



The People Behind Major Transit Projects:

Recruiting, Training, and Retaining Project Managers

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Executive Summary

The People Behind Major Transit Projects explores strategies to help agencies better recruit, train, and retain project managers for large transit projects. It examines the challenges these managers face, and highlights the skills, experience, and support they need to succeed.

This report incorporates insights from dozens of transportation industry professionals who were asked about their experience managing and monitoring major transit projects. The interviewees represent a wide range of organizations and perspectives, including FTA staff, the study's advisory committee, consultants, and transit agency officials. The report also includes profiles of project management teams in Aspen, Baton Rouge, Minneapolis-St. Paul, New York, Phoenix, and Seattle, which are a valuable element of the study.

Challenges

Transit agencies across the country struggle to recruit and retain managers capable of successfully delivering major projects. As this report makes clear, talented and experienced managers are essential for keeping projects on schedule while minimizing expenses and satisfying stakeholders. If a project manager saves an agency just one-tenth of one percent on a billion-dollar project, that is \$1,000,000 in cost savings.

Yet despite the importance of the role, agencies too often lack qualified project managers to deliver these outcomes. Factors that make recruitment difficult include higher private sector salaries, a limited talent pipeline in the transportation industry, and a lack of long-term career opportunities within public agencies.

Essential Skills

Finding qualified managers is complicated by the broad skill set required. Transit project managers shoulder vast and multifaceted responsibilities. A member of the study's advisory committee identified the following attributes of a "great" project manager: intelligence of Albert Einstein, integrity of an apolitical Supreme Court judge, patience of a saint, negotiating skills of a horse trader, savvy of James Bond, planning skills of a general, communication skills of Walter Cronkite, drive of Bill Gates, tough skin of an armadillo, and the ego of Mother Teresa. Although the list was somewhat facetious, it reveals the extraordinary range of skills and traits that project managers need to successfully complete a project.

Project managers need technical expertise in engineering, construction, and regulatory compliance. Even more critical are their leadership, strategic thinking, interpersonal,

and problem-solving skills. One of the hardest-to-find attributes is the ability to make decisions under pressure. Project managers must be able to decide, explain their reasoning, and move forward. As one transit official explained, when a concrete mixer is on its way to the construction site, and the project team is still not sure the type of wall to build or its exact placement, you can't just say "form a study committee."

Project managers need strong communication skills to effectively convey information among agency staff, leadership, consultants, contractors, partners, and various public and private stakeholders. Since organizations and individuals need to be aware of issues affecting them, project managers must present information in a timely, clear, and accessible manner. Strong communications form the foundation for a project manager's ability to collaborate and coordinate with stakeholders, policy makers, and staff.

Varied needs

Just as no two major transit projects are alike, the needs of every project management team also differ. Based on the experience of interviewees, this study recommends that agencies conduct a comprehensive review of their personnel, processes, and systems to ensure they are fully prepared before undertaking projects. They must allocate sufficient resources, establish appropriate procedures, and provide ongoing support to project teams. One agency official warned that inadequate support is a "recipe for disaster."

Agencies undertaking their first major project can face numerous challenges and be easily overwhelmed. One FTA official compared it to having a first child: "You don't know until you get there." In contrast, agencies that can undertake multiple large projects, simultaneously, can take advantage of numerous opportunities for collaboration and continuous learning between project management teams.

The type of contract and project delivery method for a specific project also make a difference in the skill set needed to manage that project. For example, engineering skills are typically more important for a design-bid-build than a design-bid contract. Likewise, public private partnerships often require more sophisticated financial expertise.

Recruitment

Public agency executives—particularly those without experience in delivering large projects—often underestimate both the importance of hiring skilled project managers and the difficulty of attracting them given the salary disparity between the public and private sectors. Many successful project managers can move from a transit agency to a consulting firm and increase their salaries by 40 percent.

The private sector pays a premium for project managers because, as one interviewee explained, “those are the positions that win the jobs.” In other words, private firms increase the competitiveness of their bids by demonstrating the competency of their team. However, working at a consulting firm has a major drawback since it often requires relocating to a new city after each project.

To help agencies recruit and select members of their project management teams, this report shares strategies that transit agencies use to develop job descriptions, disseminate information about open positions, and conduct interviews. While transit agencies may not be able to compete on salaries, they can and should highlight four distinct advantages of working in the public sector. First, agency staff may enjoy a better work life balance, as they tend to work fewer hours. Second, in-house project managers typically have decision-making authority while consultants usually can only make recommendations. Third, project managers with long tenures in an agency or deep roots in the community often take greater pride in directly contributing to an agency’s mission and serving their communities.

Job security is the fourth advantage that transit agencies can capitalize on. However, this report finds that many agencies hire employees on a temporary basis, depending on the availability of funding or until the project is completed. This undermines an agency’s ability to offer greater job security and attract top talent.

Use of consultants

While experienced consultants offer valuable expertise to project management teams, this report points out certain drawbacks of relying too heavily on consulting firms. Transit agencies report that their employees tend to have a stronger sense of ownership over a project, and better relationships within their agencies and outside stakeholders.

Moreover, an overreliance on consultants can result in a loss of institutional knowledge. Long after construction is completed, operations and maintenance staff benefit from having easy access to agency employees who worked on a project. When consultants walk out the door, they often take valuable experience and detailed project knowledge with them.

Retention challenges and solutions

Retention is a major challenge for transit agencies, since many project management staff leave for better-paying opportunities in the private sector. The pay disparities are greater for project managers than for junior staff, which makes it difficult to retain top talent.

Agencies can do a better job retaining employees by creating clear career advancement pathways and providing them with opportunities for long-term professional growth. One senior transit official said, “One of our greatest resources is within our organization. We spend time helping existing staff to grow.” He noted the benefit of having a deputy project manager and emphasized the importance of selecting deputies who have the potential to manage a project. This requires pairing them with the right person and preparing them to step in at any time.

Professional development

Without sufficient training, project managers may struggle to navigate the complexities of transit projects, leading to inefficiencies, cost overruns, delays, and unnecessary tension with stakeholders. This report finds that strong professional development and mentorship programs play a vital role in building a more capable workforce.

Training should be formalized and institutionalized in an agency. Since well-qualified project managers are key to consulting firms’ bottom lines, well-established consulting firms usually have more robust training and professional development programs than transit agencies. Some agencies do have extensive training programs, though. For example, Sound Transit established ST (Sound Transit) University to provide training for its entire workforce.

An important element of training is learning from previous projects. Unfortunately, many transit agencies fail to document the lessons they have learned after completing a project. Agencies are often reluctant to memorialize their mistakes because it might embarrass staff, management, and the organization. They also worry that documenting mistakes could jeopardize their ability to secure future funds.

Resources

This report describes numerous project management resources including conferences, FTA staff and documents, and programs offered by the American Public Transportation Association, Eno Center for Transportation, and the National Transit Institute. These resources can help transit agencies take a strategic approach to hiring, training, and retaining project managers. It can also help future project managers chart their career paths.

Introduction

Prior Eno work on transit project delivery

This is the fifth major deliverable that the Eno Center for Transportation has undertaken for the Federal Transit Administration (FTA) on transit project delivery (the process of planning, designing, and building a project).

In 2021, Eno released [*Saving Time and Making Cents: A Blueprint for Building Transit Better*](#), a report profiling nine regions across the U.S., Canada, and Europe to better understand public transit project delivery. These studies provided not only data and details on specific projects but also uncovered insights that may not be captured in literature or media reports. While each region is distinct, clear commonalities emerged in project delivery, revealing key cost and timeline drivers that influence project outcomes.

Eno subsequently hosted a four-day [symposium](#) to share findings from the report and exchange best practices in project delivery among transportation professionals, policymakers, and researchers. Symposium sessions explored broad challenges and opportunities in project delivery, along with specific themes related to governance, processes, and standards at the national, state, and local levels. The FTA Administrator delivered the opening address to officially begin Eno's Transit Cost and Project Delivery Symposium.

In 2022, Eno published [*On the Right Track: Rail Transit Project Delivery Around the World*](#), a report that examined project delivery in ten peer nations across the globe. This research highlighted [case studies](#) of how countries govern, plan, regulate, fund, and construct projects in Australia, Canada, Chile, Germany, Italy, Japan, Mexico, Norway, South Africa, and South Korea.

In 2025, Eno completed its *Analysis of Federal Transit Administration's Capital Cost Database*, which assessed the FTA's Capital Cost Database and provided recommendations for improving its usefulness. The database contains the cost components of federally funded transit projects over the last 40 years.

Need for this report

Eno's [*Saving Time and Making Cents*](#) report found that U.S. transit projects face significant workforce challenges, particularly in public sector project management. The study concluded that when public agency staff are overburdened and undertrained, they have trouble coordinating environmental review and planning documents, creating discrete and clear procurement plans, writing effective contracts, and ensuring

adherence to contract terms during construction. These can all lead to problems with litigation, change orders, cost overruns, and delays throughout a project.

Furthermore, the *On the Right Track* report noted, “There needs to be strong public-sector staff capacity and management skills, close collaboration between stakeholders, and the ability for project sponsors to make prompt, firm decisions about projects.” Eno found that transit agencies need experienced and talented managers to oversee project teams to minimize project delays and cost overruns. These teams typically consist of both agency employees and consultants, making strong agency leadership essential to ensure projects align with the public’s best interest.

Building on insights from Eno’s previous research, this report, *The People Behind Major Transit Projects*, identifies key lessons and best practices about public sector project management. Documenting lessons and best practices is essential because of the complexity of planning, design, and constructing transit projects.

Based upon a review of literature and dozens of interviews, this report documents lessons from industry leaders and projects around the country. Its findings will help transit agencies make wise decisions and investments regarding the recruitment, training, and retention of the staff responsible for the design and construction of major transit capital projects.

Beneficiaries of this report

This study was designed to benefit a broad audience across the public, private, civic, and academic sectors.

Transit agency board members and executives will gain insights into the complexity of managing large-scale projects, and learn strategies to hire, train, and retain qualified individuals to deliver successful outcomes. The report identifies specific steps that senior officials and human resources departments can take to improve the likelihood that their agencies will complete high quality projects in a timely manner, while minimizing costs and satisfying stakeholders.

Members of project management teams will benefit by learning from case studies and best practices. The report’s resources will provide staff and consultants a better understanding of project leadership roles and responsibilities. Future project managers will find the appendices especially valuable because they detail the career paths of successful transit professionals.

Project stakeholders and funders will gain a deeper appreciation for the role of skilled project managers in ensuring the successful completion of transit projects. FTA staff and consultants who oversee and conduct reviews of project management teams for large transit projects will find this report particularly helpful.

The term “project manager” as used throughout this report, refers to the individual responsible for the design and construction of a large transit project. Project managers are typically responsible for establishing and managing a project’s scope, budget, and schedule. They oversee staff, consultants and contractors; coordinate across an agency and with external project partners; and lead communication efforts. Note that many transit agencies, including those interviewed for this report, use other titles to refer to the project manager position, such as “project director” and “executive project director.”

Organization of this report

This report consists of the following ten chapters.

Chapter 1 provides background on the transportation industry professionals interviewed for this report. They represent a wide range of organizations and perspectives, including FTA staff, advisory committee members set up to inform this study, leaders from six different project management teams, and other current and former project managers and executives.

Chapter 2 highlights the critical role of project managers. Effective managers ensure projects are completed on time and within budget while also enhancing an agency’s reputation. However, they must navigate significant challenges. **Chapter 3** describes aspects of agency-wide support that enable project managers to overcome challenges and succeed in their roles. This chapter also explores the project manager’s relationship with an agency’s CEO and highlights how the shortage of qualified project managers is just one of many workforce challenges that transit agencies face.

Chapter 4 explores the skills, experiences, and traits that make project managers successful. **Chapter 5** examines the role of consultants in supporting, and sometimes even substituting for, project managers. This chapter discusses the benefits and the challenges of working with consultants compared to permanent staff.

Chapter 6 examines the hiring and promotion of staff for transit project management, including strategies for attracting and retaining top talent. **Chapter 7** addresses the importance of and challenges with retaining project managers, as well as junior staff who have the potential to grow into leadership roles. **Chapter 8** examines how transit agencies struggle to compete with private-sector firms on salaries. Agency executives

often underestimate both the importance of hiring skilled project managers and the difficulty of attracting them given the salary disparity.

Chapter 9 highlights the advantages of working at a public agency. While salaries are typically lower than in the private sector, public agencies often offer better benefits, better work-life balance, and greater job security for permanent employees. In contrast, consultants frequently face job instability. **Chapter 10** highlights the benefits of effective training programs, including minimizing project cost overruns, stronger stakeholder relationships, and improved staff retention.

This chapter also identifies training programs, documents, conferences, and organizations that can help existing project managers and prepare future managers. In addition, it discusses a key finding relating to training – how many transit agencies fail to thoroughly document lessons learned from managing major projects.

The five appendices provided detailed supporting information for this report.

Appendix 1 contains guidance and insight on managing large transit projects, based on documents and interviews with FTA officials from Colorado, Illinois, Massachusetts, Missouri, New York, Pennsylvania, Texas, Washington, and Washington, D.C. It describes key attributes and skills needed to manage FTA funded transit projects, explains the Project Management Oversight program, identifies critical elements in FTA's Project and Construction Management Guidelines, and recommends documents, courses, and conferences for transit agencies.

Appendix 2 profiles six management teams. Eno conducted interviews with numerous team members. For example, Eno interviewed the Gold Line BRT's project director, deputy general manager, former project director, deputy program manager, construction manager, as well as the FTA engineer who monitors the project. The six teams are as follows:

- VelociRFTA BRT (Aspen)
- Plank-Nicholson BRT (Baton Rouge)
- Gold Line BRT (Minneapolis - St. Paul)
- Lynnwood Link Light Rail Extension (Seattle)
- South Central Light Rail Extension (Phoenix)
- Second Avenue Subway (New York)

Appendix 3 profiles seven leaders of other project management teams: Henry Stopplecamp, Rick Clarke, Robert L. Lund, Zoe Robertson, Evelio Hernandez, Damian McShane, and Bruce Podwal. These industry leaders offered valuable insight into various aspects of managing large transit projects.

Appendix 4 summarizes interviews conducted with the study’s advisory committee members who have had extensive experience across the private, public, and academic sectors. Their backgrounds include serving as CEO of the Institute of Transportation Engineers, president of U.S. Advisory Services at WSP, administrator of FTA, president of MTA Capital Construction, and senior strategic advisor at STV.

Appendix 5 describes training programs recommended by interviewees, offered by the American Public Transportation Association, Eno Center for Transportation, and the National Transit Institute.

1. Transit industry officials interviewed

This chapter provides some background on the transportation industry professionals who were interviewed for this report. They represent a wide range of organizations and perspectives, and include (a) FTA staff, (b) six different project management teams, (c) managers of other projects, and (d) members of an advisory committee set up to inform this study.

a. FTA

At the beginning of this study, Eno interviewed FTA officials who work at its D.C. headquarters as well as its regional offices in Colorado, Illinois, Massachusetts, Missouri, New York, Pennsylvania, Texas, and the state of Washington. These officials provided important suggestions to help guide Eno’s study, recommended documents that Eno should review, and introduced Eno to project managers and numerous transit agencies across the country.

Staff at FTA’s Office of Capital Project Management were especially helpful. They manage the Project Management Oversight (PMO) program which monitors major capital projects to determine whether project sponsors have all the processes and procedures in place to effectively manage and deliver projects.

b. Project management teams

This report profiles the management teams of six transit projects: three Bus Rapid Transit (BRT) projects, two light rail projects, and a subway extension.

VelociRFTA Bus Rapid Transit

The Roaring Fork Transportation Authority (RFTA) operates the first rural BRT route in the country. Covering eight jurisdictions, it extends 42 miles and connects communities

between Glenwood Springs and Aspen, Colorado. Eno talked with the project manager (Mike Hermes), the deputy project manager (Angela Henderson) as well as the consultant (Wayne Feuerborn) who helped lead the design efforts and manage FTA-related processes.

Plank-Nicholson BRT (Baton Rouge, Louisiana)

Baton Rouge is building a BRT line that will serve as the central spine of the region's transit system connecting the downtown business district, medical facilities, commercial businesses, residential neighborhoods, and the Louisiana State University campus. The BRT bus services will be operated by the local transit agency, Capital Area Transit System (CATS). Eno talked with the city's BRT project manager (George Chike) along with Cheri L. Soileau who works for the local transit agency, and three project consultants (Scott Hoffeld, Chris Handzel, Robert Hosack). The consultants have a very prominent role in designing and managing this project.

Gold Line BRT (Minneapolis - St. Paul, Minnesota)

In the Minneapolis - St. Paul metropolitan area, Metro Transit's Gold Line BRT project is a 10-mile transit line that includes 16 stations, as well as new bridges and underpasses. The project team integrates staff from Metro Transit, Minnesota Department of Transportation, Ramsey County, Washington County, and other government entities, as well as an engineering services consultant and a project management/environmental services consultant. Eno talked with Metro Transit's project director (Alicia Vap), the agency's former deputy general manager (Mark Fuhrmann), the deputy project director (Morgan Abbott), and the former project director (Christine Beckwith).

Lynnwood Link Light Rail Extension (Seattle)

Sound Transit in the Seattle metropolitan area is undertaking the most ambitious transit expansion in the country. Its 8.5 mile-long Lynnwood Link Extension which includes three new light rail stations opened in August 2024. Eno talked with Ron Lewis, who led the design and construction efforts for all of Sound Transit's expansion projects. We also interviewed two executive project directors (Randy Harlow and Linneth Riley-Hall), a Human Resources professional (Leslie Powers), the Director of Learning and Development (Tito Harris), and Sound Transit's former Chief Executive Officer (Peter Rogoff).

South Central Light Rail Extension (Phoenix, AZ)

Valley Metro, the Phoenix region's public transportation agency, is in the midst of a major light rail expansion program that will add approximately 40 new miles to the existing system. One of those projects, the South Central Extension/Downtown Hub, is a

5.5-mile extension that will connect South Central Phoenix to the existing light rail system in downtown Phoenix. Eno talked with Trevor Collon, who is responsible for overseeing the design and construction of all the agency's rail expansion projects and Luis Mota, the project manager. In addition, Eno talked to Julie Landsburg, Valley Metro's manager for learning and organizational development, who emphasized the importance of having a professional development team to administer training programs.

Second Avenue Subway (New York City)

The Second Avenue subway is New York City's most ambitious subway expansion in more than 50 years. The first phase opened to the public in 2017, extending an existing line from 63 Street to 96 Street in Manhattan. Utility relocation has begun on the second phase. Eno interviewed three former employees of the Metropolitan Transportation Authority (MTA) Capital Construction Company: the president (Michael Horodniceanu), senior vice president and executive vice president (Bill Goodrich), and the deputy vice president and deputy project executive (Tim Gianfrancesco). In addition, Eno interviewed the senior engineering manager at the WSP consulting firm, who served as the project's construction manager (Tom Peyton).

c. Leaders of other projects

Eno also interviewed the following current and former project managers and executives.

Henry Stoppolecamp was the assistant general manager of capital programs at the Regional Transportation District (RTD), the agency that provides public transportation in the Denver metropolitan area. RTD opened its first light rail in 1994 and ten years later, the region's voters approved a tax to fund the FasTracks program, which consists of 122 miles of new commuter rail and light rail, as well as 18 miles of bus rapid transit. Stoppolecamp offered a candid perspective on the bureaucratic and administrative challenges that agencies face in delivering projects.

Richard (Rick) F. Clarke was LA Metro's chief program management officer and Stoppolecamp's predecessor as RTD's assistant general manager. One of the reasons that Clarke left RTD to manage LA Metro's engineering and construction department was because RTD was completing a large megaproject and did not have a pipeline of similar-sized projects. He offered his insight into the practices at both transit agencies.

Robert Lund was SEPTA's assistant general manager for engineering, maintenance, and construction – a department with over 1,500 employees. He provided valuable insight into the competition for talent between the private and public sector agencies.

Zoe Robertson left SEPTA in 2022 where she had been the senior director responsible for the capital program’s project controls, quality assurance, and quality control. She discussed salaries, an exodus of SEPTA employees to Amtrak, and training.

Evelio Hernandez is the assistant vice president for streetcar and systems engineering at DART (Dallas Area Rapid Transit). He manages project managers, engineers, designers, and contractors.

Damian McShane has had several positions at the Port Authority of New York and New Jersey including program manager, senior program manager, and program director. He is currently the assistant director for PATH Capital Programs. PATH is the heavy rail system that connects Manhattan with New Jersey.

Bruce Podwal managed major transportation projects across the globe over a six-decade career. He served on the board of directors and was president of several subsidiaries at Parsons Brinckerhoff, a 12,000-person engineering firm. Early in his career, Podwal is the author of the 2019 book, “The Engineering Is Easy: Memoir of a Project Manager.”

d. Advisory committee members

The members of the study’s advisory committee discussed issues relating to the hiring, promoting, and training of project managers. Transit agencies, they explained, need to conduct organizational assessments so they are prepared to plan and build large transit projects. The members discussed challenges faced by project managers, including managing multiple sets of stakeholders. Many of the members have extensive private sector experience and were able to provide valuable insights about the consulting world and its relationship with transit agencies.

2. Importance of project managers

The importance of good project management leaders cannot be overemphasized. Valley Metro’s Trevor Collon said, “I would move heaven and earth to find the right project manager.” He also said that good project managers are “rare” and that “it’s hard to find someone who can build and lead a team, especially in this job market.”

Good project managers can save money and time. If a project manager saves an agency just one-tenth of one percent on a billion-dollar project, that is \$1,000,000 in cost savings. A project that is delayed not only causes grief to stakeholders, but also costs agencies money. Likewise, when project managers develop productive partners with

their contractors and consultants, they are more likely to deliver better projects without litigation.

Effective project managers can also help an agency save money by attracting more competitive bids. The study's advisory committee noted how the reputation of an agency and its project manager, affects its ability to attract private partners. Contractors are less likely to bid on a project if they have a high level of uncertainty about a project manager's ability to deliver a project. Consultants and contractors want projects to succeed, just as much as agency staff.

Valley Metro's Trevor Collon explained why project managers need to do more than just control scope, schedule, and quality. He said, "Even if they're doing all of these things right, if they're upsetting the stakeholders that's not good. If businesses near the construction area don't ever want to see us again, then the project is not a success." He said, "If we continuously wrangle a business or city, or if the relationships are terrible, that's not a successful project." Delivering a successful project with community support is especially important in Phoenix, since local voters will decide on whether to continue a half-cent sales tax dedicated to transit that is set to expire at the end of 2025.

In Denver, Henry Stopplecamp said agencies need well-qualified and experienced agency professionals to prepare and interpret contract documents because large construction projects face unexpected conditions and events that require change orders. An experienced project management team member can save an agency money while an inexperienced one can be overpowered by an unscrupulous consultant team.

LA Metro's Rick Clarke said it was important for project managers to develop good relationships with contractors because that leads to better competition and prices. He explained, "If something is explicit in the contract, you can't give in. Sometimes contracts don't cover everything, though." He noted how the contractors he worked with "would do things at risk because they knew we'd be fair to them. That's why it's so important to have good terms with contractors."

Effective project managers need to be sensitive to the operations and ongoing maintenance needs of their completed projects. Failure to do so can result in significant cost implications. For example, even seemingly minor decisions, such as where to place a light changing a light bulb in a hard-to-reach area, can take weeks and cost thousands of dollars.

Challenges

Interviewees described numerous challenges that project managers routinely face.

They overcome numerous obstacles and manage risks associated with technical, economic, environmental, and political issues. They must also be adept at working with a various and frequently changing set of stakeholders including community groups, elected officials, as well as the future operators of their projects.

One FTA official said project managers are in the unenviable position of trying to keep their projects on schedule while receiving sometimes conflicting input from multiple stakeholders. Peter Rogoff, who led both the FTA and Sound Transit, described some of the challenges that his project managers faced: “The quality of life isn’t that great and you spend so much time putting out fires.” He added, “they have to be a flag-waving cheerleader. Most people below and above don’t appreciate that. It’s a [difficult] way of going through life every day.” While project managers do all the work, he noted, others get the glory at the ribbon cutting ceremonies.

Transit agencies and their stakeholders expect a lot from the people who manage projects, according to the advisory committee members. Project managers have to deal with promises that were made because of political pressure. Sometimes they start working on projects and then find out that the schedules they inherited are unrealistic, the costs underestimated, and the financial resources inadequate.

FTA officials noted project managers need to be familiar with numerous statutes and regulations. The list of laws and regulations are extensive, and include those relating to procurement, environmental protections, historic properties, health, and safety.

Valley Metro’s Trevor Collon said that project managers have to deal with community impacts, land acquisition, negotiations with demanding contractors, and construction. One of his project managers, Luis Mota, added that project managers need to address numerous requests from elected officials and other stakeholders. He referred to these “distractions” as part of his greatest challenge: accommodating competing needs in an urban area.

3. Organizational support and issues

This chapter has the following seven sections that describe ways that organizational issues and decisions impact the potential success of project managers.

- a) Organizational support for project managers
- b) Challenges for agencies undertaking their first major project
- c) Advantages for agencies with simultaneous projects
- d) Fundamental differences between large and small projects
- e) Differences between managing light rail and BRT Projects

- f) Implications of the contract type and delivery method
- g) Relationships with CEOs
- h) Challenges across the workforce

a. Organizational support for project managers

The members of the study’s advisory committee discussed the importance of ensuring agencies are prepared to manage large transit projects. Building an organizational culture for successful project delivery can take more than five years, one interviewee noted. Project managers need to be supported by the agency’s executives, their peers, and staff throughout their organization.

Agencies who have not recently delivered a large project should conduct organizational assessments (a comprehensive review of their people skills, processes, and systems) so they are prepared to plan and build one. The committee members noted that state highway departments, compared to transit agencies, tend to have “more horsepower and history” in constructing major new facilities.

The FTA has an adage: “If you’ve seen one transit agency, you’ve seen one transit agency.” The same can be said of large transit projects because they all have their own idiosyncrasies. The author Bruce Podwal noted, “there’s no one-size-fits-all for a project organization structure.”

At a minimum, agencies must allocate sufficient resources, develop appropriate procedures, and ensure that projects have continued support. The Port Authority’s Damian McShane pointed out that if a project team does not get an appropriate level of support staff for project controls, scheduling, and finances, “it’s a recipe for disaster.”

b. Challenges for agencies undertaking their first major project

Agencies undertaking their first major project can be easily overwhelmed. One FTA official said, “Particularly on really large projects, when people haven’t done them before they don’t know what it’s going to take. It’s like having your first kid. You don’t know until you get there.”

Leaving Minnesota’s Metro Transit for the consulting world has been a real eye-opener for Mark Fuhrmann. He said, “Many first-time project sponsors, don’t know what they don’t know.” He referred to the challenges of creating management plans, determining the alignment, completing the NEPA process, and getting a full-funding grant agreement. Many of them do not have the time and expertise to review and understand all the FTA materials that are made available to them.

c. Advantages for agencies with simultaneous projects

Some agencies, like Seattle's Sound Transit, are undertaking multiple large projects, simultaneously, which creates opportunities for collaboration and learning. Every other week, Ron Lewis meets with his direct reports and project directors where he passes on relevant information from the FTA and the chief operating officer. "They also share with each other," he said. "Usually what one project just did, another is facing. Learning in real time helps us. It's really important."

Having multiple simultaneous projects underway at Metro Transit provides a distinct advantage for the project directors. Most of them have worked together on previous projects. Since they are managing relatively similar projects, they face many of the same challenges and issues. The agency encourages a routine exchange of information that does not exist at most agencies.

d. Fundamental differences between large and small projects

Interviewees noted that managers of large projects need a different temperament and a greater level of sophistication than those who manage small projects. Abbott observed that one major difference in managing a large, rather than a small project, in Minnesota is the need to deal with powerful players including U.S. senators, local mayors, and the regional media.

Podwal said continuous support and training are required to make the transition from managing small projects to managing large ones. Managing a very large project requires strong leadership skills, day-to-day guidance, and control of a complex array of interrelated projects, phases, and activities. The heads of very large projects have to trust their deputies and associates to share the management burden, he said. They cannot micromanage. They must delegate so people know they are trusted, and so the managers can get their work done.

Project teams can be quite large. The South Central project team includes over 100 employees who work out of more than 30 portable office units, not including construction workers. At Sound Transit, the Lynwood Link executive project director has fewer than 10 full-time employees who report directly to him, but about 600 when counting employees who are matrixed into his project, including contractors and consultants.

e. Differences between managing light rail and BRT projects

One question that Eno sought to answer is whether different types of large transit projects require their own set of skills. Since Metro Transit has delivered both light rail

and BRT projects, Eno asked its project management team whether they thought the skills to manage them are substantially different.

Fuhrmann said there is not much of a difference, while Abbott answered, “From what I’ve seen they are similar.” However, Abbott noted that bus projects can be more flexible. “If you come across unstable soil, you can modify the design in the field, if necessary. And, while buses can operate in general traffic lanes; you can’t detour a train when there’s a problem.” Another difference is the need to conduct extensive testing before trains can go into service.

Beckwith thinks they are equally difficult to manage. In some ways, though, managing a BRT project can be harder. She said, “Rail projects are more expensive and the teams are bigger. On BRT, you need to wear more hats because there are fewer people.” Since budgets for consultants and staff are typically based on a percentage of the total project cost, BRT projects usually have fewer professional services and staff. One of the bigger challenges on the Gold Line was keeping a smaller staff and not burning them out.”

f. Implications of the contract type and delivery method

Clarke described how project managers might need different skills depending upon the type of contract that an agency decides upon. For example, managers of public-private partnership projects need to be more aware of finances. Financial institutions that are paying for a portion of a project might have a team of sophisticated legal and technical advisors who are involved. Clarke also noted that construction contract specifications are usually not as detailed in such partnerships, so certain technical skills might not be as critical. However, on a complex design-bid-build (DBB) project where the owner takes a more prominent role, the project manager needs to have more technical skills.

The MTA’s Tim Gianfrancesco noted the difference between managing a design-build (DB) and a DBB project. He said it is easier to go from managing a DBB project to a DB project, but not necessarily the other way around. He explained how a DB project manager’s role is more about administering contracts, while for DBB, project managers are more involved in the design and therefore need to be more technically capable.

g. Relationships with CEOs

Clarke said that the success of project managers can depend upon whether they have a good relationship with the transit agency’s CEO (chief executive officer). A project management team can benefit if the CEO has some experience with large construction projects. CEOs who have a background only in operations often have a different perspective than those who have been steeped in construction. Clarke said, “Operators

expect everything to happen the same way every day - that's a mark of success. In construction, every day is different, and unexpected things happen.”

When agency heads do not understand construction issues and do not realize how many unknowns are associated with large transit projects, they can lose patience with project managers when an unanticipated problem occurs. Clarke talked about how Phil Washington, the CEO he worked for in both Denver and Los Angeles, gave him the support that he needed. Although he was not a construction person, he understood and embraced the agency's expansion projects. Clarke said Washington came to most partnering meetings with construction executives and could talk to the mayor about construction issues in an informed manner.

Sometimes, Clarke needed Washington to meet a construction firm's president or a city's mayor, behind closed doors, to resolve a problem. For example, when RTD was building a rail line to the airport, the line was on airport property for eight miles. The city wanted RTD to build additional grade separation and track for a potential second station on airport property. After Clarke told city officials that this extra cost was not in his project's budget, he was told that RTD could not have the airport property. Ultimately, Washington and the mayor worked out a process that kept the project moving.

h. Challenges across the workforce

The advisory committee noted that transportation agencies need more people to go into a wide range of fields relating to transportation projects. Not just project managers, but also engineers, planners, financial managers, procurement, and architects. When considering promotions, agencies need to institute rigorous assessments to understand how employees are managing their work and whether they have the technical and soft skills and experience to move up.

Transit agencies and consultants emphasized the importance of expanding the potential workforce. The transportation industry needs to build upon its existing efforts that aim to encourage more young people to pursue transportation careers.

4. Skills, experiences, and traits of successful project managers

This chapter has the following sections relating to the skills, experiences, and traits that successful project managers need, according to the study's interviewees. Because few

individuals have every desired attribute needed to lead a project, transit agencies should focus on building a strong team with complementary skill sets.

- a) Priority Skills and Experience
- b) Decision-Making Skills
- c) Technical Skills and Knowledge
- d) Management and Leadership
- e) Strategic and Problem Solvers
- f) Communications, Interpersonal Skills, and Personality Traits
- g) Difference between construction managers and project managers

a. Priority skills and experience

When Eno asked interviewees, “What are the most important skills and traits of successful project managers,” the answers most frequently given did not relate to the technical elements of design and construction, but rather to soft skills such as strong leadership and interpersonal abilities. Managing a complex project requires someone who can create effective teams that incorporate agency staff, consultants, and contractors.

According to the advisory committee members, agencies need to find project managers who have a dedicated record of success, people who are phenomenal leaders and can build trust. The most successful project managers are relationship builders who hold people accountable. Project managers need a certain level of confidence and vulnerability to admit they do not know something.

Sound Transit’s Ron Lewis said, “We put lots of responsibility on the project directors and I expect their teams to be pretty self-sufficient, with support from other divisions. I can’t emphasize enough the need to get the right people.” He explained how the directors need to manage scope, schedule, and budget all together because a change in one affects the others.

Michael Horodniceanu led several transit megaprojects, simultaneously, as president of MTA Capital Construction. He described some of the key attributes he sought when hiring project managers. First, he mentioned a strong technical background. Second, he said, “desire is a key ingredient.” He explained that a candidate needed to be excited about taking on a challenging position and motivated by other factors besides money. Third, he looked for someone who was “willing to learn.” When interviewing candidates, he looked for someone who was honest, a person who likes people, and a willingness to be humble and allow others to take credit for the agency’s accomplishments.

Horodniceanu identified the following attributes of a “great” project manager: intelligence of Albert Einstein, integrity of an apolitical supreme court judge, patience of a saint, negotiating skills of a horse trader, savvy of James Bond, planning skills of a general, communication skills of Walter Cronkite, drive of Bill Gates, tough skin of an armadillo, and the ego of Mother Teresa. Although the list was somewhat facetious, it reveals the extraordinary range of skills and traits that project managers may need to successfully complete a project.

Mark Fuhrmann oversaw the delivery of rail and BRT projects as Metro Transit’s deputy general manager. His colleagues identified numerous attributes about Fuhrmann that helped explain his success delivering projects including dogged determination, intelligence, extraordinary professionalism, and the ability to unravel complex engineering issues and identify the pros and cons of strategic choices for decision makers. They also cited his honest, straight shooting and unflappable demeanor. One official noted how he deliberately stayed out of the limelight so that elected officials could get credit for Metro Transit’s accomplishments.

Robert Lund also does not seek out the limelight at SEPTA. “One of things I liked best was not to be in the public view. If I did everything right, the public wouldn’t see it. No one thinks about bridges or trains or power. They only think about it when the train or power isn’t there.”

When hiring staff to manage large projects, Metro Transit typically seeks at least nine years of progressively responsible experience in transit capital project implementation and at least five years of supervisory/management experience. Valley Metro project managers are expected to have ten years of experience in project/construction management including five years managing major capital projects involving multi-agency or multi-stakeholder projects. In Dallas, DART expects eight years of progressively responsible experience managing engineering and/or construction projects and contracts.

b. Decision-making skills

The ability to make a decision was an attribute that was repeatedly mentioned by interviewees. RFTA’s Angela Henderson said, “You need to stand behind a decision and defend it. You can’t go into this if you are the least bit fragile.” The Port Authority’s McShane said, “The most difficult thing to find in a candidate is someone who can make decisions under pressure. People try to avoid making decisions. Compounding the problem is conflict avoidance.”

