Automated People Mover Procurements in a Mature Industry

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Abstract

This paper focuses on APM procurements in situations where there is an existing APM system that will influence the process and decisions made in contracting to either refurbish that system or build a new system in order to ensure that the owners' best interests are accommodated. Three recent projects are presented to illustrate the unique circumstances of each particular situation and the decision process used to determine the best approach to provide the owner with the best possible outcome.

Introduction and Purpose

As the airport Automated People Mover (APM) industry matures, many new APM system procurements are no longer "green field" events that are independent of the influence of other existing APM systems operating at the same airport. For example, the synergy and economy that may exist with regard to combined maintenance operation for the new and existing system may influence owners toward a sole-source procurement with the existing technology supplier. However, this approach needs to be balanced with the potential savings in capital expenditures that a different technology might offer. Further, at first glance an APM system that needs a subsystem overhaul might seem like a prime candidate for a sole-source contract to the existing system supplier; however, consideration should be given to the opportunity and potential savings provided by another technology supplier.

This paper highlights three recent projects; Tampa Airside E APM System Replacement, McCarran T3 APM, and Atlanta ATC Replacement with regard to the process used in determining the best procurement approach given the unique circumstances in each case. These projects all deal with the presence of existing APM systems that weigh into the decision of determining the best approach for the owner to obtain the most advantageous operating system.

The following provides a brief description of each of the projects and the process used in determining the best procurement approach in each case.

Tampa International Airport Airside E APM Leg

Project Background

An integral element in the design and functioning of the Tampa International Airport (TIA) are its six (6) APM system legs. These legs are numbered alphanumerically A through F. For a considerable period of time, the Airside E Terminal (Airside E) building was closed and the existing APM system did not operate. As time progressed, the system became obsolete due to age and technology, while the other operating APM legs were modernized. Figure 1 below shows a layout of the Tampa International Airport APM legs.

