

Appendix G. Flow Calibration PM

Table G.1: Cordon 1 Birkenhead Inner Results – PM

			Observed Flow (PCUs)				Modelled Flow (PCUs)				DMRB (1) GEH Validation (Total PCUs)		
Direction	Cordon Pt	Road Name	Car	LGV	OGV	Total	Car	LGV	OGV	Total	Diff	% Diff	GEH
Inbound	1	Queensway Mersey Tunnel	1,454	85	0	1,539	1,321	152	0	1,473	-66	-4%	1.71
	2	A554 Tower Road	482	48	16	547	481	52	12	545	-3	0%	0.11
	3	A5027 Duke Street	352	46	19	418	448	49	19	516	98	23%	4.52
	4	A5030 Beaufort Road	161	31	6	198	187	17	2	206	8	4%	0.57
	5	A553 Laird Street	325	30	2	357	309	22	2	333	-24	-7%	1.32
	6	A5027 Park Road North	302	23	0	325	339	24	3	366	41	12%	2.18
	7	Ashville Road	244	21	17	282	256	21	11	287	5	2%	0.31
	8	Park Road South	228	22	2	252	231	22	2	255	3	1%	0.18
	9	Oxton Road	240	17	4	261	230	15	3	248	-13	-5%	0.84
	10	A552 Borough Road	471	48	10	529	469	31	6	507	-22	-4%	0.97
	11	Derby Road	238	21	21	280	232	21	3	256	-24	-9%	1.49
	12	B5148 Church Road	237	19	2	258	278	42	2	323	64	25%	3.77
	13	B5149 Old Chester Road	389	37	7	433	392	37	2	431	-1	0%	0.07
	14	A41 New Chester Road	1,068	88	26	1,183	1,085	88	31	1,204	21	2%	0.62
INBOUND TOTAL			6,193	538	133	6,864	6,258	593	98	6,949	85	1%	1.02
Direction	Cordon Pt	Road Name	Car	LGV	OGV	Total	Car	LGV	OGV	Total	Diff	% Diff	GEH
Outbound	1	Queensway Mersey Tunnel	1,236	118	0	1,354	1,320	143	0	1,463	109	8%	2.90
	2	A554 Tower Road	961	85	7	1,053	915	80	16	1,011	-42	-4%	1.31
	3	A5027 Duke Street	650	43	28	721	693	34	28	756	34	5%	1.27
	4	A5030 Beaufort Road	318	23	4	345	323	22	4	349	5	1%	0.25
	5	A553 Laird Street	456	33	2	491	461	38	3	502	11	2%	0.50
	6	A5027 Park Road North	543	28	2	573	552	29	2	583	11	2%	0.44
	7	Ashville Road	357	31	19	407	401	32	6	439	33	8%	1.59
	8	Park Road South	477	34	0	511	457	34	0	491	-20	-4%	0.88
	9	Oxton Road	368	25	2	395	349	22	2	373	-22	-6%	1.12
	10	A552 Borough Road	833	57	8	898	755	58	8	821	-76	-9%	2.61
	11	Derby Road	378	33	21	432	396	28	3	427	-5	-1%	0.26
	12	B5148 Church Road	504	41	4	549	552	34	6	592	43	8%	1.79
	13	B5149 Old Chester Road	641	56	0	697	607	55	7	668	-29	-4%	1.10
	14	A41 New Chester Road	1,260	91	13	1,364	1,251	162	1	1,414	49	4%	1.32
OUTBOUND TOTAL			8,983	696	111	9,790	9,032	771	86	9,890	100	1%	1.01
2-WAY TOTAL			15,176	1,234	243	16,653	15,290	1,364	184	16,838	185	1%	1.43

Table G.2: Cordon 2 Birkenhead Outer Results - PM

Direction	Cordon Pt	Road Name	Observed Flow (PCUs)				Modelled Flow (PCUs)				DMRB (1) GEH Validation (Total PCUs)		
			Car	LGV	OGV	Total	Car	LGV	OGV	Total	Diff	% Diff	GEH
Inbound	1	Kingsway Mersey Tunnel	2,161	157	142	2,459	2,339	185	146	2,670	211	9%	4.17
	2	A554 Seabank Road	318	22	0	341	321	22	3	347	6	2%	0.33
	3	B5143 Rake Lane	202	16	6	224	191	16	6	213	-12	-5%	0.79
	4	Seaview Road	351	31	23	405	350	31	1	382	-23	-6%	1.17
	5	Belvidere Road	227	20	19	266	242	20	8	270	4	1%	0.22
	6	A551 Wallasey Road	560	51	4	615	563	52	4	619	3	1%	0.14
	7	A59 (East of M53 J1)	805	63	24	892	800	82	108	991	98	11%	3.21
	8	A5139 Dock Road	707	93	99	899	743	123	93	960	61	7%	2.00
	9	A553 Hoylake Road	590	46	18	654	539	41	5	584	-70	-11%	2.82
	10	A5027 Upton Road	738	51	0	789	766	51	3	820	30	4%	1.07
	11	A552 Woodchurch Road	1,225	109	21	1,355	1,234	109	30	1,373	18	1%	0.48
	12	B5151 Storeton Road	618	44	6	668	615	51	6	672	4	1%	0.17
	13	Borough Road	343	32	2	376	346	32	2	380	4	1%	0.19
	14	B5148 Church Road	293	36	2	331	302	43	2	347	16	5%	0.87
	15	B5149 Old Chester Road	389	37	7	433	392	37	2	431	-1	0%	0.07
	16	A41 New Chester Road	1,068	88	26	1,183	1,085	88	31	1,204	21	2%	0.62
INBOUND TOTAL			10,596	895	400	11,891	10,829	985	449	12,262	371	3%	3.37

			Observed Flow (PCUs)				Modelled Flow (PCUs)				DMRB (1) GEH Validation (Total PCUs)		
Direction	Cordon Pt	Road Name	Car	LGV	OGV	Total	Car	LGV	OGV	Total	Diff	% Diff	GEH
Outbound	1	Kingsway Mersey Tunnel	1,544	153	210	1,908	1,539	135	167	1,842	-66	-3%	1.53
	2	A554 Seabank Road	578	52	3	633	588	52	3	643	10	2%	0.40
	3	B5143 Rake Lane	307	24	9	341	307	23	1	331	-10	-3%	0.54
	4	Seaview Road	512	45	37	593	388	35	2	425	-168	-28%	7.47
	5	Belvidere Road	310	27	19	356	309	27	4	340	-17	-5%	0.89
	6	A551 Wallasey Road	548	35	6	589	551	36	6	593	4	1%	0.18
	7	A59 (East of M53 J1)	2,127	167	64	2,359	1,727	169	104	2,000	-359	-15%	7.70
	8	A5139 Dock Road	1,064	95	80	1,239	1,038	115	79	1,232	-7	-1%	0.20
	9	A553 Hoylake Road	715	56	22	793	734	59	22	815	22	3%	0.78
	10	A5027 Upton Road	425	33	2	461	410	45	2	456	-5	-1%	0.22
	11	A552 Woodchurch Road	1,321	103	15	1,440	1,250	99	14	1,364	-75	-5%	2.01
	12	B5151 Storeton Road	610	57	5	673	593	53	3	648	-24	-4%	0.94
	13	Borough Road	487	39	0	526	466	42	0	507	-19	-4%	0.84
	14	B5148 Church Road	622	37	6	665	589	30	6	624	-41	-6%	1.60
	15	B5149 Old Chester Road	641	56	0	697	607	55	7	668	-29	-4%	1.10
	16	A41 New Chester Road	1,260	91	13	1,364	1,251	162	1	1,414	49	4%	1.32
			Car	LGV	OGV	Total	Car	LGV	OGV	Total	Diff	% Diff	GEH
OUTBOUND TOTAL			13,074	1,070	492	14,636	12,346	1,134	421	13,901	-734	-5%	6.15
2-WAY TOTAL			23,670	1,965	892	26,527	23,174	2,119	870	26,163	-364	-1%	2.24

Table G.3: Cordon 3 Wirral West of M53 Results – PM

Direction	Cordon Pt	Road Name	Observed Flow (PCUs)				Modelled Flow (PCUs)				DMRB (1) GEH Validation (Total PCUs)		
			Car	LGV	OGV	Total	Car	LGV	OGV	Total	Diff	% Diff	GEH
Inbound	1	A554 Bayswater Road	495	39	15	549	476	38	15	528	-21	-4%	0.91
	2	A551 Leasowe Road	740	58	22	821	708	61	21	790	-31	-4%	1.08
	3	A554	1,400	110	42	1,552	1,389	114	65	1,568	15	1%	0.39
	4	A553 Hoylake Road	773	54	4	831	764	57	5	827	-4	0%	0.14
	5	A551 Upton Road	985	83	18	1,086	975	81	18	1,074	-12	-1%	0.38
	6	A5027 Upton By-Pass	1,298	65	6	1,369	1,142	62	5	1,210	-159	-12%	4.43
	7	A551 Upton Road	552	53	10	615	657	56	10	724	109	18%	4.20
	8	A5027 Upton Road	793	62	24	879	747	58	9	814	-65	-7%	2.23
	9	A552 Woodchurch Road	1,185	68	19	1,272	1,041	73	20	1,135	-136	-11%	3.93
	10	Station Road	334	16	6	355	398	25	0	423	68	19%	3.47
	11	A5137 Brimstage Road	606	33	11	650	603	32	11	646	-4	-1%	0.15
	12	B5151 Clatterbridge Road	700	57	6	762	732	50	10	792	30	4%	1.07
	13	B5136 Thornton Commom Road	269	40	4	313	268	32	4	303	-10	-3%	0.56
	14	Raby Mere Road	102	8	1	111	102	8	1	111	0	0%	0.01
	15	Hooton Road	308	24	9	342	303	26	2	330	-11	-3%	0.62
	16	Birkenhead Road	254	20	8	282	256	21	8	285	3	1%	0.19
	17	Chester High Road	886	70	27	982	904	71	55	1,030	48	5%	1.50
INBOUND TOTAL			11,681	860	231	12,771	11,466	867	258	12,591	-181	-1%	1.61

