

In Motion

A PUBLICATION BY LEA+ELLIOTT TRANSPORTATION CONSULTANTS

SPECIAL EDITION 2010

Never Before...

Three U.S. APMs Began Service [Almost] Simultaneously
(President's Column)



In the 37 years that Lea+Elliott has been involved in automated people mover (APM) system design and construction, this is the first time that three systems have all opened within a two-month period. In fact, having three systems open within such a short period is completely unprecedented.

On December 3, Las Vegas' new CityCenter complex introduced their Doppelmayr elevated people mover system, providing seamless connections throughout the largest privately funded development in US history. Four days later, on December 7, Hartsfield-Jackson Atlanta International Airport unveiled their new SkyTrain, featuring Mitsubishi's rubber-tire Crystal Mover vehicles. This system connects the airport terminal to the Atlanta Convention Center and the airport's Rental Car Center. Then on January 26, Dulles International Airport introduced their new high-tech AeroTrain, the underground people mover system that is the realization of the long term plan to upgrade passenger service by improving access to the airside concourses. Together the three systems combined are expected to carry an average of 114,000 passengers per day or 40 million passengers per year. They will log in an average of 9,000 vehicle miles per day or 3 million per year.

It has been our pleasure to serve on the teams that planned, designed and delivered these three new and vital transportation resources. It has also been our

responsibility to be sure that all three of them are as safe as they can possibly be. When an APM system is nearing completion, excitement builds and everyone is anxious to see it begin operation. In our case, however, an essential part of our job is insuring that all final safety testing is accomplished and that rigorous performance tests are completed and documented before one single passenger steps on board for the inaugural ride. There is no element of our work that is more important than this commissioning process that assures both system performance and system safety.

As you can imagine, the Lea+Elliott staff of professionals has been very busy over the past few years, helping to create and complete these important transportation systems. We appreciate the opportunity to serve in such a critical capacity for these (and many, many) people mover system projects worldwide.

Jack Norton

In this issue...

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- "City within a City" is a World-Class Destination
- It's "All about the Future"

“City within a City” is a World-Class Destination

CityCenter, the largest privately funded development project in US history, opened to the public on December 3, 2009. The unveiling of CityCenter was historic and brought to fruition a remarkable project that began in 2004, when MGM MIRAGE initiated the planning process. Located in the heart of Las Vegas, Nevada, the CityCenter development, valued at US \$8.6 billion, is a tribute to urban planning and will shape the future of Las Vegas for many years to come.

Envisioned as “A City within a City,” CityCenter includes approximately 18 million square feet of space, 5,000 hotel rooms, 2,400 condominium units, and 500,000 square feet of entertainment, dining, and retail areas. All these elements are connected by an APM system. CityCenter will become one of the world’s largest environmentally sustainable urban communities, with six LEED® Gold-Certified projects. CityCenter was built to the latest Leadership in Energy and Environmental Design (LEED®) environmental standards certified by the US Green Building Council.

Lea+Elliott’s involvement with the project began in May 2005 when we were selected to assist in planning and conceptual design of the CityCenter APM system. In this early stage of the project, we worked very closely with the MGM MIRAGE Design Group (MMDG), the project’s executive architect (Gensler), design architects, architects of record, and many other consultants to define the system alignment, station locations, and applicable technologies. Our mission was to create an automated transit system that works within a vibrant city environment and integrates with the excellence and innovation of CityCenter’s design. For this to work, “we needed to thoroughly collaborate with design architects and others on design interface issues and, at the same time, quickly analyze the pros and cons of options so that MMDG could make quick and informed decisions” said **Huy Huynh, P.E., Lea+Elliott’s principal and project manager.**

The CityCenter APM operates as a dual-lane shuttle serving three passenger stations. The two end stations are located adjacent to Bellagio and Monte Carlo properties. The middle station is located in the Crystals© retail area. The system operates on an elevated structure up to 70 feet above ground level. The trains are electrically powered and capable of operating at 23.5 miles per hour and carrying 3,300 people per hour in each direction.

