Inbound Framingham/Worcester Line EMU times per Alon Levy, infill stations omitted, full high platforms at all stations

km	station	time from prev (s)	station time (s)	total time (s)	time with 7% pad	minute	current P512	savings
71.3	Worcester Union			0				
68.8	Biotech Park	103	55	158	169.06	3	infill	infill
58.7	Grafton	276	72	506	541.42	10	13	3
51.5	Westborough	166	75	747	799.29	14	17	3
44.2	Southborough	172	68	987	1056.09	18	26	8
39.0	Ashland	144	65	1196	1279.72	22	30	8
34.3	Framingham	131	67	1394	1491.58	25	41	16
32.1	West Natick	57	68	1519	1625.33	28	46	18
28.5	Natick Center	93	68	1680	1797.6	30	51	21
23.8	Wellesley Square	121	63	1864	1994.48	34	56	22
21.8	Wellesley Hills	66	58	1988	2127.16	36	60	24
20.3	Wellesley Farms	49	64	2101	2248.07	38	63	25
16.9	Auburndale	88	67	2256	2413.92	41	68	27
15.2	West Newton	47	65	2368	2533.76	43	71	28
13.3	Newtonville	53	65	2486	2660.02	45	74	29
7.5	Boston Landing	175	55	2716	2906.12	49	79	30
6.2	West Station	47	55	2818	3015.26	51	infill	infill
4.0	Yawkey	80	55	2953	3159.71	53	84	31
2.1	Back Bay	99	55	3107	3324.49	56	89	33
0	South Station	98	0	3205	3429.35	58	94	36
				25s dwell at each stop; remaining time is acceleration penalty if I understand Alon correctly				

Simulated passenger loading, 4 tph, all local trains, based on 2012 CTPS boardings

	X360	X375	X390	X405	X420	X435	X450	X465	X480	X495	X510	X525	X540	X555	X570	X585	X600	X615	X630	X645	X660	X675	X690	X705
Departure	5:02	5:17	5:32	5:47	6:02	6:17	6:32	6:47	7:02	7:17	7:32	7:47	8:02	8:17	8:32	8:47	9:02	9:17	9:32	9:47	10:02	10:17	10:32	10:47
Worcester Union	0	4	12	11	52	61	55	34	67	80	76	76	51	43	44	34	13	14	14	14	14	13	14	56
Grafton	0	5	15	15	73	87	80	50	94	122	121	122	73	60	58	46	17	17	17	17	17	17	18	62
Westborough	0	7	21	21	106	126	111	66	125	180	180	182	104	83	82	62	19	19	20	19	20	19	20	71
Southborough	0	9	28	27	135	161	140	79	161	226	225	228	131	105	103	78	23	22	22	23	22	22	23	81
Ashland	0	10	32	31	166	198	173	99	208	287	280	283	156	120	120	89	24	24	24	24	24	24	25	84
Framingham	0	13	42	41	208	249	223	150	304	373	356	370	194	143	149	111	29	29	30	30	30	29	30	108
West Natick	0	17	57	57	257	309	285	211	394	436	408	460	228	160	172	128	36	36	36	36	37	36	36	133
Natick Center	0	19	64	63	263	314	303	259	462	492	457	543	266	180	184	137	39	39	39	39	40	39	39	155
Wellesley Square	0	20	68	68	269	318	321	324	506	523	490	615	305	201	199	148	41	40	41	41	42	41	41	172
Wellesley Hills	0	21	72	71	272	320	331	349	527	541	505	644	319	208	205	153	41	41	41	41	42	41	41	174
Wellesley Farms	0	22	74	73	275	321	341	376	553	569	533	685	345	227	216	160	42	41	43	42	43	42	42	179
Auburndale	0	23	77	75	277	324	349	399	569	582	546	700	361	244	217	161	43	42	44	43	43	42	43	180
West Newton	0	23	77	75	278	324	355	417	582	594	556	717	382	265	219	163	45	44	45	45	46	44	45	184
Newtonville	0	24	83	82	283	330	366	445	602	606	570	739	410	293	222	165	47	48	47	47	48	47	48	189
Yawkey	0	24	83	82	283	330	366	445	602	606	570	739	410	293	222	165	47	48	47	47	48	47	48	189
Back Bay	0	24	83	82	283	330	366	445	602	606	570	739	410	293	222	165	47	48	47	47	48	47	48	189
Arrival	6:00	6:15	6:30	6:45	7:00	7:15	7:30	7:45	8:00	8:15	8:30	8:45	9:00	9:15	9:30	9:45	10:00	10:15	10:30	10:45	11:00	11:15	11:30	11:45
Units required	1	1	1	1	2	2	2	2	3	3	3	*4*	2	2	1	1	1	1	1	1	1	1	1	1

Equipment required for 4tph all-local all-day service, assumes 8 minute turnaround possible at BOS

Train	from	departs	to	arrives	length	equipment	notes
Y304	BOS	5:04	WUS	6:02	2	M013+M014	stored at Southampton St.
X311	FRA	4:38	BOS	5:11	3	M016+M017+M018	stored at Framingham
Y319	BOS	5:19	WUS	6:17	3	M016+M017+M018	5:11 from Framingham; long 75 min turnaround at Worcester
X326	FRA	4:53	BOS	5:26	3	M019+M020+M021	stored at Framingham
Y334	BOS	5:34	WUS	6:32	3	M019+M020+M021	5:26 from Framingham; long 45 min turnaround at Worcester
X341	FRA	5:08	BOS	5:41	3	M022+M023+M024	stored at Framingham
Y349	BOS	5:49	WUS	6:47	3	M022+M023+M024	5:41 from Framingham
X360	WUS	5:02	BOS	6:00	1	M001	stored at Worcester
Y368	BOS	6:08	WUS	7:06	1	M001	6:00 from Worcester
X375	WUS	5:17	BOS	6:15	1	M002	stored at Worcester
Y383	BOS	6:23	WUS	7:21	1	M002	6:15 from Worcester
X390	WUS	5:32	BOS	6:30	1	M003	stored at Worcester
Y398	BOS	6:38	WUS	7:36	1	M003	6:30 from Worcester
X405	WUS	5:47	BOS	6:45	1	M004	stored at Worcester
Y413	BOS	6:53	WUS	7:51	1	M004	6:45 from Worcester
X420	WUS	6:02	BOS	7:00	2	M005+M006	stored at Worcester
Y428	BOS	7:08	WUS	8:06	2	M005+M006	7:00 from Worcester
X435	WUS	6:17	BOS	7:15	2	M013+M014	6:02 from Boston; 15 minute turnaround
Y443	BOS	7:23	WUS	8:21	2	M013+M014	7:15 from Worcester
X450	WUS	6:32	BOS	7:30	2	M007+M008	stored at Worcester
Y458	BOS	7:38	FRA	8:11	2	M007+M008	7:30 from Worcester; stored midday at Framingham
X465	WUS	6:47	BOS	7:45	2	M009+M010	stored at Worcester
Y473	BOS	7:53	WUS	8:51	2	M009+M010	7:45 from Worcester
X480	WUS	7:02	BOS	8:00	3	M022+M023+M024	6:47 from Boston; 15-minute turnaround; stored midday at Southampton
Y488	BOS	8:08	WUS	9:06	1	M015	from Southampton
X495	WUS	7:17	BOS	8:15	3	M019+M020+M021	6:32 from Boston; 45-minute turnaround
Y503	BOS	8:23	WUS	9:21	3	M019+M020+M021	8:15 from Worcester
X510	WUS	7:32	BOS	8:30	3	M016+M017+M018	6:17 from Boston; 75-minute turnaround
Y518	BOS	8:38	FRA	9:11	3	M016+M017+M018	8:30 from Worcester; stored midday at Framingham
X525	WUS	7:47	BOS	8:45	3	M001+M002+M003	crush load; 7:06, 7:21, and 7:36 arrivals from Boston, assembled on platform
Y533	BOS	8:53	WUS	9:51	3	M001+M002+M003	8:45 from Worcester
X540	WUS	8:02	BOS	9:00	2	M011+M012	stored at Worcester
Y548	BOS	9:08	FRA	9:41	2	M011+M012	9:00 from Worcester, stored midday at Framingham
X555	WUS	8:17	BOS	9:15	2	M005+M006	8:06 from Boston; 11-minute turnaround
Y563	BOS	9:23	FRA	9:56	2	M005+M006	9:15 from Worcester, stored midday at Framingham
X570	WUS	8:32	BOS	9:30	1	M004	7:51 from Boston; 41-minute turnround
Y578	BOS	9:38	FRA	10:11	1	M004	9:30 from Worcester, stored midday at Framingham
X585	WUS	8:47	BOS	9:45	1	M013	8:21 from Boston, break consist on platform; 26-minute turnaround
Y593	BOS	9:53	WUS	10:51	1	M013	9:45 from Worcester
X600	WUS	9:02	BOS	10:00	1	M014	8:21 from Boston; 41-minute turnaround

