6.4463	5.6826	5.0132	4.5547
			2	0.85035	28.7104	36.3384	40.6991	43.5402					
AC Air Voids	Subgrade Material	1	1	0.03459	4.8657	9.2168	13.2101	16.5915	0.01165	1.2631	2.0496	2.541	2.8108
			2	0.02294	3.6026	7.1672	10.6691	13.7807					
		2	1	1.25086	32.7654	39.9361	44.0234	46.7541	0.30544	1.6637	1.5128	1.6353	1.8731
			2	0.94542	31.1017	38.4233	42.3881	44.881					
Base Thickness	Base Material	1	1	0.88585	22.8854	28.5404	32.4331	35.3276	0.57652	8.2651	8.2301	8.1654	8.0359
			2	0.30933	14.6203	20.3103	24.2677	27.2917					
		2	1	0.85017	22.6172	28.2579	32.1604	35.0623	0.64172	10.4046	10.6231	10.7309	10.7365
			2	0.20845	12.2126	17.6348	21.4295	24.3258					
Base Thickness	Subabase Thickness	1	1	0.68367	20.0212	25.9098	29.9549	33.0008	0.17216	2.5367	2.969	3.209	3.3823
			2	0.51151	17.4845	22.9408	26.7459	29.6185					
		2	1	0.57145	18.4109	24.1793	28.1898	31.2048	0.08427	1.9921	2.4659	2.7897	3.0215
			2	0.48718	16.4188	21.7134	25.4001	28.1833					
Base Thickness	Subabase Material	1	1	0.758	21.3827	27.3213	31.4062	34.453	0.32082	5.2597	5.7919	6.1116	6.2868

Input Variables		Levels1	Levels2	Fatigue Cracking					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
			2	0.43718	16.123	21.5294	25.2946	28.1662					
		2	1	0.62321	19.2522	25.088	29.1379	32.168	0.18779	3.6746	4.2832	4.686	4.9479
			2	0.43542	15.5776	20.8048	24.4519	27.2201					
Base Thickness	Subgrade Material	1	1	0.69274	19.6524	25.5101	29.604	32.6985	0.1903	1.7991	2.1695	2.5072	2.7777
			2	0.50244	17.8533	23.3406	27.0968	29.9208					
		2	1	0.59271	17.9787	23.6428	27.6295	30.6471	0.12679	1.1277	1.3929	1.6692	1.9061
			2	0.46592	16.851	22.2499	25.9603	28.741					
Base Material	Subabase Thickness	1	1	0.96545	23.9201	29.7795	33.8343	36.8418	0.19488	2.3376	2.7607	3.0751	3.2937
			2	0.77057	21.5825	27.0188	30.7592	33.5481					
		2	1	0.28967	14.512	20.3096	24.3103	27.3638	0.06156	2.1912	2.6741	2.9235	3.1101
			2	0.22811	12.3208	17.6355	21.3868	24.2537					
Base Material	Subabase Material	1	1	1.06523	25.1308	31.0031	35.0921	38.1154	0.39444	4.759	5.2079	5.5907	5.8409
			2	0.67079	20.3718	25.7952	29.5014	32.2745					
		2	1	0.31597	15.5041	21.4062	25.452	28.5056	0.11416	4.1754	4.8673	5.2069	5.3937
			2	0.20181	11.3287	16.5389	20.2451	23.1119					
Base Material	Subgrade Material	1	1	1.00115	23.7995	29.6555	33.7422	36.7822	0.26628	2.0964	2.5127	2.8909	3.1745
			2	0.73487	21.7031	27.1428	30.8513	33.6077					
		2	1	0.28429	13.8316	19.4974	23.4913	26.5635	0.0508	0.8304	1.0497	1.2855	1.5095

Input Variables		**Levels1**	**Levels2**	**Fatigue Cracking**					**Mean Differences**				
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	$\Delta_{1/12}$	Δ_{5}	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
			2	0.23349	13.0012	18.4477	22.2058	25.054					
Subabase Thickness	Subabase Material	1	1	0.75789	21.2143	27.2404	31.3992	34.4922	0.26066	3.9965	4.3917	4.6538	4.7789
			2	0.49723	17.2178	22.8487	26.7454	29.7133					
		2	1	0.62331	19.4206	25.1688	29.1449	32.1288	0.24794	4.9379	5.6833	6.1438	6.4558
			2	0.37537	14.4827	19.4855	23.0011	25.673					
Subabase Thickness	Subgrade Material	1	1	0.77396	20.6903	26.7719	31.0282	34.2443	0.2928	2.9485	3.4547	3.9118	4.283
			2	0.48116	17.7418	23.3172	27.1164	29.9613					
		2	1	0.51149	16.9408	22.3809	26.2052	29.1013	0.02429	-0.0217	0.1075	0.2645	0.4009
			2	0.4872	16.9625	22.2734	25.9407	28.7004					
Subabase Material	Subgrade Material	1	1	0.81128	21.4763	27.5801	31.8298	35.0102	0.24136	2.3177	2.7509	3.1155	3.3994
			2	0.56992	19.1586	24.8292	28.7143	31.6108					
		2	1	0.47417	16.1548	21.5728	25.4037	28.3354	0.07573	0.6091	0.8114	1.0609	1.2845
			2	0.39844	15.5457	20.7614	24.3428	27.0509					

Table 4: Interaction effects of input variables on transv. cracking

Input Variables				Transv. Cracking					Mean Differences				
1	2	Levels1	Levels2	1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
Climate	AC Layer Thickness	Lansing	1	0	1558.3	1608.5	1721.1	1735.8	0	542.9	547.3	571.1	571.1
			2	0	1015.4	1061.2	1150	1164.7					
		Detroit	1	0	1073	1276.7	1371.2	1403.6	0	156.9	308.2	312.7	328.8
			2	0	916.1	968.5	1058.5	1074.8					
		Pellston	1	0	1442.3	1566.8	1624.2	1643.1	0	325.9	415.4	386.2	390.7
			2	0	1116.4	1151.4	1238	1252.4					
Climate	AC Agg Gradation	Lansing	1	0	1313	1367.4	1477.2	1492.1	0	52.3	65.1	83.4	83.7
			2	0	1260.7	1302.3	1393.8	1408.4					
		Detroit	1	0	863.1	1002.3	1080.6	1104.4	0	-262.8	-240.5	-268.5	-269.6
			2	0	1125.9	1242.8	1349.1	1374					
		Pellston	1	0	1135.7	1254	1327.3	1348.4	0	-287.3	-210.3	-207.6	-198.6
			2	0	1423	1464.3	1534.9	1547					
Climate	AC Eff.Binder	Lansing	1	0	1527.3	1584.6	1645.2	1661.7	0	480.8	499.5	419.3	422.9
			2	0	1046.5	1085.1	1225.9	1238.8					
		Detroit	1	0	1047.8	1181.6	1262.2	1287.8	0	106.5	118.1	94.7	97.2
			2	0	941.3	1063.5	1167.5	1190.6					
		Pellston	1	0	1570.5	1634.6	1682.6	1698.1	0	582.3	551	503	500.7
			2	0	988.2	1083.6	1179.6	1197.4					
Climate	SPV Binder	Lansing	PG 64-34	0	713.1	798.5	986.1	1011.6	0	-1147.5	-1072.7	-898.8	-877.3