Direction	Cordon Pt	Road Name	Observed Flow (PCUs)				Modelled Flow (PCUs)				DMRB (1) GEH Validation (Total PCUs)		
			Car	LGV	OGV	Total	Car	LGV	OGV	Total	Diff	% Diff	GEH
Outbound	1	A554 Bayswater Road	975	77	30	1,082	979	77	30	1,086	4	0%	0.14
	2	A551 Leasowe Road	736	58	22	816	728	59	20	807	-9	-1%	0.31
	3	A554	860	68	26	953	780	66	30	876	-77	-8%	2.55
	4	A553 Hoylake Road	470	42	3	514	450	43	6	498	-16	-3%	0.70
	5	A551 Upton Road	687	62	14	763	706	64	14	783	21	3%	0.74
	6	A5027 Upton By-Pass	592	45	13	650	608	59	13	680	30	5%	1.17
	7	A551 Upton Road	384	26	11	420	381	20	10	412	-8	-2%	0.40
	8	A5027 Upton Road	642	50	19	711	649	69	19	737	26	4%	0.96
	9	A552 Woodchurch Road	919	63	33	1,015	850	19	33	902	-112	-11%	3.62
	10	Station Road	208	22	6	236	278	29	0	306	71	30%	4.28
	11	A5137 Brimstage Road	273	29	5	307	270	29	5	304	-3	-1%	0.16
	12	B5151 Clatterbridge Road	517	42	4	563	360	42	4	406	-157	-28%	7.12
	13	B5136 Thornton Commom Road	448	67	5	520	454	42	5	501	-20	-4%	0.87
	14	Raby Mere Road	85	7	1	93	85	7	1	93	0	0%	0.01
	15	Hooton Road	355	28	11	393	350	28	8	385	-8	-2%	0.42
	16	Birkenhead Road	219	17	7	243	216	10	4	229	-13	-5%	0.86
	17	Chester High Road	490	38	15	544	473	37	17	527	-17	-3%	0.73
			Car	LGV	OGV	Total	Car	LGV	OGV	Total	Diff	% Diff	GEH
OUTBOUND TOTAL			8,859	740	224	9,823	8,617	699	219	9,535	-288	-3%	2.93
2-WAY TOTAL			20,539	1,600	454	22,594	20,082	1,566	477	22,125	-469	-2%	3.13

Table G.4: Cordon 4 Wirral South East Results – AM

Direction	Cordon Pt	Road Name	Observed Flow (PCUs)				Modelled Flow (PCUs)				DMRB (1) GEH Validation (Total PCUs)		
			Car	LGV	OGV	Total	Car	LGV	OGV	Total	Diff	% Diff	GEH
Inbound	1	A41 New Chester Road	1,260	91	13	1,364	1,251	162	1	1,414	49	4%	1.32
	2	B5149 Old Chester Road	641	56	0	697	607	55	7	668	-29	-4%	1.10
	3	B5148 Church Road	622	37	6	665	589	30	6	624	-41	-6%	1.60
	4	Borough Road	487	39	0	526	466	42	0	507	-19	-4%	0.84
	5	B5151 Storeton Road	610	57	5	673	593	53	3	648	-24	-4%	0.94
	6	Station Road	208	22	6	236	278	29	0	306	71	30%	4.28
	7	B5151 Mount Road	832	67	7	906	842	77	7	926	20	2%	0.65
	8	B5137 Brimstage Road	813	57	13	884	819	39	13	870	-13	-2%	0.46
	9	B5136 Thornton Commom Road	448	67	5	520	454	42	5	501	-20	-4%	0.87
	10	Raby Hall Road	85	7	1	93	85	7	1	93	0	0%	0.01
	11	Eastham Rake	125	10	1	137	147	12	1	160	23	17%	1.92
	12	A41 New Chester Road	1,281	119	70	1,470	1,267	125	74	1,466	-4	0%	0.10
	13	B5132 Rivacre Road	67	5	1	73	50	16	0	65	-7	-10%	0.86
INBOUND TOTAL			7,480	636	128	8,244	7,446	686	118	8,250	6	0%	0.07

			Observed Flow (PCUs)				Modelled Flow (PCUs)				DMRB (1) GEH Validation (Total PCUs)		
Direction	Cordon Pt	Road Name	Car	LGV	OGV	Total	Car	LGV	OGV	Total	Diff	% Diff	GEH
Outbound	1	A41 New Chester Road	1,068	88	26	1,183	1,085	88	31	1,204	21	2%	0.62
	2	B5149 Old Chester Road	389	37	7	433	392	37	2	431	-1	0%	0.07
	3	B5148 Church Road	293	36	2	331	302	43	2	347	16	5%	0.87
	4	Borough Road	343	32	2	376	346	32	2	380	4	1%	0.19
	5	B5151 Storeton Road	618	44	6	668	615	51	6	672	4	1%	0.17
	6	Station Road	334	16	6	355	398	25	0	423	68	19%	3.47
	7	B5151 Mount Road	596	48	5	649	544	44	5	593	-57	-9%	2.27
	8	B5137 Brimstage Road	996	55	26	1,078	988	68	18	1,074	-3	0%	0.11
	9	B5136 Thornton Commom Road	269	40	4	313	268	32	4	303	-10	-3%	0.56
	10	Raby Hall Road	102	8	1	111	102	8	1	111	0	0%	0.01
	11	Eastham Rake	114	9	1	124	103	9	1	113	-12	-9%	1.06
	11	A41 New Chester Road	1,346	95	113	1,554	1,342	87	67	1,496	-58	-4%	1.49
12	B5132 Rivacre Road	101	8	1	110	89	3	0	92	-17	-16%	1.73	
			Car	LGV	OGV	Total	Car	LGV	OGV	Total	Diff	% Diff	GEH
OUTBOUND TOTAL			6,570	516	200	7,286	6,575	528	138	7,241	-45	-1%	0.52
2-WAY TOTAL			14,049	1,152	328	15,529	14,021	1,214	256	15,491	-39	0%	0.31

Appendix H. Traffic Count Validation

Table H.1: Validation Summary – AM

ID	Road Name	Observed Flow (PCUs)				Modelled Flow (PCUs)				GEH Validation			TAG
		Car	LGV	OGV	Total	Car	LGV	OGV	Total	Diff	% Diff	GEH	Valid
1	B5146 Corporation Road	347	52	14	412	350	34	18	402	-10	-2%	0.51	✓
1	B5146 Corporation Road	102	16	6	124	138	40	7	185	61	49%	4.92	✓
2	A552 Borough Road	685	103	19	807	815	84	3	902	94	12%	3.22	✓
2	A552 Borough Road	421	63	18	501	624	55	6	685	184	37%	7.55	x
3	A553 Fender Lane	756	100	18	874	634	84	15	733	-141	-16%	4.99	x
3	A553 Fender Lane	504	82	17	603	387	62	24	474	-130	-21%	5.58	x
4	A553 Hoylake Road	814	122	35	970	814	89	29	931	-39	-4%	1.27	✓
4	A553 Hoylake Road	500	75	21	596	520	59	34	613	17	3%	0.69	✓
5	A5027 Bridge	516	71	118	705	527	114	59	701	-5	-1%	0.18	✓
5	A5027 Bridge	488	67	134	689	370	87	78	535	-153	-22%	6.20	x
6	A5027 Oxton Road	306	42	7	355	366	62	17	445	90	25%	4.50	✓
6	A5027 Oxton Road	644	89	20	754	478	66	17	561	-192	-26%	7.50	x
7	Rendall Street	413	57	42	512	363	60	17	440	-72	-14%	3.29	✓
7	Rendall Street	309	43	55	407	199	34	8	240	-167	-41%	9.26	x
8	Oakdale Road	141	17	34	192	108	27	3	137	-55	-29%	4.28	✓
8	Oakdale Road	157	19	45	221	236	16	2	254	32	15%	2.10	✓
9	Kevlin Road	222	22	6	250	140	26	27	192	-58	-23%	3.91	✓
9	Kevlin Road	333	34	9	375	288	63	20	371	-4	-1%	0.21	✓
10	A554 Birkenhead Road	463	54	36	553	360	53	45	457	-96	-17%	4.27	✓
10	A554 Birkenhead Road	503	59	39	602	576	71	20	667	65	11%	2.58	✓

Table H.2: Validation Summary – IP

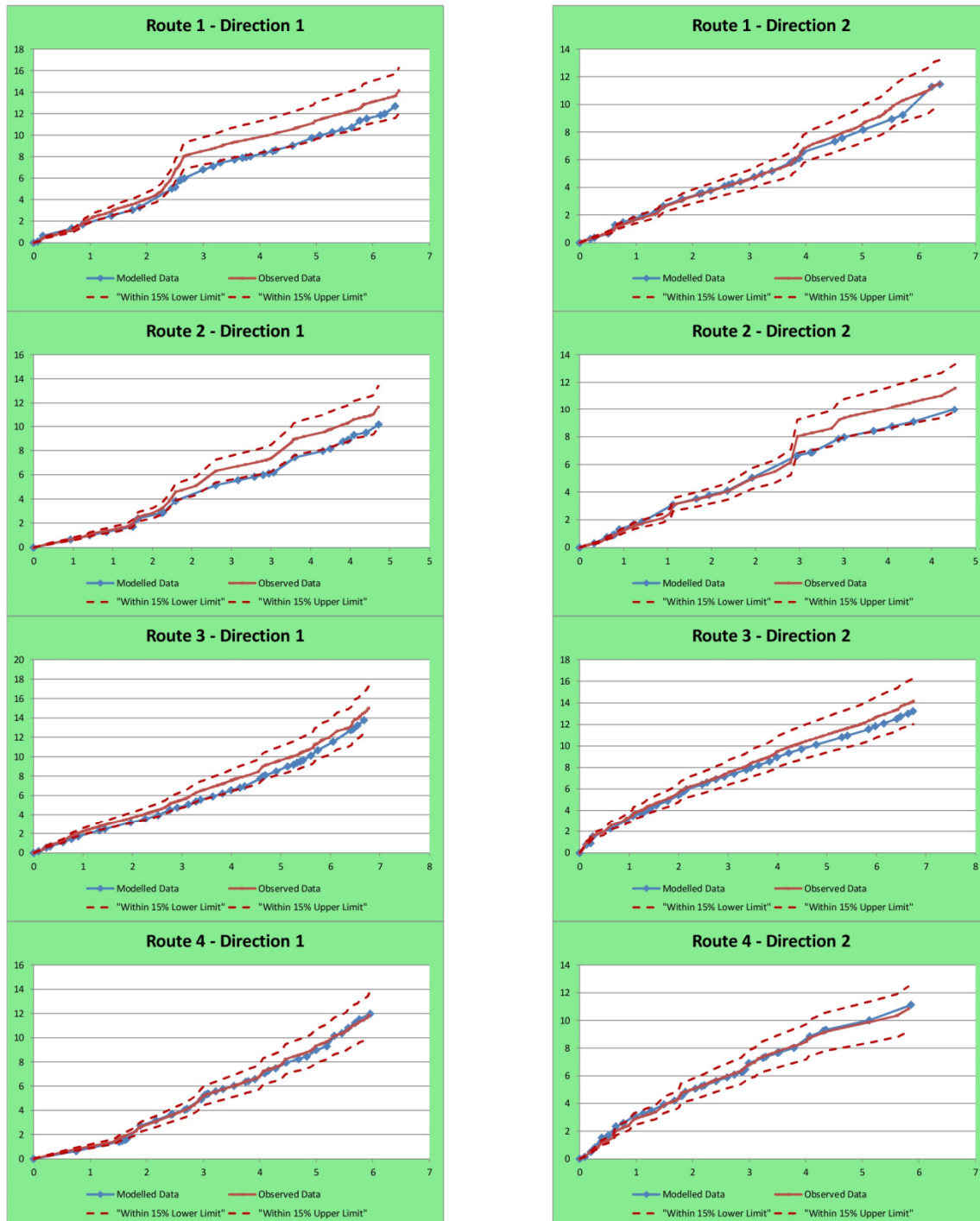
ID	Road Name	Observed Flow (PCUs)				Modelled Flow (PCUs)				GEH Validation			TAG
		Car	LGV	OGV	Total	Car	LGV	OGV	Total	Diff	% Diff	GEH	Valid
1	B5146 Corporation Road	125	19	12	156	160	32	11	203	47	31%	3.55	✓
1	B5146 Corporation Road	109	17	7	134	87	20	4	112	-22	-16%	1.96	✓
2	A552 Borough Road	485	73	17	574	478	55	23	556	-18	-3%	0.76	✓
2	A552 Borough Road	479	71	16	567	429	74	13	517	-50	-9%	2.13	✓
3	A553 Fender Lane	492	62	24	578	419	53	31	503	-75	-13%	3.25	✓
3	A553 Fender Lane	555	68	27	649	472	58	27	556	-93	-14%	3.79	✓
4	A553 Hoylake Road	575	86	24	685	536	77	41	654	-32	-5%	1.22	✓
4	A553 Hoylake Road	500	75	18	593	479	68	42	588	-5	-1%	0.19	✓
5	A5027 Bridge	327	59	90	476	295	77	84	456	-20	-4%	0.93	✓
5	A5027 Bridge	366	65	97	528	274	75	72	421	-107	-20%	4.91	x
6	A5027 Oxton Road	291	53	16	360	202	40	18	259	-100	-28%	5.69	x
6	A5027 Oxton Road	283	50	16	349	199	39	18	256	-94	-27%	5.38	✓
7	Rendall Street	307	55	56	417	350	38	54	442	25	6%	1.20	✓
7	Rendall Street	284	50	53	387	239	30	6	275	-112	-29%	6.15	x
8	Oakdale Road	112	17	29	158	61	15	11	88	-70	-44%	6.30	✓
8	Oakdale Road	92	14	27	133	68	10	0	79	-53	-40%	5.19	✓
9	Kevlin Road	216	24	6	246	165	30	30	225	-21	-8%	1.35	✓
9	Kevlin Road	212	23	6	241	115	31	40	185	-56	-23%	3.82	✓
10	A554 Birkenhead Road	386	58	47	491	383	67	44	494	4	1%	0.16	✓
10	A554 Birkenhead Road	344	52	41	437	363	64	33	460	23	5%	1.08	✓

