

Somebody's Watching Me: Using Big Data to Create Commuter Xpress Service Running Times

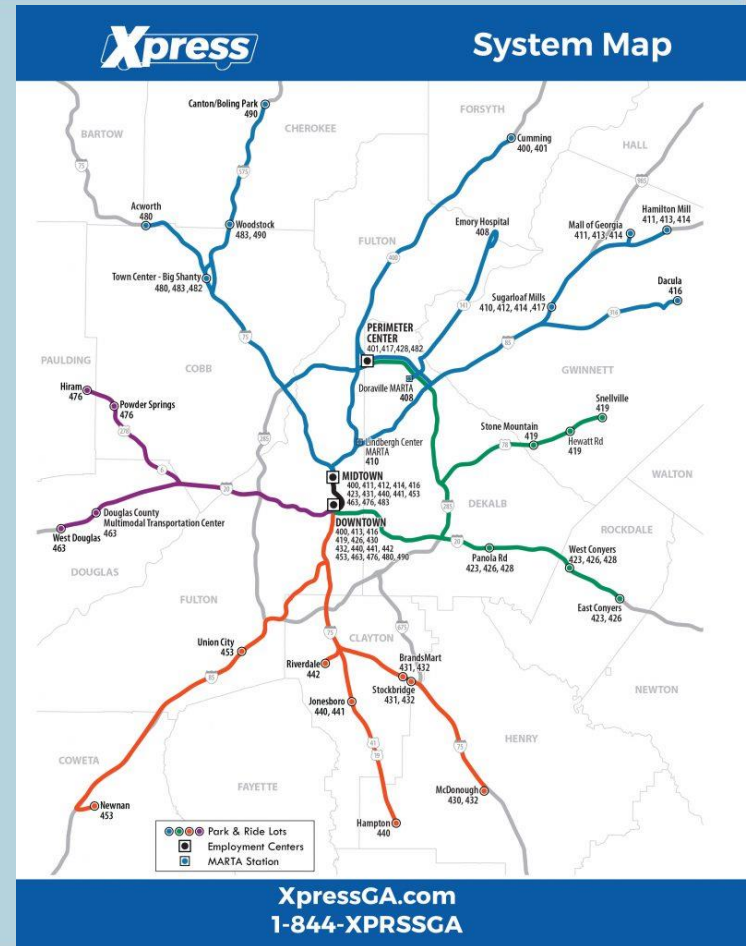
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GRTA at a Glance

- 12 Metro Atlanta Counties
- 27 Xpress Routes
- 166 Buses
- 27 Park & Rides
- 3 Primary Employment Centers
 - Downtown Atlanta
 - Midtown Atlanta
 - Perimeter Center
- 1.8 Million Annual Passenger Trips
- 7,100 Daily Passenger Trips



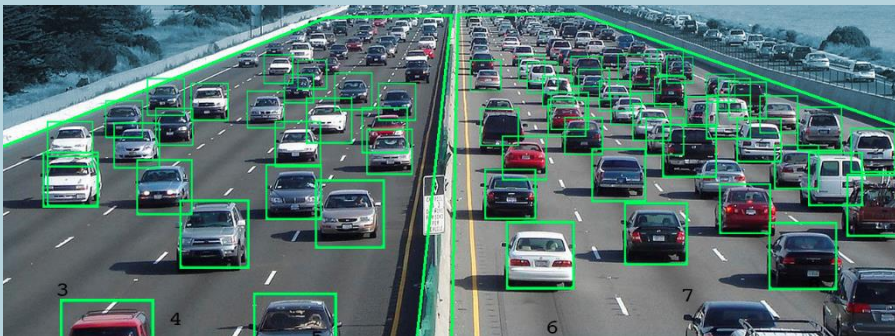
Background

- GRTA Xpress Introduced in 2003
- Comprehensive Operations Analysis Conducted 2014-2015
- Horizon 1 (First Phase) Implemented September 6, 2016
- No Major Review of Running Times Since Service Introduction
- Complete Service Restructure Necessitated a Comprehensive Rebuild of Running Times



What is INRIX?

- Global Provider of Real-Time Traffic and Travel Time Data
- Data Sources
 - Roadway Sensors
 - Traffic Monitoring Cameras
 - GPS Navigation Systems
 - Mobile Phones



