

Corridor Two Regional Rail Feasibility Study and Alignment Alternatives

TECHNICAL MEMORANDUM 4.0

Implications of Preliminary Ridership Analyses on Rail Corridor Options

December 2009

Technical Memorandum

Corridor Two Alternative Alignments and Feasibility Study Implications of Preliminary Ridership Analyses on Rail Corridor Options

February 19, 2008

Introduction

This memorandum addresses the results of an analysis that produced preliminary estimates of commuter rail ridership along the Lebanon-Hershey-Harrisburg Corridor; and the implications of those ridership estimates for identification of conceptual alternatives that will be carried forward to the operations planning phase. This step is being taken due to the expected high costs of the potential alternatives that have been identified, and the fact that the Federal Transit Administration (FTA) heavily weighs cost per rider in their review of project funding applications and in recommending projects for New Starts funding. A separate technical memorandum was prepared that documents the procedures and assumptions used to complete the ridership analysis. This memorandum uses the results of that work but does not repeat the background leading up to the estimates

Background on Potential Rail Alignments

Three existing rail alignments in the study area were identified in the RFP as being potentially relevant to creating rail service between Lebanon and Harrisburg:

1. The Norfolk Southern (NS) Harrisburg Line runs between Reading (CP River) and Harrisburg (CP Harris). The 25-mile portion of the line between Lebanon and CP-Harris is a two-track railroad with bi-directional signaling (Rule 261) on each track and numerous sidings. This is the most direct means of reaching the Harrisburg Transportation Center from the study area, also involving a short (half-mile) segment of the NS Pittsburgh Line, west of CP Harris.

The line is designated as a "Super Core" alignment by NS and is heavily used for moving freight from points west to New York and Philadelphia regional ports. It annually handles over 60 million gross ton-miles of freight traffic. This volume of traffic routinely generates congestion and delay, in particular in the vicinity of Rutherford Yard, a large, extensively-used intermodal freight yard near Rutherford Heights. Another large NS yard (Harrisburg Yard) exists just north of the Harrisburg Transportation Center.

The Harrisburg Line was once a triple-tracked facility, but much of that capability has been lost to realignment of the two remaining tracks and the easing of curves to accommodate higher speeds. Much of the tangent portions of the right-of-way is reputed to be of sufficient width to accommodate one additional track, but this assertion would need to be verified in the field.

2. The Middletown-Hummelstown Railroad (M&H) is currently privately owned, and operated as a short-line railroad between the Amtrak and NS Harrisburg Lines at

Middletown and Hummelstown, respectively. The six-mile line proceeds generally north-south following the path of the meandering Swatara Creek, originally constructed alongside or atop of the former Union Canal. It is almost entirely single-tracked with no signal system with a few sidings near its southern end. A quarter-mile section operates in the middle of Brown Street through Middletown.

There are few freight shippers along the line, mostly concentrated at the south end around Middletown. It annually handles less than a million gross ton-miles of freight traffic. The M&H predominately interchanges freight with NS at Middletown, although another interchange is also available at Hummelstown; the latter is currently maintained for the infrequent movement of PP&L transformers. About five miles of the line is used for excursion trains between Middletown and Indian Echo Caves.

Reflecting its canal-era origins, the M&H is a circuitous alignment that would need to be significantly upgraded to accommodate commuter trains at acceptable speeds.

3. A portion of the Amtrak Harrisburg Line extending from Middletown to Harrisburg, a distance of about 10 miles, could be used in conjunction with the M&H to provide service along the corridor. The alignment between Middletown and Harrisburg is two tracks, signaled for only single directional movement. As a result of the recent Amtrak/PennDOT capital improvement program along the Keystone Corridor, track speeds for passenger operation are authorized at 110 mph in this segment. Amtrak currently operates a total of 28 trains per day over this route. At present, six trains arrive or depart Harrisburg during the AM peak period and four trains arrive or depart in the PM peak period. The Corridor One project has proposed supplementing Amtrak's Keystone Service with additional commuter rail service operating between Lancaster and Harrisburg.