Train	from	departs	to	arrives	length	equipment	notes
Y608	BOS	10:08	WUS	11:06	1	M014	10:00 from Worcester
X615	WUS	9:17	BOS	10:15	1	M009	8:51 from Boston, break consist on platform; 26-minute turnaround
Y623	BOS	10:23	WUS	11:21	1	M009	10:15 from Worcester
X630	WUS	9:32	BOS	10:30	1	M010	8:51 from Boston; 41-minute turnaround
Y638	BOS	10:38	WUS	11:36	1	M010	10:30 from Worcester
X645	WUS	9:47	BOS	10:45	1	M019	9:21 from Boston, break consist on platform; 26-minute turnaround
Y653	BOS	10:53	WUS	11:51	1	M019	10:45 from Worcester
X660	WUS	10:02	BOS	11:00	1	M020	9:21 from Boston; 41-minute turnaround
Y668	BOS	11:08	WUS	12:06	1	M020	11:00 from Worcester
X675	WUS	10:17	BOS	11:15	1	M021	9:21 from Boston; 56-minute turnaround
Y683	BOS	11:23	WUS	12:21	1	M021	11:15 from Worcester
X690	WUS	10:32	BOS	11:30	1	M001	9:51 from Boston, break consist on platform; 41-minute turnaround
Y698	BOS	11:38	WUS	12:36	1	M001	11:30 from Worcester
X705	WUS	10:47	BOS	11:45	1	M002	9:51 from Boston; 56-minute turnaround
Y713	BOS	11:53	WUS	12:51	1	M002	11:45 from Worcester
X720	WUS	11:02	BOS	12:00	1	M003	9:51 from Boston; 71-minute turnaround
Y728	BOS	12:08	WUS	13:06	1	M003	12:00 from Worcester
X735	WUS	11:17	BOS	12:15	1	M013	10:51 from Boston; 26-minute turnaround
Y743	BOS	12:23	WUS	13:21	1	M013	12:15 from Worcester
X750	WUS	11:32	BOS	12:30	1	M014	11:06 from Boston; 26-minute turnaround
Y758	BOS	12:38	WUS	13:36	1	M014	12:30 from Worcester
X765	WUS	11:47	BOS	12:45	1	M009	11:21 from Boston; 26-minute turnaround
Y773	BOS	12:53	WUS	13:51	1	M009	12:45 from Worcester
X780	WUS	12:02	BOS	13:00	1	M010	11:36 from Boston; 26-minute turnaround
Y788	BOS	13:08	WUS	14:06	1	M010	13:00 from Worcester
X795	WUS	12:17	BOS	13:15	1	M019	11:51 from Boston; 26-minute turnaround
Y803	BOS	13:23	WUS	14:21	1	M019	13:15 from Worcester
X810	WUS	12:32	BOS	13:30	1	M020	12:06 from Boston; 26-minute turnaround
Y818	BOS	13:38	WUS	14:36	1	M020	13:30 from Worcester
X825	WUS	12:47	BOS	13:45	1	M021	12:21 from Boston; 26-minute turnaround
Y833	BOS	13:53	WUS	14:51	1	M021	13:45 from Worcester
X840	WUS	13:02	BOS	14:00	1	M001	12:36 from Boston; 26-minute turnaround
Y848	BOS	14:08	WUS	15:06	1	M001	14:00 from Worcester
X855	WUS	13:17	BOS	14:15	1	M002	12:51 from Boston; 26-minute turnaround
Y863	BOS	14:23	WUS	15:21	1	M002	14:15 from Worcester
							24 units total: M001-M012 overnight Worcester; M013-M015 overnight Southampton St; M016-M014 overnight Framingham
							midday storage: 3 units (750') at Southampton St; 10 units (2500') at Framingham

Simulated 90th %ile passenger loading, 6 tph, all local trains, based on 2012 CTPS boardings

	X360	X370	X380	X390	X400	X410	X420	X430	X440	X450	X460	X470	X480	X490	X500	X510	X520	X530	X540	X550	X560	X570	X580	X590	X600	X610	X620	X630	X640	X650	X660	X670	X680	X690	X700	X710
Departure time	5:02	5:12	5:22	5:32	5:42	5:52	6:02	6:12	6:22	6:32	6:42	6:52	7:02	7:12	7:22	7:32	7:42	7:52	8:02	8:12	8:22	8:32	8:42	8:52	9:02	9:12	9:22	9:32	9:42	9:52	10:02	10:12	10:22	10:32	10:42	10:52
Worcester Union	0	0	4	8	8	9	32	42	43	43	27	24	39	59	51	51	52	52	36	31	31	31	31	20	10	10	10	10	10	9	10	10	10	10	10	52
Grafton	0	0	5	11	11	11	46	60	61	60	39	35	56	83	83	82	81	82	54	42	42	41	42	27	12	13	13	12	12	12	12	12	12	13	12	57
Westborough	0	0	7	15	15	15	65	88	88	87	51	45	72	115	123	124	123	124	76	56	57	58	58	37	14	14	15	14	14	14	14	14	14	14	14	65
Southborough	0	0	9	19	20	20	84	112	113	110	61	54	92	149	153	155	152	155	96	72	73	73	71	45	15	17	17	16	16	15	16	16	16	16	16	74
Ashland	0	0	10	22	23	22	102	137	137	137	75	68	118	192	192	191	190	192	117	83	83	84	83	51	16	18	18	17	17	17	17	17	17	17	17	77
Framingham	0	0	13	29	30	30	129	170	171	171	111	102	171	268	243	241	242	253	145	98	98	103	103	62	21	21	21	21	21	21	20	21	21	21	21	98
West Natick	0	0	18	40	39	39	161	211	210	210	151	143	227	334	279	277	278	326	177	109	110	119	118	72	25	25	26	25	25	25	25	25	25	25	26	123
Natick Center	0	0	20	44	44	44	165	215	214	216	183	178	270	385	311	310	310	394	209	123	123	126	126	78	27	27	28	27	27	27	27	27	28	27	27	143
Wellesley Square	0	0	21	47	48	48	167	218	217	218	219	219	302	406	331	332	330	456	241	139	138	138	137	83	29	29	29	29	29	28	28	28	29	29	29	160
Wellesley Hills	0	0	21	49	50	49	169	220	219	219	237	237	317	419	343	342	341	482	251	144	142	141	141	85	29	29	30	29	29	28	28	29	29	29	29	162
Wellesley Farms	0	0	22	51	51	50	171	222	222	220	251	255	338	436	361	362	360	513	270	156	155	149	149	89	29	30	30	30	30	29	29	30	30	29	29	166
Auburndale	0	0	23	53	53	53	173	223	223	222	265	271	349	444	369	370	369	523	280	167	167	149	149	89	30	30	31	30	30	30	29	30	31	30	30	167
West Newton	0	0	23	53	53	53	173	223	224	223	277	284	360	450	376	377	374	537	294	182	182	151	150	90	31	31	32	31	32	31	30	31	32	31	31	171
Newtonville	0	0	25	57	57	57	176	228	228	228	295	303	373	460	384	385	383	554	311	200	200	152	151	92	33	33	33	34	33	33	32	33	33	33	32	175
Yawkey	0	0	25	57	57	57	176	228	228	228	295	303	373	460	384	385	383	554	311	200	200	152	151	92	33	33	33	34	33	33	32	33	33	33	32	175
Back Bay	0	0	25	57	57	57	176	228	228	228	295	303	373	460	384	385	383	554	311	200	200	152	151	92	33	33	33	34	33	33	32	33	33	33	32	175
Arrival time	6:00	6:10	6:20	6:30	6:40	6:50	7:00	7:10	7:20	7:30	7:40	7:50	8:00	8:10	8:20	8:30	8:40	8:50	9:00	9:10	9:20	9:30	9:40	9:50	10:00	10:10	10:20	10:30	10:40	10:50	11:00	11:10	11:20	11:30	11:40	11:50
units required	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	*3*	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Equipment required for 6tph all-local service in AM rush