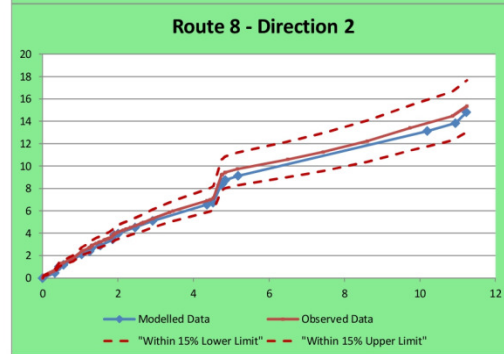
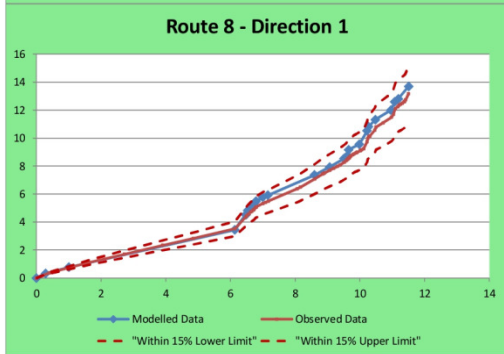
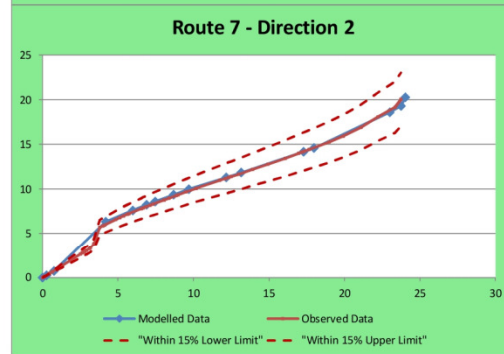
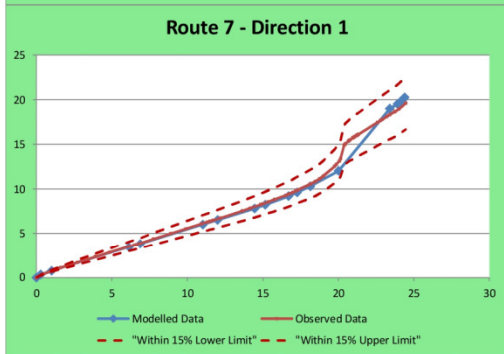
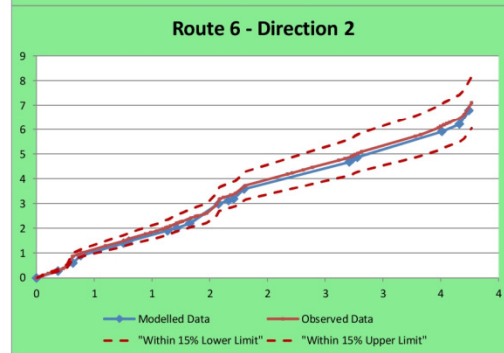
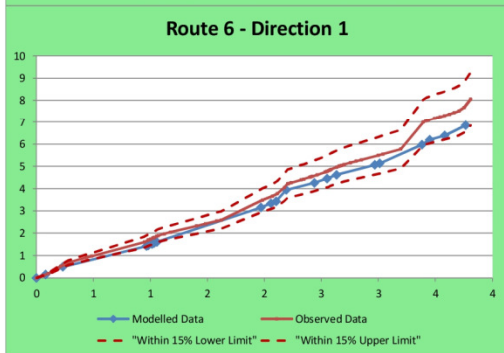
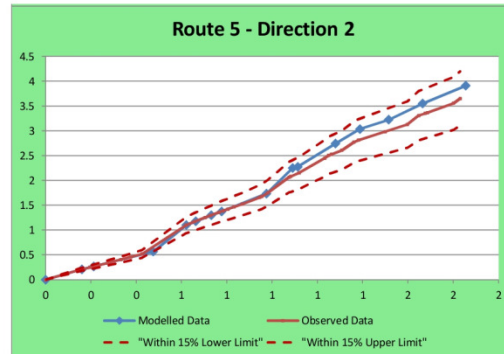
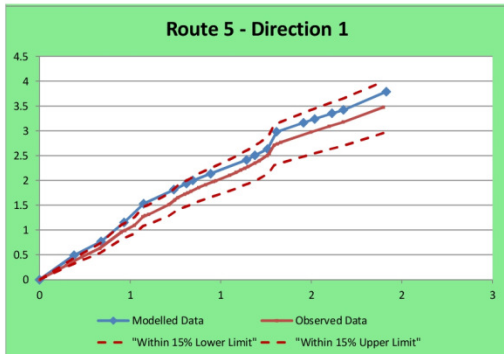
Table H.3: Validation Summary – PM

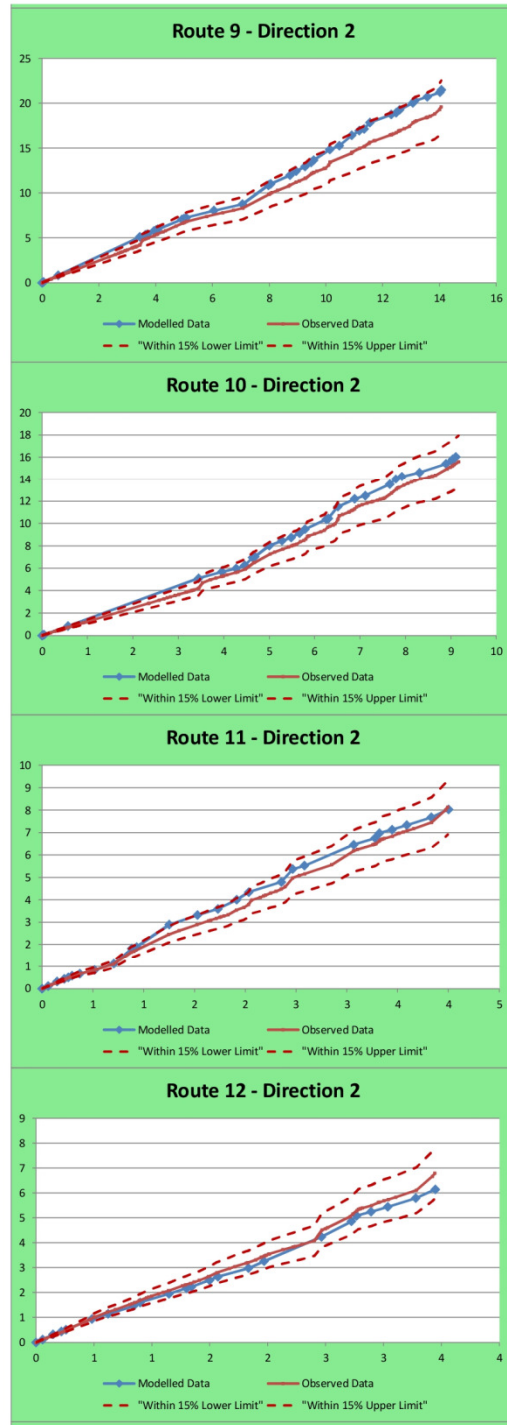
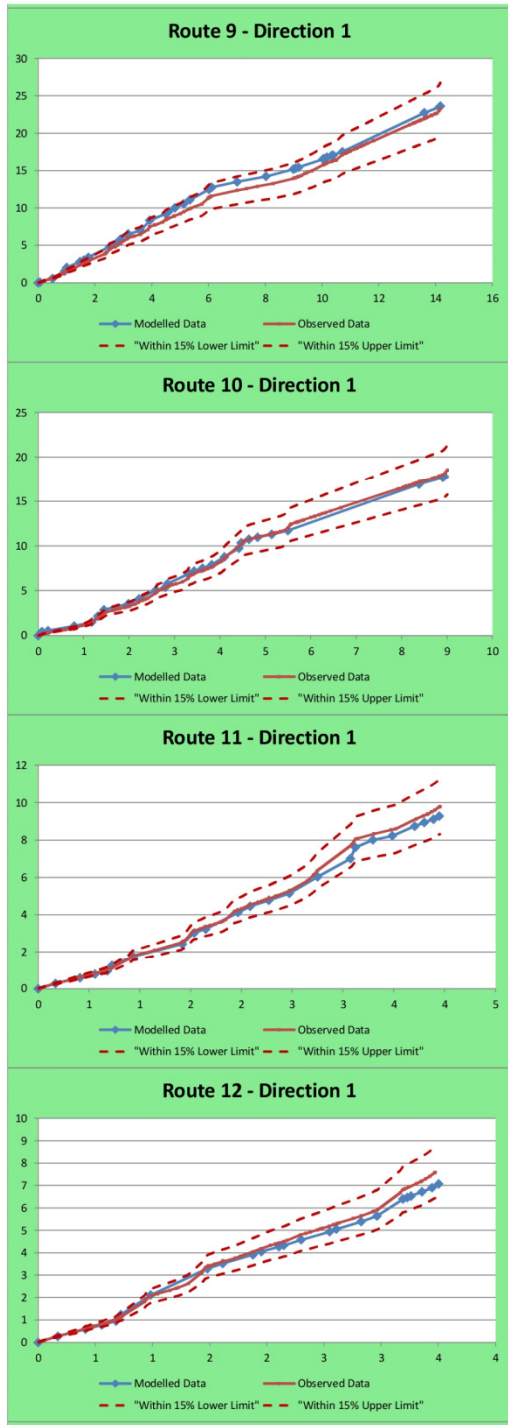
ID	Road Name	Observed Flow (PCUs)				Modelled Flow (PCUs)				GEH Validation			TAG
		Car	LGV	OGV	Total	Car	LGV	OGV	Total	Diff	% Diff	GEH	Valid
1	B5146 Corporation Road	137	20	3	160	193	11	4	208	48	30%	3.57	✓
1	B5146 Corporation Road	237	36	5	278	316	23	2	341	63	23%	3.59	✓
2	A552 Borough Road	444	66	8	518	392	24	6	422	-96	-19%	4.45	✓
2	A552 Borough Road	867	130	14	1,011	609	53	6	668	-344	-34%	11.86	x
3	A553 Fender Lane	541	48	3	593	450	43	6	498	-94	-16%	4.03	✓
3	A553 Fender Lane	963	68	5	1,035	764	57	5	826	-209	-20%	6.84	x
4	A553 Hoylake Road	692	104	16	812	555	41	5	601	-210	-26%	7.92	x
4	A553 Hoylake Road	775	116	16	906	769	60	23	852	-55	-6%	1.84	✓
5	A5027 Bridge	408	41	28	477	481	50	19	550	74	15%	3.25	✓
5	A5027 Bridge	731	73	45	850	658	38	28	724	-125	-15%	4.46	✓
6	A5027 Oxton Road	661	66	8	734	662	57	8	727	-7	-1%	0.26	✓
6	A5027 Oxton Road	390	39	10	439	341	27	8	376	-63	-14%	3.12	✓
7	Rendall Street	369	37	28	434	346	26	13	386	-48	-11%	2.37	✓
7	Rendall Street	344	34	30	409	323	27	0	350	-59	-14%	3.04	✓
8	Oakdale Road	205	18	25	248	189	19	16	224	-24	-10%	1.56	✓
8	Oakdale Road	118	10	13	141	69	8	0	77	-64	-45%	6.12	✓
9	Kevlin Road	314	25	2	342	383	35	1	419	77	23%	3.96	✓
9	Kevlin Road	238	19	2	259	144	24	5	172	-87	-34%	5.94	✓
10	A554 Birkenhead Road	632	50	19	701	477	45	4	525	-176	-25%	7.11	x
10	A554 Birkenhead Road	502	39	15	557	406	35	7	448	-108	-19%	4.84	x

