

APPENDIX C - VERIFICATION

This appendix summarizes the detailed results presented in Chapter 5. The appendix covers the following topics for each selected project:

- Input variable data for each project
- Validation results for each project

C.1 INPUT VARIABLE DATA

The details regarding the input variable values were discussed in Chapter 5.4 of the main report. The values presented here goes into more detail regarding each project.

C.1.1 Unbonded Overlays

The unbonded overlay projects are summarized by project information, pavement cross-section, MEPDG inputs and TTC information if available. The values were used to represent each project in DARWin-ME.

Table C.1.1-1 Unbonded overlay project 37997

Project Information		MEPDG Inputs	
Job number:	37997	Traffic	
Project CS:	3111	Two way AADTT	4250
Region:	Southwest	Lanes in design direction	2
Route	US 131 NB, SB	Climate	Kalamazoo
Year opened	1998	Overlay Layer	
CAADT	4250	PCC Thickness (in)	7.1
Repairs:		PCC MOR (psi)	650
2001	Diamond Grinding	AC Interlayer	
2006	Joint Seal & CPR	AC Thickness (in)	1
		AC PG or Penetration Grade	PG 58-28
Pavement Cross Section	Thickness (in)	AC Mixture air voids	3
PCC Overlay	7.1	Design % asphalt	6
AC Interlayer	1	3/4 inch sieve	0
Existing PCC	9	3/8 inch sieve	15.2
Base	3	No. 4	33.3
Subbase	11	No. 200	5.2
		Existing PCC	
TTC Site	7109	PCC Thickness (in)	9
Vehicle Class	Vehicle %	PCC Elastic Modulus (psi)	3,000,000
4	1.17	Base Layer	
5	43.69	Thickness (in)	3
6	4.20	Material type	Crushed Stone
7	1.16	Modulus (psi)	30000
8	4.28	Subbase Layer	
9	37.28	Thickness (in)	11
10	3.87	Material type	A-3
11	0.47	Modulus (psi)	13500
12	0.24	Subgrade	
13	3.64	Material type	SP1-A-3
Sum	100	Modulus (psi)	27739/ 7000

Table C.1.1-2 Unbonded overlay project 34120

Project Information		MEPDG Inputs	
Job number:	34120	Traffic	
Project CS:	47014	Two way AADTT	4279
Region:	University	Lanes in design direction	2
Route	US-23 NB, SB	Climate	Ann Arbor
Year opened	1999	Overlay Layer	
CAADT	4279	PCC Thickness (in)	7.9
Repairs:		PCC MOR (psi)	650
		AC Interlayer	
		AC Thickness (in)	1
		AC PG or Penetration Grade	PG 58-28
		AC Mixture air voids	
Pavement Cross Section		Design % asphalt	
PCC Overlay	7.9	3/4 inch sieve	0
AC Interlayer	1	3/8 inch sieve	15.2
Existing PCC	9	No. 4	33.3
Base	3	No. 200	5.2
Subbase	14	Existing PCC	
		PCC Thickness (in)	9
TTC Site	8229	PCC Elastic Modulus (psi)	3,000,000
Vehicle Class	Vehicle %	Base Layer	
4	2.46	Thickness (in)	3
5	23.46	Material type	Crushed Stone
6	4.32	Modulus (psi)	25000
7	1.40	Subbase Layer	
8	4.07	Thickness (in)	14
9	50.08	Material type	A-3
10	5.78	Modulus (psi)	13500
11	1.65	Subgrade	
12	0.56	Material type	SP2-A-3
13	6.22	Modulus (psi)	25113/ 6500
Sum	100.00		

Table C.1.1-3 Unbonded overlay project 49029

Project Information		MEPDG Inputs	
Job number:	49029	Traffic	
Project CS:	13074	Two way AADTT	5700
Region:	Southwest	Lanes in design direction	2
Route	I-69 NB, SB	Climate	Kalamazoo
Year opened	1999	Overlay Layer	
CAADT	5700	PCC Thickness (in)	7.1
Repairs:		PCC MOR (psi)	650
2004	Joint Seal and CPR	AC Interlayer	
2007	Joint Seal	AC Thickness (in)	1
2008	CPR	AC PG or Penetration Grade	PG 58-28
		AC Mixture air voids	3
Pavement Cross Section	Thickness (in)	Design % asphalt	6.3
PCC Overlay	7.1	3/4 inch sieve	0
AC Interlayer	1	3/8 inch sieve	2.6
Existing PCC	9	No. 4	24.75
Base	4	No. 200	5.3
Subbase	10	Existing PCC	
		PCC Thickness (in)	9
TTC Site	7269	PCC Elastic Modulus (psi)	3,000,000
Vehicle Class	Vehicle %	Base Layer	
4	1.30	Thickness (in)	4
5	9.14	Material type	Crushed Stone
6	1.65	Modulus (psi)	30000
7	0.09	Subbase Layer	
8	3.02	Thickness (in)	10
9	80.54	Material type	A-3
10	1.11	Modulus (psi)	13500
11	2.34	Subgrade	
12	0.52	Material type	SP1-A-3
13	0.28	Modulus (psi)	27739/ 7000
Sum	100.00		

Table C.1.1-4 Unbonded overlay project 45591

Project Information		MEPDG Inputs	
Job number:	45591	Traffic	
Project CS:	13074-23061	Two way AADTT	5595
Region:	Southwest, University	Lanes in design direction	2
Route	I-69 NB, SB	Climate	Battle Creek
Year opened	2000	Overlay Layer	
CAADT	5595	PCC Thickness (in)	7
Repairs:		PCC MOR (psi)	650
2008	CPR	AC Interlayer	
		AC Thickness (in)	1
		AC PG or Penetration Grade	PG 58-28
Pavement Cross Section	Thickness (in)	AC Mixture air voids	
PCC Overlay	7	Design % asphalt	
AC Interlayer	1	3/4 inch sieve	0
Existing PCC	9	3/8 inch sieve	2.6
Base	4	No. 4	24.75
Subbase	10	No. 200	94.7
		Existing PCC	
TTC Site	7269	PCC Thickness (in)	9
Vehicle Class	Vehicle %	PCC Elastic Modulus (psi)	3,000,000
4	1.30	Base Layer	
5	9.14	Thickness (in)	4
6	1.65	Material type	Crushed Stone
7	0.09	Modulus (psi)	30000
8	3.02	Subbase Layer	
9	80.54	Thickness (in)	10
10	1.11	Material type	A-3
11	2.34	Modulus (psi)	13500
12	0.52	Subgrade	
13	0.28	Material type	SP1-A-3
Sum	100.00	Modulus (psi)	27739/ 7000

Table C.1.1-5 Unbonded overlay project 38209

Project Information		MEPDG Inputs	
Job number:	38209	Traffic	
Project CS:	41132-41133	Two way AADTT	2744
Region:	Grand	Lanes in design direction	2
Route	US 131 NB, SB	Climate	Grand Rapids
Year opened	2000	Overlay Layer	
CAADT	2744	PCC Thickness (in)	7
Repairs:		PCC MOR (psi)	650
2010	Joint Seal	AC Interlayer	
		AC Thickness (in)	1
		AC PG or Penetration Grade	PG 52-28
Pavement Cross Section	Thickness (in)	AC Mixture air voids	3
PCC Overlay	7	Design % asphalt	5.7
AC Interlayer	1	3/4 inch sieve	0
Existing PCC	9	3/8 inch sieve	15.2
Base	4	No. 4	33.3
Subbase	10	No. 200	5.2
		Existing PCC	
TTC Site	5249	PCC Thickness (in)	9
Vehicle Class	Vehicle %	PCC Elastic Modulus (psi)	3,000,000
4	1.30	Base Layer	
5	35.36	Thickness (in)	4
6	3.36	Material type	Crushed Stone
7	0.87	Modulus (psi)	30000
8	3.35	Subbase Layer	
9	43.74	Thickness (in)	10
10	4.77	Material type	A-3
11	1.60	Modulus (psi)	13500
12	0.06	Subgrade	
13	5.60	Material type	A-4
Sum	100.00	Modulus (psi)	20314/ 5000

Table C.1.1-6 Unbonded overlay project 43499

Project Information		MEPDG Inputs	
Job number:	43499	Traffic	
Project CS:	47014	Two way AADTT	5004
Region:	University	Lanes in design direction	2
Route	US-23 NB SB	Climate	Ann Arbor
Year opened	2001	Overlay Layer	
CAADT	5004	PCC Thickness (in)	7.1
Repairs:		PCC MOR (psi)	650
		AC Interlayer	
		AC Thickness (in)	1
		AC PG or Penetration Grade	PG 70-28
Pavement Cross Section	Thickness (in)	AC Mixture air voids	
PCC Overlay	7.1	Design % asphalt	
AC Interlayer	1	3/4 inch sieve	0
Existing PCC	9	3/8 inch sieve	2.6
Base	3	No. 4	24.75
Subbase	14	No. 200	94.7
		Existing PCC	
TTC Site	8229	PCC Thickness (in)	9
Vehicle Class	Vehicle %	PCC Elastic Modulus (psi)	3,000,000
4	2.46	Base Layer	
5	23.46	Thickness (in)	3
6	4.32	Material type	Crushed Stone
7	1.40	Modulus (psi)	30000
8	4.07	Subbase Layer	
9	50.08	Thickness (in)	14
10	5.78	Material type	A-3
11	1.65	Modulus (psi)	13500
12	0.56	Subgrade	
13	6.22	Material type	SP2-A-3
Sum	100.00	Modulus (psi)	25113/ 6500

Table C.1.1-7 Unbonded overlay project 73873

Project Information		MEPDG Inputs	
Job number:	73873	Traffic	
Project CS:	65041	Two way AADTT	1458
Region:	North	Lanes in design direction	2
Route	I-75 NB	Climate	Houghton Lake
Year opened	2003	Overlay Layer	
CAADT	1458	PCC Thickness (in)	7
Repairs:		PCC MOR (psi)	650
2009	Long Joint Seal	AC Interlayer	
2011	Joint Seal	AC Thickness (in)	1
		AC PG or Penetration Grade	PG 64-28
		AC Mixture air voids	
Pavement Cross Section	Thickness (in)	Design % asphalt	
PCC Overlay	7	3/4 inch sieve	0
AC Interlayer	1	3/8 inch sieve	15.2
Existing PCC	9	No. 4	33.3
Base	4	No. 200	5.2
Subbase	10	Existing PCC	
		PCC Thickness (in)	9
TTC Site	4149	PCC Elastic Modulus (psi)	3,000,000
Vehicle Class	Vehicle %	Base Layer	
4	1.48	Thickness (in)	4
5	41.62	Material type	Crushed Stone
6	2.64	Modulus (psi)	30000
7	0.25	Subbase Layer	
8	4.93	Thickness (in)	10
9	29.62	Material type	A-3
10	10.39	Modulus (psi)	13500
11	0.93	Subgrade	
12	0.24	Material type	SP2-A-3
13	7.90	Modulus (psi)	25113/ 6500
Sum	100.00		

Table C.1.1-8 Unbonded overlay project 50763

Project Information		MEPDG Inputs	
Job number:	50763	Traffic	
Project CS:	39014, 3111	Two way AADTT	3185
Region:	Southwest	Lanes in design direction	2
Route	US-131 NB, SB	Climate	Kalamzoo
Year opened	2004	Overlay Layer	
CAADT	3185	PCC Thickness (in)	7
Repairs:		PCC MOR (psi)	650
		AC Interlayer	
		AC Thickness (in)	1
		AC PG or Penetration Grade	PG 58-28
Pavement Cross Section	Thickness (in)	AC Mixture air voids	4
PCC Overlay	7	Design % asphalt	5.5
AC Interlayer	1	3/4 inch sieve	0
Existing PCC	9	3/8 inch sieve	20.6
Base	4	No. 4	36.9
Subbase	10	No. 200	4.5
		Existing PCC	
TTC Site	4149	PCC Thickness (in)	9
Vehicle Class	Vehicle %	PCC Elastic Modulus (psi)	3,000,000
4	1.17	Base Layer	
5	43.69	Thickness (in)	4
6	4.20	Material type	Crushed Stone
7	1.16	Modulus (psi)	30000
8	4.28	Subbase Layer	
9	37.28	Thickness (in)	10
10	3.87	Material type	A-3
11	0.47	Modulus (psi)	13500
12	0.24	Subgrade	
13	3.64	Material type	SP1-A-3
Sum	100.00	Modulus (psi)	27739/ 7000

C.1.2 Rubblized Overlays

The rubblized overlay projects are summarized by project information, pavement cross-section, MEPDG inputs and TTC information if available. The values were used to represent each project in DARWin-ME.

Table C.1.2-1 Rubblized overlay project 28115

Project Information		MEPDG Inputs	
Job number:	28115	Traffic	
Project CS:	34031-34032	Two way AADTT	490/340
Region:	Grand	Lanes in design direction	2
Route	M-66 NB SB	Climate	Grand Rapids
Opened	1989	Overlay Layer	
CAADT	490/340	HMA Thickness (in)	5
Repairs:		HMA binder	Pen 120-150
1998	Chip seal	AC Mixture air voids	7
2000	Overband Crack fill	Design % asphalt	5.4
		3/4 inch sieve	20.4
		3/8 inch sieve	32.3
Pavement Cross Section	Thickness (in)	No. 4	41
AC overlay	5	No. 200	3.1
Existing PCC (fractured)	9	Existing PCC (fractured)	
Base	3	PCC Thickness (in)	9
Subbase	9	PCC Elastic Modulus (psi)	70,000
		Base Layer	
TTC Site	State Avg	Thickness (in)	3
Vehicle Class	Vehicle %	Material type	Crushed Stone
4	1.50	Modulus (psi)	30000
5	10.00	Subbase Layer	
6	2.00	Thickness (in)	9
7	0.80	Material type	A-3
8	2.50	Modulus (psi)	13500
9	70.00	Subgrade	
10	5.50	Material type	A-4
11	1.10	Modulus (psi)	20314/ 5000
12	0.20		
13	6.40		
Sum	100.00		

Table C.1.2-2 Rubblized overlay project 26755

Project Information		MEPDG Inputs	
Job number:	26755	Traffic	
Project CS:	20014	Two way AADTT	1550
Region:	North	Lanes in design direction	2
Route	I-75 SB	Climate	Houghton Lake
Opened	1990	Overlay Layer	
CAADT	1550	HMA Thickness (in)	4.25
Repairs:		HMA binder	Pen 120-150
1996	CF	AC Mixture air voids	
		Design % asphalt	5.7
		3/4 inch sieve	0
Pavement Cross Section	Thickness (in)	3/8 inch sieve	13.9
AC overlay	4.25	No. 4	37.2
Existing PCC (fractured)	8	No. 200	5.1
Base	0	Existing PCC (fractured)	
Subbase	0	PCC Thickness (in)	8
		PCC Elastic Modulus (psi)	70,000
TTC Site	4149	Base Layer	
Vehicle Class	Vehicle %	Thickness (in)	0
4	1.48	Material type	Crushed Stone
5	41.62	Modulus (psi)	30000
6	2.64	Subbase Layer	
7	0.25	Thickness (in)	0
8	4.93	Material type	A-3
9	29.62	Modulus (psi)	13500
10	10.39	Subgrade	
11	0.93	Material type	SP2- A-3
12	0.24	Modulus (psi)	25113/ 6500
13	7.90		
Sum	100.00		

Table C.1.2-3 Rubblized overlay project 29768

Project Information		MEPDG Inputs	
Job number:	29768	Traffic	
Project CS:	47013-47014	Two way AADTT	3390
Region:	University	Lanes in design direction	2
Route	US-23 NB, SB	Climate	Ann Arbor
Opened	1992	Overlay Layer	
CAADT	3390	HMA Thickness (in)	5.25
Repairs:		HMA binder	Pen 85-100
1999	Minor pothole patching	AC Mixture air voids	3.8
2000	CM and R	Design % asphalt	5
2004	Surface seal	3/4 inch sieve	0
2005	CT	3/8 inch sieve	13.1
2005	OCF and UT OL	No. 4	40.9
		No. 200	7.1
Pavement Cross Section	Thickness (in)	Existing PCC (fractured)	
AC overlay	5.0	PCC Thickness (in)	9
Existing PCC (fractured)	9.0	PCC Elastic Modulus (psi)	70,000
Base	3.0	Base Layer	
Subbase	14.0	Thickness (in)	3
		Material type	Crushed Stone
		Modulus (psi)	30000
TTC Site	8229	Subbase Layer	
Vehicle Class	Vehicle %	Thickness (in)	14
4	2.46	Material type	A-3
5	23.46	Modulus (psi)	13500
6	4.32	Subgrade	
7	1.40	Material type	SP2- A-3
8	4.07	Modulus (psi)	25113/ 6500
9	50.08		
10	5.78		
11	1.65		
12	0.56		
13	6.22		
Sum	100.00		

Table C.1.2-4 Rubblized overlay project 29670

Project Information		MEPDG Inputs	
Job number:	29670	Traffic	
Project CS:	13033	Two way AADTT	856
Region:	Southwest	Lanes in design direction	2
Route	I-194 NB, SB	Climate	Battle Creek
Opened	1993	Overlay Layer	
CAADT	856	HMA Thickness (in)	6.25
Repairs:		HMA binder	Pen 85-100
1999	Added 1.5" HMA	AC Mixture air voids	7
2003	CT	Design % asphalt	6.3
2007	CM and R	3/4 inch sieve	0
2010	CT	3/8 inch sieve	0.3
		No. 4	19.9
		No. 200	5.8
Pavement Cross Section	Thickness (in)	Existing PCC (fractured)	
AC overlay	6.25	PCC Thickness (in)	9
Existing PCC (fractured)	9	PCC Elastic Modulus (psi)	70,000
Base	3	Base Layer	
Subbase	9	Thickness (in)	3
		Material type	Crushed Stone
TTC Site	7159	Modulus (psi)	30000
Vehicle Class	Vehicle %	Subbase Layer	
4	1.26	Thickness (in)	9
5	13.75	Material type	A-3
6	2.08	Modulus (psi)	13500
7	0.19	Subgrade	
8	2.85	Material type	SP1- A-4
9	73.13	Modulus (psi)	27739/ 7000
10	2.38		
11	1.15		
12	0.34		
13	2.87		
Sum	100.00		

Table C.1.2-5 Rubblized overlay project 29581

Project Information		MEPDG Inputs	
Job number:	29581	Traffic	
Project CS:	33084-33083	Two way AADTT	3707
Region:	University	Lanes in design direction	2
Route	I-96 EB WB	Climate	Lansing
Opened	1994	Overlay Layer	
CAADT	3707	HMA Thickness (in)	7.5
Repairs:		HMA binder	Pen 85-100
2002	OCF	AC Mixture air voids	
2006	OCF	Design % asphalt	6.2
		3/4 inch sieve	0
Pavement Cross Section	Thickness (in)	3/8 inch sieve	16
AC overlay	7.5	No. 4	36.9
Existing PCC (fractured)	9	No. 200	4.9
Base	4	Existing PCC (fractured)	
Subbase	10	PCC Thickness (in)	9
		PCC Elastic Modulus (psi)	70,000
TTC Site	8049	Base Layer	
Vehicle Class	Vehicle %	Thickness (in)	4
4	1.89	Material type	Crushed Stone
5	17.23	Modulus (psi)	30000
6	3.11	Subbase Layer	
7	0.28	Thickness (in)	10
8	5.14	Material type	A-3
9	59.86	Modulus (psi)	13500
10	6.46	Subgrade	
11	2.11	Material type	CL - A-6
12	0.61	Modulus (psi)	17600/ 4400
13	3.32		
Sum	100.00		

Table C.1.2-6 Rubblized overlay project 28111

Project Information		MEPDG Inputs	
Job number:	28111	Traffic	
Project CS:	24021-16021	Two way AADTT	280
Region:	North	Lanes in design direction	1
Route	M-68	Climate	Pellston
Opened	1990	Overlay Layer	
CAADT	280	HMA Thickness (in)	4
Repairs:		HMA binder	Pen 200-300
1999	CT	AC Mixture air voids	
2003	CT	Design % asphalt	5.4
2007	CM and R	3/4 inch sieve	0
		3/8 inch sieve	16
Pavement Cross Section	Thickness (in)	No. 4	38.8
AC overlay	4	No. 200	5.7
Existing PCC (fractured)	9	Existing PCC (fractured)	
Base	0	PCC Thickness (in)	9
Subbase	0	PCC Elastic Modulus (psi)	70,000
		Base Layer	
TTC Site	State Avg	Thickness (in)	
Vehicle Class	Vehicle %	Material type	
4	1.50	Modulus (psi)	
5	10.00	Subbase Layer	
6	2.00	Thickness (in)	
7	0.80	Material type	
8	2.50	Modulus (psi)	
9	70.00	Subgrade	
10	5.50	Material type	SP1- A-3
11	1.10	Modulus (psi)	27739/ 7000
12	0.20		
13	6.40		
Sum	100.00		