The ability to make decisions in a prompt manner is especially important during nighttime and weekend construction work because decisions often must be made without consulting superiors. For example, if an overnight construction crew does not have all the staff and equipment expected to be in place, the project manager must quickly decide whether work should proceed or whether it should be modified or rescheduled.

When interviewing potential project managers, Clarke looked for their ability to promptly “make a decision, explain it, and move on.” He explained that when a concrete mixer is on the way to the construction site, and the project team is still not sure of what type of wall should be built or the limits of where the wall would be built, you can’t say “form a study committee.”

c. Technical skills and knowledge

Project managers need to be proficient in numerous technical areas such as engineering, project controls, processes, contracts, funding, transit systems, and processes.

Most interviewees said having an engineering or architecture background is helpful, but not a pre-requisite to manage most large transit projects. A project manager cannot be an expert in every relevant discipline, but they do need to understand the project, know how to read engineering drawings and ask the right questions, and help solve problems relating to civil engineering, architecture, systems design, and construction.

Project managers need to have a keen understanding of the discipline of project controls. That means they need to know how to use tools and methods to systematically manage key aspects of scope, schedule, budgets, quality, and risk.

Bruce Podwal advises project managers in the private sector to read their contracts from cover to cover (including every attachment, appendix, and reference document), at least once a month. They need to understand their contracts, as well as the principles and strategies related to contractual compliance. Public sector project managers also have to make sure their team has a deep understanding of their contracts, whether it relates to professional services, funding, construction, or other project elements. Adhering to agreements associated with federal, state, and local funding is challenging, especially since a project can be funded with ten different funding sources, and the project manager needs to know which elements of a project can be used by each source.

Project managers need to be aware of and interpret applicable local, state, and federal policies, procedures, laws, and regulations regarding engineering and construction. This

includes FTA's CIG (capital investment grant) policies and regulations, FTA reporting requirements, and construction regulations and standards.

An FTA official cautioned against hiring a project manager who has never previously worked on a transit project. A project manager could have successfully led the construction of a skyscraper or a shopping center, but those are fundamentally different experiences, she explained. Transit projects have numerous structures located in multiple locations, often in more than one municipality, and they require a complex series of sequencing, permitting, and staging activities.

Stopplecamp also recommended that a project manager have a transit background, although he thought someone with highway or railroad experience could be a good fit. Lund said that when SEPTA first hired him, the agency appreciated his extensive utility experience, because both utility and transit projects involve linear projects on a right-of-way that is many miles long. They also both have numerous types of facilities (e.g., generating plants, shops, yards).

d. Management and leadership

Interviewees emphasized how project managers need to oversee and organize multiple activities at once, scope out the length and difficulty of tasks, and measure performance against goals. HNTB's Handzel said project managers need to "take the bull by the horns and deliver a project." They must know how to keep complex projects on budget and on time, handle multiple tasks, prioritize well, and follow through on all their commitments.

Project managers need to manage teams with a broad set of skills and adapt their leadership style to the people they are managing. They also have to help team members understand how the project pieces fit together so they can work through issues. Moreover, managers need to delegate well and monitor and evaluate employee performance.

The effective management of staff and contracts requires strong negotiation skills; interviewees noted that managers must be able to find common ground and settle disputes fairly and promptly.

e. Strategic and problem solvers

Numerous interviewees offered feedback on the types of analytical skills a project manager should possess, and shared the view that project managers must be big picture thinkers. Sound Transit's Riley-Hall used the analogy that a project manager needs to be

on the balcony and not the dance floor. Other interviewees echoed this perspective and explained that keeping an eye on the big picture involves understanding the political landscape, funding, players in organizations, and elected officials. Managers need to be strategic without micromanaging, and they need to be proactive -- knowing when a project is in trouble, anticipating issues, and seeing opportunities.

Interviewees also said that project managers need to possess high-level analytical and creative skills to find solutions to an unanticipated complex and technical problems. To resolve issues, they need to identify alternatives, evaluate the advantages and disadvantages of each one, and move forward with the option that makes the most sense.

Stopplecamp said project managers need to be logical thinkers, “Someone who can look at a project, tear it apart, and put it back together.” Riley-Hall said that whenever an issue comes up, project managers need to get the right people together to resolve the problem and understand how it will impact the whole project.

Lund looks for individuals who are flexible and think outside the box when problems occur. They need to know how to weigh the pros and cons of various options, and not to be stuck in always doing things the way they have been done before. Lund had an important caveat to the concept of thinking outside the box – a project manager needs to follow rules and procedures.

f. Communications, interpersonal skills, and personality traits

Project managers must have strong communications skills because they need to coordinate information between agency staff and leadership, consultants, contractors, partners, as well as numerous public and private stakeholders. They need to make sure individuals and organizations are aware of issues that affect them and be able to present information in a timely manner that is easy to understand.

Interpersonal skills are important because managers need to establish and maintain effective working relationships with executive managers, government representatives, and transit constituencies. Certain personality traits are very helpful. Interviewees cited a positive outlook, discipline, calm, and restraint. Other traits mentioned were good listening skills, consensus building, and empathy.

Collaboration goes hand-in-hand with communications. Before leaving Metro Transit, Mark Fuhrmann’s words of wisdom to his staff were: “Communicate, collaborate, and coordinate with all the stakeholders – political, community and staff.”

Numerous interviewees emphasized the importance of project managers collaborating closely with operations and maintenance departments. Mota said, “I listen to their concerns, protect their interests, and work to earn their trust.” As noted in the Secaucus example, if a maintenance department sees a problem after construction is complete, the workaround can be costly. Educating operations and maintenance teams can be challenging because if they are not skilled in interpreting drawings, they may not recognize a potential problem until construction is underway.

g. Difference between construction managers and project managers

Many transit agencies assign a dedicated construction manager to oversee construction activities and contractors for a project. Interviewees suggested that construction managers have an engineering background, something that is less important for the person leading the entire project.

Steve Barrett, a Metro Transit construction manager, said the skills required to manage the construction component of a project are fundamentally the same as those needed to direct the overall project. However, the construction manager does not have to focus as much on the relationships with stakeholders.

Metro Transit’s project director, Christine Beckwith, described the role of construction manager as “really fast paced, and not everyone is cut out for it.” Barrett noted that time is more critical during construction, compared to the planning and design phases when the project team has more time to research and bring in additional expertise to solve problems.

Since construction crews are sometimes asked to perform work not expressly spelled out in their contracts, Barrett emphasized the importance of construction managers maintaining a productive relationship with their contractors. He likened it to a healthy relationship with a spouse, in the same way that they help each other achieve their goals.

5. Engage consultants but do not lose institutional knowledge

This chapter has the following three sections relating to the use of consultants to supplement project management teams.

- a) Project managers need consulting services
- b) Avoid relying too much on consultants
- c) Importance of institutional knowledge

a. Project managers need consulting services

The Advisory Committee members discussed the balance between consultants and non-consultants on a project management team. They noted how agencies often rely on consultants because elected officials are not allowing public agencies to pay high enough salaries to attract talent.

There is no optimal ratio between agency staff and consultants. The number of consultants on a team depends on several factors including an agency's ability to attract experienced staff, the size of its capital program, and the availability of its existing workforce. Agencies undertaking more than one large construction project will benefit from having a larger full-time staff and a pipeline of talent. In contrast, agencies undertaking only a single project may benefit from engaging more consultants because they could obtain access to specialized skills, while more easily scaling up and down the size of their teams.

Wayne Feuerborn, who managed RFTA's design efforts in Aspen, said finding experienced project managers is extremely difficult. He explained that designers need about six years to gain their foundational skills and then another four years to hone them. At that point, they learn how to manage and are ready to take on important assignments. His firm has its own learning and development center that trains project managers.

The transit agencies in Aspen and Baton Rouge needed consultants to ensure their BRT projects followed all of FTA's rules and policies. In Baton Rouge, the design consultant has brought in professionals with expertise in operations planning, traffic engineering, shelter design, landscape architecture, roadway engineering, transit technology, signal design, electrical engineering, cost estimating, surveying, value engineering, and subsurface utility engineering. The consultant Chris Handzel said, "Transit agencies lean on us. We can provide guidance based on our experience."

Another major challenge for smaller agencies is working with the FTA's project management oversight contractor (PMOC). The PMOC will evaluate projects with a fine-tooth comb and might suggest improving the procedures that agencies have long relied upon. For instance, the PMOC expects a more detailed project schedule than most smaller agencies have ever seen. The consultant, Robert Hosack said, "If the agencies have never been through it, they can find it overwhelming."

b. Avoid relying too much on consultants

In Phoenix, Valley Metro has had to rely on consultants for many positions because the agency has not been able to hire enough qualified employees to manage all its major expansion projects. In fact, the project manager for the South Central Extension project is not a Valley Metro employee, but rather a subcontractor to the consulting firm which is responsible for managing the project. The project manager was a known commodity, though, having worked on other Valley Metro projects.

Consultants bring a wealth of knowledge and experience. They can also tap into their corporations' expertise. However, interviewees noted several problems that can occur when agencies rely too much on consultants. Agency employees tend to have a greater sense of ownership over a project, and they tend to have relationships with co-workers that are harder for consultants to develop.

Robert Lund would have preferred hiring more permanent employees rather than consultants at SEPTA. He said, "Permanent employees are more invested in the organization and the project. There's a different mindset than when you're hired and gone, versus you're the owner and I'm going to be with SEPTA for a long time and I'll have to deal with it forever."

He also said that permanent employees have a different perspective on how construction will impact the agency's existing riders. "Consultants will primarily think about how something is best for construction and staying on-time and on-budget. But if I lose riders in the long-term that's not the best thing." He noted that employees have a better understanding of the operating rules, how to schedule trains and outages, and how to accommodate impacted riders and neighbors. Referring to SEPTA's customers, "we have to live with them forever."

Although agencies need consultants, Clarke said, "it's important that the project manager be an agency person. Preferably someone local. An agency person makes better decisions in the long-term interest of the agency." Clarke also said that agency personnel are more familiar with the culture and relationships within the agency including key interfaces with the Operations Department – "the ultimate customer."

Stopplecamp said when agencies have trouble retaining employees or rely too much on consultants, it can hurt their ability to successfully close out projects, a process that can take several years after construction has been completed and trains are running. Before a contract is closed, all deliverables must meet the agency's satisfaction. This includes providing spare parts, warranty documents, and proof of insurance. In addition, all disputes need to be resolved between the agency and its contractors as well as between the contractors and subcontractors. Some disputes can be complex and contentious; for

example, a company that sued RTD in 2018 for \$111 million and lost, is now appealing the court's ruling.

c. Importance of institutional knowledge

One concern that came up repeatedly in Eno's interviews was the potential loss of institutional knowledge. According to the advisory committee members, because transit agencies are relying more on consultants and experiencing increased turnover, their need to document and transfer institutional knowledge has become increasingly important.

Referring to the importance of institutional knowledge, Collon said, "it's good to have the manager of design and the senior rail engineer on staff because they can protect the design quality, and they know where the bodies are buried." If those positions are filled by consultants, the agency could lose valuable institutional knowledge, such as remembering issues and problems raised by property owners and stakeholders. That type of information might not make it into drawings or meeting minutes.

Gianfrancesco, a former MTA senior official, noted that due to the long lag between construction of the first and second phases of the Second Avenue subway, the project is losing knowledge at the agency as well as other organizations. For instance, officials at utility companies learned a great deal about subway construction during the project's first phase, but transferring that knowledge within their companies is not a very high priority for them.

Stoppolecamp said keeping project information in-house provides a "huge benefit to the organization," but, RTD's leaders "don't see it or pay for it." Long after construction is completed, operations and maintenance staff will go back to those who worked on a project when a problem occurs. They might be asked what they did, why they did it, and what was the intent. Agency staff can also offer first-hand knowledge about the past performance of consultants and contractors; information that is very valuable when the agency reviews bids on future projects.

Clarke said that some information is typically not written down. For example, LA Metro often had a challenging relationship with the city of Los Angeles. When an issue came up, Clarke sought out agency staff who understood the issue and the history. He noted that compared to outside consultants, many transit agency professionals are much more likely to have built long-term relationships with local jurisdictions that can be leveraged during a project.

Even though he now works at a consulting firm, Fuhrmann warned, “You don’t want your institutional knowledge getting flushed down the toilet.” A good consultant, he noted, can help an agency create a foundation for institutionalizing their knowledge.

6. Hiring and promoting managers

This chapter has three sections relating to the hiring and promoting of staff to manage transit projects.

- a) Working with Human Resources (HR) Departments
- b) Selecting the right candidate
- c) Recruiting challenge when positions are only temporary

a. Working with HR departments

Sound Transit’s HR department assigns a “talent advisor” to meet regularly with Ron Lewis’s department (Design, Engineering and Construction Management) and discuss the status of vacant positions and steps the agency is taking to address them. At any one time, the HR department is typically recruiting for 20 to 30 open positions in Lewis’s department.

Compared to a traditional job recruiter, a talent advisor has a broader set of responsibilities. Recruiters post job ads, review resumes, conduct initial screening interviews, and oversee the hiring process. Talent advisors also consider a department’s future staffing needs, working closely with hiring managers to advise on the best course of action for attracting talent and retaining staff. Sound Transit’s talent advisors try to build relationships with prospective candidates because someone who is not hired for a certain position might be a good candidate for a future position.

Sound Transit’s Human Resources department advertises its job openings in trade journals as well as LinkedIn and Indeed.com because that is where the agency has had the most success. Depending upon the position, it advertises on APTA.com, TransitTalent.com, and MassTransit.com. Sound Transit has also purchased ads that are printed in programs organized by the American Public Transit Association (APTA).

To most effectively recruit candidates, Human Resources departments need to work closely with hiring departments. Sound Transit has found that the best way to get project management talent is by word of mouth because someone who is happily employed is unlikely to be actively looking for a new job. The agency offers a class called “Hiring for Success” which teaches employees in every department how to discuss Sound Transit career opportunities with their peers. The class encourages employees to

set up LinkedIn profiles and share job postings. When anyone in Lewis's department goes to a conference, he tells them, "You're going on a recruiting trip."

While every transit agency struggles to find qualified staff to manage large transit projects, the problem is more acute in certain regions of the country. For example, officials in Phoenix and Seattle said their regions have a limited number of potential employees with the skills and experience their agency needs. So, they need to hire employees from government agencies and construction companies that are outside the area.

Partnerships with academic and training organizations can help recruit candidates, especially for junior-level positions. The FTA funds the Transit Workforce Center, which directly support public transit workforce development. Its mission is to "help transit agencies recruit, hire, train, and retain the workforce needed now and in the future."

b. Selecting the right candidate

Interviewees discussed the importance of finding well-qualified staff and they identified some of the techniques they use to do so. Valley Metro's Trevor Collon said that agencies need to be patient to get the right project manager and they should be interviewed "up the line, maybe even by the CEO."

When evaluating candidates, the MTA's Tim Gianfrancesco relies on references and a candidate's reputation. To find out exactly what role someone had on a project, he will ask, "not just how many projects someone worked on, but how much work they did. Did they jump around and work on different projects but have only small roles? When someone works on a project from beginning to end, you know they stuck it out and moved up through stages."

Sound Transit's Hiring for Success class helps Lewis and his team select well-qualified candidates. For example, the instructor teaches attendees how to interface with candidates more than once (because someone can have a bad day). The course also teaches attendees how to ask probing questions of interviewees. That means digging deeply to learn about someone's exact role and how they approached problems.

When the Port Authority's McShane interviews candidates, he drills down to understand how they have reacted to situations and addressed problems in their professional careers. That helps McShane determine if they are capable of making decisions on their own.

c. Recruiting challenge when positions are only temporary

Higher salaries are not the only reason why many talented project managers opt to work in the private sector. Consulting firms can tell candidates that a successful project manager will be expected to manage one large transit project after another, an opportunity that very few public sector agencies can offer.

Metro Transit has had mixed success recruiting and retaining staff. When it began its expansion program in 1998, Fuhrmann told potential hires and existing team members that approximately every four years, the agency would deliver new projects. This gave the staff some comfort that they could stay at Metro Transit for many years, moving from one project to the next. However, the agency was not able to execute this schedule due to funding shortfalls. As projects experienced a multi-year hiatus, the agency lost key staff.

Beckwith said Metro Transit has had challenges hiring all the people needed for her project, “because you can’t promise full-time employees that they will have work after the project is completed. There are no guarantees for anyone working on the project. It’s hard to find people when potential employees know the project may not even make it to construction. Because of this, Metro Transit has had to rely more on consultants than it otherwise would have.”

Sound Transit has an even bigger challenge. The agency has a finite existence because it was formed to build rail and bus lines, but not necessarily operate them. Staff who are hired either need to be retrained or their jobs will go away.

A recent Valley Metro job posting for a senior project manager included the following caveat about the tenuous nature of the position. The warning that the job was contingent upon funding could not be missed, since it was printed in capital and bolded letters on the very top of the posting: **“THIS RECRUITMENT WILL BE USED TO HIRE PERSONS THAT SUPPORT THE DEVELOPMENT OF MAJOR CAPITAL PROJECTS WITH DEDICATED FUNDING. THE DURATION OF THE EMPLOYMENT WILL BE CONTINGENT UPON THE AVAILABILITY OF FUNDING FOR THOSE PROJECTS.”**

Because funding at RTD was also intermittent, Rick Clarke had trouble holding onto his team. He found it hard to recruit for project managers because the agency only guaranteed them a position for the life of a project. “Go-getters wouldn’t worry about it. They’d say I want to work on it and get experience. There were many qualified people who wanted to work on the large projects and would have been great, but they had concerns regarding what would happen to their job when the project ended.”

When recruiting potential project managers, Clarke pointed out he had moved from Dallas to manage a project in Denver. He would tell potential employees, “It’s the opportunity of a lifetime” and when the project is complete, “you may have to move, but there won’t be a lack of interest in hiring you.” He admitted to Eno, “I felt terrible. People give so much to the project and when it ends, they’re told we don’t need you anymore.”

7. Retaining project managers

This chapter has three sections relating to the retention of project managers:

- a) Challenges in retaining managers
- b) Promoting deputy project managers
- c) Factors that have encouraged managers to stay

a. Challenges in retaining managers

Stoppolecamp said an agency, ideally, would promote from within. That can often happen with large transit projects because they involve so many employees and the teams transition over many years. He had engineers who started as inspectors at the beginning of a project and were managing the project by the time it closed out. On the other hand, Stoppolecamp expressed his disappointment that two reasons precluded him from guaranteeing deputy managers that they could manage a future project. First, the agency did not know what the next big project would be, and second, the agency required that all open positions be advertised.

The first phase of the MTA’s Second Avenue subway opened in 2017, and utility relocation has begun on the second phase. According to Gianfrancesco, not many senior employees who helped manage the first phase are still working at the MTA. Peyton said it was disconcerting that going into the project’s second phase, the MTA’s Second Avenue subway team lost its top people. He said, “Any good manager can manage a project. But, you need to know who to talk to and understand its idiosyncrasies.”

The MTA team identified two issues that have negatively affected promotion and retention. First, the agency has increasingly relied upon consultants to perform engineering tasks. Since engineers are now more likely to manage contracts rather than design projects, the MTA has had challenges attracting and retaining talented engineers who can become future project managers. Second, the MTA engineers are unionized, and their contract does not have sufficient incentives for them to pursue project management.

Issues of retaining are different for more junior roles. McShane has noticed that, “We train people, give them lots of responsibility. We provide them support and expose

them. And then they run off.” Similar to the MTA situation, in recent years, the Port Authority has relied more on outside firms for design. Since the agency is no longer conducting its own cutting-edge engineering, the work is less appealing. The agency’s engineers are spending less time designing and more time managing contracts.

When asked about retaining project managers and experienced professionals, RTD’s Stopplecamp said, “We don’t retain, unfortunately.” He succinctly explained, “We’re not paying and they’re not staying.” He added, “Without large scale projects, training, sufficient staff and competitive salaries, it is very hard to retain talented employees when the local private sector is making very nice offers.”

b. Promoting deputy project managers

Providing staff with opportunities for promotion helps both the employees and the agency. Sound Transit’s Ron Lewis said the “combination of outside and home-grown talent has served us well. One of our greatest resources is within our organization. We spend time helping existing staff to grow.” He emphasized the importance of selecting deputy project directors who have the potential to become directors. That requires pairing them with the right person and making sure they are ready to step in at any time.

Eno talked to several project managers who had been promoted from deputy positions. Sound Transit hired Randy Harlow to serve as deputy project director and the next year, he was appointed executive project director. Tim Gianfrancesco was deputy project executive for the first phase of the Second Avenue subway and the project executive for the second phase. Christine Beckwith worked on several BRT and light rail projects, rising from project controls manager to deputy project director and then project director. Sound Transit’s Linneth Riley-Hall went from deputy project director to program director and finally to executive project director.

Consulting firms have similar career paths. HNTB’s Handzel said the best way for someone to be prepared to take on a project manager position is to serve as deputy project manager, first. He said that when he was a deputy project manager, “I had a mentor who brought me to meetings. He taught me how to present myself, how to communicate with the FTA, and what information the FTA was looking for.”

As the deputy project director for the Metro Transit’s Gold Line, Morgan Abbott is now learning more about third party agreements, FTA procedures, communications, public outreach, tracking projects, document controls, and budgeting. She has been picking up skills from the consultants and the rest of the project team, especially from the project director and the construction manager.

c. Factors that have encouraged managers to stay

RTFA interviewees identified three reasons why its agency has done an excellent job retaining its employees. First, RFTA provides its employees higher salaries and more generous benefits than most other employers in the Aspen region. Second, RFTA is an organization that has had steady growth. Third, the employees appreciate how the organization is willing to take risks and adopt new cutting-edge technologies.

Harlow decided to join Sound Transit because he was looking for job security and the agency offered him a salary similar to the one he was earning as a consultant. He is staying in his position because “it’s not every day you have an opportunity to run a multi-billion-dollar job. There’s a thrill of doing a good job, delivering for riders, and building a new line. It’s exciting and fulfilling. I take great pride building the light rail line and I can tell my grandkids that I built that.”

Beckwith said that Metro Transit has also been able to recruit and retain talented projects because it pays well and offers better benefits than private consulting firms and other government agencies in the Minneapolis area. Beckwith talked about three benefits of working at Metro Transit compared to a consultant. First, project managers in the public sector can make decisions while consultants can only offer suggestions. Second, public sector employees do not have to worry about their own billable hours or work on proposals on their own time. Third, a public agency can offer a greater work-life balance. Her colleague, Steve Barrett said, “In the public sector, you trade a little less money for stability and a better work-life balance.”

Eno found that people with long-standing ties to an area have been more likely to stay after projects are completed. Tony Santana, who grew up in the Phoenix area, pursued a career at Valley Metro because he wanted to work on important infrastructure improvements and make a difference in his community. Valley Metro also offered him the opportunity to advance from resident engineer to project manager. Although most of Stoppelcamp’s project management team members left Denver for more money and the promise of working on exciting projects, he noted that two staffers stayed because they wanted to contribute to their community.

To increase retention, Sound Transit’s Human Resources department is deploying talent management software that will help agency employees explore potential career paths. The program considers employee skills and then recommends learning programs to match their goals. The agency hopes the program will improve retention because it will recommend career options that many employees might not have considered.

Sound Transit's Harlow recognizes his role in retaining employees. He said, "We have to make sure the staff is happy with their compensation and feeling fulfilled. I didn't get trained on how to do that. There's no class that says here's how you should keep people around and how to keep them happy. It's a tougher nut to crack because someone will dangle more money. You need to sell the mission and your reason for being here. There has to be a motivation besides money." After giving it more thought, he added, "I think I have the biggest responsibility. I need to communicate the message of a shared vision. That's more important than an extra dollar an hour. There has to be a compelling cause for folks who work for me."

McShane has seen how some people can burn out from the pressures of managing large projects. Meanwhile, other individuals can become addicted to that pressure and relish working in an ever-changing, intense environment. Teams, he said, need some people who are happy with a slow day at work.

8. Agencies are not competitive with salaries

In most metropolitan areas, consultants pay much higher salaries than transit agencies can offer. When Eno interviewed Sound Transit's Collon, he said at least three individuals had recently turned down his job offers because they had received higher counteroffers. The biggest challenge DART's Evelio Hernandez faces in recruiting also relates to salary.

Numerous interviewees noted the pay difference between the public and private sector is greater for project managers than for more junior positions (such as inspectors and engineers). Mota explained that the private sector pays a premium for project managers because "those are the positions that win the jobs," he said. "Companies are willing to invest more and take a hit. It's a calculated investment."

The starting salary for a SEPTA engineer is less than \$70,000, while consultants in the region are paid closer to \$100,000. Lund said, if SEPTA could hire and keep someone for four years, they were lucky because the salary difference was greater at the project management level. A project manager might earn a little more than \$100,000 at SEPTA but could earn \$160,000 at a consulting firm. Lund was never very successful at SEPTA hiring experienced managers from the outside because the agency's pay scales were not attractive. The exceptions occurred when someone was particularly attracted by public service.

Stopplecamp said that many of his staff members who developed skills during RTD's rail expansion program were gobbled up by consultants: "They could get a 50 percent increase in pay, if not more." He said on all of his projects, he had to supplement his project teams with consultants and that many of the senior staff members who worked for the consultants earned twice as much as RTD project employees.

Jumping from the public sector to a consulting firm can be very enticing. A consulting firm recruited one interviewee in 2012, offering him a \$50,000 salary increase, plus a \$30,000 signing bonus and a \$20,000 retention payment. According to the 2023 NYU Marron Institute's "Transit Costs Project" report, a project manager for capital construction at Boston's transit agency earned \$106,000 a year while the equivalent position in the private sector paid \$140,000. One advisory committee member said the competition is not limited to private vs. the public sectors. She revealed that there is also a "bidding war" between consulting firms for talent.

To understand its competition, Sound Transit subscribes to the Payfactors service which provides access to 8,000 salary surveys. Sound Transit also shares salary data with other transit agencies, and it tries to align its salaries with similar markets, including Los Angeles and the Bay Area. "They are also struggling against tech companies to attract talent," she said. Sound Transit's Powers explained, "Our philosophy is to pay market rate salaries," but she admitted, "We can't pay what Amazon pays."

Stopplecamp identified two of the reasons why transit agencies may not be paying project managers a high enough salary. First, many agency executives, especially those without a background in building large projects, have not understood the importance and challenge of finding someone with the skill sets needed to manage large transit projects. He explained that they prioritize, understandably, moving riders on a daily basis. Second, some senior transit employees responsible for operating trains and buses resent when an agency pays relatively high salaries to project managers. That same level of resentment does not occur when a consultant is hired.

Although agencies are reluctant to share salary data, Eno did obtain some information about earnings relating to the interviewees. For example, Sound Transit's Randy Harlow, an executive project director, earned \$190,575 in 2020. And, in 2019, RTD had approximately 2,850 employees: Stopplecamp was the fifth highest paid employee, earning \$222,724, while the project director for the Eagle P3 project was the 35th highest paid employee, earning \$150,440.

9. Advantages of working at a public agency

Although the public sector is typically not competitive on salaries, its benefits (e.g., pension, health care) are often better than those found in the private sector. However, these benefits are often underappreciated or misunderstood by both current and potential employees. Powers said Sound Transit needs to do a better job explaining to both its employees and recruits that its benefits “are better than 90 percent of its competitors in the region.” Lund said, “One of the key things SEPTA offered was a defined pension plan. But, younger candidates are just looking at how much money I’m putting into my pocket.” Zoe Robertson who also worked at SEPTA said that people do not always “fully appreciate the value of health care benefits and pension.”

Working in the public sector has other advantages. Luis Mota said transit agencies offer a better work-life balance and greater job security. He warned, however, that the public sector will lose their advantage if they continue to cut employee benefits and raise their retirement ages.

Gianfrancesco noted that the MTA provides a pension with good job security and a generous amount of personal time, sick time, and vacation time along with excellent health benefits. However, he has seen the salary difference widen between the private sector and the MTA in recent years. MTA’s pension program offers a strong incentive to work at the agency for at least 20 years, but many project managers are better off financially if they leave the agency once they reach their mid-50s to early 60s.

Goodrich identified three things that attracted many people to the MTA Capital Construction Company. The first was the opportunity to work on large projects. Second was the pension. Third was the opportunity to make decisions, rather than the typical consulting role of recommending decisions. Lund noted that SEPTA was attractive to young engineers because it offered opportunities to do design and field work and offered tremendous opportunities to learn.

Stopplecamp identified advantages of working at RTD: “You don’t have to look for another project, worry about work coming in, and you don’t have to travel.” He also said, “We expect 40 to 50 hours of work a week,” not 60 to 70 hours plus travel that are expected at many consulting firms.

Another downside of working for a consulting firm is the need to move for work, or losing a bid and then losing a job. Stopplecamp said if someone is looking for the “almighty dollar,” they should go to the consulting world. They should work for the agency, if they want to “own” a project, have a better quality of life, and much greater job stability. Hernandez also appreciates the benefits of the public sector: “In the consulting world, if they don’t have a job, you have to move on, or they let you go.”

Abbott, currently a deputy manager at Metro Transit is not sure where her career will take her after her project is complete. Moving up to a project director has its rewards, but she realizes that would impact her work-life balance. Abbott said she would prefer staying in the public sector because consultants need to move where the projects are, and she would miss the agency coordination and partnership building that she does now. However, she is well aware of potential opportunities in the private sector. “Recruiters,” she said, “call me all the time.”

10. Training in the public and private sectors

This chapter contains the following seven sections:

- a) Benefits of training
- b) Private vs. public sector training
- c) Agency training programs at RTD, SEPTA, and DART
- d) Institutionalizing training at Sound Transit and Valley Metro
- e) Adequately documenting lessons learned
- f) Industry training programs
- g) Project management resources

The following table shows training programs recommended by interviewees. It does not include degrees and programs offered by universities.

Interviewees	Agency training	Consulting Firms	Transportation Industry Programs			Conferences (APTA, Mpart), FTA roundtables	Courses related to specific disciplines and professional certifications
			NTI	APTA	Eno		
<i>FTA</i>						X	
<i>Aspen</i>		X					
<i>Baton Rouge</i>		X					Project Management Professional
<i>Minneapolis - St. Paul</i>	X	X	X	X		X	Project Management Professional

<i>Seattle</i>	X				X		Certified Construction Manager (offered by the Construction Management Association of America) Project Management Professional certificate (offered by the Project Management Institute) Design-Build professional certificate (offered by the Design-Build Institute of America) LEED accredited professional (offered by the U.S. Green Building Council)
<i>Phoenix</i>	X	X		X			Project Management Professional
<i>New York</i>	X	X					American Society of Civil Engineers and American Society of Mechanical Engineers
<i>Leader profiles</i>	X						
<i>Advisory Committee</i>				X	X		

a. Benefits of training

Effective training programs can help project managers learn how to improve the quality of their projects, adhere to schedules, minimize costs, and strengthen their relationships with stakeholders. Training offers other benefits.

Bill Goodrich explained how training improves retention. When he worked on Boston’s Big Dig project, the joint venture constructing the project organized a formal training program with mandatory human resources and technical training. He said, “As long as

they were trained and had an opportunity for advancement, people were willing to stay.” He said, “On large programs, you need a training element. There should be an ongoing review process at Human Resources that evaluates people, identifies the rising stars, and provides them with advancement opportunities.”

Training can save an agency money in surprising ways. According to Goodrich, “There’s no question there’s a premium that contractors build into bids whenever they are doing work for the MTA. They know how effective or ineffective agencies are in managing projects and change orders. If the MTA wants to bring down costs, they should train internal staff to manage projects more effectively.”

When Goodrich recruited employees for MTA Capital Construction projects, he often interviewed candidates from other MTA agencies, such as New York City Transit and Long Island Rail Road. He would have preferred giving these internal candidates an opportunity to work on one of MTA’s megaprojects, but Goodrich filled most positions with applicants from the private sector because many of the internal candidates had little training and thus were not as qualified.

Training is not limited to classroom activities. Some interviewees talked about the benefits of reading technical materials and attending conferences. Steve Barrett, Metro Transit’s construction manager, brings in experts to talk to his staff about specific topics on a weekly basis during the winter months. Bruce Podwal said that much of the science of project management is a list of dos and don’ts that one has to be rigorous about following. The art of project management is knowing what to do in the gray areas – this type of knowledge, he explained, often can be gained only through the experience of making mistakes and observing the mistakes of those around you.

b. Private vs. public sector training

The interviewees who were familiar with both public and private sector training programs all said that the major consulting firms do a better job training project management staff than public transit agencies. According to the interviewees, consulting firms tend to better recognize how well-qualified project managers are the key to their bottom lines. If a project manager successfully delivers projects on time and on budget, and also builds solid relationships -- the client and others will want to hire the firm again.

The advisory committee members were emphatic that many transit agencies should offer more training and mentoring programs. Some agencies, they noted, rely on the National Transit Institute’s programs, but its offerings are not considered as robust as those offered in the private sector.

HNTB has a learning and development center that offers classes for its employees. Robert Hosack participated in the company's project management training and development programs, including a Project Management Fundamentals 2 1/2 day course that teaches professionals how to lead a project including managing schedules, budgets, risks, problems, and change orders. Hosack talked about how it is in HNTB's interest for transit agencies to have their own effective project managers. He said, "It's better to have a counterpart who knows what they're doing. If you have a good project manager at a transit agency, you don't worry about getting action items accomplished."

When Scott Hoffeld worked at URS, his firm had specific criteria relating to the experience and training levels that individuals had to meet before they could be considered a certified URS project manager. The firm did not solely rely upon a supervisor's determination. Hoffeld served on his region's Project Manager Certification Board which reviewed resumes and recommendations, and also conducted interviews to determine whether someone was prepared to manage a project. If the board members did not think someone was ready to manage a project, they might recommend additional training modules or taking on a role that would provide needed experience.

When Mota worked at a consulting firm, he participated in its emerging professionals program and in workshops. He also took advantage of the firm's vast technical expertise where professionals shared their experience on an internal corporate network. Most of his training, however, came from his supervisors and informal mentors.

c. Agency training programs at RTD, SEPTA, and DART

Rick Clarke noted that much of the training at transit agencies is not directly relevant for senior managers. However, he highlighted a deeper issue. Transit agencies do not encourage and reward staff to participate in training programs. Clarke has observed that most agency staff think they don't have time for training; instead, they are focused on "putting out the fire of the day and the hour." He admitted, "It's easy to put it off."

Robertson remembered SEPTA officials talking about the need for more training "ad nauseum." They knew training was important, but sometimes courses were not offered at convenient times, and "when you're short-staffed, there are no spare bodies to do the training." Lund said training is "supposed to be" a part of every SEPTA employee's annual performance review. Each employee is also supposed to have a development plan that helps employees identify ways they can fulfill their career goals.

Lund said that SEPTA does not have “a true” project management training program. He noted, “That’s much needed in the industry.” Project managers and engineers learn most of their skills from hands-on work experience rather than from any formal training. Sometimes, he said, “they learned to do things the wrong way, if they’re learning from someone who is not doing it well.” Several schools in the Philadelphia area do offer graduate and certificate programs in project management and construction management. For example, SEPTA has paid for engineers to pursue a master’s degree in construction management at Drexel University.

At SEPTA, Lund started a rotational training program where young engineers move to different departments so they could get experience in various fields such as design, analyzing data, and managing projects. After the engineers complete their training programs, they can go back to the department where they were hired, or they could go to another group. The department heads, he said, “didn’t necessarily like it because they were losing productivity for a year. But it was a way to keep the young engineers and develop talent.”

Hernandez said DART only has a few project managers. Instead, it relies upon consultants who help oversee projects and undertake project controls and systems integration. He has learned project management skills, such as scheduling and cost estimating, by experience and by watching how his consultants do so.