Appendix I. Journey Time Validation

Figure I.1: Journey Time Validation Plots – AM Results







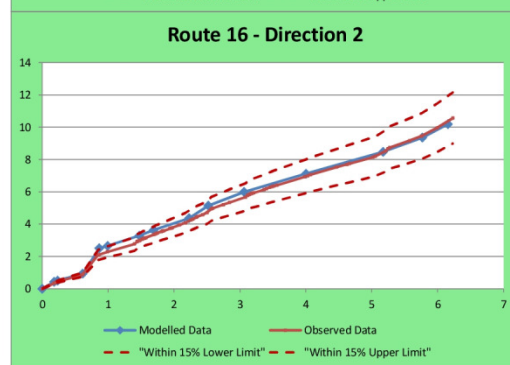
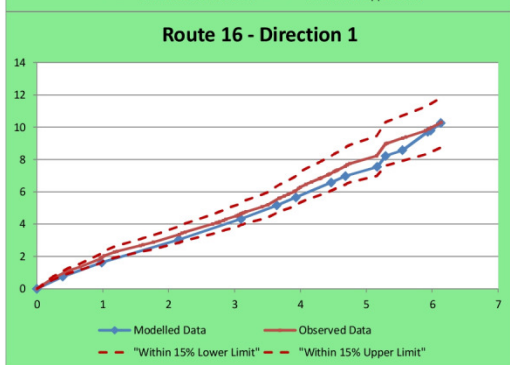
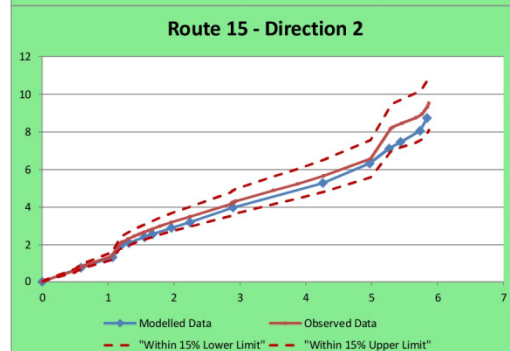
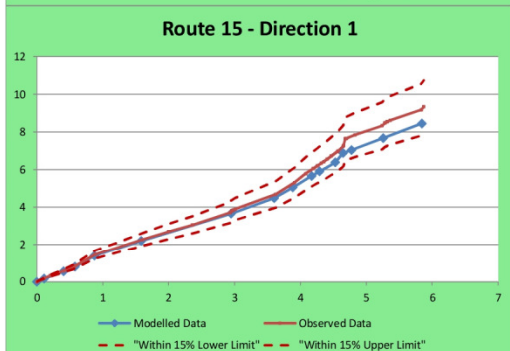
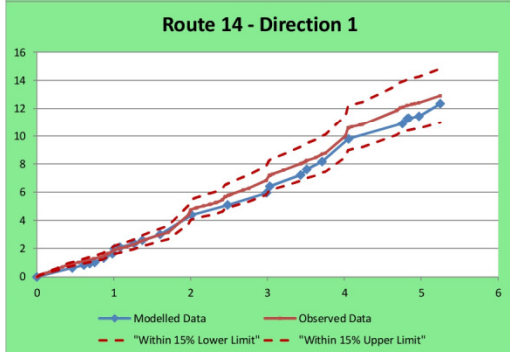
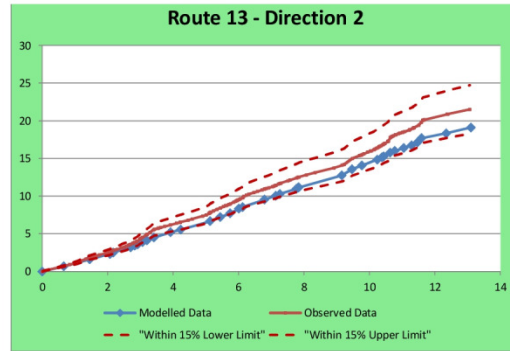
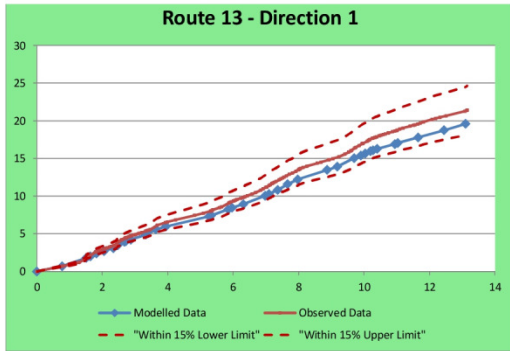
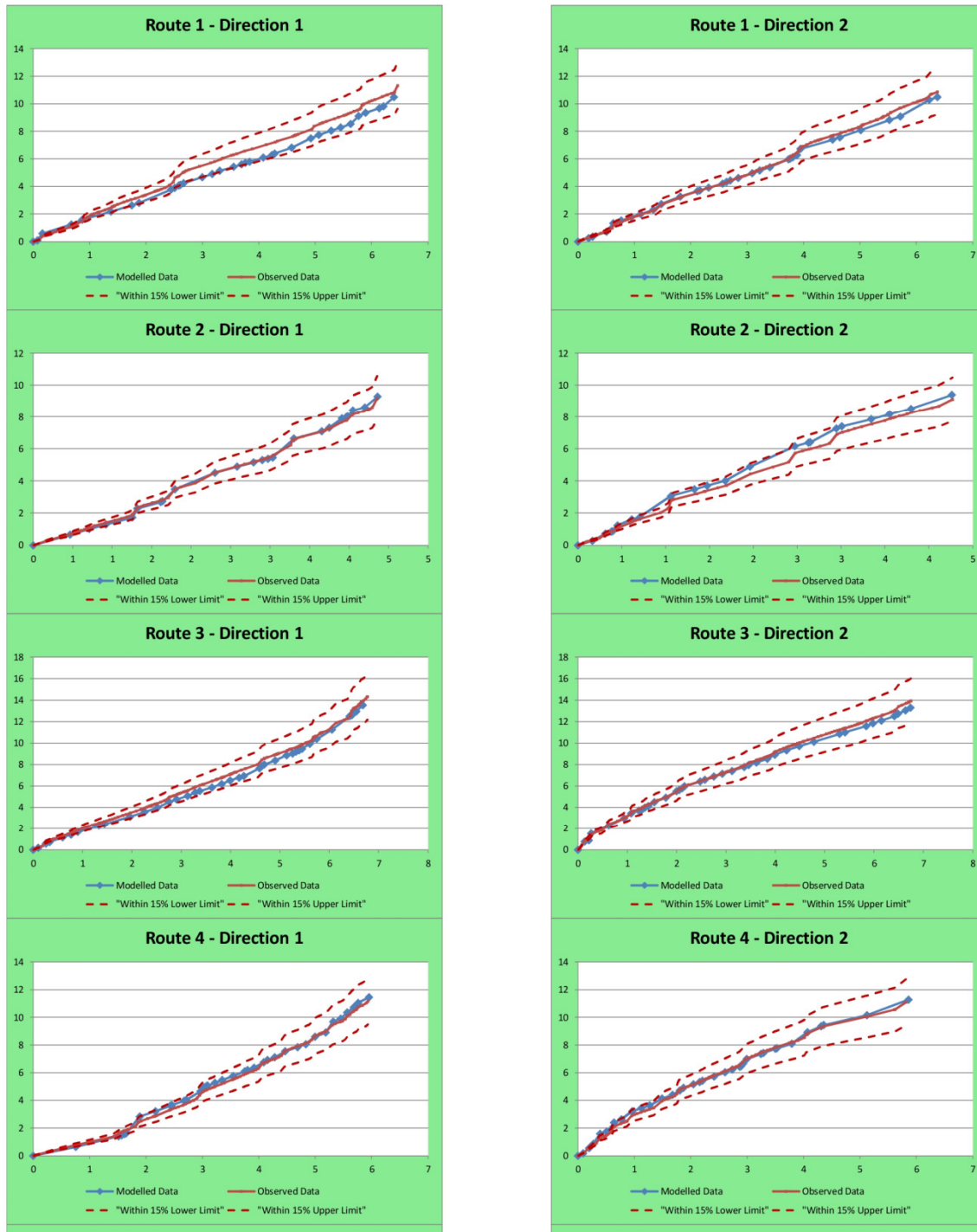