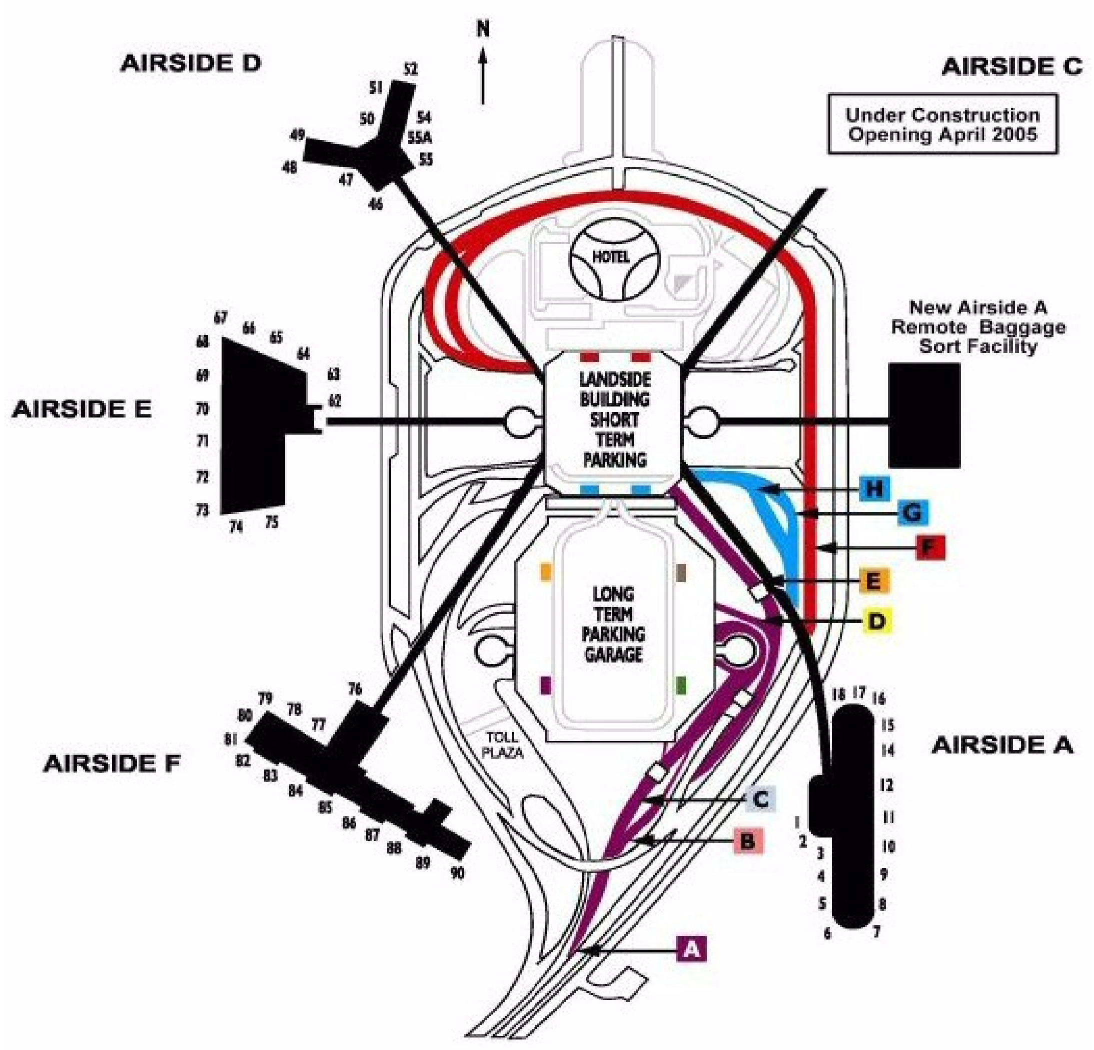

Figure 1. Tampa International Airport APM Legs

In its past configuration, Airside E passengers arriving on the APM used vertical circulation to proceed from the station platform level to the lower aircraft gate level of the building. This movement and the need to use narrow escalators to go between levels, was detrimental to the free flow of passenger movements and often caused confusion to passengers in their way finding. Thus, the decision was made by the Airport Authority that if Airside E were reopened, it would be rebuilt and incorporate a completely new design with APM station platforms and the aircraft gates located at or on about the same level.

Given the obsolete state of the APM and the fact that much of its existing facilities and structure would need to be demolished and modified to accommodate the extensive changes, the Authority commissioned Lea+Elliott to study if APM technologies other than the current Bombardier CX-100 system (the original system was a C-100 version) would meet all the criteria required for suitable passenger conveyance between the main terminal and Airside E. This could allow for a competitive procurement rather than a non-competitive, sole-source award for the Airside E APM replacement, an approach that would need extensive justification to the Authority's Board of Directors.

Based upon the findings of its study, which involved extensive evaluation techniques and other criteria, Lea+Elliott recommended that the Authority openly compete the replacement of the Airside E APM.

Approach

To establish the type of procurement, certain evaluation criteria were required to be identified. For the analysis, the following criteria were developed:

1. Technology Evaluation – were other technologies available in the market place that could meet the passenger capacity of the original system, as well as be expandable to meet future demand;

2. Fixed Facility Constraints – could other technologies fit within the confines of the existing fixed facilities at the landside terminal;

3. Experience of Technology Suppliers – the Hillsborough Aviation Authority (the Authority) operates the TIA. As the Authority was not interested in the risk involved with a new technology, it elected to require that any system technology have a service-proven track record of successful service for at least five years in an airport environment. Could other system suppliers meet this requirement; and

4. Costs – whether there were other technologies able to provide competitive pricing for not only the capital portion for the project, as well as operations and maintenance of the system for at least five years after completion of the system.

These criteria were then applied to the analysis.

Evaluation and Conclusion

For the technology portion of the evaluation, several differing suppliers were identified. These included:

- Bombardier Transportation System, USA;
- Poma-Otis; and
- Doppelmayr Cable Car.

These system suppliers were, at the time of the study, the technology alternatives that appeared to provide systems that could meet the passenger capacity and demand requirements. Both Bombardier and Poma-Otis had a proven track record of delivering systems and both had several examples of systems operating for at least the five-year period. Unfortunately, Doppelmayr did not meet the five-year period for a proven system. Thus, that system supplier was dropped from consideration.

Based upon Lea+Elliott LEGENDS© cost models, Bombardier and Poma-Otis would be very competitive in pricing for the system.

Therefore, given that more than one technology could meet the requirements of the evaluation criteria, the Authority elected to competitively bid.

McCarran International Airport Terminal 3 APM

Project Background

The Terminal 3 (T3) APM is being planned as a shuttle connection between Concourse D and the future Terminal 3 at McCarran International Airport. The APM tunnel and station structure at Concourse D were recently constructed as part of the northeast wing expansion of Concourse D. The APM station at Terminal 3 and the maintenance facility below will be designed and constructed as part of the Terminal 3 construction. Figure 2 shows the Terminal 3 APM configuration.

