

Appendix E

**Robert Cervero,
St. Louis MetroLink South Ridership Forecasts:
Second Revised Estimates for Modified Alignments
Using Local and National “Direct” Ridership
Forecasting Models
(August 2004)**

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August 2004

1. Introduction

As planning for the St. Louis MetroLink South proposal has progressed, proposed alignments and station sitings and conditions have been modified. Year-2025 land-use scenarios – for both the baseline case (LUAM) and transit-oriented development (TOD) conditions – have also been altered. Also, changes have been made to input assumptions regarding parking and inter-station distances. In light of these changes, this technical memo presents the second set of revised ridership forecasts using both the “local” (i.e., derived from existing St. Louis MetroRail experiences) and “national” (i.e., derived from 314 light rail stations in North America) direct ridership models. See two earlier technical memos for details on the methodologies, assumptions, and preliminary forecasts of these two ridership models.¹

2. Revised Forecasts Using Local Model

Using the locally derived model, Table 1 presents revised “baseline” year-2025 station-level and total-line forecasts for five alternatives: Blue Butler Hill alternative, the Purple and Blue Watson alternatives, Orange Butler Hill alternative, and Orange Reavis Barracks alternative. (*Note: For this exercise, the Purple and the Blue Watson alternative are treated as the same.*) Table 2 presents revised data for the year-2025 TOD scenario. Estimated daily ridership represents 15.5% of estimated weekly ridership based on year-2001 experiences for the entire St. Louis MetroLink System.

Compared to the earlier Blue Butler Hill alternative forecasts, estimated year-2025 ridership levels are considerably higher mainly due to higher assumed parking supplies at the Butler Hill Station. Forecasted ridership levels are higher for the Watson station but lower for the Gravois and Green Park stations. For the Orange Butler Hill alternative, forecasts remain virtually unchanged from prior estimates for the Gravois and Bayless stations; however they fall sharply for South County and rise markedly for Butler Hill due mainly from the transfer of parking to the terminus under the revised assumptions. Similarly for the Orange Reavis Barracks alternative, estimate ridership at Reavis Barracks jumps because of the assumed increase in park-and-ride supplies. The relatively high ridership forecasts for the Watson station in the Purple/Blue Watson alternatives derive significantly from the Watson station’s assumed status as a terminal (end-line) station.

The TOD scenario produces ridership gains for the Blue Butler Hill alternative, Purple/Blue Watson alternatives, and both Orange alternatives relative to the original forecasts.² This is largely due to the densification of housing, particularly at the

¹ R. Cervero, *St. Louis MetroLink Station Ridership Model and Metro South Preliminary Station Ridership Forecasts*, January 2004; R. Cervero, *St. Louis MetroLink Station Ridership Forecasts Based on National Light Rail Transit Ridership Model*, January 2004.

² TOD scenarios call for lower housing densities for the South County station (both Blue Butler Hill alternative and Orange Butler Hill alternatives) and no changes relative to the baseline scenario for the Orange Reavis Barracks alternative.

Watson Station (Blue Butler Hill alternative scenario) and Butler Hill Station (Orange Butler Hill alternative Scenario), and secondarily to increased employment (leading to a higher mixed-use entropy index) for Blue Butler Hill alternative and Purple/Blue Watson alternatives stations as well as the Orange Butler Hill alternative's outer stations (South County and Butler Hill). The forecasted ridership increases of the TOD scenario relative to the baseline option are shown on Table 1.

Table 1. 2025 Forecasts of Weekly and Daily Station Boardings for Metro South Extension using “Local” Model, *Baseline Estimates*