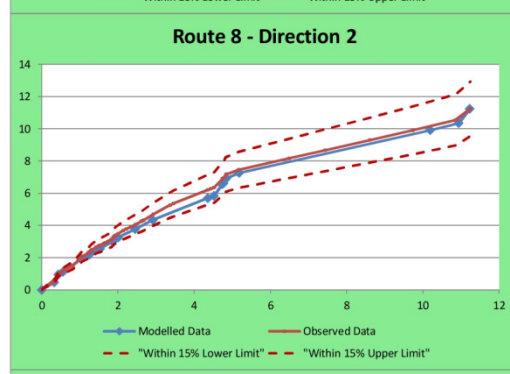
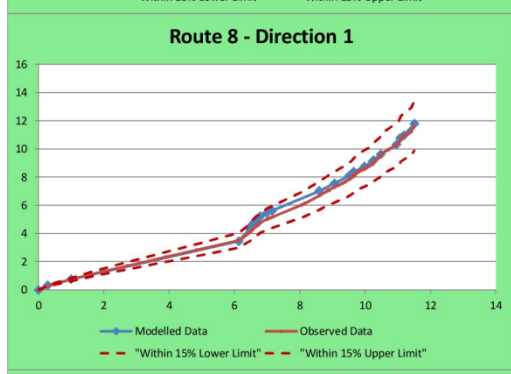
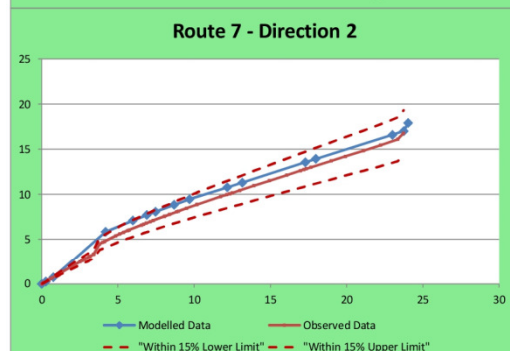
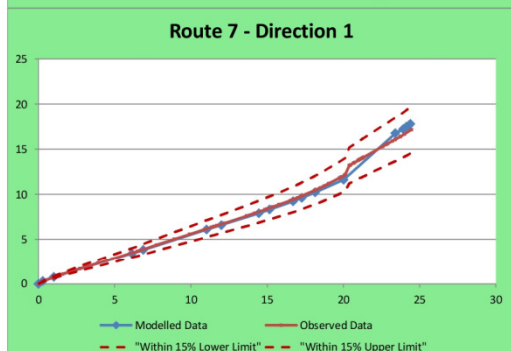
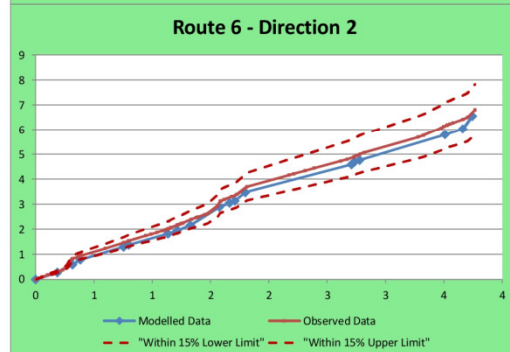
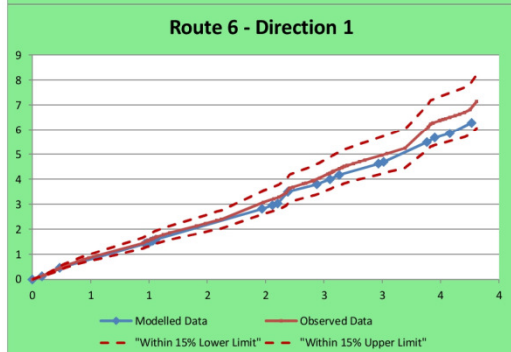
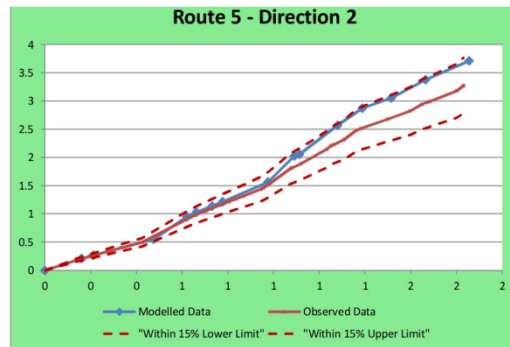
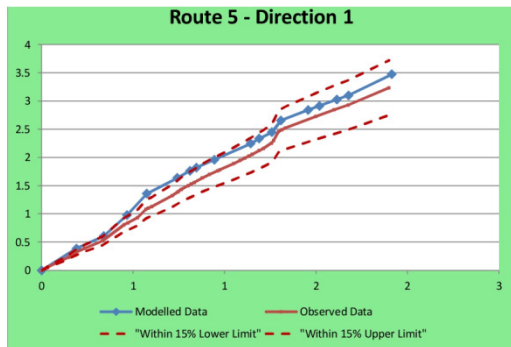
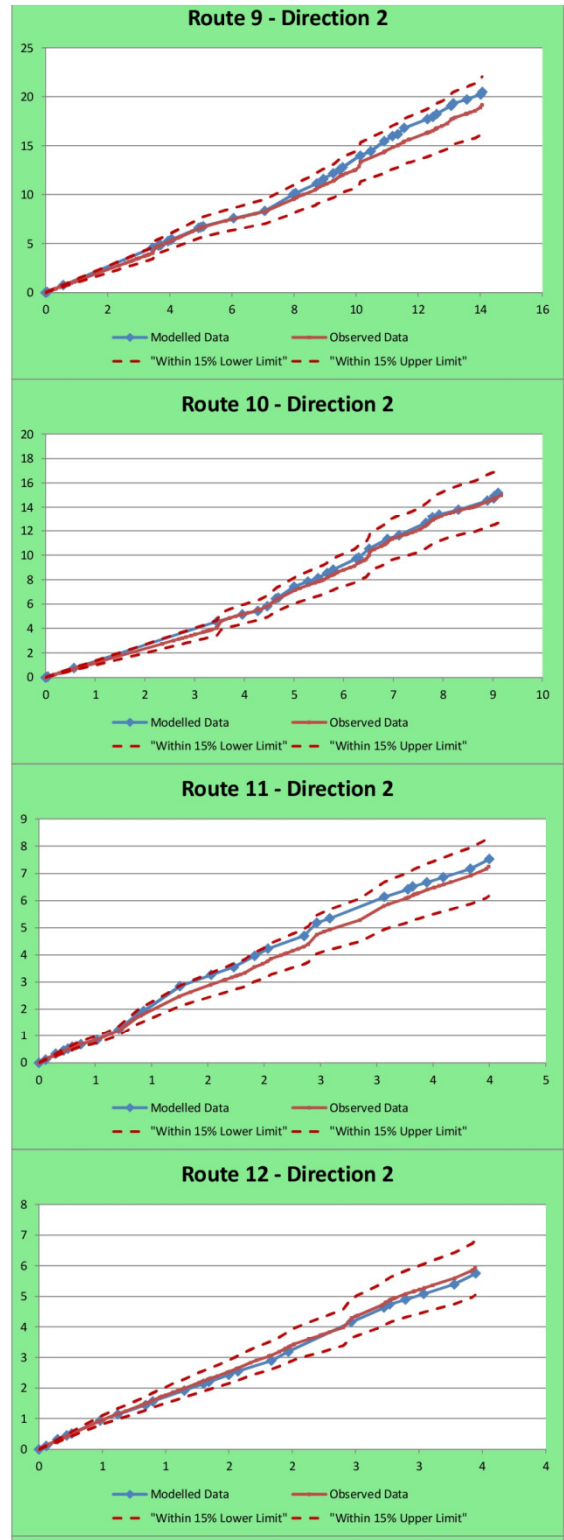
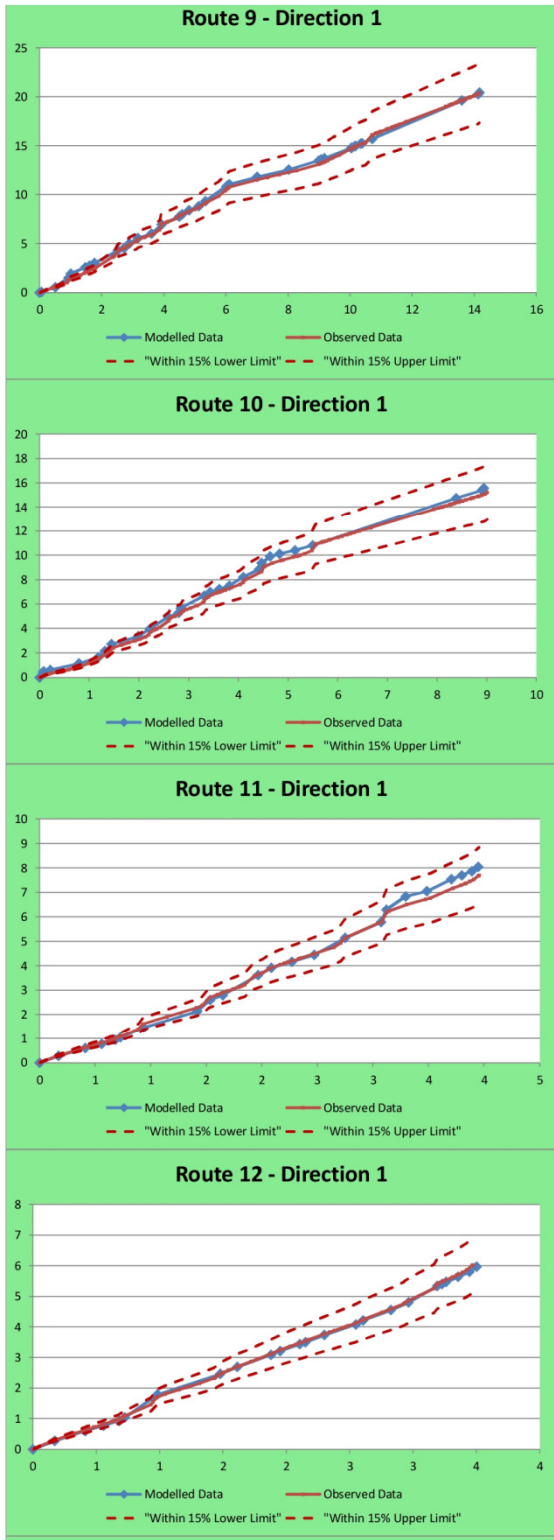