In parallel with conceptual design, Lea+Elliott was assigned to develop contracting strategy and procurement documents so that MMDG could select a design-build team for the project. MMDG ultimately chose a team led by Doppelmayr Cable Car (DCC) to perform detailed design and construction of the system. Gensler was selected to design the stations and other system fixed facilities (besides serving as executive architect of CityCenter).



CityCenter APM running past Aria Condo Hotel.

Image courtesy of Doppelmayr

In the implementation phase, the APM project was led by **Brian Packer, director of design and construction for CityCenter’s portion of this project.** In addition to being responsible for CityCenter’s many other critical projects, Mr. Packer led a diverse team of contractors, architects, consultants, and other specialists to deliver the APM system and associated facilities under a tight schedule. Lea+Elliott

assisted MMDG in overseeing the system implementation, “using proven methods and processes derived from collective experience in implementing systems all over the world,” says Huynh.

Delivering a project of the magnitude and complexity of CityCenter required a fast-track process. With more than 7,000 workers on site, many APM system elements had to be constructed and fabricated prior to completion of the full system design. This was essential in order to meet the construction sequencing requirements. Our activities included design review, fabrication and construction oversight, testing, and facilitation of construction interfaces. “Performing early design reviews, along with factory inspection and tests of key components, allowed us to recognize and address potential issues before they could impact the project” said **Sebastian Gladney, P.E.,**

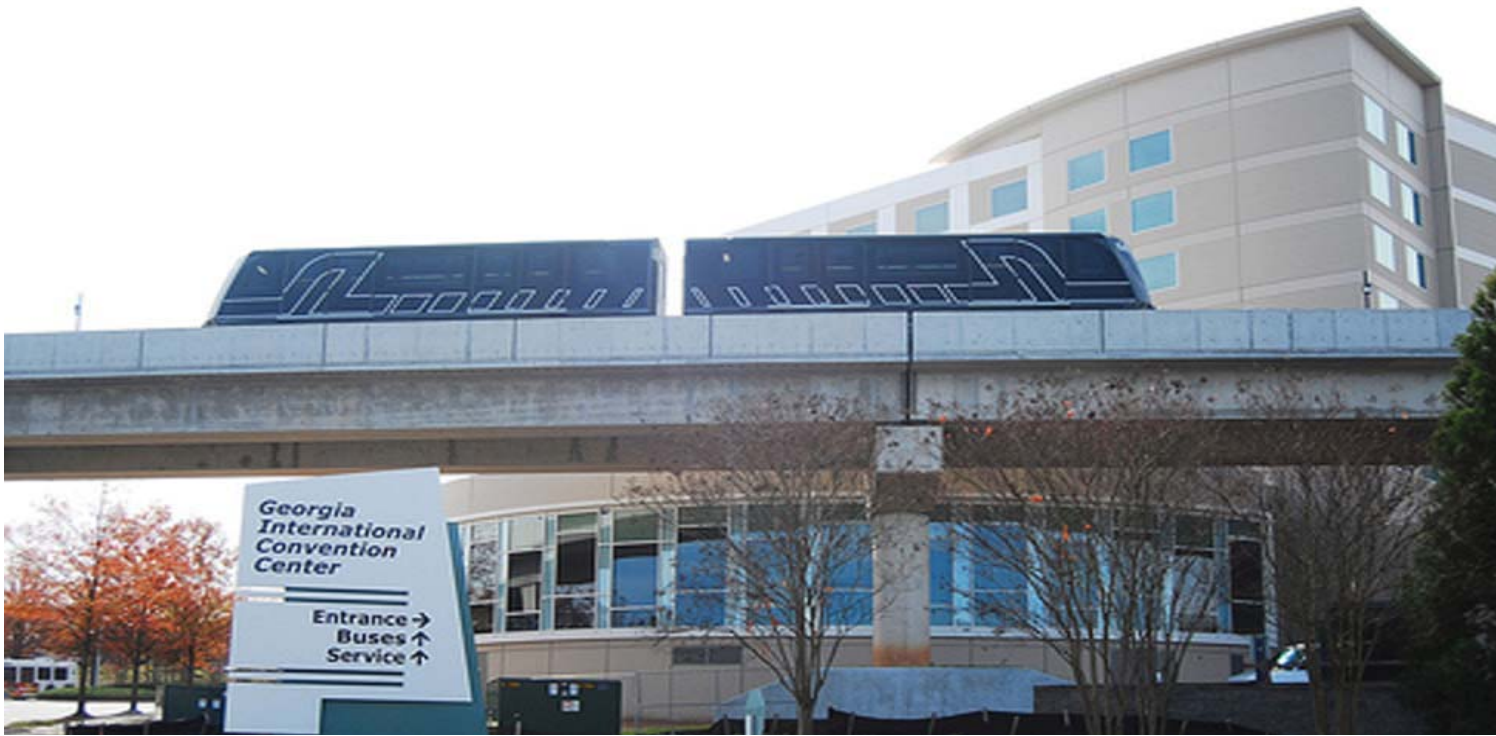
Lea+Elliott’s senior engineer on the project.