Stopplecamp is a bit skeptical of formal training programs. He said that RTD project managers basically learn from “trial and error” and most learning “is hands on.” RTD does not have a formal mentoring program. He said, “Unfortunately, project management is a hard skill to hone.” That’s why the consulting world hires the good ones “in a heartbeat.”

d. Institutionalizing training at Sound Transit and Valley Metro

Among transit agencies, Sound Transit offers one of the most extensive training programs. It established ST (Sound Transit) University to provide training for its approximately 1,200 employees. Some of its classes are generic while others are tailored to Sound Transit’s needs. The agency also has a license with LinkedIn Learning which offers over 16,000 courses.

ST University offers the following five project management courses. Some of these courses are only offered virtually, some in person, while others are offered in both formats.

- Preparing for the Project Management Professional exam (50 hours over 6 weeks)
- Principles of Project Management (2 day course)

- Risk Management (1 day course)
- Project Estimating and Control (2 day course)
- Leading High Performance Project Teams (2 day course)

Besides ST University, each Sound Transit department is provided with funds to offer its own training, and employees are also offered tuition reimbursement. In addition, Sound Transit sends approximately 32 people a year to external leadership programs including Eno/MAX Program, Leadership APTA Program, APTA Emerging Leaders Program, Eno Transit Mid-Manager Program, and Eno Transit Senior Executive Program.

Valley Metro’s manager for learning and organizational development, Julie Landsburg, explained how training needs to be formalized and institutionalized. She said, “It’s important for an agency to have a professional development team who can administer programs. It doesn’t work if it’s just ad-hoc. Then everyone would be responsible, but no one would be responsible.” Every Valley Metro employee has both annual performance and professional development goals. She emphasized the importance of institutionalizing such programs; “otherwise, if it’s just when I have time, no one has time.”

Landsburg pointed out, “Training does not change behavior. Managers need to follow up with support and provide employees with feedback on how they are performing. You can’t assume training will give them all the skills they need.” She said training is more effective when employees talk to their supervisor about what they learned, and then the supervisors help them apply those lessons and offer support for their efforts.

She recognizes that “it’s difficult at best to retain good people” and thus the agency is training some employees who will only work at the agency for a short time. “It might be good for them, but not so good for us,” she said.

She described the agency’s three-pronged approach to training which is similar to Sound Transit’s programs. The first is tuition reimbursement offered to employees. The second refers to how individual departments can sponsor professional development opportunities, such as attending conferences. The third and largest program is the agency-wide learning program which is managed by the Human Resource’s Training and Development division.

At Valley Metro, all agency directors and managers must participate in a Leadership Development program with sessions on topics such as holding effective meetings, creating a culture of feedback, and understanding legal issues in managing employees. The agency also offers a hybrid learning program for emerging leaders, and helps

employees pursue professional engineering and project management certifications. Moreover, the agency participates in the Eno/MAX program and Eno's Transportation Mid-Manager Program, and it can send interested employees to the National Transit Institute courses.

Despite all these Valley Metro programs, the agency's project managers tend to learn their technical skills (such as cost estimating and project scheduling) on the job, as they move up the ladder from office engineer to resident engineer, and then project manager.

e. Adequately documenting lessons learned

For numerous reasons, transit agencies are not thoroughly documenting the lessons they have learned from managing major projects. Failing to document these lessons and incorporating them into training programs is an important finding of this report and a significant issue in how projects are delivered in the U.S. Without documenting and sharing lessons, agencies can make the same mistake over and over again.

Interviewees understand the importance of a lessons learned document. Podwal likes to say, "Good project managers learn from their mistakes; excellent project managers also learn from the mistakes of others." Likewise, Stopplecamp said, "No project, agency team, consultant or contracting teams is perfect. Getting into how the sausage is made can detract from the enjoyment of eating the sausage. But we all need to learn from mistakes and develop a method for sharing this information."

Goodrich said lessons learned should be documented at the ends of design, construction, testing, and commissioning. He added, "If they are memorialized in a document, it could be part of a training when getting ready for the next project." He emphasized, "Lessons learned should be in a training program."

RTD has shared its experience with the transportation industry by publishing "lessons learned" documents in implementing projects. For example, it described lessons it learned from its Eagle P3 Project and remaking Denver's Union Station. In theory, these documents could be invaluable resources for project managers. Unfortunately, they have limited value in practice.

Stopplecamp explained how the RTD, like all agencies, needs to be careful when it reviews and documents a company's performance, because if the agency says that a firm did a "bad job," it could be held liable and if it says the firm did a "good job" that could be taken to mean good in all areas, which might not be the case. He said, "The best way to gain insight on a project is by talking directly with the team and relating your needs and concerns."

Towards the end of his career at RTD, Stopplecamp, revealed, “I don’t keep notes anymore; notes are discoverable and the only official record should be meeting minutes or official correspondence.” He has learned that the hard way. The Colorado Open Records Act allows the public and consultants to obtain all project documents, unless deemed privileged. Stopplecamp’s notes have been used against RTD in court.

One RTD employee told Eno that the lessons learned documents released by RTD were “worthless.” He revealed how the agency decided to “remove the warts.” because it did not want to air its “dirty laundry” and report that someone made a mistake because that could harm the credibility of employees, their supervisors, and the institution. A candid version of a lessons learned document would lead reporters, elected officials, and the general public to ask whether the agency took all the necessary steps and whether it was spending its money wisely. RTD did not even want to create an internal lessons learned document because “what if the local public radio station puts in an open records request?”

For the Second Avenue subway project, Gianfrancesco said there were various efforts to document lessons learned, but no formal compilation of them was transmitted from the project’s first phase to its second phase. Many lessons, such as design criteria and standards, have been incorporated into the second phase’s design. However, the MTA was hesitant to document its mistakes because according to one official, “you want to show that you’re improving, but don’t want to show that you did it wrong.” Some lessons, he said, are hard to formalize because an experience can be interpreted differently and taken out of context.

One way to overcome the lack of documentation is to bring together small groups of project managers where they can candidly share their stories. Section 10(g) of this report explains how the FTA’s construction roundtables provide such a setting. To better understand how agencies are avoiding documenting lessons learned, more research is needed, and that research should study how state laws regarding “open records” contributes to this problem.

f. Transportation industry training programs

This section describes the transportation industry training programs that were recommended by interviewees. They are offered by the American Public Transportation Association, Eno Center for Transportation, and the National Transit Institute.

American Public Transportation Association (APTA)

The Leadership APTA program is designed to improve senior and executive-level leadership skills. The year-long program includes executive roundtables, skill-building workshops, conferences, and team-driven capstone projects. The program is designed for experienced leaders (working for public transportation agencies and related organizations) who aspire to hold senior and executive leadership positions in their organizations, APTA, and the public transportation industry.

Only employees of APTA member organizations are eligible to participate. Candidates must have at least 10 to 15 years of significant work experience in the public or private sector, including at least three years or more of transit industry experience, plus a track record of demonstrated career progressions and successes. Candidates must be at a director-level or equivalent position or higher.

The program's most recent capstone project topics included: improving operator work schedules; improving retention through safety, culture and compensation; challenges and strategies regarding microtransit, and shaping the future of transit oriented development.

APTA also offers an Emerging Leaders Program. It is designed to provide public transportation professionals with the skills, knowledge, and networks that general managers, CEOs and executive leaders seek when identifying industry talent and promoting from within. The program provides participants with an understanding of the overall breadth of the public transportation industry, and its overarching components. An important component is helping participants build and expand their network with transit leaders, industry experts, and peers.

The program committee selects 35 individuals from APTA member organizations. The curriculum includes various skill-building workshops, round table sessions, online collaboration, and unique access to the industry's leaders through a national mentoring program. This program's intended audience is professionals with approximately two-to-six years of industry work experience, including one-to three years of managing tasks, projects, or staff. According to APTA, this program is designed to serve as a predecessor to the APTA Leadership program and the Eno Transportation Mid-Manager program.

Eno Center for Transportation

Eno offers the following three programs relevant to project managers.

Eno's Transportation Senior Executive (TSE): Designed to refine leadership and high-level intrapersonal skills, and help participants apply strategic techniques to real-world

challenges. The program is tailored specifically for senior-level managers in the transportation industry. The program includes the following topics: organizational culture and performance, organizational communication, harnessing critical leadership skills, collaboration and innovation, cultivating board and CEO relationships, building teams and inspiring talent, attracting and retaining talent, change resiliency, adaptive leadership, conscious/mindful leadership, transportation funding and legislation.

Eno/MAX (Multi-Agency Exchange): Three to four transit agencies select eight high-performing employees to participate in a cohort. The participants are typically front-line to mid-level managers from all organizational disciplines. They visit each agency in their cohort, during the year. The participants improve their knowledge, forge connections with peers, gain insight into their agency's role in the industry, hone leadership techniques, and elevate career skills. They develop a business project proposal addressing an agency-identified challenge. The program includes training, coaching, and a mock pitch with transit leaders to refine business and leadership skills.

Transportation Mid-Manager program (TMM): Designed for mid-level managers, in both the private and public sectors, across all transportation modes. Participants engage with their peers, along with Eno's executive coaches, leadership faculty, experts, guest speakers, and staff. The weeklong program is designed to improve leadership skills. Participants take part in individualized coaching sessions, learn strategies to elevate communication skills, and improve their strategic and critical thinking skills. Graduates of TMM, with a minimum of five-to-seven years of demonstrated managerial experience, are eligible to participate in TMM² Momentum, which provides advanced leadership skills. These participants learn from industry leaders and experienced facilitators, engage in interactive sessions, and build connections with peers.

National Transit Institute (NTI)

The National Transit Institute (NTI) provides training programs for transit professionals. Most attendees work at public sector transit agencies; others work for municipal, county, state governments, and metropolitan planning organizations. The training programs are funded by the FTA. Billy Terry, the former NTI executive director, says that that NTI is a vital asset for transit agencies because most agencies do not have enough resources to properly train their staffs.

NTI offers approximately 40 different courses taught about 180 times per year. Nearly all of them are conducted virtually. NTI has two distinct advantages over most other programs. The courses are tailored for transit agencies that must comply with FTA funding policies, and the classes are free. As a result, many of NTI's courses are filled up and have wait lists.

Two NTI courses relating to the overall management of large transit projects are: (i) Project Management for Transit Professionals, and (ii) Management of Transit Construction Projects. These courses attract participants with varied interests and experiences. Given the time constraints of the courses, instructors can often just introduce topics and not go into great depth.

Project Management for Transit Professionals: This introductory course, given over four half-days, is designed to help transit professionals appreciate the importance of analyzing, leading, and managing transit projects. Topics include project lifecycle and associated deliverables, project management plans, statement of work and work breakdown structure, developing realistic project schedules, using earned value to control and report project status, leadership and teamwork development, and communicating with stakeholders. The course relates to a wide range of projects that staff at a transit agency might manage, including the installation of new software.

Management of Transit Construction Projects: This course, given over three full days, explores best practices in managing transit construction projects. The topics covered include project management plans, procurement, public involvement, risk, design, construction, quality assurance and quality control, managing testing and start-up, system operations, and construction safety. Some of the requirements in the FTA-Project and Construction Management Guidelines and the FTA Construction Project Management Handbook are incorporated into the course.

In addition to the two courses cited above, the NTI offers courses that provide more detail about specific topics, including 11 courses on FTA real estate requirements, management procurement, public involvement, quality assurance, risk assessment for transit capital projects, and understanding the Americans with Disabilities Act.

g. Resources about project management

Besides the training programs described in the previous section, project management teams at transit agencies should also take advantage of the following resources.

FTA Documents: FTA’s Project Management Oversight Contractors and the FTA regional offices rely on several documents to guide how they assess the capacity of a project’s management team. Transit agencies should also be familiar with them. The first document, the FTA’s [Project Management Oversight Procedures](#), contains the “Project Management Plan Review” and “Management Capacity and Capability Review.” Another important document is the FTA’s “[Project and Construction Management Guidelines](#)” which assists agencies in advancing transit capital projects to deliver

successful projects in terms of project scope, function, schedule, cost, safety, and quality. A related document is the FTA's [Construction Project Management Handbook](#) which is designed to provide guidelines for use by public transit agencies undertaking substantial construction projects, *either for the first time or with little prior experience*.

FTA Regional Offices and Project Management Oversight Contractor (PMOC): The FTA's Susan Fletcher said providing technical support and oversight is one of the benefits that FTA provides to grantees. "We make connections between people, telling them what we're seeing, how to avoid problems, and how to slow down the bleeding." She said that it is important for the FTA "to build collaborative relationships" with its grantees so that the agencies are more receptive to the FTA's suggestions. Sound Transit's Ron Lewis, who appreciates the FTA's network, said, "Our team constantly asks the FTA and PMOC for advice on who we can talk to."

FTA Transit Construction Roundtables: The FTA's Office of Capital Project Management convenes Transit Construction Roundtables with sponsors of large capital transit projects. The peer connections that happen at these meetings are important. Since many of its sessions are held in person with a limited number of people, the participants can be candid with each other.

APTA Committees: One way that DART's Hernandez stays informed of technical issues is by participating in APTA's Streetcar Committee. "We learn from each other," he said. This is especially important for agencies like DART that offer limited training, even though they are bringing in new people, equipment, and tools.

Certifications: Sound Transit's Harlow said he encourages his staff to obtain professional certifications, including those offered by the Construction Management Association of America, Project Management Institute, Design-Build Institute of America, and U.S. Green Building Council.

PMI: The Project Management Institute, a not-for-profit association, offers training, certificates, and events. To obtain its Project Management Professional (PMP) certification, a project manager must meet certain requirements and then pass a 180-question exam. Although Cheri Soileau once had the PMP certification, she let it expire. However, she still refers to the *Project Management Body of Knowledge* guide that she used to study for the PMP certificate exam. Soileau said the information about schedules, budgets, principles, and project life cycle has been helpful, but not all the PMP-related materials are applicable to transit projects.

APTA and Mpact: Beckwith recommended that agency officials attend APTA conferences where they can learn about a wide range of topics such as light rail and Buy America requirements. At the conferences, FTA’s executive leadership often provide updates on regulations, and hold question and answer sessions. She said, “It’s a great way to learn about positions and plans that might not be in writing, yet,” For those working on the planning and development side, Beckwith also recommended attending the Mpact conference (formerly called Rail-Volution.)

Project Management Plans: Lewis refers to the “what, who and how” of delivering projects. Sound Transit’s board of directors adopts a scope of work that determines *what* will be built. The organizational chart identifies *who* will build it and the Project Management Plan explains *how* it will be built. Agencies undertaking major transit projects should read Project Management Plans prepared by other agencies. Lynnwood Link’s plan consists of 13 sections including those relating to environmental assessment/mitigation, project controls, procurement, quality control, safety, real estate acquisition, and fleet management.

Peer Review: Podwal highly recommends that project managers review other projects, periodically. He has been frequently asked to review projects, and he found that they helped him identify ideas that he should incorporate into his own projects, and made him realize when he had been falling into bad habits. He found performing a peer review can help the reviewer as much as the team that is reviewed.

11. Conclusion

To successfully deliver major transit projects, agencies need skilled and experienced managers who can keep projects on schedule, control costs, and satisfy stakeholders. Effective project managers help agencies save money by identifying efficiencies and reducing delays. Their reputations also attract more competitive bids, as private firms prefer working on well-managed projects with a higher likelihood of success. Additionally, strong project management can help prevent costly litigation.

If an effective project manager saves just one-tenth of one percent on a \$2 billion-dollar project, that is \$2,000,000 in cost savings.

Managing a project is not only about adhering to the budget, scope and schedule. If residents, businesses and elected officials are not pleased with the project manager’s work, an agency’s ability to obtain approvals and resources for future projects could be jeopardized. Moreover, if a project does not meet the needs and expectations of the

agency's operations and maintenance departments, the new transit services are less likely to satisfy transit customers and other stakeholders.

Despite the importance of their roles, transit agencies across the country are struggling to recruit and retain managers capable of successfully delivering major projects because of higher private sector salaries, a limited talent pipeline in the transportation industry, and a lack of long-term career opportunities within public agencies.

Agency preparation

To set up project managers for success, agencies should conduct a comprehensive review of their personnel, processes, and systems to ensure they are fully prepared to take on a large project. Agencies must allocate sufficient resources, establish appropriate procedures, and provide ongoing support to project management teams.

Numerous factors will directly affect the roles and responsibilities of a project management team. For instance, an agency undertaking multiple large projects can share cost estimating services across projects. A design-bid-build contract usually requires more engineering skills than a design-bid contract. And, public private partnerships typically need project managers with more sophisticated financial expertise.

The success of project managers can depend upon whether they have a good relationship with the transit agency's CEO. It helps when agency leaders have a background in construction or at least an understanding of the challenges and unanticipated problems that project managers face.

While experienced consultants can bring valuable expertise to project management teams, agencies should avoid over-relying on consulting firms. Transit agency employees may be more invested in an agency's long-term success and more likely to have been involved in a project from conception to operations. They may also have stronger networks within the agency and with external stakeholders. Moreover, an overreliance on consultants can result in a loss of institutional knowledge. Long after construction is completed, operations and maintenance staff benefit from having easy access to agency employees who worked on a project.

Recruiting

To most effectively recruit candidates, hiring departments need to be prepared and proactive. When HR departments advertise and post positions, hiring departments should share information about career opportunities via word-of-mouth and their LinkedIn pages.

When screening candidates, interviewers should pay close attention to references and a candidate's reputation. HR professionals can teach interviewers how to ask probing questions so that they can learn about a candidate's experiences, and how the candidate approaches problems and making decisions.

Finding qualified managers is complicated by the broad skill set required. Managing a large project requires controlling a complex array of interrelated projects, phases, and activities. Interviewees for this report identified numerous skills, traits, and experiences that managers need. These include technical expertise in engineering, construction, and regulatory compliance, as well as strong leadership, strategic thinking, and problem-solving skills. The interviewees also noted the need for excellent communications, interpersonal, and collaborative skills to effectively convey information and work with agency staff, leadership, consultants, contractors, partners, and various public and private stakeholders. According to interviewees, one of the hardest-to-find attributes is the ability to make decisions under pressure, which is an attribute that is critically important for managers working at a construction site.

Transit agency executives may not realize that attracting well-qualified project managers requires offering much higher salaries than most of the agency's other employees. The private sector typically pays high salaries because talented project managers help firms secure contracts. Transit agency executives, especially those without experience in managing large projects, need to recognize both the importance and challenge of finding professionals with the necessary skill set to lead major transit projects effectively.

So that transit agencies can better understand their competition, agencies should subscribe to services which provide access to compensation surveys. Agencies should also share their own salary data with other transit agencies in similar employment markets.

When recruiting employees, agencies should highlight the distinct advantages of working in the public sector rather than at a consulting firm. These typically include a better work life balance, decision-making authority, and the pride associated with building a major project in their own community. Depending upon the agency, more generous retirement benefits may also be an advantage.

Since project managers at consulting firms are often expected to move for their next jobs, transit agencies can offer greater job security. However, many agencies are hiring employees for positions that terminate when a project is completed; this undermines an agency's ability to attract top talent.

Retention

Establishing clear career advancement pathways and providing opportunities for long-term professional growth can help improve retention. To retain top talent, agency leaders should make sure employees feel valued, both in terms of compensation and job fulfillment. Equally important, agencies should actively promote the agency's mission and inspire employees to embrace it.

Retention is a major challenge for transit agencies, since many project management staff leave for higher-paying opportunities in the private sector. Offering competitive salaries is challenging because pay disparities between the public and private sectors are much greater for project managers than for junior-level positions. Many successful project managers can transition from a transit agency to a consulting firm and increase their salaries by 40 percent.

Training also plays a key role in employee retention, especially when paired with opportunities for advancement.

Training

Without sufficient training, project managers may struggle to navigate the complexities of leading a large transit project. Project managers need continuous training since expectations, processes and regulations are constantly evolving. Managers can gain valuable lessons by conducting peer reviews and having their work reviewed by colleagues. However, training alone cannot replace experience -- some lessons can only be learned through firsthand experience, including making mistakes and observing the mistakes of others.

Rotational training programs and well-structured mentorship programs can provide junior staff with valuable expertise. Current and future projects also benefit from hiring deputy project managers who have the potential to lead future initiatives. To ensure their readiness, they should be paired with experienced leaders and be prepared to step in at any time.

Transit agencies vary in the extent of their training programs regarding project management. Some offer a wide array of courses, while others offer few or none. However, all of the interviewees who were familiar with training programs in the private and public sector said essentially the same thing: large consulting firms have more robust training programs than those provided by transit agencies because project managers are essential to their bottom lines.

Successful training programs go beyond simply offering courses. Transit agencies should actively encourage and reward staff participation in training. Moreover, professional development should be an integral part of every employee's annual performance review. Beyond in-house training, many agencies provide tuition reimbursement and opportunities to participate in external programs, such as those offered by APTA, NTI, and Eno.

A crucial but often overlooked aspect of training is learning from past projects. Unfortunately, many transit agencies do not document lessons learned, apparently due to concerns about embarrassing staff, management, or the organization. One way to address this challenge is by convening informal forums (such as FTA's construction roundtables) where project management teams from different agencies can meet in person to candidly share insights and lessons learned.

Finally, this report and its appendices highlight numerous project management resources, including conferences, FTA regional offices and contractors, key documents, and programs. These resources can help transit agencies take a strategic approach to hiring, training, and retaining project managers while also supporting future project managers in planning their career paths.

Appendices

Appendix 1. FTA interviews and guidance

This appendix contains guidance and insight about managing large transit projects obtained from FTA interviews and resources.

At the beginning of this study, Eno interviewed FTA officials who work at its D.C. headquarters as well as its regional offices in Colorado, Illinois, Massachusetts, Missouri, New York, Pennsylvania, Texas, and the state of Washington. The interviewees provided important suggestions to help guide Eno's study. For example, they suggested that Eno focus on the design and construction phases of projects, and pay less attention to the planning phase. The interviewees recommended documents that Eno should review, and they introduced Eno to project managers and numerous transit agencies across the country.

This summary of Eno's interviews with FTA officials includes the following sections:

- Attributes and skills that project managers need
- Project Management Oversight program and key documents
- Key elements in FTA's Project and Construction Management Guidelines
- Recommended courses and conferences

Attributes and skills that project managers need

The FTA interviewees referred to numerous challenges that project managers face. One regional engineer said project managers are in the unenviable position of trying to keep their projects on time while stakeholders may be giving them contradictory instructions about what they should and should not do.

The FTA noted that project managers need to manage budget, schedule, and scope, as well as expectations. They also must be familiar with numerous statutes and regulations. If a project does not comply with applicable federal, state, and local levels – the project manager can jeopardize the agency's entire project and its likelihood of obtaining future grants. The list of laws and regulations are extensive, and include those relating to procurement, environmental protections, historical properties, access for individuals with disabilities, health, safety, and workforce.

The interviewees identified numerous attributes and skills that a good project manager needs.

The most frequently mentioned capabilities did not relate to technical elements of design and construction, but rather to soft skills such as strong leadership,

communications, and interpersonal abilities. Interviewees noted that project managers need to be consensus builders with empathy and political savviness. When working with contractors and consultants, they need strong negotiation skills plus they must be firm and understanding. Project managers who have worked in the private sector may be in a better position to navigate these relationships.

Some FTA officials said having an engineering background can be helpful because engineers are taught how to break down work and optimize it. Engineers are also likely to have had experience in project controls, i.e., managing scope, schedule, and risk. However, most FTA officials did not think a project manager needed to be an engineer. One FTA regional office engineer pointed out that an undergraduate degree in civil engineering might not be very helpful in managing projects, although a master's in engineering management could be very relevant.

Project Management Oversight program and key documents

FTA's Office of Program Management manages the Project Management Oversight (PMO) program which monitors major capital projects to determine whether project sponsors have all the processes and procedures in place to effectively manage and deliver the promised benefits of the project on time, within budget, and in compliance with all applicable federal requirements. As part of this oversight, PMO contractors evaluate whether an agency has the appropriate management and technical capacity to successfully implement its project.

For each project, the Office of Program Management tasks PMO contractors whose skills and experience match the needs of the project to independently perform technical oversight reviews. PMOCs provide resources experienced in all aspects of transit construction. For example, a subway project could have PMO contractors with expertise in heavy rail, tunneling, scheduling, and utility relocation. The contractors report to engineers in the FTA's regional offices.

One of the ways that PMO contractors ascertain project management capacity is by reviewing agency's Management Capacity and Capability and its Project Management Plans. FTA requires agencies undertaking large transit capital projects to prepare these plans which serve as the overarching documentation of a project. Project Management Plans span the final stages of the project development phase through the close of the FTA's grant. The plan is an evolving document that identifies specific administrative and technical procedural documents.

Project Management Plans must document many elements including the following:

- Organizational chart along with description of relationship between people and organizations
- Job descriptions and job qualifications.
- Managerial and technical skills
- Budget covering staff, consultants, property acquisition, utility relocation, etc.
- Construction schedule
- Document control procedures and record-keeping system
- Change order procedures
- Quality control and quality assurance programs
- Safety and security management
- Procedures to be used for testing of operational system and its major components
- Management of risks, contingencies, and insurance

PMO contractors and the regional offices rely on several documents to guide how they assess the capacity of a project's management team. The first series of documents, the FTA's [Project Management Oversight Procedures](#) contains the "Project Management Plan Review" and "Management Capacity and Capability Review."

This document identifies procedures and reporting requirements that PMO contractors follow when assessing sponsors' management, organization, and capabilities. For example, PMO contractors review resumes and conduct interviews to determine whether the agency has qualified and sufficient staff (and/or consultants) dedicated to the project. The review procedures do not define the terms "qualified" and "sufficient," but rather allow the contractors to make determinations and recommendations based upon their own professional expertise and experience.

Another important document is the FTA's "[Project and Construction Management Guidelines](#)" which assists agencies in advancing transit capital projects to deliver successful projects in terms of project scope, function, schedule, cost, safety, and quality. The guidelines also help PMO contractors in assessing an agency's capability to do so. (These guidelines are discussed in more detail on the following pages).

A related document is the FTA's [Construction Project Management Handbook](#). This handbook is designed to provide guidelines for use by public transit agencies undertaking substantial construction projects, *either for the first time or with little prior experience*.

After the FTA and the PMO contractors review an agency's Project Management Plan and meet with agency officials, the FTA will make suggestions, raise issues and identify voids or gaps. For example, the FTA might suggest that an agency designate someone as

a deputy project manager or add someone to the team with experience acquiring property for FTA-funded projects. Officials at both FTA's headquarters and regional offices emphasized that the FTA and its PMO contractors do not prescribe changes as they review an agency's management capacity.

Numerous FTA officials pointed out that some small grantees are not prepared to properly manage large transit projects. The problem is most acute when the grantees are small cities, who choose to directly manage a project rather than have the city's local transit agency undertake that role.

Key elements in FTA's Project and Construction Management Guidelines

The FTA's "[Project and Construction Management Guidelines](#)" document stresses the need to manage scope, budget, schedule, and quality along with procurement, risk, safety, security, and internal and external communications. The guidelines repeatedly emphasize the importance of documenting information and processes.

When it comes to managing projects, the Guidelines identify principles and best practices rather than mandating transit agencies to implement specific approaches and procedures. An example of a principle in the guidelines is: "Delegation of authority should promote transparency in decision-making. All decision-makers should be accountable for their actions, and the actions should be based on clear documentation, sound analysis, and an understanding of the consequences."

The FTA focuses on principles rather than proscribing mandates since transit agencies have different capabilities and their projects encompass a wide range of complexity. Several FTA interviewees said, "If you've seen one transit agency, you've seen one transit agency." The same can be said for the agencies' projects as well.

The guidelines do not offer any suggestions on how to balance consultants with in-house staff, but they do state, "A benefit of using contracted support services for a project of finite duration is the ability to terminate services and the associated expense when their involvement in the project is complete. ... When outsourcing services, responsibility for consultant and contractor oversight should stay with the sponsor's management personnel. The sponsor should have its own qualified organization to maintain overall control of the project, provide timely decision-making, and maintain appropriate communication with project participants and stakeholders." The guidelines even note that when project sponsors do not have sufficient resources, it is acceptable "delegating the responsibility of project management to a program/project management consultant

... Note: This option should include continuous oversight of all consultants by the sponsor’s management regarding project scope, budget, and schedule.”

The guidelines do not mandate specific experiences or training requirements. However, they do identify the following four professional organizations as resources to promote the development and practice of project management and construction management: Project Management Institute, Construction Management Association of America, Design-Build Institute of America, and Association for the Advancement of Cost Engineering.

Courses and conferences

The FTA noted that APTA conferences and the National Transit Institute’s “Management of Transit Construction Projects” can be a valuable resource for project managers. The FTA also hosts its own forums.

The FTA’s Office of Program Management convenes Transit Construction Roundtables with sponsors of large capital projects. The FTA typically invites representatives from 60 to 70 agencies who have projects in construction or in the CIG pipeline. The meetings are typically held in a city that has an FTA-funded major project underway. The peer connections that happen at these meetings are important, one FTA official said. When sessions are held in person with a limited number of people, the participants are most candid with each other.

The FTA has also hosted a focused meeting such as a “BRT Construction Roundtable” which was geared to BRT project managers and chief engineers.

Sources for FTA interviews and guidance section

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Appendix 2. Profiles of six project management teams

This appendix profiles six project management teams

- a) VelociRFTA BRT in Aspen
- b) Plank-Nicholson BRT in Baton Rouge

- c) Gold Line BRT in Minneapolis - St. Paul
- d) Lynnwood Link Light Rail Extension in Seattle
- e) South Central Light Rail Extension in Phoenix
- f) Second Avenue Subway in New York

a. **VelociRFTA BRT (Aspen)**



The Roaring Fork Transportation Authority (RFTA), headquartered in Aspen, provided over 4.8 million passenger trips in 2023, making it the second-largest transit agency in Colorado and the

largest rural transit agency in the U.S. In a 70-mile service region, the transportation agency currently operates up to 17 routes (depending upon the season), and has 153 vehicles in its fleet.

RFTA operates the first rural BRT route in the country. Covering eight jurisdictions, it extends 42 miles along the Colorado State Highway 82 corridor and connects communities between Glenwood Springs and Aspen. The FTA awarded RFTA a “Very Small Starts” grant for the BRT system in 2011 and service began in 2013 with new BRT bus stations, park-and-ride lots, and state-of-the-art amenities such as free Wi-Fi service at all the BRT stations. Four years later, RFTA achieved record annual ridership of 5.5 million trips system-wide, a 34-percent increase since 2013.

The project included a transit signal priority system for buses, a new electronic fare collection system, low-floor buses fueled by compressed natural gas (CNG), real-time electronic signs, and dedicated bus lanes in certain locations throughout the corridor. The 40-mile trip takes about one hour (about half the time it took by regular bus service). Buses operate seven days a week with no more than 15-minute headways during peak periods.

The BRT service is branded VelociRFTA, a play on the word “velociraptor.” The buses and the bus stations use the velociraptor as its primary design inspiration. Stations have large dinosaur eggs (used as benches by adults and play structures by children) and velociraptor footprints stamped into the concrete. Stations are certainly not typical rural bus stops; they were built with enclosed waiting areas, ticket vending machines, covered bicycle storage, and restrooms.

RFTA had considered building other types of transit services including a light rail line, but a corridor investment study completed in 2003 recommended BRT as the most economically feasible alternative to meet transit demand and mitigate traffic congestion. Starting in 2007, RFTA developed concepts for the service and stations, and prepared cost estimates. In 2008, regional voters approved a dedicated funding source and then RFTA prepared design documents and an environmental assessment. Construction began in 2012.

RFTA Managers

Mike Hermes: VelociRFTA Project Manager

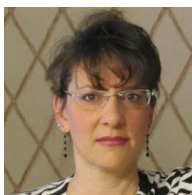


After receiving his bachelor's degree in business finance and real estate from Colorado State University, Mike Hermes worked for 25 years in the real estate and construction industries where he learned a wide range of construction techniques, contract management and project management skills that served him well as project manager.

Hermes started working at RFTA in 2001 and was appointed the VelociRFTA's project manager in 2009 after the project's planning phase was completed. At the time the organization had no experience managing large, federally funded projects so the staff at RFTA had to learn these skills on the job. He had never been responsible for such a large and complex project, and he found it challenging to learn and apply all the FTA's relevant processes, rules, and regulations.

Hermes is considered both a "people person" and "versatile director", someone who is able to bring teams of experts together to take on a project. His deputy project manager, Angela Henderson, said that Hermes' strength is that he "sees the big picture" and has a "long-term vision." He doesn't just consider short-term implications, she said, but also how something will play out in 50 years. She described his "uncanny ability" to understand how the "political, personality and physical aspects of a project" are related and then "make things come together."

Angela [Kincade] Henderson: Deputy Project Manager



In 2007, Angela Henderson started at RFTA as an administrative assistant working for Hermes and RFTA's staff attorney. She has a college degree in accounting and had previously managed multiple projects at a Colorado Airport. With six children at home and needing to take care of a sick mother-in-law, she said, "I was looking for an easier

job where I could go home at 4:30.” Given her project management experience, though, she was asked to become a project manager of a multi-use trail that RFTA was constructing along a railroad right-of-way.

Henderson did not exactly volunteer to work on the VelociRFTA project. When asked why she first started working on the project in 2008, she quipped, “I missed a meeting and was assigned the project.” She managed certain project elements including acquiring rights-of-way, preparing manuals, and ensuring the work met local building codes. Henderson is currently the assistant director of project management and facility operations.

Henderson talked about traits that made her successful. “You need to stand behind a decision and defend it. You can’t go into this if you are the least bit fragile. You need a hard shell to go up against jurisdictions. I have a pretty strong personality but I’m professional, courteous and civil. I’m also steadfast and will defend us to nth degree to get things done in the best interest of the taxpayers.” Henderson said when she hires people, she looks for the same traits that made her successful. She said, “I want them to stand up as I do. We have lots of areas where we need that strength of character.”

Hermes said Henderson has “strong people skills, an incredible work ethic, and she is able to figure out any problem she is assigned. Angela has a very wide variety of skills and experience, and she can talk with electricians, politicians, and the FTA with equal skill.”

Other Members of the VelociRFTA Team

Dan Blankenship (CEO). Kent Blackmer and John Hocker (Operations Directors), Kenny Osier (Fleet Maintenance Director), David Johnson (BRT Assistant Project Manager & Planning Director) Phil Schultz (IT Director) John Tangen (Finance Director) Dawn Mullally Chase (Marketing and Creative Manager), Jason White (Planner), Amy Skinner (Business Specialist).

Retaining RFTA project team

Henderson had opportunities to leave the Aspen area and make more money, but she said she likes the region’s quality of life and wanted her children to have a stable life, growing up. She has lived in the area since the 1980s. Many of RFTA’s directors have stayed on for 30 or 40 years, she observed, because they feel that they are doing something meaningful. She said, “RFTA has its challenges, but it’s a good place to work.”

Hermes said most of the project team is still working at RFTA, ten years after the BRT project was completed. He gave a few reasons for RFTA's high level of retention. First, RFTA is one of the region's largest employers and it provides good compensation and benefits. Second, RFTA is an organization that has had steady growth with stable leadership (its CEO announced his retirement in December 2023 after 34 years at RFTA and its predecessor). Third, RFTA is a very progressive organization and willing to take risks and adopt new cutting-edge knowledge.

Wayne Feuerborn and the consultant team



RFTA brought in HNTB to help them design the BRT system and manage all the FTA-related processes. Wayne Feuerborn, who managed these efforts, has a master's in urban planning and design and two decades of experience before managing the project's design process. Hermes said that Feuerborn "was fabulous."

HNTB finalized plans and prepared the final designs. They helped RFTA hold charettes with communities, all of whom wanted bus stops with an inviting, mountain feel to them. The communities delved into very specific details including the proposed furniture, walls, lighting, and plantings.