Train	from	departs	to	arrives	length	equipment	notes
X360	WUS	5:02	BOS	6:00	1	M001	twelve trainsets stored in Worcester, M001-M012
Y305	BOS	5:05	WUS	6:03	1	M013	fourteen trainsets stored in Boston, M013-M026
X370	WUS	5:12	BOS	6:10	1	M002	
Y315	BOS	5:15	WUS	6:13	1	M014	
X380	WUS	5:22	BOS	6:20	1	M003	
Y325	BOS	5:25	WUS	6:23	1	M015	
X390	WUS	5:32	BOS	6:30	1	M004	
Y335	BOS	5:35	WUS	6:33	1	M016	
X400	WUS	5:42	BOS	6:40	1	M005	
Y345	BOS	5:45	WUS	6:43	1	M017	
X410	WUS	5:52	BOS	6:50	1	M006	
Y355	BOS	5:55	WUS	6:53	1	M018	
X420	WUS	6:02	BOS	7:00	1	M007	
Y365	BOS	6:05	WUS	7:03	1	M019+M020	prepositioning 2-trainset consist
X430	WUS	6:12	BOS	7:10	1	M008	
Y375	BOS	6:15	WUS	7:13	1	M021+M022	prepositioning 2-trainset consist
X440	WUS	6:22	BOS	7:20	1	M013	6:03 arrival from BOS
Y385	BOS	6:25	WUS	7:23	1	M023+M024	prepositioning 2-trainset consist
X450	WUS	6:32	BOS	7:30	1	M014	6:13 arrival from BOS
Y395	BOS	6:35	WUS	7:33	2	M001+M002	6:00 and 6:10 arrivals from WUS
X460	WUS	6:42	BOS	7:40	2	M009+M010	
Y405	BOS	6:45	WUS	7:43	2	M003+M004	6:20 and 6:30 arrivals from WUS
X470	WUS	6:52	BOS	7:50	2	M011+M012	
Y415	BOS	6:55	WUS	7:53	2	M025+M026	
X480	WUS	7:02	BOS	8:00	2	M015+M016	6:23 and 6:33 arrivals from BOS
Y425	BOS	7:05	WUS	8:03	2	M005+M006	6:40 and 6:50 arrivals from WUS
X490	WUS	7:12	BOS	8:10	2	M017+M018	6:43 and 6:53 arrivals from BOS
Y435	BOS	7:15	WUS	8:13	1	M007	7:00 arrival from WUS (too late to join WUS peak)
X500	WUS	7:22	BOS	8:20	2	M019+M020	7:03 arrival from BOS
Y445	BOS	7:25	WUS	8:23	1	M008	7:10 arrival from WUS
X510	WUS	7:32	BOS	8:30	2	M021+M022	7:13 arrival from BOS
Y455	BOS	7:35	WUS	8:33	1	M013	7:20 arrival from WUS
X520	WUS	7:42	BOS	8:40	2	M023+M024	7:23 arrival from BOS
Y465	BOS	7:45	WUS	8:43	1	M014	7:30 arrival from WUS
X530	WUS	7:52	BOS	8:50	2	M001+M002	7:33 arrival from BOS; should be triple per new model
Y475	BOS	7:55	WUS	8:53	1	M009	7:40 arrival from WUS, separated on platform
X540	WUS	8:02	BOS	9:00	2	M003+M004	7:43 arrival from BOS
Y485	BOS	8:05	WUS	9:03	1	M010	7:40 arrival from WUS, separated on platform; M011+M012 from 7:50 arrival to Southampton
X550	WUS	8:12	BOS	9:10	2	M025+M026	7:53 arrival from BOS

Train	from	departs	to	arrives	length	equipment	notes
Y495	BOS	8:15	WUS	9:13	1	M015	8:00 arrival from WUS, separated on platform; M017+M018 from 8:10 arrival to Southampton
X560	WUS	8:22	BOS	9:20	1	M006	8:03 arrival from BOS, separated on platform; M005 out of service on platform
Y505	BOS	8:25	WUS	9:23	1	M016	8:00 arrival from WUS, separated on platform
X570	WUS	8:32	BOS	9:30	1	M007	8:13 arrival from BOS
Y515	BOS	8:35	WUS	9:33	1	M019	8:20 arrival from WUS, separated on platform
X580	WUS	8:42	BOS	9:40	1	M008	8:23 arrival from BOS
Y525	BOS	8:45	WUS	9:43	1	M020	8:20 arrival from WUS, separated on platform; M021+M022 from 8:30 arrival to Southampton
X590	WUS	8:52	BOS	9:50	1	M013	8:33 arrival from BOS
Y535	BOS	8:55	WUS	9:53	1	M023	8:40 arrival from WUS, separated on platform
X600	WUS	9:02	BOS	10:00	1	M014	8:43 arrival from BOS
Y545	BOS	9:05	WUS	10:03	1	M024	8:40 arrival from WUS, separated on platform; M001+M002 from 8:50 arrival to Southampton
X610	WUS	9:12	BOS	10:10	1	M009	8:53 arrival from BOS
Y555	BOS	9:15	WUS	10:13	1	M003	9:00 arrival from WUS, separated on platform
X620	WUS	9:22	BOS	10:20	1	M010	9:03 arrival from BOS
Y565	BOS	9:25	WUS	10:23	1	M004	9:00 arrival from WUS, separated on platform; M025+M026 from 9:10 arrival to Southampton
X630	WUS	9:32	BOS	10:30	1	M015	9:13 arrival from BOS
Y575	BOS	9:35	WUS	10:33	1	M026	9:20 arrival from WUS
X640	WUS	9:42	BOS	10:40	1	M016	9:23 arrival from BOS
Y585	BOS	9:45	WUS	10:43	1	M007	9:30 arrival from WUS
X650	WUS	9:52	BOS	10:50	1	M019	9:33 arrival from BOS
Y595	BOS	9:55	WUS	10:53	1	M008	9:40 arrival from WUS
X660	WUS	10:02	BOS	11:00	1	M020	9:43 arrival from BOS
Y605	BOS	10:05	WUS	11:03	1	M013	9:50 arrival from WUS
X670	WUS	10:12	BOS	11:10	1	M023	9:53 arrival from BOS
Y615	BOS	10:15	WUS	11:13	1	M014	10:00 arrival from WUS
X680	WUS	10:22	BOS	11:20	1	M024	10:03 arrival from BOS
Y625	BOS	10:25	WUS	11:23	1	M009	10:10 arrival from WUS
X690	WUS	10:32	BOS	11:30	1	M003	10:13 arrival from BOS
Y635	BOS	10:35	WUS	11:33	1	M010	10:20 arrival from WUS
X700	WUS	10:42	BOS	11:40	1	M004	10:23 arrival from BOS
Y645	BOS	10:45	WUS	11:43	1	M015	10:30 arrival from WUS
							midday storage requirements: 10 trainsets in Boston (2500 feet), 1 trainset in Worcester (250 feet, on platform); requirements higher if frequency reduced at midday

Simulated 90th %ile passenger loading, 6 tph, alternating Worcester/Framingham, based on 2012 CTPS boardings

