Memorandum

DATE: February 20, 2015

TO: Mike Reininger, AAF
Ali Soule, AAF

FROM: Al Racciatti

SUBJECT: **Review of Economic Analysis of AAF by John N. Friedman**

As you have requested, Louis Berger has reviewed the paper prepared by John N. Friedman of Brown University entitled "An Economic Analysis of All Aboard Florida" (February 2015). While we agree that a top-down aggregate calculation of ridership and fare revenue potential can often be a valuable exercise in understanding and confirming more detailed ridership estimates, we believe that Prof. Friedman lacked some key information regarding the travel market which contributes to a substantial underestimate of ridership and revenue potential in his conclusions. Below is a discussion of several key aspects of his report as compared to the investment grade ridership and revenue study we conducted for AAF over the past several years. This memo does not speak to the CapEx, OpEx and financing assumptions in the Friedman report which are beyond the scope of our ridership and revenue work for AAF.

- **Size of the Addressable Market** – A key shortcoming of the Friedman report is the lack of information about the magnitude and extent of the addressable market for intercity travel in Central and Southeast Florida. An important first step in the preparation of a passenger rail forecast is an understanding of the existing number of travelers between the cities served, the origin destination patterns for those trips with respect to station locations, the purpose of the trip, and the existing mode of travel used.

  Friedman Report: The report makes no reference to specific travel patterns within and between Central and Southeast Florida. Instead the report assumes a level for AAF ridership (not the overall market) based on a comparison to ridership on Amtrak's Northeast Corridor services, scaling down to the population of the cities to be served by AAF. This overall ridership assumption is then distributed to station pairs without reference to data on travel between the cities served by the stations.

  AAF Forecast: The AAF forecast was prepared with a detailed data set of trips on the roadway network for the entire state of Florida derived from an assemblage of regional travel models developed by Metropolitan Planning Organizations from surveys and traffic counts. The final model was separated into long distance travel (Central to Southeast Florida) and short-distance model (trips within Southeast Florida). Each model had several hundred travel analysis zones and represented trips and travel time/cost between those zones. Louis Berger supplemented this data with research on the size of the air travel market, long-distance and commuter rail market, and bus market between the cities served referencing federal, state, and local government sources. Because the size of the market is the basis for the mode choice analysis (see below),

we employed several methods to confirm the detailed data on trips and origin/destination patterns, including:

- An origin/destination survey of 8,000 travelers in the region implemented by Louis Berger specifically for this study. The survey confirmed the overall magnitude of trips between the cities served, the current mode of travel, trip purpose, and party size.
- An analysis of traffic count data from the Florida Turnpike Enterprise and Florida DOT. This confirmed the overall number of auto travelers between Orlando and Southeast Florida currently on the roadways adjusting for through trips and intermediate destinations.
- A review of previous studies was conducted by the study team. The overall travel market estimate we developed closely corresponds to market research conducted previously for the Florida Statewide Rail Plan and previous forecast studies for high-speed rail proposal between Central and Southeast Florida.

Conclusion: Passenger rail ridership is directly related to price, frequency of service and quality of service in addition to the overall size of the market and the extent of competitive alternatives. A top-down estimate based reference to another corridor cannot take these fundamental attributes into account. AAF service will have a profile of service and pricing that will differ substantially from Amtrak in the Northeast Corridor. By assuming a value for AAF ridership, Friedman cannot account for these differences or benchmark his estimate to the observed patterns of travel between the four cities served by AAF. Friedman's analysis also makes no reference to the overall size of the travel market in the Northeast Corridor and Amtrak's share of that market based on the key service attributes. The AAF forecast was based on a detailed dataset of trips confirmed independently through survey work, traffic counts, and reference to previous studies.

- **Mode Choice Evaluation** – As noted above, the Friedman report assumes a level of ridership for AAF. The AAF Forecast is based on mode choice model which considers traveler preferences for the time and cost of travel and calculates the share of overall travel market AAF is likely to capture given these preferences and the attributes of competing modes.

  Friedman Report: The report assumes AAF ridership through a comparison to Amtrak Northeast Corridor service scaled to the size of the cities served by AAF. One top-down estimate for all travel between the four cities served was assumed.

  AAF Forecast: The AAF forecast was prepared with a detailed data set of trips by all modes of travel with a disaggregate representation of origin/destination patterns and travel time and cost (between several hundred travel analysis zones) for each mode of travel. The forecast used the following methods.

