

FrontRunner North Rail Project Before-and-After Study (2013)

Salt Lake City, Utah



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Weber County to Salt Lake Commuter Rail Project; Salt Lake City, Utah

The Weber County to Salt Lake Commuter Rail Project, known as FrontRunner North, is a 44-mile commuter rail line extending north from downtown Salt Lake City through Ogden to the northern end of Weber County at Pleasant View, Utah. The project was planned, developed, and built by the Utah Transit Authority (UTA). FrontRunner North is the first commuter rail service in the Salt Lake City metropolitan area. UTA operates the commuter rail line as part of a region-wide transit system that includes local and express buses, bus rapid transit, and light rail. In early 2013, UTA opened FrontRunner South, a 40-mile extension of the commuter rail line extending south from downtown Salt Lake City to Orem, Utah.

In September 2001, an alternatives analysis identified commuter rail in the north-south corridor as the preferred alternative for transit improvements in the corridor. The project entered preliminary engineering (PE) in December 2003, and advanced into final design (FD) in June 2005. UTA and FTA executed a Full Funding Grant Agreement (FFGA) for the project in June 2006. The project opened to service in May 2008.

The accompanying figure is a map of FrontRunner North and the corridor it serves.

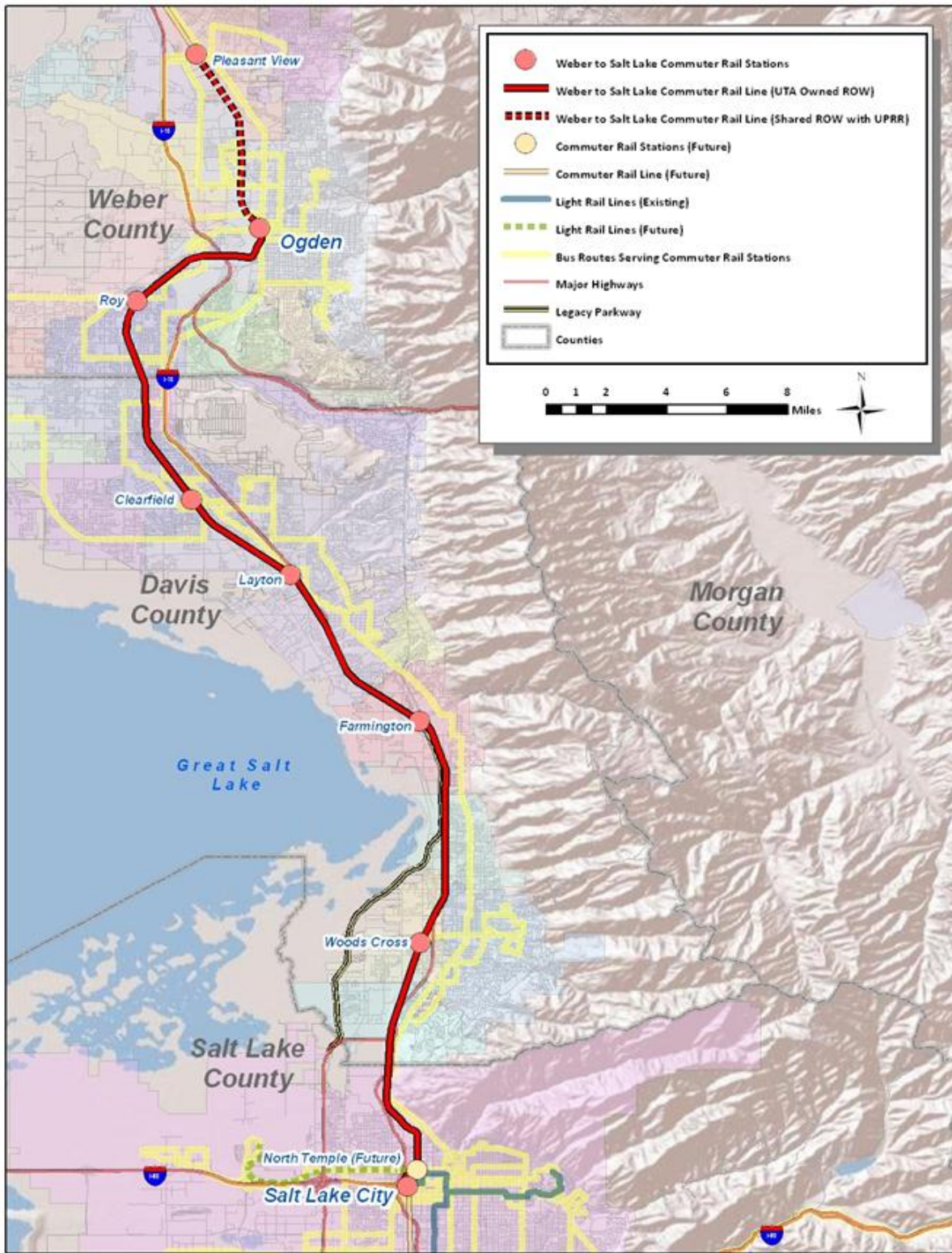
Physical scope of the project

The project extends over 44 miles from the Salt Lake Intermodal Center just west of downtown Salt Lake City to the northern terminus at the Pleasant View Station. Over the first 38 miles – to the Ogden Intermodal Center – FrontRunner North operates on single track built by UTA on right of way purchased from the Union Pacific Railroad (UPRR) in 2002. Two tracks at each station and three passing sidings permit efficient two-way operations. Throughout this 38-mile segment, the FrontRunner track is located immediately adjacent to active UPRR tracks but is physically and operationally separate from freight operations. For the six miles from Ogden to Pleasant View, FrontRunner shares two UPRR tracks with UPRR freight operations.

FrontRunner North opened to service with eight stations. UTA subsequently added a ninth station at North Temple near downtown Salt Lake City in conjunction with the FrontRunner South project. Station platforms accommodate trains up to eight cars long and provide level boarding over their entire lengths. Except at the Salt Lake Intermodal Terminal, all stations have park-and-ride lots that provide a total of 3,400 spaces. The vehicle fleet comprises 11 new diesel locomotives, 12 new bi-level cab cars, and 12 bi-level passenger coaches – plus 23 used single-level passenger coaches that were purchased to provide spares and capacity for expansion.

