South Corridor Light Rail Project Before-and-After Study (2011)

Charlotte, North Carolina

U.S. Department of Transportation

Federal Transit Administration

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South Corridor Light Rail – Charlotte, North Carolina

The South Corridor project is a 9.6-mile light rail line extending south from Charlotte's central business district (CBD) roughly parallel to, and one to two miles east of, Interstate-77 to a terminus at Interstate-485, the beltway for the metropolitan area. The project also includes 20 light-rail vehicles, 15 passenger stations, park-ride facilities at seven stations providing a total of 3,200 spaces, a maintenance-and-storage facility for the rail vehicles, and an operations control center. The "Blue Line" is the first light rail project in metropolitan Charlotte. Figure 1 is a map of the South Corridor and the Blue Line project.

The project was developed and built, and is now operated, by the Charlotte Area Transit System (CATS), a department of the City of Charlotte. The "before" conditions for the Before-and-After Study are from fall 2007 while the "after" conditions are from spring 2009, 18 months after the project opened for revenue service.

Physical Scope of the Project: In general, the scope of the project remained substantially the same – in its length, alignment, number and location of stations, and degree of grade separation – from its early conceptualization in alternatives analysis through project development to its as-built condition.

Capital Cost: The actual capital cost of the South Corridor light rail line was $462.75 million in year-of-expenditure (YOE) dollars. Table 1 shows that, in YOE dollars, the cost predictions at each project development milestone consistently underestimated the as-built costs, but by a smaller amount as project-development proceeded. The project was built substantially as planned and at a cost that exceeded the planning cost forecast by 28 percent in YOE dollars as the project was constructed during a period of unanticipated rapid inflation in global and regional construction costs. The YOE forecasts were low because they did not anticipate: (1) the rapid general inflation in construction prices that occurred nationally and regionally during the engineering and construction of the project; and (2) the added exposure to general cost inflation that resulted from the later-than-anticipated opening of the project in November 2007, nearly two years later than anticipated in the MIS/AA.

Table 1
South Corridor Light Rail – Charlotte, NC
Capital Costs at Project Milestones

Milestone	As-Built	MIS/AA (1)	FEIS/ROD	FFGA	Amended FFGA
Year of actual/forecast costs	2007	1999	2002	2005	2007
Costs in Year-of-Expenditure Dollars (millions)					
Planned/actual opening date	Nov. 2007	Winter 2005	Spring 2006	Apr. 2007	Nov. 2007
Total ($ year of expenditure)	$ 462.75	$ 331.10	$ 370.85	$ 426.84	$ 462.75
Difference from actual	$ -	$ (131.65)	$ (91.90)	$ (35.91)	$ 0.0
Difference from actual (%)	-	-28%	-20%	-8%	0%