	X360	X370	X380	X390	X400	X410	X420	X430	X440	X450	X460	X470	X480	X490	X500	X510	X520	X530	X540	X550	X560	X570	X580	X590	X600	X610	X620	X630	X640	X650	X660	X670	X680	X690	X700	X710
Departure (WUS)		5:12		5:32		5:52		6:12		6:32		6:52		7:12		7:32		7:52		8:12		8:32		8:52		9:12		9:32		9:52		10:12		10:32		10:52
Departure (FRA)	5:27		5:47		6:07		6:27		6:47		7:07		7:27		7:47		8:07		8:27		8:47		9:07		9:27		9:47		10:07		10:27		10:47		11:07	
Worcester Union		4		14		39		80		64		59		106		99		85		58		57		28		18		17		17		17		18		52
Grafton		5		19		55		114		94		86		159		159		132		79		77		37		22		22		22		23		23		57
Westborough		7		26		78		165		132		114		230		239		194		109		109		48		25		25		25		26		25		66
Southborough		9		34		100		213		165		141		292		298		242		138		139		58		29		29		28		30		29		75
Ashland		11		40		121		262		203		181		372		373		297		159		159		65		31		31		31		32		31		77
Framingham	0	11	4	47	9	128	30	296	39	239	39	213	59	447	57	422	58	359	36	174	20	179	24	75	5	35	5	35	5	34	5	36	6	34	6	98
West Natick	0	11	9	57	20	138	62	335	80	277	81	253	118	513	94	457	94	432	68	186	31	194	40	85	10	39	11	38	11	38	10	40	10	38	11	122
Natick Center	0	11	11	62	24	142	67	339	84	280	113	286	160	565	128	490	129	498	100	197	46	203	49	91	13	42	13	40	13	40	13	42	12	41	13	144
Wellesley Square	0	11	12	65	27	147	70	343	88	283	152	328	193	586	151	512	151	559	131	212	61	214	59	96	14	43	14	42	14	41	15	44	14	42	15	161
Wellesley Hills	0	11	13	67	30	148	72	345	90	285	169	346	208	598	162	524	161	585	143	217	66	218	64	98	14	43	14	42	14	41	15	44	14	42	15	162
Wellesley Farms	0	11	14	69	31	149	74	346	91	287	186	364	229	617	181	543	181	617	163	231	79	225	72	102	15	43	15	43	15	42	15	44	15	43	16	166
Auburndale	0	11	14	71	33	151	75	348	93	290	199	379	239	625	190	551	190	630	174	241	90	226	72	103	15	44	15	43	15	43	15	44	15	44	16	167
West Newton	0	11	15	71	34	151	76	349	93	290	211	393	252	632	196	558	197	642	187	255	105	227	73	104	16	45	17	44	16	44	17	46	17	45	18	171
Newtonville	0	11	16	75	38	156	80	351	97	294	227	410	266	641	206	567	205	662	207	275	125	229	74	105	18	47	19	46	18	46	18	47	18	46	19	176
Yawkey	0	11	16	75	38	156	80	351	97	294	227	410	266	641	206	567	205	662	207	275	125	229	74	105	18	47	19	46	18	46	18	47	18	46	19	176
Back Bay	0	11	16	75	38	156	80	351	97	294	227	410	266	641	206	567	205	662	207	275	125	229	74	105	18	47	19	46	18	46	18	47	18	46	19	176
Arrival time	6:00	6:10	6:20	6:30	6:40	6:50	7:00	7:10	7:20	7:30	7:40	7:50	8:00	8:10	8:20	8:30	8:40	8:50	9:00	9:10	9:20	9:30	9:40	9:50	10:00	10:10	10:20	10:30	10:40	10:50	11:00	11:10	11:20	11:30	11:40	11:50
Units required	1	1	1	1	1	1	1	2	1	2	1	2	2	**3**	1	**3**	1	**3**	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Simulated 90th %ile passenger loading, 6/7.5/6/3 tph, all local trains, based on 2012 CTPS boardings

	X360	X370	X380	X390	X400	X410	X420	X430	X440	X450	X460	X470	X480	X490	X500	X510	X520	X528	X536	X544
Departure	5:02	5:12	5:22	5:32	5:42	5:52	6:02	6:12	6:22	6:32	6:42	6:52	7:02	7:12	7:22	7:32	7:42	7:50	7:58	8:06
Worcester Union	0	0	4	8	8	8	32	42	42	43	27	24	40	58	52	51	43	43	40	26
Grafton	0	0	6	11	11	11	46	61	60	60	38	35	56	82	83	81	68	67	62	34
Westborough	0	0	7	15	15	15	67	87	85	87	50	46	74	114	125	124	99	99	92	47
Southborough	0	0	9	19	20	20	85	111	110	112	60	55	92	146	155	154	124	123	116	58
Ashland	0	0	11	22	23	23	103	136	135	138	75	69	120	188	191	191	153	154	143	66
Framingham	0	0	14	30	29	30	129	169	169	170	110	102	173	267	241	243	195	201	190	81
West Natick	0	0	18	39	40	40	160	209	209	213	152	145	230	333	278	277	223	252	245	89
Natick Center	0	0	20	45	45	45	164	213	213	217	181	179	269	383	311	312	250	299	294	100
Wellesley Square	0	0	21	48	48	48	167	215	216	220	219	218	302	405	330	333	267	339	345	111
Wellesley Hills	0	0	23	49	50	50	169	217	217	223	237	239	317	418	342	343	276	356	364	116
Wellesley Farms	0	0	23	51	51	51	170	218	219	224	252	257	335	434	360	361	290	378	389	126
Auburndale	0	0	24	53	53	53	171	220	220	225	266	273	348	443	369	370	298	386	397	136
West Newton	0	0	24	53	53	54	172	221	221	225	279	285	358	451	375	376	305	394	409	147
Newtonville	0	0	25	58	58	58	175	224	224	229	293	301	373	459	385	386	313	406	425	162
Yawkey	0	0	25	58	58	58	175	224	224	229	293	301	373	459	385	386	313	406	425	162
Back Bay	0	0	25	58	58	58	175	224	224	229	293	301	373	459	385	386	313	406	425	162
Arrival	6:00	6:10	6:20	6:30	6:40	6:50	7:00	7:10	7:20	7:30	7:40	7:50	8:00	8:10	8:20	8:30	8:40	8:48	8:56	9:04
Units required	0	0	1	1	1	1	1	1	1	1	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	*2*	1

	X552	X560	X570	X580	X590	X600	X620	X640	X660	X680	X700	X720
Departure	8:14	8:22	8:32	8:42	8:52	9:02	9:22	9:42	10:02	10:22	10:42	11:02
Worcester Union	25	31	30	32	20	17	17	18	17	18	18	44
Grafton	34	41	41	42	27	21	22	22	22	23	23	47
Westborough	47	56	56	57	35	24	25	26	25	25	26	54
Southborough	59	72	71	72	45	28	29	29	29	29	29	61
Ashland	68	82	82	83	51	30	31	32	31	31	32	63
Framingham	80	97	102	103	62	38	37	38	38	39	38	80
West Natick	90	109	117	118	72	47	47	47	46	48	47	100
Natick Center	101	122	126	127	77	51	51	51	50	51	50	119
Wellesley Square	113	135	135	136	83	53	53	54	52	54	53	134
Wellesley Hills	117	141	139	140	85	53	53	54	53	55	53	136
Wellesley Farms	127	154	147	148	89	55	54	55	54	56	54	139
Auburndale	136	165	147	148	90	56	56	56	55	57	55	140
West Newton	147	180	148	149	91	59	58	59	57	59	57	142
Newtonville	163	200	150	150	93	62	62	62	60	63	61	145
Yawkey	163	200	150	150	93	62	62	62	60	63	61	145
Back Bay	163	200	150	150	93	62	62	62	60	63	61	145
Arrival	9:12	9:20	9:30	9:40	9:50	10:00	10:20	10:40	11:00	11:20	11:40	12:00
Units required	1	1	1	1	1	1	1	1	1	1	1	1

Simulated 90th %ile passenger loading, 8/8/4 tph, zone express, based on 2012 CTPS boardings