INRIX Data

NAME	Column1	MILES	5 AM	6 AM	7 AM	8 AM	9 AM	10 AM	11 AM	12 PM	1 PM	2 PM	3 PM	4 PM	5 PM	6 PM	7 PM	8 PM
I-75 & I-85 SPLIT (NORTH)/I		0.564014	69.76	64.94	47.56	38.53	50.97	62.27	61.24	60.59	59.85	60	56.01	51.41	50.3	48.63	56.85	55.1
10TH ST/NB EXIT 250		0.290082	66.99	61.64	42.02	35.45	48.71	59.83	59.02	57.09	55.86	55.49	48.84	44.09	43.37	42.02	50.83	45.97
10TH ST/NB EXIT 250		0.141163	66.16	60.46	40.87	35.7	47.74	53.71	57.31	53.91	52.43	51.9	44.08	39.59	39.54	38.92	46.52	45.87
US-78/US-278/US-29/SB EX		0.278679	64.97	57.27	38.42	34.48	46.26	48.44	55.28	48.57	46.97	45.34	34.86	31.06	31.7	32.28	40.55	43.65
US-78/US-278/US-29/SB EX		0.004176	65.52	55.33	36.57	33.37	45.87	46.52	55.11	45	43.22	41.84	29	25.19	26.47	28.37	38.49	42.2
WILLIAMS ST/SB EXIT 249C		0.515725	65.79	55.69	36.29	32.94	45.48	46.77	55	44.62	43.08	42.28	29.63	25.43	26.89	29.13	39.18	43.31
WILLIAMS ST/SB EXIT 249C		0.009694	66.28	54.68	34.65	31.61	44.42	46.41	53.93	41.99	40.78	40.8	28.08	23.4	25.88	29.04	39.8	44.46
SPRING ST/NB EXIT 249D		0.415978	66.11	55.38	35.95	32.74	45.48	46.52	55.15	44.11	42.78	41.93	28.96	24.82	26.44	28.86	39.2	43.2
SPRING ST/NB EXIT 249D		0.107185	64.84	53.93	34.09	31.28	43.88	45.92	53.21	42.37	42.33	40.61	28.33	23.38	26.02	29.71	39.51	45.24
PINE ST/PEACHTREE ST/NB		0.079235	64.39	53.04	33.55	30.82	42.67	44.6	51.56	41.48	41.54	39.87	28.4	23.3	26	30.18	39.25	45.34
PINE ST/PEACHTREE ST/NB		0.202775	66.36	52.51	29.84	27.67	38.15	42.37	48.13	39.58	39.52	36.94	27.58	22.55	25.43	30.17	39.47	47.76
GA-10/FREEDOM PKWY/SB		0.666526	63.4	46.63	19.96	18.26	26.3	34.49	39.37	32.71	31.14	27.65	19.91	16.14	19.65	24.47	35.89	46.31
GA-10/FREEDOM PKWY/SB		0.032978	62.53	44.24	18.46	16.5	25.33	34.77	40.46	33.65	31.63	27.9	20	16.25	20.43	26.69	37.43	46.99
JESSE HILL JR DR NE/JOHN 1		0.300521	63.16	48.02	22.07	20.63	28.51	34.79	39.72	33.02	31.62	28.52	21.01	17.2	20.45	24.85	35.4	45.96
JESSE HILL JR DR NE/JOHN 1		0.036122	65.15	46.13	19.27	17.91	25.45	34.45	38.53	32.16	30.38	26.69	19.12	15.26	18.56	23.23	35.37	46.32
GA-10/FREEDOM PKWY/NE		0.329883	63.41	45.23	18.44	16.6	24.63	34.23	39.2	32.61	30.68	26.98	19.11	15.32	19.01	24.32	36.42	46.72
GA-10/FREEDOM PKWY/NE		0.042684	62.51	44.28	18.47	16.5	25.33	34.51	40.45	33.64	31.59	27.89	19.99	16.29	20.53	26.75	37.47	47.03
EDGEWOOD AVE/NB EXIT 2		0.208685	62.84	45.49	20.17	19.51	26.82	35.54	41.23	34.77	33.32	28.69	20.13	17.54	22.55	29.47	39.1	47.77
EDGEWOOD AVE/NB EXIT 2		0.115798	61.17	43.8	18.12	17.55	25.26	35.04	41.49	33.73	32.59	28.25	19.59	17.2	21.81	31.06	39.55	46.78
MARTIN LUTHER KING DR/S		0.263393	62.7	43.32	16.39	16.16	24.06	35	42.1	33.11	31.77	27.58	18.42	16.47	20.32	32.24	41.35	47.22
MARTIN LUTHER KING DR/S		0.010595	63.96	44.97	15.87	16.09	24.15	36.65	44.04	34.01	32.28	28.02	18.33	16.61	19.6	33.68	43.88	48.54
I-20/SB EXIT 247		0.062687	60.6	44.38	15.69	15.78	23.42	34.22	40.59	32.44	31.11	26.9	17.91	16.15	19.1	31.53	41.41	46.32
I-20/SB EXIT 247		0.197618	63.94	45.02	15.49	15.88	23.71	36.54	44.26	33.71	32.13	28.18	18.16	16.88	19.79	34.36	45.05	48.94
FULTON ST/SB EXIT 246		0.399734	67.66	45.09	14.37	14.74	22.76	37.61	47.57	34.83	33.51	30	19.34	18.79	24.94	37.86	52.05	52.02
FULTON ST/SB EXIT 246		0.022228	64.67	43.83	13.98	14.36	22.61	38.86	47.86	36.22	35.59	31.02	21.05	20.58	27.88	38.79	51.92	50.27
I-20/MEMORIAL DR/NB EXI		0.102649	65.99	41.41	14.35	14.87	24.82	39.69	49.5	40.22	39.92	34.78	26.06	25.57	32.85	41.37	52.71	53.58
FULTON ST/CENTRAL AVE/I		0.058679	65.51	36.5	12.74	13.63	23.16	37.56	47.33	37.08	37.55	31.13	23.64	24.7	30.08	36.77	51.19	58.28
PRYOR ST/NB EXIT 245		0.246888	65.81	35.72	12.54	13.51	23.36	38.49	48.61	37.82	38.15	31.27	23.5	24.5	30.26	36.48	51.3	59.4
PRYOR ST/NB EXIT 245		0.170674	65.03	34.45	12.23	13.62	24.52	39.72	51.08	40.54	38.98	32.17	25.07	25.35	31.78	37.17	51.01	60.49
UNIVERSITY AVE/EXIT 244		0.501383	64.98	35.9	12.96	14.69	28.45	44.03	55.84	45.44	42.5	36.25	29.74	28.7	36.26	41.16	54.19	60.46
UNIVERSITY AVE/EXIT 244		1.04018	64.54	39.7	15.25	18.88	39.65	53.95	60.81	51.12	52.71	46.1	41.69	39.43	46.26	52.45	61.13	61.72
GA-166/LANGFORD PKWY/		0.727504	64.96	38.21	15.72	26.02	52.65	58.93	62.58	49.55	58.77	51.3	45.87	45.96	52.03	59.3	61.77	61.32