Input Variables		Levels1	Levels2	Transv. Cracking					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_{5}	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
			PG 58-22	0	1860.6	1871.2	1884.9	1888.9					
		Detroit	PG 64-34	0	340.6	498.1	651.9	683.4	0	-1307.9	-1249	-1125.9	-1111.6
			PG 58-22	0	1648.5	1747.1	1777.8	1795					
		Pellston	PG 64-34	0	783	874.9	997	1018.4	0	-992.8	-968.5	-868.3	-858.7
			PG 58-22	0	1775.8	1843.4	1865.3	1877.1					
Climate	AC Air Voids	Lansing	1	0	1186.7	1225.1	1316.2	1335.8	0	-200.4	-219.4	-238.6	-229
			2	0	1387.1	1444.5	1554.8	1564.8					
		Detroit	1	0	849.5	934.9	999.2	1025.7	0	-290.1	-375.3	-431.3	-427
			2	0	1139.6	1310.2	1430.5	1452.7					
		Pellston	1	0	1165.7	1228.5	1287	1308.5	0	-227.3	-261.3	-288.2	-278.5
			2	0	1393	1489.8	1575.2	1587					
Climate	Base Thickness	Lansing	1	0	1286.3	1334.3	1431.8	1446.8	0	-1.1	-1	-7.4	-6.9
			2	0	1287.4	1335.3	1439.2	1453.7					
		Detroit	1	0	986.7	1118.9	1213	1240.3	0	-15.6	-7.3	-3.7	2.2
			2	0	1002.3	1126.2	1216.7	1238.1					
		Pellston	1	0	1304	1382.3	1453.5	1470.9	0	49.3	46.4	44.8	46.3
			2	0	1254.7	1335.9	1408.7	1424.6					
Climate	Base Material	Lansing	1	0	1269.8	1318.9	1422.1	1437	0	-34.2	-31.9	-26.8	-26.5
			2	0	1304	1350.8	1448.9	1463.5					
		Detroit	1	0	976.1	1108.2	1204.3	1230.2	0	-36.9	-28.7	-21.1	-18
			2	0	1013	1136.9	1225.4	1248.2					

Input Variables		Levels1	Levels2	Transv. Cracking					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
		Pellston	1	0	1260.8	1342.8	1416.6	1434	0	-37.1	-32.7	-29	-27.5
			2	0	1297.9	1375.5	1445.6	1461.5					
Climate	Subabase Thickness	Lansing	1	0	1293.9	1346.1	1444.1	1459.8	0	14.1	22.5	17.2	19
			2	0	1279.8	1323.6	1426.9	1440.8					
		Detroit	1	0	1003.1	1133	1223.1	1249.2	0	17.1	20.8	16.5	20
			2	0	986	1112.2	1206.6	1229.2					
		Pellston	1	0	1276.9	1356.9	1428.1	1445.4	0	-4.9	-4.5	-6.1	-4.7
			2	0	1281.8	1361.4	1434.2	1450.1					
Climate	Subabase Material	Lansing	1	0	1295.8	1336.1	1433.7	1448	0	17.9	2.5	-3.7	-4.6
			2	0	1277.9	1333.6	1437.4	1452.6					
		Detroit	1	0	996.6	1121.4	1212.1	1237.7	0	4.2	-2.4	-5.5	-3
			2	0	992.4	1123.8	1217.6	1240.7					
		Pellston	1	0	1282.3	1360.3	1432.1	1449.7	0	5.9	2.3	2	3.9
			2	0	1276.4	1358	1430.1	1445.8					
Climate	Subgrade Material	Lansing	1	0	1284.1	1330.2	1430.2	1444.6	0	-5.5	-9.2	-10.7	-11.4
			2	0	1289.6	1339.4	1440.9	1456					
		Detroit	1	0	988	1113.8	1207.5	1232.4	0	-13.1	-17.5	-14.7	-13.6
			2	0	1001.1	1131.3	1222.2	1246					
		Pellston	1	0	1265.4	1344.9	1417.6	1434.5	0	-27.9	-28.4	-27	-26.5
			2	0	1293.3	1373.3	1444.6	1461					
AC Layer	AC Agg	1	1	0	1192.4	1345.7	1442	1466.2	0	-331	-276.7	-260.3	-255.9

Input Variables		Levels1	Levels2	Transv. Cracking					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
Thickness	Gradation		2	0	1523.4	1622.4	1702.3	1722.1					
		2	1	0	1015.5	1070.2	1148.1	1163.7	0	-0.9	19.7	-1.4	-0.5
			2	0	1016.4	1050.5	1149.5	1164.2					
AC Layer Thickness	AC Eff.Binder	1	1	0	1587.1	1698.8	1775.1	1793.9	0	458.4	429.5	405.9	399.5
			2	0	1128.7	1269.3	1369.2	1394.4					
		2	1	0	1176.6	1235.1	1284.9	1304.5	0	321.3	349.5	272.1	281.1
			2	0	855.3	885.6	1012.8	1023.4					
AC Layer Thickness	SPV Binder	1	PG 64-34	0	782.6	930.2	1081.3	1111	0	-1150.7	-1107.6	-981.7	-966.3
			PG 58-22	0	1933.3	2037.8	2063	2077.3					
		2	PG 64-34	0	441.9	517.4	675.4	697.9	0	-1148.1	-1085.8	-946.9	-932.1
			PG 58-22	0	1590	1603.2	1622.3	1630					
AC Layer Thickness	AC Air Voids	1	1	0	1207.9	1309.6	1396.5	1426.5	0	-300	-348.9	-351.3	-335.3
			2	0	1507.9	1658.5	1747.8	1761.8					
		2	1	0	926.6	949.4	1005.1	1020.1	0	-178.7	-221.8	-287.5	-287.7
			2	0	1105.3	1171.2	1292.6	1307.8					
AC Layer Thickness	Base Thickness	1	1	0	1372.8	1499.5	1588.2	1612.7	0	29.8	30.9	32.1	37.1
			2	0	1343	1468.6	1556.1	1575.6					
		2	1	0	1011.9	1057.6	1144	1159.3	0	-8.1	-5.5	-9.7	-9.4
			2	0	1020	1063.1	1153.7	1168.7					
AC Layer Thickness	Base Material	1	1	0	1339.5	1469.2	1560.1	1583.8	0	-36.8	-29.6	-24.1	-20.8
			2	0	1376.3	1498.8	1584.2	1604.6					