Due to a large number of interfaces between the operating system and fixed facilities, and to avoid potential future problems, system details had to be carefully controlled and documented. Lea+Elliott worked closely with DCC and the station architects to coordinate interface areas throughout the design and construction process, ensuring that the many project elements combined seamlessly. Given the fast paced nature of the project, where many designs were finalized while construction was in progress, these interfaces were critical. During the design review, installation and testing phases, **Lea+Elliott’s project engineers, Nicolas Gutierrez and Richard Koerner,** provided key support to the project.

CityCenter opened to the public in December 2009. It took MGM MIRAGE only five years to plan, design and construct this unprecedented project. The CityCenter APM began to carry passengers on December 3, 2009. Lea+Elliott is proud to have been a part of this project from concept through completion and we wish CityCenter great success in fulfilling its vision to transform Las Vegas into the world’s leading urban entertainment destination.

“Lea+Elliott was instrumental in coordinating the collaboration of all disciplines while making the Owner’s original concept become reality. Their ability to balance the Owner’s technical program and schedule along with coordinating the interaction of three general contractors was the keystone to the success of this project.” - Brian Packer, CityCenter

The Future has Arrived at the World's Busiest Airport!



The ATL SkyTrain opened in December, providing the first major U.S. airport connection to a convention center.

On December 7, 2009, Hartsfield-Jackson Atlanta International Airport (Hartsfield-Jackson) opened its biggest holiday gift for its passengers: a new, state-of-the-art rental car center and the ATL SkyTrain, the first Crystal Mover to go into service in the U.S. The ribbon cutting ceremony was led by Atlanta Mayor Shirley Franklin, Aviation General Manager Ben DeCosta and College Park Mayor Jack Longino. According to DeCosta, "The future has arrived. Our passengers will enjoy the speed and convenience of having all rental car operations, including customer transaction counters and vehicles, in one easily accessible location."

The elevated ATL SkyTrain is a key element of this streamlined operation, smoothly transporting airport passengers to the Rental Car Center in less than five minutes during peak periods. The ATL SkyTrain operates in a pinched-loop configuration for most of its seven-day, 24-hour service. It travels to three stations, beginning at the airport's ground transportation center, running parallel to MARTA before crossing the interstate to terminate at the remote 60+ acre Rental Car Center approximately 1.3 miles away.