Figure I.2: Journey Time Validation Plots – IP Results







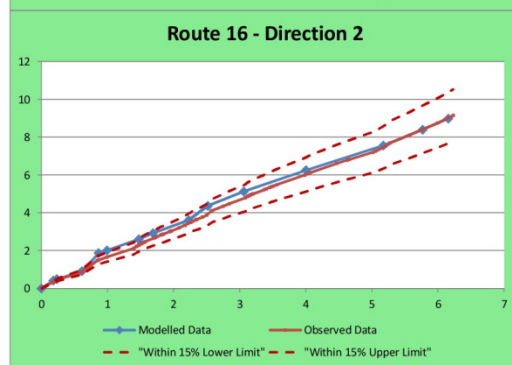
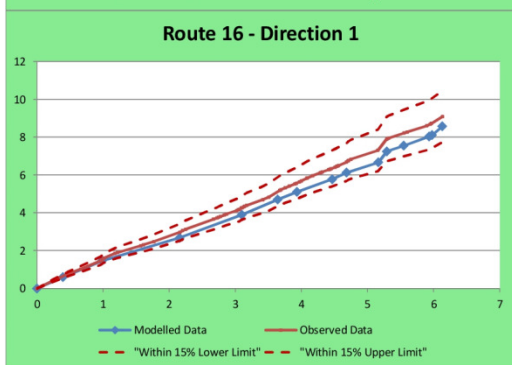
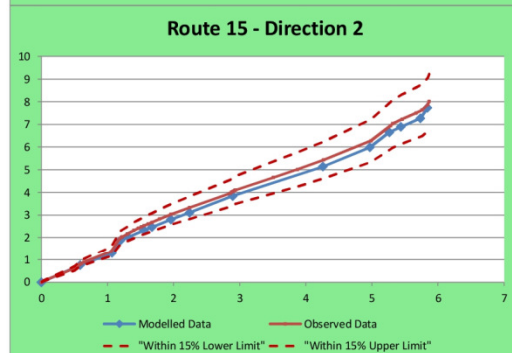
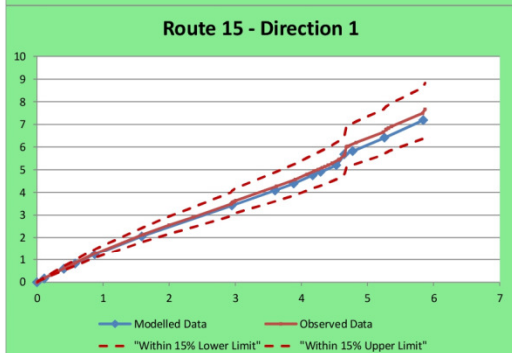
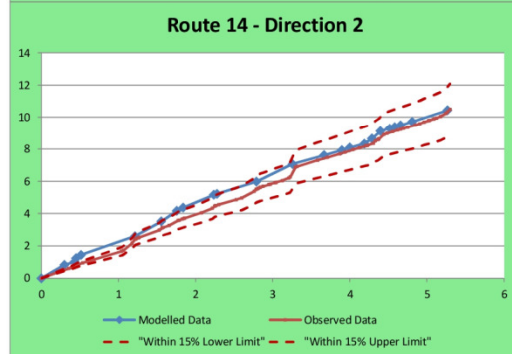
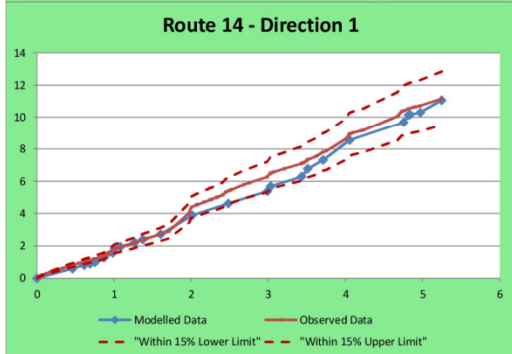
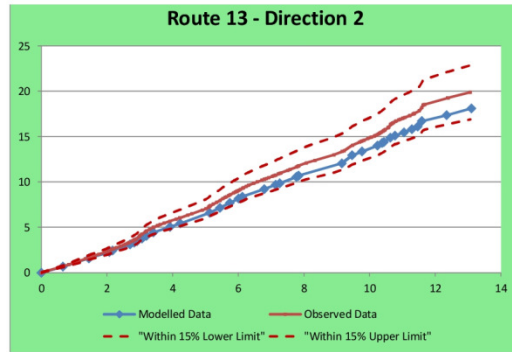
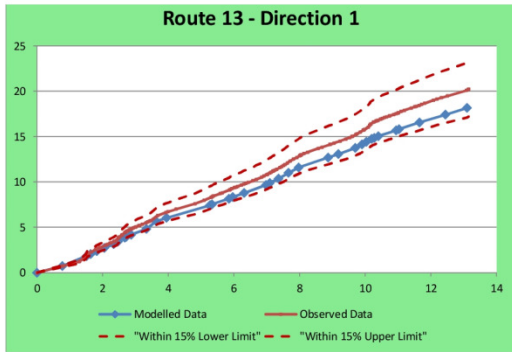
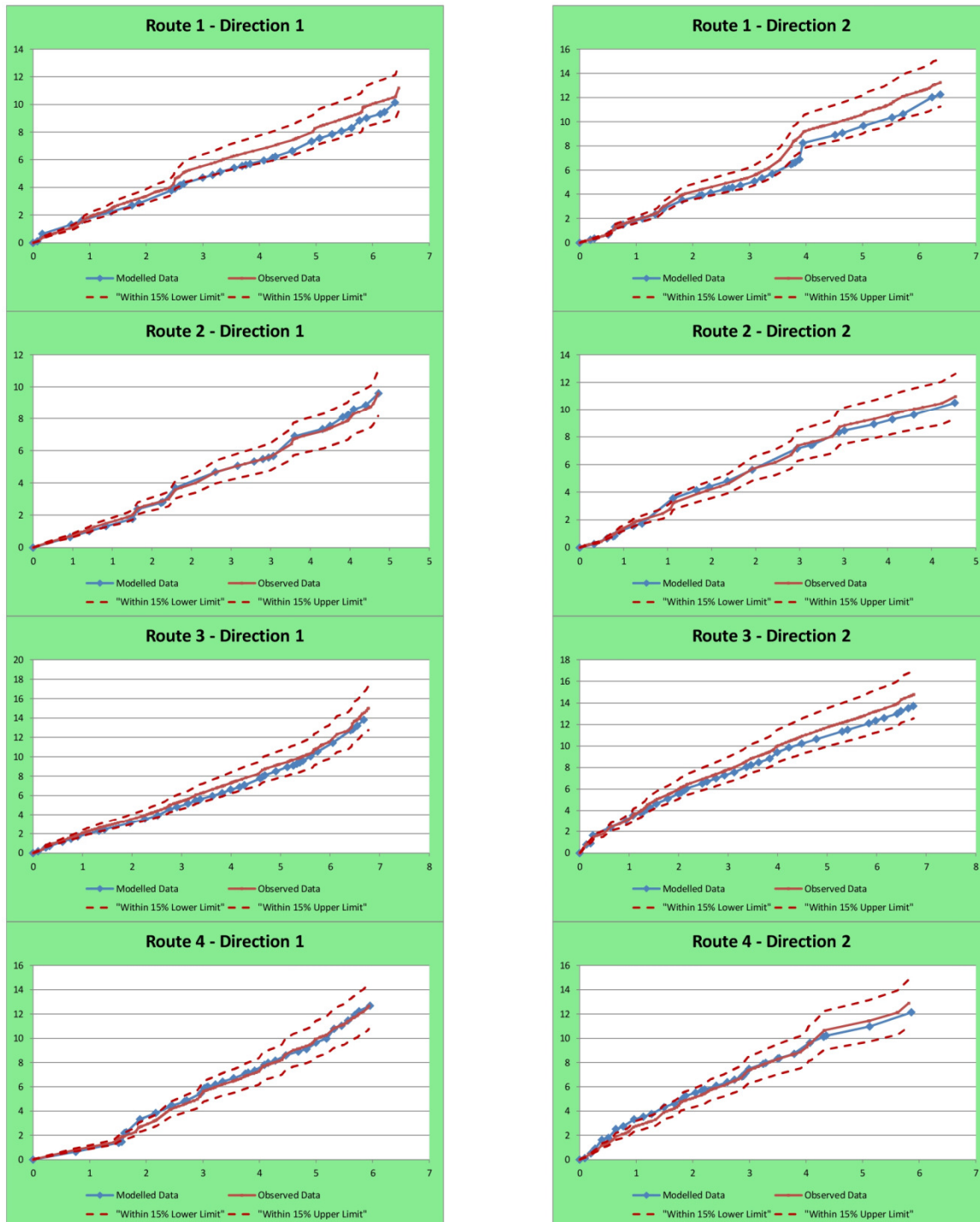
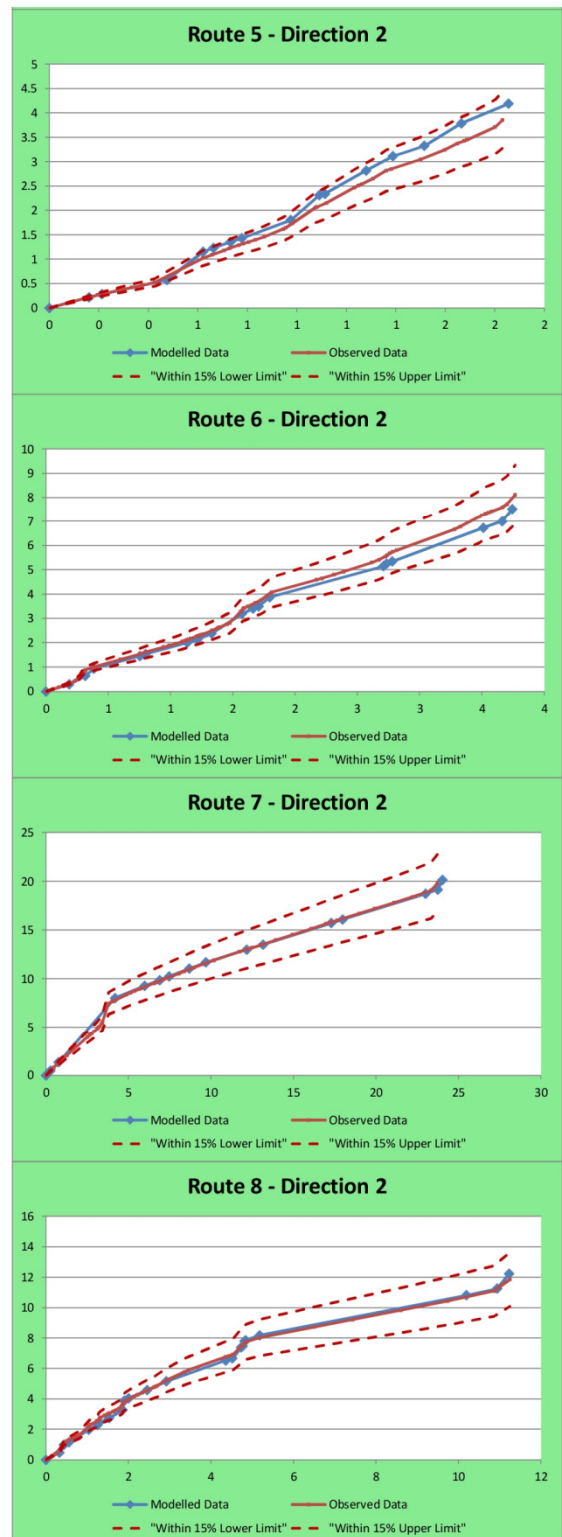
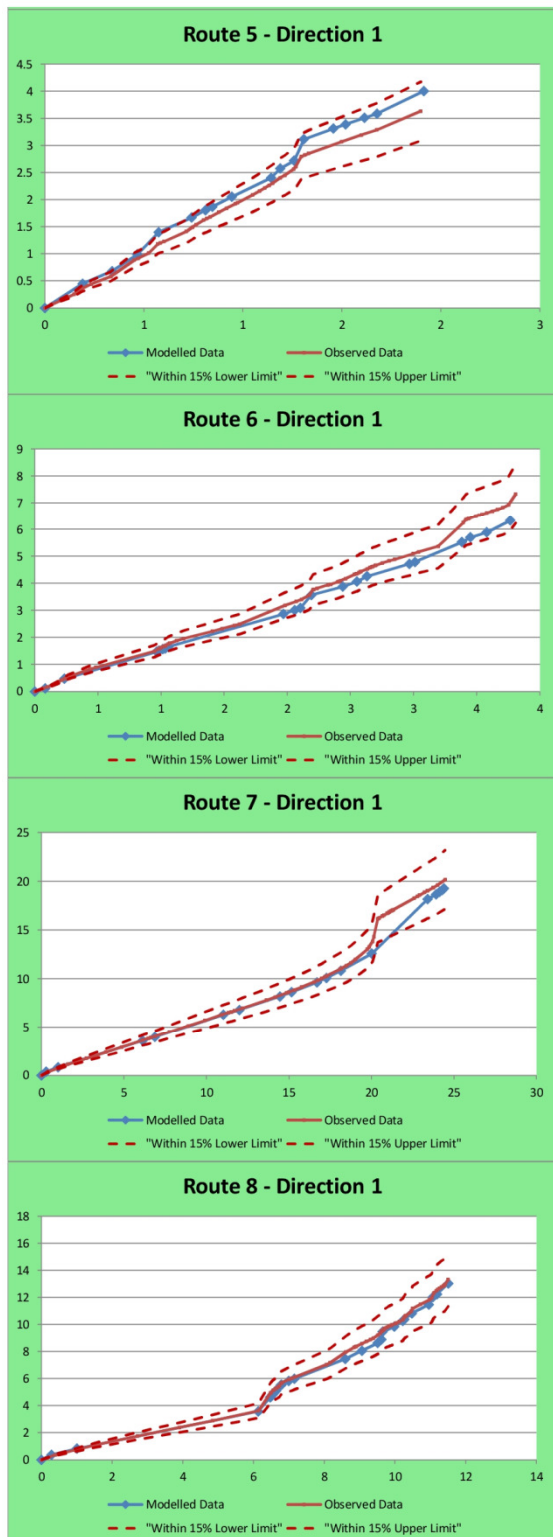
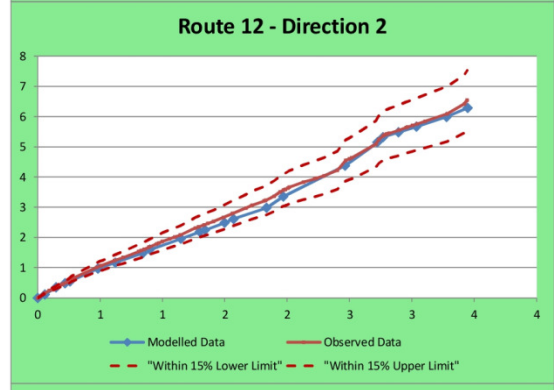
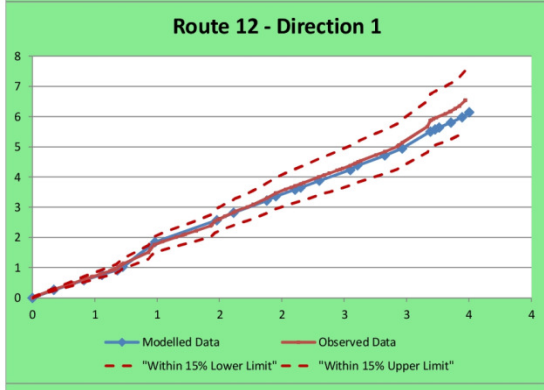
