

Corridor Two Regional Rail Feasibility Study and Alignment Alternatives

TECHNICAL MEMORANDUM 3.0

Preliminary Analysis of Commuter Rail Demand

December 2009

Technical Memorandum

Lebanon-Hershey-Harrisburg “Corridor Two” Preliminary Analysis of Commuter Rail Demand February 19, 2008

Introduction

The purpose of this technical memorandum is to document the assessment of the maximum commuter rail ridership that might be expected along the Lebanon-Hershey-Harrisburg Corridor under optimal conditions. Optimal conditions are generally defined as frequent headways, attractive fares, convenient station locations, attractive average operating speeds, park-and-ride facilities at each station, and convenient connector services for key stations and major trip generators. This memorandum only discusses base year demand estimates for 2008. The numbers presented in this report must be viewed as very preliminary. They were done solely to help inform the discussion of identification of conceptual rail alternatives that may be carried forward for more detailed operations planning and analyses. More refined ridership estimates will be prepared for the alternatives that are selected for further analysis.

Approach

The Census Transportation Planning Package (CTPP)-based Commuter Rail Aggregate Rail Ridership Forecasting model (ARRF) was used to estimate the demand for commuter rail in Corridor Two. This model was developed by the Federal Transit Administration (FTA) and is recommended by FTA for use on projects such as Corridor Two. The ARRF estimates weekday unlinked work trips as a function of Journey to Work flows documented in the Census Transportation Planning Package (CTTP) Part 3. CTPP Parts 1 and 2 are also utilized to disaggregate the travel markets by three income categories and prepare home and work end buffers around the rail stations. The buffers represent “catchment” areas that are impacted by the rail service for both the resident population (on the home end of work trips) and estimated employment (for the employment site end of work trips). For high and medium income residents, a 6 mile home end buffer is used and for low income residents, a 2 mile home end buffer is used to estimate patronage on the home end of the work trip. The difference in the assumptions for high and low income persons reflects the likely availability of transportation to access the rail service for the respective income groups. As a general rule, a one mile buffer was used to estimate patronage on the work end of the work trip for all income categories. However, special attention was paid to the locations of major employers in the Hershey area, and in the Harrisburg Mall/TechPort area to assure that the buffer areas for those locales were appropriately defined.

In addition to CTPP data, inputs needed for the ARRF that were developed by the consultant team include the following:

1. System Average Speed
2. Annual Revenue Vehicle Miles

3. Annual Revenue Vehicle Hours
4. Average Train Length
5. Directional Route Miles
6. Station Locations

The basis for these assumptions is explained below.

The speed of various commuter rail systems throughout United States was computed from annual revenue miles and annual revenue hours obtained from the National Transit Database. A weighted average of speed and annual revenue miles was computed and found to be 33 mph. This was used as an estimate for the commuter rail speed for Corridor Two.

The annual revenue miles were calculated using respective combinations of peak hour headway and off peak hour headways for three alternatives, as outlined in Table 1. It was assumed that the commuter rail system will be operational for ten hours per day with trains running at the peak hour headway during two hours in the morning and two hours in the evening, and off peak hour headways during the remainder six hours. The annual revenue hours were calculated by dividing annual revenue miles by the average speed (33 mph).

The average train length (number of coaches) was assumed to be four. This assumption was based on the Commuter Rail Aggregate Rail Ridership forecasting studies for Baltimore, Dallas, Miami, and other areas. An average consist length of four was used for all of these studies.

The station locations were preliminarily determined based on development patterns, comments obtained through several stakeholder feedback sessions, and consideration of the need to balance convenient access with reasonable operating speeds.

Base Year Commuter Rail Demand Estimate

The output of the ARRF is unlinked daily work trips for the entire system. Total trips were estimated from work trips under the assumption that non-work trips account for 20% of all trips on typical commuter rail systems. This is supported by observed data for several commuter rail systems across the country.

The origin-destination travel patterns at the rail station level were estimated using the CTPP Part 3 data. These travel patterns were used to disaggregate the ARRF total daily ridership into boardings at individual stations. These individual station shares were applied to the output of the ARRF, factored to account for non-work trips, to estimate the total daily boardings at each station for the year 2000 (since 2000 Census data for population and employment was used). Station level growth factors were computed from socioeconomic data provided by the various local planning departments and applied to year 2000 station boardings to estimate 2008. The results are presented in Table 1. No attempt was made to develop forecasts at this point in time since currently-available population and employment forecasts do not reflect the introduction of commuter rail service along the Corridor. As part of the operations planning phase of this study, the consulting team will work with local planning agencies to ascertain the likely impact of

the proposed rail service on population and employment projections along the Corridor, for use in developing forecasts of future commuter rail demand.

Assumptions for February 2008 Model Run:

- 10 hour weekday service – 4 hours peak, 6 hours off-peak
- Avg. speed of 33 mph
- 4-car trains
- Used train-miles as data input

Table 1 (February 2008) 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

It must be emphasized that the total daily ridership estimates are a more reliable data set to use for decision making than individual station figures, due to the very preliminary nature of the analyses from which these estimates were derived. More detailed analyses will be completed as part of the rail operations planning that will occur in the next phase of work

NOTE: The above Table 1 accurately depicts the preliminary ridership estimates as presented to the Steering Committee in February 2008. In April 2008, after further study of the model, the assumptions and the various input parameters, the consultant team advised the Modern Transit Partnership that the preliminary estimates likely understated the potential rail ridership for Corridor Two by 40-50 percent. Upon review, the study team and the Modern Transit Partnership decided that this level of change did not negate the decision, based on the results presented in Table 1, to focus future study efforts on the rail alternative involving the addition of a third track to the Norfolk Southern mainline to be used primarily for passenger rail service. This decision reflected a judgment that the ridership numbers would likely not be high enough to support the more expensive rail alternatives that involved significant new rights-of-way.

Upon completion of the rail operations analysis and identification of station sites, the preliminary demand estimates will be revised.