HNTB also helped RFTA get ready for its meetings with the FTA and its PMO contractor, and during the construction phase, HNTB ensured that the work was consistent the intent of the design.

HNTB designs different types of projects (e.g., stadium and BRT projects). Feuerborn said that designers tend not to switch between project types because they require their own set of skills and experience. Likewise, construction requires its own skill set.

Now a senior vice president at the firm, he said finding experienced project managers is extremely difficult. He said designers need about six years to gain their foundational skills and then another four years to hone them. At that point, they learn how to manage and are ready to take on important assignments.

Feuerborn said that VelociRFTA was the largest project that RFTA had ever done. He said, "they staffed up and figured it out. They had an adept team who were capable of thinking through items, better than most transit teams. We helped them be successful."

Other Consultants: Parsons Transportation Group (preliminary planning), Bluegreen, Noelhouse Creative, Schmueser Gordon Meyer, Michael Baker Jr (designer of record), Zgroup Architects, Connect One Design, and Sopris Engineering.

Hiring and training RFTA project managers

Hermes said, “managing consultants is one of the most difficult tasks a public employee can undertake. Consultants are there to provide you with technical expertise your agency lacks and to help you design and build your project, but they are also there to make money for their firm and it’s a balancing act to keep costs under control.”

HNTB has its own learning and development center where it provides project manager training. Feuerborn said, “we have our own delivery approach.”

Using and managing consultants

Rather than hire staff it might not need once the project ended, RFTA chose to hire a consultant to design and manage several of the project’s more technical elements. Since RFTA did not manage federally funded projects on a regular basis, it also needed help completing documents (e.g., grant award, certifications, assurances), and ensuring it adhered to rules and processes (e.g., real estate, procurement, construction.)

Based on his experience, Hermes believes that a blended team works best for small agencies attempting federally funded projects similar to the VelociRFTA. The project manager and the persons responsible for construction and procurement should all be staff members. He said, “I would fill in the rest of the project team with consultants to provide expertise in specialty areas such as IT, land acquisition, architectural and engineering services, and other technical needs.” Knowing Colorado DOT’s regulations was vital since the BRT was constructed and operates along the state highway’s right-of-way; HNTB provided that expertise related to both design and construction.

Strong community support

One of the keys to RFTA’s success was the strong support the project received from the community within RFTA’s jurisdictions. The housing market, geography, and culture all played a part.

Aspen has one of the most expensive housing markets in the world. In recent years, the median home price has exceeded \$2 million, approximately five times higher than the U.S. median. As a result, many Aspen workers live 40 miles or more away from their jobs.

Located in the Roaring Fork Valley, most of the residential and commercial development in the area is along the four-lane State Highway 82. Because widening this highway was not a practical option, transit was seen as the only way to minimize congestion and accommodate more development. Another reason why people supported the BRT is because of a lack of parking in Aspen. The city, which is known for its environmental sensitivity, would rather have more workers and visitors use transit than build more parking facilities.

Feuerborn noted how the project was unusual for a rural transit agency. The region set a maximum level of average daily traffic and the only way to achieve its goal was to expand transit on the corridor. The three counties, eight municipalities, and Colorado DOT were all in sync about the project. He noticed there was a common goal across the corridor even though each community had its nuances and idiosyncrasies (especially those related to solving their own local mobility issues.)

Hermes explained how and why the project (unlike many other transit projects in the U.S.) received very broad support across incomes, geography and political ideologies. The city of Aspen tends to be very liberal in its political views and is supportive of transit in general. Although Garfield County residents tend to be much more conservative, they were excited about the project's CNG component because the county has a large number of active oil and gas wells. The project was also seen across the region as a way to reduce traffic on local streets and avoid the need to widen local roads. Moreover, the region's residents did not want to see more cars on Highway 82 while the ski and hospitality industries wanted improved bus service to ski resorts.

Innovative agency

RFTA's culture helps explain both the organization and the project's success. RFTA has a history of innovation including testing and deploying advanced vehicle technologies in its buses. In 1996, RFTA was named Mass Transit Magazine's "Best Mass Transit System of North America" and in 2012 it was designated a White House Transportation Innovator Champion of Change.

Henderson said the board is environmentally conscious and "wants the staff to be thoughtful and go out looking for the newest and best ways to do things." She said, "It's been like that since I started here." Feuerborn, providing an outsider's perspective, referred to RFTA as "very progressive." The region's culture encourages innovation according to Hermes. He thinks there is a correlation between the adventurous outdoor sports popular with the area's residents and a tendency to be risk takers and environmentally conscious.

Hermes noted that RFTA takes on projects that are leading edge and innovative (even if they might be less cost efficient than standard technologies), because citizens of the area and the RFTA board want the agency to be a leader in technology and innovation. He said RFTA is often selected to receive grants “because at times we are on the leading edge of technical innovations.” He added, “that being a technological leader makes it more interesting to work here.”

The CNG component of the VelociRFTA is one example of RFTA’s innovation. Despite the high up-front cost of building a CNG fueling station, RFTA decided to use CNG buses for numerous reasons. First, based on a life-cycle cost analysis, CNG was expected to be less expensive than its other two options (diesel or diesel/electric hybrid). Second, the price of diesel fuel was volatile, and RFTA wanted to shift to a wider variety of fuels in case of price increases. Third, CNG was locally available and as noted above, it appealed to Garfield County. Fourth, at the time, CNG was a new and innovative technology. Fifth, it appealed to the environmental community.

How the project changed RFTA

In three separate interviews, Hermes, Henderson and Feuerborn all described RFTA before the VelociRFTA project as a small, rural transit agency and noted that FTA’s funding for the BRT project was by far the largest grant RFTA had ever received.

Feuerborn remembered, “They had log stumps rather than seats at bus stops. Paddles with reflective tape were left at bus stops so that passengers during a snowstorm could wave them to flag down a bus.” Henderson said, “Most of the RFTA staff had been here since RFTA parked buses in a barn and a local family warmed them up for us.”

As part of the project, RFTA included new fare collection systems and software to help modernize bus ticket sales and bus fare collection as well as improve the reporting of passenger counts and bus travel times. The software also helped RFTA manage route scheduling, asset management and vehicle maintenance. The bus service also became much more sophisticated; for example, the BRT schedule was designed so that it would coordinate with local bus services and minimize wait times when transferring from one service to another.

Besides the inclusion of CNG powered buses, the project included other technologies new to RFTA, such as transit signal priority equipment, slip lanes that allow buses to get around traffic bottleneck, and real time bus location information. Within a few years, RFTA became a much more sophisticated agency with more tech-savvy managers.

Challenges

The project had a number of technical obstacles to overcome as the project was developed. One challenge was the ticket vending machines at the bus stations. RFTA had never used them before and when they were first installed, the paper froze in the machines because they were not designed for very cold weather.

Installing the transit signal priority system was challenging because the local Colorado DOT regional office had never designed and deployed one. It has proven demanding to keep the system operational and all of RFTA's bus drivers trained on how to use it.

The addition of CNG powered buses made the project more complicated and expensive. Because the technology was so new, RFTA had to address numerous concerns from local building and fire officials. Only one other U.S. transit agency, in Syracuse, had ever built an indoor CNG fueling facility. The buses initially had issues operating on Aspen's steep hills and its high altitude, especially during the winter. RFTA also found it challenging to train RFTA's facilities staff how to manage and repair the CNG compression, fueling equipment and buses.

Federal procurement requirements add expense and complication. Hermes said that local contractors were not familiar with many of the federal requirements and contractual clauses (such as Buy America) that are associated with federal funds. He said local contractors were hesitant to bid on projects when they saw more than 100 pages of FTA required terms and conditions, and the contractors were surprised to learn that they could not purchase Canadian products or steel from India as part of the project. The federal procurement and construction rules deterred some local contractors from bidding on the project and those that did bid priced them higher to cover the risks associated with the federal rules and regulations.

Working with FTA

Henderson said, for the most part, the FTA was easy to work with. RFTA mostly dealt with FTA's Region 8 office in Denver except on real estate acquisition issues when it worked with the FTA's headquarters. She said that the FTA was very flexible in adjusting regulations because the Very Small Starts program at the time was new. Projects seeking funding in this program had to meet all the eligibility requirements of Small Starts, but have a total capital cost of less than \$50 million. Note that this program was discontinued.

Although Hermes and Henderson commented about how long it took to prepare the required project management plans, Henderson said "I still go back and look at the documents." They help her manage the facilities, see what RFTA committed to support,

and remember why they made certain decisions. She said, “Mike and I did a lot of work putting it together, but it was very valuable and the work was so important.”

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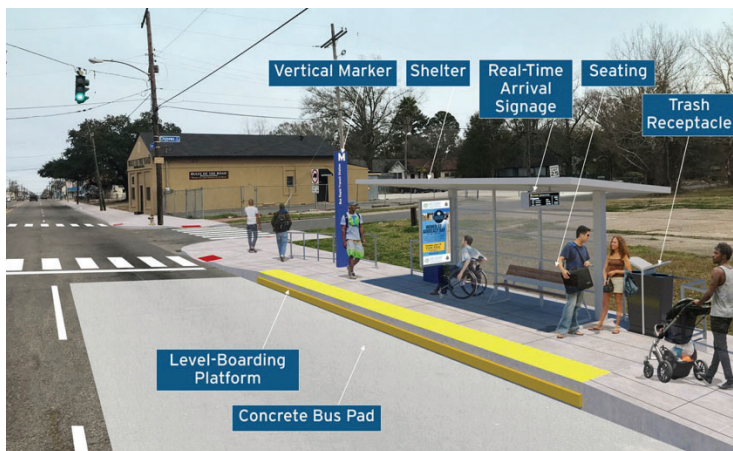
b. Plank-Nicholson BRT (Baton Rouge)

About the BRT project

The Capital Area Transit System (CATS) provides bus services in Baton Rouge, Louisiana. In 2023, it carried 1.1 million passengers on 25 fixed routes with over 1,500 bus stops in the city.

The City of Baton Rouge, Louisiana's capital, is building a BRT line that will serve as the central spine of the region's transit system connecting the downtown business district, medical facilities, commercial businesses, residential neighborhoods, and the Louisiana State University campus. The city initially planned on building a streetcar line on Nicholson Drive, but it transitioned in 2018 to a less costly BRT Project along a 9-mile corridor, that would also include Plank Road. The BRT bus services will be provided by CATS.

The Plank-Nicholson BRT project, the state's first BRT line, includes new bus stops with raised platforms, shelters, and electronic signs displaying arrival times. A new bus station, the North Transit Center, will offer park-and-ride facilities, a waiting area, and rest rooms. Other project components include transit signal priority and improvements to intersections and sidewalks.



Source: City of Baton Rouge, "Featured Project: Plank-Nicholson Bus Rapid Transit Project."

The project has three phases: planning, design and construction. In the construction phase, three separate contracts will be awarded -- for corridor improvements, North Transit Center, and the purchase of new electric buses.

The BRT service is expected to begin in late 2025 and operate with 15-to-30-minute headways. Vehicles will be 35 foot-long electric-powered buses. The project relies upon multiple funding sources including FHWA's Surface Transportation Program and Congestion Mitigation Air Quality (CMAQ) funds, FTA's 49 U.S.C. 5307 Urbanized Area Formula Grant program, FTA's 49 U.S.C. 5309 Capital Investment Grant program, and the U.S. Department of Transportation's Better Utilizing Investments to Leverage Development (BUILD) program. The City-Parish has never implemented an FTA major capital project, although it has had experience with FHWA funded projects.

The project is a partnership between three entities:

- Baton Rouge is a city located in the East Baton Rouge Parish. Even though the parish surrounds three other cities, the city of Baton Rouge and the parish share one consolidated government -- the City-Parish -- which is the project sponsor.
- The Capital Area Transit System (CATS) will operate the transit service.
- The Louisiana Department of Transportation and Development is providing funding, and the BRT will operate on roads that it currently owns (and is transferring to local control).

City-Parish

The City-Parish's first "BRT Project Manager" was Melissa Glascock. She has a bachelor's degree in engineering and was a project engineer for the City-Parish between 2005 and 2023. After Glascock retired, she was replaced by **George Chike** in March 2023.

Chike had been a civil engineer for 33 years at the Louisiana Department of Transportation and Development before joining the City-Parish. He has a master's degree in environmental chemistry. He said the key to successfully managing a project is to ask questions, listen, work hard, and follow the rules and regulations. He has had experience managing a wide range of projects including railroad crossings, roadways, dams, levees, and reservoirs, but this is his first FTA-funded project.

The project manager is responsible for overall engineering management and coordination, managing design and construction contracts, and coordination with the city departments, consultants, and the FTA. Chike does not work full-time on the BRT project. He reports to Fred Raiford, the "Project Director" who is responsible for general management, support, and oversight. Raiford is the City-Parish's director of transportation and drainage, and has a public works background. Chike said that Raiford has little direct involvement with the project, but Chike does keep him updated on its progress.

Chike, along with the consulting firm, Stantec, are responsible for ensuring that the consultants' and contractors' work complies with contract provisions, and federal, state and city requirements. They review invoices, monitor budgets, schedule, and quality.

Stantec: Day-to-day management



The City-Parish hired Stantec to manage the project on a day-to-day basis. The Stantec team includes professionals with expertise in program quality assurance, program controls, program utility coordination, public engagement, and construction. **Scott Hoffeld** of Stantec is the “BRT Program Project Manager,” who reports to Chike and has been delegated extensive responsibilities including coordinating with stakeholders.

Hoffeld has a bachelor's degree in economics and a master's in resource management and administration. He has worked at several consulting firms since 1991 starting with environmental analysis and moving up to a project coordination role, then deputy project manager, project manager, and now a senior project manager. He has worked on numerous transportation projects including highway, transit, seaport, and aviation.

HNTB: design consultant

The City-Parish and Stantec manage, review, and coordinate the activities of HNTB, the design consultant. As the designer of record, HNTB facilitates design discussions, develops cost estimates, produces construction documents, and provides support during construction. HNTB also coordinates with the FTA and ensures that its work meets FTA's requirements. The final design is the 100% completion of all plans, specifications, estimates, special provisions and bid documents.

HNTB brings in planners and engineers from around the country to help with the design. Their team includes professionals with expertise in operations planning, traffic engineering, shelter design, landscape architecture, roadway engineering, transit technology, signal design, electrical engineering, cost estimating, surveying, value engineering, and subsurface utility engineering.



Chris Handzel is HNTB's design lead, reporting to Hoffeld (at Stantec) and Chike (at the City-Parish). He does not work on this project, full-time. Handzel is the director of transportation planning and policy at HNTB and has been with the firm since 2005. He has a landscape architecture degree and has managed numerous BRT projects out of the firm's Kansas City office. His work at HNTB has

included transit facility design for bus, bus rapid transit, and streetcar projects. He has experience in project management, design charrette facilitation, master planning, conceptual site design, and construction documentation. Handzel said, “Transit agencies lean on us. We can provide guidance based on our experience when agencies embark on new initiatives like their first BRT project.”

Capital Area Transit System



Cheri L. Soileau is the project’s “BRT Planning/Operations Lead.” She is the director of planning and program development at CATS where she reports directly to the CEO and has a broad portfolio including responsibility for service planning and capital budgets as well as compliance with DBE and civil rights issues. She started working at CATS in 2020 after approximately 20 years of experience in the transportation industry. She studied history as an undergraduate and has a masters of public administration degree.

Soileau typically only works a few hours a week on the BRT project, but as this project has progressed, she has spent more time on coordination. With the impending construction of the North Transit Center, she anticipates 30 percent or more of her time will be spent with the project along with monitoring the construction of the stations. She has been assertive in protecting and advocating for CATS interests both externally and internally, and doing so before final decisions are made. She said, “it’s hard to pipe up, once design is done.”

Externally, she has pushed for meetings with the City-Parish to stay on top of the project and influence the design of numerous elements such as traffic signal prioritization and station locations. Her goals are to ensure that the new facilities meet CATS’ operating needs and that the BRT proves successful. Internally, she has been pushing the CATS maintenance and operations departments to review plans for the transit center and the bus stops. She has organized trips to take them to Omaha, Kansas City, and Birmingham to learn about other BRT lines. Since CATS has had little experience with capital construction (its facilities are owned by the City-Parish), CATS has urged that the project’s design be simple with off-the-shelf products that are easy to replace.

When Soileau worked at Dallas Area Rapid Transit, one of her responsibilities was preliminary design work for a light rail extension. She credited that experience with helping her to anticipate problems and identify opportunities on the Baton Rouge BRT project. (Her predecessor did not have that experience.) Soileau learned the importance

of walking the corridor to identify potential issues, such as lighting, signage, and the effects of inclement weather conditions.

HNTB's experience with transit agencies

The HNTB team has worked with a wide range of transit agencies. Some are small like CATS with little experience managing large projects and others have capital construction departments with a history of delivering projects. HNTB tailors their advice and services to what the agencies know and don't know.



Robert Hosack, who served as a deputy project manager for the Baton Rouge project, said, “We don’t need to tell mature agencies how to operate service, if they’ve done it before. But, we do need to educate them about change and trends.”

Smaller agencies, he said, may need more support and education. If they have never undertaken a major project and gone through the federal grant process, “We help them prepare and tell them what they need to do to satisfy FTA’s requirements. Reporting and the sheer amount of information that FTA requires from major capital grantees is often a surprise.”

Another major challenge for smaller agencies is the involvement of the FTA’s project management oversight contractor (PMOC). Hosack said, “We as consultants can explain what will occur when the PMOC comes in, but the agencies don’t fully understand it until they’ve gone through it.” The PMOC team will evaluate projects with a fine-tooth comb and might suggest improving the procedures that agencies have relied upon. For instance, the PMOC expects a more detailed project schedule than most entities have ever seen. “It’s not that the agencies are doing anything wrong, it’s just that the bar is so much higher,” he said. The PMOC will expect to see the schedule for installing a bus shelter to have details from inception to implementation, including details about procurement, mobilization, technology integration, and testing. Hosack said, “If the agencies have never been through it, they can find it overwhelming.”

When a transit agency is *not* managing the transit project, Hosack said it is important for the agency to closely coordinate with the project sponsor. “Coordination is the focus of every project; some do it better than others. When there are personal relationships and an understanding of what everyone is responsible for, all can work together for the benefit of the project.”

Hiring and training project managers

Handzel said that HNTB would like to hire more project managers, especially those with 8 to 10 years of experience. He identified four traits of successful project managers:

- Someone with organizational skills, who can maintain a schedule and budget, and know their status at all times. Project managers need to stay on schedule and task; that is among FTA's top oversight priorities.
- Technical skills: For designing a BRT project that means an in-depth understanding of both transit planning and design. Few people, Handzel said, can do both. He also said that having a transit operations background is helpful.
- A personality that is outward facing, not a wallflower.
- Someone who can take the bull by the horns and deliver a project.

HNTB has had more success hiring entry level professionals. The firm brings on many individuals with less than five years of experience. Handzel said there are great schools in the Midwest that offer transportation design and planning programs. He said that the current generation is more excited about transit and interested in multi-modal engineering.

While Handzel does not think that an engineering degree is necessary to manage the BRT project, Hosack sees the benefit of having an engineer in charge. He said someone with a planning background can be helpful during the design and construction phases, but he thinks it is better for the project manager to be an engineer or at least have training on design standards and specifications.

Training project managers: HNTB

HNTB has a learning and development center that offers classes for its employees. Handzel said, "it's up to us to train employees to become project managers." He said that HNTB invests in internal training and development opportunities to provide the base of knowledge that is needed and then accelerates the process of turning staff into project managers.

He said, "We find them deputy project manager roles; that's the best way to train them." Deputies get on-the-job training and are better prepared for the next project. Handzel appreciates HNTB's philosophy because he took those classes and later served as a deputy project manager. "I had a mentor who brought me to meetings. He taught me how to present myself, how to communicate with the FTA, and what information the FTA was looking for." Handzel has noticed that smaller transit agencies usually do not have deputy project managers. He also says that project managers in the private sector work in a faster paced environment and have more simultaneous assignments than their public sector counterparts.

Robert Hosack, who served as Handzel's deputy, also participated in HNTB's project management training and development programs. While in graduate school, he had an internship at HNTB. Upon graduating in 2012, he started a full-time position at HNTB, where he said, "I was surrounded by a good group of leaders and mentors." They helped him learn terms, methodologies and exposed him to a variety of work assignments. His primary focus has been transit planning (including service planning, ridership forecasting, corridor planning, and alternatives analysis.)

HNTB offers a wide range of courses including the following:

- Young professionals course (less than 3 years of experience). This two-day course helps new employees learn about HNTB's three different career tracks (project management, technical experts, people managers).
- Project Management Fundamentals: This 2 ½ day course teaches professionals how to lead a project including managing schedules, budgets, risks, problems, and change orders.

Hosack talked about how it is in HNTB's interest for transit agencies to have effective project managers. He said, "It's better to have a counterpart who knows what they're doing. If you have a good project manager at a transit agency, you don't worry about getting action items accomplished." He explained that consulting firms are hesitant about taking on a project that has too much risk. Experienced and talented project managers reduce the risk of projects failing. "We want to succeed, that's our business," Hosack said.

Training: Stantec

When Hoffeld worked at URS, the firm had specific criteria relating to experience and training that had to be met before someone could be a certified URS project manager. The training modules were compliant with the Project Management Institute (PMI) curriculum, which meant that the program incorporated some of PMI's materials and did not contradict them.

URS did not solely rely upon the determination of an individual's supervisors. Every region certified its project managers and Hoffeld served on his region's Project Manager Certification Board. The board served as an independent body and reviewed resumes, and recommendations, and also conducted interviews to determine whether someone was prepared to manage a project. The board had approximately five people, each representing a different discipline. If the board members did not think someone was ready to manage a project, they might recommend additional training modules or taking on a role that would provide needed experience.

Hoffeld admitted that it would be ideal if the BRT project was led by one person who was an architect and a traffic engineer and a transit planner, who also had construction inspection experience. But, he said, those are not even the most important attributes needed to successfully manage the project. Instead, the project manager needs to know how to deal with people and is resourceful, a good communicator, effective coordinator, and well-organized.

He said, “because there are so many plates in the air, keeping people accountable and following up on open items is essential.” He believes that anyone can improve their organizational skills and behaviors. He explained how he sets an example (by taking notes, preparing agendas, sending out action items) that he has seen junior staff follow.

Hoffeld said managers need to have the courage to raise their hands when they don’t know something and ask around for help. He said, “Everything we need to know, someone on the team knows, we just need to make sure to keep people in the loop.” Hoffeld takes on this role for the project and he does this via email and the virtual meetings that he convenes every week or two (depending upon the project phase).

Training: PMP certificate

The Project Management Institute, a not-for-profit association, offers training, certificates, and events. To obtain its Project Management Professional (PMP) certification, a project manager must meet certain requirements and then pass a 180-question exam. Cheri Soileau once had the PMP certification, but she let it expire. She still refers to the *Project Management Body of Knowledge* guide that she used to study for the PMP certificate exam. Soileau said the information about schedules, budgets, principles, and project life cycle has been helpful, but not all the PMP-related materials are applicable to transit projects.

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Chris Handzel, resume

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Incorporated comments on draft of this document from Hoffeld, Handzel, Hossack and Soileau, and Wallace.

c. Gold Line BRT (Minneapolis - St. Paul)

The information in this case study was current as of February 2024.

Metro Transit’s services

Metro Transit, a division of the Metropolitan Council, is the transit agency serving the area. Its services include the following:

Type of service	Line	Date service began
Commuter rail	Northstar Line	2009
Light rail lines	Blue Line	2004
	Green Line	2014
BRT lines	Red	2013
	A	2016
	C	2019
	Orange	2021
	D	2022

The Twin Cities has had one of the most ambitious transit expansion programs in the entire country. Not only has Metro Transit delivered these eight projects, but eight more are either under development or construction. Two are light rail projects (Green Line and Blue Line extensions) and six are BRT projects (B, E, F, G, Gold, and Purple lines).

Gold Line project

The Gold Line BRT project is a planned 10-mile transit line in the eastern part of the Twin Cities metropolitan area. The project includes 16 stations five pairs in downtown St. Paul) as well as new bridges and underpasses.



Gold Line rendering. Source: FTA’s BRT Section 106 Assessment. November 2020.

The project traces its roots back to an alternatives analysis report issued in 2013. FTA approved the project’s entry into project development in 2018, the environmental analysis was completed in 2020, and construction began in 2022.

The project team integrates staff from Metro Transit, Minnesota Department of Transportation (MnDOT), Ramsey County, Washington County, and other government entities, as well as an engineering services consultant and a project management/environmental services consultant.

The project management consultant (HNTB) provides overall project management, administrative support, project controls, financial reporting, agreements development, and public outreach, and environmental services. The leader of HNTB’s team reports to the project’s deputy project manager.

FTA’s regional office

Hassan Dastgir is a general engineer at FTA’s regional office in Chicago where, among other responsibilities, he oversees Metro Transit’s CIG federally funded projects and manages the Project Management Oversight Contractor (PMOC). FTA headquarters hires the PMOC to help FTA staff perform oversight of major capital projects.

Dastgir emphasized the importance of agencies informing the FTA when it has an unexpected problem, anything from finding unexpected soil conditions to issues obtaining local funding. He said since the FTA is a funding partner, project sponsors “have an obligation and a courtesy to tell us what’s going on.”

The FTA and its PMOC conduct risk workshops before projects can be awarded a full funding grant agreement and begin construction. They also ensure that agencies follow

FTA regulations and review all change orders over \$100,000. The FTA does not approve contracts or change orders, but they do ask questions, focusing on impacts to schedule and cost.

Dastgir praised Metro Transit for hiring well qualified project managers and deputies. He noted some of FTA's smaller grantees are not familiar with all the required documents that are needed for CIG projects. He said in those instances, "we provide them with sample documents and recommend they bring in someone with experience building CIG-funded projects."

Metro Transit's management team

Five key players on the Gold Line project discussed in this document are:

- a) Alicia Vap (project director, 2022 - present)
- b) Mark Fuhrmann (deputy general manager, 2004 - 2018)
- c) Christine Beckwith (project director, 2017 – 2022)
- d) Morgan Abbott (deputy program manager, 2021 - present)
- e) Steve Barrett (construction manager, 2021 – present)

Alicia Vap, the project director, leads the team with staff from Metro Transit and other government entities. She is responsible for managing the project budget and schedule; developing plans, policies, and procedures; coordinating with project partners, coordinating project disciplines, and integrating the project with other Metro Transit departments. Her team consists of up to approximately 50 technical professionals and she is also responsible for financial oversight, procurement, agreement negotiations and grant compliance.

In a 2022 job posting for the project director position, the minimum qualifications (subject to waivers) were nine years of progressively responsible experience in transit capital project implementation and at least five years of supervisory/management experience. *See Excerpts of Job Posting immediately following this section.*

Having multiple simultaneous projects underway at Metro Transit provides a distinct advantage for the project directors. Since they are managing relatively similar projects, they face many of the same challenges and issues. The agency encourages a routine exchange of information that does not exist at most agencies. Beckwith, the former project director for the Gold Line explained, "It can be lonely at the top. I can't confide with my staff about some issues, but I can talk to my peers about them."

Most of Metro Transit's project directors have worked together on previous projects. Metro Transit will not have the same project management consistency going forward

because staffing on newer projects is leaner; they are relying more on county employees (on loan to Metro Transit) and consultants.

Excerpts of job posting: Gold Line project director (three pages long)

SALARY: \$115,980.80 - \$175,115.20 Annually

JOB TYPE: Full-Time

JOB NUMBER: 2022-00396

OPENING DATE: 09/01/2022 CLOSING DATE: 9/23/2022

How your work would contribute to our organization and the Twin Cities region:

The Director, Guideway Bus Rapid Transit (BRT) Project position is responsible for overseeing all the Gold Line BRT project activities including managing the project budget and schedule; developing plans, policies and procedures; coordinating and maintaining a productive working relationship with project partners including the FTA, state agencies, Washington and Ramsey counties and corridor cities; making sure that all internal project disciplines are working together to deliver the project; and integrating the Project with the planning and operational departments of Metro Transit.

This position is eligible for a hybrid (both remote and onsite) telework arrangement. Candidate's permanent residence must be in Minnesota or Wisconsin.

What you would do in this job:

1. Represent the Project and serves as the strategic liaison between Metro Transit/Met Council, FTA, Washington and Ramsey Counties, project partners, corridor cities and other key stakeholders.

- Work with elected officials, policy board members, community groups to represent Metro Transit and share project information.
- Represent the Metropolitan Council's interests in gaining support and consensus from these organizations with differing interests, needs and financial requirements.
- Serve as a spokesperson for the project for public and external partners.
- Communicate clearly and effectively with numerous stakeholders including project and agency staff, the public, elected officials, project partner staff and private entities.
- Work with communications staff in serving as a spokesperson for the project with media.
- Provide project updates to legislature or other high level policy makers upon requested.
- Meet weekly with Outreach and Communications staff to discuss and resolve communication challenges and concerns and develop messaging.
- Present business items and project update to the Metropolitan Council and its advisory committees, project specific advisory committees, various elected bodies, and other stakeholders.

2. Oversee development, maintenance and implementation of the FTA New Starts process and required documentation including the New Starts app and over 20 project management plans required as part of the Federal New Starts process and for the development and implementation of effective processes and procedures

- Oversee preparation of the New Starts FTA submittal process including regular updates for rating and the FFGA submittal. Ensure everything completed in a timely and quality manner.
- Oversee the development of the PMP and associated chapters, service plans, operating procedures, and external department practices in support of delivering BRT projects on time and successfully.
- Oversee the development of project specific procedures and work direction.
- Ensure official plans and procedures documents are distributed and training conducted with agency and consultant staff working on the project.
- Serve as the project office lead on FTA regular check in meetings, travel to Region V headquarters as needed.
- Oversee staff preparing the monthly reports and materials for quarterly or monthly meetings

3. Oversee the design, engineering, construction, and delivery of the Gold Line project. This includes assigning responsibilities, delegating tasks, empowering staff, removing obstacles, allocating resources, coordinating work efforts and monitoring progress:

- Meet separately in one-on-one check-ins with project staff to provide feedback on performance and guidance on priorities.
- Establish expectations and accountability and coordinate with supervisors of indirect reports to ensure consistent high quality of service in front-line project delivery by contractors and staff
- Check-in periodically with supporting department representatives, both peers and leadership, including and particularly from Bus Operations, Engineering & Facilities, Service Development, Safety, General Counsel, Procurement, and Equal Opportunity.
- Oversee the budget and grants for appropriate design, engineering, and environmental consultants, property acquisition, construction contracts, interagency agreements, and audit functions.

4. Oversee the project budget and schedule:

- Be accountable for on-time and on-budget project delivery.
- Oversee the development of the project budget.
- Provide guidance and direction to the consultant team developing the project schedule/IMPS.
- Meet periodically with internal departmental stakeholders to discuss and resolve key operational decisions related to projects in development, as well as proactively seek cross project efficiencies to ensure project stays on time and budget.
- Manage the interrelated schedules for projects within the program and tie budgets and staff resources to project milestones, including new responsibility for assigned construction staff resources.

5. Provide direction, establish priorities, and assigns roles and responsibilities that links teams, departments, and functions to ensure a collaborative and inclusive process:

- Convene or oversee weekly Project Management Team meetings for active projects in planning, engineering, and construction phases of development.
- Meet regularly with discipline leads to discuss issues/impediments to project advancement and strategies/approaches to overcoming those issues/impediments.

6. Attend bi-weekly Director's meetings and monthly managers meetings to connect and stay abreast of overall Metro Transit activities.

What education and experience are required for this job (minimum qualifications)

Bachelor's degree in engineering, urban studies, transportation planning, geography, architecture, statistics, business administration or related field AND nine (9) years of progressively responsible experience in transit capital project implementation, AND at least five (5) years of supervisory/management experience.

Equivalencies for Education and Experience:

- A master's degree in engineering, urban studies, transportation planning, geography, architecture, statistics, business administration or related field AND seven (7) years of progressively responsible experience in transit capital project implementation, AND at least five (5) years of supervisory/management experience.
- Associate degree in engineering, urban studies, transportation planning, geography, architecture, statistics, business administration or related field AND eleven (11) years of progressively responsible experience in transit capital project implementation, And at least five (5) years of supervisory/management experience.
- High School Diploma/GED AND thirteen (13) years of progressively responsible experience in transit capital project implementation, including at least five (5) years of supervisory/management experience

What additional skills and experience would be helpful in this job (desired qualifications):

- Experience working on federally funded transportation project
- Experience effectively managing and leading large scale and complex
- Projects

What knowledge, skills and abilities you should have for this job:

Knowledge of:

- Management of projects including federally funded transit projects to ensure compliance with complex schedule and budget processes.
- Transit capital project implementation including planning, design, construction, and implementation processes.
- Project budget development and management including funding availability for multi-disciplinary projects (bus purchase, construction, design, etc.) and interrelated funding streams
- Knowledge and proficiency in transit service planning concepts and available tools.
- Knowledge of FTA Capital Investment Grant program including project rating requirements and process, program progression, and requirements of project management plans and procedures.
- Knowledge of Microsoft Office programs to clearly communicate project needs and fulfill business practice needs

Skills in:

- Effectively managing and leading large-scale complex and multi-disciplinary project teams (two years or more in length).
- Written and verbal communication to clearly explain project details and build understanding and support for project implementation.
- Skilled at developing effective organizational structures, processes, and procedures that support effective project teams.

Ability to:

- Develop project support with public, policymakers, external technical staff, internal departmental collaboration.
- Prioritize and deploy direct report staff resources to most urgent priorities, efficiently address necessary workload to accomplish department objectives.
- Mentor and develop staff to build skills to create an independent, motivated, and satisfied workforce.
- Act as a key spokesperson for an organization, speaking before elected officials and advisory committees.
- Understand technical analysis and interpretation of complex data and communicate it in plain language to a wide range of audiences.
- Handle information/issues in a confidential manner.

What you can expect from us:

- We offer the opportunity to make a difference and positively influence the Twin Cities metropolitan area.
- We encourage our employees to develop their skills through on-site training.
- We provide a competitive salary, excellent benefits and a good work/life balance.

Mark Fuhrmann (executive responsible for expansion projects)



Between 2004 and 2018, Mark Fuhrmann served as Metro Transit’s deputy general manager where he oversaw the delivery of rail and BRT projects. The project directors all reported to him.

Fuhrmann has a bachelor’s and master’s degree in urban planning. He joined Metro Transit as an intern in 1981, and later moved to Washington, D.C. where he worked on new rail projects. In 1993, he returned to Metro Transit as CFO where he prepared the agency’s capital and operating budgets, and helped secure the agency’s first FTA Full Funding Grant Agreement.

Metro Transit officials identified the following attributes about Fuhrmann that helped explain his success delivering projects:

- Dogged determination, intelligence and extraordinary professionalism.
- Persevered through the most challenging political conversations imaginable.
- Able to unravel complex engineering issues and identify the pros and cons of strategic choices for decision makers.
- Brilliant, prepared, thoughtful, determined and always respectful to his colleagues.
- Honest, straight shooting and unflappable. He was very calm under intense pressure because he always had his facts right. I was always amazed at how people on all sides of the transit issue might disagree with one of our conclusions but never the facts that Mark presented.
- Encyclopedic memory for events, dates and financial information.
- When he faced angry and often powerful people, he respected them, kept his head down, and pushed forward.
- He deliberately stayed out of the limelight. At public events and ribbon-cutting ceremonies, he would carefully stand behind office holders. If politicians insisted that Fuhrmann join them in the photo-op, he would politely oblige but on more than one occasion, he directed staff to crop him out of the frame.

