

Landside APM at Baltimore Washington International Airport – Prospect for the Future

Mr. Hal Lindsey* and Ms. Catherine Cronin, P.E.**

*Senior Associate, Lea+Elliott, Inc., 14325 Willard Road, Suite 200, Chantilly, VA 20151, Phone: 703.968.7883, Cell: 703.380.8016, hlindsey@leae Elliott.com

**Manager of Engineering Projects, Lea+Elliott, Inc., 14325 Willard Road, Suite 200, Chantilly, VA 20151, Phone: 917.838.3450, Cell: 908.868.2814, ccronin@leae Elliott.com

Abstract

With over 20 million passengers in 2005, Baltimore Washington International Airport (BWI) is the 26th busiest passenger airport in North America¹. One of three regional airports that serve the Baltimore/Washington, DC metropolitan area, approximately half of the airport's passengers are carried by Southwest Airlines.

Owned and operated by the Maryland Aviation Administration (MAA), BWI began investigating the need for and feasibility of a landside automated people mover (APM) system in 1998. Following the completion of a preliminary study in 2001, the MAA began environmental assessment activities in 2004 aimed at examining the overall ground transportation network serving the airport and defining the need for improved ground transportation considering an APM as a solution.

With that phase of planning work scheduled for completion in 2007, the MAA is evaluating the start of phase two of the environmental studies that would refine the APM route, passenger demand, station locations, phasing, funding, and other critical factors prior to the start of procurement activities. These activities will be coordinated with the airport-wide masterplan update that is currently in process on a parallel path.

This paper describes the current airport environment and the benefit of frequent fixed guideway service that could link the main terminal with short- and long-term parking, Amtrak's station on the busy Northeast Corridor, the recently constructed consolidated rental car facility and possibly commercial development.

From a funding perspective, this paper will explore various Public-Private Partnership (PPP) options that are creative in nature and patterned after funding schemes adopted by other airports and rail transit systems. These schemes offer fresh thinking to prospective owners of APM systems elsewhere. It is the goal of the authors to (1) stimulate thinking about the creative funding of APM systems; (2) update the industry on the status of the landside APM planning activities at BWI; and (3) solicit thoughts, ideas and lessons learned from the industry at large as the MAA and its consultants proceed forward.

¹ Airports Council International North America, 2005 North America Final Traffic Report: Total Passengers, <http://www.aci-na.org/asp/traffic.asp?art=215>

BWI by Definition

Opened and dedicated for use in 1950 by President Harry S. Truman, the current BWI Airport was originally named Friendship International Airport. In 1972, the State of Maryland Department of Transportation (MDOT) purchased the airport from the City of Baltimore and renamed it in 1973. Now managed by the MAA, a division of MDOT, BWI is one of the largest economic generators in the state, contributing approximately \$5.7 billion annually to the state's economy.²

Sited on 3,600 acres, the airport today serves more than 20 million annual passengers with 70 jet gates and 12 gates dedicated to commuter aircraft located in 4 domestic concourses and 1 international concourse. Over 25,000 regular parking spaces are provided for BWI passengers with another 7,500 available to handle peak travel periods.³

From a regional transportation and accessibility standpoint, BWI is well served by I-95, one of the highest capacity interstates along the east coast of the United States; Amtrak's busy Northeast Corridor, high-speed rail linking Washington, DC with Baltimore, Philadelphia, New York, Boston and points between; regional light rail transit operated by the Maryland Transportation Administration (MTA); and local and regional bus lines.

BWI is located 10 miles south of Baltimore and 30 miles north of Washington, DC, strategically positioned to serve the greater Baltimore/Washington, DC metropolitan area and its 8+ million residents.