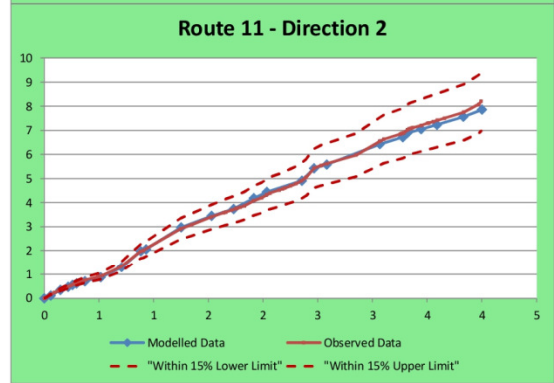
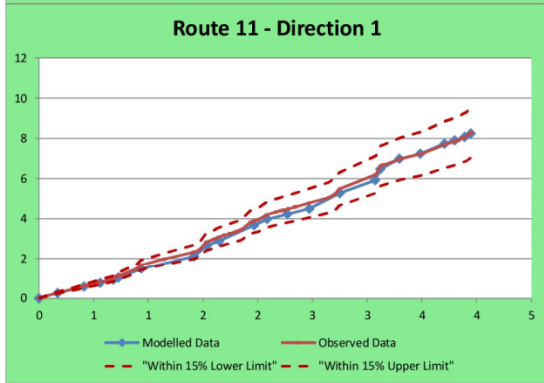
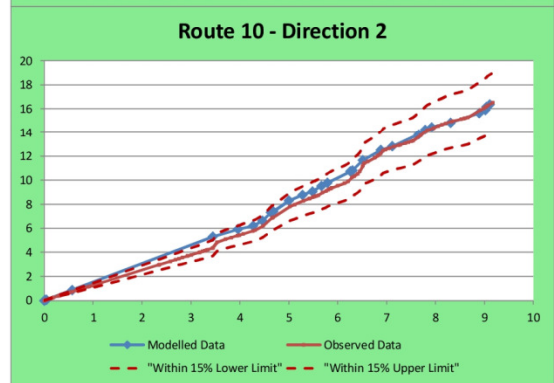
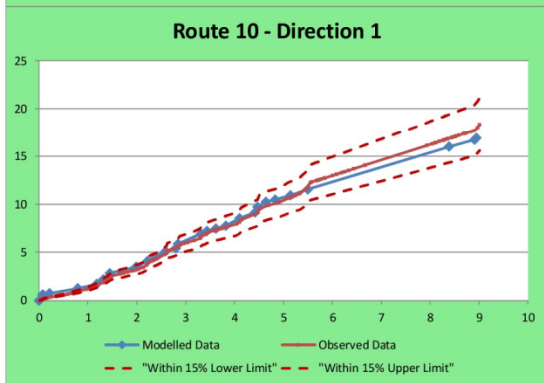
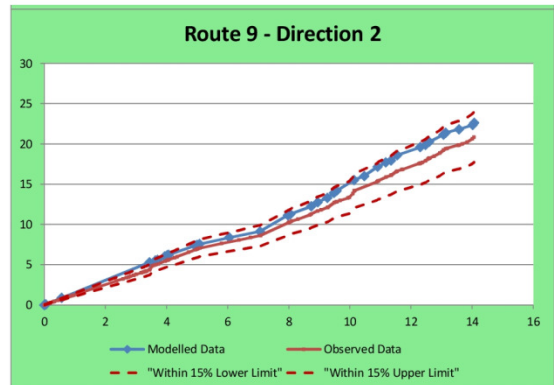
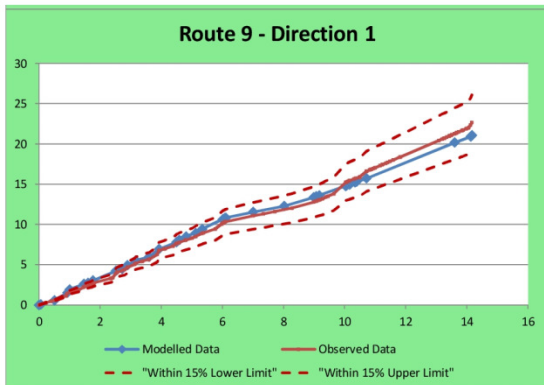
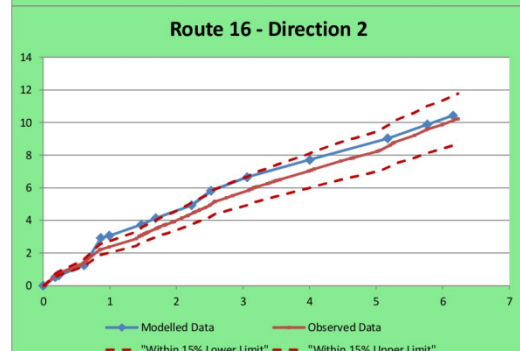
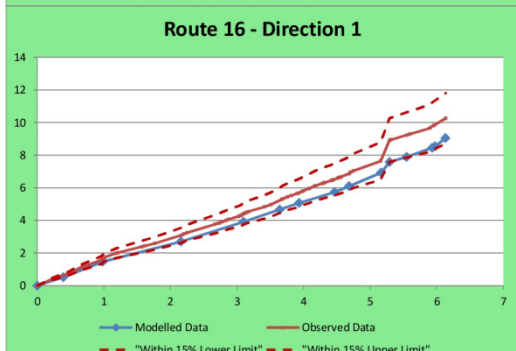
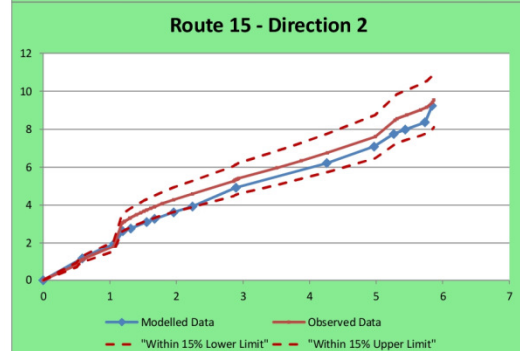
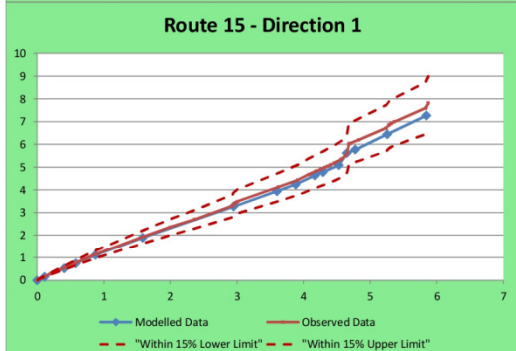
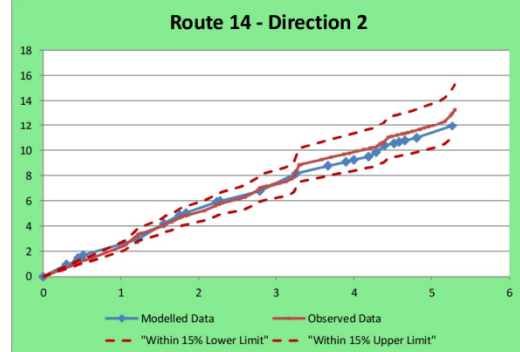
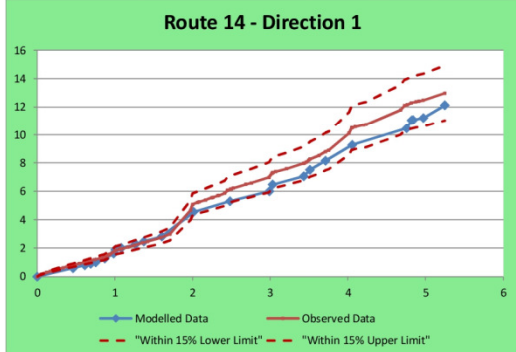
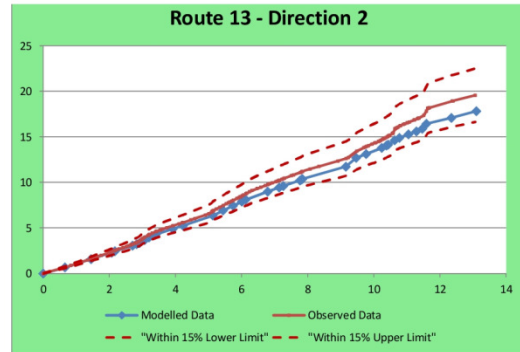
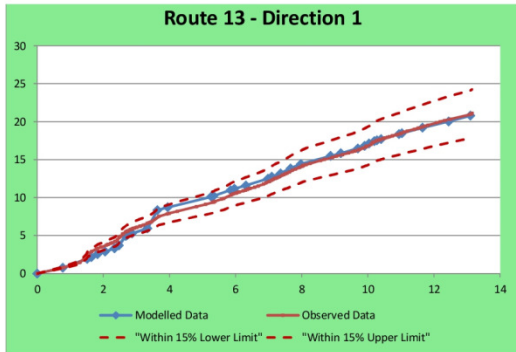