In 2018, he retired from Metro Transit to take an associate vice president position at HDR. His words of wisdom to his staff before leaving were: “Communicate, collaborate, and coordinate with all the stakeholders – political, community, and staff.”

Fuhrmann left Metro Transit for a combination of reasons. He said, “I needed some fresh projects and the opportunity to learn more.” He also said he was burnt out after 14 years at Metro Transit, and the agency’s two major projects were not advancing as fast as he had hoped, due to delays in obtaining federal and local funding. Salary was not the primary factor in his decision. Metro Transit had obtained an exemption of its salary cap to pay him one of highest salaries in the state’s public sector. (The salary range for his replacement was advertised at \$124,446 to \$230,6352021.) He said, “What I like most about consulting is that I don’t have to be summoned in front of a firing squad of state legislators, who say ‘no way, never rail’.”

Christine Beckwith (first project director)



Christine Beckwith was the Gold Line’s project director between 2017 and 2021 reporting to the Deputy General Manager.

After receiving a bachelor’s degree in civil engineering, she worked at MnDOT for ten years, moving up from graduate engineer to senior engineer. She also earned an MBA while working for the agency. In 2008, she started at Metro Transit where she has worked on several BRT and light rail projects, rising from project controls manager to deputy project director and then project director.

In June 2022, she stepped down from directing the Gold Line to become project director for the Blue Line rail extension project.

Alicia Vap (project director since 2022)



Alicia Vap became the acting project director of the Gold Line project in June 2022 and then was appointed the permanent director a few months later.

She has a bachelor’s degree in political science and a master’s in urban planning. After graduation she worked as a transportation planner for more than 14 years. Between 2008 and 2020, she managed the design of stations and maintenance facilities for two Metro Transit light rail projects and a BRT project. This involved overseeing design contracts and coordinating with internal and external stakeholders.

Vap said that her previous work on major projects prepared her for the project director position. She said, “I could see all the nuts and bolts” and it provided her with experience managing people, contracts, procurement processes, working with the FTA, testing, and scheduling.

Vap credits her success as project director to surrounding herself with experts and knowing when to ask for help. She said the work requires her to understand the project and how it fits in with the political landscape, funding, the Metro Transit organization, and numerous processes (including New Starts, procurement, legal, and contracts).

Morgan Abbott (deputy program manager)

Morgan Abbott, an engineer for Minnesota’s Washington County, is assigned full-time as deputy project director for the Gold Line. She has a civil engineering degree and has been an engineer in both the private and public sector since 2008. She started working for Washington County in 2018 and has been the project’s deputy since 2021. When asked who her boss is, Abbott responded that it is the project director not her supervisor at the county.

Abbott recognizes that serving as a deputy is one of the best ways to become prepared to serve as a project manager. She oversees the contract with the consultant who provides project management and environmental services, and she is also learning more about third party agreements, FTA procedures, communications, public outreach, tracking projects, document controls, and budgeting. She has been picking up skills from the consultants and the rest of the project team, especially from the project director and the construction manager. Abbott observed that one major difference in managing a large, rather than a small project, is the need to deal with powerful players including U.S. senators, local mayors, and the regional media.

In previous positions, Abbott had little experience with stakeholder engagement and coordination, such as working with communities on what a station would look like. She has learned about “the need to hold the line when they expect more. However, I do need more training about getting informed consent and buy-in.”

In Minnesota, counties take the lead on the initial planning of large transit projects and then help fund the construction. That is why Abbott, the deputy project director, is a Washington County employee assigned to the project. (Note that Ramsey County also provides funding, but it did not have any available staff to dedicate full-time to the team.)

Having a county employee as deputy has its pros and cons.

Abbott said, “Having the county part of the team gives the project team more credibility and trust.” This can be especially helpful if Metro Transit runs into problems and experiences delays or cost overruns. Beckwith said that giving the county such a meaningful role on the team, “makes the project more challenging, but better in the long run. If the counties are part of the team and helping to make decisions, when things go sideways, they are there to help solve problems.”

However, Fuhrmann has his misgivings. Although, Abbott’s role promotes conversation between the Metro Transit and the county, it does not necessarily help get a project done on time.

Steve Barrett (construction manager)

Steve Barrett, an engineer, is the construction manager for the Gold Line. He oversees construction activities and contracts, and coordinates work with the design team.

Barrett has a bachelor’s and master’s degree in civil engineering from the University of Minnesota. After graduating, he worked at MnDOT for 29 years, moving up from graduate engineer to hydraulic design engineer, project engineer, resident engineer, and then project manager. In 2021, he was hired by Metro Transit. The agency was familiar with the work that he had done on transit projects while working at MnDOT.

Attributes, skills and experience of a good project manager

Dastgir, Fuhrmann, and Beckwith identified the key attributes, skills, and experience that a project manager needs. Note that the term ‘project manager’ is used as a generic term here for the role that the ‘project director’ performs on the Gold Line.

Based on Dastgir’s experience at the FTA, he said project managers need the following:

- Ability to communicate in a timely manner with a wide range of stakeholders (from contractors to FTA officials.) Talking to the right people at the right time, he said, is the difference between fixing a problem sooner or faster.
- Knowing how to keep a project on schedule. A successful project manager completes a project on budget and on time.
- Technical skills to understand design elements.
- Experience with previous transit projects.
- Knows how to take advantages of opportunities.
- Works well under political pressure.

Fuhrmann provided an important insight for identifying skills, experience, and attributes because he recruited, hired, managed, and promoted numerous managers at

Met Council. He said a successful project manager on a large transit project understands the following six elements:

- Fixed guideway / high capacity transit systems
- How all the pieces of a project fit together
- Environmental / NEPA
- Finances
- Contract delivery methods
- FTA New Starts

Fuhrmann said when he hires a project manager, he wants a seasoned professional, someone with more than five or six years of relevant experience. If he could find someone who meets all the above qualifications, “I’d hire them immediately. Those candidates, though, are few and far between.” He indicated that if he can find someone who understands many of those elements, he can “grow them into a full-fledged project manager who understands all the components, how they fit together, and how they are sequenced.”

Beckwith said a good project manager can help bring in a project on time and avoid many extra costs. The elements that she thinks are the most important are:

- Most importantly, the ability to manage a team with a broad set of skills. She emphasized the importance of empowering the team’s members. “People will leave,” she said, “if they don’t feel empowered and have the ability to make decisions. You need to let people manage their own tasks, acknowledge when they have done good work and give them credit for good work.”
- Understanding contracts and the strategy behind them is critical because project managers need to negotiate and manage numerous contracts, including professional services (e.g., design), funding agreements (with counties and the FTA), and construction contracts. They need to understand ramifications to a project, the team and the agency. Some of this knowledge is hard to teach and can only come from experience, she said.
- Understand many different technical areas.
- Know when a project is in trouble. Her project controls background has been helpful managing schedule, procedures, contracts, and risk.
- Anticipate issues – looking far into future.
- Understand milestones and timelines.
- Know when to communicate to policy makers.
- Help the team understand how pieces fit together so they can work through issues, identify missing pieces, and make suggestions for improvements.

Need to be engineer?

Eno asked Beckwith, Vap, Abbott, Barrett, and Dastgir whether a project manager needs to be an engineer.

The first project director, Beckwith, has an engineering background. She said, “If you’re a quick study, you don’t necessarily need to be an engineer. You need to understand technical issues, ask the right questions, and help solve problems. Other people can bring in other skill sets. I’ve seen some project managers who don’t understand technical issues and then make decisions without consulting others. They can end up agreeing to things that cause problems.”

Vap, the current director, has a planning, not an engineering, background. She has noticed, especially in the construction industry, how non-engineers are sometimes treated with less respect than male engineers. She said technical skills are important, but “I don’t need to know how many piles are needed to support a bridge. I look at my staff for that. I know enough to understand the project.”

Abbott, the deputy project director, said that even though Beckwith is an engineer, she brought many important non-engineering skills to the project. “Through their education, planners learn about selling projects and getting buy-in. Engineers don’t get that kind of education. We understand the process of design and construction. Engineers don’t learn about getting early buy-in, how to get funding, and how to get people to support a project.”

Barrett, an engineer who also worked for both Beckwith and Vap, had a similar answer to Abbott. He said, “I don’t know if it matters. Alicia [Vap] relies on the engineering team more. There are certain skill sets she may need to delegate. But, she has other experiences and skills that are important such as planning, funding, and coordinating with the FTA.”

Difference between managing light rail and BRT projects

Since Metro Transit has delivered both light rail and BRT projects, Eno asked Fuhrmann, Abbott, and Beckwith whether the skills to manage them are different.

Emphasizing the importance of securing approvals from stakeholders, Fuhrmann said there is not much a difference. He said even if you think you have secured local funding, prepared the best environmental impact statement, and identified the ideal alignment, it doesn’t matter if the project manager can’t get the FTA to sign off on the environmental document and secure a consensus among local officials on the alignment.

Abbott said, “From what I’ve seen they are similar.” However, she noted that bus projects can be more flexible. “If you come across unstable soil, you can modify the design in the field, if necessary. And, while buses can operate in general traffic lanes; you can’t detour a train when there’s a problem.” Another difference is the need to conduct extensive testing before trains can go into service.

Beckwith has the most timely experience having moved over from directing the Gold Line BRT to directing the Blue Line light rail project. She said that officially, Metro Council thinks that light rail projects are more complicated which is why the project director for a light rail project gets paid about \$25,000 more than the director of a BRT project. But, she thinks they are equally difficult to manage.

In some ways, though, managing a BRT project is even harder. She said, “rail projects are more expensive, and the teams are bigger. On BRT, you need to wear more hats because there are fewer people. Since budgets for consultants and staff have historically been based on a percentage of the total project cost, BRT projects typically have fewer professional services and staff. One of the bigger challenges on the Gold Line was keeping a smaller staff and not burning them out.”

Construction manager and managing contactors

Barrett, Beckwith, and Abbott discussed the role of a construction manager and the challenges of managing contractors.

Barrett, the construction manager, said the skills needed to manage the construction component of a project are fundamentally the same as those needed to direct the overall project. However, he said the project director does have to focus more on the relationships with stakeholders and working with federal agencies, and be concerned about the requirements associated with existing funding sources, getting additional funding secured, obtaining permits, environmental documentation, and agreements.

Barrett said in the planning and design phases, there is more time to research and bring people in to help solve problems. During the construction phase, there is more urgency because “time is money.” He referred to the following skills and experience that are important for a good *construction manager*:

- Having good relationships with contractors.
- Being creative, finding solutions to problems, and thinking outside the box in real-time.
- Strong and wide background in engineering.
- Understanding how contracts work

- Understanding important roles and responsibilities
- Knowing when things will impact the critical path of the schedule. Part of that is understanding when a need is critical, and the agency needs to spend money quickly.
- A wide knowledge base dealing with every aspect of project.

Creative problem solving is an important component of construction management according to Barrett. One example he gave was how prior to going out to bid for a construction contract, Barrett reviewed designs and saw that the location of a proposed storm sewer trunk line would create numerous conflicts with utility lines. After he recommended moving the storm sewer to the other side of the roadway, the project needed to be redesigned. The change extended the design schedule, but made the project more constructible.

Another example was how during construction, asbestos was discovered at a pond. This was a time sensitive issue, and he had to bring the contractor and subcontractors together to determine the best course of action and draft a change order document. He said it is best to resolve these types of issues in a prompt manner.

When there is a problem, Barrett keeps the project director informed and listens to her comments and thoughts. But, construction managers are expected to solve most problems on their own.

Beckwith, the first project director, said projects need a seasoned construction manager with a technical background who knows how to manage projects. She explained, “It’s really fast paced, and not everyone is cut out for it.”

When asked whether it would be helpful for the construction manager to have experience working for a contractor, she said, “they may not fully understand quality management, paperwork and oversight from an owner's perspective.” For example, someone who worked for a contractor might not necessarily think about writing down extensive details that could prove to be relevant later on if there are quality issues, for example, if concrete was poured in the rain. Documenting such details are important as they occur because site conditions could affect the material’s performance down the road.

Abbott said, “In my role as deputy, I’m not making decisions in trenches. That’s Steve [Barrett’s] job. He makes the calls while I monitor change orders and the budget, and communicate with stakeholders.” She said that there are always change orders that take place in design and environmental contracts. On the BRT project, change orders were needed when asbestos and unstable soil were found during construction. If change

orders bring the project over budget, the team needs to go back to elected officials and ask for more funding.

Beckwith said the hardest part of the construction manager's job is not managing the construction, but dealing with contractors who are trying to maximize their profit. Since contractors are often selected based on low bids, sometimes they try to cut corners. The example of pouring concrete in the rain is one example. Sometimes a contractor will try to use materials that do not meet the contract specifications, if the inspector is not at the construction site. "You need to have enough people watching the work," she said.

Beckwith said, "Some, not all, contractors will count on padding their profits with change orders. Depending on the contract, you may have to renegotiate something, but it's harder to get a lower price after a contract is signed. I learned this from working on project after project, not from my engineering classes. I also learned a lot from seasoned inspectors and from observations."

Barrett said, "You need a good relationship, but not blind faith." He explained that you don't want an adversarial relationship with someone you work with every day, but you need to verify their work and have good quality assurance program. You need to understand they are there to make money and that they are committed to meeting the contract requirements.

Barrett explained how maintaining a professional relationship and being a good partner is important because, quite often, the construction manager needs to ask contractors to perform work for the "good of the project." He explained that "Metro Transit needs to pay contractors extra when they do work not outlined in the contract, but sometimes things are not always black and white. The language is not always crystal clear." He gave the following example of how a productive relationship with a contractor helped the project.

"We had an upset homeowner. We had cleared trees near her home, but a tree on her property wasn't on the plan. After the contractor was out of the area, she complained because she wanted her tree to come out, also. We met with her and then the contractor agreed to bring back his crew. We paid to remove it at the same 'cost per tree' as all the other ones. If we had an adversarial relationship, the contractor would have said he's not going to remove it unless he gets additional money for mobilization plus a higher amount than the cost per tree he had initially bid. Because we have a good relationship and he knows I won't make him do things on a whim, he won't nickel and dime us. He just got it done."

A productive relationship works both ways. Bartlett remembers a contractor had to close the shoulder of a highway lane while construction was underway. According to the contract, the contractor could shut down the shoulder for up to 30 days, but would incur a penalty for each additional day over that. Bartlett said, “They came to us early, telling us they would need to keep the shoulder closed more than 30 days. We realized there wouldn’t be a significant impact of having no shoulder, so we let them extend the closure. We could have charged them the penalty, but we had a productive conversation and we said we wouldn’t do that.”

These two instances he said were reflective of a good relationship not a one-for-one trade. It is similar he said, “to a healthy relationship with a spouse. They help each other achieve their goals.”

Recruiting and retaining

Fuhrmann discussed their experience regarding recruiting and retaining experienced staff for major transit projects.

Starting in 1998, Mark Fuhrmann (the former deputy general manager) told potential hires and existing team members that approximately every four years, the agency would deliver and open new projects. When Metro Transit completed one project then the team would shift gears to the next project. This gave the staff some comfort that they could stay at Metro Transit for many years. However, due to changes in the legislature and funding shortfalls, the agency was not able to execute Fuhrmann’s schedule and some of the projects experienced a multi-year hiatus.

As the Blue Line was nearing completion in 2004, the staff started asking “what’s next?” Fuhrmann said he was honest about Metro Transit’s political and financial challenges. As a result, he said, “We had a great migration.” Many of the project staff moved to Phoenix whose light rail construction began in 2005 and opened in 2008. He said, “It was not ideal. We couldn’t keep them because they needed to find work while we waited for money.”

Fuhrmann noted how some engineers became deputy project managers and then project managers. He said that was how two of Metro Transit’s “very talented” project managers, Alicia Vap and Christine Beckwith, moved up. “Once they reach the penultimate, there’s not many places to go. I’m Exhibit #1. Once you reach a certain spot and don’t see an opportunity for advancement to General Manager or deputy General Manager then you might start looking outside Metro Transit.”

His perspective about holding onto talented project managers has probably evolved since becoming a consultant. Referring to Vap and Beckwith, he said, “Maybe they’ll want to spread their wings, like me in 2018. There’s a very small community of people delivering FTA-funded projects. If Chris and Alicia can share and help deliver projects that’s a good thing. Our passion is delivering projects that benefit communities. If they can do it, it’s a value to the transit industry.”

Beckwith said that one important reason why Metro Transit has been able to recruit and retain talented staff is because they pay well and offer better benefits compared to the region’s other government agencies and its private consulting firms.

She understood why her former boss, Mark Fuhrmann, moved on: “The work can be so exhausting and stressful, especially the politics.” One of the hardest parts, she explained, is managing the requests from the region’s counties and cities who have a great deal of power over the projects. “They might want to move a park-and-ride location or add a pedestrian bridge, but these types of requests can drive up costs.”

Beckwith left Metro Transit for a short time to work for a consulting firm. She talked about three benefits of coming back to Metro Transit. First, project managers in the public sector can make decisions while consultants can only offer suggestions. Second, public sector employees do not have to worry about their own billable hours or work on proposals on their own time. Third, at a public agency, there can be more flexibility and opportunity for work-life balance.

Referring to three key players who left Metro Council to work at HDR, she said, “I don’t think they left because they could get more money. Their projects were completed, their kids were grown, and they were ready to do something different.”

Vap said that different areas of the agency are having trouble keeping project managers. Some go to consulting firms, but money is only one reason why. She explained, “there are only so many projects at a transit agency.” Abbott has also noticed that finding qualified people has gotten much more challenging in the past few years.

Beckwith said, it has been challenging to hire all the people that are needed for the project, especially “because you can’t promise full-time employees that they will have work after the project is completed. There are no guarantees for anyone working on the project. It’s hard to find people when potential employees know the project may not even make it to construction. Because of this, Metro Transit has had to rely more on consultants than it otherwise would have.”

Barrett said he is supposed to be construction manager for a future Metro Transit project, although there is some uncertainty about its status. He said, “I’m not worried at this stage in my career.” Consultants have expressed interest in hiring him, but he said he never talked to them seriously to find out how much they are offering. He has seen many of his peers go to consultants, but also quite a few go from consulting to Minnesota DOT.

Two major factors kept him at MnDOT and now Metro Transit. First is quality of life. He said, “In the public sector, you trade a little less money for stability and a better work-life balance.” He is also not interested in the pressure of having to meet a certain number of billable hours. The second is his roots. He grew up in Minnesota and takes enormous pride in all the transportation improvements he has made. After working on so many projects in the Twin Cities area, he knows how to deal with federal and state agencies as well as all the municipalities. “I know who to talk to and I know their concerns without even talking to them, but I still loop them in as appropriate.”

Abbott is not sure where her career will take her after the project is complete. If she decides to go back to her old position at the county, she would have to take a pay cut. Moving up to a project director has its rewards, but she realizes that would impact her work-life balance. Abbott said she would prefer staying in the public sector because consultants need to move where the projects are, and she would miss the agency coordination and partnership building that she does now. “Recruiters,” she said, “call me all the time.”

Role of consultants

When Metro Transit first started putting together its project teams in the late 1990s and early 2000s, Fuhrmann said the state legislature and the counties (who were helping to pay for projects) wanted to minimize costs and maintain more local control by minimizing the number of consultants. In response, Fuhrmann created hybrid teams with Metro Transit staff managing the projects and consultants providing supplemental services.

Fuhrmann opened up project offices where staff and consultants shared one space. At least once a week, for about 90 minutes, representatives from all the disciplines on each project team would meet to discuss how to resolve issues. He said it helped the participants understand a broad perspective of project issues.

In recent years, he said agencies are having trouble finding qualified project managers to staff projects and they are not inclined to do one-time hiring. Instead, they are

looking for consultants to design, engineer, manage, deliver, test, and commission projects -- from start to finish.

Even though he now works at HDR, he warned of relying too much on consultants. “You don’t want your institutional knowledge getting flushed down the toilet. Metro Transit has done a really good job of building a base of knowledge with its own core team, and pulling in consultants for horsepower.” A good consultant, he noted, can help an agency create a foundation for institutionalizing their knowledge.

Leaving Metro Council has been a real eye-opener for him. He said, “many first-time project sponsors, don’t know what they don’t know.” He referred to the challenges of creating management plans, determining the alignment, completing the NEPA process, and getting a full-funding grant agreement. Getting a CIG grant, he said, is much more complicated than procuring buses or obtaining funds from the U.S. Department of Transportation’s RAISE and BUILD programs. “We try to educate them.” he said. “It’s not like building a park-and-ride lot.”

Training

Beckwith, Vap, and Fuhrmann discussed the topic of training programs to prepare staff and program managers.

Fuhrmann says that consultants have more robust training programs than transit agencies, including very specific course offerings in topics such as cost estimating and scheduling.

When Abbott worked in the private sector, her firm hired a consultant who led a three-day project management training course. In 2022, she took FTA/ NTI’s three-day project management course.

Abbott said that both the consultant’s course and the NTI course discussed ways to manage projects to meet milestones and deliverables. The consultant’s course had one very important difference. It included topics designed to ensure that the firm made a profit on its work, including lessons on preparing proposals, managing overhead, and seeking reimbursement when work outside of the scope needs to be performed (change orders).

Vap was well-prepared and fortunate before taking on the project director’s role. She had taken a six-month project management program at Metro Transit, worked on two major Metro Transit transitway projects, and when she became acting director, she met with Beckwith (her predecessor), every week. Furthermore, unlike most other transit

agencies, she has peers. “At Metro Transit, we have three CIG projects in the pipeline,” she said.

For Barrett’s first two years working at MnDOT, he was in a “graduate engineer” program where he rotated between departments. The program’s emphasis was on learning new technical skills and understanding who was responsible for various tasks. He later took a multi-day project management seminar that was designed specifically for MnDOT staff where he learned about how to take a project “from cradle to grave” as well as lessons that helped him improve his communications and organizational skills. During his career, MnDOT encouraged him to take classes, and he did so. Over time and on the job, he learned how to better prioritize work and deal with stressful situations. Today, as construction manager, he brings in experts to talk to his staff about specific topics on a weekly basis during the winter months.

Beckwith said that educating staff has been an important part of the Gold Line project because employees from the counties and MnDOT assigned to the project had never worked on a project like this one. Training is not always formalized, though. “If there’s a problem, we might refer to past examples and solutions say on the Orange line or the Blue line. We also have a big data base of lessons learned, such as how to manage contingency.”

At Metro Transit, Beckwith took courses associated with the Project Management Professional (PMP) certification program and she participated in the APTA (American Public Transportation Association) Leadership Program. She highly recommended APTA’s year-long program, praising the association’s relationship with the FTA and its ability to incorporate the most up-to-date information.

Beckwith recommended other sources of education for project managers starting with APTA conferences where attendees can learn about a wide range of topics such as light rail and the Buy America requirements. At the conferences, FTA’s executive leadership often provide updates on regulations, and hold question and answer sessions. “It’s a great way to learn about positions and plans that might not be in writing, yet.”

She also said that NTI has good courses on risk management, noise analysis, and ridership, as well as the project manager course. For those working on the planning and development side, she recommended MPact (formerly called Rail-Volution.)

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d. Lynnwood Link Light Rail Extension (Seattle)

Note that this profile was written before the extension opened on August 30, 2024.

Transit Services and the Lynnwood Link Extension

Sound Transit (officially the Central Puget Sound Regional Transit Authority) was created in 1993 by King, Pierce and Snohomish counties to build a regional rapid transit system. It serves the Seattle metropolitan area, providing light rail services in Seattle and Tacoma as well as express bus services and a commuter rail line.

With tax increases approved by voters in 1996, 2008 and 2016, the agency is undertaking the most ambitious transit expansion in the country, with new service opening every few years. Its Link Light Rail system now has two lines that are 24.5 miles long. Over the next two decades, this is expected grow to five lines with 116 miles.

Despite Sound Transit's numerous transit offerings, the agency currently has fewer than 1,200 full-time employees because it does not operate most of its own services. For example, it has contracted with King County (the region's largest transit operator) to operate the Link Light Rail service in Seattle.

Sound Transit currently has four expansion projects under construction including the Lynnwood Link Extension. This project extends light rail from Northgate in Seattle to Lynnwood in neighboring Snohomish County. The 8.5-mile-long project includes three new stations and is expected to open in 2024.

The typical schedule for one of Sound Transit's projects is: planning (4 to 5 years), final design (2 to 3 years), construction (5 or more years), testing and pre-operations (6 months to a year).

Rendering of Lynwood Station.

Source: Sound Metro's April 2019 Open House Display.

Organization



The Design, Engineering & Construction Management Department leads the design and construction efforts for Sound Transit's expansion projects. It has the following three divisions:

- Capital Project Management Division ensures projects' performance including scope, budget, schedule, risk, safety, security, and quality for the

- final design, construction, start-up/testing and rail activation phases.
- Business and Construction Service Division oversees permitting, real estate, and construction management services.
 - Design and Engineering Division oversees policies, standards and strategies, including updates to the agency’s procedures manual.

Because the agency’s focus is on delivering multiple expansion projects, rather than directly operating services, many project management functions and controls are centralized. Likewise, all its departments have extensive experience related to constructing large projects. These departments include Safety and Quality Assurance; Procurement and Contracts; Legal; Planning, Environment, and Project Development; and Finance and Information Technology.

Two other departments also perform critical roles. The Operations Department ensures that construction complies with the agency’s plans and procedures, and coordinates with Sound Transit’s operating partners. The Executive Department provides human resources, communications, government relations, and other functions.

Susan Fletcher and FTA’s regional office



Susan Fletcher was appointed regional administrator of FTA’s Seattle office in 2023. She has a long history of working with Sound Transit since she previously served as deputy regional administrator, director of the office of operations and program management, and regional engineer.

Fletcher said, “Sound Transit had some ‘troubles’ during its initial startup, but they always asked, ‘what are we doing wrong, and how can we do it better?’ When we gave them the names of other people who had similar issues, Sound Transit always ran with it and pulled in practices from other agencies.”

Fletcher said providing technical support is one of the benefits that FTA provides to grantees. “We make connections between people, telling them what we’re seeing, how to avoid problems, and how to slow down the bleeding.” She said that it is important for the FTA “to build collaborative relationships” with its grantees so that the agencies are more receptive to the FTA’s suggestions.

Fletcher tells transit agencies, “We’re not successful, if you’re not successful. The FTA can look at the big picture and help you see how things are going. We can pull your

heads out of the weeds and provide you with a free independent review.” She did admit that the “FTA could do a better job sharing experiences from the around the country.”

When Sound Transit started ramping up, the FTA warned the agency that it would be difficult to get quality people and emphasized the importance of training staff, defining responsibilities, and setting up procedures ahead of time. She said, “Particularly on really large projects, when people haven’t done them before they don’t know what it’s going to take. It’s like having your first kid. You don’t know until you get there.”

She also emphasized the importance of identifying lessons learned as a project goes along, although she understands some agencies are hesitant to document these lessons because they could be used as evidence in a claim against the agency. Fletcher said Sound Transit documents their lessons in a way that is not discoverable, so that it cannot be used against them.

The FTA’s regional office in Seattle has staff with general skills who oversee projects, but when the FTA headquarters hires Project Management Oversight Contractors (PMOC) to help the regional offices, they draw from a deep bench of specialists who have specific expertise in areas such as cost estimating, project controls, revenue service. The PMOCs are usually not based in the region, but rather fly in periodically.

Project team

This document refers to the following Sound Transit staff.

- Ron Lewis, Executive Director of Design, Engineering and Construction Management
- Randy Harlow, Executive Project Director for the construction phase of the Lynnwood Link Extension (in Lewis’s department)
- Linneth Riley-Hall, Executive Project Director for Federal Way Link Extension (in Lewis’s department)
- Leslie Powers, Deputy Executive Director of Talent Acquisition and Rewards
- Tito Harris, Director of Learning and Development.
- Peter Rogoff, Chief Executive Officer from 2016 to 2022

Ron Lewis (Department’s executive director)



Ron Lewis heads the Design, Engineering and Construction Management Department, reporting to the deputy chief executive officer.

He has a bachelor's degree in urban planning, and a master's in transportation planning and engineering. After graduation, he was a planner and project manager with the city of Seattle, King County Metro, and Parsons Brinckerhoff. Since joining Sound Transit in 2002, he has had numerous roles including project director for the Airport Link and executive project director for the East Link Extension.

Lewis leads a department that includes project directors (such as Randy Harlow and Linneth Riley-Hall), engineers, architects, construction managers and other professional staff responsible for the design and construction of the light rail program.

His responsibilities on the Lynnwood Link project include the following:

- Direct the development and implementation of project delivery processes, practices and strategies.
- Ensure project execution is in accordance with policies, plans and procedures.
- Commit resources and provide contracting authority for consultants and contractors.
- Approve contract change orders, third party agreements, and claim settlements.
- Negotiate agreements with third parties.
- Interface with consultant and contractor executives to ensure responsiveness and contract compliance.

When Peter Rogoff was the CEO, he referred to Lewis's exemplary leadership skills and ability to master complex projects. In 2023, Rogoff said, "Ron is a rock star and he's still struggling to steer the tanker in a slightly different direction." He referred to Lewis as "thoughtful" and said, "we need more Ron Lewis's of the world who can think about the big picture and keep people from freaking out over bad situations."

Lewis refers to the "what, who, and how" of delivering projects. Sound Transit's board of directors adopts a scope of work that determines *what* will be built. The organizational chart identifies *who* will build it and the project management plan (PMP) explains *how* it will be built.

Each project director, he said, is responsible for preparing and periodically updating the PMP, which identifies all the roles and responsibilities associated with a project. The project director and team members are expected to be familiar with its contents, and revisit it periodically. Lewis noted the critical importance of keep the organizational

chart up to date. He said Sound Transit uses the PMP to demonstrate how a project has the expertise and “adequate bench strength” that FTA expects to see in key positions.

When Sound Transit started its building program, Lewis said the Seattle area did not have much expertise locally, “So, we had to import it.” He credits two former Sound Transit officials, Ahmad Fazel and Joannie Earle, for setting up the organization and instilling a strong culture.

Lewis said, “We put lots of responsibility on the project directors and I expect their teams to be pretty self-sufficient, with support from other divisions. I can’t emphasize enough the need to get the right people.” He explained how the directors need to manage scope, schedule, and budget all together because a change in one affects the others.

Project directors are supported by the agency’s executives, their peers, and support staff. Every other week, Lewis meets with his direct reports and project directors where he passes on relevant information from the FTA and the chief operating officer. “They also share with each other,” he said, “and that’s just as critical because we are building four large light rail extensions at the same time. Usually what one project just did, another is facing. Learning in real time helps us. It’s really important.”

Lewis said that peer-to-peer sharing of information within the industry is also important, but admitted, “we don’t do it enough because there’s not enough time.” In recent years, though, they are doing it somewhat more because of virtual communication opportunities.

When talking about sharing information, he said something that the FTA would probably appreciate hearing more often from its grantees: “Our team constantly asks the FTA and PMOC for advice on who we can talk to.”

Project Management Plan and organizational chart

In 2016, Sound Transit held a PMP workshop for the Lynnwood Link project and used it to develop the initial plan that was issued the following year. The plan consists of the following 13 sections:

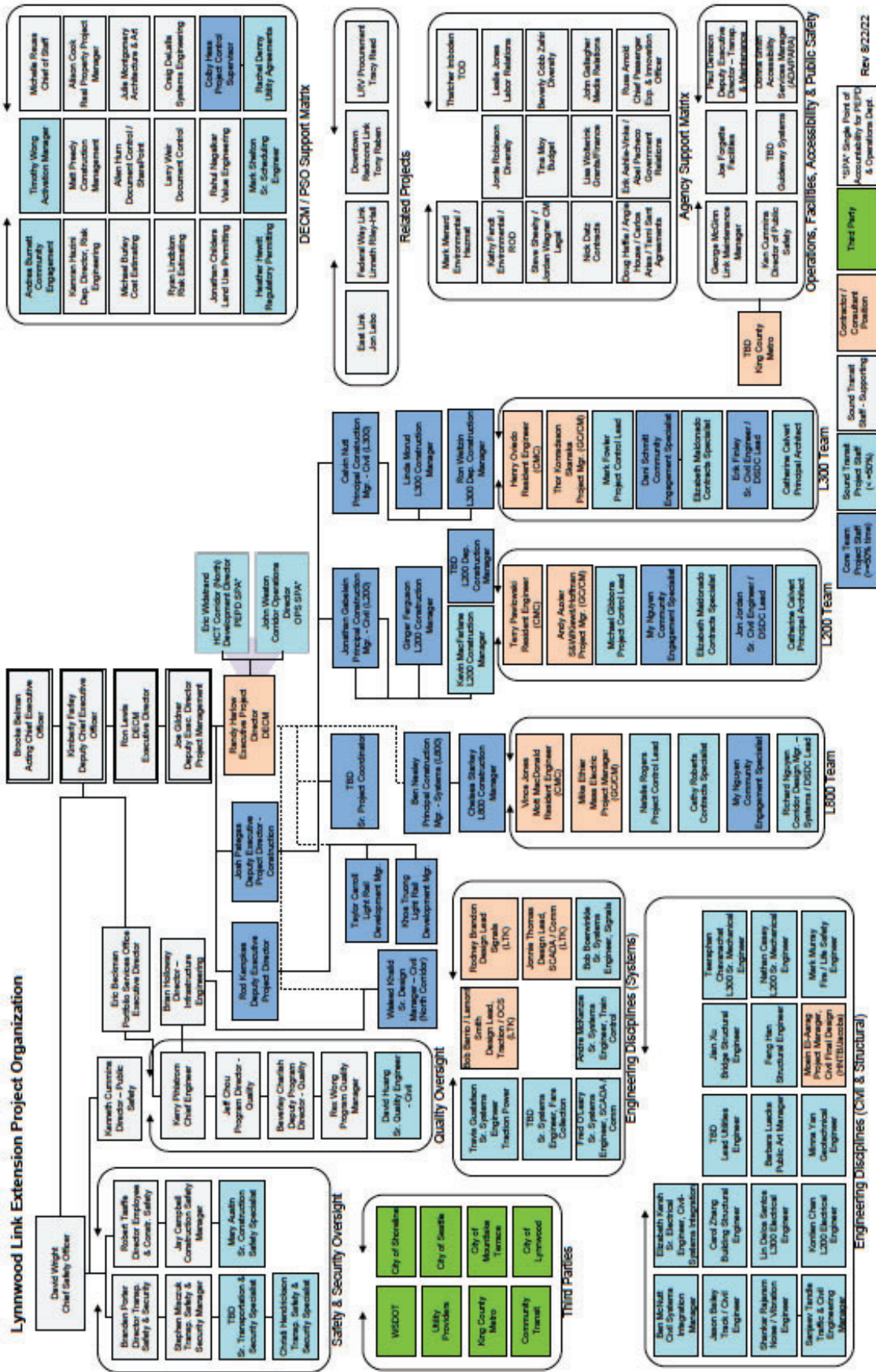
- Basis for the Project
- Environmental Assessment / Mitigation Plan
- Design Control Plan
- Project Controls
- Project Delivery and Procurement Plan
- Labor Relations and Policies

- Construction and Fixed Infrastructure
- Start Up and Revenue Operations
- Sponsor Management Capacity and Capability Documents
- Quality Assurance / Quality Control Program Plan
- Safety and Security
- Real Estate Acquisition and Management Plan
- Fleet Management Plan

As Ron Lewis noted, the PMP provides detailed information about all the project's phases. For example, it explains how Sound Transit determined the design and construction delivery methods (e.g., design-build, design-bid-build) and how it evaluated numerous options for packaging contracts into bundles.

The following page shows the Lynnwood Link project's organizational chart.

Lynnwood Link Extension Project Organization



Randy Harlow (executive project director)



Randy Harlow is the executive project director for the construction phase of the Lynnwood Link project. He reports to the deputy executive director who reports to Ron Lewis.