Table C.1.2-7 Rubblized overlay project 29729

Project Information		MEPDG Inputs	
Job number:	29729	Traffic	
Project CS:	74012	Two way AADTT	370
Region:	Bay	Lanes in design direction	1
Route	M-53	Climate	Flint
Opened	1995	Overlay Layer	
CAADT	370	HMA Thickness (in)	5
Repairs:		HMA binder	Pen 120-150
2000	CT	AC Mixture air voids	
2003	CT & UT Overlay	Design % asphalt	5.2
		3/4 inch sieve	0
Pavement Cross Section	Thickness (in)	3/8 inch sieve	38.3
AC overlay	5	No. 4	52.2
Existing PCC (fractured)	9	No. 200	5.6
Base	0	Existing PCC (fractured)	
Subbase	18	PCC Thickness (in)	9
		PCC Elastic Modulus (psi)	70,000
TTC Site	State Avg	Base Layer	
Vehicle Class	Vehicle %	Thickness (in)	0
4	1.50	Material type	
5	10.00	Modulus (psi)	
6	2.00	Subbase Layer	
7	0.80	Thickness (in)	18
8	2.50	Material type	A-3
9	70.00	Modulus (psi)	13500
10	5.50	Subgrade	
11	1.10	Material type	SM - A-4
12	0.20	Modulus (psi)	24764/ 5200
13	6.40		
Sum	100.00		

Table C.1.2-8 Rubblized overlay project 45053

Project Information		MEPDG Inputs	
Job number:	45053	Traffic	
Project CS:	67021, 67022	Two way AADTT	675
Region:	North	Lanes in design direction	1
Route	US-10	Climate	Reed City
Opened	1999	Overlay Layer	
CAADT	675	HMA Thickness (in)	5.5
Repairs:		HMA binder	PG 58-28
2005	CM and R	AC Mixture air voids	
2009	OCF and Micro	Design % asphalt	6
		3/4 inch sieve	0
Pavement Cross Section	Thickness (in)	3/8 inch sieve	16.7
AC overlay	5.5	No. 4	56.2
Existing PCC (fractured)	9	No. 200	4.1
Base	3	Existing PCC (fractured)	
Subbase	12	PCC Thickness (in)	9
		PCC Elastic Modulus (psi)	70,000
TTC Site	State Avg	Base Layer	
Vehicle Class	Vehicle %	Thickness (in)	3
4	1.50	Material type	Crushed Stone
5	10.00	Modulus (psi)	30000
6	2.00	Subbase Layer	
7	0.80	Thickness (in)	12
8	2.50	Material type	A-3
9	70.00	Modulus (psi)	13500
10	5.50	Subgrade	
11	1.10	Material type	SP1- A-3
12	0.20	Modulus (psi)	27739/ 7000
13	6.40		
Sum	100.00		

Table C.1.2-9 Rubblized overlay project 44109

Project Information		MEPDG Inputs	
Job number:	44109	Traffic	
Project CS:	5001	Two way AADTT	279
Region:	North	Lanes in design direction	1
Route	US-31	Climate	Traverse City
Opened	1999	Overlay Layer	
CAADT	279	HMA Thickness (in)	7.5
Repairs:		HMA binder	PG 58-28
2007	OCF and Micro	AC Mixture air voids	8
		Design % asphalt	13
		3/4 inch sieve	0
Pavement Cross Section	Thickness (in)	3/8 inch sieve	2
AC overlay	7.5	No. 4	33.9
Existing PCC (fractured)	8	No. 200	4.5
Base	0	Existing PCC (fractured)	
Subbase	9	PCC Thickness (in)	8
		PCC Elastic Modulus (psi)	70,000
TTC Site	State Avg	Base Layer	
Vehicle Class	Vehicle %	Thickness (in)	0
4	1.50	Material type	
5	10.00	Modulus (psi)	
6	2.00	Subbase Layer	
7	0.80	Thickness (in)	9
8	2.50	Material type	A-3
9	70.00	Modulus (psi)	13500
10	5.50	Subgrade	
11	1.10	Material type	SP1-A-3
12	0.20	Modulus (psi)	27739/ 7000
13	6.40		
Sum	100.00		

Table C.1.2-10 Rubblized overlay project 38190

Project Information		MEPDG Inputs	
Job number:	38190	Traffic	
Project CS:	41033, 61171	Two way AADTT	575
Region:	Grand	Lanes in design direction	1
Route	M-37	Climate	Muske-gon
Opened	2000	Overlay Layer	
CAADT	575	HMA Thickness (in)	5.5
Repairs:		HMA binder	PG 58-28
		AC Mixture air voids	8
		Design % asphalt	10.4
		3/4 inch sieve	0
Pavement Cross Section	Thickness (in)	3/8 inch sieve	16.5
AC overlay	5.5	No. 4	33.7
Existing PCC (fractured)	9	No. 200	4.9
Base	4	Existing PCC (fractured)	
Subbase	14	PCC Thickness (in)	9
		PCC Elastic Modulus (psi)	70,000
TTC Site	State Avg	Base Layer	
Vehicle Class	Vehicle %	Thickness (in)	4
4	1.50	Material type	Crushed Stone
5	10.00	Modulus (psi)	30000
6	2.00	Subbase Layer	
7	0.80	Thickness (in)	14
8	2.50	Material type	A-3
9	70.00	Modulus (psi)	13500
10	5.50	Subgrade	
11	1.10	Material type	SP1-A-3
12	0.20	Modulus (psi)	27739/ 7000
13	6.40		
Sum	100.00		

Table C.1.2-11 Rubblized overlay project 32388

Project Information		MEPDG Inputs	
Job number:	32388	Traffic	
Project CS:	46082	Two way AADTT	455
Region:	University	Lanes in design direction	1
Route	M-50	Climate	Adrian
Opened	1997	Overlay Layer	
CAADT	455	HMA Thickness (in)	6
Repairs:		HMA binder	58-28
2001	CT	AC Mixture air voids	3
2007	CM & R	Design % asphalt	4.9
2008	CT	3/4 inch sieve	12
		3/8 inch sieve	46.5
Pavement Cross Section	Thickness (in)	No. 4	51.6
AC overlay	6	No. 200	5.1
Existing PCC (fractured)	8	Existing PCC (fractured)	
Base	0	PCC Thickness (in)	8
Subbase	12	PCC Elastic Modulus (psi)	70,000
		Base Layer	
TTC Site	State Avg	Thickness (in)	0
Vehicle Class	Vehicle %	Material type	
4	1.50	Modulus (psi)	
5	10.00	Subbase Layer	
6	2.00	Thickness (in)	12
7	0.80	Material type	A-3
8	2.50	Modulus (psi)	13500
9	70.00	Subgrade	
10	5.50	Material type	CL- A-6
11	1.10	Modulus (psi)	17600/ 4400
12	0.20		
13	6.40		
Sum	100.00		

C.1.3 Composite Overlays

The composite overlay projects are summarized by project information, pavement cross-section, MEPDG inputs and TTC information if available. The values were used to represent each project in DARWin-ME.

Table C.1.3-1 Composite overlay project 25543

Project Information		MEPDG Inputs	
Job number:	25543	Traffic	
Project CS:	25131	Two way AADTT	2250
Region:	Bay	Lanes in design direction	2
Route	I-75 NB, SB	Climate	Flint
Opened	1987	Overlay Layer	
CAADT	2250	HMA Thickness (in)	4
Repairs:	None	HMA binder	85-100
		AC Mixture air voids	
		Design % asphalt	6.1
		3/4 inch sieve	0
Pavement Cross Section	Thickness (in)	3/8 inch sieve	11.4
AC overlay	4	No. 4	31.7
Existing PCC	9	No. 200	6.5
Base	4	Existing PCC	
Subbase	10	PCC Thickness (in)	9
		PCC Compressive Strength (psi)	5,000
TTC Site	State Avg	Base Layer	
Vehicle Class	Vehicle %	Thickness (in)	4
4	1.50	Material type	Crushed Stone
5	10.00	Modulus (psi)	30000
6	2.00	Subbase Layer	
7	0.80	Thickness (in)	10
8	2.50	Material type	A-3
9	70.00	Modulus (psi)	13500
10	5.50	Subgrade	
11	1.10	Material type	SM -
12	0.20	Modulus (psi)	A-4
13	6.40		
Sum	100.00		

Table C.1.3-2 Composite overlay project 24252

Project Information		MEPDG Inputs	
Job number:	24252	Traffic	
Project CS:	80024, 39024	Two way AADTT	6250
Region:	Southwest	Lanes in design direction	2
Route	I-96 EB, WB	Climate	Kalamazoo
Opened	1988	Overlay Layer	
CAADT	6250	HMA Thickness (in)	4.5
Repairs:		HMA binder	85-100
1996	OCF in Decreasing dir.	AC Mixture air voids	
		Design % asphalt	5.6
		3/4 inch sieve	0
Pavement Cross Section	Thickness (in)	3/8 inch sieve	12
AC overlay	4.5	No. 4	31.9
Existing PCC	9	No. 200	5.4
Base	3	Existing PCC	
Subbase	9	PCC Thickness (in)	9
		PCC Compressive Strength (psi)	5,000
TTC Site	State Avg	Base Layer	
Vehicle Class	Vehicle %	Thickness (in)	3
4	1.50	Material type	Crushed Stone
5	10.00	Modulus (psi)	30000
6	2.00	Subbase Layer	
7	0.80	Thickness (in)	9
8	2.50	Material type	A-3
9	70.00	Modulus (psi)	13500
10	5.50	Subgrade	
11	1.10	Material type	SP1-A-3
12	0.20	Modulus (psi)	27739/ 7000
13	6.40		
Sum	100.00		

Table C.1.3-3 Composite overlay project 29586

Project Information		MEPDG Inputs	
Job number:	29586	Traffic	
Project CS:	41026, 70063	Two way AADTT	2882
Region:	Grand	Lanes in design direction	2
Route	I-96 EB, WB	Climate	Grand Rapids
Opened	1990	Overlay Layer	
CAADT	2882	HMA Thickness (in)	3
Repairs:		HMA binder	85-100
1999	CM and R	AC Mixture air voids	
		Design % asphalt	6
		3/4 inch sieve	0
Pavement Cross Section	Thickness (in)	3/8 inch sieve	11.6
AC overlay	3	No. 4	36.2
Existing PCC	9	No. 200	6.5
Base	3	Existing PCC	
Subbase	12	PCC Thickness (in)	9
		PCC Compressive Strength (psi)	5,000
TTC Site	State Avg	Base Layer	
Vehicle Class	Vehicle %	Thickness (in)	3
4	1.50	Material type	Crushed Stone
5	10.00	Modulus (psi)	30000
6	2.00	Subbase Layer	
7	0.80	Thickness (in)	12
8	2.50	Material type	A-3
9	70.00	Modulus (psi)	13500
10	5.50	Subgrade	
11	1.10	Material type	A-4
12	0.20	Modulus (psi)	20314/ 5000
13	6.40		
Sum	100.00		

Table C.1.3-4 Composite overlay project 29716

Project Information		MEPDG Inputs	
Job number:	29716	Traffic	
Project CS:	67051, 83051	Two way AADTT	672
Region:	North	Lanes in design direction	2
Route	M-115	Climate	Reed City
Opened	1992	Overlay Layer	
CAADT	672	HMA Thickness (in)	3.75
Repairs:		HMA binder	85-100
2000	OCF	AC Mixture air voids	
		Design % asphalt	
		3/4 inch sieve	
Pavement Cross Section	Thickness (in)	3/8 inch sieve	
AC overlay	3.75	No. 4	
Existing PCC	9	No. 200	
Base	3	Existing PCC	
Subbase	12	PCC Thickness (in)	9
		PCC Compressive Strength (psi)	5,000
TTC Site	State Avg	Base Layer	
Vehicle Class	Vehicle %	Thickness (in)	3
4	1.50	Material type	Crushed Stone
5	10.00	Modulus (psi)	30000
6	2.00	Subbase Layer	
7	0.80	Thickness (in)	12
8	2.50	Material type	A-3
9	70.00	Modulus (psi)	13500
10	5.50	Subgrade	
11	1.10	Material type	SP1- A-3
12	0.20	Modulus (psi)	27739/7000
13	6.40		
Sum	100.00		

Table C.1.3-5 Composite overlay project 33812

Project Information		MEPDG Inputs	
Job number:	33812	Traffic	
Project CS:	50031	Two way AADTT	1380
Region:	Metro	Lanes in design direction	2
Route	M-97	Climate	Detroit
Opened	1995	Overlay Layer	
CAADT	1380	HMA Thickness (in)	3
Repairs:		HMA binder	85-100
1998	Micro	AC Mixture air voids	3.5
2005	CM and R	Design % asphalt	5.3
		3/4 inch sieve	0
Pavement Cross Section	Thickness (in)	3/8 inch sieve	38.3
AC overlay	3	No. 4	56
Existing PCC	9	No. 200	5.6
Base	3	Existing PCC	
Subbase	14	PCC Thickness (in)	9
		PCC Compressive Strength (psi)	5,000
TTC Site	State Avg	Base Layer	
Vehicle Class	Vehicle %	Thickness (in)	3
4	1.50	Material type	Crushed Stone
5	10.00	Modulus (psi)	30000
6	2.00	Subbase Layer	
7	0.80	Thickness (in)	14
8	2.50	Material type	A-3
9	70.00	Modulus (psi)	13500
10	5.50	Subgrade	
11	1.10	Material type	SP1-A-3
12	0.20	Modulus (psi)	27739/ 7000
13	6.40		
Sum	100.00		

Table C.1.3-6 Composite overlay project 33924

Project Information		MEPDG Inputs	
Job number:	33924	Traffic	
Project CS:	9032	Two way AADTT	1000
Region:	Bay	Lanes in design direction	2
Route	M-13	Climate	Bay City
Opened	1996	Overlay Layer	
CAADT	1000	HMA Thickness (in)	4
Repairs:		HMA binder	85-100
1999	Micro	AC Mixture air voids	3.5
		Design % asphalt	5
		3/4 inch sieve	0
		3/8 inch sieve	39
Pavement Cross Section	Thickness (in)	No. 4	61
AC overlay	4	No. 200	5
Existing PCC	8	Existing PCC	
Base	4	PCC Thickness (in)	8
Subbase	10	PCC Compressive Strength (psi)	5,000
		Base Layer	
TTC Site	State Avg	Thickness (in)	4
Vehicle Class	Vehicle %	Material type	Crushed Stone
4	1.50	Modulus (psi)	30000
5	10.00	Subbase Layer	
6	2.00	Thickness (in)	10
7	0.80	Material type	A-3
8	2.50	Modulus (psi)	13500
9	70.00	Subgrade	
10	5.50	Material type	SC - A-6
11	1.10	Modulus (psi)	17600/ 4400
12	0.20		
13	6.40		
Sum	100.00		

Table C.1.3-7 Composite overlay project 45443

Project Information		MEPDG Inputs	
Job number:	45443	Traffic	
Project CS:	32011	Two way AADTT	512
Region:	Bay	Lanes in design direction	2
Route	M-25	Climate	Bay City
Opened	2000	Overlay Layer	
CAADT	512	HMA Thickness (in)	3.5
Repairs:		HMA binder	58-28
2002	CT	AC Mixture air voids	4
		Design % asphalt	5
		3/4 inch sieve	2.6
		3/8 inch sieve	22.9
Pavement Cross Section	Thickness (in)	No. 4	34.2
AC overlay	3.5	No. 200	4.5
Existing PCC	8	Existing PCC	
Base	0	PCC Thickness (in)	8
Subbase	15	PCC Compressive Strength (psi)	5,000
		Base Layer	
TTC Site	State Avg	Thickness (in)	0
Vehicle Class	Vehicle %	Material type	Crushed Stone
4	1.50	Modulus (psi)	30000
5	10.00	Subbase Layer	
6	2.00	Thickness (in)	15
7	0.80	Material type	A-3
8	2.50	Modulus (psi)	13500
9	70.00	Subgrade	
10	5.50	Material type	SC - A-6
11	1.10	Modulus (psi)	17600/ 4400
12	0.20		
13	6.40		
Sum	100.00		

C.1.4 HMA over HMA

The HMA overlay projects are summarized by project information, pavement cross-section, MEPDG inputs and TTC information if available. The values were used to represent each project in DARWin-ME.

Table C.1.4-1 HMA overlay project 33534

Project Information		MEPDG Inputs		
Job number:	33534	Traffic		
Project CS:	67015, 83031	Two way AADTT	450	
Region:	North	Lanes in design direction	2	
Route	US 131	Climate	Reed City	
Year opened	1992	Overlay Layer	Top	Leveling
CAADT	450	HMA Thickness (in)	1.25	1.25
Repairs:		HMA binder	120-150	
1998	OCF & Micro	AC Mixture air voids	6	6
2007	Crush and Shape	Effective Binder Content (%)	9.4	10.4
		3/4 inch sieve	0	0
		3/8 inch sieve	28.6	14.5
Pavement Cross Section	Thickness (in)	No. 4	50.2	50
HMA overlay	2.5	No. 200	4.8	5.9
Existing HMA	3.25	Existing HMA		
Base	11	HMA Thickness (in)	3.25	
Subbase	25	HMA binder	120-150	
Initial IRI	50	AC Mixture air voids	7	
Original construction	1976	Effective Binder Content (%)	11.6	
		3/4 inch sieve	0	
TTC Site	State Avg	3/8 inch sieve	28.6	
Vehicle Class	Vehicle %	No. 4	50.2	
4	1.50	No. 200	4.8	
5	10.00	Base Layer		
6	2.00	Thickness (in)	11	
7	0.80	Material type	Crushed Stone	
8	2.50	Modulus (psi)	30000	
9	70.00	Subbase Layer		
10	5.50	Thickness (in)	25	
11	1.10	Material type	A-3	
12	0.20	Modulus (psi)	13500	
13	6.40	Subgrade		
Sum	100.00	Material type	SP-1 A-3	
		Modulus (psi)	27739/ 7000	

Table C.1.4-2 HMA overlay project 33550

Project Information		MEPDG Inputs		
Job number:	33550	Traffic		
Project CS:	80012	Two way AADTT	1564	
Region:	Southwest	Lanes in design direction	2	
Route	I-196	Climate	Kalamazoo	
Year opened	1992	Overlay Layer	Top	Leveling
CAADT	1564	HMA Thickness (in)	1.5	1.5
Repairs:		HMA binder	85-100	
1999	+ 1.5" HMA	AC Mixture air voids	6.6	4.8
2002	CT	Effective Binder Content (%)	10	11
2005	CM &R	3/4 inch sieve	0	0
		3/8 inch sieve	36	10.3
		No. 4	45.6	41.4
		No. 200	6.5	7.5
Pavement Cross Section	Thickness (in)	Existing HMA		
HMA overlay	3	HMA Thickness (in)	4.5	
Existing HMA	4.5	HMA binder	85-100	
Base	8	AC Mixture air voids	7	
Subbase	28	Effective Binder Content (%)	6	
		3/4 inch sieve	0	
Initial IRI	50	3/8 inch sieve	36	
Original construction	1977	No. 4	45.6	
		No. 200	6.5	
TTC Site	State Avg	Base Layer		
Vehicle Class	Vehicle %	Thickness (in)	8	
4	1.50	Material type	Crushed Stone	
5	10.00	Modulus (psi)	30000	
6	2.00	Subbase Layer		
7	0.80	Thickness (in)	28	
8	2.50	Material type	A-3	
9	70.00	Modulus (psi)	13500	
10	5.50	Subgrade		
11	1.10	Material type	SP-1-A_3	
12	0.20	Modulus (psi)	27739/7000	
13	6.40			
Sum	100.00			