Input Variables		**Levels1**	**Levels2**	**Transv. Cracking**					**Mean Differences**				
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	$\Delta_{1/12}$	Δ_{5}	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
		2	1	0	998.3	1044.1	1135.2	1150.4	0	-35.3	-32.5	-27.3	-27.1
			2	0	1033.6	1076.6	1162.5	1177.5					
AC Layer Thickness	Subbase Thickness	1	1	0	1358.1	1487.7	1576.5	1600.2	0	0.3	7.4	8.7	12
			2	0	1357.8	1480.3	1567.8	1588.2					
		2	1	0	1024.6	1069.6	1153.7	1169.4	0	17.3	18.5	9.7	10.8
			2	0	1007.3	1051.1	1144	1158.6					
AC Layer Thickness	Subbase Material	1	1	0	1369.1	1486.1	1569.1	1592.1	0	22.4	4.2	-6.1	-4.2
			2	0	1346.7	1481.9	1575.2	1596.3					
		2	1	0	1014.1	1059	1149.4	1164.9	0	-3.7	-2.6	1.1	1.8
			2	0	1017.8	1061.6	1148.3	1163.1					
AC Layer Thickness	Subgrade Material	1	1	0	1350.8	1474.5	1562.4	1584.8	0	-14.2	-19	-19.5	-18.7
			2	0	1365	1493.5	1581.9	1603.5					
		2	1	0	1007.5	1051.5	1141.1	1156.2	0	-16.8	-17.7	-15.5	-15.6
			2	0	1024.3	1069.2	1156.6	1171.8					
AC Agg Gradation	AC Eff.Binder	1	1	0	1327.5	1436.6	1497.5	1519.1	0	447.1	457.4	404.9	408.3
			2	0	880.4	979.2	1092.6	1110.8					
		2	1	0	1436.2	1497.3	1562.5	1579.3	0	332.6	321.7	273.1	272.2
			2	0	1103.6	1175.6	1289.4	1307.1					
AC Agg Gradation	SPV Binder	1	PG 64-34	0	430.4	556.6	711.3	737.7	0	-1347.1	-1302.6	-1167.5	-1154.6
			PG 58-22	0	1777.5	1859.2	1878.8	1892.3					
		2	PG 64-34	0	794.1	891	1045.4	1071.3	0	-951.6	-890.9	-761.1	-743.8

Input Variables		Levels1	Levels2	Transv. Cracking					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
			PG 58-22	0	1745.7	1781.9	1806.5	1815.1					
AC Agg Gradation	AC Air Voids	1	1	0	989.5	1062.6	1115.1	1136.6	0	-228.9	-290.6	-359.9	-356.8
			2	0	1218.4	1353.2	1475	1493.4					
		2	1	0	1145	1196.4	1286.5	1310.1	0	-249.7	-280.1	-278.9	-266.1
			2	0	1394.7	1476.5	1565.4	1576.2					
AC Agg Gradation	Base Thickness	1	1	0	1114.6	1218.5	1306.5	1327	0	21.3	21.2	22.9	24
			2	0	1093.3	1197.3	1283.6	1303					
		2	1	0	1270.1	1338.6	1425.7	1445	0	0.5	4.2	-0.5	3.7
			2	0	1269.6	1334.4	1426.2	1441.3					
AC Agg Gradation	Base Material	1	1	0	1094.4	1200.6	1288.6	1308.8	0	-19.1	-14.6	-12.9	-12.3
			2	0	1113.5	1215.2	1301.5	1321.1					
		2	1	0	1243.3	1312.7	1406.7	1425.3	0	-53.1	-47.5	-38.5	-35.7
			2	0	1296.4	1360.2	1445.2	1461					
AC Agg Gradation	Subabase Thickness	1	1	0	1099.3	1205	1291.5	1311.8	0	-9.3	-5.8	-7.1	-6.4
			2	0	1108.6	1210.8	1298.6	1318.2					
		2	1	0	1283.3	1352.2	1438.7	1457.8	0	26.8	31.5	25.5	29.2
			2	0	1256.5	1320.7	1413.2	1428.6					
AC Agg Gradation	Subabase Material	1	1	0	1122.4	1220.6	1304.7	1325	0	36.8	25.4	19.3	20.1
			2	0	1085.6	1195.2	1285.4	1304.9					
		2	1	0	1260.8	1324.6	1413.8	1431.9	0	-18.1	-23.7	-24.3	-22.5
			2	0	1278.9	1348.3	1438.1	1454.4					

Input Variables		Levels1	Levels2	Transv. Cracking					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
AC Agg Gradation	Subgrade Material	1	1	0	1100.1	1203.7	1291.3	1311.4	0	-7.7	-8.4	-7.5	-7.2
			2	0	1107.8	1212.1	1298.8	1318.6					
		2	1	0	1258.3	1322.3	1412.3	1429.6	0	-23.2	-28.3	-27.3	-27.1
			2	0	1281.5	1350.6	1439.6	1456.7					
AC Eff. Binder	SPV Binder	1	PG 64-34	0	867.6	1025.9	1142	1175	0	-1028.5	-882.1	-776	-748.4
			PG 58-22	0	1896.1	1908	1918	1923.4					
		2	PG 64-34	0	356.9	421.8	614.6	633.9	0	-1270.2	-1311.3	-1152.7	-1150
			PG 58-22	0	1627.1	1733.1	1767.3	1783.9					
AC Eff. Binder	AC Air Voids	1	1	0	1292	1324	1372.9	1387.9	0	-179.7	-285.9	-314.2	-322.6
			2	0	1471.7	1609.9	1687.1	1710.5					
		2	1	0	842.5	935.1	1028.8	1058.7	0	-299	-284.7	-324.4	-300.4
			2	0	1141.5	1219.8	1353.2	1359.1					
AC Eff. Binder	Base Thickness	1	1	0	1401	1483.3	1546.2	1565.6	0	38.3	32.8	32.4	32.8
			2	0	1362.7	1450.5	1513.8	1532.8					
		2	1	0	983.8	1073.7	1186	1206.4	0	-16.4	-7.4	-9.9	-5.1
			2	0	1000.2	1081.1	1195.9	1211.5					
AC Eff. Binder	Base Material	1	1	0	1371.2	1458.6	1522.9	1542.4	0	-21.3	-16.7	-14.2	-13.6
			2	0	1392.5	1475.3	1537.1	1556					
		2	1	0	966.5	1054.7	1172.4	1191.8	0	-50.9	-45.5	-37.2	-34.3
			2	0	1017.4	1100.2	1209.6	1226.1					
AC Eff. Binder	Subabase	1	1	0	1384.6	1471.4	1530.7	1550.3	0	5.5	8.9	1.4	2.2