	X300	X308	X315	X323	X330	X338	X345	X353	X360	X368	X375	X383	X390	X398	X405	X413	X420	X425	X435	X440	X450	X455	X465
Depart WUS		~~4:10~~		~~4:25~~		~~4:40~~		4:55		5:10		5:25		5:40		5:55		6:15		6:30		6:45	
Depart FRA	4:27		4:42	4:50	4:57	5:05	5:12		5:27		5:42		5:57		6:12		6:27		6:42		6:57		7:12
Worcester Union		~~0~~		~~0~~		~~0~~		0		0		8		11		12		60		62		53	
Grafton		~~0~~		~~0~~		~~0~~		0		0		11		16		16		85		88		76	
Westborough		~~0~~		~~0~~		~~0~~		0		0		15		22		23		122		126		105	
Southborough		~~0~~		~~0~~		~~0~~		0		0		19		28		29		156		162		130	
Ashland		~~0~~		~~0~~		~~0~~		0		0		22		32		33		192		200		160	
Framingham	0	~~0~~	0	0	0	0	0	0	0	0	0	23	8	37	7	39	8	224	21	234	21	194	21
West Natick	0	~~0~~	0	0	0	0	0	0	0	0	0	25	16	43	17	46	15	260	43	274	42	233	43
Natick Center	0	~~0~~	0	0	0	0	0	0	0	0	0	25	20	46	20	49	22		49		54		92
Wellesley Square	0	~~0~~	0	0	0	0	0	0	0	0	0	26	23	49	23	50	26		53		69		153
Wellesley Hills	0	~~0~~	0	0	0	0	0	0	0	0	0	27	24	51	25	51	29		57		74		182
Wellesley Farms	0	~~0~~	0	0	0	0	0	0	0	0	0	27	25	52	26	52	32		59		80		208
Auburndale	0	~~0~~	0	0	0	0	0	0	0	0	0	27	27	53	28	53	34		61		84		230
West Newton	0	~~0~~	0	0	0	0	0	0	0	0	0	27	28	53	28	54	35		62		87		250
Newtonville	0	~~0~~	0	0	0	0	0	0	0	0	0	28	30	56	31	56	41		68		96		277
Yawkey	0	~~0~~	0	0	0	0	0	0	0	0	0	28	30	56	31	56	41	260	68	274	96	233	277
Back Bay	0	~~0~~	0	0	0	0	0	0	0	0	0	28	30	56	31	56	41	260	68	274	96	233	277
Arrive	5:00	~~5:08~~	5:15	5:23	5:30	5:38	5:45	5:53	6:00	6:08	6:15	6:23	6:30	6:38	6:45	6:53	7:00	7:05	7:15	7:20	7:30	7:35	7:45
Units required	0	~~0~~	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	2	1	2	1	2	2

	X470	X480	X485	X495	X500	X510	X515	X525	X530	X540	X545	X555	X560	X570	X585	X600	X615	X630	X645	X660	X675	X690	X705
Depart WUS	7:00		7:15		7:30		7:45		8:00		8:15		8:30		8:47		9:17		9:47		10:17		10:47
Depart FRA		7:27		7:42		7:57		8:12		8:27		8:42		8:57		9:27		9:57		10:27		10:57	
Worcester Union	34		76		77		76		75		46		70		52		24		24		25		58
Grafton	50		107		121		121		121		64		95		69		31		31		32		65
Westborough	65		143		181		180		180		89		134		91		35		35		36		75
Southborough	79		184		229		225		224		113		168		112		42		41		42		85
Ashland	99		240		284		281		278		133		195		127		45		44		46		88
Framingham	132	21	310	46	338	30	332	31	339	36	153	11	209	32	152	7	50	8	50	7	51	8	111
West Natick	175	43	372	84	377	48	367	51	402	75	172	18	221	55	172	15	56	15	56	15	57	14	138
Natick Center		108		146		99		129		132		38		70	183	18	59	18	60	19	60	18	161
Wellesley Square		159		180		132		193		184		61		87	197	21	61	20	62	21	61	20	179
Wellesley Hills		182		198		149		221		203		67		94	202	21	61	20	62	21	61	20	180
Wellesley Farms		209		225		177		257		235		88		106	211	21	62	21	63	22	63	22	185
Auburndale		226		237		190		271		250		104		110	211	22	63	22	64	22	64	22	187
West Newton		243		247		200		287		271		126		115	213	25	65	24	65	24	65	25	192
Newtonville		265		262		213		307		298		154		122	216	27	67	27	68	27	68	27	196
Yawkey	175	265	372	262	377	213	367	307	402	298	172	154	221	122	216	27	67	27	68	27	68	27	196
Back Bay	175	265	372	262	377	213	367	307	402	298	172	154	221	122	216	27	67	27	68	27	68	27	196
Arrive	7:50	8:00	8:05	8:15	8:20	8:30	8:35	8:45	8:50	9:00	9:05	9:15	9:20	9:30	9:45	10:00	10:15	10:30	10:45	11:00	11:15	11:30	11:45
Units required	1	2	2	2	2	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1

Equipment required for zone express service with 8 tph peak and 4 tph off-peak

Train	from	plt	departs	to	plt	arrives	layover	becomes	units	equipment	notes
X300	FRA		4:27	BOS	1	5:00	12m	Y312	1	F001	stored overnight at Fountain St.
Y312	BOS	1	5:12	FRA		5:45	12m	X390	1	F001	
X315	FRA		4:42	BOS	1	5:15	12m	Y327	1	F002	stored overnight at Fountain St.
Y320	BOS	2	5:20	WUS		6:18	12m	X440	2	S001+S002	stored overnight at Southampton St.
X323	FRA		4:50	BOS	2	5:23	12m	Y335	2	F003+F004	stored overnight at Fountain St.
Y327	BOS	1	5:27	FRA		6:00	12m	X405	1	F002	
X330	FRA		4:57	BOS	1	5:30	12m	Y342	1	F005	stored overnight at Fountain St.
Y335	BOS	2	5:35	WUS		6:33	12m	X455	2	F003+F004	
X338	FRA		5:05	BOS	2	5:38	12m	Y350	2	F006+F007	stored overnight at Fountain St.
Y342	BOS	1	5:42	FRA		6:15	12m	X420	1	F005	
X345	FRA		5:12	BOS	1	5:45	12m	Y357	1	F008	stored overnight at Fountain St.
Y350	BOS	2	5:50	WUS		6:48	12m	X470	2	F006+F007	
X353	WUS		4:55	BOS	2	5:53	12m	Y365	2	W001+W002	stored overnight at Worcester
Y357	BOS	1	5:57	FRA		6:30	12m	X435	1	F008	
X360	FRA		5:27	BOS	1	6:00	12m	Y372	1	F009	stored overnight at Fountain St.
Y365	BOS	2	6:05	WUS		7:03	12m	X485	2	W001+W002	
X368	WUS		5:10	BOS	2	6:08	12m	Y380	2	W003+W004	stored overnight at Worcester
Y372	BOS	1	6:12	FRA		6:45	12m	X450	1	F009	
X375	FRA		5:42	BOS	1	6:15	12m	Y387	1	F010	stored overnight at Fountain St.
Y380	BOS	2	6:20	WUS		7:18	12m	X500	2	W003+W004	
X383	WUS		5:25	BOS	2	6:23	12m	Y395	2	W005+W006	stored overnight at Worcester
Y387	BOS	1	6:27	FRA		7:00	17m	X465	1	F010	
X390	FRA		5:57	BOS	1	6:30	12m	Y402	1	F001	
Y395	BOS	2	6:35	WUS		7:33	12m	X515	2	W005+W006	
X398	WUS		5:40	BOS	2	6:38	12m	Y410	2	W007+W008	stored overnight at Worcester
Y402	BOS	1	6:42	FRA		7:15	12m	X480	1	F001	
X405	FRA		6:12	BOS	1	6:45	12m	Y417	1	F002	
Y410	BOS	2	6:50	WUS		7:48	12m	X530	2	W007+W008	
X413	WUS		5:55	BOS	2	6:53	10m	Y423	2	W009+W010	stored overnight at Worcester; **NB SHORT TURNAROUND TIME**
Y417	BOS	1	6:57	FRA		7:30	12m	X495	1	F002	
X420	FRA		6:27	BOS	1	7:00	12m	Y432	1	F005	
Y423	BOS	2	7:03	WUS		8:01	14m	X545	2	W009+W010	
X425	WUS		6:15	BOS	2	7:05	12m	Y437	2	W011+W012	stored overnight at Worcester
Y432	BOS	1	7:12	FRA		7:45	12m	X510	1	F005	
X435	FRA		6:42	BOS	1	7:15	12m	Y447	1	F008	
Y437	BOS	2	7:17	WUS		8:15	15m	X560	2	W011+W012	
X440	WUS		6:30	BOS	2	7:20	12m	Y452	2	S001+S002	
Y447	BOS	1	7:27	FRA		8:00	12m	X525	1	F008	possibly swap for 2-unit consist for extra seats on X525 (out of service after a single round trip), would be F011+F012 if done
X450	FRA		6:57	BOS	1	7:30	12m	Y462	1	F009	
Y452	BOS	2	7:32	WUS		8:30	17m	X585	2	S001+S002	
X455	WUS		6:45	BOS	2	7:35	12m	Y467	2	F003+F004	
Y462	BOS	1	7:42	FRA		8:15	12m	X540	1	F009	possibly couple to F008 for extra seats on X540
X465	FRA		7:17	BOS	1	7:45	12m	Y477	1	F010	
Y467	BOS	2	7:47	WUS		8:45		OOS	2	F003+F004	need to identify storage location, maybe deadhead to Fountain St.; by preference we'd like to have 4 tph peak service westbound to serve Worcester commuters so short-turning this train is undesirable