  - A stated preference survey of 1,800 travelers in the region was implemented by Louis Berger specifically for this study. The survey confirmed collected information on a recent reference trip between the cities served and presented a set of 8 choice experiments to gauge traveler choice of mode with the introduction of a new mode of travel (AAF), given a range of travel time and cost scenarios.
  - Discrete choice analysis was used to derive parameters for the mode choice model including in-vehicle travel time, travel cost, access/egress travel time/cost, and frequency of service. The analysis was conducted separately for Business and Non-Business trip purposes and long-distance

and short-distance travel. The implied value of time resulting from the model was benchmarked to U.S. DOT guidelines and other surveys for the region and compared favorably to those benchmarks.

- Models were calibrated to base year (2010) travel conditions for each city pair, trip purpose, and mode of travel.
- Future forecasts were developed by estimating future year travel volumes by mode and applying the mode choice models. This resulted in an estimate of future travel diverted to AAF from the traditional modes of travel. The addressable market used in the estimates was adjusted downward to account for travelers that needed to make intermediate stops by auto (en-route captives) and was further limited to account for reasonable catchment area around stations (20-30 minutes access time for Short Distance and 30-40 minute access time for long distance). Within the catchment areas the mode choice model accounted for actual travel and access time by each mode of travel.
- The resulting market capture for AAF as estimated by the models ranged from 5% to 10% of the total market for long-distance travel (Central – Southeast Florida) depending on distance, and 0.5% to 4% for short-distance travel (within Southeast Florida) depending on distance. Capture rates are calculated on a zone-by-zone basis reflecting the actual time and money cost of travel and access/egress (including taxi/rental car, parking) for each mode. These capture rates are reasonable given known values for other U.S. and international rail services, and previous forecasts for the Florida market.

Conclusion: The aggregate assumption for ridership in the Friedman Report excludes information on total market size and the capture potential of a new service based on a disaggregate understanding of travel time and cost preferences and attributes by mode in the markets to be served. Without this detailed information, Friedman substantially underestimates the ridership potential of AAF.

- **Induced Ridership** – Friedman's method of deriving an aggregate ridership estimate by scaling from other rail corridors does not allow for the estimation of how the addition of a new mode of travel will encourage travelers to make trips they may not otherwise have made. This potential induced travel was confirmed through responses to the AAF stated preference survey.

  Friedman Report: Makes no allowance for induced travel.

  AAF Forecast: The AAF forecast estimates induced travel based on the overall improvement in the generalized cost of travel with the addition of a new mode (AAF) with the assumed fares, travel time, and frequency of services. This method is standard practice for passenger rail forecasting and the resulting rates of induced travel (10% to 20% based on distance) compare favorably to benchmarks in the literature.

  Conclusion: The Friedman estimate does not allow for a reasonable level of induced ridership.

- **Expansion to Additional Markets** – AAF management has outlined identified a variety of travel markets not currently adequately served by existing modes of transportation. These markets include international travelers who may want to expand a trip to South Florida to the resorts in Central Florida, special event attendees, resort visitors, university students, and other types of travelers, that could be encouraged to

make trips that would not otherwise be made, through targeted marketing efforts by AAF and arrangements with travel arrangers, resort operators, and special events venues. AAF management has assembled a detailed plan for these marketing efforts. Louis Berger has reviewed that plan and independently confirmed the market size assumptions and examined the justification for the capture rates.

Friedman Report: Makes no reference to the potential for expansion of the market through targeted initiatives.

AAF Forecast: The AAF forecast includes an enumeration of these potential markets for new travelers and comments on the assumptions for market capture to AAF.

Conclusion: The Friedman estimate does not allow for a reasonable level of market expansion through targeted marketing initiatives.

- **Travel Market Growth** – The Friedman report assumes a level of ridership that appears to apply to an initial year of service and does not appear to grow into the future. The revenue estimates, therefore, appear to be based on a static picture of annual ridership and revenue.

  Friedman Report: Assumes a static annual level of ridership and fare revenue.