Running Time Methodology

- Develop Excel-Based Schedule-Building Model
- Assemble Corridor Segment Data in Hourly Increments
- Assign a Reasonable Penalty to Reflect Bus Speeds (-10%)
- Assume HOV Speeds to be 80% better than Mixed Traffic
- Assume HOT Speeds Maintained at 50 MPH
- Assume Appropriate Dwell Times
 - Implement PM Pay as you Exit
 - 30 Seconds at Stops
 - 5 Minutes at Park & Rides



ScheduleBuilder

- Running Times Built Segment-by-Segment in Hourly Windows

Route 401 Cumming/Perimeter Southbound

Segment	Dwells	Road	From	To	Distance	HOV/ HOT?	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM
0	P-I	Park & Ride	Cumming P&R (arrive)	Cumming P&R (depart)	0.00		5.0	5.0	5.0	5.0	5.0	5.0
55		P&R-GA 400	Cumming P&R (depart)	GA 400 & SR 20 Entr. Ramp	1.20		4.1	4.8	5.9	5.9	4.8	4.6
1000		GA 400	GA 400 & SR 20 Entr. Ramp	GA 400 & Old Milton Pkwy.	10.90		10.4	12.7	14.3	13.7	12.1	10.6
1001		GA 400	GA 400 & Old Milton Pkwy.	GA 400 & Abernathy Ramp	11.10		10.6	14.7	29.5	28.5	19.6	13.8
11	D-I	Abernathy Road	GA 400 & Abernathy Ramp	Sandy Springs MARTA Station	0.80		3.7	4.3	5.2	5.2	4.3	4.0
62	D-I	Perimeter Center W/Pkwy	Sandy Springs MARTA Station	Dunwoody MARTA Station	1.00		4.7	5.3	6.4	6.4	5.3	5.0
60	D-I	Perimeter Center Pkwy/Lake Hearn Dr	Dunwoody MARTA Station	Medical Center MARTA Station (arrive)	1.30		7.1	8.2	10.0	10.0	8.2	7.6
0	P-O	Rail Station	Medical Center MARTA Station (arrive)	Medical Center MARTA Station (depart)	0.00		5.0	5.0	5.0	5.0	5.0	5.0
TOTALS					26.30		51	60	81	80	64	55

ScheduleBuilder

- Running Times Translated into a Final Blocked Schedule

Route 401

Cumming/Perimeter Southbound

Block	Norcross Garage (Remington Park Court)	Inbound to Perimeter								Norcross Garage (Remington Park Court)	
		Cumming P&R (arrive)	Cumming P&R (depart)	GA 400 & SR 20 Entr. Ramp	GA 400 & Old Milton Pkwy.	GA 400 & Abernathy Ramp	Sandy Springs MARTA Station	Dunwoody MARTA Station	Medical Center MARTA Station (arrive)		Medical Center MARTA Station (depart)
		1	1				2	3	4	4	
40101	5:10 AM	5:45 AM	5:50 AM	5:54 AM	6:04 AM	6:19 AM	6:23 AM	6:28 AM	6:36 AM	6:41 AM	
40102	6:00 AM	6:35 AM	6:40 AM	6:45 AM	6:58 AM	7:13 AM	7:18 AM	7:24 AM	7:34 AM	7:39 AM	
40103	6:45 AM	7:20 AM	7:25 AM	7:31 AM	7:45 AM	8:15 AM	8:20 AM	8:26 AM	8:36 AM	8:41 AM	9:06 AM

Follow-Up

- Post-Implementation Review of On-Time Performance at 12 weeks
- Out of 327 Daily Trips, 8.54 Additional Revenue Hours Needed
- Equates to 1.6 Minutes Variance per Trip
- Worst Cases:
 - 30 Minute Shortfall
 - 12 Minute Excess



Questions?

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