An intermediate station adjacent to the Georgia International Convention Center has given the airport claim to yet another first: Hartsfield-Jackson is now the first major airport in the nation to be connected by a people mover to a convention center. The Atlanta Business Chronicle notes that the "nearby hotels and meeting venues expect tourism dollars to ride its 1.5-mile route." Indeed, the addition of the ATL SkyTrain station to the convention center complex is expected to boost attendance at center events and has already increased development in the immediate area, with the construction of an office building and two hotels adjacent to the station (a Springhill Suites, which opened in December, and a Marriott to open this summer).

The ATL SkyTrain is also a boon for the environment. The electrically-driven vehicles have replaced over 125 rental car shuttle buses, thus significantly reducing the airport's carbon foot-

print. In addition, the traffic flow around the terminal will improve with both the reduction in buses and the reduced number of rental cars on the terminal roadways. The location of the hotels next to the convention center station has been recognized as an environmentally friendly practice and helped Springhill Suites attain LEED® certification.

The initial ATL SkyTrain fleet consists of 12 cars, operating in married pairs around a 14,000-foot pinched loop.

Initial peak service capacity

is around 2,700 pphpd at approximately 135 second headways and a roundtrip time of nine minutes. The ultimate system will provide a capacity of almost 5,500 pphpd with 120 second headways. The fleet will ultimately comprise 28 cars, and will operate in four-car trains.

Lea+Elliott, as sub-consultant to Hartsfield Transportation Group (HTG), has been an integral part of the Hartsfield-Jackson Development Program team, working on this project for over six years, from conceptual design (2003) to substantial completion (2009). As the APM systems consultant, we have worked closely with the airport and the contractor throughout all phases of this project to achieve a timely delivery of a safe and reliable system. During the first two months of passenger operation, the ATL SkyTrain system has operated with an impressive 99.8%+ availability.

Lea+Elliott is proud to have played a part in this major component of the airport's \$6-billion-plus development program. Further, we are honored to have been selected for continued work at the airport, where we are currently part of the AGD (Atlanta Gateway Designers) team. Here, we serve as APM systems consultant, providing construction services for the expansion of the Bombardier CX-100 system to the new Maynard Holbrook Jackson International Terminal.



Atlanta Mayor Shirley Franklin christens the ATL SkyTrain, while Aviation General Manager Ben DeCosta (far right), College Park Mayor Jack Longino (beside DeCosta) and other honorees look on.

Image courtesy of Warren Bond Photography

It's "All About the Future"

Dulles begins 2010 with a new APM



C Gates Station: The AeroTrain station uses side and center platforms.

Image courtesy of MWAA

Thanks to the hard work and commitment of the Metropolitan Washington Airports Authority (MWAA), passengers at Washington Dulles International Airport (IAD) are celebrating the grand opening of the new AeroTrain system. The new APM system was the final and most critical element of MWAA's \$3-billion expansion program that included concourse and terminal expansions, a fourth runway, parking garages, and a new control tower. At the January 26, 2010 opening ceremony, high above the new main terminal station, James E. Bennett, the president and chief executive of MWAA said it best by proclaiming "The AeroTrain is all about the future...."