Harlow has a bachelor's degree in civil and environmental engineering, and coursework toward a master's in construction management. After graduating college, he worked as an engineer at consulting and construction firms where he served as a resident engineer on five different Sound Transit light rail projects.

Ron Lewis was familiar with Harlow's work and asked him to join Sound Transit. Lewis said, "Randy's a consummate project delivery guy." He pointed out that Harlow had valuable skills from his work as a resident engineer and running his own company. Lewis said, "His bedside manner is outstanding. He has outstanding communication skills, not what you'd expect engineers to have based on stereotypes."

In 2019, Sound Transit hired Harlow to serve as deputy project director for the construction phase of the Lynnwood Link project. The next year, he was appointed executive project director. "It's a fun job, the biggest one I've been on," he said. Harlow appreciates his autonomy. "I make decisions every day," he said.

Harlow directs all aspects of project delivery for the project. As described in the Project Management Plan, his responsibilities as executive project director including the following:

- Ensure project is designed and constructed to meet all requirements, commitments, and permit conditions.
- Participate in negotiations of general contractor / construction manager contracts.
- Lead design and construction reviews.
- Develop, monitor, and report on scope, schedule and budget status.
- Determine priorities and direct resolution of project delivery issues.
- Direct key staff and coordinate agency resources.
- Oversee development of project management and other project related plans and progress reports.
- Interface with third parties, the Sound Transit Board and committees, the Citizen Oversight Panel, citizens, community groups, oversight agencies,

and other external stakeholders.

- Oversee development of third-party agreements.
- Ensure successful transition of capital assets through all project phases.

Harlow talked about the different ways that project managers and construction managers work with their contractors. He said his strategy tends to be on the “partnership side” while some of his counterparts have operated like the “contractor is looking to maximize profit at the expense of the owner.” He has noticed how managers vary in how willing they are to take suggestions from contractors.

Firms that try to take advantage of clients can face repercussions. He explained, “Some foxes understand they won’t get into any other henhouse, if they chew on all the chickens.”

Other team members

Harlow has fewer than 10 full-time employees who report directly to him, but about 600 when counting employees who are matrixed into his project, contractors, and consultants. These include:

- Deputy Project Director (assists in project management and administration)
- Deputy Project Director for Construction (assists in project management and administration of the construction phase)
- Project Development Manager (builds and maintains relationships with project stakeholders)
- Project Managers (negotiate and maintain agreements with local governments and government agencies)
- Corridor Design Managers (coordinate engineering, design, and design services during construction)
- Principal Architect (oversees architectural, urban design, landscaping design elements)
- Principal Construction Manager (oversees and administers construction and construction managers)
- Civil/Systems Coordinator (oversees pre-revenue systems and integration testing.
- Corridor Project Control Manager (coordinates project control functions)
- Senior Real Property Agent (directs the acquisition / disposition of property and easements.
- Lead Utilities Engineer (coordinates utility relocations and services with design consultants and utility companies)

Sound Transit also has retained firms to provide design service, construction management services, and construction.

Linneth Riley-Hall and Federal Way project



Linneth Riley-Hall is *not* working on the Lynnwood project. She is the executive project director for a different project, the Federal Way Link Extension which is connecting the cities of SeaTac and Federal Way.

Linneth Riley-Hall has a bachelor's degree in accounting and business management, as well as an MBA. Since she started at the agency in 2010, she has had numerous roles including director of design and construction contracts, and deputy chief of staff. In 2017, she became deputy project director for the Federal Way project and was then promoted to program director and finally to executive project director.

She noted that going forward, Sound Transit will try to hire executive project directors while a project is in the planning stage, so they can oversee a project from beginning to end. When asked whether this is a good idea since a project might not make it to construction, she responded that as far as she knows, none of the agency's projects had ever completely died in the planning phase.

Ron Lewis praised Riley-Hall's leadership skills and how she invested in herself by serving on boards of organizations to fast track her construction knowledge. Her role as deputy was also very valuable for her, he said.

Peter Rogoff



Peter Rogoff was Sound Transit's chief executive officer between 2016 and 2022. Previously, he served as FTA Administrator for nearly five years and U.S. DOT Under Secretary of Transportation for two years. Project management issues, he said, are a critical need in the transit industry.

He described some of the challenges that project managers face.

There's a risk and reward of rising to the project management level. The quality of life isn't that great, and you spend so much time putting out fires. Project managers try to make a challenging situation look better for everyone involved. Not just to the CEO, the board and elected officials. But, also they have to make it look better for everyone below

them. You have to be a flag waving cheerleader. Most people below and above don't appreciate that. You have to be driven.

With both sarcasm and relevancy, he referred to the six phases of a project that have been used to describe the common pitfalls and frustrations associated with large projects: (1) enthusiasm, (2) disillusionment, (3) panic, (4) search for the guilty, (5) punish the innocent, and (6) reward the uninvolved. Regarding that sixth phase, he said, "Project managers do all the work, and others get the glory. It's just hard. You spend years of your life just so that you can drive by and say, 'Grandpa built it.' There's not much kudos and recognition."

Rogoff said the head of a transit agency has a much more prominent and public role, and they tend to get more public accolades and greater credit when projects are completed. Rogoff said that can be very rewarding for the kind of people who value being on the evening news.

He discussed some of the challenges that project managers face in both the public and private sectors. "When you're working for a contractor, it's like being in the military, having to move every few years." Rogoff remembered a conversation between a contractor's project manager and his counterpart at a transit agency. The contractor said to the agency employee, "I can never do your job. There's too much grief from people who don't know what they're talking about." The agency official responded by saying, "I couldn't do your construction manager's job. There's too much grief from corporate headquarters and dealing with subcontractors." Rogoff remarked, "It's always greener on the other side."

As the FTA Administrator, Rogoff worked with transit systems all across the country. He noticed that some of the FTA's grantees "didn't know what they don't know." This was especially problematic when a city's mayor would seek FTA funds directly, rather than having their local transit agency (which the mayor couldn't control) act as the sponsor. Rogoff remembers instances of cities not understanding the traffic impacts associated with installing rail lines and not recognizing the importance of providing traffic signal preemption. Ignorance sometime led a city to withdraw its application and what he described as the "more frightening scenario of a poorly designed, poorly executed project."

Rogoff remembered a challenge he faced at Sound Transit trying to ramp up the organization: "After the 2016 ballot measure passed, we were hiring people so fast to spool up for what we promised. Three years later, I was already a veteran. We plucked

people from DART, Washington State DOT, the Port of Seattle, Portland, and other municipal agencies. It only worked so well.”

Employee surveys revealed some dissatisfaction with the workplace as a result of this rapid growth. One problem was succession planning. Rogoff wanted managers to identify a list of five people who could take their job. But because the organization was so thinly staffed, it was hard for them to do so. That led to some issues regarding employee leave. He added, “It’s not that I didn’t want someone to go on vacation, I just wanted to make sure when someone was on vacation, we could continue to function.”

Attributes, skills and experience of a good project manager

FTA’s Fletcher and Sound Transit’s Lewis, Harlow, Riley-Hall, and Rogoff identified the key attributes, skills, and experience that project managers need. Note that the term “project manager” is used as a generic term here for the role that the executive project director performs at Sound Transit.

Susan Fletcher emphasized that a project manager does not need to be an engineer or know how to read every drawing. “It takes so much more than being an engineer,” she said. The two most important assets are strong communications and leadership skills. She noted, “it is rare that any of us have that out of school. It is important to have the right mentorship and culture to foster those skills.”

Ron Lewis said he looks for a combination of technical and political awareness, and budget consciousness. Political savviness, he says, requires knowing “where the winds are blowing.”

Randy Harlow identified three important traits: personality, experience, and education. At a screening interview, he tries to get a sense of someone’s communications skills, an attribute he links to leadership and personality. Different types of leadership styles may be equally effective, he said, but “some leaders need to adapt their style to the people they are managing.”

Linneth Riley-Hall said a project manager “absolutely does not need to be an engineer. I don’t know how to make engineering drawings, but when they show it to me, I’ll understand it.”

She explained how effective project managers need to be strategic thinkers with a business mindset, who can manage people. Whenever an issue comes up, they need to get the right people together to resolve the problem and understand how it will impact the whole project.

Riley-Hall said the engineers on her team need to focus on design and construction issues, but not necessarily all the requirements associated with the project. “It’s important for me to keep my eyes on the entire project because it’s easy to lose sight of tasks that aren’t immediate.”

She gave an example of how the environmental impact statement for her project requires Sound Transit to perform certain mitigations before the light rail extension can begin revenue service. When Riley-Hall first started, she focused the team’s efforts on identifying all the tasks these mitigations would require. Her effort revealed critical steps associated with traffic mitigation that involved conducting appraisals and then acquiring private properties. “That’s strategic thinking,” she said. “Thinking down the road.”

Riley-Hall said “the project needs someone to be on the balcony not the dance floor. Someone who can see all the pieces and how they interrelate.” Her role as deputy chief of staff gave her insight into looking at a broader picture. She said, “A chief of staff is even higher on the balcony. They need to think about all the projects and operations.”

She remarked, “I have the skill set of bringing people together. I’m big on inclusion, bringing the right people together at the executive office or on a project. I don’t focus on who made the mistake but how to resolve it. I rely heavily on my people.”

Peter Rogoff talked about the importance of being a good *people* manager. He said the old way of managing -- the “I’m going to bark and you’re going to jump” philosophy -- doesn’t go well with today’s workforce. He remembered how a Sound Transit project manager steeped in that mode was “the best one at going toe to toe with contractors and getting the job done.” But, Rogoff said that isn’t good enough anymore because Sound Transit promised its employees that it would be collaborative, inclusive, and respectful.

Rogoff also emphasized the importance of project managers being able to work well with people outside of their departments (including procurement and human resources) and how that varies depending upon the delivery method (e.g., design-build or design-bid-build.)

Working with Operations

Both Randy Harlow and Peter Rogoff discussed the importance and challenges of meeting operational needs. Although Sound Transit enters into agreements with other organizations to operate most of its services, it has an Operations Department which oversees both operations and maintenance.

In the past, operational needs had taken a back seat to capital development, although Rogoff and Harlow report that has been changing. When Rogoff started in 2016, he said the organization valued “building temples to transit” and placed less emphasis on meeting the needs of the operators. He specifically cited the University of Washington station, shown below.



Source of Photo: Sound Transit, “Two years in: How University Link is transforming Seattle,” March 19, 2018.

Rogoff admitted that he had difficulty trying to change that mentality. “I was solving a culture problem,” he said, “and real culture change takes six to seven years.”

In the past, Harlow said that some Operations teams did not have the skills and experience to interpret drawings especially for stations (which have much more complicated designs than those for tracks and signals.) Harlow said that Operations might not realize “something isn’t going to work for them until you start to build the station.” He gave two examples. When windows are being framed, the Operations Department might realize they need better fall protection. And, when construction is underway, the department might realize that the access to filters (which need to be regularly changed) must be improved.

Recruiting and retaining

Fletcher, Lewis, and Harlow discussed the topic of recruiting and retaining both staff and program managers.

Fletcher warned against hiring someone as a project manager who has never built a transit project. She said, “they could have tons of design and construction experience, but they are not ready to lead a transit project.” She gave an example of someone who had experience constructing commercial buildings. When you build an office tower, everything is in one place. A transit project, though, has numerous buildings located in multiple cities and counties. “There’s a lot to figure out,” she said, when you start determining sequencing, permitting, and staging.

She also said it “takes a long time to learn the FTA regulations and rules, and then once you receive funding, all the reporting requirements.” Fletcher noted that FTA’s Capital Investment Grant projects often take many years to construct with prescribed processes for each step. Not many people have managed these types of projects.

She warned against “being dazzled by someone’s resume.” Transit project managers need a wide range of skills (such as understanding different delivery methods) and they need to fit in with the agency’s culture.

She noted that Sound Transit has had trouble find people with certain skill sets, such as designing tracks and signals because “it’s not something that many engineers learn in school.”

Ron Lewis said each department has a Human Resources (HR) partner “who knows what we want.” He meets regularly with the HR team, where they discuss the status of vacancies and what Sound Transit is taking to address them. The vacancy rate in his department has ranged recently between 10% and 15%. “That’s an uncomfortable level for me,” he said. “I like to be around the 5% range, although H.R. says 7% is customary.”

Lewis admitted it is hard to attract and retain staff especially because Seattle is among the most expensive cities in the nation. He said, “We’re constantly trying to offer an attractive and competitive compensation package.” Lewis revealed, “We have lots of consultants and we poach from each other. We try not to do that very much. We need to attract more people to the region to build a collective bench.”

He emphasized the importance of the agency providing the HR team with the resources they need. “We have a strong HR group, but we suffered when the HR team was suffering attrition. Now they’ve staffed up,” he was pleased to report.

He does not leave recruiting to the HR team. While HR places advertising in specific publications to attract certain subject matter experts, Lewis encourages his staff to participate in industry-wide programs as a way to identify potential job candidates.

When anyone in his department goes to conferences, he tells them “you’re going on a recruiting trip.”

Lewis said the “combination of outside and home-grown talent has served us well. One of our greatest resources is within our organization. We spend time helping existing staff to grow.” He emphasized the importance of selecting deputy project directors who have the potential to become directors. That requires pairing them with the right person and making sure they are ready to step in at any time.

Not every project director at Sound Transit has met Lewis’s standards. He said, “they can have all the right credentials, but they also need to have the confidence of the team including the agency’s Board of Directors. They need to carry themselves, accordingly.”

Randy Harlow decided to join Sound Transit because he was looking for job security and the agency offered him a salary similar to the one he was earning as a consultant. He reiterated what Lewis said about how people in the Seattle often move between consultants, contractors, and agencies.

Harlow also said, “Ron [Lewis] was a big part of my wanting to make the transition. He called and said, ‘I’d really like you to come on board.’ I have a lot of respect for Ron, and I’ve known him a long time. He’s always a standup guy. He’ll give you the speech that will make you run through a wall.”

An issue that potential hires might consider before taking a project manager position is what will happen to their job when the project is completed. Harlow said he never talked with Sound Transit about that, but assumes he can stay at Sound Transit as long as he is performing well.

Since Harlow started working on the Lynnwood Link project, some of his staff have left for various reasons including getting better paid jobs in the tech industry, moving across the country, and not performing adequate work. “Now that the project is mostly completed,” he said, “I want to hire junior people and promote the ones we have. It’s also easier to hire at the junior level.”

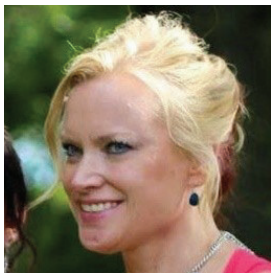
Harlow realizes he is responsible for recruiting and retaining employees as much as HR and Lewis. He said, “We have to make sure the staff is happy with their compensation and feeling fulfilled. I didn’t get trained on how to do that. There’s no class that says here’s how you should keep people around and how to keep them happy. It’s a tougher nut to crack because someone will dangle more money. You need to sell the mission and your reason for being here. There has to be a motivation besides money.”

After giving it more thought, he said, “I think I have the biggest responsibility. I need to communicate the message of a shared vision. That’s more important than an extra dollar an hour. There has to be a compelling cause for folks who work for me.”

Harlow said he’s staying in his position because “it’s not every day you have an opportunity to run a multi-billion-dollar job. There’s a thrill of doing a good job, delivering for riders, and building a new line. It’s exciting and fulfilling. I take great pride building the light rail line and I can tell my grandkids that I built that.”

He said, “Some people might be willing to take on a smaller job next, where there’s less pressure.” But, he hopes to take on another major project after the Lynnwood Link project is completed. He also noted that he’s likely to stay in the Seattle area since he grew up there. He is not interested in doing what he has seen some engineers do: “Go from Singapore to Britain chasing tunneling work.”

Recruiting from the human resources perspective



Leslie Powers is Sound Transit’s Deputy Executive Director of Talent Acquisition and Rewards at Sound Transit. The Human Resources team has grown dramatically in recent years from 7 in 2016 to approximately 40, today.

Powers discussed some of the recruitment challenges Sound Transit faces. Because the agency was set up to build transit lines, rather than operate services, “We have a finite existence. All the folks we are hiring now, either need to be retrained to do something on the operations side or their jobs will go away.”

Powers said the labor pool in the area is mostly technology related. “The talent we’re looking for isn’t plentiful here. More and more, we need to look outside of the area, even though Sound Transit’s governing principles promote hiring from within the area we serve. We do what we can to hire locally, but we need to hire from government agencies and construction companies that are outside our area.”

To overcome its challenges, Sound Transit undertakes strategic advertising, works closely with each department, pays market-rate salaries, and encourages staff to recruit new employees.

Advertising and empowering staff

The agency advertises in trade journals as well as LinkedIn and Indeed.com because that is where the agency has had the most success. Depending upon the position, they also advertise on APTA.com, TransitTalent.com, and MassTransit.com. Sometimes, Sound Transit purchases ads that are printed in APTA's conference programs. "We want to be in the most obvious places," Powers said.

Sound Transit has assigned one talent advisor to Ron Lewis's department, which has about 200 employees (the talent advisor supports another group as well as Lewis's). Talent advisors typically are recruiting for 20 to 30 open positions at any one time. Powers said, "They build relationships with candidates because someone they don't hire might be good for another job."

Sound Transit offers a class called "Hiring for Success." She said that's where Ron Lewis and others learned how to discuss Sound Transit career opportunities with their peers. Employees are also encouraged to distribute materials about Sound Transit when they attend conferences, and to set up LinkedIn profiles that indicate the agency is hiring.

Powers said, "HR's job is to hire people, but we can't do it alone. The best way to get talent is by word of mouth. Otherwise, if someone is happily employed, they wouldn't know a great job is available."

To help Lewis's department select the best candidates, the Hiring for Success class teaches interviewers how to ask good questions. That means, she said, "asking probing questions to get more authentic answers. You can't just ask a question and then move on to the next. To get more authentic answers, you need to dive deeper like asking 'what was your role?' More questions get more authentic answers. That's we teach them."

Power also said, "We teach them to interface with the candidates more than once. Someone can have a horrible day, or be a good interviewee but a terrible employee. You need to take time on the front end. Don't think you can have a one-hour-long interview and then make a decision. You need to think more holistically and avoid bias."

The agency also encourages trained staff to participate in the hiring panels for other groups. Powers said, "This helps panels look at candidates more holistically and the outside person might think of another position the candidate would be good at."

Salaries

Powers said, “Our philosophy is to pay market rate salaries, but that is challenging because we compete with the tech sector.” She admitted, “We can’t pay what Amazon pays.”

The agency subscribes to the Payfactors service which provides them access to 8,000 salary surveys. Sound Transit also shares salary data with other transit agencies, and it tries to align its salaries with similar markets, including California’s LA Metro and BART. “They are also struggling against tech companies to attract talent,” she said.

Powers said the agency needs to do a better job explaining to both its employees and recruits that its benefits “are better than 90 percent of its competitors in the region.”

The following table shows selected 2020 salaries for Sound Transit staff as published in the News Tribune. The table shows the very highest earners at the agency and then the highest paid employees in the Department of Design, Engineering and Construction Management (DECM).

In 2020, Peter Rogoff earned \$420,644 and Ron Lewis earned \$284,571. Linneth-Hall earned \$181,792 and Randy Harlow earned \$190,575. These two executive project directors both reported to Joseph Gildner, who earned \$248,482.

Salary Rank	Name	Title	Department	Total Pay
1	Rogoff, Peter	Chief Executive Officer	Executive	\$420,644
2	Lewis, Ron	Executive Director	Design, Engineering and Construction Management (DECM)	\$284,571
3	Billen, Don	Executive Director	Planning, Environment and Project Development	\$275,513
4	Cummings, Mary	Chief Administrative Officer	Executive	\$275,225
5	Brown, Desmond	General Counsel	Legal	\$273,906
6	Weiss, Jason	Chief Information Officer	ITS	\$255,056

7	Gildner, Joseph	Deputy Executive Director (DED)	DECM	\$248,482
11	Davis, Don	Executive Project Director	DECM	\$230,229
13	Gutierrez, Moises	ED-Portfolio Services	DECM	\$228,829
16	Bell, Mike	Sr. Executive Project Director	DECM	\$223,077
18	Usoro, Aniekan	DED-Project Control & Value Engineering	DECM	\$217,276
26	Sleavin, John	Executive Technical Advisor	DECM	\$205,966
27	Beckman, Eric	DED - Business & Construction Services	DECM	\$205,959
28	Reed, Tracy	DED - Project Management	DECM	\$205,443
35	Brown, Peter	Director -Systems Engineering & Integration	DECM	\$196,924
40	Raben, Tony	Executive Project Director	DECM	\$193,216
41	Pihlstrom, Kerry	Director - Civil & Structural Engineer	DECM	\$193,021
43	Harlow, Randy	Executive Project Director	DECM	\$190,575
45	Kempkes, Rod	Deputy Project Director	DECM	\$190,077
58	Endlich, Ron	Project Director	DECM	\$181,877
59	Riley-Hall, Linneth	Executive Project Director	DECM	\$181,792

Training

Rogoff, Lewis, Harlow, Riley-Hall, and Powers discussed training programs at the agency.

Peter Rogoff identified one of the biggest challenges to finding well-qualified project managers: “There is no formalized instruction on how to serve in that role -- other than

mentors who take you under your wing. Project managers need lots of different skills but get very little training. Rather than thinking we can hire someone off the street, we need to grow project managers ourselves. We can create our own rotational programs.”

Rogoff warned that creating effective teams incorporating agency staff, consultants, and contractors can be very challenging. Students in engineering schools, he said, “don’t learn about all the people issues related to managing projects.”

He emphasized the value of cross-training. When he was at Sound Transit and one department or project manager “stole” someone from another department, Rogoff said, “I loved it.” If someone moves from construction to finance, he explained, they pick up new skills and there is cross-pollination within the organization. He fondly remembered how his chief of staff had worked for half a dozen different departments, and always seemed to know the right person to call whenever he needed information.

He suggested that transit agencies consider taking a page from technology firms who typically offer non-managerial promotion tracks. Rogoff said, “In the transit industry, we’re still stuck in the mold that the best way to keep really good engineers is by paying them more, and putting them into management positions they might not want, or be bad at. We don’t want to lose them and that’s how get they more money. Technology firms respect and appreciate their technical people. We need to find a way to do that.”

Ron Lewis talked about Sound Transit’s onboarding program, topic-specific training (for example, the agency held a session on new Buy America guidance), and how project directors rely upon their peers.

Lewis expects his project directors to make decisions. “I don’t want all the tough decisions to bubble up. We have decision making tools.” He referred to the RAPID decision-making model which helps his directors consider the five important considerations involved in most decision processes (Recommend, Agree, Perform, Input, and Decide). This tool helps his project directors make decisions that are sustainable, informed by disciplines, supported, and documented.

Randy Harlow said you can train a construction manager to be a project manager, but it’s harder to teach someone how to manage construction because of the need for more technical skills, such as reading blueprints. He said, the project manager might know the task is to build an HVAC system. But the “construction manager needs to understand all the details of installing the duct work and hangars.”

As a former construction manager, he admitted “I’m biased. I like to think my experience is good. but maybe I miss the forest, sometimes. Like a head coach calling plays for the quarterback.”

Riley-Hall and Harlow talked about courses they have taken. Riley-Hall has taken courses through the Design-Build Institute of America. Its program is designed to prepare design-build team members relating to all roles and disciplines.

Harlow, who is a professional civil engineer in the state of Washington, said that his engineering certification does not require any ongoing classes. He said he has taken some very targeted courses such as those relating to waterproofing and concrete. He thinks that some of the graduate-level construction management courses he took were valuable and gave him tools to manage projects, but some of the courses were outdated. “On the job training is better for me,” he said. “But, I do a lot of reading. Some individuals need classes.”

Harlow said he encourages his staff to obtain professional certifications, including the following:

- Certified Construction Manager (offered by the Construction Management Association of America).
- Project Management Professional certificate (offered by the Project Management Institute).
- Design-Build professional certificate (offered by the Design-Build Institute of America).
- LEED accredited professional (offered by the U.S. Green Building Council).

Leslie Powers from the Talent Acquisition team said the “knee-jerk reaction among managers is to get the most qualified person. But, we really need to bring in lower level folks and keep them.” That is why she is excited about new talent management software (“Talent Guard”) that Sound Transit is installing. This program is designed to help employees identify clearly defined career paths, for both lateral moves and promotions. The program considers an employee’s skills and then recommends a learning program to achieve the goals of the employee and Sound Transit. Powers expects it to be a strong retention tool because it recommends career options that many employees might not have considered.

Sound Transit University



Tito Harris is Sound Transit’s Director of Learning and Development. When he started working at the agency in 2013, he was the only person providing training, Now, he leads a team of six people providing a wide range of programs.

The agency’s budget provides resources for three types of training: (1) Harris’s department offers training (2) each department is provided with funds to offer their own training, and (3) employees are offered tuition reimbursement.

Sound Transit established ST (Sound Transit) University to provide training for its approximately 1,200 employees. It also has a license with LinkedIn Learning which offers over 16,000 different courses.

ST University offers both internal and external *leadership* programs that are geared toward the more than 25 percent of its employees who are people leaders (having direct reports) and another 20 to 25 percent who lead non-Sound Transit people (e.g., consultants and contractors). Some of the classes it offers are generic while others are tailored to Sound Transit’s needs.

The internal leadership courses are both virtual and in person. All new people leaders must participate in a 15-hour “Engaging New Leaders in Sound Transit” program to ensure they share the same leadership foundation. They are schooled in four principles: allocentric leadership (where the leader considers the needs and well-being of others, and holds them in higher regard than themselves), emotional intelligence, inclusion, and systems thinking. ST University also offers other leadership programs including a senior leaders program that was launched in 2023.

Sound Transit sends approximately 32 people a year to seven different external leadership programs including Eno/MAX Program, Leadership APTA Program, APTA Emerging Leaders Program, Eno Transit Mid-Manager Program, and Eno Transit Senior Executive Program.)

In 2023, ST University offered the following five Project Management courses.

- Preparing for the Project Management Professional exam (50 hours over 6 weeks)
- Principles of Project Management (2 day course)
- Risk Management (1 day course)
- Project Estimating and Control (2 day course)
- Leading High Performance Project Teams (2 day course)

Some workshops are only offered virtually, some in person, while others are offered in both formats. The programs are facilitated by the Versatile Company and Tarka Consulting Corp.

Harris said his department works with a project management learning community within Sound Transit to identify skills that are needed. Based on that input, the Learning and Development team can issue an RFP and procure experts to provide educational services.

Sources for Seattle’s Lynnwood Link Extension

Interviews

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This version incorporates comments received from Randy Harlow.

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e. South Central Light Rail Extension (Phoenix)

The Light Rail Project



Valley Metro is the public transportation agency in the Phoenix region providing bus, streetcar, light rail and paratransit services.

It is currently in the midst of a major light rail expansion program that will add approximately 40 new miles to the existing system. One of those expansion projects, the South Central Extension/Downtown Hub, is a 5.5-mile extension that will connect South Central Phoenix to the existing light rail system in downtown Phoenix. The project, expected to be completed in 2025, will have eight stations and a park and ride lot with 110 parking spaces.

This project includes landscaping, ticket vending machines, traction power buildings, train signals, and new vehicles. As part of construction, Valley Metro will renovate and reconstruct the facilities disrupted by light rail construction, such as street surfaces, sidewalks, curbs and gutters, traffic signals, utilities, storm drainage, and landscaping.

The utility work is extensive. For every linear foot of trackway installed, six linear feet of wet utilities (including water, sewer and storm drains) will be removed, relocated or upgraded. That does not include all the other affected third-party utility lines, such as power, electricity, telephone, gas and cable.

Key Project Milestones

2013: Alternatives analysis completed.

2016: Environmental assessment published.

2019: Construction began with utility work.

2021: City of Phoenix, Valley Metro and FTA entered into full funding grant agreement.

The method of project delivery for the light rail extension is construction manager at risk (also known as construction manager / general contractor). Design-build is being used for one project element, the expansion of the agency's Operations and Maintenance Center.

Project Team

The project management team for the South Central extension includes a project manager, manager of construction and utilities, deputy director of corridor development, representative from the agency's contracts and procurement department, project controls specialist, and City of Phoenix representative.

The project manager's duties include:

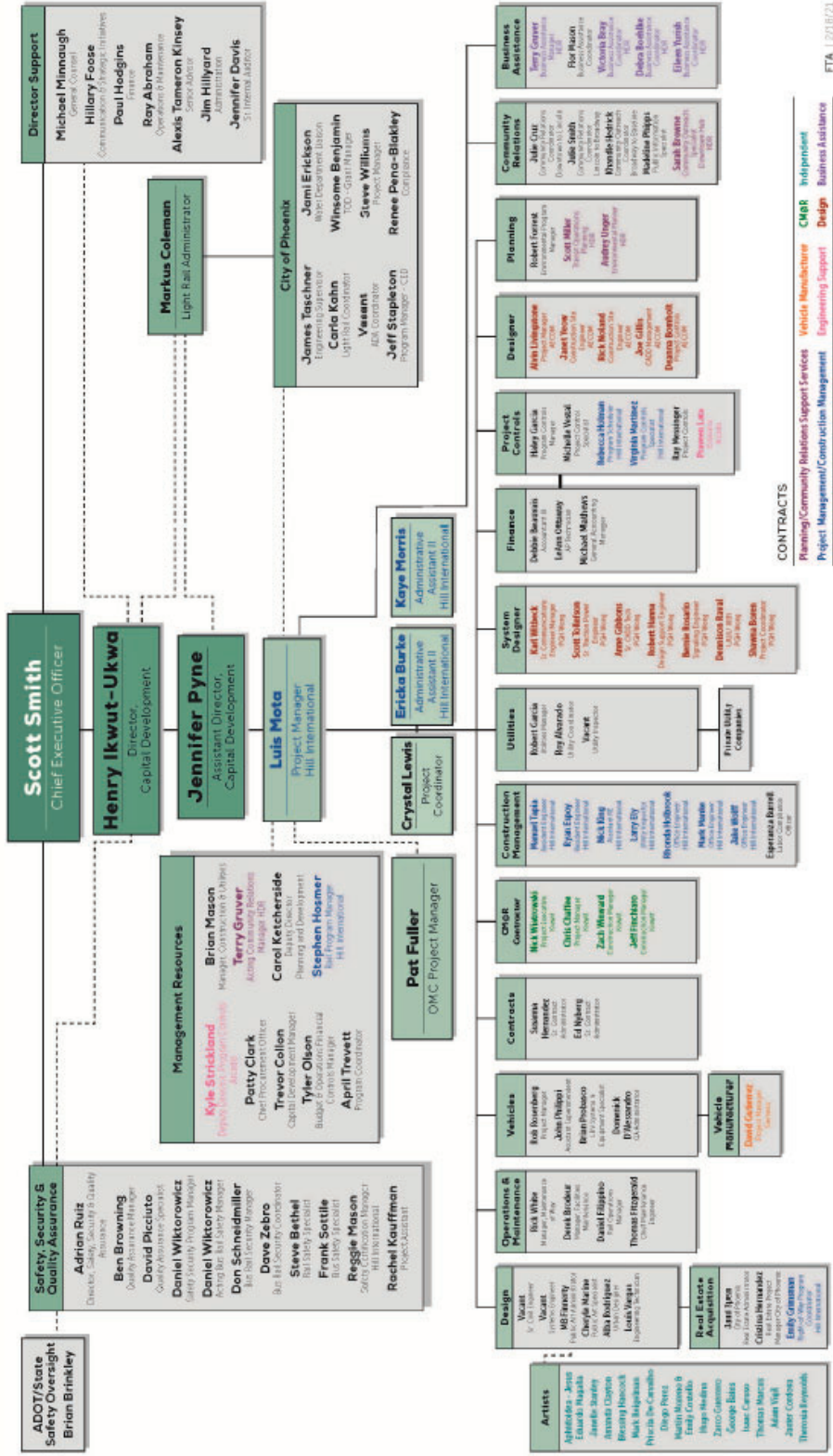
- establishing scope, budget and schedule
- leading communication across various divisions
- overseeing consultants and contractors
- coordinating design reviews
- overseeing construction change process
- coordinating assigned activities with other departments and outside agencies

This document refers to the following Valley Metro staff.

- Trevor Collon, deputy director of design & construction
- Luis Mota, project manager for the South Central Extension project (also chief executive manager of the Infenix, LLC consulting company)
- Tony Santana, project manager for the Northwest Extension Phase II project
- Julie Landspurg, manager in the Human Resources Department.

The organization chart, as of March 2021, is shown below.

Figure 2-4: SCE/Downtown Hub Construction Team Organization



Trevor Collon



Eno interviewed Trevor Collon when he was Valley Metro’s deputy director of design and construction. He was responsible for overseeing the design and construction of all the agency’s rail expansion projects. (In 2024, Collon was promoted to chief of capital development).

Collon has extensive civil engineering and managerial experience. After graduating college with an engineering degree, he worked for consulting firms on numerous projects including managing contracts with the U.S. Army Corps of Engineers and leading a design team in India. He then took a full-time position as project manager for the City of Mesa, where he oversaw various capital improvement projects including roadway, utilities, and light rail extensions. He joined Valley Metro in 2019 as manager of capital development.

Since the South Central project is being led by a consultant project manager, Eno asked Collon his thoughts about balancing agency staff and consultants on a project team.

Collon said, “it’s good to have the manager of design and the senior rail engineer on staff because they can protect the design quality, and they know where the bodies are buried.” If those positions are filled by consultants, he explained, the agency could lose valuable institutional knowledge, such as remembering issues and problems raised by property owners and stakeholders. That type of information might not make it into drawings or meeting minutes. Collon said the “Great Retirement” in the early 2020s was a “double whammy” because the agency lost both people and institutional knowledge.

Because of the challenges associated with hiring qualified employees, retaining skilled professionals, and properly sizing in-house staff for a dynamic capital program, the agency has had to rely on consultants for many positions. Collon acknowledged that “managing the program and maintaining key staff has been a struggle.” All the resident engineers on the agency’s large projects are currently consultants. These engineers also some manage most of the day-to-day aspects of construction and work with contractors.

Collon talked about the relationship with Valley Metro’s construction contractors. Some he said, put “their logos behind them and look out for what’s in everyone’s interests.” With others, he noted, “There’s more distrust. We have to strike a balance. We still need to partner with them. Their crews are laying tracks and pouring concrete. We can’t be at a point where we’re constantly threatening claims and lawsuits.”

Collon referred to the South Central extension as “our most extensive undertaking since the original 20-mile system was built and opened in 2008.”

Luis Mota



Valley Metro hired the firm, Hill International, as the lead project management/construction management consultant to help manage the South Central project. In turn, Hill International entered into a subcontract with the engineering firm, Infenix, to provide engineering consulting service. The head of Infenix, Luis Mota, manages the project on behalf of Valley Metro.

Mota is a registered professional engineer with a civil engineering degree. After graduating college, he worked at Parsons Brinckerhoff for twenty years moving up from civil engineer to the area manager for construction services. In that role, he was responsible for the construction services division in Arizona, New Mexico, and Nevada. His responsibilities included marketing, hiring, managing inspection and project management teams, operations, and project delivery.

In 2017, he started Infenix, a consulting firm which provides project management, construction management, administration, and inspection services. The company now has approximately ten employees.

When he was at Parsons Brinckerhoff, most of his work was in the aviation and highway fields. He worked on his first transit project when Valley Metro was looking for a resident engineer and they insisted that it be someone who was a locally certified professional engineer. He remembered, “I thought it would be good way to round out my experience.”