Figure I.3: Journey Time Validation Plots – PM Results









Appendix J. Impact of Matrix Estimation

J.1 Overview

Matrix estimation has been carried out to calibrate the prior matrix against observed sector cordon traffic flows.

The impact of matrix estimation has been compared for the following elements:

- Matrix totals
- Matrix zonal cell values
- Matrix zonal trip end values;
- Sector to sector matrices; and
- Trip length distribution.

Guidance criteria presented in TAG has been applied to assess the significance of matrix estimation changes. Table J.1 shows the recommended acceptance criteria.

Table J.1: Significance of Matrix Estimation Changes

Measure	Significance Criteria
Matrix zonal cell values	Slope within 0.98 and 1.02 Intercept near zero R ² in excess of 0.95
Matrix zonal trip ends	Slope within 0.99 and 1.01 Intercept near zero R ² in excess of 0.98
Trip length distributions	Means within 5% Standard deviations within 5%
Sector to sector level matrices	Differences within 5%

Source: Table 5, TAG UNIT M3.1 Highway Assignment Modelling, October 2013

J.2 Impact of Matrix Estimation – Matrix Totals

A comparison between matrix totals prior and post matrix estimation are shown in Table J.2, and changes by sub-user class for each time period are shown in Table J.3 to Table J.5.

Overall it can be seen that the matrix estimation has had a small impact on the overall size of the matrices both by time period and by individual user class. The change in the OGV matrix is higher than for the other userclasses, this is to be expected given the sparser matrices for this userclass. The AM, IP and PM matrices have changed by an absolute value of 2.8%, 2.1%, and 1.7%, respectively during matrix estimation.

Table J.2: Matrix Total Comparison

	Prior ME Matrix	Post ME Matrix	Difference	Percentage Difference (%)
AM Peak	709,934	730,127	20,194	2.8%
Inter Peak	525,588	536,472	10,885	2.1%
PM Peak	708,669	720,710	12,041	1.7%

Table J.3: Comparison between Post and Prior ME matrices – AM Peak Hour

Time Period	User Class	User Class	Prior ME	Post ME	Diff	% Diff	Slope	Intercept	R2
AM	1	Car Commute	277,521	273,245	-4,277	-1.5%	1.01	0.01	0.97
	2	Car Other	329,078	347,268	18,190	5.5%	1.00	-0.04	0.99
	3	Car Emp.Business	28,983	29,827	844	2.9%	0.97	0.00	0.93
	4	LGV	47,165	47,686	522	1.1%	0.98	0.00	0.90
	5	OGV	27,186	32,101	4,915	18.1%	0.41	0.03	0.28
	T	Total	709,934	730,127	20,194	2.8%			

Table J.4: Comparison between Post and Prior ME matrices – Average Inter Peak Hour

Time Period	User Class	User Class	Prior ME	Post ME	Diff	% Diff	Slope	Intercept	R2
IP	1	Car Commute	64,580	63,113	-1,467	-2.3%	1.00	0.00	0.97
	2	Car Other	364,305	369,781	5,476	1.5%	1.00	-0.01	0.99
	3	Car Emp.Business	24,597	25,984	1,386	5.6%	0.94	0.00	0.91
	4	LGV	44,017	42,774	-1,243	-2.8%	1.00	0.00	0.90
	5	OGV	28,088	34,820	6,732	24.0%	0.39	0.03	0.37
	T	Total	525,588	536,472	10,885	2.1%			

Table J.5: Comparison between Post and Prior ME matrices – PM Peak Hour

Time Period	User Class	User Class	Prior ME	Post ME	Diff	% Diff	Slope	Intercept	R2
PM	1	Car Commute	225,182	218,637	-6,545	-2.9%	1.00	0.01	0.96
	2	Car Other	384,470	399,641	15,171	3.9%	1.00	-0.03	0.98
	3	Car Emp.Business	37,409	39,229	1,820	4.9%	0.96	0.00	0.93
	4	LGV	43,479	43,890	411	0.9%	0.96	0.00	0.89
	5	OGV	18,129	19,314	1,185	6.5%	0.43	0.02	0.36
	T	Total	708,669	720,710	12,041	1.7%			

J.3 Impact of Matrix Estimation – Zonal Trip End Values

The impact of matrix estimation has been compared for matrix trip end values.

Table J.6: Trip Ends – AM Peak Hour

Time Period	User Class	Origins				Destinations			
		Slope	Intercept	Multiple R2	R2	Slope	Intercept	Multiple R2	R2
AM	1	1.11	-40.55	0.99	0.98	1.15	-54.16	0.99	0.98
	2	1.06	-58.15	0.99	0.99	1.06	-59.17	0.99	0.99
	3	1.08	-4.79	0.98	0.97	1.11	-6.06	0.99	0.97
	4	1.07	-5.85	0.98	0.95	1.19	-14.33	0.98	0.97
	5	0.79	2.50	0.89	0.79	0.81	1.70	0.88	0.78

Table J.7: Trip Ends – Average Inter Peak Hour

Time Period	User Class	Origins				Destinations			
		Slope	Intercept	Multiple R2	R2	Slope	Intercept	Multiple R2	R2
IP	1	1.15	-11.74	0.99	0.99	1.16	-13.14	0.99	0.98
	2	1.08	-50.66	0.99	0.99	1.09	-57.72	0.99	0.99
	3	1.01	-2.37	0.98	0.96	1.06	-4.27	0.94	0.89
	4	1.15	-7.96	0.98	0.95	1.28	-16.33	0.98	0.96
	5	0.71	4.87	0.90	0.81	0.75	2.73	0.92	0.84

Table J.8: Trip Ends – PM Peak Hour

Time Period	User Class	Origins				Destinations			
		Slope	Intercept	Multiple R2	R2	Slope	Intercept	Multiple R2	R2
PM	1	1.15	-40.05	0.99	0.98	1.15	-38.16	0.99	0.98
	2	1.07	-62.68	0.99	0.98	1.07	-66.97	0.99	0.99
	3	1.04	-4.89	0.99	0.97	1.10	-8.44	0.97	0.94
	4	1.03	-2.56	0.97	0.95	1.16	-11.25	0.98	0.97
	5	0.89	1.45	0.91	0.82	0.93	0.25	0.91	0.82

J.4 Trip Length Distribution

The impact of the matrix estimation process upon the structure of the matrix has been investigated by comparing the trip length distribution between prior and post matrices, for all user classes.

Table J.9: Impact of Matrix Estimation on Trip Length Distribution – AM Peak Hour

	Car Com	Car Other	Car EB	LGV	OGV
Prior Mean Distance (Km)	22.57	19.99	25.74	27.36	44.26
Post Mean Distance (Km)	20.34	19.13	24.58	24.77	39.61
Difference	-2.23	-0.86	-1.16	-2.59	-4.65
Percentage Difference	-9.9%	-4.3%	-4.5%	-9.5%	-10.5%

Table J.10: Impact of Matrix Estimation on Trip Length Distribution – Average IP Hour

	Car Com	Car Other	Car EB	LGV	OGV
Prior Mean Distance (Km)	21.64	19.84	24.86	26.56	41.85
Post Mean Distance (Km)	19.15	19.20	24.93	22.54	40.07
Difference	-2.49	-0.64	0.07	-4.02	-1.77
Percentage Difference	-11.5%	-3.2%	0.3%	-15.1%	-4.2%

Table J.11: Impact of Matrix Estimation on Trip Length Distribution – PM Peak Hour

	Car Com	Car Other	Car EB	LGV	OGV
Prior Mean Distance (Km)	22.68	21.33	25.83	28.04	46.61
Post Mean Distance (Km)	20.04	20.56	24.58	26.61	42.30
Difference	-2.64	-0.77	-1.25	-1.43	-4.31
Percentage Difference	-11.6%	-3.6%	-4.8%	-5.1%	-9.2%