Other project elements include a maintenance-and-storage facility in Ogden acquired as part of the 2002 right-of-way purchase from UPRR, modifications to 43 grade crossings, a cab-signal system, two new single-track railroad bridges, and two 1,200-foot single-track fly-over structures – one crossing the Weber River and the second spanning the UPRR rail yard in Ogden.

The 2001 locally preferred Alternative (LPA) described a project scope that accurately anticipated the as-built project in broad terms: a commuter rail line from a terminal west of downtown Salt Lake City to Ogden operating on a single track next to, but separate from, the UPRR. Subsequent changes have been modest: the extension of rail service to an additional station in Pleasant View on existing UPRR tracks; revisions to the mix of new and used passenger vehicles; and the upgrade of the signal system from block signals to cab signals.



FrontRunner North and the North Corridor

These changes occurred during preliminary engineering and the project scope at entry into final design was an accurate representation of the as-built project.

A significantly larger set of changes occurred in the complexity of construction of the project. Throughout project development and into construction, UTA discovered additional complexities associated with construction of the new commuter rail track immediately adjacent to mainline UPRR tracks carrying active freight services. These complexities included the realities of building the new track in right-of-way that had previously been a drainage ditch – leading to the reconstruction of a large number of drainage structures in the narrow corridor between the Wasatch Mountains on the east and the Great Salt Lake immediately to the west of the right of way. Other complexities were the need for temporary track-work to maintain freight service during construction and reconstruction work and for cabling to upgrade the signal system in the corridor to permit 79 mph maximum commuter rail speeds. These realities were identified through negotiations with UPRR, largely in preliminary engineering but also extending into final design and construction. Together, they represented a substantial change in the work required to build the project even though the broad scope of the project was largely unchanged.

Capital cost

The actual cost of the project was \$614 million in year-of-expenditure (YOE) dollars. Local governments separately provided \$18 million to fund localized improvements. For the 38-mile segment of the new single-track commuter rail facilities, total capital costs averaged \$15 million per mile including stations, vehicles, and the maintenance-and-storage facility.

