

APPENDIX P

Future Scenarios' VISSIM Model Validation Exhibits

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Future Scenarios' VISSIM Model Files

(VISSIM files located in electronic Appendix P folder)

P1 – Year 2028 No Build VISSIM AM

P2 – Year 2028 No Build VISSIM PM

P3 – Year 2028 No Build with Signal Retimings VISSIM AM

P4 – Year 2028 No Build with Signal Retimings VISSIM PM

P5 – Year 2048 No Build VISSIM AM

P6 – Year 2048 No Build VISSIM PM

P7 – Year 2048 No Build with Signal Retimings VISSIM AM

P8 – Year 2048 No Build with Signal Retimings VISSIM PM

P9 – Year 2028 Build with Short Term Improvements VISSIM AM

P10 – Year 2028 Build with Short Term Improvements VISSIM PM

P11 – Year 2048 Build with Short Term Improvements VISSIM AM

P12 – Year 2048 Build with Short Term Improvements VISSIM PM

P13 – Year 2048 Build with Long Term Improvements VISSIM AM

P14 – Year 2048 Build with Long Term Improvements VISSIM PM

APPENDIX P1

Year 2028 No Build VISSIM AM Peak Hour

I-41 Traffic and Engineering Study
No Build (2028) AM Peak Hour Calibration
Freeway Mainline and Ramp Volumes

			% Demand	Segments										Target					Vissim					Difference					RMSE					RMSE				
			100%	Forecast ID	Link ID	Description	Type	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	TOTAL	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2	7:00-7:15AM3	7:15-7:30AM3	7:30-7:45AM3	7:45-8:00AM3	TOTAL3	7:00-7:15AM6	7:15-7:30AM6	7:30-7:45AM6	7:45-8:00AM6	TOTAL6	7:00-7:15AM5	7:15-7:30AM5	7:30-7:45AM5	7:45-8:00AM5	TOTAL5						
TEOp5 Validation - 15 minute periods				10001	69	NB I-41 (Southern Project Limits)	MAINLINE	673	849	902	1026	3450	748	863	852	970	3433	75	14	-50	-56	-17	11%	2%	2%	5%	1%	2.9	0.5	1.7	1.8	0.3						
Test	Target	Model		10002	72	NB I-41 Exit to CTH BB	RAMP	125	169	189	177	660	125	169	184	168	646	-1	0	-4	-9	-14	0%	0%	2%	5%	2%	0.0	0.0	0.3	0.7	0.5						
			Tier 1	RSME < 5%	7%																		12%	1%	7%	7%	1%	2.8	0.2	1.8	1.9	0.6						
Tier 2				RSNE < 3 for 85% of links	90%																																	
TEOp5 Validation - 60 minute period				10007	77	NB I-41 betw WIS 125 Exit to WIS 125 Ent	MAINLINE	546	623	666	726	2560	594	628	619	677	2518	48	5	-47	-48	-42	3%	1%	5%	5%	2%	2.1	0.2	1.8	1.8	0.8						
Test	Target	Model		10008	79	NB I-41 Ent from WIS 125	RAMP	53	72	104	71	300	57	69	101	72	299	4	-3	-4	-2	-1	7%	4%	3%	2%	0%	0.5	0.3	0.3	0.2	0.1						
			Tier 1	RMSE < 5%	4%																	1%	1%	1%	1%	3%	1.7	0.3	2.2	2.0	1.5							
Tier 2				RSNE < 3 for 85% of links	87%																																	
				10010	82	NB I-41 Exit to WIS96	RAMP	130	157	169	214	670	135	160	166	198	659	6	3	-3	-16	-11	4%	2%	2%	6%	2%	0.5	0.2	0.3	1.1	0.4						
				10011	81	NB I-41 betw WIS 96 Exit to WIS 96 Ent	MAINLINE	470	537	602	582	2190	512	535	557	551	2156	43	-2	-44	-31	-34	9%	0%	7%	5%	2%	2.0	0.1	1.8	1.3	0.7						
				10012	83	NB I-41 Ent from WIS 96	RAMP	46	53	74	67	240	45	51	75	67	239	-1	-2	1	1	-1	2%	3%	1%	1%	0%	0.1	0.2	0.1	0.1	0.1						
				10013	85	NB I-41 WIS 96 Ent to WIS 15 Exit	MAINLINE	516	590	676	649	2430	551	585	631	616	2383	35	-5	-45	-33	-47	2%	1%	7%	5%	2%	1.6	0.2	1.7	1.3	1.0						
				10014	87	NB I-41 Exit to WIS15	RAMP	110	155	189	177	630	113	143	177	174	607	3	-12	-12	-2	-23	3%	4%	6%	1%	4%	0.3	1.0	0.9	0.2	0.9						
				10015	86	NB I-41 betw WIS 15 Exit to WIS 15 Ent	MAINLINE	406	435	487	472	1800	430	440	448	441	1760	24	6	-40	-39	-31	4%	1%	6%	7%	2%	1.2	0.3	1.8	1.4	0.9						
				10016	88	NB I-41 Ent from WIS15	RAMP	150	186	202	213	750	150	173	198	191	713	0	-13	-3	-22	-37	0%	2%	4%	10%	5%	0.0	0.9	0.2	1.5	1.4						
				10017	90	NB I-41 betw WIS 15 Ent to WIS 47 Exit	MAINLINE	556	620	689	685	2550	568	618	649	642	2478	12	-2	-40	-43	-72	2%	0%	4%	3%	3%	0.5	0.1	1.5	1.6	1.4						
				10018	93	NB I-41 Exit to WIS47	RAMP	70	84	123	143	420	72	79	103	121	386	4	-5	-20	-12	-34	4%	2%	1%	4%	1%	0.3	0.6	1.8	1.0	1.7						
				10019	92	NB I-41 betw WIS 47 Exit to WIS 47 Ent	MAINLINE	486	536	566	582	2130	478	534	543	515	2069	8	-3	-23	-27	-61	2%	1%	4%	5%	3%	0.4	0.1	1.0	1.2	1.3						
				10020	94	NB I-41 Ent from WIS47	RAMP	174	210	165	170	720	169	204	167	171	711	-5	-5	2	0	-9	3%	3%	1%	0%	1%	0.4	0.4	0.2	0.0	0.3						
				10021	96	NB I-41 betw WIS 47 Ent to Ballard Exit	MAINLINE	660	746	731	712	2850	637	741	715	689	2782	-23	-5	-16	-23	-68	4%	1%	2%	3%	2%	0.9	0.2	0.6	0.9	1.3						
				10022	98	NB I-41 Exit to Ballard	RAMP	199	243	201	247	890	199	242	210	221	826	-26	173	-21	9	-25	-44	12%	9%	4%	14%	7%	1.8	1.4	0.6	1.6	2.1					
				10023	97	NB I-41 betw Ballard Exit to Ballard Ent	MAINLINE	462	503	530	466	1960	450	514	501	460	1925	-11	11	-29	-6	-35	2%	2%	5%	1%	2%	0.5	0.5	1.2	0.3	0.8						
				10024	99	NB I-41 Ent from Ballard	RAMP	208	294	290	287	1080	205	247	263	277	992	-3	205	-27	-10	-88	2%	10%	8%	4%	4%	0.2	2.7	1.6	0.6	2.7						
				10025	100	NB I-41 betw Ballard Ent to 441 Exit	MAINLINE	669	797	820	753	3040	655	763	761	741	2920	-14	-29	-59	-12	-120	2%	4%	5%	2%	4%	0.5	1.2	2.0	0.4	2.2						
				10026	102	NB I-41 Exit to SB441	RAMP	155	226	203	227	810	141	197	200	195	733	-14	-29	-3	-32	-77	1%	3%	2%	2%	3%	1.1	1.9	0.2	2.1	2.7						
				10027	101	NB I-41 betw 441 Exit to 441 Ent	MAINLINE	515	571	617	526	2230	508	552	539	518	2158	-7	-19	-58	13	-72	1%	3%	5%	2%	3%	0.3	0.8	2.3	0.5	1.5						
				10028	33	NB I-41 Ent from NB441	RAMP	223	243	256	259	980	228	242	250	256	977	5	-1	-5	-3	-3	2%	0%	2%	1%	0%	0.3	0.0	0.3	0.2	0.1						
				10029	104	NB I-41 betw 441 Ent to CTH N Exit	MAINLINE	737	814	873	785	3144	738	789	814	802	3144	1	-25	-59	17	-66	0%	0%	3%	2%	2%	0.0	0.9	2.0	0.6	1.2						
				10030	106	NB I-41 Exit to CTH N	RAMP	76	53	67	84	280	84	61	59	79	283	9	7	-8	-5	3	21%	16%	11%	6%	1%	1.0	1.0	0.9	0.5	0.2						
				10031	105	NB I-41 betw CTH N Exit to CTH N Entrance	MAINLINE	662	761	807	701	2930	644	724	748	726	2842	-17	644	-37	-58	-25	-48	3%	5%	5%	3%	4%	3%	0.7	1.3	2.1	0.9	1.6				
				10032	107	NB I-41 Ent from CTH N	RAMP	68	80	66	56	270	68	77	63	57	266	0	-2	-3	1	-4	1%	3%	4%	2%	2%	0.1	0.2	0.4	0.2	0.3						
				10033	109	NB I-41 betw CTH N Exit to WIS 55 Exit	MAINLINE	730	840	873	757	3200	715	800	814	789	3118	-15	-41	-58	32	-82	2%	5%	7%	4%	3%	0.6	1.4	2.0	1.2	1.5						
				10034	111	NB I-41 Exit to WIS55	RAMP	74	85	69	91	320	81	75	71	82	308	6	-10	-2	-9	-12	2%	4%	5%	2%	4%	0.7	1.1	0.2	1.0	0.7						
				10035	110	NB I-41 betw WIS 55 Exit to WIS 55 Ent	MAINLINE	656	755	804	666	2880	623	724	737	684	2793	-33	724	-32	-67	-44	5%	4%	2%	10%	3%	1.3	1.2	2.4	1.7	1.6						
				10036	112	NB I-41 Ent from WIS55	RAMP	48	26	49	38	160	48	49	38	1	44	-17	158	2	-2	2	2%	2%	2%	5%	1%	0.1	0.2	0.1	0.3	0.1						
				10037	114	NB I-41 betw WIS 55 Ent to CTH J Exit	MAINLINE	704	781	843	713	3040	668	759	768	761	2955	-36	-23	-75	-48	-85	5%	3%	1%	3%	3%	1.3	0.8	2.6	1.8	1.5						
				10038	116	NB I-41 Exit to CTH J	RAMP	70	58	70	72	270	57	62	63	72	254	-12	5	-7	0	-16	11%	8%	10%	0%	4%	1.5	0.6	0.9	0.0	1.0						
				10039	115	NB I-41 betw CTH J Exit to CTH J Ent	MAINLINE	634	724	772	640	2770	608	691	703	692	2694	-26	-33	-69	52	-76	4%	5%	8%	6%	3%	1.0	1.2	2.5	2.0	1.4						
				10040	117	NB I-41 Ent from CTH J	RAMP	102	108	122	<																											

I-41 Traffic and Engineering Study
No Build (2028) AM Peak Period Calibration
Intersection Turning Movements

			% Demand	Intersections					Target					Vissim					Difference					RNSE				
			100%	Int ID	Int Name	From Link	To Link	Mvmt	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	TOTAL	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2	7:00-7:15AM3	7:15-7:30AM3	7:30-7:45AM3	7:45-8:00AM3	TOTAL3	7:00-7:15AM5	7:15-7:30AM5	7:30-7:45AM5	7:45-8:00AM5	TOTAL5
TEOps Validation - 15 minute periods				108	SB I-41 & WIS15	303	52	EBL	47	60	34	59	200	47	58	38	55	198	0	-2	4	-4	-2	0.0	0.3	0.6	0.5	0.1
Test	Target	Model		108	SB I-41 & WIS15	303	304	EBT	240	300	315	385	1240	240	289	326	368	1225	0	-11	12	-17	-15	0.0	0.6	0.6	0.9	0.4
Tier 1	RMSPE < 5%	Not Applicable		108	SB I-41 & WIS15	309	302	WBT	158	153	152	188	650	148	149	155	187	640	-10	-4	3	0	-10	0.8	0.3	0.3	0.0	0.4
Tier 2	RSNE < 3 for 75% of turns	99%		108	SB I-41 & WIS15	309	52	WBR	82	91	113	94	380	92	90	107	93	381	9	-2	-6	-1	1	1.0	0.2	0.5	0.1	0.1
				108	SB I-41 & WIS15	51	304	SBT	44	62	40	44	190	38	47	43	39	167	-7	-15	3	-5	-23	1.0	1.9	0.5	0.7	1.7
				108	SB I-41 & WIS15	51	302	SBR	131	207	243	229	810	198	164	173	191	725	66	-43	-70	-38	-85	1.2	3.0	1.1	2.5	3.0
				106	SB I-41 & WIS96	323	325	EBT	103	154	205	189	650	105	148	204	190	647	2	-6	-1	2	-3	0.2	0.5	0.1	0.1	0.1
				106	SB I-41 & WIS96	323	57	EBR	34	53	58	65	210	36	52	59	64	211	2	-1	1	-1	1	0.4	0.2	0.1	0.1	0.0
				106	SB I-41 & WIS96	332	57	WBL	65	108	108	100	380	64	102	107	98	372	0	-6	-1	-1	-8	0.1	0.6	0.1	0.1	0.4
				106	SB I-41 & WIS96	332	334	WBT	125	131	153	241	650	127	135	141	215	618	2	4	-12	-26	-32	0.2	0.4	1.0	1.7	1.3
				106	SB I-41 & WIS96	340	325	SBT	30	40	48	42	160	35	33	36	38	142	5	-7	-12	-3	-18	0.9	1.2	1.7	0.5	1.4
				106	SB I-41 & WIS96	340	57	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				106	SB I-41 & WIS96	340	334	SBR	47	77	71	94	290	63	52	61	69	245	15	-24	-10	-25	-45	2.2	2.8	1.2	2.6	2.6
				104	SB I-41 & WIS125	349	351	EBT	115	131	147	157	550	116	130	144	154	544	1	-2	-3	-3	-6	0.1	0.2	0.2	0.2	0.3
				104	SB I-41 & WIS125	349	60	EBR	41	49	37	33	160	42	49	37	33	161	1	0	0	0	1	0.2	0.0	0.1	0.0	0.1
				104	SB I-41 & WIS125	361	60	WBL	60	73	69	88	290	62	74	68	84	289	2	2	-1	-4	-1	0.3	0.2	0.1	0.4	0.1
				104	SB I-41 & WIS125	361	363	WBT	99	143	175	242	660	106	140	172	228	646	7	-3	-3	-15	-14	0.7	0.3	0.3	0.9	0.6
				104	SB I-41 & WIS125	367	351	SBT	37	47	64	62	210	38	40	46	55	179	1	-7	-17	-7	-31	0.1	1.1	2.2	0.9	2.1
				104	SB I-41 & WIS125	367	60	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				104	SB I-41 & WIS125	367	363	SBR	65	62	108	106	340	72	64	73	88	296	7	2	-35	-18	-44	0.9	0.2	1.2	1.7	2.4
				101	SB I-41 & CTHBB	377	381	EBT	125	127	155	142	550	121	127	158	143	549	-4	-1	3	1	-1	0.4	0.0	0.2	0.1	0.0
				101	SB I-41 & CTHBB	377	66	EBR	43	48	59	60	210	44	47	59	60	210	1	-1	0	0	0	0.2	0.1	0.0	0.0	0.0
				101	SB I-41 & CTHBB	382	66	WBL	38	42	46	34	160	39	43	45	33	160	1	0	-1	-1	0	0.2	0.1	0.2	0.2	0.0
				101	SB I-41 & CTHBB	382	379	WBT	92	130	127	141	490	95	125	129	138	488	3	-4	2	-3	-2	0.4	0.4	0.2	0.3	0.1
				101	SB I-41 & CTHBB	393	381	SBT	20	27	38	45	130	17	21	28	35	102	-3	-6	-10	-10	-28	0.6	1.1	1.6	1.6	2.5
				101	SB I-41 & CTHBB	393	66	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				101	SB I-41 & CTHBB	393	379	SBR	88	125	113	134	460	100	98	108	116	422	12	-28	-4	-18	-38	1.3	2.5	0.4	1.5	1.8
				109	NB I-41 & WIS15	304	316	EBL	119	157	145	179	600	122	147	146	157	573	3	-9	1	-22	-27	0.3	0.7	0.0	1.7	1.1
				109	NB I-41 & WIS15	304	311	EBT	166	206	210	249	830	159	187	213	227	786	-7	-18	3	-22	-44	0.5	1.3	0.2	1.4	1.5
				109	NB I-41 & WIS15	87	308	NBL	43	52	60	35	190	44	48	59	42	194	1	-4	0	7	4	0.1	0.6	0.0	1.2	0.3
				109	NB I-41 & WIS15	87	316	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				109	NB I-41 & WIS15	87	311	NBR	67	103	129	141	440	72	94	120	137	423	5	-9	-9	-4	-17	0.6	0.9	0.8	0.4	0.8
				109	NB I-41 & WIS15	10338	308	WBT	196	192	205	246	840	199	192	200	241	832	3	1	-5	-6	-8	0.2	0.0	0.4	0.4	0.3
				109	NB I-41 & WIS15	10338	315	WBR	31	29	56	34	150	28	29	56	36	149	-3	0	0	2	-1	0.5	0.1	0.0	0.4	0.1
				107	NB I-41 & WIS96	325	83	EBL	26	35	61	49	170	25	33	61	49	168	-1	-2	0	0	-2	0.1	0.3	0.0	0.0	

I-41 Traffic and Engineering Study
No Build (2028) AM Peak Period Calibration
Intersection Turning Movements

			% Demand	Intersections				Target					Vissim					Difference					RNSE						
			100%	Int ID	Int Name	From Link	To Link	Mvmt	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	TOTAL	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2	7:00-7:15AM3	7:15-7:30AM3	7:30-7:45AM3	7:45-8:00AM3	TOTAL3	7:00-7:15AM5	7:15-7:30AM5	7:30-7:45AM5	7:45-8:00AM5	TOTAL5	
TEOps Validation - 15 minute periods				113	CTH N & SB I-41	222	24	NBL	77	61	99	83	320	76	63	97	82	318	-1	2	-3	0	-2	0.1	0.3	0.3	0.0	0.1	
Test	Target	Model		113	CTH N & SB I-41	222	216	NBT	51	78	55	86	270	62	80	58	81	281	11	2	3	-5	11	1.5	0.2	0.4	0.6	0.6	
Tier 1	RMSPE < 5%			113	CTH N & SB I-41	23	220	WBL	30	29	31	31	120	42	-2	27	31	30	129	12	-2	0	-1	9	2.2	0.3	0.1	0.1	0.9
Tier 2	RSNE < 3 for 75% of turns			113	CTH N & SB I-41	23	24	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	
				113	CTH N & SB I-41	23	216	WBR	14	11	26	19	70	23	13	16	24	75	9	2	-10	5	5	2.5	0.7	2.0	1.0	0.6	
				113	CTH N & SB I-41	217	220	SBT	54	57	48	51	210	56	58	47	49	210	2	1	-1	-2	0	0.2	0.1	0.1	0.3	0.0	
TEOps Validation - 60 minute period				113	CTH N & SB I-41	217	24	SBR	55	64	72	79	270	56	64	71	76	268	2	0	0	-4	-2	0.2	0.0	0.0	0.4	0.1	
				114	CTH N & NB I-41	224	221	EBL	35	26	17	32	110	43	29	19	28	119	8	3	2	-4	9	1.3	0.7	0.4	0.6	0.9	
Test	Target	Model		114	CTH N & NB I-41	224	107	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	
Tier 1	RMSPE < 5%			114	CTH N & NB I-41	224	227	EBR	41	28	49	52	170	40	34	40	51	165	-1	6	-9	-1	-5	0.1	1.2	1.3	0.2	0.4	
Tier 2	RSNE < 3 for 75% of turns			114	CTH N & NB I-41	229	221	NBT	93	113	137	137	480	96	113	137	134	480	3	0	0	-3	0	0.3	0.0	0.0	0.2	0.0	
				114	CTH N & NB I-41	229	107	NBR	46	54	50	40	190	47	53	48	41	189	1	-1	-2	1	-1	0.2	0.1	0.3	0.2	0.1	
				114	CTH N & NB I-41	223	107	SBL	22	25	16	16	80	21	24	16	17	78	-1	-1	-1	0	-2	0.2	0.1	0.1	0.1	0.2	
				114	CTH N & NB I-41	223	227	SBT	62	60	63	66	250	77	59	63	62	261	15	-2	1	-3	11	1.9	0.2	0.1	0.4	0.7	
				115	WIS55 & SB I-41	187	16	NBL	50	79	76	65	270	49	79	73	64	265	-1	0	-3	-1	-5	0.1	0.0	0.3	0.1	0.3	
				115	WIS55 & SB I-41	187	184	NBT	58	56	93	72	280	61	56	89	74	279	3	-1	-4	2	-1	0.3	0.1	0.4	0.2	0.0	
				115	WIS55 & SB I-41	15	186	WBL	17	24	18	21	80	25	17	24	20	85	7	-7	6	-1	5	1.8	1.4	1.3	0.2	0.6	
				115	WIS55 & SB I-41	15	16	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	
				115	WIS55 & SB I-41	15	184	WBR	61	4	4	1	70	16	26	11	14	68	-44	22	7	13	-2	0.7	0.5	1.6	12.7	0.3	
				115	WIS55 & SB I-41	183	186	SBT	35	66	42	56	200	36	65	43	56	200	1	-1	1	-1	0	0.2	0.2	0.1	0.1	0.0	
				115	WIS55 & SB I-41	183	16	SBR	31	32	47	31	140	31	32	45	31	139	1	1	-2	0	-1	0.1	0.1	0.3	0.0	0.1	
				116	WIS55 & NB I-41	111	187	EBL	12	13	11	14	50	15	12	11	14	51	3	-1	-1	0	1	1.0	0.3	0.2	0.1	0.1	
				116	WIS55 & NB I-41	111	112	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	
				116	WIS55 & NB I-41	111	188	EBR	63	73	58	77	270	67	65	61	70	264	5	-7	3	-7	-6	0.6	0.9	0.5	0.8	0.4	
				116	WIS55 & NB I-41	200	187	NBT	97	122	158	123	500	95	122	154	123	495	-1	0	-4	0	-5	0.1	0.0	0.3	0.0	0.2	
				116	WIS55 & NB I-41	200	112	NBR	31	25	38	36	130	32	25	38	35	130	1	0	0	-1	0	0.2	0.1	0.0	0.1	0.0	
				116	WIS55 & NB I-41	186	112	SBL	17	1	1	11	30	18	2	1	9	29	1	1	-1	-1	-1	0.1	1.2	0.5	0.4	0.1	
				116	WIS55 & NB I-41	186	188	SBT	36	89	59	66	250	44	79	67	66	255	9	-10	8	-1	5	1.4	1.1	1.0	0.1	0.3	
				117	CTH J & SB I-41	182	197	NBL	36	50	45	50	180	36	51	44	47	178	1	1	-1	-3	-2	0.1	0.2	0.2	0.4	0.1	
				117	CTH J & SB I-41	182	189	NBT	74	44	62	81	260	69	47	57	75	248	-5	3	-5	-6	-12	0.5	0.5	0.6	0.6	0.7	
				117	CTH J & SB I-41	196	191	WBL	38	43	27	21	130	32	40	35	28	135	-5	-4	7	7	5	0.9	0.6	1.4	1.5	0.4	
				117	CTH J & SB I-41	196	197	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	
				117	CTH J & SB I-41	196	189	WBR	15	10	19	16	60	20	13	14	17	65	5	4	-6	2	5	1.3	1.2	1.3	0.4	0.6	
				117	CTH J & SB I-41	190	191	SBT	29	27	39	35	130	30	26	39	36	130	1	0	-1	1	0	0.2	0.1	0.1	0.1	0.0	
				117	CTH J & SB I-41	190	197	SBR	63	49	65	53	230	66	48	64	53	230	3	-1	-1	-1	0	0.4	0.1	0.1	0.1	0.0	
				118	CTH J & NB I-41	199	182	EBL	35	29	36	50	150	31	31	32	43	137	-4	2	-3	-7	-13	0.7	0.3	0.5	1.0	1.1	
				118	CTH J & NB I-41	199	198	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	
				118	CTH J & NB I-41	199	192	EBR	35	29	35	22	120	26	32	32	29	119	-9	4	-3	7	-1	1.5	0.7	0.5	1.5	0.1	
				118	CTH J & NB I-41	174	182	NBT	74	65	71	80	290	75	68	68	80	290	1	2	-3	0	0	0.1	0.3	0.4	0.0	0.0	
				118	CTH J & NB I-41	174	198	NBR	84	90	99	78	350	85	91	96	78	348	1	1	-3	0	-2	0.1	0.1	0.3	0.0	0.1	
				118	CTH J & NB I-41	191	198	SBL	18	18	24	21	80	19	18	22	22	80	1	0	-2	1	0	0.2	0.1	0.4	0.2	0.0	
				118	CTH J & NB I-41	191	192	SBT	49	52	43	36	180	45	47	52	42	186	-4	-5	9	6	6	0.6	0.7	1.4	1.0	0.4	
				119	CTH U & SB I-41	166	8	NBL	20	21	16	14	70	19	19	16	15	70	-1	-1	0	1	0	0.1	0.3	0.0	0.4	0.0	
				119	CTH U & SB I-41	166	167	NBT	4	15	26	55	100	9	14	29	37	88	5	-2	2	-18	-12	2.6	0.4	0.4	2.4	1.2	
				119	CTH U & SB I-41	7	159	WBL	22	30	30	18	100	18	25	31	24	99	-3	-5	1	6	-1	0.7	0.9	0.2	1.3	0.1	
				119</																									

I-41 Traffic and Engineering Study
No Build (2028) AM Peak Period Calibration
Lane Utilization Comparison

I-41 NB															
Location		I-41 NB south of CTH BB			I-41 NB betw WIS 125 & WIS 96				I-41 NB betw CTH E & WIS 441			I-41 NB betw WIS 441 & CTH N		I-41 NB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
Field VISSIM (ATR)	7:00 AM	30%	29%	42%	26%	29%	37%	8%	39%	40%	22%	49%	51%	51%	49%
	7:15 AM	29%	29%	41%	25%	29%	38%	8%	37%	38%	26%	49%	51%	51%	49%
	7:30 AM	28%	29%	43%	25%	28%	37%	9%	37%	37%	26%	49%	51%	51%	49%
	7:45 AM	30%	30%	40%	25%	28%	37%	11%	36%	38%	26%	49%	51%	51%	49%
	7:00 AM	39%	36%	25%	12%	25%	35%	28%	25%	32%	43%	45%	55%	39%	61%
	7:15 AM	37%	35%	28%	14%	24%	33%	30%	26%	29%	45%	43%	57%	38%	62%
	7:30 AM	36%	36%	29%	13%	25%	32%	30%	27%	29%	44%	42%	58%	38%	62%
	7:45 AM	36%	33%	31%	14%	26%	31%	30%	31%	28%	41%	48%	52%	40%	60%
VISSIM	Avg	29%	29%	42%	25%	29%	37%	9%	37%	38%	25%	49%	51%	51%	49%
Field	Avg	37%	35%	28%	13%	25%	32%	29%	27%	29%	43%	45%	55%	39%	61%

I-41 SB															
Location		I-41 SB south of CTH BB			I-41 SB betw WIS 125 & WIS 96				I-41 SB betw CTH E & WIS 441			I-41 SB betw WIS 441 & CTH N		I-41 SB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
Field VISSIM (ATR)	7:00 AM	32%	36%	32%	26%	33%	35%	5%	30%	31%	39%	50%	50%	49%	51%
	7:15 AM	32%	35%	33%	26%	32%	35%	7%	30%	31%	40%	49%	51%	49%	51%
	7:30 AM	32%	35%	32%	25%	31%	37%	7%	30%	30%	40%	50%	50%	49%	51%
	7:45 AM	32%	35%	32%	23%	29%	39%	9%	31%	30%	39%	50%	50%	50%	50%
	7:00 AM	26%	39%	35%	7%	25%	33%	34%	27%	33%	40%	45%	55%	42%	58%
	7:15 AM	26%	37%	38%	8%	25%	31%	36%	26%	32%	42%	44%	56%	40%	60%
	7:30 AM	25%	36%	39%	9%	24%	31%	36%	28%	31%	41%	43%	57%	41%	59%
	7:45 AM	28%	36%	36%	12%	26%	29%	33%	29%	32%	39%	45%	55%	45%	55%
VISSIM	Avg	32%	35%	32%	25%	31%	37%	7%	30%	30%	39%	50%	50%	49%	51%
Field	Avg	26%	37%	37%	9%	25%	31%	35%	28%	32%	41%	44%	56%	42%	58%

TEOps Validation

Test	Data	Target	Model
Tier 1	--	Not Applicable	--
Tier 2	ATR	RNSE < 3.0 for 85% of data points	40%

I-41 Traffic and Engineering Study
No Build (2028) AM Peak Period Calibration
Mainline Speed Comparison

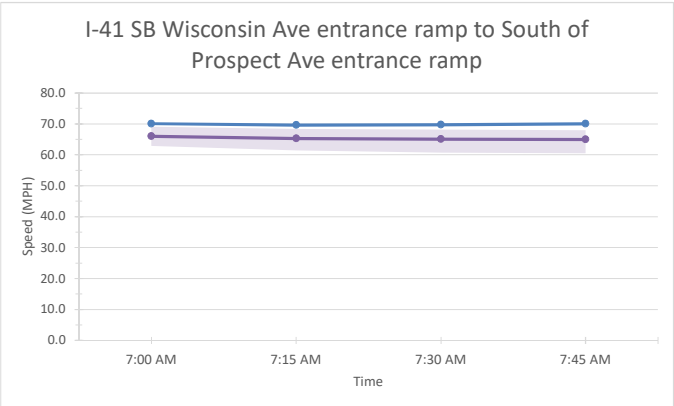
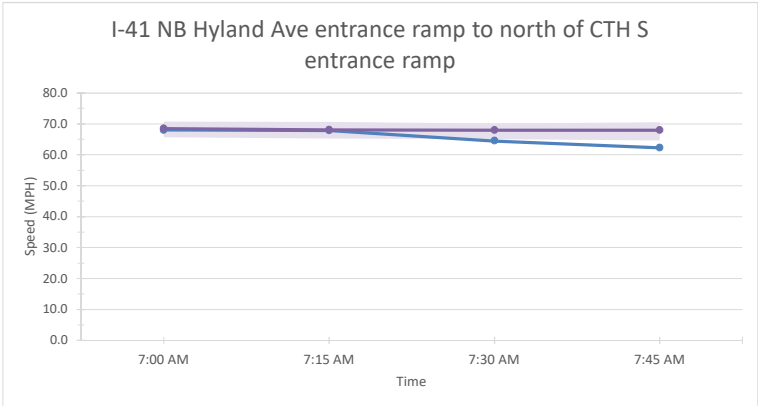
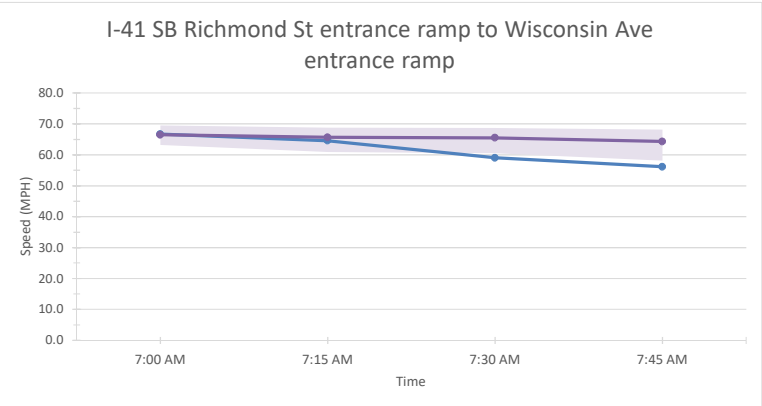
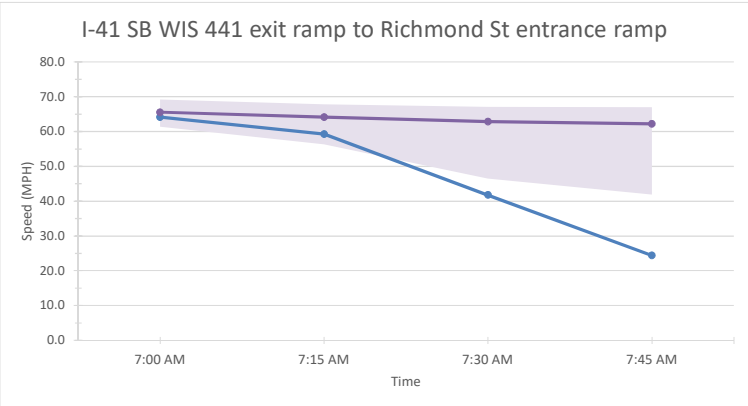
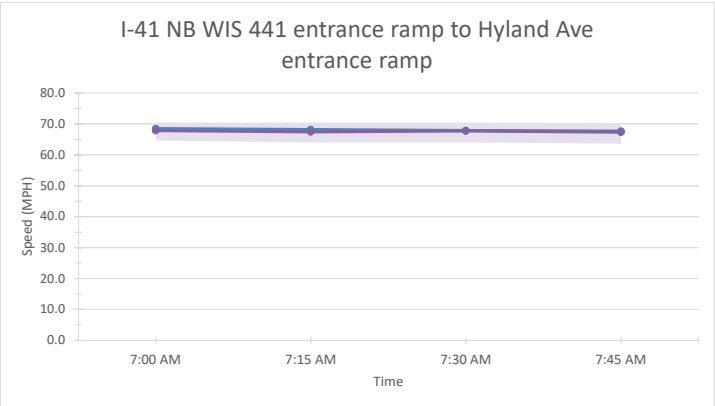
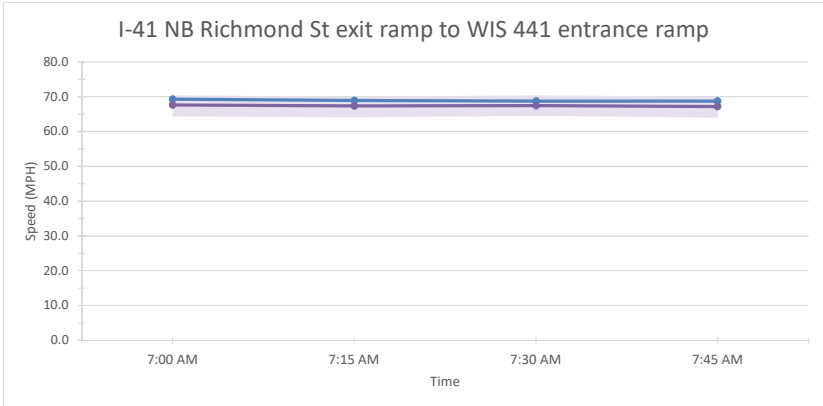
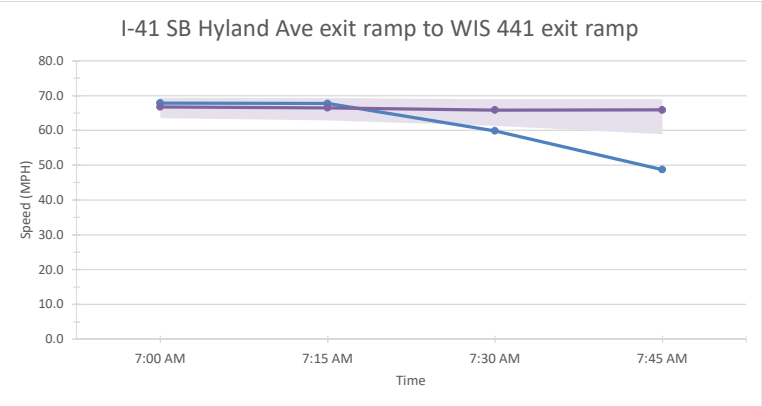
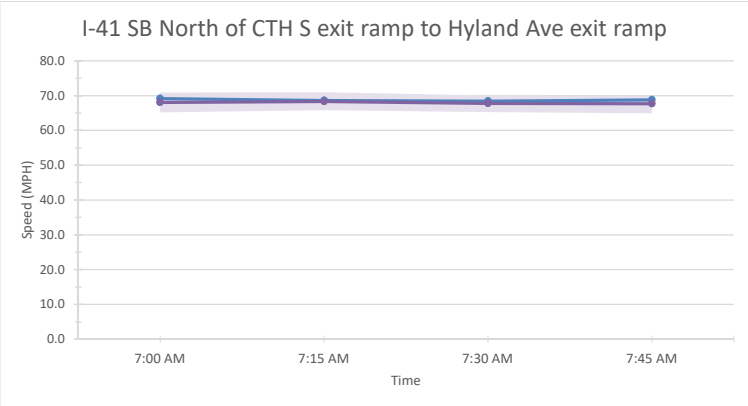
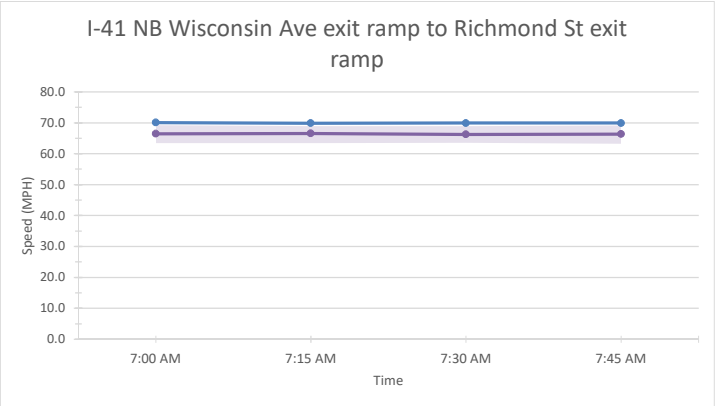
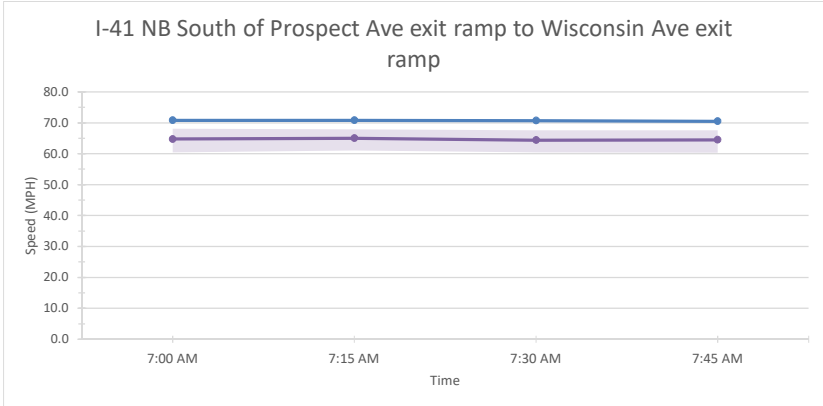
Segment		I-41 NB						Segment		I-41 SB					
		I-41 NB South of Prospect Ave exit ramp to Wisconsin Ave exit ramp	I-41 NB Wisconsin Ave exit ramp to Richmond St exit ramp	I-41 NB Richmond St exit ramp to WIS 441 entrance ramp	I-41 NB WIS 441 entrance ramp to Hyland Ave entrance ramp	I-41 NB Hyland Ave entrance ramp to north of CTH S entrance ramp				I-41 SB North of CTH S exit ramp to Hyland Ave exit ramp	I-41 SB Hyland Ave exit ramp to WIS 441 exit ramp	I-41 SB WIS 441 exit ramp to Richmond St entrance ramp	I-41 SB Richmond St entrance ramp to Wisconsin Ave entrance ramp	I-41 SB Wisconsin Ave entrance ramp to South of Prospect Ave entrance ramp	
VISSIM	7:00 AM	70.8	70.1	69.3	68.5	68.0		VISSIM	7:00 AM	69.1	67.9	64.2	66.7	70.1	
	7:15 AM	70.8	69.9	69.0	68.1	67.9			7:15 AM	68.6	67.7	59.3	64.6	69.6	
	7:30 AM	70.7	69.9	68.8	67.9	64.5			7:30 AM	68.4	59.9	41.8	59.0	69.7	
	7:45 AM	70.5	69.9	68.7	67.7	62.3			7:45 AM	68.8	48.7	24.4	58.1	70.1	
Field (NPMRDS Average)	7:00 AM	64.7	66.4	67.7	67.9	68.5		Field (NPMRDS Average)	7:00 AM	68.0	66.8	65.6	66.5	66.0	
	7:15 AM	65.0	66.6	67.4	67.5	68.1			7:15 AM	68.3	66.5	64.2	65.7	65.3	
	7:30 AM	64.3	66.2	67.5	67.7	68.0			7:30 AM	67.8	65.8	62.9	65.5	65.1	
	7:45 AM	64.5	66.3	67.1	67.3	68.0			7:45 AM	67.7	65.9	62.2	64.3	65.0	
Field (NPMRDS 15th Percentile)	7:00 AM	60.5	63.4	64.3	64.7	65.8		Field (NPMRDS 15th Percentile)	7:00 AM	65.2	63.6	61.4	63.2	62.9	
	7:15 AM	61.1	63.4	64.1	64.0	65.3			7:15 AM	65.9	62.9	56.4	61.0	61.5	
	7:30 AM	60.4	63.5	64.5	64.0	65.1			7:30 AM	65.3	61.4	48.6	60.5	60.8	
	7:45 AM	60.3	63.2	64.0	63.6	64.7			7:45 AM	64.9	59.0	41.9	58.1	60.6	
Field (NPMRDS 85th Percentile)	7:00 AM	68.1	69.2	70.4	70.5	70.8		Field (NPMRDS 85th Percentile)	7:00 AM	70.9	69.4	69.2	69.5	69.1	
	7:15 AM	67.9	68.9	70.1	70.4	70.7			7:15 AM	70.9	69.3	67.8	68.8	68.4	
	7:30 AM	67.5	68.9	70.4	70.5	70.2			7:30 AM	70.1	69.0	67.1	68.6	68.2	
	7:45 AM	67.5	69.1	70.0	70.1	70.6			7:45 AM	69.9	68.9	67.0	68.1	68.0	

TEOps Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	73%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts	93%

TEOps Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	73%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts	93%



I-41 Traffic and Engineering Study
 No Build (2028) AM Peak Period Calibration
Travel Time Comparison

FULL CORRIDOR

Data	Time	I-41 NB
		Average Travel Time (min)
		South of CTH BB to North of CTH S
Distance (mi)		26.59
VISSIM	7:00AM	23.6
NPMRDS	7:00AM	23.7



Data	Time	I-41 SB
		Average Travel Time (min)
		North of CTH S to South of CTH BB
Distance (mi)		26.58
VISSIM	7:00AM	26.2
NPMRDS	7:00AM	24.0

SEGMENTS

I-41 NB				
Average Travel Time (minutes)				
South of CTH BB to Wisc Ave Exit	Wisc Ave Exit to Richmond Exit	Richmond Exit to 441 Entrance	441 Entrance to Hyland Entrance	Hyland Entrance to North of CTH S
3.12	4.0	3.49	5.26	10.71
2.7	3.4	3.0	4.6	9.8
2.9	3.6	3.1	4.7	9.4
I-41 SB				
Average Travel Time (minutes)				
North of CTH S to Hyland Exit	Hyland Exit to 441 Exit	441 Exit to Richmond Entrance	Richmond Entrance to Wisc Ave Entrance	Wisc Ave Entrance to South of CTH BB
10.68	5.52	3.25	4.0	3.09
9.3	5.5	4.7	4.0	2.7
9.4	5.0	3.1	3.7	2.8

TEOpS Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	18%
Tier 2	NPMRDS	TT ± 15% for 85% of routes	90%

I-41 Traffic and Engineering Study
No Build (2028) AM Peak Hour Calibration
Merge and Diverge Segment Speeds

Merge/Diverge Links			Vissim Speed				
Forecast ID	Link ID	Description	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2
Merge/Diverge Speeds							
	70	NB I-41 CTH BB diverge	69	70	70	69	70
	74	NB I-41 CTH BB merge	70	70	69	69	70
	76	NB I-41 WIS 125 diverge	70	70	69	70	70
	80	NB I-41 WIS 125merge	69	70	69	69	69
		NB I-41 WIS 96 diverge					
	84	NB I-41 WIS 96 merge	70	70	70	70	70
	--	NB I-41 WIS 15 diverge	--	--	--	--	--
	89	NB I-41 WIS 15 merge	69	69	68	69	69
	91	NB I-41 WIS 47 diverge	69	69	69	69	69
	95	NB I-41 WIS 47 merge	67	66	67	66	67
	418	NB I-41 Ballard diverge	64	65	63	64	64
	100	NB I-41 Ballard merge	68	67	66	66	67
		NB I-41 441 diverge					
	103	NB I-41 441 merge	67	66	65	64	65
	420	NB I-41 CTH N diverge	66	65	64	64	65
	108	NB I-41 CTH N merge	67	63	66	67	66
	422	NB I-41 WIS 55 diverge	66	65	65	65	65
	113	NB I-41 WIS 55 merge	69	69	69	68	68
	417	NB I-41 CTH J diverge	64	64	62	62	63
	118	NB I-41 CTH J merge	65	63	59	63	63
	415	NB I-41 CTH U diverge	64	64	63	63	63
	123	NB I-41 CTH U merge	67	63	62	60	63
	425	NB I-41 CTH S diverge	62	61	55	54	58
	128	NB I-41 CTH S merge	57	40	23	26	36
	426	SB I-41 CTH S diverge	62	61	61	62	61
	21	SB I-41 CTH S merge	69	68	68	69	68
	424	SB I-41 CTH U diverge	58	52	55	57	56
	20	SB I-41 CTH U merge	68	65	65	67	66
	416	SB I-41 CTH J diverge	66	65	64	64	65
	19	SB I-41 CTH J merge	66	65	60	61	63
	423	SB I-41 WIS 55 diverge	65	64	63	63	64
	18	SB I-41 WIS 55 merge	67	65	63	62	64
	421	SB I-41 CTH N diverge	62	64	43	27	49
	26	SB I-41 CTH N merge	66	63	25	21	44
	419	SB I-41 441 diverge	64	65	63	63	64
	36	SB I-41 441 merge	61	61	59	56	60
		SB I-41 Ballard diverge					
	40	SB I-41 Ballard merge	60	49	40	24	44
	42	SB I-41 WIS 47 diverge	62	61	38	16	44
	46	SB I-41 WIS 47 merge	52	40	19	16	32
	48	SB I-41 WIS 15 diverge	62	63	59	63	62
	--	SB I-41 WIS 15 merge	--	--	--	--	--
	53	SB I-41 WIS 96 diverge	69	69	68	69	69
	56	SB I-41 WIS 96 merge	69	69	69	69	69
		SB I-41 WIS 125 diverge					
	61	SB I-41 WIS 125merge	69	69	69	69	69
	63	SB I-41 CTH BB diverge	69	69	68	69	69
	67	SB I-41 CTH BB merge	69	69	69	70	69

DRAFT

APPENDIX P2

Year 2028 No Build VISSIM PM Peak Hour

I-41 Traffic and Engineering Study
No Build (2028) PM Peak Hour Calibration
Freeway Mainline and Ramp Volumes

			% Demand	Segments					Target					Vissim					Difference					RMSPE					RMSE				
			100%	Forecast ID	Link ID	Description	Type	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	TOTAL	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2	4:15-4:30PM3	4:30-4:45PM3	4:45-5:00PM3	5:00-5:15PM3	TOTAL3	4:15-4:30PM6	4:30-4:45PM6	4:45-5:00PM6	5:00-5:15PM6	TOTAL6	4:15-4:30PM5	4:30-4:45PM5	4:45-5:00PM5	5:00-5:15PM5	TOTAL5	
TEOps Validation - 15 minute periods				10001	69	NB I-41 (Southern Project Limits)	MAINLINE	892	882	932	843	3550	890	879	934	842	3544	-2	-3	2	-1	-5	0%	0%	0%	0%	0%	0.1	0.1	0.1	0.0	0.1	
Test			Target	10002	72	NB I-41 Exit to CTH BB	RAMP	148	143	160	150	600	150	139	161	148	599	3	-4	1	-1	-1	2%	2%	1%	1%	0%	0.2	0.3	0.1	0.1	0.0	
Tier 1			RMSPE < 5%	10003	71	NB I-41 betw CTH BB Exit to CTH BB Ent	MAINLINE	744	739	772	694	2950	731	743	767	691	2933	-13	4	-5	-2	-16	2%	0%	1%	0%	1%	0.5	0.1	0.2	0.1	0.3	
Tier 2			RSNE < 3 for 85% of links	10004	73	NB I-41 Ent from CTH BB	RAMP	197	207	195	191	790	201	202	189	180	773	4	-5	-5	-10	-17	2%	2%	3%	5%	2%	0.3	0.3	0.4	0.7	0.6	
			Model	10005	75	NB I-41 betw CTH BB Ent to WIS 125 Exit	MAINLINE	941	954	967	884	3740	925	967	964	856	3740	-16	7	-11	-8	-28	2%	1%	1%	1%	1%	0.5	0.2	0.4	0.3	0.5	
				10006	78	NB I-41 Exit to WIS 125	RAMP	257	263	242	239	1000	218	224	213	242	857	-38	-39	-29	-37	-143	10%	10%	10%	10%	10%	2.4	2.4	1.8	2.4	8.2	
TEOps Validation - 60 minute period				10007	77	NB I-41 betw WIS 125 Exit to WIS 125 Ent	MAINLINE	685	684	725	645	2740	662	686	707	640	2695	-23	3	-19	-5	-43	3%	0%	3%	1%	2%	0.9	0.1	0.7	0.2	0.9	
Test			Target	10008	79	NB I-41 Ent from WIS 125	RAMP	180	209	209	253	850	175	201	209	219	804	-5	8	1	-34	-46	3%	4%	0%	0%	5%	0.4	0.5	0.1	2.1	1.6	
Tier 1			RMSPE < 5%	10009	80	NB I-41 betw WIS 125 Ent to WIS 96 Exit	MAINLINE	864	892	934	898	3690	823	879	906	863	3461	-41	13	-28	-45	-128	5%	1%	3%	5%	4%	1.4	0.4	0.9	1.5	2.2	
Tier 2			RSNE < 3 for 85% of links	10010	82	NB I-41 Exit to WIS96	RAMP	221	226	211	252	910	224	226	207	236	892	3	0	-4	-16	-18	1%	0%	2%	2%	2%	0.2	0.0	0.3	1.0	0.6	
			Model	10011	81	NB I-41 betw WIS 96 Exit to WIS 96 Ent	MAINLINE	643	666	723	646	2680	606	666	707	631	2610	-37	1	-16	-16	-68	4%	0%	2%	2%	3%	1.5	0.0	0.6	0.6	1.4	
				10012	83	NB I-41 Ent from WIS 96	RAMP	220	262	257	300	1040	240	245	239	269	992	20	-17	-19	-32	-48	4%	7%	7%	17%	5%	1.3	1.1	1.2	1.8	1.5	
				10013	85	NB I-41 WIS 96 Ent to WIS 15 Exit	MAINLINE	863	928	980	947	3720	841	914	944	980	3607	-23	14	-36	-38	-111	3%	1%	4%	4%	3%	0.8	0.5	1.2	1.2	1.8	
				10014	87	NB I-41 Exit to WIS15	RAMP	267	290	261	282	1100	257	275	254	267	1052	-10	-15	-7	-15	-48	4%	5%	3%	5%	4%	0.6	0.9	0.4	0.9	1.4	
				10015	86	NB I-41 betw WIS 15 Exit to WIS 15 Ent	MAINLINE	597	638	664	658	2620	575	630	683	640	2528	-21	8	-36	-25	-90	4%	1%	5%	4%	4%	0.9	0.3	1.3	1.0	1.8	
				10016	88	NB I-41 Ent from WIS15	RAMP	327	345	247	271	1190	246	231	249	209	935	-81	-115	2	-62	-255	21%	11%	1%	11%	21%	4.1	4.1	0.2	2.0	7.2	
				10017	90	NB I-41 betw WIS 15 Ent to WIS 47 Exit	MAINLINE	923	984	966	935	3810	818	873	918	875	3484	-106	-110	-48	-60	-324	21%	11%	5%	0%	1%	4.0	4.0	1.5	2.0	9.2	
				10018	93	NB I-41 Exit to WIS47	RAMP	177	173	166	224	740	150	159	154	178	641	-17	-14	-13	-46	-99	10%	8%	5%	1%	4%	2.0	1.0	1.0	1.4	15.7	
				10019	92	NB I-41 betw WIS 47 Exit to WIS 47 Ent	MAINLINE	747	810	800	711	3070	661	714	750	700	2875	-85	-96	-50	-12	-243	21%	12%	6%	2%	4%	4.0	4.1	1.2	1.8	4.8	
				10020	94	NB I-41 Ent from WIS47	RAMP	191	195	192	232	810	188	188	173	237	786	-3	-7	-19	5	-24	1%	4%	10%	2%	3%	0.2	0.5	1.4	0.3	0.8	
				10021	96	NB I-41 betw WIS 47 Ent to Ballard Exit	MAINLINE	938	1005	992	943	3880	854	895	915	951	3615	-84	-110	-77	8	-263	4%	12%	8%	1%	7%	2.7	4.3	2.4	0.3	4.2	
				10022	98	NB I-41 Exit to Ballard	RAMP	119	134	153	153	570	146	119	128	152	545	27	-15	-35	-12	-25	22%	11%	21%	1%	4%	2.4	1.3	2.7	0.1	1.1	
				10023	97	NB I-41 betw Ballard Exit to Ballard Ent	MAINLINE	818	871	828	790	3310	700	770	768	798	3037	-118	-101	-60	8	-271	14%	10%	7%	1%	4%	4.1	4.4	2.1	0.3	4.7	
				10024	99	NB I-41 Ent from Ballard	RAMP	170	200	202	198	770	171	186	194	188	739	1	-14	-8	-11	-32	1%	7%	4%	5%	4%	0.1	1.0	0.5	0.8	1.1	
				10025	100	NB I-41 betw Ballard Ent to 441 Exit	MAINLINE	988	1072	1030	988	4080	871	954	963	988	3776	-117	-117	-66	-1	-302	17%	11%	6%	0%	7%	3.7	2.7	2.1	0.0	4.8	
				10026	102	NB I-41 Exit to SB441	RAMP	316	347	348	338	1350	273	305	306	319	1203	-43	-43	-43	-19	-147	14%	16%	2%	1%	11%	2.4	2.3	2.3	1.0	4.6	
				10027	101	NB I-41 betw 441 Exit to 441 Ent	MAINLINE	672	724	682	650	2730	592	640	645	657	2534	-80	-84	-37	7	-194	22%	16%	5%	1%	6%	3.4	3.4	0.3	0.4	0.3	
				10028	33	NB I-41 Ent from NB441	RAMP	164	145	176	186	670	161	144	176	186	668	-2	0	0	0	0	1%	0%	0%	0%	0%	0.2	0.0	0.0	0.0	0.1	
				10029	104	NB I-41 betw 441 Ent to CTH N Exit	MAINLINE	836	869	858	837	3400	747	786	809	826	3168	-89	-83	-48	-10	-231	11%	10%	6%	1%	7%	4.1	2.8	1.7	0.4	4.0	
				10030	106	NB I-41 Exit to CTH N	RAMP	173	209	215	194	790	147	177	186	161	671	-25	-32	-29	-32	-119	15%	16%	14%	17%	15%	1.9	2.2	2.0	2.3	4.2	
				10031	105	NB I-41 betw CTH N Exit to CTH N Entrance	MAINLINE	664	660	642	643	2610	586	607	613	565	2371	-77	-58	-62	-29	-78	22%	8%	5%	14%	8%	3.0	2.0	1.1	0.3	4.7	
				10032	107	NB I-41 Ent from CTH N	RAMP	56	63	67	44	230	55	62	68	44	229	0	1	1	0	-2	3%	2%	1%	0%	1%	0.2	0.1	0.1	0.0	0.1	
				10033	109	NB I-41 betw CTH N Ent to WIS 55 Exit	MAINLINE	720	723	710	687	2840	642	668	686	614	2610	-77	-55	-68	-23	-73	-229	11%	8%	3%	11%	4%	2.9	2.0	0.9	2.8	8.2
				10034	111	NB I-41 Exit to WIS55	RAMP	100	139	99	122	460	98	110	108	102	419	-2	-29	9	-20	-41	2%	2%	6%	0%	7%	0.7	2.5	0.9	1.8	1.9	
				10035	110	NB I-41 betw WIS 55 Exit to WIS 55 Ent	MAINLINE	620	634	611	565	2380	533	555	573	531	2173	-87	-28	-37	-54	-206	3%	5%	6%	1%	11%	0.2	1.2	1.5	0.4	0.3	
				10036	112	NB I-41 Ent from WIS55	RAMP	29	37	33	53	150	28	31	36	30	147	-1	0	1	-3	-31	3%	0%	5%	2%	2%	0.2	0.0	0.3	0.4	0.2	
				10037	114	NB I-41 betw WIS 55 Ent to CTH J Exit	MAINLINE	649	620	642	618</																						

I-41 Traffic and Engineering Study
No Build (2028) PM Peak Period Calibration
Intersection Turning Movements

TEOps Validation - 15 minute periods

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	97%

TEOps Validation - 60 minute period

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	92%

% Demand 100%	Intersections						Target					Vissim					Difference					RNSE				
	Int ID	Int Name	Forecast ID	From Link	To Link	Mvmt	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	TOTAL	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2	4:15-4:30PM3	4:30-4:45PM3	4:45-5:00PM3	5:00-5:15PM3	TOTAL3	4:15-4:30PM5	4:30-4:45PM5	4:45-5:00PM5	5:00-5:15PM5	TOTAL5
	108	SB I-41 & WIS15	8EBL	303	52	EBL	79	62	38	51	230	71	54	43	38	206	-8	-8	5	-13	-24	0.9	1.0	0.8	1.9	1.6
	108	SB I-41 & WIS15	8EBT	303	304	EBT	425	508	397	370	1700	346	320	335	369	1369	-79	-189	-62	-1	-331	2.2	2.2	2.2	0.0	2.2
	108	SB I-41 & WIS15	8WBT	309	302	WBT	310	290	303	267	1170	261	272	241	241	1014	-49	-18	-62	-27	-156	2.8	1.1	2.2	1.6	2.2
	108	SB I-41 & WIS15	8WBR	309	52	WBR	102	99	137	142	480	85	85	85	99	354	-16	-14	-53	-43	-126	1.6	1.4	2.2	2.2	2.2
	108	SB I-41 & WIS15	8SBL	51	304	SBL	26	41	40	54	160	34	32	38	42	145	8	-9	-3	-12	-15	1.6	1.4	0.4	1.6	1.2
	108	SB I-41 & WIS15	8SBR	51	302	SBR	214	224	225	226	890	218	209	215	212	853	3	-15	-10	-15	-37	0.2	1.0	0.7	1.0	1.2
	106	SB I-41 & WIS96	6EBT	323	325	EBT	355	405	394	425	1580	393	392	391	381	1556	38	-13	-4	-44	-23	2.0	0.7	0.2	2.2	0.6
	106	SB I-41 & WIS96	6EBR	323	57	EBR	98	113	88	121	420	105	108	92	104	409	7	-5	4	-17	-11	0.7	0.4	0.4	1.5	0.5
	106	SB I-41 & WIS96	6WBL	332	57	WBL	140	166	162	132	600	134	138	141	138	549	-7	-28	-21	6	-50	0.6	2.2	1.7	0.5	2.1
	106	SB I-41 & WIS96	6WBT	332	334	WBT	367	439	398	417	1620	358	372	371	369	1470	1470	-9	-67	-26	-47	-150	0.5	2.2	1.3	2.3
	106	SB I-41 & WIS96	6SBL	340	325	SBL	55	48	60	57	220	51	48	48	52	199	-4	0	-12	-6	-21	0.5	0.0	1.5	0.8	1.4
	106	SB I-41 & WIS96	6SBT	340	57	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	106	SB I-41 & WIS96	6SBR	340	334	SBR	133	109	134	124	500	101	110	113	118	442	-32	1	-21	-6	-58	2.8	0.1	1.8	0.5	2.6
	104	SB I-41 & WIS125	4EBT	349	351	EBT	313	368	324	376	1380	309	354	334	328	1324	-3	-14	10	-49	-55	0.2	0.7	0.6	2.5	1.5
	104	SB I-41 & WIS125	4EBR	349	60	EBR	141	161	135	163	600	142	158	139	142	580	1	-4	3	-21	-20	0.0	0.3	0.3	1.6	0.8
	104	SB I-41 & WIS125	4WBL	361	60	WBL	111	118	99	112	440	113	121	98	111	444	2	3	-1	-1	3	0.2	0.3	0.1	0.1	0.2
	104	SB I-41 & WIS125	4WBT	361	363	WBT	358	363	374	355	1450	351	360	383	356	1450	-8	-3	9	1	0	0.4	0.2	0.5	0.1	0.0
	104	SB I-41 & WIS125	4SBL	367	351	SBL	39	41	66	43	190	45	40	45	52	182	6	-1	-21	8	-8	0.9	0.2	2.6	1.3	0.6
	104	SB I-41 & WIS125	4SBT	367	60	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	104	SB I-41 & WIS125	4SBR	367	363	SBR	56	50	61	43	210	65	48	51	48	211	9	-2	-11	5	1	1.2	0.2	1.4	0.8	0.1
	101	SB I-41 & CTHB8	1EBT	377	381	EBT	182	203	220	226	830	201	198	203	209	812	20	-5	-17	-17	-18	1.5	0.3	1.1	1.1	0.6
	101	SB I-41 & CTHB8	1EBR	377	66	EBR	102	96	105	108	410	118	94	96	103	411	16	-2	-9	-5	1	1.6	0.2	0.8	0.5	0.0
	101	SB I-41 & CTHB8	1WBL	382	66	WBL	87	86	79	78	330	86	83	82	80	331	-1	-3	3	2	1	0.2	0.3	0.4	0.3	0.0
	101	SB I-41 & CTHB8	1WBT	382	379	WBT	82	104	100	95	380	83	96	102	99	380	1	-8	2	5	0	0.1	0.8	0.2	0.5	0.0
	101	SB I-41 & CTHB8	1SBL	393	381	SBL	57	49	37	38	180	40	53	40	36	169	-17	4	4	-2	-11	2.2	0.6	0.6	0.3	0.8
	101	SB I-41 & CTHB8	1SBT	393	66	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	101	SB I-41 & CTHB8	1SBR	393	379	SBR	61	80	91	79	310	72	67	77	81	298	11	-12	-13	2	-12	1.5	1.4	1.4	0.2	0.7
	109	NB I-41 & WIS15	9EBL	304	316	EBL	226	282	192	191	890	177	163	192	180	712	-48	-119	1	-12	-178	2.2	2.2	0.0	0.8	2.2
	109	NB I-41 & WIS15	9EBT	304	311	EBT	225	267	246	232	970	198	181	189	222	792	-27	-86	-56	-10	-179	1.8	2.2	2.2	0.6	2.2
	109	NB I-41 & WIS15	9NBL	87	308	NBL	83	90	51	76	300	71	96	55	70	292	-12	5	4	-5	-8	1.3	0.6	0.6	0.6	0.4
	109	NB I-41 & WIS15	9NBT	87	316	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	109	NB I-41 & WIS15	9NBR	87	311	NBR	184	200	210	206	800	180	189	203	202	773	-4	-11	-7	-5	-27	0.3	0.8	0.5	0.3	0.9
	109	NB I-41 & WIS15	9WBT	312	308	WBT	329	299	389	333	1350	285	253	282	256	1076	-44	-45	-107	-78	-274	2.4	2.6	2.2	2.2	2.2
	109	NB I-41 & WIS15	9WBR	312	315	WBR	101	64	55	80	300	66	73	57	36	232	-35	9	2	-44	-68	2.2	1.1	0.3	2.2	2.2
	107	NB I-41 & WIS96	7EBL	325	83	EBL	159	182	177	212	730	175	177	170	187	709	16	-4	-7	-25	-20	1.3	0.3	0.5	1.7	0.8
	107	NB I-41 & WIS96	7EBT	325	337	EBT	250	272	277	271	1070	270	263	267	242	1043	20	-8	-10	-29	-27	1.2	0.5	0.6	1.7	0.8
	107	NB I-41 & WIS96	7NBL	343	332	NBL	104	108	93	116	420	96	96	97	98	386	-8	-12	4	-18	-34	0.8	1.2	0.4	1.7	1.6
	107	NB I-41 & WIS96	7NBT	343	83	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	107	NB I-41 & WIS96	7NBR	343	337	NBR	118	118	118	136	490	117	116	109	118	460	-1	-2	-9	-18	-30	0.0	0.2	0.8	1.6	1.3
	107	NB I-41 & WIS96	7WBT	331	332	WBT	404	497	467	432	1800	396	414	415	409	1633	-8	-83	-52	-23	-166	0.4	2.2	2.4	1.1	2.2
107	NB I-41 & WIS96	7WBR	331	83	WBR	61	81	80	88	310	65	68	68	83	284	4	-12	-12	-6	-26	0.5	1.4	1.3	0.6	1.5	

I-41 Traffic and Engineering Study
No Build (2028) PM Peak Period Calibration
Intersection Turning Movements

TEOps Validation - 15 minute periods

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	97%

TEOps Validation - 60 minute period

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	92%

Demand 100%	Intersections						Target					Vissim					Difference					RNSE				
	Int ID	Int Name	Forecast ID	From Link	To Link	Mvmt	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	TOTAL	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2	4:15-4:30PM3	4:30-4:45PM3	4:45-5:00PM3	5:00-5:15PM3	TOTAL3	4:15-4:30PM5	4:30-4:45PM5	4:45-5:00PM5	5:00-5:15PM5	TOTAL5
	113	CTH N & SB I-41	13NBL	222	24	NBL	50	103	87	100	340	50	98	86	104	339	1	-5	-1	4	-1	0.1	0.5	0.1	0.4	0.0
	113	CTH N & SB I-41	13NBT	222	216	NBT	124	124	150	151	550	103	107	116	125	451	-22	-17	-34	-26	-99	1.9	1.5	2.8	2.1	4.2
	113	CTH N & SB I-41	13WBL	23	220	WBL	76	87	101	86	350	54	82	92	97	325	-21	-5	-10	10	-25	2.4	0.5	0.9	1.1	1.3
	113	CTH N & SB I-41	13WBT	23	24	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	113	CTH N & SB I-41	13WBR	23	216	WBR	25	34	33	29	120	15	28	31	37	112	-10	-6	-1	8	-9	1.9	1.0	0.2	1.5	0.8
	113	CTH N & SB I-41	13SBT	217	220	SBT	71	88	74	78	310	66	91	71	80	308	-6	3	-2	2	-3	0.7	0.3	0.3	0.3	0.1
	113	CTH N & SB I-41	13SBR	217	24	SBR	37	66	50	47	200	37	65	52	47	200	0	-2	2	0	0	0.0	0.2	0.3	0.0	0.0
	114	CTH N & NB I-41	14EBL	224	221	EBL	86	99	123	123	430	69	77	98	90	334	-16	-22	-25	-33	-96	1.8	2.2	2.2	2.9	2.4
	114	CTH N & NB I-41	14EBT	224	107	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	114	CTH N & NB I-41	14EBR	224	227	EBR	87	110	93	71	360	78	93	84	66	321	-9	-16	-9	-5	-39	1.0	1.6	0.9	0.6	2.1
	114	CTH N & NB I-41	14NBT	229	221	NBT	89	128	114	129	460	84	130	106	135	455	-5	2	-8	7	-4	0.5	0.2	0.8	0.6	0.2
	114	CTH N & NB I-41	14NBR	229	107	NBR	34	32	38	36	140	34	32	38	35	139	-1	0	0	-1	-1	0.1	0.1	0.0	0.1	0.1
	114	CTH N & NB I-41	14SBL	223	107	SBL	22	31	29	8	90	21	30	30	9	90	-1	-1	1	1	0	0.2	0.1	0.1	0.3	0.0
	114	CTH N & NB I-41	14SBT	223	227	SBT	125	144	146	156	570	97	145	129	173	543	-28	1	-17	17	-27	2.5	0.1	1.4	1.4	1.1
	115	WIS55 & SB I-41	15NBL	187	16	NBL	89	117	89	115	410	89	115	88	114	406	0	-2	-2	0	-4	0.0	0.2	0.2	0.0	0.2
	115	WIS55 & SB I-41	15NBT	187	184	NBT	50	81	47	72	250	57	64	56	63	240	7	-16	9	-10	-10	1.0	1.8	1.3	1.1	0.6
	115	WIS55 & SB I-41	15WBL	15	186	WBL	52	42	57	40	190	41	46	48	53	187	-11	4	-10	13	-3	1.5	0.7	1.3	2.1	0.2
	115	WIS55 & SB I-41	15WBT	15	16	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	115	WIS55 & SB I-41	15WBR	15	184	WBR	12	9	14	15	50	12	11	12	14	50	0	2	-2	-1	0	0.0	0.6	0.4	0.2	0.1
	115	WIS55 & SB I-41	15SBT	183	186	SBT	45	41	49	55	190	43	43	49	55	190	-1	1	0	-1	0	0.2	0.2	0.0	0.1	0.0
	115	WIS55 & SB I-41	15SBR	183	16	SBR	11	22	16	31	80	11	22	16	32	81	0	0	0	0	0	0.0	0.0	0.0	0.1	0.1
	116	WIS55 & NB I-41	16EBL	111	187	EBL	9	35	17	30	90	15	18	25	22	80	6	-16	8	-8	-10	2.0	2.7	2.1	1.5	1.1
	116	WIS55 & NB I-41	16EBT	111	112	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	116	WIS55 & NB I-41	16EBR	111	188	EBR	91	105	83	92	370	85	93	88	82	348	-5	-12	5	-10	-22	0.5	1.2	0.6	1.1	1.2
	116	WIS55 & NB I-41	16NBT	200	187	NBT	130	163	120	157	570	130	161	118	157	566	0	-2	-1	0	-4	0.0	0.1	0.1	0.0	0.1
	116	WIS55 & NB I-41	16NBR	200	112	NBR	21	32	27	41	120	21	32	28	39	119	0	0	1	-2	-1	0.0	0.0	0.2	0.3	0.1
	116	WIS55 & NB I-41	16SBL	186	112	SBL	8	4	5	13	30	8	5	5	12	29	0	0	0	-1	-1	0.1	0.1	0.1	0.3	0.2
	116	WIS55 & NB I-41	16SBT	186	188	SBT	88	79	101	83	350	76	84	92	95	348	-12	6	-10	13	-3	1.2	0.7	0.9	1.4	0.1
	117	CTH J & SB I-41	17NBL	182	197	NBL	24	26	21	29	100	24	25	21	28	98	1	-1	-1	-1	-2	0.1	0.2	0.1	0.2	0.2
	117	CTH J & SB I-41	17NBT	182	189	NBT	79	54	82	55	270	61	63	68	63	255	-18	9	-13	7	-15	2.0	1.2	1.5	1.0	0.9
	117	CTH J & SB I-41	17WBL	196	191	WBL	88	86	90	56	320	67	89	86	78	320	-22	2	-3	22	-1	2.3	0.3	0.3	2.9	0.0
	117	CTH J & SB I-41	17WBT	196	197	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	117	CTH J & SB I-41	17WBR	196	189	WBR	27	39	23	20	110	19	33	32	23	107	-8	-6	8	2	-3	1.5	1.0	1.7	0.5	0.3
	117	CTH J & SB I-41	17SBT	190	191	SBT	51	81	38	60	230	52	77	42	59	230	1	-4	5	-1	0	0.1	0.4	0.7	0.1	0.0
	117	CTH J & SB I-41	17SBR	190	197	SBR	44	61	51	73	230	46	57	55	75	232	2	-5	4	2	2	0.3	0.6	0.5	0.2	0.1
	118	CTH J & NB I-41	18EBL	199	182	EBL	52	26	53	29	160	36	34	41	37	147	-16	8	-12	8	-13	2.3	1.5	1.7	1.5	1.0
	118	CTH J & NB I-41	18EBT	199	198	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	118	CTH J & NB I-41	18EBR	199	192	EBR	70	72	88	70	300	62	59	80	76	276	-8	-13	-8	6	-24	1.0	1.5	0.8	0.7	1.4
	118	CTH J & NB I-41	18NBT	174	182	NBT	50	54	50	56	210	50	54	49	53	207	0	0	-1	-2	-4	0.0	0.0	0.2	0.3	0.2
	118	CTH J & NB I-41	18NBR	174	198	NBR	59	56	47	58	220	59	55	47	58	219	0	-1	0	0	-1	0.0	0.1	0.0	0.0	0.1
118	CTH J & NB I-41	18SBL	191	198	SBL	16	41	10	23	90	17	37	15	21	90	1	-3	5	-2	0	0.2	0.5	1.4	0.4	0.0	
118	CTH J & NB I-41	18SBT	191	192	SBT	123	127	117	93	460	101	127	116	114	459	-22	0	-1	22	-1	2.0	0.0	0.1	2.3	0.1	
119	CTH U & SB I-41	19NBL	166	8	NBL	19	22	17	21	80	20	21	16	21	79	1	-1	-1	0	-1	0.2	0.1	0.3	0.0	0.1	
119	CTH U & SB I-41	19NBT	166	167	NBT	45	62	60	53	220	52	45	68	52	217	7	-17	9	-1	-2	1.1	2.2	1.1	0.1	0.2	
119	CTH U & SB I-41	19WBL	7	159	WBL	36	59	61	65	220	27	51	58	65	201	-8	-8	-2	0	-19	1.4	1.1	0.3	0.0	1.3	
119	CTH U & SB I-41	19WBT	7	8	WBT	0	0	0	0	0	0	0	0	0	0	0	0</									

I-41 Traffic and Engineering Study
No Build (2028) PM Peak Period Calibration
Lane Utilization Comparison

I-41 NB															
Location		I-41 NB south of CTH BB			I-41 NB betw WIS 125 & WIS 96				I-41 NB betw CTH E & WIS 441			I-41 NB betw WIS 441 & CTH N		I-41 NB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
VISSIM	4:15 PM	33%	34%	33%	22%	26%	40%	13%	35%	35%	30%	45%	55%	51%	49%
	4:30 PM	34%	34%	33%	21%	27%	39%	13%	35%	35%	30%	45%	55%	51%	49%
	4:45 PM	33%	34%	33%	22%	27%	39%	12%	35%	34%	30%	45%	55%	51%	49%
	5:00 PM	34%	34%	33%	20%	25%	41%	14%	34%	35%	30%	46%	54%	51%	49%
Field (ATR)	4:15 PM	34%	35%	31%	13%	28%	31%	29%	32%	25%	42%	47%	53%	43%	57%
	4:30 PM	35%	35%	30%	14%	28%	31%	28%	35%	25%	40%	47%	53%	43%	57%
	4:45 PM	35%	34%	31%	15%	27%	31%	28%	33%	26%	41%	48%	52%	44%	56%
	5:00 PM	36%	35%	29%	13%	28%	31%	28%	35%	26%	39%	48%	52%	45%	55%
VISSIM	Avg	33%	34%	33%	21%	26%	40%	13%	35%	35%	30%	46%	54%	51%	49%
Field	Avg	35%	35%	30%	14%	28%	31%	28%	34%	25%	41%	47%	53%	44%	56%

I-41 SB															
Location		I-41 SB south of CTH BB			I-41 SB betw WIS 125 & WIS 96				I-41 SB betw CTH E & WIS 441			I-41 SB betw WIS 441 & CTH N		I-41 SB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
VISSIM	4:15 PM	32%	36%	32%	24%	26%	42%	8%	30%	46%	24%	50%	50%	48%	52%
	4:30 PM	32%	35%	33%	23%	27%	42%	7%	31%	43%	26%	51%	49%	47%	53%
	4:45 PM	32%	36%	32%	24%	27%	41%	8%	30%	46%	24%	50%	50%	48%	52%
	5:00 PM	31%	36%	32%	23%	26%	43%	8%	31%	42%	26%	50%	50%	47%	53%
Field (ATR)	4:15 PM	36%	33%	31%	10%	31%	32%	28%	24%	34%	42%	47%	53%	40%	60%
	4:30 PM	36%	33%	31%	9%	31%	31%	29%	24%	35%	42%	47%	53%	41%	59%
	4:45 PM	35%	33%	32%	10%	29%	32%	29%	24%	34%	42%	47%	53%	40%	60%
	5:00 PM	37%	33%	30%	9%	31%	32%	29%	24%	34%	42%	47%	53%	43%	57%
VISSIM	Avg	32%	36%	33%	23%	26%	42%	8%	31%	44%	25%	50%	50%	48%	52%
Field	Avg	36%	33%	31%	9%	31%	32%	29%	24%	34%	42%	47%	53%	41%	59%

TEOpS Validation

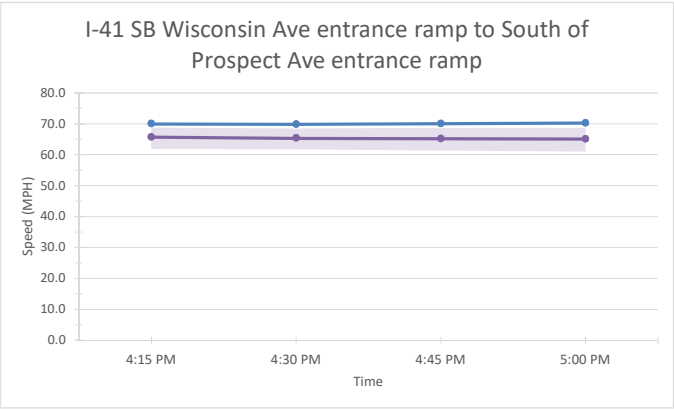
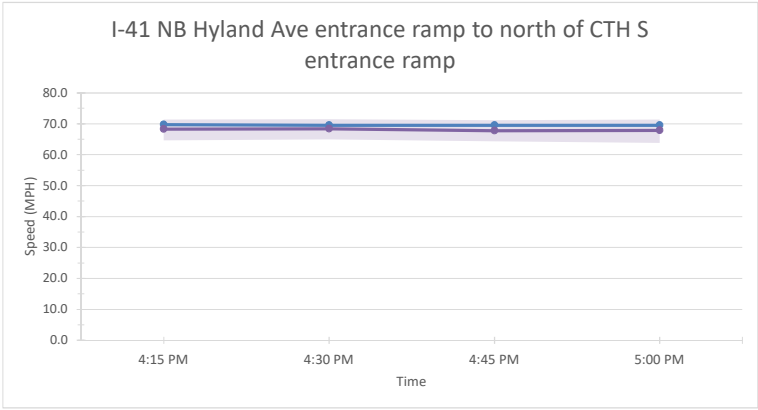
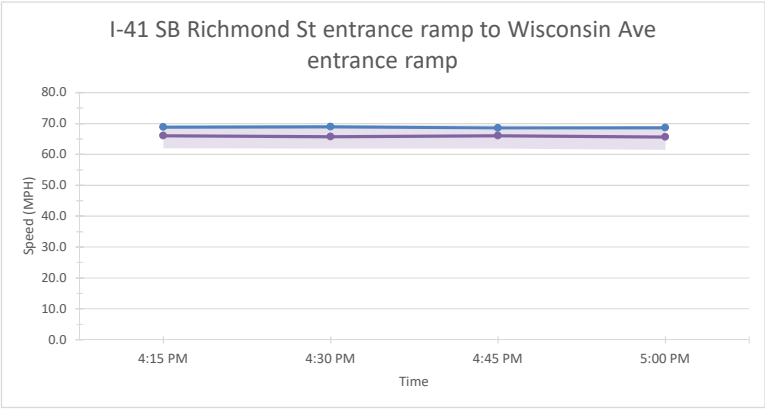
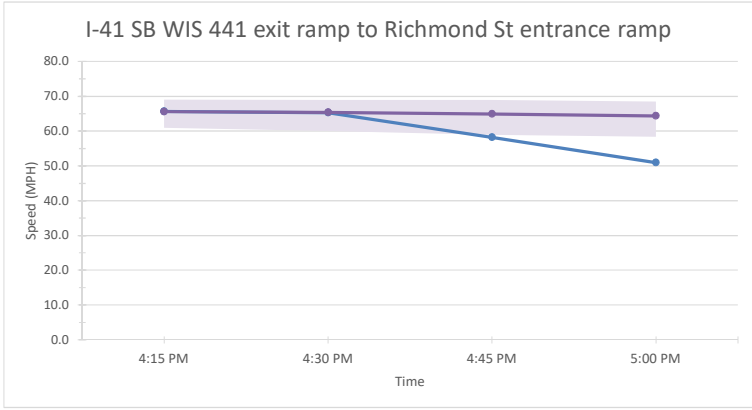
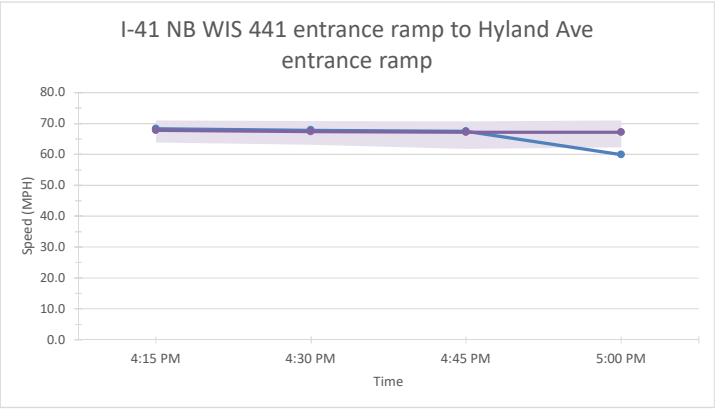
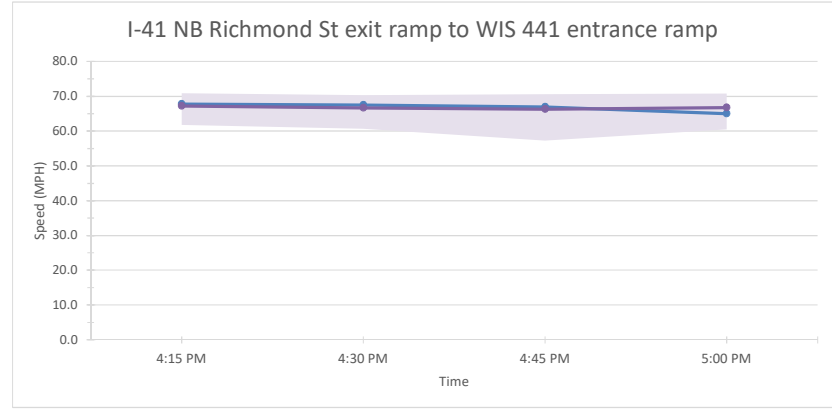
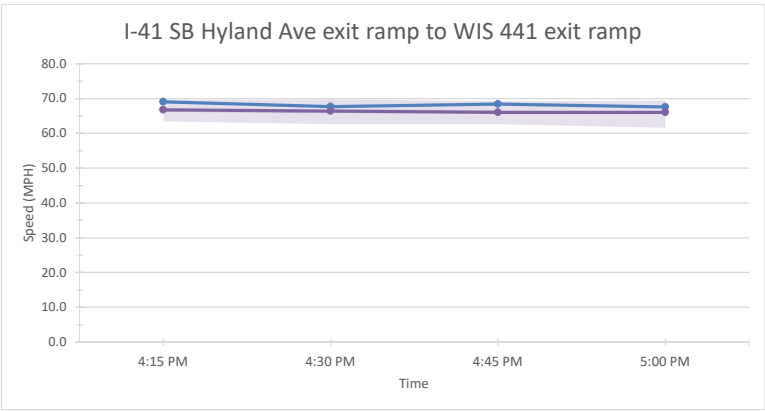
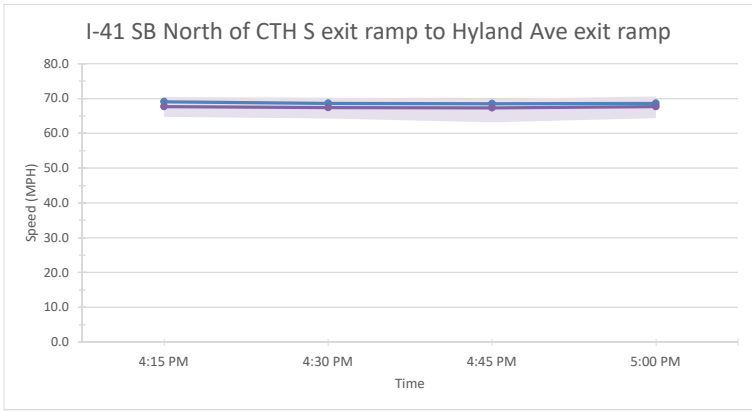
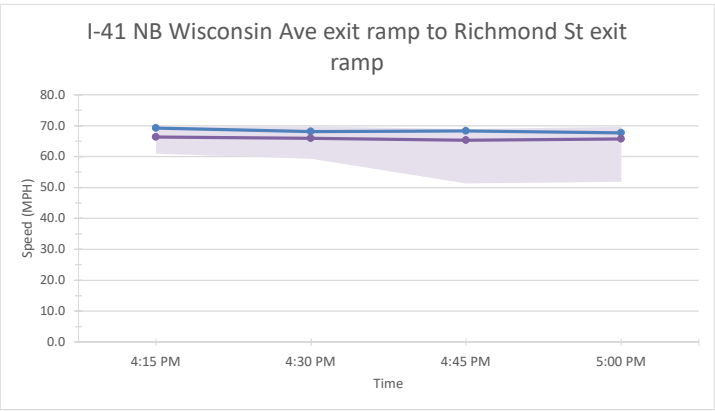
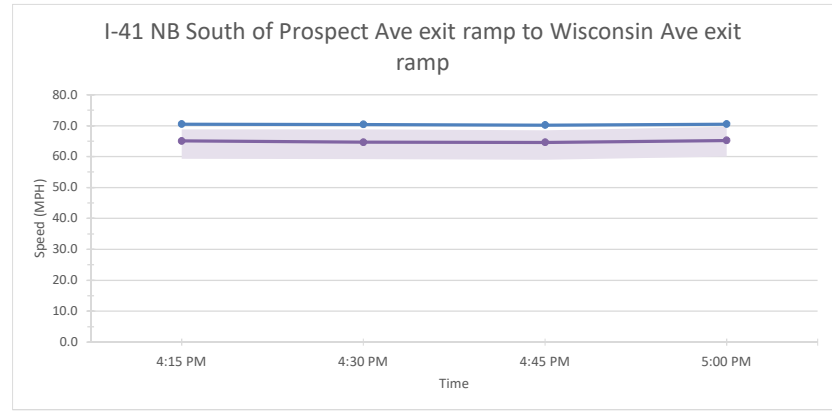
Test	Data	Target	Model
Tier 1	--	Not Applicable	--
Tier 2	ATR	RNSE < 3.0 for 85% of data points	44%