In addition to considering the above active rail lines, the consulting team completed a cursory examination of the potential for creating a new rail right-of-way along the corridor. No abandoned railroad or power line rights-of-way were identified in the study area which would represent a viable alternative for creating a new rail line between Lebanon and Harrisburg. In addition, it was also determined that it is not likely that a practical, contiguous, "green field" right-of-way could be found that would cost-effectively serve the CORRIDORTwo service objectives.

The most direct and desirable alignment for Corridor Two passenger service would be over the NS Harrisburg Line. Passenger and freight trains can share the same set of tracks but the high volume of freight traffic would present a considerable challenge, particularly in the vicinity of the highly congested Rutherford freight yard. NS has indicated that there is not sufficient capacity in the existing physical plant to add passenger trains without a significant degradation of freight train operating performance. A cursory review of present traffic levels suggests that NS' concerns are valid.

Discussion of Potential Service Concepts

Four rail service alternatives have been identified as follows:

- A. Construct one or possibly two additional tracks within the NS right-of-way with associated systems improvements (e.g.: communications, signals, interlockings and crossing protection). As noted above, there is not always room for more

tracks in the existing right-of-way, so additional right-of-way may need to be acquired. Under this scenario, freight and passenger trains would jointly share all tracks in the corridor. This would involve considerable expense but may be attractive to NS because of the real capacity improvements it would represent.

- B. Construct a new passenger-only track within the NS right-of-way with an occasional second track where trains moving in opposite directions need to pass each other. This option would entail many of the same construction elements and costs associated with the first approach, but without providing NS with a commensurate improvement in freight capacity. Further, NS would likely perceive this option as curtailing their ability to expand freight capacity at a future date in response to traffic growth and therefore consider it undesirable.
- C. Construct a new passenger-only track outside the NS right-of-way with an occasional second track where trains moving in opposite directions need to pass each other. This option would be considerably more expensive than Option 2 as it would require extensive right-of-way acquisition as well as new under-grade bridges, culverts, and overpasses. Even without encroaching on the present NS right-of-way, NS may still perceive this option as curtailing their ability to expand freight capacity at a later date.
- D. Construct a new passenger-only track following the premise of either Option 2 or 3 between Lebanon and Hummelstown, then upgrade the condition of the M&H between Hummelstown and Middletown to commuter rail standards. This option would permit commuter trains to access Harrisburg from Middletown via the Amtrak Harrisburg Line, albeit via a longer and more circuitous routing than via the NS Harrisburg Line. It does have the advantage of avoiding the more congested portion of the NS Harrisburg Line in the vicinity of Rutherford Yard, so it may be more palatable to NS. Implementation would require the full cooperation of M&H management and likewise entail considerable expense. The existing M&H physical plant would need to be reconstructed in its entirety along with associated system improvements. This option also would not provide service to inner CORRIDOR two stations west of Hummelstown (such as Paxtang).

The first three alternatives, operating directly between Lebanon and Harrisburg via the NS Harrisburg Line, provide the most direct alignment and therefore were initially assumed to have the greatest potential to attract ridership.

NS may be willing to consider passenger train service within its right-of-way, providing capacity improvements are made sufficient to improve present freight operations as well as provide adequate capacity for future growth in traffic.

If the NS mainline were to be selected as the chosen alignment, six passenger stations are suggested for initial modeling purposes. The station location parameters included the existing rail alignment, development patterns, stakeholder feedback, and the need to balance convenient access with attractive running speeds. The six stations, all situated in the traditional commercial cores of the boroughs along the Corridor, are listed below.

- Lebanon
- Annville
- Hershey
- Hummelstown
- Paxtang/East Harrisburg

- Harrisburg Transportation Center

For Option 4, a stop at Middletown would substitute for the stop at Paxtang as the trains would diverge from the NS Harrisburg Line at Hummelstown.