Table C.1.4-3 HMA overlay project 28155

Project Information		MEPDG Inputs		
Job number:	28155	Traffic		
Project CS:	80111	Two way AADTT	185	
Region:	Southwest	Lanes in design direction	2	
Route		Climate	Kalamazoo	
Year opened	1991	Overlay Layer	Top	Leveling
CAADT	185	HMA Thickness (in)	1.25	1.25
Repairs:		HMA binder	120-150	
		AC Mixture air voids	7	7
		Effective Binder Content (%)	11.8	11
		3/4 inch sieve	0	0
		3/8 inch sieve	11	10.6
Pavement Cross Section	Thickness (in)	No. 4	34.1	31.5
HMA overlay	2.5	No. 200	5.4	5.4
Existing HMA	5	Existing HMA		
Base	7	HMA Thickness (in)	5.2	
Subbase	12	HMA binder	120-150	
		AC Mixture air voids	7	
Initial IRI	75	Effective Binder Content (%)	12	
Original construction	1975	3/4 inch sieve	0	
		3/8 inch sieve	10.6	
TTC Site	State Avg	No. 4	31.5	
Vehicle Class	Vehicle %	No. 200	5.4	
4	1.50	Base Layer		
5	10.00	Thickness (in)	7	
6	2.00	Material type	Crushed Stone	
7	0.80	Modulus (psi)	30000	
8	2.50	Subbase Layer		
9	70.00	Thickness (in)	12	
10	5.50	Material type	A-3	
11	1.10	Modulus (psi)	13500	
12	0.20	Subgrade		
13	6.40	Material type	SP-1-A_3	
Sum	100.00	Modulus (psi)	27739/7000	

Table C.1.4-4 HMA overlay project 26658

Project Information		MEPDG Inputs		
Job number:	26658	Traffic		
Project CS:	28021	Two way AADTT	130	
Region:		Lanes in design direction	1	
Route		Climate	Traverse city	
Year opened	1992	Overlay Layer	Top	Leveling
CAADT	130	HMA Thickness (in)	1.25	1.25
Repairs:		HMA binder		
		AC Mixture air voids	4.8	6
		Effective Binder Content (%)	12	11.4
		3/4 inch sieve	0	0
		3/8 inch sieve	18.6	17.3
Pavement Cross Section	Thickness (in)	No. 4	40.4	37.4
HMA overlay	2.5	No. 200	5.4	6.4
Existing HMA	5*	Existing HMA		
Base	7*	HMA Thickness (in)	5*	
Subbase	12*	HMA binder	120-150	
		AC Mixture air voids	7	
Initial IRI	50	3/4 inch sieve	0	
Original construction	1975	3/8 inch sieve	17.3	
		No. 4	37.4	
TTC Site	State Avg	No. 200	5.7	
Vehicle Class	Vehicle %	Base Layer		
4	1.50	Thickness (in)	7*	
5	10.00	Material type	Crushed Stone	
6	2.00	Modulus (psi)	30000	
7	0.80	Subbase Layer		
8	2.50	Thickness (in)	12*	
9	70.00	Material type	A-3	
10	5.50	Modulus (psi)	13500	
11	1.10	Subgrade		
12	0.20	Material type	SP-1-A_3	
13	6.40	Modulus (psi)	27739/7000	
Sum	100.00			

Table C.1.4-5 HMA overlay project 29755

Project Information		MEPDG Inputs		
Job number:	29755	Traffic		
Project CS:	80072	Two way AADTT	184.3	
Region:	North	Lanes in design direction	1	
Route	M-40	Climate	Traverse City	
Year opened	1994	Overlay Layer	Top	Leveling
CAADT	184.3	HMA Thickness (in)	1.5	1.5
Repairs:		HMA binder	120-150	
		AC Mixture air voids	4.8	6
		Effective Binder Content (%)	12	11.4
		3/4 inch sieve	0	0
		3/8 inch sieve	18.6	17.3
Pavement Cross Section	Thickness (in)	No. 4	40.4	37.4
HMA overlay	3	No. 200	5.4	5.7
Existing HMA	4.75	Existing HMA		
Base	4	HMA Thickness (in)	4.75	
Subbase	0	HMA binder	120-150	
		AC Mixture air voids	7	
Initial IRI	63	Effective Binder Content (%)	11	
Original construction	1975	3/4 inch sieve	0	
		3/8 inch sieve	17.3	
TTC Site	State Avg	No. 4	37.4	
Vehicle Class	Vehicle %	No. 200	5.7	
4	1.50	Base Layer		
5	10.00	Thickness (in)	4	
6	2.00	Material type	Stabalized	
7	0.80	Modulus (psi)		
8	2.50	Subbase Layer		
9	70.00	Thickness (in)	0	
10	5.50	Material type		
11	1.10	Modulus (psi)		
12	0.20	Subgrade		
13	6.40	Material type	SP-1 A-3	
Sum	100.00	Modulus (psi)	27739/ 7000	

Table C.1.4-6 HMA overlay project 30701

Project Information		MEPDG Inputs		
Job number:	30701	Traffic		
Project CS:	14041	Two way AADTT	408	
Region:	Southwest	Lanes in design direction	1	
Route	US-12	Climate	Kalamazoo	
Year opened	1994	Overlay Layer	Top	
CAADT	408	HMA Thickness (in)	1.5	1.5
Repairs:		HMA binder	85-100	
		AC Mixture air voids	6.6	4.8
		Effective Binder Content (%)	10	11.8
		3/4 inch sieve	0	0
Pavement Cross Section	Thickness (in)	3/8 inch sieve	36	10.3
HMA overlay	3	No. 4	45.6	41.4
Existing HMA	4.5	No. 200	6.5	5.7
Base	7	Existing HMA		
Subbase	15	HMA Thickness (in)	4.5	
		HMA binder	85-100	
Initial IRI	63	AC Mixture air voids	7	
Original construction	1959	Effective Binder Content (%)	11	
		3/4 inch sieve	0	
TTC Site	State Avg	3/8 inch sieve	36	
Vehicle Class	Vehicle %	No. 4	45.6	
4	1.50	No. 200	6.5	
5	10.00	Base Layer		
6	2.00	Thickness (in)	7	
7	0.80	Material type	Crushed Stone	
8	2.50	Modulus (psi)	30000	
9	70.00	Subbase Layer		
10	5.50	Thickness (in)	15	
11	1.10	Material type	A-3	
12	0.20	Modulus (psi)	13500	
13	6.40	Subgrade		
Sum	100.00	Material type	SP-1 A-3	
		Modulus (psi)	27739/ 7000	

Table C.1.4-7 HMA overlay project 31047

Project Information		MEPDG Inputs		
Job number:	31047	Traffic		
Project CS:	2042	Two way AADTT	260	
Region:		Lanes in design direction	1	
Route	M-28	Climate	Marquette	
Year opened	1996	Overlay Layer	Top	Leveling
CAADT	260	HMA Thickness (in)	1.5	1.5
Repairs:		HMA binder	120-150	
		AC Mixture air voids	4.8	6
		Effective Binder Content (%)	12	11.4
		3/4 inch sieve	0	0
		3/8 inch sieve	18.6	17.3
Pavement Cross Section	Thickness (in)	No. 4	40.4	37.4
HMA overlay	3	No. 200	5.4	5.7
Existing HMA	3	Existing HMA		
Base	10	HMA Thickness (in)	3.3	
Subbase	18	HMA binder	120-150	
		AC Mixture air voids	7	
Initial IRI	63	Effective Binder Content (%)	11	
Original construction	1961	3/4 inch sieve	0	
		3/8 inch sieve	17.3	
TTC Site	State Avg	No. 4	37.4	
Vehicle Class	Vehicle %	No. 200	5.7	
4	1.50	Base Layer		
5	10.00	Thickness (in)	10	
6	2.00	Material type	Crushed Stone	
7	0.80	Modulus (psi)	30000	
8	2.50	Subbase Layer		
9	70.00	Thickness (in)	18	
10	5.50	Material type	A-3	
11	1.10	Modulus (psi)	13500	
12	0.20	Subgrade		
13	6.40	Material type	SP-SM	
Sum	100.00	Modulus (psi)	20400/ 7000	

Table C.1.4-8 HMA overlay project 32361

Project Information		MEPDG Inputs		
Job number:	32361	Traffic		
Project CS:	32092	Two way AADTT	3900 adt	
Region:	Bay	Lanes in design direction	1	
Route	M-25	Climate	Flint	
Year opened	1997	Overlay Layer	Top	Leveling
CAADT	3900 adt	HMA Thickness (in)	1.5	1.5
Repairs:		HMA binder	120-150	
		AC Mixture air voids	4.8	6
		Effective Binder Content (%)	12	11.4
		3/4 inch sieve	0	0
		3/8 inch sieve	18.6	17.3
Pavement Cross Section	Thickness (in)	No. 4	40.4	37.4
HMA overlay	3	No. 200	5.4	5.7
Existing HMA	3.3	Existing HMA		
Base	5-7-5	HMA Thickness (in)	3.3	
Subbase	13.7	HMA binder	120-150	
		AC Mixture air voids	7	
Initial IRI	50	Effective Binder Content (%)	11	
Original construction	1954	3/4 inch sieve	0	
		3/8 inch sieve	17.3	
TTC Site	State Avg	No. 4	37.4	
Vehicle Class	Vehicle %	No. 200	5.7	
4	1.50	Base Layer		
5	10.00	Thickness (in)	5-7-5	
6	2.00	Material type	Crushed Stone	
7	0.80	Modulus (psi)	30000	
8	2.50	Subbase Layer		
9	70.00	Thickness (in)	13.7	
10	5.50	Material type	A-3	
11	1.10	Modulus (psi)	13500	
12	0.20	Subgrade		
13	6.40	Material type	SM - A-4	
Sum	100.00	Modulus (psi)	24764/ 5200	

Table C.1.4-9 HMA overlay project 45875

Project Information		MEPDG Inputs		
Job number:	45875	Traffic		
Project CS:	14042	Two way AADTT	803.4	
Region:		Lanes in design direction	1	
Route	US-12	Climate	South Bend	
Year opened	2002	Overlay Layer	Top	Leveling
CAADT	803.4	HMA Thickness (in)	2	2
Repairs:		HMA binder	PG 64-28	
		AC Mixture air voids	8	8
		Effective Binder Content (%)	12.1	12.42
		3/4 inch sieve	0	0
		3/8 inch sieve	2.5	13.2
Pavement Cross Section	Thickness (in)	No. 4	32.8	35.1
HMA overlay	2	No. 200	5.4	95.4
Existing HMA	5	Existing HMA		
Base	11	HMA Thickness (in)	4.5	
Subbase	15	HMA binder	PG 64-28	
		AC Mixture air voids	7	
Initial IRI	55	Effective Binder Content (%)	11	
Original construction	1968	3/4 inch sieve	0	
		3/8 inch sieve	13.2	
TTC Site	State Avg	No. 4	35.1	
Vehicle Class	Vehicle %	No. 200	4.6	
4	1.50	Base Layer		
5	10.00	Thickness (in)	11	
6	2.00	Material type	Crushed Stone	
7	0.80	Modulus (psi)	30000	
8	2.50	Subbase Layer		
9	70.00	Thickness (in)	15	
10	5.50	Material type	A-3	
11	1.10	Modulus (psi)	13500	
12	0.20	Subgrade		
13	6.40	Material type	SP-1 A-3	
Sum	100.00	Modulus (psi)	27739/ 7000	

Table C.1.4-10 HMA overlay project 50715

Project Information		MEPDG Inputs			
Job number:	50715	Traffic			
Project CS:	30041	Two way AADTT	350		
Region:		Lanes in design direction	1		
Route	M-34	Climate	Jackson		
Year opened	2005	Overlay Layer	Top	Leveling	Base
CAADT	350	HMA Thickness (in)	1	1.25	1.25
Repairs:		HMA binder	PG 64-28	PG 64-28	PG 58-22
		AC Mixture air voids	8	8	6
		Effective Binder Content (%)	12.1	12.42	11.8
		3/4 inch sieve	0	0	1.1
		3/8 inch sieve	2.5	13.2	23.8
		No. 4	32.8	35.1	37.7
		No. 200	5.4	4.6	3.8
Pavement Cross Section	Thickness (in)	Existing HMA			
HMA overlay	3.5	HMA Thickness (in)	7.59		
Existing HMA	7.59	HMA binder	PG 64-28		
Base	6	AC Mixture air voids	7		
Subbase	8	Effective Binder Content (%)	11		
		3/4 inch sieve	0		
		3/8 inch sieve	13.2		
		No. 4	35.1		
		No. 200	4.6		
Original construction	1951	Base Layer			
		Thickness (in)	6		
		Material type	Crushed Stone		
		Modulus (psi)	30000		
		Subbase Layer			
		Thickness (in)	8		
		Material type	A-3		
		Modulus (psi)	13500		
		Subgrade			
		Material type	SP-SM		
		Modulus (psi)	20400/ 7000		
TTC Site	State Avg				
Vehicle Class	Vehicle %				
4	1.50				
5	10.00				
6	2.00				
7	0.80				
8	2.50				
9	70.00				
10	5.50				
11	1.10				
12	0.20				
13	6.40				
Sum	100.00				

Table C.1.4-11 HMA overlay project 20313

Project Information		MEPDG Inputs		
Job number:	20313	Traffic		
Project CS:	45021	Two way AADTT	300	
Region:	North	Lanes in design direction	1	
Route	M-72	Climate	Traverse city	
Year opened	1983	Overlay Layer	Top	Leveling
CAADT	300	HMA Thickness (in)	1	1.25
Repairs:		HMA binder	120-150	
		AC Mixture air voids	6	7
		Effective Binder Content (%)	12	10.4
		3/4 inch sieve	0	0
Pavement Cross Section	Thickness (in)	3/8 inch sieve	15.4	13.4
HMA overlay	2.25	No. 4	32.9	100
Existing HMA	1.5	No. 200	7.4	5.8
Base	5	Existing HMA		
Subbase	0	HMA Thickness (in)	1.5	
		HMA binder	120-150	
		AC Mixture air voids	7	
Initial IRI	63	Effective Binder Content (%)	11	
Original construction	1963	3/4 inch sieve	0	
		3/8 inch sieve	13.4	
TTC Site	State Avg	No. 4	37	
Vehicle Class	Vehicle %	No. 200	5.8	
4	1.50	Base Layer		
5	10.00	Thickness (in)	5	
6	2.00	Material type	Crushed Stone	
7	0.80	Modulus (psi)	30000	
8	2.50	Subbase Layer		
9	70.00	Thickness (in)		
10	5.50	Material type		
11	1.10	Modulus (psi)		
12	0.20	Subgrade		
13	6.40	Material type	SP1-A-3	
Sum	100.00	Modulus (psi)	27739/ 7000	

Table C.1.4-12 HMA overlay project 12802

Project Information		MEPDG Inputs	
Job number:	12802	Traffic	
Project CS:	10041	Two way AADTT	3800 ADT
Region:		Lanes in design direction	1
Route	M-115	Climate	Traverse City
Year opened	1984	Overlay Layer	
CAADT	3800 ADT	HMA Thickness (in)	2.5
Repairs:		HMA binder	120-150
		AC Mixture air voids	7
		Effective Binder Content (%)	11.2
		3/4 inch sieve	0
Pavement Cross Section	Thickness (in)	3/8 inch sieve	15
HMA overlay	2.5	No. 4	36
Existing HMA	2.25 or 4.75	No. 200	6.4
Base	7	Existing HMA	
Subbase	0 or 12	HMA Thickness (in)	2.25 or 4.75
		HMA binder	120-150
		AC Mixture air voids	7
Initial IRI	63	Effective Binder Content (%)	11
Original construction	1957	3/4 inch sieve	0
		3/8 inch sieve	15
TTC Site	State Avg	No. 4	36
Vehicle Class	Vehicle %	No. 200	6.4
4	1.50	Base Layer	
5	10.00	Thickness (in)	7
6	2.00	Material type	Crushed Stone
7	0.80	Modulus (psi)	30000
8	2.50	Subbase Layer	
9	70.00	Thickness (in)	0 or 12
10	5.50	Material type	A-3
11	1.10	Modulus (psi)	13500
12	0.20	Subgrade	
13	6.40	Material type	SP-1 A-3
Sum	100.00	Modulus (psi)	27739/ 7000

Table C.1.4-13 HMA overlay project 24621

Project Information		MEPDG Inputs		
Job number:	24621	Traffic		
Project CS:	13092	Two way AADTT	238	
Region:		Lanes in design direction	1	
Route	M-99	Climate	Battle Creek	
Year opened	1987	Overlay Layer	Top	Leveling
CAADT	238	HMA Thickness (in)	1.25	1.25
Repairs:		HMA binder	120-150	
		AC Mixture air voids	7	7
		Effective Binder Content (%)	11.2	10.4
		3/4 inch sieve	0	0
		3/8 inch sieve	14.2	13.3
Pavement Cross Section	Thickness (in)	No. 4	36.4	34.1
HMA overlay	2.5	No. 200	6.9	8.5
Existing HMA	3.75	Existing HMA		
Base	8	HMA Thickness (in)	3.75	
Subbase	0	HMA binder	120-150	
		AC Mixture air voids	7	
Initial IRI	63	Effective Binder Content (%)	11	
Original construction	1934	3/4 inch sieve	0	
		3/8 inch sieve	13.3	
TTC Site	State Avg	No. 4	34.1	
Vehicle Class	Vehicle %	No. 200	8.5	
4	1.50	Base Layer		
5	10.00	Thickness (in)	8	
6	2.00	Material type	Crushed Stone	
7	0.80	Modulus (psi)	30000	
8	2.50	Subbase Layer		
9	70.00	Thickness (in)		
10	5.50	Material type		
11	1.10	Modulus (psi)		
12	0.20	Subgrade		
13	6.40	Material type	SP-1 A-3	
Sum	100.00	Modulus (psi)	27739/ 7000	

Table C.1.4-14 HMA overlay project 25515

Project Information		MEPDG Inputs		
Job number:	25515	Traffic		
Project CS:	83021	Two way AADTT	315	
Region:		Lanes in design direction	1	
Route	M-55 and M-115	Climate	Cadillac	
Year opened	1989	Overlay Layer	Top	Leveling
CAADT	315	HMA Thickness (in)	1.25	1.25
Repairs:		HMA binder	120-150	
		AC Mixture air voids	7	7
		Effective Binder Content (%)	11	11
		3/4 inch sieve	0	0
Pavement Cross Section	Thickness (in)	3/8 inch sieve	10.2	12
HMA overlay	2.5	No. 4	38.4	35.2
Existing HMA	2.25	No. 200	5.6	6.6
Base	10	Existing HMA		
Subbase	0	HMA Thickness (in)	2.25	
		HMA binder	120-150	
		AC Mixture air voids	7	
Initial IRI	63	Effective Binder Content (%)	11	
Original construction	1954	3/4 inch sieve	0	
		3/8 inch sieve	12	
TTC Site	State Avg	No. 4	35.2	
Vehicle Class	Vehicle %	No. 200	5.6	
4	1.50	Base Layer		
5	10.00	Thickness (in)	10	
6	2.00	Material type	Crushed Stone	
7	0.80	Modulus (psi)	30000	
8	2.50	Subbase Layer		
9	70.00	Thickness (in)		
10	5.50	Material type		
11	1.10	Modulus (psi)		
12	0.20	Subgrade		
13	6.40	Material type	SP-1 A-3	
Sum	100.00	Modulus (psi)	27739/ 7000	

C.2 VALIDATION RESULTS

The validation results include the PMS and Sensor database extracted data. To avoid repetitiveness, only one set of figures are presented to account for both, field performance, and predicted performance. The predicted performance is plotted on the same figure to illustrate how well the software predicts measured performance. For unbonded overlays, each figure is divided into three plots namely:

- Percent slabs cracked
- IRI
- Faulting

For rubblized, composite, and HMA overlay projects, the figures are divided into four plots consisting of:

- Longitudinal cracking
- Thermal transverse cracking
- Rutting
- IRI

C.2.1 Unbonded Overlays

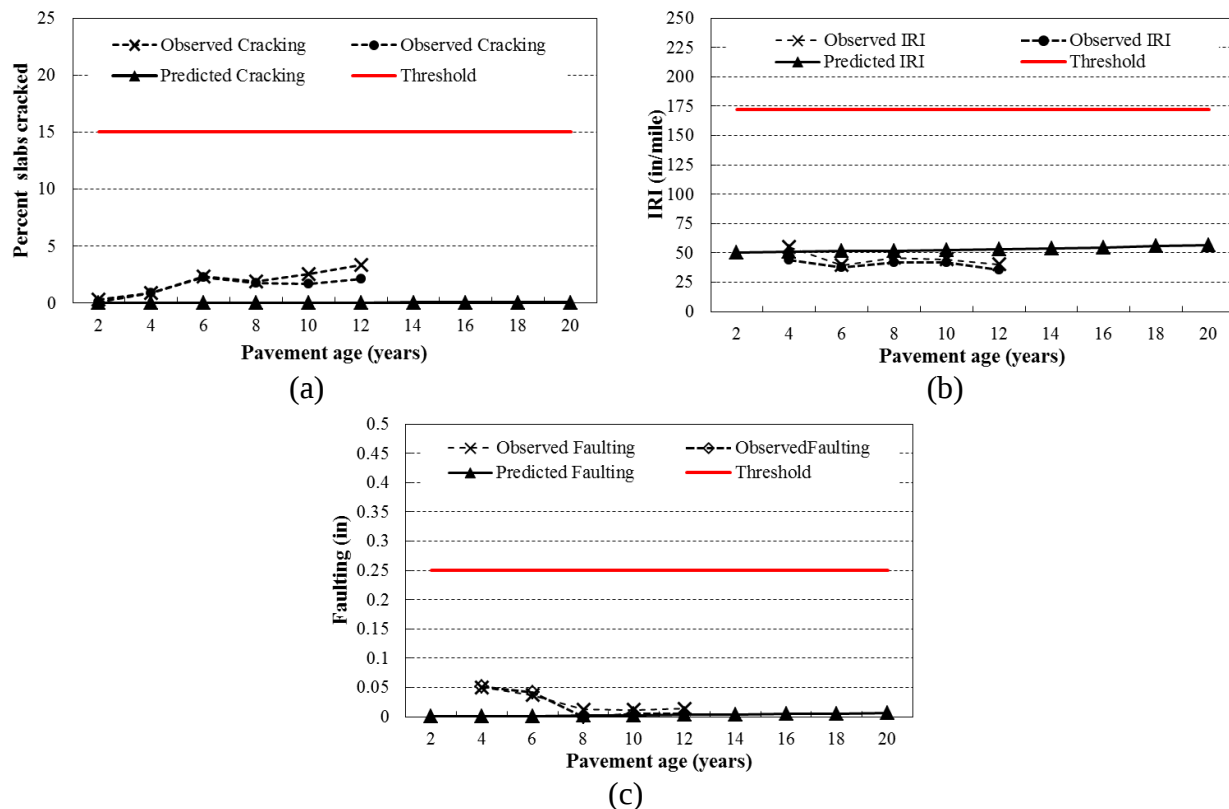
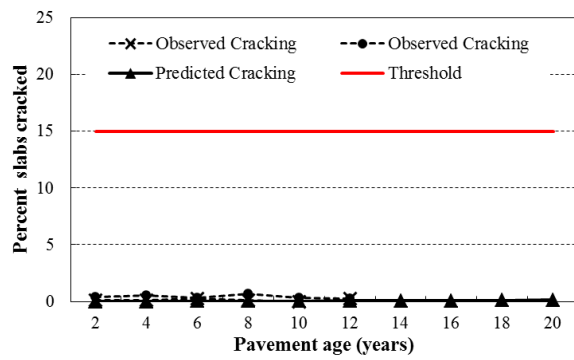
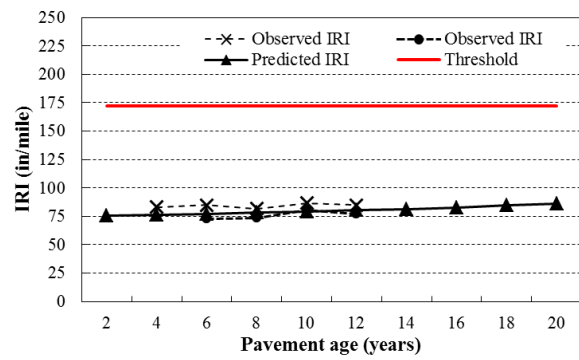


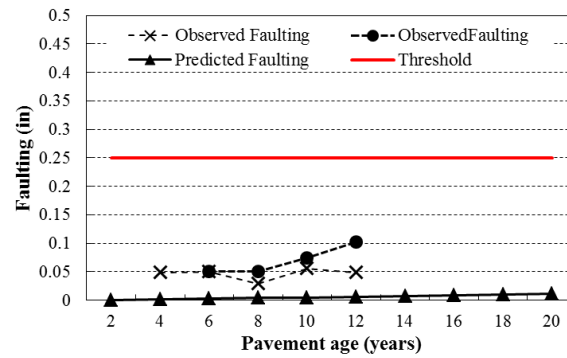
Figure C.2.1-1 Unbonded overlay project 37997



(a)

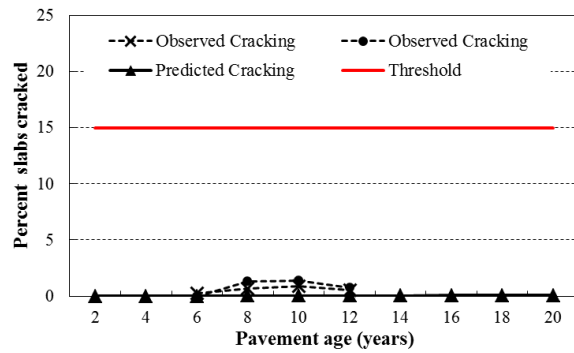


(b)

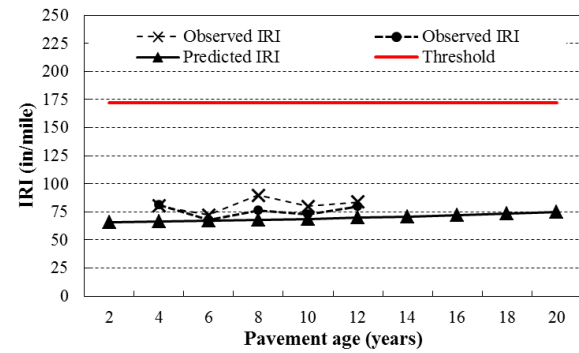


(c)

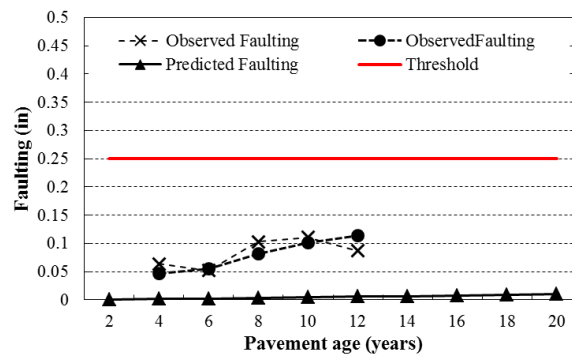
Figure C.2.1-2 Unbonded overlay project 34120



(a)

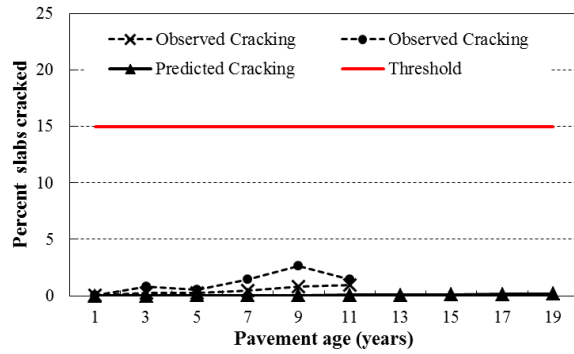


(b)

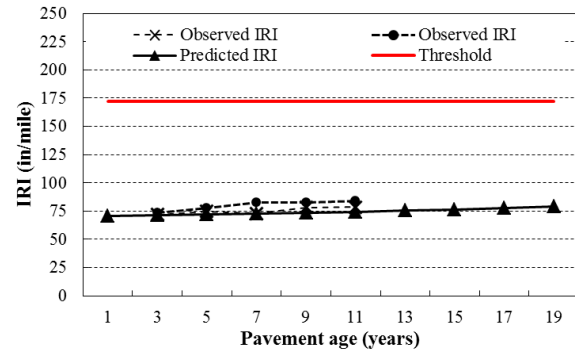


(c)

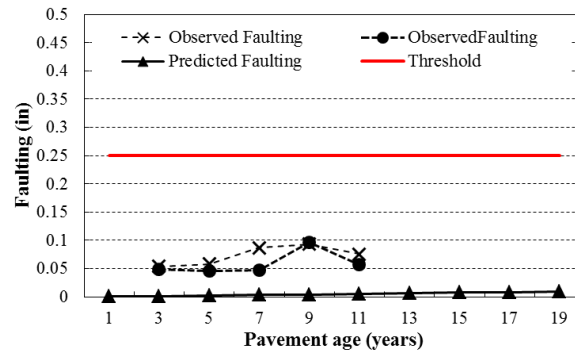
Figure C.2.1-3 Unbonded overlay project 49029



(a)

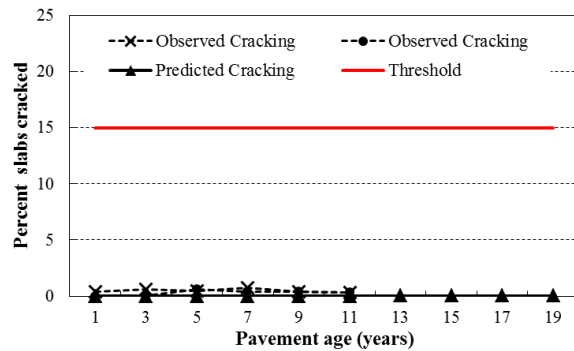


(b)

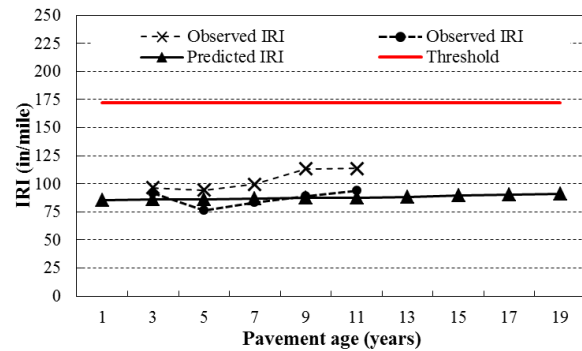


(c)

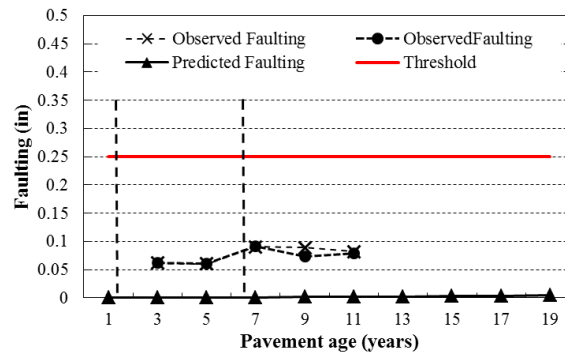
Figure C.2.1-4 Unbonded overlay project 45591



(a)

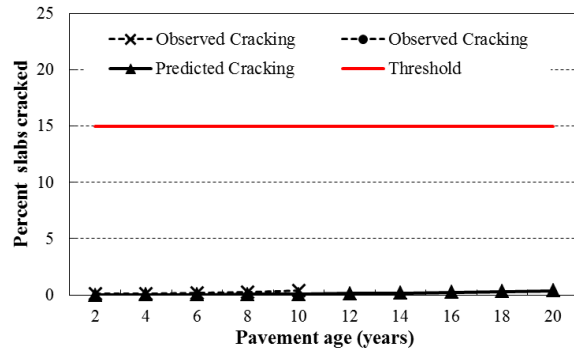


(b)

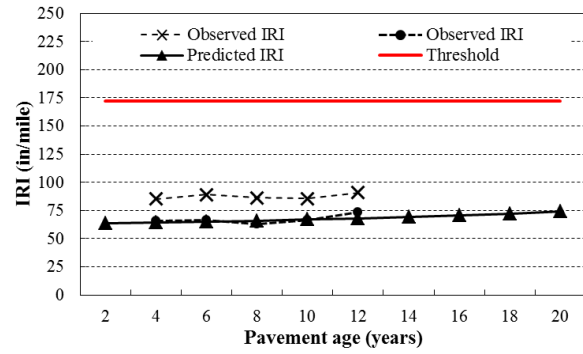


(c)

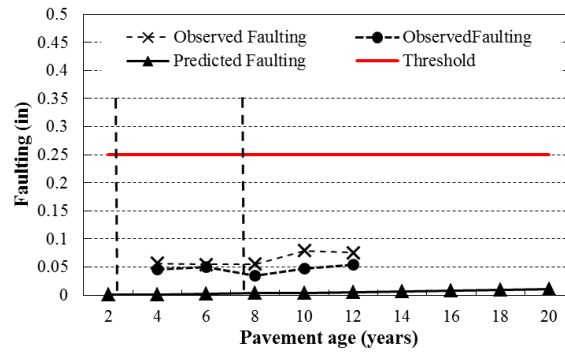
Figure C.2.1-5 Unbonded overlay project 38209



(a)

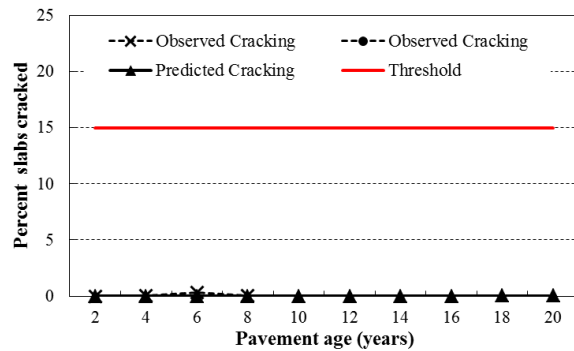


(b)

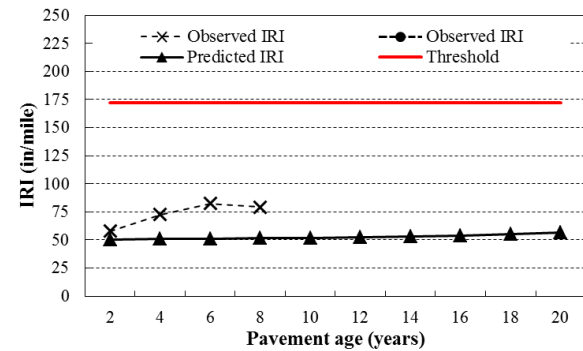


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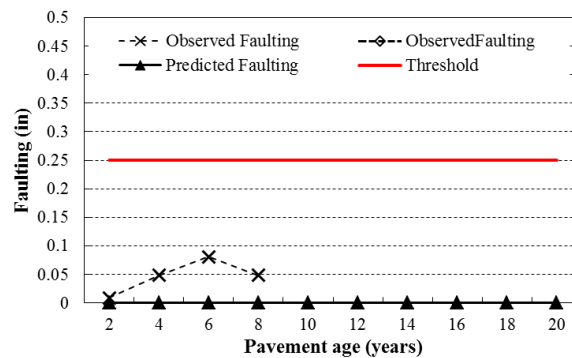
Figure C.2.1-6 Unbonded overlay project 43499



(a)

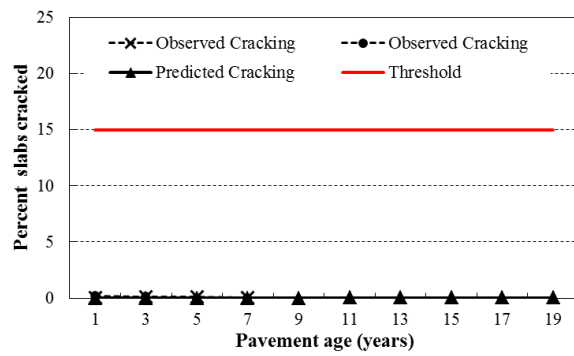


(b)

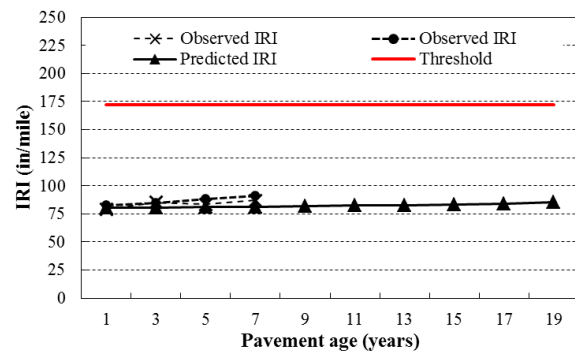


(c)

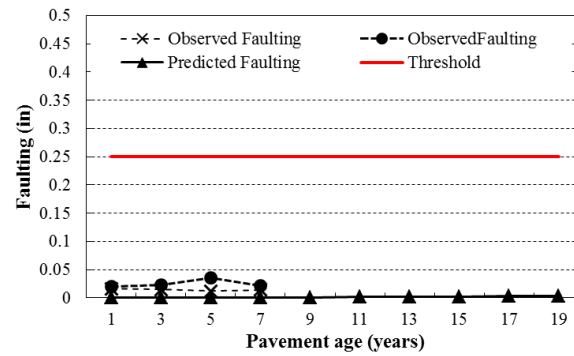
Figure C.2.1-7 Unbonded overlay project 73873



(a)



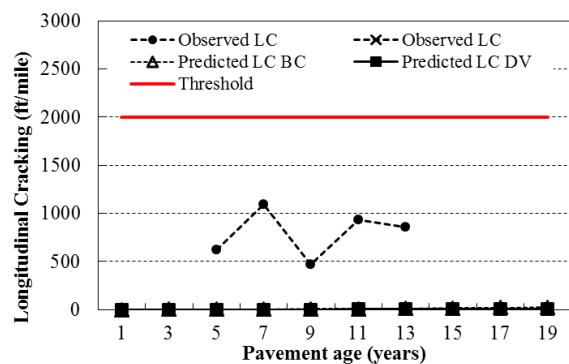
(b)



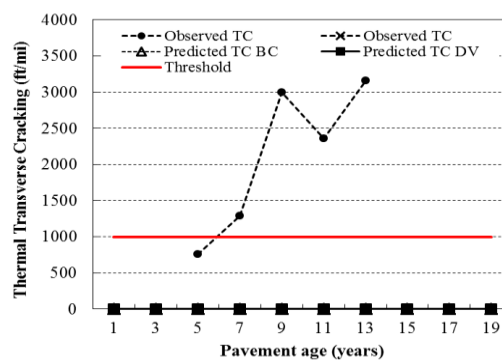
(c)

Figure C.2.1-8 Unbonded overlay project 50763

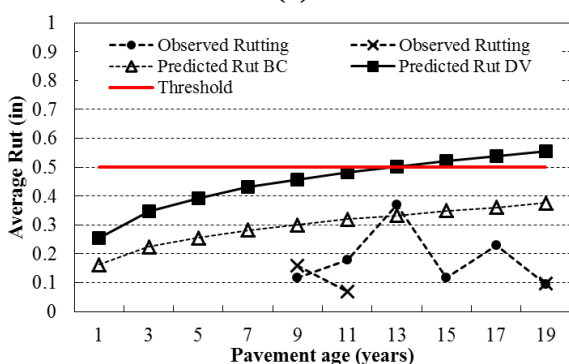
C.2.2 Rubblized Overlays



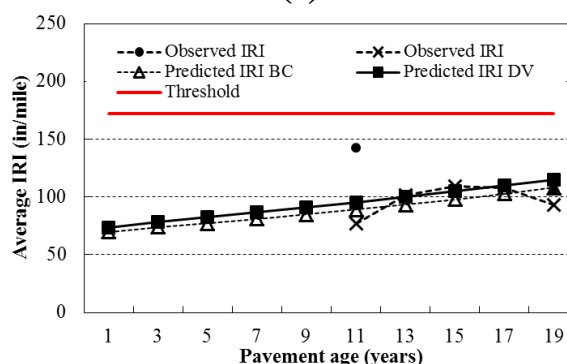
(a)



(b)



(c)



(d)

Figure C.2.2-1 Rubblized overlay project 28155

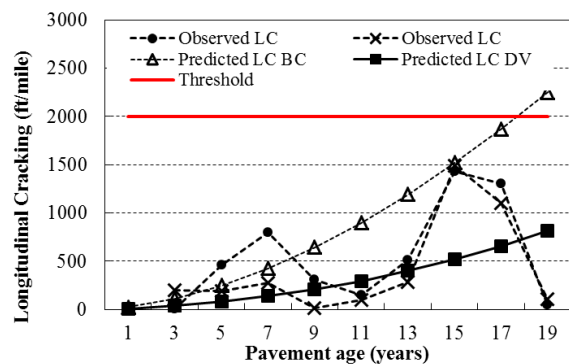
(a)

(b)