I-41 Traffic and Engineering Study
No Build (2028) PM Peak Period Calibration
Mainline Speed Comparison

I-41 NB							I-41 SB						
Segment		I-41 NB South of Prospect Ave exit ramp to Wisconsin Ave exit ramp	I-41 NB Wisconsin Ave exit ramp to Richmond St exit ramp	I-41 NB Richmond St exit ramp to WIS 441 entrance ramp	I-41 NB WIS 441 entrance ramp to Hyland Ave entrance ramp	I-41 NB Hyland Ave entrance ramp to north of CTH S entrance ramp	Segment		I-41 SB North of CTH S exit ramp to Hyland Ave exit ramp	I-41 SB Hyland Ave exit ramp to WIS 441 exit ramp	I-41 SB WIS 441 exit ramp to Richmond St entrance ramp	I-41 SB Richmond St entrance ramp to Wisconsin Ave entrance ramp	I-41 SB Wisconsin Ave entrance ramp to South of Prospect Ave entrance ramp
VISSIM	4:15 PM	70.5	69.2	67.8	68.3	69.7	VISSIM	4:15 PM	69.1	69.1	65.6	68.8	70.0
	4:30 PM	70.4	68.1	67.5	67.8	69.5		4:30 PM	68.6	67.7	65.3	68.9	69.8
	4:45 PM	70.2	68.3	66.9	67.5	69.5		4:45 PM	68.5	68.4	58.2	68.5	70.1
	5:00 PM	70.5	67.7	65.0	59.9	69.5		5:00 PM	68.6	67.6	50.9	68.6	70.2
Field (NPMRDS - Average)	4:15 PM	65.0	66.3	67.2	67.8	68.3	Field (NPMRDS - Average)	4:15 PM	67.7	66.8	65.6	66.0	65.7
	4:30 PM	64.6	66.0	66.7	67.3	68.4		4:30 PM	67.4	66.4	65.3	65.7	65.3
	4:45 PM	64.6	65.3	66.2	67.1	67.8		4:45 PM	67.3	66.0	64.9	66.0	65.2
	5:00 PM	65.2	65.7	66.7	67.2	67.9		5:00 PM	67.7	66.0	64.3	65.6	65.1
Field (NPMRDS - 15th Percentile)	4:15 PM	59.3	60.9	61.8	63.8	64.7	Field (NPMRDS - 15th Percentile)	4:15 PM	64.8	63.5	61.0	62.0	61.9
	4:30 PM	59.2	59.3	60.7	63.1	65.0		4:30 PM	64.3	62.6	60.1	61.9	61.8
	4:45 PM	59.0	51.3	57.3	61.7	64.4		4:45 PM	63.2	62.6	58.9	61.9	61.4
	5:00 PM	60.1	51.9	60.5	62.3	63.9		5:00 PM	64.4	61.6	58.4	61.5	61.1
Field (NPMRDS - 85th Percentile)	4:15 PM	68.8	69.6	70.8	71.0	71.4	Field (NPMRDS - 85th Percentile)	4:15 PM	70.4	69.6	69.1	69.0	68.9
	4:30 PM	68.8	69.8	70.3	70.8	71.6		4:30 PM	70.3	69.7	69.0	69.5	68.6
	4:45 PM	68.5	68.9	70.7	70.7	71.3		4:45 PM	69.9	69.3	68.9	69.5	68.7
	5:00 PM	69.7	69.7	70.8	70.9	71.4		5:00 PM	70.6	69.4	68.5	68.9	68.8

TEOps
Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	6%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts	100%



I-41 Traffic and Engineering Study
 No Build (2028) PM Peak Period Calibration
Travel Time Comparison

FULL CORRIDOR

Data	Time	I-41 NB
		Average Travel Time (min)
		South of CTH BB to North of CTH S
Distance (mi)		26.59
VISSIM	4:15PM	23.4
NPMRDS	4:15PM	23.8

FULL CORRIDOR

Data	Time	I-41 SB
		Average Travel Time (min)
		North of CTH S to South of CTH BB
Distance (mi)		26.58
VISSIM	4:15PM	23.7
NPMRDS	4:15PM	24.0

SEGMENTS

I-41 NB				
Average Travel Time (minutes)				
South of CTH BB to Wisc Ave Exit	Wisc Ave Exit to Richmond Exit	Richmond Exit to 441 Entrance	441 Entrance to Hyland Entrance	Hyland Entrance to North of CTH S
3.12	4.0	3.49	5.26	10.71
2.7	3.5	3.1	4.8	9.3
2.9	3.7	3.1	4.7	9.4
I-41 SB				
Average Travel Time (minutes)				
North of CTH S to Hyland Exit	Hyland Exit to 441 Exit	441 Exit to Richmond Entrance	Richmond Entrance to Wisc Ave Entrance	Wisc Ave Entrance to South of CTH BB
10.68	5.52	3.25	4.0	3.09
9.3	4.9	3.3	3.5	2.7
9.5	5.0	3.0	3.7	2.8

TEOpS Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	5%
Tier 2	NPMRDS	TT ± 15% for 85% of routes	100%

I-41 Traffic and Engineering Study
No Build (2028) PM Peak Hour Calibration
Merge and Diverge Segment Speeds

Merge/Diverge Links			Vissim Speed				
Forecast ID	Link ID	Description	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2
Merge/Diverge Speeds							
	70	NB I-41 CTH BB diverge	70	69	67	69	69
	74	NB I-41 CTH BB merge	69	69	69	70	69
	76	NB I-41 WIS 125 diverge	63	63	64	62	63
	80	NB I-41 WIS 125merge	70	69	68	69	69
		NB I-41 WIS 96 diverge					
	84	NB I-41 WIS 96 merge	69	69	70	69	69
	--	NB I-41 WIS 15 diverge	--	--	--	--	--
	89	NB I-41 WIS 15 merge	67	66	65	65	66
	91	NB I-41 WIS 47 diverge	69	67	68	66	67
	95	NB I-41 WIS 47 merge	66	65	62	57	63
	418	NB I-41 Ballard diverge	59	61	57	54	58
	100	NB I-41 Ballard merge	66	63	65	63	64
		NB I-41 441 diverge					
	103	NB I-41 441 merge	64	66	63	63	64
	420	NB I-41 CTH N diverge	59	55	54	11	45
	108	NB I-41 CTH N merge	68	67	67	66	67
	422	NB I-41 WIS 55 diverge	66	65	64	63	65
	113	NB I-41 WIS 55 merge	70	70	69	69	69
	417	NB I-41 CTH J diverge	37	36	35	34	36
	118	NB I-41 CTH J merge	66	66	67	66	66
	415	NB I-41 CTH U diverge	69	69	69	69	69
	123	NB I-41 CTH U merge	68	68	68	69	68
	425	NB I-41 CTH S diverge	63	62	63	62	63
	128	NB I-41 CTH S merge	67	67	65	66	66
	426	SB I-41 CTH S diverge	54	54	54	54	54
	21	SB I-41 CTH S merge	69	68	68	68	68
	424	SB I-41 CTH U diverge	53	49	50	50	50
	20	SB I-41 CTH U merge	68	67	68	68	68
	416	SB I-41 CTH J diverge	65	61	64	65	64
	19	SB I-41 CTH J merge	67	66	67	66	67
	423	SB I-41 WIS 55 diverge	64	64	64	62	63
	18	SB I-41 WIS 55 merge	68	66	68	66	67
	421	SB I-41 CTH N diverge	64	58	59	54	59
	26	SB I-41 CTH N merge	68	63	67	66	66
	419	SB I-41 441 diverge	63	58	53	54	57
	36	SB I-41 441 merge	67	67	66	54	63
		SB I-41 Ballard diverge					
	40	SB I-41 Ballard merge	58	51	32	22	40
	42	SB I-41 WIS 47 diverge	67	66	66	68	67
	46	SB I-41 WIS 47 merge	67	66	67	67	67
	48	SB I-41 WIS 15 diverge	56	54	53	51	53
	--	SB I-41 WIS 15 merge	--	--	--	--	--
	53	SB I-41 WIS 96 diverge	66	67	66	65	66
	56	SB I-41 WIS 96 merge	69	70	70	70	70
		SB I-41 WIS 125 diverge					
	61	SB I-41 WIS 125merge	69	69	69	69	69
	63	SB I-41 CTH BB diverge	68	63	66	66	65
	67	SB I-41 CTH BB merge	68	68	68	68	68

APPENDIX P3

Year 2028 No Build with Retimings VISSIM AM Peak Hour

I-41 Traffic and Engineering Study
No Build (2028) With Signal Retimings AM Peak Hour Calibration
Freeway Mainline and Ramp Volumes

			% Demand	Segments										Vissim										Difference										RMSPE										RMSE									
			100%	Forecast ID	Link ID	Description	Type	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	TOTAL	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2	7:00-7:15AM3	7:15-7:30AM3	7:30-7:45AM3	7:45-8:00AM3	TOTAL3	7:00-7:15AM6	7:15-7:30AM6	7:30-7:45AM6	7:45-8:00AM6	TOTAL6	7:00-7:15AM5	7:15-7:30AM5	7:30-7:45AM5	7:45-8:00AM5	TOTAL5																					
TEOps Validation - 15 minute periods																																																					
Test	Target		Model	10001	69	NB I-41 (Southern Project Limits)	MAINLINE	673	849	902	1026	3450	748	863	852	970	3433	75	14	-50	-56	-17	11%	2%	2%	5%	1%	2.9	0.5	1.7	1.8	0.3																					
	Target			10002	72	NB I-41 Exit to CTH BB	RAMP	125	169	189	177	660	125	169	184	168	646	-1	0	-4	-9	-14	0%	0%	2%	5%	2%	0.0	0.0	0.3	0.7	0.5																					
	RMSPE < 5%			10003	71	NB I-41 betw CTH BB Exit to CTH BB Ent	MAINLINE	548	680	714	849	2790	614	686	666	793	2759	67	6	-48	-56	-31	12%	1%	7%	7%	1%	2.8	0.2	1.8	1.9	0.6																					
Tier 1																																																					
Tier 2																																																					
TEOps Validation - 60 minute period																																																					
Test	Target		Model	10007	77	NB I-41 betw WIS 125 Exit to WIS 125 Ent	MAINLINE	546	623	666	726	2560	595	627	619	677	2518	49	4	-47	-48	-42	3%	1%	5%	5%	2%	2.1	0.2	1.8	1.8	0.8																					
	Target			10008	79	NB I-41 Ent from WIS 125	RAMP	53	72	104	71	300	57	69	101	72	299	4	-3	-4	2	-1	7%	4%	4%	2%	0%	0.5	0.3	0.4	0.2	0.1																					
	RMSPE < 5%			10009	80	NB I-41 betw WIS 125 Ent to WIS 96 Exit	MAINLINE	599	694	771	796	2778	641	687	710	740	2778	42	-7	-60	-57	-82	3%	1%	1%	3%	3%	1.7	0.3	2.2	2.0	1.5																					
Tier 1																																																					
Tier 2																																																					

I-41 Traffic and Engineering Study
No Build (2028) With Signal Retimings AM Peak Period Calibration
Intersection Turning Movements

			% Demand	Intersections					Target					Vissim					Difference					RNSE				
			100%	Int ID	Int Name	From Link	To Link	Mvmt	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	TOTAL	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2	7:00-7:15AM3	7:15-7:30AM3	7:30-7:45AM3	7:45-8:00AM3	TOTAL3	7:00-7:15AM5	7:15-7:30AM5	7:30-7:45AM5	7:45-8:00AM5	TOTAL5
TEOps Validation - 15 minute periods				108	SB I-41 & WIS15	303	52	EBL	47	60	34	59	200	49	59	35	39	182	2	-1	1	-20	-18	0.2	0.1	0.1	2.6	1.3
Test	Target	Model		108	SB I-41 & WIS15	303	304	EBT	240	300	315	385	1240	239	293	297	268	1097	-1	-7	-18	-117	-143	0.0	0.4	1.0	2.2	2.2
Tier 1	RMSPE < 5%	Not Applicable		108	SB I-41 & WIS15	309	302	WBT	158	153	152	188	650	148	149	154	189	640	-9	-4	2	1	-10	0.7	0.3	0.2	0.1	0.4
Tier 2	RSNE < 3 for 75% of turns	98%		108	SB I-41 & WIS15	309	52	WBR	82	91	113	94	380	91	90	108	91	380	9	-1	-4	-3	0	1.0	0.1	0.4	0.3	0.0
				108	SB I-41 & WIS15	51	304	SBL	44	62	40	44	190	38	44	45	34	161	-7	-18	5	-9	-29	1.0	2.3	0.8	1.4	2.1
				108	SB I-41 & WIS15	51	302	SBR	131	207	243	229	810	195	159	180	181	715	63	-48	-62	-48	-95	1.1	1.1	1.1	1.1	1.1
				106	SB I-41 & WIS96	323	325	EBT	103	154	205	189	650	105	148	204	190	647	2	-6	-1	2	-3	0.2	0.5	0.1	0.1	0.1
				106	SB I-41 & WIS96	323	57	EBR	34	53	58	65	210	36	52	59	64	211	2	-1	1	-1	1	0.3	0.2	0.1	0.1	0.0
				106	SB I-41 & WIS96	332	57	WBL	65	108	108	100	380	64	102	107	98	372	0	-6	-1	-1	-8	0.1	0.6	0.1	0.1	0.4
				106	SB I-41 & WIS96	332	334	WBT	125	131	153	241	650	127	135	141	215	618	2	4	-12	-26	-32	0.1	0.4	1.0	1.7	1.3
				106	SB I-41 & WIS96	340	325	SBL	30	40	48	42	160	35	32	38	37	142	5	-8	-10	-5	-18	0.8	1.3	1.5	0.7	1.5
				106	SB I-41 & WIS96	340	57	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				106	SB I-41 & WIS96	340	334	SBR	47	77	71	94	290	62	52	62	68	244	14	-24	-9	-27	-46	2.1	2.8	1.1	2.8	2.7
				104	SB I-41 & WIS125	349	351	EBT	115	131	147	157	550	116	129	143	155	544	1	-2	-3	-3	-6	0.1	0.2	0.3	0.2	0.3
				104	SB I-41 & WIS125	349	60	EBR	41	49	37	33	160	42	49	37	33	161	1	0	-1	0	1	0.2	0.0	0.1	0.0	0.1
				104	SB I-41 & WIS125	361	60	WBL	60	73	69	88	290	62	75	68	84	289	2	2	-1	-4	-1	0.3	0.2	0.2	0.4	0.1
				104	SB I-41 & WIS125	361	363	WBT	99	143	175	242	660	108	139	172	226	644	8	-4	-3	-17	-16	0.8	0.4	0.2	1.1	0.6
				104	SB I-41 & WIS125	367	351	SBL	37	47	64	62	210	37	39	47	55	179	1	-8	-17	-7	-31	0.1	1.2	2.1	0.9	2.2
				104	SB I-41 & WIS125	367	60	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				104	SB I-41 & WIS125	367	363	SBR	65	62	108	106	340	71	63	72	89	295	6	1	-36	-16	-45	0.8	0.2	1.1	1.6	2.4
				101	SB I-41 & CTHBB	377	381	EBT	125	127	155	142	550	122	128	156	143	549	-3	0	1	1	-1	0.3	0.0	0.1	0.1	0.0
				101	SB I-41 & CTHBB	377	66	EBR	43	48	59	60	210	44	48	58	60	210	1	0	-1	0	0	0.2	0.0	0.1	0.0	0.0
				101	SB I-41 & CTHBB	382	66	WBL	38	42	46	34	160	39	42	45	33	160	2	0	-1	-1	0	0.3	0.1	0.2	0.1	0.0
				101	SB I-41 & CTHBB	382	379	WBT	92	130	127	141	490	96	125	128	139	488	4	-4	1	-2	-2	0.4	0.4	0.1	0.1	0.1
				101	SB I-41 & CTHBB	393	381	SBL	20	27	38	45	130	17	21	30	35	102	-3	-6	-9	-11	-28	0.7	1.1	1.4	1.6	2.5
				101	SB I-41 & CTHBB	393	66	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				101	SB I-41 & CTHBB	393	379	SBR	88	125	113	134	460	100	96	111	115	422	12	-30	-2	-20	-38	1.3	2.6	0.2	1.7	1.8
				109	NB I-41 & WIS15	304	316	EBL	119	157	145	179	600	126	134	122	125	508	7	-22	-23	-55	-92	0.7	1.8	1.9	1.1	1.1
				109	NB I-41 & WIS15	304	311	EBT	166	206	210	249	830	158	182	199	178	716	-8	-24	-11	-71	-114	0.6	1.6	0.8	1.1	1.1
				109	NB I-41 & WIS15	87	308	NBL	43	52	60	35	190	44	47	60	42	193	1	-5	1	6	3	0.1	0.6	0.1	1.1	0.2
				109	NB I-41 & WIS15	87	316	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				109	NB I-41 & WIS15	87	311	NBR	67	103	129	141	440	72	95	120	137	424	5	-8	-9	-5	-16	0.6	0.8	0.8	0.4	0.8
				109	NB I-41 & WIS15	10338	308	WBT	196	192	205	246	840	198	190	206	242	836	2	-2	0	-4	-4	0.1	0.1	0.0	0.3	0.1
				109	NB I-41 & WIS15	10338	315	WBR	31	29	56	34	150	28	29	56	36	149	-3	0	0	2	-1	0.5	0.1	0.0	0.4	0.1
				107	NB I-41 & WIS96	325	83	EBL	26	35	61	49	170	25	33	61	49	168	-1	-2	0	0	-2	0.1	0.3	0.0	0.0	0.2

I-41 Traffic and Engineering Study
No Build (2028) With Signal Retimings AM Peak Period Calibration
Intersection Turning Movements

			% Demand	Intersections				Target					Vissim					Difference					RNSE					
			100%	Int ID	Int Name	From Link	To Link	Mvmt	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	TOTAL	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2	7:00-7:15AM3	7:15-7:30AM3	7:30-7:45AM3	7:45-8:00AM3	TOTAL3	7:00-7:15AM5	7:15-7:30AM5	7:30-7:45AM5	7:45-8:00AM5	TOTAL5
TEOps Validation - 15 minute periods				113	CTH N & SB I-41	222	24	NBL	77	61	99	83	320	77	63	97	81	319	1	1	-2	-1	-1	0.1	0.2	0.2	0.1	0.1
Test	Target	Model		113	CTH N & SB I-41	222	216	NBT	51	78	55	86	270	62	80	58	82	281	10	2	2	-4	11	1.5	0.3	0.3	0.4	0.7
Tier 1	RMSPE < 5%			113	CTH N & SB I-41	23	220	WBL	30	29	31	31	120	42	26	31	29	128	12	-3	0	-2	8	2.2	0.5	0.0	0.3	0.8
Tier 2	RSNE < 3 for 75% of turns			113	CTH N & SB I-41	23	24	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				113	CTH N & SB I-41	23	216	WBR	14	11	26	19	70	22	13	16	24	75	9	2	-10	4	5	2.4	0.7	2.0	1.0	0.6
				113	CTH N & SB I-41	217	220	SBT	54	57	48	51	210	55	58	47	50	210	1	1	-1	-1	0	0.1	0.2	0.1	0.2	0.0
				113	CTH N & SB I-41	217	24	SBR	55	64	72	79	270	57	64	71	76	269	2	0	0	-3	-1	0.3	0.0	0.0	0.3	0.1
				114	CTH N & NB I-41	224	221	EBL	35	26	17	32	110	44	28	19	28	120	9	3	2	-4	10	1.5	0.5	0.4	0.7	0.9
				114	CTH N & NB I-41	224	107	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				114	CTH N & NB I-41	224	227	EBR	41	28	49	52	170	40	33	40	50	164	-1	6	-9	-2	-6	0.1	1.1	1.3	0.3	0.5
				114	CTH N & NB I-41	229	221	NBT	93	113	137	137	480	93	115	136	135	479	1	1	-1	-1	-1	0.1	0.1	0.1	0.1	0.0
				114	CTH N & NB I-41	229	107	NBR	46	54	50	40	190	47	53	48	41	189	1	-1	-2	1	-1	0.2	0.1	0.3	0.2	0.1
				114	CTH N & NB I-41	223	107	SBL	22	25	16	16	80	21	25	16	17	78	-1	0	-1	0	-2	0.2	0.1	0.1	0.0	0.2
				114	CTH N & NB I-41	223	227	SBT	62	60	63	66	250	76	60	63	62	260	14	-1	0	-3	10	1.7	0.1	0.0	0.4	0.6
				115	WIS55 & SB I-41	187	16	NBL	50	79	76	65	270	49	79	73	64	265	-1	0	-2	-1	-5	0.1	0.0	0.3	0.1	0.3
				115	WIS55 & SB I-41	187	184	NBT	58	56	93	72	280	60	56	89	73	279	2	0	-4	1	-1	0.3	0.0	0.4	0.2	0.1
				115	WIS55 & SB I-41	15	186	WBL	17	24	18	21	80	25	17	23	20	85	8	-7	5	-1	5	1.8	1.4	1.3	0.2	0.6
				115	WIS55 & SB I-41	15	16	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				115	WIS55 & SB I-41	15	184	WBR	61	4	4	1	70	17	26	11	14	68	-44	22	7	13	-2	0.7	0.5	1.6	1.2	0.3
				115	WIS55 & SB I-41	183	186	SBT	35	66	42	56	200	36	65	43	56	200	1	-1	1	0	0	0.2	0.2	0.1	0.1	0.0
				115	WIS55 & SB I-41	183	16	SBR	31	32	47	31	140	31	32	45	31	139	1	1	-2	0	-1	0.1	0.1	0.3	0.0	0.1
				116	WIS55 & NB I-41	111	187	EBL	12	13	11	14	50	15	12	11	14	51	3	-1	-1	0	1	0.9	0.3	0.2	0.1	0.1
				116	WIS55 & NB I-41	111	112	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				116	WIS55 & NB I-41	111	188	EBR	63	73	58	77	270	67	64	62	69	262	4	-9	4	-8	-8	0.5	1.0	0.6	0.9	0.5
				116	WIS55 & NB I-41	200	187	NBT	97	122	158	123	500	96	122	154	123	495	-1	0	-3	0	-5	0.1	0.0	0.3	0.0	0.2
				116	WIS55 & NB I-41	200	112	NBR	31	25	38	36	130	32	25	38	35	130	1	0	0	-1	0	0.2	0.1	0.0	0.1	0.0
				116	WIS55 & NB I-41	186	112	SBL	17	1	1	11	30	18	2	1	9	29	1	1	-1	-1	-1	0.1	1.2	0.5	0.4	0.1
				116	WIS55 & NB I-41	186	188	SBT	36	89	59	66	250	44	79	67	66	255	8	-10	8	-1	5	1.4	1.1	1.0	0.1	0.3
				117	CTH J & SB I-41	182	197	NBL	36	50	45	50	180	36	51	44	47	178	1	1	-1	-3	-2	0.1	0.1	0.1	0.4	0.1
				117	CTH J & SB I-41	182	189	NBT	74	44	62	81	260	69	47	56	75	248	-4	3	-5	-6	-12	0.5	0.5	0.7	0.7	0.8
				117	CTH J & SB I-41	196	191	WBL	38	43	27	21	130	33	39	35	27	135	-5	-5	8	6	5	0.8	0.7	1.5	1.3	0.4
				117	CTH J & SB I-41	196	197	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				117	CTH J & SB I-41	196	189	WBR	15	10	19	16	60	20	13	14	17	65	5	4	-6	2	5	1.3	1.2	1.3	0.4	0.6
				117	CTH J & SB I-41	190	191	SBT	29	27	39	35	130	30	26	39	36	130	1	0	-1	1	0	0.2	0.1	0.1	0.1	0.0
				117	CTH J & SB I-41	190	197	SBR	63	49	65	53	230	67	48	64	53	230	4	-1	-1	-1	0	0.5	0.1	0.2	0.1	0.0
				118	CTH J & NB I-41	199	182	EBL	35	29	36	50	150	31	30	32	43	136	-4	1	-3	-7	-14	0.7	0.2	0.5	1.0	1.1
				118	CTH J & NB I-41	199	198	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				118	CTH J & NB I-41	199	192	EBR	35	29	35	22	120	26	32	31	30	119	-9	3	-3	8	-1	1.5	0.6	0.6	1.6	0.1
				118	CTH J & NB I-41	174	182	NBT	74	65	71	80	290	75	67	69	80	290	1	1	-2	0	0	0.1	0.2	0.3	0.0	0.0
				118	CTH J & NB I-41	174	198	NBR	84	90	99																	

I-41 Traffic and Engineering Study
 No Build (2028) With Signal Retimings AM Peak Period Calibration
Lane Utilization Comparison

I-41 NB															
Location		I-41 NB south of CTH BB			I-41 NB betw WIS 125 & WIS 96				I-41 NB betw CTH E & WIS 441			I-41 NB betw WIS 441 & CTH N		I-41 NB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
Field VISSIM (ATR)	7:00 AM	30%	29%	42%	26%	29%	37%	8%	38%	40%	22%	48%	52%	51%	49%
	7:15 AM	29%	29%	41%	25%	28%	38%	8%	36%	38%	26%	49%	51%	51%	49%
	7:30 AM	28%	29%	43%	24%	29%	38%	9%	37%	38%	26%	49%	51%	51%	49%
	7:45 AM	30%	30%	40%	25%	28%	37%	10%	36%	38%	26%	48%	52%	51%	49%
	7:00 AM	39%	36%	25%	12%	25%	35%	28%	25%	32%	43%	45%	55%	39%	61%
	7:15 AM	37%	35%	28%	14%	24%	33%	30%	26%	29%	45%	43%	57%	38%	62%
	7:30 AM	36%	36%	29%	13%	25%	32%	30%	27%	29%	44%	42%	58%	38%	62%
	7:45 AM	36%	33%	31%	14%	26%	31%	30%	31%	28%	41%	48%	52%	40%	60%
VISSIM	Avg	29%	29%	42%	25%	28%	37%	9%	37%	38%	25%	49%	51%	51%	49%
Field	Avg	37%	35%	28%	13%	25%	32%	29%	27%	29%	43%	45%	55%	39%	61%

I-41 SB															
Location		I-41 SB south of CTH BB			I-41 SB betw WIS 125 & WIS 96				I-41 SB betw CTH E & WIS 441			I-41 SB betw WIS 441 & CTH N		I-41 SB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
Field VISSIM (ATR)	7:00 AM	32%	36%	32%	26%	33%	36%	5%	31%	31%	39%	51%	49%	49%	51%
	7:15 AM	32%	36%	32%	25%	32%	37%	6%	29%	31%	40%	50%	50%	49%	51%
	7:30 AM	32%	35%	33%	24%	31%	37%	7%	30%	31%	39%	50%	50%	49%	51%
	7:45 AM	32%	35%	33%	23%	30%	39%	8%	32%	30%	38%	50%	50%	49%	51%
	7:00 AM	26%	39%	35%	7%	25%	33%	34%	27%	33%	40%	45%	55%	42%	58%
	7:15 AM	26%	37%	38%	8%	25%	31%	36%	26%	32%	42%	44%	56%	40%	60%
	7:30 AM	25%	36%	39%	9%	24%	31%	36%	28%	31%	41%	43%	57%	41%	59%
	7:45 AM	28%	36%	36%	12%	26%	29%	33%	29%	32%	39%	45%	55%	45%	55%
VISSIM	Avg	32%	35%	32%	25%	31%	37%	7%	30%	30%	39%	50%	50%	49%	51%
Field	Avg	26%	37%	37%	9%	25%	31%	35%	28%	32%	41%	44%	56%	42%	58%

TEOps Validation

Test	Data	Target	Model
Tier 1	--	Not Applicable	--
Tier 2	ATR	RNSE < 3.0 for 85% of data points	39%

I-41 Traffic and Engineering Study
No Build (2028) With Signal Retimings AM Peak Period Calibration
Mainline Speed Comparison

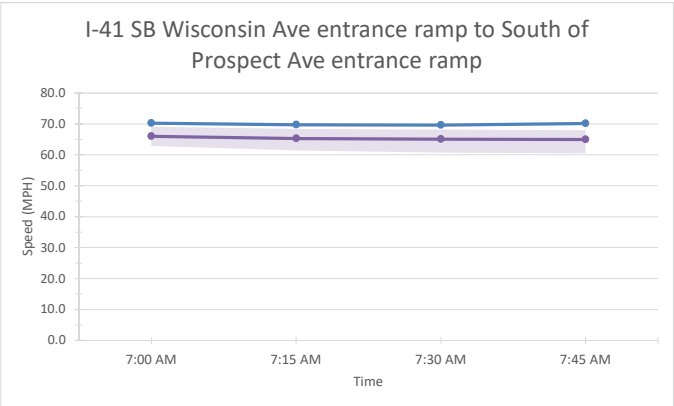
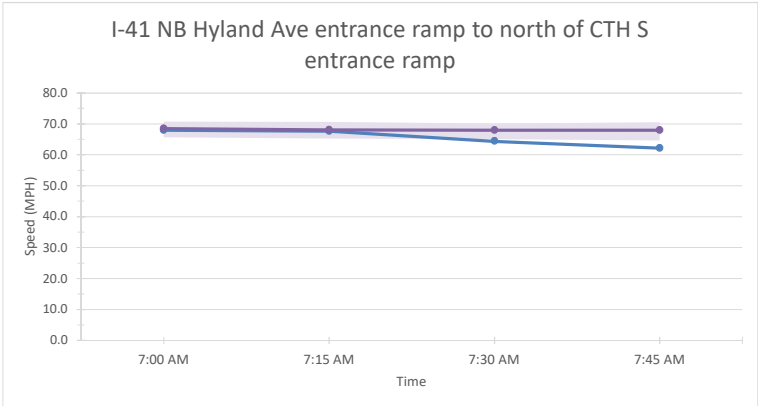
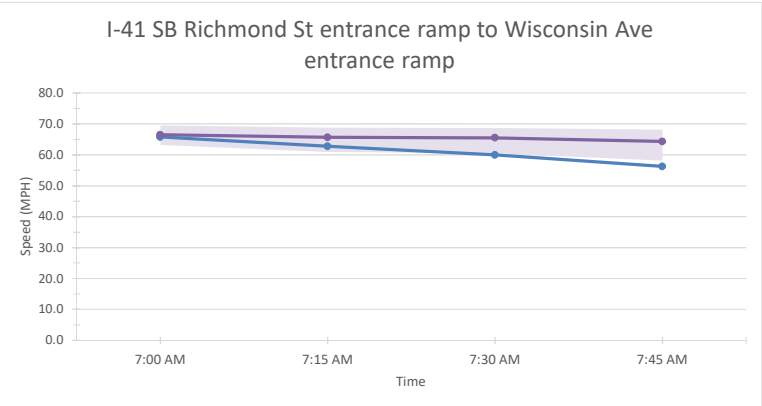
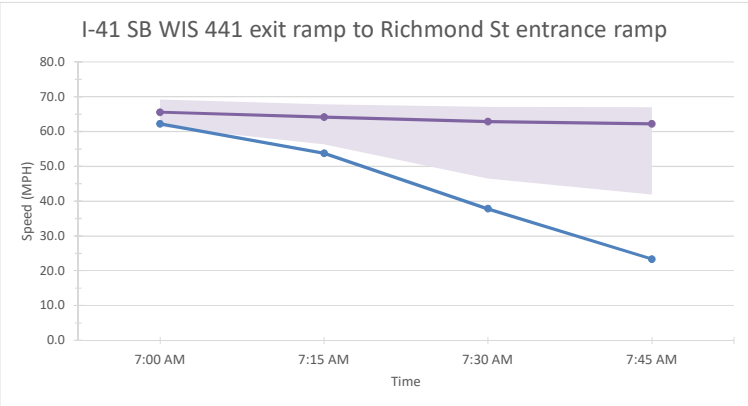
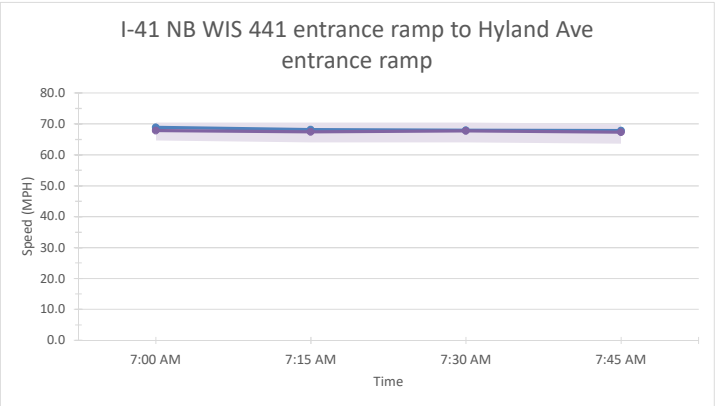
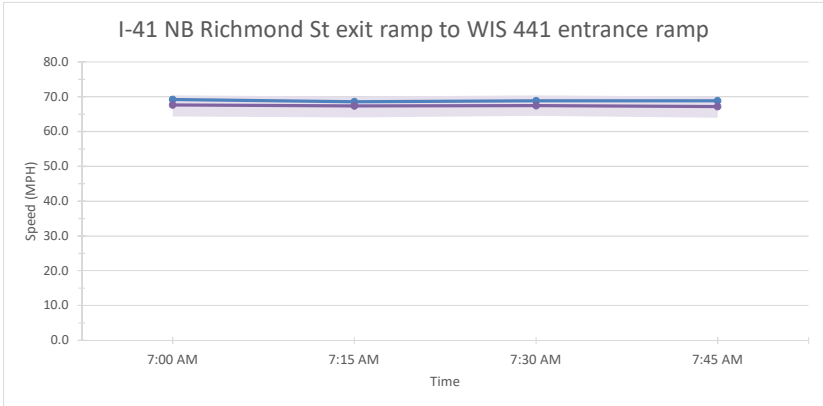
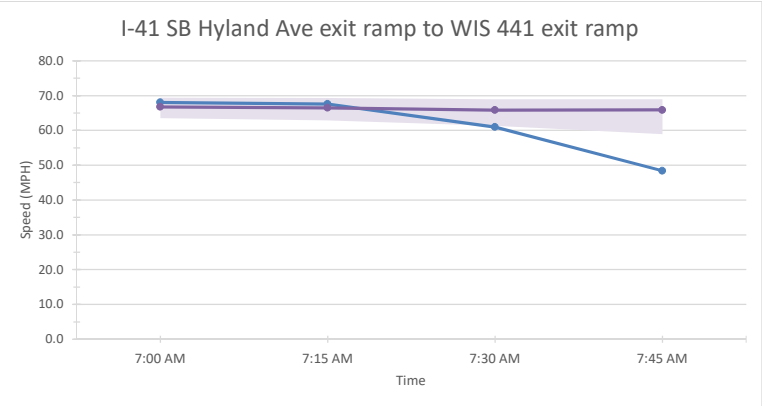
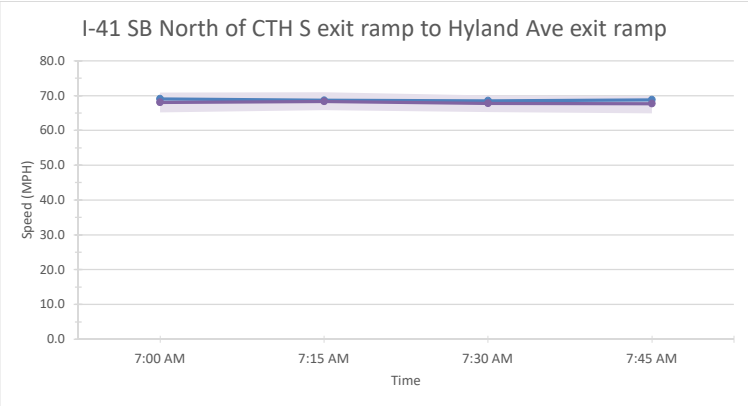
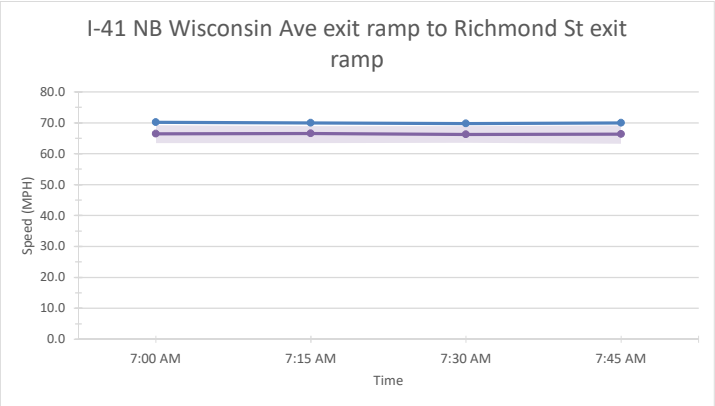
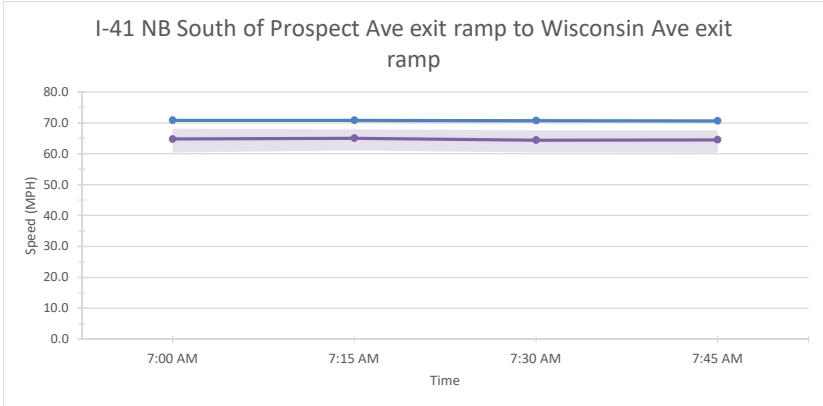
Segment		I-41 NB						I-41 SB					
		I-41 NB South of Prospect Ave exit ramp to Wisconsin Ave exit ramp	I-41 NB Wisconsin Ave exit ramp to Richmond St exit ramp	I-41 NB Richmond St exit ramp to WIS 441 entrance ramp	I-41 NB WIS 441 entrance ramp to Hyland Ave entrance ramp	I-41 NB Hyland Ave entrance ramp to north of CTH S entrance ramp		I-41 SB North of CTH S exit ramp to Hyland Ave exit ramp	I-41 SB Hyland Ave exit ramp to WIS 441 exit ramp	I-41 SB WIS 441 exit ramp to Richmond St entrance ramp	I-41 SB Richmond St entrance ramp to Wisconsin Ave entrance ramp	I-41 SB Wisconsin Ave entrance ramp to South of Prospect Ave entrance ramp	
VISSIM	7:00 AM	70.8	70.1	69.2	68.9	68.0		69.1	68.0	62.2	65.8	70.2	
	7:15 AM	70.8	69.9	68.6	68.2	67.7		68.6	67.5	53.8	62.8	69.8	
	7:30 AM	70.7	69.8	68.9	68.0	64.4		68.5	61.0	37.8	60.0	69.7	
	7:45 AM	70.5	70.0	68.8	67.8	62.1		68.8	48.4	23.4	56.2	70.1	
Field (NPMRDS Average)	7:00 AM	64.7	66.4	67.7	67.9	68.5		68.0	66.8	65.6	66.5	66.0	
	7:15 AM	65.0	66.6	67.4	67.5	68.1		68.3	66.5	64.2	65.7	65.3	
	7:30 AM	64.3	66.2	67.5	67.7	68.0		67.8	65.8	62.9	65.5	65.1	
	7:45 AM	64.5	66.3	67.1	67.3	68.0		67.7	65.9	62.2	64.3	65.0	
Field (NPMRDS 15th Percentile)	7:00 AM	60.5	63.4	64.3	64.7	65.8		65.2	63.6	61.4	63.2	62.9	
	7:15 AM	61.1	63.4	64.1	64.0	65.3		65.9	62.9	56.4	61.0	61.5	
	7:30 AM	60.4	63.5	64.5	64.0	65.1		65.3	61.4	46.6	60.5	60.8	
	7:45 AM	60.3	63.2	64.0	63.6	64.7		64.9	59.0	41.9	58.1	60.6	
Field (NPMRDS 85th Percentile)	7:00 AM	68.1	69.2	70.4	70.5	70.8		70.9	69.4	69.2	69.5	69.1	
	7:15 AM	67.9	68.9	70.1	70.4	70.7		70.9	69.3	67.8	68.8	68.4	
	7:30 AM	67.5	68.9	70.4	70.5	70.2		70.1	69.0	67.1	68.6	68.2	
	7:45 AM	67.5	69.1	70.0	70.1	70.6		69.9	68.9	67.0	68.1	68.0	

TEOps
Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	14%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts	93%

TEOps
Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	14%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts	93%



I-41 Traffic and Engineering Study
No Build (2028) With Signal Retimings AM Peak Period Calibration
Travel Time Comparison

FULL CORRIDOR

Data	Time	I-41 NB
		Average Travel Time (min)
		South of CTH BB to North of CTH S
Distance (mi)		26.59
VISSIM	7:00AM	23.6
NPMRDS	7:00AM	23.7



Data	Time	I-41 SB
		Average Travel Time (min)
		North of CTH S to South of CTH BB
Distance (mi)		26.58
VISSIM	7:00AM	26.5
NPMRDS	7:00AM	24.0

SEGMENTS

I-41 NB				
Average Travel Time (minutes)				
South of CTH BB to Wisc Ave Exit	Wisc Ave Exit to Richmond Exit	Richmond Exit to 441 Entrance	441 Entrance to Hyland Entrance	Hyland Entrance to North of CTH S
3.12	4.0	3.49	5.26	10.71
2.7	3.4	3.0	4.6	9.8
2.9	3.6	3.1	4.7	9.4
I-41 SB				
Average Travel Time (minutes)				
North of CTH S to Hyland Exit	Hyland Exit to 441 Exit	441 Exit to Richmond Entrance	Richmond Entrance to Wisc Ave Entrance	Wisc Ave Entrance to South of CTH BB
10.68	5.52	3.25	4.0	3.09
9.3	5.5	5.1	4.0	2.6
9.4	5.0	3.1	3.7	2.8

TEOpS Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	27%
Tier 2	NPMRDS	TT ± 15% for 85% of routes	90%

I-41 Traffic and Engineering Study
No Build (2028) With Signal Retimings AM Peak Hour Calibration
Merge and Diverge Segment Speeds

Merge/Diverge Links			Vissim Speed				
Forecast ID	Link ID	Description	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2
Merge/Diverge Speeds							
	70	NB I-41 CTH BB diverge	69	70	70	69	70
	74	NB I-41 CTH BB merge	70	70	69	69	70
	76	NB I-41 WIS 125 diverge	70	70	70	69	70
	80	NB I-41 WIS 125merge	69	69	69	70	69
		NB I-41 WIS 96 diverge					
	84	NB I-41 WIS 96 merge	70	70	70	70	70
	--	NB I-41 WIS 15 diverge	--	--	--	--	--
	89	NB I-41 WIS 15 merge	69	69	69	69	69
	91	NB I-41 WIS 47 diverge	69	69	69	70	69
	95	NB I-41 WIS 47 merge	67	66	66	67	67
	418	NB I-41 Ballard diverge	61	64	64	63	63
	100	NB I-41 Ballard merge	67	66	66	66	66
		NB I-41 441 diverge					
	103	NB I-41 441 merge	67	66	65	65	66
	420	NB I-41 CTH N diverge	67	66	65	65	66
	108	NB I-41 CTH N merge	67	65	66	67	66
	422	NB I-41 WIS 55 diverge	66	65	65	64	65
	113	NB I-41 WIS 55 merge	69	68	68	68	68
	417	NB I-41 CTH J diverge	65	62	63	63	63
	118	NB I-41 CTH J merge	65	62	61	64	63
	415	NB I-41 CTH U diverge	65	63	63	64	64
	123	NB I-41 CTH U merge	66	64	63	57	62
	425	NB I-41 CTH S diverge	61	61	56	53	58
	128	NB I-41 CTH S merge	57	40	20	26	36
	426	SB I-41 CTH S diverge	62	61	61	62	61
	21	SB I-41 CTH S merge	69	68	68	69	68
	424	SB I-41 CTH U diverge	58	52	56	58	56
	20	SB I-41 CTH U merge	68	66	66	67	67
	416	SB I-41 CTH J diverge	64	65	64	65	65
	19	SB I-41 CTH J merge	65	65	60	64	63
	423	SB I-41 WIS 55 diverge	63	64	61	62	63
	18	SB I-41 WIS 55 merge	68	65	56	64	63
	421	SB I-41 CTH N diverge	63	64	54	23	51
	26	SB I-41 CTH N merge	64	63	27	19	43
	419	SB I-41 441 diverge	66	66	63	63	64
	36	SB I-41 441 merge	63	60	51	38	53
		SB I-41 Ballard diverge					
	40	SB I-41 Ballard merge	52	44	31	19	37
	42	SB I-41 WIS 47 diverge	61	59	38	17	44
	46	SB I-41 WIS 47 merge	49	33	23	16	30
	48	SB I-41 WIS 15 diverge	59	60	60	63	61
	--	SB I-41 WIS 15 merge	--	--	--	--	--
	53	SB I-41 WIS 96 diverge	68	69	69	68	69
	56	SB I-41 WIS 96 merge	69	69	69	69	69
		SB I-41 WIS 125 diverge					
	61	SB I-41 WIS 125merge	69	68	69	69	69
	63	SB I-41 CTH BB diverge	69	68	69	69	69
	67	SB I-41 CTH BB merge	69	69	69	69	69

DRAFT

APPENDIX P4

Year 2028 No Build with Retimings VISSIM PM Peak Hour

I-41 Traffic and Engineering Study
No Build (2028) With Signal Retimings PM Peak Hour Calibration
Freeway Mainline and Ramp Volumes

			% Demand	Segments					Target					Vissim					Difference					RMSPE					RMSE				
			100%	Forecast ID	Link ID	Description	Type	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	TOTAL	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2	4:15-4:30PM3	4:30-4:45PM3	4:45-5:00PM3	5:00-5:15PM3	TOTAL3	4:15-4:30PM6	4:30-4:45PM6	4:45-5:00PM6	5:00-5:15PM6	TOTAL6	4:15-4:30PM5	4:30-4:45PM5	4:45-5:00PM5	5:00-5:15PM5	TOTAL5	
TEOps Validation - 15 minute periods				10001	69	NB I-41 (Southern Project Limits)	MAINLINE	892	882	932	843	3550	890	879	934	842	3544	-2	-3	2	-1	-5	0%	0%	0%	0%	0%	0.1	0.1	0.1	0.0	0.1	
Test	Tier 1	Target	Model	10002	72	NB I-41 Exit to CTH BB	RAMP	148	143	160	150	600	150	139	161	149	599	3	-4	1	-1	-1	2%	3%	1%	1%	0%	0.2	0.3	0.1	0.1	0.0	
				10003	71	NB I-41 betw CTH BB Exit to CTH BB Ent	MAINLINE	744	739	772	694	2950	732	742	768	691	2933	-13	3	-4	-3	-16	2%	0%	1%	0%	1%	0.5	0.1	0.1	0.1	0.3	
Tier 2		RSNE < 5%	95%	10004	73	NB I-41 Ent from CTH BB	RAMP	197	207	195	191	790	194	205	196	190	786	-2	-2	1	0	-4	1%	1%	1%	0%	1%	0.2	0.1	0.1	0.0	0.2	
				10005	75	NB I-41 betw CTH BB Ent to WIS 125 Exit	MAINLINE	941	946	967	884	3740	921	952	968	882	3723	-20	6	1	-2	-15	2%	1%	0%	0%	0%	0.7	0.2	0.0	0.1	0.3	
TEOps Validation - 60 minute period	Test	Tier 2	Model	10006	78	NB I-41 Exit to WIS 125	RAMP	257	263	242	239	1000	217	224	215	204	860	-40	-38	-27	-35	-140	10%	10%	10%	10%	10%	2.5	2.4	1.7	2.3	8.2	
				10007	77	NB I-41 betw WIS 125 Exit to WIS 125 Ent	MAINLINE	685	684	725	645	2740	661	686	713	644	2703	-24	2	-13	-1	-35	3%	0%	2%	0%	1%	0.9	0.1	0.5	0.0	0.7	
Tier 1		RMSPE < 5%	95%	10008	79	NB I-41 Ent from WIS 125	RAMP	180	209	209	253	850	171	203	208	229	811	-9	20	-1	-24	-39	5%	3%	0%	0%	5%	0.7	0.4	0.0	1.5	1.3	
				10009	80	NB I-41 betw WIS 125 Ent to WIS 96 Exit	MAINLINE	864	892	934	898	3590	821	881	910	864	3476	-43	11	-13	-24	-34	-112	5%	1%	3%	4%	3%	1.5	0.4	0.8	1.1	1.9
Tier 2		RSNE < 3 for 85% of links	95%	10010	82	NB I-41 Exit to WIS96	RAMP	221	226	211	252	910	225	227	209	240	900	4	0	-2	-12	-10	2%	0%	1%	5%	1%	0.3	0.0	0.1	0.8	0.3	
				10011	81	NB I-41 betw WIS 96 Exit to WIS 96 Ent	MAINLINE	643	666	723	646	2680	603	666	712	637	2618	-40	0	-10	-9	-60	4%	0%	1%	1%	2%	1.6	0.0	0.4	0.4	1.2	
Tier 1		RMSPE < 5%	95%	10012	83	NB I-41 Ent from WIS 96	RAMP	220	262	257	300	1040	247	241	241	266	994	26	-21	-17	-35	-46	10%	8%	8%	12%	4%	1.8	1.3	1.0	2.0	1.4	
				10013	85	NB I-41 WIS 96 Ent to WIS 15 Exit	MAINLINE	863	928	980	947	3720	844	910	952	980	912	3618	-19	844	-28	-35	-100	2%	2%	3%	4%	3%	0.7	0.6	0.9	1.1	1.7
Tier 2		RSNE < 3 for 85% of links	95%	10014	87	NB I-41 Exit to WIS15	RAMP	267	290	261	282	1100	258	274	256	270	1058	-9	-16	-5	-12	-42	3%	4%	2%	4%	4%	0.7	1.0	0.3	0.7	1.3	
				10015	86	NB I-41 betw WIS 15 Exit to WIS 15 Ent	MAINLINE	597	638	719	664	2620	576	633	686	637	2532	-21	5	-33	-27	-87	3%	1%	5%	4%	3%	0.9	0.2	1.2	1.1	1.7	
Tier 1		RMSPE < 5%	95%	10016	88	NB I-41 Ent from WIS15	RAMP	327	345	247	271	1190	193	164	142	171	669	-134	-182	-105	-100	-521	10%	10%	10%	10%	10%	2.4	1.1	1.2	2.0	9.4	
				10017	90	NB I-41 betw WIS 15 Ent to WIS 47 Exit	MAINLINE	923	984	966	935	3810	771	793	831	822	3217	-152	-190	-135	-113	-591	10%	10%	10%	10%	10%	2.9	1.2	2.9	2.1	9.8	
Tier 2		RSNE < 3 for 85% of links	95%	10018	93	NB I-41 Exit to WIS47	RAMP	177	173	166	139	740	163	158	139	172	593	-37	-30	-27	-52	-147	10%	10%	10%	10%	10%	2.8	2.3	2.1	1.2	8.4	
				10019	92	NB I-41 betw WIS 47 Exit to WIS 47 Ent	MAINLINE	747	810	800	711	3070	622	646	680	652	2600	-124	-164	-120	-89	-468	10%	10%	10%	10%	10%	4.1	1.2	1.2	2.2	8.8	
Tier 1		RMSPE < 5%	95%	10020	94	NB I-41 Ent from WIS47	RAMP	191	195	192	232	810	191	190	181	238	799	-1	-5	-11	6	-10	0%	2%	6%	2%	1%	0.0	0.3	0.8	0.4	0.4	
				10021	96	NB I-41 betw WIS 47 Ent to Ballard Exit	MAINLINE	938	1005	992	943	3880	814	839	853	903	3408	-124	-166	-138	-41	-470	10%	10%	10%	10%	10%	4.1	1.2	1.2	1.3	9.4	
Tier 2		RSNE < 3 for 85% of links	95%	10022	98	NB I-41 Exit to Ballard	RAMP	119	134	163	153	570	135	119	129	153	537	16	-15	-14	0	-33	10%	10%	10%	10%	10%	1.5	1.3	2.7	0.0	1.4	
				10023	97	NB I-41 betw Ballard Exit to Ballard Ent	MAINLINE	818	871	828	790	3310	669	711	712	744	2835	-149	-161	-117	-46	-473	10%	10%	10%	10%	10%	4.2	1.4	1.1	1.6	8.2	
Tier 1		RMSPE < 5%	95%	10024	99	NB I-41 Ent from Ballard	RAMP	170	200	202	198	770	173	191	197	181	742	3	-9	-4	-18	-28	2%	5%	2%	2%	4%	0.3	0.7	0.3	1.3	1.0	
				10025	100	NB I-41 betw Ballard Ent to 441 Exit	MAINLINE	988	1072	1030	988	4080	843	903	911	926	3583	-145	-168	-119	-62	-495	10%	10%	10%	10%	10%	4.2	1.1	1.2	2.0	9.8	
Tier 2		RSNE < 3 for 85% of links	95%	10026	102	NB I-41 Exit to SB441	RAMP	316	347	348	338	1350	264	288	294	300	1147	-52	294	-54	-38	-203	10%	10%	10%	10%	10%	2.9	1.2	2.9	2.1	9.8	
				10027	101	NB I-41 betw 441 Exit to 441 Ent	MAINLINE	672	724	682	650	2730	602	619	620	604	2404	-67	-122	-60	-32	-324	10%	10%	10%	10%	10%	4.1	1.2	1.2	2.2	8.5	
Tier 1		RMSPE < 5%	95%	10028	33	NB I-41 Ent from NB441	RAMP	164	145	176	186	670	161	144	176	186	667	-2	0	0	0	-3	1%	0%	0%	0%	0%	0.2	0.0	0.0	0.0	0.1	
				10029	104	NB I-41 betw 441 Ent to CTH N Exit	MAINLINE	836	869	858	837	3400	727	749	779	749	3067	-109	-120	-79	-24	-332	10%	10%	10%	10%	10%	4.1	1.2	1.2	2.2	8.5	
Tier 2		RSNE < 3 for 85% of links	95%	10030	106	NB I-41 Exit to CTH N	RAMP	173	209	215	194	790	144	172	184	195	695	-29	-37	-31	1	-95	10%	10%	10%	10%	1%	1.2	2.5	2.1	0.1	8.8	
				10031	105	NB I-41 betw CTH N Exit to CTH N Entrance	MAINLINE	664	660	642	643	2610	567	580	587	615	2349	-96	580	-55	-38	-259	10%	10%	10%	10%	10%	4.2	1.1	2.2	1.1	8.7	
Tier 1		RMSPE < 5%	95%	10032	107	NB I-41 Ent from CTH N	RAMP	56	63	67	44	230	54	62	68	43	228	-2	-1	1	0	-2	4%	1%	1%	1%	1%	0.3	0.1	0.1	0.1	0.1	
				10033	109	NB I-41 betw CTH N Ent to WIS 55 Exit	MAINLINE	720	723	710	687	2840	621	645	653	661	2581	-98	-78	-56	-26	-258	10%	10%	10%	10%	10%	4.1	2.9	2.1	1.0	8.2	
Tier 2		RSNE < 3 for 85% of links	95%	10034	111	NB I-41 Exit to WIS55	RAMP	100	139	99	122	460	93	107	106	106	413	-6	-32	7	-16	-47	10%	10%	10%	10%	10%	0.6	2.7	0.7	1.4	2.2	
				10035	110	NB I-41 betw WIS 55 Exit to WIS 55 Ent	MAINLINE	620	630	611	565	2380	520	533	542	527	2152	-100	50	-69	-8	-227	10%	10%	10%	10%	10%	4.1	1.2	1.2	2.2	8.5	
Tier 1		RMSPE < 5%	95%	10036	112	NB I-41 Ent from WIS55	RAMP	29	27	33	30	150	28	31																			

I-41 Traffic and Engineering Study
No Build (2028) With Signal Retimings PM Peak Period Calibration
Intersection Turning Movements

			% Demand	Intersections						Target					Vissim					Difference					RNSE				
			100%	Int ID	Int Name	Forecast ID	From Link	To Link	Mvmt	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	TOTAL	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2	4:15-4:30PM3	4:30-4:45PM3	4:45-5:00PM3	5:00-5:15PM3	TOTAL3	4:15-4:30PM5	4:30-4:45PM5	4:45-5:00PM5	5:00-5:15PM5	TOTAL5
TEOps Validation - 15 minute periods				108	SB I-41 & WIS15	8EBL	303	52	EBL	79	62	38	51	230	32	37	34	39	141	-46	-26	-4	-13	-88	1.7	1.7	0.7	1.8	1.7
Test	Target	Model		108	SB I-41 & WIS15	8EBT	303	304	EBT	425	508	397	370	1700	202	170	172	186	729	-223	-338	-226	-184	-971	2.2	2.2	2.2	2.2	2.2
Tier 1	RMSPE < 5%	Not Applicable		108	SB I-41 & WIS15	8WBT	309	302	WBT	310	290	303	267	1170	293	301	299	267	1159	-18	12	-4	-1	-11	1.0	0.7	0.2	0.1	0.3
Tier 2	RSNE < 3 for 75% of turns	97%		108	SB I-41 & WIS15	8WBR	309	52	WBR	102	99	137	142	480	103	97	134	143	476	1	-2	-4	1	-4	0.1	0.2	0.3	0.1	0.2
				108	SB I-41 & WIS15	8SBL	51	304	SBL	26	41	40	54	160	30	30	28	35	124	4	-11	-12	-18	-36	0.9	1.7	1.9	2.5	2.8
				108	SB I-41 & WIS15	8SBR	51	302	SBR	214	224	225	226	890	156	198	185	191	730	-58	-26	-40	-36	-160	2.2	1.8	2.7	2.4	2.2
TEOps Validation - 60 minute period				106	SB I-41 & WIS96	6EBT	323	325	EBT	355	405	394	425	1580	389	390	397	377	1552	34	-16	2	-49	-28	1.8	0.8	0.1	2.4	0.7
Test	Target	Model		106	SB I-41 & WIS96	6EBR	323	57	EBR	98	113	88	121	420	102	110	92	106	409	3	-3	4	-15	-11	0.3	0.3	0.4	1.3	0.5
Tier 1	RMSPE < 5%	Not Applicable		106	SB I-41 & WIS96	6WBL	332	57	WBL	140	166	162	132	600	134	136	141	140	550	-7	-30	-21	8	-49	0.6	2.3	1.7	0.7	2.0
Tier 2	RSNE < 3 for 75% of turns	93%		106	SB I-41 & WIS96	6WBT	332	334	WBT	367	439	398	417	1620	360	369	372	369	1470	-7	-70	-25	-48	-150	0.4	2.2	1.3	2.3	2.2
				106	SB I-41 & WIS96	6SBL	340	325	SBL	55	48	60	57	220	41	46	43	52	182	-14	-2	-17	-6	-38	1.8	0.3	2.2	0.8	2.6
				106	SB I-41 & WIS96	6SBT	340	57	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				106	SB I-41 & WIS96	6SBR	340	334	SBR	133	109	134	124	500	80	103	102	112	396	-54	-6	-32	-12	-104	2.2	0.6	2.7	1.1	2.2
				104	SB I-41 & WIS125	4EBT	349	351	EBT	313	368	324	376	1380	304	354	337	343	1337	-8	-14	13	-33	-42	0.5	0.7	0.7	1.7	1.1
				104	SB I-41 & WIS125	4EBR	349	60	EBR	141	161	135	163	600	139	160	140	148	587	-2	-2	5	-14	-13	0.2	0.1	0.4	1.1	0.5
				104	SB I-41 & WIS125	4WBL	361	60	WBL	111	118	99	112	440	111	117	97	109	434	0	-1	-2	-2	-6	0.0	0.1	0.2	0.2	0.3
				104	SB I-41 & WIS125	4WBT	361	363	WBT	358	363	374	355	1450	347	352	377	356	1433	-11	-11	3	1	-17	0.6	0.6	0.2	0.1	0.4
				104	SB I-41 & WIS125	4SBL	367	351	SBL	39	41	66	43	190	41	35	44	46	167	1	-6	-22	3	-23	0.2	0.9	2.7	0.5	1.7
				104	SB I-41 & WIS125	4SBT	367	60	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				104	SB I-41 & WIS125	4SBR	367	363	SBR	56	50	61	43	210	54	49	48	50	202	-3	0	-13	7	-8	0.4	0.0	1.7	1.1	0.6
				101	SB I-41 & CTHB8	1EBT	377	381	EBT	182	203	220	226	830	181	204	220	222	827	-1	1	0	-3	-2	0.1	0.1	0.0	0.2	0.1
				101	SB I-41 & CTHB8	1EBR	377	66	EBR	102	96	105	108	410	104	95	105	109	413	2	-1	1	1	3	0.2	0.1	0.0	0.1	0.1
				101	SB I-41 & CTHB8	1WBL	382	66	WBL	87	86	79	78	330	90	81	80	80	331	3	-6	2	2	1	0.4	0.6	0.2	0.2	0.1
				101	SB I-41 & CTHB8	1WBT	382	379	WBT	82	104	100	95	380	85	93	103	98	380	3	-11	4	4	0	0.4	1.1	0.4	0.4	0.0
				101	SB I-41 & CTHB8	1SBL	393	381	SBL	57	49	37	38	180	38	46	41	36	160	-19	-2	4	-2	-20	2.6	0.3	0.6	0.3	1.5
				101	SB I-41 & CTHB8	1SBT	393	66	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				101	SB I-41 & CTHB8	1SBR	393	379	SBR	61	80	91	79	310	63	63	76	77	279	2	-16	-15	-2	-31	0.3	1.8	1.6	0.2	1.7
				109	NB I-41 & WIS15	9EBL	304	316	EBL	226	282	192	191	890	98	98	91	96	383	-128	-184	-100	-96	-507	2.2	2.2	2.2	2.2	2.2
				109	NB I-41 & WIS15	9EBT	304	311	EBT	225	267	246	232	970	134	106	106	127	473	-91	-162	-139	-105	-497	2.2	2.2	2.2	2.2	2.2
				109	NB I-41 & WIS15	9NBL	87	308	NBL	83	90	51	76	300	77	87	60	68	293	-6	-3	9	-7	-7	0.7	0.3	1.3	0.9	0.4
				109	NB I-41 & WIS15	9NBT	87	316	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				109	NB I-41 & WIS15	9NBR	87	311	NBR	184	200	210	206	800	184	187	204	207	783	0	-13	-5	0	-17	0.0	0.9	0.4	0.0	0.6
				109	NB I-41 & WIS15	9WBT	10338	308	WBT	329	299	389	333	1350	323	303	378	337	1341	-6	4	-11	4	-9	0.3	0.2	0.5	0.2	0.2
				109	NB I-41 & WIS15	9WBR	10338	315	WBR	101	64	55	80	300	98	68	53	77	296	-3	5	-2	-3	-3	0.3	0.6	0.3	0.3	0.2
				107	NB I-41 & WIS96	7EBL	325	83	EBL	159	182	177	212	730	176	174	172	187	710	17	-7	-5	-25	-20	1.4	0.6	0.4	1.7	0.8
				107	NB I-41 & WIS96	7EBT	325	337	EBT	250	272	277	271	1070	258	262	264	242	1025	7	-10	-13	-29	-45	0.5	0.6	0.8	1.8	1.4
				107	NB I-41 & WIS96	7NBL	343	332	NBL	104	108	93	116	420	96	96	98	97	387	-7	-12	5	-19	-33	0.7	1.1	0.6	1.8	1.6
				107	NB I-41 & WIS96	7NBT	343	83	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				107	NB I-41 & WIS96	7NBR	343	337	NBR	118	118	118	136	490	114	123	112	125	474	-3	4	-6	-10	-16	0.3	0.4	0.6	0.9	0.7
				107	NB I-41 & WIS96	7WBT	331	332	WBT	404	497	467	432	1800	397	4													

I-41 Traffic and Engineering Study
No Build (2028) With Signal Retimings PM Peak Period Calibration
Intersection Turning Movements

TEOps Validation - 15 minute periods

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	97%

TEOps Validation - 60 minute period

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	93%

Demand 100%	Intersections						Target					Vissim					Difference					RNSE				
	Int ID	Int Name	Forecast ID	From Link	To Link	Mvmt	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	TOTAL	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2	4:15-4:30PM3	4:30-4:45PM3	4:45-5:00PM3	5:00-5:15PM3	TOTAL3	4:15-4:30PM5	4:30-4:45PM5	4:45-5:00PM5	5:00-5:15PM5	TOTAL5
	113	CTH N & SB I-41	13NBL	222	24	NBL	50	103	87	100	340	51	96	88	100	336	1	-7	1	0	-4	0.2	0.7	0.1	0.0	0.2
	113	CTH N & SB I-41	13NBT	222	216	NBT	124	124	150	151	550	106	104	124	148	482	-18	-20	-26	-4	-68	1.6	1.8	2.1	0.3	2.9
	113	CTH N & SB I-41	13WBL	23	220	WBL	76	87	101	86	350	57	85	85	104	331	-19	-2	-16	17	-19	2.2	0.2	1.6	1.9	1.0
	113	CTH N & SB I-41	13WBT	23	24	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	113	CTH N & SB I-41	13WBR	23	216	WBR	25	34	33	29	120	16	28	32	37	112	-9	-6	-1	8	-8	1.8	1.0	0.2	1.4	0.7
	113	CTH N & SB I-41	13SBT	217	220	SBT	71	88	74	78	310	69	86	77	78	310	-2	-2	3	0	0	0.2	0.2	0.3	0.0	0.0
	113	CTH N & SB I-41	13SBR	217	24	SBR	37	66	50	47	200	36	65	51	48	200	0	-1	1	0	0	0.0	0.2	0.2	0.1	0.0
	114	CTH N & NB I-41	14EBL	224	221	EBL	86	99	123	123	430	67	81	96	118	362	-19	-18	-27	-4	-68	2.0	1.8	2.4	0.4	2.2
	114	CTH N & NB I-41	14EBT	224	107	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	114	CTH N & NB I-41	14EBR	224	227	EBR	87	110	93	71	360	77	90	84	79	329	-10	-19	-9	8	-31	1.1	1.8	0.9	0.9	1.6
	114	CTH N & NB I-41	14NBT	229	221	NBT	89	128	114	129	460	90	124	115	130	459	2	-4	0	1	-1	0.2	0.4	0.0	0.1	0.1
	114	CTH N & NB I-41	14NBR	229	107	NBR	34	32	38	36	140	33	33	38	35	139	-1	1	0	-1	-1	0.1	0.1	0.0	0.1	0.1
	114	CTH N & NB I-41	14SBL	223	107	SBL	22	31	29	8	90	21	30	31	8	90	-1	-1	2	0	0	0.2	0.3	0.3	0.1	0.0
	114	CTH N & NB I-41	14SBT	223	227	SBT	125	144	146	156	570	105	138	133	174	549	-20	-5	-13	18	-21	1.8	0.4	1.1	1.4	0.9
	115	WIS55 & SB I-41	15NBL	187	16	NBL	89	117	89	115	410	89	114	88	115	406	0	-3	-1	0	-4	0.0	0.2	0.1	0.0	0.2
	115	WIS55 & SB I-41	15NBT	187	184	NBT	50	81	47	72	250	56	64	56	65	241	6	-16	9	-7	-8	0.8	1.8	1.4	0.9	0.6
	115	WIS55 & SB I-41	15WBL	15	186	WBL	52	42	57	40	190	41	46	48	52	187	-11	5	-10	12	-3	1.5	0.7	1.3	2.0	0.2
	115	WIS55 & SB I-41	15WBT	15	16	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	115	WIS55 & SB I-41	15WBR	15	184	WBR	12	9	14	15	50	12	11	12	14	49	0	2	-2	-1	-1	0.0	0.6	0.5	0.1	0.1
	115	WIS55 & SB I-41	15SBT	183	186	SBT	45	41	49	55	190	44	43	48	55	190	-1	1	-1	0	0	0.1	0.2	0.1	0.0	0.0
	115	WIS55 & SB I-41	15SBR	183	16	SBR	11	22	16	31	80	11	22	16	32	81	0	0	0	0	0	0.0	0.0	0.0	0.1	0.1
	116	WIS55 & NB I-41	16EBL	111	187	EBL	9	35	17	30	90	14	19	24	24	81	5	-15	7	-6	-9	1.6	2.6	1.8	1.1	1.0
	116	WIS55 & NB I-41	16EBT	111	112	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	116	WIS55 & NB I-41	16EBR	111	188	EBR	91	105	83	92	370	82	90	85	85	342	-9	-15	2	-7	-28	0.9	1.4	0.2	0.7	1.5
	116	WIS55 & NB I-41	16NBT	200	187	NBT	130	163	120	157	570	130	161	119	157	566	-1	-2	-1	0	-4	0.0	0.2	0.1	0.0	0.2
	116	WIS55 & NB I-41	16NBR	200	112	NBR	21	32	27	41	120	21	32	28	39	119	0	0	1	-2	-1	0.0	0.0	0.2	0.3	0.1
	116	WIS55 & NB I-41	16SBL	186	112	SBL	8	4	5	13	30	8	5	5	11	29	0	0	0	-1	-1	0.1	0.1	0.1	0.3	0.2
	116	WIS55 & NB I-41	16SBT	186	188	SBT	88	79	101	83	350	75	84	91	96	347	-12	6	-10	14	-3	1.3	0.6	1.0	1.5	0.1
	117	CTH J & SB I-41	17NBL	182	197	NBL	24	26	21	29	100	25	25	21	28	98	1	-1	-1	-1	-3	0.1	0.2	0.1	0.3	0.2
	117	CTH J & SB I-41	17NBT	182	189	NBT	79	54	82	55	270	61	64	65	64	255	-18	10	-16	9	-15	2.0	1.4	1.8	1.2	0.9
	117	CTH J & SB I-41	17WBL	196	191	WBL	88	86	90	56	320	66	90	86	78	320	-22	3	-4	22	0	2.3	0.4	0.4	3.0	0.0
	117	CTH J & SB I-41	17WBT	196	197	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	117	CTH J & SB I-41	17WBR	196	189	WBR	27	39	23	20	110	20	33	32	22	107	-8	-6	8	2	-3	1.5	1.0	1.7	0.4	0.3
	117	CTH J & SB I-41	17SBT	190	191	SBT	51	81	38	60	230	51	77	43	59	230	0	-5	5	-1	0	0.0	0.5	0.9	0.1	0.0
	117	CTH J & SB I-41	17SBR	190	197	SBR	44	61	51	73	230	45	56	55	75	232	1	-5	4	2	2	0.2	0.7	0.6	0.2	0.1
	118	CTH J & NB I-41	18EBL	199	182	EBL	52	26	53	29	160	36	36	37	38	147	-16	10	-16	10	-13	2.3	1.9	2.2	1.8	1.0
	118	CTH J & NB I-41	18EBT	199	198	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	118	CTH J & NB I-41	18EBR	199	192	EBR	70	72	88	70	300	59	58	75	81	273	-11	-14	-12	11	-27	1.4	1.7	1.3	1.3	1.6
	118	CTH J & NB I-41	18NBT	174	182	NBT	50	54	50	56	210	51	54	49	53	207	1	-1	-1	-2	-4	0.1	0.1	0.2	0.3	0.2
	118	CTH J & NB I-41	18NBR	174	198	NBR	59	56	47	58	220	59	55	47	58	219	-1	-1	1	0	-1	0.1	0.1	0.1	0.0	0.1
118	CTH J & NB I-41	18SBL	191	198	SBL	16	41	10	23	90	17	37	15	21	90	0	-4	5	-2	0	0.1	0.6	1.5	0.4	0.0	
118	CTH J & NB I-41	18SBT	191	192	SBT	123	127	117	93	460	100	128	116	115	459	-23	1	-2	22	-2	2.1	0.1	0.2	2.3	0.1	
119	CTH U & SB I-41	19NBL	166	8	NBL	19	22	17	21	80	20	21	16	21	79	1	-1	-1	0	-1	0.2	0.1	0.3	0.0	0.1	
119	CTH U & SB I-41	19NBT	166	167	NBT	45	62	60	53	220	51	44	69	51	215	6	-17	9	-2	-4	0.9	2.2	1.2	0.3	0.3	
119	CTH U & SB I-41	19WBL	7	159	WBL	36	59	61	65	220	27	51	58	64	201	-9	-8	-2	0	-19	1.4	1.0	0.3	0.0	1.3	
119	CTH U & SB I-41	19WBT	7	8	WBT	0	0	0	0	0	0	0														

I-41 Traffic and Engineering Study
 No Build (2028) With Signal Retimings PM Peak Period Calibration
Lane Utilization Comparison

I-41 NB															
Location		I-41 NB south of CTH BB			I-41 NB betw WIS 125 & WIS 96				I-41 NB betw CTH E & WIS 441			I-41 NB betw WIS 441 & CTH N		I-41 NB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
VISSIM	4:15 PM	30%	30%	40%	22%	26%	38%	13%	34%	36%	30%	46%	54%	50%	50%
	4:30 PM	30%	31%	39%	22%	26%	38%	13%	34%	35%	30%	46%	54%	50%	50%
	4:45 PM	30%	30%	40%	23%	27%	39%	12%	34%	35%	31%	46%	54%	50%	50%
	5:00 PM	29%	30%	41%	20%	25%	40%	15%	35%	34%	31%	46%	54%	50%	50%
Field (ATR)	4:15 PM	34%	35%	31%	13%	28%	31%	29%	32%	25%	42%	47%	53%	43%	57%
	4:30 PM	35%	35%	30%	14%	28%	31%	28%	35%	25%	40%	47%	53%	43%	57%
	4:45 PM	35%	34%	31%	15%	27%	31%	28%	33%	26%	41%	48%	52%	44%	56%
	5:00 PM	36%	35%	29%	13%	28%	31%	28%	35%	26%	39%	48%	52%	45%	55%
VISSIM	Avg	30%	30%	40%	22%	26%	39%	13%	35%	35%	30%	46%	54%	50%	50%
Field	Avg	35%	35%	30%	14%	28%	31%	28%	34%	25%	41%	47%	53%	44%	56%

I-41 SB															
Location		I-41 SB south of CTH BB			I-41 SB betw WIS 125 & WIS 96				I-41 SB betw CTH E & WIS 441			I-41 SB betw WIS 441 & CTH N		I-41 SB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
VISSIM	4:15 PM	31%	35%	34%	20%	27%	45%	8%	30%	46%	24%	50%	50%	49%	51%
	4:30 PM	32%	35%	33%	20%	27%	45%	8%	32%	43%	25%	50%	50%	48%	52%
	4:45 PM	32%	35%	33%	21%	29%	42%	9%	30%	47%	23%	50%	50%	49%	51%
	5:00 PM	32%	36%	33%	19%	28%	44%	9%	32%	41%	26%	50%	50%	49%	51%
Field (ATR)	4:15 PM	36%	33%	31%	10%	31%	32%	28%	24%	34%	42%	47%	53%	40%	60%
	4:30 PM	36%	33%	31%	9%	31%	31%	29%	24%	35%	42%	47%	53%	41%	59%
	4:45 PM	35%	33%	32%	10%	29%	32%	29%	24%	34%	42%	47%	53%	40%	60%
	5:00 PM	37%	33%	30%	9%	31%	32%	29%	24%	34%	42%	47%	53%	43%	57%
VISSIM	Avg	32%	35%	33%	20%	27%	44%	8%	31%	44%	24%	50%	50%	49%	51%
Field	Avg	36%	33%	31%	9%	31%	32%	29%	24%	34%	42%	47%	53%	41%	59%

TEOpS Validation

Test	Data	Target	Model
Tier 1	--	Not Applicable	--
Tier 2	ATR	RNSE < 3.0 for 85% of data points	43%

I-41 Traffic and Engineering Study
No Build (2028) With Signal Retimings PM Peak Period Calibration
Mainline Speed Comparison

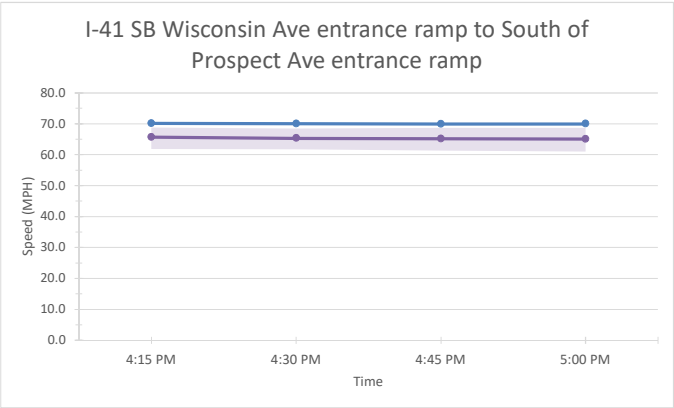
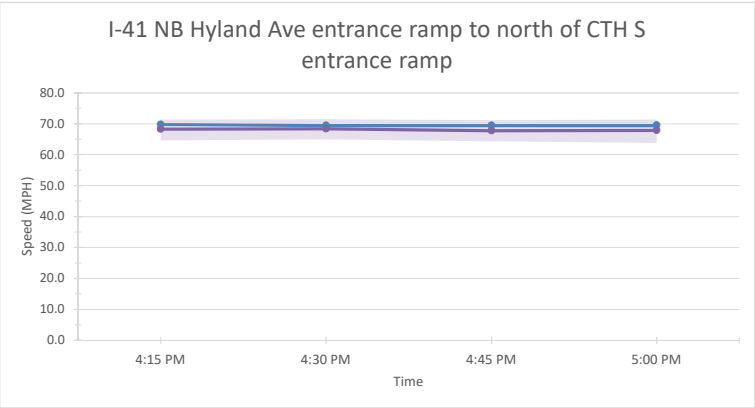
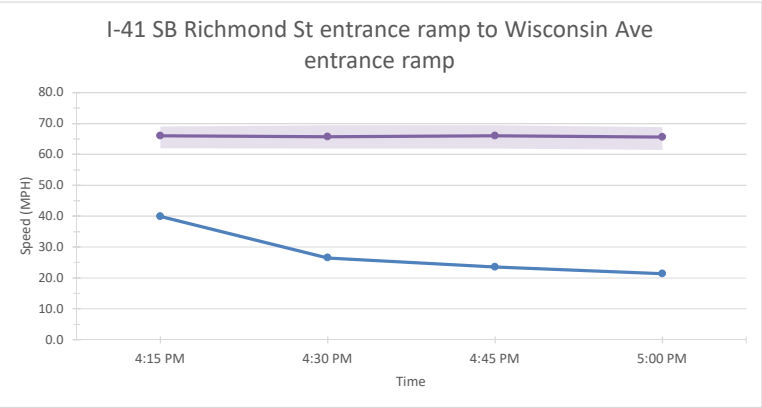
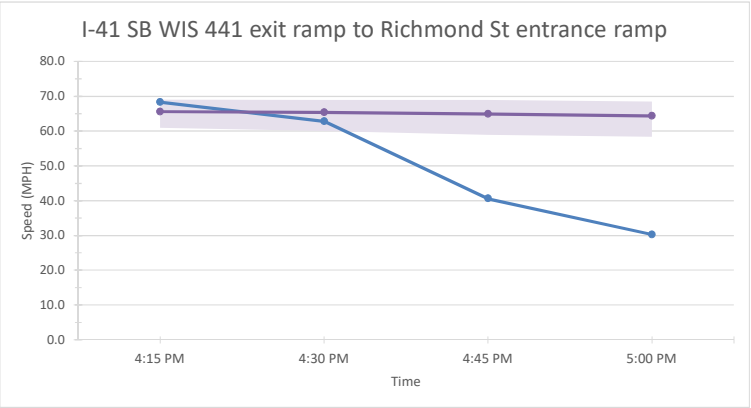
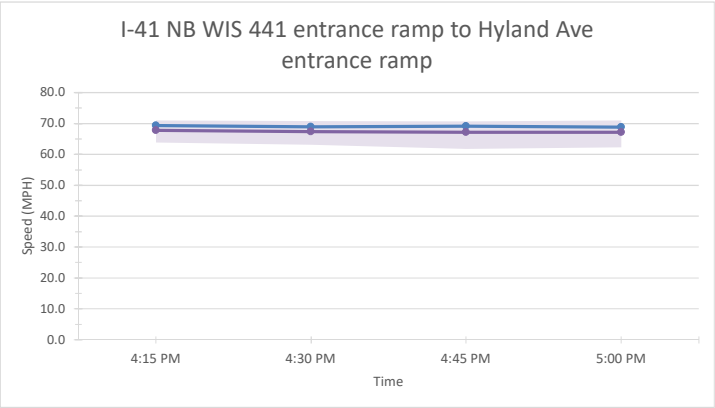
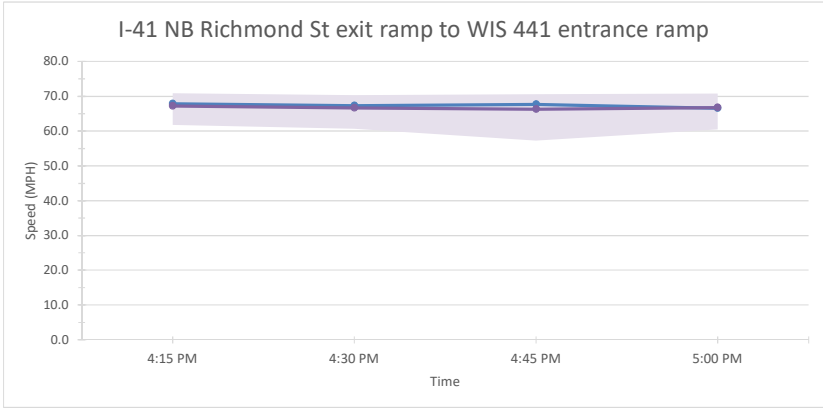
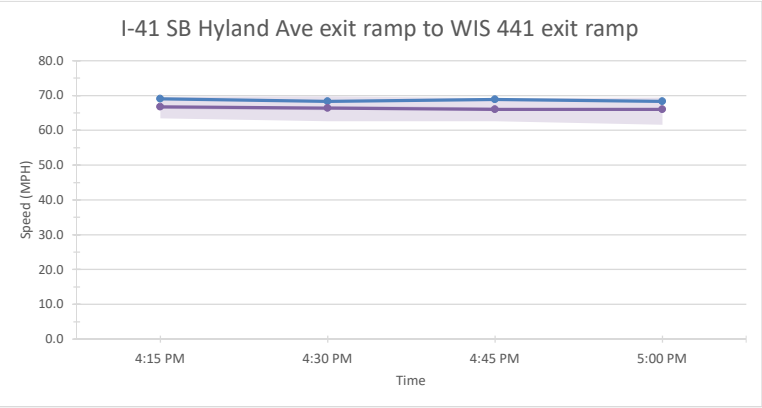
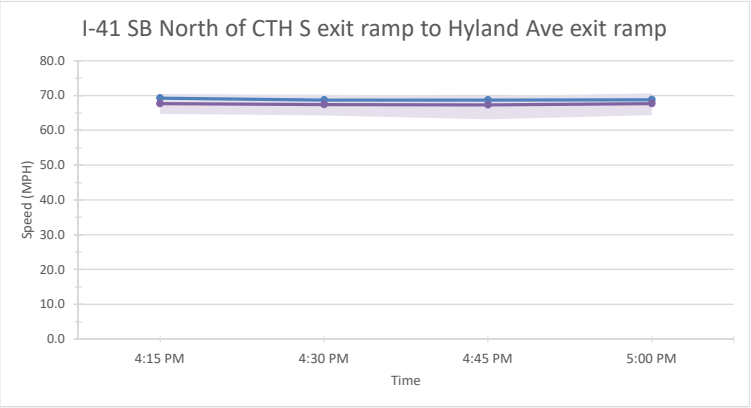
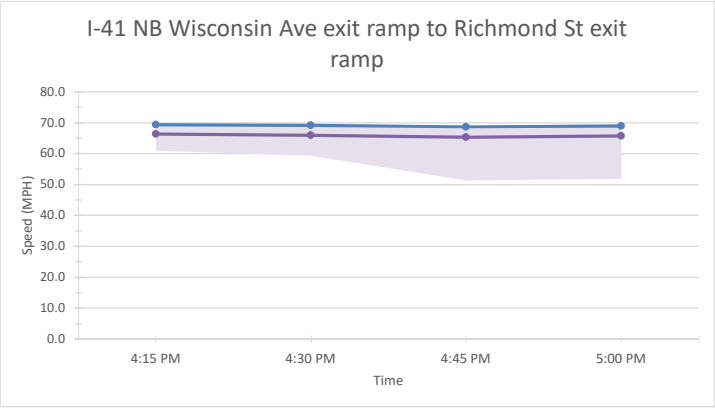
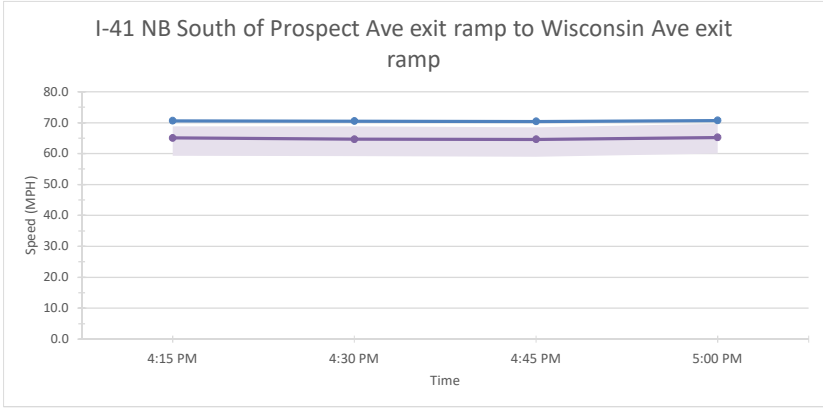
I-41 NB							I-41 SB						
Segment		I-41 NB South of Prospect Ave exit ramp to Wisconsin Ave exit ramp	I-41 NB Wisconsin Ave exit ramp to Richmond St exit ramp	I-41 NB Richmond St exit ramp to WIS 441 entrance ramp	I-41 NB WIS 441 entrance ramp to Hyland Ave entrance ramp	I-41 NB Hyland Ave entrance ramp to north of CTH S entrance ramp	Segment		I-41 SB North of CTH S exit ramp to Hyland Ave exit ramp	I-41 SB Hyland Ave exit ramp to WIS 441 exit ramp	I-41 SB WIS 441 exit ramp to Richmond St entrance ramp	I-41 SB Richmond St entrance ramp to Wisconsin Ave entrance ramp	I-41 SB Wisconsin Ave entrance ramp to South of Prospect Ave entrance ramp
VISSIM	4:15 PM	70.6	69.4	67.8	69.4	69.8	VISSIM	4:15 PM	69.2	69.1	68.3	39.9	70.2
	4:30 PM	70.5	69.2	67.3	68.9	69.4		4:30 PM	68.7	68.3	62.8	26.5	70.1
	4:45 PM	70.4	68.7	67.7	69.1	69.5		4:45 PM	68.7	68.9	40.6	23.6	70.0
	5:00 PM	70.7	68.9	66.5	68.8	69.5		5:00 PM	68.8	68.3	30.3	21.4	70.0
Field (NPMRDS - Average)	4:15 PM	65.0	66.3	67.2	67.8	68.3	Field (NPMRDS - Average)	4:15 PM	67.7	66.8	65.6	66.0	65.7
	4:30 PM	64.6	66.0	66.7	67.3	68.4		4:30 PM	67.4	66.4	65.3	65.7	65.3
	4:45 PM	64.6	65.3	66.2	67.1	67.8		4:45 PM	67.3	66.0	64.9	66.0	65.2
	5:00 PM	65.2	65.7	66.7	67.2	67.9		5:00 PM	67.7	66.0	64.3	65.6	65.1
Field (NPMRDS - 15th Percentile)	4:15 PM	59.3	60.9	61.8	63.8	64.7	Field (NPMRDS - 15th Percentile)	4:15 PM	64.8	63.5	61.0	62.0	61.9
	4:30 PM	59.2	59.3	60.7	63.1	65.0		4:30 PM	64.3	62.6	60.1	61.9	61.8
	4:45 PM	59.0	51.3	57.3	61.7	64.4		4:45 PM	63.2	62.6	58.9	61.9	61.4
	5:00 PM	60.1	51.9	60.5	62.3	63.9		5:00 PM	64.4	61.6	58.4	61.5	61.1
Field (NPMRDS - 85th Percentile)	4:15 PM	68.8	69.6	70.8	71.0	71.4	Field (NPMRDS - 85th Percentile)	4:15 PM	70.4	69.6	69.1	69.0	68.9
	4:30 PM	68.8	69.8	70.3	70.8	71.6		4:30 PM	70.3	69.7	69.0	69.5	68.6
	4:45 PM	68.5	68.9	70.7	70.7	71.3		4:45 PM	69.9	69.3	68.9	69.5	68.7
	5:00 PM	69.7	69.7	70.8	70.9	71.4		5:00 PM	70.6	69.4	68.5	68.9	68.8

