

First-class experience molds the Second Avenue Subway—and vice versa

By Arthur Schurr

Albert Einstein said, “The only source of knowledge is experience.” When it comes to transportation megaprojects, that theory is relatively absolute.

Virtually by definition, a megaproject has few peers, rivals, or comforting precedents on which to rely. It combines grand actions with countless minute details, creating a complex logistic mix that is comparable only to an all-encompassing global endeavor—something like a world war. In some ways, though, it's even more difficult.

Subways, for example, must be squeezed into an active urban environment *without* harming or substantially interfering with that environment (a restraining complication that warriors can generally ignore). And when it comes to the challenge of wedging a new subway into an established, dense, complex, and dynamic urban setting, the pinnacle by practically every measure is the Second Avenue Subway in New York City.

The first major expansion of that subway system in more than 50 years, the double-tracked Second Avenue Subway will stretch 8.5 miles under Manhattan's East Side, from 125th Street in Harlem to Hanover Square in Lower Manhattan. Boasting 16 ADA-compliant stations and a capacity to handle more than 500,000 passenger trips per day, the \$16.8 billion subway will be completed by 2020. Through phased construction, however, a segment of the new subway will start operations as early as 2014, when it will begin serving more than 200,000 trips per day.

Featuring an array of tunneling and construction methods that accommodate the demanding geology and challenging urban geography, the Second



PHOTOS BY JOHN LIVZEY

Avenue Subway project is no small order. Though it's nowhere near completion yet, the Second Avenue Subway already offers a host of lessons for anyone contemplating the design or construction of a transportation megaproject.

"There is a comprehensive set of strategies and procedures that have made a very real difference in our effectiveness and cohesion," explains Anil Parikh, P.E., program manager for MTA Capital Construction (MTACC, an agency of the Metropolitan Transportation Authority). "And we have worked very closely with each of the project stakeholders to establish an optimal project structure and to ensure continuous communication and effective decision making."

Echoing that sentiment is Jeff Fosbrook, P.E., DMJM Harris's Second Avenue Subway project director, who adds, "There is a wealth of experience here, on both sides of the table. That has made for a great working relationship. By combining our expertise on transit projects around the globe with the MTA's outstanding expertise and knowledge of their system and environment, we struck an all-important balance and established a rapport to make best possible use of that shared wisdom." DMJM Harris is the lead firm in a joint venture with Arup to design the subway line.

Parikh and Fosbrook cite several factors that contribute to the success of the working relationship between the MTA and the DMJM Harris project team. First on their list is the absolute necessity for an integrated project office.



Although the benefits of an integrated project office are many, and seemingly obvious, not everyone uses that approach. Offering unlimited, intimate contact through sheer proximity, an integrated project office facilitates effective communication. Though every project has regular, official, scheduled meetings, the constant availability of project personnel on both sides of the table helps facilitate fast, comprehensive communication and decision making. Fosbrook explains.

"Our offices and Mr. Parikh's MTACC staff's are in the same building. In some cases, we even share a floor. Because of that, we have frequent, comfortable interactions. From the beginning, I met with our client contact at least daily. Our staff was able to work with their principal engineers and the specific people devoted to Second Avenue. Being able to meet with them that easily, having that kind of in-depth contact, helped make the process better, faster, and more efficient. Periodically, we had working group meetings where multiple groups would join us. This is a project office where everybody works together; everyone knows what's happening, and decisions are virtually instantaneous. That's a direct benefit of the integrated project office."

"Agencies like ours have very large engineering departments," explains Parikh. "But the people who operate the subway, our operations personnel, are in a different department. Incorporating them into the

process, getting them involved early as stakeholders, was also very important to the successful outcome of the design effort. Having an integrated project office gave designers access to the operations people. So that facilitated their input into the design. And that is invaluable."