		Housing	Housing	Mixed					Est. Weekly	Est. Daily
		<u>Units</u>	<u>Densities</u>	<u>Use</u>	<u>Terminal</u>	<u>Parking</u>	<u>Bus Rtes.</u>	<u>Veh/HH</u>	Boardings	Boardings
Blue	Butler Hill									
B1	Watson	1,073	2.134	0.944	0	150	1	1.44	5,378	834
B3	Gravois	2,523	5.020	0.844	0	150	3	1.61	7,733	1,199
B4	Green Park	657	1.308	0.906	0	0	3	1.63	2,694	418
B7A	South County	260	0.517	0.448	0	0	6	1.61	2,329	361
B8A	Butler Hill	1,708	3.398	0.770	1	1690	2	1.97	20,992	3,254
<i>Totals</i>									39,126	6,065
Purple/Blue Watson										
	Watson	1,073	2.134	0.944	1	20	1	1.44	13,368	2,072
Orange Butler Hill										
O2	Gravois	1,083	2.154	0.743	0	0	5	1.63	4,350	674
O2.5	Morganford	1,900	3.780	0.302	0	0	6	1.60	5,471	848
O3B	Bayless	1,641	3.264	0.610	0	0	5	1.57	5,672	879
O4	Reavis Barracks	2,096	4.171	0.453	0	180	5	1.56	7,394	1,146
O7C	South County	260	0.517	0.476	0	0	6	1.61	2,434	377
O8B	Butler Hill	1,708	3.398	0.755	1	1480	2	1.97	19,491	3,021
<i>Totals</i>									40,462	6,272
Orange Reavis Barracks										
O2	Gravois	1,083	2.154	0.743	0	0	5	1.63	4,350	674
O2.5	Morganford	1,900	3.780	0.302	0	0	6	1.60	5,471	848
O3B	Bayless	1,641	3.264	0.610	0	0	5	1.57	5,672	879
O4	Reavis Barracks	2,096	4.171	0.453	1	1480	5	1.56	25,213	3,908
<i>Totals</i>									40,706	6,309

Table 2. 2025 Forecasts of Weekly and Daily Station Boardings for Metro South Extension using “Local” Model, TOD Estimates

		Housing	Housing	Mixed					Est. Weekly	Est. Daily
		<u>Units</u>	<u>Densities</u>	<u>Use</u>	<u>Terminal</u>	<u>Parking</u>	<u>Bus Rtes.</u>	<u>Veh/HH</u>	<u>Boardings</u>	<u>Boardings</u>
Blue	Butler Hill									
B1	Watson	1,455	2.894	0.957	0	150	1	1.44	6,255	970
B3	Gravois	2,847	5.663	0.953	0	150	3	1.61	8,842	1,371
B4	Green Park	657	1.308	0.867	0	0	3	1.63	2,550	395
B7A	South County	240	0.478	0.633	0	0	6	1.61	2,979	462
B8A	Butler Hill	2,032	4.042	0.812	1	1690	2	1.97	21,852	3,387
<i>Totals</i>									42,478	6,584
Purple/Blue Watson										
	Watson	1,231	2.450	0.882	1	20	1	1.44	13,477	2,089
Orange Butler Hill										
O2	Gravois	1,083	2.154	0.743	0	0	5	1.63	4,350	674
O2.5	Morganford	1,900	3.780	0.302	0	0	6	1.60	5,471	848
O3B	Bayless	1,670	3.323	0.651	0	0	5	1.57	5,889	913
O4	Reavis Barracks	2,096	4.171	0.453	0	180	5	1.56	7,394	1,146
O7C	South County	240	0.478	0.633	0	0	6	1.61	2,979	462
O8B	Butler Hill	2,032	4.042	0.812	1	1480	2	1.97	20,408	3,163
<i>Totals</i>									42,142	6,532
Orange Reavis Barracks										
O2	Gravois	1,083	2.154	0.743	0	0	5	1.63	4,350	674
O2.5	Morganford	1,900	3.780	0.302	0	0	6	1.60	5,471	848
O3B	Bayless	1,641	3.264	0.610	0	0	5	1.57	5,672	879
O4	Reavis Barracks	2,096	4.171	0.453	1	1480	5	1.56	25,213	3,908
<i>Totals</i>									40,706	6,309

Blue Butler Hill alternative (8.6%); Purple/Blue Watson alternatives (0.8%); and Orange Butler Hill alternative (4.2%).

2. Revised Forecasts Using National Model

Tables 3 and 4 present the corresponding results (baseline and TOD scenarios, respectively) using the nationally derived model. In the case of the baseline scenarios, these updated forecasts are generally higher than those of the previous forecasts for the Blue Butler Hill alternative. However, they are lower for both Orange alternatives due to assumed reductions in parking supplies relative to the earlier forecast. Also, forecasts for the TOD scenarios are generally lower than those of the previous national-model estimates. Nevertheless, estimated year-2025 forecasts for the TOD scenarios using the national model are considerably higher than the baseline assumptions for all alternatives except the Orange Reavis Barracks alternative option: Blue Butler Hill alternative (7.4%); Purple (16.3%); and Orange Butler Hill alternative (3.8%).