TEOps Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	22%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts	85%

TEOps Validation

Test	Data	Target		Model
Tier 1	NPMRDS	RMSPE < 10%		22%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts		85%



I-41 Traffic and Engineering Study
No Build (2028) With Signal Retimings PM Peak Period Calibration
Travel Time Comparison

FULL CORRIDOR

Data	Time	I-41 NB
		Average Travel Time (min)
		South of CTH BB to North of CTH S
Distance (mi)		26.59
VISSIM	4:15PM	23.1
NPMRDS	4:15PM	23.8



Data	Time	I-41 SB
		Average Travel Time (min)
		North of CTH S to South of CTH BB
Distance (mi)		26.58
VISSIM	4:15PM	30.3
NPMRDS	4:15PM	24.0

SEGMENTS

I-41 NB				
Average Travel Time (minutes)				
South of CTH BB to Wisc Ave Exit	Wisc Ave Exit to Richmond Exit	Richmond Exit to 441 Entrance	441 Entrance to Hyland Entrance	Hyland Entrance to North of CTH S
3.12	4.0	3.49	5.26	10.71
2.7	3.5	3.1	4.6	9.3
2.9	3.7	3.1	4.7	9.4
I-41 SB				
Average Travel Time (minutes)				
North of CTH S to Hyland Exit	Hyland Exit to 441 Exit	441 Exit to Richmond Entrance	Richmond Entrance to Wisc Ave Entrance	Wisc Ave Entrance to South of CTH BB
10.68	5.52	3.25	4.0	3.09
9.3	4.8	4.3	9.2	2.7
9.5	5.0	3.0	3.7	2.8

TEOpS Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	50%
Tier 2	NPMRDS	TT ± 15% for 85% of routes	80%

I-41 Traffic and Engineering Study
No Build (2028) With Signal Retimings PM Peak Hour Calibration
Merge and Diverge Segment Speeds

Merge/Diverge Links			Vissim Speed				
Forecast ID	Link ID	Description	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2
Merge/Diverge Speeds							
	70	NB I-41 CTH BB diverge	70	69	69	70	70
	74	NB I-41 CTH BB merge	69	69	69	69	69
	76	NB I-41 WIS 125 diverge	69	68	69	69	69
	80	NB I-41 WIS 125merge	68	69	69	67	68
		NB I-41 WIS 96 diverge					
	84	NB I-41 WIS 96 merge	69	70	70	70	70
	--	NB I-41 WIS 15 diverge	--	--	--	--	--
	89	NB I-41 WIS 15 merge	68	68	69	68	68
	91	NB I-41 WIS 47 diverge	68	69	68	67	68
	95	NB I-41 WIS 47 merge	64	63	64	58	62
	418	NB I-41 Ballard diverge	65	66	64	64	64
	100	NB I-41 Ballard merge	65	63	64	64	64
		NB I-41 441 diverge					
	103	NB I-41 441 merge	66	67	66	65	66
	420	NB I-41 CTH N diverge	64	65	65	63	64
	108	NB I-41 CTH N merge	68	68	67	68	68
	422	NB I-41 WIS 55 diverge	66	67	67	67	67
	113	NB I-41 WIS 55 merge	69	69	69	69	69
	417	NB I-41 CTH J diverge	63	63	63	62	63
	118	NB I-41 CTH J merge	67	66	68	67	67
	415	NB I-41 CTH U diverge	69	68	69	69	69
	123	NB I-41 CTH U merge	68	68	68	69	68
	425	NB I-41 CTH S diverge	64	62	63	61	63
	128	NB I-41 CTH S merge	67	67	64	65	66
	426	SB I-41 CTH S diverge	56	57	57	58	57
	21	SB I-41 CTH S merge	69	68	68	69	69
	424	SB I-41 CTH U diverge	56	54	51	52	53
	20	SB I-41 CTH U merge	68	68	68	68	68
	416	SB I-41 CTH J diverge	66	66	66	67	66
	19	SB I-41 CTH J merge	67	67	67	65	67
	423	SB I-41 WIS 55 diverge	66	65	65	65	65
	18	SB I-41 WIS 55 merge	68	67	68	66	67
	421	SB I-41 CTH N diverge	65	62	63	62	63
	26	SB I-41 CTH N merge	69	66	68	67	67
	419	SB I-41 441 diverge	65	65	64	65	64
	36	SB I-41 441 merge	69	68	68	59	66
		SB I-41 Ballard diverge					
	40	SB I-41 Ballard merge	65	63	54	49	57
	42	SB I-41 WIS 47 diverge	67	66	52	41	57
	46	SB I-41 WIS 47 merge	65	44	22	16	37
	48	SB I-41 WIS 15 diverge	7	9	10	9	9
	--	SB I-41 WIS 15 merge	--	--	--	--	--
	53	SB I-41 WIS 96 diverge	69	67	69	68	68
	56	SB I-41 WIS 96 merge	70	69	69	69	69
		SB I-41 WIS 125 diverge					
	61	SB I-41 WIS 125merge	68	68	69	69	69
	63	SB I-41 CTH BB diverge	70	69	70	69	69
	67	SB I-41 CTH BB merge	68	68	68	68	68

APPENDIX P5

Year 2048 No Build VISSIM AM Peak Hour

I-41 Traffic and Engineering Study
No Build (2048) AM Peak Hour Calibration
Freeway Mainline and Ramp Volumes

			% Demand	Segments								Target					Vissim					Difference					RMSPE					RMSE				
			100%	Forecast ID	Link ID	Description	Type	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	TOTAL	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2	7:00-7:15AM3	7:15-7:30AM3	7:30-7:45AM3	7:45-8:00AM3	TOTAL3	7:00-7:15AM6	7:15-7:30AM6	7:30-7:45AM6	7:45-8:00AM6	TOTAL6	7:00-7:15AM5	7:15-7:30AM5	7:30-7:45AM5	7:45-8:00AM5	TOTALS				
TEOps Validation - 15 minute periods				10001	69	NB I-41 (Southern Project Limits)	MAINLINE	748	937	988	1128	3800	832	948	933	1067	3782	85	12	-55	-60	-18	11%	1%	6%	5%	0%	1.1	0.4	1.7	1.8	0.3				
Test	Target	Model		10002	72	NB I-41 Exit to CTH BB	RAMP	129	174	182	182	680	129	172	189	177	667	-1	-3	-7	-6	-13	0%	2%	3%	2%	2%	0.0	0.2	0.4	0.3	0.5				
Tier 1			RMSPE < 5%	14%		10003	71	NB I-41 betw CTH BB Exit to CTH BB Ent	MAINLINE	618	762	794	946	3120	691	771	741	874	3076	73	8	-53	-72	-44	12%	1%	7%	8%	1%	2.9	0.3	1.9	2.3	0.8		
Tier 2			RSNE < 3 for 85% of links	14%		10004	73	NB I-41 Ent from CTH BB	RAMP	135	141	187	147	610	130	140	183	149	603	-5	0	-4	3	-7	4%	0%	2%	2%	1%	0.4	0.0	0.3	0.2	0.3		
				10005	75	NB I-41 betw CTH BB Ent to WIS 125 Exit	MAINLINE	753	903	981	1093	3730	813	915	925	1017	3671	60	13	-55	-76	-59	8%	1%	6%	7%	2%	2.2	0.4	1.8	2.3	1.0				
				10006	78	NB I-41 Exit to WIS 125	RAMP	113	176	204	246	740	108	162	184	204	658	-6	-14	-20	-42	-82	5%	8%	10%	17%	11%	0.5	1.1	1.4	2.7	3.0				
TEOps Validation - 60 minute period				10007	77	NB I-41 betw WIS 125 Exit to WIS 125 Ent	MAINLINE	640	727	777	846	2990	687	739	718	790	2933	47	12	-59	-57	-7	1%	2%	6%	5%	2%	1.8	0.5	2.1	1.9	1.0				
Test	Target	Model		10008	79	NB I-41 Ent from WIS 125	RAMP	66	86	125	84	360	64	84	118	87	353	-1	-2	-7	3	-7	2%	3%	6%	4%	2%	0.2	0.2	0.6	0.4	0.4				
Tier 1			RMSPE < 5%	14%		10009	80	NB I-41 betw WIS 125 Ent to WIS 96 Exit	MAINLINE	706	832	902	930	3350	736	813	824	866	3239	30	1	-77	-64	-111	4%	0%	0%	3%	1%	1.1	0.0	2.6	2.1	1.9		
Tier 2			RSNE < 3 for 85% of links	14%		10010	82	NB I-41 Exit to WIS96	RAMP	142	172	186	240	740	141	172	182	224	719	0	1	-5	-17	-21	0%	0%	3%	0%	0.0	0.0	0.3	1.1	0.8			
				10011	81	NB I-41 betw WIS 96 Exit to WIS 96 Ent	MAINLINE	564	641	715	690	2610	600	655	653	715	2559	36	14	-62	-39	-51	4%	2%	5%	6%	2%	1.5	0.6	2.3	1.5	1.0				
				10012	83	NB I-41 Ent from WIS 96	RAMP	53	59	83	75	270	49	60	84	75	269	-3	1	1	0	-1	4%	1%	2%	0%	1%	0.5	0.1	0.1	0.0	0.1				
				10013	85	NB I-41 WIS 96 Ent to WIS 15 Exit	MAINLINE	617	700	798	765	2880	644	711	732	732	2819	27	11	-66	-33	-61	4%	2%	4%	4%	2%	1.1	0.4	2.3	1.2	1.1				
				10014	87	NB I-41 Exit to WIS15	RAMP	136	187	229	208	760	132	171	213	208	724	-4	-17	-15	0	-36	3%	4%	7%	0%	5%	0.3	1.2	1.0	0.0	1.3				
				10015	86	NB I-41 betw WIS 15 Exit to WIS 15 Ent	MAINLINE	481	513	570	557	2120	505	533	517	522	2077	24	20	-52	-34	-43	5%	4%	8%	8%	2%	1.1	0.9	2.2	1.5	0.9				
				10016	88	NB I-41 Ent from WIS15	RAMP	197	244	258	280	980	182	176	204	168	780	-16	-68	-54	-112	-250	2%	10%	11%	10%	2%	1.1	2.7	1.7	8.7	8.8				
				10017	90	NB I-41 betw WIS 15 Ent to WIS 47 Exit	MAINLINE	679	757	828	837	3100	674	713	726	784	2807	-4	-43	-101	-143	-293	1%	1%	10%	12%	1%	0.2	1.6	1.7	5.8	5.9				
				10018	93	NB I-41 Exit to WIS47	RAMP	95	116	164	154	570	94	102	133	150	479	-1	-14	-32	-44	-91	1%	1%	12%	10%	10%	0.1	1.3	2.5	0.8	0.5				
				10019	92	NB I-41 betw WIS 47 Exit to WIS 47 Ent	MAINLINE	583	640	663	643	2530	559	611	590	543	2303	-24	-29	-73	-100	-227	4%	5%	11%	10%	8%	1.0	1.1	2.8	4.8	4.8				
				10020	94	NB I-41 Ent from WIS47	RAMP	206	243	196	206	850	196	238	200	185	818	-10	-5	4	-21	-32	5%	2%	2%	10%	4%	0.7	0.3	0.3	1.5	1.1				
				10021	96	NB I-41 betw WIS 47 Ent to Ballard Exit	MAINLINE	789	883	859	849	3380	737	853	787	747	3125	-52	-30	-72	-101	-255	7%	3%	8%	12%	4%	1.8	1.0	2.4	8.5	4.4				
				10022	98	NB I-41 Exit to Ballard	RAMP	257	308	250	304	1120	207	250	246	275	979	-50	-58	-4	-29	-141	10%	10%	2%	10%	10%	3.7	3.3	0.3	1.7	4.7				
				10023	97	NB I-41 betw Ballard Exit to Ballard Ent	MAINLINE	532	575	609	544	2260	509	547	518	533	2107	-23	-28	-91	-11	-153	4%	5%	13%	2%	7%	1.0	1.1	3.7	0.5	3.7				
				10024	99	NB I-41 Ent from Ballard	RAMP	254	363	355	349	1320	235	254	257	273	1019	-19	-108	-98	-76	-301	7%	10%	10%	22%	23%	1.2	3.3	3.3	8.1	8.3				
				10025	100	NB I-41 betw Ballard Ent to 441 Exit	MAINLINE	786	937	964	893	3580	744	804	774	808	3130	-42	-133	-189	-85	-450	5%	10%	10%	2%	17%	1.5	4.4	2.7	2.8	7.8				
				10026	102	NB I-41 Exit to SB441	RAMP	198	288	257	287	1030	181	217	224	225	846	-17	-72	-32	-62	-184	1%	10%	10%	10%	1%	1.2	4.1	2.1	1.6	5.9				
				10027	101	NB I-41 betw 441 Exit to 441 Ent	MAINLINE	988	649	707	606	3552	552	583	544	576	2256	-36	-294	-66	-294	-66	4%	3%	15%	5%	14%	2.6	2.6	1.2	1.2	4.8				
				10028	33	NB I-41 Ent from NB441	RAMP	255	278	292	295	1120	260	253	178	130	821	5	-25	-114	-165	-299	2%	8%	8%	14%	23%	0.3	1.5	8.7	1.4	8.8				
				10029	104	NB I-41 betw 441 Ent to CTH N Exit	MAINLINE	844	927	998	901	3670	817	842	722	721	3103	-27	81	-276	-179	-567	3%	8%	10%	10%	11%	0.9	2.8	8.7	6.8	8.4				
				10030	106	NB I-41 Exit to CTH N	RAMP	90	65	76	99	330	98	72	53	61	284	7	8	-22	-38	-46	4%	10%	10%	10%	14%	0.8	0.9	2.6	8.8	2.5				
				10031	105	NB I-41 betw CTH N Exit to CTH N Entrance	MAINLINE	753	862	922	802	3340	714	753	664	622	2815	-39	714	-258	-138	-525	5%	10%	10%	17%	16%	1.4	3.1	8.4	8.8	8.1				
				10032	107	NB I-41 Ent from CTH N	RAMP	104	118	95	84	400	101	116	93	85	395	-3	-2	-2	1	-5	2%	1%	2%	1%	1%	0.3	0.2	0.2	0.1	0.3				
				10033	109	NB I-41 betw CTH N Ent to WIS 55 Exit	MAINLINE	857	980	1017	886	3740	808	897	770	759	3234	-49	808	-248	-126	-506	4%	8%	10%	14%	14%	1.7	2.7	7.8	4.3	8.1				
				10034	111	NB I-41 Exit to WIS55	RAMP	86	99	81	105	370	93	85	73	71	322	7	-14	-8	-34	-48	4%	10%	10%	10%	17%	0.7	1.4	0.9	3.1	2.5				
				10035	110	NB I-41 betw WIS 55 Exit to WIS 55 Ent	MAINLINE	771	882	936	781	3370	749	805	699	637	2906	-61	76	-238	-88	-464	4%	10%	10%	10%	17%	2.2	2.6	0.7	0.1	0.1				
				10036	112	NB I-41 Ent from WIS55	RAMP	66	35	51	68	220	70	36	46	67	219	2	1	-5	-5	-1	4%	3%	15%	2%	1%	0.5	0.2	0.7	0.1	0.1				
				10037</																																

I-41 Traffic and Engineering Study
No Build (2048) AM Peak Period Calibration
Intersection Turning Movements

			% Demand	Intersections					Target					Vissim					Difference					RNSE					
			100%	Int ID	Int Name	From Link	To Link	Mvmt	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	TOTAL	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2	7:00-7:15AM3	7:15-7:30AM3	7:30-7:45AM3	7:45-8:00AM3	TOTAL3	7:00-7:15AM5	7:15-7:30AM5	7:30-7:45AM5	7:45-8:00AM5	TOTAL5	
TEOps Validation - 15 minute periods				108	SB I-41 & WIS15	303	52	EBL	66	85	48	81	280	67	62	40	38	208	1	-22	-8	-43	-72	0.1	2.4	1.1	4.2	4.2	
Test	Target	Model		108	SB I-41 & WIS15	303	304	EBT	303	379	394	485	1560	292	259	270	274	1095	-11	-119	-124	-211	-465	0.6	2.1	2.2	2.2	11.2	
Tier 1	RMSPE < 5%	Not Applicable		108	SB I-41 & WIS15	309	302	WBT	196	190	190	233	810	183	185	187	235	790	-14	-5	-3	2	-20	1.0	0.4	0.2	0.2	0.7	
Tier 2	RSNE < 3 for 75% of turns	89%		108	SB I-41 & WIS15	309	52	WBR	99	111	138	112	460	111	106	135	116	467	11	-5	-3	4	7	1.1	0.5	0.2	0.3	0.3	
				108	SB I-41 & WIS15	51	304	SBT	53	75	48	53	230	38	31	37	40	146	-15	-44	-11	-13	-84	2.1	0.0	1.6	1.8	0.2	
				108	SB I-41 & WIS15	51	302	SBR	178	278	326	307	1090	210	164	159	166	699	31	-114	-167	-141	-391	2.3	2.2	2.2	2.2	11.2	
				106	SB I-41 & WIS96	323	325	EBT	116	169	226	210	720	115	167	224	210	717	-1	-1	-1	0	-3	0.1	0.1	0.0	0.1	0.1	
				106	SB I-41 & WIS96	323	57	EBR	46	71	78	85	279	47	-3	69	79	84	279	1	-3	1	-1	-1	0.2	0.3	0.1	0.1	0.1
				106	SB I-41 & WIS96	332	57	WBL	71	117	117	105	410	71	109	119	103	402	0	-8	2	-3	-8	0.0	0.7	0.2	0.2	0.4	
				106	SB I-41 & WIS96	332	334	WBT	138	145	169	268	720	143	143	164	223	673	6	-2	-5	-45	-47	0.5	0.2	0.4	2.7	1.8	
				106	SB I-41 & WIS96	340	325	SBT	31	40	47	42	160	35	25	26	29	114	4	-15	-22	-13	-46	0.7	2.4	2.1	2.0	1.2	
				106	SB I-41 & WIS96	340	57	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	
				106	SB I-41 & WIS96	340	334	SBR	57	95	89	119	360	68	57	54	65	243	10	-38	-35	-55	-117	1.4	2.2	2.2	2.2	8.2	
				104	SB I-41 & WIS125	349	351	EBT	130	148	166	176	620	128	144	163	178	614	-2	-4	-3	2	-6	0.2	0.3	0.2	0.2	0.3	
				104	SB I-41 & WIS125	349	60	EBR	43	52	40	36	170	43	51	39	36	169	0	-1	-1	0	-1	0.0	0.1	0.1	0.0	0.1	
				104	SB I-41 & WIS125	361	60	WBL	62	75	72	91	300	65	75	71	89	300	3	0	-1	-1	0	0.3	0.1	0.1	0.2	0.0	
				104	SB I-41 & WIS125	361	363	WBT	106	154	189	260	710	112	153	186	241	693	6	-1	-3	-19	-17	0.6	0.1	0.2	1.2	0.6	
				104	SB I-41 & WIS125	367	351	SBT	42	54	73	71	240	42	38	44	44	169	0	-16	-28	-26	-71	0.1	2.2	2.1	2.1	4.4	
				104	SB I-41 & WIS125	367	60	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	
				104	SB I-41 & WIS125	367	363	SBR	85	81	139	136	440	79	74	82	85	320	-6	-7	-57	-51	-120	0.6	0.8	2.2	2.2	2.2	
				101	SB I-41 & CTHBB	377	381	EBT	153	153	190	174	670	152	158	187	173	669	-1	5	-3	0	-1	0.1	0.4	0.2	0.0	0.0	
				101	SB I-41 & CTHBB	377	66	EBR	47	53	65	65	230	47	53	63	64	228	0	1	-1	-1	-2	0.0	0.1	0.2	0.2	0.1	
				101	SB I-41 & CTHBB	382	66	WBL	38	42	46	34	160	39	41	45	35	160	1	-1	-1	1	0	0.2	0.1	0.2	0.2	0.0	
				101	SB I-41 & CTHBB	382	379	WBT	103	143	141	153	540	105	137	141	153	535	2	-6	-1	0	-5	0.2	0.5	0.1	0.0	0.2	
				101	SB I-41 & CTHBB	393	381	SBT	22	29	41	49	140	19	20	25	31	96	-2	-9	-16	-18	-44	0.5	1.7	2.4	2.5	1.2	
				101	SB I-41 & CTHBB	393	66	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	
				101	SB I-41 & CTHBB	393	379	SBR	106	149	135	159	550	105	108	109	112	434	-2	-42	-26	-47	-116	0.2	2.2	2.2	2.2	10.2	
				109	NB I-41 & WIS15	304	316	EBL	162	211	195	243	810	151	146	145	133	575	-10	-65	-50	-109	-235	0.8	4.2	1.4	2.6	8.2	
				109	NB I-41 & WIS15	304	311	EBT	194	243	248	295	980	169	144	159	178	651	-25	-98	-88	-117	-329	1.8	2.2	2.2	2.2	10.2	
				109	NB I-41 & WIS15	87	308	NBL	61	74	84	50	270	60	69	79	60	269	-1	-5	-5	10	-1	0.1	0.6	0.6	1.4	0.1	
				109	NB I-41 & WIS15	87	316	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	
				109	NB I-41 & WIS15	87	311	NBR	74	114	144	158	490	73	105	135	155	467	-1	-9	-9	-3	-23	0.1	0.8	0.8	0.2	1.0	
				109	NB I-41 & WIS15	10338	308	WBT	234	227	244	295	1000	235	224	241	288	988	1	-3	-2	-7	-12	0.0	0.2	0.2	0.4	0.4	
				109	NB I-41 & WIS15	10338	315	WBR	36	33	63	38	170	33	32	64	38	167	-3	0	0	0	-3	0.5	0.1	0.0	0.1	0.2	
				107	NB I-41 & WIS96	325	83	EBL	29	39	67	55	190	28	39	66	54	188	-1	0	-								

I-41 Traffic and Engineering Study
No Build (2048) AM Peak Period Calibration
Intersection Turning Movements

TEOps Validation - 15 minute periods

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	89%

TEOps Validation - 60 minute period

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	82%

Demand 100%	Intersections					Target					Vissim					Difference					RNSE				
	Int ID	Int Name	From Link	To Link	Mvmt	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	TOTAL	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2	7:00-7:15AM3	7:15-7:30AM3	7:30-7:45AM3	7:45-8:00AM3	TOTAL3	7:00-7:15AM5	7:15-7:30AM5	7:30-7:45AM5	7:45-8:00AM5	TOTAL5
	113	CTH N & SB I-41	222	24	NBL	79	60	100	81	320	81	63	98	80	322	2	2	-1	-1	2	0.2	0.3	0.1	0.1	0.1
	113	CTH N & SB I-41	222	216	NBT	68	99	72	111	350	76	101	77	88	342	8	2	5	-23	-8	1.0	0.2	0.6	2.1	0.4
	113	CTH N & SB I-41	23	220	WBL	35	34	35	35	140	51	35	23	19	128	15	1	-12	-16	-12	2.6	0.1	2.1	2.7	1.0
	113	CTH N & SB I-41	23	24	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	113	CTH N & SB I-41	23	216	WBR	25	21	48	36	130	39	22	18	25	104	14	1	-30	-11	-26	2.9	0.2	2.7	1.8	2.3
	113	CTH N & SB I-41	217	220	SBT	80	83	67	70	300	77	81	70	70	298	-3	-2	3	0	-2	0.3	0.3	0.4	0.1	0.1
	113	CTH N & SB I-41	217	24	SBR	76	88	98	108	370	78	91	97	104	370	2	3	-1	-5	0	0.2	0.4	0.1	0.4	0.0
	114	CTH N & NB I-41	224	221	EBL	47	36	24	43	150	55	40	25	23	144	8	5	2	-20	-6	1.2	0.8	0.4	2.1	0.5
	114	CTH N & NB I-41	224	107	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	114	CTH N & NB I-41	224	227	EBR	43	29	52	55	180	41	34	28	39	142	-2	5	-24	-17	-38	0.3	1.0	2.7	2.2	2.8
	114	CTH N & NB I-41	229	221	NBT	100	124	148	149	520	100	124	151	145	520	0	0	3	-4	0	0.0	0.0	0.3	0.3	0.0
	114	CTH N & NB I-41	229	107	NBR	53	63	58	46	220	54	63	55	48	221	1	1	-2	1	1	0.2	0.1	0.3	0.2	0.1
	114	CTH N & NB I-41	223	107	SBL	50	55	37	37	180	48	54	38	38	177	-2	-2	1	0	-3	0.3	0.2	0.2	0.0	0.2
	114	CTH N & NB I-41	223	227	SBT	65	62	65	68	260	80	62	55	51	248	15	0	-10	-17	-12	1.9	0.0	1.3	2.0	0.7
	115	WIS55 & SB I-41	187	16	NBL	52	83	78	67	280	52	82	77	67	279	1	-1	-1	0	-1	0.1	0.1	0.1	0.0	0.0
	115	WIS55 & SB I-41	187	184	NBT	83	82	133	103	400	86	82	126	101	395	3	0	-7	-1	-5	0.3	0.0	0.6	0.1	0.3
	115	WIS55 & SB I-41	15	186	WBL	20	26	21	24	90	33	19	24	13	89	13	-7	3	-11	-1	3.0	1.4	0.7	2.2	0.1
	115	WIS55 & SB I-41	15	16	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	115	WIS55 & SB I-41	15	184	WBR	102	10	7	2	120	25	47	15	19	106	-76	37	8	17	-14	2.2	11.9	3.0	12.2	1.3
	115	WIS55 & SB I-41	183	186	SBT	56	101	65	89	310	58	98	65	87	308	3	-3	0	-1	-2	0.3	0.3	0.0	0.2	0.1
	115	WIS55 & SB I-41	183	16	SBR	48	50	73	48	220	50	50	71	48	218	1	0	-2	-1	-2	0.2	0.1	0.3	0.1	0.1
	116	WIS55 & NB I-41	111	187	EBL	17	18	17	19	70	22	17	15	14	67	5	-1	-2	-6	-3	1.2	0.2	0.4	1.3	0.3
	116	WIS55 & NB I-41	111	112	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	116	WIS55 & NB I-41	111	188	EBR	69	81	64	85	300	74	70	60	58	262	5	-11	-4	-27	-38	0.6	1.3	0.6	2.9	2.2
	116	WIS55 & NB I-41	200	187	NBT	118	148	194	151	610	118	146	192	151	607	0	-2	-2	1	-3	0.0	0.1	0.2	0.1	0.1
	116	WIS55 & NB I-41	200	112	NBR	38	31	47	44	160	40	31	45	45	160	2	0	-2	1	0	0.3	0.0	0.3	0.1	0.0
	116	WIS55 & NB I-41	186	112	SBL	28	4	4	24	60	30	5	1	22	59	3	1	-3	-2	-1	0.6	0.7	1.6	0.3	0.1
	116	WIS55 & NB I-41	186	188	SBT	48	123	81	89	340	60	112	89	77	338	12	-12	9	-12	-2	1.8	1.0	1.0	1.2	0.1
	117	CTH J & SB I-41	182	197	NBL	44	62	55	59	220	37	62	47	54	200	-6	-1	-7	-5	-20	1.0	0.1	1.0	0.7	1.3
	117	CTH J & SB I-41	182	189	NBT	114	70	98	127	410	111	80	78	93	362	-4	9	-20	-34	-48	0.3	1.1	2.0	2.7	2.4
	117	CTH J & SB I-41	196	191	WBL	41	48	29	23	140	34	43	42	21	139	-7	-5	13	-1	-1	1.1	0.7	2.3	0.3	0.0
	117	CTH J & SB I-41	196	197	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	117	CTH J & SB I-41	196	189	WBR	28	18	36	29	110	37	22	23	29	110	9	4	-13	0	0	1.7	0.9	2.1	0.0	0.0
	117	CTH J & SB I-41	190	191	SBT	48	44	63	56	210	48	44	62	57	211	1	0	-1	1	1	0.1	0.0	0.1	0.1	0.1
	117	CTH J & SB I-41	190	197	SBR	97	74	99	80	350	97	76	97	82	351	0	2	-1	1	1	0.0	0.2	0.1	0.1	0.1
	118	CTH J & NB I-41	199	182	EBL	57	46	57	80	240	54	49	42	52	196	-3	3	-16	-28	-44	0.4	0.4	2.1	1.7	2.8
	118	CTH J & NB I-41	199	198	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	118	CTH J & NB I-41	199	192	EBR	44	36	43	27	150	29	34	31	35	128	-15	-2	-12	7	-22	2.3	0.4	1.8	1.4	1.8
	118	CTH J & NB I-41	174	182	NBT	102	87	95	107	390	94	92	84	95	365	-7	5	-11	-12	-25	0.7	0.6	1.2	1.2	1.3
	118	CTH J & NB I-41	174	198	NBR	103	110	121	96	430	101	105	109	90	405	-2	-5	-12	-6	-25	0.2	0.4	1.1	0.6	1.2
	118	CTH J & NB I-41	191	198	SBL	27	26	36	32	120	26	27	34	34	121	0	1	-2	2	1	0.0	0.1	0.3	0.3	0.1
	118	CTH J & NB I-41	191	192	SBT	62	65	56	47	230	56	59	71	44	230	-6	-6	15	-2	0	0.7	0.8	1.9	0.3	0.0
	119	CTH U & SB I-41	166	8	NBL	26	27	20	19	90	25	25	19	18	88	0	-1	-1	0	-2	0.0	0.2	0.2	0.0	0.2
	119	CTH U & SB I-41	166	167	NBT	7	23	37	84	150	5	16	40	48	109	-1	-6	3	-37	-41	0.6	1.3	0.6	2.7	2.2
	119	CTH U & SB I-41	7	159	WBL	32	46	45	27	150	25	41	44	37	147	-7	-5	-2	9	-3	1.2	0.7	0.2	1.8	0.3
	119	CTH U & SB I-41	7	8	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	119	CTH U & SB I-41	7	167	WBR	40	36	25	19																

I-41 Traffic and Engineering Study
 No Build (2048) AM Peak Period Calibration
Lane Utilization Comparison

I-41 NB															
Location		I-41 NB south of CTH BB			I-41 NB betw WIS 125 & WIS 96				I-41 NB betw CTH E & WIS 441			I-41 NB betw WIS 441 & CTH N		I-41 NB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
Field VISSIM (ATR)	7:00 AM	30%	30%	40%	27%	30%	36%	8%	37%	38%	24%	48%	52%	51%	49%
	7:15 AM	29%	30%	41%	26%	29%	35%	9%	36%	37%	27%	49%	51%	51%	49%
	7:30 AM	29%	30%	42%	26%	29%	35%	10%	35%	36%	29%	49%	51%	52%	48%
	7:45 AM	30%	31%	39%	25%	28%	35%	12%	35%	37%	28%	49%	51%	51%	49%
	7:00 AM	39%	36%	25%	12%	25%	35%	28%	25%	32%	43%	45%	55%	39%	61%
	7:15 AM	37%	35%	28%	14%	24%	33%	30%	26%	29%	45%	43%	57%	38%	62%
	7:30 AM	36%	36%	29%	13%	25%	32%	30%	27%	29%	44%	42%	58%	38%	62%
	7:45 AM	36%	33%	31%	14%	26%	31%	30%	31%	28%	41%	48%	52%	40%	60%
VISSIM	Avg	30%	30%	40%	26%	29%	35%	10%	36%	37%	27%	49%	51%	51%	49%
Field	Avg	37%	35%	28%	13%	25%	32%	29%	27%	29%	43%	45%	55%	39%	61%

I-41 SB															
Location		I-41 SB south of CTH BB			I-41 SB betw WIS 125 & WIS 96				I-41 SB betw CTH E & WIS 441			I-41 SB betw WIS 441 & CTH N		I-41 SB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
Field VISSIM (ATR)	7:00 AM	32%	35%	33%	25%	32%	37%	6%	36%	29%	34%	50%	50%	49%	51%
	7:15 AM	33%	35%	32%	24%	31%	38%	8%	38%	28%	34%	50%	50%	49%	51%
	7:30 AM	32%	35%	33%	23%	31%	38%	8%	39%	28%	33%	51%	49%	49%	51%
	7:45 AM	32%	36%	33%	23%	30%	38%	9%	41%	27%	33%	52%	48%	49%	51%
	7:00 AM	26%	39%	35%	7%	25%	33%	34%	27%	33%	40%	45%	55%	42%	58%
	7:15 AM	26%	37%	38%	8%	25%	31%	36%	26%	32%	42%	44%	56%	40%	60%
	7:30 AM	25%	36%	39%	9%	24%	31%	36%	28%	31%	41%	43%	57%	41%	59%
	7:45 AM	28%	36%	36%	12%	26%	29%	33%	29%	32%	39%	45%	55%	45%	55%
VISSIM	Avg	32%	35%	33%	24%	31%	38%	8%	38%	28%	34%	51%	49%	49%	51%
Field	Avg	26%	37%	37%	9%	25%	31%	35%	28%	32%	41%	44%	56%	42%	58%

TEOps Validation

Test	Data	Target	Model
Tier 1	--	Not Applicable	--
Tier 2	ATR	RNSE < 3.0 for 85% of data points	31%

I-41 Traffic and Engineering Study
No Build (2048) AM Peak Period Calibration
Mainline Speed Comparison

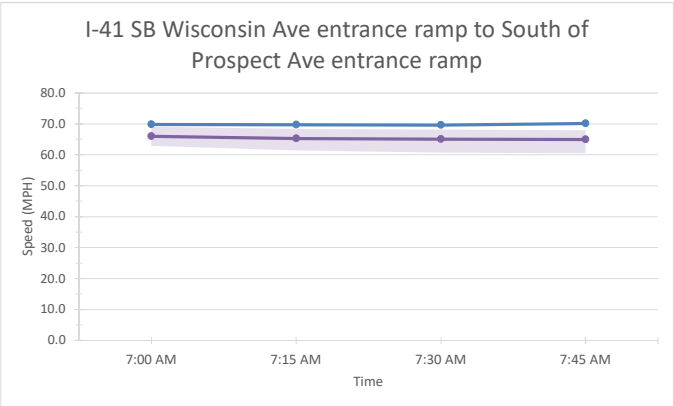
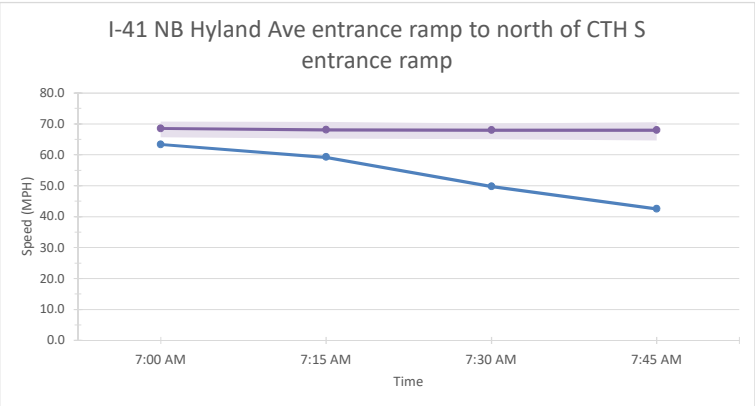
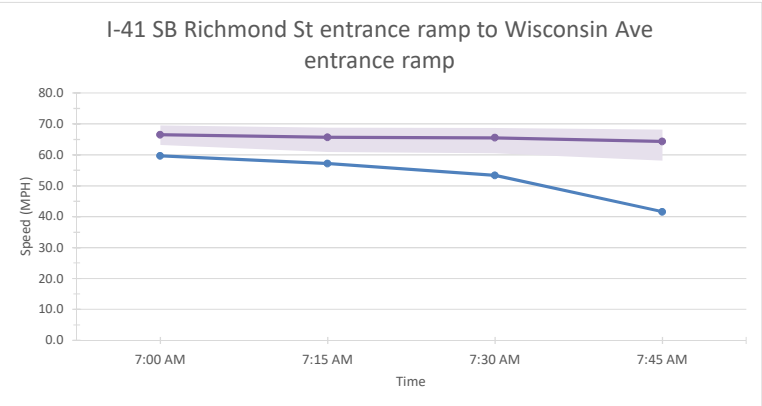
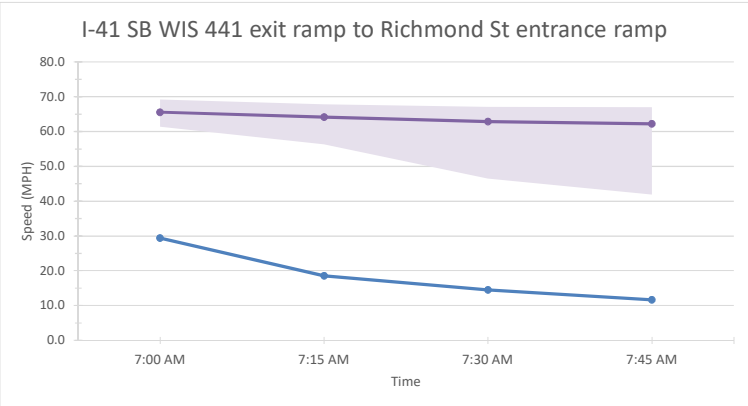
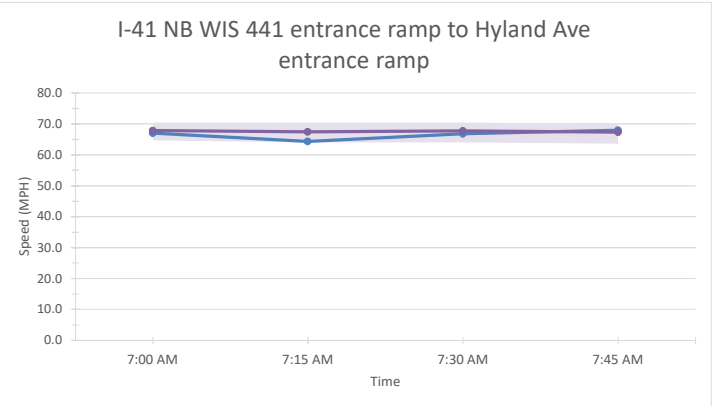
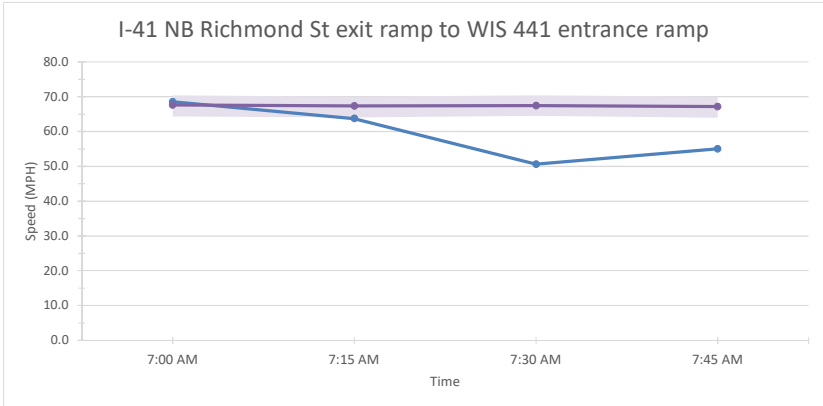
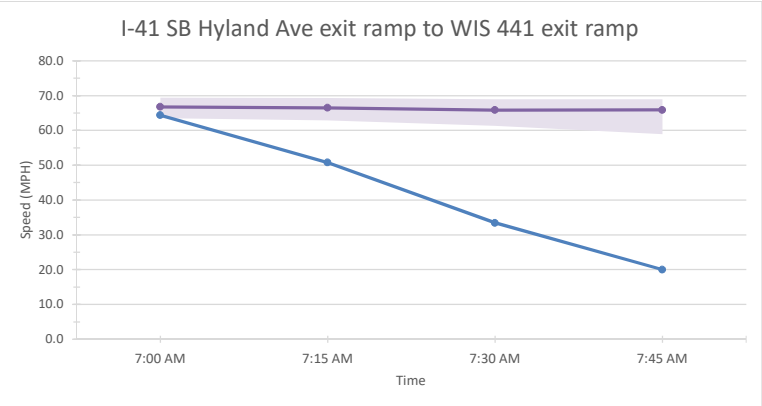
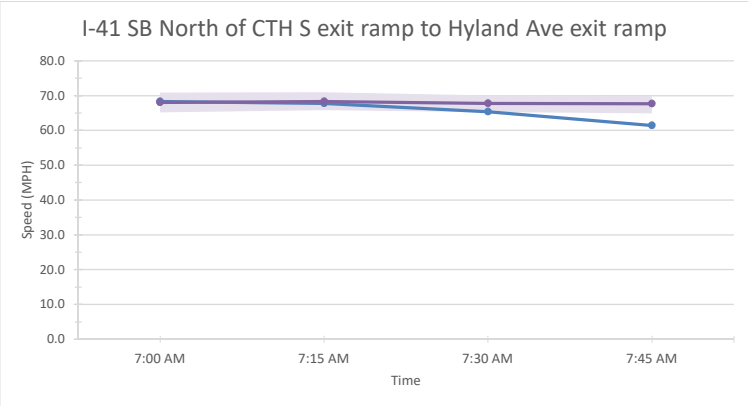
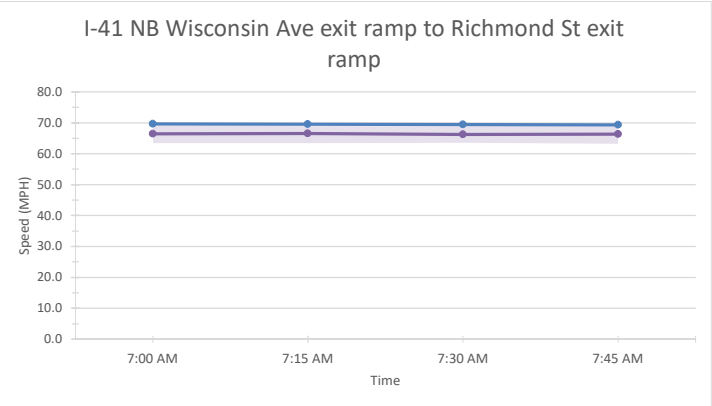
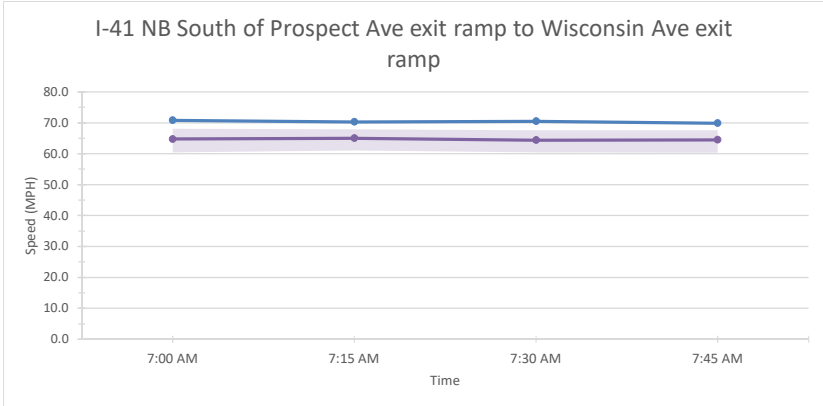
Segment		I-41 NB						Segment		I-41 SB					
		I-41 NB South of Prospect Ave exit ramp to Wisconsin Ave exit ramp	I-41 NB Wisconsin Ave exit ramp to Richmond St exit ramp	I-41 NB Richmond St exit ramp to WIS 441 entrance ramp	I-41 NB WIS 441 entrance ramp to Hyland Ave entrance ramp	I-41 NB Hyland Ave entrance ramp to north of CTH S entrance ramp				I-41 SB North of CTH S exit ramp to Hyland Ave exit ramp	I-41 SB Hyland Ave exit ramp to WIS 441 exit ramp	I-41 SB WIS 441 exit ramp to Richmond St entrance ramp	I-41 SB Richmond St entrance ramp to Wisconsin Ave entrance ramp	I-41 SB Wisconsin Ave entrance ramp to South of Prospect Ave entrance ramp	
VISSIM	7:00 AM	70.8	69.6	68.6	67.0	63.4		VISSIM	7:00 AM	68.4	64.4	29.4	59.7	69.9	
	7:15 AM	70.3	69.5	63.7	64.3	59.2			7:15 AM	67.8	50.7	18.6	57.2	69.7	
	7:30 AM	70.5	69.4	50.7	66.8	49.7			7:30 AM	65.4	33.4	14.5	53.3	69.6	
	7:45 AM	69.9	69.4	55.1	68.0	42.5			7:45 AM	61.5	20.0	11.7	41.6	70.1	
Field (NPMRDS Average)	7:00 AM	64.7	66.4	67.7	67.9	68.5		Field (NPMRDS Average)	7:00 AM	68.0	66.8	65.6	66.5	66.0	
	7:15 AM	65.0	66.6	67.4	67.5	68.1			7:15 AM	68.3	66.5	64.2	65.7	65.3	
	7:30 AM	64.3	66.2	67.5	67.7	68.0			7:30 AM	67.8	65.8	62.9	65.5	65.1	
	7:45 AM	64.5	66.3	67.1	67.3	68.0			7:45 AM	67.7	65.9	62.2	64.3	65.0	
Field (NPMRDS 15th Percentile)	7:00 AM	60.5	63.4	64.3	64.7	65.8		Field (NPMRDS 15th Percentile)	7:00 AM	65.2	63.6	61.4	63.2	62.9	
	7:15 AM	61.1	63.4	64.1	64.0	65.3			7:15 AM	65.9	62.9	56.4	61.0	61.5	
	7:30 AM	60.4	63.5	64.5	64.0	65.1			7:30 AM	65.3	61.4	48.6	60.5	60.8	
	7:45 AM	60.3	63.2	64.0	63.6	64.7			7:45 AM	64.9	59.0	41.9	58.1	60.6	
Field (NPMRDS 85th Percentile)	7:00 AM	68.1	69.2	70.4	70.5	70.8		Field (NPMRDS 85th Percentile)	7:00 AM	70.9	69.4	69.2	69.5	69.1	
	7:15 AM	67.9	68.9	70.1	70.4	70.7			7:15 AM	70.9	69.3	67.8	68.8	68.4	
	7:30 AM	67.5	68.9	70.4	70.5	70.2			7:30 AM	70.1	69.0	67.1	68.6	68.2	
	7:45 AM	67.5	69.1	70.0	70.1	70.6			7:45 AM	69.9	68.9	67.0	68.1	68.0	

TEOps
Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	29%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts	73%

TEOps
Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	29%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts	73%



I-41 Traffic and Engineering Study
 No Build (2048) AM Peak Period Calibration
Travel Time Comparison

FULL CORRIDOR

Data	Time	I-41 NB
		Average Travel Time (min)
		South of CTH BB to North of CTH S
Distance (mi)		26.59
VISSIM	7:00AM	26.7
NPMRDS	7:00AM	23.7



Data	Time	I-41 SB
		Average Travel Time (min)
		North of CTH S to South of CTH BB
Distance (mi)		26.58
VISSIM	7:00AM	38.4
NPMRDS	7:00AM	24.0

SEGMENTS

I-41 NB				
Average Travel Time (minutes)				
South of CTH BB to Wisc Ave Exit	Wisc Ave Exit to Richmond Exit	Richmond Exit to 441 Entrance	441 Entrance to Hyland Entrance	Hyland Entrance to North of CTH S
3.12	4.0	3.49	5.26	10.71
2.7	3.5	3.6	4.7	12.3
2.9	3.6	3.1	4.7	9.4
I-41 SB				
Average Travel Time (minutes)				
North of CTH S to Hyland Exit	Hyland Exit to 441 Exit	441 Exit to Richmond Entrance	Richmond Entrance to Wisc Ave Entrance	Wisc Ave Entrance to South of CTH BB
10.68	5.52	3.25	4.0	3.09
9.8	9.5	11.8	4.7	2.7
9.4	5.0	3.1	3.7	2.8

TEOpS Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	96%
Tier 2	NPMRDS	TT ± 15% for 85% of routes	60%

I-41 Traffic and Engineering Study
No Build (2048) AM Peak Hour Calibration
Merge and Diverge Segment Speeds

Merge/Diverge Links			Vissim Speed				
Forecast ID	Link ID	Description	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2
Merge/Diverge Speeds							
	70	NB I-41 CTH BB diverge	70	68	70	67	69
	74	NB I-41 CTH BB merge	70	69	69	68	69
	76	NB I-41 WIS 125 diverge	70	69	69	69	69
	80	NB I-41 WIS 125merge	69	69	68	68	68
		NB I-41 WIS 96 diverge					
	84	NB I-41 WIS 96 merge	70	70	70	70	70
	--	NB I-41 WIS 15 diverge	--	--	--	--	--
	89	NB I-41 WIS 15 merge	68	69	68	68	68
	91	NB I-41 WIS 47 diverge	68	68	69	69	69
	95	NB I-41 WIS 47 merge	65	64	65	65	65
	418	NB I-41 Ballard diverge	64	21	12	17	28
	100	NB I-41 Ballard merge	66	65	64	63	65
		NB I-41 441 diverge					
	103	NB I-41 441 merge	59	53	59	66	59
	420	NB I-41 CTH N diverge	63	63	66	66	65
	108	NB I-41 CTH N merge	64	45	65	65	60
	422	NB I-41 WIS 55 diverge	65	63	62	64	64
	113	NB I-41 WIS 55 merge	68	64	66	67	66
	417	NB I-41 CTH J diverge	61	61	62	61	61
	118	NB I-41 CTH J merge	61	54	49	60	56
	415	NB I-41 CTH U diverge	62	61	55	62	60
	123	NB I-41 CTH U merge	52	33	20	21	31
	425	NB I-41 CTH S diverge	49	35	20	24	32
	128	NB I-41 CTH S merge	20	18	18	20	19
	426	SB I-41 CTH S diverge	59	57	59	60	59
	21	SB I-41 CTH S merge	68	56	61	67	63
	424	SB I-41 CTH U diverge	52	45	43	51	48
	20	SB I-41 CTH U merge	65	57	53	62	59
	416	SB I-41 CTH J diverge	65	65	49	15	49
	19	SB I-41 CTH J merge	60	55	22	11	37
	423	SB I-41 WIS 55 diverge	62	58	33	12	41
	18	SB I-41 WIS 55 merge	63	51	21	11	37
	421	SB I-41 CTH N diverge	60	53	17	11	36
	26	SB I-41 CTH N merge	53	35	14	11	28
	419	SB I-41 441 diverge	41	20	14	11	21
	36	SB I-41 441 merge	13	12	9	8	11
		SB I-41 Ballard diverge					
	40	SB I-41 Ballard merge	19	16	12	10	14
	42	SB I-41 WIS 47 diverge	43	18	15	12	22
	46	SB I-41 WIS 47 merge	22	18	15	13	17
	48	SB I-41 WIS 15 diverge	60	63	50	37	52
	--	SB I-41 WIS 15 merge	--	--	--	--	--
	53	SB I-41 WIS 96 diverge	68	69	69	69	69
	56	SB I-41 WIS 96 merge	68	68	68	69	69
		SB I-41 WIS 125 diverge					
	61	SB I-41 WIS 125merge	69	69	69	68	69
	63	SB I-41 CTH BB diverge	68	69	67	69	68
	67	SB I-41 CTH BB merge	69	69	69	69	69

DRAFT

APPENDIX P6

Year 2048 No Build VISSIM PM Peak Hour

I-41 Traffic and Engineering Study
No Build (2048) PM Peak Hour Calibration
Freeway Mainline and Ramp Volumes

			% Demand	Segments								Target						Vissim						Difference						RMSPE						RMSE					
			100%	Forecast ID	Link ID	Description	Type	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	TOTAL	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2	4:15-4:30PM3	4:30-4:45PM3	4:45-5:00PM3	5:00-5:15PM3	TOTAL3	4:15-4:30PM6	4:30-4:45PM6	4:45-5:00PM6	5:00-5:15PM6	TOTAL6	4:15-4:30PM5	4:30-4:45PM5	4:45-5:00PM5	5:00-5:15PM5	TOTAL5									
TEOps Validation - 15 minute periods																																									
Test	Target		Model	10001	69	NB I-41 (Southern Project Limits)	MAINLINE	981	970	1034	935	3920	981	973	1024	935	3913	0	3	-10	0	-7	0%	0%	1%	0%	0%	0.0	0.1	0.3	0.0	0.1									
	Target			10002	72	NB I-41 Exit to CTH BB	RAMP	151	147	166	156	620	152	145	149	158	605	1	-2	-17	2	-15	1%	1%	1%	1%	2%	0.1	0.2	1.3	0.2	0.6									
	RMSPE < 5%			10003	71	NB I-41 betw CTH BB Exit to CTH BB Ent	MAINLINE	830	823	868	779	3300	815	830	852	785	3281	-15	7	-16	6	-18	2%	1%	2%	1%	1%	0.5	0.2	0.5	0.2	0.3									
Tier 1																																									
RSNE < 3 for 85% of links		10004	73	NB I-41 Ent from CTH BB	RAMP	237	249	240	233	960	237	220	239	220	916	0	30	0	-30	0	-44	0%	0%	0%	0%	5%	0.0	1.9	0.1	0.8	1.4										
Tier 2																																									
RSNE < 3 for 85% of links		10005	75	NB I-41 betw CTH BB Ent to WIS 125 Exit	MAINLINE	1067	1072	1108	1012	4260	1051	1052	1091	1008	4202	-16	-20	-18	-4	-58	1%	2%	2%	0%	1%	0.5	0.6	0.5	0.1	0.9											
TEOps Validation - 60 minute period																																									
Test	Target		Model	10007	77	NB I-41 betw WIS 125 Exit to WIS 125 Ent	MAINLINE	808	807	865	771	3250	785	792	833	750	3160	-23	-15	-32	-20	-89	3%	2%	4%	3%	3%	0.8	0.5	1.1	0.7	1.6									
	Target			10008	79	NB I-41 Ent from WIS 125	RAMP	218	254	256	311	1040	209	213	213	193	829	-9	-40	-43	-118	-211	4%	16%	17%	16%	16%	0.6	2.5	2.7	8.7	8.8									
	RMSPE < 5%			10009	80	NB I-41 betw WIS 125 Ent to WIS 96 Exit	MAINLINE	1026	1060	1121	1082	4290	980	987	977	887	3817	-48	-87	-144	-195	-472	4%	16%	16%	14%	14%	1.4	2.7	4.3	8.7	7.8									
Tier 1																																									
RSNE < 3 for 85% of links		10010	82	NB I-41 Exit to WIS96	RAMP	242	250	233	276	1000	233	194	196	193	816	-9	-56	-36	-83	-184	4%	22%	16%	16%	16%	0.6	3.1	2.4	3.6	3.8											
Tier 2																																									
RSNE < 3 for 85% of links		10011	81	NB I-41 betw WIS 96 Exit to WIS 96 Ent	MAINLINE	784	811	888	806	3290	750	752	768	702	2972	-34	-59	-121	-104	-317	4%	7%	14%	13%	10%	1.2	2.1	2.9	3.7	3.8											
TEOps Validation - 15 minute periods																																									
Test	Target		Model	10012	83	NB I-41 Ent from WIS 96	RAMP	246	289	283	333	1150	246	242	240	252	980	0	-47	-43	-81	-170	0%	16%	15%	14%	15%	0.0	2.8	2.5	8.4	8.0									
	Target			10013	85	NB I-41 WIS 96 Ent to WIS 15 Exit	MAINLINE	1029	1099	1172	1139	4440	986	997	1093	966	3952	-44	-102	-168	-173	-487	4%	4%	14%	14%	11%	1.4	3.7	8.7	8.7	2.8									
	RMSPE < 5%			10014	87	NB I-41 Exit to WIS15	RAMP	321	354	307	338	1320	293	307	288	259	1147	-28	-47	-19	-80	-173	4%	13%	6%	14%	14%	1.6	2.5	1.1	8.3	8.8									
Tier 2																																									
RSNE < 3 for 85% of links		10015	86	NB I-41 betw WIS 15 Exit to WIS 15 Ent	MAINLINE	708	746	865	801	3120	674	686	706	706	2772	-34	60	-159	-95	-348	5%	4%	14%	14%	11%	1.3	2.2	1.4	8.3	8.2											
TEOps Validation - 60 minute period																																									
Test	Target		Model	10016	88	NB I-41 Ent from WIS15	RAMP	424	459	326	353	1560	223	217	248	224	911	-201	-242	-78	-129	-649	4%	13%	13%	17%	17%	8.8	11.7	1.7	8.3	10.4									
	Target			10017	90	NB I-41 betw WIS 15 Ent to WIS 47 Exit	MAINLINE	1132	1204	1190	1153	4680	897	908	928	836	3670	-235	-296	-262	-217	-1010	21%	15%	15%	17%	16%	1.9	8.6	1.6	8.8	10.2									
	RMSPE < 5%			10018	93	NB I-41 Exit to WIS47	RAMP	239	234	224	303	1000	179	179	174	193	724	-60	-55	-51	-111	-276	24%	14%	14%	13%	13%	1.9	1.6	1.6	8.4	8.7									
Tier 2																																									
RSNE < 3 for 85% of links		10019	92	NB I-41 betw WIS 47 Exit to WIS 47 Ent	MAINLINE	893	971	966	850	3680	705	733	741	743	2923	-188	-237	-225	-107	-757	21%	14%	14%	13%	13%	8.3	2.8	9.2	8.5	10.5											
TEOps Validation - 15 minute periods																																									
Test	Target		Model	10020	94	NB I-41 Ent from WIS47	RAMP	222	230	219	279	950	194	198	173	222	787	-28	-32	-46	-57	-163	11%	14%	14%	10%	11%	1.9	2.1	3.1	8.4	8.9									
	Target			10021	96	NB I-41 betw WIS 47 Ent to Ballard Exit	MAINLINE	1115	1201	1185	1129	4630	902	929	920	955	3707	-213	-271	-265	-174	-923	15%	15%	15%	14%	14%	8.4	7.8	9.7	8.2	10.6									
	RMSPE < 5%			10022	98	NB I-41 Exit to Ballard	RAMP	149	168	202	191	710	174	142	143	153	611	24	-74	-59	-38	-99	10%	15%	15%	14%	14%	2.0	2.0	4.4	2.8	8.7									
Tier 2																																									
RSNE < 3 for 85% of links		10023	97	NB I-41 betw Ballard Exit to Ballard Ent	MAINLINE	966	1033	983	938	3920	722	778	772	789	3060	-244	-255	-212	-148	-860	14%	15%	15%	14%	14%	9.8	7.8	8.8	8.4	10.7											
TEOps Validation - 60 minute period																																									
Test	Target		Model	10024	99	NB I-41 Ent from Ballard	RAMP	203	241	247	239	930	207	197	193	197	794	4	-44	-53	-42	-136	2%	16%	12%	14%	14%	0.3	2.9	3.4	2.7	8.3									
	Target			10025	100	NB I-41 betw Ballard Ent to 441 Exit	MAINLINE	1169	1274	1230	1177	4850	928	974	966	988	3856	-241	-300	-264	-189	-994	21%	15%	15%	13%	13%	9.7	8.4	7.9	8.3	10.3									
	RMSPE < 5%			10026	102	NB I-41 Exit to SB441	RAMP	402	442	438	429	1710	310	331	321	346	1308	-91	-111	-117	-43	-402	21%	15%	15%	17%	16%	4.8	3.3	6.9	8.8	9.7									
Tier 2																																									
RSNE < 3 for 85% of links		10027	101	NB I-41 betw 441 Exit to 441 Ent	MAINLINE	768	832	792	749	3140	605	630	635	635	2505	-162	-202	-202	-113	-635	21%	14%	14%	14%	14%	0.6	3.4	0.1	8.3	8.8											
TEOps Validation - 15 minute periods																																									
Test	Target		Model	10028	33	NB I-41 Ent from NB441	RAMP	187	166	204	214	770	183	166	204	212	765	-4	1	0	-2	-5	2%	0%	0%	1%	1%	0.3	0.1	0.0	0.2	0.2									
	Target			10029	104	NB I-41 betw 441 Ent to CTH N Exit	MAINLINE	954	997	996	963	3910	780	799	826	711	3117	-174	-198	-170	-251	-794	14%	14%	14%	14%	14%	8.8	8.1	9.4	8.3	10.2									
	RMSPE < 5%			10030	106	NB I-41 Exit to CTH N	RAMP	201	242	256	231	930	156	168	157	136	618	-45	-74	-99	-95	-313	22%	11%	11%	11%	11%	8.2	4.8	8.2	8.2	10.2									
Tier 2																																									
RSNE < 3 for 85% of links		10031	105	NB I-41 betw CTH N Exit to CTH N Entrance	MAINLINE	753	755	740	731	2980	618	608	577	510	2313	-135	-148	-163	-221	-667	14%	14%	14%	14%	14%	8.9	8.4	8.8	8.2	10.2											
TEOps Validation - 60 minute period																																									
Test	Target		Model	10032	107	NB I-41 Ent from CTH N	RAMP	85	100	106	59	350	85	96	103	64	348	0	-4	-2	5	-1	0%	4%	2%	4%	0%	0.0	0.4	0.2	0.7	0.1									
	Target			10033	109	NB I-41 betw CTH N Ent to WIS 55 Exit	MAINLINE	838	856	846	790	3330	700	706	687	574	2666	-137	-150	-159	-216	-663	14%	14%	14%	17%	16%	8.7	8.1	1.3	8.7	11.3									
	RMSPE < 5%			10034	111	NB I-41 Exit to WIS55	RAMP	114	171	117	147	550	108	113	118	80	419	-6	-58	-1	-47	-131	4%	15%	1%	1%	1%	8.8	1.8	0.1	8.3	10.3									
Tier 2																																									
RSNE < 3 for 85% of links		10035	110	NB I-41 betw WIS 55 Exit to WIS 55 Ent	MAINLINE	723	685	729	643	2780	583	597	527	3																											

I-41 Traffic and Engineering Study
No Build (2048) PM Peak Period Calibration
Intersection Turning Movements

TEOps Validation - 15 minute periods

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	64%

TEOps Validation - 60 minute period

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	64%

% Demand 100%	Intersections						Target					Vissim					Difference					RNSE				
	Int ID	Int Name	Forecast ID	From Link	To Link	Mvmt	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	TOTAL	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2	4:15-4:30PM3	4:30-4:45PM3	4:45-5:00PM3	5:00-5:15PM3	TOTAL3	4:15-4:30PM5	4:30-4:45PM5	4:45-5:00PM5	5:00-5:15PM5	TOTAL5
	108	SB I-41 & WIS15	8EBL	303	52	EBL	109	86	53	71	320	65	64	63	63	255	-45	-22	10	-8	-65	2.3	2.4	1.4	0.9	2.4
	108	SB I-41 & WIS15	8EBT	303	304	EBT	538	651	497	464	2150	304	271	288	320	1182	-234	-380	-210	-144	-968	2.2	2.2	2.2	2.2	2.2
	108	SB I-41 & WIS15	8WBT	309	302	WBT	390	365	378	337	1470	282	298	284	252	1116	-107	-67	-94	-85	-354	2.2	2.2	2.2	2.2	2.2
	108	SB I-41 & WIS15	8WBR	309	52	WBR	121	119	162	168	570	82	84	79	91	337	-39	-35	-83	-77	-233	2.2	2.2	2.2	2.2	2.2
	108	SB I-41 & WIS15	8SBL	51	304	SBL	29	47	44	59	180	41	26	32	39	138	11	-21	-12	-20	-42	2.1	2.2	1.8	2.6	2.1
	108	SB I-41 & WIS15	8SBR	51	302	SBR	289	302	302	307	1200	237	243	235	258	972	-52	-59	-67	-49	-227	2.1	2.2	2.2	2.8	2.2
	106	SB I-41 & WIS96	6EBT	323	325	EBT	400	448	438	474	1760	389	386	390	391	1556	-11	-62	-48	-82	-203	0.5	2.9	2.3	2.2	2.2
	106	SB I-41 & WIS96	6EBR	323	57	EBR	131	152	117	161	560	113	138	111	113	474	-19	-13	-6	-48	-86	1.6	1.1	0.5	2.2	2.2
	106	SB I-41 & WIS96	6WBL	332	57	WBL	149	177	172	142	640	131	139	138	143	552	-18	-38	-34	2	-88	1.5	2.8	2.6	0.1	2.2
	106	SB I-41 & WIS96	6WBT	332	334	WBT	406	485	439	461	1790	377	368	371	372	1488	-29	-117	-67	-90	-302	1.4	2.2	2.2	2.2	2.2
	106	SB I-41 & WIS96	6SBL	340	325	SBL	55	48	60	57	220	37	42	38	46	163	-18	-6	-22	-11	-57	2.4	0.8	2.9	1.5	2.2
	106	SB I-41 & WIS96	6SBT	340	57	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	106	SB I-41 & WIS96	6SBR	340	334	SBR	163	132	163	152	610	98	118	107	115	438	-65	-14	-56	-36	-172	2.1	1.2	2.2	3.0	2.2
	104	SB I-41 & WIS125	4EBT	349	351	EBT	357	414	367	432	1570	351	359	310	288	1308	-6	-55	-57	-144	-262	0.3	2.7	3.0	2.2	2.2
	104	SB I-41 & WIS125	4EBR	349	60	EBR	148	170	142	170	630	148	148	123	118	538	0	-21	-19	-52	-92	0.0	1.6	1.6	2.2	2.2
	104	SB I-41 & WIS125	4WBL	361	60	WBL	111	118	100	111	440	106	110	102	100	417	-5	-9	2	-11	-23	0.5	0.8	0.2	1.1	1.1
	104	SB I-41 & WIS125	4WBT	361	363	WBT	383	389	399	380	1550	361	374	377	377	1488	-22	-14	-22	-3	-62	1.1	0.7	1.1	0.2	1.6
	104	SB I-41 & WIS125	4SBL	367	351	SBL	45	48	76	51	220	47	43	39	53	181	2	-5	-37	2	-38	0.2	0.8	2.2	0.3	2.6
	104	SB I-41 & WIS125	4SBT	367	60	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	104	SB I-41 & WIS125	4SBR	367	363	SBR	72	64	78	55	270	72	66	54	58	250	0	2	-24	3	-20	0.0	0.2	2.8	0.4	1.2
	101	SB I-41 & CTHB8	1EBT	377	381	EBT	225	249	271	275	1020	249	236	271	271	1028	24	-13	0	-4	8	1.6	0.8	0.0	0.2	0.2
	101	SB I-41 & CTHB8	1EBR	377	66	EBR	109	103	113	115	440	119	99	114	114	447	10	-4	2	-1	7	1.0	0.4	0.2	0.1	0.3
	101	SB I-41 & CTHB8	1WBL	382	66	WBL	91	89	80	80	340	67	67	55	60	250	-24	-22	-25	-19	-90	2.5	2.3	2.8	2.2	2.2
	101	SB I-41 & CTHB8	1WBT	382	379	WBT	92	117	114	108	430	85	88	86	93	352	-6	-29	-28	-15	-78	0.7	2.7	2.6	1.4	2.2
	101	SB I-41 & CTHB8	1SBL	393	381	SBL	57	49	37	37	180	40	44	37	33	154	-17	-5	0	-4	-26	2.3	0.7	0.0	0.6	2.0
	101	SB I-41 & CTHB8	1SBT	393	66	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	101	SB I-41 & CTHB8	1SBR	393	379	SBR	73	96	107	95	370	80	72	75	82	309	8	-23	-32	-13	-61	0.9	2.4	2.2	1.3	2.2
	109	NB I-41 & WIS15	9EBL	304	316	EBL	309	387	262	262	1220	163	156	173	177	669	-146	-232	-89	-85	-551	2.2	2.2	2.2	2.2	2.2
	109	NB I-41 & WIS15	9EBT	304	311	EBT	258	311	280	261	1110	178	133	158	166	635	-81	-177	-121	-95	-475	2.2	2.2	2.2	2.2	2.2
	109	NB I-41 & WIS15	9NBL	87	308	NBL	116	127	72	106	420	92	120	88	75	376	-24	-6	17	-31	-44	2.2	0.6	2.0	2.2	2.2
	109	NB I-41 & WIS15	9NBT	87	316	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	109	NB I-41 & WIS15	9NBR	87	311	NBR	206	227	235	233	900	195	198	206	195	795	-10	-29	-29	-37	-105	0.7	1.9	1.9	2.4	2.2
	109	NB I-41 & WIS15	9WBT	10338	308	WBT	395	357	468	400	1620	284	254	283	258	1078	-112	-102	-186	-142	-542	2.2	2.2	2.2	2.2	2.2
	109	NB I-41 & WIS15	9WBR	10338	315	WBR	114	71	64	91	340	56	68	75	52	250	-59	-4	12	-39	-90	2.2	0.4	1.5	2.2	2.2
	107	NB I-41 & WIS96	7EBL	325	83	EBL	182	206	201	241	830	179	178	177	180	714	-3	-28	-24	-61	-116	0.2	1.9	1.7	2.2	2.2
	107	NB I-41 & WIS96	7EBT	325	337	EBT	273	290	298	290	1150	249	246	252	260	1007	-24	-44	-46	-30	-143	1.5	2.6	2.6	1.7	2.2
	107	NB I-41 & WIS96	7NBL	343	332	NBL	123	129	111	137	500	97	97	97	97	388	-26	-31	-14	-41	-112	2.3	2.8	1.3	2.2	2.2
	107	NB I-41 & WIS96	7NBT	343	83	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	107	NB I-41 & WIS96	7NBR	343	337	NBR	119	121	122	138	500	112	93	97	92	394	-7	-28	-25	-46	-106	0.7	2.5	2.3	2.2	2.2
	107	NB I-41 & WIS96	7WBT	331	332	WBT	432	533	500	466	1930	411	410	412	418	1652	-21	-123	-87	-47	-278	1.0	2.2	2.2	2.2	2.2
	107	NB I-41 & WIS9																								

I-41 Traffic and Engineering Study
No Build (2048) PM Peak Period Calibration
Intersection Turning Movements

TEOps Validation - 15 minute periods

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	64%

TEOps Validation - 60 minute period

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	64%

% Demand 100%	Intersections						Target					Vissim					Difference					RNSE				
	Int ID	Int Name	Forecast ID	From Link	To Link	Mvmt	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	TOTAL	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2	4:15-4:30PM3	4:30-4:45PM3	4:45-5:00PM3	5:00-5:15PM3	TOTAL3	4:15-4:30PM5	4:30-4:45PM5	4:45-5:00PM5	5:00-5:15PM5	TOTAL5
	113	CTH N & SB I-41	13NBL	222	24	NBL	53	110	92	106	360	57	105	93	102	356	4	-5	1	-4	-4	0.5	0.5	0.1	0.4	0.2
	113	CTH N & SB I-41	13NBT	222	216	NBT	159	161	195	195	710	127	116	119	119	481	-32	-45	-75	-76	-229	2.6	2.3	1.4	1.1	1.1
	113	CTH N & SB I-41	13WBL	23	220	WBL	91	106	123	100	420	68	95	101	118	382	-23	-11	-22	18	-38	2.4	1.1	1.9	1.8	1.8
	113	CTH N & SB I-41	13WBT	23	24	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	113	CTH N & SB I-41	13WBR	23	216	WBR	47	65	62	57	230	32	50	60	61	203	-15	-14	-2	5	-27	2.2	1.8	0.2	0.6	1.8
	113	CTH N & SB I-41	13SBT	217	220	SBT	104	129	109	108	450	104	126	108	111	448	0	-3	-2	3	-2	0.0	0.3	0.2	0.3	0.1
	113	CTH N & SB I-41	13SBR	217	24	SBR	49	90	68	63	270	49	88	69	65	271	0	-2	1	2	1	0.1	0.2	0.2	0.2	0.0
	114	CTH N & NB I-41	14EBL	224	221	EBL	113	129	160	158	560	82	82	85	80	329	-31	-47	-75	-78	-231	2.9	1.7	1.9	1.7	1.7
	114	CTH N & NB I-41	14EBT	224	107	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	114	CTH N & NB I-41	14EBR	224	227	EBR	89	113	96	73	370	75	74	72	55	275	-13	-39	-24	-18	-95	1.4	1.7	2.5	2.2	1.7
	114	CTH N & NB I-41	14NBT	229	221	NBT	100	142	126	143	510	102	139	127	142	510	3	-2	0	-1	0	0.3	0.2	0.0	0.1	0.0
	114	CTH N & NB I-41	14NBR	229	107	NBR	39	36	44	41	160	38	34	45	42	159	0	-2	1	0	-1	0.1	0.3	0.1	0.1	0.1
	114	CTH N & NB I-41	14SBL	223	107	SBL	46	65	62	18	190	47	63	59	23	191	1	-2	-3	5	2	0.2	0.2	0.3	1.2	0.1
	114	CTH N & NB I-41	14SBT	223	227	SBT	149	170	170	190	680	126	156	150	209	640	-24	-14	-20	19	-39	1.9	1.1	1.6	1.4	1.5
	115	WIS55 & SB I-41	15NBL	187	16	NBL	100	132	101	128	460	99	127	105	124	455	-1	-5	4	-4	-5	0.1	0.4	0.4	0.4	0.2
	115	WIS55 & SB I-41	15NBT	187	184	NBT	78	126	73	113	390	86	94	82	90	352	9	-32	9	-23	-38	1.0	2.8	1.0	2.2	1.9
	115	WIS55 & SB I-41	15WBL	15	186	WBL	62	50	69	50	230	52	55	53	63	223	-10	5	-15	13	-7	1.3	0.8	1.9	1.8	0.5
	115	WIS55 & SB I-41	15WBT	15	16	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	115	WIS55 & SB I-41	15WBR	15	184	WBR	25	18	28	29	100	27	22	19	29	97	3	4	-9	0	-3	0.5	0.9	1.7	0.0	0.3
	115	WIS55 & SB I-41	15SBT	183	186	SBT	66	60	71	83	280	66	61	70	79	276	-1	1	0	-4	-4	0.1	0.1	0.1	0.4	0.2
	115	WIS55 & SB I-41	15SBR	183	16	SBR	19	39	28	54	140	19	38	29	52	138	1	-1	1	-2	-2	0.1	0.2	0.1	0.2	0.2
	116	WIS55 & NB I-41	16EBL	111	187	EBL	14	54	26	46	140	24	24	33	22	103	10	-30	7	-24	-37	2.7	1.7	1.3	1.5	2.7
	116	WIS55 & NB I-41	16EBT	111	112	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	116	WIS55 & NB I-41	16EBR	111	188	EBR	101	117	91	101	410	85	91	89	61	326	-15	-26	-3	-40	-84	1.5	2.4	0.3	1.9	1.7
	116	WIS55 & NB I-41	16NBT	200	187	NBT	163	204	148	196	710	163	199	152	193	706	0	-5	5	-3	-4	0.0	0.3	0.4	0.2	0.1
	116	WIS55 & NB I-41	16NBR	200	112	NBR	24	37	31	48	140	25	36	32	48	140	1	-1	0	0	0	0.1	0.1	0.1	0.0	0.0
	116	WIS55 & NB I-41	16SBL	186	112	SBL	19	10	11	29	70	17	11	12	28	67	-2	0	1	-1	-3	0.4	0.1	0.2	0.3	0.3
	116	WIS55 & NB I-41	16SBT	186	188	SBT	109	100	128	104	440	101	106	112	114	432	-8	6	-17	10	-8	0.8	0.6	1.5	1.0	0.4
	117	CTH J & SB I-41	17NBL	182	197	NBL	26	29	23	32	110	28	29	23	30	110	2	1	0	-1	1	0.4	0.1	0.1	0.2	0.0
	117	CTH J & SB I-41	17NBT	182	189	NBT	135	92	139	95	460	83	86	85	86	339	-52	-6	-54	-9	-121	1.1	0.7	1.7	0.9	1.7
	117	CTH J & SB I-41	17WBL	196	191	WBL	105	102	107	67	380	83	100	99	103	386	-22	-2	-8	37	6	2.1	0.1	0.8	1.9	0.3
	117	CTH J & SB I-41	17WBT	196	197	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	117	CTH J & SB I-41	17WBR	196	189	WBR	47	68	40	35	190	35	50	59	40	184	-12	-18	19	5	-6	1.7	2.2	2.9	0.8	0.5
	117	CTH J & SB I-41	17SBT	190	191	SBT	81	126	60	92	360	76	73	76	55	280	-5	-53	16	-37	-80	0.5	1.7	2.0	1.9	1.7
	117	CTH J & SB I-41	17SBR	190	197	SBR	67	94	78	111	350	74	55	61	68	258	8	-40	-17	-43	-92	0.9	1.7	1.9	1.7	1.7
	118	CTH J & NB I-41	18EBL	199	182	EBL	92	46	93	50	280	39	41	39	41	160	-53	-5	-54	-8	-120	1.7	0.7	1.7	1.2	1.7
	118	CTH J & NB I-41	18EBT	199	198	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	118	CTH J & NB I-41	18EBR	199	192	EBR	91	94	114	91	390	59	47	47	62	215	-32	-47	-68	-29	-175	1.7	1.7	1.9	1.9	1.7
	118	CTH J & NB I-41	18NBT	174	182	NBT	69	75	69	76	290	71	74	69	75	289	1	-1	0	-2	-1	0.2	0.1	0.0	0.2	0.1
	118	CTH J & NB I-41	18NBR	174	198	NBR	72	68	59	72	270	72	68	57	72	268	0	0	-2	0	-2	0.0	0.0	0.2	0.0	0.1
	118	CTH J & NB I-41	18SBL	191	198	SBL	21	54	14	31	120	21	27	33	12	94	0	-27	20	-19	-26	0.0	1.7	1.4	1.4	2.4
	118	CTH J & NB I-41	18SBT	191	192	SBT	165	174	154	128	620	139	145	143	147	573	-26	-29	-11	19	-47	2.0	2.2	0.9	1.7	1.9
	119	CTH U & SB I-41	19NBL	166	8	NBL	29	33	26	32	120	30	32	26	33	122	1	-1	1	1	2	0.2	0.2	0.1	0.2	0.2
	119	CTH U & SB I-41	19NBT	166	167	NBT	64	93	86	77	320	77	61	92	68	297	12	-32	6	-9	-22	1.6	1.7	0.6	1.0	1.3
	119	CTH U & SB I-41	19WBL	7																						

I-41 Traffic and Engineering Study
 No Build (2048) PM Peak Period Calibration
Lane Utilization Comparison

I-41 NB															
Location		I-41 NB south of CTH BB			I-41 NB betw WIS 125 & WIS 96				I-41 NB betw CTH E & WIS 441			I-41 NB betw WIS 441 & CTH N		I-41 NB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
VISSIM	4:15 PM	30%	31%	39%	24%	27%	36%	13%	34%	34%	32%	47%	53%	50%	50%
	4:30 PM	30%	31%	39%	29%	28%	28%	15%	34%	34%	32%	46%	54%	51%	49%
	4:45 PM	30%	31%	39%	40%	28%	17%	14%	34%	34%	32%	51%	49%	50%	50%
	5:00 PM	30%	31%	40%	45%	26%	15%	14%	34%	33%	33%	63%	37%	50%	50%
Field (ATR)	4:15 PM	34%	35%	31%	13%	28%	31%	29%	32%	25%	42%	47%	53%	43%	57%
	4:30 PM	35%	35%	30%	14%	28%	31%	28%	35%	25%	40%	47%	53%	43%	57%
	4:45 PM	35%	34%	31%	15%	27%	31%	28%	33%	26%	41%	48%	52%	44%	56%
	5:00 PM	36%	35%	29%	13%	28%	31%	28%	35%	26%	39%	48%	52%	45%	55%
VISSIM	Avg	30%	31%	39%	34%	27%	24%	14%	34%	34%	32%	52%	48%	50%	50%
Field	Avg	35%	35%	30%	14%	28%	31%	28%	34%	25%	41%	47%	53%	44%	56%