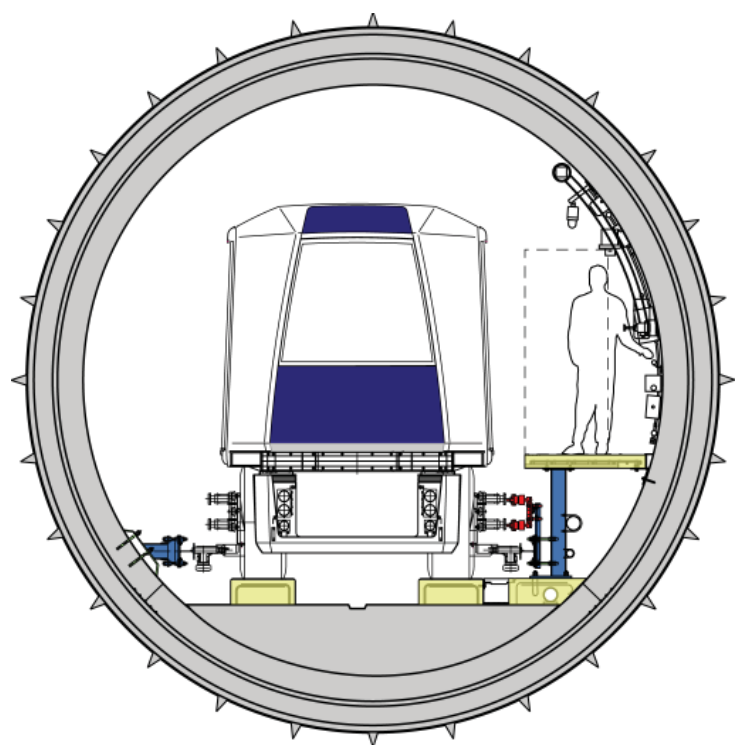
The \$1.4-billion AeroTrain has been in the works for more than a decade. It runs every two minutes during peak travel times, connecting passengers between the main terminal and A, B and C gates at speeds up to 42 miles per hour. The system operates in nearly four miles of tunnel, clear of aircraft operations above, and provides 24-hour service to each of the four stations. The airport's distinctive "mobile lounge" buses will still be used to shuttle international arrival passengers to customs and will run between the main terminal and the D and H gates.

MWAA contracted with Sumitomo Corporation of America, who, working with Mitsubishi Heavy Industries, provided the fleet of 29 Crystal Mover APM vehicles and the relevant guideway and station equipment, traction power, and controls.

Lea+Elliott has been involved with the AeroTrain from its inception. As part of an overall team, Lea+Elliott participated in all phases of the AeroTrain's planning and implementation, including feasibility studies; preliminary engineering of the APM system and guideway; procurement and evaluation; and oversight of system implementation.

In designing the AeroTrain, Lea+Elliott worked to help define the specific needs of the client and incorporated best practices for APM systems which were the product of 37 years of Lea+Elliott experience.

Lea+Elliott is proud to have contributed to the AeroTrain's success and congratulates MWAA on achieving their vision for an advanced APM system that will address the future passenger needs at Washington Dulles.



Dulles Mined Tunnel: The AeroTrain tunnels were constructed using the cut-and-cover, NATM and TBM methods.

People In+Motion

Sambit Bhattacharjee receives LEED® Certification



MIAMI – Lea+Elliott is proud to announce that **Sambit Bhattacharjee, P.E., LEED® AP** has earned the title of LEED® Accredited Professional. Mr. Bhattacharjee is a senior associate with the firm and is responsible for overseeing development of environmental and planning aspects of transportation projects. The U.S. Green Building Council accredits professional by examination

through their Leadership in Energy and Environmental Design program. Lea+Elliott management and Board of Directors has established the goal for our professional staff to obtain accreditation to support our firm's and client's environmental strategic initiatives.

Lea+Elliott is pleased to announce that several of our employees have been promoted to Manager of Engineering Projects, including:



SAN FRANCISCO - **Jenny Baumgartner, P.E., AICP** has extensive experience in transit planning, engineering and management. With degrees in civil engineering and urban planning, Ms. Baumgartner has expertise in planning urban and airport automated transit systems. Since joining Lea+Elliott in 2000, she has managed and coordinated the work of team members that included various disciplines such as systems, civil, architectural, environmental, planning, and visual simulations for many projects, including the San Jose International Airport and the Seattle Monorail. Ms. Baumgartner is currently the project manager responsible for the design development, procurement, installation and testing oversight activities for the new APM system currently under construction at Sacramento International Airport.



SAN FRANCISCO - **Sebastian Gladney, P.E.**, a civil engineer by degree, has 10 years of experience in planning and operational analysis for transportation systems. Since joining Lea+Elliott in 2000, he has been responsible for project coordination and management, alternatives analysis, preparation of contract specifications and reference drawings,

work coordination with subcontractors and clients, statistical analysis of ridership data, LEGENDS² train operations simulation and cost modeling, assessments of transportation technologies, design reviews, and implementation and testing oversight. Mr. Gladney recently served as senior engineer for the new Las Vegas CityCenter APM, where he participated in the planning, conceptual design, procurement, and construction and testing.