Input Variables		Levels1	Levels2	Transv. Cracking					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
	Thickness		2	0	1379.1	1462.5	1529.3	1548.1					
		2	1	0	998	1085.8	1199.5	1219.3	0	12.1	16.8	17	20.7
			2	0	985.9	1069	1182.5	1198.6					
AC Eff. Binder	Subabase Material	1	1	0	1400	1482.9	1539.7	1559.7	0	36.3	31.9	19.4	21
			2	0	1363.7	1451	1520.3	1538.7					
		2	1	0	983.2	1062.3	1178.8	1197.2	0	-17.6	-30.3	-24.3	-23.5
			2	0	1000.8	1092.6	1203.1	1220.7					
AC Eff. Binder	Subgrade Material	1	1	0	1380.1	1463.1	1527.1	1546.5	0	-3.5	-7.6	-5.8	-5.4
			2	0	1383.6	1470.7	1532.9	1551.9					
		2	1	0	978.3	1062.9	1176.4	1194.5	0	-27.4	-29.1	-29.2	-28.9
			2	0	1005.7	1092	1205.6	1223.4					
SPV Binder	AC Air Voids	PG 64-34	1	0	421.3	461.1	576.5	603.9	0	-381.9	-525.5	-603.7	-601.1
			2	0	803.2	986.6	1180.2	1205					
		PG 58-22	1	0	1713.2	1798	1825.1	1842.8	0	-96.8	-45.1	-35.1	-21.8
			2	0	1810	1843.1	1860.2	1864.6					
SPV Binder	Base Thickness	PG 64-34	1	0	616.8	727.1	882.8	910.5	0	9.2	6.5	9	12.1
			2	0	607.6	720.6	873.8	898.4					
		PG 58-22	1	0	1767.9	1830	1849.4	1861.5	0	12.6	18.9	13.5	15.6
			2	0	1755.3	1811.1	1835.9	1845.9					
SPV Binder	Base Material	PG 64-34	1	0	586.9	699.6	857.1	884.4	0	-50.6	-48.4	-42.5	-40.2
			2	0	637.5	748	899.6	924.6					

Input Variables		Levels1	Levels2	Transv. Cracking					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
		PG 58-22	1	0	1750.8	1813.6	1838.2	1849.8	0	-21.6	-13.8	-8.9	-7.7
			2	0	1772.4	1827.4	1847.1	1857.5					
SPV Binder	Subabase Thickness	PG 64-34	1	0	610.5	726	878.4	906.2	0	-3.5	4.4	0.1	3.5
			2	0	614	721.6	878.3	902.7					
		PG 58-22	1	0	1772.1	1831.2	1851.8	1863.4	0	21	21.4	18.3	19.4
			2	0	1751.1	1809.8	1833.5	1844					
SPV Binder	Subabase Material	PG 64-34	1	0	614.6	722.9	871.2	898.6	0	4.7	-1.9	-14.3	-11.7
			2	0	609.9	724.8	885.5	910.3					
		PG 58-22	1	0	1768.6	1822.3	1847.4	1858.3	0	14	3.5	9.5	9.3
			2	0	1754.6	1818.8	1837.9	1849					
SPV Binder	Subgrade Material	PG 64-34	1	0	593.3	702.4	859.2	885.5	0	-37.9	-42.8	-38.3	-38
			2	0	631.2	745.2	897.5	923.5					
		PG 58-22	1	0	1765.1	1823.6	1844.3	1855.5	0	7	6.1	3.3	3.7
			2	0	1758.1	1817.5	1841	1851.8					
AC Air Voids	Base Thickness	1	1	0	1070	1138.1	1211.3	1236	0	5.4	17.2	21	25.3
			2	0	1064.6	1120.9	1190.3	1210.7					
		2	1	0	1314.7	1418.9	1520.9	1536	0	16.3	8.2	1.5	2.4
			2	0	1298.4	1410.7	1519.4	1533.6					
AC Air Voids	Base Material	1	1	0	1051.1	1115.5	1187.6	1211.7	0	-32.3	-28.1	-26.4	-23.3
			2	0	1083.4	1143.6	1214	1235					
		2	1	0	1286.7	1397.8	1507.7	1522.5	0	-39.8	-34.1	-24.9	-24.6

Input Variables		Levels1	Levels2	Transv. Cracking					Mean Differences				
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
			2	0	1326.5	1431.9	1532.6	1547.1					
AC Air Voids	Subabase Thickness	1	1	0	1057.4	1124.6	1200.3	1224.6	0	-19.7	-9.9	-1.1	2.5
			2	0	1077.1	1134.5	1201.4	1222.1					
		2	1	0	1325.2	1432.7	1529.9	1545	0	37.2	35.7	19.5	20.4
			2	0	1288	1397	1510.4	1524.6					
AC Air Voids	Subabase Material	1	1	0	1073.4	1127.7	1200.4	1223.3	0	12.3	-3.6	-0.8	0
			2	0	1061.1	1131.3	1201.2	1223.3					
		2	1	0	1309.7	1417.4	1518.1	1533.6	0	6.3	5.1	-4.1	-2.4
			2	0	1303.4	1412.3	1522.2	1536					
AC Air Voids	Subgrade Material	1	1	0	1054.2	1116.2	1187.3	1209.8	0	-26.1	-26.6	-27.1	-27
			2	0	1080.3	1142.8	1214.4	1236.8					
		2	1	0	1304.2	1409.8	1516.3	1531.2	0	-4.8	-10.1	-7.8	-7.3
			2	0	1309	1419.9	1524.1	1538.5					
Base Thickness	Base Material	1	1	0	1186.6	1273.5	1362.2	1383.3	0	-11.5	-10.1	-7.8	-5.4
			2	0	1198.1	1283.6	1370	1388.7					
		2	1	0	1151.1	1239.8	1333.1	1350.9	0	-60.7	-52.1	-43.6	-42.5
			2	0	1211.8	1291.9	1376.7	1393.4					
Base Thickness	Subabase Thickness	1	1	0	1193.3	1282.3	1370.6	1391.8	0	1.9	7.5	9	11.6
			2	0	1191.4	1274.8	1361.6	1380.2					
		2	1	0	1189.3	1274.9	1359.6	1377.8	0	15.6	18.2	9.4	11.3
			2	0	1173.7	1256.7	1350.2	1366.5					

Input Variables		Levels1	Levels2	Transv. Cracking					Mean Differences				
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}	$\Delta_{1/12}$
Base Thickness	Subabase Material	1	1	0	1204.1	1284.7	1370.5	1391.6	0	23.5	12.3	8.8	11.3
			2	0	1180.6	1272.4	1361.7	1380.3					
		2	1	0	1179.1	1260.5	1348	1365.3	0	-4.8	-10.7	-13.8	-13.7
			2	0	1183.9	1271.2	1361.8	1379					
Base Thickness	Subgrade Material	1	1	0	1182.3	1267.9	1356	1376.2	0	-20.1	-21.3	-20.2	-19.6
			2	0	1202.4	1289.2	1376.2	1395.8					
		2	1	0	1176.1	1258.1	1347.6	1364.8	0	-10.8	-15.5	-14.6	-14.7
			2	0	1186.9	1273.6	1362.2	1379.5					
Base Material	Subabase Thickness	1	1	0	1167.8	1258.1	1347.1	1368.3	0	-2.2	3	-1.1	2.5
			2	0	1170	1255.1	1348.2	1365.8					
		2	1	0	1214.8	1299.1	1383.1	1401.3	0	19.7	22.8	19.6	20.4
			2	0	1195.1	1276.3	1363.5	1380.9					
Base Material	Subabase Material	1	1	0	1185.4	1268.4	1357	1377.5	0	33	23.6	18.7	20.9
			2	0	1152.4	1244.8	1338.3	1356.6					
		2	1	0	1197.8	1276.7	1361.5	1379.4	0	-14.3	-22	-23.7	-23.3
			2	0	1212.1	1298.7	1385.2	1402.7					
Base Material	Subgrade Material	1	1	0	1163.4	1250.8	1342.8	1362.6	0	-11	-11.7	-9.7	-8.9
			2	0	1174.4	1262.5	1352.5	1371.5					
		2	1	0	1194.9	1275.2	1360.7	1378.4	0	-20.1	-25	-25.2	-25.3
			2	0	1215	1300.2	1385.9	1403.7					
Subabase	Subabase	1	1	0	1199.8	1283.2	1366.2	1386.8	0	16.9	9.2	2.2	4