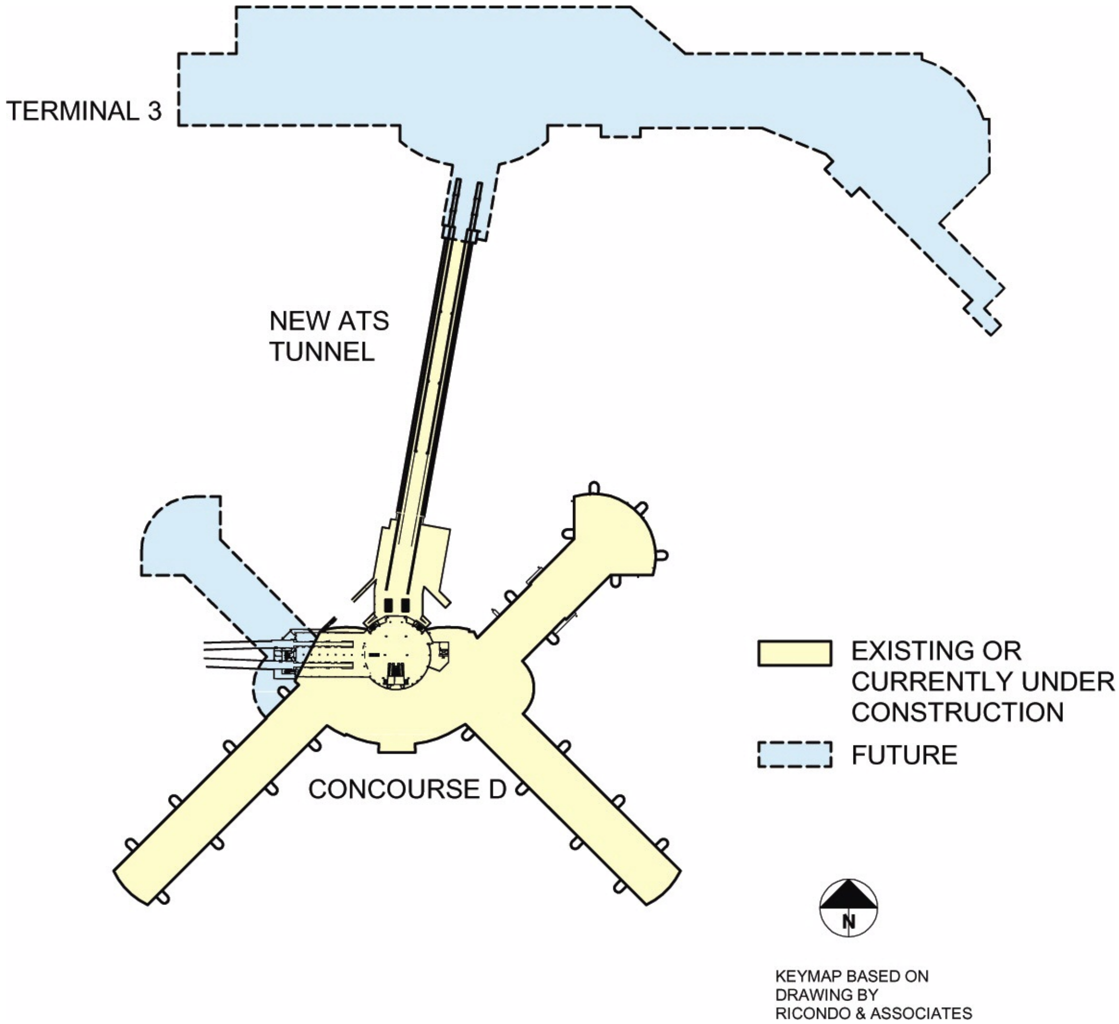

Figure 2. McCarran International Airport - Terminal 3 APM System Configuration

There are two existing APM shuttles at McCarran; one that connects Terminal 1 and Concourse C that was put into service in 1985 and the other that was put into service in 1992 that connects Terminal 1 and Concourse D. Both existing systems are Bombardier's technologies (Terminal 1 to Concourse C is the C-100 and Terminal 1 to Concourse D is the CX-100), and Bombardier is contracted to do the maintenance for both systems.

The Clark County Department of Aviation (DOA) contracted with Lea+Elliott in early 2004 to evaluate whether it is in the best interest of the DOA to procure the T3 APM system competitively or to enter into a sole-source agreement with Bombardier given the two existing APM shuttle systems operating at McCarran.

Key Issues/Decision Factors

The approach of the analysis focused primarily on: 1) the assessment of the technologies that could be accommodated within the planned and existing facilities for the Terminal 3 APM and that could provide the appropriate level of passenger service to determine whether viable technology candidates exist; 2) whether a potential economic benefit exists to support a competitive procurement in terms of life cycle cost given the inherent advantage provided by Bombardier's existing maintenance operation at McCarran; and 3) given that the Concourse C shuttle is in need of overhaul, if any benefit would be provided by a joint sole-source procurement for replacement or refurbishment of the C shuttle vehicles and the new Terminal 3 APM system.