DALLAS/FORT WORTH - **Aaron Hester, P.E.** is an electrical engineer with over 11 years of experience in transit systems, specializing AC and DC power distribution systems, programming, CCTV and communication systems, on-site testing and commissioning, and simulations and analyses. He previously provided engineering support for the design, inspection and testing of Dallas/Fort Worth International Airport's Skylink APM system,

the world's largest airport APM. Aaron is currently the train system lead electrical engineer for the Phoenix Sky Harbor International Airport Sky Train®. Mr. Hester joined Lea+Elliott in 1998.



MIAMI – **Gregory Love** is an electrical engineer with 16 years of experience in planning, procurement and implementation of transportation systems. Mr. Love is currently the deputy project manager and director of testing and commissioning for the new North Terminal Development APM System at Miami International Airport where he is responsible

for the coordination and oversight of all testing and inspection activities related to the APM. He is also the Project Manager for the implementation phase oversight of the Miami MetroRail extension, currently leading the design review process. Since joining Lea+Elliott in 1993, he has been responsible for project evaluation of transit systems, electrification and power distribution, evaluation of corrosion control and cathodic protection for transit systems, transit analysis, technology assessment, facilities design criteria, connection time analysis, and computer simulation modeling development.



MIAMI – **Guadalupe Murillo** has 12 years of transit system experience in procurement, implementation, and operating system design oversight and testing. Mr. Murillo has led the development of the technical requirements of several transit projects that have been successfully procured. He is experienced in monorail, rubber tire, steel wheel, and air levitated

cable-type technologies. Mr. Murillo's technical expertise includes vehicle design, transit system operational simulations, and analysis of system operations & maintenance. He is currently managing the operating system design aspect of the MIA Mover project. He is part of the MIA Mover airport implementation team responsible for assuring the contractor design is in compliance with the final contract. He is also a member of the MIA Mover's System Safety and Security Committee. Mr. Murillo is also managing the Dubai APM project. He leads all technical work related to the operating system and is responsible for reviewing the operating system design and testing documentation to assure compliance with the contract.



MIAMI – **Scott Sipes** has extensive transportation engineering and project management experience which includes engineering, marketing, project implementation, construction and operations and maintenance – both with Lea+Elliott, as well as with a major transit system supplier. Prior to joining Lea+Elliott, Mr. Sipes served as project manager for

numerous transit implementation projects where he had responsibility for the on-time delivery of projects in accordance with the technical and commercial contract terms. Since joining Lea+Elliott in 2008, Mr. Sipes has been involved with all aspects of the MIA Mover project with his primary role being the management of the operating system/fixed facilities integration and contract compliance. As system integration manager, he is responsible for overseeing the Contractor's execution of the work in conformance with the contract.