The predicted capital cost at entry into preliminary engineering was \$408 million in YOE dollars, an underestimate of \$205 million equivalent to 34 percent of the actual cost. The principal drivers of the underestimate were: (1) the unanticipated complexity of track construction, site-work, and special conditions (\$167 million); (2) the upgraded signal system (\$21 million); and (3) the later introduction of financing costs into the project budget (\$84 million). These underestimates were partially offset by the \$68 million unallocated contingency included in the predicted costs at entry to preliminary engineering.

At entry into final design, the predicted capital cost was \$581 million in YOE dollars, an underestimate of \$33 million equivalent to eight percent of the actual cost. At the FFGA, the predicted cost was \$611.7 million. The difference between these two predictions is attributable solely to the addition of financing costs to the FFGA project budget. As construction neared completion and the unallocated contingency reserve in the FFGA remained untapped, the contingency amount was redirected to the acquisition of a larger fleet of vehicles for capacity expansion (\$24 million) and to fund a larger amount of project financing costs.

Transit service

On weekdays, FrontRunner North provides service from 5:00 am to midnight. Trains depart in both directions every 30 minutes for three hours in the morning peak and four hours in the evening peak, and every 60 minutes at all other times. This service pattern is a modification of the FrontRunner North schedule in place when the line began service in 2008. Under the original schedule, trains departed every 30 minutes all day until 8:00 pm, when they shifted to 60 minutes between departures. On Saturday, trains depart every 60 minutes from 5:00 am to 1:00 am. FrontRunner does not operate on Sundays. Runtime between Salt Lake City and Ogden is 50 minutes, an improvement over the initial 59-minute runtime that is the result of adjustments to

operating speeds and passing locations. FrontRunner fares are distance-based: \$2.50 for the first station plus \$0.50 for each additional station. Commuter rail riders transfer for free to/from UTA bus and light rail routes.

In September 2011, UTA suspended rail service between Ogden and Pleasant View because of schedule unreliability, low ridership, and operating costs. When FrontRunner North opened to service in 2008, rail service between the Ogden and Pleasant View stations consisted of two departures in each direction during the peak periods by a single-car shuttle sharing UPRR tracks with UPRR freight service. Passengers transferred between the rail shuttle and trains to/from Salt Lake City at the Ogden station. UTA has replaced that shuttle service with express buses operating between the Pleasant View and Ogden stations. UTA remains committed to the provision of a FrontRunner North connection to Pleasant View and continues to examine options for restoring the service.

At the Salt Lake Intermodal Center just west of downtown, FrontRunner North connects to the TRAX light rail system and to 15 bus routes providing more than 30 bus departures per hour. At the Ogden Intermodal Center, FrontRunner North connects to most Ogden-area bus routes because the bus system uses the Intermodal Center as a service hub. Few bus routes connect to other FrontRunner North stations.

Other bus services in the corridor include two local routes that continue to provide on-and-off service for short trips not well served by commuter rail and two express routes that provide direct service to major activity centers in Salt Lake City – one to the University of Utah and the second to locations within downtown. These express routes rely primarily on park-and-ride access in the north corridor, operate wifi-equipped over-the-road coaches with reclining seats, and provide a one-seat ride to the specific locations that they serve. The university route provides moderately higher service levels than it did prior to FrontRunner North opening. The downtown route provides 25 percent of its pre-FrontRunner North service because most riders shifted to the new commuter rail option.

Predicted transit service levels at the project-development milestones differed from actual outcomes in four ways. First, FrontRunner North headways were planned at PE-entry to be 20 minutes during peak periods and 40 minutes at all other times of day. At FD-entry and at the FFGA, headways were to be 20 minutes peak and 60 minutes at other times. When it opened for service, FrontRunner North headways were 30 minutes all day before changing to 60 minutes after 8:00pm. UTA subsequently revised the headways to 30 minutes in the peak periods only and 60 minutes at all other times. Second, the project was planned to provide Pleasant View service with two through-routed trains during the peak periods operating on shared UPRR tracks. When FrontRunner North opened, the Pleasant View service consisted of a one-car shuttle operation providing two trips in each direction during the peak period, connecting at the Ogden station with trains to/from Salt Lake City. UTA has since temporarily suspended the rail shuttle and replaced it with bus shuttles. Third, FrontRunner North was planned to have a supporting network of feeder buses at its stations. With the project's opening, significant feeder-bus connections are available only at the intermodal centers in Ogden and Salt Lake City. Fourth, UTA anticipated the elimination of the two express buses in the corridor. However, rider resistance to service cuts led to the retention of both express routes – one at marginally higher service levels and the second at approximately 25 percent of its pre-FrontRunner North levels.