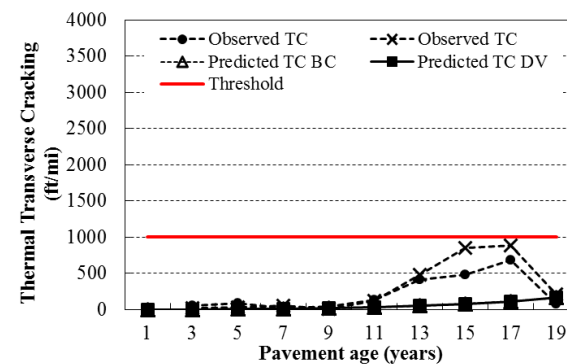
(c)

(d)

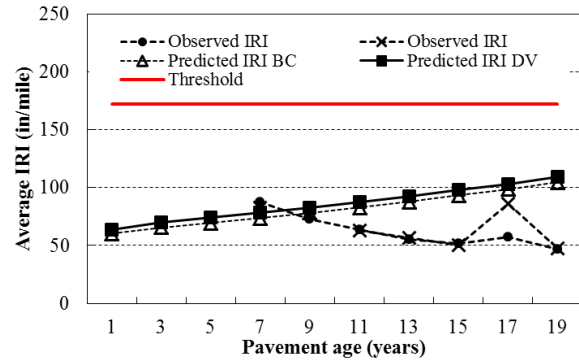
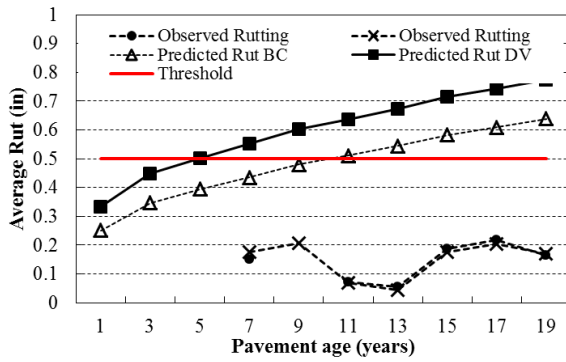
Figure C.2.2-2 Rubblized overlay project 26755



(a)



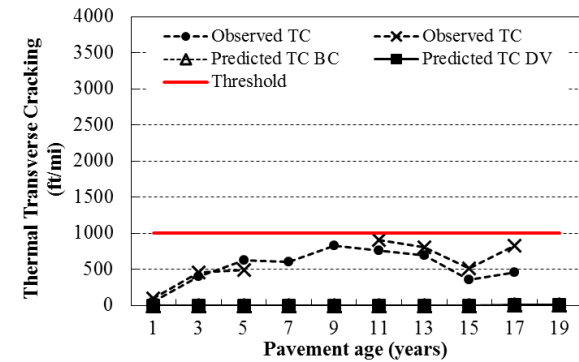
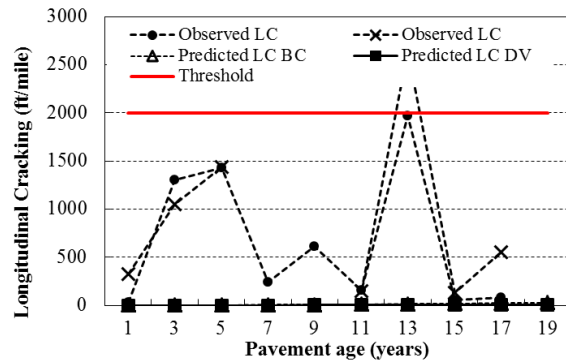
(b)



(c)

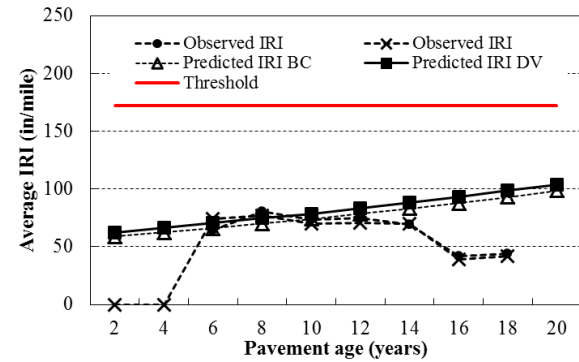
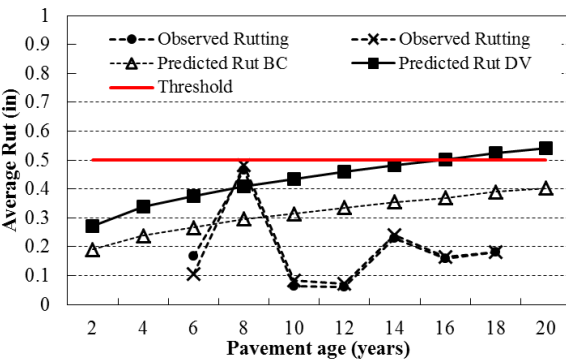
(d)

Figure C.2.2-3 Rubblized overlay project 29768



(a)

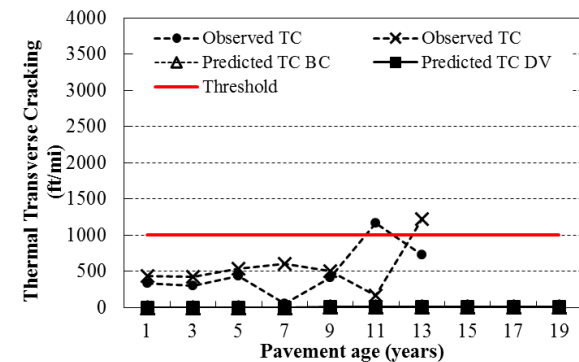
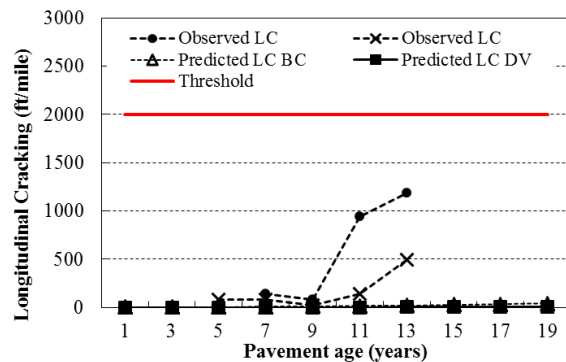
(b)



(c)

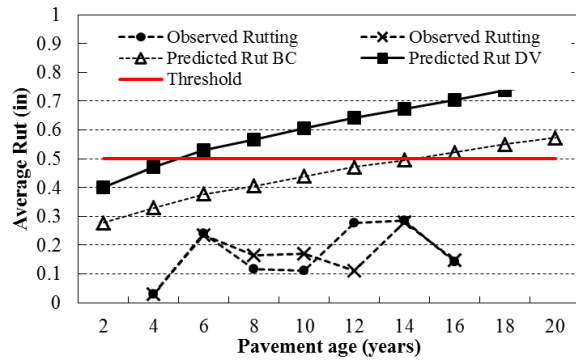
(d)

Figure C.2.2-4 Rubblized overlay project 29670

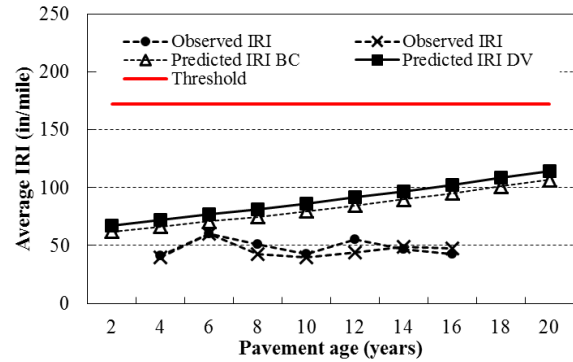


(a)

(b)

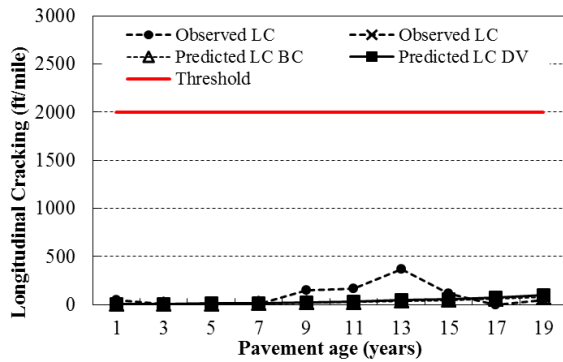


(c)

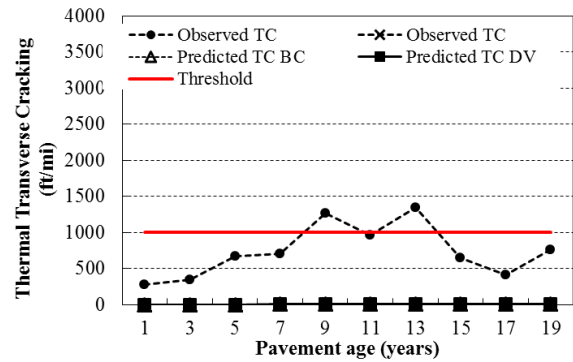


(d)

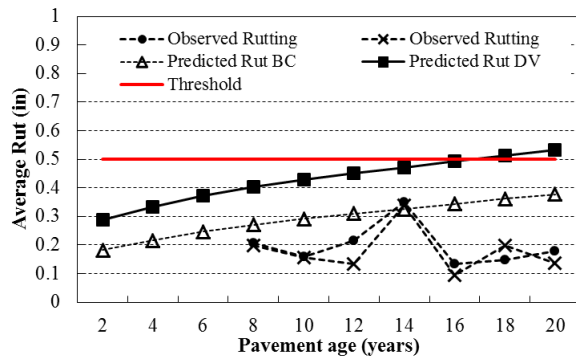
Figure C.2.2-5 Rubblized overlay project 29581



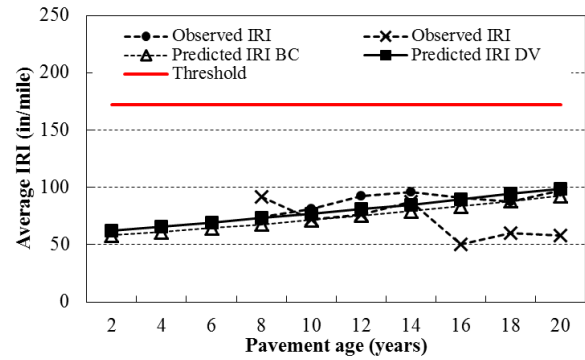
(a)



(b)

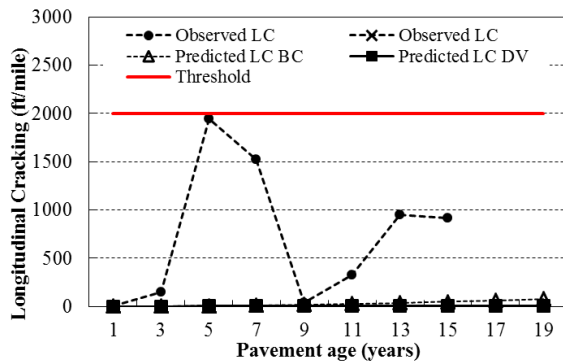


(c)

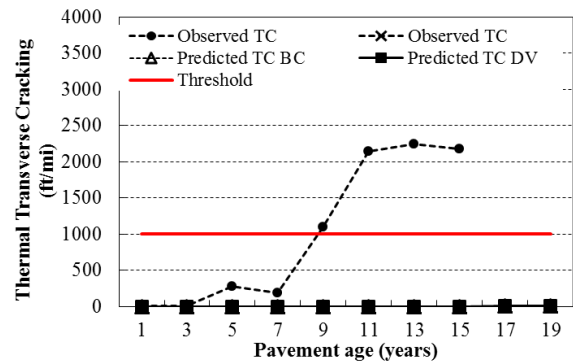


(d)

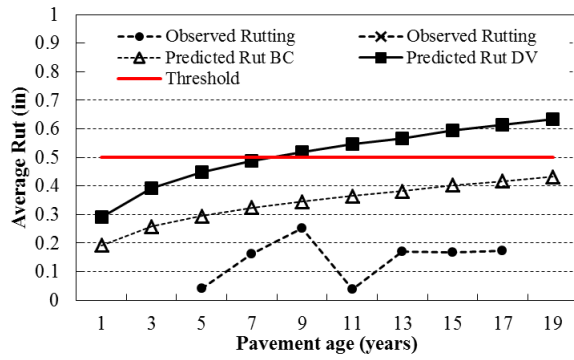
Figure C.2.2-6 Rubblized overlay project 28111



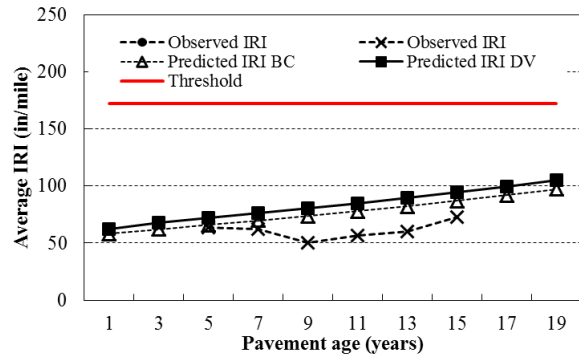
(a)



(b)

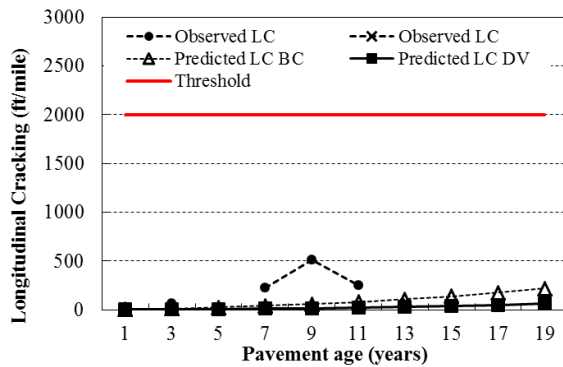


(c)

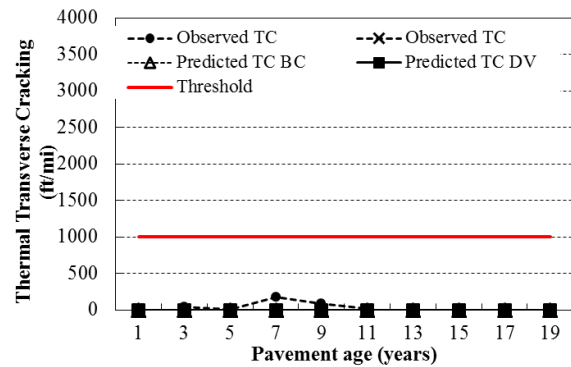


(d)

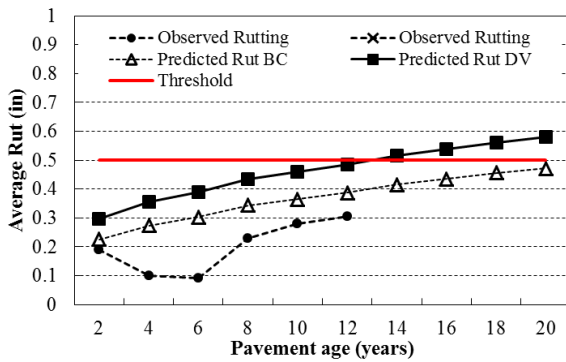
Figure C.2.2-7 Rubblized overlay project 29729



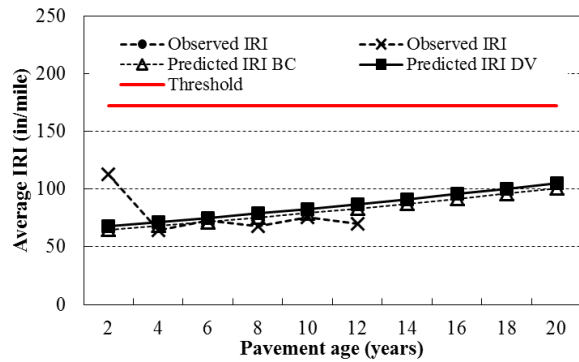
(a)



(b)

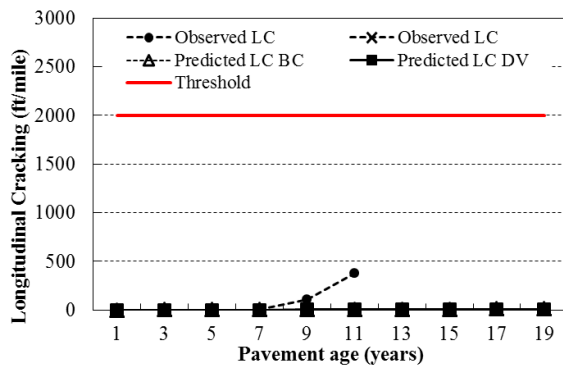


(c)

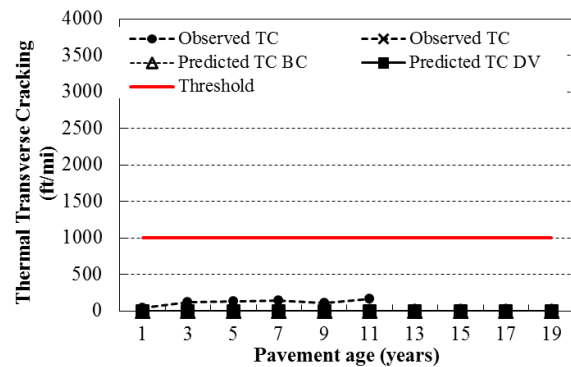


(d)

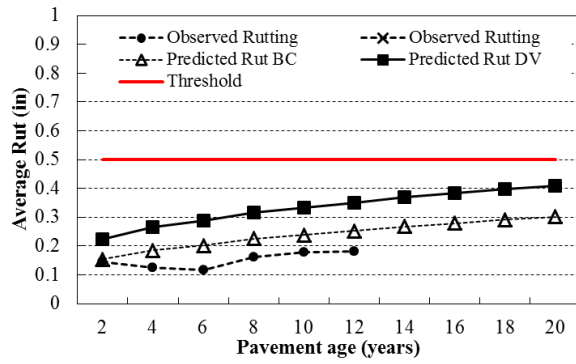
Figure C.2.2-8 Rubblized overlay project 45053



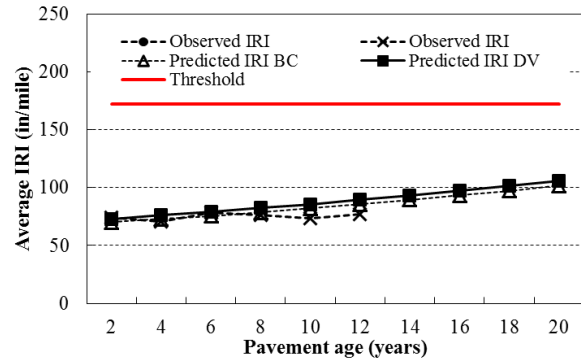
(a)



(b)

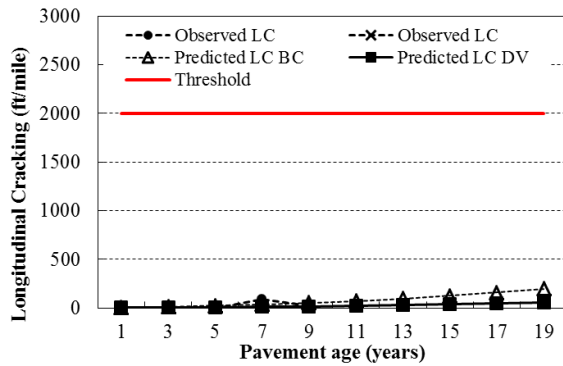


(c)

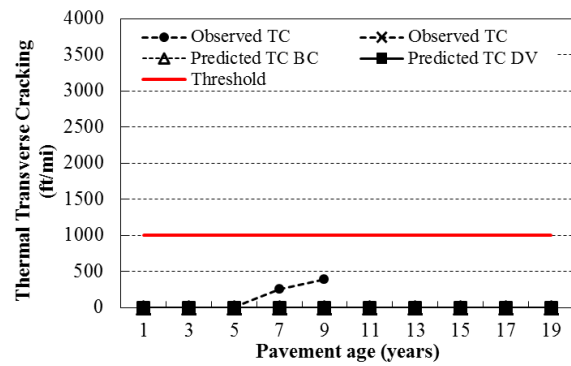


(d)

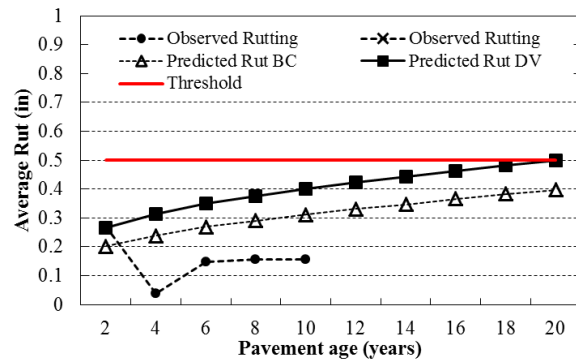
Figure C.2.2-9 Rubblized overlay project 44109