3. Midpoint Estimates

The midpoint estimated ridership figures – averaging results from the local and national models – are shown in Tables 5 and 6 for the baseline and TOD scenarios, respectively. Except for the Butler Hill terminal station, the national model generally produced higher ridership estimates than the local model for the Blue Butler Hill alternative.. The national model also produced higher estimates for the Purple/Blue Watson alternatives. For the Orange Butler Hill alternative, however, the local model generated higher ridership for all but the South County station. For both models, ridership estimates for the Orange Butler Hill Gravois station were equivalent. The local model yielded significantly higher estimates for terminal stations of both Orange alternatives (i.e., Butler Hill or Reavis Barracks). Comparing midpoint values for the two year-2025 land-use options, the TOD scenario yielded the following ridership increases relative to the baseline scenario: Blue Butler Hill alternative (7.9%); Purple/Blue Watson alternatives (9.7%); Orange Butler Hill alternative (4.0%); and Orange Reavis Barracks alternative (0%).

4. Considerations

The TOD scenarios only modify land-use characteristics of ½-mile station rings – specifically, housing and employment densities. Other (non-land-use) variables in the forecasting model remain unchanged. Consideration could be given to altering other assumed values of TOD scenarios. For example, in the local model, average vehicle ownership rates are one of the predictive variables. Experiences show that those who live in TOD settings often reduce car ownership (usually in the form of giving up a second car), sometimes lowering the average number of vehicles per household in the 15% to 20% range.³ The Location Efficient Mortgage (LEM) principle is based on

³ J. Holtzclaw, R. Clear, H. Dittmar, D. Goldstein, and P. Haas, “Location Efficiency: Neighborhood and Socio-Economic Characteristics Determine Automobile Ownership and Use – Studies in Chicago, Los

the very principle that those living in TODs (i.e., efficient locations) are inclined to reduce their car ownership levels, and as a consequence ride transit more often and save enough money in the process to make it easier to afford to purchase a home. Similarly, the TOD scenarios might justify increasing assumed feeder bus levels of stations, a factor (in the local ridership model) that would further increase estimated ridership levels.

Angeles, and San Francisco”, *Transportation Planning and Technology*, Vol. 2, 2002, pp. 1-27; R. Cervero, et al., *Transit Oriented Development in America: Experiences, Challenges, and Prospects*, Washington, D.C.: Transit Cooperative Research Program, H-27, final report, 2004.

Table 3. 2025 Forecasts of Weekday Station Boardings for Metro South Extension using “National” Model, *Baseline Estimates*

		Terminal Station	Park & Ride	Distance Nearest Station	Distance to CBD	Housing Densities	Employment Densities	2025 Weekday Ridership Estimate
Blue	Butler Hill							
B1	Watson	0	1	1.14	12.77	2.13	5.14	1,146
B3	Gravois	0	1	1.96	15.05	5.02	3.34	1,362
B4	Green Park	0	0	0.98	17.01	1.31	2.30	572
B7A	South County	0	0	0.98	17.99	0.52	5.71	534
B8A	Butler Hill	1	1	2.13	20.12	3.40	1.73	2,683
<i>Totals</i>								6,297
Purple/Blue	Watson							
	Watson	1	1	1.37	12.77	2.13	5.14	2,795
Orange	Butler Hill							
O2	Gravois	0	0	0.73	14.22	2.15	1.25	594
O2.5	Morganford	0	0	0.73	14.95	3.78	0.30	633
O3B	Bayless Reavis	0	0	1.74	16.82	3.26	1.61	746
O4	Barracks	0	1	1.74	18.56	4.17	0.87	1,125
O7A	South County	0	0	1.99	20.55	0.52	5.71	598
O8A	Butler Hill	1	1	2.09	22.64	3.40	1.73	2,608
<i>Totals</i>								6,303
Orange	Reavis Barracks							
O2	Gravois	0	0	0.73	14.22	2.15	1.25	594
O2.5	Morganford	0	0	0.73	14.95	3.78	0.30	633
O3B	Bayless Reavis	0	0	1.74	16.82	3.26	1.61	746
O4	Barracks	1	1	1.74	18.56	4.17	0.87	2,644
<i>Totals</i>								4,617