Input Variables		**Levels1**	**Levels2**	**Transv. Cracking**					**Mean Differences**				
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	**$\Delta_{1/12}$**	**Δ_5**	**Δ_{10}**	**Δ_{20}**	**$\Delta_{1/12}$**
Thickness	Material		2	0	1182.9	1274	1364	1382.8					
		2	1	0	1183.4	1261.9	1352.4	1370.2	0	1.8	-7.6	-7	-6.3
			2	0	1181.6	1269.5	1359.4	1376.5					
Subabase Thickness	Subgrade Material	1	1	0	1177.9	1264.6	1351.4	1371.2	0	-26.8	-28.1	-27.4	-27.2
			2	0	1204.7	1292.7	1378.8	1398.4					
		2	1	0	1180.4	1261.4	1352.1	1369.8	0	-4.2	-8.6	-7.6	-7.1
			2	0	1184.6	1270	1359.7	1376.9					
Subabase Material	Subgrade Material	1	1	0	1188	1268.1	1356.6	1376	0	-7.2	-8.9	-5.4	-4.9
			2	0	1195.2	1277	1362	1380.9					
		2	1	0	1170.3	1257.9	1347	1365	0	-23.9	-27.8	-29.4	-29.3
			2	0	1194.2	1285.7	1376.4	1394.3					

Table 5: Interaction effects of input variables on long. cracking

Input Variables		Levels1	Levels2	Long. Cracking					Mean Differences			
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}
Climate	AC Layer Thickness	Lansing	1	24.189	1850.51	2652.58	3234.61	3686.58	24.189	1850.42	3234.17	3685.9
			2	0	0.09	0.23	0.44	0.68				
		Detroit	1	25.5936	1838.72	2635.44	3214.91	3668.29	25.5838	1834.77	3199.04	3646.17
			2	0.0098	3.95	9.35	15.87	22.12				
		Pellston	1	24.5715	1873.46	2684.32	3268.08	3726.41	24.5622	1869.6	3252.62	3704.93
			2	0.0093	3.86	9.12	15.46	21.48				
Climate	AC Agg Gradation	Lansing	1	9.0183	834.12	1212.71	1492.02	1708.76	-6.1524	-182.36	-251.01	-269.74
			2	15.1707	1016.48	1440.1	1743.03	1978.5				
		Detroit	1	9.7949	835.02	1213.56	1496.15	1717.09	-6.0137	-172.63	-238.49	-256.23
			2	15.8086	1007.65	1431.23	1734.64	1973.32				
		Pellston	1	9.7859	843.14	1228.05	1512.85	1735.54	-5.009	-191.03	-257.84	-276.81
			2	14.7949	1034.17	1465.39	1770.69	2012.35				
Climate	AC Eff.Binder	Lansing	1	21.1417	1305.76	1751.63	2065.81	2304.37	18.0943	760.92	896.57	921.48
			2	3.0474	544.84	901.18	1169.24	1382.89				
		Detroit	1	22.4911	1290.54	1735.44	2052.86	2297.09	19.3787	738.41	874.93	903.77
			2	3.1124	552.13	909.34	1177.93	1393.32				
		Pellston	1	21.4556	1319.62	1775.56	2096.8	2346.59	18.3304	761.93	910.06	945.29
			2	3.1252	557.69	917.88	1186.74	1401.3				
Climate	SPV	Lansing	PG 64-34	15.1835	955.88	1358.03	1649.85	1876.45	6.1779	61.16	64.65	65.64

Input Variables		Levels1	Levels2	Long. Cracking					Mean Differences			
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}
	Binder		PG 58-22	9.0056	894.72	1294.78	1585.2	1810.81				
		Detroit	PG 64-34	15.9056	952.91	1359.19	1657.67	1892.74	6.2077	63.15	84.55	95.07
			PG 58-22	9.6979	889.76	1285.6	1573.12	1797.67				
		Pellston	PG 64-34	15.4513	976.95	1392.63	1693.69	1930.63	6.3218	76.59	103.84	113.37
			PG 58-22	9.1295	900.36	1300.81	1589.85	1817.26				
Climate	AC Air Voids	Lansing	1	0.2141	87.88	208.58	349.72	490.22	-23.761	-1674.8	-2535.6	-2706.8
			2	23.9749	1762.72	2444.23	2885.33	3197.05				
		Detroit	1	0.2445	95.29	223.56	373.95	520.66	-25.115	-1652.1	-2482.9	-2649.1
			2	25.359	1747.38	2421.22	2856.84	3169.75				
		Pellston	1	0.2204	98.19	234.4	387.76	541.52	-24.14	-1680.9	-2508	-2664.9
			2	24.3604	1779.12	2459.04	2895.78	3206.37				
Climate	Base Thickness	Lansing	1	13.7922	1026.45	1450.61	1752.91	1985.91	3.3954	202.3	270.76	284.56
			2	10.3968	824.15	1202.2	1482.15	1701.35				
		Detroit	1	14.662	1023.33	1447.95	1754.81	1993.66	3.7206	203.99	278.83	296.91
			2	10.9414	819.34	1196.83	1475.98	1696.75				
		Pellston	1	14.0237	1043.24	1475.49	1783.02	2023.88	3.4666	209.16	282.49	299.87
			2	10.5571	834.08	1217.96	1500.53	1724.01				
Climate	Base Material	Lansing	1	20.8	1339.65	1826.85	2167.6	2425.68	17.4109	828.71	1100.15	1164.09
			2	3.3891	510.94	825.96	1067.45	1261.59				
		Detroit	1	22.0533	1340.91	1830.67	2177.09	2441.84	18.5031	839.15	1123.4	1193.27
			2	3.5502	501.76	814.11	1053.69	1248.57				