Figure 1⁴: Baltimore/Washington, DC Metropolitan Area Airports

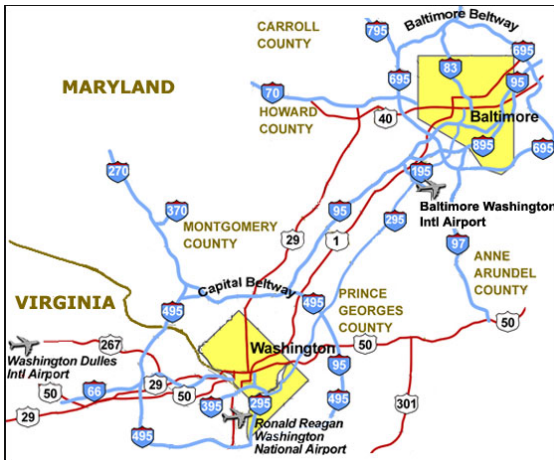
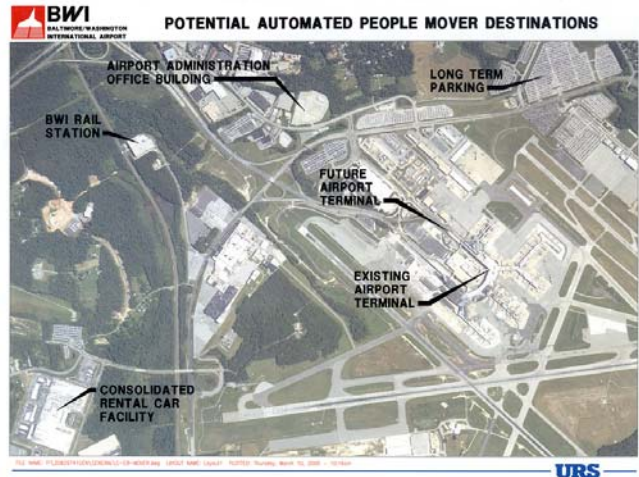


Figure 2⁵: BWI Airport Layout



² Maryland Aviation Administration (MAA) website, BWI Timeline, http://www.bwiairport.com/about_bwi/bwi_timeline/

³ MAA website, General Statistics, http://www.bwiairport.com/about_bwi/general_statistics/

⁴ Visiting DC.com, BWI Airport, <http://www.visitingdc.com/airport/washington-dc-airport-map.htm>

⁵ Courtesy URS Corporation

Figure 3: Feasibility Study for MAA

APM Planning (2000-2001)⁶

In response to the airport's rapid growth (six percent annual increase in passenger trips) in the decade between 1990 and 2000, and as part of the airport's capital five-year, \$1.8 billion expansion and improvement program called VISION, MAA commissioned a feasibility study for a landside APM system in 2000.

The Study initially evaluated eight alternatives (route and technology pairings). Of these eight, two APM alternatives were selected for further study. Each alternative included multiple stations in the Main Terminal area, and linkages to long term parking, a proposed Intermodal Center (for transfer to regional light rail transit and bus), the Amtrak BWI rail station and the consolidated rental car facility at Stoney Run. A second line extended from the main terminal area to the long term parking lots to the east.

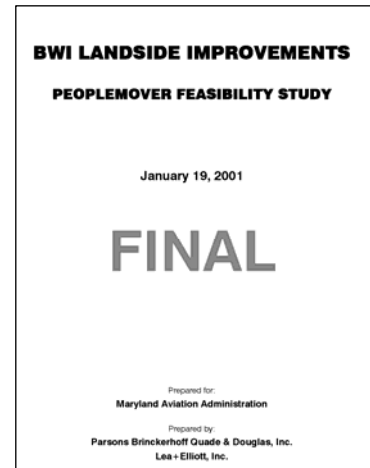
As conceived, the full system was approximately 5.6 miles long with 16 stations. It was envisioned that nearly all of the dual-lane guideway would be elevated. MAA concluded the study in April 2001 examining primarily candidate vehicle technologies and alternative alignments for an APM system.

Prior to any further action to progress the APM at BWI, the events of 9/11 took place. The airline industry underwent a recession and passenger numbers at all airports dropped significantly. As such, the pressure to quickly improve ground transportation at BWI to meet the high levels of passenger growth they were experiencing eased. MAA took this opportunity to reintegrate the work that was happening on the APM with the overall master planning efforts being undertaken for the airport.