Table 4. 2025 Forecasts of Weekday Station Boardings for Metro South Extension using “National” Model, *TOD Estimates*

		Terminal Station	Park & Ride	Distance Nearest Station	Distance to CBD	Housing Densities	Employment Densities	2025 Weekday Ridership Estimates
Blue	Butler Hill							
B1	Watson	0	1	1.14	12.77	2.89	6.13	1,260
B3	Gravois	0	1	1.96	15.05	5.66	5.01	1,480
B4	Green Park	0	0	0.98	17.01	1.31	2.30	572
B7A	South County	0	0	0.98	17.99	0.48	9.73	608
B8A	Butler Hill	1	1	2.13	20.12	4.04	2.40	2,842
Totals								6,761
Purple/Blue	Watson							
	Watson	1	1	1.37	12.77	2.45	8.62	3,251
Orange	Butler Hill							
O2	Gravois	0	0	0.73	14.22	2.15	1.25	594
O2.5	Morganford	0	0	0.73	14.95	3.78	0.30	633
O3B	Bayless Reavis	0	0	1.74	16.82	3.32	1.68	751
O4	Barracks	0	1	1.74	18.56	4.17	0.87	1,125
O7A	South County	0	0	1.99	20.55	0.48	9.73	680
O8A	Butler Hill	1	1	2.09	22.64	4.04	2.40	2,762
Totals								6,544
Orange	Reavis Barracks							
O2	Gravois	0	0	0.73	14.22	2.15	1.25	594
O2.5	Morganford	0	0	0.73	14.95	3.78	0.30	633
O3B	Bayless Reavis	0	0	1.74	16.82	3.26	1.61	746
O4	Barracks	1	1	1.74	18.56	4.17	0.87	2,644
Totals								4,617

Table 5. 2025 Midpoint Forecasts of Weekday Station Boardings for Metro South Extension, Baseline Estimates

		2025 Weekday Ridership Forecasts		Midpoint Estimates
		Local Model	National Model	
Blue	Butler Hill			
B1	Watson	834	1,146	990
B3	Gravois	1,199	1,362	1,280
B4	Green Park	418	572	495
B7A	South County	361	534	448
B8A	Butler Hill	3,254	2,683	2,968
<i>Totals</i>		6,065	6,297	6,181
Purple/Blue Watson				
B1	Watson	2,072	2,795	2,433
Orange	Butler Hill			
O2	Gravois	674	594	634
O2.5	Morganford	848	633	740
O3B	Bayless	879	746	813
O4	Reavis Barracks	1,146	1,125	1,135
O7A	South County	377	598	487
O8A	Butler Hill	3,021	2,608	2,814
<i>Totals</i>		6,272	6,303	6,287
Orange	Reavis Barracks			
O2	Gravois	674	594	634
O2.5	Morganford	848	633	740
O3B	Bayless	879	746	813
O4	Reavis Barracks	3,908	2,644	3,276
<i>Totals</i>		6,309	4,617	5,463

Table 6. 2025 Midpoint Forecasts of Weekday Station Boardings for Metro South Extension, TOD Estimates

		2025 Weekday Ridership Forecasts		Midpoint Estimates
		Local Model	National Model	
Blue	Butler Hill			
B1	Watson	970	1,260	1,115
B3	Gravois	1,371	1,480	1,425
B4	Green Park	395	572	483
B7A	South County	462	608	535
B8A	Butler Hill	3,387	2,842	3,114
<i>Totals</i>		<i>6,584</i>	<i>6,761</i>	<i>6,673</i>
Purple				
B1	Watson	2,089	3,251	2,670
Orange	Butler Hill			
O2	Gravois	674	594	634
O2.5	Morganford	848	633	740
O3B	Bayless	913	751	832
O4	Barracks	1,146	1,125	1,135
O7A	South County	462	680	571
O8A	Butler Hill	3,163	2,762	2,963
<i>Totals</i>		<i>6,532</i>	<i>6,544</i>	<i>6,538</i>
Orange	Reavis Barracks			
O2	Gravois	674	594	634
O2.5	Morganford	848	633	740
O3B	Bayless	879	746	813
O4	Barracks	3,908	2,644	3,276
<i>Totals</i>		<i>6,309</i>	<i>4,617</i>	<i>5,463</i>