Operating and maintenance costs

The 2010 operating expenses for FrontRunner North totaled \$15.6 million. Operating costs included \$7.1 million for train operations and fuel, \$4.3 million for maintenance the vehicle fleet and stations, \$3.4 million for maintenance of the right-of-way, and \$0.9 million for administration and insurance. To control overhead costs, UTA made FrontRunner North a second unit of the rail division first established for TRAX light rail.

Predicted operating and maintenance costs during project development marginally overstated the actual outcome. At PE-entry, the predicted \$17.2 million cost included significantly underestimated costs for train operations and fuel that were more than offset by overestimates of costs for station and vehicle maintenance and for administration. At FD-entry and the FFGA, the predicted \$16 million cost continued to underestimate fuel costs and overestimate the costs of maintenance and administration.

Ridership

FrontRunner North ridership averaged 5,300 trips per weekday and 2,500 trips on Saturday in 2011-2012. However, several large swings occurred before ridership reached this relatively steady level. In FrontRunner's initial six months of service, ridership climbed from 6,000 per day to nearly 9,000 per day in October 2008. This period witnessed gasoline price increases to more than \$4.00 per gallon in mid-summer. Ridership then dropped precipitously to fewer than 4,000 per weekday by May 2009. Three events contributed to this drop. First, gasoline prices plummeted to less than \$1.60 per gallon in January 2009, before partially rebounding to \$2.50 by early summer. Second, the severe economic downturn began in the fall of 2008, causing a substantial rise in unemployment that eroded the demand for commuter-oriented transit services. Third, the Utah Department of Transportation opened the Legacy Parkway in the north corridor, adding two, new freeway lanes in each direction and effectively eliminating both the substantial peak-period congestion on I-15 and much of FrontRunners travel-time competitiveness. Ridership has grown steadily since then with weekday averages of 4,700 in 2009, 5,000 in 2010, and 5,300 in 2011-2012.

Ridership on FrontRunner North is substantially concentrated in the peak periods: the 12 peak-period trains carry nearly half of all weekday trips while the 46 trains during the remainder of the day carry the other half. Some 70 percent of peak-period ridership is southbound towards Salt Lake City in the morning and northbound in the afternoon. Much of the "reverse commute" market comprises students traveling to Weber State University in Ogden. Half of all riders are traveling to or from work and 20 percent to or from school. Some 75 percent use an automobile to travel from home to a train station and 85 percent transfer at least once. Fully 75 percent of riders are from households with three or more vehicles.

Ridership counts and surveys taken before and after the opening of FrontRunner North suggest that total transit ridership in the corridor has increased by approximately 4,000 average weekday trips. Express-bus ridership dropped by 1,000 trips and commuter rail attracted 5,300 trips. These results suggest that a high share of commuter rail ridership – perhaps as much as 75 percent – is new to transit.

Opening year ridership predictions at the project development milestones were 8,400 trips at PE-entry, 5,650 trips at FD-entry, and 5,900 trips at the FFGA. The latter two milestones compare well with actual FrontRunner North ridership of 5,300 weekday trips. The details of these

ridership predictions no longer exist; so analysis of individual travel markets is not possible. For the Before-and-After Study, however, UTA recreated the FFGA forecasts employing the same regional travel model and key assumptions used at the FFGA milestone. In addition to the close match on total FrontRunner North ridership, the recreated FFGA prediction accurately portrays the directionality and geographical patterns of FrontRunners riders. This result likely reflects the substantial local experience gained over the past three decades in ridership forecasting for a series of new fixed-guideway projects in the Salt Lake City area.