  AAF Forecast: The AAF report makes allowance for the underlying growth in the overall travel market given reasonable forecast projections for growth in population, employment, visitation, and other sources of intercity travel. The forecast for travel market growth was prepared separately for each traditional mode of travel in the total market (auto, air, rail, and bus) in both the short-distance and long-distance markets. The growth forecasts were benchmarked against other reliable sources of socioeconomic and travel market information including the regional planning agencies, the Florida Bureau for Economic and Business Research, Florida Department of Labor, and third-party commercial economic forecasting firms. Overall, intercity travel has grown substantially in the last 10 years with the Florida Turnpike mainline long-distance traffic growing at 3.6% per year and intercity air travel growing at 3.2% per year. The turnpike and aviation authorities anticipate that this growth will continue into the future with long-range forecasts showing 3.2% growth in turnpike traffic and 3.0% growth in intercity airline trips. The AAF forecast based on a disaggregate view of growth in each market segment yields growth rates of 1.5% to 3% per year depending on the distance, well within the demonstrated record of travel growth for the region.

  Conclusion: In excluding consideration of travel market growth, the Friedman report's estimate of financial feasibility substantially underestimates future ridership and revenue potential.

- **Willingness to Pay for Travel Time Savings / Fare Estimation** – Friedman assumes value of time based on US DOT guidelines in a top-down calculation based on a simplified view of travel time and cost to calculate the applicable fares—a single fare level assumed per mile traveled. The AAF study was based on a detailed fare optimization procedure utilizing the mode choice models to estimate the revenue maximizing fare for each city pair based on value of time by trip purpose.

  Friedman Report: Uses U.S. DOT guidelines for Value of Time assumptions applied to a simplified aggregate view of travel time savings potential.

  AAF Forecast: The AAF forecast calculates the willingness to pay for travel time savings based on results

of a stated-preference survey of actual travelers making trips between the cities to be served by AAF. The calculation accounts for preferences by trip purpose and length of trip and accounts for preferences in in-vehicle travel time, cost, access/egress time/cost, and frequency of service. The mode choice models use this information to calculate the probability of AAF ridership with disaggregate information on travel time and cost by location reflecting detailed knowledge of origin/destination patterns and the precise location of the stations. This disaggregate view allows for the evaluation of the revenue maximizing fare for each city pair for business and non-business trip purposes accounting for the origin-destination patterns in each market, the travel times and costs in station access and egress, and the actual travel times and costs of competing modes. These fares are substantially higher than Friedman's estimates and vary by distance and trip purpose. The AAF forecast included a detailed review of AAF fares in reference to Amtrak fares for comparable distances and levels of service in the Northeast Corridor and found the estimated AAF fares to be generally lower than the Amtrak benchmarks consistent with the AAF estimates of overall demand and willingness to pay in the Central/Southeast Florida market.

Conclusion: The top-down assumptions for value of time and fare levels do not account for market variations in willingness to pay revealed in the AAF survey. The top-down methods substantially underestimates the potential fare levels for the city pairs given AAF's plan of service. By separating out the calculation of estimated ridership and applicable fares, the Friedman report ignores the interplay between ridership and revenue based on fare elasticity. It is difficult to directly compare the estimates produced by Friedman with the AAF forecast because of this fundamental difference in methodology.

- **Ancillary Revenue** – The Friedman report assumes that all ancillary revenues are scalable with ridership. Louis Berger reviewed the ancillary fare estimates prepared by AAF and determined them to be reasonable. The estimates include items that are not directly related to AAF ridership and items that have been sized appropriately to the anticipated levels of ridership and revenue.

  Friedman Report: Assumes direct correspondence between ancillary revenues and ridership which is static over time given the methods employed.

  AAF Forecast: The AAF management estimate of ancillary revenues is based on a bottom-up view based on market research and reference to comparables. The management view accounts for growth over time for each line items based on the components driving demand.

  Conclusion: The potential of ancillary revenue is underestimated based on the lack of information related to ridership and elements of ancillary revenue that are not expected to vary with ridership.

- **General Comment on Methodology** – Although the Friedman Report addresses some of the basic elements underpinning ridership demand and fare revenue on AAF in high-level overview, the report was not based on the comprehensive level of information or detailed methods that are customary for an investment-grade level analysis. The AAF forecast was developed in keeping with industry standards as a reference for AAF management and potential investors and has been subject to thorough peer review by other consultants and infrastructure investment professional as planning for the railroad has advanced and due diligence by investors and rating agencies has been undertaken. The AAF forecast study included sensitivity testing that allows readers to assess the uncertainty and variability underlying the forecast inputs and has been subject to stress-case scenario testing during rating agency review.