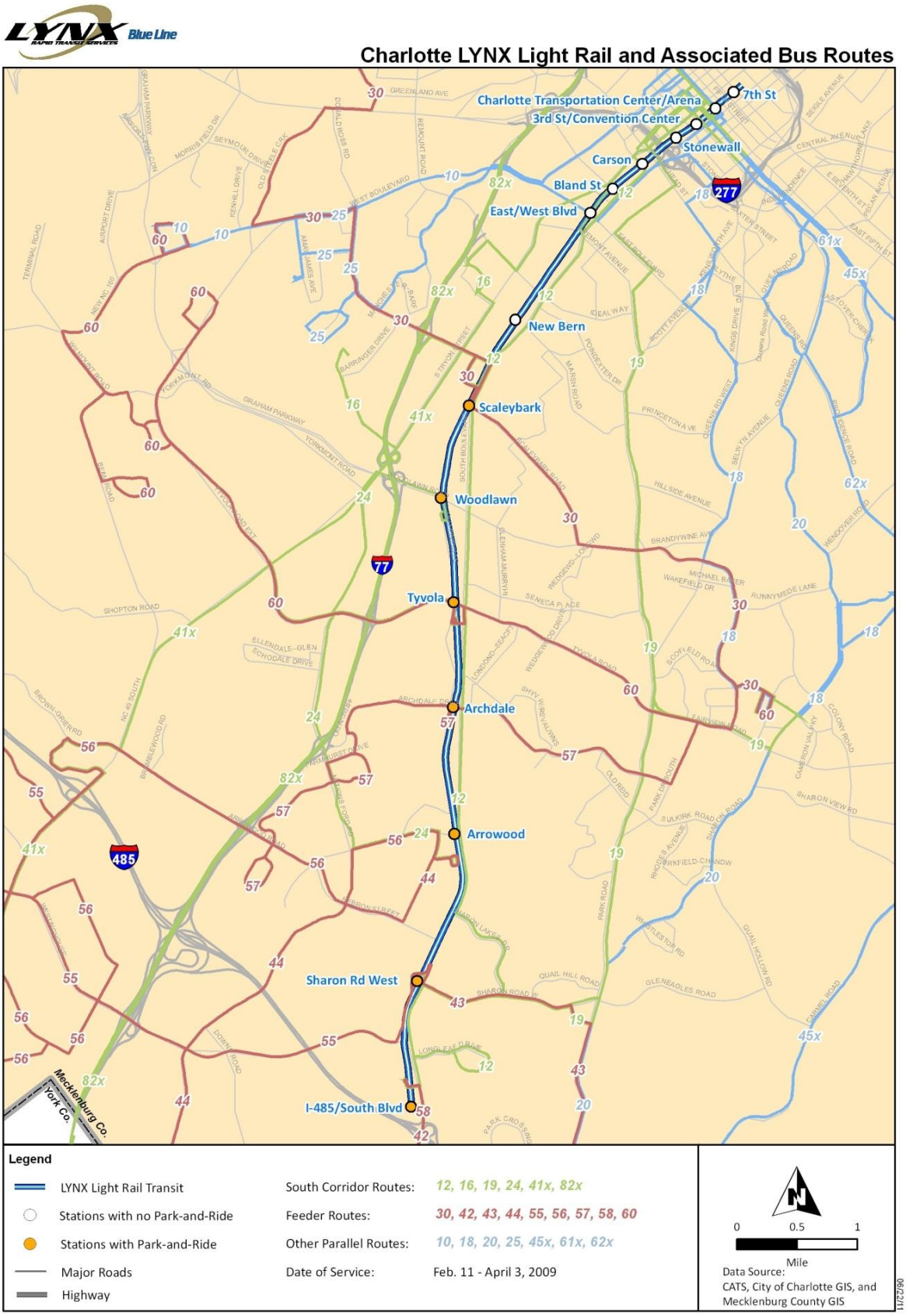

Figure 1
Charlotte South Corridor and 2011 Bus Routes

Transit Service Levels: Transit service in Metropolitan Charlotte increased markedly over the past 15 years. In 1997, CATS operated 134 buses in peak fixed-route service. In 1998, Mecklenburg County voters approved a ½-cent sales tax to implement a 2025 transit plan that called for construction of a light rail system and significant expansion of bus services. By 2007, just before light rail service opened in the South Corridor, CATS was operating 263 buses in peak fixed-route service, effectively doubling service over the 10-year period. Changes to the transit system reflected: (1) the opening of the Blue Line; (2) the adjustments to South Corridor buses to integrate rail and bus services; and (3) system-wide downsizing of service in response to a downturn in tax revenues caused by the national economic downturn. In aggregate terms, transit service in the South Corridor increased by 33 percent between 2007 and 2009. The effect of system-wide downsizing is evident in the seven percent reduction in vehicle-miles and vehicle-hours in other corridors.

Overall, after the reductions in 2009, aggregate system-wide vehicle-hours of service remained at levels that were more than double the service provided by CATS in 2000.

Operating and Maintenance Cost: Between CATS' fiscal year 2007 and fiscal year 2009, system-wide O&M costs increased by 22.6 percent, reflecting a marginal (1.7 percent) increase in fixed-route bus costs and the start of light rail service. Predictions of system-wide O&M costs during project planning and development consistently overestimated the actual outcome. This over-estimate of costs directly reflects the anticipated higher levels of bus service by 2009 that were not achieved because of service reductions in response to the economic downturn.

Ridership: Transit ridership has grown substantially over the past 10 to 15 years in response to the rapid expansion of transit service and demographic growth in the metropolitan area. In the mid-to-late 1990s, the CATS bus system served 11.7 million annual boardings by transit riders – with 41,000 boardings on the average weekday. By 2007, just before the light rail opened in the South Corridor, system-wide ridership had grown to 20.4 million annual boardings – with 70,000 boardings on the average weekday.

The South Corridor LRT (Blue Line) opened in November 2007. Weekday boardings on the line averaged 12,000 in the initial months of operation, increased to 17,000 by summer 2008, and then settled to the 14-15,000 range where it remains in mid-2011. Table 2 summarizes the transit service and ridership changes that have occurred in the South Corridor and system-wide.

Table 2
South Corridor Light Rail – Charlotte, NC
Changes in Service Levels and Ridership

Characteristic	Weekday Vehicle-hours (annual thousands)				Average Weekday Boardings (daily)			
Milestone	Before	After	Change	% Chg.	Before	After	Change	%
Transit Routes								
South Corridor LRT	----	34	34	----	----	14,370	14,370	----
South Corridor Totals	161	213	52	32%	14,716	26,875	12,159	83%
Other Corridors	509	475	-33	-7%	46,042	51,386	5,343	12%
System Totals	670	689	19	3%	60,758	78,470	17,711	29%

Forecasts of project ridership varied significantly over the course of planning and development of the South Corridor light rail project. Work performed in 1998 anticipated 14,000 trips per average weekday on the South Corridor by 2025. Subsequent forecasts reported in the FTA annual report to Congress anticipated as many as 25,800 weekday rail trips by 2025. Later revisions to the forecasting tools produced revised forecasts of 18,000 per average weekday in 2025.

The opening-year forecast underestimated actual ridership thus far by 19 percent. Since the project opened to service, gasoline prices spiked in mid-2008, gasoline supplies to metropolitan Charlotte were disrupted by Hurricane Ike's Texas landfall in September 2008, the economy weakened, and CATS reduced bus service (largely in other corridors) in response to the consequent decline in sales-tax revenues. All of these events had some degree of influence on transit ridership in Metropolitan Charlotte in addition to the impacts of the Blue Line opening.

***Conclusion**:* The predictions of both capital cost and ridership for the project were reasonably accurate for an initial rail project – particularly for a modest-sized transit agency in a medium-sized metro area. The project outcomes are generally consistent with the information that FTA used to evaluate and rate the project for FTA decisionmaking and funding recommendations.