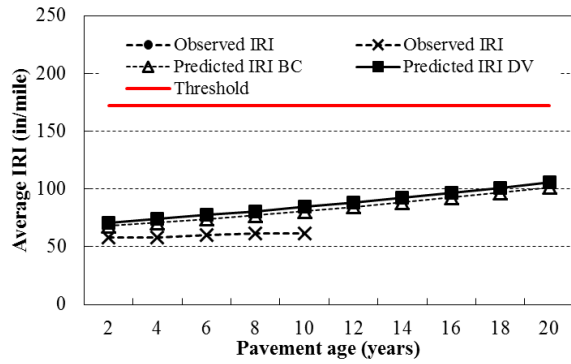
(a)



(b)

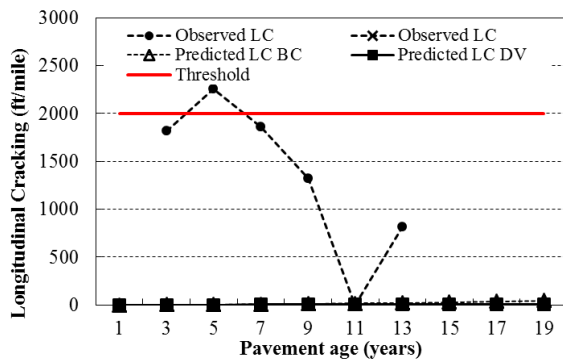


(c)

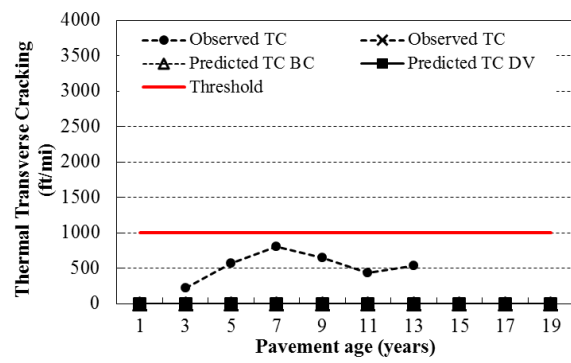


(d)

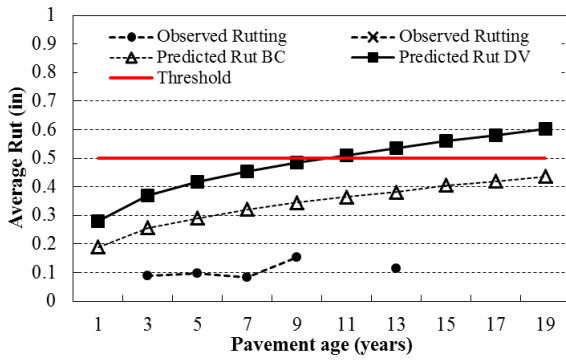
Figure C.2.2-10 Rubblized overlay project 38190



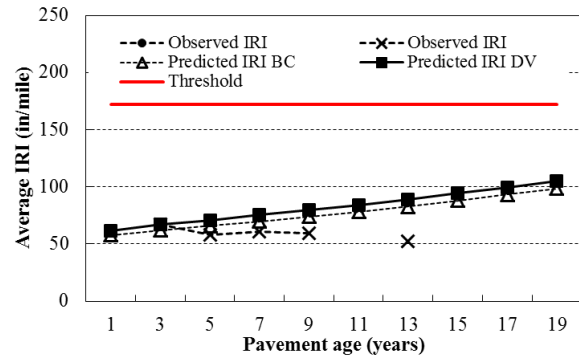
(a)



(b)



(c)



(d)

Figure C.2.2-11 Rubblized overlay project 32388

C.2.3 Composite Overlays

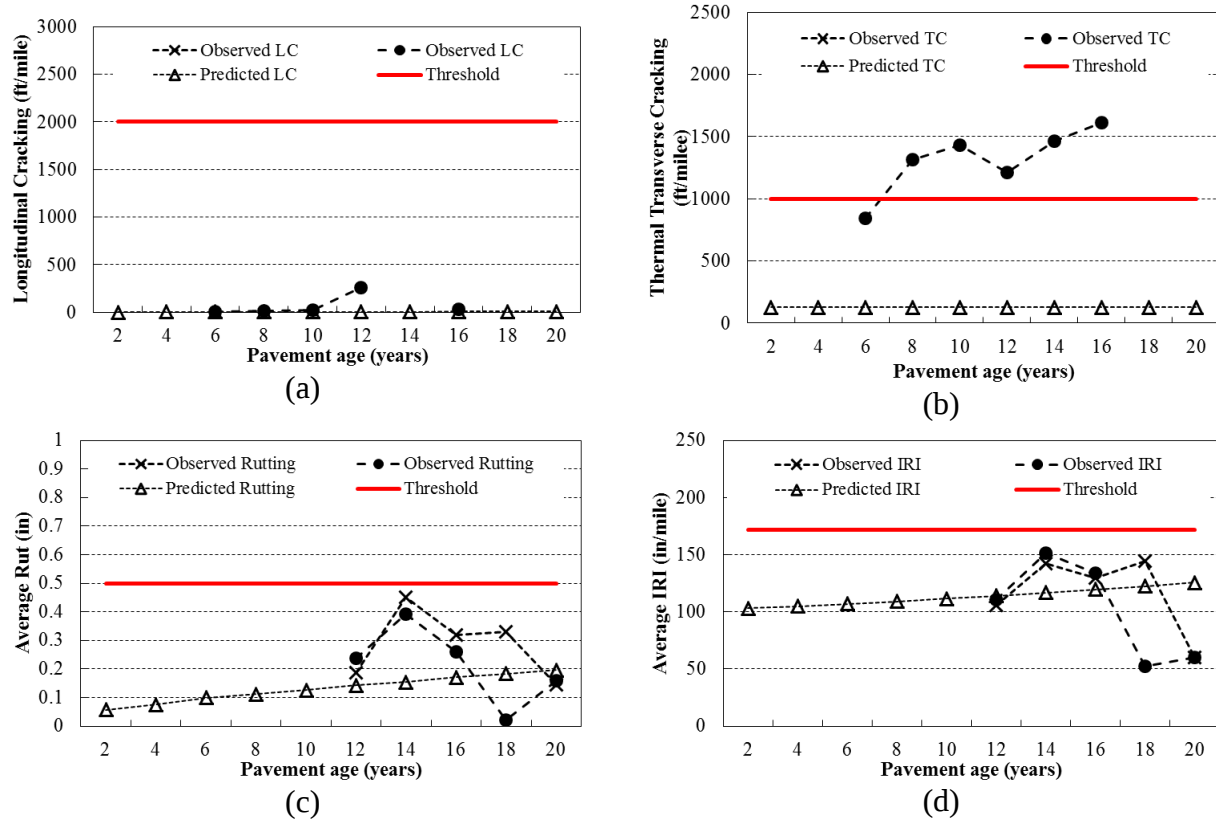
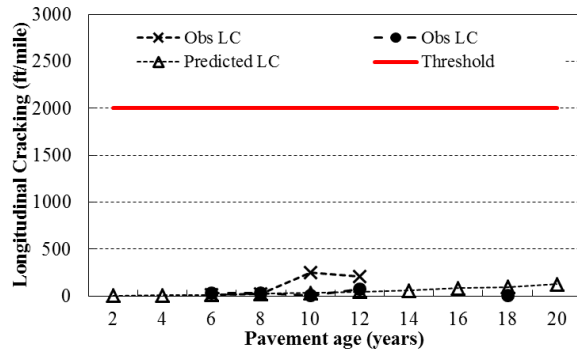
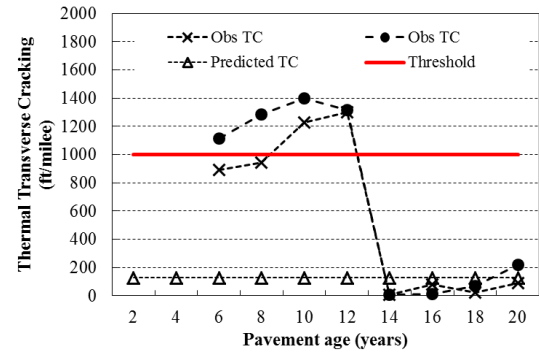


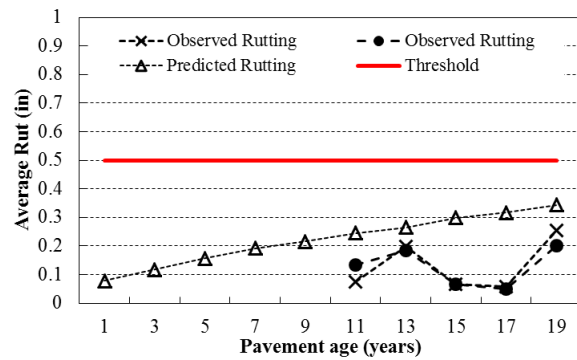
Figure C.2.3-1 Composite overlay project 25543



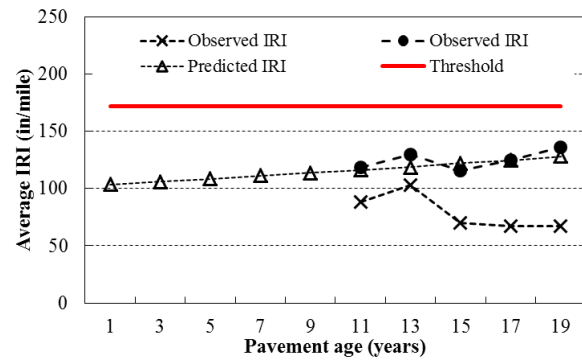
(a)



(b)

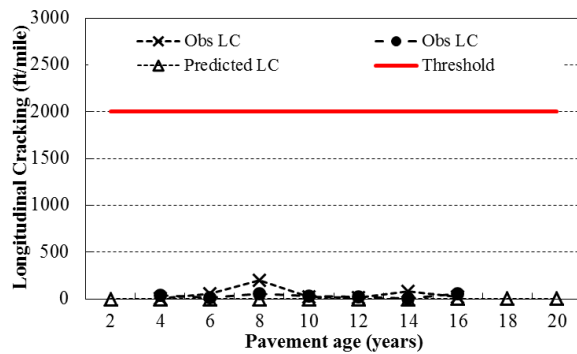


(c)

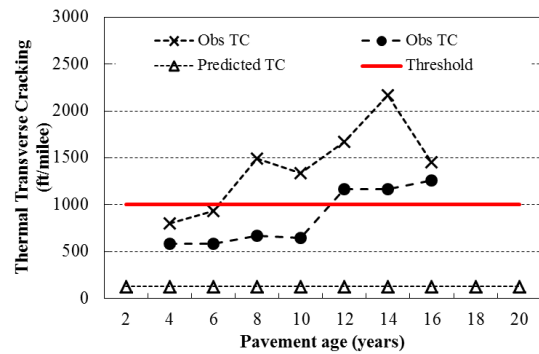


(d)

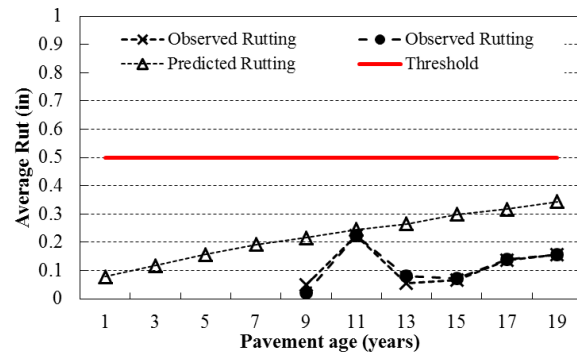
Figure C.2.3-2 Composite overlay project 24252



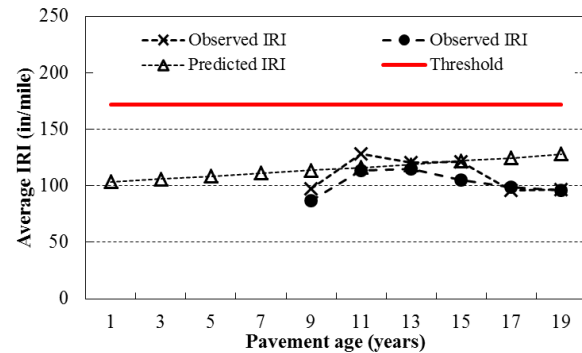
(a)



(b)

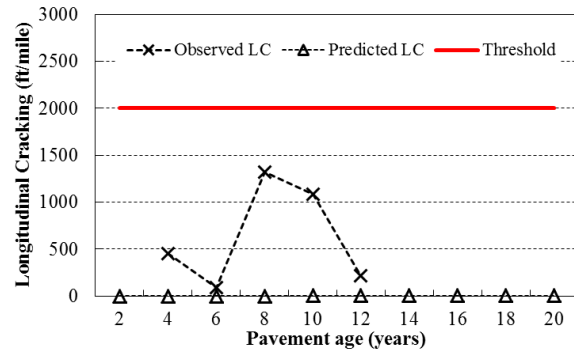


(c)



(d)

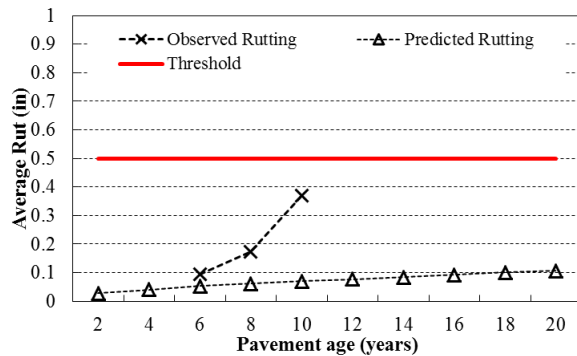
Figure C.2.3-3 Composite overlay project 29586



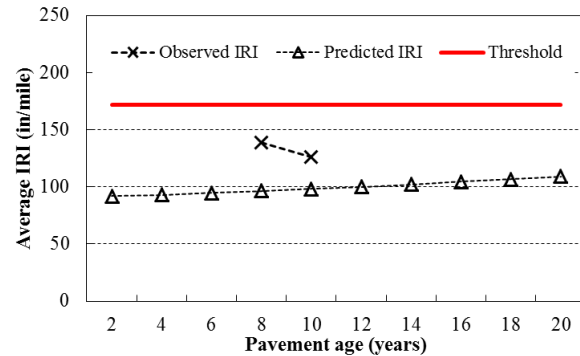
(a)



(b)

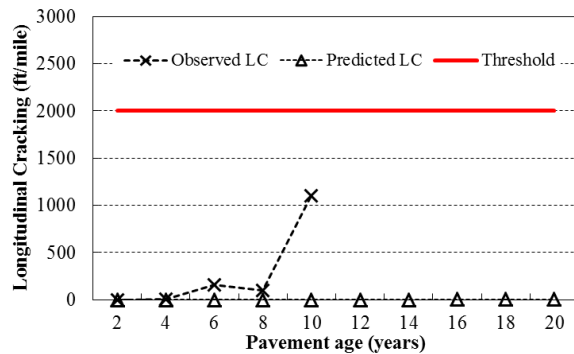


(c)

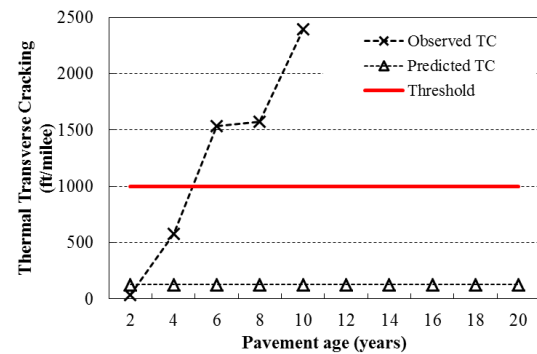


(d)

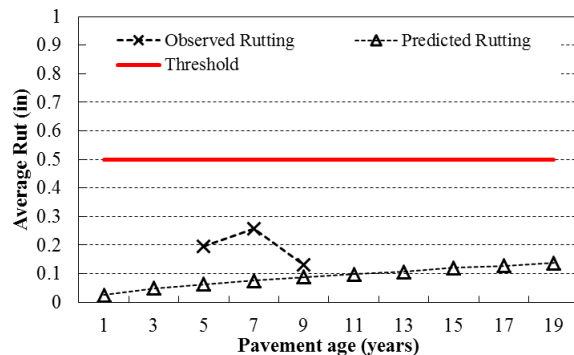
Figure C.2.3-4 Composite overlay project 29716



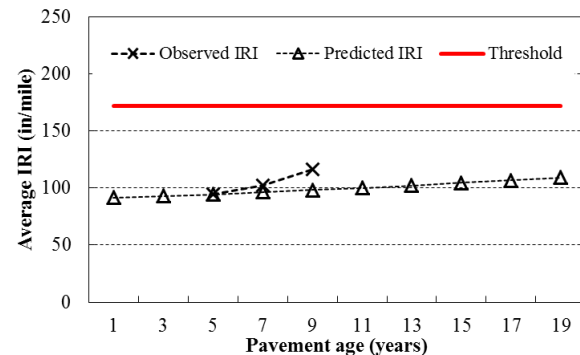
(a)



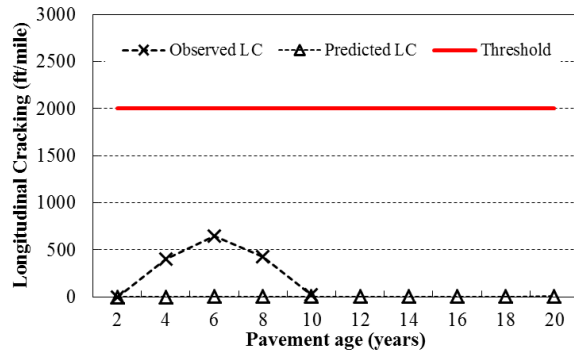
(b)



(c)



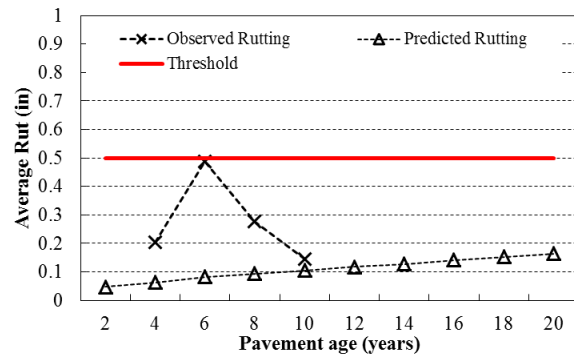
(d)



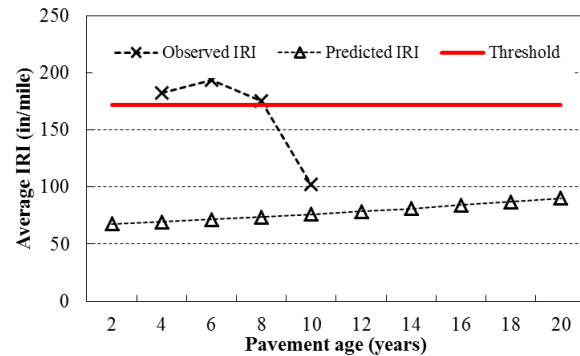
(a)



(b)

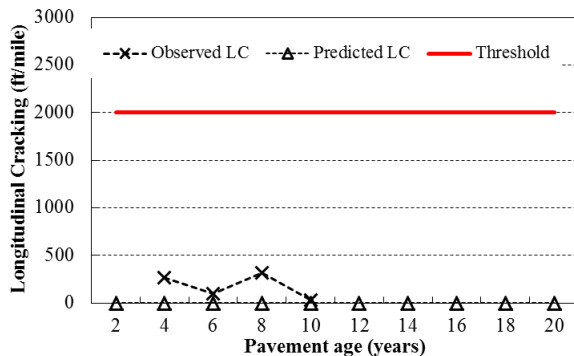


(c)

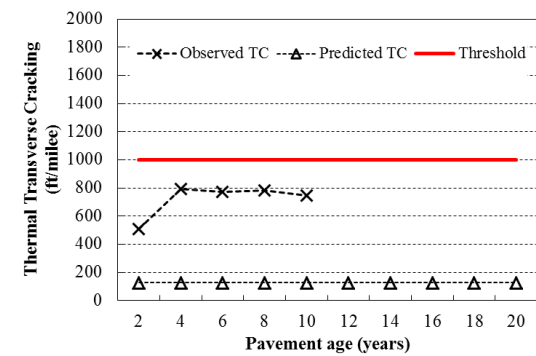


(d)