Train	from	plt	departs	to	plt	arrives	layover	becomes	units	equipment	notes
X470	WUS		7:00	BOS	2	7:50	12m	Y482	2	F006+F007	
Y477	BOS	1	7:57	FRA		8:30	12m	X555	1	F010	
X480	FRA		7:27	BOS	1	8:00	12m	Y492	1	F001	
Y482	BOS	2	8:02	WUS		9:00	17m	X615	2	F006+F007	
X485	WUS		7:15	BOS	2	8:05	12m	Y497	2	W001+W002	
Y492	BOS	1	8:12	FRA		8:45	12m	X570	1	F001	
X495	FRA		7:42	BOS	1	8:15	12m	Y507	1	F002	
Y497	BOS	2	8:17	FRA		8:50		OOS	2	W001+W002	stored midday at Fountain St.
X500	WUS		7:30	BOS	2	8:20	12m	Y512	2	W003+W004	
Y507	BOS	1	8:27	FRA		9:00		OOS	1	F002	stored midday at Fountain St.
X510	FRA		7:57	BOS	1	8:30	12m	Y522	1	F005	
Y512	BOS	2	8:32	WUS		9:30	17m	X645	2	W003+W004	
X515	WUS		7:45	BOS	2	8:35	12m	Y527	2	W005+W006	
Y522	BOS	1	8:42	FRA		9:15	12m	X600	1	F005	
X525	FRA		8:12	BOS	1	8:45	12m	Y537	1	F008	
Y527	BOS	2	8:47	FRA		9:20		OOS	2	W005+W006	stored midday at Fountain St.
X530	WUS		8:00	BOS	2	8:50	12m	Y542	2	W007+W008	
Y537	BOS	1	8:57	FRA		9:30		OOS	1	F008	stored midday at Fountain St.
X540	FRA		8:27	BOS	1	9:00	12m	Y552	1	F009	
Y542	BOS	2	9:02	WUS		10:00	17m	X675	2	W007+W008	
X545	WUS		8:15	BOS	2	9:05	12m	Y557	2	W009+W010	
Y552	BOS	1	9:12	FRA		9:45	12m	X630	1	F009	
X555	FRA		8:42	BOS	1	9:15	12m	Y567	1	F010	
Y557	BOS	2	9:17	FRA		9:50		OOS	2	W009+W010	stored midday at Fountain St.
X560	WUS		8:30	BOS	2	9:20	12m	Y572	2	W011+W012	
Y567	BOS	1	9:27	FRA		10:00		OOS	1	F010	stored midday at Fountain St.
X570	FRA		8:57	BOS	1	9:30	12m	Y582	1	F001	
Y572	BOS	2	9:32	WUS		10:30	17m	X705	2	W011+W012	
Y582	BOS	1	9:42	FRA		10:15	12m	X660	1	F001	
X585	WUS		8:47	BOS	2	9:45	12m	Y597	2	S001+S002	
Y597	BOS	2	9:57	WUS		10:55	22m	X735	2	S001+S002	
X600	FRA		9:27	BOS	1	10:00	12m	Y612	1	F005	
Y612	BOS	1	10:12	FRA		10:50	7m	X690	1	F005	***NB short 7 minute turnaround***
X615	WUS		9:17	BOS	2	10:15	12m	Y627	2	F006+F007	
Y627	BOS	2	10:27	WUS		11:25	22m	X765	2	F006+F007	
X630	FRA		9:57	BOS	1	10:30	12m	Y642	1	F009	
Y642	BOS	1	10:42	FRA		11:15	12m	X720	1	F009	
X645	WUS		9:47	BOS	2	10:45	12m	Y657	2	W003+W004	
Y657	BOS	2	10:57	WUS		11:55	22m	X795	2	W003+W004	
X660	FRA		10:27	BOS	1	11:00	12m	Y672	1	F001	
Y672	BOS	1	11:12	FRA		11:45	12m	X750	1	F001	
X675	WUS		10:17	BOS	2	11:15	12m	Y687	2	W007+W008	
Y687	BOS	2	11:27	WUS		12:25	22m	X825	2	W007+W008	
X690	FRA		10:57	BOS	1	11:30	12m	Y702	1	F005	
Y702	BOS	1	11:42	FRA		12:15	12m	X780	1	F005	
X705	WUS		10:47	BOS	2	11:45	12m	Y717	2	W011+W012	
Y717	BOS	2	11:57	WUS		12:55	22m	X855	2	W011+W012	

Train	from	plt	departs	to	plt	arrives	layover	becomes	units	equipment	notes
X720	FRA		11:27	BOS	1	12:00	12m	Y732	1	F009	
Y732	BOS	1	12:12	FRA		12:45	12m	X810	1	F009	
X735	WUS		11:17	BOS	2	12:15	12m	Y747	2	S001+S002	
Y747	BOS	2	12:27	WUS		13:25		X885	2	S001+S002	
X750	FRA		11:57	BOS	1	12:30	12m	Y762	1	F001	
Y762	BOS	1	12:42	FRA		13:15		X840	1	F001	
X765	WUS		11:47	BOS	2	12:45	12m	Y777	2	F006+F007	
Y777	BOS	2	12:57	WUS		13:55		X915	2	F006+F007	
X780	FRA		12:27	BOS	1	13:00	12m	Y792	1	F005	
Y792	BOS	1	13:12	FRA		13:45		X780	1	F005	
X795	WUS		12:17	BOS	2	13:15	12m	Y807	2	W003+W004	
Y807	BOS	2	13:27	WUS		14:25		X945	2	W003+W004	
X810	FRA		12:57	BOS	1	13:30	12m	Y822	1	F009	
Y822	BOS	1	13:42	FRA		14:15		X900	1	F009	
X825	WUS		12:47	BOS	2	13:45	12m	Y837	2	W007+W008	
Y837	BOS	2	13:57	WUS		14:55		X960	2	W007+W008	
X840	FRA		13:27	BOS	1	14:00		Y852	1	F001	
X855	WUS		13:17	BOS	2	14:15		Y867	2	W011+W012	
	pattern continues until around 15:45 when stored trains are restarted to initiate PM rush service									total unit requirement: 24	
										overnight storage requirement: 2 at SHSY, 12 at Worcester layover, 10 at Fountain St. layover (units coded by overnight storage location)	
										midday storage requirement: 2 at Worcester (or Fountain St.), 9 at Fountain St.	
										platform requirements: 2 at South Station (peak only), 2 at Worcester (1 existing)	