Analysis and Evaluation

The assessment of viable technologies was performed in two levels of screening. The initial screening was based on commercial conditions and technical maturity. The final assessment considered the capacity of the technology, compatibility with existing and planning facility conditions, magnitude of modifications required for existing and planned facilities to accommodate the technology and passenger level of service issues. Physical compatibility issues were primarily due to platform length, column locations at the edge of the platform (potential column interference with vehicle door locations) and guideway envelope constraints for guideway equipment or vehicles.

The next step in the analysis was to determine, based on life cycle cost analysis of the viable technology alternatives, if any economic advantage exists to support either a sole-source or competitive procurement approach. This analysis considered the initial system capital cost of the viable technology options including the cost of any modification to existing facility structures and the O&M cost using a 25-year design life. This analysis also considered the potential economy or advantage of a combined maintenance operation with the existing APM systems as compared with a separate maintenance operation of a different technology.

Another factor considered in the analysis was whether there was any benefit to a sole-source combined procurement given the Concourse C shuttle vehicles were nearing the need for an overhaul. Four options were considered in terms of whether to refurbish or replace the Concourse C vehicles. These options were evaluated using criteria such as compatibility with systems overhaul timing, capacity, and overhaul process efficiency. Procurement of either two or four replacement vehicles for use in the Concourse C shuttle and later in the Terminal 3 APM provides some economic and level of service benefits. However, the schedule risk given the timing of the projects was found to be problematic.

Conclusions

The results of the technology assessment found that viable technology options that meet the level of service and performance criteria for the Terminal 3 APM system as well as being compatible with the existing and planned facilities at McCarran exist. In addition, the findings of the financial analysis indicate that there is a significant potential economic benefit to support a competitive procurement approach. This is due to the potential of cable-propelled APM systems with lower initial capital cost competing that could offset the economic benefit of a combined O&M operation with the existing self-propelled APM systems. Also, the financial analysis predicted the potential for lower capital and O&M prices resulting from a competitive procurement as compared to a sole-source procurement. Finally, the findings of the analysis indicted that there is not a compelling reason to couple the procurements for the Concourse C shuttle and the Terminal 3 APM primarily because of schedule issues, therefore, a sole-source procurement could not be supported on this basis. Thus, a competitive procurement approach was deemed to be potentially advantageous to the owner.

Atlanta Automated Guideway Transit System (AGTS) Automatic Train Control (ATC) Modernization

Project Background

Located in the City of Atlanta (City), the Hartsfield-Jackson International Airport is one of the world's busiest airports. It is Delta Airlines' home base and the facility provides major hub operations for that and other airlines amongst six terminals. Each of the terminals is connected by two means of passenger conveyance. The first and primary means is an Automated Guideway Transit System (AGTS) capable of carrying over 9,000 to 10,000 passengers per hour per direction. As a back up to this system, a moving sidewalk system is also installed between terminals. However, the preferred method of passengers is to ride the AGTS as it provides a much quicker movement than the sidewalk system. Figure 3 provides an overview of the AGTS system.

The current AGTS has undergone some modernization with the purchase of new vehicles in 2001. However, the Automatic Train Control (ATC) system is the original version installed in 1980 and is approaching the end of its useful life with subsequent reduction in reliability of the system.

In the fall of 2003, Lea+Elliott was awarded a contract to analyze the best procurement alternative for the modernization of the original AGTS, ATC system.