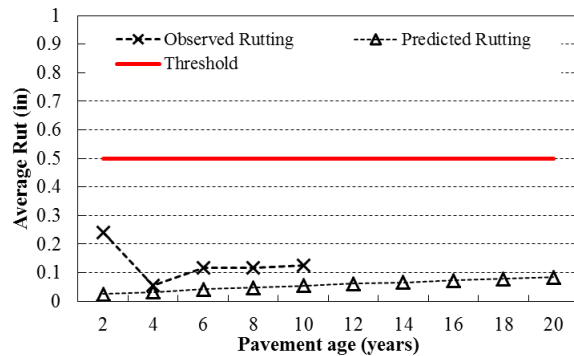
Figure C.2.3-6 Composite overlay project 33924



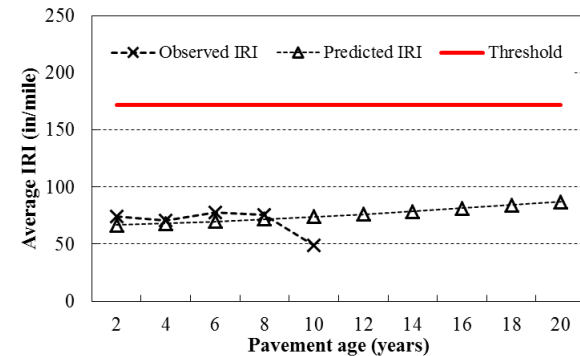
(a)



(b)



(c)



(d)

C.2.4 HMA over HMA

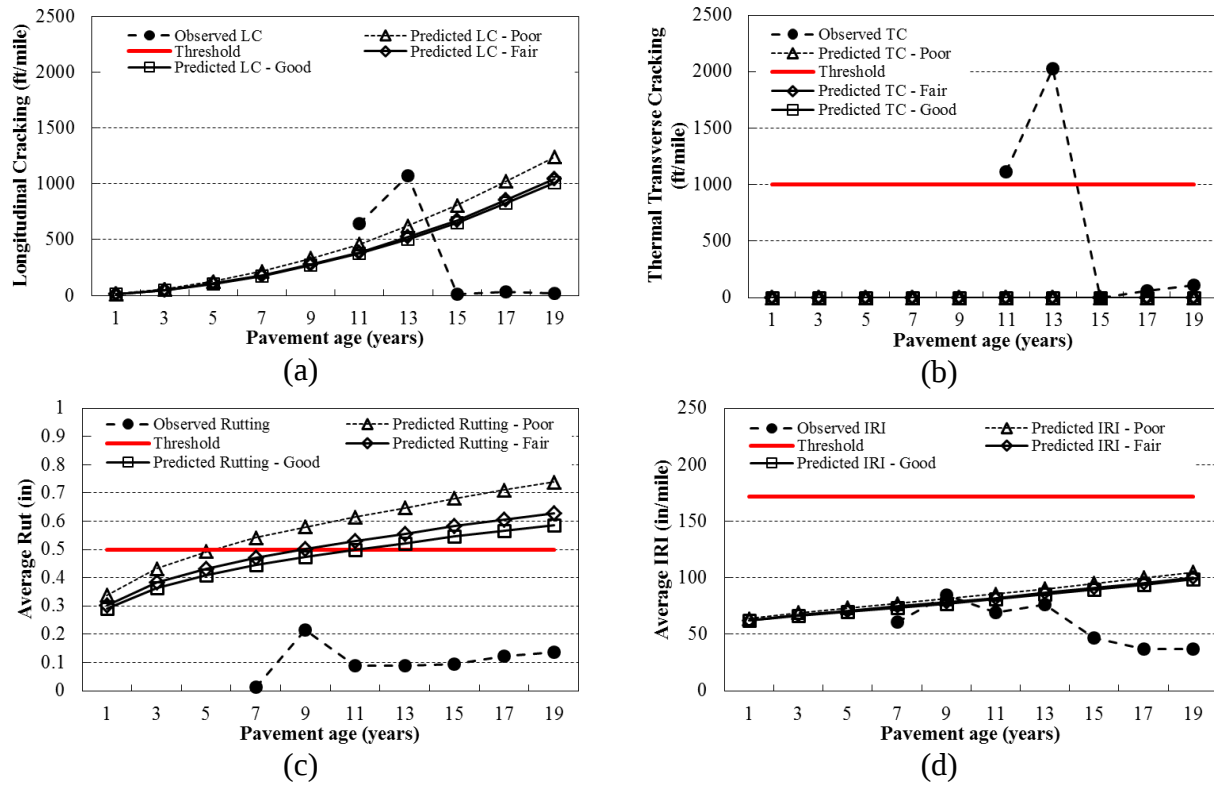
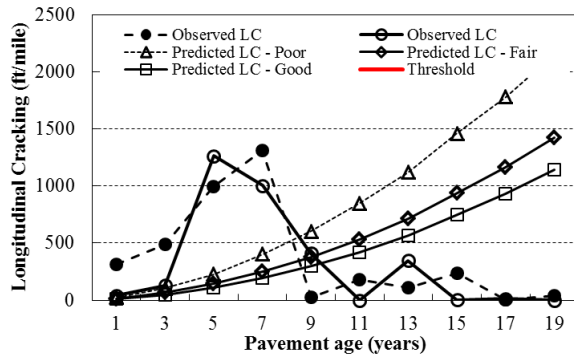
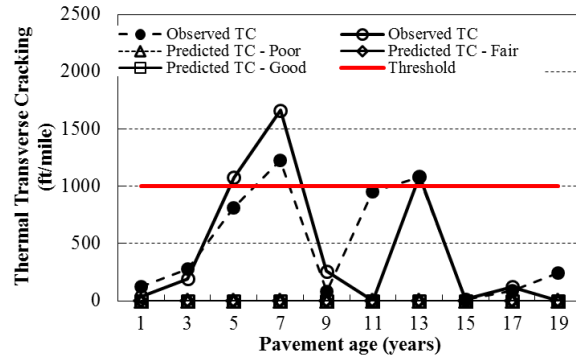


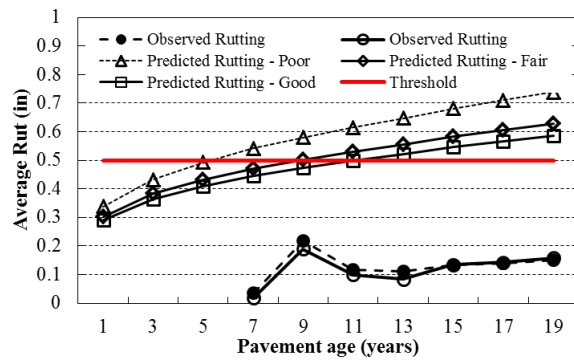
Figure C.2.4-1 HMA overlay project 33534



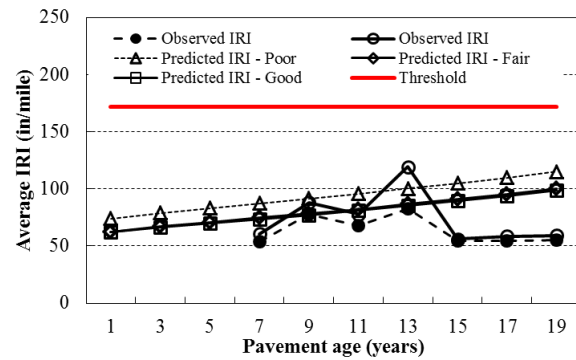
(a)



(b)

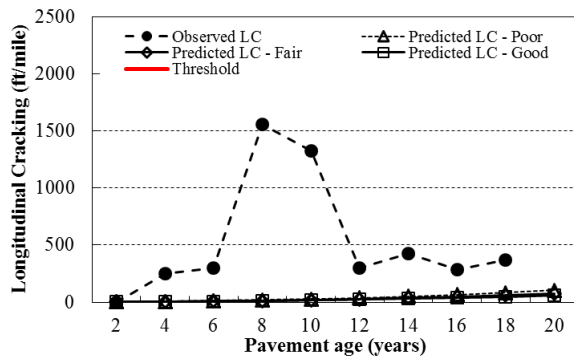


(c)

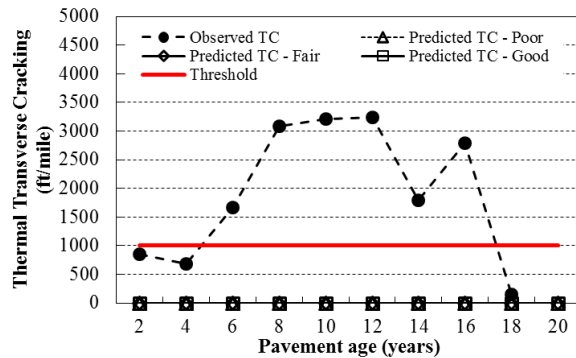


(d)

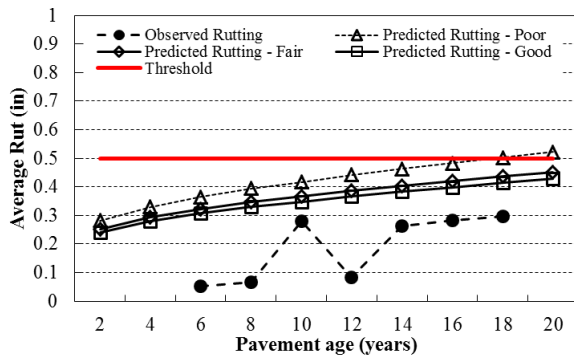
Figure C.2.4-2 HMA overlay project 33550



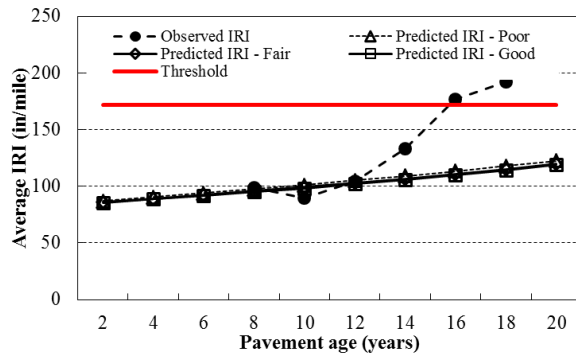
(a)



(b)

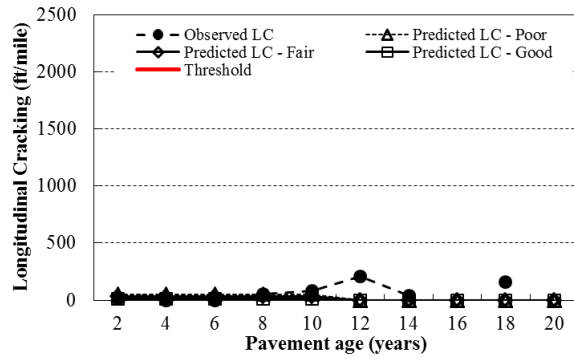


(c)

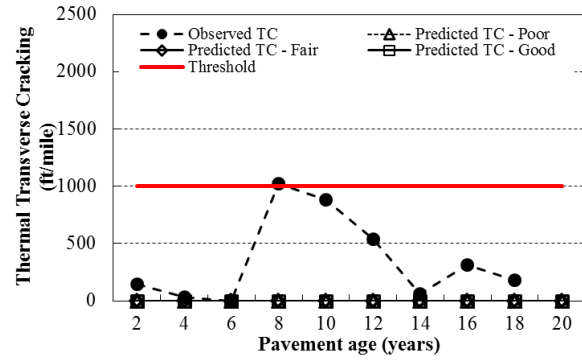


(d)

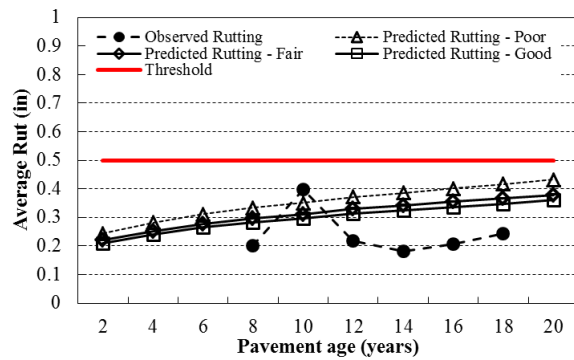
Figure C.2.4-3 HMA overlay project 28155



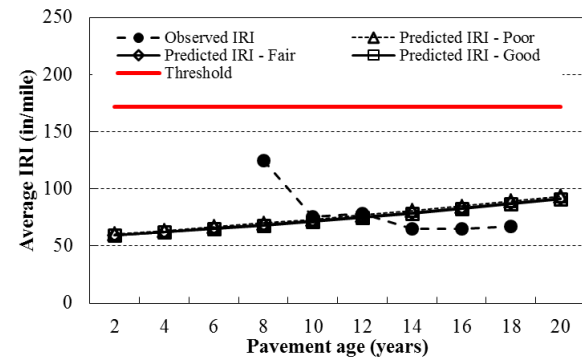
(a)



(b)

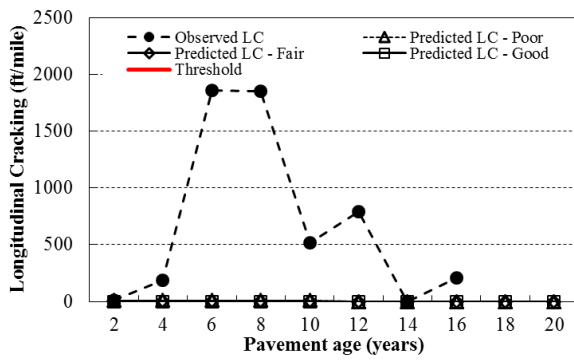


(c)

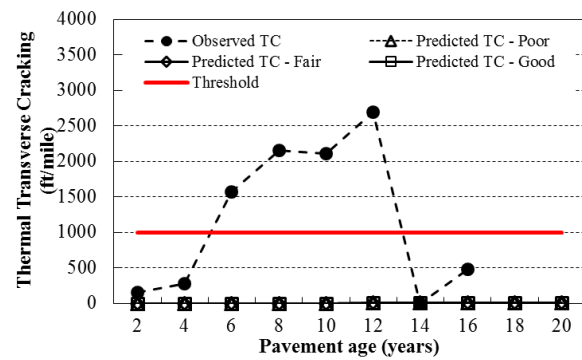


(d)

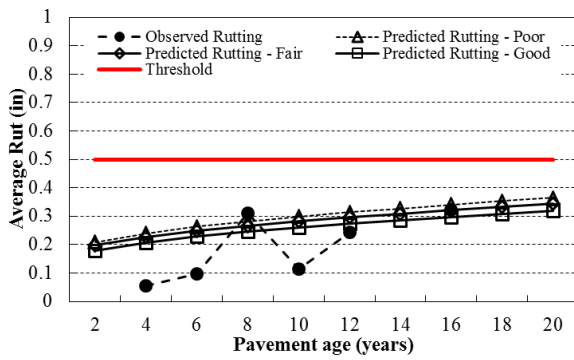
Figure C.2.4-4 HMA overlay project 26658



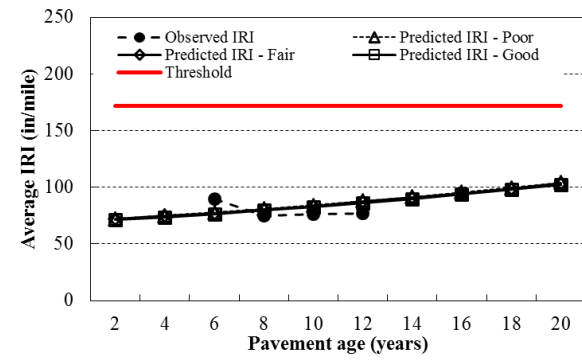
(a)



(b)

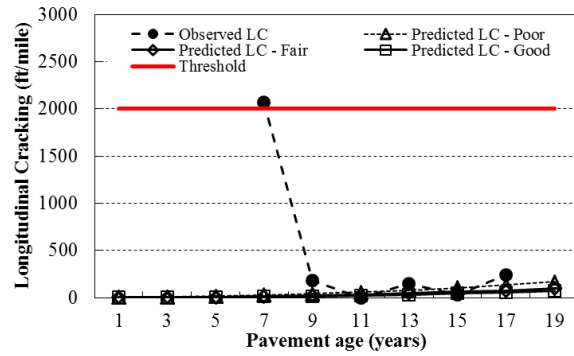


(c)

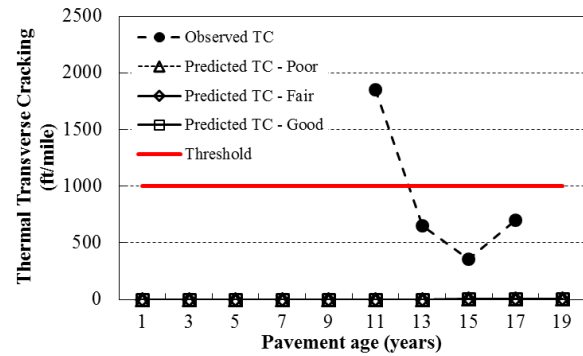


(d)

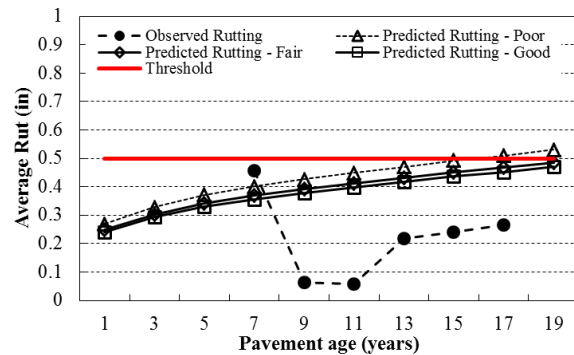
Figure C.2.4-5 HMA overlay project 29755



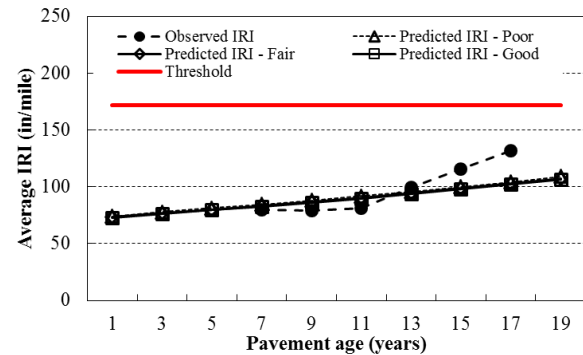
(a)



(b)

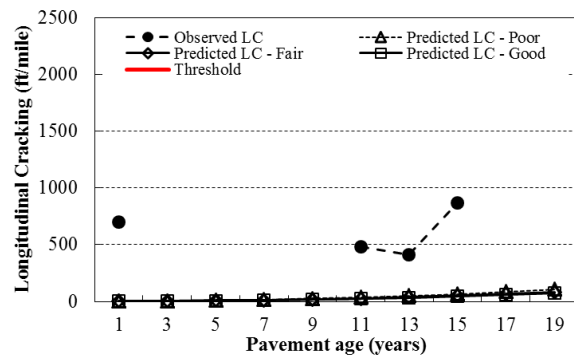


(c)

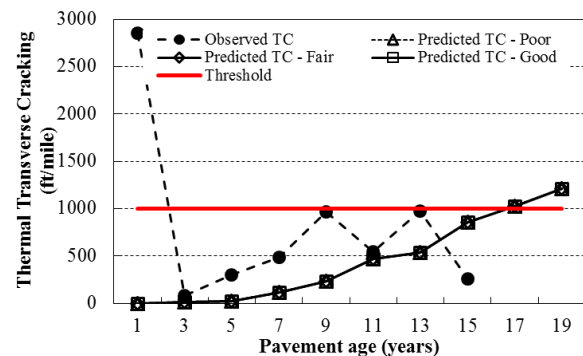


(d)

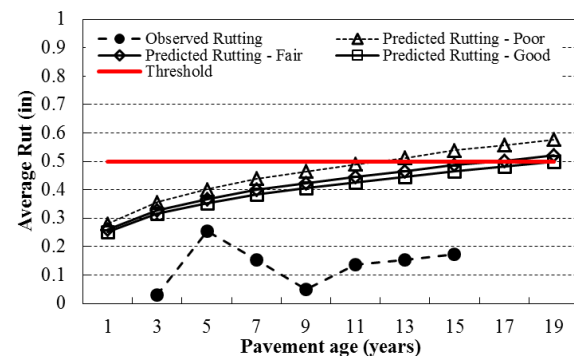
Figure C.2.4-6 HMA overlay project 30701