Full schedule, "zone express" scenario, inbound trips only

	X300	X308	X315	X323	X330	X338	X345	X353	X360	X368	X375	X383	X390	X398	X405	X413	X420	X425	X435	X440	X450	X455	X465
Worcester Union		4:10		4:25		4:40		4:55		5:10		5:25		5:40		5:55		6:15		6:30		6:45	
Biotech Park		4:13		4:28		4:43		4:58		5:13		5:28		5:43		5:58		6:18		6:33		6:48	
Grafton		4:20		4:35		4:50		5:05		5:20		5:35		5:50		6:05		6:25		6:40		6:55	
Westborough		4:24		4:39		4:54		5:09		5:24		5:39		5:54		6:09		6:29		6:44		6:59	
Southborough		4:28		4:43		4:58		5:13		5:28		5:43		5:58		6:13		6:33		6:48		7:03	
Ashland		4:32		4:47		5:02		5:17		5:32		5:47		6:02		6:17		6:37		6:52		7:07	
Framingham	4:27	4:35	4:42	4:50	4:57	5:05	5:12	5:20	5:27	5:35	5:42	5:50	5:57	6:05	6:12	6:20	6:27	6:40	6:42	6:55	6:57	7:10	7:12
West Natick	4:30	4:38	4:45	4:53	5:00	5:08	5:15	5:23	5:30	5:38	5:45	5:53	6:00	6:08	6:15	6:23	6:30	6:43	6:45	6:58	7:00	7:13	7:15
Natick Center	4:33	4:40	4:48	4:55	5:03	5:10	5:18	5:25	5:33	5:40	5:48	5:55	6:03	6:10	6:18	6:25	6:33		6:48		7:03		7:18
Wellesley Square	4:36	4:44	4:51	4:59	5:06	5:14	5:21	5:29	5:36	5:44	5:51	5:59	6:06	6:14	6:21	6:29	6:36		6:51		7:06		7:21
Wellesley Hills	4:38	4:46	4:53	5:01	5:08	5:16	5:23	5:31	5:38	5:46	5:53	6:01	6:08	6:16	6:23	6:31	6:38		6:53		7:08		7:23
Wellesley Farms	4:40	4:48	4:55	5:03	5:10	5:18	5:25	5:33	5:40	5:48	5:55	6:03	6:10	6:18	6:25	6:33	6:40		6:55		7:10		7:25
Auburndale	4:43	4:51	4:58	5:06	5:13	5:21	5:28	5:36	5:43	5:51	5:58	6:06	6:13	6:21	6:28	6:36	6:43		6:58		7:13		7:28
West Newton	4:45	4:53	5:00	5:08	5:15	5:23	5:30	5:38	5:45	5:53	6:00	6:08	6:15	6:23	6:30	6:38	6:45		7:00		7:15		7:30
Newtonville	4:47	4:55	5:02	5:10	5:17	5:25	5:32	5:40	5:47	5:55	6:02	6:10	6:17	6:25	6:32	6:40	6:47		7:02		7:17		7:32
Boston Landing	4:51	4:59	5:06	5:14	5:21	5:29	5:36	5:44	5:51	5:59	6:06	6:14	6:21	6:29	6:36	6:44	6:51	6:56	7:06	7:11	7:21	7:26	7:36
West Station	4:53	5:01	5:08	5:16	5:23	5:31	5:38	5:46	5:53	6:01	6:08	6:16	6:23	6:31	6:38	6:46	6:53	6:58	7:08	7:13	7:23	7:28	7:38
Yawkey	4:55	5:03	5:10	5:18	5:25	5:33	5:40	5:48	5:55	6:03	6:10	6:18	6:25	6:33	6:40	6:48	6:55	7:00	7:10	7:15	7:25	7:30	7:40
Back Bay	4:58	5:06	5:13	5:21	5:28	5:36	5:43	5:51	5:58	6:06	6:13	6:21	6:28	6:36	6:43	6:51	6:58	7:03	7:13	7:18	7:28	7:33	7:43
South Station	5:00	5:08	5:15	5:23	5:30	5:38	5:45	5:53	6:00	6:08	6:15	6:23	6:30	6:38	6:45	6:53	7:00	7:05	7:15	7:20	7:30	7:35	7:45

(Note: The X308 column header and all of its time values appear with strikethrough formatting.)

	X470	X480	X485	X495	X500	X510	X515	X525	X530	X540	X545	X555	X560	X570	X585	X600	X615	X630	X645	X660	X675	X690	X705
Worcester Union	7:00		7:15		7:30		7:45		8:00		8:15		8:30		8:47		9:17		9:47		10:17		10:47
Biotech Park	7:03		7:18		7:33		7:48		8:03		8:18		8:33		8:50		9:20		9:50		10:20		10:50
Grafton	7:10		7:25		7:40		7:55		8:10		8:25		8:40		8:57		9:27		9:57		10:27		10:57
Westborough	7:14		7:29		7:44		7:59		8:14		8:29		8:44		9:01		9:31		10:01		10:31		11:01
Southborough	7:18		7:33		7:48		8:03		8:18		8:33		8:48		9:05		9:35		10:05		10:35		11:05
Ashland	7:22		7:37		7:52		8:07		8:22		8:37		8:52		9:09		9:39		10:09		10:39		11:09
Framingham	7:25	7:27	7:40	7:42	7:55	7:57	8:10	8:12	8:25	8:27	8:40	8:42	8:55	8:57	9:12	9:27	9:42	9:57	10:12	10:27	10:42	10:57	11:12
West Natick	7:28	7:30	7:43	7:45	7:58	8:00	8:13	8:15	8:28	8:30	8:43	8:45	8:58	9:00	9:15	9:30	9:45	10:00	10:15	10:30	10:45	11:00	11:15
Natick Center		7:33		7:48		8:03		8:18		8:33		8:48		9:03	9:17	9:33	9:47	10:03	10:17	10:33	10:47	11:03	11:17
Wellesley Square		7:36		7:51		8:06		8:21		8:36		8:51		9:06	9:21	9:36	9:51	10:06	10:21	10:36	10:51	11:06	11:21
Wellesley Hills		7:38		7:53		8:08		8:23		8:38		8:53		9:08	9:23	9:38	9:53	10:08	10:23	10:38	10:53	11:08	11:23
Wellesley Farms		7:40		7:55		8:10		8:25		8:40		8:55		9:10	9:25	9:40	9:55	10:10	10:25	10:40	10:55	11:10	11:25
Auburndale		7:43		7:58		8:13		8:28		8:43		8:58		9:13	9:28	9:43	9:58	10:13	10:28	10:43	10:58	11:13	11:28
West Newton		7:45		8:00		8:15		8:30		8:45		9:00		9:15	9:30	9:45	10:00	10:15	10:30	10:45	11:00	11:15	11:30
Newtonville		7:47		8:02		8:17		8:32		8:47		9:02		9:17	9:32	9:47	10:02	10:17	10:32	10:47	11:02	11:17	11:32
Boston Landing	7:41	7:51	7:56	8:06	8:11	8:21	8:26	8:36	8:41	8:51	8:56	9:06	9:11	9:21	9:36	9:51	10:06	10:21	10:36	10:51	11:06	11:21	11:36
West Station	7:43	7:53	7:58	8:08	8:13	8:23	8:28	8:38	8:43	8:53	8:58	9:08	9:13	9:23	9:38	9:53	10:08	10:23	10:38	10:53	11:08	11:23	11:38
Yawkey	7:45	7:55	8:00	8:10	8:15	8:25	8:30	8:40	8:45	8:55	9:00	9:10	9:15	9:25	9:40	9:55	10:10	10:25	10:40	10:55	11:10	11:25	11:40
Back Bay	7:48	7:58	8:03	8:13	8:18	8:28	8:33	8:43	8:48	8:58	9:03	9:13	9:18	9:28	9:43	9:58	10:13	10:28	10:43	10:58	11:13	11:28	11:43
South Station	7:50	8:00	8:05	8:15	8:20	8:30	8:35	8:45	8:50	9:00	9:05	9:15	9:20	9:30	9:45	10:00	10:15	10:30	10:45	11:00	11:15	11:30	11:45

Full schedule, "zone express" scenario, outbound trips only

	Y312	Y320	Y327	Y335	Y342	Y350	Y357	Y365	Y372	Y380	Y387	Y395	Y402	Y410	Y417	Y423	Y432	Y437	Y447	Y452	Y462	Y467	Y477
South Station	5:12	5:20	5:27	5:35	5:42	5:50	5:57	6:05	6:12	6:20	6:27	6:35	6:42	6:50	6:57	7:03	7:12	7:17	7:27	7:32	7:42	7:47	7:57
***																							
Framingham	5:45	5:53	6:00	6:08	6:15	6:23	6:30	6:38	6:45	6:53	7:00	7:08	7:15	7:23	7:30	7:36	7:45	7:50	8:00	8:05	8:15	8:20	8:30
***																							
Worcester		6:18		6:33		6:48		7:03		7:18		7:33		7:48		8:01		8:15		8:30		8:45	
																						OOS	

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	Y482	Y492	Y497	Y507	Y512	Y522	Y527	Y537	Y542	Y552	Y557	Y567	Y572	Y582	Y597	Y612	Y627	Y642	Y657	Y672	Y687	Y702	Y717
South Station	8:02	8:12	8:17	8:27	8:32	8:42	8:47	8:57	9:02	9:12	9:17	9:27	9:32	9:42	9:57	10:12	10:27	10:42	10:57	11:12	11:27	11:42	11:57
***																							
Framingham	8:35	8:45	8:50	9:00	9:05	9:15	9:20	9:30	9:35	9:45	9:50	10:00	10:05	10:15	10:30	10:45	11:00	11:15	11:30	11:45	12:00	12:15	12:30
***			OOS	OOS			OOS	OOS			OOS	OOS											
Worcester	9:00				9:30				10:00				10:30		10:55		11:25		11:55		12:25		12:55