Based on a cursory review, Service Concept A would likely represent the least expensive and most direct service for passenger train service between Lebanon and Harrisburg. Nonetheless, it is expected to involve considerable public investment in infrastructure improvements (albeit not as much as the other three options).

Estimates of Commuter Rail Ridership

As noted earlier, a separate technical memorandum was prepared that documents the procedures and assumptions used to complete the demand analysis. While the content of that memorandum is not repeated here, it is relevant to note that the ridership analysis assumed very attractive levels of service, equally attractive amenities, and convenient connecting services. Table I presents the estimates of demand for 2008 using three alternative levels of service to illustrate the sensitivity of demand to service frequency: 60 minute headways throughout the day, 30 minute peak/60 minute off off-peak headways, and 15/30 minute peak/off-peak headways.

Table I Estimated 2008 Rail Ridership Lebanon-Hershey-Harrisburg			
Location	peak/off-peak service frequency (minutes)		
	60/60	30/60	15/30
Harrisburg	268	298	374
Harrisburg East	210	233	293
Hummelstown	175	195	246
Hershey	222	247	310
Annville	97	109	136
Lebanon	81	91	112
Total	1053	1173	1471

Of the three levels of rail service evaluated as part of the ridership analysis, the intermediate (30 minute peak headways and 60 minute off-peak headways) is considered to be the most practical given the development density along the Corridor. It is viewed as a more realistic service when the practices of established, comparable commuter rail services in Pennsylvania and adjacent states are considered. The 2008 estimate of average weekday train boardings for the intermediate level of service is 1173 weekday trips. Even if the highest level of service is considered, the average weekday ridership is estimated at 1471, which is still not a high number when viewed in the context of the likelihood of relatively high capital costs associated with all of the alternative rail alignments and service concepts.

Implications of Ridership Estimates on Corridor Two Rail Alternatives

It is expected that all of the alternatives under consideration will require considerable public investment as well as the on-going cooperation of NS to develop. In addition, it is a known fact that FTA's New Starts funding program is very competitive and relies heavily on cost per rider as a selection criterion. Therefore, it is appropriate to pause at this juncture and consider the current study approach and scope, and decide how best to use the remaining project resources to further the objective of providing a premium level of transit service along Corridor Two. A fundamental question to consider is: *Given the estimate of rail ridership for the Corridor (which assumed relatively high levels of service and a corresponding high level of connector services and amenities), which rail alternatives should receive further analysis, and to what degree should those analyses go?*

Benchmarks for Comparison

To assist in evaluating the question posed above, relevant benchmark data can be found in the Utah Transit Authority's *FrontRunner* rail service -- a 44-mile new commuter rail line that will open later this year (see attached fact sheet). Similar to service Option B, *FrontRunner* will operate over exclusive, passenger-only tracks constructed within the right-of-way of a heavily-trafficked Union Pacific freight line. The capital cost for the Utah line is estimated to be \$611 million. Annual operating costs are estimated at \$12 million. Initial *FrontRunner* ridership is forecasted to be 5,900 weekday trips and eventually grow to 12,600 trips by 2020.

While detailed cost estimates have not yet been developed for any of the Corridor Two options, prorating the 43-mile *FrontRunner's* statistics to the 25-mile Corridor Two alignment via the NS Harrisburg Line would suggest potential Corridor Two capital costs on the order of \$347 million (not including right-of-way acquisition and/or trackage right fees). Likewise prorating *FrontRunner's* ridership estimates to account for the shorter length of Corridor Two would result in *FrontRunner* benchmarks of about 3,300 weekday trips on opening day, with the ultimate potential of attracting about 7,100 weekday trips. These benchmarks are significant given the highly competitive nature of the FTA New Starts funding program. Corridor Two will need to compete with other projects like *FrontRunner* from across the country when applying for construction grants. *FrontRunner* did qualify for New Starts funding at approximately 50% of total project costs.