I-41 SB															
Location		I-41 SB south of CTH BB			I-41 SB betw WIS 125 & WIS 96				I-41 SB betw CTH E & WIS 441			I-41 SB betw WIS 441 & CTH N		I-41 SB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
VISSIM	4:15 PM	32%	36%	33%	19%	27%	44%	9%	29%	44%	27%	50%	50%	48%	52%
	4:30 PM	32%	35%	32%	21%	27%	43%	9%	30%	42%	28%	51%	49%	49%	51%
	4:45 PM	32%	35%	33%	20%	27%	44%	9%	29%	46%	25%	50%	50%	48%	52%
	5:00 PM	32%	36%	32%	21%	27%	43%	9%	30%	43%	27%	50%	50%	48%	52%
Field (ATR)	4:15 PM	36%	33%	31%	10%	31%	32%	28%	24%	34%	42%	47%	53%	40%	60%
	4:30 PM	36%	33%	31%	9%	31%	31%	29%	24%	35%	42%	47%	53%	41%	59%
	4:45 PM	35%	33%	32%	10%	29%	32%	29%	24%	34%	42%	47%	53%	40%	60%
	5:00 PM	37%	33%	30%	9%	31%	32%	29%	24%	34%	42%	47%	53%	43%	57%
VISSIM	Avg	32%	35%	33%	20%	27%	44%	9%	30%	44%	27%	50%	50%	48%	52%
Field	Avg	36%	33%	31%	9%	31%	32%	29%	24%	34%	42%	47%	53%	41%	59%

TEOpS Validation

Test	Data	Target	Model
Tier 1	--	Not Applicable	--
Tier 2	ATR	RNSE < 3.0 for 85% of data points	38%

I-41 Traffic and Engineering Study
No Build (2048) PM Peak Period Calibration
Mainline Speed Comparison

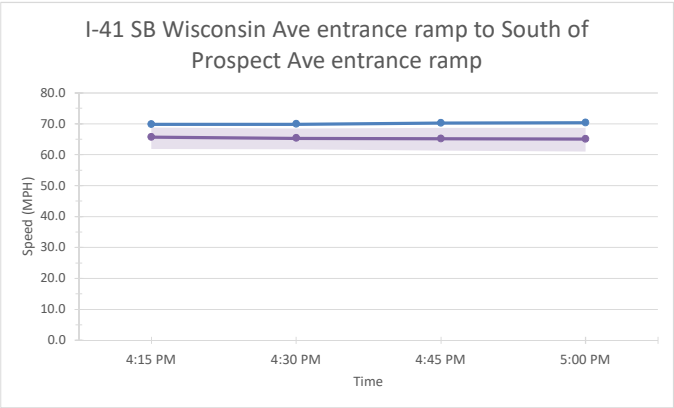
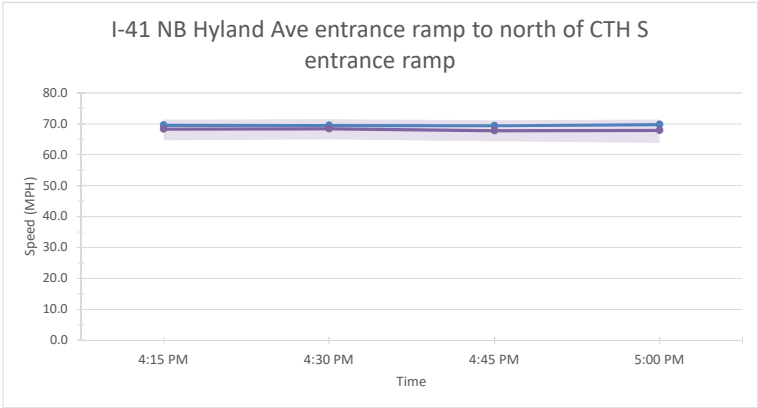
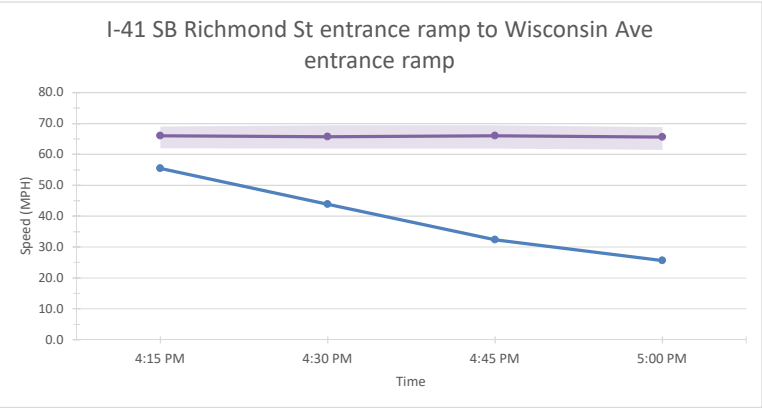
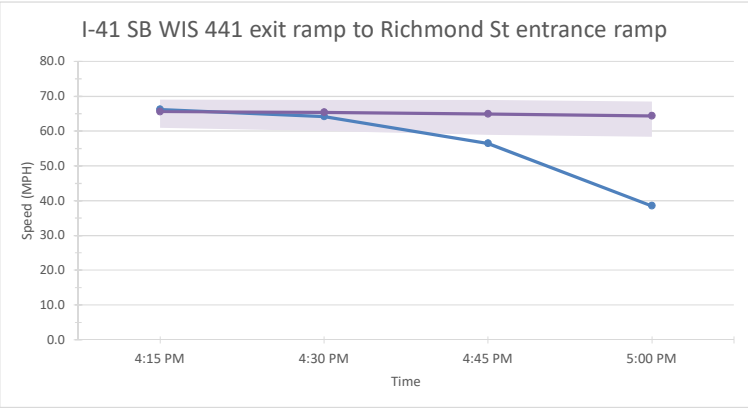
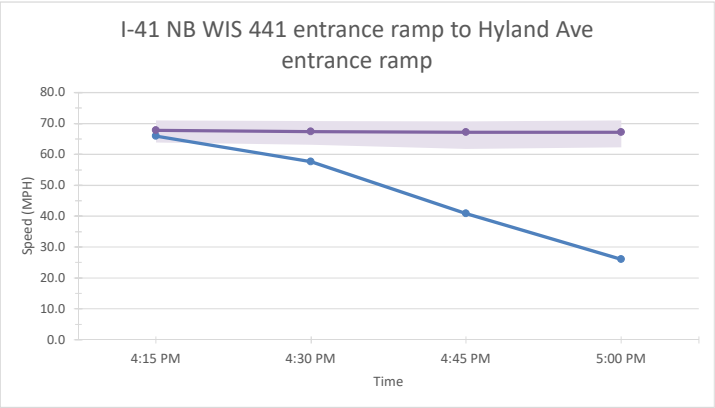
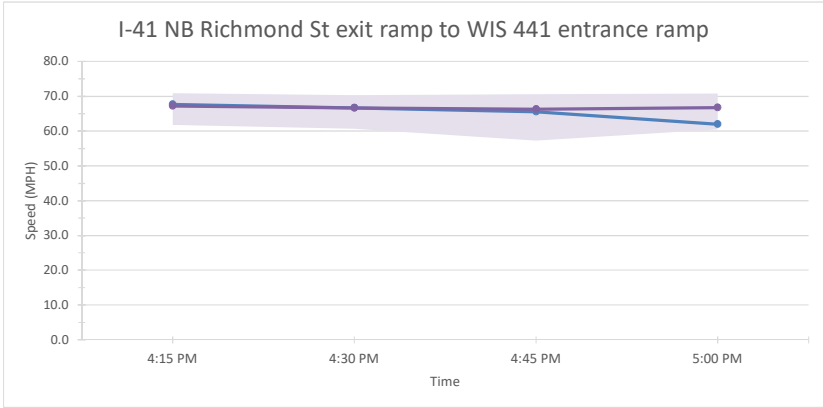
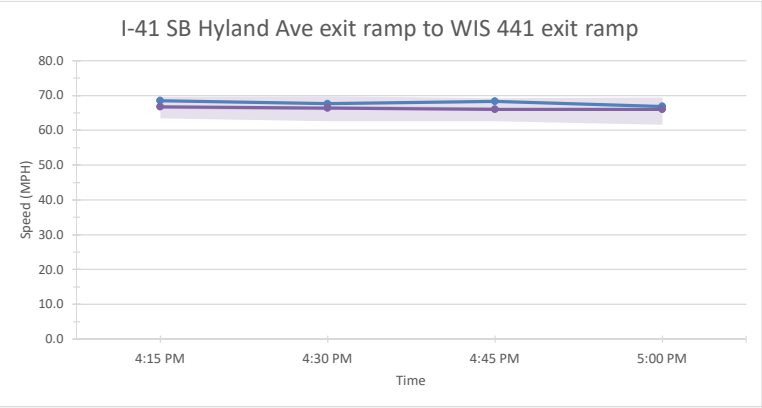
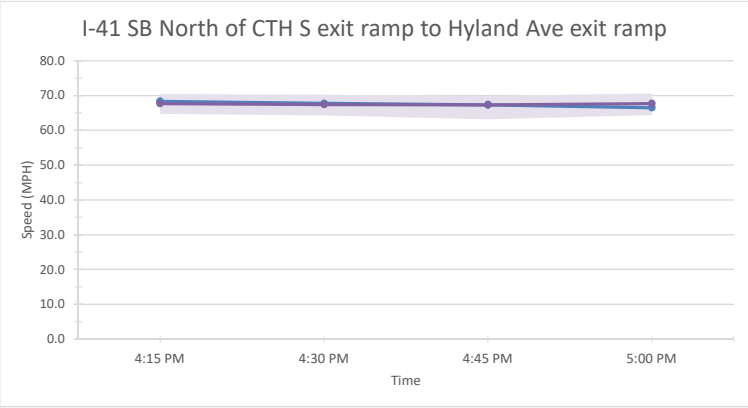
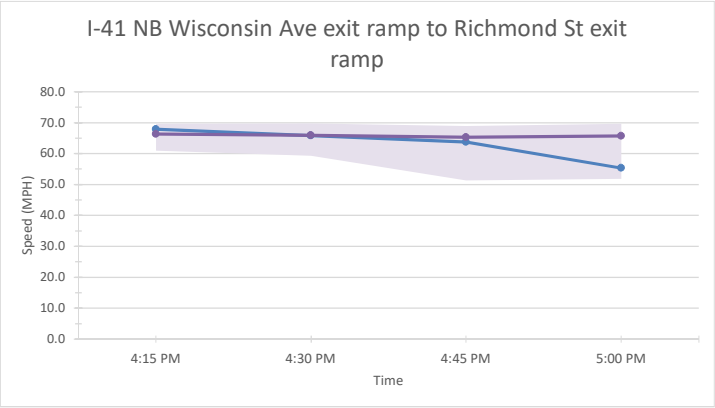
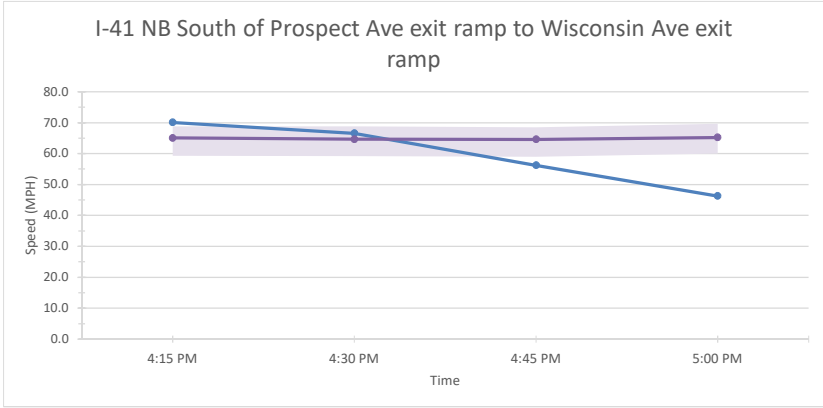
Segment		I-41 NB					Segment		I-41 SB				
		I-41 NB South of Prospect Ave exit ramp to Wisconsin Ave exit ramp	I-41 NB Wisconsin Ave exit ramp to Richmond St exit ramp	I-41 NB Richmond St exit ramp to WIS 441 entrance ramp	I-41 NB WIS 441 entrance ramp to Hyland Ave entrance ramp	I-41 NB Hyland Ave entrance ramp to north of CTH S entrance ramp			I-41 SB North of CTH S exit ramp to Hyland Ave exit ramp	I-41 SB Hyland Ave exit ramp to WIS 441 exit ramp	I-41 SB WIS 441 exit ramp to Richmond St entrance ramp	I-41 SB Richmond St entrance ramp to Wisconsin Ave entrance ramp	I-41 SB Wisconsin Ave entrance ramp to South of Prospect Ave entrance ramp
VISSIM	4:15 PM	70.1	67.9	67.7	65.9	69.6	VISSIM	4:15 PM	68.3	68.5	66.2	55.4	69.9
	4:30 PM	66.6	65.8	66.7	57.6	69.4		4:30 PM	67.7	67.6	64.2	43.9	69.9
	4:45 PM	56.2	63.7	65.6	40.9	69.4		4:45 PM	67.3	68.3	56.5	32.4	70.2
	5:00 PM	46.3	55.3	61.9	26.1	69.7		5:00 PM	66.4	66.9	38.5	25.7	70.3
Field (NPMRDS Average)	4:15 PM	65.0	66.3	67.2	67.8	68.3	Field (NPMRDS Average)	4:15 PM	67.7	66.8	65.6	66.0	65.7
	4:30 PM	64.6	66.0	66.7	67.3	68.4		4:30 PM	67.4	66.4	65.3	65.7	65.3
	4:45 PM	64.6	65.3	66.2	67.1	67.8		4:45 PM	67.3	66.0	64.9	66.0	65.2
	5:00 PM	65.2	65.7	66.7	67.2	67.9		5:00 PM	67.7	66.0	64.3	65.6	65.1
Field (NPMRDS 15th Percentile)	4:15 PM	59.3	60.9	61.8	63.8	64.7	Field (NPMRDS 15th Percentile)	4:15 PM	64.8	63.5	61.0	62.0	61.9
	4:30 PM	59.2	59.3	60.7	63.1	65.0		4:30 PM	64.3	62.6	60.1	61.9	61.8
	4:45 PM	59.0	51.3	57.3	61.7	64.4		4:45 PM	63.2	62.6	58.9	61.9	61.4
	5:00 PM	60.1	51.9	60.5	62.3	63.9		5:00 PM	64.4	61.6	58.4	61.5	61.1
Field (NPMRDS 85th Percentile)	4:15 PM	68.8	69.6	70.8	71.0	71.4	Field (NPMRDS 85th Percentile)	4:15 PM	70.4	69.6	69.1	69.0	68.9
	4:30 PM	68.8	69.8	70.3	70.8	71.6		4:30 PM	70.3	69.7	69.0	69.5	68.6
	4:45 PM	68.5	68.9	70.7	70.7	71.3		4:45 PM	69.9	69.3	68.9	69.5	68.7
	5:00 PM	69.7	69.7	70.8	70.9	71.4		5:00 PM	70.6	69.4	68.5	68.9	68.8

TEOps
Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	20%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts	83%

TEOps
Validation

Test	Data	Target		Model
Tier 1	NPMRDS	RMSPE < 10%		20%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts		83%



I-41 Traffic and Engineering Study
 No Build (2048) PM Peak Period Calibration
Travel Time Comparison

FULL CORRIDOR

Data	Time	I-41 NB
		Average Travel Time (min)
		South of CTH BB to North of CTH S
Distance (mi)		26.59
VISSIM	4:15PM	27.0
NPMRDS	4:15PM	23.8

FULL CORRIDOR

Data	Time	I-41 SB
		Average Travel Time (min)
		North of CTH S to South of CTH BB
Distance (mi)		26.58
VISSIM	4:15PM	27.4
NPMRDS	4:15PM	24.0

SEGMENTS

I-41 NB				
Average Travel Time (minutes)				
South of CTH BB to Wisc Ave Exit	Wisc Ave Exit to Richmond Exit	Richmond Exit to 441 Entrance	441 Entrance to Hyland Entrance	Hyland Entrance to North of CTH S
3.12	4.0	3.49	5.26	10.71
3.2	3.8	3.2	7.5	9.3
2.9	3.7	3.1	4.7	9.4
I-41 SB				
Average Travel Time (minutes)				
North of CTH S to Hyland Exit	Hyland Exit to 441 Exit	441 Exit to Richmond Entrance	Richmond Entrance to Wisc Ave Entrance	Wisc Ave Entrance to South of CTH BB
10.68	5.52	3.25	4.0	3.09
9.5	4.9	3.6	6.7	2.7
9.5	5.0	3.0	3.7	2.8

TEOpS Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	33%
Tier 2	NPMRDS	TT ± 15% for 85% of routes	70%

I-41 Traffic and Engineering Study
No Build (2048) PM Peak Hour Calibration
Merge and Diverge Segment Speeds

Merge/Diverge Links			Vissim Speed				
Forecast ID	Link ID	Description	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2
Merge/Diverge Speeds							
	70	NB I-41 CTH BB diverge	69	67	57	43	59
	74	NB I-41 CTH BB merge	66	66	67	67	67
	76	NB I-41 WIS 125 diverge	69	68	69	68	68
	80	NB I-41 WIS 125merge	67	31	10	7	29
		NB I-41 WIS 96 diverge					
	84	NB I-41 WIS 96 merge	68	69	68	67	68
	--	NB I-41 WIS 15 diverge	--	--	--	--	--
	89	NB I-41 WIS 15 merge	65	60	43	23	48
	91	NB I-41 WIS 47 diverge	68	68	68	66	67
	95	NB I-41 WIS 47 merge	63	58	60	48	57
	418	NB I-41 Ballard diverge	64	64	63	63	63
	100	NB I-41 Ballard merge	66	63	61	61	63
		NB I-41 441 diverge					
	103	NB I-41 441 merge	66	65	61	52	61
	420	NB I-41 CTH N diverge	63	47	11	8	32
	108	NB I-41 CTH N merge	66	66	64	65	65
	422	NB I-41 WIS 55 diverge	66	65	57	14	51
	113	NB I-41 WIS 55 merge	69	64	12	6	38
	417	NB I-41 CTH J diverge	12	7	6	6	8
	118	NB I-41 CTH J merge	66	66	65	66	66
	415	NB I-41 CTH U diverge	69	69	69	69	69
	123	NB I-41 CTH U merge	67	67	67	68	67
	425	NB I-41 CTH S diverge	62	61	62	63	62
	128	NB I-41 CTH S merge	67	67	64	65	66
	426	SB I-41 CTH S diverge	52	53	48	54	52
	21	SB I-41 CTH S merge	63	68	62	65	65
	424	SB I-41 CTH U diverge	47	46	46	44	46
	20	SB I-41 CTH U merge	67	66	67	63	66
	416	SB I-41 CTH J diverge	65	61	36	46	52
	19	SB I-41 CTH J merge	66	67	63	61	64
	423	SB I-41 WIS 55 diverge	65	64	65	63	64
	18	SB I-41 WIS 55 merge	68	67	68	64	67
	421	SB I-41 CTH N diverge	63	61	61	56	60
	26	SB I-41 CTH N merge	68	61	66	66	65
	419	SB I-41 441 diverge	65	65	63	64	64
	36	SB I-41 441 merge	66	64	67	66	65
		SB I-41 Ballard diverge					
	40	SB I-41 Ballard merge	62	44	26	34	41
	42	SB I-41 WIS 47 diverge	68	66	65	43	60
	46	SB I-41 WIS 47 merge	62	64	43	15	46
	48	SB I-41 WIS 15 diverge	12	12	10	12	11
	--	SB I-41 WIS 15 merge	--	--	--	--	--
	53	SB I-41 WIS 96 diverge	69	69	68	68	68
	56	SB I-41 WIS 96 merge	69	69	69	70	69
		SB I-41 WIS 125 diverge					
	61	SB I-41 WIS 125merge	68	69	69	69	69
	63	SB I-41 CTH BB diverge	69	69	70	70	69
	67	SB I-41 CTH BB merge	68	68	69	69	69

DRAFT

APPENDIX P7

Year 2048 No Build with Retimings VISSIM AM Peak Hour

I-41 Traffic and Engineering Study
No Build (2048) with Signal Retiming and Peak Spreading AM Peak Hour Calibration
Freeway Mainline and Ramp Volumes

			% Demand	Segments										Vissim										Difference										RMSPE										RMSE									
			100%	Forecast ID	Link ID	Description	Type	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	TOTAL	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2	7:00-7:15AM3	7:15-7:30AM3	7:30-7:45AM3	7:45-8:00AM3	TOTAL3	7:00-7:15AM6	7:15-7:30AM6	7:30-7:45AM6	7:45-8:00AM6	TOTAL6	7:00-7:15AM5	7:15-7:30AM5	7:30-7:45AM5	7:45-8:00AM5	TOTAL5	7:00-7:15AM4	7:15-7:30AM4	7:30-7:45AM4	7:45-8:00AM4	TOTAL4	7:00-7:15AM7	7:15-7:30AM7	7:30-7:45AM7	7:45-8:00AM7	TOTAL7	7:00-7:15AM8	7:15-7:30AM8	7:30-7:45AM8	7:45-8:00AM8	TOTAL8						
TEOps Validation - 15 minute periods					10001	69	NB I-41 (Southern Project Limits)	MAINLINE	839	952	937	1072	3799.7	832	950	934	1069	3785	-6	-2	-3	-4	-15	1%	0%	0%	0%	0%	0.2	0.1	0.1	0.1	0.2	0.7	0.1	0.1	0.1	0.1	0.2	0.7	0.1	0.1	0.1	0.1	0.2								
Test			Target	10002	72	NB I-41 Exit to CTH BB	RAMP	133	176	194	177	679.9	127	173	191	173	665	-5	-3	-3	-4	-15	4%	2%	1%	2%	2%	0.5	0.2	0.2	0.2	0.3	0.6	0.5	0.2	0.2	0.3	0.6	0.5	0.2	0.2	0.3	0.6	0.5	0.2	0.2	0.3	0.6					
Tier 1			RMSPE < 5%	10003	71	NB I-41 betw CTH BB Exit to CTH BB Ent	MAINLINE	706	776	743	895	3119.8	691	771	740	879	3080	-15	-5	-3	-16	-39	2%	1%	0%	2%	1%	0.6	0.2	0.1	0.5	0.5	0.7	0.6	0.2	0.1	0.5	0.5	0.7	0.6	0.2	0.1	0.5	0.5	0.7	0.6	0.2	0.1	0.5	0.5	0.7		
Tier 2			RSNE < 3 for 85% of links	10004	73	NB I-41 Ent from CTH BB	RAMP	133	142	187	147	609.7	130	140	178	154	605	-3	0	-9	7	-5	3%	0%	5%	5%	1%	0.3	0.0	0.6	0.6	0.2	0.7	0.6	0.2	0.0	0.6	0.6	0.2	0.3	0.0	0.6	0.6	0.2	0.3	0.0	0.6	0.6					
				10005	75	NB I-41 betw CTH BB Exit to WIS 125 Exit	MAINLINE	840	918	930	1042	3729.5	813	915	924	1029	3680	-27	-3	-7	-13	-49	3%	0%	1%	1%	1%	0.9	0.1	0.2	0.4	0.8	0.8	0.8	0.1	0.2	0.4	0.8	0.8	0.1	0.2	0.4	0.8	0.8	0.1	0.2	0.4	0.8	0.8				
				10006	78	NB I-41 Exit to WIS 125	RAMP	116	181	203	241	740.1	111	162	180	215	667	-5	-19	-23	-26	-73	4%	11%	11%	11%	10%	0.5	1.4	1.6	1.7	2.7	2.7	2.7	1.4	1.6	1.7	2.7	2.7	1.4	1.6	1.7	2.7	2.7	1.4	1.6	1.7	2.7	2.7				
TEOps Validation - 60 minute period					10007	77	NB I-41 betw WIS 125 Exit to WIS 125 Ent	MAINLINE	723	737	728	801	2989.4	679	740	720	792	2930	-44	2	-8	-9	-59	1%	0%	1%	1%	2%	1.6	0.1	0.3	0.3	1.1	1.1	1.1	0.1	0.3	0.3	1.1	1.1	0.1	0.3	0.3	1.1	1.1	0.1	0.3	0.3	1.1	1.1			
Test			Target	10008	79	NB I-41 Ent from WIS 125	RAMP	66	86	123	85	359.9	66	86	119	87	358	0	0	-4	2	-2	0%	0%	3%	2%	1%	0.0	0.0	0.0	0.4	0.2	0.1	0.0	0.0	0.4	0.2	0.1	0.0	0.4	0.2	0.1	0.0	0.4	0.2	0.1	0.0	0.4					
Tier 1			RMSPE < 5%	10009	80	NB I-41 betw WIS 125 Ent to WIS 96 Exit	MAINLINE	789	823	851	887	3349.3	731	815	827	868	3241	-59	-8	-23	-19	-109	1%	1%	3%	2%	3%	2.1	0.2	0.3	0.8	0.6	1.9	1.9	1.9	0.2	0.3	0.8	0.6	1.9	1.9	0.2	0.3	0.8	0.6	1.9	1.9						
Tier 2			RSNE < 3 for 85% of links	10010	82	NB I-41 Exit to WIS96	RAMP	145	173	184	238	739.6	145	170	177	226	718	0	-3	-7	-12	-21	0%	2%	4%	5%	3%	0.0	0.2	0.2	0.5	0.8	0.8	0.2	0.2	0.5	0.8	0.2	0.2	0.5	0.8	0.2	0.2	0.5	0.8	0.2	0.2	0.5	0.8				
				10011	81	NB I-41 betw WIS 96 Exit to WIS 96 Ent	MAINLINE	644	650	667	649	2609.7	591	655	664	662	2561	-53	5	-3	-3	-48	4%	1%	0%	0%	2%	2.1	0.2	0.1	0.1	0.1	0.9	0.9	0.1	0.1	0.1	0.1	0.9	0.9	0.1	0.1	0.1	0.1	0.9	0.9	0.1	0.1	0.9				
				10012	83	NB I-41 Ent from WIS 96	RAMP	51	59	84	75	270.2	49	60	84	73	267	-2	1	0	-3	-4	4%	1%	0%	3%	1%	0.3	0.1	0.0	0.3	0.2	0.2	0.3	0.1	0.0	0.3	0.2	0.3	0.1	0.0	0.3	0.2	0.3	0.1	0.0	0.3	0.2	0.3	0.1	0.0		
				10013	85	NB I-41 WIS 96 Ent to WIS 15 Exit	MAINLINE	696	709	751	724	2879.9	636	713	743	730	2822	-59	6	-8	6	-58	4%	1%	1%	1%	2%	2.2	0.1	0.3	0.2	1.1	1.1	1.1	0.1	0.3	0.2	1.1	1.1	0.1	0.3	0.2	1.1	1.1	0.1	0.3	0.2	1.1	1.1				
				10014	87	NB I-41 Exit to WIS15	RAMP	139	189	225	207	760	134	178	213	204	728	-6	-11	-12	-3	-32	4%	6%	5%	1%	4%	0.5	0.8	0.8	0.8	0.2	1.2	1.2	0.5	0.8	0.8	0.2	1.2	1.2	0.5	0.8	0.8	0.2	1.2	1.2	0.5	0.8	0.8				
				10015	86	NB I-41 betw WIS 15 Exit to WIS 15 Ent	MAINLINE	556	520	526	518	2119.9	495	532	525	523	2075	-61	495	12	-1	6	11%	2%	0%	1%	2%	2.6	0.5	0.1	0.2	1.0	1.0	1.0	0.5	0.1	0.2	1.0	1.0	0.5	0.1	0.2	1.0	1.0	0.5	0.1	0.2	1.0	1.0				
				10016	88	NB I-41 Ent from WIS15	RAMP	193	244	261	283	979.9	141	136	157	131	565	-51	-108	-104	-152	-415	27%	44%	40%	14%	42%	3.7	4.4	4.7	4.4	8.8	8.8	4.7	4.4	4.7	4.4	8.8	8.8	4.7	4.4	4.7	4.4	8.8	8.8	4.7	4.4	4.7	4.4	8.8	8.8		
				10017	90	NB I-41 betw WIS 15 Ent to WIS 47 Exit	RAMP	749	764	787	800	3099.8	622	674	686	656	2637	-127	-90	-101	-144	-462	17%	18%	19%	19%	19%	4.4	4.4	4.4	4.4	8.8	8.8	4.4	4.4	4.4	4.4	8.8	8.8	4.4	4.4	4.4	4.4	8.8	8.8	4.4	4.4	4.4	4.4	8.8	8.8		
				10018	93	NB I-41 Exit to WIS47	RAMP	98	117	164	191	569.9	88	96	142	148	468	-10	-21	-43	-49	-122	0%	1%	3%	2%	3%	1.0	1.9	1.9	1.9	3.8	3.8	1.9	1.9	1.9	1.9	3.8	3.8	1.9	1.9	1.9	1.9	3.8	3.8	1.9	1.9	1.9	1.9	3.8	3.8		
				10019	92	NB I-41 betw WIS 47 Exit to WIS 47 Ent	MAINLINE	651	647	673	609	2529.9	510	578	567	510	2165	-140	-69	-56	-100	-365	23%	11%	8%	16%	14%	3.1	2.7	2.3	4.8	2.8	2.8	3.1	2.7	2.3	4.8	2.8	2.8	3.1	2.7	2.3	4.8	2.8	2.8	3.1	2.7	2.3	4.8	2.8	2.8		
				10020	94	NB I-41 Ent from WIS47	RAMP	201	243	196	211	850.4	198	239	198	205	840	-2	-3	1	-6	-10	1%	1%	1%	3%	1%	0.2	0.2	0.1	0.4	0.4	0.4	0.2	0.1	0.4	0.4	0.2	0.1	0.4	0.4	0.2	0.1	0.4	0.4	0.2	0.1	0.4	0.4				
				10021	96	NB I-41 betw WIS 47 Ent to Ballard Exit	MAINLINE	851	890	820	820	3380.3	695	822	769	725	3011	-156	-68	-51	-95	-370	18%	8%	8%	12%	11%	4.3	2.3	1.8	4.3	4.3	4.3	4.3	2.3	1.8	4.3	4.3	4.3	2.3	1.8	4.3	4.3	4.3	2.3	1.8	4.3	4.3	4.3	2.3	1.8		
				10022	98	NB I-41 Exit to Ballard	RAMP	261	311	246	303	1120	196	261	249	243	948	-64	-96	-52	3	-60	23%	17%	1%	24%	11%	4.8	2.9	0.2	4.8	4.8	4.8	2.9	0.2	4.8	4.8	2.9	0.2	4.8	4.8	2.9	0.2	4.8	4.8	2.9	0.2	4.8	4.8				
				10023	97	NB I-41 betw Ballard Exit to Ballard Ent	MAINLINE	590	578	574	518	2260.3	484	548	518	479	2029	-107	-30	-56	-38	-231	18%	5%																													

I-41 Traffic and Engineering Study
No Build (2048) with Signal Retimings and Peak Spreading AM Peak Period Calibration
Intersection Turning Movements

			% Demand	Intersections					Target					Vissim					Difference					RNSE					
			100%	Int ID	Int Name	From Link	To Link	Mvmt	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	TOTAL	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2	7:00-7:15AM3	7:15-7:30AM3	7:30-7:45AM3	7:45-8:00AM3	TOTAL3	7:00-7:15AM5	7:15-7:30AM5	7:30-7:45AM5	7:45-8:00AM5	TOTAL5	
TEOps Validation - 15 minute periods																													
Test	Target		Model	108	SB I-41 & WIS15	303	52	EBL	68	84	48	81	280.2	38	51	33	40	161	-30	-33	-15	-41	-119	2.2	2.2	2.2	2.2	2.1	
Tier 1	RMSPE < 5%		Not Applicable	108	SB I-41 & WIS15	303	304	EBT	302	378	395	486	1560.2	194	212	173	160	740	-107	-166	-222	-326	-821	2.2	2.2	2.2	2.2	2.2	
Tier 2	RSNE < 3 for 75% of turns		89%	108	SB I-41 & WIS15	309	302	WBT	194	192	190	234	809.9	189	188	194	230	801	-6	-4	4	-4	-9	0.4	0.3	0.3	0.2	0.3	
TEOps Validation - 60 minute period																													
Test	Target		Model	108	SB I-41 & WIS15	309	52	WBR	103	110	138	110	460	107	107	133	115	462	4	-3	-4	4	2	0.4	0.2	0.4	0.4	0.1	
Tier 1	RMSPE < 5%		Not Applicable	108	SB I-41 & WIS15	51	304	SBL	56	61	49	50	216.3551975	27	38	32	31	128	-28	-23	-17	-20	-88	2.2	3.0	2.4	2.8	2.2	
Tier 2	RSNE < 3 for 75% of turns		89%	108	SB I-41 & WIS15	51	302	SBR	206	251	281	290	1028.756517	186	186	136	117	625	-20	-65	-145	-174	-404	1.4	2.1	2.2	2.2	2.2	
TEOps Validation - 15 minute periods																													
Test	Target		Model	106	SB I-41 & WIS96	323	325	EBT	115	169	227	209	720.2	116	167	226	207	716	1	-2	-1	-2	-4	0.1	0.2	0.0	0.1	0.2	
Tier 1	RMSPE < 5%		Not Applicable	106	SB I-41 & WIS96	323	57	EBR	47	71	78	85	279.6	47	69	79	86	280	1	-2	1	1	1	0.1	0.2	0.1	0.1	0.0	
Tier 2	RSNE < 3 for 75% of turns		89%	106	SB I-41 & WIS96	332	57	WBL	73	116	117	104	409.9	74	108	118	107	407	1	-8	1	3	-3	0.1	0.8	0.1	0.3	0.1	
TEOps Validation - 60 minute period																													
Test	Target		Model	106	SB I-41 & WIS96	332	334	WBT	138	145	169	268	720	145	141	159	225	670	7	-4	-10	-43	-50	0.6	0.3	0.8	2.6	1.9	
Tier 1	RMSPE < 5%		Not Applicable	106	SB I-41 & WIS96	340	325	SBL	33	38	42	41	152.9258911	36	26	25	20	108	3	-11	-16	-21	-45	0.6	1.8	2.6	2.1	2.2	
Tier 2	RSNE < 3 for 75% of turns		89%	106	SB I-41 & WIS96	340	57	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	
TEOps Validation - 15 minute periods																													
Test	Target		Model	106	SB I-41 & WIS96	340	334	SBR	65	85	84	108	341.9657476	65	58	54	52	230	0	-27	-29	-56	-112	0.0	2.9	2.2	2.2	2.1	
TEOps Validation - 60 minute period																													
Test	Target		Model	104	SB I-41 & WIS125	349	351	EBT	131	147	165	178	619.9	127	147	163	176	613	-4	0	-1	-2	-7	0.3	0.0	0.1	0.1	0.3	
Tier 1	RMSPE < 5%		Not Applicable	104	SB I-41 & WIS125	349	60	EBR	44	52	39	35	170	44	51	40	35	170	0	-1	1	0	0	0.0	0.1	0.2	0.1	0.0	
Tier 2	RSNE < 3 for 75% of turns		89%	104	SB I-41 & WIS125	361	60	WBL	64	76	70	90	299.8	64	73	70	90	298	0	-3	0	0	-2	0.1	0.3	0.0	0.0	0.1	
TEOps Validation - 15 minute periods																													
Test	Target		Model	104	SB I-41 & WIS125	361	363	WBT	107	156	190	258	710	115	151	183	244	694	8	-5	-6	-14	-16	0.8	0.4	0.5	0.8	0.6	
Tier 1	RMSPE < 5%		Not Applicable	104	SB I-41 & WIS125	367	351	SBL	45	53	65	66	228.7629725	38	42	42	40	162	-7	-11	-23	-26	-66	1.0	1.5	2.8	2.2	2.4	
Tier 2	RSNE < 3 for 75% of turns		89%	104	SB I-41 & WIS125	367	60	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	
TEOps Validation - 60 minute period																													
Test	Target		Model	104	SB I-41 & WIS125	367	363	SBR	85	85	123	126	419.7929322	71	77	81	78	306	-15	-9	-42	-48	-114	1.6	0.9	2.2	2.2	2.2	
Tier 1	RMSPE < 5%		Not Applicable	101	SB I-41 & CTHBB	377	381	EBT	153	157	189	172	670.1	153	159	186	175	672	-1	2	-2	3	2	0.0	0.1	0.2	0.3	0.1	
Tier 2	RSNE < 3 for 75% of turns		89%	101	SB I-41 & CTHBB	377	66	EBR	48	53	64	65	230.1	49	52	64	65	230	1	-1	1	0	0	0.1	0.1	0.1	0.0	0.0	
TEOps Validation - 15 minute periods																													
Test	Target		Model	101	SB I-41 & CTHBB	382	66	WBL	39	42	46	34	160	38	42	44	36	159	-1	0	-2	2	-1	0.1	0.0	0.3	0.4	0.0	
Tier 1	RMSPE < 5%		Not Applicable	101	SB I-41 & CTHBB	382	379	WBT	104	142	143	151	539.7	104	138	142	152	537	0	-4	-1	1	-3	0.0	0.3	0.1	0.1	0.1	
Tier 2	RSNE < 3 for 75% of turns		89%	101	SB I-41 & CTHBB	393	381	SBL	22	28	37	45	133.1888027	20	19	25	27	91	-2	-9	-13	-19	-42	0.4	1.7	2.1	2.8	2.2	
TEOps Validation - 60 minute period																													
Test	Target		Model	101	SB I-41 & CTHBB	393	66	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	
Tier 1	RMSPE < 5%		Not Applicable	101	SB I-41 & CTHBB	393	379	SBR	109	136	129	151	524.9169233	101	105	107	100	413	-8	-31	-22	-50	-111	0.8	2.7	1.9	2.1	2.2	
TEOps Validation - 15 minute periods																													
Test	Target		Model	109	NB I-41 & WIS15	304	316	EBL	158	211	197	245	810	110	106	96	94	406	-48	-105	-101	-151	-404	2.2	2.2	2.2	2.2	2.2	
Tier 1	RMSPE < 5%		Not Applicable	109	NB I-41 & WIS15	304	311	EBT	200	228	247	291	966.5551975	109	140	108	101	457	-91	-88	-140	-191	-509	2.2	2.2	2.2	2.2	2.2	
Tier 2	RSNE < 3 for 75% of turns		89%	109	NB I-41 & WIS15	87	308	NBL	63	74	83	50	269.9	64	71	85	53	274	1	-3	2	3	4	0.1	0.3	0.2	0.5	0.2	
TEOps Validation - 60 minute period																													
Test	Target		Model	109	NB I-41 & WIS15	87	316	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	
Tier 1	RMSPE < 5%		Not Applicable	109	NB I-41 & WIS15	87	311	NBR	76	11																			

I-41 Traffic and Engineering Study
No Build (2048) with Signal Retimings and Peak Spreading AM Peak Period Calibration
Intersection Turning Movements

TEOps Validation - 15 minute periods

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	89%

TEOps Validation - 60 minute period

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	81%

Demand 100%	Intersections					Target					Vissim					Difference					RNSE				
	Int ID	Int Name	From Link	To Link	Mvmt	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	TOTAL	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2	7:00-7:15AM3	7:15-7:30AM3	7:30-7:45AM3	7:45-8:00AM3	TOTAL3	7:00-7:15AM5	7:15-7:30AM5	7:30-7:45AM5	7:45-8:00AM5	TOTAL5
	113	CTH N & SB I-41	222	24	NBL	80	61	92	82	314.2546734	79	64	89	83	315	-1	3	-2	1	0	0.1	0.4	0.2	0.1	0.0
	113	CTH N & SB I-41	222	216	NBT	66	100	73	112	350	72	103	74	88	337	6	3	2	-24	-13	0.7	0.3	0.2	2.2	0.7
	113	CTH N & SB I-41	23	220	WBL	34	34	35	37	139.7	50	30	18	23	121	16	-4	-17	-13	-18	2.7	0.7	2.9	2.2	1.6
	113	CTH N & SB I-41	23	24	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	113	CTH N & SB I-41	23	216	WBR	24	20	48	37	130.1	38	20	12	25	96	14	0	-36	-12	-34	2.8	0.0	2.2	2.0	2.2
	113	CTH N & SB I-41	217	220	SBT	78	83	67	71	299.9	77	84	67	71	299	-1	1	-1	-1	-1	0.1	0.2	0.1	0.1	0.1
	113	CTH N & SB I-41	217	24	SBR	80	84	93	107	364.1816395	80	83	93	105	361	0	-1	0	-2	-3	0.0	0.1	0.0	0.1	0.2
	114	CTH N & NB I-41	224	221	EBL	46	36	25	43	150	52	37	27	22	139	7	1	2	-21	-11	1.0	0.2	0.4	2.2	0.9
	114	CTH N & NB I-41	224	107	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	114	CTH N & NB I-41	224	227	EBR	42	29	54	56	180.3	43	34	27	41	145	1	5	-27	-15	-35	0.2	0.9	2.2	2.0	2.6
	114	CTH N & NB I-41	229	221	NBT	100	125	139	150	514.2546734	97	127	139	149	512	-3	3	0	-2	-2	0.3	0.2	0.0	0.1	0.1
	114	CTH N & NB I-41	229	107	NBR	55	63	55	47	220.1	54	62	57	47	220	-1	-1	2	1	0	0.1	0.2	0.2	0.1	0.0
	114	CTH N & NB I-41	223	107	SBL	50	55	36	39	179.8	48	55	36	39	178	-2	0	0	1	-2	0.3	0.0	0.0	0.1	0.1
	114	CTH N & NB I-41	223	227	SBT	63	62	66	70	259.8	80	59	49	55	243	17	-2	-17	-15	-17	2.2	0.3	2.1	1.8	1.1
	115	WIS55 & SB I-41	187	16	NBL	56	77	75	68	276.687858	55	75	76	69	275	-1	-2	1	1	-1	0.1	0.2	0.1	0.1	0.1
	115	WIS55 & SB I-41	187	184	NBT	83	81	133	103	399.9	85	81	127	100	393	3	0	-6	-3	-7	0.3	0.0	0.5	0.3	0.4
	115	WIS55 & SB I-41	15	186	WBL	19	26	20	24	89.7	32	22	19	10	83	13	-4	-1	-15	-6	2.9	0.7	0.1	3.0	0.7
	115	WIS55 & SB I-41	15	16	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	115	WIS55 & SB I-41	15	184	WBR	67	12	33	9	120	25	45	12	15	98	-41	34	-21	6	-22	0.2	0.0	2.2	2.1	2.0
	115	WIS55 & SB I-41	183	186	SBT	58	101	63	89	309.9	57	98	65	87	308	0	-3	2	-1	-2	0.0	0.3	0.3	0.1	0.1
	115	WIS55 & SB I-41	183	16	SBR	50	49	67	50	215.8200031	49	48	66	51	214	-1	-1	-1	1	-2	0.1	0.2	0.1	0.1	0.1
	116	WIS55 & NB I-41	111	187	EBL	16	17	17	19	70	21	16	15	13	65	4	-1	-3	-6	-5	1.1	0.3	0.6	1.4	0.6
	116	WIS55 & NB I-41	111	112	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	116	WIS55 & NB I-41	111	188	EBR	67	80	66	87	300.3	68	71	56	58	253	0	-9	-10	-28	-47	0.1	1.0	1.3	2.0	2.7
	116	WIS55 & NB I-41	200	187	NBT	123	141	191	152	606.587858	121	139	191	154	605	-2	-2	0	2	-1	0.1	0.1	0.0	0.1	0.1
	116	WIS55 & NB I-41	200	112	NBR	40	31	45	44	160	40	31	44	45	160	0	0	-1	1	0	0.0	0.1	0.1	0.1	0.0
	116	WIS55 & NB I-41	186	112	SBL	31	4	1	24	59.9	29	6	1	22	59	-2	2	0	-2	-1	0.4	1.1	0.2	0.3	0.2
	116	WIS55 & NB I-41	186	188	SBT	46	123	82	89	339.7	60	113	86	74	333	14	-10	4	-15	-7	2.0	0.9	0.4	1.5	0.4
	117	CTH J & SB I-41	182	197	NBL	46	57	54	59	215.8497605	38	59	51	54	201	-8	2	-3	-5	-15	1.2	0.2	0.4	0.7	1.0
	117	CTH J & SB I-41	182	189	NBT	113	70	98	128	409.7	110	79	75	94	357	-4	9	-23	-35	-52	0.3	1.1	2.3	2.2	2.6
	117	CTH J & SB I-41	196	191	WBL	40	47	29	24	140	35	44	40	15	134	-5	-3	11	-9	-6	0.8	0.5	2.1	1.9	0.5
	117	CTH J & SB I-41	196	197	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	117	CTH J & SB I-41	196	189	WBR	27	18	36	30	110	34	25	23	17	101	8	8	-12	-12	-9	1.5	1.8	2.1	2.3	0.9
	117	CTH J & SB I-41	190	191	SBT	48	44	62	56	210.4	49	43	62	54	208	1	-1	-1	-1	-2	0.1	0.1	0.1	0.2	0.2
	117	CTH J & SB I-41	190	197	SBR	98	73	93	80	343.5539606	95	73	94	78	339	-3	0	2	-3	-4	0.3	0.0	0.2	0.3	0.2
	118	CTH J & NB I-41	199	182	EBL	55	46	59	80	239.7	55	47	37	53	191	0	1	-22	-27	-48	0.0	0.2	2.9	2.2	2.2
	118	CTH J & NB I-41	199	198	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	118	CTH J & NB I-41	199	192	EBR	42	36	45	28	150	28	34	33	32	128	-14	-1	-12	5	-22	2.1	0.2	1.8	0.9	1.8
	118	CTH J & NB I-41	174	182	NBT	104	81	93	107	385.8497605	93	90	88	96	368	-11	9	-5	-11	-18	1.1	1.0	0.5	1.0	0.9
	118	CTH J & NB I-41	174	198	NBR	107	111	117	97	430.2	96	109	113	90	409	-10	-2	-3	-6	-22	1.0	0.2	0.3	0.6	1.0
	118	CTH J & NB I-41	191	198	SBL	27	26	34	32	120.3	27	27	33	32	119	-1	1	-1	0	-1	0.1	0.1	0.2	0.0	0.1
	118	CTH J & NB I-41	191	192	SBT	61	65	57	47	230.1	56	61	69	37	223	-5	-4	12	-10	-7	0.6	0.5	1.5	1.5	0.5
	119	CTH U & SB I-41	166	8	NBL	26	25	20	19	89.09641014	27	24	19	19	89	1	-1	-1	1	0	0.1	0.1	0.2	0.1	0.0
	119	CTH U & SB I-41	166	167	NBT	6	23	37	84	150.1	6	17	41	45	109	0	-6	4	-39	-41	0.1	1.3	0.6	2.2	2.2
	119	CTH U & SB I-41	7	159	WBL	31	46	45	29	150	27	39	44	35	145	-4	-6	-1	6	-5	0.7	0.9	0.1	1.2	0.4
	119	CTH U & SB I-41	7	8	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0</				

I-41 Traffic and Engineering Study
 No Build (2048) with Signal Retimings and Peak Spreading AM Peak Period Calibration
Lane Utilization Comparison

I-41 NB															
Location		I-41 NB south of CTH BB			I-41 NB betw WIS 125 & WIS 96				I-41 NB betw CTH E & WIS 441			I-41 NB betw WIS 441 & CTH N		I-41 NB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
Field VISSIM (ATR)	7:00 AM	30%	30%	40%	26%	30%	36%	8%	37%	39%	24%	48%	52%	50%	50%
	7:15 AM	29%	30%	41%	26%	29%	35%	9%	37%	36%	26%	50%	50%	51%	49%
	7:30 AM	29%	30%	42%	25%	29%	36%	10%	36%	36%	28%	48%	52%	51%	49%
	7:45 AM	30%	31%	39%	26%	28%	35%	12%	35%	37%	28%	48%	52%	51%	49%
	7:00 AM	39%	36%	25%	12%	25%	35%	28%	25%	32%	43%	45%	55%	39%	61%
	7:15 AM	37%	35%	28%	14%	24%	33%	30%	26%	29%	45%	43%	57%	38%	62%
	7:30 AM	36%	36%	29%	13%	25%	32%	30%	27%	29%	44%	42%	58%	38%	62%
	7:45 AM	36%	33%	31%	14%	26%	31%	30%	31%	28%	41%	48%	52%	40%	60%
VISSIM	Avg	29%	30%	40%	26%	29%	36%	10%	37%	37%	26%	49%	51%	51%	49%
Field	Avg	37%	35%	28%	13%	25%	32%	29%	27%	29%	43%	45%	55%	39%	61%

I-41 SB															
Location		I-41 SB south of CTH BB			I-41 SB betw WIS 125 & WIS 96				I-41 SB betw CTH E & WIS 441			I-41 SB betw WIS 441 & CTH N		I-41 SB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
Field VISSIM (ATR)	7:00 AM	32%	36%	32%	25%	32%	37%	6%	39%	27%	34%	50%	50%	50%	50%
	7:15 AM	33%	35%	32%	24%	30%	39%	7%	40%	26%	34%	51%	49%	49%	51%
	7:30 AM	33%	35%	32%	23%	30%	39%	9%	39%	27%	34%	52%	48%	49%	51%
	7:45 AM	31%	35%	33%	22%	30%	39%	9%	38%	28%	34%	51%	49%	49%	51%
	7:00 AM	26%	39%	35%	7%	25%	33%	34%	27%	33%	40%	45%	55%	42%	58%
	7:15 AM	26%	37%	38%	8%	25%	31%	36%	26%	32%	42%	44%	56%	40%	60%
	7:30 AM	25%	36%	39%	9%	24%	31%	36%	28%	31%	41%	43%	57%	41%	59%
	7:45 AM	28%	36%	36%	12%	26%	29%	33%	29%	32%	39%	45%	55%	45%	55%
VISSIM	Avg	32%	35%	33%	23%	30%	38%	8%	39%	27%	34%	51%	49%	49%	51%
Field	Avg	26%	37%	37%	9%	25%	31%	35%	28%	32%	41%	44%	56%	42%	58%

TEOps Validation

Test	Data	Target	Model
Tier 1	--	Not Applicable	--
Tier 2	ATR	RNSE < 3.0 for 85% of data points	32%

I-41 Traffic and Engineering Study
No Build (2048) with Signal Retimings and Peak Spreading AM Peak Period Calibration
Mainline Speed Comparison

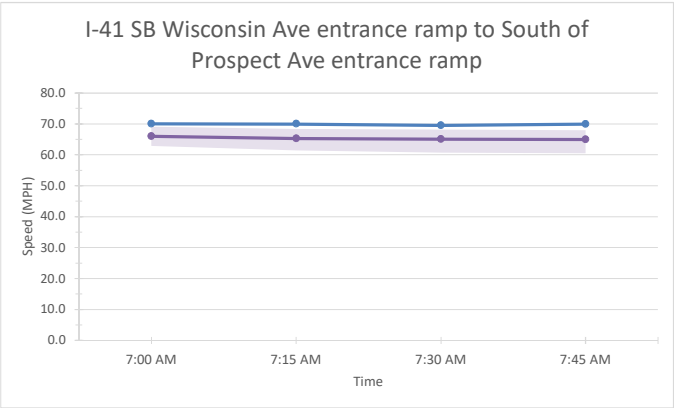
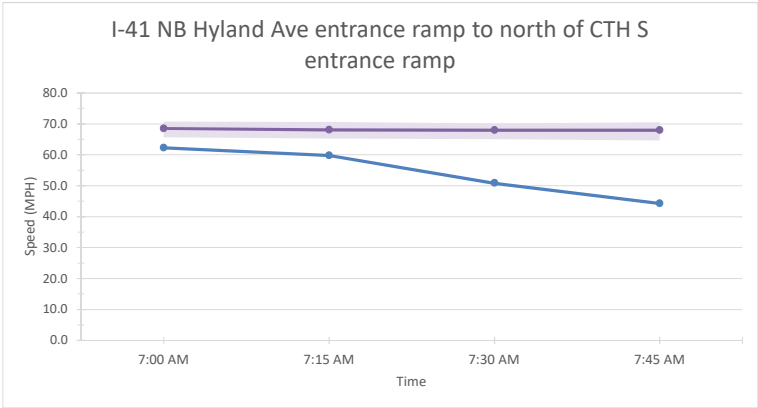
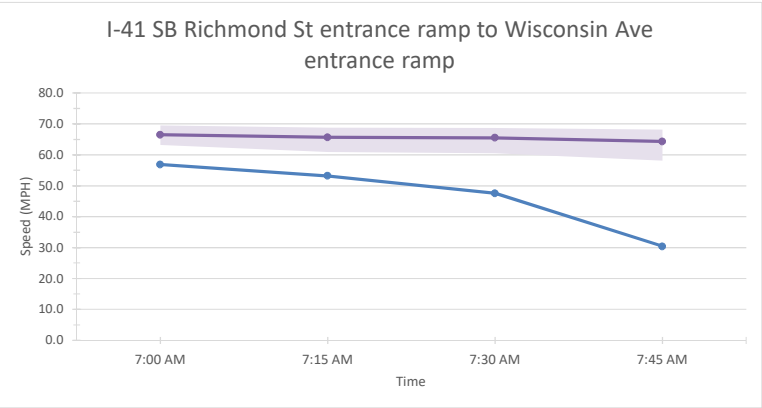
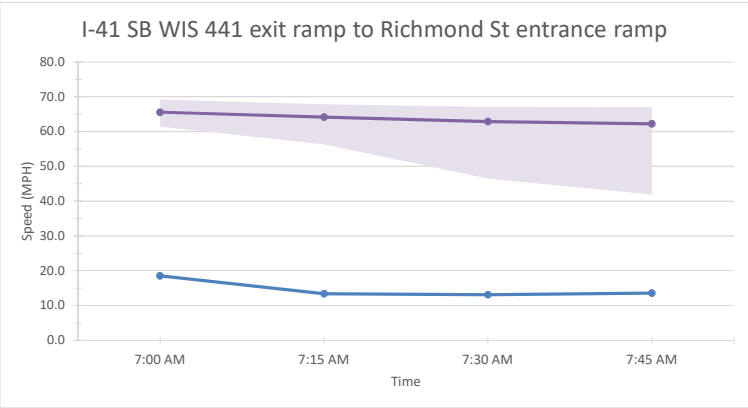
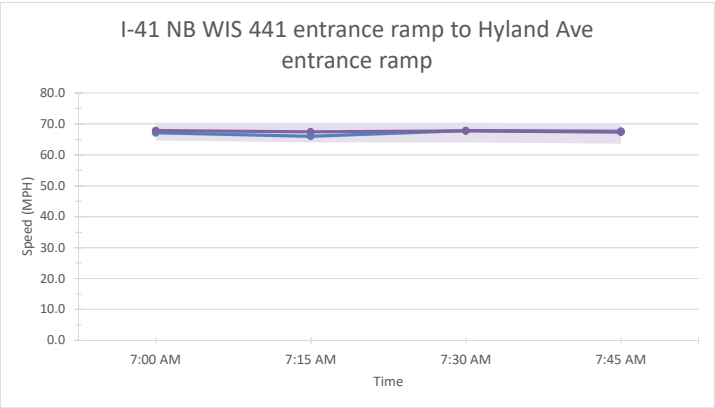
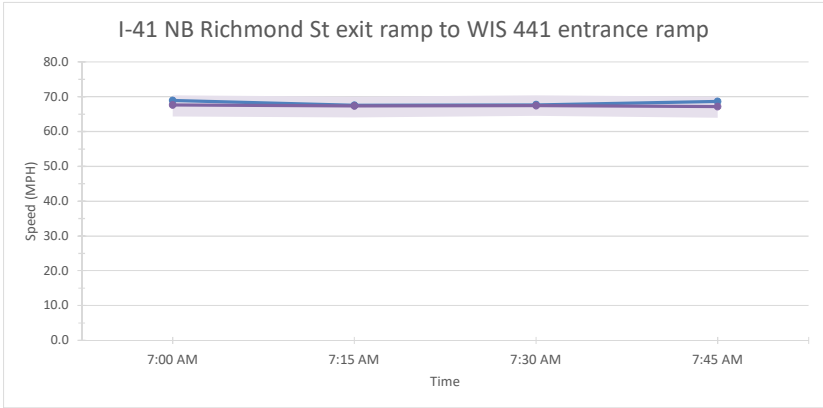
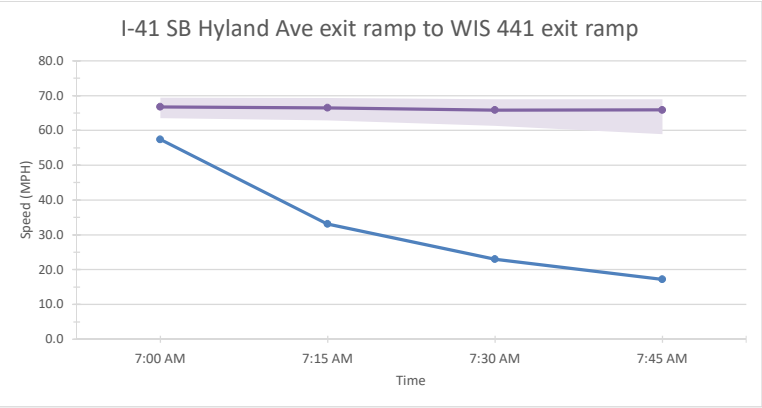
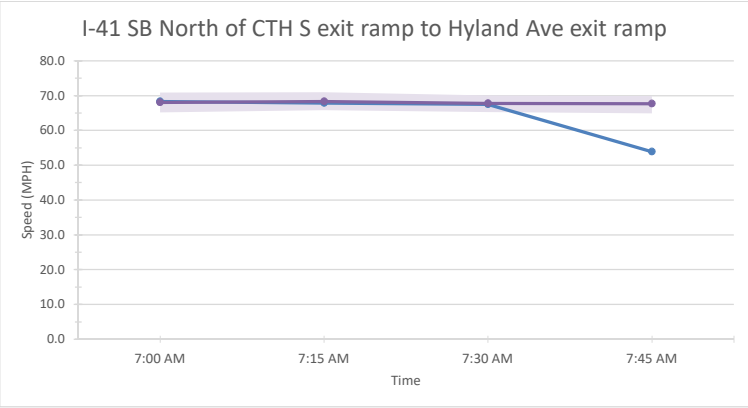
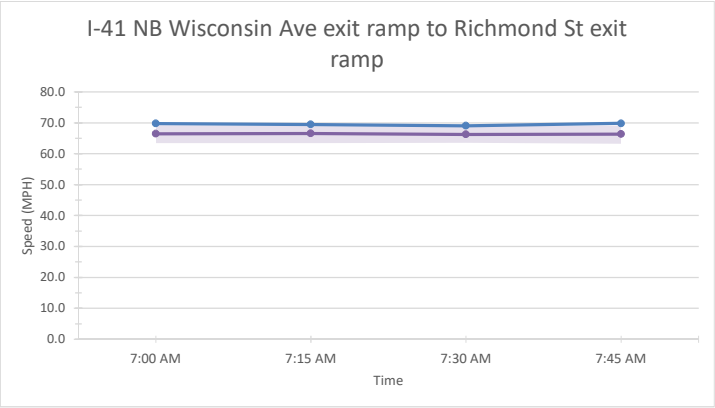
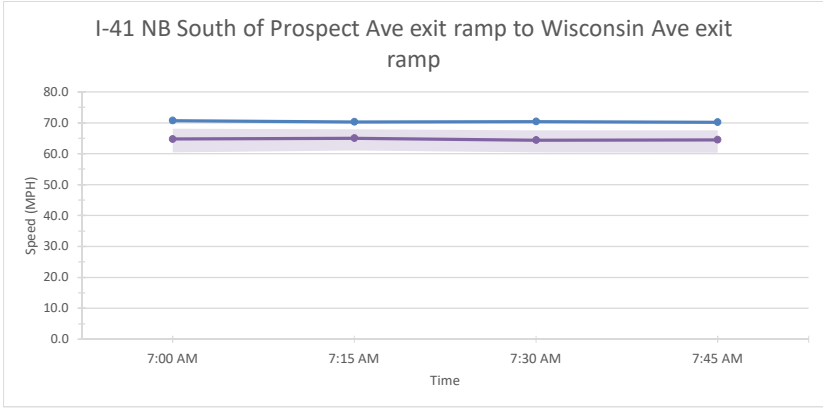
Segment		I-41 NB						I-41 SB					
		I-41 NB South of Prospect Ave exit ramp to Wisconsin Ave exit ramp	I-41 NB Wisconsin Ave exit ramp to Richmond St exit ramp	I-41 NB Richmond St exit ramp to WIS 441 entrance ramp	I-41 NB WIS 441 entrance ramp to Hyland Ave entrance ramp	I-41 NB Hyland Ave entrance ramp to north of CTH S entrance ramp		I-41 SB North of CTH S exit ramp to Hyland Ave exit ramp	I-41 SB Hyland Ave exit ramp to WIS 441 exit ramp	I-41 SB WIS 441 exit ramp to Richmond St entrance ramp	I-41 SB Richmond St entrance ramp to Wisconsin Ave entrance ramp	I-41 SB Wisconsin Ave entrance ramp to South of Prospect Ave entrance ramp	
VISSIM	7:00 AM	70.7	69.8	69.0	67.1	62.2		68.3	57.4	18.6	56.9	70.1	
	7:15 AM	70.3	69.5	67.6	66.0	59.8		67.8	33.1	13.4	53.2	70.0	
	7:30 AM	70.4	69.0	67.7	67.9	50.9		67.5	23.0	13.2	47.6	69.6	
	7:45 AM	70.2	69.8	68.6	67.6	44.3		53.9	17.2	13.6	30.4	70.0	
Field (NPMRDS Average)	7:00 AM	64.7	66.4	67.7	67.9	68.5		68.0	66.8	65.6	66.5	66.0	
	7:15 AM	65.0	66.6	67.4	67.5	68.1		68.3	66.5	64.2	65.7	65.3	
	7:30 AM	64.3	66.2	67.5	67.7	68.0		67.8	65.8	62.9	65.5	65.1	
	7:45 AM	64.5	66.3	67.1	67.3	68.0		67.7	65.9	62.2	64.3	65.0	
Field (NPMRDS 15th Percentile)	7:00 AM	60.5	63.4	64.3	64.7	65.8		65.2	63.6	61.4	63.2	62.9	
	7:15 AM	61.1	63.4	64.1	64.0	65.3		65.9	62.9	56.4	61.0	61.5	
	7:30 AM	60.4	63.5	64.5	64.0	65.1		65.3	61.4	48.6	60.5	60.8	
	7:45 AM	60.3	63.2	64.0	63.6	64.7		64.9	59.0	41.9	58.1	60.6	
Field (NPMRDS 85th Percentile)	7:00 AM	68.1	69.2	70.4	70.5	70.8		70.9	69.4	69.2	69.5	69.1	
	7:15 AM	67.9	68.9	70.1	70.4	70.7		70.9	69.3	67.8	68.8	68.4	
	7:30 AM	67.5	68.9	70.4	70.5	70.2		70.1	69.0	67.1	68.6	68.2	
	7:45 AM	67.5	69.1	70.0	70.1	70.6		69.9	68.9	67.0	68.1	68.0	

TEOps Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	33%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts	73%

TEOps Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	33%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts	73%



I-41 Traffic and Engineering Study
No Build (2048) with Signal Retimings and Peak Spreading AM Peak Period Calibration
Travel Time Comparison

FULL CORRIDOR

Data	Time	I-41 NB
		Average Travel Time (min)
		South of CTH BB to North of CTH S
		Distance (mi)
		26.59
VISSIM	7:00AM	25.9
NPMRDS	7:00AM	23.7



Data	Time	I-41 SB
		Average Travel Time (min)
		North of CTH S to South of CTH BB
		Distance (mi)
		26.58
VISSIM	7:00AM	44.1
NPMRDS	7:00AM	24.0

SEGMENTS

I-41 NB				
Average Travel Time (minutes)				
South of CTH BB to Wisc Ave Exit	Wisc Ave Exit to Richmond Exit	Richmond Exit to 441 Entrance	441 Entrance to Hyland Entrance	Hyland Entrance to North of CTH S
3.12	4.0	3.49	5.26	10.71
2.7	3.5	3.1	4.7	12.1
2.9	3.6	3.1	4.7	9.4
I-41 SB				
Average Travel Time (minutes)				
North of CTH S to Hyland Exit	Hyland Exit to 441 Exit	441 Exit to Richmond Entrance	Richmond Entrance to Wisc Ave Entrance	Wisc Ave Entrance to South of CTH BB
10.68	5.52	3.25	4.0	3.09
10.1	12.4	13.5	5.5	2.7
9.4	5.0	3.1	3.7	2.8

TEOpS Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	119%
Tier 2	NPMRDS	TT ± 15% for 85% of routes	60%

I-41 Traffic and Engineering Study
No Build (2048) with Signal Retimings and Peak Spreading AM Peak Hour Calibration
Merge and Diverge Segment Speeds

Merge/Diverge Links			Vissim Speed				
Forecast ID	Link ID	Description	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2
Merge/Diverge Speeds							
	70	NB I-41 CTH BB diverge	70	69	70	69	69
	74	NB I-41 CTH BB merge	70	70	69	69	69
	76	NB I-41 WIS 125 diverge	70	69	69	68	69
	80	NB I-41 WIS 125merge	69	68	68	68	68
		NB I-41 WIS 96 diverge					
	84	NB I-41 WIS 96 merge	70	70	70	70	70
	--	NB I-41 WIS 15 diverge	--	--	--	--	--
	89	NB I-41 WIS 15 merge	69	69	68	69	69
	91	NB I-41 WIS 47 diverge	69	68	69	69	69
	95	NB I-41 WIS 47 merge	66	64	65	66	65
	418	NB I-41 Ballard diverge	63	52	55	63	58
	100	NB I-41 Ballard merge	67	66	66	67	66
		NB I-41 441 diverge					
	103	NB I-41 441 merge	62	59	62	65	62
	420	NB I-41 CTH N diverge	63	64	66	66	65
	108	NB I-41 CTH N merge	61	55	61	65	61
	422	NB I-41 WIS 55 diverge	64	61	65	66	64
	113	NB I-41 WIS 55 merge	67	65	69	66	67
	417	NB I-41 CTH J diverge	63	60	62	62	62
	118	NB I-41 CTH J merge	62	57	55	63	59
	415	NB I-41 CTH U diverge	63	61	62	63	62
	123	NB I-41 CTH U merge	58	35	20	26	35
	425	NB I-41 CTH S diverge	56	36	20	24	34
	128	NB I-41 CTH S merge	22	18	18	20	19
	426	SB I-41 CTH S diverge	60	56	59	60	59
	21	SB I-41 CTH S merge	68	65	63	68	66
	424	SB I-41 CTH U diverge	50	50	46	51	49
	20	SB I-41 CTH U merge	65	65	61	63	64
	416	SB I-41 CTH J diverge	65	66	62	7	50
	19	SB I-41 CTH J merge	59	46	30	4	35
	423	SB I-41 WIS 55 diverge	60	56	18	7	35
	18	SB I-41 WIS 55 merge	63	57	12	8	35
	421	SB I-41 CTH N diverge	59	28	10	13	27
	26	SB I-41 CTH N merge	48	16	9	13	21
	419	SB I-41 441 diverge	19	11	13	15	15
	36	SB I-41 441 merge	10	9	10	10	10
		SB I-41 Ballard diverge					
	40	SB I-41 Ballard merge	13	11	14	13	13
	42	SB I-41 WIS 47 diverge	17	17	18	15	17
	46	SB I-41 WIS 47 merge	18	18	18	14	17
	48	SB I-41 WIS 15 diverge	56	39	16	9	30
	--	SB I-41 WIS 15 merge	--	--	--	--	--
	53	SB I-41 WIS 96 diverge	69	69	69	69	69
	56	SB I-41 WIS 96 merge	69	68	68	68	68
		SB I-41 WIS 125 diverge					
	61	SB I-41 WIS 125merge	69	69	69	69	69
	63	SB I-41 CTH BB diverge	69	69	66	69	68
	67	SB I-41 CTH BB merge	69	69	69	69	69

DRAFT

APPENDIX P8

Year 2048 No Build with Retimings VISSIM PM Peak Hour

I-41 Traffic and Engineering Study
No Build (2048) with Signal Retimings and Peak Spreading *PM Peak Hour Calibration*
Freeway Mainline and Ramp Volumes

[illegible]

I-41 Traffic and Engineering Study
No Build (2048) with Signal Retimings and Peak Spreading PM Peak Period Calibration
Intersection Turning Movements

			% Demand	Intersections						Target					Vissim					Difference					RNSE				
			100%	Int ID	Int Name	Forecast ID	From Link	To Link	Mvmt	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	TOTAL	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2	4:15-4:30PM3	4:30-4:45PM3	4:45-5:00PM3	5:00-5:15PM3	TOTAL3	4:15-4:30PM5	4:30-4:45PM5	4:45-5:00PM5	5:00-5:15PM5	TOTAL5
TEOps Validation - 15 minute periods				108	SB I-41 & WIS15	8EBL	303	52	EBL	109	86	53	71	320	29	26	29	25	109	-80	-60	-24	-46	-211	2.7	2.4	2.4	2.2	21.3
Test	Target	Model		108	SB I-41 & WIS15	8EBT	303	304	EBT	543	602	501	460	2107	137	151	140	138	565	-407	-451	-360	-323	-1541	2.2	2.2	2.2	2.2	21.2
Tier 1	RMSPE < 5%	Not Applicable		108	SB I-41 & WIS15	8WBT	309	302	WBT	391	365	378	337	1470	366	354	366	315	1401	-25	-10	-13	-22	-70	1.3	0.5	0.6	1.2	1.8
Tier 2	RSNE < 3 for 75% of turns	54%		108	SB I-41 & WIS15	8WBR	309	52	WBR	122	118	163	168	570	114	121	138	160	533	-8	4	-25	-8	-37	0.7	0.3	1.9	0.6	1.5
				108	SB I-41 & WIS15	8SBL	51	304	SBL	29	46	45	60	180	30	23	27	25	105	1	-23	-18	-34	-75	0.2	2.4	2.7	2.3	2.6
				108	SB I-41 & WIS15	8SBR	51	302	SBR	288	304	302	307	1200	179	167	183	192	721	-109	-137	-119	-114	-479	2.4	2.8	2.8	2.3	21.9
TEOps Validation - 60 minute period				106	SB I-41 & WIS96	6EBT	323	325	EBT	400	440	433	466	1739	392	388	394	388	1562	-8	-52	-39	-77	-177	0.4	2.5	1.9	2.4	2.7
Test	Target	Model		106	SB I-41 & WIS96	6EBR	323	57	EBR	132	150	118	161	560	111	131	125	115	483	-21	-19	8	-45	-77	1.8	1.5	0.7	2.2	2.7
Tier 1	RMSPE < 5%	Not Applicable		106	SB I-41 & WIS96	6WBL	332	57	WBL	150	177	174	140	640	134	144	135	144	558	-15	-32	-38	4	-82	1.3	2.4	2.9	0.4	2.7
Tier 2	RSNE < 3 for 75% of turns	52%		106	SB I-41 & WIS96	6WBT	332	334	WBT	407	485	439	459	1790	376	371	375	371	1493	-31	-114	-64	-88	-297	1.5	2.7	2.1	2.1	2.2
				106	SB I-41 & WIS96	6SBL	340	325	SBL	55	48	60	57	220	29	32	35	34	129	-26	-16	-25	-24	-91	2.4	2.3	2.2	2.2	2.2
				106	SB I-41 & WIS96	6SBR	340	334	SBR	163	133	163	152	610	74	82	93	103	351	-89	-51	-70	-49	-259	2.2	2.2	2.2	2.2	2.2
				104	SB I-41 & WIS125	4EBT	349	351	EBT	357	411	363	422	1553	353	369	351	299	1371	-4	-42	-12	-123	-181	0.2	2.1	0.6	2.2	2.2
				104	SB I-41 & WIS125	4EBR	349	60	EBR	148	170	142	171	630	148	154	142	123	567	0	-15	1	-48	-63	0.0	1.2	0.1	2.7	2.5
				104	SB I-41 & WIS125	4WBL	361	60	WBL	111	119	100	111	440	103	103	96	89	392	-7	-15	-4	-22	-48	0.7	1.4	0.4	2.1	2.3
				104	SB I-41 & WIS125	4WBT	361	363	WBT	382	388	403	377	1550	352	355	362	349	1418	-30	-32	-41	-29	-133	1.5	1.6	2.1	1.5	2.2
				104	SB I-41 & WIS125	4SBL	367	351	SBL	46	47	76	51	219	40	37	41	45	164	-6	-10	-34	-5	-56	0.8	1.5	2.2	0.8	2.2
				104	SB I-41 & WIS125	4SBR	367	360	SBR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				104	SB I-41 & WIS125	4SBR	367	363	SBR	73	64	78	55	270	58	61	50	51	220	-14	-2	-28	-5	-50	1.7	0.3	2.2	0.6	2.2
				101	SB I-41 & CTHB8	1EBT	377	381	EBT	225	247	260	274	1008	209	204	175	220	809	-16	-43	-85	-54	-199	1.1	2.8	2.4	2.3	2.2
				101	SB I-41 & CTHB8	1EBR	377	66	EBR	109	103	112	116	440	105	84	79	93	361	-4	-19	-34	-23	-79	0.4	1.9	2.2	2.1	2.2
				101	SB I-41 & CTHB8	1WBL	382	66	WBL	91	89	81	80	340	97	77	87	71	332	6	-11	7	-9	-8	0.6	1.2	0.8	1.0	0.4
				101	SB I-41 & CTHB8	1WBT	382	379	WBT	92	117	114	107	430	101	95	124	100	420	9	-22	11	-7	-10	1.0	2.0	1.0	0.7	0.5
				101	SB I-41 & CTHB8	1SBL	393	381	SBL	57	49	37	37	179	31	38	36	32	138	-25	-11	-1	-4	-42	2.4	1.5	0.2	0.7	2.2
				101	SB I-41 & CTHB8	1SBR	393	379	SBR	73	95	109	94	370	62	68	70	76	276	-10	-27	-39	-18	-94	1.2	2.8	2.2	2.2	2.2
				109	NB I-41 & WIS15	9EBL	304	316	EBL	314	335	267	261	1177	82	86	80	83	331	-231	-250	-187	-177	-845	21.1	21.2	21.2	21.2	21.2
				109	NB I-41 & WIS15	9EBT	304	311	EBT	259	313	278	259	1110	87	89	84	84	343	-172	-225	-195	-176	-767	22.2	22.2	22.2	22.2	22.2
				109	NB I-41 & WIS15	9NBL	87	308	NBL	117	127	72	105	420	98	113	97	64	372	-19	-14	26	-41	-48	1.8	1.3	2.2	2.2	2.4
				109	NB I-41 & WIS15	9NBT	87	316	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				109	NB I-41 & WIS15	9NBR	87	311	NBR	206	226	236	232	900	196	206	203	191	797	-10	-21	-32	-41	-103	0.7	1.4	2.1	2.7	2.2
				109	NB I-41 & WIS15	9WBT	10338	308	WBT	396	356	470	399	1620	388	359	398	412	1556	-8	4	-72	13	-64	0.4	0.2	2.2	0.6	1.6
				109	NB I-41 & WIS15	9WBR	10338	315	WBR	104	70	65	82	322	99	73	57	84	313	-5	3	-8	2	-9	0.5	0.3	1.0	0.2	0.5
				107	NB I-41 & WIS96	7EBL	325	83	EBL	184	197	195	233	809	179	179	172	177	707	-5	-18	-23	-56	-102	0.4	1.3	1.6	2.7	2.4
				107	NB I-41 & WIS96	7EBT	325	337	EBT	272	290	298	290	1150	245	240	254	244	983	-27	-50	-44	-46	-166	1.6	2.9	2.5	2.7	2.7
				107	NB I-41 & WIS96	7NBL	343	332	NBL	123	129	111	138	500	97	97	97	95	386	-26	-32	-13	-42	-114	2.4	2.9	1.3	2.2	2.1
				107	NB I-41 & WIS96	7NBT	343	83	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				107	NB I-41 & WIS96	7NBR	343	337	NBR	119	121	121	138	500	104	93	89	111	397	-15	-28	-33	-27	-102	1.4	2.5	3.0	2.3	2.2
				107	NB I-41 & WIS96	7WBT	331	332	WBT	434	532	502	462	1930	414	418	413	420	1665	-20	-114	-89	-42	-265	1.0	2.2	2.2	1.9	2.2
				107	NB I-41 & WIS96	7WBR	331	83	WBR	66	79	79	89	313	72	61	62	72	267	6	-18	-17	-1						

I-41 Traffic and Engineering Study
No Build (2048) with Signal Retimings and Peak Spreading PM Peak Period Calibration
Intersection Turning Movements

			% Demand	Intersections					Target					Vissim					Difference					RNSE					
			100%	Int ID	Int Name	Forecast ID	From Link	To Link	Mvmt	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	TOTAL	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2	4:15-4:30PM3	4:30-4:45PM3	4:45-5:00PM3	5:00-5:15PM3	TOTAL3	4:15-4:30PM5	4:30-4:45PM5	4:45-5:00PM5	5:00-5:15PM5	TOTAL5
TEOps Validation - 15 minute periods				113	CTH N & SB I-41	13NBL	222	24	NBL	54	108	92	107	360	56	101	95	102	356	3	-6	3	-4	-4	0.4	0.6	0.4	0.4	0.2
Test	Target	Model		113	CTH N & SB I-41	13NBT	222	216	NBT	159	159	187	192	697	130	126	137	130	523	-28	-33	-50	-62	-173	2.3	2.6	2.7	2.7	2.2
Tier 1	RMSPE < 5%	Not Applicable		113	CTH N & SB I-41	13WBL	23	220	WBL	88	105	123	105	420	68	94	103	118	383	-19	-11	-20	14	-36	2.0	1.0	1.8	1.3	1.8
Tier 2	RSNE < 3 for 75% of turns	6.1%		113	CTH N & SB I-41	13WBT	23	24	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				113	CTH N & SB I-41	13WBR	23	216	WBR	47	65	62	57	230	31	51	61	59	202	-16	-14	-1	2	-29	2.3	1.8	0.1	0.3	1.9
				113	CTH N & SB I-41	13SBT	217	220	SBT	104	128	109	108	450	104	125	108	110	447	0	-3	-2	2	-2	0.0	0.2	0.2	0.2	0.1
				113	CTH N & SB I-41	13SBR	217	24	SBR	50	89	68	63	270	49	89	68	65	271	-1	0	0	2	2	0.1	0.0	0.0	0.3	0.1
				114	CTH N & NB I-41	14EBL	224	221	EBL	113	126	153	155	547	85	95	104	91	375	-27	-31	-49	-64	-171	2.6	2.8	2.0	2.1	2.2
				114	CTH N & NB I-41	14EBT	224	107	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				114	CTH N & NB I-41	14EBR	224	227	EBR	90	106	92	76	364	72	85	67	61	286	-18	-21	-25	-14	-78	1.9	2.1	2.6	1.7	2.1
				114	CTH N & NB I-41	14NBT	229	221	NBT	100	140	126	144	510	100	139	126	144	509	0	-2	0	0	-1	0.0	0.1	0.0	0.0	0.0
				114	CTH N & NB I-41	14NBR	229	107	NBR	39	36	44	41	160	38	34	45	41	159	-1	-2	1	0	-1	0.1	0.3	0.1	0.1	0.1
				114	CTH N & NB I-41	14SBL	223	107	SBL	46	65	61	18	190	47	61	59	24	191	1	-4	-3	6	1	0.2	0.4	0.3	1.4	0.1
				114	CTH N & NB I-41	14SBT	223	227	SBT	146	168	171	195	680	126	153	150	209	638	-20	-15	-21	14	-41	1.7	1.1	1.6	1.0	1.6
				115	WIS55 & SB I-41	15NBL	187	16	NBL	101	129	102	128	460	99	126	105	123	454	-2	-2	3	-4	-6	0.2	0.2	0.3	0.4	0.3
				115	WIS55 & SB I-41	15NBT	187	184	NBT	80	121	75	111	388	85	98	77	91	349	4	-24	1	-21	-39	0.5	2.1	0.2	2.0	2.0
				115	WIS55 & SB I-41	15WBL	15	186	WBL	62	50	69	50	230	51	53	53	65	222	-11	3	-16	15	-8	1.4	0.5	1.9	2.1	0.5
				115	WIS55 & SB I-41	15WBT	15	16	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				115	WIS55 & SB I-41	15WBR	15	184	WBR	25	18	28	29	100	28	22	19	29	99	4	4	-10	0	-1	0.8	1.0	1.8	0.0	0.1
				115	WIS55 & SB I-41	15SBT	183	186	SBT	67	60	71	82	280	64	63	70	82	280	-3	3	-1	0	-1	0.3	0.3	0.1	0.0	0.0
				115	WIS55 & SB I-41	15SBR	183	16	SBR	19	39	28	55	140	20	38	29	53	139	1	-1	1	-2	-1	0.2	0.1	0.2	0.2	0.1
				116	WIS55 & NB I-41	16EBL	111	187	EBL	17	49	28	44	138	22	27	27	24	101	5	-22	-1	-20	-37	1.2	2.7	0.2	3.0	2.2
				116	WIS55 & NB I-41	16EBT	111	112	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				116	WIS55 & NB I-41	16EBR	111	188	EBR	101	110	91	100	403	89	92	78	60	318	-12	-19	-14	-40	-85	1.2	1.8	1.4	2.0	2.2
				116	WIS55 & NB I-41	16NBT	200	187	NBT	164	202	149	195	710	163	199	153	192	706	-2	-3	3	-3	-4	0.1	0.2	0.3	0.2	0.1
				116	WIS55 & NB I-41	16NBR	200	112	NBR	24	37	31	47	140	25	36	32	48	141	1	-1	0	0	0	0.1	0.1	0.1	0.0	0.0
				116	WIS55 & NB I-41	16SBL	186	112	SBL	19	10	11	29	70	17	11	12	29	68	-2	0	0	-1	-2	0.5	0.1	0.1	0.1	0.2
				116	WIS55 & NB I-41	16SBT	186	188	SBT	109	100	129	103	440	99	106	111	118	433	-10	6	-18	15	-7	1.0	0.6	1.6	1.5	0.3
				117	CTH J & SB I-41	17NBL	182	197	NBL	27	28	23	32	110	28	29	22	30	110	2	1	-1	-2	0	0.3	0.3	0.2	0.3	0.0
				117	CTH J & SB I-41	17NBT	182	189	NBT	130	95	132	97	454	84	86	87	83	339	-46	-9	-45	-14	-115	2.7	1.0	2.2	1.4	2.2
				117	CTH J & SB I-41	17WBL	196	191	WBL	104	102	108	67	380	84	98	102	105	389	-20	-4	-5	38	9	1.9	0.4	0.5	2.2	0.4
				117	CTH J & SB I-41	17WBT	196	197	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				117	CTH J & SB I-41	17WBR	196	189	WBR	46	68	40	35	190	34	50	58	42	185	-12	-17	18	7	-5	1.8	2.1	2.8	1.2	0.3
				117	CTH J & SB I-41	17SBT	190	191	SBT	81	126	60	93	360	77	75	74	53	278	-4	-51	14	-40	-82	0.5	2.0	1.8	2.2	2.2
				117	CTH J & SB I-41	17SBR	190	197	SBR	68	92	78	111	350	75	56	56	69	256	6	-37	-22	-42	-94	0.8	2.0	2.5	2.2	2.0
				118	CTH J & NB I-41	18EBL	199	182	EBL	88	49	86	52	274	39	42	38	42	161	-48	-7	-48	-10	-113	2.2	1.0	2.2	1.4	2.2
				118	CTH J & NB I-41	18EBT	199	198	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				118	CTH J & NB I-41	18EBR	199	192	EBR	91	92	108	93	384	59	49	47	58	213	-32	-43	-61	-34	-171	2.2	2.2	2.2	2.2	2.2
				118																									

I-41 Traffic and Engineering Study
 No Build (2048) with Signal Retimings and Peak Spreading PM Peak Period Calibration
Lane Utilization Comparison

I-41 NB															
Location		I-41 NB south of CTH BB			I-41 NB betw WIS 125 & WIS 96				I-41 NB betw CTH E & WIS 441			I-41 NB betw WIS 441 & CTH N		I-41 NB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
VISSIM	4:15 PM	30%	30%	40%	23%	27%	37%	13%	34%	34%	32%	47%	53%	50%	50%
	4:30 PM	30%	30%	39%	28%	28%	30%	15%	34%	33%	33%	46%	54%	51%	49%
	4:45 PM	30%	30%	40%	40%	30%	17%	14%	34%	34%	32%	44%	56%	50%	50%
	5:00 PM	30%	30%	40%	43%	25%	18%	14%	34%	34%	32%	45%	55%	50%	50%
Field (ATR)	4:15 PM	34%	35%	31%	13%	28%	31%	29%	32%	25%	42%	47%	53%	43%	57%
	4:30 PM	35%	35%	30%	14%	28%	31%	28%	35%	25%	40%	47%	53%	43%	57%
	4:45 PM	35%	34%	31%	15%	27%	31%	28%	33%	26%	41%	48%	52%	44%	56%
	5:00 PM	36%	35%	29%	13%	28%	31%	28%	35%	26%	39%	48%	52%	45%	55%
VISSIM	Avg	30%	30%	40%	34%	28%	25%	14%	34%	34%	32%	45%	55%	50%	50%
Field	Avg	35%	35%	30%	14%	28%	31%	28%	34%	25%	41%	47%	53%	44%	56%