He revealed how his roadway and airport background helped prepare him to work on Valley Metro projects. Highway work, he said, is similar to rail projects because on both types, engineers have to deal with roadway and utilities, and they need to collaborate with communities and affected businesses. Although airports have fewer stakeholders, they are similar to rail projects because they both involve sophisticated equipment. Mota explained, “Airports have instrument landing systems and weather stations, while light rail has train control systems, signal equipment, and overhead power. You need to know how they work and the specifications.”

Overall, Mota has more than 25 years of experience providing construction management, administration, and inspection services. He has been described as “tough, but fair,” an approach that has reportedly earned him the respect from owners and contractors alike.

Mota’s Work with Valley Metro

Before managing the South Central project, Mota’s consulting firm worked on other Valley Metro projects including providing construction management services to support the Tempe Streetcar project which opened in May 2022.

Regarding his position as the South Central project manager, Mota noted that it is not common for a subcontractor to fulfil a key role, but he is grateful for the opportunity.

The project requires a large team. The project field office complex is comprised of more than 30 portable office units with over 100 employees, not including construction workers. Moreover, Valley Metro has about a dozen employees working on the project, and the City of Phoenix has a large team of inspectors.

Earning Trust

Mota said, “I have a lot of bosses.” He reports to both Trevor Collon and a senior program manager at Hill International. Mota also needs to maintain a positive relationship with the City of Phoenix, in part because the city worked with Valley Metro to obtain federal funding. “We have to earn their trust,” he remarked.

Mota said, “I feel like a Valley Metro employee. People treat me like an employee. When we go to meetings, I say I’m from Valley Metro. I even have Valley Metro business cards.”

Mota referred to the importance of developing a strong working relationship with other agency staff. He explained, “Once we are done with construction, we get to move onto the next project. However, what we build and how well we do it has a much more meaningful impact on the operations and maintenance groups. For this reason, I listen to their concerns, protect their interests, and work to earn their trust. It’s a win-win because we are much more effective in managing the project when we have support from operations and maintenance during the design development as well as construction.”

When Valley Metro needed to hire someone for the South Central project, Mota’s work on Valley Metro’s Streetcar project was coming to an end. Collon indicated he would have preferred that a Valley Metro staffer manage the project; however, the agency did

not have enough qualified people to manage all its major expansion projects that were under construction at the time.

Collon had been impressed by Mota's previous work on Valley Metro projects. Collon said, "I have the ultimate trust in Luis. He protects the agency first. There are not many people that I'd trust like an agency person. He's had project management experience, a track record, and the knowledge base."

Collon added, "He's dedicated and he's shown that he could deliver and build teams."

Tony Santana



Tony Santana does not work directly on the South Central Extension/Downtown Hub Project. Rather, he managed a 1.6-mile-long light rail extension, the Northwest Extension Phase II project which opened in January 2024. (Eno interviewed Santana while construction work was underway).

Born and raised in the Phoenix area, Santana graduated college with a civil engineering degree and wanted to work on regional light rail projects after graduation. First, he did so as an engineering consultant, performing various roles including cost estimating, CAD design, field inspection, and office engineer. In 2017, he joined Valley Metro as a resident engineer and was then promoted to project manager for engineering and construction projects.

Santana said, "I never wake up and say I gotta go to work. I truly enjoy going to work and thinking about how to get the project done." He noted how much he appreciates the opportunity to work with organizations such as fire departments, schools, and emergency institutions. Santana recognizes the seriousness of his work, noting how he has to make sure contractors do not disrupt utility lines serving hospitals.

He talked about the benefits of fulfilling project roles as a Valley Metro staff member and not as a consultant. "As an agency person, I know that I'm not going to just be here for one project and then leave. I take ownership a lot more seriously because of that. I don't think of my work as completing a project and then moving onto the next one, where I never have to worry about it, again. If something goes south on a project I worked on, they have my number and trust me they will call. Also, as a Valley Metro

staff member, I believe it allows me to work closely with in house staff and build projects that are best for operating and maintaining the system.”

He thinks that having that sense of ownership adds to accountability and has allowed him to build a relationship with co-workers that is harder for consultants to develop. “I know who to call to get things done,” he remarked. He also thinks that helps him encourage Valley Metro to buy into innovation. He said, “Solutions are accepted faster and then we can proceed faster.”

Trevor Collon praised Santana, saying, “Tony has all the skills I look for in a project manager -- engineering skills, communications, and the ability to manage and lead a team.”

Attributes, skills and experience of a good project manager

Trevor Collon, Luis Mota, and Tony Santana discussed the attributes, skills and experience needed by project managers.

Collon said, “When project managers start their jobs, they need to be ready to take on a wide range of responsibilities from managing day-to day issues of construction, ensuring our stakeholders’ concerns are addressed, and building a strong cohesive team.” He explained how project managers need technical skills, a strong knowledge base, and the right mentality. Strong communications skills are critical, he noted, because project managers need to conduct news interviews, and make presentations to the FTA and city councils. “It’s a grab bag of things,” he said.

He expects a lot from his project managers. He likes to hire one person who can manage both the design and construction components. And, his project managers also serve as construction managers. He said, “I am looking for unique expertise, an engineer who can communicate, and the ability to manage and lead a team. When you are introducing a new mode of transportation, you have to deal with community impacts, land acquisition, negotiations with demanding contractors, and construction.”

“I love engineers,” he said. “They know the requirements and why they’re doing things. They can review a set of documents. But many of them don’t have those project management skills. Engineers tend to live in a black and white world where they produce things that are safe and maintainable, and in the public interest. But they need other skills to manage large projects.”

Collon added, “You need to be patient to get the right one. They need to be interviewed up the line and maybe even by the CEO. Project managers also need to be vetted by our city counterparts. I want their key staff members to bless the project manager. If someone isn’t right, we need to move on. If we make a quick and knee-jerk hiring decision, it could affect the project.”

When asked if a project manager needs to be an engineer, he responded, “If someone has been in the industry and built large projects, they don’t need to be a PE [certified professional engineer]. We tend to see PEs, though.”

When asked if a project manager needs to have a calming presence, he answered, “They need a positive outlook, I’m not always calm.” He added, “They do need to stop every now and then to celebrate milestones. Otherwise, a four- or five-year program to build a light rail project would burn anyone out. Staying calm is important because projects are a marathon not a sprint. They need to keep things in perspective and keep people motivated.”

Luis Mota talked about numerous challenges that he and other Valley Metro’s project managers face.

The first thing he mentioned was distractions. While project managers are trying to focus on designing and building a light rail line, they get numerous requests from elected officials and other stakeholders. These distractions are associated with what he referred to as his greatest challenge – accommodating competing needs in an urban area.

Mota gave an example of how restaurants want Valley Metro to undertake construction during the day, while many other businesses want construction to be performed during evening hours. He said, “Phone calls and emails come in from very visible folks. With construction taking more than two years, many Mom and Pop shops are affected, and they are run by people who work hard to survive.”

After a while, Mota said, “Construction fatigue starts to kick in with stakeholders.” They get frustrated as utility workers repeatedly open and close streets to move storm drainage pipes, fiber optic lines, power lines, and other utilities. Contractors also need to frequently shift construction to accommodate traffic.

Tony Santana said the hardest part of the transition to project manager “was to remove myself from the day-to-day technical work. I shouldn’t be in the project plans or specs every day and I had to learn to hand that off. I’m not just overseeing design or

construction but understanding and coordinating many disciplines such as real estate, third party utilities, stakeholder concerns, and community outreach. I've learned to manage on a broader scale. Once I stepped away from being technical, I could look at the project in broader way and make sure the right people are in the room to keep the project moving.”

According to a Valley Metro job posting, when the agency hires a senior project manager, they seek candidates who have a bachelor's degree in construction management, project management, or architecture. The project managers are expected to have ten years of experience in project/construction management including five years managing major capital projects involving multi-agency or multi-stakeholder projects. The transit agency does consider candidates with an equivalent combination of education and experience, and prefers individuals with a master's degree.

The following are some of the duties, knowledge, and skills associated with the senior project manager position.

Duties include:

- Manages and coordinates all aspects of complex major capital projects during design and construction.
- Establishes scope, budget and schedule, and assures these elements are monitored and maintained throughout the project.
- Leads and facilitates communication between members of a multi-disciplinary project management team, including civil engineering, systems engineering, real estate, architectural, planning, utilities, construction management, project controls, public involvement, safety, quality assurance, environmental compliance, operations procurement, and contracts staff.
- Oversees consultants and contractors involved in capital projects, and facilitates strong communication and coordination between these entities.
- Communicates and coordinates project development with staff from affected federal, state, regional and local agencies.
- Regularly communicates project status and issues with Valley Metro leadership.
- Coordinates and participates in design reviews, peer reviews and value engineering teams.
- Oversees construction change process.
- Develops and oversees preparation of project status reports, including reports for Valley Metro leadership, member agencies, and the FTA.
- Ensures project compliance with laws, regulations, codes, and standards.
-

Knowledge of:

- Management principles and practices
- Transit operations
- Construction regulations and standards
- Civil engineering, architectural design, and systems design and construction
- Project budgets and estimating
- Principles of contractual compliance and administration
- Agencies, groups and organizations involved in transit planning and development
- Laws, codes, regulations, and legal requirements

Possess numerous skills including:

- Organizing heavy and complex workloads, establishing and adjusting priorities, and accomplishing objectives within established scopes, budgets, and schedules
- Effective communications and interpersonal skills and the ability to establish and maintain effective working relationships with executive managers, city staff representation, and transit constituencies
- Interpreting and applying local, state, and federal policies, procedures, laws, and regulations
- Monitoring and evaluating employees
- Prioritizing and assigning work
- Leading, managing and coordinating capital projects
- Developing effective work plans, goals and objectives
- Technical and procedural writing skills
- Excellent verbal and presentation skills
- Coordinating knowledge and efforts of agency staff, consultants, and contractors

Project Managers and the importance of community relations

Trevor Collon shared a very important lesson about why community relations can be so important for both a project manager and a transit agency. He explained “a bad project manager can affect quality, schedule, and scope. Even if they’re doing all of these things right, if they’re upsetting the stakeholders that’s not good. If businesses near the construction area don’t ever want to see us again, then the project is not a success.”

He explained, “You need to look at other things besides time and money. If we continuously wrangle a business or city, or if the relationships are terrible, that’s not a successful project. We at Valley Metro aren’t going anywhere. We’re here to serve. We want to build partnerships that go beyond the project.”

Collon emphasized how Valley Metro needs to work with community groups and build partnerships. Referring to the conditions that occur when contractors close down roads and create dust, he said, “Construction is disruptive, it can get overwhelming while we’re out there relocating utilities, replacing sidewalks and driveways.”

Before Valley Metro started some of its large projects, some businesses in the impacted communities opposed the projects. “Now, they are stakeholders and we’re building in front of their businesses. We’re married to them / tied at the hip,” he said.

The project managers need to accommodate a wide range of needs and wants. Collon noted how in downtown Phoenix, the rail line runs in front of City Hall and theaters, while South Phoenix has many small businesses. The project manager might have to meet with a corporate executive in the morning and the manager of a pizza shop in the afternoon.

In recent years, the downtown business community has supported Phoenix’s rail expansion projects, although they do not like the day-to-day construction impacts that can divert traffic and disrupt utilities. Valley Metro is cognizant of mitigating impacts to stakeholders and delivering a successful project, especially as Maricopa County voters will, in the near future, decide on a continuation of the half-cent sales tax that is set to expire at the end of 2025.

Collon noted that construction work for the South Central rail line is taking place not far from the State Capitol. He said, both advocates and opponents are watching to see whether Valley Metro meets its promises regarding quality, budget and schedule. “But, we need to do more than those three things. We need to take care of our community and our customers. We want them to see Valley Metro as a partner.”

Recruiting and retaining

Santana, Collon, and Mota discussed issues relating to recruiting and retaining project managers.

Tony Santana decided to work at Valley Metro for several reasons. For one, he wanted to stay in the Phoenix area where he grew up. Another factor was his interest in working on important infrastructure improvements in the region. He said, “I always wanted to make a difference in my community.” A third reason was the opportunity to advance his career. When Santana was working for a consultant on Valley Metro projects, an agency director told Santana that he would be a stronger candidate for a future project manager position, if he worked at Valley Metro. The director said, “You’ll have first choice on

what you want to work on.” The agency fulfilled that promise when Santana was promoted from resident engineer to project manager.

Trevor Collon said Valley Metro has had trouble hiring engineers and project managers. Recently, at least three individuals turned down his job offers because they received higher counteroffers. “They were looking for significantly higher than we were able to offer. It’s a struggle to find someone and then salary is an impediment.”

“Good project managers are a rare animal,” he reiterated. “It’s hard to find someone who can build and lead a team, especially in this job market.”

Collon declared, “I would move heaven and earth to find the right project manager.”

Luis Mota said it is “more challenging for the public sector to retain people. The pay is lower, although the benefits might be better.” He did say that the public agencies offer a better work-life balance and greater job security.

Mota has noticed that “Public agencies have been cutting benefits and people. As the public sector raises the retirement age, the benefits are starting to line up with the private sector.” He warned that the public sector will lose their advantage if they continue to cut benefits and raise the retirement age.

Mota explained why the pay difference between the public and private sector is greater for project managers than for more junior positions. “Those are the positions that win the jobs,” he said. “Companies are willing to invest more and take a hit. It’s a calculated investment. Also, sometimes lower-level positions are easier to fill.”

A recent Valley Metro job posting for a senior project manager included the following caveat about the tenuous nature of the position. The warning that the job was contingent upon funding could not be missed, since it was printed in capital and bolded letters on the very top of the posting:

“THIS RECRUITMENT WILL BE USED TO HIRE PERSONS THAT SUPPORT THE DEVELOPMENT OF MAJOR CAPITAL PROJECTS WITH DEDICATED FUNDING. THE DURATION OF THE EMPLOYMENT WILL BE CONTINGENT UPON THE AVAILABILITY OF FUNDING FOR THOSE PROJECTS.”

The pay is listed as \$143,268 to \$214,903 annually. Mota said, “If agencies hire provisionally, they’ll need to pay like the private sector.”

Training

Luis Mota, Trevor Collon, Tony Santana, and Julie Landspurg (from the Human Resources Department) talked about training opportunities.

Mota appreciated the training he received while working at Parsons Brinckerhoff. He mostly remembered his lessons about budgeting and contractual language, along with their associated pitfalls. He participated in the consulting firm's emerging professionals program and in workshops. "I never passed up an opportunity," he said.

Mota also took advantage of the firm's vast technical expertise. He remembered how when he needed some advice on how to work with a new material, he simply logged into a Parsons Brinckerhoff network and asked if anyone had any experience with it. "People were always willing to help out," he said.

Most of his training, however, came from his supervisors and informal mentors. He started as an inspector at a construction site, documenting construction and capturing quantities. That gave him exposure to the means and methods of construction. He said he learned from both "good and bad resident engineers."

Collon talked about how employees in his department learn a lot of their skills (such as cost estimating, project scheduling) on the job, as they move up the ladder from office engineer to resident engineer and then project manager. A lot of other professional development programs from writing to leadership development are offered through a variety of in-house training opportunities and programs at Valley Metro.

Santana described some of the training that has helped him. He was part of APTA's Emerging Leaders Program Class of 2019, and he completed his MBA while working at Valley Metro. He said, "I also took the PMP [Professional Management Professional] courses to develop as a manager."

Regarding leadership, Santana cited books which taught him how to motivate people. He has learned to recognize the different personalities and traits of his team members so that he knows, "what I can and can't push them to do."



Julie Landspurg, Valley Metro's manager for learning and organizational development, talked about the importance Valley Metro places on training. She said, "An organization without professional development opportunities is like a city without a park. You might have only 20 percent of the population taking advantage of them, but it's really important to have them."

Landspurg also said, "It's important for an agency to have a professional development team who can administer programs. It doesn't work if it's just ad-hoc. Then everyone would be responsible, but no one would be responsible. That's what happened before I was here."

Likewise, every Valley Metro employee has both annual performance and professional development goals. She said that also has to be institutionalized; "otherwise, if it's just when I have time, no one has time."

Landspurg pointed out, "Training does not change behavior. Managers need to follow up with support and provide employees with feedback on how they are performing. You can't assume training will give them all the skills they need." She said training is more effective when employees talk to their supervisor about what they learned, and then the supervisors help them apply those lessons and offer support for their efforts.

She recognizes that "it's difficult at best to retain good people" and thus the agency is training some employees who will only work at the agency for a short time. "It might be good for them, but not so good for us," she said.

She described the agency's three-pronged approach to training. The first is tuition reimbursement offered to employees. The second refers to how individual departments can sponsor professional development opportunities, such as attending conferences. The third and largest program is the agency-wide learning program which is managed by the Human Resource's Training and Development division.

All agency directors and managers must participate in a Leadership Development program with sessions on topics such as holding effective meetings, creating a culture of feedback, and understanding legal issues in managing employees. The agency also offers a hybrid learning program for emerging leaders.

Valley Metro helps employees pursue professional engineering and PMP certifications. The agency also participates in the Eno/MAX program and Eno's Transportation Mid-

Manager Program, and it can send interested employees to the National Transit Institute courses.

The agency subscribes to an e-learning library. The following page lists some of the online courses related to project management and PMP preparation. The acronym PMBOK refers to *Project Management Body of Knowledge*, a book published by the Project Management Institute which describes processes, best practices, terminologies, and guidelines.

When asked which transit agencies were role models for their training programs, Landspurg cited the agencies in Seattle, Pittsburgh and Atlanta.

Online learning courses related to Project Management.

PROJECT MANAGEMENT SKILLS

SKILLSOFT SERIES: PROFESSIONAL DEVELOPMENT	COURSE TITLE	DURATION In MINUTES
Project Management Ethics and Values	Ethics and Project Management	55
	Ethical Standards and PMI® Core Values	58
Project Management for All	New Project Manager Essentials	21
	Defining a Project Scope and Team	23
	Creating a Project Schedule and Budget	24
	Managing a Project to Minimize Risk and Maximize Quality	29
	Navigating through Changes and Conflicts in Projects	28
Project Integration (PMBOK® Guide Sixth Edition)	Taking Final Steps to Bring a Project to its Close	27
	Project Initiation and Planning (PMBOK® Guide Sixth Edition)	72
	Managing Project Work (PMBOK® Guide Sixth Edition)	80
Project Changes and Closing (PMBOK® Guide Sixth Edition)	Project Changes and Closing (PMBOK® Guide Sixth Edition)	64
	Capturing, Analyzing, and Using Project Lessons Learned	68
	Strategically Focused Project Management	72
	Project Scope (PMBOK® Guide Sixth Edition)	
Project Scope (PMBOK® Guide Sixth Edition)	Plan and Define Project Scope (PMBOK® Guide Sixth Edition)	72
	Create Work Breakdown Structure (PMBOK® Guide Sixth Edition)	72
	Validate and Control Scope (PMBOK® Guide Sixth Edition)	56
Project Schedule (PMBOK® Guide Sixth Edition)	Define and Sequence Activities (PMBOK® Guide Sixth Edition)	84
	Develop the Project Schedule (PMBOK® Guide Sixth Edition)	109
	Control the Project Schedule (PMBOK® Guide Sixth Edition)	52
Project Cost (PMBOK® Guide Sixth Edition)	Creating a Project Budget (PMBOK® Guide Sixth Edition)	68
	Keeping Your Project on Budget (PMBOK® Guide Sixth Edition)	97

SKILLSOFT SERIES: PROFESSIONAL DEVELOPMENT	COURSE TITLE	DURATION In MINUTES
Project Quality (PMBOK® Guide Sixth Edition)	Planning Quality Management (PMBOK® Guide Sixth Edition)	68
	Manage and Control Quality (PMBOK® Guide Sixth Edition)	79
	Quality Methodologies and Standards for Project Management	64
Resource Management (PMBOK® Guide Sixth Edition)	Plan and Acquire Resources (PMBOK® Guide Sixth Edition)	90
	Develop and Manage Resources (PMBOK® Guide Sixth Edition)	81
Communications (PMBOK® Guide Sixth Edition)	Plan and Manage Communications (PMBOK® Guide Sixth Edition)	67
	Monitor Project Communications (PMBOK® Guide Sixth Edition)	48
Project Risk (PMBOK® Guide Sixth Edition)	Planning Risk Management (PMBOK® Guide Sixth Edition)	67
	Identifying Risk (PMBOK® Guide Sixth Edition)	65
	Analyzing Risk (PMBOK® Guide Sixth Edition)	83
	Responding to Risk (PMBOK® Guide Sixth Edition)	75
Project Procurement (PMBOK® Guide Sixth Edition)	Procurement Planning (PMBOK® Guide Sixth Edition)	70
	Procurement Management (PMBOK® Guide Sixth Edition)	39
Project Stakeholders (PMBOK® Guide Sixth Edition)	Planning Stakeholder Engagement (PMBOK® Guide Sixth Edition)	61
	Managing Stakeholder Engagement (PMBOK® Guide Sixth Edition)	50
Project Management (PMBOK® Guide Sixth Edition)	Project Management Introduction (PMBOK® Guide Sixth Edition)	63
	Project Fundamentals (PMBOK® Guide Sixth Edition)	51
	The Process Groups (PMBOK® Guide Sixth Edition)	73
Project Management PMBOK Test Preps	PMP Exam Prep (2021 Update)	180
	TestPrep Project Management Professional PMBOK 6th Ed.	240
	TestPrep Certified Associate in Project Management (CAPM) PMBOK Guide 6th Ed.	180

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Interviews

Trevor Collon, interview with Plotch, January 13, 2023; Collon’s LinkedIn page.

Julie Landspurg, interview with Plotch, January 25, 2023; Landspurg’s LinkedIn page.

Luis Mota, interview with Plotch, December 14, 2022; Mota’s LinkedIn page.

Tony Santana, interview with Plotch, January 26, 2023; Santana’s LinkedIn page.

This document incorporates comments on draft version of this document made by Collon, Santana and Mota.

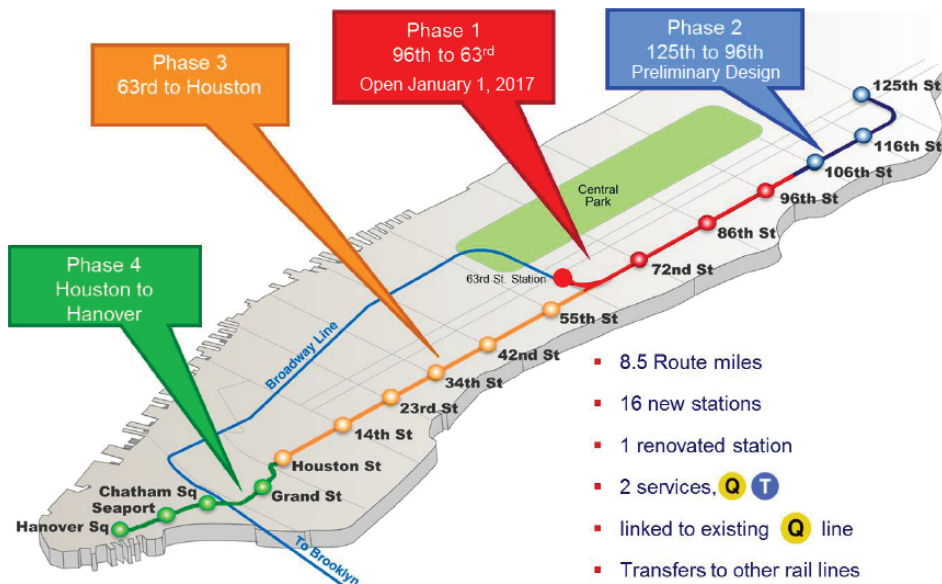
f. Second Avenue Subway (New York City)

The Second Avenue subway is New York City's most ambitious subway expansion in more 50 years. The project dates back to the 1920s when the city first announced it was replacing an elevated rail line with a new subway. The project was mothballed until the 1970s when several tunnel segments were constructed; however, those tunnels were abandoned due to a lack of funding. In 2004, an environmental impact statement was completed, the project separated into four separate phases and in 2007 construction began on the first phases.

This first phase opened to public in 2017, extending the existing Q line from 63 Street to 96 Street on Manhattan's Upper East Side. The project cost approximately \$4.5 billion. On an average weekday in 2023, subway ridership exceeded 21,000 at 72nd Street, 16,000 at 86th Street, and 12,000 at 96th Street.

Construction of the second phase has not yet begun. It will extend the line north from 96 Street to 125 Street in East Harlem.

Photos and map



The four subway phases. Source: MTA



Construction required replacing numerous utility lines. Source: [Wikipedia](#).



New Station at 86th Street. Source: MTA

Project team

The MTA Capital Construction Company, a subsidiary of the Metropolitan Transportation Authority (MTA), led the construction of the first phase. The Capital Construction Company was formed in 2003 to build the MTA's largest subway and railroad projects.

The MTA's New York City Transit Authority operates and maintains the city's subways. For the first phase of the Second Avenue subway, the Transit Authority's Capital Program Management department was responsible for the engineering, and it managed a team of consultant engineers. The first phase was a design bid build project.

WSP was the project's consultant construction manager, responsible for overseeing the work of contractors.

For the second phase, the MTA Capital Construction and Development Company (its name was recently changed from MTA Capital Construction) is leading both the engineering and the construction. It will be a mix of design build and design-bid-build contracts.

This document refers to the following project management staff.

- Michael Horodniceanu, former president of MTA Capital Construction.
- Bill Goodrich, former senior vice president and executive vice president at MTA Capital Construction.
- Tim Gianfrancesco, former MTA Capital Construction's deputy vice president and deputy project executive.
- Tom Peyton, former senior engineering manager at the WSP consulting firm, who served as the project's construction manager.

Design and construction challenges

Building the Second Avenue subway was expensive, complicated, and disruptive. Construction workers had to dig up streets and then move utilities including sewer, gas, water, electricity, telephone, and steam. MTA Capital Construction president, Michael Horodniceanu, said relocating the lines while trying to minimize outages to utility services was like “trying to ride a bike and change the tire at the same time.”

The MTA dug tunnels, built underground caverns, laid tracks, and installed signal systems. New stations were built along with stairs, mezzanines, and elevators. The subway incorporated components that were far more sophisticated than subways built in previous generations. For example, each station had 19 different communication systems including those relating to intercoms, intrusion detections, closed-circuit television, service announcements, telephones, emergency booths, police and fire radios, emergency broadcasts, and fire-alarm/pull stations.

The design required an endless number of decisions such as station location, the number of entrances, the depth of stations, the number of tracks, and the width of platforms. No cookie cutter design exists when building a subway in one of the world's most densely populated neighborhoods.

The designers had numerous external stakeholders including residents, businesses, media, and elected officials. Just as complicated were its internal stakeholders. For example, six different divisions in NYC Transit Authority's sprawling bureaucracy submitted a detailed and extensive list of employee facilities that they wanted at the new stations.

Despite the MTA's extensive precautions, subway construction disrupted the lives of businesses, residents, drivers, and pedestrians. Water, electricity, cable, and telephone service were periodically halted. Construction workers installing equipment accidentally flooded the basement of the Memorial Sloan Kettering Cancer Center. Two years after construction began, more than 90 percent of fifty-nine businesses polled near the construction said their sales were down, and nearly half had to lay off workers.

Horodniceanu's motto was, "You have a plan, and it changes on Day One." For example, a 450-foot long tunnel boring machine was used under Second Avenue. But not long before the machine was fully assembled and deployed, advance probes found soil and crumbly rock zone just past the launch area, not something the boring machine was designed to dig through. If it kept going, apartments buildings could have collapsed. After numerous meetings, Horodniceanu's team decided to drill a series of 80-foot deep holes where workers inserted steel pipes and pumped in a liquid chilled to thirteen degrees below zero to freeze that zone, allowing the tunnel boring machine to safely mine through it.

Michael Horodniceanu



Michael Horodniceanu was president of MTA Capital Construction Corporation between 2008 and 2017. He had previously been the chairman and CEO of an engineering and planning firm, and New York City DOT's traffic commissioner. He had a bachelor's degree in engineering, a master's degree in management, and a PhD in transportation planning and engineering. *(Photo per LinkedIn)*

When Horodniceanu told Enr his highest annual salary was \$341,000, he noted that the CEO for the Crossrail project in London earned approximately \$700,000 one year.

Horodniceanu identified the following impediments to effective project management

- Lack of training in management techniques (finance, communications, leadership, negotiations)
- Lack of authority
- Too many projects
- Lack of commitment
- Lack of people skills

- Lack of knowledge about the client
- Lack of participation during negotiations

Bill Goodrich



Between 2008 and 2018, Goodrich was the senior vice president and then executive vice president at MTA Capital Construction with full responsibility for the design, construction, and commissioning of the Second Avenue subway and the multi-billion dollar project that connected Long Island Rail Road with Grand Central Terminal.

Goodrich has a bachelor's and master's degrees in engineering. Over a long career, he has held numerous engineering and management roles including leading construction of nuclear power plant units, a resident engineer for the Big Dig project, and vice president at Parsons Brinckerhoff where he provided construction management services for NYC DOT and MTA projects.

When Goodrich worked on the Big Dig, he learned that on such large projects, someone could start in an entry level position (e.g., field inspector or field engineer) and spend a significant percentage of their career on that one project. Those individuals would learn as they go, gain experience, and become a valuable asset to the engineering and construction industry.

In 2008, Goodrich was working as a consultant for the MTA when Horodniceanu offered him the position as the program executive in charge of the Second Avenue subway. Goodrich saw it as a “great opportunity to join the client organization and lead a major program.” The MTA’s pension program was very appealing, something that he was not getting in the private sector.

He was also offered a higher salary than he was earning. In 2013, Goodrich became the 58th highest paid employee at the MTA with a salary of \$200,909. Keep in mind that the MTA had more than 71,000 employees at the time.

Tim Gianfrancesco



Tim Gianfrancesco was MTA Capital Construction’s deputy vice president and deputy project executive for the first phase of the Second Avenue subway. His background and experience made him an ideal candidate to help lead the design and construction of a new subway line under Manhattan’s streets.

Gianfrancesco was hired in 1989 as part of the “Transit Corps of Engineers” program. The state established this program to attract young engineers to the NYC Transit Authority. Each year, the program selected 30 upper division students from college engineering programs. If students took positions at the Transit Authority, they would be reimbursed for their college tuition (less any amounts received from scholarship) over a four year period. The program was discontinued after a few years.

Upon graduation, Gianfrancesco decided to work at the Transit Authority, in part because the salary and benefits (including the tuition reimbursement) were more lucrative than his other offers. When engineers started in this program, they attended job development lectures and classes, and had frequent interactions with senior leadership who helped develop career advancement goals. This early career coaching and professional contacts opened up opportunities within the engineering and construction groups at the Transit Authority.

Early in his career, Gianfrancesco worked on a variety of projects including pumping systems, ventilation fans, and tunnel lighting. He designed subsurface utilities including power and communication ducts, sanitary and storm sewers, and water mains.

In New York City, most of the underground utilities are owned by private firms (e.g., cable, phone, steam, gas, and electric companies) and the City of New York (e.g., water and sewer). There were two primary reasons why the transit agency needed to design elements related to utilities it did not own. First, the subway tunnels and stations were adjacent and below utility lines, and subway projects could impact those utilities. Second, when a Transit Authority project required a utility line to be moved or replaced, the agency was historically and legally responsible for all the associated design and construction costs.

Additional underground space was often needed when installing new communications systems, exhaust systems, elevators, and other subway components. These projects could impact not only utilities, but also adjacent building foundations.

After Gianfrancesco obtained drawings and maps of existing utilities and subway structures, he would figure out where contractors could excavate and build out space

while minimizing impacts and costs. Design was challenging because the maps did not always indicate the correct location of utility lines, and construction was challenging because of the need to minimize any utility outage.

Gianfrancesco learned how to manage numerous external stakeholders including residents and local businesses, and those who worked for the City of New York and the utility companies. All this experience would prove invaluable because the most complicated aspects of building a new subway line under Second Avenue related to utilities and constructing below and adjacent to residential and commercial structures.

As he moved around and up in the organization, he worked on increasingly more complicated reconstruction and expansion projects such as the reconstruction of the 1 and 9 subway lines at the World Trade Center, and the new South Ferry station and Fulton Street Transit Center. These projects provided Gianfrancesco with valuable experience directly related to the challenges that he would later face building the new concrete tunnel and station structures for the Second Avenue Subway. He also worked on another subway expansion project, the 63rd Street Connector, where he learned about other construction techniques applicable to Second Avenue, including building slurry walls.

Tom Peyton



As a senior engineering manager at the WSP consulting firm, Tom Peyton served as the project director for construction of the Second Avenue subway. WSP was the project's consultant construction manager, responsible for overseeing the work of contractors on behalf of the MTA Capital Construction Company.

Peyton was responsible for providing WSP's services which included resident engineering and inspection, constructability reviews, contract management and administration, project controls, utility coordination, commissioning, and startup. During much of the construction period, WSP had an average of 120 people on the site, managing up to eight construction contracts simultaneously.

Peyton had previously served as construction manager on other major projects including a water tunnel in Massachusetts. He has a bachelor's degree in engineering as well as an MBA, and he had extensive tunnel construction experience using numerous techniques under a wide range of underground conditions.

When he managed the Second Avenue subway project, he talked with his team and construction firms every morning to find out what happened the night before. Looking at work summaries and dashboards, his team planned and monitored all the work that was expected to occur that day and week. He said, “I was always ready to have a Plan B. Not only in the morning, but throughout the day. If something doesn’t happen, you need to find out why and figure out how to catch up.”

Attributes, skills and experience of a good project manager

Horodniceanu described some of the key attributes he sought when hiring project managers. First, he mentioned a strong technical background. Second, he said, “Desire is a key ingredient.” He explained that a candidate needed to be excited about taking on a challenging position and motivated by other factors besides money. Third, he looked for someone who was “willing to learn.”

When interviewing candidates, he looked for someone who was honest, a person who likes people, and a willingness to be humble and allow others to take credit for the agency’s accomplishments.

He identified the following attributes of a “great” project manager. Although the list was facetious, it reveals the extraordinary challenges that project managers must face.

- Intelligence of Einstein
- Integrity of an Apolitical Supreme Court Judge
- Patience of a Saint
- Negotiating Skills of a Horse Trader
- Savvy of James Bond
- Planning Skills of a General
- Communication Skills of Walter Cronkite
- Drive of Bill Gates
- Tough Skin of an Armadillo
- Ego of Mother Theresa

Obviously no one can meet the standard above. So, Horodniceanu identified the following attributes of a “quality” project manager:

- Follow through on all commitments
- Backs team members decisions
- A good listener
- Organized
- Proactive

- Technically proficient
- On top of all project aspects
- Handles multiple tasks and prioritizes well
- Leads by example
- Delegates well
- A good communicator
- Holds people accountable

Goodrich discussed the difference between a *project manager* and a *construction manager*. He said managing a project requires different skills than managing construction. Project managers, he said, have certain technical knowledge, but what they are being asked to do is to manage contracts. “It’s more pure contract administration,” he said.

Referring to Peyton’s role as construction manager, Goodrich said, “Tom Peyton is a tunneling guy. He spent his whole career on tunneling projects. He knows everything from rock mechanics to tunnel boring machines, and how contractors will look at and execute jobs. It’s a different skill set. More hands on with the technical part of the work.”

Recruiting and hiring

When the MTA Capital Construction Company was first established in 2003, Goodrich said the new agency brought in many employees from the NYC Transit Authority. “By the time I got there in 2008, most recruitment was from the outside. We would advertise and interview internal candidates, but more than 50 percent were from outside the MTA. Oftentimes they had more experience, skills and knowledge. It’s too bad. It would have been nice to give people from other MTA agencies the opportunity. If they spent their whole career and never got training or only a limited opportunity to even get outside training, they wouldn’t be as developed as a consultant or contractor.”