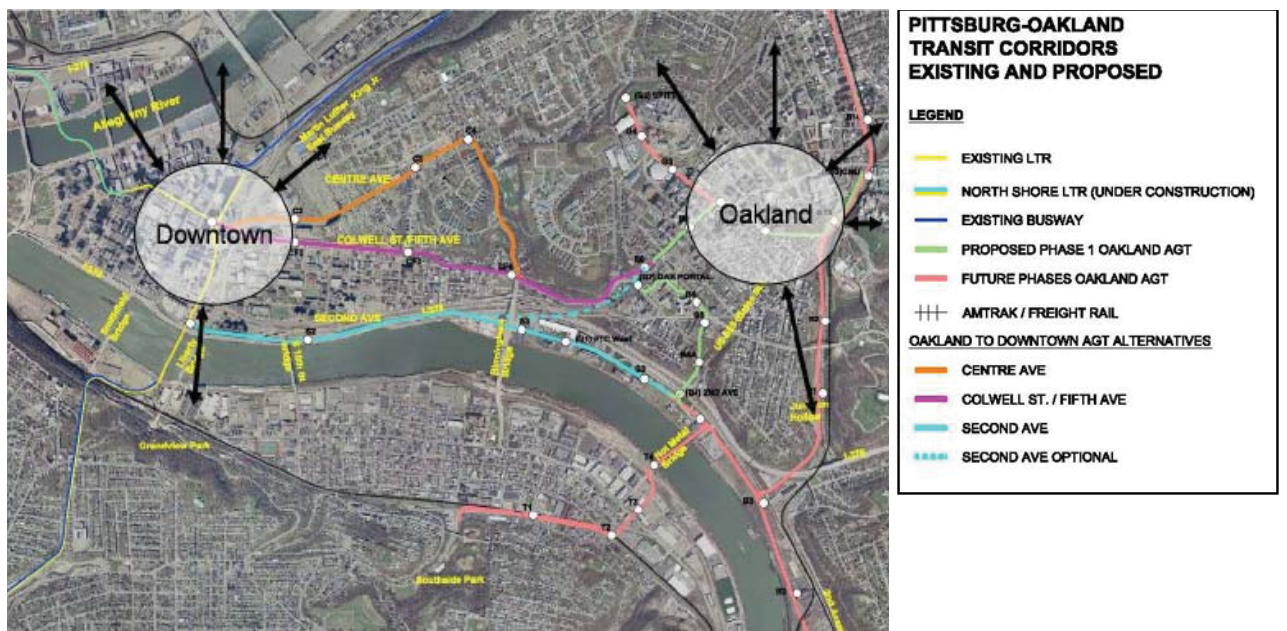
Allegheny County Opts for Public-Private Partnerships (P3s)

The three projects featured in this issue of *In+Motion* were all delivered in the traditional “pay-as-you-go” manner. The pressure on project costs, as well as the owners’ financial capacity to issue long term debt due to the downturn in economic conditions, makes P3s an attractive alternative. The hope of alternative project delivery methods, such as P3s, is that more projects will be built, providing a greater range of transportation options to the public.

With limited financial resources to self-implement transit improvements, the Transportation Action Partnership (TAP) that represents

the leadership and major stakeholders within the Pittsburgh region concluded that a P3 delivery approach offers a vehicle to leverage local development parcels that create investment opportunities for the private sector partner in return for funding and implementing priority transportation needs. To facilitate the solicitation process for these potential projects, the Redevelopment Authority of Allegheny County (RAAC) is making available project related materials including preliminary project prospectus documents to interested parties online at www.pittsburgh-oaklandconnector.com. An industry review process was set up to solicit expressions of interest and industry feedback that can be factored into the final solicitation process policy decisions. A webinar for interested parties is scheduled for March 1, 2010 and the deadline for industry interest and feedback is April 30, 2010. Based on responses received from the industry, the TAP will then determine if interest warrants continuing efforts to advance appropriate legislation in the Pennsylvania House and Senate to enable this envisioned project delivery approach and proceeding with a competitive process (Request for Proposals) to select the entity that will perform the work in partnership with the public.

For further information regarding this P3 initiative or other P3 project structuring opportunities, contact Sanjeev Shah or Larry Coleman in our Miami office.



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About Lea+Elliott

Lea+Elliott is a transportation consulting firm offering a broad range of planning, engineering, program management, and construction management services for clients worldwide. These services are provided to public transit authorities, airports and private sector owners for new transit systems and the refurbishment of existing systems. We have expertise in all modes of transit, including high-speed and intercity rail, rapid transit, commuter rail, light rail, automated guideway transit, personal rapid transit, and conventional and advanced technology buses. The firm is especially well known for its creative structuring of procurements for a wide range of delivery options that include DBOM and P3.



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