Inbound Framingham/Worcester Line EMU times per Alon Levy, express service from West Natick to Boston Landing

km	station	time from prev (s)	station time (s)	total time (s)	time with 7% pad	minute	time ahead	current P504
71.3	Worcester Union			0				
68.8	Biotech Park	103	55	158	169.06	3	0	infill
58.7	Grafton	276	72	506	541.42	10	0	13
51.5	Westborough	166	75	747	799.29	14	0	17
44.2	Southborough	172	68	987	1056.09	18	0	26
39.0	Ashland	144	65	1196	1279.72	22	0	30
34.3	Framingham	131	67	1394	1491.58	25	0	40
32.1	West Natick	57	68	1519	1625.33	28	0	46
28.5	Natick Center	93	0	1612	1724.84	29	2	
23.8	Wellesley Square	121	0	1733	1854.31	31	3	
21.8	Wellesley Hills	66	0	1799	1924.93	33	4	
20.3	Wellesley Farms	49	0	1848	1977.36	33	5	
16.9	Auburndale	88	0	1936	2071.52	35	6	
15.2	West Newton	47	0	1983	2121.81	36	7	
13.3	Newtonville	53	0	2036	2178.52	37	9	
7.5	Boston Landing	175	55	2266	2424.62	41	9	
6.2	West Station	47	55	2368	2533.76	43	9	
4.0	Yawkey	80	55	2503	2678.21	45	9	69
2.1	Back Bay	99	55	2657	2842.99	48	9	74
0	South Station	98	0	2755	2947.85	50	9	80
				assumes 25s dwell at each stop; remaining time is acceleration				

Inbound Framingham/Worcester Line EMU times per Alon Levy, superexpress service from Worcester to Boston Landing

km	station	time from prev (s)	station time (s)	total time (s)	time with 7% pad	minute	time ahead	current P552	
71.3	Worcester Union			0					
68.8	Biotech Park	103	55	158	169.06	3	0	infill	
58.7	Grafton	276	0	434	464.38	8	2		
51.5	Westborough	166	0	600	642	11	3		
44.2	Southborough	172	0	772	826.04	14	4		
39.0	Ashland	144	0	916	980.12	17	5		
34.3	Framingham	131	67	1114	1191.98	20	5		
32.1	West Natick	57	0	1171	1252.97	21	7		
28.5	Natick Center	93	0	1264	1352.48	23	8		
23.8	Wellesley Square	121	0	1385	1481.95	25	9		
21.8	Wellesley Hills	66	0	1451	1552.57	26	10		
20.3	Wellesley Farms	49	0	1500	1605	27	11		
16.9	Auburndale	88	0	1588	1699.16	29	12		
15.2	West Newton	47	0	1635	1749.45	30	14		
13.3	Newtonville	53	0	1688	1806.16	31	15		
7.5	Boston Landing	175	55	1918	2052.26	35	15		
6.2	West Station	47	55	2020	2161.4	37	15	infill	
4.0	Yawkey	80	55	2155	2305.85	39	15		55
2.1	Back Bay	99	55	2309	2470.63	42	15		60
0	South Station	98	0	2407	2575.49	43	15		66
				assumes 25s dwell at each stop; remaining time is acceleration					

Inbound Framingham/Worcester Line EMU times per Alon Levy, infill stations omitted, Framingham short-turn

km	station	time from prev (s)	station time (s)	total time (s)	time with 7% pad	minute	current P512	savings			
71.3	Worcester Union										
68.8	Biotech Park										
58.7	Grafton										
51.5	Westborough										
44.2	Southborough										
39.0	Ashland										
34.3	Framingham	0	0	0	0	0	41	41			
32.1	West Natick	57	68	125	133.75	3	46	43			
28.5	Natick Center	93	68	286	306.02	6	51	45			
23.8	Wellesley Square	121	63	470	502.9	9	56	47			
21.8	Wellesley Hills	66	58	594	635.58	11	60	49			
20.3	Wellesley Farms	49	64	707	756.49	13	63	50			
16.9	Auburndale	88	67	862	922.34	16	68	52			
15.2	West Newton	47	65	974	1042.18	18	71	53			
13.3	Newtonville	53	65	1092	1168.44	20	74	54			
7.5	Boston Landing	175	55	1322	1414.54	24	79	55			
6.2	West Station	47	55	1424	1523.68	26	infill	infill			
4.0	Yawkey	80	55	1559	1668.13	28	84	56			
2.1	Back Bay	99	55	1713	1832.91	31	89	58			
0	South Station	98	0	1811	1937.77	33	94	61			
			25s dwell at each stop; remaining time is acceleration penalty if I understand Alon correctly								

Inbound Framingham/Worcester Line EMU times per Alon Levy, infill stations omitted, Riverside Jct. short-turn

km	station	time from prev (s)	station time (s)	total time (s)	time with 7% pad	minute						
71.3	Worcester Union											
68.8	Biotech Park											
58.7	Grafton											
51.5	Westborough											
44.2	Southborough											
39.0	Ashland											
34.3	Framingham											
32.1	West Natick											
28.5	Natick Center											
23.8	Wellesley Square											
21.8	Wellesley Hills											
20.3	Wellesley Farms											
16.9	Auburndale	0	0	0	0	0						
15.2	West Newton	47	65	112	119.84	2						
13.3	Newtonville	53	65	230	246.1	5						
7.5	Boston Landing	175	55	460	492.2	9						
6.2	West Station	47	55	562	601.34	11						
4.0	Yawkey	80	55	697	745.79	13						
2.1	Back Bay	99	55	851	910.57	16						
0	South Station	98	0	949	1015.43	17						
			25s dwell at each stop; remaining time is acceleration penalty if I understand Alon correctly									

2012 CTPS F/W inbound passenger loads, by arrival time at South Station

km	departing station	6:31	7:08	7:46	8:11	8:23	8:56	9:08	9:35	10:00	12:05
71.3	Worcester Union	21	136	49	65	199		129		81	42
58.7	Grafton	30	199	75	92	326		179		108	45
51.5	Westborough	43	293	99	125	500		255		124	53
44.2	Southborough	58	379	120	165	630		328		146	60
39.0	Ashland	68	470	153	216	789		380		159	62
34.3	Framingham	91	594	233	313	952	75	421	47	199	80
32.1	West Natick	126	737	334	401	1066	166	451	84	249	100
28.5	Natick Center	156		413	465	1171	250	485	105	273	119
23.8	Wellesley Square	179		513	560		331	524	130	288	135
21.8	Wellesley Hills	194		558	610		363	537	140	289	137
20.3	Wellesley Farms	205		602	691		403	571	159	298	141
16.9	Auburndale	217		638	728		445		166		142
15.2	West Newton	221		671	758		498		184		145
13.3	Newtonville	249		715	800		569		207		148
4.0	Yawkey	222	616	632	710		477				
2.1	Back Bay	161	439	359	392	647	332	279	119	201	76

2012 CTPS F/W inbound net boardings, by arrival time at South Station

km	departing station	6:31	7:08	7:46	8:11	8:23	8:56	9:08	9:35	10:00	12:05
71.3	Worcester Union	21	136	49	65	199		129		81	42
58.7	Grafton	9	63	26	27	127		50		27	3
51.5	Westborough	13	94	24	33	174		76		16	8
44.2	Southborough	15	86	21	40	130		73		22	7
39.0	Ashland	10	91	33	51	159		52		13	2
34.3	Framingham	23	124	80	97	163	75	41	47	40	18
32.1	West Natick	35	143	101	88	114	91	30	37	50	20
28.5	Natick Center	30		79	64	105	84	34	21	24	19
23.8	Wellesley Square	23		100	95		81	39	25	15	16
21.8	Wellesley Hills	15		45	50		32	13	10	1	2
20.3	Wellesley Farms	11		44	81		40	34	19	9	4
16.9	Auburndale	12		36	37		42		7		1
15.2	West Newton	4		33	30		53		18		3
13.3	Newtonville	28		44	42		71		23		3
4.0	Yawkey	-27	-121	-83	-90		-92				
2.1	Back Bay	-61	-177	-273	-318	-524	-145	-292	-88	-97	-72