Input Variables		Levels1	Levels2	Long. Cracking					Mean Differences			
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}
		Pellston	1	21.1275	1361.76	1858.74	2205.43	2471.64	17.6742	846.21	1127.32	1195.38
			2	3.4533	515.55	834.71	1078.11	1276.26				
Climate	Subabase Thickness	Lansing	1	11.4548	904.89	1289.77	1568.66	1779.22	-1.2794	-40.81	-97.74	-128.82
			2	12.7342	945.7	1363.04	1666.4	1908.04				
		Detroit	1	12.1943	902.96	1289.69	1571.68	1787.25	-1.2149	-36.75	-87.43	-115.91
			2	13.4092	939.71	1355.09	1659.11	1903.16				
		Pellston	1	11.6493	916.18	1310.7	1593.81	1812.04	-1.2822	-44.96	-95.92	-123.81
			2	12.9315	961.14	1382.75	1689.73	1935.85				
Climate	Subabase Material	Lansing	1	19.271	1349.62	1830.65	2159.75	2404.78	14.353	848.64	1084.45	1122.29
			2	4.918	500.98	822.16	1075.3	1282.49				
		Detroit	1	20.5586	1350.98	1837.64	2174.58	2424.44	15.5138	859.29	1118.37	1158.47
			2	5.0448	491.69	807.15	1056.21	1265.97				
		Pellston	1	19.6714	1372.15	1869.85	2208.68	2463.88	14.762	866.98	1133.81	1179.86
			2	4.9094	505.17	823.6	1074.87	1284.02				
Climate	Subgrade Material	Lansing	1	4.4129	546.03	834.51	1058	1236.35	-15.363	-758.54	-1119.1	-1214.6
			2	19.7761	1304.57	1818.3	2177.05	2450.91				
		Detroit	1	4.6496	532.9	820.73	1045.96	1228.94	-16.304	-776.86	-1138.9	-1232.5
			2	20.9539	1309.76	1824.06	2184.83	2461.47				
		Pellston	1	4.4865	556.5	851.51	1077.41	1261.69	-15.608	-764.32	-1128.7	-1224.5
			2	20.0943	1320.82	1841.94	2206.13	2486.21				
AC Layer	AC Agg	1	1	19.0533	1669.73	2424.11	2980.2	3412.47	-11.463	-369	-518.01	-562.57

Input Variables		Levels1	Levels2	Long. Cracking					Mean Differences			
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}
Thickness	Gradation		2	30.5161	2038.73	2890.78	3498.21	3975.04				
		2	1	0.0127	5.12	12.1	20.48	28.45	0.0127	4.98	19.78	27.37
			2	0	0.14	0.37	0.7	1.08				
AC Layer Thickness	AC Eff.Binder	1	1	43.3795	2605.41	3496.11	4122.76	4602.96	37.1895	1502.36	1767.11	1818.4
			2	6.19	1103.05	1818.78	2355.65	2784.56				
		2	1	0.0127	5.2	12.31	20.89	29.08	0.0127	5.14	20.6	28.63
			2	0	0.06	0.16	0.29	0.45				
AC Layer Thickness	SPV Binder	1	PG 64-34	31.0142	1918.64	2727.62	3313.33	3770.93	12.4589	128.82	148.25	154.34
			PG 58-22	18.5553	1789.82	2587.27	3165.08	3616.59				
		2	PG 64-34	0.0127	5.19	12.28	20.81	28.96	0.0127	5.12	20.44	28.39
			PG 58-22	0	0.07	0.19	0.37	0.57				
AC Layer Thickness	AC Air Voids	1	1	0.4399	182.48	432.36	720.64	1006.75	-48.69	-3343.5	-5037.1	-5374
			2	49.1295	3525.98	4882.53	5757.76	6380.77				
		2	1	0.0127	5.09	12.01	20.31	28.18	0.0127	4.92	19.44	26.83
			2	0	0.17	0.46	0.87	1.35				
AC Layer Thickness	Base Thickness	1	1	28.3131	2059.81	2910.59	3517.47	3988.2	7.0567	411.16	556.54	588.88
			2	21.2564	1648.65	2404.3	2960.93	3399.32				
		2	1	0.0055	2.2	5.44	9.68	14.1	-0.0017	-0.86	-1.82	-1.32
			2	0.0072	3.06	7.03	11.5	15.42				
AC Layer Thickness	Base Material	1	1	42.6447	2690.84	3668.07	4351	4871.22	35.72	1673.22	2223.59	2354.92
			2	6.9247	1017.62	1646.82	2127.41	2516.3				

Input Variables		Levels1	Levels2	Long. Cracking					Mean Differences			
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}
		2	1	0.0091	4.05	9.43	15.75	21.55	0.0055	2.83	10.32	13.57
			2	0.0036	1.22	3.03	5.43	7.98				
AC Layer Thickness	Subabase Thickness	1	1	23.5248	1812.95	2586.4	3144.6	3570.26	-2.5199	-82.56	-189.21	-247
			2	26.0447	1895.51	2728.49	3333.81	3817.26				
		2	1	0.0075	3.07	7.04	11.5	15.41	0.0023	0.88	1.82	1.29
			2	0.0052	2.19	5.43	9.68	14.12				
AC Layer Thickness	Subabase Material	1	1	39.6558	2710.21	3680.43	4342.32	4834.86	29.7422	1711.97	2206.23	2282.21
			2	9.9136	998.24	1634.46	2136.09	2552.65				
		2	1	0.0116	4.95	11.66	19.69	27.2	0.0105	4.64	18.2	24.87
			2	0.0011	0.31	0.81	1.49	2.33				
AC Layer Thickness	Subgrade Material	1	1	9.0301	1089.04	1668.13	2115.51	2476.82	-31.509	-1530.4	-2247.4	-2433.9
			2	40.5393	2619.42	3646.76	4362.9	4910.69				
		2	1	0.0025	1.24	3.03	5.4	7.83	-0.0077	-2.78	-10.38	-13.87
			2	0.0102	4.02	9.44	15.78	21.7				
AC Agg Gradation	AC Eff.Binder	1	1	16.6161	1207.89	1645.08	1957.44	2196.59	14.1661	740.92	914.19	952.26
			2	2.45	466.97	791.13	1043.25	1244.33				
		2	1	26.7761	1402.72	1863.34	2186.21	2435.44	23.0361	766.58	873.52	894.77
			2	3.74	636.14	1027.81	1312.69	1540.67				
AC Agg Gradation	SPV Binder	1	PG 64-34	12.3188	866.42	1247.46	1532.6	1756.74	5.5715	57.98	64.51	72.55
			PG 58-22	6.7473	808.44	1188.75	1468.09	1684.19				
		2	PG 64-34	18.7081	1057.41	1492.44	1801.55	2043.15	6.9001	75.96	104.19	110.18

Input Variables		**Levels1**	**Levels2**	**Long. Cracking**					**Mean Differences**			
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	**$\Delta_{1/12}$**	**Δ_{5}**	**Δ_{10}**	**Δ_{20}**
			PG 58-22	11.808	981.45	1398.71	1697.36	1932.97				
AC Agg Gradation	AC Air Voids	1	1	0.1598	72.88	176.75	303.92	431.26	-18.747	-1529.1	-2392.8	-2578.4
			2	18.9063	1601.98	2259.46	2696.76	3009.67				
		2	1	0.2929	114.7	267.61	437.04	603.67	-29.93	-1809.5	-2624.8	-2768.8
			2	30.2233	1924.17	2623.54	3061.87	3372.44				
AC Agg Gradation	Base Thickness	1	1	10.8604	932.11	1336.52	1632.25	1862.57	2.6547	189.36	263.82	284.21
			2	8.2057	742.75	1099.69	1368.43	1578.36				
		2	1	17.4583	1129.9	1579.52	1894.9	2139.73	4.4004	220.94	290.9	303.34
			2	13.0579	908.96	1311.64	1604	1836.39				
AC Agg Gradation	Base Material	1	1	16.3132	1237.67	1713.15	2051.62	2307.53	13.5603	800.48	1102.55	1174.13
			2	2.7529	437.19	723.06	949.07	1133.4				
		2	1	26.3406	1457.22	1964.36	2315.13	2585.24	22.1651	875.57	1131.36	1194.36
			2	4.1755	581.65	926.79	1183.77	1390.88				
AC Agg Gradation	Subabase Thickness	1	1	9.0254	815.65	1179.48	1449.67	1654.7	-1.0153	-43.55	-101.34	-131.53
			2	10.0407	859.2	1256.73	1551.01	1786.23				
		2	1	14.5069	1000.37	1413.96	1706.43	1930.97	-1.5023	-38.12	-86.05	-114.17
			2	16.0092	1038.49	1477.19	1792.48	2045.14				
AC Agg Gradation	Subabase Material	1	1	14.8805	1241.22	1714.94	2045.66	2289.54	10.6949	807.59	1090.63	1138.15
			2	4.1856	433.63	721.27	955.03	1151.39				
		2	1	24.7869	1473.94	1977.15	2316.35	2572.52	19.0577	909.02	1133.79	1168.92
			2	5.7292	564.92	914	1182.56	1403.6				