I-41 SB															
Location		I-41 SB south of CTH BB			I-41 SB betw WIS 125 & WIS 96				I-41 SB betw CTH E & WIS 441			I-41 SB betw WIS 441 & CTH N		I-41 SB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
VISSIM	4:15 PM	31%	35%	34%	18%	25%	47%	10%	30%	44%	26%	50%	50%	49%	51%
	4:30 PM	32%	35%	33%	17%	26%	48%	9%	31%	38%	31%	50%	50%	49%	51%
	4:45 PM	31%	35%	34%	18%	26%	47%	9%	41%	25%	35%	50%	50%	48%	52%
	5:00 PM	31%	35%	33%	18%	26%	46%	10%	44%	22%	33%	51%	49%	48%	52%
Field (ATR)	4:15 PM	36%	33%	31%	10%	31%	32%	28%	24%	34%	42%	47%	53%	40%	60%
	4:30 PM	36%	33%	31%	9%	31%	31%	29%	24%	35%	42%	47%	53%	41%	59%
	4:45 PM	35%	33%	32%	10%	29%	32%	29%	24%	34%	42%	47%	53%	40%	60%
	5:00 PM	37%	33%	30%	9%	31%	32%	29%	24%	34%	42%	47%	53%	43%	57%
VISSIM	Avg	31%	35%	33%	18%	26%	47%	9%	36%	32%	31%	50%	50%	48%	52%
Field	Avg	36%	33%	31%	9%	31%	32%	29%	24%	34%	42%	47%	53%	41%	59%

TEOpS Validation

Test	Data	Target	Model
Tier 1	--	Not Applicable	--
Tier 2	ATR	RNSE < 3.0 for 85% of data points	37%

I-41 Traffic and Engineering Study
No Build (2048) with Signal Retimings and Peak Spreading PM Peak Period Calibration
Mainline Speed Comparison

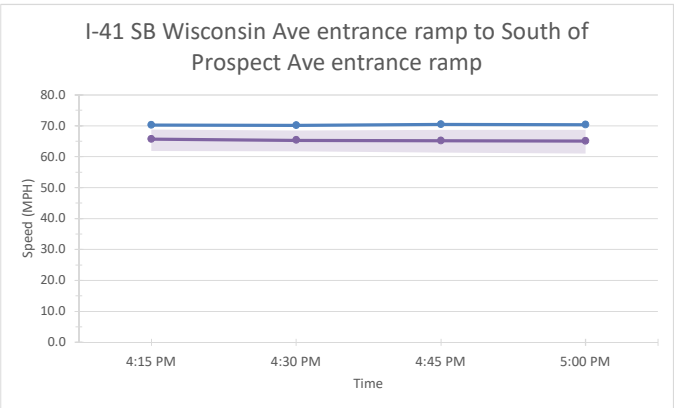
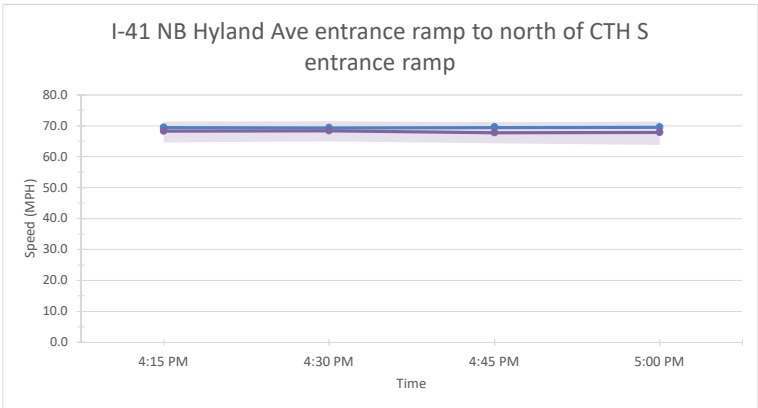
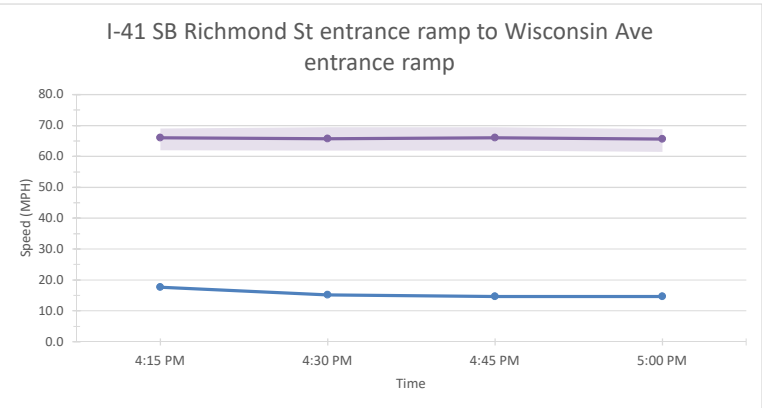
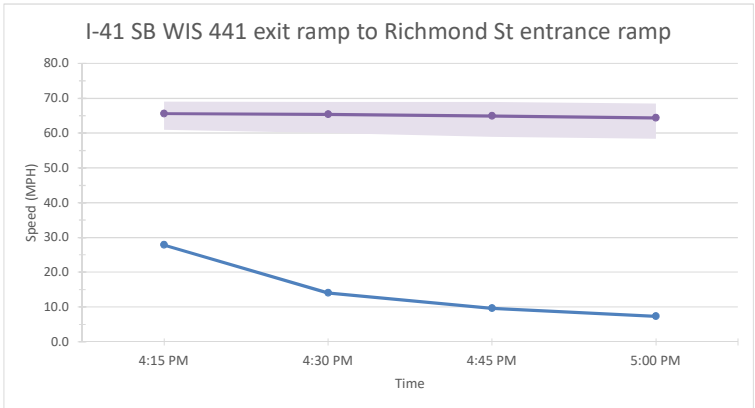
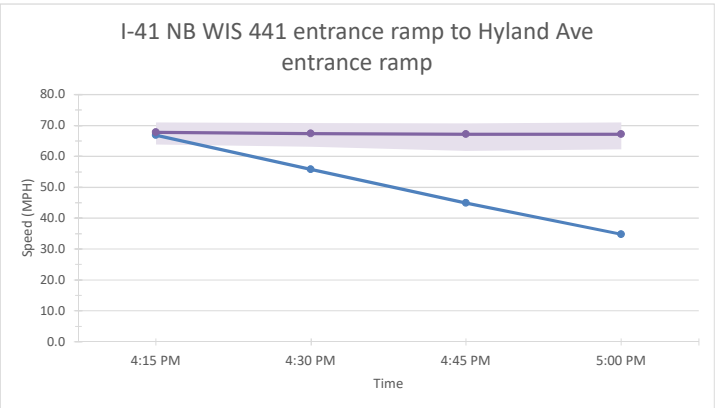
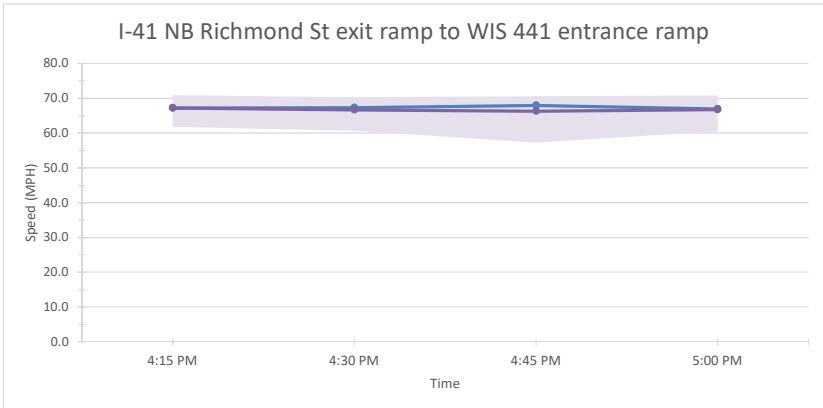
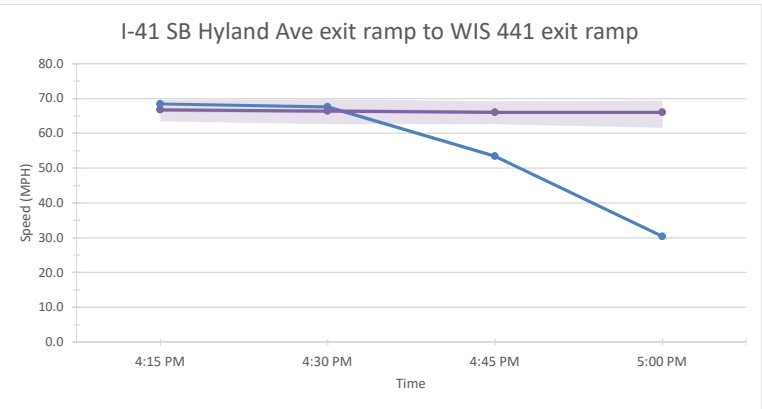
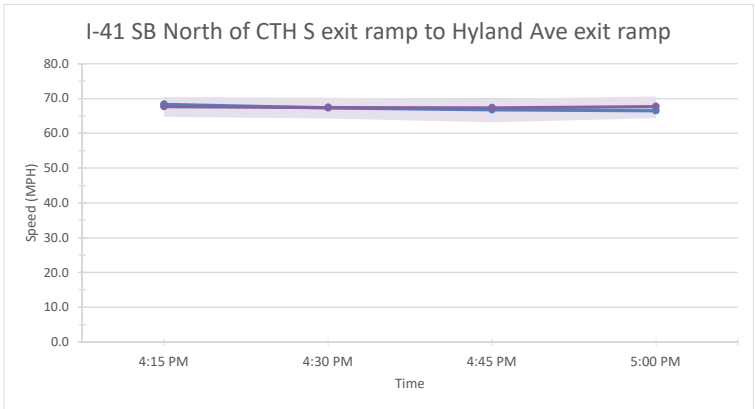
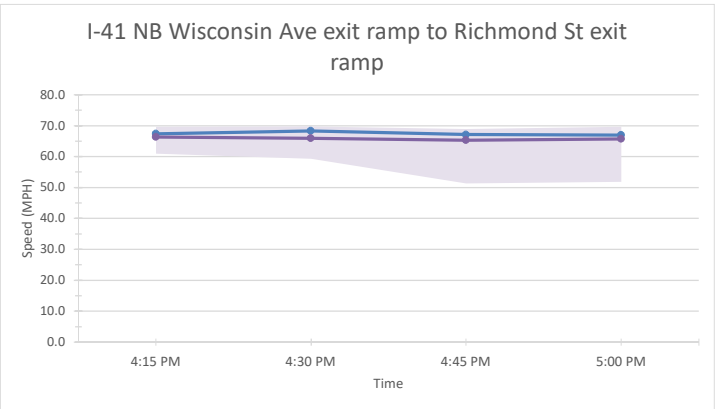
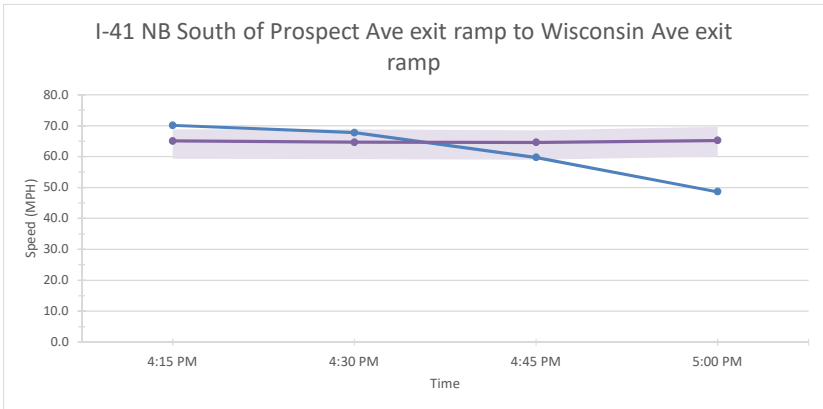
Segment		I-41 NB					Segment		I-41 SB				
		I-41 NB South of Prospect Ave exit ramp to Wisconsin Ave exit ramp	I-41 NB Wisconsin Ave exit ramp to Richmond St exit ramp	I-41 NB Richmond St exit ramp to WIS 441 entrance ramp	I-41 NB WIS 441 entrance ramp to Hyland Ave entrance ramp	I-41 NB Hyland Ave entrance ramp to north of CTH S entrance ramp			I-41 SB North of CTH S exit ramp to Hyland Ave exit ramp	I-41 SB Hyland Ave exit ramp to WIS 441 exit ramp	I-41 SB WIS 441 exit ramp to Richmond St entrance ramp	I-41 SB Richmond St entrance ramp to Wisconsin Ave entrance ramp	I-41 SB Wisconsin Ave entrance ramp to South of Prospect Ave entrance ramp
VISSIM	4:15 PM	70.1	67.4	67.2	66.8	69.5	VISSIM	4:15 PM	68.3	68.5	27.8	17.7	70.3
	4:30 PM	67.7	68.3	67.3	55.8	69.3		4:30 PM	67.3	67.6	14.0	15.2	70.2
	4:45 PM	59.7	67.1	67.9	44.9	69.5		4:45 PM	66.7	53.4	9.6	14.7	70.5
	5:00 PM	48.6	66.9	66.9	34.8	69.5		5:00 PM	66.5	30.4	7.3	14.6	70.4
Field (NPMRDS - Average)	4:15 PM	65.0	66.3	67.2	67.8	68.3	Field (NPMRDS - Average)	4:15 PM	67.7	66.8	65.6	66.0	65.7
	4:30 PM	64.6	66.0	66.7	67.3	68.4		4:30 PM	67.4	66.4	65.3	65.7	65.3
	4:45 PM	64.6	65.3	66.2	67.1	67.8		4:45 PM	67.3	66.0	64.9	66.0	65.2
	5:00 PM	65.2	65.7	66.7	67.2	67.9		5:00 PM	67.7	66.0	64.3	65.6	65.1
Field (NPMRDS - 15th Percentile)	4:15 PM	59.3	60.9	61.8	63.8	64.7	Field (NPMRDS - 15th Percentile)	4:15 PM	64.8	63.5	61.0	62.0	61.9
	4:30 PM	59.2	59.3	60.7	63.1	65.0		4:30 PM	64.3	62.6	60.1	61.9	61.8
	4:45 PM	59.0	51.3	57.3	61.7	64.4		4:45 PM	63.2	62.6	58.9	61.9	61.4
	5:00 PM	60.1	51.9	60.5	62.3	63.9		5:00 PM	64.4	61.6	58.4	61.5	61.1
Field (NPMRDS - 85th Percentile)	4:15 PM	68.8	69.6	70.8	71.0	71.4	Field (NPMRDS - 85th Percentile)	4:15 PM	70.4	69.6	69.1	69.0	68.9
	4:30 PM	68.8	69.8	70.3	70.8	71.6		4:30 PM	70.3	69.7	69.0	69.5	68.6
	4:45 PM	68.5	68.9	70.7	70.7	71.3		4:45 PM	69.9	69.3	68.9	69.5	68.7
	5:00 PM	69.7	69.7	70.8	70.9	71.4		5:00 PM	70.6	69.4	68.5	68.9	68.8

TEOps Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	37%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts	70%

TEOps Validation

Test	Data	Target		Model
Tier 1	NPMRDS	RMSPE < 10%		37%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts		70%



I-41 Traffic and Engineering Study
No Build (2048) with Signal Retimings and Peak Spreading PM Peak Period Calibration
Travel Time Comparison

FULL CORRIDOR

Data	Time	I-41 NB
		Average Travel Time (min)
		South of CTH BB to North of CTH S
Distance (mi)		26.59
VISSIM	4:15PM	25.7
NPMRDS	4:15PM	23.8

FULL CORRIDOR

Data	Time	I-41 SB
		Average Travel Time (min)
		North of CTH S to South of CTH BB
Distance (mi)		26.58
VISSIM	4:15PM	51.5
NPMRDS	4:15PM	24.0

SEGMENTS

I-41 NB				
Average Travel Time (minutes)				
South of CTH BB to Wisc Ave Exit	Wisc Ave Exit to Richmond Exit	Richmond Exit to 441 Entrance	441 Entrance to Hyland Entrance	Hyland Entrance to North of CTH S
3.12	4.0	3.49	5.26	10.71
3.1	3.6	3.1	6.6	9.3
2.9	3.7	3.1	4.7	9.4
I-41 SB				
Average Travel Time (minutes)				
North of CTH S to Hyland Exit	Hyland Exit to 441 Exit	441 Exit to Richmond Entrance	Richmond Entrance to Wisc Ave Entrance	Wisc Ave Entrance to South of CTH BB
10.68	5.52	3.25	4.0	3.09
9.6	6.7	16.8	15.7	2.6
9.5	5.0	3.0	3.7	2.8

TEOpS Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	100%
Tier 2	NPMRDS	TT ± 15% for 85% of routes	60%

I-41 Traffic and Engineering Study
No Build (2048) with Signal Retimings and Peak Spreading PM Peak Hour Calibration
Merge and Diverge Segment Speeds

Merge/Diverge Links			Vissim Speed				
Forecast ID	Link ID	Description	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2
Merge/Diverge Speeds							
	70	NB I-41 CTH BB diverge	69	59	62	69	65
	74	NB I-41 CTH BB merge	67	65	68	69	67
	76	NB I-41 WIS 125 diverge	69	69	69	68	69
	80	NB I-41 WIS 125merge	67	35	13	11	31
		NB I-41 WIS 96 diverge					
	84	NB I-41 WIS 96 merge	69	69	69	68	69
	--	NB I-41 WIS 15 diverge	--	--	--	--	--
	89	NB I-41 WIS 15 merge	63	68	67	65	66
	91	NB I-41 WIS 47 diverge	68	68	68	69	68
	95	NB I-41 WIS 47 merge	62	62	63	59	62
	418	NB I-41 Ballard diverge	64	64	64	64	64
	100	NB I-41 Ballard merge	65	64	67	66	65
		NB I-41 441 diverge					
	103	NB I-41 441 merge	64	65	67	65	65
	420	NB I-41 CTH N diverge	64	63	66	63	64
	108	NB I-41 CTH N merge	66	65	66	68	66
	422	NB I-41 WIS 55 diverge	66	66	60	51	61
	113	NB I-41 WIS 55 merge	69	68	34	7	45
	417	NB I-41 CTH J diverge	16	7	6	6	9
	118	NB I-41 CTH J merge	66	66	66	66	66
	415	NB I-41 CTH U diverge	69	68	69	69	69
	123	NB I-41 CTH U merge	67	67	67	68	67
	425	NB I-41 CTH S diverge	62	63	62	62	62
	128	NB I-41 CTH S merge	66	67	65	64	65
	426	SB I-41 CTH S diverge	53	51	50	56	52
	21	SB I-41 CTH S merge	65	63	64	68	65
	424	SB I-41 CTH U diverge	46	45	42	44	44
	20	SB I-41 CTH U merge	63	65	65	64	64
	416	SB I-41 CTH J diverge	66	55	32	46	50
	19	SB I-41 CTH J merge	66	66	65	61	65
	423	SB I-41 WIS 55 diverge	64	64	65	63	64
	18	SB I-41 WIS 55 merge	68	66	67	61	66
	421	SB I-41 CTH N diverge	63	62	60	46	58
	26	SB I-41 CTH N merge	68	62	68	30	57
	419	SB I-41 441 diverge	64	57	17	6	36
	36	SB I-41 441 merge	66	20	5	5	24
		SB I-41 Ballard diverge					
	40	SB I-41 Ballard merge	48	6	5	5	16
	42	SB I-41 WIS 47 diverge	17	7	7	8	10
	46	SB I-41 WIS 47 merge	7	7	7	8	7
	48	SB I-41 WIS 15 diverge	6	6	7	7	7
	--	SB I-41 WIS 15 merge	--	--	--	--	--
	53	SB I-41 WIS 96 diverge	69	70	68	69	69
	56	SB I-41 WIS 96 merge	69	70	70	70	70
		SB I-41 WIS 125 diverge					
	61	SB I-41 WIS 125merge	69	68	69	69	69
	63	SB I-41 CTH BB diverge	70	70	70	70	70
	67	SB I-41 CTH BB merge	68	69	69	68	69

DRAFT

APPENDIX P9

Year 2028 Build with Short Term Improvements

VISSIM AM Peak Hour

I-41 Traffic and Engineering Study
Build (2028) With Short Term Improvements and Signal Retimings AM Peak Hour Calibration
Freeway Mainline and Ramp Volumes

			% Demand	Segments										Target					Vissim					Difference					RMSE					RMSE				
			100%	Forecast ID	Link ID	Description	Type	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	TOTAL	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2	7:00-7:15AM3	7:15-7:30AM3	7:30-7:45AM3	7:45-8:00AM3	TOTAL3	7:00-7:15AM6	7:15-7:30AM6	7:30-7:45AM6	7:45-8:00AM6	TOTAL6	7:00-7:15AM5	7:15-7:30AM5	7:30-7:45AM5	7:45-8:00AM5	TOTAL5						
TEOps Validation - 15 minute periods																																						
Test	Target	Model		10001	69	NB I-41 (Southern Project Limits)	MAINLINE	673	849	902	1026	3450	748	863	852	970	3433	75	14	-50	-56	-17	11%	2%	2%	5%	1%	2.9	0.5	1.7	1.8	0.3						
				10002	72	NB I-41 Exit to CTH BB	RAMP	125	169	189	177	660	125	170	185	169	649	0	1	-3	-8	-11	0%	0%	2%	4%	2%	0.0	0.1	0.3	0.6	0.4						
				10003	71	NB I-41 betw CTH BB Exit to CTH BB Ent	MAINLINE	548	680	714	849	2790	614	686	666	793	2759	67	6	-48	-56	-31	12%	1%	7%	7%	1%	2.8	0.2	1.8	1.9	0.6						
				10004	73	NB I-41 Ent from CTH BB	RAMP	110	117	154	119	500	107	116	153	122	498	-3	-1	-1	3	-2	3%	1%	0%	3%	0%	0.3	0.1	0.1	0.3	0.1						
				10005	75	NB I-41 betw CTH BB Ent to WIS 125 Exit	MAINLINE	658	797	867	968	3290	720	800	819	914	3253	62	3	-49	-53	-37	4%	0%	6%	6%	1%	2.4	0.1	1.7	1.7	0.6						
				10006	78	NB I-41 Exit to WIS 125	RAMP	112	174	201	242	618	78	112	174	205	618	-8	-30	-33	-40	-112	7%	12%	12%	12%	10%	0.7	2.3	2.4	2.6	8.1						
				10007	77	NB I-41 betw WIS 125 Exit to WIS 125 Ent	MAINLINE	546	623	666	726	2560	593	626	617	676	2512	47	4	-49	-49	-48	3%	1%	5%	5%	2%	2.0	0.1	1.9	1.8	0.9						
				10008	79	NB I-41 Ent from WIS 125	RAMP	53	72	104	71	300	57	69	101	72	299	4	-3	-4	-2	-1	7%	4%	4%	2%	0%	0.5	0.3	0.4	0.2	0.1						
				10009	80	NB I-41 betw WIS 125 Ent to WIS 96 Exit	MAINLINE	599	694	771	740	2860	641	687	694	771	2778	42	-7	-67	-61	-56	-82	7%	1%	3%	3%	3%	1.7	0.3	2.2	2.0	1.5					
				10010	82	NB I-41 Exit to WIS96	RAMP	130	157	169	214	670	135	160	165	198	659	6	3	-4	-16	-11	4%	2%	2%	7%	2%	0.5	0.2	0.3	1.1	0.4						
				10011	81	NB I-41 betw WIS 96 Exit to WIS 96 Ent	MAINLINE	470	537	602	582	2190	512	536	557	552	2156	43	-1	-536	-30	-34	9%	0%	7%	5%	2%	2.0	0.1	1.8	1.3	0.7						
				10012	83	NB I-41 Ent from WIS 96	RAMP	46	53	74	67	240	45	51	75	67	239	-1	-2	1	1	-1	2%	3%	1%	1%	0%	0.1	0.2	0.1	0.1	0.1						
				10013	85	NB I-41 WIS 96 Ent to WIS 15 Exit	MAINLINE	516	590	676	649	2430	553	587	632	619	2390	37	-53	-43	-30	-40	7%	1%	4%	5%	2%	1.6	0.1	1.7	1.2	0.8						
				10014	87	NB I-41 Exit to WIS15	RAMP	110	155	189	177	630	113	143	176	174	607	3	-12	-12	-2	-23	3%	4%	6%	1%	4%	0.3	1.0	0.9	0.2	0.9						
				10015	86	NB I-41 betw WIS 15 Exit to WIS 15 Ent	MAINLINE	406	435	487	472	1800	430	440	449	441	1761	25	6	-38	-31	-39	6%	1%	6%	7%	2%	1.2	0.3	1.7	1.4	0.9						
				10016	88	NB I-41 Ent from WIS15	RAMP	150	186	202	213	750	147	177	202	208	734	-4	8	0	-5	-16	2%	4%	0%	2%	2%	0.3	0.6	0.0	0.4	0.6						
				10017	90	NB I-41 betw WIS 15 Ent to WIS 47 Exit	MAINLINE	556	620	689	685	2550	568	624	648	658	2499	13	-4	-41	-27	-51	2%	1%	4%	4%	2%	0.5	0.2	1.6	1.0	1.0						
				10018	93	NB I-41 Exit to WIS47	RAMP	70	84	123	143	420	72	80	103	135	390	2	-4	-20	-8	-30	3%	5%	3%	1%	2%	0.3	0.5	1.8	0.7	1.5						
				10019	92	NB I-41 betw WIS 47 Exit to WIS 47 Ent	MAINLINE	486	536	566	582	2130	478	538	541	531	2087	-8	1	-25	-11	-43	2%	0%	4%	2%	2%	0.4	0.1	1.1	0.5	0.9						
				10020	94	NB I-41 Ent from WIS47	RAMP	174	210	165	170	720	169	204	167	171	711	-5	-5	2	0	-9	3%	3%	1%	0%	1%	0.4	0.4	0.2	0.0	0.3						
				10021	96	NB I-41 betw WIS 47 Ent to Ballard Exit	MAINLINE	660	746	731	712	2850	638	742	715	700	2796	-22	-44	-16	-12	-54	3%	0%	2%	2%	2%	0.9	0.1	0.6	0.4	1.0						
				10022	98	NB I-41 Exit to Ballard	RAMP	199	243	201	247	890	175	225	214	225	839	-24	-18	13	-21	-51	12%	0%	4%	4%	4%	1.7	1.1	0.9	1.4	1.7						
				10023	97	NB I-41 betw Ballard Exit to Ballard Ent	MAINLINE	462	503	530	466	1960	451	514	502	467	1934	-11	11	-28	1	-26	2%	2%	5%	0%	1%	0.5	0.5	1.2	0.1	0.6						
				10024	99	NB I-41 Ent from Ballard	RAMP	208	294	290	287	1080	206	270	286	295	1057	-2	-24	-5	7	-23	1%	6%	2%	3%	2%	0.1	1.4	0.3	0.4	0.7						
				10025	100	NB I-41 betw Ballard Ent to 441 Exit	MAINLINE	669	797	820	753	3040	656	786	787	765	2993	-13	-11	-33	-12	-47	2%	1%	4%	2%	2%	0.5	0.4	1.2	0.4	0.8						
				10026	102	NB I-41 Exit to SB441	RAMP	155	226	203	227	810	141	203	207	202	752	-14	-23	-4	-25	-58	1%	0%	2%	1%	1%	1.1	1.5	0.3	1.6	2.0						
				10027	101	NB I-41 betw 441 Exit to 441 Ent	MAINLINE	515	571	617	526	2230	508	569	579	557	2212	-6	-3	-39	31	-18	1%	0%	3%	1%	1%	0.3	0.1	1.6	1.3	0.4						
				10028	33	NB I-41 Ent from NB441	RAMP	223	243	256	259	980	228	242	250	256	977	5	-1	-5	-3	-3	2%	0%	2%	1%	0%	0.3	0.0	0.3	0.2	0.1						
				10029	104	NB I-41 betw 441 Ent to CTH N Exit	MAINLINE	737	814	873	785	3210	739	805	833	818	3195	-2	-79	-40	33	-15	0%	1%	5%	4%	0%	0.1	0.3	1.4	1.2	0.3						
				10030	106	NB I-41 Exit to CTH N	RAMP	76	53	67	84	280	84	62	61	83	290	9	8	-5	-2	10	12%	16%	8%	2%	4%	1.0	1.1	0.6	0.2	0.6						
				10031	105	NB I-41 betw CTH N Exit to CTH N Entrance	MAINLINE	662	761	807	701	2930	648	739	767	737	2891	-14	-22	-39	36	-39	2%	3%	5%	5%	1%	0.5	0.8	1.4	1.4	0.7						
				10032	107	NB I-41 Ent from CTH N	RAMP	68	80	66	56	270	68	78	63	58	266	-1	-1	-3	2	-4	1%	2%	5%	3%	1%	0.1	0.2	0.4	0.2	0.2						
				10033	109	NB I-41 betw CTH N Ent to WIS 55 Exit	MAINLINE	730	840	873	757	3200	714	815	832	801	3161	-3206	-26	815	-41	44	-39	2%	3%	5%	2%	1%	0.6	0.9	1.4	1.6	0.7					
				10034	111	NB I-41 Exit to WIS55	RAMP	74	85	69	91	320	80	76	73	82	311	6	-10	4	-9	9	7%	1%	5%	10%	3%	0.7	1.0	0.5	0.9	0.5						
				10035	110	NB I-41 betw WIS 55 Exit to WIS 55 Ent	MAINLINE	656	755	804	666	2880	624	729	751	722	2827	-31	-26	-52	56	-53	5%	3%	2%	5%	2%	0.2	0.9	1.8	2.2	1.0						
				10036	112	NB I-41 Ent from WIS55	RAMP	48	26	49	39	160	47	49	38	44	157	1	-1	-1	-2	-2	1%	0%	3%	5%	1%	0.1	0.2	0.1	0.3	0.1						
				10037	114	NB I-41 betw WIS 55 Ent to CTH J Exit	MAINLINE	704	781	8																												

I-41 Traffic and Engineering Study
 Build (2028) With Short Term Improvements and Signal Retimings AM Peak Hour Calibration
 Freeway Mainline Operations

Fwy/Dir	#	Link ID	Segment	# Lanes	HCM Type	Avg Speed (mph)				Density (pcphpl)				LOS			
						7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM
I-41 NB	25	129	NB I-41: Northern Project Limits	2	Basic	69	68	67	68	26.6	28.0	31.7	30.7	D	D	D	D
	24	125	NB I-41 betw CTH S Exit to CTH S Ent	2	Basic	68	68	61	65	23.5	24.5	31.3	27.9	C	C	D	D
	23	124	NB I-41 betw CTH U Ent to CTH S Exit	2	Basic	69	68	66	67	23.9	26.1	30.0	28.3	C	D	D	D
	22	122	NB I-41 CTH U Exit to CTH U Ent	2	Basic	69	69	67	68	21.7	23.6	26.9	24.8	C	C	D	C
	21	119	NB I-41 betw CTH J Ent to CTH U Exit	2	Basic	69	69	68	69	22.5	25.1	27.1	25.5	C	C	D	C
	20	115	NB I-41 betw CTH J Exit to CTH J Ent	2	Basic	69	69	68	69	19.0	22.1	23.3	22.1	C	C	C	C
	19	114	NB I-41 betw WIS 55 Ent to CTH J Exit	2	Basic	69	69	68	68	21.0	24.2	25.2	24.7	C	C	C	C
	18	110	NB I-41 betw WIS 55 Exit to WIS 55 Ent	2	Basic	70	69	69	68	19.6	23.0	23.8	23.0	C	C	C	C
	17	109	NB I-41 betw CTH N Ent to WIS 55 Exit	2	Basic	69	68	68	68	22.6	26.1	26.6	25.5	C	D	D	C
	16	105	NB I-41 betw CTH N Exit to CTH N Entrance	2	Basic	70	69	68	69	20.3	23.5	24.4	23.3	C	C	C	C
	15	104	NB I-41 betw 441 Ent to CTH N Exit	2	Basic	68	68	67	67	23.5	26.0	27.0	26.8	C	C	D	D
	14	101	NB I-41 betw 441 Exit to 441 Ent	2	Basic	70	70	70	69	15.8	17.8	18.1	17.6	B	B	C	B
	13	100	NB I-41 betw Ballard Ent to 441 Exit	3	Weave	68	66	67	66	14.0	17.3	17.2	16.9	B	B	B	B
	12	97	NB I-41 betw Ballard Exit to Ballard Ent	2	Basic	70	70	70	70	14.0	16.1	15.6	14.6	B	B	B	B
	11	96	NB I-41 betw WIS 47 Ent to Ballard Exit	2	Basic	69	68	69	68	20.1	23.7	22.7	22.4	C	C	C	C
	10	92	NB I-41 betw WIS 47 Exit to WIS 47 Ent	2	Basic	71	70	70	71	14.8	16.7	16.8	16.4	B	B	B	B
	9	90	NB I-41 betw WIS 15 Ent to WIS 47 Exit	2	Basic	70	70	69	69	17.7	19.6	20.3	20.7	B	C	C	C
	8	86	NB I-41 betw WIS 15 Exit to WIS 15 Ent	2	Basic	70	70	70	70	13.3	13.7	13.9	13.7	B	B	B	B
	7	85	NB I-41 WIS 96 Ent to WIS 15 Exit	3	Basic	70	70	69	70	11.5	12.2	13.2	12.9	B	B	B	B
	6	81	NB I-41 betw WIS 96 Exit to WIS 96 Ent	3	Basic	71	71	71	71	10.5	11.0	11.4	11.3	A	A	B	B
	5	80	NB I-41 betw WIS 125 Ent to WIS 96 Exit	4	Weave	70	70	69	69	10.0	10.8	11.2	11.7	A	B	B	B
	4	77	NB I-41 betw WIS 125 Exit to WIS 125 Ent	3	Basic	71	71	71	71	12.1	12.8	12.6	13.9	B	B	B	B
	3	75	NB I-41 betw CTH BB Ent to WIS 125 Exit	3	Basic	70	70	69	69	14.9	16.6	17.2	19.2	B	B	B	C
	2	71	NB I-41 betw CTH BB Exit to CTH BB Ent	3	Basic	71	71	71	70	12.6	14.1	13.7	16.4	B	B	B	B
	1	69	NB I-41 (Southern Project Limits)	3	Basic	71	71	71	71	15.3	17.7	17.5	20.0	B	B	B	C

Fwy/Dir	#	Link ID	Segment	# Lanes	HCM Type	Avg Speed (mph)				Density (pcphpl)				LOS			
						7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM
I-41 SB	1	1	SB I-41: Northern projects limit	2	Basic	70	69	69	70	21.3	23.9	23.4	21.0	C	C	C	C
	2	2	SB I-41 betw CTH S Exit to CTH S Ent	2	Basic	69	68	68	69	19.9	22.4	22.5	20.2	C	C	C	C
	3	5	SB I-41 betw CTH S Exit to CTH U Exit	2	Basic	69	68	68	69	21.7	24.6	24.6	22.0	C	C	C	C
	4	6	SB I-41 betw CTH U Exit to CTH U Ent	2	Basic	68	65	66	67	20.7	23.6	23.8	21.6	C	C	C	C
	5	9	SB I-41 CTH U Ent to CTH J Exit	2	Basic	69	69	69	69	21.3	23.2	24.1	22.5	C	C	C	C
	6	10	SB I-41 CTH J Exit to CTH J Ent	2	Basic	69	69	69	68	19.4	20.9	22.7	21.7	C	C	C	C
	7	13	SB I-41 CTH J Ent to WIS 55 Exit	2	Basic	67	67	66	66	23.3	24.5	27.5	25.8	C	C	D	C
	8	14	SB I-41 WIS 55 Exit to WIS 55 Ent	2	Basic	69	68	65	66	21.3	22.6	26.7	24.7	C	C	D	C
	9	17	SB I-41 betw WIS 55 Ent to CTH N Exit	2	Basic	68	68	66	67	24.1	25.8	30.3	27.9	C	C	D	D
	10	22	SB I-41 CTH N Exit to CTH N Ent	2	Basic	69	68	59	47	21.6	24.2	31.4	37.1	C	C	D	E
	11	25	SB I-41 CTH N Ent to 441 Exit	2	Basic	68	68	63	62	25.8	28.0	34.8	34.4	C	D	D	D
	12	27	SB I-41 betw 441 Exit to 441 Ent	2	Basic	69	69	68	68	20.0	20.2	23.9	24.0	C	C	C	C
	13	36	SB I-41 betw 441 Ent to Ballard Exit	3	Weave	65	63	60	61	21.2	22.6	26.4	24.4	C	C	C	C
	14	37	SB I-41 Ballard Exit to Ballard Ent	2	Basic	67	66	63	52	25.5	25.9	29.1	33.2	C	C	D	D
	15	41	SB I-41 betw Ballard Ent to WIS 47 Exit	2	Basic	67	65	53	22	30.6	33.2	41.5	85.4	D	D	E	F
	16	43	SB I-41 betw WIS 47 Exit to WIS 47 Ent	2	Basic	68	55	21	14	27.6	34.4	81.5	108.7	D	D	F	F
	17	47	SB I-41 WIS 47 Ent to WIS 15 Exit	2	Basic	66	65	64	64	32.5	33.2	33.5	33.7	D	D	D	D
	18	49	SB I-41 WIS 15 Exit to WIS 15 Ent	2	Basic	69	68	68	69	23.5	24.6	23.7	23.2	C	C	C	C
	19	50	SB I-41 WIS 15 Ent to WIS 96 Exit	3	Basic	70	70	70	70	18.5	19.2	18.6	18.4	C	C	C	C
	20	55	SB I-41 betw WIS 96 Exit to WIS 96 Ent	3	Basic	71	71	71	71	16.3	17.3	16.3	15.9	B	B	B	B
	21	56	SB I-41 betw WIS 96 Ent to WIS 125 Exit	4	Weave	69	69	69	69	14.0	15.7	15.2	14.9	B	B	B	B
	22	58	SB I-41 betw WIS 125 Exit to WIS 125 Ent	3	Basic	71	70	70	70	16.2	18.3	17.4	16.2	B	C	B	B
	23	62	SB I-41 betw WIS 125 Ent to CTH BB Exit	3	Basic	69	68	69	69	18.6	21.4	20.1	18.9	C	C	C	C
	24	64	SB I-41 betw CTH BB Exit to CTH BB Ent	3	Basic	71	70	70	71	15.9	18.3	16.8	15.3	B	C	B	B
	25	68	SB I-41: Southern project limits	3	Basic	70	70	70	70	17.6	20.0	19.3	17.3	B	C	C	B

Notes:
 Volume is exported as Total Vehicles and use 9% Trucks for passenger car equivalent purposes.
 Levels of Service (LOS) as shown are based on density thresholds established by the 6th Edition Highway Capacity Manual (HCM) for each segment type
 Densities and LOSs are only reported for mainline sections that generally represent the segment methodologies within the 6th Edition HCM. Vissim and HCM 6 methodologies are different and no direct comparison should be made

Legend				
Color	Speed (mph)	LOS	Density (pcphpl)	
			Basic	Weave
	55+	A	0-11	0-10
		B	11-18	10-20
	50-55	C	18-28	20-28
	40-50	D	26-35	28-35
	30-40	E	35-45	35-43
	0-30	F	45+	43+

I-41 Traffic and Engineering Study
Build (2028) With Short Term Improvements and Signal Retimings AM Peak Period Calibration
Intersection Turning Movements

			% Demand	Intersections					Target					Vissim					Difference					RNSE				
			100%	Int ID	Int Name	From Link	To Link	Mvmt	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	TOTAL	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2	7:00-7:15AM3	7:15-7:30AM3	7:30-7:45AM3	7:45-8:00AM3	TOTAL3	7:00-7:15AM5	7:15-7:30AM5	7:30-7:45AM5	7:45-8:00AM5	TOTAL5
TEOps Validation - 15 minute periods				108	SB I-41 & WIS15	303	52	EBL	47	60	34	59	200	49	59	35	57	200	1	-1	1	-2	0	0.2	0.1	0.2	0.3	0.0
Test	Target	Model		108	SB I-41 & WIS15	303	304	EBT	240	300	315	385	1240	241	294	316	383	1234	1	-6	1	-2	-6	0.1	0.4	0.1	0.1	0.2
Tier 1	RMSPE < 5%	Not Applicable		108	SB I-41 & WIS15	309	302	WBT	158	153	152	188	650	149	147	157	187	641	-8	-5	4	0	-9	0.6	0.4	0.4	0.0	0.4
Tier 2	RSNE < 3 for 75% of turns	99%		108	SB I-41 & WIS15	309	52	WBR	82	91	113	94	380	92	90	107	93	383	10	-1	-5	0	3	1.1	0.1	0.5	0.0	0.2
				108	SB I-41 & WIS15	51	304	SBT	44	62	40	44	190	37	47	46	40	170	-7	-15	6	-4	-20	1.0	1.9	0.9	0.6	1.5
				108	SB I-41 & WIS15	51	302	SBR	131	207	243	229	810	196	162	184	204	746	65	-45	-59	-25	-64	1.7	1.7	1.7	1.7	2.2
				106	SB I-41 & WIS96	323	325	EBT	103	154	205	189	650	105	148	204	190	647	2	-6	-1	2	-3	0.2	0.5	0.1	0.1	0.1
				106	SB I-41 & WIS96	323	57	EBR	34	53	58	65	210	36	52	59	64	211	2	-1	1	-1	1	0.3	0.2	0.1	0.1	0.0
				106	SB I-41 & WIS96	332	57	WBL	65	108	108	100	380	64	102	107	98	372	0	-6	-1	-1	-8	0.1	0.6	0.1	0.1	0.4
				106	SB I-41 & WIS96	332	334	WBT	125	131	153	241	650	127	135	142	215	619	2	4	-12	-26	-31	0.2	0.4	0.9	1.7	1.2
				106	SB I-41 & WIS96	340	325	SBT	30	40	48	42	160	35	33	37	41	146	5	-7	-10	-1	-14	0.8	1.2	1.5	0.2	1.1
				106	SB I-41 & WIS96	340	57	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				106	SB I-41 & WIS96	340	334	SBR	47	77	71	94	290	62	53	65	74	254	15	-24	-7	-20	-36	2.2	2.7	0.8	2.1	2.1
				104	SB I-41 & WIS125	349	351	EBT	115	131	147	157	550	116	129	144	154	543	1	-2	-3	-3	-7	0.1	0.2	0.3	0.3	0.3
				104	SB I-41 & WIS125	349	60	EBR	41	49	37	33	160	42	49	37	33	161	1	0	0	0	1	0.2	0.0	0.1	0.0	0.0
				104	SB I-41 & WIS125	361	60	WBL	60	73	69	88	290	62	75	68	85	289	2	2	-1	-3	-1	0.3	0.2	0.2	0.4	0.1
				104	SB I-41 & WIS125	361	363	WBT	99	143	175	242	660	108	139	172	225	644	8	-4	-4	-17	-16	0.8	0.4	0.3	1.1	0.6
				104	SB I-41 & WIS125	367	351	SBT	37	47	64	62	210	37	39	48	59	183	0	-8	-16	-3	-27	0.0	1.1	2.0	0.4	1.9
				104	SB I-41 & WIS125	367	60	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				104	SB I-41 & WIS125	367	363	SBR	65	62	108	106	340	71	64	74	95	304	6	2	-34	-11	-36	0.7	0.3	1.2	1.0	2.0
				101	SB I-41 & CTHBB	377	381	EBT	125	127	155	142	550	123	128	155	143	549	-2	1	0	0	-1	0.2	0.1	0.0	0.0	0.0
				101	SB I-41 & CTHBB	377	66	EBR	43	48	59	60	210	44	48	58	60	210	1	0	-1	0	0	0.2	0.1	0.1	0.0	0.0
				101	SB I-41 & CTHBB	382	66	WBL	38	42	46	34	160	39	41	46	33	159	1	-1	0	-1	-1	0.1	0.1	0.0	0.1	0.1
				101	SB I-41 & CTHBB	382	379	WBT	92	130	127	141	490	97	125	128	138	488	5	-5	1	-3	-2	0.5	0.4	0.1	0.2	0.1
				101	SB I-41 & CTHBB	393	381	SBT	20	27	38	45	130	17	21	30	37	105	-3	-6	-8	-8	-25	0.7	1.1	1.3	1.2	2.2
				101	SB I-41 & CTHBB	393	66	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				101	SB I-41 & CTHBB	393	379	SBR	88	125	113	134	460	101	97	111	118	428	13	-28	-2	-16	-32	1.3	2.5	0.1	1.4	1.5
				109	NB I-41 & WIS15	304	316	EBL	119	157	145	179	600	120	152	149	172	593	2	-5	3	-7	-7	0.1	0.4	0.3	0.5	0.3
				109	NB I-41 & WIS15	304	311	EBT	166	206	210	249	830	158	188	216	242	805	-7	-17	7	-7	-25	0.6	1.2	0.5	0.5	0.9
				109	NB I-41 & WIS15	87	308	NBL	43	52	60	35	190	45	49	58	42	193	1	-3	-2	7	3	0.2	0.5	0.2	1.1	0.2
				109	NB I-41 & WIS15	87	316	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				109	NB I-41 & WIS15	87	311	NBR	67	103	129	141	440	72	95	121	136	424	5	-8	-8	-5	-16	0.6	0.8	0.7	0.4	0.8
				109	NB I-41 & WIS15	10338	308	WBT	196	192	205	246	840	197	190	207	243	836	1	-2	1	-3	-4	0.1	0.2	0.1	0.2	0.1
				109	NB I-41 & WIS15	10338	315	WBR	31	29	56	34	150	28	29	56	36	149	-3	0	0	2	-1	0.5	0.1	0.0	0.4	0.1
				107	NB I-41 & WIS96	325	83	EBL	26	35	61	49	170	25	33	61	49	168	-1	-2	0	0	-2	0.1	0.3	0.0	0.0	0.2
				10																								

I-41 Traffic and Engineering Study
Build (2028) With Short Term Improvements and Signal Retimings AM Peak Period Calibration
Intersection Turning Movements

TEOps Validation - 15 minute periods

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	99%

TEOps Validation - 60 minute period

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	99%

Demand 100%	Intersections					Target					Vissim					Difference					RNSE				
	Int ID	Int Name	From Link	To Link	Mvmt	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	TOTAL	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2	7:00-7:15AM3	7:15-7:30AM3	7:30-7:45AM3	7:45-8:00AM3	TOTAL3	7:00-7:15AM5	7:15-7:30AM5	7:30-7:45AM5	7:45-8:00AM5	TOTAL5
	113	CTH N & SB I-41	222	24	NBL	77	61	99	83	320	78	63	97	81	318	1	2	-3	-2	-2	0.1	0.2	0.3	0.2	0.1
	113	CTH N & SB I-41	222	216	NBT	51	78	55	86	270	62	79	59	83	283	11	2	3	-3	13	1.6	0.2	0.4	0.3	0.8
	113	CTH N & SB I-41	23	220	WBL	30	29	31	31	120	42	26	31	31	130	12	-2	0	0	10	2.2	0.4	0.0	0.0	0.9
	113	CTH N & SB I-41	23	24	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	113	CTH N & SB I-41	23	216	WBR	14	11	26	19	70	23	14	15	25	77	9	2	-11	6	7	2.4	0.7	2.1	1.3	0.8
	113	CTH N & SB I-41	217	220	SBT	54	57	48	51	210	55	58	47	49	209	1	1	-1	-2	-1	0.1	0.1	0.1	0.2	0.0
	113	CTH N & SB I-41	217	24	SBR	55	64	72	79	270	56	64	72	76	269	2	0	0	-3	-1	0.2	0.0	0.0	0.3	0.1
	114	CTH N & NB I-41	224	221	EBL	35	26	17	32	110	44	28	20	29	122	9	2	3	-3	12	1.6	0.5	0.7	0.5	1.1
	114	CTH N & NB I-41	224	107	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	114	CTH N & NB I-41	224	227	EBR	41	28	49	52	170	40	34	42	52	168	-1	6	-7	-1	-2	0.1	1.2	1.0	0.1	0.2
	114	CTH N & NB I-41	229	221	NBT	93	113	137	137	480	94	114	136	136	480	2	1	-1	-1	0	0.2	0.1	0.1	0.1	0.0
	114	CTH N & NB I-41	229	107	NBR	46	54	50	40	190	47	53	48	41	189	1	-1	-2	1	-1	0.2	0.2	0.3	0.2	0.0
	114	CTH N & NB I-41	223	107	SBL	22	25	16	16	80	21	25	15	17	79	-1	0	-1	1	-1	0.3	0.0	0.3	0.2	0.2
	114	CTH N & NB I-41	223	227	SBT	62	60	63	66	250	76	59	63	64	262	15	-1	0	-2	12	1.8	0.2	0.0	0.2	0.8
	115	WIS55 & SB I-41	187	16	NBL	50	79	76	65	270	49	79	73	64	265	-1	0	-2	-1	-5	0.1	0.0	0.3	0.2	0.3
	115	WIS55 & SB I-41	187	184	NBT	58	56	93	72	280	61	56	89	74	280	2	0	-4	2	0	0.3	0.0	0.4	0.2	0.0
	115	WIS55 & SB I-41	15	186	WBL	17	24	18	21	80	25	17	24	20	85	8	-7	6	-1	5	1.8	1.5	1.4	0.2	0.6
	115	WIS55 & SB I-41	15	16	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	115	WIS55 & SB I-41	15	184	WBR	61	4	4	1	70	16	26	11	15	68	-44	22	7	13	-2	0.7	0.5	1.6	1.2	0.3
	115	WIS55 & SB I-41	183	186	SBT	35	66	42	56	200	36	65	43	56	200	1	-1	1	-1	0	0.2	0.2	0.1	0.1	0.0
	115	WIS55 & SB I-41	183	16	SBR	31	32	47	31	140	31	32	45	31	139	1	1	-2	0	-1	0.1	0.1	0.3	0.0	0.1
	116	WIS55 & NB I-41	111	187	EBL	12	13	11	14	50	15	12	11	14	52	3	-1	-1	0	2	1.0	0.2	0.2	0.0	0.2
	116	WIS55 & NB I-41	111	112	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	116	WIS55 & NB I-41	111	188	EBR	63	73	58	77	270	67	65	64	70	266	4	-7	6	-7	-4	0.5	0.8	0.8	0.8	0.3
	116	WIS55 & NB I-41	200	187	NBT	97	122	158	123	500	96	122	154	123	495	-1	0	-3	0	-5	0.1	0.0	0.3	0.0	0.2
	116	WIS55 & NB I-41	200	112	NBR	31	25	38	36	130	32	25	38	35	130	1	0	0	0	0	0.1	0.1	0.0	0.1	0.0
	116	WIS55 & NB I-41	186	112	SBL	17	1	1	11	30	18	2	1	9	29	1	1	-1	-1	-1	0.1	1.2	0.5	0.4	0.1
	116	WIS55 & NB I-41	186	188	SBT	36	89	59	66	250	44	79	66	65	255	9	-10	8	-1	5	1.5	1.1	1.0	0.2	0.3
	117	CTH J & SB I-41	182	197	NBL	36	50	45	50	180	36	51	44	47	178	0	1	-1	-3	-2	0.1	0.1	0.1	0.4	0.1
	117	CTH J & SB I-41	182	189	NBT	74	44	62	81	260	70	47	58	76	250	-4	3	-4	-5	-10	0.4	0.5	0.5	0.6	0.6
	117	CTH J & SB I-41	196	191	WBL	38	43	27	21	130	33	39	35	28	135	-5	-4	7	7	5	0.8	0.6	1.4	1.5	0.5
	117	CTH J & SB I-41	196	197	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	117	CTH J & SB I-41	196	189	WBR	15	10	19	16	60	20	13	14	17	65	5	3	-6	2	5	1.3	1.1	1.3	0.4	0.6
	117	CTH J & SB I-41	190	191	SBT	29	27	39	35	130	30	26	39	36	131	1	0	-1	1	1	0.2	0.1	0.1	0.1	0.1
	117	CTH J & SB I-41	190	197	SBR	63	49	65	53	230	66	48	64	53	230	3	-1	-1	-1	0	0.4	0.1	0.2	0.1	0.0
	118	CTH J & NB I-41	199	182	EBL	35	29	36	50	150	31	30	33	45	139	-4	1	-2	-6	-11	0.7	0.2	0.4	0.8	0.9
	118	CTH J & NB I-41	199	198	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	118	CTH J & NB I-41	199	192	EBR	35	29	35	22	120	26	32	33	29	120	-9	4	-2	7	0	1.5	0.7	0.3	1.5	0.0
	118	CTH J & NB I-41	174	182	NBT	74	65	71	80	290	75	67	68	80	290	1	2	-3	0	0	0.1	0.2	0.4	0.0	0.0
	118	CTH J & NB I-41	174	198	NBR	84	90	99	78	350	86	90	96	77	348	2	0	-3	0	-2	0.2	0.0	0.3	0.0	0.1
	118	CTH J & NB I-41	191	198	SBL	18	18	24	21	80	19	18	22	22	80	1	0	-2	1	0	0.2	0.1	0.3	0.2	0.0
	118	CTH J & NB I-41	191	192	SBT	49	52	43	36	180	45	47	52	41	186	-4	-5	9	6	6	0.6	0.7	1.4	1.0	0.4
	119	CTH U & SB I-41	166	8	NBL	20	21	16	14	70	19	19	16	15	70	-1	-1	0	1	0	0.1	0.3	0.0	0.4	0.0
	119	CTH U & SB I-41	166	167	NBT	4	15	26	55	100	9	14	29	38	89	5	-2	2	-17	-11	2.6	0.4	0.4	2.2	1.1
	119	CTH U & SB I-41	7	159	WBL	22	30	30	18	100	18	25	31	24	99	-3	-5	1	6	-1	0.7	0.9	0.2	1.3	0.1
	119	CTH U & SB I-41	7	8	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	119	CTH U & SB I-41	7	167	WBR	23	21	14	11	70	21	23	17	11	72	-2	2	3	0	2	0.5	0			

I-41 Traffic and Engineering Study
 Build (2028) With Short Term Improvements and Signal Retimings AM Peak Period Calibration
Lane Utilization Comparison

I-41 NB															
Location		I-41 NB south of CTH BB			I-41 NB betw WIS 125 & WIS 96				I-41 NB betw CTH E & WIS 441			I-41 NB betw WIS 441 & CTH N		I-41 NB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
Field VISSIM (ATR)	7:00 AM	30%	29%	42%	25%	29%	38%	7%	38%	40%	22%	48%	52%	50%	50%
	7:15 AM	29%	29%	41%	25%	28%	38%	9%	37%	38%	25%	49%	51%	51%	49%
	7:30 AM	28%	29%	43%	25%	29%	37%	9%	37%	37%	26%	49%	51%	51%	49%
	7:45 AM	30%	30%	40%	25%	28%	37%	10%	36%	38%	26%	49%	51%	50%	50%
	7:00 AM	39%	36%	25%	12%	25%	35%	28%	25%	32%	43%	45%	55%	39%	61%
	7:15 AM	37%	35%	28%	14%	24%	33%	30%	26%	29%	45%	43%	57%	38%	62%
	7:30 AM	36%	36%	29%	13%	25%	32%	30%	27%	29%	44%	42%	58%	38%	62%
	7:45 AM	36%	33%	31%	14%	26%	31%	30%	31%	28%	41%	48%	52%	40%	60%
VISSIM	Avg	29%	29%	42%	25%	29%	37%	9%	37%	38%	25%	49%	51%	50%	50%
Field	Avg	37%	35%	28%	13%	25%	32%	29%	27%	29%	43%	45%	55%	39%	61%

I-41 SB															
Location		I-41 SB south of CTH BB			I-41 SB betw WIS 125 & WIS 96				I-41 SB betw CTH E & WIS 441			I-41 SB betw WIS 441 & CTH N		I-41 SB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
Field VISSIM (ATR)	7:00 AM	32%	35%	33%	27%	32%	36%	5%	34%	45%	21%	50%	50%	49%	51%
	7:15 AM	32%	35%	33%	25%	32%	36%	7%	33%	44%	23%	50%	50%	49%	51%
	7:30 AM	32%	35%	32%	24%	32%	37%	7%	34%	42%	24%	50%	50%	50%	50%
	7:45 AM	32%	35%	33%	23%	30%	38%	8%	35%	41%	24%	50%	50%	49%	51%
	7:00 AM	26%	39%	35%	7%	25%	33%	34%	27%	33%	40%	45%	55%	42%	58%
	7:15 AM	26%	37%	38%	8%	25%	31%	36%	26%	32%	42%	44%	56%	40%	60%
	7:30 AM	25%	36%	39%	9%	24%	31%	36%	28%	31%	41%	43%	57%	41%	59%
	7:45 AM	28%	36%	36%	12%	26%	29%	33%	29%	32%	39%	45%	55%	45%	55%
VISSIM	Avg	32%	35%	33%	25%	31%	37%	7%	34%	43%	23%	50%	50%	49%	51%
Field	Avg	26%	37%	37%	9%	25%	31%	35%	28%	32%	41%	44%	56%	42%	58%

TEOps Validation

Test	Data	Target	Model
Tier 1	--	Not Applicable	--
Tier 2	ATR	RNSE < 3.0 for 85% of data points	30%

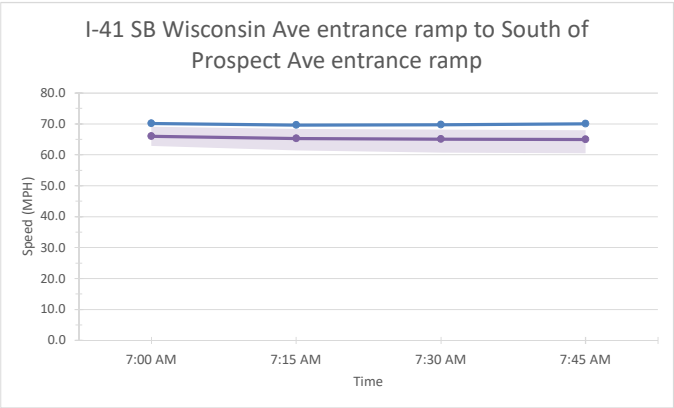
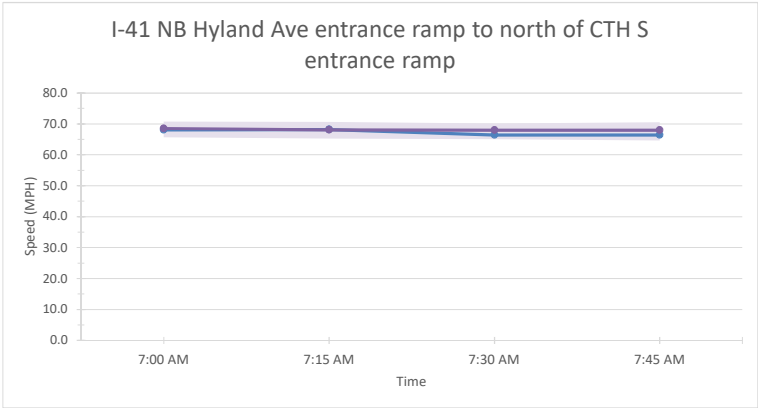
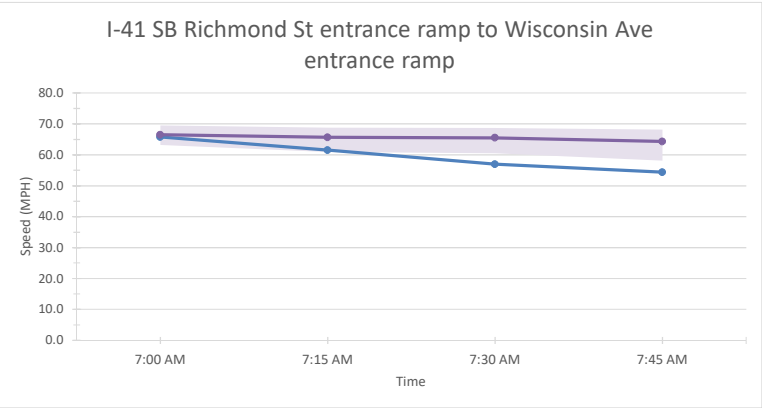
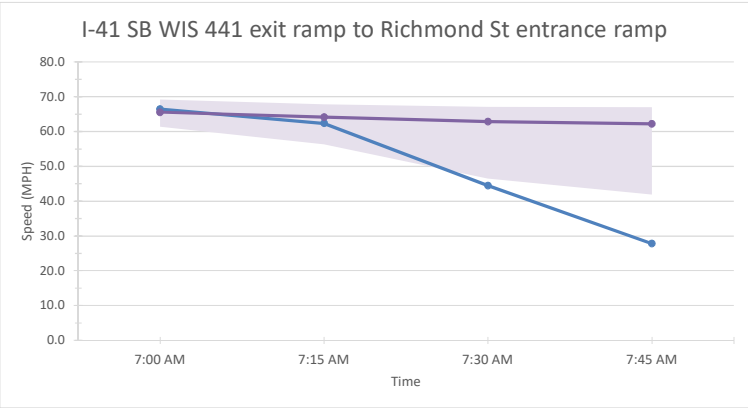
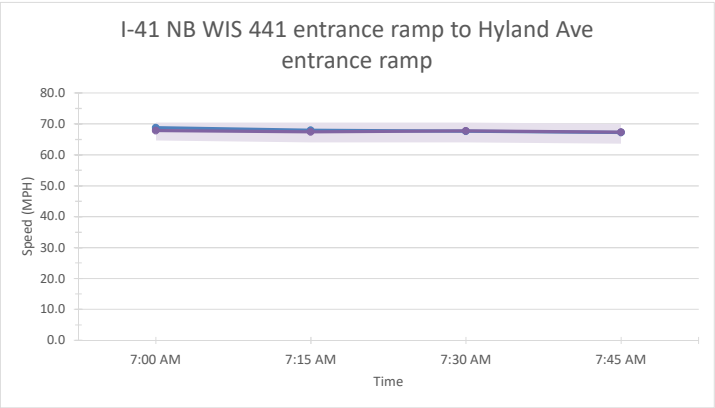
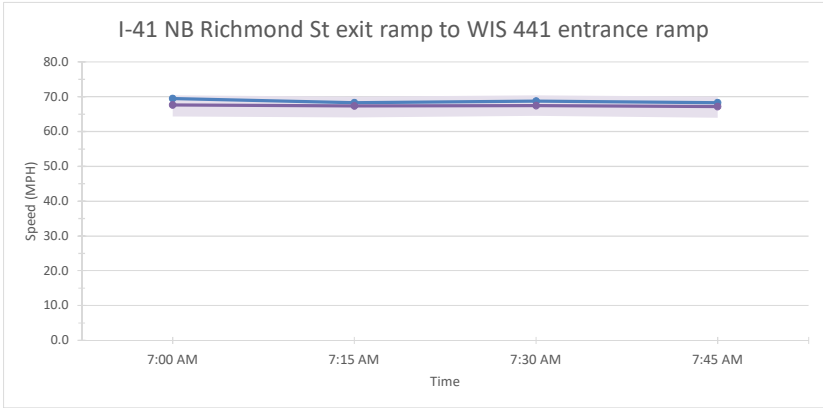
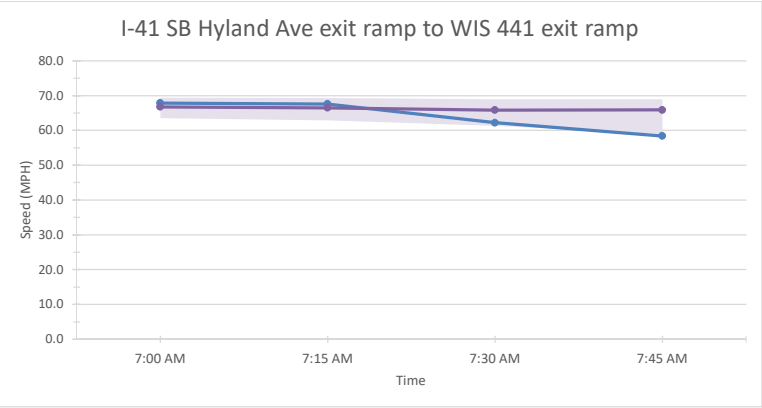
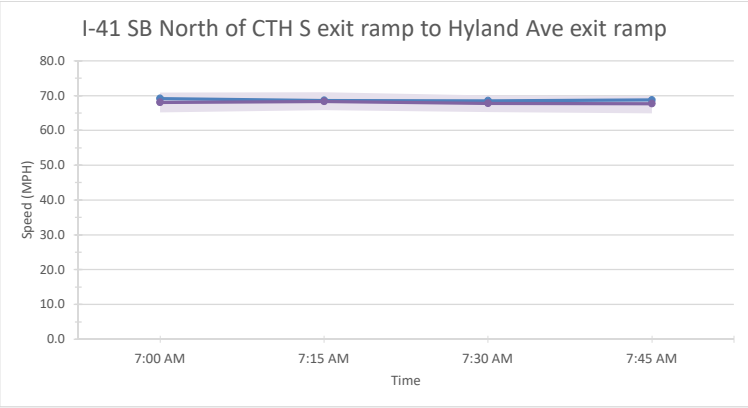
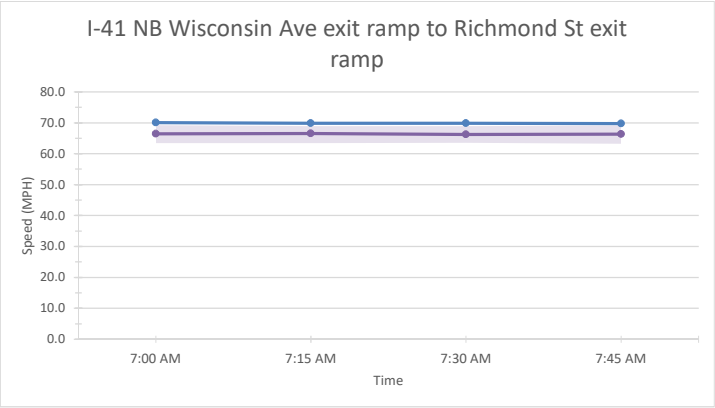
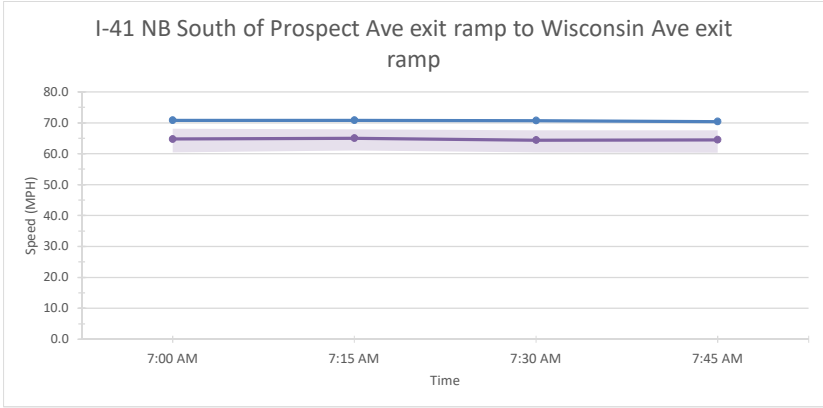
Segment		I-41 NB						Segment		I-41 SB					
		I-41 NB South of Prospect Ave exit ramp to Wisconsin Ave exit ramp	I-41 NB Wisconsin Ave exit ramp to Richmond St exit ramp	I-41 NB Richmond St exit ramp to WIS 441 entrance ramp	I-41 NB WIS 441 entrance ramp to Hyland Ave entrance ramp	I-41 NB Hyland Ave entrance ramp to north of CTH S entrance ramp				I-41 SB North of CTH S exit ramp to Hyland Ave exit ramp	I-41 SB Hyland Ave exit ramp to WIS 441 exit ramp	I-41 SB WIS 441 exit ramp to Richmond St entrance ramp	I-41 SB Richmond St entrance ramp to Wisconsin Ave entrance ramp	I-41 SB Wisconsin Ave entrance ramp to South of Prospect Ave entrance ramp	
VISSIM	7:00 AM	70.8	70.1	69.5	68.8	68.1		VISSIM	7:00 AM	69.1	67.9	66.4	65.8	70.1	
	7:15 AM	70.8	69.8	68.3	68.0	68.2			7:15 AM	68.6	67.6	62.4	61.5	69.7	
	7:30 AM	70.7	69.9	68.8	67.7	66.4			7:30 AM	68.5	62.2	44.5	57.0	69.7	
	7:45 AM	70.4	69.8	68.3	67.2	66.4			7:45 AM	68.7	58.4	27.8	54.4	70.1	
Field (NPMRDS Average)	7:00 AM	64.7	66.4	67.7	67.9	68.5		Field (NPMRDS Average)	7:00 AM	68.0	66.8	65.6	66.5	66.0	
	7:15 AM	65.0	66.6	67.4	67.5	68.1			7:15 AM	68.3	66.5	64.2	65.7	65.3	
	7:30 AM	64.3	66.2	67.5	67.7	68.0			7:30 AM	67.8	65.8	62.9	65.5	65.1	
	7:45 AM	64.5	66.3	67.1	67.3	68.0			7:45 AM	67.7	65.9	62.2	64.3	65.0	
Field (NPMRDS 15th Percentile)	7:00 AM	60.5	63.4	64.3	64.7	65.8		Field (NPMRDS 15th Percentile)	7:00 AM	65.2	63.6	61.4	63.2	62.9	
	7:15 AM	61.1	63.4	64.1	64.0	65.3			7:15 AM	65.9	62.9	56.4	61.0	61.5	
	7:30 AM	60.4	63.5	64.5	64.0	65.1			7:30 AM	65.3	61.4	46.6	60.5	60.8	
	7:45 AM	60.3	63.2	64.0	63.6	64.7			7:45 AM	64.9	59.0	41.9	58.1	60.6	
Field (NPMRDS 85th Percentile)	7:00 AM	68.1	69.2	70.4	70.5	70.8		Field (NPMRDS 85th Percentile)	7:00 AM	70.9	69.4	69.2	69.5	69.1	
	7:15 AM	67.9	68.9	70.1	70.4	70.7			7:15 AM	70.9	69.3	67.8	68.8	68.4	
	7:30 AM	67.5	68.9	70.4	70.5	70.2			7:30 AM	70.1	69.0	67.1	68.6	68.2	
	7:45 AM	67.5	69.1	70.0	70.1	70.6			7:45 AM	69.9	68.9	67.0	68.1	68.0	

TEOps Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	11%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts	95%

TEOps Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	11%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts	95%



I-41 Traffic and Engineering Study
Build (2028) With Short Term Improvements and Signal Retimings AM Peak Period Calibration
Travel Time Comparison

FULL CORRIDOR

Data	Time	I-41 NB
		Average Travel Time (min)
		South of CTH BB to North of CTH S
Distance (mi)		26.59
VISSIM	7:00AM	23.4
NPMRDS	7:00AM	23.7

FULL CORRIDOR

Data	Time	I-41 SB
		Average Travel Time (min)
		North of CTH S to South of CTH BB
Distance (mi)		26.58
VISSIM	7:00AM	25.6
NPMRDS	7:00AM	24.0

SEGMENTS

I-41 NB				
Average Travel Time (minutes)				
South of CTH BB to Wisc Ave Exit	Wisc Ave Exit to Richmond Exit	Richmond Exit to 441 Entrance	441 Entrance to Hyland Entrance	Hyland Entrance to North of CTH S
3.12	4.0	3.49	5.26	10.71
2.7	3.4	3.0	4.6	9.6
2.9	3.6	3.1	4.7	9.4
I-41 SB				
Average Travel Time (minutes)				
North of CTH S to Hyland Exit	Hyland Exit to 441 Exit	441 Exit to Richmond Entrance	Richmond Entrance to Wisc Ave Entrance	Wisc Ave Entrance to South of CTH BB
10.68	5.52	3.25	4.0	3.09
9.3	5.2	4.3	4.1	2.7
9.4	5.0	3.1	3.7	2.8

TEOpS Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	14%
Tier 2	NPMRDS	TT ± 15% for 85% of routes	90%

I-41 Traffic and Engineering Study
 Build (2028) With Short Term Improvements and Signal Retimings AM Peak Hour Calibration
 Merge and Diverge Segment Speeds

Merge/Diverge Links			Vissim Speed				
Forecast ID	Link ID	Description	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2
Merge/Diverge Speeds							
	70	NB I-41 CTH BB diverge	69	70	70	69	70
	74	NB I-41 CTH BB merge	70	70	69	69	70
	76	NB I-41 WIS 125 diverge	70	70	70	69	70
	80	NB I-41 WIS 125merge	70	70	69	69	69
		NB I-41 WIS 96 diverge					
	84	NB I-41 WIS 96 merge	70	70	70	70	70
	--	NB I-41 WIS 15 diverge	--	--	--	--	--
	89	NB I-41 WIS 15 merge	68	68	67	67	68
	91	NB I-41 WIS 47 diverge	69	68	69	69	69
	95	NB I-41 WIS 47 merge	67	65	67	65	66
	418	NB I-41 Ballard diverge	65	62	64	63	63
	100	NB I-41 Ballard merge	68	66	67	66	67
		NB I-41 441 diverge					
	103	NB I-41 441 merge	67	65	66	62	65
	420	NB I-41 CTH N diverge	67	65	64	65	65
	108	NB I-41 CTH N merge	67	61	65	66	65
	422	NB I-41 WIS 55 diverge	66	64	64	63	64
	113	NB I-41 WIS 55 merge	69	69	68	68	68
	417	NB I-41 CTH J diverge	64	64	62	63	63
	118	NB I-41 CTH J merge	65	62	57	65	62
	415	NB I-41 CTH U diverge	65	67	66	64	65
	123	NB I-41 CTH U merge	67	63	52	59	60
	425	NB I-41 CTH S diverge	60	60	55	55	57
	128	NB I-41 CTH S merge	64	62	48	57	58
	426	SB I-41 CTH S diverge	62	61	61	62	61
	21	SB I-41 CTH S merge	69	68	68	69	68
	424	SB I-41 CTH U diverge	58	52	55	57	56
	20	SB I-41 CTH U merge	68	66	65	67	66
	416	SB I-41 CTH J diverge	66	65	64	64	65
	19	SB I-41 CTH J merge	66	66	62	59	63
	423	SB I-41 WIS 55 diverge	65	64	61	63	63
	18	SB I-41 WIS 55 merge	67	66	55	60	62
	421	SB I-41 CTH N diverge	62	63	60	60	61
	26	SB I-41 CTH N merge	64	61	41	38	51
	419	SB I-41 441 diverge	66	66	59	60	63
	36	SB I-41 441 merge	65	63	60	61	62
		SB I-41 Ballard diverge					
	40	SB I-41 Ballard merge	64	60	55	30	52
	42	SB I-41 WIS 47 diverge	64	64	38	19	46
	46	SB I-41 WIS 47 merge	50	33	23	21	32
	48	SB I-41 WIS 15 diverge	62	60	62	61	61
	--	SB I-41 WIS 15 merge	--	--	--	--	--
	53	SB I-41 WIS 96 diverge	69	69	69	68	69
	56	SB I-41 WIS 96 merge	69	69	69	69	69
		SB I-41 WIS 125 diverge					
	61	SB I-41 WIS 125merge	69	68	69	69	69
	63	SB I-41 CTH BB diverge	69	69	69	69	69
	67	SB I-41 CTH BB merge	69	69	69	69	69

DRAFT

APPENDIX P10

Year 2028 Build with Short Term Improvements

VISSIM PM Peak Hour

I-41 Traffic and Engineering Study
Build (2028) With Short Term Improvements and Signal Retimings PM Peak Hour Calibration
Freeway Mainline and Ramp Volumes

			% Demand	Segments					Target					Vissim					Difference					RMSPE					RMSE								
			100%	Forecast ID	Link ID	Description	Type	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	TOTAL	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2	4:15-4:30PM3	4:30-4:45PM3	4:45-5:00PM3	5:00-5:15PM3	TOTAL3	4:15-4:30PM6	4:30-4:45PM6	4:45-5:00PM6	5:00-5:15PM6	TOTAL6	4:15-4:30PM5	4:30-4:45PM5	4:45-5:00PM5	5:00-5:15PM5	TOTAL5					
TEOps Validation - 15 minute periods																																					
Test	Target		Model	10001	69	NB I-41 (Southern Project Limits)	MAINLINE	892	882	932	843	3550	890	879	934	842	3544	-2	-3	2	-1	-5	0%	0%	0%	0%	0%	0%	0.1	0.1	0.1	0.0	0.1				
				10002	72	NB I-41 Exit to CTH BB	RAMP	148	143	130	150	600	150	139	159	151	599	3	-4	-1	-1	-1	2%	3%	0%	0%	0%	0%	0.2	0.3	0.1	0.1	0.0				
Tier 1 RMSPE < 5%																																					
Tier 2 RSNE < 3 for 85% of links 97%																																					
TEOps Validation - 60 minute period																																					
Test	Target		Model	10007	77	NB I-41 betw WIS 125 Exit to WIS 125 Ent	MAINLINE	685	684	725	645	2740	660	686	712	644	2702	-25	3	-13	-1	-36	4%	0%	2%	0%	1%	0.9	0.1	0.5	0.0	0.7					
				10008	79	NB I-41 Ent from WIS 125	RAMP	180	209	209	253	850	172	201	204	229	806	-8	-7	-4	-24	-43	5%	4%	2%	2%	5%	0.6	0.5	0.3	1.5	1.5					
Tier 1 RMSPE < 5%																																					
Tier 2 RSNE < 3 for 85% of links 99%																																					

I-41 Traffic and Engineering Study
 Build (2028) With Short Term Improvements and Signal Retimings PM Peak Hour Calibration
 Mainline Operations

Fwy/Dir	#	Link ID	Segment	# Lanes	HCM Type	Avg Speed (mph)				Density (pcphpl)				LOS			
						4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM
I-41 NB	25	129	NB I-41: Northern Project Limits	2	Basic	70	69	69	69	17.8	19.5	20.5	19.6	B	C	C	C
	24	125	NB I-41 betw CTH S Exit to CTH S Ent	2	Basic	69	69	70	69	16.0	17.7	17.3	16.9	B	B	B	B
	23	124	NB I-41 betw CTH U Ent to CTH S Exit	2	Basic	70	69	69	69	17.4	19.3	18.4	18.5	B	C	C	C
	22	122	NB I-41 CTH U Exit to CTH U Ent	2	Basic	70	70	70	70	15.6	17.2	16.6	17.3	B	B	B	B
	21	119	NB I-41 betw CTH J Ent to CTH U Exit	2	Basic	70	70	70	70	16.9	18.8	18.0	18.5	B	C	B	C
	20	115	NB I-41 betw CTH J Exit to CTH J Ent	2	Basic	70	70	70	70	14.6	16.0	15.9	16.0	B	B	B	B
	19	114	NB I-41 betw WIS 55 Ent to CTH J Exit	2	Basic	69	69	69	69	18.3	19.5	19.9	20.1	C	C	C	C
	18	110	NB I-41 betw WIS 55 Exit to WIS 55 Ent	2	Basic	70	70	70	70	17.4	18.0	18.6	18.0	B	C	C	B
	17	109	NB I-41 betw CTH N Ent to WIS 55 Exit	2	Basic	69	69	69	69	21.2	21.9	22.7	21.8	C	C	C	C
	16	105	NB I-41 betw CTH N Exit to CTH N Entrance	2	Basic	69	69	69	69	19.2	20.0	20.4	20.2	C	C	C	C
	15	104	NB I-41 betw 441 Ent to CTH N Exit	2	Basic	69	68	67	67	24.9	26.5	28.0	28.0	C	D	D	D
	14	101	NB I-41 betw 441 Exit to 441 Ent	2	Basic	70	69	67	65	19.5	21.4	22.4	22.3	C	C	C	C
	13	100	NB I-41 betw Ballard Ent to 441 Exit	3	Weave	66	65	62	60	20.3	22.5	24.2	24.6	C	C	C	C
	12	97	NB I-41 betw Ballard Exit to Ballard Ent	2	Basic	69	69	69	69	23.8	25.7	26.2	25.8	C	C	D	C
	11	96	NB I-41 betw WIS 47 Ent to Ballard Exit	2	Basic	68	66	65	64	29.3	31.2	32.5	33.4	D	D	D	D
	10	92	NB I-41 betw WIS 47 Exit to WIS 47 Ent	2	Basic	70	69	69	63	22.4	24.1	25.4	25.6	C	C	C	C
	9	90	NB I-41 betw WIS 15 Ent to WIS 47 Exit	2	Basic	68	67	66	67	28.9	30.3	32.1	30.9	D	D	D	D
	8	86	NB I-41 betw WIS 15 Exit to WIS 15 Ent	2	Basic	70	67	63	60	18.0	20.6	23.9	23.8	B	C	C	C
	7	85	NB I-41 WIS 96 Ent to WIS 15 Exit	3	Basic	68	67	68	66	18.0	20.0	20.7	20.6	B	C	C	C
	6	81	NB I-41 betw WIS 96 Exit to WIS 96 Ent	3	Basic	71	70	71	71	12.3	13.8	14.6	13.1	B	B	B	B
	5	80	NB I-41 betw WIS 125 Ent to WIS 96 Exit	4	Weave	68	68	69	69	13.1	14.2	14.4	13.6	B	B	B	B
	4	77	NB I-41 betw WIS 125 Exit to WIS 125 Ent	3	Basic	71	71	71	71	13.5	14.1	14.6	13.2	B	B	B	B
	3	75	NB I-41 betw CTH BB Ent to WIS 125 Exit	3	Basic	69	68	68	69	19.3	20.2	20.5	18.7	C	C	C	C
	2	71	NB I-41 betw CTH BB Exit to CTH BB Ent	3	Basic	71	71	70	71	15.0	15.3	15.8	14.2	B	B	B	B
	1	69	NB I-41 (Southern Project Limits)	3	Basic	71	71	71	71	18.3	18.0	19.2	17.3	C	B	C	B

Fwy/Dir	#	Link ID	Segment	# Lanes	HCM Type	Avg Speed (mph)				Density (pcphpl)				LOS			
						4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM
I-41 SB	1	1	SB I-41: Northern projects limit	2	Basic	69	69	69	69	25.4	24.9	26.5	23.6	C	C	D	C
	2	2	SB I-41 betw CTH S Exit to CTH S Ent	2	Basic	68	68	68	69	22.0	22.7	23.4	21.2	C	C	C	C
	3	5	SB I-41 betw CTH S Exit to CTH U Exit	2	Basic	69	69	68	69	22.8	24.1	25.0	23.1	C	C	C	C
	4	6	SB I-41 betw CTH U Exit to CTH U Ent	2	Basic	68	68	67	67	20.2	21.4	22.5	20.8	C	C	C	C
	5	9	SB I-41 CTH U Ent to CTH J Exit	2	Basic	69	69	69	69	20.4	22.2	22.4	22.0	C	C	C	C
	6	10	SB I-41 CTH J Exit to CTH J Ent	2	Basic	70	70	70	70	16.7	18.7	18.2	19.0	B	C	C	C
	7	13	SB I-41 CTH J Ent to WIS 55 Exit	2	Basic	69	68	69	68	19.2	21.7	20.7	23.0	C	C	C	C
	8	14	SB I-41 WIS 55 Exit to WIS 55 Ent	2	Basic	70	69	69	69	17.2	19.7	18.4	20.4	B	C	C	C
	9	17	SB I-41 betw WIS 55 Ent to CTH N Exit	2	Basic	69	68	69	68	20.4	24.2	21.9	25.5	C	C	C	C
	10	22	SB I-41 CTH N Exit to CTH N Ent	2	Basic	69	69	70	69	17.9	20.3	17.9	20.7	B	C	B	C
	11	25	SB I-41 CTH N Ent to 441 Exit	2	Basic	69	68	69	69	20.6	25.7	22.5	25.2	C	C	C	C
	12	27	SB I-41 betw 441 Exit to 441 Ent	2	Basic	70	70	70	69	13.8	16.4	14.4	16.7	B	B	B	B
	13	36	SB I-41 betw 441 Ent to Ballard Exit	3	Weave	69	68	68	68	15.6	17.5	16.9	17.9	B	B	B	B
	14	37	SB I-41 Ballard Exit to Ballard Ent	2	Basic	69	69	69	69	18.0	19.8	20.1	20.3	B	C	C	C
	15	41	SB I-41 betw Ballard Exit to WIS 47 Exit	2	Basic	68	67	67	66	26.9	29.4	29.4	31.9	D	D	D	D
	16	43	SB I-41 betw WIS 47 Exit to WIS 47 Ent	2	Basic	70	70	70	70	20.4	21.7	22.1	22.9	C	C	C	C
	17	47	SB I-41 WIS 47 Ent to WIS 15 Exit	2	Basic	69	69	69	69	25.3	26.1	26.8	27.3	C	D	D	D
	18	49	SB I-41 WIS 15 Exit to WIS 15 Ent	2	Basic	69	69	70	70	16.8	17.6	18.3	17.7	B	B	C	B
	19	50	SB I-41 WIS 15 Ent to WIS 96 Exit	3	Basic	70	70	70	70	15.1	14.9	16.0	15.9	B	B	B	B
	20	55	SB I-41 betw WIS 96 Exit to WIS 96 Ent	3	Basic	71	71	71	71	11.6	11.4	11.9	11.8	B	B	B	B
	21	56	SB I-41 betw WIS 96 Ent to WIS 125 Exit	4	Weave	69	69	69	69	12.6	12.8	13.1	13.2	B	B	B	B
	22	58	SB I-41 betw WIS 125 Exit to WIS 125 Ent	3	Basic	70	70	70	71	14.1	14.9	15.0	15.2	B	B	B	B
	23	62	SB I-41 betw WIS 125 Ent to CTH BB Exit	3	Basic	69	68	68	68	19.7	21.2	20.6	21.0	C	C	C	C
	24	64	SB I-41 betw CTH BB Exit to CTH BB Ent	3	Basic	71	70	71	70	17.0	17.9	17.3	17.9	B	B	B	B
	25	68	SB I-41: Southern project limits	3	Basic	70	70	70	70	21.1	21.6	21.6	21.7	C	C	C	C