The next essential component is early community involvement. Community stakeholders include community boards, retail establishments, commercial establishments, and residential buildings affected by station and ancillary-building construction. In addressing the concerns of these stakeholders, it is critical to establish a flow of information to the community to prevent unfounded rumors and speculation. Left unchecked, such forces can grow to the point where they could actually prevent the start of a project or a project component.

In New York particularly, community boards are quasi-governmental agencies that have unparalleled access to city council and borough presidents. They are very influential. So their concerns—and those of the constituents they represent—must be addressed. The benefit of *early* involvement is that concerns can be addressed *before* they become problems, while there is still time to react and address potential crises. If a concern cannot be addressed completely, early intervention at least allows time for explanation and informational give-and-take. It provides time for a solution to be worked out.

Another vital aspect that must be addressed early is the identification of real estate acquisition needs. Initially, ridership studies will determine where stations need to be located, and these are described in the environmental impact statement (EIS). Pedestrian and access modeling will dictate where specific entrances ought to be placed to accommodate the heaviest volumes. But even so, such placements should be decided with an eye to minimizing the impact on existing structures. In the end, though, real estate must often be acquired.

Once the requirements have been determined, an agency's real estate department starts the acquisition process. Using design data and metes-and-bounds surveys, the real estate department begins titles searches as a prelude to acquiring specific properties—following federal guidelines if federal funding is involved. In routine cases, the acquisition process can take up to two years; residential relocations are particularly difficult,

and can take even longer. For that reason, starting early is critical to ensuring that real estate acquisition does not significantly delay a project.

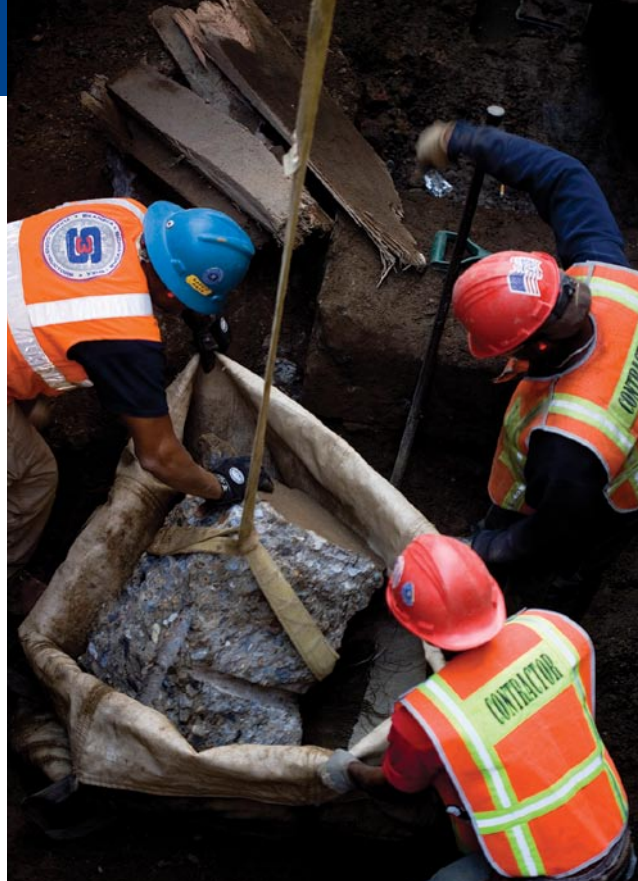
Involvement in the community does not end after the initial flurry of activity. Comprehensive and continuing community involvement is a major strategic component of any successful megaproject. After addressing initial concerns during the planning and design phases, there are a whole host of additional community concerns that must be addressed during construction.

How will my restaurant stay open? How can I make or take deliveries? How will garbage collection be addressed? How will traffic be rerouted? These are just some of the concerns routinely proffered by existing commercial establishments. And they are not the only community with concerns. The contracting community will have concerns that mirror their specific stake in the process.

How will we haul out the excavated material generated by the tunneling process? How will we remove that material from local streets? Where will we dispose of the material? Community outreach and construction industry outreach must be conducted simultaneously. It is critical that these concerns be addressed effectively, as they each have the power to slow or stop a project. Fosbrook explains.