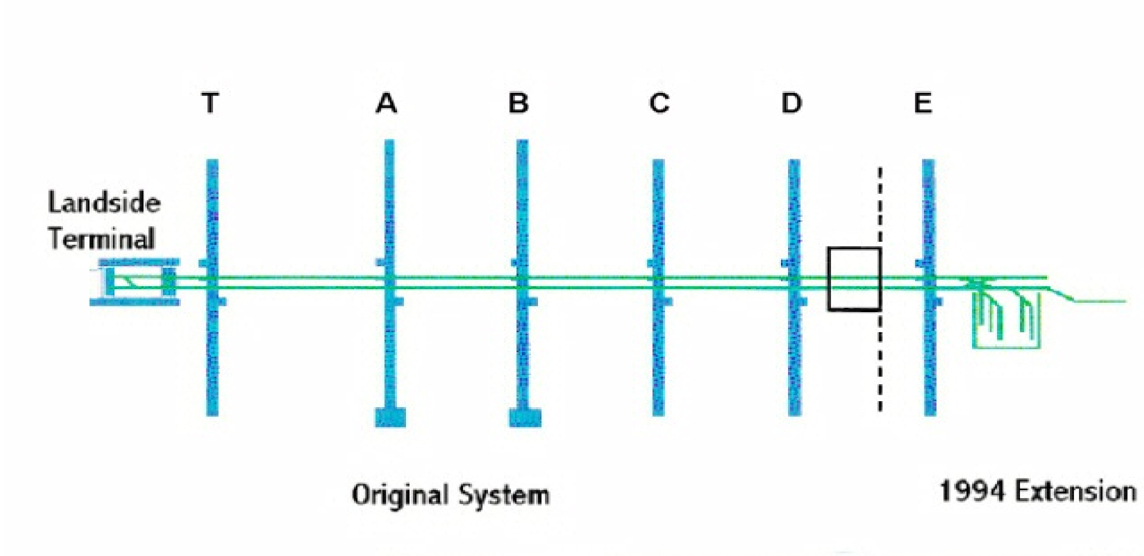

Figure 3. Hartsfield Jackson International Airport AGTS Configuration

Approach

Replacement of an ATC system on a critical operating system such as the AGTS could be classed as extremely difficult. Therefore, there would be two classes of possible modernization. These were to 1) upgrade or modernize the ATC system with a Bombardier product to maintain the existing vehicle wayside interface, or 2) upgrade or modernize the system using another technology that does not maintain the existing vehicle/wayside interface. Technologies that were considered were those of the “fixed-block” type where sections of the trains’ control system are divided into discreet physical entities with defined boundaries, and “moving-block” types where the safety distance between trains is calculated and adjusted based upon train position, speed and other factors. Also, under consideration was the replacement of the current proprietary fixed block system with a programmable logic controller or PLC system. The following table shows the options selected under each of the categories for investigation.

Upgrade Options That **Maintain** Existing Vehicle/Wayside Interface

Option	Description
1	Minimal Upgrade at Old Central only
2	Upgrade Old Central* only with Gealoc™ (a Bombardier fixed-block system technology)
2a	Upgrade Old Central only with another Fixed-Block Technology
3	Upgrade New Central (excluding ATS) and Old Central with Gealoc™
3a	Upgrade New Central and Old Central with another Fixed-Block Technology

Replacement Options That **DoNot Maintain** Existing Vehicle/Wayside Interface

Option	Description
4	Replace ATC with Generic Communications Based Train Control (CBTC) Technology
4a	Replace ATC with Flexiblok^{TM} CBTC (a Bombardier moving-block product) Technology
5	Replace ATC with a PLC-based Technology
6	Replace ATC with Generic Fixed-Block Technology

* Old Central – this was the original location of Central Control. When the system was expanded to Concourse E, a new Central Control was established in a new maintenance facility located at that concourse. However, much of the existing train control equipment necessary for operations continues to be located at the old Central Control facility.

As detailed above, options were not limited to one supplier. For example, several vendors offer fixed-block and moving-block train control systems. The challenge would be to overlay and interface those systems with what is currently installed and to continue to provide the high levels of passenger service.

In a fashion similar to the McCarran Airport evaluation detailed previously, each of the options underwent an extensive screening process. In the course of the analysis each option was examined and evaluated using a number of criteria established by the City and Lea+Elliott including costs, effects on operations, length of time to complete the work, complexity of installation, required safety testing and other factors. In addition, a risk analysis was completed that compared the costs of each option with its probability of risk. As the options were evaluated, several key factors became clear. First, as the system vehicles were new, replacement of the vehicles was not possible or prudent: it would be necessary to interface another supplier's ATC system into the existing proprietary vehicles. It would also be necessary to extensively test and overlay a new ATC system on the wayside. All of this work would need to be completed within the short window of maintenance down-time periods when the system demand was low. Both of these items posed substantial risk to the City, even when competitive pricing for the work is taken into account.

Conclusion

After full analysis of these factors, it was determined that the most cost effective solution to sustain reliable operation while minimization of the risk to the City would be to implement Option 2 and that the award of the work should be on a sole-source basis to the current AGTS provider.

Conclusions and Observations

The analysis and evaluation process used in the three projects described in this paper illustrate the importance of due diligence in consideration of the unique circumstances of any project to determine the best possible approach for procurement. The outcome in each of the case was different based on the issues that were important to the owner and technical and economic factors. As illustrated in these examples, existing APM systems heavily influence the decision process by adding a level of complexity that is beyond that of a “green field” project. This factor shapes the process of determining the most advantageous procurement approach for the owner whether it is a sole-source award or a competitive procurement. As detailed above, each situation is unique and requires detailed analysis to determine the most effective method when making such a determination.