Notes:
 Volume is reported as Total Vehicles and use 9% Trucks for passenger car equivalent purposes.
 Levels of Service (LOS) as shown are based on density thresholds established by the 6th Edition Highway Capacity Manual (HCM) for each segment type
 Densities and LOSs are only reported for mainline sections that generally represent the segment methodologies within the 6th Edition HCM. Vissim and HCM 6 methodologies are different and no direct comparison should be made

Legend				
Color	Speed (mph)	LOS	Density (pcphpl)	
			Basic	Weave
	55+	A	0-11	0-10
		B	11-18	10-20
	50-55	C	18-26	20-28
	40-50	D	26-35	28-35
	30-40	E	35-45	35-43
	0-30	F	45+	43+

I-41 Traffic and Engineering Study
Build (2028) With Short Term Improvements and Signal Retimings PM Peak Period Calibration
Intersection Turning Movements

			% Demand	Intersections						Target					Vissim					Difference					RNSE				
			100%	Int ID	Int Name	Forecast ID	From Link	To Link	Mvmt	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	TOTAL	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2	4:15-4:30PM3	4:30-4:45PM3	4:45-5:00PM3	5:00-5:15PM3	TOTAL3	4:15-4:30PM5	4:30-4:45PM5	4:45-5:00PM5	5:00-5:15PM5	TOTAL5
TEOps Validation - 15 minute periods				108	SB I-41 & WIS15	8EBL	303	52	EBL	79	62	38	51	230	81	61	43	51	235	3	-2	5	-1	5	0.3	0.2	0.8	0.1	0.3
Test	Target	Model		108	SB I-41 & WIS15	8EBT	303	304	EBT	425	508	397	370	1700	430	500	413	363	1706	5	-9	15	-7	6	0.3	0.4	0.8	0.3	0.1
Tier 1	RMSPE < 5%	Not Applicable		108	SB I-41 & WIS15	8WBT	309	302	WBT	310	290	303	267	1170	297	294	306	270	1167	-13	5	4	2	-3	0.8	0.3	0.2	0.1	0.1
Tier 2	RSNE < 3 for 75% of turns	100%		108	SB I-41 & WIS15	8WBR	309	52	WBR	102	99	137	142	480	107	97	130	144	477	5	-3	-8	2	-3	0.5	0.3	0.7	0.2	0.1
				108	SB I-41 & WIS15	8SBL	51	304	SBL	26	41	40	54	160	35	32	39	47	153	9	-9	-1	-7	-7	1.9	1.4	0.1	0.9	0.5
				108	SB I-41 & WIS15	8SBR	51	302	SBR	214	224	225	226	890	216	219	216	232	884	2	-5	-9	6	-6	0.1	0.3	0.6	0.4	0.2
TEOps Validation - 60 minute period				106	SB I-41 & WIS96	6EBT	323	325	EBT	355	405	394	425	1580	389	392	403	394	1578	35	-14	9	-32	-2	1.8	0.7	0.4	1.5	0.1
Test	Target	Model		106	SB I-41 & WIS96	6EBR	323	57	EBR	98	113	88	121	420	103	110	90	116	420	5	-2	2	-5	0	0.5	0.2	0.2	0.4	0.0
Tier 1	RMSPE < 5%	Not Applicable		106	SB I-41 & WIS96	6WBL	332	57	WBL	140	166	162	132	600	134	149	159	149	590	-7	-17	-3	17	-10	0.6	1.3	0.2	1.5	0.4
Tier 2	RSNE < 3 for 75% of turns	100%		106	SB I-41 & WIS96	6WBT	332	334	WBT	367	439	398	417	1620	359	399	409	400	1568	-8	-39	12	-17	-52	0.4	1.9	0.6	0.8	1.3
				106	SB I-41 & WIS96	6SBL	340	325	SBL	55	48	60	57	220	54	48	53	60	215	-1	0	-7	2	-5	0.1	0.0	0.9	0.3	0.3
				106	SB I-41 & WIS96	6SBT	340	57	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				106	SB I-41 & WIS96	6SBR	340	334	SBR	133	109	134	124	500	111	115	124	132	482	-22	6	-9	8	-17	1.9	0.6	0.8	0.7	0.8
				104	SB I-41 & WIS125	4EBT	349	351	EBT	313	368	324	376	1380	308	349	339	346	1342	-4	-19	16	-31	-38	0.2	1.0	0.9	1.6	1.0
				104	SB I-41 & WIS125	4EBR	349	60	EBR	141	161	135	163	600	140	159	141	148	587	-1	-3	5	-14	-13	0.1	0.2	0.5	1.1	0.5
				104	SB I-41 & WIS125	4WBL	361	60	WBL	111	118	99	112	440	111	114	96	109	429	0	-4	-3	-3	-11	0.0	0.4	0.3	0.3	0.5
				104	SB I-41 & WIS125	4WBT	361	363	WBT	358	363	374	355	1450	344	351	369	355	1418	-15	-13	-5	0	-32	0.8	0.7	0.3	0.0	0.8
				104	SB I-41 & WIS125	4SBL	367	351	SBL	39	41	66	43	190	46	41	53	53	193	6	0	-13	10	3	1.0	0.0	1.5	1.5	0.2
				104	SB I-41 & WIS125	4SBT	367	60	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				104	SB I-41 & WIS125	4SBR	367	363	SBR	56	50	61	43	210	62	50	56	52	220	6	1	-6	9	10	0.8	0.1	0.7	1.3	0.7
				101	SB I-41 & CTHB8	1EBT	377	381	EBT	182	203	220	226	830	181	206	219	220	827	0	3	-1	-5	-3	0.0	0.2	0.1	0.3	0.1
				101	SB I-41 & CTHB8	1EBR	377	66	EBR	102	96	105	108	410	102	96	103	109	410	0	0	-2	1	0	0.0	0.0	0.2	0.1	0.0
				101	SB I-41 & CTHB8	1WBL	382	66	WBL	87	86	79	78	330	87	79	82	78	326	0	-8	4	0	-4	0.0	0.8	0.4	0.0	0.2
				101	SB I-41 & CTHB8	1WBT	382	379	WBT	82	104	100	95	380	85	90	105	98	378	3	-14	5	4	-2	0.4	1.4	0.5	0.4	0.1
				101	SB I-41 & CTHB8	1SBL	393	381	SBL	57	49	37	38	180	44	52	41	39	176	-13	4	4	1	-4	1.8	0.5	0.7	0.2	0.3
				101	SB I-41 & CTHB8	1SBT	393	66	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				101	SB I-41 & CTHB8	1SBR	393	379	SBR	61	80	91	79	310	70	68	86	84	308	10	-11	-5	5	-2	1.2	1.3	0.5	0.5	0.1
				109	NB I-41 & WIS15	9EBL	304	316	EBL	226	282	192	191	890	224	245	241	186	897	-1	-37	50	-5	7	0.1	2.2	1.4	0.3	0.2
				109	NB I-41 & WIS15	9EBT	304	311	EBT	225	267	246	232	970	239	257	251	223	971	14	-10	5	-9	1	1.0	0.6	0.3	0.6	0.0
				109	NB I-41 & WIS15	9NBL	87	308	NBL	83	90	51	76	300	76	91	59	69	295	-7	1	8	-7	-5	0.8	0.1	1.1	0.8	0.3
				109	NB I-41 & WIS15	9NBT	87	316	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				109	NB I-41 & WIS15	9NBR	87	311	NBR	184	200	210	206	800	184	190	205	210	790	0	-10	-4	4	-10	0.0	0.7	0.3	0.3	0.4
				109	NB I-41 & WIS15	9WBT	10338	308	WBT	329	299	389	333	1350	327	298	369	351	1345	-2	-1	-20	17	-5	0.1	0.1	1.0	1.0	0.1
				109	NB I-41 & WIS15	9WBR	10338	315	WBR	101	64	55	80	300	98	68	86	78	297	-3	5	-3	-2	-3	0.3	0.6	0.4	0.2	0.2
				107	NB I-41 & WIS96	7EBL	325	83	EBL	159	182	177	212	730	176	177	177	194	723	17	-5	0	-18	-6	1.3	0.4	0.0	1.2	0.2
				107	NB I-41 & WIS96	7EBT	325	337	EBT	250	272	277	271	1070	268	264	278	260	1070	17	-8	1	-10	0	1.1	0.5	0.1	0.6	0.0
				107	NB I-41 & WIS96	7NBL	343	332	NBL	104	108	93	116	420	95	96	96	93	381	-8	-12	3	-23	-40	0.8	1.1	0.3	2.1	1.9
				107	NB I-41 & WIS96	7NBT	343	83	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				107	NB I-41 & WIS96	7NBR	343	337	NBR	118	118	118	136	490	123	118	114	131	486	6	0	-4	-5	-4	0.5	0.0	0.4	0.4	0.2
				107	NB I-41 & WIS96	7WBT	331	332	WBT	404	497	467	432																

I-41 Traffic and Engineering Study
Build (2028) With Short Term Improvements and Signal Retimings PM Peak Period Calibration
Intersection Turning Movements

			% Demand	Intersections					Target					Vissim					Difference					RNSE					
			100%	Int ID	Int Name	Forecast ID	From Link	To Link	Mvmt	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	TOTAL	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2	4:15-4:30PM3	4:30-4:45PM3	4:45-5:00PM3	5:00-5:15PM3	TOTAL3	4:15-4:30PM5	4:30-4:45PM5	4:45-5:00PM5	5:00-5:15PM5	TOTAL5
TEOps Validation - 15 minute periods				113	CTH N & SB I-41	13NBL	222	24	NBL	50	103	87	100	340	51	96	89	99	335	1	-7	2	-1	-5	0.1	0.7	0.2	0.1	0.3
Test	Target	Model		113	CTH N & SB I-41	13NBT	222	216	NBT	124	124	150	151	550	112	113	133	155	513	-12	-11	-16	3	-37	1.1	1.0	1.3	0.3	1.6
Tier 1	RMSPE < 5%			113	CTH N & SB I-41	13WBL	23	220	WBL	76	87	101	86	350	57	83	87	104	332	-18	-4	-14	18	-18	2.1	0.4	1.4	1.9	1.0
Tier 2	RSNE < 3 for 75% of turns		100%	113	CTH N & SB I-41	13WBT	23	24	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				113	CTH N & SB I-41	13WBR	23	216	WBR	25	34	33	29	120	15	28	32	37	112	-9	-6	-1	7	-8	1.9	1.0	0.1	1.4	0.8
TEOps Validation - 60 minute period				113	CTH N & SB I-41	13SBT	217	220	SBT	71	88	74	78	310	69	89	74	78	310	-3	1	0	1	0	0.3	0.1	0.0	0.1	0.0
				113	CTH N & SB I-41	13SBR	217	24	SBR	37	66	50	47	200	36	65	52	47	200	0	-1	2	0	0	0.0	0.2	0.2	0.0	0.0
Test	Target	Model		114	CTH N & NB I-41	14EBL	224	221	EBL	86	99	123	123	430	74	88	110	123	395	-12	-11	-13	1	-35	1.3	1.1	1.2	0.1	1.7
Tier 1	RMSPE < 5%			114	CTH N & NB I-41	14EBT	224	107	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
Tier 2	RSNE < 3 for 75% of turns		100%	114	CTH N & NB I-41	14EBR	224	227	EBR	87	110	93	71	360	81	97	93	85	356	-6	-13	0	14	-5	0.6	1.2	0.0	1.6	0.2
				114	CTH N & NB I-41	14NBT	229	221	NBT	89	128	114	129	460	90	123	114	130	457	1	-5	0	1	-3	0.1	0.4	0.0	0.1	0.1
				114	CTH N & NB I-41	14NBR	229	107	NBR	34	32	38	36	140	34	32	38	35	139	-1	1	0	-1	-1	0.1	0.1	0.0	0.1	0.1
				114	CTH N & NB I-41	14SBL	223	107	SBL	22	31	29	8	90	21	29	31	9	90	-1	-2	2	1	0	0.2	0.3	0.3	0.2	0.0
				114	CTH N & NB I-41	14SBT	223	227	SBT	125	144	146	156	570	104	139	132	172	547	-21	-5	-14	17	-23	1.9	0.4	1.1	1.3	1.0
				115	WIS55 & SB I-41	15NBL	187	16	NBL	89	117	89	115	410	89	115	88	114	406	0	-2	-2	0	-4	0.0	0.2	0.2	0.0	0.2
				115	WIS55 & SB I-41	15NBT	187	184	NBT	50	81	47	72	250	57	66	58	66	247	7	-15	12	-7	-3	0.9	1.6	1.7	0.8	0.2
				115	WIS55 & SB I-41	15WBL	15	186	WBL	52	42	57	40	190	41	46	48	52	187	-11	4	-9	12	-4	1.5	0.7	1.2	2.0	0.2
				115	WIS55 & SB I-41	15WBT	15	16	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				115	WIS55 & SB I-41	15WBR	15	184	WBR	12	9	14	15	50	12	11	12	14	49	0	2	-2	-1	-1	0.0	0.6	0.5	0.1	0.1
				115	WIS55 & SB I-41	15SBT	183	186	SBT	45	41	49	55	190	43	43	48	56	191	-1	2	0	0	1	0.2	0.3	0.0	0.0	0.0
				115	WIS55 & SB I-41	15SBR	183	16	SBR	11	22	16	31	80	11	22	16	31	80	0	0	0	0	0	0.0	0.0	0.0	0.1	0.0
				116	WIS55 & NB I-41	16EBL	111	187	EBL	9	35	17	30	90	14	20	27	24	86	6	-14	11	-5	-4	1.9	2.4	2.6	1.0	0.4
				116	WIS55 & NB I-41	16EBT	111	112	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				116	WIS55 & NB I-41	16EBR	111	188	EBR	91	105	83	92	370	90	96	94	89	369	-1	-8	12	-3	-1	0.1	0.8	1.3	0.4	0.1
				116	WIS55 & NB I-41	16NBT	200	187	NBT	130	163	120	157	570	130	161	118	157	567	0	-2	-1	0	-3	0.0	0.2	0.1	0.0	0.1
				116	WIS55 & NB I-41	16NBR	200	112	NBR	21	32	27	41	120	21	32	28	39	119	0	0	1	-2	-1	0.0	0.0	0.2	0.3	0.1
				116	WIS55 & NB I-41	16SBL	186	112	SBL	8	4	5	13	30	8	4	5	11	29	0	0	0	-1	-1	0.1	0.0	0.2	0.3	0.2
				116	WIS55 & NB I-41	16SBT	186	188	SBT	88	79	101	83	350	75	84	91	96	347	-13	6	-10	14	-3	1.3	0.6	1.0	1.5	0.2
				117	CTH J & SB I-41	17NBL	182	197	NBL	24	26	21	29	100	25	25	21	28	98	1	-1	0	-1	-3	0.1	0.2	0.1	0.3	0.2
				117	CTH J & SB I-41	17NBT	182	189	NBT	79	54	82	55	270	62	65	69	69	265	-17	10	-13	14	-5	1.9	1.4	1.4	1.8	0.3
				117	CTH J & SB I-41	17WBL	196	191	WBL	88	86	90	56	320	67	89	86	78	320	-21	2	-4	22	0	2.3	0.3	0.4	3.0	0.0
				117	CTH J & SB I-41	17WBT	196	197	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				117	CTH J & SB I-41	17WBR	196	189	WBR	27	39	23	20	110	20	33	32	22	107	-7	-6	8	2	-4	1.4	1.0	1.7	0.4	0.3
				117	CTH J & SB I-41	17SBT	190	191	SBT	51	81	38	60	230	51	77	43	59	230	0	-4	5	-1	0	0.0	0.5	0.9	0.1	0.0
				117	CTH J & SB I-41	17SBR	190	197	SBR	44	61	51	73	230	46	56	56	75	232	2	-5	5	2	3	0.3	0.7	0.6	0.2	0.1
				118	CTH J & NB I-41	18EBL	199	182	EBL	52	26	53	29	160	38	35	41	42	156	-15	9	-12	13	-4	2.0	1.8	1.6	2.5	0.3
				118	CTH J & NB I-41	18EBT	199	198	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				118	CTH J & NB I-41	18EBR	199	192	EBR	70	72	88	70	300	63	58	86	85	292	-6	-14	-2	15	-8	0.8	1.6	0.2	1.8	0.4
				118	CTH J & NB I-41	18NBT	174	182	NBT	50	54																		

I-41 Traffic and Engineering Study
 Build (2028) With Short Term Improvements and Signal Retimings PM Peak Period Calibration
Lane Utilization Comparison

I-41 NB															
Location		I-41 NB south of CTH BB			I-41 NB betw WIS 125 & WIS 96				I-41 NB betw CTH E & WIS 441			I-41 NB betw WIS 441 & CTH N		I-41 NB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
VISSIM	4:15 PM	30%	30%	40%	22%	26%	39%	13%	35%	35%	30%	46%	54%	50%	50%
	4:30 PM	30%	31%	39%	22%	27%	38%	13%	35%	35%	30%	47%	53%	51%	49%
	4:45 PM	30%	30%	40%	22%	28%	38%	12%	35%	34%	31%	46%	54%	50%	50%
	5:00 PM	29%	30%	41%	20%	25%	39%	16%	35%	35%	31%	47%	53%	50%	50%
Field (ATR)	4:15 PM	34%	35%	31%	13%	28%	31%	29%	32%	25%	42%	47%	53%	43%	57%
	4:30 PM	35%	35%	30%	14%	28%	31%	28%	35%	25%	40%	47%	53%	43%	57%
	4:45 PM	35%	34%	31%	15%	27%	31%	28%	33%	26%	41%	48%	52%	44%	56%
	5:00 PM	36%	35%	29%	13%	28%	31%	28%	35%	26%	39%	48%	52%	45%	55%
VISSIM	Avg	30%	30%	40%	22%	26%	38%	13%	35%	35%	30%	46%	54%	50%	50%
Field	Avg	35%	35%	30%	14%	28%	31%	28%	34%	25%	41%	47%	53%	44%	56%

I-41 SB															
Location		I-41 SB south of CTH BB			I-41 SB betw WIS 125 & WIS 96				I-41 SB betw CTH E & WIS 441			I-41 SB betw WIS 441 & CTH N		I-41 SB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
VISSIM	4:15 PM	32%	35%	33%	22%	27%	42%	8%	30%	46%	24%	50%	50%	48%	52%
	4:30 PM	32%	35%	33%	21%	27%	43%	8%	32%	43%	25%	50%	50%	48%	52%
	4:45 PM	32%	35%	33%	22%	27%	41%	9%	31%	47%	22%	49%	51%	49%	51%
	5:00 PM	33%	35%	32%	21%	28%	43%	8%	32%	43%	25%	50%	50%	49%	51%
Field (ATR)	4:15 PM	36%	33%	31%	10%	31%	32%	28%	24%	34%	42%	47%	53%	40%	60%
	4:30 PM	36%	33%	31%	9%	31%	31%	29%	24%	35%	42%	47%	53%	41%	59%
	4:45 PM	35%	33%	32%	10%	29%	32%	29%	24%	34%	42%	47%	53%	40%	60%
	5:00 PM	37%	33%	30%	9%	31%	32%	29%	24%	34%	42%	47%	53%	43%	57%
VISSIM	Avg	32%	35%	33%	22%	27%	42%	9%	31%	45%	24%	50%	50%	49%	51%
Field	Avg	36%	33%	31%	9%	31%	32%	29%	24%	34%	42%	47%	53%	41%	59%

TEOpS Validation

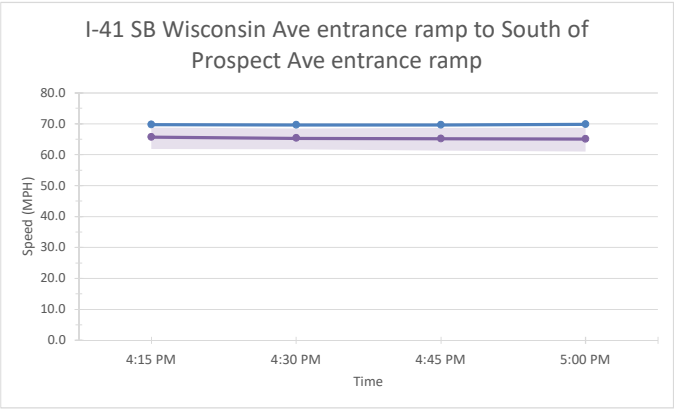
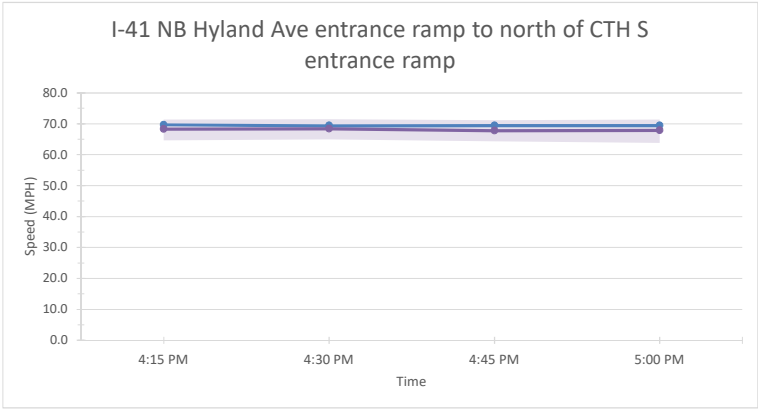
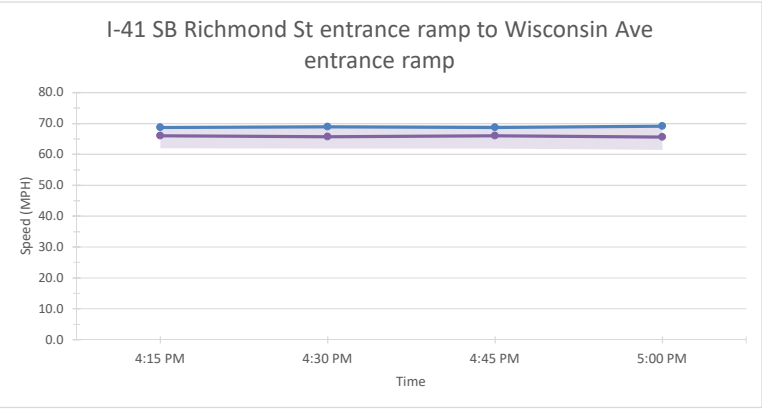
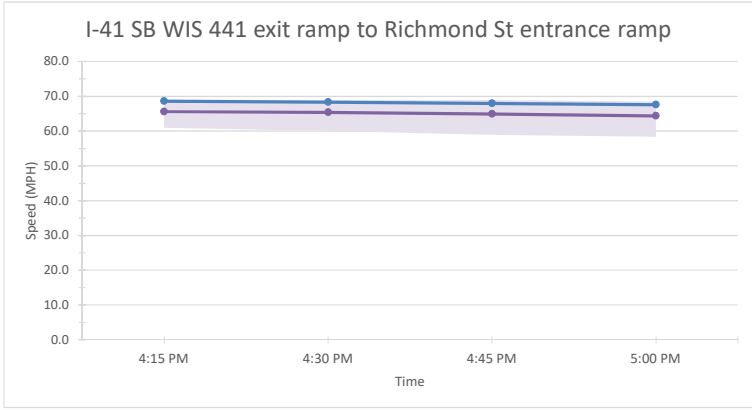
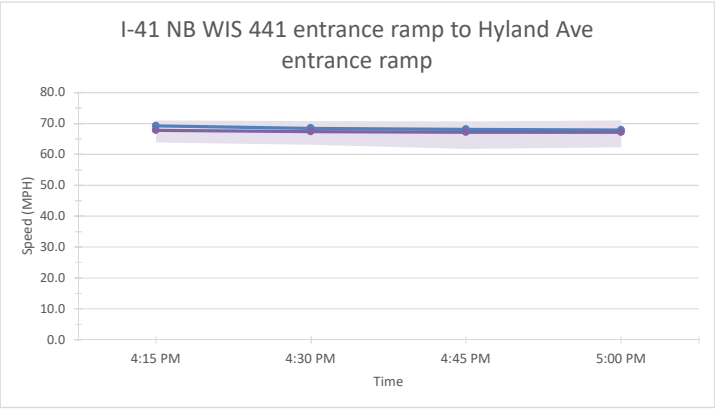
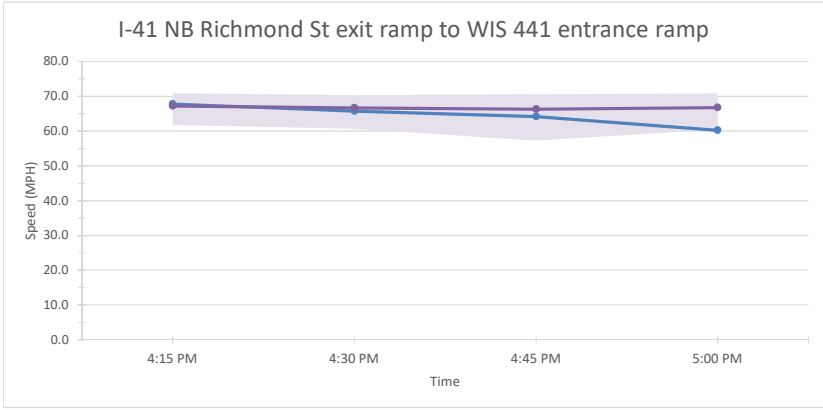
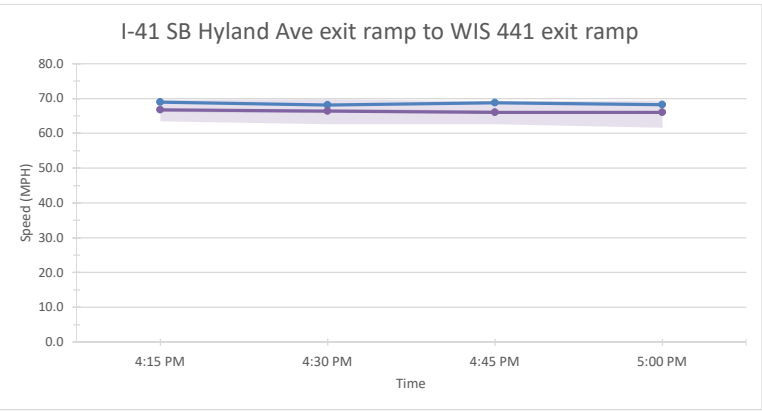
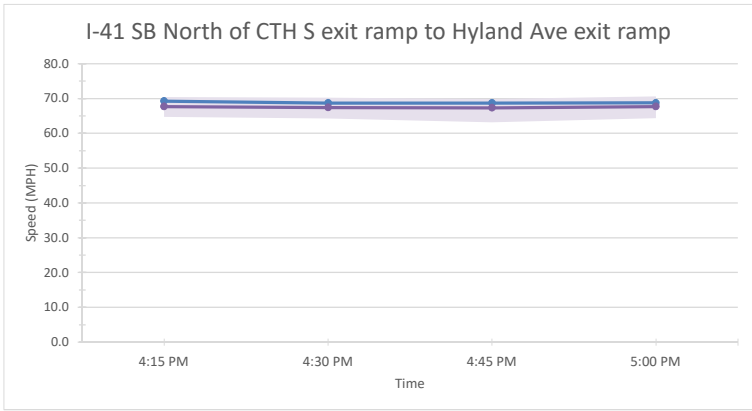
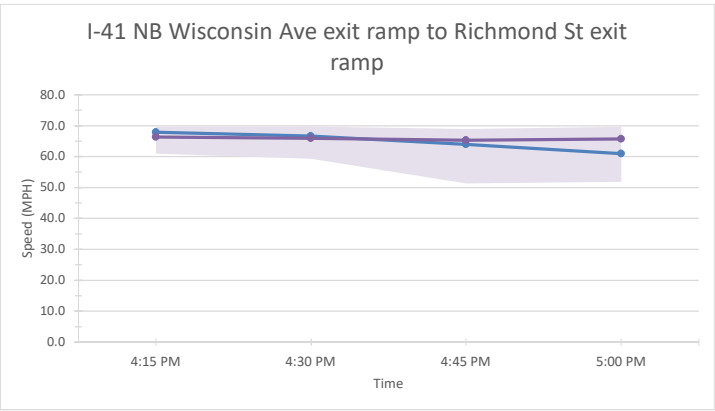
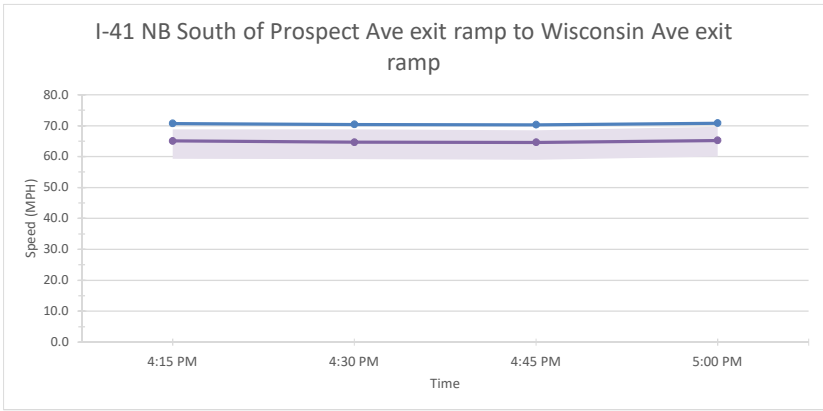
Test	Data	Target	Model
Tier 1	--	Not Applicable	--
Tier 2	ATR	RNSE < 3.0 for 85% of data points	47%

I-41 Traffic and Engineering Study
Build (2028) With Short Term Improvements and Signal Retimings PM Peak Period Calibration
Mainline Speed Comparison

Segment		I-41 NB					Segment		I-41 SB				
		I-41 NB South of Prospect Ave exit ramp to Wisconsin Ave exit ramp	I-41 NB Wisconsin Ave exit ramp to Richmond St exit ramp	I-41 NB Richmond St exit ramp to WIS 441 entrance ramp	I-41 NB WIS 441 entrance ramp to Hyland Ave entrance ramp	I-41 NB Hyland Ave entrance ramp to north of CTH S entrance ramp			I-41 SB North of CTH S exit ramp to Hyland Ave exit ramp	I-41 SB Hyland Ave exit ramp to WIS 441 exit ramp	I-41 SB WIS 441 exit ramp to Richmond St entrance ramp	I-41 SB Richmond St entrance ramp to Wisconsin Ave entrance ramp	I-41 SB Wisconsin Ave entrance ramp to South of Prospect Ave entrance ramp
VISSIM	4:15 PM	70.7	67.9	67.8	69.3	69.7	VISSIM	4:15 PM	69.2	69.0	68.6	68.7	69.8
	4:30 PM	70.4	66.7	65.7	68.5	69.4		4:30 PM	68.7	68.2	68.3	68.9	69.6
	4:45 PM	70.3	64.0	64.2	68.1	69.4		4:45 PM	68.7	68.8	68.0	68.7	69.6
	5:00 PM	70.8	60.9	60.2	67.9	69.4		5:00 PM	68.7	68.2	67.5	69.1	69.8
Field (NPMRDS - Average)	4:15 PM	65.0	66.3	67.2	67.8	68.3	Field (NPMRDS - Average)	4:15 PM	67.7	66.8	65.6	66.0	65.7
	4:30 PM	64.6	66.0	66.7	67.3	68.4		4:30 PM	67.4	66.4	65.3	65.7	65.3
	4:45 PM	64.6	65.3	66.2	67.1	67.8		4:45 PM	67.3	66.0	64.9	66.0	65.2
	5:00 PM	65.2	65.7	66.7	67.2	67.9		5:00 PM	67.7	66.0	64.3	65.6	65.1
Field (NPMRDS - 15th Percentile)	4:15 PM	59.3	60.9	61.8	63.8	64.7	Field (NPMRDS - 15th Percentile)	4:15 PM	64.8	63.5	61.0	62.0	61.9
	4:30 PM	59.2	59.3	60.7	63.1	65.0		4:30 PM	64.3	62.6	60.1	61.9	61.8
	4:45 PM	59.0	51.3	57.3	61.7	64.4		4:45 PM	63.2	62.6	58.9	61.9	61.4
	5:00 PM	60.1	51.9	60.5	62.3	63.9		5:00 PM	64.4	61.6	58.4	61.5	61.1
Field (NPMRDS - 85th Percentile)	4:15 PM	68.8	69.6	70.8	71.0	71.4	Field (NPMRDS - 85th Percentile)	4:15 PM	70.4	69.6	69.1	69.0	68.9
	4:30 PM	68.8	69.8	70.3	70.8	71.6		4:30 PM	70.3	69.7	69.0	69.5	68.6
	4:45 PM	68.5	68.9	70.7	70.7	71.3		4:45 PM	69.9	69.3	68.9	69.5	68.7
	5:00 PM	69.7	69.7	70.8	70.9	71.4		5:00 PM	70.6	69.4	68.5	68.9	68.8

TEOps
Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	5%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts	100%



I-41 Traffic and Engineering Study
Build (2028) With Short Term Improvements and Signal Retimings PM Peak Period Calibration
Travel Time Comparison

FULL CORRIDOR

Data	Time	I-41 NB
		Average Travel Time (min)
		South of CTH BB to North of CTH S
Distance (mi)		26.59
VISSIM	4:15PM	23.5
NPMRDS	4:15PM	23.8

FULL CORRIDOR

Data	Time	I-41 SB
		Average Travel Time (min)
		North of CTH S to South of CTH BB
Distance (mi)		26.58
VISSIM	4:15PM	23.2
NPMRDS	4:15PM	24.0

SEGMENTS

I-41 NB				
Average Travel Time (minutes)				
South of CTH BB to Wisc Ave Exit	Wisc Ave Exit to Richmond Exit	Richmond Exit to 441 Entrance	441 Entrance to Hyland Entrance	Hyland Entrance to North of CTH S
3.12	4.0	3.49	5.26	10.71
2.7	3.7	3.2	4.6	9.3
2.9	3.7	3.1	4.7	9.4
I-41 SB				
Average Travel Time (minutes)				
North of CTH S to Hyland Exit	Hyland Exit to 441 Exit	441 Exit to Richmond Entrance	Richmond Entrance to Wisc Ave Entrance	Wisc Ave Entrance to South of CTH BB
10.68	5.52	3.25	4.0	3.09
9.3	4.8	2.9	3.5	2.7
9.5	5.0	3.0	3.7	2.8

TEOpS Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	4%
Tier 2	NPMRDS	TT ± 15% for 85% of routes	100%

I-41 Traffic and Engineering Study
 Build (2028) With Short Term Improvements and Signal Retimings PM Peak Hour Calibration
 Merge and Diverge Segment Speeds

Merge/Diverge Links			Vissim Speed				
Forecast ID	Link ID	Description	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2
Merge/Diverge Speeds							
	70	NB I-41 CTH BB diverge	70	69	68	70	69
	74	NB I-41 CTH BB merge	69	68	69	69	69
	76	NB I-41 WIS 125 diverge	69	69	69	70	69
	80	NB I-41 WIS 125merge	68	68	69	69	68
		NB I-41 WIS 96 diverge					
	84	NB I-41 WIS 96 merge	69	70	70	69	69
	--	NB I-41 WIS 15 diverge	--	--	--	--	--
	89	NB I-41 WIS 15 merge	61	58	54	52	56
	91	NB I-41 WIS 47 diverge	66	66	66	68	67
	95	NB I-41 WIS 47 merge	63	54	51	44	53
	418	NB I-41 Ballard diverge	64	62	62	62	63
	100	NB I-41 Ballard merge	66	65	62	60	63
		NB I-41 441 diverge					
	103	NB I-41 441 merge	67	66	56	53	61
	420	NB I-41 CTH N diverge	65	62	61	63	63
	108	NB I-41 CTH N merge	68	67	67	68	67
	422	NB I-41 WIS 55 diverge	66	65	66	67	66
	113	NB I-41 WIS 55 merge	69	69	69	69	69
	417	NB I-41 CTH J diverge	63	61	57	61	60
	118	NB I-41 CTH J merge	67	66	68	67	67
	415	NB I-41 CTH U diverge	69	68	68	68	68
	123	NB I-41 CTH U merge	68	68	68	68	68
	425	NB I-41 CTH S diverge	63	62	64	62	63
	128	NB I-41 CTH S merge	69	68	68	68	68
	426	SB I-41 CTH S diverge	56	57	57	58	57
	21	SB I-41 CTH S merge	69	68	68	69	69
	424	SB I-41 CTH U diverge	56	54	52	52	53
	20	SB I-41 CTH U merge	68	68	68	68	68
	416	SB I-41 CTH J diverge	66	66	66	67	66
	19	SB I-41 CTH J merge	67	67	67	66	67
	423	SB I-41 WIS 55 diverge	66	65	65	64	65
	18	SB I-41 WIS 55 merge	68	66	68	67	67
	421	SB I-41 CTH N diverge	63	62	63	61	62
	26	SB I-41 CTH N merge	67	64	66	65	65
	419	SB I-41 441 diverge	64	64	66	65	65
	36	SB I-41 441 merge	69	68	68	68	68
		SB I-41 Ballard diverge					
	40	SB I-41 Ballard merge	66	64	65	62	64
	42	SB I-41 WIS 47 diverge	68	68	67	67	68
	46	SB I-41 WIS 47 merge	64	64	65	64	64
	48	SB I-41 WIS 15 diverge	63	61	65	64	63
	--	SB I-41 WIS 15 merge	--	--	--	--	--
	53	SB I-41 WIS 96 diverge	70	69	69	68	69
	56	SB I-41 WIS 96 merge	69	69	69	69	69
		SB I-41 WIS 125 diverge					
	61	SB I-41 WIS 125merge	68	68	69	68	68
	63	SB I-41 CTH BB diverge	69	69	69	68	69
	67	SB I-41 CTH BB merge	68	68	68	68	68

DRAFT

APPENDIX P11

Year 2048 Build with Short Term Improvements

VISSIM AM Peak Hour

I-41 Traffic and Engineering Study
Build (2048) With Short Term Improvements and Signal Retimings AM Peak Hour Calibration
Freeway Mainline and Signal Volumes

			% Demand	Segments										Target					Vissim					Difference					RMSPE					RMSE				
			100%	Forecast ID	Link ID	Description	Type	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	TOTAL	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2	7:00-7:15AM3	7:15-7:30AM3	7:30-7:45AM3	7:45-8:00AM3	TOTAL3	7:00-7:15AM6	7:15-7:30AM6	7:30-7:45AM6	7:45-8:00AM6	TOTAL6	7:00-7:15AM5	7:15-7:30AM5	7:30-7:45AM5	7:45-8:00AM5	TOTAL5						
TEOps Validation - 15 minute periods																																						
Test	Target	Model		10001	69	NB I-41 (Southern Project Limits)	MAINLINE	748	937	988	1128	3800	832	948	933	1067	3782	85	12	-55	-60	-18	1%	1%	2%	5%	0%	0.1	0.4	1.7	1.8	0.3						
				10002	72	NB I-41 Exit to CTH BB	RAMP	129	174	195	182	680	129	172	190	178	670	0	-2	-5	-3	-10	0%	1%	2%	2%	1%	0.0	0.1	0.3	0.2	0.4						
Tier 1 RMSPE < 5%																																						
Tier 2	RSNE < 3 for 85% of links		95%	10003	71	NB I-41 betw CTH BB Exit to CTH BB Ent	MAINLINE	618	762	794	946	3120	691	771	741	874	3076	73	8	-53	-72	-44	12%	1%	7%	8%	1%	2.9	0.3	1.9	2.3	0.8						
Tier 2 RSNE < 3 for 85% of links																																						
TEOps Validation - 60 minute period																																						
Test	Target	Model		10004	73	NB I-41 Ent from CTH BB	RAMP	135	141	187	147	610	130	142	180	150	603	-4	2	-7	4	-7	3%	1%	4%	2%	1%	0.4	0.1	0.5	0.3	0.3						
				10005	75	NB I-41 betw CTH BB Ent to WIS 125 Exit	MAINLINE	753	903	981	1093	3730	813	916	925	1015	3670	60	13	-56	-77	-60	8%	1%	6%	7%	2%	2.2	0.4	1.8	2.3	1.0						
Tier 1 RMSPE < 5%																																						
Tier 2	RSNE < 3 for 85% of links		95%	10006	78	NB I-41 Exit to WIS 125	RAMP	113	176	204	246	740	101	152	172	192	618	-12	-25	-31	-54	-122	11%	18%	18%	24%	17%	1.1	1.9	2.2	8.4	8.1						
Tier 2 RSNE < 3 for 85% of links																																						
TEOps Validation - 60 minute period																																						
Test	Target	Model		10007	77	NB I-41 betw WIS 125 Exit to WIS 125 Ent	MAINLINE	640	727	777	846	2990	684	738	747	787	2925	44	11	-60	-60	-65	2%	2%	6%	5%	2%	1.8	0.4	2.2	2.1	1.2						
				10008	79	NB I-41 Ent from WIS 125	RAMP	66	86	125	84	360	64	84	118	87	353	-1	-2	-7	3	-7	2%	3%	6%	4%	2%	0.2	0.2	0.6	0.4	0.4						
Tier 1 RMSPE < 5%																																						
Tier 2	RSNE < 3 for 85% of links		95%	10009	80	NB I-41 betw WIS 125 Ent to WIS 96 Exit	MAINLINE	706	812	902	930	3330	735	803	825	864	3238	30	1	-76	-67	-112	4%	0%	0%	3%	1%	1.1	0.0	2.5	2.2	1.9						
Tier 2 RSNE < 3 for 85% of links																																						
TEOps Validation - 60 minute period																																						
Test	Target	Model		10010	82	NB I-41 Exit to WIS96	RAMP	142	172	186	240	740	142	172	182	225	721	0	1	-4	-15	-19	0%	0%	2%	6%	3%	0.0	0.0	0.3	1.0	0.7						
				10011	81	NB I-41 betw WIS 96 Exit to WIS 96 Ent	MAINLINE	564	641	715	690	2610	600	655	654	651	2560	36	15	-62	-39	-50	4%	2%	5%	6%	2%	1.5	0.6	2.3	1.5	1.0						
Tier 1 RMSPE < 5%																																						
Tier 2	RSNE < 3 for 85% of links		95%	10012	83	NB I-41 Ent from WIS 96	RAMP	53	59	83	75	270	49	60	84	75	269	-3	1	1	0	-1	4%	1%	2%	0%	1%	0.5	0.1	0.1	0.0	0.1						
Tier 2 RSNE < 3 for 85% of links																																						
TEOps Validation - 60 minute period																																						
Test	Target	Model		10013	85	NB I-41 WIS 96 Ent to WIS 15 Exit	MAINLINE	617	700	798	765	2880	646	711	736	733	2827	29	11	-62	-32	-53	5%	2%	4%	4%	2%	1.2	0.4	2.2	1.1	1.0						
				10014	87	NB I-41 Exit to WIS15	RAMP	136	187	229	208	760	132	171	214	208	724	-4	-17	-15	0	-36	3%	4%	6%	0%	5%	0.3	1.2	1.0	0.0	1.3						
Tier 1 RMSPE < 5%																																						
Tier 2	RSNE < 3 for 85% of links		95%	10015	86	NB I-41 betw WIS 15 Exit to WIS 15 Ent	MAINLINE	481	513	570	557	2120	504	534	518	521	2076	23	21	-52	-36	-44	5%	4%	7%	7%	2%	1.0	0.9	2.2	1.5	0.9						
Tier 2 RSNE < 3 for 85% of links																																						
TEOps Validation - 60 minute period																																						
Test	Target	Model		10016	88	NB I-41 Ent from WIS15	RAMP	197	244	258	280	980	191	233	244	262	947	-7	-11	3	-18	-33	3%	4%	1%	7%	3%	0.5	0.7	0.2	1.1	1.1						
				10017	90	NB I-41 betw WIS 15 Ent to WIS 47 Exit	MAINLINE	679	757	828	837	3100	684	763	784	786	3017	5	7	-44	-51	-83	3%	1%	5%	6%	3%	0.2	0.2	1.5	1.8	1.5						
Tier 1 RMSPE < 5%																																						
Tier 2	RSNE < 3 for 85% of links		95%	10018	93	NB I-41 Exit to WIS47	RAMP	95	116	164	194	570	96	108	152	171	527	1	-8	-12	-23	-43	1%	7%	7%	10%	7%	0.1	0.8	0.9	1.6	1.8						
Tier 2 RSNE < 3 for 85% of links																																						
TEOps Validation - 60 minute period																																						
Test	Target	Model		10019	92	NB I-41 betw WIS 47 Exit to WIS 47 Ent	MAINLINE	583	640	663	643	2530	568	652	632	605	2458	-15	12	-31	-38	-72	3%	2%	5%	6%	3%	0.6	0.5	1.2	1.5	1.4						
				10020	94	NB I-41 Ent from WIS47	RAMP	206	243	196	206	850	196	238	200	193	827	-10	-5	4	-12	-23	5%	2%	2%	6%	3%	0.7	0.3	0.3	0.9	0.8						
Tier 1 RMSPE < 5%																																						
Tier 2	RSNE < 3 for 85% of links		95%	10021	96	NB I-41 betw WIS 47 Ent to Ballard Exit	MAINLINE	789	883	859	849	3380	749	893	828	815	3286	-40	10	-31	-33	-94	5%	1%	4%	4%	3%	1.4	0.3	1.1	1.1	1.6						
Tier 2 RSNE < 3 for 85% of links																																						
TEOps Validation - 60 minute period																																						
Test	Target	Model		10022	98	NB I-41 Exit to Ballard	RAMP	257	308	250	304	1120	216	257	265	288	1043	-41	-35	15	-17	-77	10%	14%	6%	5%	7%	2.5	2.0	0.9	0.9	2.3						
				10023	97	NB I-41 betw Ballard Exit to Ballard Ent	MAINLINE	532	575	609	544	2260	519	572	548	570	2210	-13	-3	-61	-26	-50	2%	1%	10%	5%	2%	0.5	0.1	2.5	1.1	1.1						
Tier 1 RMSPE < 5%																																						
Tier 2	RSNE < 3 for 85% of links		95%	10024	99	NB I-41 Ent from Ballard	RAMP	254	363	355	349	1320	248	275	289	299	1110	-7	-88	-66	-50	-210	3%	24%	10%	14%	10%	0.4	4.6	2.4	2.7	3.8						
Tier 2 RSNE < 3 for 85% of links																																						
TEOps Validation - 60 minute period																																						
Test	Target	Model		10025	100	NB I-41 betw Ballard Ent to 441 Exit	MAINLINE	786	937	964	893	3580	765	848	835	874	3323	-21	-90	-128	-18	-257	3%	10%	12%	2%	7%	0.8	2.9	1.7	0.6	4.1						
				10026	102	NB I-41 Exit to SB441	RAMP	198	288	257	287	1030	187	233	237	248	905	-11	-56	-20	-39	-125	3%	18%	6%	1%	12%	0.8	1.6	1.2	2.3	1.8						
Tier 1 RMSPE < 5%																																						
Tier 2	RSNE < 3 for 85% of links		95%	10027	101	NB I-41 betw 441 Exit to 441 Ent	MAINLINE	588	649	707	606	2590	569	609	587	629	2394	-20	-69	-40	-20	-156	3%	6%	10%	4%	6%	0.8	0.9	0.9	0.9	0.9						
Tier 2 RSNE < 3 for 85% of links																																						
TEOps Validation - 60 minute period																																						
Test	Target	Model		10028	33	NB I-41 Ent from NB441	RAMP	255	278	292	295	1120	260	279	241	238	1018	-5	1	-50	-57	-102	2%	0%	10%	10%	6%	0.3	0.1	2.9	8.4	3.8						
				10029	104	NB I-41 betw 441 Ent to CTH N Exit	MAINLINE	844	927	998	901	3670	836	873	856	861	3426	-8	-54	-142	-40	-244	1%	6%	10%	4%	7%	0.3	1.8	2.1	1.3	4.0						
Tier 1 RMSPE < 5%																																						
Tier 2	RSNE < 3 for 85% of links		95%	10030	106	NB I-41 Exit to CTH N	RAMP	90	65	76	99	330	100	74	64	79	317	9	9	-12	-19	-13	10%	16%	16%	14%	4%	1.0	1.1	1.4	1.9	0.7						
Tier 2 RSNE < 3 for 85% of links																																						
TEOps Validation - 60 minute period																																						
Test	Target	Model		10031	105	NB I-41 betw CTH N Exit to CTH N Entrance	MAINLINE	753	862	922	802	3340	731	794	797	770	3092	-23	-69	-125	-32	-248	3%	6%	10%	4%	7%	0.8	2.3	6.1	1.1	4.1						
				10032	107	NB I-41 Ent from CTH N	RAMP	104	118	95	84	400	101	116	93	85	396	-2	-2	-2	2	4	2%	1%	2%	2%	1%	0.2	0.1	0.2	0.2							

Fwy/Dir	#	Link ID	Segment	# Lanes	HCM Type	Avg Speed (mph)				Density (pcphpl)				LOS			
						7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM
I-41 NB	25	129	NB I-41: Northern Project Limits	2	Basic	67	67	66	66	31.6	32.0	32.6	33.9	D	D	D	D
	24	125	NB I-41 betw CTH S Exit to CTH S Ent	2	Basic	65	54	32	24	28.9	35.2	59.2	81.4	D	E	F	F
	23	124	NB I-41 betw CTH U Exit to CTH S Exit	2	Basic	66	66	57	55	29.8	31.3	35.9	37.2	D	D	E	E
	22	122	NB I-41 CTH U Exit to CTH U Ent	2	Basic	66	59	22	17	26.6	31.2	80.6	102.0	D	D	F	F
	21	119	NB I-41 betw CTH J Exit to CTH U Exit	2	Basic	68	68	65	56	26.6	28.5	30.7	34.5	D	D	D	D
	20	115	NB I-41 betw CTH J Exit to CTH J Ent	2	Basic	68	67	58	65	22.7	24.8	29.2	25.1	C	C	D	C
	19	114	NB I-41 betw WIS 55 Ent to CTH J Exit	2	Basic	68	68	67	67	25.7	27.1	28.0	27.8	C	D	D	D
	18	110	NB I-41 betw WIS 55 Exit to WIS 55 Ent	2	Basic	69	68	69	69	22.9	25.9	26.0	24.7	C	C	C	C
	17	109	NB I-41 betw CTH N Ent to WIS 55 Exit	2	Basic	68	66	66	67	26.7	30.0	29.7	28.0	D	D	D	D
	16	105	NB I-41 betw CTH N Exit to CTH N Entrance	2	Basic	69	68	66	67	23.0	25.6	26.4	25.2	C	C	D	C
	15	104	NB I-41 betw 441 Ent to CTH N Exit	2	Basic	67	64	65	65	27.3	29.8	28.6	29.0	D	D	D	D
	14	101	NB I-41 betw 441 Exit to 441 Ent	2	Basic	69	64	66	67	17.8	20.6	19.3	20.4	B	C	C	C
	13	100	NB I-41 betw Ballard Ent to 441 Exit	3	Weave	66	65	63	63	17.0	19.1	19.3	20.2	B	B	B	C
	12	97	NB I-41 betw Ballard Exit to Ballard Ent	2	Basic	70	65	58	63	16.2	19.3	20.8	20.0	B	B	C	C
	11	96	NB I-41 betw WIS 47 Ent to Ballard Exit	2	Basic	68	61	37	55	23.9	31.7	48.6	32.4	C	D	F	D
	10	92	NB I-41 betw WIS 47 Exit to WIS 47 Ent	2	Basic	70	70	70	70	17.7	20.3	19.6	18.8	B	C	C	C
	9	90	NB I-41 betw WIS 15 Ent to WIS 47 Exit	2	Basic	69	69	69	68	21.6	24.2	24.9	25.1	C	C	C	C
	8	86	NB I-41 betw WIS 15 Exit to WIS 15 Ent	2	Basic	70	70	69	70	15.7	16.7	16.3	16.3	B	B	B	B
	7	85	NB I-41 WIS 96 Ent to WIS 15 Exit	3	Basic	69	69	68	69	13.6	15.0	15.7	15.5	B	B	B	B
	6	81	NB I-41 betw WIS 96 Exit to WIS 96 Ent	3	Basic	71	71	71	71	12.3	13.4	13.4	13.4	B	B	B	B
	5	80	NB I-41 betw WIS 125 Ent to WIS 96 Exit	4	Weave	69	69	68	69	11.6	12.8	13.1	13.7	B	B	B	B
	4	77	NB I-41 betw WIS 125 Exit to WIS 125 Ent	3	Basic	71	71	71	71	14.1	15.2	14.7	16.2	B	B	B	B
	3	75	NB I-41 betw CTH 88 Ent to WIS 125 Exit	3	Basic	70	70	69	69	16.9	19.2	19.4	21.5	B	C	C	C
	2	71	NB I-41 betw CTH 88 Exit to CTH 88 Ent	3	Basic	71	70	71	70	14.2	15.9	15.2	18.2	B	B	B	C
	1	69	NB I-41 (Southern Project Limits)	3	Basic	71	70	71	70	17.1	19.6	19.2	22.0	B	C	C	C

Fwy/Dir	#	Segment	# Lanes	HCM Type	Avg Speed (mph)				Density (pcphpl)				LOS				
					7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	
I-41 SB	1	1	SB I-41: Northern projects limit	2	Basic	69	69	69	69	24.5	27.4	26.8	24.2	C	D	D	C
	2	2	SB I-41 betw CTH S Exit to CTH S Ent	2	Basic	68	65	65	68	23.3	26.5	26.8	23.2	C	D	D	C
	3	5	SB I-41 betw CTH S Exit to CTH U Exit	2	Basic	68	66	66	68	25.9	29.1	30.0	25.9	C	D	D	C
	4	6	SB I-41 betw CTH U Exit to CTH U Ent	2	Basic	66	64	63	65	24.6	26.5	29.2	25.2	C	D	D	C
	5	9	SB I-41 CTH U Ent to CTH J Exit	2	Basic	68	68	67	53	25.2	26.1	29.3	32.7	C	D	D	D
	6	10	SB I-41 CTH J Exit to CTH J Ent	2	Basic	68	66	32	11	23.0	24.4	54.3	116.6	C	C	F	F
	7	13	SB I-41 CTH J Ent to WIS 55 Exit	2	Basic	64	63	51	11	28.6	29.9	38.8	119.0	D	D	E	F
	8	14	SB I-41 WIS 55 Exit to WIS 55 Ent	2	Basic	67	64	33	8	25.3	27.3	54.2	139.7	C	D	F	F
	9	17	SB I-41 betw WIS 55 Ent to CTH N Exit	2	Basic	66	65	33	10	28.6	30.7	56.3	127.5	D	D	F	F
	10	22	SB I-41 CTH N Exit to CTH N Ent	2	Basic	67	63	12	8	25.2	29.2	109.9	135.7	C	D	F	F
	11	25	SB I-41 CTH N Ent to 441 Exit	2	Basic	67	42	14	14	30.1	47.6	109.6	111.0	D	F	F	F
	12	27	SB I-41 betw 441 Exit to 441 Ent	2	Basic	66	11	9	8	23.9	108.1	128.3	133.8	C	F	F	F
	13	36	SB I-41 betw 441 Ent to Ballard Exit	3	Weave	34	10	11	9	46.2	115.3	109.9	119.8	F	F	F	F
	14	37	SB I-41 Ballard Exit to Ballard Ent	2	Basic	25	11	13	10	71.1	117.4	112.6	126.1	F	F	F	F
	15	41	SB I-41 betw Ballard Ent to WIS 47 Exit	2	Basic	26	20	19	15	76.6	91.5	95.6	107.4	F	F	F	F
	16	43	SB I-41 betw WIS 47 Exit to WIS 47 Ent	2	Basic	18	16	14	11	98.4	103.0	110.3	120.9	F	F	F	F
	17	47	SB I-41 WIS 47 Ent to WIS 15 Exit	2	Basic	63	64	63	63	33.9	33.8	33.5	33.5	D	D	D	D
	18	49	SB I-41 WIS 15 Exit to WIS 15 Ent	2	Basic	67	68	68	68	23.5	23.8	23.5	22.8	C	C	C	C
	19	50	SB I-41 WIS 15 Ent to WIS 96 Exit	3	Basic	70	70	70	70	18.9	19.5	19.2	19.1	C	C	C	C
	20	55	SB I-41 betw WIS 96 Exit to WIS 96 Ent	3	Basic	71	71	70	71	16.5	17.5	17.0	16.4	B	B	B	B
	21	56	SB I-41 betw WIS 96 Ent to WIS 125 Exit	4	Weave	69	67	67	68	14.5	16.6	16.5	15.6	B	B	B	B
	22	58	SB I-41 betw WIS 125 Exit to WIS 125 Ent	3	Basic	70	70	70	70	16.5	18.9	18.5	17.3	B	C	C	C
	23	62	SB I-41 betw WIS 125 Ent to CTH 88 Exit	3	Basic	69	68	68	67	19.0	21.9	21.3	20.9	C	C	C	C
	24	64	SB I-41 betw CTH 88 Exit to CTH 88 Ent	3	Basic	70	70	70	70	16.0	18.3	17.9	16.6	B	C	B	B
	25	68	SB I-41: Southern project limits	3	Basic	70	70	70	70	17.7	20.2	20.4	18.6	B	C	C	C

Notes:
Volume is exported as Total Vehicles and use 9% Trucks for passenger car equivalent purposes.
Levels of Service (LOS) as shown are based on density thresholds established by the 6th Edition Highway Capacity Manual (HCM) for each segment type
Densities and LOSs are only reported for mainline sections that generally represent the segment methodologies within the 6th Edition HCM. Vissim and HCM 6 methodologies are different and no direct comparison should be made

Legend				
Color	Speed (mph)	LOS	Density (pcphpl)	
			Basic	Weave
	55+	A	0-11	0-10
		B	11-19	10-20
	50-55	C	18-26	20-28
	40-50	D	26-35	28-35
	30-40	E	35-45	35-43
	0-30	F	45+	43+

I-41 Traffic and Engineering Study
Build (2048) With Short Term Improvements and Signal Retimings AM Peak Period Calibration
Intersection Turning Movements

			% Demand	Intersections					Target					Vissim					Difference					RNSE				
			100%	Int ID	Int Name	From Link	To Link	Mvmt	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	TOTAL	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2	7:00-7:15AM3	7:15-7:30AM3	7:30-7:45AM3	7:45-8:00AM3	TOTAL3	7:00-7:15AM5	7:15-7:30AM5	7:30-7:45AM5	7:45-8:00AM5	TOTAL5
TEOps Validation - 15 minute periods				108	SB I-41 & WIS15	303	52	EBL	66	85	48	81	280	68	82	51	78	279	1	-2	3	-3	-1	0.2	0.3	0.4	0.4	0.1
Test	Target	Model		108	SB I-41 & WIS15	303	304	EBT	303	379	394	485	1560	302	373	398	474	1547	0	-5	4	-11	-13	0.0	0.3	0.2	0.5	0.3
Tier 1	RMSPE < 5%	Not Applicable		108	SB I-41 & WIS15	309	302	WBT	196	190	190	233	810	182	186	188	235	791	-14	-4	-2	2	-19	1.0	0.3	0.2	0.1	0.7
Tier 2	RSNE < 3 for 75% of turns	94%		108	SB I-41 & WIS15	309	52	WBR	99	111	138	112	460	111	109	131	116	467	12	-2	-7	4	7	1.2	0.2	0.6	0.4	0.3
				108	SB I-41 & WIS15	51	304	SBL	53	75	48	53	230	39	45	44	45	173	-14	-30	-4	-8	-57	1.9	2.8	0.6	1.0	2.8
				108	SB I-41 & WIS15	51	302	SBR	178	278	326	307	1090	215	187	190	206	799	36	-91	-136	-101	-291	2.7	2.8	2.1	2.8	2.8
				106	SB I-41 & WIS96	323	325	EBT	116	169	226	210	720	115	167	224	210	717	-1	-1	-1	0	-3	0.1	0.1	0.1	0.0	0.1
				106	SB I-41 & WIS96	323	57	EBR	46	71	78	85	279	47	69	79	84	279	1	-3	1	-1	-1	0.2	0.3	0.1	0.1	0.1
				106	SB I-41 & WIS96	332	57	WBL	71	117	117	105	410	71	109	119	103	402	0	-8	2	-3	-8	0.0	0.7	0.2	0.2	0.4
				106	SB I-41 & WIS96	332	334	WBT	138	145	169	268	720	144	142	163	223	672	6	-2	-6	-45	-48	0.5	0.2	0.5	2.7	1.8
				106	SB I-41 & WIS96	340	325	SBL	31	40	47	42	160	36	26	28	37	127	4	-13	-20	-4	-33	0.8	2.1	2.8	0.6	2.6
				106	SB I-41 & WIS96	340	57	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				106	SB I-41 & WIS96	340	334	SBR	57	95	89	119	360	68	60	65	80	274	11	-35	-23	-39	-86	1.4	2.8	2.5	2.8	2.8
				104	SB I-41 & WIS125	349	351	EBT	130	148	166	176	620	128	144	163	178	614	-2	-4	-3	2	-6	0.2	0.3	0.2	0.2	0.3
				104	SB I-41 & WIS125	349	60	EBR	43	52	40	36	170	43	51	39	36	169	0	-1	-1	0	-1	0.0	0.1	0.1	0.0	0.1
				104	SB I-41 & WIS125	361	60	WBL	62	75	72	91	300	65	75	71	89	300	3	0	-1	-2	0	0.3	0.1	0.1	0.2	0.0
				104	SB I-41 & WIS125	361	363	WBT	106	154	189	260	710	113	153	186	242	693	7	-2	-4	-18	-17	0.6	0.1	0.3	1.1	0.6
				104	SB I-41 & WIS125	367	351	SBL	42	54	73	71	240	45	39	49	50	183	3	-15	-24	-21	-57	0.5	2.1	2.8	2.5	2.8
				104	SB I-41 & WIS125	367	60	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				104	SB I-41 & WIS125	367	363	SBR	85	81	139	136	440	79	82	85	99	345	-6	1	-54	-36	-95	0.6	0.1	2.8	2.1	2.8
				101	SB I-41 & CTHBB	377	381	EBT	153	153	190	174	670	151	158	186	174	669	-2	5	-4	1	-1	0.2	0.4	0.3	0.1	0.0
				101	SB I-41 & CTHBB	377	66	EBR	47	53	65	65	230	48	53	64	64	228	0	0	-1	-1	-2	0.1	0.1	0.1	0.2	0.1
				101	SB I-41 & CTHBB	382	66	WBL	38	42	46	34	160	39	43	44	35	161	1	1	-2	1	1	0.2	0.1	0.3	0.2	0.1
				101	SB I-41 & CTHBB	382	379	WBT	103	143	141	153	540	105	138	141	152	536	2	-5	0	-1	-4	0.2	0.4	0.0	0.0	0.2
				101	SB I-41 & CTHBB	393	381	SBL	22	29	41	49	140	20	20	26	37	103	-2	-9	-15	-12	-37	0.4	1.7	2.3	1.7	2.8
				101	SB I-41 & CTHBB	393	66	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				101	SB I-41 & CTHBB	393	379	SBR	106	149	135	159	550	105	114	115	129	463	-2	-35	-21	-31	-87	0.2	2.9	1.8	2.4	2.8
				109	NB I-41 & WIS15	304	316	EBL	162	211	195	243	810	159	201	205	230	795	-3	-10	10	-13	-15	0.2	0.7	0.7	0.8	0.5
				109	NB I-41 & WIS15	304	311	EBT	194	243	248	295	980	180	209	243	278	910	-14	-34	-5	-17	-70	1.0	2.2	0.3	1.0	2.2
				109	NB I-41 & WIS15	87	308	NBL	61	74	84	50	270	60	68	80	59	267	-2	-6	-4	9	-3	0.2	0.6	0.5	1.2	0.2
				109	NB I-41 & WIS15	87	316	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				109	NB I-41 & WIS15	87	311	NBR	74	114	144	158	490	73	104	135	154	467	-1	-9	-9	-4	-23	0.1	0.9	0.8	0.3	1.0
				109	NB I-41 & WIS15	10338	308	WBT	234	227	244	295	1000	241	224	242	291	997	6	-3	-2	-4	-3	0.4	0.2	0.1	0.3	0.1
				109	NB I-41 & WIS15	10338	315	WBR	36	33	63	38	170	33	32	64	38	167	-3	0	0	0	-3	0.5	0.1	0.0	0.1	0.2
				107	NB I-41 & WIS96	325	83	EBL	29	39	67	55	190	28	39	66	54	188	-1	0	-1	-1	-2	0.2	0.0	0.1	0.1	0.

I-41 Traffic and Engineering Study
Build (2048) With Short Term Improvements and Signal Retimings AM Peak Period Calibration
Intersection Turning Movements

TEOps Validation - 15 minute periods

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	94%

TEOps Validation - 60 minute period

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	88%

% Demand	Intersections					Target					Vissim					Difference					RNSE				
100%	Int ID	Int Name	From Link	To Link	Mvmt	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	TOTAL	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2	7:00-7:15AM3	7:15-7:30AM3	7:30-7:45AM3	7:45-8:00AM3	TOTAL3	7:00-7:15AM5	7:15-7:30AM5	7:30-7:45AM5	7:45-8:00AM5	TOTAL5
	113	CTH N & SB I-41	222	24	NBL	79	60	100	81	320	80	63	100	78	321	1	2	1	-4	1	0.2	0.3	0.1	0.4	0.0
	113	CTH N & SB I-41	222	216	NBT	68	99	72	111	350	80	101	79	95	355	12	2	7	-15	5	1.4	0.2	0.9	1.5	0.3
	113	CTH N & SB I-41	23	220	WBL	35	34	35	35	140	50	35	22	18	124	14	0	-13	-18	-16	2.4	0.1	2.2	3.0	1.3
	113	CTH N & SB I-41	23	24	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	113	CTH N & SB I-41	23	216	WBR	25	21	48	36	130	39	22	17	23	101	14	1	-31	-13	-29	2.9	0.2	4.5	2.1	2.5
	113	CTH N & SB I-41	217	220	SBT	80	83	67	70	300	78	81	69	70	298	-3	-2	2	0	-2	0.3	0.2	0.3	0.0	0.1
	113	CTH N & SB I-41	217	24	SBR	76	88	98	108	370	78	91	97	104	370	2	3	-1	-5	0	0.3	0.3	0.1	0.4	0.0
	114	CTH N & NB I-41	224	221	EBL	47	36	24	43	150	57	40	30	29	156	10	4	7	-14	6	1.5	0.7	1.4	2.2	0.5
	114	CTH N & NB I-41	224	107	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	114	CTH N & NB I-41	224	227	EBR	43	29	52	55	180	41	35	35	50	161	-2	6	-17	-6	-19	0.3	1.1	2.4	0.7	1.4
	114	CTH N & NB I-41	229	221	NBT	100	124	148	149	520	100	126	148	146	519	0	2	0	-3	-1	0.0	0.2	0.0	0.2	0.0
	114	CTH N & NB I-41	229	107	NBR	53	63	58	46	220	54	63	55	48	221	1	1	-2	1	1	0.2	0.1	0.3	0.2	0.1
	114	CTH N & NB I-41	223	107	SBL	50	55	37	37	180	48	54	38	38	177	-2	-2	1	1	-3	0.3	0.2	0.1	0.1	0.2
	114	CTH N & NB I-41	223	227	SBT	65	62	65	68	260	79	63	54	49	244	14	1	-12	-19	-16	1.7	0.1	1.4	2.3	1.0
	115	WIS55 & SB I-41	187	16	NBL	52	83	78	67	280	52	82	78	67	279	1	-1	0	0	-1	0.1	0.1	0.0	0.0	0.0
	115	WIS55 & SB I-41	187	184	NBT	83	82	133	103	400	87	82	127	105	401	4	0	-6	2	1	0.4	0.0	0.5	0.2	0.1
	115	WIS55 & SB I-41	15	186	WBL	20	26	21	24	90	33	20	24	10	87	13	-7	4	-13	-3	2.9	1.3	0.8	2.7	0.4
	115	WIS55 & SB I-41	15	16	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	115	WIS55 & SB I-41	15	184	WBR	102	10	7	2	120	25	47	15	16	103	-76	37	8	14	-17	2.2	11.0	2.7	4.0	1.6
	115	WIS55 & SB I-41	183	186	SBT	56	101	65	89	310	58	98	65	87	308	2	-3	1	-1	-2	0.3	0.3	0.1	0.2	0.1
	115	WIS55 & SB I-41	183	16	SBR	48	50	73	48	220	50	50	71	48	218	1	0	-2	0	-2	0.2	0.1	0.3	0.1	0.1
	116	WIS55 & NB I-41	111	187	EBL	17	18	17	19	70	22	18	16	18	73	5	0	-1	-2	3	1.3	0.1	0.3	0.4	0.4
	116	WIS55 & NB I-41	111	112	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	116	WIS55 & NB I-41	111	188	EBR	69	81	64	85	300	75	70	70	65	280	6	-11	6	-20	-20	0.7	1.3	0.7	2.2	1.2
	116	WIS55 & NB I-41	200	187	NBT	118	148	194	151	610	118	146	191	153	608	0	-2	-3	2	-2	0.0	0.1	0.2	0.2	0.1
	116	WIS55 & NB I-41	200	112	NBR	38	31	47	44	160	40	31	45	45	160	1	0	-2	1	0	0.2	0.0	0.3	0.1	0.0
	116	WIS55 & NB I-41	186	112	SBL	28	4	4	24	60	31	5	1	22	59	3	1	-3	-2	-1	0.6	0.6	1.6	0.3	0.1
	116	WIS55 & NB I-41	186	188	SBT	48	123	81	89	340	60	111	90	75	336	12	-12	9	-13	-4	1.7	1.1	1.0	1.4	0.2
	117	CTH J & SB I-41	182	197	NBL	44	62	55	59	220	37	62	47	51	196	-7	-1	-8	-8	-24	1.1	0.1	1.0	1.1	1.6
	117	CTH J & SB I-41	182	189	NBT	114	70	98	127	410	110	82	80	99	372	-4	12	-17	-29	-38	0.4	1.4	1.8	2.5	1.9
	117	CTH J & SB I-41	196	191	WBL	41	48	29	23	140	34	42	42	20	139	-7	-5	13	-2	-1	1.1	0.8	2.5	0.5	0.1
	117	CTH J & SB I-41	196	197	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	117	CTH J & SB I-41	196	189	WBR	28	18	36	29	110	36	22	23	28	109	9	4	-13	-1	-1	1.6	1.0	2.2	0.2	0.1
	117	CTH J & SB I-41	190	191	SBT	48	44	63	56	210	48	44	62	57	211	1	48	0	-1	1	0.1	0.0	0.1	0.2	0.1
	117	CTH J & SB I-41	190	197	SBR	97	74	99	80	350	97	76	97	81	350	0	2	-2	1	0	0.0	0.2	0.2	0.1	0.0
	118	CTH J & NB I-41	199	182	EBL	57	46	57	80	240	54	49	47	62	212	-2	3	-10	-18	-28	0.3	0.4	1.3	2.1	1.8
	118	CTH J & NB I-41	199	198	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	118	CTH J & NB I-41	199	192	EBR	44	36	43	27	150	29	35	37	37	138	-15	-1	-7	10	-12	2.3	0.1	1.0	1.8	1.0
	118	CTH J & NB I-41	174	182	NBT	102	87	95	107	390	93	94	80	89	355	-9	7	-15	-18	-35	0.9	0.7	1.5	1.7	1.8
	118	CTH J & NB I-41	174	198	NBR	103	110	121	96	430	100	105	104	87	396	-3	-5	-16	-9	-34	0.3	0.4	1.5	1.0	1.6
	118	CTH J & NB I-41	191	198	SBL	27	26	36	32	120	27	27	33	34	121	0	1	-2	2	1	0.0	0.1	0.3	0.3	0.1
	118	CTH J & NB I-41	191	192	SBT	62	65	56	47	230	56	59	70	44	230	-6	-6	14	-3	0	0.7	0.7	1.8	0.4	0.0
	119	CTH U & SB I-41	166	8	NBL	26	27	20	19	90	25	25	19	18	88	0	-1	-1	0	-2	0.0	0.2	0.2	0.0	0.2
	119	CTH U & SB I-41	166	167	NBT	7	23	37	84	150	5	17	41	47	109	-1	-6	4	-37	-41	0.5	1.2	0.6	2.7	2.2
	119	CTH U & SB I-41	7	159	WBL	32	46	45	27	150	25	41	43	37	147	-7	-5	-2	10	-3	1.2	0.7	0.3	1.9	0.3
	119	CTH U & SB I-41	7	8	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	119	CTH U & SB I-41	7	167	WBR	40	36	25	19	120	38	41	27	22	128	-2	4	3	3	8	0.3	0.7	0.5	0.8	0.8
	119	CTH U & SB I-41	158	159	SBT	56	86	117	132	390	56	85	116	132	389	-1	0	-1	1	-1	0.1	0.0	0.1	0.1	0.1
	119	CTH U & SB I-41	158	8	SBR	26	23	28	22	100	27	23	29	23	102	1	0	1	1	2	0.1	0.1	0.1	0.3	0.2
	120	CTH U & NB I-41	121	165	EBL	7	14	6	53	80	5	9	10	16	41	-1	-5	4	-37	-39	0.5	1.4	1.6	4.7	4.4
	120	CTH U & NB I-41	121	120	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	120	CTH U & NB I-41	121	162	EBR	15	11	26	38	90	16	13	11	25	65	1	2	-15	-14	-25	0.3	0.5	2.9	2.2	2.7
	120	CTH U & NB I-41	164	165	NBT	26	35	50	50	160	26	34	49	49	158	0	-1	-1	0	-2	0.0	0.2	0.2	0.0	0.2
	120	CTH U & NB I-41	164	120	NBR	77	85	119	99	380	81	84	114	100	379	4	-1	-5	1	-1	0.4	0.1	0.5	0.1	0.1
	120	CTH U & NB I-41	160	120	SBL	0	45	29	37	110	0	43	28	38	110	0	-2	0	1	0	0.4	0.3	0.0	0.2	0.0
	120	CTH U & NB I-41	160	162	SBT	88	86	133	122	430	80	81	130	133	425	-8	-5	-3	11	-5	0.8	0.5	0.3	1.0	0.3
	121	SB I-41 & CTH S	131	132	EBT	94	108	120	68	390	95	109	118	70	391	1	0	-3	3	1	0.1	0.0	0.2	0.3	0.1
	121	SB I-41 & CTH S	131	143	EBR	25	34	21	21	100	25	34	21	21	101	1	0	0	0	1	0.2	0.0	0.1	0.0	0.1

I-41 Traffic and Engineering Study
 Build (2048) With Short Term Improvements and Signal Retimings AM Peak Period Calibration
Lane Utilization Comparison

I-41 NB															
Location		I-41 NB south of CTH BB			I-41 NB betw WIS 125 & WIS 96				I-41 NB betw CTH E & WIS 441			I-41 NB betw WIS 441 & CTH N		I-41 NB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
Field VISSIM (ATR)	7:00 AM	30%	30%	40%	26%	30%	37%	8%	37%	38%	24%	48%	52%	50%	50%
	7:15 AM	29%	30%	41%	26%	30%	36%	9%	36%	36%	27%	49%	51%	51%	49%
	7:30 AM	29%	30%	42%	25%	29%	35%	10%	35%	37%	28%	50%	50%	51%	49%
	7:45 AM	30%	31%	39%	25%	29%	35%	11%	36%	36%	28%	50%	50%	51%	49%
	7:00 AM	39%	36%	25%	12%	25%	35%	28%	25%	32%	43%	45%	55%	39%	61%
	7:15 AM	37%	35%	28%	14%	24%	33%	30%	26%	29%	45%	43%	57%	38%	62%
	7:30 AM	36%	36%	29%	13%	25%	32%	30%	27%	29%	44%	42%	58%	38%	62%
	7:45 AM	36%	33%	31%	14%	26%	31%	30%	31%	28%	41%	48%	52%	40%	60%
VISSIM	Avg	30%	30%	40%	26%	29%	36%	9%	36%	37%	27%	49%	51%	51%	49%
Field	Avg	37%	35%	28%	13%	25%	32%	29%	27%	29%	43%	45%	55%	39%	61%

I-41 SB															
Location		I-41 SB south of CTH BB			I-41 SB betw WIS 125 & WIS 96				I-41 SB betw CTH E & WIS 441			I-41 SB betw WIS 441 & CTH N		I-41 SB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
Field VISSIM (ATR)	7:00 AM	32%	35%	33%	25%	32%	37%	6%	34%	40%	25%	50%	50%	49%	51%
	7:15 AM	33%	35%	33%	24%	31%	37%	7%	38%	28%	34%	50%	50%	49%	51%
	7:30 AM	33%	35%	33%	24%	30%	37%	9%	37%	29%	33%	52%	48%	49%	51%
	7:45 AM	33%	35%	32%	23%	31%	37%	9%	38%	27%	34%	52%	48%	49%	51%
	7:00 AM	26%	39%	35%	7%	25%	33%	34%	27%	33%	40%	45%	55%	42%	58%
	7:15 AM	26%	37%	38%	8%	25%	31%	36%	26%	32%	42%	44%	56%	40%	60%
	7:30 AM	25%	36%	39%	9%	24%	31%	36%	28%	31%	41%	43%	57%	41%	59%
	7:45 AM	28%	36%	36%	12%	26%	29%	33%	29%	32%	39%	45%	55%	45%	55%
VISSIM	Avg	32%	35%	33%	24%	31%	37%	8%	37%	31%	32%	51%	49%	49%	51%
Field	Avg	26%	37%	37%	9%	25%	31%	35%	28%	32%	41%	44%	56%	42%	58%

TEOps Validation

Test	Data	Target	Model
Tier 1	--	Not Applicable	--
Tier 2	ATR	RNSE < 3.0 for 85% of data points	28%

I-41 Traffic and Engineering Study
Build (2048) With Short Term Improvements and Signal Retimings AM Peak Period Calibration
Mainline Speed Comparison