Input Variables		Levels1	Levels2	Long. Cracking					Mean Differences			
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}
AC Agg Gradation	Subgrade Material	1	1	3.104	476.18	745.4	958.16	1128.79	-12.858	-722.5	-1084.4	-1183.3
			2	15.962	1198.68	1690.81	2042.53	2312.13				
		2	1	5.9286	614.11	925.76	1162.76	1355.86	-18.659	-810.65	-1173.4	-1264.4
			2	24.5875	1424.76	1965.39	2336.14	2620.26				
AC Eff. Binder	SPV Binder	1	PG 64-34	27.2163	1342.02	1792.42	2114.13	2362.79	11.0404	73.43	84.61	93.54
			PG 58-22	16.1759	1268.59	1716	2029.52	2269.25				
		2	PG 64-34	3.8106	581.81	947.48	1220.01	1437.1	1.4312	60.51	84.08	89.19
			PG 58-22	2.3794	521.3	871.46	1135.93	1347.91				
AC Eff. Binder	AC Air Voids	1	1	0.3731	155.77	361.54	589.46	805.4	-42.646	-2299.1	-2964.7	-3021.2
			2	43.0191	2454.84	3146.89	3554.19	3826.64				
		2	1	0.0795	31.8	82.83	151.5	229.53	-6.0309	-1039.5	-2052.9	-2326
			2	6.1104	1071.3	1736.1	2204.44	2555.48				
AC Eff. Binder	Base Thickness	1	1	24.7046	1429.48	1898.48	2229.26	2481.86	6.017	248.34	314.87	331.68
			2	18.6876	1181.14	1609.94	1914.39	2150.18				
		2	1	3.614	632.54	1017.55	1297.9	1520.44	1.038	161.97	239.86	255.88
			2	2.576	470.57	801.39	1058.04	1264.56				
AC Eff. Binder	Base Material	1	1	37.3785	1843.97	2349.65	2703.84	2973.46	31.3648	1077.33	1264.03	1314.89
			2	6.0137	766.64	1158.78	1439.81	1658.57				
		2	1	5.2753	850.91	1327.86	1662.91	1919.3	4.3606	598.72	969.88	1053.6
			2	0.9147	252.19	491.08	693.03	865.7				
AC Eff.	Subabase	1	1	20.5035	1260.75	1682.96	1983.35	2209.3	-2.3852	-89.11	-176.95	-213.43

Input Variables		Levels1	Levels2	Long. Cracking					Mean Differences			
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}
Binder	Thickness		2	22.8887	1349.86	1825.46	2160.3	2422.73				
		2	1	3.0288	555.27	910.48	1172.75	1376.37	-0.1324	7.43	-10.44	-32.27
			2	3.1612	547.84	908.46	1183.19	1408.64				
AC Eff. Binder	Subabase Material	1	1	34.6167	1832.86	2322.96	2660.93	2914.77	25.8412	1055.11	1178.21	1197.5
			2	8.7755	777.75	1185.47	1482.72	1717.27				
		2	1	5.0507	882.3	1369.14	1701.08	1947.29	3.9115	661.5	1046.22	1109.57
			2	1.1392	220.8	449.8	654.86	837.72				
AC Eff. Binder	Subgrade Material	1	1	7.8123	811.89	1164.46	1427.19	1634.3	-27.768	-986.83	-1289.3	-1363.4
			2	35.5799	1798.72	2343.97	2716.46	2997.74				
		2	1	1.2204	278.39	506.7	693.73	850.35	-3.7492	-546.33	-968.48	-1084.3
			2	4.9696	824.72	1312.23	1662.21	1934.65				
SPV Binder	AC Air Voids	PG 64-34	1	0.3119	106.34	246.84	406.37	563.46	-30.403	-1711.2	-2521.4	-2673
			2	30.7149	1817.49	2493.06	2927.77	3236.43				
		PG 58-22	1	0.1407	81.24	197.53	334.59	471.47	-18.274	-1627.4	-2496.3	-2674.2
			2	18.4146	1708.65	2389.93	2830.86	3145.69				
SPV Binder	Base Thickness	PG 64-34	1	18.0191	1068.81	1499.01	1806.99	2047.47	5.0113	213.79	279.84	295.05
			2	13.0078	855.02	1240.89	1527.15	1752.42				
		PG 58-22	1	10.2995	993.2	1417.02	1720.16	1954.84	2.0437	196.51	274.88	292.52
			2	8.2558	796.69	1170.44	1445.28	1662.32				
SPV Binder	Base Material	PG 64-34	1	26.7803	1383.98	1874.24	2221.5	2487.92	22.5337	844.13	1108.86	1175.96
			2	4.2466	539.85	865.66	1112.64	1311.96				

Input Variables				**Long. Cracking**					**Mean Differences**			
1	**2**	**Levels1**	**Levels2**	**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	**$\Delta_{1/12}$**	**Δ_5**	**Δ_{10}**	**Δ_{20}**
		PG 58-22	1	15.8735	1310.9	1803.26	2145.25	2404.84	13.1917	831.91	1125.06	1192.52
			2	2.6818	478.99	784.2	1020.19	1212.32				
SPV Binder	Subabase Thickness	PG 64-34	1	14.9603	948.65	1344.63	1631.02	1849.39	-1.1063	-26.53	-72.1	-101.11
			2	16.0666	975.18	1395.27	1703.12	1950.5				
		PG 58-22	1	8.572	867.37	1248.81	1525.08	1736.29	-1.4113	-55.15	-115.29	-144.58
			2	9.9833	922.52	1338.65	1640.37	1880.87				
SPV Binder	Subabase Material	PG 64-34	1	25.2377	1398.29	1886.97	2225.34	2479.74	19.4485	872.75	1116.54	1159.59
			2	5.7892	525.54	852.93	1108.8	1320.15				
		PG 58-22	1	14.4297	1316.88	1805.12	2136.66	2382.32	10.3041	843.87	1107.88	1147.49
			2	4.1256	473.01	782.34	1028.78	1234.83				
SPV Binder	Subgrade Material	PG 64-34	1	5.786	568.27	859.39	1085.14	1268.78	-19.455	-787.29	-1163.9	-1262.3
			2	25.2409	1355.56	1880.51	2249.01	2531.11				
		PG 58-22	1	3.2466	522.02	811.78	1035.78	1215.88	-12.062	-745.85	-1093.9	-1185.4
			2	15.3087	1267.87	1775.68	2129.67	2401.28				
AC Air Voids	Base Thickness	1	1	0.2506	109.18	257.49	426.62	593.13	0.0486	30.78	112.28	151.33
			2	0.202	78.4	186.88	314.34	441.8				
		2	1	28.068	1952.84	2658.55	3100.53	3409.17	7.0065	379.53	442.43	436.23
			2	21.0615	1573.31	2224.45	2658.1	2972.94				
AC Air Voids	Base Material	1	1	0.3756	157.76	368.17	603.96	830.19	0.2985	127.94	466.96	625.45
			2	0.0771	29.82	76.2	137	204.74				
		2	1	42.2783	2537.13	3309.33	3762.79	4062.58	35.427	1548.11	1766.95	1743.05