"On the Second Avenue Subway project, we're operating in New York City and Lower Manhattan. There must be more than \$20 billion of construction on the books there right now. So we had to take a look at what the craft and trade demand would be. What jobs do they want to bid? Does the agency have stringent terms and conditions in their contract that will drive away certain bidders? Obviously, we can't have that; we need competition to let the market keep prices at reasonable levels. Construction industry outreach is as important as sustained community outreach, and both must be an essential part of the program."

An EIS document, by definition, identifies the need for mitigating impacts on the construction, environment and the community. These mitigation measures must be reflected in the contract documents. However, EIS documents on megaprojects are almost always voluminous. For that reason, it is extremely important to ensure that mitigation measures are appropriately incorporated into contract documents, and carefully



tracked. According to Fosbrook, "You never want to miss things that have been committed to in the EIS or in the final record of decision issued by the permitting agency. Put simply, anything that is promised but not delivered will have to be addressed later—and usually at far greater cost."

Early coordination with agencies and emergency services cannot be overlooked either. Police, fire, the city department of transportation (DOT)—every public sector stakeholder needs to be involved as early as reasonably possible. Although the rationale behind coordination seems obvious, why must it be early? First, when lives are at stake nothing should be left to chance. And second, early action allows for proper planning and testing.

For example, the design consultant must develop a maintenance and protection of traffic plan (MPT) to be reviewed and approved by city DOT that addresses detours and helps to cope with the reality of heavy trucks on city streets. In addition, to bid accurately, a contractor must know what he or she will be allowed to do on city streets. Through early participation, design consultants can create preliminary MPTs, get them reviewed and informally approved by the permitting agency, and then inform the contractor as to what practices and procedures will be acceptable.

Working proactively with police and fire departments can help avoid potentially dangerous situations



down the road. Are their high-rise buildings in the alignment? Unusual low-rise buildings? Critical access points between two neighborhoods or areas that will be impeded by construction? Early intervention allows time to create and test potential plans. But potential issues do not only center on life/safety interests.

Are there any historic structures affected by construction? Are there any archeological concerns that must be addressed? Are there any scheduled events on the alignment that might be impeded by construction? To understand the issues and what mitigation measures need be incorporated into construction documents, it is vital to address all of these concerns as early as possible. Not only does it help with community and agency goodwill, but it also helps the contractor avoid potential claims and schedule delays, which eventually affect the client.

Finally, it is critically important to establish an aggressive risk-management program. For those unfamiliar with the concept, a risk-management program identifies potential risks that can negatively affect project costs or the schedule, and ultimately prevent that project or program from succeeding. An art unto itself, risk management is fast becoming a principal element of every large project or program. With a risk register at its heart, risk management is a management tool that enhances the likelihood of project success by minimizing the potential for negative outcomes.

According to Bob Rocco, DMJM Harris's risk manager for the Second Avenue Subway project, "artful and effective risk management requires two things in addition to technical expertise: flexibility and honesty. If

a risk program is not flexible, it cannot provide ongoing, accurate risk assessments. Things change, so a risk program must be able to adapt. And without honest data and reporting from the project team, the numbers will be meaningless. Honest assessment by the working groups, senior management, estimators, contractors, owners—everyone—is the only way to achieve meaningful, insightful, effective risk management."

There is nothing quite like the challenge of shoehorning a megaproject into crowded urban spaces. According to the MTACC's Anil Parikh, P.E., "Understanding what to do in theory is one thing. Doing it is something else completely. Taking lessons learned from others who have been in the trenches provides a very useful, practical education. If you notice, aside from the absolute need for technical expertise, there are recurring themes throughout our program: start early, communicate well, anticipate problems, and be flexible. But no matter how many times you tell people that, they don't really gain a complete understanding of it until they've been through it themselves. You cannot put a price on experience, especially when it involves implementing a new subway."

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