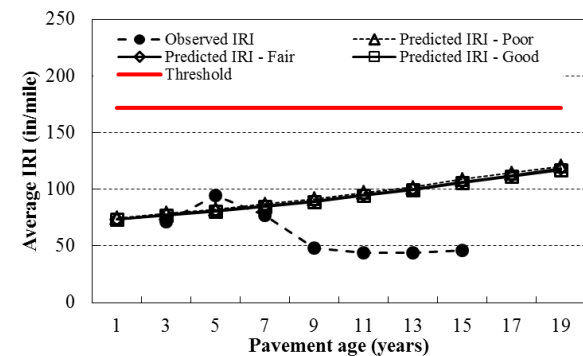
(a)



(b)

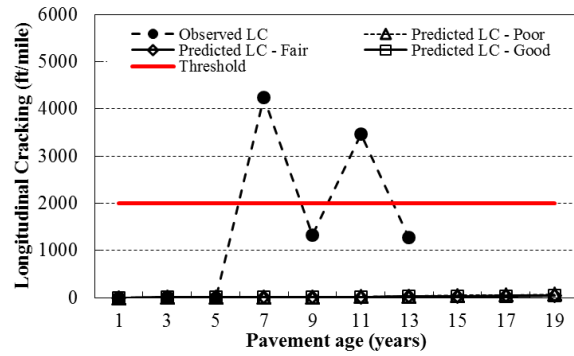


(c)

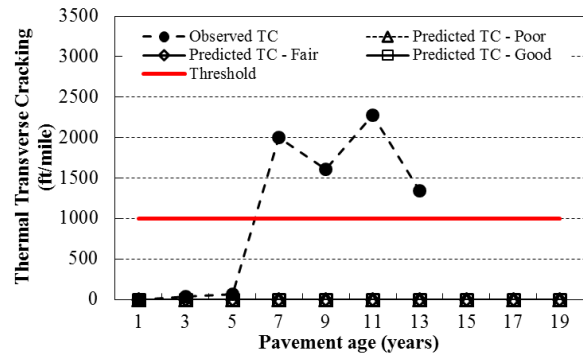


(d)

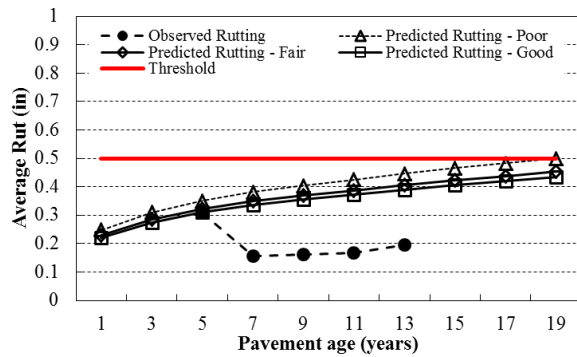
Figure C.2.4-7 HMA overlay project 31047



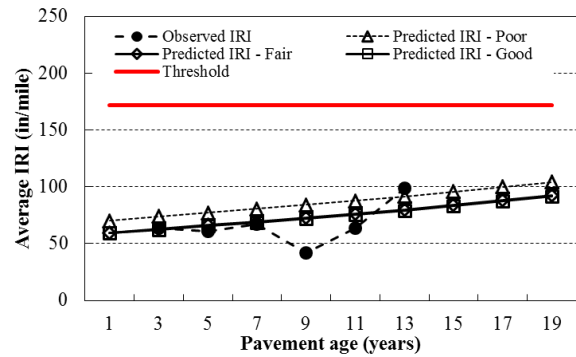
(a)



(b)

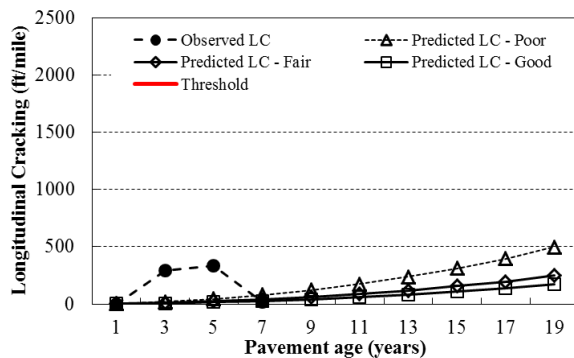


(c)

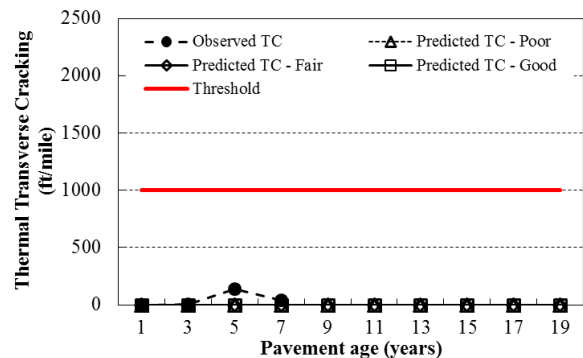


(d)

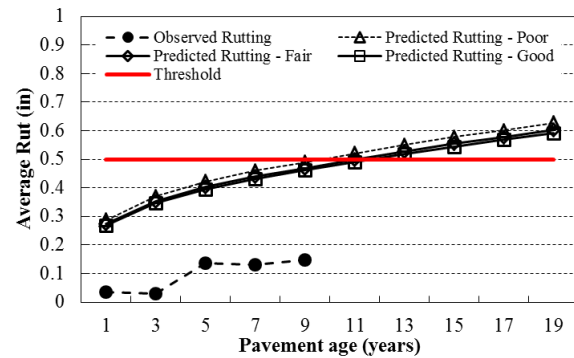
Figure C.2.4-8 HMA overlay project 32361



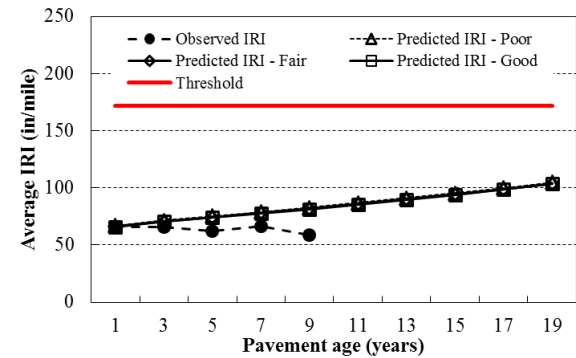
(a)



(b)



(c)



(d)

Figure C.2.4-9 HMA overlay project 45875

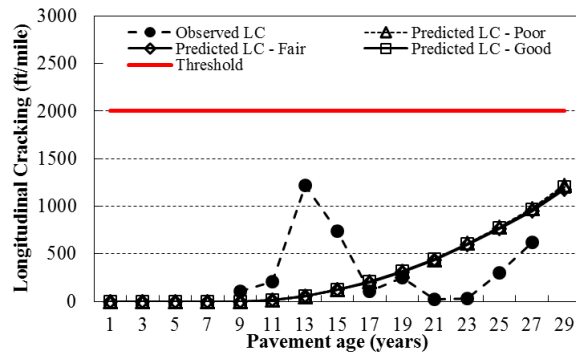
(a)

(b)

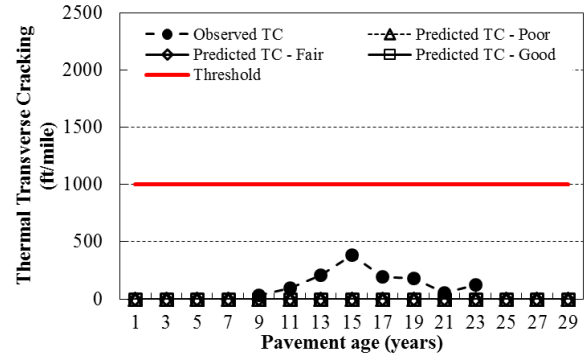
(c)

(d)

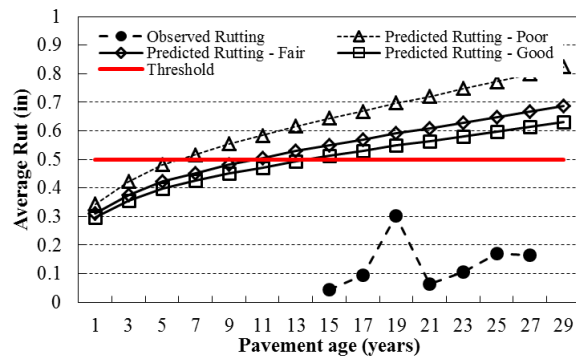
Figure C.2.4-10 HMA overlay project 50715



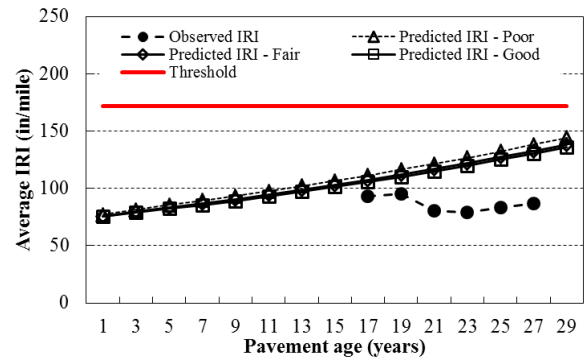
(a)



(b)

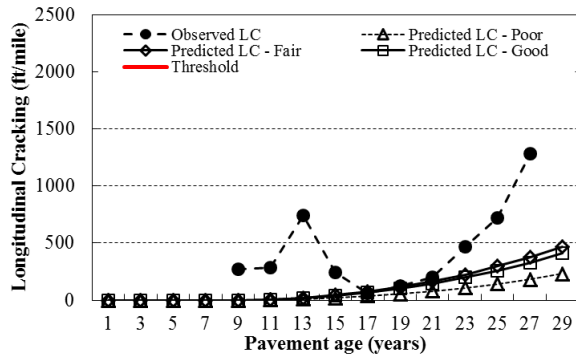


(c)

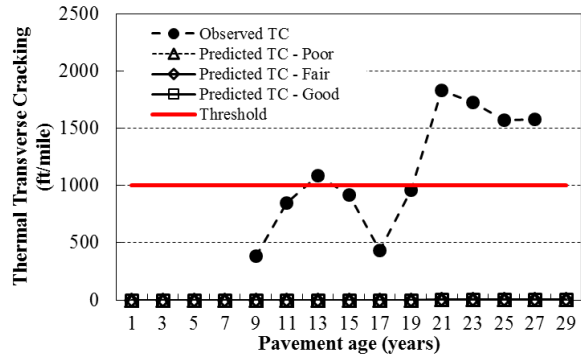


(d)

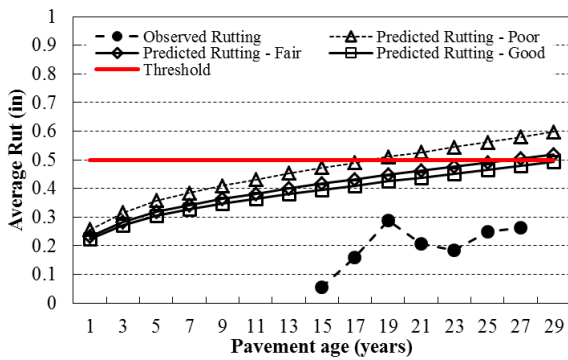
Figure C.2.4-11 HMA overlay project 20313



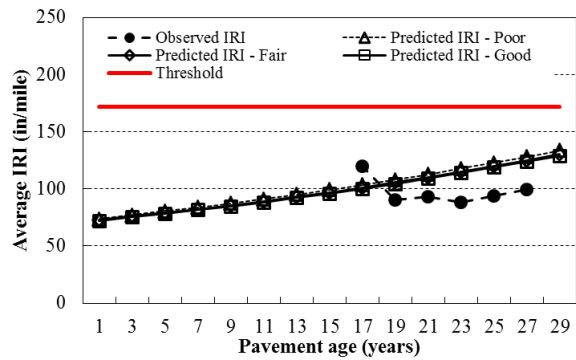
(a)



(b)

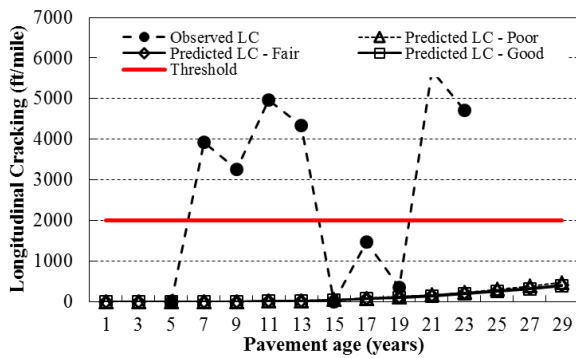


(c)

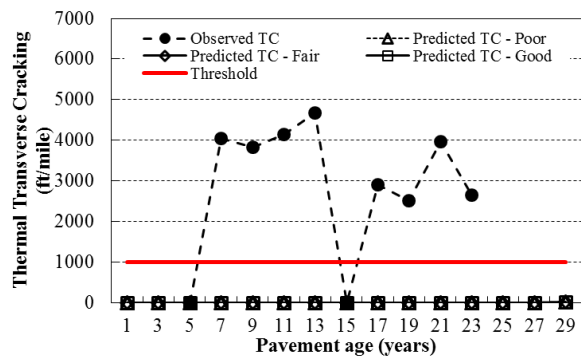


(d)

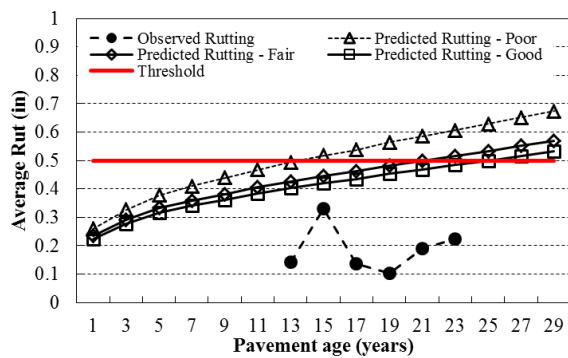
Figure C.2.4-12 HMA overlay project 12802



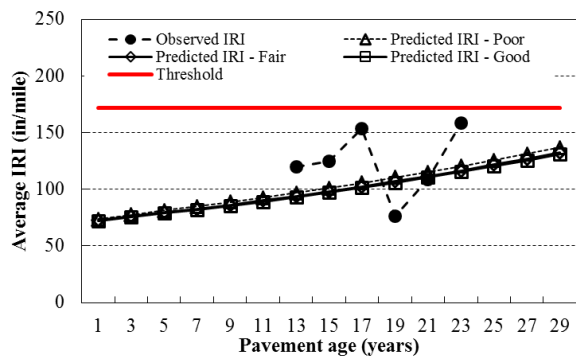
(a)



(b)

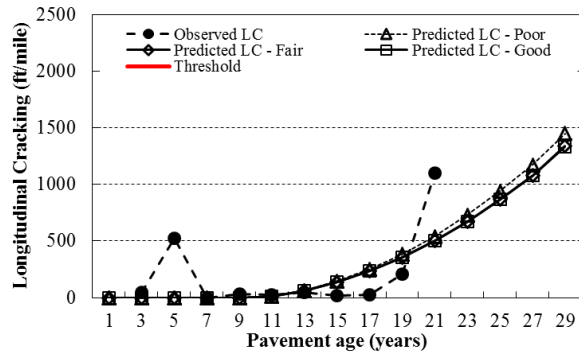


(c)

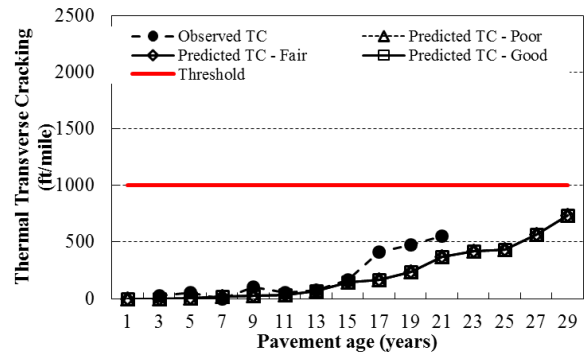


(d)

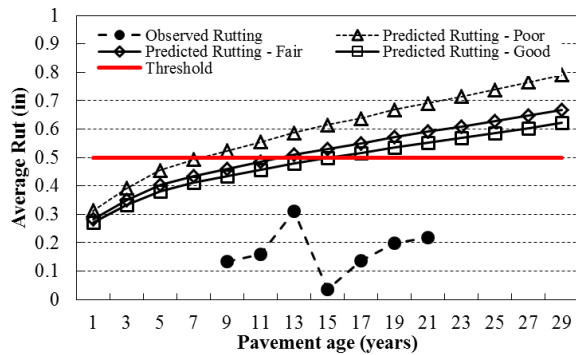
Figure C.2.4-13 HMA overlay project 24621



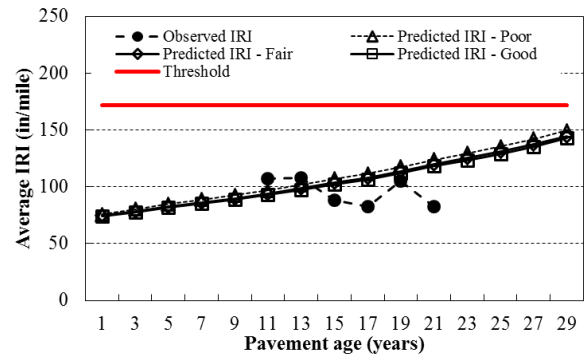
(a)



(b)

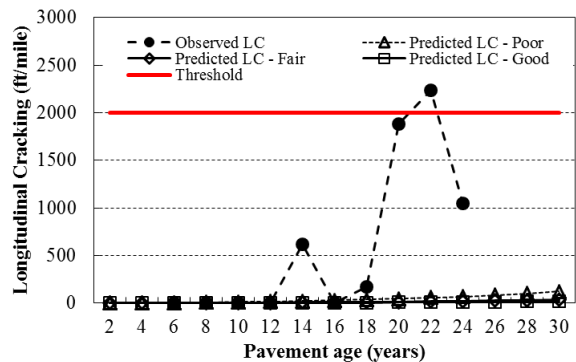


(c)

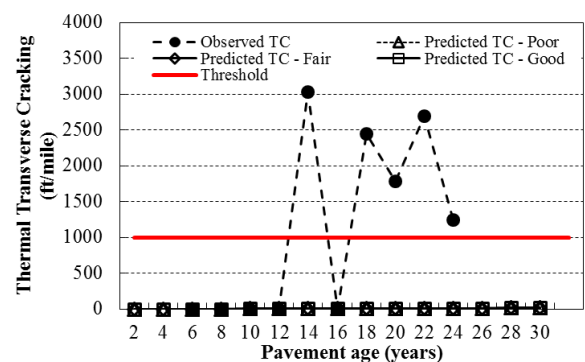


(d)

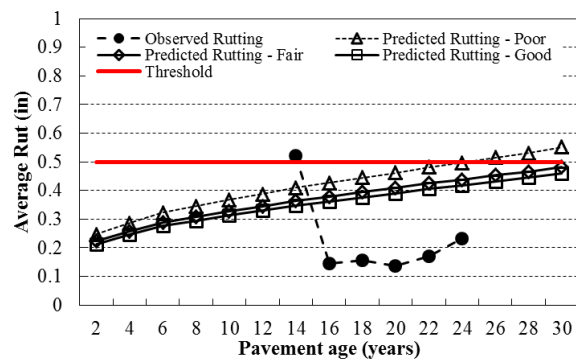
Figure C.2.4-14 HMA overlay project 25515



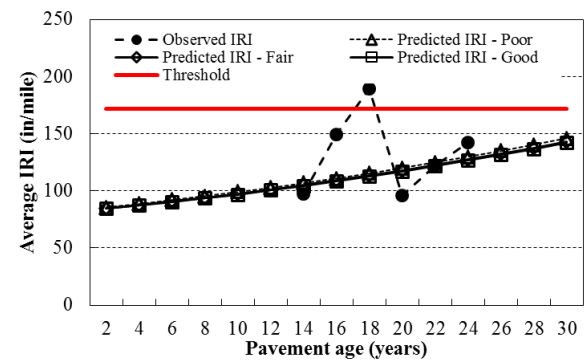
(a)



(b)



(c)



(d)

Figure C.2.4-15 HMA overlay project 30702

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