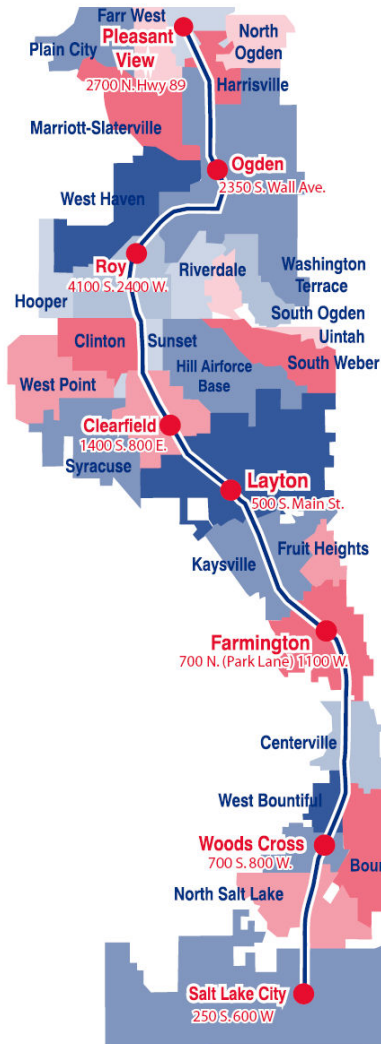
The only local comparison to help inform this discussion is the estimated ridership and costs for Corridor One. Average weekday ridership was estimated at approximately 900 boardings if the service was to start in 2009, and construction costs were estimated at approximately \$ 19.4 million (year of expenditure dollars – 2008 through 2010). Annual operating expense in the year of opening (2009 was used) was estimated at approximately \$11.6 million (Corridor One costs only – does not include Amtrak costs for Keystone Service operations). While the ridership estimates for Corridor two are slightly higher than Corridor One, the capital costs for Corridor Two will clearly be dramatically higher than Corridor One. Also, while the Corridor One project has been exempted from application of FTA's New Starts traditional rating criteria due to its low capital costs, Corridor Two will not qualify for such an exemption.



FRONT RUNNER

Weber County to Salt Lake City Commuter Rail

Opens Spring 2008



Legend ● Rail Line and Station



Find more information at www.rideuta.com and click the Commuter Rail icon. Or call the hotline: 1-877-UTA-RAIL (882-7245).

Used with permission of TTX Company, the registered owner of the FRONT RUNNER® mark.

Track

Length: 44 miles

Exclusive Right of Way: 38 miles of new track built by UTA. New track is east of Union Pacific Railroad (UPRR) mainline track.

Shared Track: Six miles from Ogden to Pleasant View is shared with UPRR.

Grade Crossings: 43 at-grade street crossings

Bridges: Two bridges; one 1450-foot bridge spanning the Weber River and one 680-foot bridge in the UPRR Ogden Rail Yard

Rail: 32,900 tons

Ballast: 640,000 tons

Concrete Ties: 112,000 ties

Stations

Number of Stations: Eight stations will be constructed with this project.

Platform Length: Maximum of 850 feet to accommodate a 10-car consist

Transportation Mode Connections:

- Park & ride lots and bus staging at each station
- Salt Lake City Intermodal Hub will connect to TRAX

Trains

Locomotives: Diesel-electric locomotives (Push-pull)

Passenger Cars: Bombardier bi-level cab cars and refurbished single-level cars

Initial Train Consist: One locomotive with three passenger cars; ultimately trains can have up to 10 passenger cars

Operations

Hours of Operation: 5 a.m. to 11 p.m. Monday through Friday.
7:30 a.m. to 11 p.m. Saturdays

Headways: At least 30-minute daytime service, hourly night and Saturday service.

Ridership Projections: 5,900 riders on opening day; 12,600 daily riders in 2025

Fare: \$2.50 one-way base fare, \$0.50 for each additional station, \$145 FrontRunner Monthly Passes (good for all UTA services)

Maintenance

Main Facility: Warm Springs Service Center in Salt Lake City (former UPRR Diesel Locomotive Maintenance Facility, 900 North 500 West)

Layover Facility: Ogden Intermodal Center