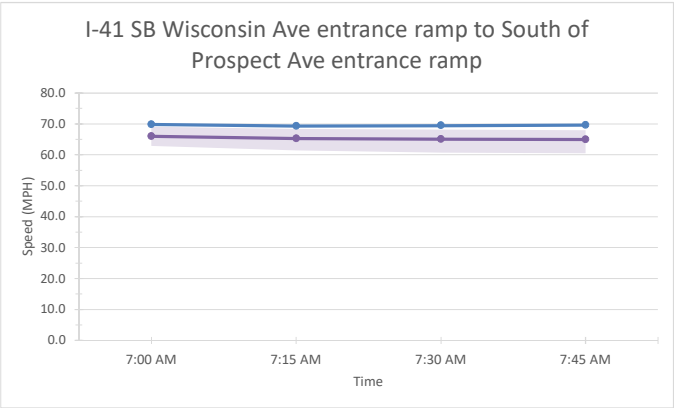
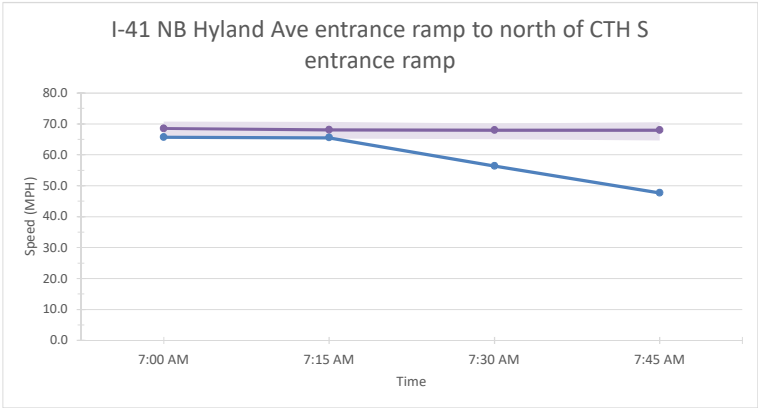
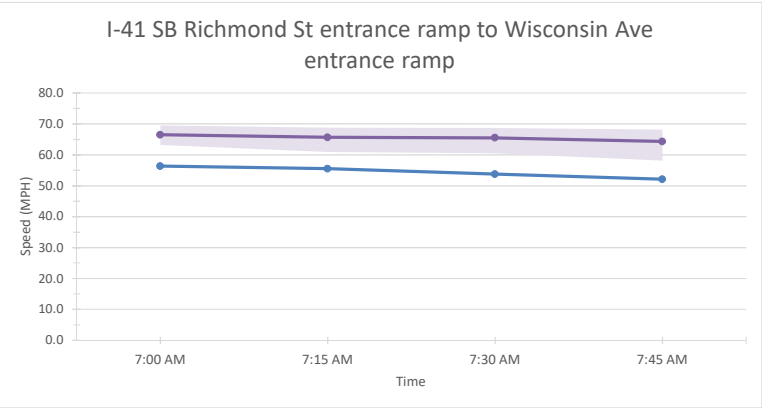
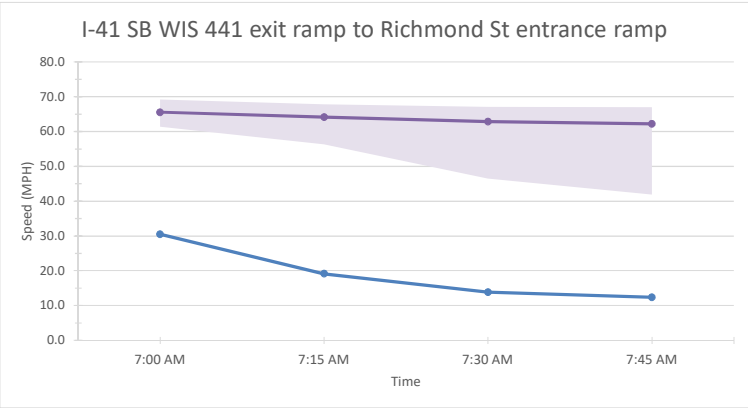
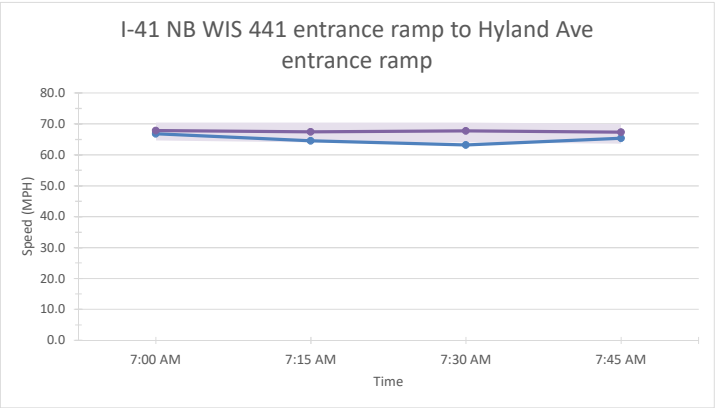
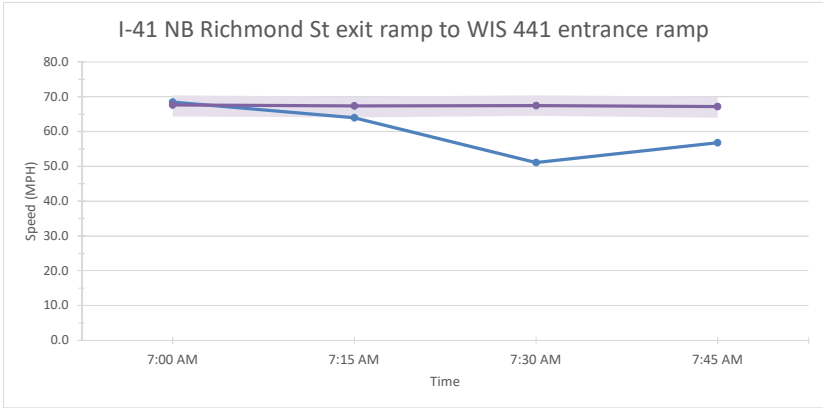
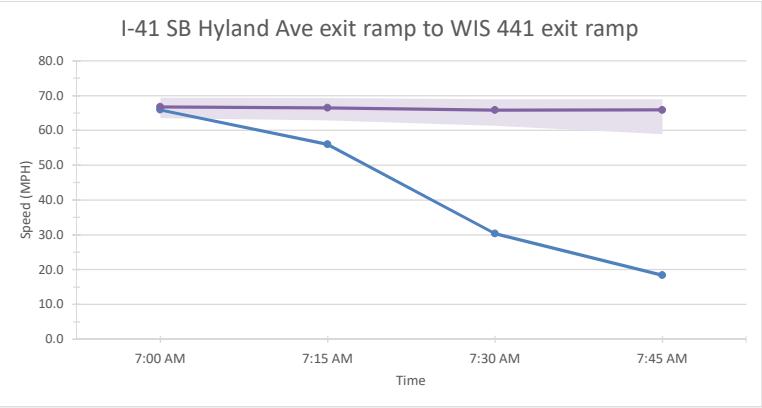
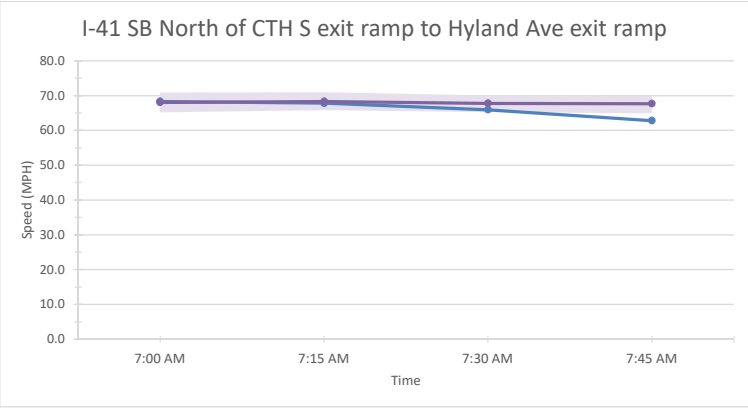
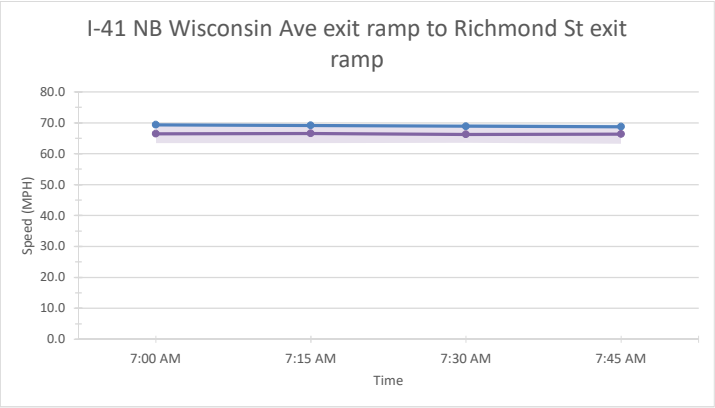
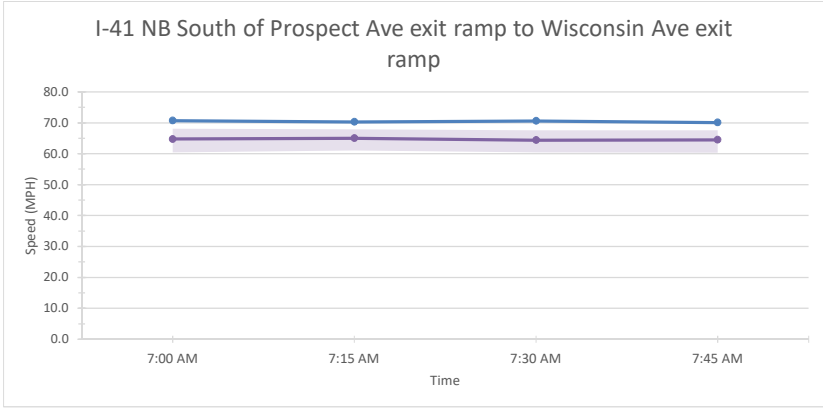
Segment		I-41 NB						Segment		I-41 SB				
		I-41 NB South of Prospect Ave exit ramp to Wisconsin Ave exit ramp	I-41 NB Wisconsin Ave exit ramp to Richmond St exit ramp	I-41 NB Richmond St exit ramp to WIS 441 entrance ramp	I-41 NB WIS 441 entrance ramp to Hyland Ave entrance ramp	I-41 NB Hyland Ave entrance ramp to north of CTH S entrance ramp				I-41 SB North of CTH S exit ramp to Hyland Ave exit ramp	I-41 SB Hyland Ave exit ramp to WIS 441 exit ramp	I-41 SB WIS 441 exit ramp to Richmond St entrance ramp	I-41 SB Richmond St entrance ramp to Wisconsin Ave entrance ramp	I-41 SB Wisconsin Ave entrance ramp to South of Prospect Ave entrance ramp
VISSIM	7:00 AM	70.7	69.3	68.5	66.8	65.7		VISSIM	7:00 AM	68.3	65.9	30.5	56.4	69.9
	7:15 AM	70.3	69.1	63.9	64.6	65.6			7:15 AM	67.8	56.0	19.2	55.6	69.3
	7:30 AM	70.6	68.9	51.1	63.2	56.4			7:30 AM	65.9	30.4	13.9	53.8	69.5
	7:45 AM	70.0	68.7	56.8	65.4	47.7			7:45 AM	62.8	18.4	12.4	52.1	69.7
Field (NPMRDS Average)	7:00 AM	64.7	66.4	67.7	67.9	68.5		Field (NPMRDS Average)	7:00 AM	68.0	66.8	65.6	66.5	66.0
	7:15 AM	65.0	66.6	67.4	67.5	68.1			7:15 AM	68.3	66.5	64.2	65.7	65.3
	7:30 AM	64.3	66.2	67.5	67.7	68.0			7:30 AM	67.8	65.8	62.9	65.5	65.1
	7:45 AM	64.5	66.3	67.1	67.3	68.0			7:45 AM	67.7	65.9	62.2	64.3	65.0
Field (NPMRDS 15th Percentile)	7:00 AM	60.5	63.4	64.3	64.7	65.8		Field (NPMRDS 15th Percentile)	7:00 AM	65.2	63.6	61.4	63.2	62.9
	7:15 AM	61.1	63.4	64.1	64.0	65.3			7:15 AM	65.9	62.9	56.4	61.0	61.5
	7:30 AM	60.4	63.5	64.5	64.0	65.1			7:30 AM	65.3	61.4	46.6	60.5	60.8
	7:45 AM	60.3	63.2	64.0	63.6	64.7			7:45 AM	64.9	59.0	41.9	58.1	60.6
Field (NPMRDS 85th Percentile)	7:00 AM	68.1	69.2	70.4	70.5	70.8		Field (NPMRDS 85th Percentile)	7:00 AM	70.9	69.4	69.2	69.5	69.1
	7:15 AM	67.9	68.9	70.1	70.4	70.7			7:15 AM	70.9	69.3	67.8	68.8	68.4
	7:30 AM	67.5	68.9	70.4	70.5	70.2			7:30 AM	70.1	69.0	67.1	68.6	68.2
	7:45 AM	67.5	69.1	70.0	70.1	70.6			7:45 AM	69.9	68.9	67.0	68.1	68.0

TEOps Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	29%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts	80%

TEOps Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	29%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts	80%



I-41 Traffic and Engineering Study
Build (2048) With Short Term Improvements and Signal Retimings AM Peak Period Calibration
Travel Time Comparison

FULL CORRIDOR

Data	Time	I-41 NB
		Average Travel Time (min)
		South of CTH BB to North of CTH S
Distance (mi)		26.59
VISSIM	7:00AM	25.7
NPMRDS	7:00AM	23.7

FULL CORRIDOR

Data	Time	I-41 SB
		Average Travel Time (min)
		North of CTH S to South of CTH BB
Distance (mi)		26.58
VISSIM	7:00AM	38.4
NPMRDS	7:00AM	24.0

SEGMENTS

I-41 NB				
Average Travel Time (minutes)				
South of CTH BB to Wisc Ave Exit	Wisc Ave Exit to Richmond Exit	Richmond Exit to 441 Entrance	441 Entrance to Hyland Entrance	Hyland Entrance to North of CTH S
3.12	4.0	3.49	5.26	10.71
2.7	3.5	3.5	4.9	11.2
2.9	3.6	3.1	4.7	9.4
I-41 SB				
Average Travel Time (minutes)				
North of CTH S to Hyland Exit	Hyland Exit to 441 Exit	441 Exit to Richmond Entrance	Richmond Entrance to Wisc Ave Entrance	Wisc Ave Entrance to South of CTH BB
10.68	5.52	3.25	4.0	3.09
9.7	10.0	11.6	4.5	2.7
9.4	5.0	3.1	3.7	2.8

TEOpS Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	94%
Tier 2	NPMRDS	TT ± 15% for 85% of routes	60%

I-41 Traffic and Engineering Study
 Build (2048) With Short Term Improvements and Signal Retimings AM Peak Hour Calibration
 Merge and Diverge Segment Speeds

Merge/Diverge Links			Vissim Speed				
Forecast ID	Link ID	Description	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2
Merge/Diverge Speeds							
	70	NB I-41 CTH BB diverge	70	68	70	67	69
	74	NB I-41 CTH BB merge	70	69	69	69	69
	76	NB I-41 WIS 125 diverge	69	70	69	69	69
	80	NB I-41 WIS 125merge	69	69	68	69	69
		NB I-41 WIS 96 diverge					
	84	NB I-41 WIS 96 merge	70	70	70	70	70
	--	NB I-41 WIS 15 diverge	--	--	--	--	--
	89	NB I-41 WIS 15 merge	67	66	66	65	66
	91	NB I-41 WIS 47 diverge	68	68	68	69	68
	95	NB I-41 WIS 47 merge	66	61	63	64	63
	418	NB I-41 Ballard diverge	64	26	12	25	32
	100	NB I-41 Ballard merge	66	65	63	63	64
		NB I-41 441 diverge					
	103	NB I-41 441 merge	63	38	51	47	50
	420	NB I-41 CTH N diverge	65	64	64	61	64
	108	NB I-41 CTH N merge	62	53	50	59	56
	422	NB I-41 WIS 55 diverge	65	62	63	63	63
	113	NB I-41 WIS 55 merge	67	68	68	67	67
	417	NB I-41 CTH J diverge	61	62	59	59	60
	118	NB I-41 CTH J merge	59	50	34	50	48
	415	NB I-41 CTH U diverge	66	63	47	23	50
	123	NB I-41 CTH U merge	49	35	19	19	30
	425	NB I-41 CTH S diverge	52	55	41	36	46
	128	NB I-41 CTH S merge	54	42	27	29	38
	426	SB I-41 CTH S diverge	59	57	59	60	59
	21	SB I-41 CTH S merge	68	56	57	67	62
	424	SB I-41 CTH U diverge	53	47	47	51	50
	20	SB I-41 CTH U merge	65	60	55	63	61
	416	SB I-41 CTH J diverge	65	66	46	14	48
	19	SB I-41 CTH J merge	57	51	21	9	35
	423	SB I-41 WIS 55 diverge	62	59	41	9	43
	18	SB I-41 WIS 55 merge	61	55	26	8	37
	421	SB I-41 CTH N diverge	59	61	16	10	36
	26	SB I-41 CTH N merge	57	43	13	11	31
	419	SB I-41 441 diverge	65	19	12	11	27
	36	SB I-41 441 merge	34	10	11	9	16
		SB I-41 Ballard diverge					
	40	SB I-41 Ballard merge	21	13	14	11	15
	42	SB I-41 WIS 47 diverge	24	21	18	14	19
	46	SB I-41 WIS 47 merge	24	23	20	18	21
	48	SB I-41 WIS 15 diverge	57	60	58	59	58
	--	SB I-41 WIS 15 merge	--	--	--	--	--
	53	SB I-41 WIS 96 diverge	69	69	69	69	69
	56	SB I-41 WIS 96 merge	69	67	67	68	68
		SB I-41 WIS 125 diverge					
	61	SB I-41 WIS 125merge	69	68	69	68	68
	63	SB I-41 CTH BB diverge	68	67	69	68	68
	67	SB I-41 CTH BB merge	69	68	69	69	69

APPENDIX P12

Year 2048 Build with Short Term Improvements

VISSIM PM Peak Hour

I-41 Traffic and Engineering Study
Build (2048) With Short Term Improvements and Signal Retimings PM Peak Hour Calibration
Freeway Mainline and Ramp Volumes

			% Demand	Segments										Target					Vissim					Difference					RMSPE					RMSE				
			100%	Forecast ID	Link ID	Description	Type	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	TOTAL	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2	4:15-4:30PM3	4:30-4:45PM3	4:45-5:00PM3	5:00-5:15PM3	TOTAL3	4:15-4:30PM6	4:30-4:45PM6	4:45-5:00PM6	5:00-5:15PM6	TOTAL6	4:15-4:30PM5	4:30-4:45PM5	4:45-5:00PM5	5:00-5:15PM5	TOTAL5						
TEOps Validation - 15 minute periods																																						
Test	Target	Model		10001	69	NB I-41 (Southern Project Limits)	MAINLINE	981	970	1034	935	3920	981	973	1024	935	3913	0	3	-10	0	-7	0%	0%	1%	0%	0%	0.0	0.1	0.3	0.0	0.1						
				10002	72	NB I-41 Exit to CTH BB	RAMP	151	147	166	156	620	152	143	159	159	613	0	-5	-7	4	-8	0%	3%	4%	2%	1%	0.0	0.4	0.5	0.3	0.3						
Tier 1		RMSPE < 5%	11%	10003	71	NB I-41 betw CTH BB Exit to CTH BB Ent	MAINLINE	830	823	868	779	3300	814	830	850	787	3282	-16	7	-17	8	-18	2%	1%	2%	1%	1%	0.5	0.3	0.6	0.3	0.3						
Tier 2		RSNE < 3 for 85% of links	10%	10004	73	NB I-41 Ent from CTH BB	RAMP	237	249	240	233	960	228	224	222	240	881	-9	-26	-18	-26	-79	4%	10%	8%	11%	4%	0.6	1.6	1.2	1.7	2.6						
				10005	75	NB I-41 betw CTH BB Ent to WIS 125 Exit	MAINLINE	1067	1072	1108	1012	4260	1042	1053	1078	1002	4175	-24	-20	-30	-10	-84	2%	2%	3%	1%	2%	0.7	0.6	0.9	0.3	1.3						
				10006	78	NB I-41 Exit to WIS 125	RAMP	259	266	244	242	1010	218	222	209	244	854	-41	-44	-34	-37	-156	10%	10%	10%	10%	10%	2.5	2.7	2.2	2.4	8.0						
				10007	77	NB I-41 betw WIS 125 Exit to WIS 125 Ent	MAINLINE	808	807	865	771	3250	779	793	815	736	3124	-28	-13	-49	-35	-126	4%	2%	6%	5%	4%	1.0	0.5	1.7	1.3	2.2						
				10008	79	NB I-41 Ent from WIS 125	RAMP	218	254	256	311	1040	203	225	212	297	1037	-15	-29	-44	-114	-203	5%	17%	17%	17%	20%	1.0	1.8	2.7	8.0	8.0						
				10009	80	NB I-41 betw WIS 125 Ent to WIS 96 Exit	MAINLINE	1026	1060	1121	1082	4290	971	1006	962	963	3982	-55	-54	-179	-219	-598	5%	5%	10%	10%	10%	1.7	1.7	1.7	1.7	1.7						
				10010	82	NB I-41 Exit to WIS96	RAMP	242	250	233	276	1000	237	198	195	184	816	-5	-51	-37	-91	-184	2%	21%	16%	15%	15%	0.3	1.7	2.4	1.6	3.8						
				10011	81	NB I-41 betw WIS 96 Exit to WIS 96 Ent	MAINLINE	784	811	888	806	3290	741	774	728	626	2870	-43	-37	-160	-180	-419	5%	5%	10%	22%	11%	1.5	1.3	2.0	6.0	2.0						
				10012	83	NB I-41 Ent from WIS 96	RAMP	246	289	283	333	1150	255	268	260	275	1059	9	-20	-23	-57	-91	4%	7%	8%	17%	8%	0.6	1.2	1.4	8.0	2.7						
				10013	85	NB I-41 WIS 96 Ent to WIS 15 Exit	MAINLINE	1029	1099	1172	1139	4440	989	1000	1000	902	840	-41	-100	-270	-299	-709	4%	8%	10%	10%	10%	1.3	2.0	2.0	6.0	10.0						
				10014	87	NB I-41 Exit to WIS15	RAMP	321	354	307	338	1320	292	311	248	227	1079	-29	-42	-59	-111	-241	8%	12%	10%	10%	10%	1.6	2.3	1.4	6.0	6.0						
				10015	86	NB I-41 betw WIS 15 Exit to WIS 15 Ent	MAINLINE	708	746	865	801	3120	662	621	623	612	2519	-46	-124	-242	-188	-601	7%	17%	10%	10%	10%	1.7	4.8	1.2	6.0	6.0						
				10016	88	NB I-41 Ent from WIS15	RAMP	424	459	326	353	1560	338	314	295	322	1269	-85	-144	-31	-31	-291	10%	10%	10%	10%	10%	8.1	8.0	1.7	1.6	7.0						
				10017	90	NB I-41 betw WIS 15 Exit to WIS 47 Exit	MAINLINE	1132	1204	1199	1153	4680	943	929	927	937	3737	-188	-275	-263	-216	-943	10%	10%	10%	10%	10%	1.0	1.0	1.0	1.0	1.0						
				10018	93	NB I-41 Exit to WIS47	RAMP	239	234	303	300	1000	183	191	174	183	741	-45	-43	-51	-121	-259	10%	10%	10%	10%	10%	2.0	2.0	1.0	1.0	1.0						
				10019	92	NB I-41 betw WIS 47 Exit to WIS 47 Ent	MAINLINE	893	971	966	850	3680	746	738	748	749	2981	-147	-233	-218	-101	-699	10%	10%	10%	10%	10%	8.0	8.0	1.0	1.0	1.0						
				10020	94	NB I-41 Ent from WIS47	RAMP	222	230	219	279	950	198	199	173	226	796	-24	-31	-46	-53	-154	11%	11%	11%	10%	10%	1.6	2.0	2.1	8.0	8.0						
				10021	96	NB I-41 betw WIS 47 Ent to Ballard Exit	MAINLINE	1115	1201	1185	1129	4630	945	942	927	961	3775	-170	-259	-258	-168	-855	10%	10%	10%	10%	10%	8.0	8.0	1.0	1.0	1.0						
				10022	98	NB I-41 Exit to Ballard	RAMP	149	168	202	191	710	185	132	130	202	599	35	-35	-32	-72	-39	11%	10%	10%	10%	10%	2.9	2.7	2.0	2.8	4.0						
				10023	97	NB I-41 betw Ballard Exit to Ballard Ent	MAINLINE	966	1033	983	938	3920	753	805	794	800	3152	-213	-228	-189	-138	-768	10%	10%	10%	10%	10%	8.0	8.0	1.0	1.0	1.0						
				10024	99	NB I-41 Ent from Ballard	RAMP	203	241	247	239	930	220	226	236	227	909	17	-15	-10	-13	-21	8%	8%	4%	5%	2%	1.2	1.0	0.7	0.8	0.7						
				10025	100	NB I-41 betw Ballard Ent to 441 Exit	MAINLINE	1169	1274	1230	1177	4850	977	1031	1031	1027	4067	-192	-243	-199	-150	-783	10%	10%	10%	10%	10%	8.0	8.0	1.0	1.0	1.0						
				10026	102	NB I-41 Exit to SB441	RAMP	402	442	438	429	1710	334	345	352	333	1384	-67	-98	-86	-76	-326	10%	10%	10%	10%	10%	8.0	8.0	1.0	1.0	1.0						
				10027	101	NB I-41 betw 441 Exit to 441 Ent	MAINLINE	768	832	792	789	3140	634	678	669	665	2646	-133	-153	-84	-84	-494	10%	10%	10%	10%	10%	8.0	8.0	1.0	1.0	1.0						
				10028	33	NB I-41 Ent from NB441	RAMP	187	166	204	214	770	183	166	204	212	765	-4	-1	0	-2	-5	2%	0%	0%	1%	1%	0.3	0.1	0.0	0.2	0.2						
				10029	104	NB I-41 betw 441 Ent to CTH N Exit	MAINLINE	954	997	996	963	3910	820	840	868	885	3414	-134	-157	-127	-78	-497	10%	10%	10%	10%	10%	8.0	8.0	1.0	1.0	1.0						
				10030	106	NB I-41 Exit to CTH N	RAMP	201	242	256	231	930	158	193	208	219	778	-44	-49	-48	-12	-152	10%	10%	10%	10%	10%	8.0	8.0	1.0	1.0	1.0						
				10031	105	NB I-41 betw CTH N Exit to CTH N Entrance	MAINLINE	753	755	740	731	2980	662	638	664	641	2604	-91	-118	-77	-91	-376	10%	10%	10%	10%	10%	8.0	8.0	1.0	1.0	1.0						
				10032	107	NB I-41 Ent from CTH N	RAMP	85	100	106	59	350	84	95	104	65	348	-1	-5	-2	6	-1	1%	5%	1%	10%	0%	0.1	0.5	0.2	0.8	0.1						
				10033	109	NB I-41 betw CTH N Ent to WIS 55 Exit	MAINLINE	838	856	846	790	3330	749	732	737	528	2747	-89	-123	-109	-262	-583	11%	10%	10%	10%	10%	8.0	8.0	1.0	1.0	1.0						
				10034	111	NB I-41 Exit to WIS55	RAMP	114	171	117	147	550	115	115	106	70	407	1	-56	-11	-77	-143	1%	10%	10%	10%	10%	0.1	8.0	1.0	8.0	8.0						
				10035	110	NB I-41 betw WIS 55 Exit to WIS 55 Ent	MAINLINE	723	685	729	643	2780	626	59																								

I-41 Traffic and Engineering Study
 Build (2048) With Short Term Improvements and Signal Retimings PM Peak Period Calibration
 Mainline Operations

Segment	# Lanes	HCM Type	Avg Speed (mph)				Density (pcphpl)				LOS			
			4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM
NB I-41: Northern Project Limits	2	Basic	69	70	69	70	19.4	19.8	19.6	17.0	C	C	C	B
NB I-41 betw CTH S Exit to CTH S Ent	2	Basic	69	69	69	70	17.5	16.9	15.6	12.9	B	B	B	B
NB I-41 betw CTH U Ent to CTH S Exit	2	Basic	69	69	69	70	19.4	18.6	17.2	13.9	C	C	B	B
NB I-41 CTH U Exit to CTH U Ent	2	Basic	70	70	70	70	16.5	15.1	14.6	11.9	B	B	B	B
NB I-41 betw CTH J Ent to CTH U Exit	2	Basic	70	70	70	70	18.3	16.7	15.8	12.9	C	B	B	B
NB I-41 betw CTH J Exit to CTH J Ent	2	Basic	60	60	61	60	17.8	16.0	14.1	11.9	B	B	B	B
NB I-41 betw WIS 55 Ent to CTH J Exit	2	Basic	33	10	7	6	42.0	122.0	149.7	155.4	E	F	F	F
NB I-41 betw WIS 55 Exit to WIS 55 Ent	2	Basic	70	40	8	5	19.6	32.6	133.7	163.9	C	D	F	F
NB I-41 betw CTH N Ent to WIS 55 Exit	2	Basic	69	69	41	10	23.8	23.1	38.9	115.8	C	C	E	F
NB I-41 betw CTH N Exit to CTH N Entrance	2	Basic	69	69	70	59	20.9	20.0	20.7	23.8	C	C	C	C
NB I-41 betw 441 Ent to CTH N Exit	2	Basic	67	67	66	66	26.5	27.4	28.6	29.1	D	D	D	D
NB I-41 betw 441 Exit to 441 Ent	2	Basic	68	65	66	67	20.5	22.9	22.0	21.5	C	C	C	C
NB I-41 betw Ballard Ent to 441 Exit	3	Weave	60	59	57	60	23.7	25.2	26.3	24.9	C	C	C	C
NB I-41 betw Ballard Exit to Ballard Ent	2	Basic	69	69	69	69	23.7	25.5	25.2	25.2	C	C	C	C
NB I-41 betw WIS 47 Ent to Ballard Exit	2	Basic	67	68	68	66	30.7	30.3	29.8	31.6	D	D	D	D
NB I-41 betw WIS 47 Exit to WIS 47 Ent	2	Basic	70	70	70	70	23.2	22.9	23.3	23.4	C	C	C	C
NB I-41 betw WIS 15 Ent to WIS 47 Exit	2	Basic	64	64	64	64	32.0	31.6	31.6	32.0	D	D	D	D
NB I-41 betw WIS 15 Exit to WIS 15 Ent	2	Basic	34	12	11	10	42.2	108.5	125.0	127.7	E	F	F	F
NB I-41 WIS 96 Ent to WIS 15 Exit	3	Basic	65	31	14	10	22.0	46.7	92.0	121.0	C	F	F	F
NB I-41 betw WIS 96 Exit to WIS 96 Ent	3	Basic	70	67	41	11	15.3	16.7	26.1	82.4	B	B	D	F
NB I-41 betw WIS 125 Ent to WIS 96 Exit	4	Weave	67	51	11	7	15.8	21.6	92.9	130.6	B	C	F	F
NB I-41 betw WIS 125 Exit to WIS 125 Ent	3	Basic	71	71	47	26	16.0	16.3	25.0	41.8	B	B	C	E
NB I-41 betw CTH BB Ent to WIS 125 Exit	3	Basic	66	67	67	68	22.8	22.9	23.4	21.5	C	C	C	C
NB I-41 betw CTH BB Exit to CTH BB Ent	3	Basic	70	70	70	69	16.8	17.3	17.8	16.6	B	B	B	B
NB I-41 (Southern Project Limits)	3	Basic	71	71	70	70	20.2	20.0	21.1	19.3	C	C	C	C

Segment	# Lanes	HCM Type	Avg Speed (mph)				Density (pcphpl)				LOS			
			4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM
SB I-41: Northern projects limit	2	Basic	69	69	68	69	30.0	28.5	31.4	27.3	D	D	D	D
SB I-41 betw CTH S Exit to CTH S Ent	2	Basic	66	66	64	65	26.7	26.3	29.1	25.6	D	D	D	C
SB I-41 betw CTH S Exit to CTH U Exit	2	Basic	67	68	67	67	27.8	28.4	30.3	27.6	D	D	D	D
SB I-41 betw CTH U Exit to CTH U Ent	2	Basic	65	66	65	65	24.2	24.8	25.9	24.2	C	C	C	C
SB I-41 CTH U Ent to CTH J Exit	2	Basic	69	69	68	68	23.9	25.4	25.6	25.4	C	C	C	C
SB I-41 CTH J Exit to CTH J Ent	2	Basic	69	69	65	67	19.1	20.8	21.1	22.2	C	C	C	C
SB I-41 CTH J Ent to WIS 55 Exit	2	Basic	68	68	67	66	22.8	23.8	22.9	25.8	C	C	C	C
SB I-41 WIS 55 Exit to WIS 55 Ent	2	Basic	69	69	69	69	19.7	21.0	19.7	22.1	C	C	C	C
SB I-41 betw WIS 55 Ent to CTH N Exit	2	Basic	69	68	68	68	23.4	26.7	24.1	28.3	C	D	C	D
SB I-41 CTH N Exit to CTH N Ent	2	Basic	69	69	69	69	19.9	21.7	18.5	22.0	C	C	C	C
SB I-41 CTH N Ent to 441 Exit	2	Basic	69	68	69	68	23.2	28.1	24.1	27.0	C	D	C	D
SB I-41 betw 441 Exit to 441 Ent	2	Basic	70	70	70	70	15.1	17.1	14.7	17.0	B	B	B	B
SB I-41 betw 441 Ent to Ballard Exit	3	Weave	68	66	67	61	18.4	20.5	19.2	22.2	B	C	B	C
SB I-41 Ballard Exit to Ballard Ent	2	Basic	69	67	65	58	20.6	21.8	22.8	25.6	C	C	C	C
SB I-41 betw Ballard Ent to WIS 47 Exit	2	Basic	64	63	62	62	33.5	34.6	35.5	35.0	D	D	E	D
SB I-41 betw WIS 47 Exit to WIS 47 Ent	2	Basic	69	70	69	70	24.4	24.0	24.7	23.6	C	C	C	C
SB I-41 WIS 47 Ent to WIS 15 Exit	2	Basic	67	68	67	68	31.2	30.0	30.9	29.6	D	D	D	D
SB I-41 WIS 15 Exit to WIS 15 Ent	2	Basic	68	68	69	69	19.7	19.4	19.3	18.4	C	C	C	C
SB I-41 WIS 15 Ent to WIS 96 Exit	3	Basic	69	70	70	69	17.5	16.9	17.0	17.0	B	B	B	B
SB I-41 betw WIS 96 Exit to WIS 96 Ent	3	Basic	71	71	71	71	13.4	12.7	12.7	12.7	B	B	B	B
SB I-41 betw WIS 96 Ent to WIS 125 Exit	4	Weave	68	69	69	69	14.6	14.5	14.1	14.2	B	B	B	B
SB I-41 betw WIS 125 Exit to WIS 125 Ent	3	Basic	70	70	70	70	16.0	16.6	16.1	16.0	B	B	B	B
SB I-41 betw WIS 125 Ent to CTH BB Exit	3	Basic	68	68	69	68	21.7	22.5	21.5	21.0	C	C	C	C
SB I-41 betw CTH BB Exit to CTH BB Ent	3	Basic	70	70	70	70	18.4	19.1	18.4	17.7	C	C	C	B
SB I-41 (Southern project limits)	3	Basic	70	70	70	70	22.4	22.8	22.2	21.5	C	C	C	C

cles and use 9% Trucks for passenger car equivalent purposes.
 n are based on density thresholds established by the 6th Edition Highway Capacity Manual (HCM) for each segment type
 ted for mainline sections that generally represent the segment methodologies within
 CM 6 methodologies are different and no direct comparison should be made

Legend				
Color	Speed (mph)	LOS	Density (pcphpl)	
			Basic	Weave
	55+	A	0-11	0-10
		B	11-18	10-20
	50-55	C	18-26	20-28
	40-50	D	26-35	28-35
	30-40	E	35-45	35-43
	0-30	F	45+	43+

I-41 Traffic and Engineering Study
Build (2048) With Short Term Improvements and Signal Retimings PM Peak Period Calibration
Intersection Turning Movements

			% Demand	Intersections						Target					Vissim					Difference					RNSE				
			100%	Int ID	Int Name	Forecast ID	From Link	To Link	Mvmt	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	TOTAL	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2	4:15-4:30PM3	4:30-4:45PM3	4:45-5:00PM3	5:00-5:15PM3	TOTAL3	4:15-4:30PM5	4:30-4:45PM5	4:45-5:00PM5	5:00-5:15PM5	TOTAL5
TEOps Validation - 15 minute periods				108	SB I-41 & WIS15	8EBL	303	52	EBL	109	86	53	71	320	96	81	54	54	285	-13	-5	1	-17	-35	1.2	0.6	0.1	2.0	1.9
Test	Target	Model		108	SB I-41 & WIS15	8EBT	303	304	EBT	538	651	497	464	2150	408	423	415	451	1696	-130	-228	-83	-13	-454	0.2	0.2	0.2	0.6	0.2
Tier 1	RMSPE < 5%	Not Applicable		108	SB I-41 & WIS15	8WBT	309	302	WBT	390	365	378	337	1470	373	359	360	312	1403	-17	-6	-18	-25	-66	0.9	0.3	0.9	1.4	1.7
Tier 2	RSNE < 3 for 75% of turns	90%		108	SB I-41 & WIS15	8WBR	309	52	WBR	121	119	162	168	570	118	121	146	168	553	-3	2	-16	0	-17	0.2	0.2	1.3	0.0	0.7
				108	SB I-41 & WIS15	8SBL	51	304	SBL	29	47	44	59	180	42	35	45	45	168	13	-12	1	-14	-12	2.4	1.8	0.2	1.8	0.9
				108	SB I-41 & WIS15	8SBR	51	302	SBR	289	302	302	307	1200	291	285	293	285	1154	2	-18	-9	-22	-46	0.1	1.0	0.5	1.3	1.3
				106	SB I-41 & WIS96	6EBT	323	325	EBT	400	448	438	474	1760	414	412	413	399	1639	14	-37	-25	-74	-121	0.7	1.7	1.2	1.2	2.9
				106	SB I-41 & WIS96	6EBR	323	57	EBR	131	152	117	161	560	128	139	118	124	509	-4	-12	1	-37	-52	0.3	1.0	0.1	2.9	2.2
				106	SB I-41 & WIS96	6WBL	332	57	WBL	149	177	172	142	640	141	154	157	159	611	-8	-23	-15	17	-29	0.6	1.8	1.2	1.5	1.2
				106	SB I-41 & WIS96	6WBT	332	334	WBT	406	485	439	461	1790	378	408	410	418	1614	-28	-77	-29	-43	-176	1.4	0.2	1.4	2.0	0.2
				106	SB I-41 & WIS96	6SBL	340	325	SBL	55	48	60	57	220	48	50	50	59	207	-7	2	-10	1	-13	0.9	0.3	1.2	0.2	0.9
				106	SB I-41 & WIS96	6SBR	340	325	SBR	163	132	163	152	610	132	146	137	144	558	-31	14	-26	-8	-51	2.4	1.2	2.1	0.6	2.1
				104	SB I-41 & WIS125	4EBT	349	351	EBT	357	414	367	432	1570	347	375	340	300	1362	-10	-39	-27	-132	-208	0.5	1.9	1.4	0.2	0.2
				104	SB I-41 & WIS125	4EBR	349	60	EBR	148	170	142	170	630	148	153	137	118	557	0	-16	-5	-52	-73	0.0	1.2	0.4	0.2	0.2
				104	SB I-41 & WIS125	4WBL	361	60	WBL	111	118	100	111	440	103	103	96	93	396	-8	-15	-3	-18	-44	0.7	1.4	0.3	1.7	2.1
				104	SB I-41 & WIS125	4WBT	361	363	WBT	383	389	399	380	1550	353	362	362	356	1433	-30	-27	-37	-23	-117	1.5	1.4	1.9	1.2	3.0
				104	SB I-41 & WIS125	4SBL	367	351	SBL	45	48	76	51	220	55	43	54	64	216	9	-5	-22	13	-4	1.4	0.7	2.5	1.9	0.3
				104	SB I-41 & WIS125	4SBR	367	360	SBR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				104	SB I-41 & WIS125	4SBL	367	363	SBR	72	64	78	55	270	87	69	62	66	284	15	5	-17	11	15	1.8	0.7	1.9	1.4	0.9
				101	SB I-41 & CTH88	1EBT	377	381	EBT	225	249	271	275	1020	240	231	250	245	967	16	-18	-21	-29	-53	1.0	1.1	1.3	1.8	1.7
				101	SB I-41 & CTH88	1EBR	377	66	EBR	109	103	113	115	440	119	95	106	100	420	10	-8	-7	-16	-20	0.9	0.8	0.6	1.4	1.0
				101	SB I-41 & CTH88	1WBL	382	66	WBL	91	89	80	80	340	74	69	63	70	277	-17	-19	-17	-10	-63	1.8	2.0	1.9	1.1	0.2
				101	SB I-41 & CTH88	1WBT	382	379	WBT	92	117	114	108	430	84	86	102	103	375	-8	-31	-12	-4	-55	0.9	2.9	1.1	0.4	2.7
				101	SB I-41 & CTH88	1SBL	393	381	SBL	57	49	37	37	180	43	52	41	34	170	-14	3	4	-3	-10	1.8	0.4	0.7	0.5	0.8
				101	SB I-41 & CTH88	1SBR	393	379	SBR	73	96	107	95	370	86	79	91	95	351	14	-17	-16	0	-19	1.6	1.7	1.6	0.0	1.0
				109	NB I-41 & WIS15	9EBL	304	316	EBL	309	387	262	262	1220	239	238	243	241	961	-71	-149	-19	-20	-259	0.0	0.0	1.2	1.2	0.4
				109	NB I-41 & WIS15	9EBT	304	311	EBT	258	311	280	261	1110	216	220	215	248	898	-43	-91	-64	-14	-212	2.7	0.2	0.0	0.8	0.4
				109	NB I-41 & WIS15	9NBL	87	308	NBL	116	127	72	106	420	97	116	83	56	352	-18	-11	11	-49	-68	1.7	1.0	1.3	0.0	0.0
				109	NB I-41 & WIS15	9NBT	87	316	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				109	NB I-41 & WIS15	9NBR	87	311	NBR	206	227	235	233	900	194	198	182	170	743	-11	-29	-53	-63	-157	0.8	1.9	0.0	0.0	0.0
				109	NB I-41 & WIS15	9WBT	10338	308	WBT	395	357	468	400	1620	389	365	419	424	1597	-6	8	-49	24	-23	0.3	0.4	2.3	1.2	0.6
				109	NB I-41 & WIS15	9WBR	10338	315	WBR	114	71	64	91	340	109	76	63	88	336	-5	4	0	-3	-4	0.5	0.5	0.0	0.3	0.2
				107	NB I-41 & WIS96	7EBL	325	83	EBL	182	206	201	241	830	189	191	184	192	755	7	-15	-16	-49	-74	0.5	1.1	1.2	0.2	2.6
				107	NB I-41 & WIS96	7EBT	325	337	EBT	273	290	298	290	1150	277	268	280	263	1088	4	-22	-17	-27	-62	0.2	1.3	1.0	1.6	1.8
				107	NB I-41 & WIS96	7NBL	343	332	NBL	123	129	111	137	500	94	94	94	96	377	-29	-35	-18	-42	-123	2.6	0.2	1.7	0.0	0.0
				107	NB I-41 & WIS96	7NBT	343	83	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				107	NB I-41 & WIS96	7NBR	343	337	NBR	119	121	122	138	500	115	90	100	95	400	-4	-31	-22	-43	-101	0.4	2.8	2.0	0.0	0.0
				107	NB I-41 & WIS96	7WBT	331	332	WBT	432	533	500	466	1930	425	468	474	480	1848	-6	-65	-26	14	-82	0.3	2.8	1.1	0.7	1.9
				107	NB I-41 & WIS96	7WBR	331	83	WBR	63	82	83	92	320	67	77	77	90	311	3	-5	-6	-1	-9	0.4	0.6	0.6	0.1	0.5
				105</																									

Intersection Turning Movements

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	79%

I-41 Traffic and Engineering Study
 Build (2048) With Short Term Improvements and Signal Retimings PM Peak Period Calibration
Lane Utilization Comparison

I-41 NB															
Location		I-41 NB south of CTH BB			I-41 NB betw WIS 125 & WIS 96				I-41 NB betw CTH E & WIS 441			I-41 NB betw WIS 441 & CTH N		I-41 NB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
VISSIM	4:15 PM	30%	31%	39%	24%	27%	36%	13%	34%	34%	32%	47%	53%	51%	49%
	4:30 PM	30%	31%	39%	25%	28%	33%	14%	34%	34%	32%	47%	53%	51%	49%
	4:45 PM	30%	31%	39%	39%	28%	18%	14%	34%	34%	32%	46%	54%	50%	50%
	5:00 PM	30%	31%	40%	42%	27%	16%	15%	34%	33%	33%	46%	54%	50%	50%
Field (ATR)	4:15 PM	34%	35%	31%	13%	28%	31%	29%	32%	25%	42%	47%	53%	43%	57%
	4:30 PM	35%	35%	30%	14%	28%	31%	28%	35%	25%	40%	47%	53%	43%	57%
	4:45 PM	35%	34%	31%	15%	27%	31%	28%	33%	26%	41%	48%	52%	44%	56%
	5:00 PM	36%	35%	29%	13%	28%	31%	28%	35%	26%	39%	48%	52%	45%	55%
VISSIM	Avg	30%	31%	39%	33%	27%	26%	14%	34%	34%	32%	46%	54%	51%	49%
Field	Avg	35%	35%	30%	14%	28%	31%	28%	34%	25%	41%	47%	53%	44%	56%

I-41 SB															
Location		I-41 SB south of CTH BB			I-41 SB betw WIS 125 & WIS 96				I-41 SB betw CTH E & WIS 441			I-41 SB betw WIS 441 & CTH N		I-41 SB betw CTH U & CTH S	
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Right	Left	Right
VISSIM	4:15 PM	33%	35%	32%	21%	28%	41%	10%	29%	44%	27%	50%	50%	48%	52%
	4:30 PM	32%	36%	33%	22%	27%	42%	9%	30%	43%	28%	50%	50%	49%	51%
	4:45 PM	32%	35%	33%	22%	28%	41%	10%	29%	46%	25%	50%	50%	48%	52%
	5:00 PM	32%	35%	33%	21%	27%	42%	10%	30%	42%	27%	49%	51%	48%	52%
Field (ATR)	4:15 PM	36%	33%	31%	10%	31%	32%	28%	24%	34%	42%	47%	53%	40%	60%
	4:30 PM	36%	33%	31%	9%	31%	31%	29%	24%	35%	42%	47%	53%	41%	59%
	4:45 PM	35%	33%	32%	10%	29%	32%	29%	24%	34%	42%	47%	53%	40%	60%
	5:00 PM	37%	33%	30%	9%	31%	32%	29%	24%	34%	42%	47%	53%	43%	57%
VISSIM	Avg	32%	35%	33%	21%	27%	42%	10%	30%	44%	27%	50%	50%	48%	52%
Field	Avg	36%	33%	31%	9%	31%	32%	29%	24%	34%	42%	47%	53%	41%	59%

TEOpS Validation

Test	Data	Target	Model
Tier 1	--	Not Applicable	--
Tier 2	ATR	RNSE < 3.0 for 85% of data points	43%

I-41 Traffic and Engineering Study
Build (2048) With Short Term Improvements and Signal Retimings PM Peak Period Calibration
Mainline Speed Comparison

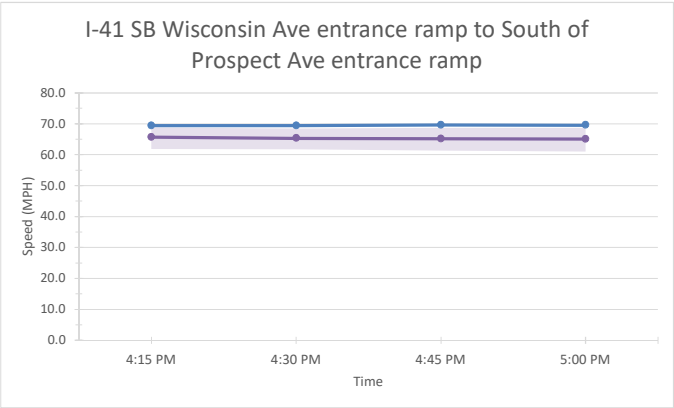
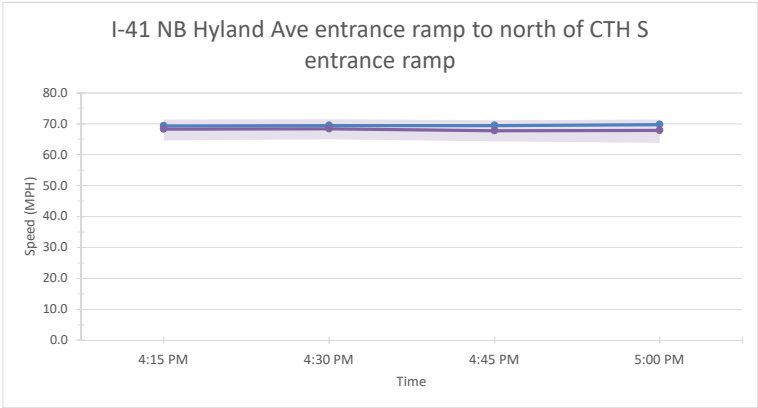
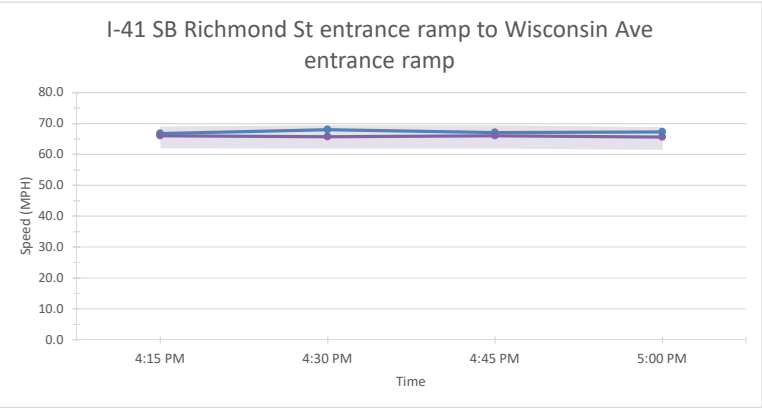
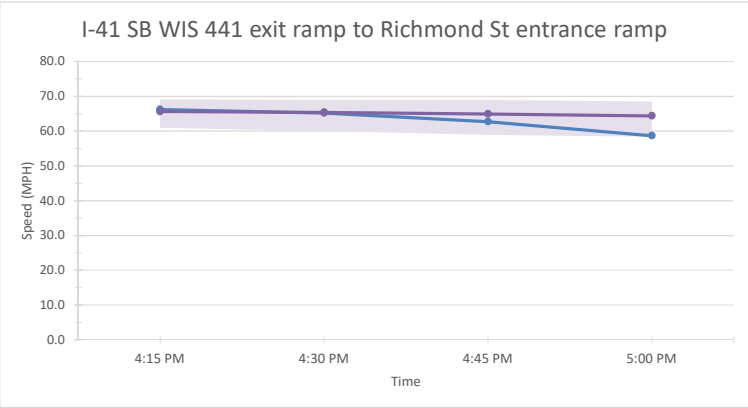
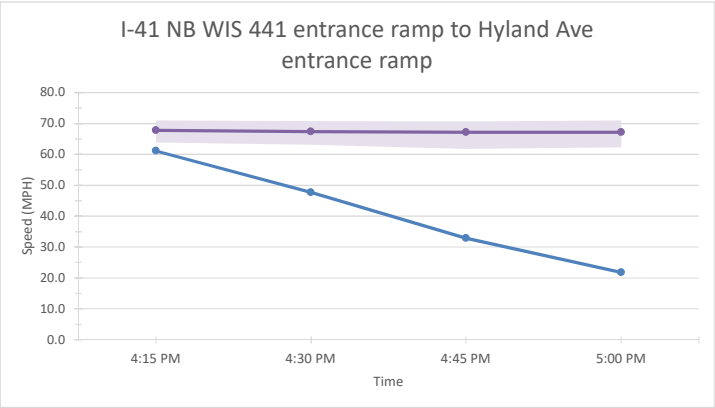
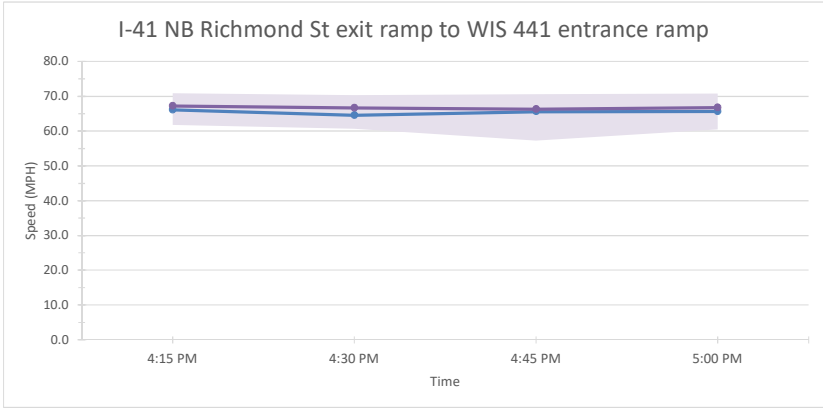
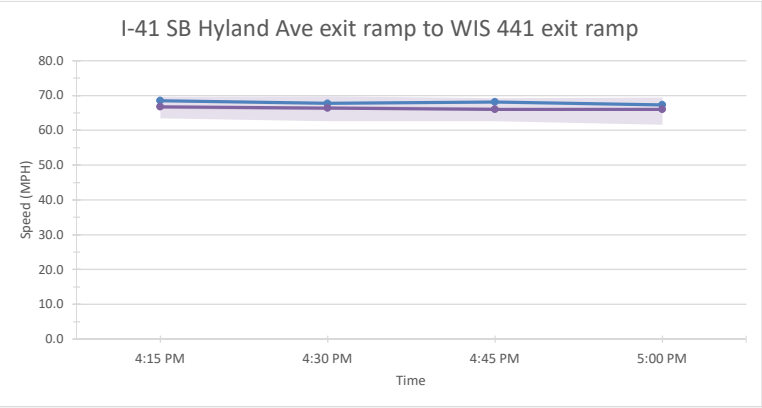
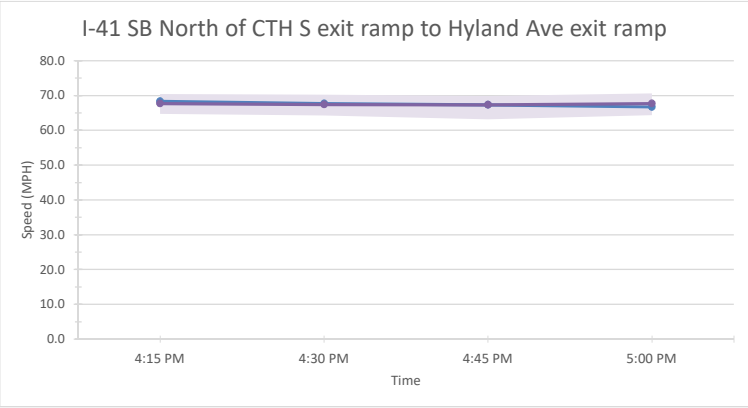
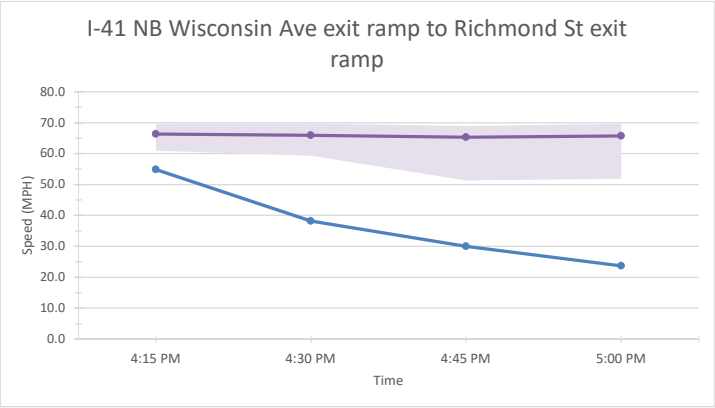
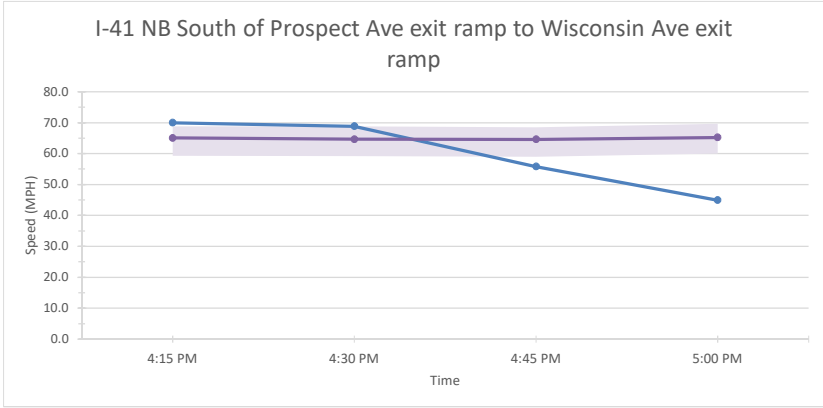
Segment		I-41 NB					Segment		I-41 SB				
		I-41 NB South of Prospect Ave exit ramp to Wisconsin Ave exit ramp	I-41 NB Wisconsin Ave exit ramp to Richmond St exit ramp	I-41 NB Richmond St exit ramp to WIS 441 entrance ramp	I-41 NB WIS 441 entrance ramp to Hyland Ave entrance ramp	I-41 NB Hyland Ave entrance ramp to north of CTH S entrance ramp			I-41 SB North of CTH S exit ramp to Hyland Ave exit ramp	I-41 SB Hyland Ave exit ramp to WIS 441 exit ramp	I-41 SB WIS 441 exit ramp to Richmond St entrance ramp	I-41 SB Richmond St entrance ramp to Wisconsin Ave entrance ramp	I-41 SB Wisconsin Ave entrance ramp to South of Prospect Ave entrance ramp
VISSIM	4:15 PM	69.9	54.9	66.1	61.1	69.3	VISSIM	4:15 PM	68.3	68.5	66.1	66.7	69.4
	4:30 PM	68.9	38.2	64.5	47.7	69.4		4:30 PM	67.7	67.7	65.2	68.0	69.4
	4:45 PM	55.8	30.0	65.6	32.9	69.4		4:45 PM	67.3	68.1	62.7	67.1	69.6
	5:00 PM	44.9	23.7	65.6	21.8	69.7		5:00 PM	66.7	67.3	58.7	67.3	69.6
Field (NPMRDS Average)	4:15 PM	65.0	66.3	67.2	67.8	68.3	Field (NPMRDS Average)	4:15 PM	67.7	66.8	65.6	66.0	65.7
	4:30 PM	64.6	66.0	66.7	67.3	68.4		4:30 PM	67.4	66.4	65.3	65.7	65.3
	4:45 PM	64.6	65.3	66.2	67.1	67.8		4:45 PM	67.3	66.0	64.9	66.0	65.2
	5:00 PM	65.2	65.7	66.7	67.2	67.9		5:00 PM	67.7	66.0	64.3	65.6	65.1
Field (NPMRDS 15th Percentile)	4:15 PM	59.3	60.9	61.8	63.8	64.7	Field (NPMRDS 15th Percentile)	4:15 PM	64.8	63.5	61.0	62.0	61.9
	4:30 PM	59.2	59.3	60.7	63.1	65.0		4:30 PM	64.3	62.6	60.1	61.9	61.8
	4:45 PM	59.0	51.3	57.3	61.7	64.4		4:45 PM	63.2	62.6	58.9	61.9	61.4
	5:00 PM	60.1	51.9	60.5	62.3	63.9		5:00 PM	64.4	61.6	58.4	61.5	61.1
Field (NPMRDS 85th Percentile)	4:15 PM	68.8	69.6	70.8	71.0	71.4	Field (NPMRDS 85th Percentile)	4:15 PM	70.4	69.6	69.1	69.0	68.9
	4:30 PM	68.8	69.8	70.3	70.8	71.6		4:30 PM	70.3	69.7	69.0	69.5	68.6
	4:45 PM	68.5	68.9	70.7	70.7	71.3		4:45 PM	69.9	69.3	68.9	69.5	68.7
	5:00 PM	69.7	69.7	70.8	70.9	71.4		5:00 PM	70.6	69.4	68.5	68.9	68.8

TEOps
Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	22%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts	83%

TEOps
Validation

Test	Data	Target		Model
Tier 1	NPMRDS	RMSPE < 10%		22%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts		83%



I-41 Traffic and Engineering Study
Build (2048) With Short Term Improvements and Signal Retimings PM Peak Period Calibration
Travel Time Comparison

FULL CORRIDOR

Data	Time	I-41 NB
		Average Travel Time (min)
		South of CTH BB to North of CTH S
Distance (mi)		26.59
VISSIM	4:15PM	31.9
NPMRDS	4:15PM	23.8



Data	Time	I-41 SB
		Average Travel Time (min)
		North of CTH S to South of CTH BB
Distance (mi)		26.58
VISSIM	4:15PM	23.7
NPMRDS	4:15PM	24.0

SEGMENTS

I-41 NB				
Average Travel Time (minutes)				
South of CTH BB to Wisc Ave Exit	Wisc Ave Exit to Richmond Exit	Richmond Exit to 441 Entrance	441 Entrance to Hyland Entrance	Hyland Entrance to North of CTH S
3.12	4.0	3.49	5.26	10.71
3.2	7.2	3.2	9.0	9.3
2.9	3.7	3.1	4.7	9.4
I-41 SB				
Average Travel Time (minutes)				
North of CTH S to Hyland Exit	Hyland Exit to 441 Exit	441 Exit to Richmond Entrance	Richmond Entrance to Wisc Ave Entrance	Wisc Ave Entrance to South of CTH BB
10.68	5.52	3.25	4.0	3.09
9.5	4.9	3.1	3.6	2.7
9.5	5.0	3.0	3.7	2.8

TEOpS Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	42%
Tier 2	NPMRDS	TT ± 15% for 85% of routes	80%

I-41 Traffic and Engineering Study
 Build (2048) With Short Term Improvements and Signal Retimings PM Peak Hour Calibration
 Merge and Diverge Segment Speeds

Merge/Diverge Links			Vissim Speed				
Forecast ID	Link ID	Description	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2
Merge/Diverge Speeds							
	70	NB I-41 CTH BB diverge	69	61	55	55	60
	74	NB I-41 CTH BB merge	65	66	66	67	66
	76	NB I-41 WIS 125 diverge	68	68	68	68	68
	80	NB I-41 WIS 125merge	67	51	11	7	34
		NB I-41 WIS 96 diverge					
	84	NB I-41 WIS 96 merge	69	61	26	7	41
	--	NB I-41 WIS 15 diverge	--	--	--	--	--
	89	NB I-41 WIS 15 merge	23	13	13	13	15
	91	NB I-41 WIS 47 diverge	68	67	67	67	67
	95	NB I-41 WIS 47 merge	61	62	63	55	60
	418	NB I-41 Ballard diverge	63	64	63	64	64
	100	NB I-41 Ballard merge	60	59	57	60	59
		NB I-41 441 diverge					
	103	NB I-41 441 merge	65	57	56	60	59
	420	NB I-41 CTH N diverge	63	63	65	61	63
	108	NB I-41 CTH N merge	65	66	66	45	61
	422	NB I-41 WIS 55 diverge	66	66	13	6	38
	113	NB I-41 WIS 55 merge	69	23	7	5	26
	417	NB I-41 CTH J diverge	8	7	6	6	7
	118	NB I-41 CTH J merge	63	66	66	65	65
	415	NB I-41 CTH U diverge	69	69	69	69	69
	123	NB I-41 CTH U merge	67	66	68	68	67
	425	NB I-41 CTH S diverge	62	62	62	62	62
	128	NB I-41 CTH S merge	68	69	69	69	69
	426	SB I-41 CTH S diverge	52	53	48	54	52
	21	SB I-41 CTH S merge	64	67	62	62	64
	424	SB I-41 CTH U diverge	46	47	44	45	46
	20	SB I-41 CTH U merge	66	66	66	65	66
	416	SB I-41 CTH J diverge	65	52	31	50	49
	19	SB I-41 CTH J merge	66	67	64	61	64
	423	SB I-41 WIS 55 diverge	65	65	65	64	64
	18	SB I-41 WIS 55 merge	68	66	67	64	66
	421	SB I-41 CTH N diverge	63	61	62	59	61
	26	SB I-41 CTH N merge	66	63	66	65	65
	419	SB I-41 441 diverge	67	63	62	63	64
	36	SB I-41 441 merge	68	66	67	61	65
		SB I-41 Ballard diverge					
	40	SB I-41 Ballard merge	61	54	56	43	54
	42	SB I-41 WIS 47 diverge	66	67	65	67	66
	46	SB I-41 WIS 47 merge	58	62	56	60	59
	48	SB I-41 WIS 15 diverge	59	58	60	60	59
	--	SB I-41 WIS 15 merge	--	--	--	--	--
	53	SB I-41 WIS 96 diverge	69	68	68	68	68
	56	SB I-41 WIS 96 merge	68	69	69	69	69
		SB I-41 WIS 125 diverge					
	61	SB I-41 WIS 125merge	68	68	69	69	68
	63	SB I-41 CTH BB diverge	68	68	67	68	68
	67	SB I-41 CTH BB merge	68	68	68	68	68

APPENDIX P13

Year 2048 Build with Long Term Improvements

VISSIM AM Peak Hour

I-41 Traffic and Engineering Study
Build (2048) With Long Term Improvements and Signal Retimings AM Peak Hour Calibration
Freeway Mainline and Ramp Volumes

			% Demand	Segments					Target					Vissim					Difference					RMSPE					RMSE								
			100%	Forecast ID	Link ID	Description	Type	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	TOTAL	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2	7:00-7:15AM3	7:15-7:30AM3	7:30-7:45AM3	7:45-8:00AM3	TOTAL3	7:00-7:15AM6	7:15-7:30AM6	7:30-7:45AM6	7:45-8:00AM6	TOTAL6	7:00-7:15AM5	7:15-7:30AM5	7:30-7:45AM5	7:45-8:00AM5	TOTAL5					
TEOps Validation - 15 minute periods																																					
Test	Target	Model		10001	69	NB I-41 (Southern Project Limits)	MAINLINE	845	952	935	1067	3810	837	945	935	1074	3791	-8	-7	0	7	-19	1%	1%	0%	1%	0%	0.3	0.2	0.0	0.2	0.3					
				10002	72	NB I-41 Exit to CTH BB	RAMP	127	171	187	173	660	122	169	187	170	649	-4	-2	0	-3	-11	3%	1%	0%	2%	2%	0.4	0.2	0.0	0.2	0.4					
				10003	71	NB I-41 betw CTH BB Exit to CTH BB Ent	MAINLINE	719	781	748	894	3150	701	774	755	888	3105	-18	-7	-5	-6	-45	3%	1%	1%	1%	1%	0.7	0.2	0.2	0.2	0.8					
				10004	73	NB I-41 Ent from CTH BB	RAMP	150	162	210	167	690	147	162	205	166	681	-2	0	-5	-1	-9	2%	0%	2%	1%	1%	0.2	0.0	0.3	0.1	0.4					
				10005	75	NB I-41 betw CTH BB Ent to WIS 125 Exit	MAINLINE	868	943	958	1061	3840	842	942	946	1053	3783	-26	-1	-12	-8	-57	3%	0%	1%	1%	1%	0.9	0.0	0.4	0.2	0.9					
				10006	78	NB I-41 Exit to WIS 125	RAMP	119	186	209	253	770	107	154	176	216	653	-12	31	-32	-37	-117	10%	12%	8%	13%	10%	1.1	2.3	2.2	2.3	4.7					
				10007	77	NB I-41 betw WIS 125 Exit to WIS 125 Ent	MAINLINE	749	758	789	808	3070	706	757	736	793	2992	-43	1	-13	-15	-78	1%	0%	2%	2%	3%	1.6	0.0	0.5	0.5	1.4					
				10008	79	NB I-41 Ent from WIS 125	RAMP	72	92	132	90	380	68	86	125	94	374	-4	-5	-7	4	-6	5%	3%	4%	5%	4%	0.4	0.5	0.6	0.4	0.3					
				10009	80	NB I-41 betw WIS 125 Ent to WIS 96 Exit	MAINLINE	821	849	881	898	3450	762	835	851	880	3327	-60	-14	-30	-39	-123	4%	2%	3%	2%	4%	2.1	0.5	1.0	0.6	2.6					
				10010	82	NB I-41 Exit to WIS96	RAMP	138	169	179	234	720	144	165	176	218	704	6	-3	-3	-16	-16	4%	2%	2%	3%	2%	0.5	0.3	0.2	1.0	0.6					
				10011	81	NB I-41 betw WIS 96 Exit to WIS 96 Ent	MAINLINE	683	681	702	664	2730	623	684	687	673	2668	-60	4	-15	-9	-62	4%	1%	2%	1%	2%	2.3	0.1	0.6	0.4	1.2					
				10012	83	NB I-41 Ent from WIS 96	RAMP	62	72	106	91	330	58	70	107	93	328	-4	-2	1	3	-2	7%	3%	1%	3%	1%	0.5	0.2	0.1	0.3	0.1					
				10013	85	NB I-41 WIS 96 Ent to WIS 15 Exit	MAINLINE	746	753	753	794	3060	677	752	795	767	2991	-69	-12	-12	-3	-69	4%	0%	1%	2%	2%	2.5	0.0	0.4	0.5	1.2					
				10014	87	NB I-41 Exit to WIS15	RAMP	131	182	217	205	740	133	170	205	203	711	3	-12	-12	-2	-29	2%	4%	4%	1%	4%	0.2	0.9	0.8	0.2	1.1					
				10015	86	NB I-41 betw WIS 15 Exit to WIS 15 Ent	MAINLINE	615	570	590	549	2320	533	572	585	564	2253	-83	2	-6	15	-67	10%	0%	1%	3%	3%	4.7	0.1	0.2	0.6	1.4					
				10016	88	NB I-41 Ent from WIS15	RAMP	219	269	287	306	1090	218	261	284	293	1056	-1	8	-2	-12	-34	0%	3%	1%	4%	3%	0.1	0.5	0.1	0.7	1.0					
				10017	90	NB I-41 betw WIS 15 Ent to WIS 47 Exit	MAINLINE	834	839	877	855	3410	739	827	877	868	3311	-95	-13	-1	14	-99	4%	2%	0%	2%	3%	0.4	0.0	0.5	1.7	0.7					
				10018	93	NB I-41 Exit to WIS47	RAMP	97	118	167	150	590	100	111	154	186	551	3	-7	-13	-12	-39	4%	1%	1%	1%	1%	0.4	0.7	1.0	0.8	1.6					
				10019	92	NB I-41 betw WIS 47 Exit to WIS 47 Ent	MAINLINE	737	722	709	657	2820	623	712	715	684	2734	-113	-8	5	27	-86	1%	1%	1%	4%	3%	4.7	0.4	0.2	1.0	1.6					
				10020	94	NB I-41 Ent from WIS47	RAMP	231	271	223	230	960	226	269	220	218	933	-4	-2	-2	-13	-27	2%	1%	1%	4%	3%	0.3	0.1	0.2	0.8	0.9					
				10021	96	NB I-41 betw WIS 47 Ent to Ballard Exit	MAINLINE	967	993	932	888	3780	841	988	942	910	3682	-126	-5	10	23	-98	1%	3%	1%	3%	3%	4.7	0.2	0.3	0.8	1.6					
				10022	98	NB I-41 Exit to Ballard	RAMP	260	320	253	320	1180	234	307	282	295	1118	-26	-11	29	-24	-62	10%	3%	10%	10%	10%	2.4	0.6	2.7	1.0	1.6					
				10023	97	NB I-41 betw Ballard Exit to Ballard Ent	MAINLINE	707	676	679	568	2600	593	675	661	624	2553	-115	0	-17	56	-47	14%	0%	3%	14%	2%	4.7	1.3	0.0	2.9	1.1					
				10024	99	NB I-41 Ent from Ballard	RAMP	279	395	393	375	1410	268	354	374	374	1371	-11	41	-19	0	-39	4%	10%	5%	0%	3%	0.6	2.1	0.9	0.0	1.0					
				10025	100	NB I-41 betw Ballard Ent to 441 Exit	MAINLINE	986	1071	1072	943	4010	860	1027	1037	1004	3927	-127	-43	-35	61	-83	1%	4%	3%	2%	2%	4.7	1.3	1.1	2.0	1.3					
				10026	102	NB I-41 Exit to SB441	RAMP	271	329	321	301	1080	276	275	276	282	1029	-75	-54	-45	-19	-51	1%	3%	10%	10%	10%	2.4	0.6	2.7	1.0	1.6					
				10027	101	NB I-41 betw 441 Exit to 441 Ent	MAINLINE	716	742	751	642	2930	658	750	760	722	2890	-58	8	10	81	-40	4%	1%	1%	1%	1%	2.2	0.3	0.4	0.7	0.7					
				10028	33	NB I-41 Ent from NB441	RAMP	310	333	343	361	1250	293	308	319	320	1241	-17	-25	-24	-40	-9	5%	3%	3%	1%	1%	1.0	1.4	1.3	2.1	0.3					
				10029	104	NB I-41 betw 441 Ent to CTH N Exit	MAINLINE	1026	1075	1094	1002	4180	947	1062	1073	1053	4135	-79	947	-20	51	-45	4%	1%	2%	5%	1%	2.5	0.4	0.6	1.6	0.7					
				10030	106	NB I-41 Exit to CTH N	RAMP	100	74	86	109	360	109	80	76	100	364	9	6	-10	-9	4	4%	4%	10%	10%	10%	2.4	0.6	2.7	1.0	1.6					
				10031	105	NB I-41 betw CTH N Exit to CTH N Entrance	MAINLINE	926	1001	1008	893	3820	827	975	1008	953	3751	-98	-26	-13	60	-69	1%	3%	1%	2%	2%	4.7	0.8	0.4	2.0	1.1					
				10032	107	NB I-41 Ent from CTH N	RAMP	106	119	94	86	410	94	110	87	78	369	-11	9	-7	-8	-41	11%	4%	4%	4%	10%	1.1	0.8	0.7	0.9	2.0					
				10033	109	NB I-41 betw CTH N Exit to WIS 55 Exit	MAINLINE	1031	1120	1102	979	4230	931	1091	1091	1047	4159	-101	-29	-11	68	-71	1%	3%	1%	7%	2%	3.1	0.9	0.3	2.2	1.1					
				10034	111	NB I-41 Exit to WIS55	RAMP	104	121	104	128	460	107	112	108	114	442	3	-9	5	-14	-18	3%	3%	5%	3%	11%	0.3	0.9	0.5	1.2	0.8					
				10035	110	NB I-41 betw WIS 55 Exit to WIS 55 Ent	MAINLINE	927	999	998	851	3770	811	968	980	929	3688	-76	-31	-18	78	-82	1%	3%	2%	3%	2%	4.7	1.0	0.6	2.7	1.3					
				10036	112	NB I-41 Ent from WIS55	RAMP	74	40	53	75	230	69	0	4	50	126	40	0	-3	-7	-4	4%	0%	4	2%	0	0.6	0.0	0.4	0.8	0.3					
				10037	114	NB I-41 betw WIS 55 Ent to CTH J Exit	MAINLINE	1001	1039	1051	926	4000	874	1005	1034	1008	392																				

I-41 Traffic and Engineering Study
 Build (2048) With Long Term Improvements and Signal Retimings AM Peak Hour Calibration
 Freeway Mainline Operations

Fwy/Dir	#	Link ID	Segment	# Lanes	HCM Type	Avg Speed (mph)				Density (pcphpl)				LOS			
						7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM
I-41 NB	25	129	NB I-41: Northern Project Limits	3	Basic	70	69	69	69	22.0	24.6	27.6	26.0	C	C	D	C
	24	125	NB I-41 betw CTH S Exit to CTH S Ent	3	Basic	69	69	68	69	19.3	22.0	24.9	23.3	C	C	C	C
	23	124	NB I-41 betw CTH U Ent to CTH S Exit	3	Basic	70	69	69	69	20.3	23.4	25.6	24.5	C	C	C	C
	22	493	NB I-41 CTH U Exit to CTH U Ent	3	Basic	69	69	68	69	18.6	20.9	22.6	21.1	C	C	C	C
	21	119	NB I-41 betw CTH J Ent to CTH U Exit	3	Basic	70	70	70	70	18.6	21.7	22.7	21.6	C	C	C	C
	20	115	NB I-41 betw CTH J Exit to CTH J Ent	3	Basic	70	70	70	70	16.0	18.8	19.5	18.5	B	C	C	C
	19	114	NB I-41 betw WIS 55 Ent to CTH J Exit	3	Basic	70	70	70	70	18.2	20.9	21.5	21.1	C	C	C	C
	18	110	NB I-41 betw WIS 55 Exit to WIS 55 Ent	3	Basic	71	70	70	70	16.7	20.1	20.3	19.2	B	C	C	C
	17	109	NB I-41 betw CTH N Ent to WIS 55 Exit	3	Basic	70	70	70	70	19.3	22.7	22.7	21.8	C	C	C	C
	16	105	NB I-41 betw CTH N Exit to CTH N Entrance	3	Basic	70	70	70	70	17.1	20.3	20.7	19.8	B	C	C	C
	15	104	NB I-41 betw 441 Ent to CTH N Exit	3	Basic	70	70	70	70	19.6	22.1	22.3	21.9	C	C	C	C
	14	101	NB I-41 betw 441 Exit to 441 Ent	3	Basic	71	70	70	71	13.5	15.5	15.7	14.9	B	B	B	B
	13	100	NB I-41 betw Ballard Ent to 441 Exit	4	Weave	66	64	63	63	14.1	17.5	18.0	17.3	B	B	B	B
	12	97	NB I-41 betw Ballard Exit to Ballard Ent	4	Basic	71	71	71	71	9.1	10.4	10.2	9.6	A	A	A	A
	11	96	NB I-41 betw WIS 47 Ent to Ballard Exit	4	Basic	70	70	70	70	13.0	15.4	14.6	14.1	B	B	B	B
	10	92	NB I-41 betw WIS 47 Exit to WIS 47 Ent	3	Basic	71	71	71	71	12.8	14.7	14.7	14.1	B	B	B	B
	9	90	NB I-41 betw WIS 15 Ent to WIS 47 Exit	3	Basic	71	70	70	70	15.2	17.1	18.1	18.0	B	B	C	B
	8	86	NB I-41 betw WIS 15 Exit to WIS 15 Ent	3	Basic	71	71	70	70	10.9	11.8	12.1	11.7	A	B	B	B
	7	85	NB I-41 WIS 96 Ent to WIS 15 Exit	3	Basic	69	68	67	68	14.3	16.0	17.1	16.5	B	B	B	B
	6	81	NB I-41 betw WIS 96 Exit to WIS 96 Ent	3	Basic	71	71	71	70	12.8	14.1	14.1	13.9	B	B	B	B
	5	80	NB I-41 betw WIS 125 Ent to WIS 96 Exit	4	Weave	68	69	68	68	12.1	13.2	13.6	14.1	B	B	B	B
	4	77	NB I-41 betw WIS 125 Exit to WIS 125 Ent	3	Basic	71	71	71	71	14.5	15.6	15.1	16.3	B	B	B	B
	3	75	NB I-41 betw CTH BB Ent to WIS 125 Exit	3	Basic	70	69	69	69	17.6	19.8	20.0	22.3	B	C	C	C
	2	71	NB I-41 betw CTH BB Exit to CTH BB Ent	3	Basic	71	71	70	70	14.4	15.9	15.3	18.3	B	B	B	C
	1	69	NB I-41 (Southern Project Limits)	3	Basic	71	70	71	70	17.2	19.5	19.3	22.2	B	C	C	C

Fwy/Dir	#	Link ID	Segment	# Lanes	HCM Type	Avg Speed (mph)				Density (pcphpl)				LOS			
						7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM
I-41 SB	1	1	SB I-41: Northern projects limit	3	Basic	70	70	70	71	18.0	20.2	19.5	17.6	B	C	C	B
	2	2	SB I-41 betw CTH S Exit to CTH S Ent	3	Basic	70	70	70	70	16.5	18.5	18.5	16.6	B	C	C	B
	3	5	SB I-41 betw CTH S Exit to CTH U Exit	3	Basic	70	70	70	70	18.4	20.7	20.7	18.4	C	C	C	C
	4	6	SB I-41 betw CTH U Exit to CTH U Ent	3	Basic	70	69	69	70	17.2	18.7	19.4	17.5	B	C	C	B
	5	9	SB I-41 CTH U Ent to CTH J Exit	3	Basic	70	70	70	70	18.1	19.3	20.4	18.7	C	C	C	C
	6	10	SB I-41 CTH J Exit to CTH J Ent	3	Basic	70	69	69	70	16.5	17.7	19.2	17.8	B	B	C	B
	7	13	SB I-41 CTH J Ent to WIS 55 Exit	3	Basic	69	69	69	69	20.1	21.0	23.2	21.3	C	C	C	C
	8	14	SB I-41 WIS 55 Exit to WIS 55 Ent	3	Basic	70	70	69	69	18.5	19.3	21.8	20.2	C	C	C	C
	9	17	SB I-41 betw WIS 55 Ent to CTH N Exit	3	Basic	70	70	69	69	21.0	22.1	25.6	23.4	C	C	C	C
	10	22	SB I-41 CTH N Exit to CTH N Ent	3	Basic	69	70	69	69	18.8	20.5	24.1	21.6	C	C	C	C
	11	25	SB I-41 CTH N Ent to 441 Exit	3	Basic	69	69	67	68	22.7	24.3	29.5	26.8	C	C	D	D
	12	471	SB I-41 betw 441 Exit to 441 Ent	3	Basic	71	70	70	70	14.6	14.3	16.8	15.5	B	B	B	B
	15	484	SB I-41 betw Ballard Ent to WIS 47 Exit	5	Basic	71	70	70	71	15.2	15.8	17.2	15.6	B	B	B	B
	16	43	SB I-41 betw WIS 47 Exit to WIS 47 Ent	4	Basic	70	70	69	59	17.5	17.4	18.9	20.1	B	B	C	C
	17	487	SB I-41 WIS 47 Ent to WIS 15 Exit	3	Basic	68	68	65	64	28.7	28.9	31.8	32.4	D	D	D	D
	18	49	SB I-41 WIS 15 Exit to WIS 15 Ent	3	Basic	70	69	68	68	21.2	21.5	22.2	21.7	C	C	C	C
	19	50	SB I-41 WIS 15 Ent to WIS 96 Exit	4	Basic	67	64	65	59	19.2	20.6	20.5	22.2	C	C	C	C
	20	55	SB I-41 betw WIS 96 Exit to WIS 96 Ent	3	Basic	70	70	70	70	21.7	22.8	22.3	21.9	C	C	C	C
	21	56	SB I-41 betw WIS 96 Ent to WIS 125 Exit	4	Weave	65	61	61	61	19.6	22.9	22.8	22.4	B	C	C	C
	22	58	SB I-41 betw WIS 125 Exit to WIS 125 Ent	3	Basic	69	67	66	67	21.5	25.0	24.5	23.0	C	C	C	C
	23	62	SB I-41 betw WIS 125 Ent to CTH BB Exit	3	Basic	68	65	64	65	24.1	28.5	28.0	26.3	C	D	D	D
	24	64	SB I-41 betw CTH BB Exit to CTH BB Ent	3	Basic	70	69	69	70	19.6	23.0	21.6	19.7	C	C	C	C
	25	68	SB I-41: Southern project limits	3	Basic	70	69	69	70	21.1	24.7	23.9	21.8	C	C	C	C

Notes:
 Volume is exported as Total Vehicles and use 9% Trucks for passenger car equivalent purposes.
 Levels of Service (LOS) as shown are based on density thresholds established by the 6th Edition Highway Capacity Manual (HCM) for each segment type
 Densities and LOSs are only reported for mainline sections that generally represent the segment methodologies within the 6th Edition HCM. Vissim and HCM 6 methodologies are different and no direct comparison should be made

Legend				
Color	Speed (mph)	LOS	Density (pcphpl)	
			Basic	Weave
	55+	A	0-11	0-10
		B	11-18	10-20
	50-55	C	18-26	20-28
	40-50	D	26-35	28-35
	30-40	E	35-45	35-43
	0-30	F	45+	43+

I-41 Traffic and Engineering Study
Build (2048) With Long Term Improvements and Signal Retimings AM Peak Period Calibration
Intersection Turning Movements

TEOps Validation - 15 minute periods

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	98%

TEOps Validation - 60 minute period

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	98%

Demand 100%	Intersections					Target					Vissim					Difference					RNSE				
	Int ID	Int Name	From Link	To Link	Mvmt	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	TOTAL	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2	7:00-7:15AM3	7:15-7:30AM3	7:30-7:45AM3	7:45-8:00AM3	TOTAL3	7:00-7:15AM5	7:15-7:30AM5	7:30-7:45AM5	7:45-8:00AM5	TOTAL5
	108	SB I-41 & WIS15	303	52	EBL	71	85	49	79	280	68	80	54	76	278	-3	-5	5	-4	-2	0.3	0.5	0.7	0.4	0.1
	108	SB I-41 & WIS15	303	305	EBT	315	388	408	498	1620	321	377	419	486	1603	6	-10	11	-12	-17	0.3	0.5	0.6	0.5	0.4
	108	SB I-41 & WIS15	309	302	WBT	191	189	188	232	810	197	183	189	234	803	6	-7	0	3	-7	0.4	0.5	0.0	0.2	0.2
	108	SB I-41 & WIS15	309	52	WBR	102	106	133	105	440	105	99	133	107	443	3	-7	0	2	3	0.3	0.7	0.0	0.2	0.2
	108	SB I-41 & WIS15	51	305	SBL	59	88	57	63	270	57	69	67	65	258	-2	-19	10	2	-12	0.3	2.1	1.3	0.3	0.7
	108	SB I-41 & WIS15	51	302	SBR	179	303	351	346	1190	266	254	304	342	1166	87	-48	-47	-4	-24	0.3	2.8	2.5	0.2	0.7
	106	SB I-41 & WIS96	323	325	EBT	123	180	244	223	770	122	177	241	227	768	-2	-3	-3	5	-2	0.1	0.2	0.2	0.3	0.1
	106	SB I-41 & WIS96	323	57	EBR	50	74	83	87	300	52	75	83	89	299	2	1	1	2	-1	0.2	0.1	0.1	0.2	0.0
	106	SB I-41 & WIS96	332	57	WBL	80	125	125	110	440	80	115	125	118	438	-1	-10	0	8	-2	0.1	0.9	0.0	0.8	0.1
	106	SB I-41 & WIS96	332	334	WBT	133	140	164	263	690	146	136	156	234	672	13	-5	-8	-28	-18	1.2	0.4	0.6	1.7	0.7
	106	SB I-41 & WIS96	340	325	SBL	36	50	59	54	200	48	42	49	54	193	11	-8	-9	1	-7	1.9	1.1	1.2	0.1	0.5
	106	SB I-41 & WIS96	340	57	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	106	SB I-41 & WIS96	340	334	SBR	57	100	93	128	380	83	76	91	107	357	26	-24	-2	-21	-23	1.4	2.4	0.2	1.9	1.2
	104	SB I-41 & WIS125	349	351	EBT	127	142	161	171	600	125	140	159	173	597	-3	-1	-2	3	-3	0.2	0.1	0.2	0.2	0.1
	104	SB I-41 & WIS125	349	60	EBR	41	48	36	32	160	40	50	37	33	160	-1	2	1	1	0	0.1	0.3	0.1	0.1	0.0
	104	SB I-41 & WIS125	361	60	WBL	62	75	69	88	300	64	75	71	91	302	3	0	2	3	2	0.3	0.0	0.2	0.3	0.1
	104	SB I-41 & WIS125	361	363	WBT	108	157	192	265	720	115	152	185	255	707	7	-5	-7	-10	-13	0.7	0.4	0.5	0.6	0.5
	104	SB I-41 & WIS125	367	351	SBL	42	57	76	70	240	47	46	63	67	223	5	-11	-13	-3	-17	0.7	1.4	1.5	0.3	1.1
	104	SB I-41 & WIS125	367	60	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	104	SB I-41 & WIS125	367	363	SBR	83	84	146	135	450	101	82	112	138	434	18	-2	-33	3	-16	2.0	0.3	2.8	0.3	0.8
	101	SB I-41 & CTHBB	498	381	EBT	158	162	190	169	680	159	164	187	168	677	1	2	-3	-1	-3	0.1	0.2	0.2	0.1	0.1
	101	SB I-41 & CTHBB	498	66	EBR	49	53	63	64	230	48	54	63	65	230	0	1	0	1	0	0.1	0.1	0.1	0.2	0.0
	101	SB I-41 & CTHBB	382	66	WBL	36	41	42	32	150	36	40	42	31	148	-1	0	0	-1	-2	0.1	0.0	0.0	0.3	0.1
	101	SB I-41 & CTHBB	382	379	WBT	99	138	136	146	520	98	135	135	148	516	-1	-3	-1	2	-4	0.1	0.3	0.1	0.1	0.2
	101	SB I-41 & CTHBB	393	381	SBL	30	43	60	70	200	33	36	46	64	179	3	-7	-13	-6	-21	0.5	1.0	1.7	0.7	1.5
	101	SB I-41 & CTHBB	393	66	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	101	SB I-41 & CTHBB	393	379	SBR	114	164	152	177	610	138	135	156	168	598	25	-28	4	-8	-12	2.3	2.2	0.4	0.6	0.5
	109	NB I-41 & WIS15	10360	316	EBL	183	237	222	268	910	185	233	222	256	896	2	-4	0	-12	-14	0.1	0.2	0.0	0.7	0.5
	109	NB I-41 & WIS15	10341	311	EBT	192	240	243	293	980	189	218	255	289	949	-3	-22	12	-4	-31	0.2	1.4	0.8	0.2	1.0
	109	NB I-41 & WIS15	87	308	NBL	59	71	79	48	260	65	67	74	58	265	7	-3	-4	11	5	0.9	0.4	0.5	1.5	0.3
	109	NB I-41 & WIS15	87	316	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	109	NB I-41 & WIS15	87	311	NBR	72	112	138	157	480	72	105	132	151	460	0	-6	-6	-7	-20	0.0	0.6	0.5	0.5	0.9
	109	NB I-41 & WIS15	10338	308	WBT	235	225	243	289	990	234	223	243	284	984	0	-2	0	-4	-6	0.0	0.1	0.0	0.3	0.2
	109	NB I-41 & WIS15	10338	315	WBR	36	33	65	37	180	36	34	66	41	177	0	1	1	4	-3	0.0	0.2	0.2	0.7	0.2
	107	NB I-41 & WIS96	325	83	EBL	38	51	89	71	250	37	51	88	73	249	-1	0	-1	3	-1	0.2	0.0	0.1	0.3	0.1
	107	NB I-41 & WIS96	325	337	EBT	122	179	214	206	720	134	167	202	208	711	12	-12	-11	2	-9	1.1	0.9	0.8	0.1	0.3
	107	NB I-41 & WIS96	343	332	NBL	54	73	79	124	330	60	68	76	113	317	7	-5	-4	-11	-13	0.9	0.6	0.4	1.0	0.7
	107	NB I-41 & WIS96	343	83	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	107	NB I-41 & WIS96	343	337	NBR	85	96	100	110	390	86	96	99	104	385	1	1	0	-7	-5	0.1	0.1	0.0	0.6	0.2
	107	NB I-41 & WIS96	331	332	WBT	160	192	210	249	800	166	183	205	240	793	6	-9	-5	-9	-7	0.5	0.7	0.3	0.6	0.2
	107	NB I-41 & WIS96	331	83	WBR	25	21	17	20	80	22	20	18	20	80	-3	-1	2	0	0	0.6	0.2	0.5	0.0	0.0
	105	NB I-41 & WIS125	351	79	EBL	52	54	85	52	240	49	53	81	57	239	-3	-1	-5	5	-1	0.4	0.1	0.5	0.7	0.1
	105	NB I-41 & WIS125	351	354	EBT</																				