APM Environmental Assessment and Preliminary Engineering (2004 – Current)

In December 2004, MAA began a new study to assess and document any *need* for an improved ground transportation system, considering an APM as a potential solution. MAA initiated this study to ensure that it maintains easy accessibility in the future and continues to be known as an “easy-come, easy-go” airport as air traffic and ground transportation traffic increases in future years. This first phase of the study focused on an analysis of the entire ground transportation system, the existing and future transportation problems, and the potential solutions including APM.

As part of assessing the possible need for implementation of an APM at BWI, or for other improvements to the ground transportation system, interviews were held with parties who



⁶ Parsons Brinckerhoff Quade & Douglas, Inc. and Lea+Elliott, Inc., BWI Landside Improvements People Mover Feasibility Study, January 19, 2001

have an interest in the development of the Airport and its operation. General consensus of the interviewees was that some type of improvements to the ground transportation network would be needed in the future. Beyond that sentiment, two key points emerged from the interviews:

- 1) Regardless of the ground transportation mode ultimately pursued, the system must be developed within the framework of the Airport's master planning initiatives, and
- 2) Cost of design, construction and operation of an APM is a primary concern and implementation of a system must be done in an efficient, competitive manner if it is to work at BWI.

The first phase of work also included evaluation of the state of the industry related to APM development at other airports in North America, collection of existing environmental data and preparation of environmental resource inventory maps to be used in future analysis of the APM corridor, and an evaluation of four different ground transportation scenarios. Specifically, the study looked at the following four alternatives:

Alternative 1: No Build: Assumed only roadway improvements adopted in the region's 2030 Constrained Long-Range Plan (CLRP).

Alternative 2: Roadway Capacity Enhancements: Relatively modest capital improvements to improve traffic conditions at isolated locations in the study area.

Alternative 3: APM: Implementation of an APM to serve the Airport.

Alternative 4: Ground Transportation System Enhancements: More substantial capital improvements to serve various BWI shuttles including provision of a consolidated ground transportation center.

The specific items of work completed as part of the first phase of the environmental assessment and preliminary engineering effort included:

- Meetings with stakeholders of the BWI community, including the MAA, State Highway Administration (SHA), other MDOT personnel, Anne Arundel County, the Greater Baltimore Committee/Baltimore Transit Alliance, Delta and Southwest Airlines, the BWI Development Council, the BWI Business Partnership, Amtrak, and MTA.
- A benchmarking report outlining the current and planned usage of APMs at medium- and large-hub airports within North America.
- Existing transportation facilities as they relate to roadway usage, Amtrak ridership, light rail ridership, BWI shuttles, shuttles other than those operated by BWI, limousines, taxis, etc., parking garage and parking lot were cataloged and analyzed.

- Relevant ground transportation system usage and passenger forecasts were compiled and analyzed. Traffic counts were performed to fill in any remaining data needs.
- An environmental inventory of existing conditions of MAA-owned property in preparation for the next phase of work was compiled.
- Future ground transportation conditions were determined using air passenger forecasts provided by MAA, as well as information on Airport employee-use patterns and growth projections, and ground transportation forecasts (autos, transit, rental car operations, shuttles, etc.).
- Alternatives to address future potential ground transportation issues were developed: (1) No-Build, (2) Roadway Capacity Enhancements, (3) APM, and (4) Ground Transportation System Enhancements.
- Ridership demand estimates for a potential future APM were modeled, as were the projected shuttle bus needs.

The result of the phase one analyses determined the following:

- Alternative 1 – No-Build alternative does not address the growing traffic congestion on either the public roadway network or within the terminal area roadways. Traffic congestion on the surrounding roadway network of BWI Airport is already failing in current conditions and will continue to fail with the CLRP improvements slated for development by 2030.
- Alternative 2 – Roadway Capacity Enhancements provide relief from traffic congestion problems on the local roadway network but do not alleviate the future, increased levels of shuttle traffic within the Airport roadways and terminal curbside areas.
- Alternatives 3 and 4 – APM System and Ground Transportation System Enhancements both provide relief from traffic congestion with the additional benefit of reducing the amount of shuttle traffic using the local roadways and impacting the terminal curbside area. Both Alternative 3 and Alternative 4 are justifiable development scenarios, as the airport will generate enough traffic for each of these systems to be a viable alternative.