Input Variables		Levels1	Levels2	Long. Cracking					Mean Differences			
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}
			2	6.8513	989.02	1573.66	1995.84	2319.53				
AC Air Voids	Subabase Thickness	1	1	0.2144	91.78	217.15	361.56	503.26	-0.0238	-4.02	-17.83	-28.41
			2	0.2382	95.8	227.22	379.39	531.67				
		2	1	23.3179	1724.25	2376.29	2794.54	3082.41	-2.4938	-77.65	-169.56	-217.29
			2	25.8117	1801.9	2506.7	2964.1	3299.7				
AC Air Voids	Subabase Material	1	1	0.3302	158.69	372.5	611.96	839.97	0.2078	129.81	482.97	645.01
			2	0.1224	28.88	71.86	128.99	194.96				
		2	1	39.3372	2556.47	3319.59	3750.04	4022.09	29.5448	1586.8	1741.45	1662.06
			2	9.7924	969.67	1563.4	2008.59	2360.03				
AC Air Voids	Subgrade Material	1	1	0.0627	30.07	74.72	133.25	197.3	-0.3273	-127.43	-474.46	-640.33
			2	0.39	157.5	369.65	607.71	837.63				
		2	1	8.9699	1060.21	1596.45	1987.67	2287.35	-31.19	-1405.7	-1783.3	-1807.4
			2	40.1596	2465.93	3286.55	3770.96	4094.77				
Base Thickness	Base Material	1	1	23.0526	1386.56	1871.72	2212.35	2474.16	17.7865	711.11	897.55	946.02
			2	5.2661	675.45	1044.31	1314.8	1528.14				
		2	1	19.6013	1308.32	1805.78	2154.4	2418.6	17.939	964.93	1336.36	1422.46
			2	1.6623	343.39	605.54	818.04	996.14				
Base Thickness	Subabase Thickness	1	1	13.9745	1037.18	1457.05	1754.72	1979.97	-0.3696	12.35	-17.71	-42.36
			2	14.3441	1024.83	1458.98	1772.43	2022.33				
		2	1	9.5578	778.84	1136.39	1401.37	1605.7	-2.148	-94.02	-169.69	-203.34
			2	11.7058	872.86	1274.94	1571.06	1809.04				

Input Variables		Levels1	Levels2	Long. Cracking					Mean Differences			
1	2			1 month	5 years	10 years	15 years	20 years	$\Delta_{1/12}$	Δ_5	Δ_{10}	Δ_{20}
Base Thickness	Subabase Material	1	1	23.8217	1558.54	2083.92	2438.86	2701.35	19.3248	1055.07	1350.57	1400.4
			2	4.4969	503.47	832.11	1088.29	1300.95				
		2	1	15.8457	1156.62	1608.17	1923.14	2160.71	10.4278	661.54	873.85	906.68
			2	5.4179	495.08	803.15	1049.29	1254.03				
Base Thickness	Subgrade Material	1	1	5.1338	629.6	952.83	1200.85	1399.1	-18.051	-802.81	-1125.5	-1204.1
			2	23.1848	1432.41	1963.2	2326.3	2603.21				
		2	1	3.8988	460.68	718.33	920.07	1085.55	-13.466	-730.34	-1132.3	-1243.6
			2	17.3648	1191.02	1692.99	2052.37	2329.19				
Base Material	Subabase Thickness	1	1	20.1905	1329.64	1811.13	2150.72	2406.08	-2.2729	-35.6	-65.31	-80.6
			2	22.4634	1365.24	1866.37	2216.03	2486.68				
		2	1	3.3418	486.38	782.3	1005.38	1179.59	-0.2447	-46.07	-122.08	-165.1
			2	3.5865	532.45	867.55	1127.46	1344.69				
Base Material	Subabase Material	1	1	33.8961	1909.73	2463.34	2827.8	3092.94	25.1384	1124.58	1288.85	1293.11
			2	8.7577	785.15	1214.16	1538.95	1799.83				
		2	1	5.7713	805.43	1228.75	1534.21	1769.12	4.6142	592.03	935.58	1013.96
			2	1.1571	213.4	421.1	598.63	755.16				
Base Material	Subgrade Material	1	1	8.3557	915.02	1339.88	1650.28	1890.6	-25.942	-864.85	-1066.2	-1111.6
			2	34.2981	1779.87	2337.62	2716.47	3002.17				
		2	1	0.6769	175.27	331.28	470.64	594.05	-5.5746	-668.3	-1191.6	-1336.2
			2	6.2515	843.57	1318.57	1662.2	1930.22				
Subabase	Subabase	1	1	18.7969	1311.8	1776.79	2096.81	2331.7	14.0615	807.58	1037.52	1077.73

Input Variables		**Levels1**	**Levels2**	**Long. Cracking**					**Mean Differences**			
1	**2**			**1 month**	**5 years**	**10 years**	**15 years**	**20 years**	**$\Delta_{1/12}$**	**Δ_{5}**	**Δ_{10}**	**Δ_{20}**
Thickness	Material		2	4.7354	504.22	816.64	1059.29	1253.97				
		2	1	20.8705	1403.36	1915.3	2265.19	2530.36	15.6911	909.03	1186.89	1229.35
			2	5.1794	494.33	818.62	1078.3	1301.01				
Subabase Thickness	Subgrade Material	1	1	3.3215	471.21	718.68	913.62	1066.44	-16.889	-873.61	-1328.9	-1452.8
			2	20.2108	1344.82	1874.75	2242.48	2519.23				
		2	1	5.7111	619.08	952.48	1207.29	1418.21	-14.628	-659.54	-928.91	-994.96
			2	20.3388	1278.62	1781.44	2136.2	2413.17				
Subabase Material	Subgrade Material	1	1	7.6242	908.94	1318	1608.4	1826.99	-24.419	-897.29	-1145.2	-1208.1
			2	32.0432	1806.23	2374.1	2753.61	3035.07				
		2	1	1.4084	181.35	353.17	512.52	657.66	-7.098	-635.86	-1112.5	-1239.7
			2	8.5064	817.21	1282.1	1625.06	1897.33				