I-41 Traffic and Engineering Study
Build (2048) With Long Term Improvements and Signal Retimings AM Peak Period Calibration
Intersection Turning Movements

TEOps Validation - 15 minute periods

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	98%

TEOps Validation - 60 minute period

Test	Target	Model
Tier 1	RMSPE < 5%	Not Applicable
Tier 2	RSNE < 3 for 75% of turns	98%

% Demand 100%	Intersections					Target					Vissim					Difference					RNSE				
	Int ID	Int Name	From Link	To Link	Mvmt	7:00-7:15AM	7:15-7:30AM	7:30-7:45AM	7:45-8:00AM	TOTAL	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2	7:00-7:15AM3	7:15-7:30AM3	7:30-7:45AM3	7:45-8:00AM3	TOTAL3	7:00-7:15AM5	7:15-7:30AM5	7:30-7:45AM5	7:45-8:00AM5	TOTAL5
	113	CTH N & SB I-41	222	24	NBL	86	65	105	84	340	86	68	104	83	341	0	3	-1	-1	1	0.0	0.3	0.1	0.1	0.0
	113	CTH N & SB I-41	222	216	NBT	73	108	78	121	380	85	110	83	113	391	12	2	5	-8	11	1.4	0.2	0.6	0.7	0.5
	113	CTH N & SB I-41	23	220	WBL	46	45	49	50	190	60	45	47	50	202	14	-1	-2	0	12	2.1	0.1	0.2	0.1	0.8
	113	CTH N & SB I-41	23	24	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	113	CTH N & SB I-41	23	216	WBR	20	17	40	30	110	38	18	25	39	119	18	1	-15	8	9	4.2	0.2	2.4	1.5	0.9
	113	CTH N & SB I-41	217	220	SBT	63	66	54	57	250	67	68	56	57	248	3	1	3	0	-2	0.4	0.2	0.4	0.1	0.1
	113	CTH N & SB I-41	217	24	SBR	91	106	116	126	450	94	110	119	127	451	3	4	4	2	1	0.3	0.4	0.3	0.2	0.0
	114	CTH N & NB I-41	224	221	EBL	58	45	32	55	180	64	47	33	46	190	6	2	1	-8	10	0.7	0.3	0.2	1.1	0.8
	114	CTH N & NB I-41	224	107	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	114	CTH N & NB I-41	224	227	EBR	42	29	54	55	180	46	33	44	56	178	4	5	-11	1	-2	0.6	0.9	1.4	0.2	0.1
	114	CTH N & NB I-41	229	221	NBT	101	128	151	150	540	105	130	155	151	541	4	3	4	0	1	0.4	0.2	0.3	0.0	0.0
	114	CTH N & NB I-41	229	107	NBR	66	75	66	56	260	62	75	65	55	257	-3	-1	-1	-2	-3	0.4	0.1	0.1	0.2	0.2
	114	CTH N & NB I-41	223	107	SBL	40	44	28	30	150	42	46	31	31	150	2	2	2	1	0	0.3	0.3	0.4	0.2	0.0
	114	CTH N & NB I-41	223	227	SBT	69	68	74	77	290	85	67	73	75	300	16	-1	-1	-2	10	1.9	0.1	0.1	0.2	0.6
	115	WIS55 & SB I-41	187	16	NBL	61	99	91	78	330	63	96	92	77	328	2	-3	1	-1	-2	0.2	0.3	0.1	0.2	0.1
	115	WIS55 & SB I-41	187	184	NBT	86	85	139	109	420	91	82	136	110	420	5	-3	-3	2	0	0.5	0.3	0.3	0.1	0.0
	115	WIS55 & SB I-41	10225	186	WBL	23	31	24	29	100	34	23	27	24	108	11	-8	3	-6	8	2.2	1.5	0.7	1.0	0.8
	115	WIS55 & SB I-41	10225	16	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	115	WIS55 & SB I-41	15	184	WBR	85	8	23	4	120	27	43	21	24	114	-58	35	-3	20	-6	0.2	0.4	0.6	0.2	0.5
	115	WIS55 & SB I-41	183	186	SBT	48	85	53	76	260	49	82	54	74	258	1	-3	1	-2	-2	0.1	0.4	0.2	0.2	0.1
	115	WIS55 & SB I-41	183	16	SBR	55	57	82	53	240	53	53	79	52	237	-2	-3	-3	-1	-3	0.3	0.5	0.3	0.1	0.2
	116	WIS55 & NB I-41	10466	187	EBL	20	22	21	24	90	27	21	22	23	92	7	-1	0	-1	2	1.5	0.2	0.1	0.1	0.2
	116	WIS55 & NB I-41	10466	112	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	116	WIS55 & NB I-41	10465	188	EBR	84	100	82	104	370	84	92	89	92	356	0	-8	7	-13	-14	0.0	0.8	0.8	1.2	0.7
	116	WIS55 & NB I-41	200	187	NBT	127	162	209	163	660	126	160	208	162	656	-1	-2	-1	-1	-4	0.1	0.2	0.1	0.1	0.1
	116	WIS55 & NB I-41	200	112	NBR	45	36	52	51	170	41	34	48	48	170	-4	-2	-4	-4	0	0.6	0.4	0.5	0.5	0.0
	116	WIS55 & NB I-41	186	112	SBL	29	4	1	24	60	29	6	2	21	57	0	2	1	-3	-3	0.0	1.3	0.7	0.6	0.4
	116	WIS55 & NB I-41	186	188	SBT	43	113	76	81	300	54	97	82	76	308	11	-15	6	-5	8	1.7	1.5	0.7	0.6	0.5
	117	CTH J & SB I-41	182	12	NBL	50	70	62	65	240	49	69	57	63	238	-1	-1	-4	-2	-2	0.2	0.1	0.5	0.3	0.1
	117	CTH J & SB I-41	182	189	NBT	114	70	99	129	410	118	77	83	116	394	3	7	-15	-13	-16	0.3	0.9	1.5	1.1	0.8
	117	CTH J & SB I-41	11	191	WBL	43	49	31	25	150	38	44	45	29	156	-5	-5	14	5	6	0.8	0.8	2.5	0.9	0.5
	117	CTH J & SB I-41	11	12	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	117	CTH J & SB I-41	11	189	WBR	29	19	38	32	120	37	24	28	33	122	8	5	-10	2	2	1.5	1.2	1.7	0.3	0.2
	117	CTH J & SB I-41	190	191	SBT	48	44	62	56	210	49	44	62	56	211	1	4	0	0	1	0.2	0.0	0.0	0.0	0.0
	117	CTH J & SB I-41	190	12	SBR	103	78	102	81	410	115	88	115	94	411	12	10	13	12	1	1.2	1.2	1.3	1.4	0.1
	118	CTH J & NB I-41	116	182	EBL	63	52	68	90	270	64	57	53	80	253	1	4	-14	-10	-17	0.1	0.6	1.7	1.1	1.0
	118	CTH J & NB I-41	116	117	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	118	CTH J & NB I-41	116	192	EBR	45	38	48	29	160	31	43	39	43	156	-14	5	-9	14	-4	2.1	0.9	1.2	2.7	0.3
	118	CTH J & NB I-41	174	182	NBT	101	87	93	105	380	102	88	88	101	379	1	1	-5	-4	-1	0.1	0.1	0.5	0.4	0.1
	118	CTH J & NB I-41	174	117	NBR	109	113	118	100	440	109	113	119	98	439	0	0	1	-3	-1	0.0	0.0	0.1	0.3	0.0
	118	CTH J & NB I-41	191	117	SBL	29	28	36	34	130	29	29	36	36	129	0	1	0	1	-1	0.0	0.2	0.0	0.2	0.1
	118	CTH J & NB I-41	191	192	SBT	62	65	57	46	230	57	59	71	50	236	-5	-6	14	3	6	0.6	0.7	1.9	0.5	0.4
	119	CTH U & SB I-41	166	8	NBL	27	28	22	20	100	26	25	25	25	101	-1	-3	4	5	1	0.1	0.7	0.8	1.1	0.1
	119	CTH U & SB I-41	166	167	NBT	5	17	29	68	110	6	3	10	19	38	1	-14	-19	-48	-72	0.4	0.2	0.2	0.2	0.2
	119	CTH U & SB I-41	10166	159	WBL	33	49	48	30	160	28	39	49	37	153	-5	-10	1	6	-7	1.0	1.4	0.1	1.2	0.6
	119	CTH U & SB I-41	10166	8	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
	119	CTH U & SB I-41	10167	167	WBR	40	37																		

I-41 Traffic and Engineering Study
 Build (2048) With Long Term Improvements and Signal Retimings AM Peak Period Calibration
Lane Utilization Comparison

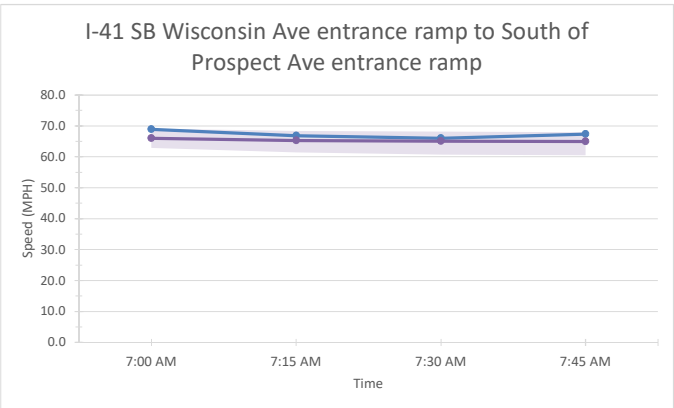
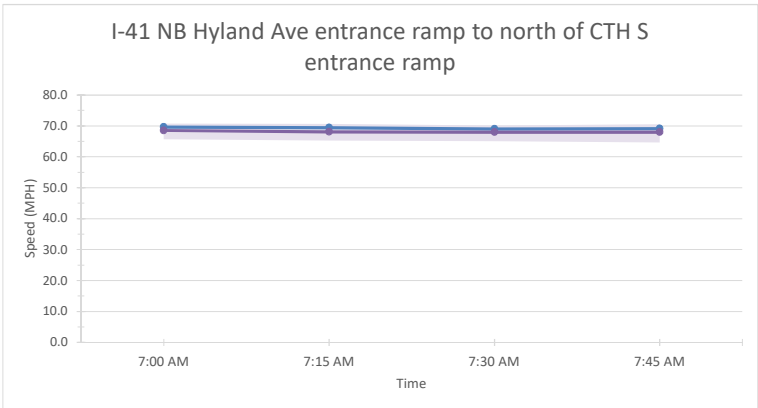
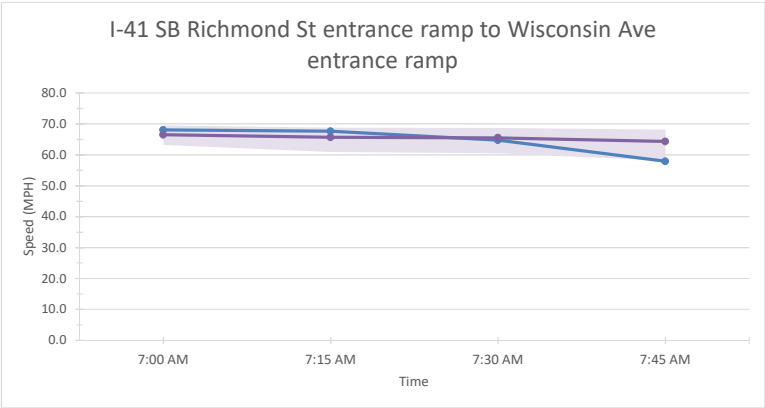
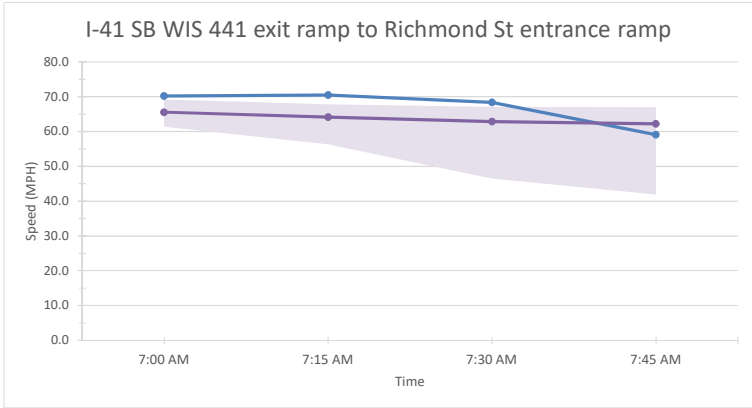
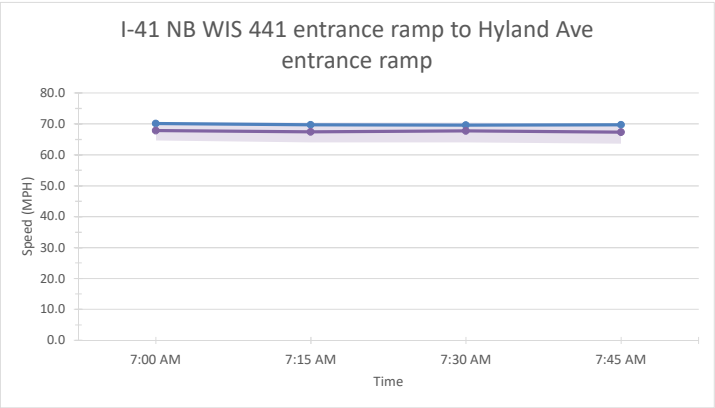
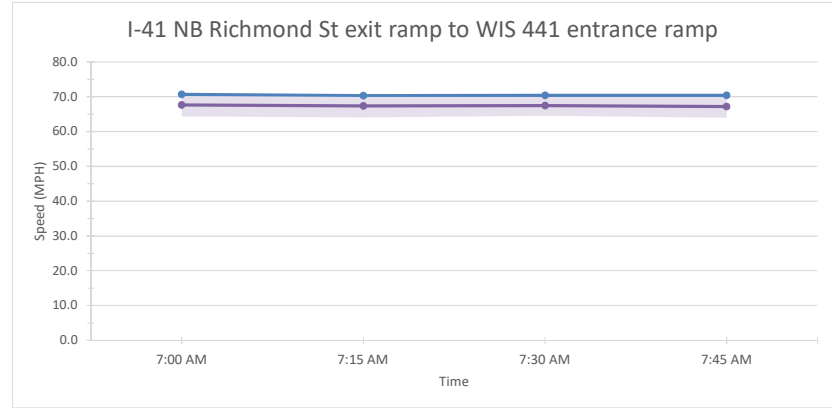
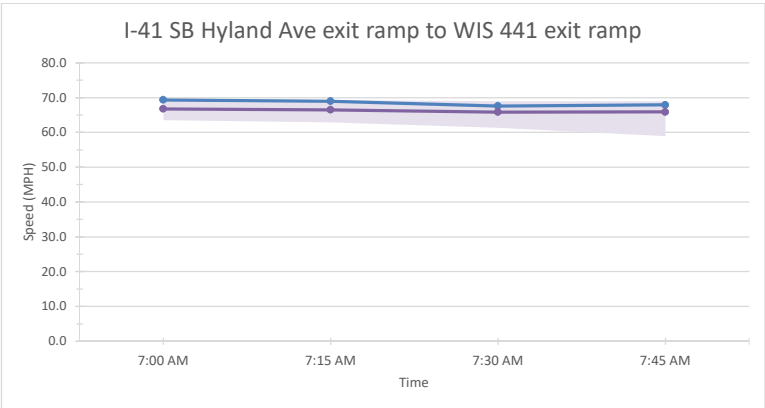
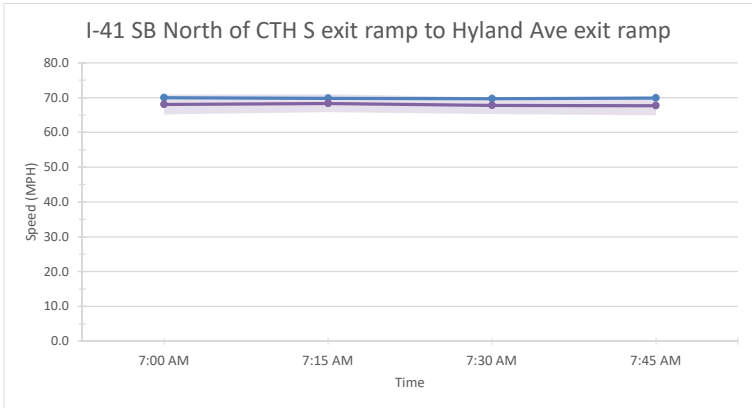
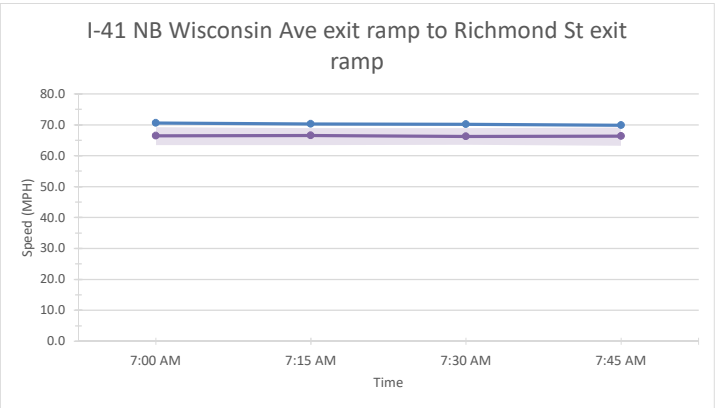
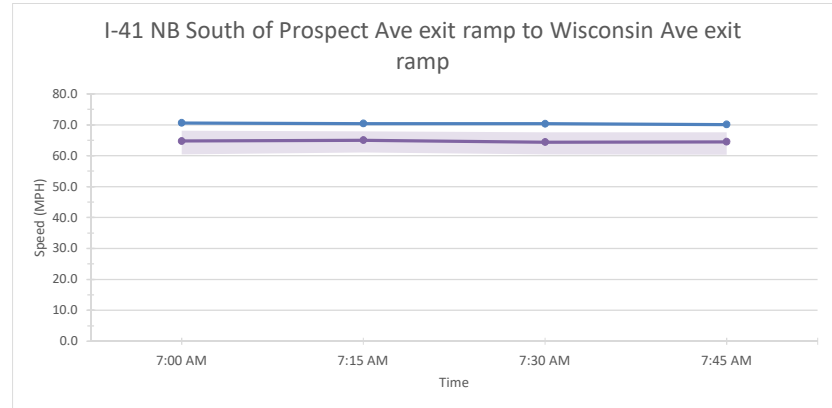
I-41 NB																		
Location		I-41 NB south of CTH BB			I-41 NB betw WIS 125 & WIS 96				I-41 NB betw CTH E & WIS 441				I-41 NB betw WIS 441 & CTH N			I-41 NB betw CTH U & CTH S		
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Center	Right
VISSIM	7:00 AM	30%	30%	40%	26%	30%	36%	8%	24%	28%	26%	23%	29%	33%	37%	32%	34%	33%
	7:15 AM	30%	30%	40%	26%	30%	36%	8%	24%	27%	24%	25%	31%	33%	36%	33%	34%	34%
	7:30 AM	29%	30%	41%	25%	29%	36%	10%	24%	27%	24%	25%	31%	34%	35%	33%	34%	33%
	7:45 AM	30%	30%	40%	26%	29%	34%	11%	23%	26%	24%	27%	31%	33%	37%	33%	34%	33%
	Avg	30%	30%	40%	26%	29%	36%	9%	24%	27%	24%	25%	30%	33%	36%	33%	34%	33%
I-41 SB																		
Location		I-41 SB south of CTH BB			I-41 SB betw WIS 125 & WIS 96				I-41 SB betw CTH E & WIS 441				I-41 SB betw WIS 441 & CTH N			I-41 SB betw CTH U & CTH S		
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right		Left	Center	Right	Left	Center	Right
VISSIM	7:00 AM	33%	35%	32%	25%	32%	36%	7%	34%	36%	30%		32%	35%	33%	32%	34%	34%
	7:15 AM	34%	34%	32%	26%	31%	35%	8%	34%	36%	29%		33%	34%	33%	31%	34%	35%
	7:30 AM	32%	35%	33%	24%	31%	35%	10%	35%	35%	30%		33%	34%	33%	32%	34%	34%
	7:45 AM	33%	35%	32%	23%	31%	35%	11%	35%	35%	30%		33%	34%	33%	32%	35%	34%
	Avg	33%	35%	32%	24%	31%	35%	9%	34%	36%	30%		33%	34%	33%	32%	34%	34%

I-41 Traffic and Engineering Study
Build (2048) With Long Term Improvements and Signal Retimings AM Peak Period Calibration
Mainline Speed Comparison

Segment		I-41 NB						Segment		I-41 SB				
		I-41 NB South of Prospect Ave exit ramp to Wisconsin Ave exit ramp	I-41 NB Wisconsin Ave exit ramp to Richmond St exit ramp	I-41 NB Richmond St exit ramp to WIS 441 entrance ramp	I-41 NB WIS 441 entrance ramp to Hyland Ave entrance ramp	I-41 NB Hyland Ave entrance ramp to north of CTH S entrance ramp				I-41 SB North of CTH S exit ramp to Hyland Ave exit ramp	I-41 SB Hyland Ave exit ramp to WIS 441 exit ramp	I-41 SB WIS 441 exit ramp to Richmond St entrance ramp	I-41 SB Richmond St entrance ramp to Wisconsin Ave entrance ramp	I-41 SB Wisconsin Ave entrance ramp to South of Prospect Ave entrance ramp
VISSIM	7:00 AM	70.6	70.5	70.7	70.2	69.6		VISSIM	7:00 AM	69.9	69.3	70.2	68.0	68.9
	7:15 AM	70.4	70.2	70.4	69.7	69.4			7:15 AM	69.8	68.9	70.5	67.6	66.9
	7:30 AM	70.3	70.1	70.4	69.6	69.0			7:30 AM	69.7	67.6	68.3	64.8	66.1
	7:45 AM	70.1	69.9	70.4	69.7	69.1			7:45 AM	69.9	67.9	59.1	57.9	67.4
Field (NPMRDS Average)	7:00 AM	64.7	66.4	67.7	67.9	68.5		Field (NPMRDS Average)	7:00 AM	68.0	66.8	65.6	66.5	66.0
	7:15 AM	65.0	66.6	67.4	67.5	68.1			7:15 AM	68.3	66.5	64.2	65.7	65.3
	7:30 AM	64.3	66.2	67.5	67.7	68.0			7:30 AM	67.8	65.8	62.9	65.5	65.1
	7:45 AM	64.5	66.3	67.1	67.3	68.0			7:45 AM	67.7	65.9	62.2	64.3	65.0
Field (NPMRDS 15th Percentile)	7:00 AM	60.5	63.4	64.3	64.7	65.8		Field (NPMRDS 15th Percentile)	7:00 AM	65.2	63.6	61.4	63.2	62.9
	7:15 AM	61.1	63.4	64.1	64.0	65.3			7:15 AM	65.9	62.9	56.4	61.0	61.5
	7:30 AM	60.4	63.5	64.5	64.0	65.1			7:30 AM	65.3	61.4	48.6	60.5	60.8
	7:45 AM	60.3	63.2	64.0	63.6	64.7			7:45 AM	64.9	59.0	41.9	58.1	60.6
Field (NPMRDS 85th Percentile)	7:00 AM	68.1	69.2	70.4	70.5	70.8		Field (NPMRDS 85th Percentile)	7:00 AM	70.9	69.4	69.2	69.5	69.1
	7:15 AM	67.9	68.9	70.1	70.4	70.7			7:15 AM	70.9	69.3	67.8	68.8	68.4
	7:30 AM	67.5	68.9	70.4	70.5	70.2			7:30 AM	70.1	69.0	67.1	68.6	68.2
	7:45 AM	67.5	69.1	70.0	70.1	70.6			7:45 AM	69.9	68.9	67.0	68.1	68.0

TEOps
Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	5%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts	100%



I-41 Traffic and Engineering Study
Build (2048) With Long Term Improvements and Signal Retimings AM Peak Period Calibration
Travel Time Comparison

FULL CORRIDOR

Data	Time	I-41 NB
		Average Travel Time (min)
		South of CTH BB to North of CTH S
Distance (mi)		26.59
VISSIM	7:00AM	22.9
NPMRDS	7:00AM	23.7



Data	Time	I-41 SB
		Average Travel Time (min)
		North of CTH S to South of CTH BB
Distance (mi)		26.58
VISSIM	7:00AM	23.5
NPMRDS	7:00AM	24.0

SEGMENTS

I-41 NB				
Average Travel Time (minutes)				
South of CTH BB to Wisc Ave Exit	Wisc Ave Exit to Richmond Exit	Richmond Exit to 441 Entrance	441 Entrance to Hyland Entrance	Hyland Entrance to North of CTH S
3.12	4.0	3.49	5.26	10.71
2.7	3.4	3.0	4.5	9.3
2.9	3.6	3.1	4.7	9.4
I-41 SB				
Average Travel Time (minutes)				
North of CTH S to Hyland Exit	Hyland Exit to 441 Exit	441 Exit to Richmond Entrance	Richmond Entrance to Wisc Ave Entrance	Wisc Ave Entrance to South of CTH BB
10.68	5.52	3.25	4.0	3.09
9.2	4.9	2.9	3.8	2.8
9.4	5.0	3.1	3.7	2.8

TEOpS Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	4%
Tier 2	NPMRDS	TT ± 15% for 85% of routes	100%

I-41 Traffic and Engineering Study
 Build (2048) With Long Term Improvements and Signal Retimings AM Peak Hour Calibration
 Merge and Diverge Segment Speeds

Merge/Diverge Links			Vissim Speed				
Forecast ID	Link ID	Description	7:00-7:15AM2	7:15-7:30AM2	7:30-7:45AM2	7:45-8:00AM2	TOTAL2
Merge/Diverge Speeds							
	70	NB I-41 CTH BB diverge	70	70	68	69	69
	74	NB I-41 CTH BB merge	69	69	68	69	69
	76	NB I-41 WIS 125 diverge	70	69	69	68	69
	80	NB I-41 WIS 125merge	68	69	68	68	68
		NB I-41 WIS 96 diverge					
	84	NB I-41 WIS 96 merge	70	70	69	69	69
	494	NB I-41 WIS 15 diverge	64	59	56	56	59
	89	NB I-41 WIS 15 merge	70	69	69	69	69
	91	NB I-41 WIS 47 diverge	70	69	70	70	70
	95	NB I-41 WIS 47 merge	70	69	70	70	70
	496	NB I-41 Ballard diverge	58	56	57	57	57
	100	NB I-41 Ballard merge	66	64	63	63	64
		NB I-41 441 diverge					
	103	NB I-41 441 merge	70	69	69	70	69
	420	NB I-41 CTH N diverge	65	66	65	65	65
	108	NB I-41 CTH N merge	69	68	68	69	69
	422	NB I-41 WIS 55 diverge	70	69	69	69	69
	113	NB I-41 WIS 55 merge	69	68	68	69	69
	417	NB I-41 CTH J diverge	66	66	66	64	65
	118	NB I-41 CTH J merge	69	68	68	68	68
	122	NB I-41 CTH U diverge	68	69	67	66	68
	123	NB I-41 CTH U merge	67	66	65	65	66
	425	NB I-41 CTH S diverge	63	64	62	62	63
	128	NB I-41 CTH S merge	67	66	63	66	66
	426	SB I-41 CTH S diverge	69	68	68	68	68
	21	SB I-41 CTH S merge	69	68	68	69	69
	424	SB I-41 CTH U diverge	64	63	61	62	63
	20	SB I-41 CTH U merge	69	68	68	69	68
	416	SB I-41 CTH J diverge	63	62	64	65	63
	19	SB I-41 CTH J merge	68	68	68	68	68
	423	SB I-41 WIS 55 diverge	65	65	65	65	65
	18	SB I-41 WIS 55 merge	68	67	66	67	67
	421	SB I-41 CTH N diverge	63	65	63	63	64
	26	SB I-41 CTH N merge	67	67	64	66	66
	419	SB I-41 441 diverge	67	63	58	60	62
	484	SB I-41 441 merge	71	70	70	71	70
		SB I-41 WIS47 diverge					
	46	SB I-41 WIS 47 merge	63	64	40	26	48
	48	SB I-41 WIS 15 diverge	67	68	61	64	65
	50	SB I-41 WIS 15 merge	67	64	65	59	64
	53	SB I-41 WIS 96 diverge	68	67	68	67	67
	56	SB I-41 WIS 96 merge	65	61	61	61	62
		SB I-41 WIS 125 diverge					
	61	SB I-41 WIS 125merge	68	65	56	65	63
	63	SB I-41 CTH BB diverge	68	65	66	67	66
	67	SB I-41 CTH BB merge	68	67	67	68	68

DRAFT

APPENDIX P14

Year 2048 Build with Long Term Improvements

VISSIM PM Peak Hour

I-41 Traffic and Engineering Study
Build (2048) With Long Term Improvements and Signal Retimings PM Peak Hour Calibration
Freeway Mainline and Ramp Volumes

			% Demand 100%	Segments					Target					Vissim					Difference					RMSPE					RMSE					
				Forecast ID	Link ID	Description		Type	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	TOTAL	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2	4:15-4:30PM3	4:30-4:45PM3	4:45-5:00PM3	5:00-5:15PM3	TOTAL3	4:15-4:30PM6	4:30-4:45PM6	4:45-5:00PM6	5:00-5:15PM6	TOTAL6	4:15-4:30PM5	4:30-4:45PM5	4:45-5:00PM5	5:00-5:15PM5	TOTAL5	
TEOps Validation - 15 minute periods				10001	69	NB I-41 (Southern Project Limits)		MAINLINE	988	975	1036	931	3930	983	976	1031	933	3923	-5	1	-6	2	-7	0%	0%	1%	0%	0%	0.1	0.0	0.2	0.1	0.1	
Test	Target	Model		10002	72	NB I-41 Exit to CTH BB		RAMP	150	146	162	153	610	149	148	159	151	607	-1	2	-3	-1	-3	1%	2%	2%	1%	0%	0.1	0.2	0.2	0.1	0.1	
				10003	71	NB I-41 betw CTH BB Exit to CTH BB Ent		MAINLINE	838	830	875	778	3320	821	834	862	785	3302	-17	4	-12	7	-18	2%	1%	1%	1%	1%	0.6	0.2	0.4	0.3	0.3	
				10004	73	NB I-41 Ent from CTH BB		RAMP	268	282	268	262	1080	265	283	262	269	1079	-3	26	1	-6	26	7	1%	0%	2%	3%	7	0.2	0.1	0.4	0.4	0.0
Tier 1	RMSPE < 5%	9%		10005	75	NB I-41 betw CTH BB Ent to WIS 125 Exit		MAINLINE	1105	1112	1143	1040	4400	1075	1124	1129	1056	4384	-30	13	-14	16	-15	3%	0%	0%	0.5	0.4	0.9	0.4	0.3	0.2	0.4	0.0
Tier 2	RSNE < 3 for 85% of links	97%		10006	78	NB I-41 Exit to WIS 125		RAMP	268	277	254	252	1050	226	239	219	219	903	-42	-37	-34	-33	-147	10%	10%	10%	10%	10%	2.6	2.2	2.2	2.1	8.2	
TEOps Validation - 60 minute period				10007	77	NB I-41 betw WIS 125 Exit to WIS 125 Ent		MAINLINE	837	835	889	788	3350	801	840	871	801	3313	-36	6	-18	12	-36	4%	1%	2%	2%	1%	1.3	0.2	0.6	0.4	0.6	
Test	Target	Model		10008	79	NB I-41 Ent from WIS 125		RAMP	230	267	269	324	1090	228	262	270	314	1073	-2	-5	1	-10	-17	1%	2%	0%	3%	2%	0.2	0.3	0.0	0.5	0.5	
Tier 1	RMSPE < 5%	2%		10009	80	NB I-41 betw WIS 125 Ent to WIS 96 Exit		MAINLINE	1067	1102	1158	1112	4440	1018	1088	1127	1106	4339	-49	-13	-31	-6	-100	5%	1%	3%	1%	2%	1.5	0.4	0.9	0.2	1.5	
Tier 2	RSNE < 3 for 85% of links	97%		10010	82	NB I-41 Exit to WIS96		RAMP	237	245	226	272	980	233	252	227	268	980	-3	7	0	-4	0	1%	3%	0%	2%	0%	0.2	0.4	0.0	0.3	0.0	
				10011	81	NB I-41 betw WIS 96 Exit to WIS 96 Ent		MAINLINE	831	856	932	841	3460	795	853	913	857	3418	-36	-3	-18	16	-41	4%	0%	2%	2%	1%	1.2	0.1	0.6	0.6	0.7	
				10012	83	NB I-41 Ent from WIS 96		RAMP	304	356	352	408	1420	318	343	360	389	1410	14	-13	7	-18	-9	5%	4%	2%	5%	1%	0.8	0.7	0.4	0.9	0.3	
				10013	85	NB I-41 WIS 96 Ent to WIS 15 Exit		MAINLINE	1134	1212	1284	1248	4880	1103	1193	1273	1251	4820	-31	1193	-12	3	-59	3%	2%	1%	0%	0%	0.9	0.5	0.3	0.1	0.9	
				10014	87	NB I-41 Exit to WIS15		RAMP	315	345	299	331	1290	292	327	309	316	1245	-22	-18	10	-15	-45	4%	5%	3%	4%	4%	1.3	1.0	0.5	0.8	1.3	
				10015	86	NB I-41 betw WIS 15 Exit to WIS 15 Ent		MAINLINE	820	867	985	917	3590	806	845	957	826	3534	-14	-22	-28	8	-55	2%	3%	3%	1%	2%	0.5	0.7	0.9	0.3	0.9	
				10016	88	NB I-41 Ent from WIS15		RAMP	465	506	360	388	1720	451	420	423	426	1720	-15	-86	63	38	0	3%	10%	10%	10%	0%	0.7	2.7	2.7	1.9	0.0	
				10017	90	NB I-41 betw WIS 15 Ent to WIS 47 Exit		MAINLINE	1285	1374	1345	1305	5310	1258	1273	1365	1379	5276	-27	100	20	74	-33	2%	4%	2%	4%	1%	0.7	2.7	0.6	2.0	0.5	
				10018	93	NB I-41 Exit to WIS47		RAMP	246	242	312	302	1030	231	232	234	287	985	-15	-10	4	-24	-45	4%	4%	2%	6%	4%	1.0	0.7	0.3	1.4	1.4	
				10019	92	NB I-41 betw WIS 47 Exit to WIS 47 Ent		MAINLINE	1039	1131	1115	994	4280	1014	1036	1115	1086	4250	-25	-96	0	92	-29	2%	4%	0%	6%	1%	0.8	2.8	0.0	2.9	0.5	
				10020	94	NB I-41 Ent from WIS47		RAMP	250	260	248	313	1070	250	252	245	299	1046	1	-8	-2	-14	-24	0%	3%	1%	4%	2%	0.1	0.5	0.2	0.8	0.7	
				10021	96	NB I-41 betw WIS 47 Exit to Ballard Exit		MAINLINE	1289	1391	1363	1307	5350	1274	1292	1356	1401	5323	-15	-99	-7	94	-26	1%	4%	0%	4%	1%	0.4	2.6	0.2	2.6	0.4	
				10022	98	NB I-41 Exit to Ballard		RAMP	157	178	213	202	750	205	162	194	213	774	48	205	-16	-18	11	25	40%	9%	9%	5%	3%	2.7	1.2	1.3	0.8	0.9
				10023	97	NB I-41 betw Ballard Exit to Ballard Ent		MAINLINE	1132	1214	1150	1104	4600	1065	1124	1159	1189	4538	-66	89	9	85	-62	4%	7%	1%	4%	1%	2.0	2.6	0.3	2.6	0.9	
				10024	99	NB I-41 Ent from Ballard		RAMP	218	261	268	263	1010	222	253	268	259	1001	4	-8	0	-4	-9	2%	3%	0%	1%	1%	0.3	0.5	0.0	0.2	0.3	
				10025	100	NB I-41 betw Ballard Ent to 441 Exit		MAINLINE	1349	1475	1418	1367	5610	1287	1371	1430	1440	5528	-62	103	12	73	-81	5%	7%	1%	5%	1%	1.7	2.7	0.3	2.0	1.1	
				10026	102	NB I-41 Exit to SB441		RAMP	422	468	462	458	1810	434	434	449	463	1743	-26	-34	-13	6	-67	4%	7%	3%	1%	4%	1.3	1.6	0.6	0.3	1.6	
				10027	101	NB I-41 betw 441 Exit to 441 Ent		MAINLINE	927	1007	956	910	3800	880	930	973	965	3750	-47	-77	17	57	-49	5%	6%	2%	4%	0.6	1.5	2.4	0.6	1.9	0.8	
				10028	33	NB I-41 Ent from NB441		RAMP	202	178	218	232	830	200	179	216	230	826	-2	1	-2	2	-1	1%	0%	1%	1%	1%	0.1	0.1	0.1	0.1	0.2	
				10029	104	NB I-41 betw 441 Exit to CTH N Exit		MAINLINE	1129	1185	1174	1141	4630	1060	1124	1168	1204	4556	-69	-61	-6	63	-74	4%	5%	1%	5%	2%	2.0	1.8	0.2	1.9	1.1	
				10030	106	NB I-41 Exit to CTH N		RAMP	214	261	277	249	1000	185	229	262	269	944	-29	-32	-15	20	-56	14%	12%	5%	6%	4%	2.0	2.0	0.9	1.3	1.8	
				10031	105	NB I-41 betw CTH N Exit to CTH N Entrance		MAINLINE	915	924	898	893	3630	893	987	900	898	921	3573	-49	86	38	2	29	5%	4%	0%	3%	2%	1.6	1.2	0.1	1.0	0.9
				10032	107	NB I-41 Ent from CTH N		RAMP	87	100	108	65	360	78	88	94	68	328	-8	-12	-13	3	-31	4%	10%	10%	4%	4%	0.9	1.2	1.3	0.3	1.7	
				10033	109	NB I-41 betw CTH N Ent to WIS 55 Exit		MAINLINE	1001	1025	1005	958	3990	947	986	1010	1003	3946	-55	38	5	45	-43	5%	4%	0%	5%	1%	1.7	1.2	0.2	1.5	0.7	
				10034	111	NB I-41 Exit to WIS55		RAMP	140	207	144	178	670	148	162	175	159	643	8	-45	31	20	-26	4%	7%	1%	5%	1%	0.7	2.7	2.6	1.5	1.0	
				10035	110	NB I-41 betw WIS 55 Exit to WIS 55 Ent		MAINLINE	861	818	861	779</																						

I-41 Traffic and Engineering Study
 Build (2048) With Long Term Improvements and Signal Retimings PM Peak Hour Calibration
 Mainline Operations

Fwy/Dir	#	Link ID	Segment	# Lanes	HCM Type	Avg Speed (mph)				Density (pcphpl)				LOS			
						4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM
I-41 NB	25	129	NB I-41: Northern Project Limits	3	Basic	70	70	70	70	16.4	17.9	18.5	17.4	B	B	C	B
	24	125	NB I-41 betw CTH S Exit to CTH S Ent	3	Basic	70	70	70	70	14.9	16.6	15.4	14.9	B	B	B	B
	23	124	NB I-41 betw CTH U Ent to CTH S Exit	3	Basic	70	70	70	70	16.3	17.9	16.5	16.6	B	B	B	B
	22	493	NB I-41 CTH U Exit to CTH U Ent	3	Basic	70	70	70	70	14.4	15.6	14.8	15.5	B	B	B	B
	21	119	NB I-41 betw CTH J Ent to CTH U Exit	3	Basic	71	70	70	70	15.3	17.0	15.8	16.8	B	B	B	B
	20	115	NB I-41 betw CTH J Exit to CTH J Ent	3	Basic	70	69	70	70	13.5	14.6	14.2	14.8	B	B	B	B
	19	114	NB I-41 betw WIS 55 Ent to CTH J Exit	3	Basic	70	64	64	69	17.1	19.7	19.8	19.2	B	C	C	C
	18	110	NB I-41 betw WIS 55 Exit to WIS 55 Ent	3	Basic	70	71	71	71	16.1	17.0	17.0	17.3	B	B	B	B
	17	109	NB I-41 betw CTH N Ent to WIS 55 Exit	3	Basic	70	70	70	70	19.6	20.4	20.9	20.8	C	C	C	C
	16	105	NB I-41 betw CTH N Exit to CTH N Entrance	3	Basic	69	70	70	69	18.1	18.4	18.8	19.3	C	C	C	C
	15	104	NB I-41 betw 441 Ent to CTH N Exit	3	Basic	69	69	69	69	22.3	23.6	24.7	25.5	C	C	C	C
	14	101	NB I-41 betw 441 Exit to 441 Ent	3	Basic	69	69	67	67	18.6	19.7	21.0	21.0	C	C	C	C
	13	100	NB I-41 betw Ballard Ent to 441 Exit	4	Weave	61	58	49	43	23.1	25.9	31.8	36.9	C	C	D	E
	12	97	NB I-41 betw Ballard Exit to Ballard Ent	4	Basic	69	69	69	68	16.9	17.7	18.4	19.0	B	B	C	C
	11	96	NB I-41 betw WIS 47 Ent to Ballard Exit	4	Basic	70	70	70	70	19.8	20.1	21.1	21.9	C	C	C	C
	10	92	NB I-41 betw WIS 47 Exit to WIS 47 Ent	3	Basic	70	70	70	70	20.9	21.5	23.1	22.6	C	C	C	C
	9	90	NB I-41 betw WIS 15 Ent to WIS 47 Exit	3	Basic	70	70	69	69	26.3	26.6	28.8	29.0	D	D	D	D
	8	86	NB I-41 betw WIS 15 Exit to WIS 15 Ent	3	Basic	69	69	68	69	18.9	17.8	20.3	19.6	B	B	C	C
	7	85	NB I-41 WIS 96 Ent to WIS 15 Exit	3	Basic	61	57	55	53	26.3	30.5	33.9	34.0	D	D	D	D
	6	81	NB I-41 betw WIS 96 Exit to WIS 96 Ent	3	Basic	69	69	68	67	16.6	18.0	19.6	18.5	B	B	C	C
	5	80	NB I-41 betw WIS 125 Ent to WIS 96 Exit	4	Weave	65	64	64	62	17.2	18.5	19.2	19.6	B	B	B	B
	4	77	NB I-41 betw WIS 125 Exit to WIS 125 Ent	3	Basic	71	70	71	70	16.5	17.3	18.0	16.5	B	B	B	B
	3	75	NB I-41 betw CTH BB Ent to WIS 125 Exit	3	Basic	66	66	67	66	23.5	24.8	24.5	23.1	C	C	C	C
	2	71	NB I-41 betw CTH BB Exit to CTH BB Ent	3	Basic	70	71	70	71	16.9	17.2	17.8	16.2	B	B	B	B
	1	69	NB I-41 (Southern Project Limits)	3	Basic	70	71	70	71	20.3	20.1	21.3	19.2	C	C	C	C

Fwy/Dir	#	Link ID	Segment	# Lanes	HCM Type	Avg Speed (mph)				Density (pcphpl)				LOS			
						4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM
I-41 SB	1	1	SB I-41: Northern projects limit	3	Basic	70	70	70	70	22.0	20.7	22.6	19.8	C	C	C	C
	2	2	SB I-41 betw CTH S Exit to CTH S Ent	3	Basic	70	70	70	71	18.7	18.4	19.5	17.4	C	C	C	B
	3	5	SB I-41 betw CTH S Exit to CTH U Exit	3	Basic	70	70	70	70	19.9	20.4	21.4	19.3	C	C	C	C
	4	6	SB I-41 betw CTH U Exit to CTH U Ent	3	Basic	70	70	69	70	17.1	17.6	18.1	16.5	B	B	C	B
	5	9	SB I-41 CTH U Ent to CTH J Exit	3	Basic	70	70	70	70	17.6	18.7	18.5	18.2	B	C	C	C
	6	10	SB I-41 CTH J Exit to CTH J Ent	3	Basic	70	70	70	70	14.2	15.2	14.7	15.6	B	B	B	B
	7	13	SB I-41 CTH J Ent to WIS 55 Exit	3	Basic	70	70	70	69	16.5	18.2	17.1	19.2	B	C	B	C
	8	14	SB I-41 WIS 55 Exit to WIS 55 Ent	3	Basic	70	70	70	70	14.9	16.3	15.2	17.1	B	B	B	B
	9	17	SB I-41 betw WIS 55 Ent to CTH N Exit	3	Basic	70	70	70	69	17.6	20.6	18.4	21.6	B	C	C	C
	10	22	SB I-41 CTH N Exit to CTH N Ent	3	Basic	70	70	70	70	15.1	16.9	14.4	17.3	B	B	B	B
	11	25	SB I-41 CTH N Ent to 441 Exit	3	Basic	70	70	70	70	17.6	21.4	18.5	21.1	B	C	C	C
	12	471	SB I-41 betw 441 Exit to 441 Ent	3	Basic	71	71	71	71	9.4	10.7	9.5	11.0	A	A	A	A
	15	484	SB I-41 betw Ballard Ent to WIS 47 Exit	5	Basic	71	70	70	70	13.6	14.4	14.3	15.5	B	B	B	B
	16	43	SB I-41 betw WIS 47 Exit to WIS 47 Ent	4	Basic	71	70	71	70	13.4	13.9	13.9	14.8	B	B	B	B
	17	487	SB I-41 WIS 47 Ent to WIS 15 Exit	3	Basic	69	69	69	69	22.5	22.7	23.1	23.7	C	C	C	C
	18	49	SB I-41 WIS 15 Exit to WIS 15 Ent	3	Basic	70	69	69	70	14.6	14.8	15.2	14.9	B	B	B	B
	19	50	SB I-41 WIS 15 Ent to WIS 96 Exit	4	Basic	65	66	67	66	15.5	14.8	15.2	15.8	B	B	B	B
	20	55	SB I-41 betw WIS 96 Exit to WIS 96 Ent	3	Basic	71	71	71	71	14.9	14.3	14.5	14.7	B	B	B	B
	21	56	SB I-41 betw WIS 96 Ent to WIS 125 Exit	4	Weave	65	65	66	66	16.9	17.3	16.7	17.3	B	B	B	B
	22	58	SB I-41 betw WIS 125 Exit to WIS 125 Ent	3	Basic	70	69	70	70	18.3	19.0	18.3	19.0	C	C	C	C
	23	62	SB I-41 betw WIS 125 Ent to CTH BB Exit	3	Basic	66	66	66	67	24.6	26.5	24.8	25.6	C	D	C	C
	24	64	SB I-41 betw CTH BB Exit to CTH BB Ent	3	Basic	70	70	70	70	19.9	21.6	20.0	21.0	C	C	C	C
	25	68	SB I-41: Southern project limits	3	Basic	69	69	69	69	24.2	25.6	24.3	25.2	C	C	C	C

Notes:

Volume is exported as Total Vehicles and use 9% Trucks for passenger car equivalent purposes.
 Levels of Service (LOS) as shown are based on density thresholds established by the 6th Edition Highway Capacity Manual (HCM) for each segment type
 Densities and LOSs are only reported for mainline sections that generally represent the segment methodologies within
 the 6th Edition HCM. Vissin and HCM 6 methodologies are different and no direct comparison should be made

Legend				
Color	Speed (mph)	LOS	Density (pcphpl)	
			Basic	Weave
	55+	A	0-11	0-10
		B	11-18	10-20
	50-55	C	18-26	20-28
	40-50	D	26-35	28-35
	30-40	E	35-45	35-43
	0-30	F	45+	43+

I-41 Traffic and Engineering Study
Build (2048) With Long Term Improvements and Signal Retimings PM Peak Period Calibration
Intersection Turning Movements

			% Demand	Intersections						Target					Vissim					Difference					RNSE				
			100%	Int ID	Int Name	Forecast ID	From Link	To Link	Mvmt	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	TOTAL	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2	4:15-4:30PM3	4:30-4:45PM3	4:45-5:00PM3	5:00-5:15PM3	TOTAL3	4:15-4:30PM5	4:30-4:45PM5	4:45-5:00PM5	5:00-5:15PM5	TOTAL5
TEOps Validation - 15 minute periods				108	SB I-41 & WIS15	8EBL	303	52	EBL	106	84	51	69	310	111	78	60	73	322	5	-5	9	4	13	0.5	0.6	1.2	0.5	0.7
Test	Target	Model		108	SB I-41 & WIS15	8EBT	303	305	EBT	561	680	513	477	2230	558	556	586	552	2251	-3	-124	73	75	21	0.1	1.2	1.2	1.4	0.4
Tier 1	RMSPE < 5%	Not Applicable		108	SB I-41 & WIS15	8WBT	309	302	WBT	381	354	367	327	1430	360	355	361	329	1404	-21	0	-7	2	-26	1.1	0.0	0.3	0.1	0.7
Tier 2	RSNE < 3 for 75% of turns	97%		108	SB I-41 & WIS15	8WBR	309	52	WBR	120	117	159	165	560	113	118	141	168	540	-7	1	-18	3	-20	0.6	0.1	1.4	0.2	0.9
				108	SB I-41 & WIS15	8SBL	51	305	SBL	34	56	52	68	210	49	43	53	65	210	15	-13	1	-3	0	2.5	1.7	0.2	0.3	0.0
				108	SB I-41 & WIS15	8SBR	51	302	SBR	315	334	334	337	1320	316	317	336	331	1299	1	-17	2	-6	-21	0.0	1.0	0.1	0.3	0.6
				106	SB I-41 & WIS96	6EBT	323	325	EBT	428	484	473	514	1900	438	480	478	502	1898	9	-5	5	-12	-2	0.5	0.2	0.2	0.5	0.1
				106	SB I-41 & WIS96	6EBR	323	57	EBR	139	159	123	169	590	139	158	124	167	588	0	-1	1	-2	-2	0.0	0.1	0.1	0.1	0.1
				106	SB I-41 & WIS96	6WBL	332	57	WBL	162	191	185	152	690	155	181	183	164	683	-7	-11	-1	12	-7	0.6	0.8	0.1	1.0	0.3
				106	SB I-41 & WIS96	6WBT	332	334	WBT	395	474	429	453	1750	391	450	441	448	1731	-3	-24	13	-5	-20	0.2	1.1	0.6	0.2	0.5
				106	SB I-41 & WIS96	6SBL	340	325	SBL	67	59	74	71	270	66	58	69	72	265	0	-1	-5	1	-5	0.0	0.1	0.6	0.2	0.3
				106	SB I-41 & WIS96	6SBT	340	57	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				106	SB I-41 & WIS96	6SBR	340	334	SBR	173	141	175	162	650	142	152	153	174	621	-30	11	-22	12	-29	2.3	1.0	1.6	1.0	1.1
				104	SB I-41 & WIS125	4EBT	349	351	EBT	342	404	356	419	1520	344	399	358	407	1508	2	-5	2	-11	-12	0.1	0.2	0.1	0.6	0.3
				104	SB I-41 & WIS125	4EBR	349	60	EBR	143	165	135	166	610	143	164	139	163	609	0	-1	4	-3	-1	0.0	0.1	0.3	0.2	0.0
				104	SB I-41 & WIS125	4WBL	361	60	WBL	113	122	101	114	450	114	122	100	115	451	1	1	-1	1	2	0.1	0.0	0.1	0.1	0.1
				104	SB I-41 & WIS125	4WBT	361	363	WBT	379	386	399	375	1540	376	388	395	380	1539	-3	2	-4	5	-1	0.2	0.1	0.2	0.3	0.0
				104	SB I-41 & WIS125	4SBL	367	351	SBL	45	48	76	51	220	56	45	62	63	225	11	-3	-14	12	5	1.6	0.4	1.7	1.7	0.3
				104	SB I-41 & WIS125	4SBT	367	60	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				104	SB I-41 & WIS125	4SBR	367	363	SBR	75	66	82	58	280	87	75	72	70	304	12	9	-10	13	23	1.4	1.1	1.1	1.7	1.4
				101	SB I-41 & CTHB8	1EBT	498	381	EBT	229	253	277	281	1040	229	250	272	288	1039	0	-3	-5	7	-1	0.0	0.2	0.3	0.4	0.0
				101	SB I-41 & CTHB8	1EBR	498	66	EBR	109	103	112	116	440	110	102	111	118	441	1	-1	0	2	1	0.1	0.1	0.0	0.2	0.1
				101	SB I-41 & CTHB8	1WBL	382	66	WBL	86	84	74	76	320	83	83	79	76	321	-3	-1	5	1	1	0.3	0.1	0.6	0.1	0.1
				101	SB I-41 & CTHB8	1WBT	382	379	WBT	86	109	106	99	400	89	104	105	100	398	2	-5	-1	1	-3	0.2	0.5	0.1	0.1	0.1
				101	SB I-41 & CTHB8	1SBL	393	381	SBL	75	65	50	49	240	63	68	59	49	239	-13	3	9	0	-1	1.5	0.3	1.3	0.1	0.1
				101	SB I-41 & CTHB8	1SBT	393	66	SBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				101	SB I-41 & CTHB8	1SBR	393	379	SBR	80	105	121	104	410	96	94	114	111	415	16	-11	-7	7	5	1.8	1.1	0.7	0.7	0.3
				109	NB I-41 & WIS15	9EBL	10360	316	EBL	344	430	293	292	1360	339	350	359	334	1381	-5	-81	65	41	21	0.2	1.4	1.4	2.4	0.6
				109	NB I-41 & WIS15	9EBT	10341	311	EBT	251	305	271	253	1080	258	247	295	289	1089	6	-58	24	36	9	0.4	1.2	1.5	2.3	0.3
				109	NB I-41 & WIS15	9NBL	87	308	NBL	114	124	69	103	410	104	120	86	94	403	-10	-4	17	-9	-7	0.9	0.4	2.0	0.9	0.3
				109	NB I-41 & WIS15	9NBT	87	316	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				109	NB I-41 & WIS15	9NBR	87	311	NBR	201	221	230	228	880	189	211	234	225	859	-12	-10	4	-2	-21	0.8	0.7	0.2	0.2	0.7
				109	NB I-41 & WIS15	9WBT	10338	308	WBT	387	347	457	389	1580	380	345	419	413	1556	-7	-2	-38	23	-24	0.4	0.1	1.8	1.2	0.6
				109	NB I-41 & WIS15	9WBR	10338	315	WBR	121	76	67	96	360	117	79	68	92	357	-4	3	1	-4	-3	0.4	0.4	0.2	0.4	0.2
				107	NB I-41 & WIS96	7EBL	325	83	EBL	234	266	262	308	1070	243	262	262	297	1064	9	-3	0	-11	-5	0.6	0.2	0.0	0.6	0.2
				107	NB I-41 & WIS96	7EBT	325	337	EBT	261	278	286	277	1100	260	276	284	277	1098	-1	-2	-1	1	-3	0.0	0.1	0.1	0.1	0.1
				107	NB I-41 & WIS96	7NBL	343	332	NBL	120	126	108	136	490	117	127	114	125	483	-3	1	5	-11	-7	0.3	0.1	0.5	0.9	0.3
				107	NB I-41 & WIS96	7NBT	343	83	NBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
				107	NB I-41 & WIS96	7NBR	343	337	NBR	117	119	118	136	490	118	121	119	134	493	2	2	1	-2	3	0.2	0.2	0.1	0.1	0.1
				107	NB I-41 & WIS96	7WBT	331	332	WBT	437	539	505	469	1950	429	504	511	487	1931	-8	-3								

I-41 Traffic and Engineering Study																											
Build (2048) With Long Term Improvements and Signal Retimings PM Peak Period Calibration																											
Intersection Turning Movements																											
% Demand		Intersections						Target					Vissim					Difference					RNSE				
100%		Int ID	Int Name	Forecast ID	From Link	To Link	Mvmt	4:15-4:30PM	4:30-4:45PM	4:45-5:00PM	5:00-5:15PM	TOTAL	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2	4:15-4:30PM3	4:30-4:45PM3	4:45-5:00PM3	5:00-5:15PM3	TOTAL3	4:15-4:30PM5	4:30-4:45PM5	4:45-5:00PM5	5:00-5:15PM5	TOTAL5
TEOpS Validation - 15 minute periods		113	CTH N & SB I-41	13NBL	222	24	NBL	58	119	101	113	390	60	105	105	113	384	2	-14	4	0	-7	0.3	1.3	0.4	0.0	0.3
Test	Target	Model																									
Tier 1	RMSPE < 5%	Not Applicable																									
Tier 2	RSNE < 3 for 75% of turns	97%																									
TEOpS Validation - 60 minute period		113	CTH N & SB I-41	13NBT	222	216	NBT	172	176	211	211	770	149	159	197	214	718	-23	-18	-14	3	-51	1.7	1.3	1.0	0.2	1.9
Test	Target	Model																									
Tier 1	RMSPE < 5%	Not Applicable																									
Tier 2	RSNE < 3 for 75% of turns	97%																									
		113	CTH N & SB I-41	13WBL	23	24	WBL	108	128	147	127	510	86	123	130	146	485	-21	-5	-18	19	-25	2.1	0.4	1.4	1.7	1.1
		113	CTH N & SB I-41	13WBT	23	24	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
		113	CTH N & SB I-41	13WBR	23	216	WBR	39	54	51	47	190	25	45	53	53	176	-14	-9	2	6	-14	2.2	1.2	0.3	0.9	1.0
		113	CTH N & SB I-41	13SBL	217	220	SBT	98	121	104	108	430	96	120	106	104	425	-2	-1	2	-4	-4	0.2	0.1	0.2	0.3	0.2
		113	CTH N & SB I-41	13SBR	217	24	SBR	62	108	84	77	330	61	106	85	77	329	0	-2	1	0	-1	0.1	0.2	0.1	0.0	0.1
		114	CTH N & NB I-41	14EBL	224	221	EBL	126	148	181	175	630	105	130	162	187	583	-21	-18	-19	12	-47	1.9	1.5	1.4	0.9	1.9
		114	CTH N & NB I-41	14EBT	224	107	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
		114	CTH N & NB I-41	14EBR	224	227	EBR	89	113	96	73	370	83	98	100	89	370	-5	-15	4	15	0	0.6	1.4	0.5	1.8	0.0
		114	CTH N & NB I-41	14NBT	229	221	NBT	104	148	130	149	530	104	147	132	144	527	0	-1	2	-4	-3	0.0	0.1	0.2	0.4	0.1
		114	CTH N & NB I-41	14NBR	229	107	NBR	46	43	52	49	190	46	44	51	49	189	-1	1	-1	0	0	0.1	0.2	0.1	0.0	0.1
		114	CTH N & NB I-41	14SBL	223	107	SBL	40	58	56	16	170	41	52	53	25	171	0	-5	-2	8	1	0.0	0.7	0.3	2.1	0.1
		114	CTH N & NB I-41	14SBT	223	227	SBT	165	191	195	219	770	140	186	178	233	737	-25	-5	-17	14	-33	1.9	0.4	1.2	1.0	1.2
		115	WIS55 & SB I-41	15NBL	187	16	NBL	120	155	121	154	550	120	151	124	150	545	0	-4	3	-4	-5	0.0	0.3	0.3	0.3	0.2
		115	WIS55 & SB I-41	15NBT	187	184	NBT	75	124	70	111	380	84	96	92	95	367	10	-29	22	-16	-13	1.1	2.6	2.6	1.5	0.7
		115	WIS55 & SB I-41	15WBL	10225	186	WBL	64	53	71	52	240	46	62	58	67	233	-18	9	-13	15	-7	2.2	1.3	1.6	2.0	0.4
		115	WIS55 & SB I-41	15WBT	10225	16	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
		115	WIS55 & SB I-41	15WBR	15	184	WBR	22	17	25	26	90	24	20	18	26	89	2	3	-7	0	-1	0.5	0.8	1.3	0.0	0.1
		115	WIS55 & SB I-41	15SBT	183	186	SBT	59	54	63	74	250	58	53	62	64	237	-1	-1	-2	-11	-13	0.1	0.1	0.2	1.2	0.8
		115	WIS55 & SB I-41	15SBR	183	16	SBR	19	38	29	54	140	20	38	28	48	134	1	0	0	-6	-6	0.2	0.1	0.1	0.8	0.5
		116	WIS55 & NB I-41	16EBL	10466	187	EBL	16	61	30	53	160	25	37	49	38	149	9	-24	20	-15	-10	2.3	1.1	1.1	2.0	0.8
		116	WIS55 & NB I-41	16EBT	10466	112	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
		116	WIS55 & NB I-41	16EBR	10465	188	EBR	124	146	114	126	510	125	125	131	122	503	1	-21	16	-4	-7	0.1	1.7	1.5	0.3	0.3
		116	WIS55 & NB I-41	16NBT	200	187	NBT	179	218	162	212	770	180	214	165	208	766	1	-4	3	-3	-4	0.1	0.3	0.2	0.2	0.1
		116	WIS55 & NB I-41	16NBR	200	112	NBR	26	40	34	51	150	26	39	34	51	150	0	-1	0	0	0	0.1	0.1	0.0	0.0	0.0
		116	WIS55 & NB I-41	16SBL	186	112	SBL	17	9	10	25	60	15	9	10	21	55	-2	0	1	-4	-5	0.4	0.1	0.2	0.9	0.7
		116	WIS55 & NB I-41	16SBT	186	188	SBT	106	98	125	101	430	91	105	109	109	414	-15	8	-16	7	-16	1.5	0.8	1.4	0.7	0.8
		117	CTH J & SB I-41	17NBL	182	12	NBL	30	31	26	35	120	32	31	25	33	121	2	1	-1	-1	1	0.4	0.1	0.2	0.2	0.1
		117	CTH J & SB I-41	17NBT	182	189	NBT	141	95	146	98	480	106	107	134	130	477	-35	12	-12	32	-3	2.9	1.2	1.0	1.1	0.1
		117	CTH J & SB I-41	17WBL	11	191	WBL	115	114	118	74	420	97	119	106	104	427	-17	6	-12	30	7	1.6	0.5	1.1	1.1	0.3
		117	CTH J & SB I-41	17WBT	11	12	WBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0
		117	CTH J & SB I-41	17WBR	11	189	WBR	51	76	44	39	210	39	60	65	41	205	-12	-16	21	2	-5	1.7	1.8	1.1	0.3	0.3
		117	CTH J & SB I-41	17SBT	190	191	SBT	86	133	64	97	380	85	129	70	96	380	-1	-5	7	-1	0	0.1	0.4	0.8	0.1	0.0
		117	CTH J & SB I-41	17SBR	190	12	SBR	80	108	92	128	410	80	108	92	128	408	0	0	0	-2	-2	0.0	0.0	0.0	0.2	0.1
		118	CTH J & NB I-41	18EBL	116	182	EBL	104	52	106	58	320	70	62	96	89	317	-34	10	-10	31	-3	1.1	1.4	1.0	1.1	0.2
		118	CTH J & NB I-41	18EBT	116	117	EBT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0	0.0	0.0	0.0	0

I-41 Traffic and Engineering Study
 Build (2048) With Long Term Improvements and Signal Retimings PM Peak Period Calibration
 Lane Utilization Comparison

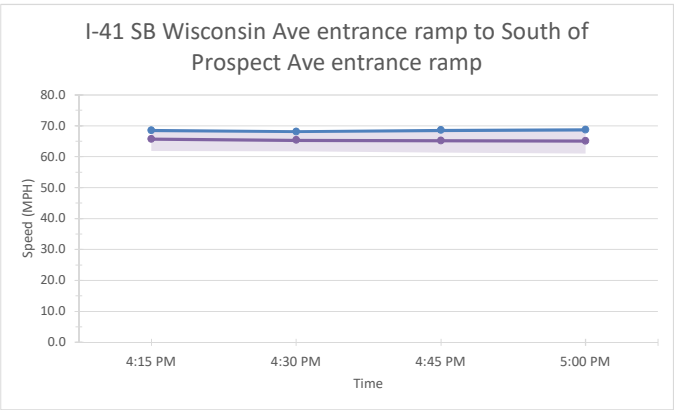
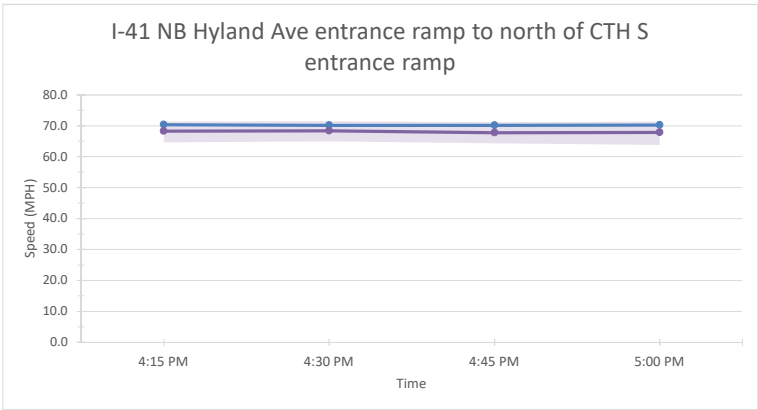
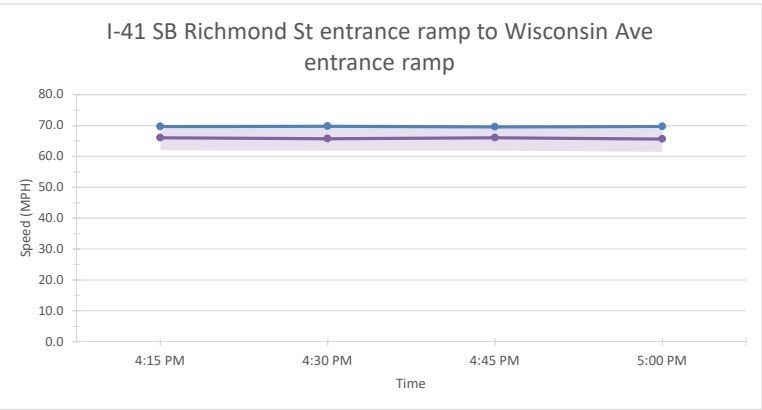
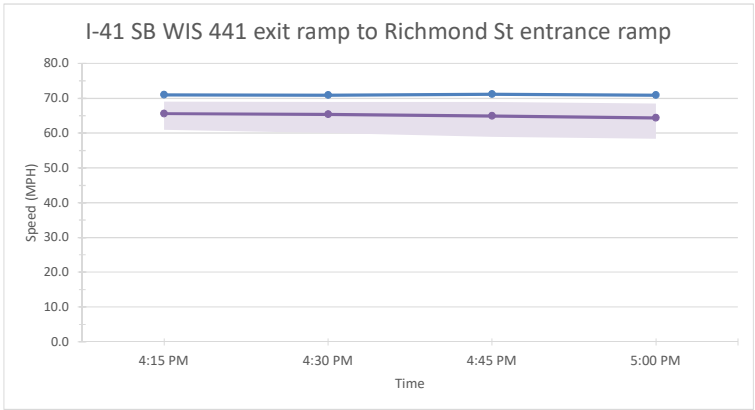
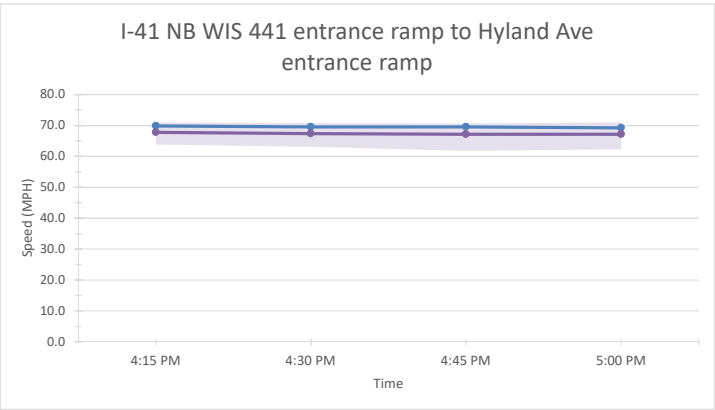
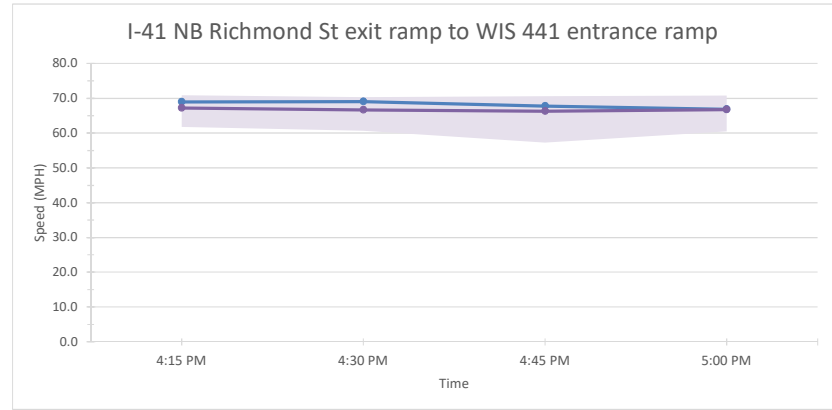
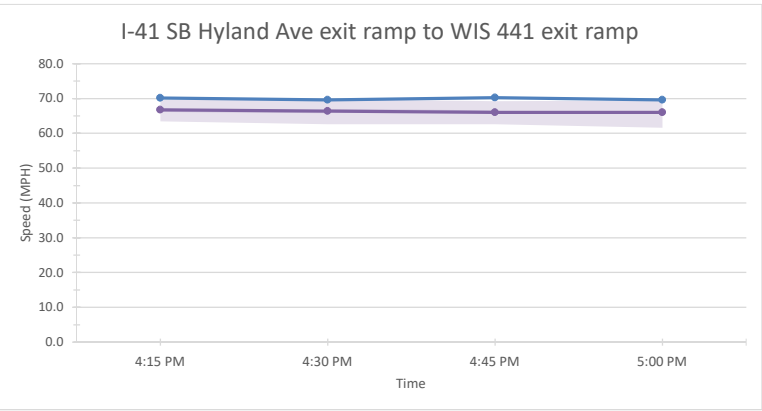
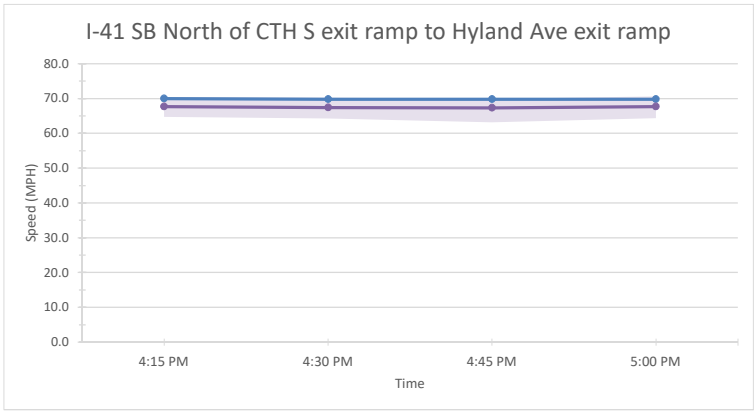
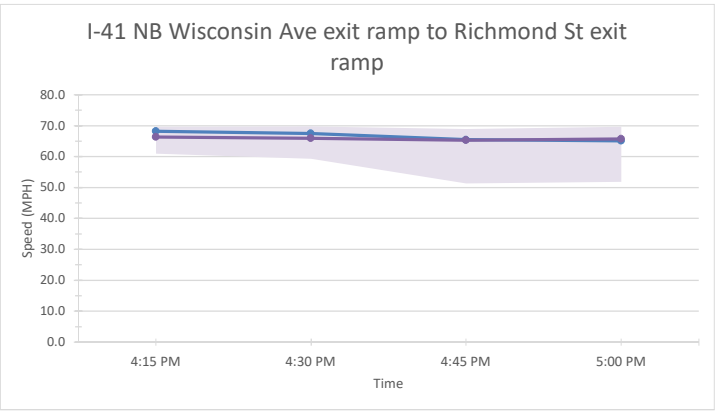
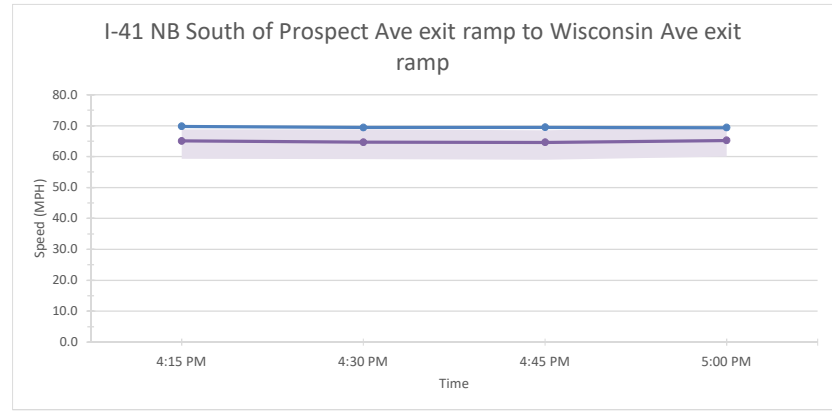
I-41 NB																		
Location		I-41 NB south of CTH BB			I-41 NB betw WIS 125 & WIS 96				I-41 NB betw CTH E & WIS 441				I-41 NB betw WIS 441 & CTH N			I-41 NB betw CTH U & CTH S		
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Center	Right	Left	Center	Right	Left	Center	Right
VISSIM	4:15 PM	30%	31%	39%	24%	28%	34%	13%	24%	25%	22%	29%	30%	31%	39%	31%	35%	34%
	4:30 PM	30%	31%	40%	24%	27%	35%	13%	24%	25%	22%	29%	29%	32%	39%	31%	35%	34%
	4:45 PM	30%	30%	39%	25%	28%	34%	13%	25%	26%	22%	28%	29%	31%	39%	32%	35%	33%
	5:00 PM	30%	30%	40%	23%	28%	34%	15%	27%	26%	21%	26%	29%	31%	39%	32%	35%	34%
	Avg	30%	31%	40%	24%	28%	34%	14%	25%	25%	22%	28%	29%	32%	39%	32%	35%	34%
I-41 SB																		
Location		I-41 SB south of CTH BB			I-41 SB betw WIS 125 & WIS 96				I-41 SB betw CTH E & WIS 441				I-41 SB betw WIS 441 & CTH N			I-41 SB betw CTH U & CTH S		
	Lane	Left	Center	Right	Left	Center	Center	Right	Left	Center	Right		Left	Center	Right	Left	Center	Right
VISSIM	4:15 PM	33%	34%	33%	22%	29%	39%	10%	36%	36%	27%		32%	35%	32%	30%	34%	36%
	4:30 PM	33%	34%	33%	22%	28%	39%	11%	36%	36%	28%		32%	35%	33%	31%	32%	37%
	4:45 PM	33%	34%	33%	22%	29%	39%	10%	36%	38%	27%		32%	35%	32%	30%	33%	37%
	5:00 PM	33%	34%	32%	21%	29%	39%	10%	35%	37%	28%		33%	35%	32%	30%	32%	37%
	Avg	33%	34%	33%	22%	29%	39%	10%	36%	37%	28%		32%	35%	33%	30%	33%	37%

I-41 Traffic and Engineering Study
Build (2048) With Long Term Improvements and Signal Retimings PM Peak Period Calibration
Mainline Speed Comparison

		I-41 NB							I-41 SB				
Segment		I-41 NB South of Prospect Ave exit ramp to Wisconsin Ave exit ramp	I-41 NB Wisconsin Ave exit ramp to Richmond St exit ramp	I-41 NB Richmond St exit ramp to WIS 441 entrance ramp	I-41 NB WIS 441 entrance ramp to Hyland Ave entrance ramp	I-41 NB Hyland Ave entrance ramp to north of CTH S entrance ramp	Segment		I-41 SB North of CTH S exit ramp to Hyland Ave exit ramp	I-41 SB Hyland Ave exit ramp to WIS 441 exit ramp	I-41 SB WIS 441 exit ramp to Richmond St entrance ramp	I-41 SB Richmond St entrance ramp to Wisconsin Ave entrance ramp	I-41 SB Wisconsin Ave entrance ramp to South of Prospect Ave entrance ramp
VISSIM	4:15 PM	69.8	68.2	68.9	69.8	70.4	VISSIM	4:15 PM	70.0	70.2	71.0	69.7	68.5
	4:30 PM	69.4	67.5	69.0	69.5	70.2		4:30 PM	69.8	69.6	70.9	69.7	68.1
	4:45 PM	69.5	65.5	67.8	69.5	70.2		4:45 PM	69.8	70.2	71.2	69.6	68.6
	5:00 PM	69.4	65.1	66.9	69.2	70.3		5:00 PM	69.8	69.6	70.9	69.6	68.7
Field (NPMRDS Average)	4:15 PM	65.0	66.3	67.2	67.8	68.3	Field (NPMRDS Average)	4:15 PM	67.7	66.8	65.6	66.0	65.7
	4:30 PM	64.6	66.0	66.7	67.3	68.4		4:30 PM	67.4	66.4	65.3	65.7	65.3
	4:45 PM	64.6	65.3	66.2	67.1	67.8		4:45 PM	67.3	66.0	64.9	66.0	65.2
	5:00 PM	65.2	65.7	66.7	67.2	67.9		5:00 PM	67.7	66.0	64.3	65.6	65.1
Field (NPMRDS 15th Percentile)	4:15 PM	59.3	60.9	61.8	63.8	64.7	Field (NPMRDS 15th Percentile)	4:15 PM	64.8	63.5	61.0	62.0	61.9
	4:30 PM	59.2	59.3	60.7	63.1	65.0		4:30 PM	64.3	62.6	60.1	61.9	61.8
	4:45 PM	59.0	51.3	57.3	61.7	64.4		4:45 PM	63.2	62.6	58.9	61.9	61.4
	5:00 PM	60.1	51.9	60.5	62.3	63.9		5:00 PM	64.4	61.6	58.4	61.5	61.1
Field (NPMRDS 85th Percentile)	4:15 PM	68.8	69.6	70.8	71.0	71.4	Field (NPMRDS 85th Percentile)	4:15 PM	70.4	69.6	69.1	69.0	68.9
	4:30 PM	68.8	69.8	70.3	70.8	71.6		4:30 PM	70.3	69.7	69.0	69.5	68.6
	4:45 PM	68.5	68.9	70.7	70.7	71.3		4:45 PM	69.9	69.3	68.9	69.5	68.7
	5:00 PM	69.7	69.7	70.8	70.9	71.4		5:00 PM	70.6	69.4	68.5	68.9	68.8

TEOps
Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	5%
Tier 2	NPMRDS	Spd ± 20% for 85% of pts	100%



I-41 Traffic and Engineering Study
Build (2048) With Long Term Improvements and Signal Retimings PM Peak Period Calibration
Travel Time Comparison

FULL CORRIDOR

Data	Time	I-41 NB
		Average Travel Time (min)
		South of CTH BB to North of CTH S
Distance (mi)		26.59
VISSIM	4:15PM	23.1
NPMRDS	4:15PM	23.8



Data	Time	I-41 SB
		Average Travel Time (min)
		North of CTH S to South of CTH BB
Distance (mi)		26.58
VISSIM	4:15PM	22.9
NPMRDS	4:15PM	24.0

SEGMENTS

I-41 NB				
Average Travel Time (minutes)				
South of CTH BB to Wisc Ave Exit	Wisc Ave Exit to Richmond Exit	Richmond Exit to 441 Entrance	441 Entrance to Hyland Entrance	Hyland Entrance to North of CTH S
3.12	4.0	3.49	5.26	10.71
2.7	3.6	3.1	4.5	9.2
2.9	3.7	3.1	4.7	9.4
I-41 SB				
Average Travel Time (minutes)				
North of CTH S to Hyland Exit	Hyland Exit to 441 Exit	441 Exit to Richmond Entrance	Richmond Entrance to Wisc Ave Entrance	Wisc Ave Entrance to South of CTH BB
10.68	5.52	3.25	4.0	3.09
9.2	4.8	2.7	3.5	2.7
9.5	5.0	3.0	3.7	2.8

TEOpS Validation

Test	Data	Target	Model
Tier 1	NPMRDS	RMSPE < 10%	5%
Tier 2	NPMRDS	TT ± 15% for 85% of routes	100%

I-41 Traffic and Engineering Study
 Build (2048) With Long Term Improvements and Signal Retimings PM Peak Hour Calibration
 Merge and Diverge Segment Speeds

Merge/Diverge Links			Vissim Speed				
Forecast ID	Link ID	Description	4:15-4:30PM2	4:30-4:45PM2	4:45-5:00PM2	5:00-5:15PM2	TOTAL2
Merge/Diverge Speeds							
	70	NB I-41 CTH BB diverge	70	70	69	70	70
	74	NB I-41 CTH BB merge	65	64	67	66	65
	76	NB I-41 WIS 125 diverge	69	69	69	69	69
	80	NB I-41 WIS 125merge	65	64	64	62	64
		NB I-41 WIS 96 diverge					
	84	NB I-41 WIS 96 merge	55	47	42	37	45
	494	NB I-41 WIS 15 diverge	51	47	50	52	50
	89	NB I-41 WIS 15 merge	66	66	64	65	65
	91	NB I-41 WIS 47 diverge	69	66	68	67	67
	95	NB I-41 WIS 47 merge	70	70	69	69	69
	496	NB I-41 Ballard diverge	60	63	62	61	62
	100	NB I-41 Ballard merge	61	58	49	43	52
		NB I-41 441 diverge					
	103	NB I-41 441 merge	68	69	67	66	68
	420	NB I-41 CTH N diverge	59	60	58	57	59
	108	NB I-41 CTH N merge	69	69	69	69	69
	422	NB I-41 WIS 55 diverge	69	70	70	70	69
	113	NB I-41 WIS 55 merge	69	69	69	69	69
	417	NB I-41 CTH J diverge	63	41	45	61	53
	118	NB I-41 CTH J merge	70	69	70	69	70
	122	NB I-41 CTH U diverge	67	67	63	67	66
	123	NB I-41 CTH U merge	69	69	69	69	69
	425	NB I-41 CTH S diverge	65	64	65	64	64
	128	NB I-41 CTH S merge	69	69	69	69	69
	426	SB I-41 CTH S diverge	69	68	68	69	69
	21	SB I-41 CTH S merge	69	69	68	69	69
	424	SB I-41 CTH U diverge	62	60	60	61	61
	20	SB I-41 CTH U merge	69	69	69	69	69
	416	SB I-41 CTH J diverge	61	60	60	60	60
	19	SB I-41 CTH J merge	69	69	69	69	69
	423	SB I-41 WIS 55 diverge	66	65	65	64	65
	18	SB I-41 WIS 55 merge	69	68	69	68	69
	421	SB I-41 CTH N diverge	64	61	62	59	61
	26	SB I-41 CTH N merge	69	68	69	68	69
	419	SB I-41 441 diverge	69	68	68	69	68
	484	SB I-41 441 merge	71	70	70	70	70
		SB I-41 WIS 47 diverge					
	46	SB I-41 WIS 47 merge	68	68	68	68	68
	48	SB I-41 WIS 15 diverge	67	66	67	66	67
	50	SB I-41 WIS 15 merge	65	66	67	66	66
	53	SB I-41 WIS 96 diverge	69	70	70	69	70
	56	SB I-41 WIS 96 merge	65	65	66	66	65
		SB I-41 WIS 125 diverge					
	61	SB I-41 WIS 125merge	66	66	67	67	66
	63	SB I-41 CTH BB diverge	68	67	68	67	67
	67	SB I-41 CTH BB merge	67	67	68	68	67

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