From a global perspective, it is clear that something more than a ‘No-Build’ Alternative is necessary. The build alternatives analyzed have the ability to provide mitigation of the ground transportation system challenges. Much of the decision for a recommended alternative needs to be based on two factors: (1) a policy decision on the desired level of service the Airport wants to provide to its users, and (2) how the alternatives integrate with the long-term Airport layout likely to be developed during the concurrent LRNA process.

Next Steps

The overall recommendation of a final ground transportation system alternative will not be finalized until the development of the preferred LRNA plan; however, there are several steps that can be taken in preparation. Future task assignments include comparative evaluation of the alternative transportation system enhancements, updates to reflect the approved long-range needs assessment forecast, development of interim year forecasts as appropriate, and development of budget cost estimates for recommended alternatives. The final concept definition study will be a consolidated document that is coordinated with and can be integrated into the Airport's upcoming LRNA and will include detailed planning of a recommended alternative; construction, and operating and maintenance costs; and associated environmental document preparation.

Potential Funding and Financing Scenarios

There are a number of ways that the capital and operations and maintenance (O&M) costs of an APM system can be obtained. As the airport owner, MAA must evaluate these and other options in light of enabling state legislation (at the moment, specific state legislation is not in place that expressly authorizes PPPs for transportation infrastructure); MDOT, MAA and Federal Aviation Administration regulations; the economic climate at the time; their ability and interest in sharing risks and responsibility for system financing with the private sector; and their own budgetary policies.

The purpose of this section of the document is to highlight a range of methods that could be used. The options range from very low risk on the part of the MAA to more risk-sharing with one or more private sector teams. As risks are moved from the public sector to the private sector, there is typically an increase in price. Further, public entities like MAA can usually borrow money at a lower rate than private sector companies but sometimes find it preferable to finance large projects through the private sector from a cash flow and budgeting standpoint. The examples below are simply and solely shown as examples to stimulate further thought and discussion.

Figure 4: APM System Funding and Financing Scenarios

Option Number	Type of Procurement	Infrastructure Financed By	Rolling Stock and System Financed By	Comments
Option 1	Design-Build-Operate-Maintain (DBOM)	MAA	MAA	Large outlay required during construction years with much smaller amount during O&M
Option 2	Build-Operate-Transfer (BOT) Complete System	Private Sector	Private Sector	Removes large initial outlay and creates flat fee. If the system is free to the user, a method of shadow tolling will have to be derived so that the O&M costs can be fairly allocated.

Option Number	Type of Procurement	Infrastructure Financed By	Rolling Stock and System Financed By	Comments
Option 3	Partial Build-Operate-Transfer (BOT) Rolling Stock and System Components subject to BOT; Infrastructure designed and built by MAA	MAA	Private Sector	MAA retains control of design and construction of technology-neutral guideway, stations and maintenance facility; multiple APM technologies can fit on guideway. Reduces initial capital cost by approximately 30%.
Option 4	PPP where MAA trades land and/or commercial development rights along APM right-of-way to offset APM capital and O&M costs.	MAA or Private Sector	MAA or Private Sector	Commercial development along APM right-of-way reduces capital and O&M costs of system over the life of the system

Traditional funding sources for large MAA capital programs usually include airport revenue bonds, Passenger Facility Charges, and Airport Improvement Program funds obtained from the FAA.

Conclusion / Summary

MAA and its consultant team will continue work over the next one to two years to determine the most optimal solution to the airport's ground transportation needs. Should an APM system be determined to be the best solution, MAA will engage the transit industry in further dialogue and discussion as to how it will proceed so as to stimulate competition and procure the best value system for the airport's near-, mid- and long-term needs.

Acknowledgments

This paper reflects the views of the authors and not necessarily those of Lea+Elliott, Inc. The authors thank Jordan Schwartz of The World Bank Group and Catherine Berns of Lea+Elliott, Inc. for their contributions to this paper.