Goodrich identified three things that attracted many people to the MTA Capital Construction Company. The first was the opportunity to work on large projects. Second was the pension. Third was the opportunity to make decisions as a client, not someone who recommended decisions as a consultant.

Goodrich said, “When hiring someone in their 30s and 40s, they are more likely to think about pensions and retirement. Talking to a 21 year old about retirement, that’s such a foreign concept. It falls on deaf ears. Pension is more of a factor for mid-career people.” He said he thinks that job security is also more important when someone is in their 30s and 40s.

Gianfrancesco noted that when hiring project managers, a candidate's certifications and education do not necessarily indicate whether that individual would be a good project manager.

He relies on references and someone's reputation, and wants to know exactly what work a person did on a project. He said, "Not just how many projects someone worked on, but how much work they did. Did they jump around and work on different projects but have only small roles? When someone works on a project from beginning to end, you know they stuck it out and moved up through stages."

Gianfrancesco said a project manager on a large transit project does not necessarily need to be an engineer; it depends on the project and what the challenges will be. Some managers could have a project management background or have been a contractor with technical experience, but not have an engineering degree.

Gianfrancesco pointed out the importance of understanding scheduling. The Second Avenue subway needed a scheduler for each project component and then someone at the top to understand how each schedule fit into the overall programmatic schedule.

Gianfrancesco also noted the difference between managing a design-build (DB) and a design-bid-build (DBB) project. He believes it is easier to go from managing a DBB project to a DB project, but not necessarily, the other way around. He explained how DB project manager's role is more about administering contracts, while for DBB, project managers are more involved in the design and therefore need to be more technically capable.

Retaining and promoting

Interviews with former MTA officials revealed the following issues relating to retaining engineers and project managers.

i. Reducing Staff Led to Lower Morale and Fewer Project Managers

In recent years, the MTA has reduced staffing levels through attrition. When the MTA began undertaking design of the Second Avenue subway and other megaprojects, agency leaders decided to fill the engineering gap with consultants, rather than permanent employees. This was seen as a way to save money and provide greater flexibility in staffing levels. However, it had two major long-term negative consequences. First, it reduced the future availability of experienced and qualified project managers. Second, it hurt morale because the agency's engineers spent less time on engineering and more time managing contracts.

ii. Not Enough Incentives

Horodniceanu lamented that MTA's engineers are unionized, and their salaries are determined by the union contract. As a result, he said they had little incentive to perform quality work: "If they make a lot of errors, they won't get promoted. They could get punished but not rewarded. So, if you don't do anything, you don't get into trouble."

Some experienced engineers choose not to get promoted to project management positions because the position may be less secure, the hours are longer, and they are no longer eligible for overtime. Engineers can sometimes earn higher salaries than their managers. Others choose not to go into project management because they enjoy the technical aspect more than the managing role.

iii. Pay

Referring to project managers at the MTA and other public sector organizations, Peyton said, "They don't pay them enough, no question about it." Although he did say that a benefit of working in the public sector workers is having more vacation time.

Gianfrancesco noted that the MTA provides a pension with good job security and a generous amount of personal time, sick time, and vacation time along with excellent health benefits. However, he has seen the salary difference widen between private sector and the MTA in recent years.

iv. Pensions

The pension program for MTA employees has changed over the years and its benefits depend upon when someone was first employed. The program's features offer a strong incentive to work at the agency for at least 20 years and most employees are eligible to begin collecting a pension once they reach 55 years old.

There are two reasons why MTA project managers are better off financially if they leave the agency once they reach their mid-50s to early 60s. First, they can collect a pension and also get a higher paying position for a private firm. Second, the spouse of a retired employee is eligible to receive pension payments; but, if the employee dies before retiring, the spouse will not receive any pension payments.

WSP's Tom Peyton has noticed that experienced project managers in the public sector leave their organizations when they are eligible to receive attractive pensions. Private sector firms like to hire them because they can be used to win and lead the company's next projects.

Role of consultants

Horodniceanu, Goodrich, and Peyton offered their insight into the appropriate role of consultants in a large transit project.

The MTA Capital Construction Company was a lean organization when Horodniceanu was president. He proudly declared that its headcount was no more than 141 full-time people while it was responsible for building the Second Avenue subway and other large transit construction projects.

He did not want to hire too many people because it would have been too hard to fire them. Firing someone, he explained, required extensive documentation and if someone was older than 40 they could claim discrimination based on age. He said when hiring a full-time employee at the MTA, “it’s til death do us part.”

As traffic commissioner and the head of a private consulting firm, Horodniceanu knew the presidents and CEOs of many consulting companies retained by the MTA Capital Construction Company. He said his position gave him leverage. If a consultant was not performing, he would contact their bosses and they would find him someone else.

Goodrich believes the most efficient way to manage a project is with a blended team consisting of agency staff supplemented with outside consultants. He said that fits in with the approach taken by the large consulting firms WSP, HNTB and AECOM. He noted that Bechtel prefers to manage and be responsible for all facets of a project on behalf of their clients.

Goodrich said that consultants nearly always comprise more than half of a project’s staff. He explained, “You don’t want to hire and fire people. Consultants can ramp up and down on a project since they generally have other projects they can move staff to. It’s difficult though for agencies to send people to other projects after their projects are complete.”

Goodrich remembered that on the Second Avenue subway project, only 10 to 20 percent of the staff were agency employees; the rest were consultants including those who designed and managed the construction. The percentages changed over time. During the early stages of the project, MTA staff comprised about 30 to 40 percent. As the agency moved closer to construction, the consultants began comprising a higher percentage of the team.

He said, “Looking back, it was appropriate. Agencies should be able to manage contractors and consultants with that level of staffing. At the end of day, you need to rely on outside consultants and outside contractors for the bulk of the organization.”

Peyton praised the work of Tim Gianfrancesco saying that he had a thorough knowledge of the organization and how it worked. Gianfrancesco “listened, asked questions, and took advice.”

But, he said, “MTA Capital Construction didn’t have the experience to manage ten construction projects, simultaneously.” He noticed that the agency did not have anyone with enough experience building new tunnels and stations, working with major contractors, and understanding how everything fit together. He said, “Nobody had built a tunnel. It was not a skill set they had retained. It wasn’t just the size, but also the type of project. It’s different than changing elevators or escalators.”

Training

Goodrich, Gianfrancesco, and Peyton shared their insight about training issues.

Goodrich on training and experience

Goodrich talked about how training and retaining employees are connected. On the Big Dig project, the joint venture constructing the project organized a formal training program with mandatory human resources and technical training. All the engineers and managers were brought up to a certain level of expertise. He said, “As long as they were trained and had an opportunity for advancement, people were willing to stay.”

Goodrich said the Big Dig’s training programs and modules were tailored to the roles and levels of the employees. Some of the classes served multiple purposes. For example, learning about change order management taught employees how to handle change orders and familiarized them with the project’s contracts as well as its policies and procedures.

He said, “On large programs, you need a training element. There should be an ongoing review process at Human Resources that evaluates people. Who are the rising stars? Identify them and make sure they have an opportunity to advance in the organization.”

Goodrich said that most large engineering and construction firms have some sort of project management certification program. He said, “I believe it contributes to retention, as long as someone is learning and advancing, and is compensated fairly.”

He noted that MTA Capital Construction did not have a formal training program when he was there, but he thinks it should have had certification programs along with technical training for construction managers, project managers, and inspectors. Goodrich noted that MTA Capital Construction (where he worked) had significant organizational differences in terms of policies, procedures, and practices than the MTA's NYC Transit Authority (where Gianfrancesco received the bulk of his training and mentoring.)

He explained one way that training can save an agency money. "There's no question there's a premium that contractors build into bids whenever they are doing work for the MTA. They know how effective or ineffective agencies are in managing projects and change orders. If the MTA wants to bring down costs, they should train internal staff to manage projects more effectively."

Goodrich said, "Contractors get frustrated regarding change orders. It could be as much as 20 to 30 percent of a project's cost. They know they'll have to finance it, because of delays in getting paid for change order work. By the time they get all the approvals at the transit agency and get paid, they've had to pay labor and materials for all that time. If the project is managed more effectively and change orders are executed in a timelier manner, there's no need, theoretically, to carry an additional cushion or premium."

Eno asked Goodrich whether contractors earn more than they deserve because seasoned contractors can outmaneuver inexperienced transit agency project managers. He responded that it was unusual for that to happen because agency lawyers are typically part of a change order process. However, if the project manager is inexperienced, the contractors need to spend more time (and money) negotiating change orders.

Gianfrancesco on training

Gianfrancesco learned most of his technical skills from working with experienced people. Some skills were not taught at any engineering school. For example, he learned how to read utility company maps and then how to relate that to surveys of existing manhole covers, streets and sidewalks. He had to find and then decipher as-built drawings of subways that were constructed in the early 20th century.

Gianfrancesco was selected to be in a Transit Authority program for top performers who had demonstrated significant career potential. He attended the program's three-day management course, and he was assigned a mentor who helped Gianfrancesco identify career paths.

Gianfrancesco took Transit Authority training courses, usually one or two days long, on topics such as communications, time management, cost management, cost controls, and schedule controls. He attended informal training sessions (such as a ‘lunch and learn’ with subject matter experts) and he took courses through the American Society of Civil Engineers and American Society of Mechanical Engineers.

Peyton on training and experience

Peyton said good project managers need to manage costs and understand how project elements fit together. He cited different experiences that helped him on his Second Avenue work.

He had developed schedules and cost estimates, and his engineering background gave him the skills needed to approach and solve problems. His contractor background gave him valuable construction experience. “It was easier to manage contractors because I was one.” He added, “I knew how to get labor to work with us, not against us.”

He understood from experience, what mobilization would look like, and what contractors could and could not do. He also had worked on projects with multiple contractors where he had to make sure that each contractor performed its work in a way that allowed other contractors to perform theirs, whether that work was done sequentially or simultaneously.

He credits the mentoring and experience he gained at a construction firm where he learned “what it took to be seen as an engineer, act the part, and be the part.” He said the firm encouraged him to hone his skills, insisting that he get his professional engineering license, and then paid for his master’s and PhD courses.

“Us gray haired guys have lots of experience. Every time you manage another project, you learn more.” He said he understood what the members of his team needed to do – from the resident engineers who talked to the doormen on a daily basis to the schedulers and cost estimators. “I understood all of these skills. I had developed them over time, and it made me a better, well-rounded manager.”

Transition from Phase 1 to Phase 2

The first phase of the Second Avenue subway opened in 2017, but construction has not yet begun on the second phase. According to Gianfrancesco, not many senior employees who helped manage the first phase are still working at the MTA.

Peyton said it was disconcerting that going into the project’s second phase, the MTA Capital Construction Company’s Second Avenue subway team lost its top people. He

said, “Any good manager can manage a project. But, you need to know who to talk to and understand its idiosyncrasies.”

Peyton remembered when the MTA Capital Construction was trying to finish up the first phase, issues were raised by numerous operating groups (e.g., safety, maintenance, electrical). These departments had signed off on design documents years earlier but when they needed to give final approvals, technologies and standards had changed. The people who had given their original approvals were no longer in the same positions.

Gianfrancesco also noted that due to the long lag between phases, the project is losing institutional knowledge at the MTA and at its stakeholders. For instance, at the utility companies, officials learned a great deal about subway construction during the first phase, but transferring that knowledge within their companies is not their highest priority.

Goodrich noted that it would have been preferable to build the second phase of the Second Avenue, sooner. He said, “If no funding is available that smoothly takes you from phase 1 to phase 2, you can’t retain people. They’ll move on. In the private sector, they’ll move to other projects. In the public sector, they’ll go elsewhere.”

He said, “we had a great team feeling. We realized that we were doing something unique and getting all this experience. If we could have kept the team and consultants together, we would have had such a great opportunity to transfer and utilize that knowledge.”

Instead, once the new line was opened, the team was ready to close out contracts and move on. Goodrich noted, “It always comes down to funding.”

Lessons Learned

Gianfrancesco said there were various efforts to document lessons learned, but no formal compilation of them that was transmitted from the project’s first phase to its second phase. Gianfrancesco was in a position to know, since he was the deputy project director on the first phase and the project director for the second phase.

Many lessons, however, have been incorporated into the second phase. For instance, the MTA engaged some consultants who had worked on the first phase to set up design criteria and standards for the second phase. The MTA and its consultants also drafted technical advisory papers and talked to the utility companies about how the second phase could be performed better.

Although there was no single lessons learned document, some documents containing lessons learned were prepared. Based upon discussions with interviewees, these documents have *not* been widely shared within the MTA, let alone outside the MTA.

The MTA Capital Construction Company did prepare a folder of lessons learned. And Horodniceanu hired a consultant, Molly Gordy, to write a book about the Second Avenue subway; but the book was never finalized or released.

Peyton said he also prepared a lessons learned document. His firm, WSP, documented and submitted an extensive spreadsheet with details about both the positive and negative aspects of the project.

The MTA was hesitant to document lessons because according to one official, “you want to show that you’re improving, but don’t want to show that you did it wrong.” Some lessons are hard to formalize because an experience can be interpreted differently and taken out of context. For example, one lesson learned from the first phase was that the MTA should remove trees from a park as soon as it gets the permit to do so.

On Second Avenue, the MTA needed to remove trees in a park where it would be storing large equipment during construction. Once the city’s Parks Department provided a permit to remove the trees, the MTA started to mobilize a tree removal crew. But the community wanted the MTA to wait several months because the park space was not needed, yet. The MTA agreed to wait. However, when the time came for the trees to be removed, squirrels had begun nesting in them. The community got upset about removing the trees, which led to delays when the MTA tried to renew its permit.

The squirrel story demonstrated why revealing lessons to the public could harm an agency’s reputation. The MTA would be intensely criticized if the public learned that it wants to knock down trees because it fears that squirrels will start nesting in them. The editors at New York City tabloids would enjoy preparing headlines and graphics to accompany that story.

Goodrich said lessons learned should be documented at the ends of design, construction, testing, and commissioning. He added, “If they are memorialized in a document, it could be part of a training when getting ready for the next project.” He emphasized, “Lessons learned should be in a training program.”

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Former MTA officials who wished to remain anonymous.

This incorporates comments on draft document by Goodrich, Peyton, and Gianfrancesco.

Appendix 3. Profiles of other leaders (project managers and project executives)

This appendix profiles seven leaders of project management teams.

- a) Henry Stopplecamp
- b) Rick Clarke
- c) Robert L. Lund
- d) Zoe Robertson
- e) Evelio Hernandez
- f) Damian McShane
- g) Bruce Podwal

a. Henry Stopplecamp



Eno interviewed Henry Stopplecamp when he was the assistant general manager of capital programs at the Regional Transportation District (RTD), a position he held for eight years. Stopplecamp's predecessor as assistant general manager was Richard F. (Rick) Clarke.

RTD provides public transportation in the Denver metropolitan area. The agency opened its first light rail in 1994 and ten years later, the region's voters approved a tax to fund the FasTracks program, which consists of 122 miles of new commuter rail and light rail, 18 miles of bus rapid transit, and 21,000 new parking spaces at rail and bus stations.

Stopplecamp obtained a bachelor's and a master's degree in civil engineering after serving in the U.S. Army for four years. After graduating, he worked in various roles for six years at BNSF Railway. He joined RTD in 2000 as a senior civil engineer and held several positions including senior manager of construction and chief engineer.

Stopplecamp was a member of the core group that developed the RTD's FasTracks program and then a member of the senior leadership team that implemented it. He managed more than 350 RTD employees and consultants as assistant general manager.

When he retired in August 2023 after 23 years of service, he said with great pride, "I have been blessed to work on 10 major corridor and terminal projects from environmental through construction and into operations and maintenance along with another 3 light rail corridor projects from final design into operations." He added, "It has been a privilege and a blessing to work with such talented and dedicated individuals."

He told Eno that RTD has done "a fantastic job." But, he admitted, "we could have done better." There is always room for improvement. RTD had a dedicated staff that put their heart and soul into all the corridors. A couple areas that could have helped with staff retention and morale would have been additional training and competitive salaries.

Attracting and retaining

When asked about retaining project managers and experienced professionals, he said, "We don't retain, unfortunately." He succinctly explained, "We're not paying and they're not staying." He added, "Without large scale projects, training, sufficient staff and competitive salaries, it is very hard to retain talented employees when the local private sector is making very nice offers."

Stopplecamp said the agency, ideally, would promote from within. That can happen with large transit projects because they involve so many staff and the teams transition over many years. He has had engineers who were inspectors at the beginning of a project become the project manager by the time it had closed out. Stopplecamp is disappointed that RTD cannot guarantee individuals that they will be the next project manager, because the agency does not know what the next big project are, and it also needs to advertise all open positions.

Stopplecamp also noted due to the lack of large-scale projects, once project managers reach a certain level, there are fewer opportunities for promotion at the agency.

Salaries

Stopplecamp said, "the private sector is more lucrative. People with skillset developed during the FasTracks program get gobbled up by consultants. They can get a 50 percent jump in pay, if not more." He said on all of his projects, he had to supplement his project teams with consultants, many of the senior project staff members (working for

consultants) earned twice as much as RTD project employees. That made it harder to retain the agency employee until the end of a project.

RTD could match the salaries for young engineers, but not senior engineers and project managers. Referring to working for a consultant, Stoppolecamp said, “I could go across street and get a \$100,000 raise. But, I like what I’m doing.”

Stoppolecamp stated that RTD had paid a consulting firm \$500,000 per year for a project director. The director earned half of that amount which was more than the Assistant General Manager’s salary.

Stoppolecamp said that RTD’s benefits (medical, dental, and time off) are “pretty good and competitive” with the consultant world. But not the base pay.

In 2019, RTD had approximately 2,850 employees. According to the *Denver Business Journal*, Stoppolecamp was the fifth highest paid employee, earning \$222,724. The highest paid were the general manager (\$295,000), chief operating officer (\$255,625), chief financial officer (\$226,315), and general counsel (\$225,514). Joe Christie, the project director for the Eagle P3 project was the 35th highest paid employee, earning \$150,440. Stoppolecamp noted that some transit agency employees with significant responsibilities operating trains and buses can resent when an agency pays relatively high salaries to project managers. That same level of resentment does not occur when a consultant is hired.

Stoppolecamp said RTD’s salaries are lower than consultants because building major transit projects has typically not been the agency’s highest priority and it is hard to relate to folks with unique skillsets and demands different from the typical transit employees. The top priority, understandably, has been moving people, day in and day out. Many agency executives, especially those without a background in building large projects, have not understood the importance and challenge of finding someone with the skill sets needed to manage large transit projects.

Benefits of Working at Public Agency

He identified advantages of working at RTD: “You don’t have to look for another project, worry about work coming in, and you don’t have to travel.” He also said, “We expect 40 to 50 hours of work a week,” not 60 to 70 hours plus travel that are expected at many consulting firms.

Another downside of working for a consulting firm is the need to move for work, or losing a bid and then losing a job. Stoppolecamp said if someone is looking for the

“almighty dollar,” they should go to the consulting world. They should work for the agency, if they want to “own” a project, have a better quality of life, and much greater job stability.

He said that most of his project management team members have left for more money and promise of better things, but he did refer to two staffers who stayed because they “want to contribute to the community.”

Disadvantages of relying on consultants

Stoppolecamp did say that there is a need to augment agency staff with consultants, but there must be a balancing act between core team members and support members. Stoppolecamp said many agency officials do not recognize how hiring a consultant rather than staff impacts institutional knowledge. Keeping project information in-house is a “huge benefit to the organization,” he said. But, RTD’s leaders “don’t see it or pay for it.”

Long after a project is completed, those who managed a project (and are still working at RTD) do not have any official role related to operations and maintenance, but, Stoppolecamp said, “people come back to you when there’s a problem.” The project managers have institutional knowledge and can work on a project their entire career. He said they’ll be asked what they did, why they did it, and “what was the intent?”

Another reason institutional knowledge is important is because an RTD employee will be able to offer first-hand knowledge about the past performance of consultants and contractors. That information is very valuable when the agency reviews bids on future projects.

He has had good and bad experiences with consultants and contractors. But consultants who have spoken on behalf of the agency and then leave their firm/project has given him “heartburn.” in the past. Also as noted above, he has had project managers and deputy project managers who were consultants, getting paid twice as much as the agency’s project lead. This has made it harder to retain the agency employee until the end of a project.

Stoppolecamp said when agencies have trouble retaining employees or rely too much on consultants, it can hurt their ability to successfully close out projects, a process that can take several years after construction has been completed and trains are running. Before a contract is closed, all deliverables must meet the agency’s satisfaction. This includes providing spare parts, warranty documents, and proof of insurance. In addition, all disputes need to be resolved between the agency and its contractors as well as between the contractors and subcontractors. Some disputes can be complex and contentious; for

example, a company that sued RTD in 2018 for \$111 million and lost, is now appealing the court's ruling.

Documenting lessons learned

Stopplecamp said, "No project, agency team, consultant or contracting teams is perfect. Getting into how the sausage is made can detract from the enjoyment of eating the sausage. But we all need to learn from mistakes and develop a method for sharing this information."

RTD has shared its experience with the transportation industry by publishing "lessons learned" documents in implementing projects. For example, it described lessons it learned from its Eagle P3 Project and remaking Denver's Union Station. In theory, these documents could be invaluable resources for project managers. Unfortunately, they have limited value.

Stopplecamp said that sharing lessons learned is a "nice concept", but other agencies need to talk with individuals involved in a project to really understand those lessons and the impact on the project and agency.

Stopplecamp explained how the RTD, like all agencies, needs to be careful when it reviews and documents a company's performance, because if the agency says that a firm did a "bad job," it could be held liable and if it says the firm did a "good job" that could be taken to mean good in all areas, which might not be the case. He said, "The best way to gain insight on a project is by talking directly with the team and relating your needs and concerns."

Someone who wished to remain anonymous told Eno that the lessons learned documents released by RTD were "worthless." He revealed how the agency decided to "remove the warts." because it did not want to air its "dirty laundry" and report that someone made a mistake because that could harm the credibility of employees, their supervisors, and the institution. A candid version of a lessons learned document would lead reporters, elected officials, and the general public to ask whether the agency took all the necessary steps and whether it was spending its money wisely. RTD did not even want to create an internal lessons learned document because "what if the local public radio station puts in an open records request?"

When Eno interviewed Stopplecamp, he revealed, "I don't keep notes anymore; notes are discoverable, and the only official record should be meeting minutes or official correspondence." He has learned that the hard way. The Colorado Open Records Act

allows the public and consultants to obtain all or any project documents unless deemed privileged. His notes in the past have been used for and against RTD in court.

He gave an example of a conflict that the transit agency could have had with any third-party entity. If his notes indicated that he thought that the third party was correct and the RTD was not, Stoppolecamp might be accused of undermining or not supporting the project team. On the other hand, if he wrote that the third party was wrong in his opinion, the consultant or contractor could claim that it should be relieved of that particular obligation. For instance, a disagreement could occur about who is responsible for gaining site access from a public street. A city could say it is the contractor's obligation while the contractor says the inter-governmental agreement indicates it is the city's responsibility. Stoppolecamp said, "If I write down in my notes my understanding, one side can use it against RTD."

What to look for in a project manager

Stoppolecamp identified the following characteristics that he looks for in project managers:

- Engineering mindset. Someone who can look at a project, tear it apart, and put it back together.
- Logical thinking.
- Understanding of what it takes to make a project successful.
- Knowledge of content, schedule, budget, and funding. He said that you cannot let any of these things get out of control.
- Experience working on large scale projects
- Knowledge of agreements and grants (since a project can be funded with ten different funding sources, project managers need to know which elements of a project can be used by each source)

He said the agency is "Asking for a lot, expecting a lot, and not paying."

Training

Stoppolecamp said that RTD project managers basically learn from "trial and error" and most learning "is hands on." RTD does not have a formal mentoring program.

He said, "unfortunately, project management is a hard skill to hone." That's why the consulting world hires the good ones "in a heartbeat."

He expects engineers to have learned about scheduling and contracts in school. The Project Management Professional programs, he said, provides generic training, but the not all coursework is relevant to federal transit projects.

He also recommended not hiring someone who has only managed the construction of buildings and expect them to build a transit line. Someone with highway and FRA experience would be a better fit, he believes.

Change orders and project managers

Every large construction project faces some unexpected conditions or events that require change orders. When that happens, Stoppolecamp explained how a good project manager, who understands the project from conception to grave, can save an agency money from private firms attempting to cover their mistakes.

An inexperienced project manager can be overpowered by a clever consultant team. Stoppolecamp said, some firms have been known to submit low bids and then ask for one change order after another. Some private firms have more sophisticated staff than a public agency's project team and are more willing to fight. They can take advantage of an agency that "doesn't want to be dragged through the mud in the press."

He described how some contractors have hired former agency staff who are adept at finding loopholes in contracts. For example, the specifications in a contract might stipulate that the rail should be 136 pounds per yard, but a drawing in the contract might indicate that industry standard rail should be used. A contractor could claim that 115 pounds is the standard in the transit industry and that the agency must pay an additional amount if the agency wants 136 pounds. This example highlights the importance of having well-qualified and experienced agency professionals preparing contract documents.

Mr. Stoppolecamp generously offered to discuss any of the information above in more detail with anyone interested.

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b. Rick Clarke



Richard (Rick) F. Clarke was an Assistant General Manager of Capital Programs at the Denver RTD, responsible for all the FasTracks program, between 2009 and 2015.

He has a bachelor’s degree in economics and a master’s in engineering. Before moving to Denver, he worked on transportation projects in Germany, New York, Cleveland, Boston, Dallas, and Philadelphia. As a consultant, he learned about systems integration, project controls, budgeting and schedule – skills that are all essential for managing large projects. In 2000, he went to the RTD to

manage the agency’s T-Rex project, a \$1.7 billion program that combined freeway reconstruction and a light-rail extension project.

When the CEO of RTD, Phil Washington, left Denver to become the CEO of LA Metro in 2015, Clarke followed him a few months later to manage LA Metro’s engineering and construction department. One of the reasons that Clarke left was because RTD was completing its large mega-projects on the FasTracks program and did not have a pipeline of similar size projects. He noted how the size and complexity of mega-projects provide unique challenges and opportunities in a professional career.

Recruiting and retention

When Clarke started at RTD, he saw that the agency had well-qualified experienced professionals who understood large rail projects and knew the local area. He used them as the core of his team. Maintaining “a core of experienced project management personnel” with “technical capacity” can help improve the quality and reduce the cost of projects, he said.

However, because funding at RTD was intermittent, he had trouble holding onto his team. Clarke also found it hard to recruit for project managers because the agency only

guaranteed them a position for the life of a project. “Go-getters wouldn’t worry about it. They’d say I want to work on it and get experience. There were many qualified people who wanted to work on the large projects and would have been great, but they had concerns regarding what would happen to their job when the project ended.”

He said, “it’s very hard to build a consistent pipeline of projects that can keep key core staff.” That is why RTD and LA Metro both hire consultants.

When recruiting potential project managers, Clarke could point out he had moved from Dallas to manage a Denver project. He would tell potential employees, “It’s the opportunity of a lifetime” and when the project is complete, “you may have to move, but there won’t be a lack of interest in hiring you.”

He said, “I felt terrible. People give so much to the project and when it ends, they’re told we don’t need you anymore.” Luckily, he knew, there is a great demand for their skills, and they can command a nice salary. In fact, he noted that many have gone on to successful careers at agencies and consultants.

Clarke was not the only project manager who went to California from Denver. He said that LA Metro was sometimes referred to as “Denver West.” Nadine Lee, an RTD project manager, went to LA Metro in 2016. She now heads the Dallas transit agency. James Starling left his position as RTD project manager in 2014 to work at Jacobs in San Diego on the Mid-Coast Light Rail project. And, Joe Christie, who was an RTD project director went to a Los Angeles firm in 2021.

Institutional knowledge

Clarke explained why retaining staff who hold institutional knowledge is important. An agency can build projects using similar design criteria and standards, but some information is only in a person’s head. For instance, an important part of managing a project is working with cities and jurisdictions. In Los Angeles, LA Metro often had a challenging relationship with the city. When an issue came up, he sought out agency staff who understood the issues and history.

He noted that compared to outside consultants, “Many transit agency professionals have built long term relationships with local jurisdictions that can be leveraged during the project. Also, local jurisdictions usually prefer to work with agency staff compared to consultants or contractors. In addition, agency personnel are embedded in the culture and relationships within the agency including key interfaces with the Operations Department – the ultimate customer.”

He said that an agency needs consultants, but “it’s important that the project manager be an agency person. Preferably someone local. An agency person makes better decisions in the long-term interest of the agency.”

Training

Most program managers are engineers, Clarke said, who don’t learn in engineering school how to present to boards, how to manage a budget, and the financial aspects of managing projects. Although Clarke revealed that he learned from the “school of hard knocks,” he does not recommend that for others.

When Clarke went to LA Metro, he had a program manager, Sameh Ghaly, who headed all the megaprojects. Ghaly emphasized the need to train the project management team, and he enrolled several staff members into a Harvard Business School program. Most of the LA Metro project managers went to training programs including Eno’s program. Phil Washington, LA’s Metro’s CEO, was very supportive of these efforts.

Clarke said, “Most people are like me” and say they “don’t have time for training. Most of us think about putting out the fire of the day and the hour.” Clarke credits Ghaly for taking the initiative on training.

Clarke identified two major problems with training. First, “a lot of training at the agency level is not directly relevant for high level people.” Second, “staff often don’t take it. It’s easy to put it off.”

Lessons learned from projects are also important to provide staff with knowledge of actual project experiences – both good and bad.

Planning to engineering, construction and operations

Clarke explained how the transition from planning to construction and then operations and maintenance can be problematic for managing projects.

Sometimes, the engineers felt that planners had passed down problems that could have been resolved earlier. However, the engineers often were not paying attention to issues raised in the planning process because the projects seemed so far down the road. The operators had their own concerns with coordination. They would say that engineers were building projects in an “expedient way that won’t be good for long-term operations.”

Clarke tried to address this problem by having both engineering and planning project managers work together. The engineering project manager would get involved in the planning phase and then eventually take over project.

He said, “It’s a healthy tension. The way to address it is by making sure departments are involved in every stage. Sometimes it’s hard. It takes resources including assigning qualified engineers with strong skill sets in design and construction to the planning phase. Likewise, operations personnel with the pressures of daily operations need to be assigned away from that area to planning and design.”

Project Managers and their CEOs

Clarke said that the success of project managers can depend upon whether they have a good relationship with the CEO. It can be helpful if the CEO has a background that included experience with large construction projects.

CEOs who have a background only in operations often have a different perspective than those who have been steeped in construction. Clarke said, “operators expect everything to happen the same way every day - that’s a mark of success. In construction, every day is different, and unexpected things happen.”

When agency heads do not understand construction issues and do not realize how many unknowns are associated with large transit projects, they can lose patience with project managers when an unanticipated problem occurred. Clarke said Phil Washington gave him the support that he needed. Washington was “not a construction person, but he understood and embraced it. He came to most partnering meetings with construction executives, and he could deal with the heads of construction. He could talk with a mayor about construction issues.”

Sometimes, Clarke needed Phil Washington to meet the president of a construction company or a mayor behind closed doors to resolve a problem. For example, when RTD was building a rail line to the airport, the line was on airport property for eight miles. The city wanted RTD to build additional grade separation and track for a potential second station on airport property. After Clarke told city officials that this extra cost was not in his project’s budget, he was told that RTD could not have the airport property. Ultimately, Washington and the mayor worked out a process that kept the project moving.

Relationship with contractors

Clarke said, “Good projects have partnering. Usually, the president and vice president of construction companies are involved. I needed equal representation from our side. Phil

[Washington] knew contractors on a first name basis.” He was able to work things about when contractors had big claims.

Clarke said, “I felt strongly we had to be fair with contractors. Not give away the store. Good relationships lead to better competition and better prices.” Sometimes, he faced internal criticism when he agreed to change orders that accommodated contractors’ requests. He explained, “If something is explicit in the contract, you can’t give in. Sometimes contracts don’t cover everything, though.” He cited an example of additional work that was needed after an unexpected problem occurred. Clarke agreed to pay for half the costs, after the agency and contractor could not agree on who was to blame.

He noted how the contractors he worked with “would do things at risk because they knew we’d be fair to them. That’s why it’s so important to have good terms with contractors.”

Attributes of good project managers

Clarke identified the attributes and skills he has sought when hiring project managers.

The number one trait, he said, is someone who can be a good decision maker. Project managers need to know how to make decisions. Some of them, he said, are afraid to do so.

He explained how project managers often have to make decisions quickly and stand by them. In construction, project managers often don’t have much time. For example, when a concrete mixer is on the way to the construction site, and the project team is still not sure of what type of wall should be built or the limits of where the wall would be built, you can’t say “form a study committee.” That is why, Clarke looks for the ability of a potential project manager to “make a decision, explain it, and move on.”

Project managers, he said, “need do lots of things.” They need technical skills as a base, but that “is just one part of the job.” A good project manager needs to know how to hire good people and trust them. They also have to be good communicators and understand the political world. “When they deal with city council members and county commissioners, they can’t give just technical jargon.”

Clarke described how project managers might need different skills depending upon the type of contract. For example, managers of public-private partnership projects need to be more aware of finances. Financial institutions that are paying for a portion of a project might have a team of sophisticated legal and technical advisors who are involved. Also, construction contract specifications are usually not as detailed in such

partnerships, so certain technical skills might not be as critical. However, on a complex design-bid-build project where the owner takes a more prominent role, the technical skills are critical.

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Nadine Lee, LinkedIn page, <https://www.linkedin.com/in/nadine-s-lee-08314124/>

Richard F. Clarke, interview with Plotch, December 15, 2022.

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Incorporated comments on draft of this document from Rick Clarke.

c. Robert L. Lund

Background

Robert Lund retired from Philadelphia’s Southeastern Pennsylvania Transportation Authority (SEPTA) in December 2021.

Between 2012 and 2019, he was SEPTA’s assistant general manager for engineering, maintenance, and construction – a department with over 1,500 employees. Although SEPTA has not built any transit megaprojects in decades, it is the fifth largest transit operator in the U.S. with an annual capital budget of approximately \$1 billion. Lund was promoted in 2020 to be SEPTA’s deputy general manager, responsible for all operations, infrastructure, revenue and non-revenue vehicles, real estate, and capital programs. He retired on December 31, 2021.

Lund’s background includes approximately 23 years working in the utility industry. After receiving his bachelor’s and master’s degrees in civil engineering, he worked at an engineering consulting firm and then the New York New York Power Authority.

He moved from utility design into project management / construction management because “the opportunities for advancement were there and I was tired of crunching

numbers.” He learned how to manage projects by “doing it for many years.” He described how his field experience was a valuable way to learn about construction. For two years, he provided technical engineering support for construction of a high voltage transmission line through the Catskill Mountains to the New York City area. He also managed utility construction projects; first one-at-a time, and then multiple projects, simultaneously.

SEPTA’s chief engineer who hired Lund in 2001, understood the commonalities between utilities and transit. They both involve linear projects on a right-of-way many miles long. They both have facilities (e.g., generating plants, shops, yards). They are both customer-focused and involve taxpayer money. Providing a utility service is also similar to operating trains because any delays and outages can have a major impact to customers.

Lund said, “I could have made higher salaries in the private sector, but I liked being able to do something for the public.” He did not seek out the limelight. “One of things I liked best was not to be in the public view. If I did everything right, the public wouldn’t see it. No one thinks about bridges or trains or power. They only think about it when the train or power isn’t there.”

Attracting and retaining: the salary differential

According to Lund, SEPTA’s “salary scale is not very attractive.” He took a significant pay cut when he started at SEPTA in 2001. He had personal reasons that made it worthwhile to move to Philadelphia, and he liked the challenges available at SEPTA.

For entry level engineers, the salary differential between consultants and SEPTA is approximately 5 to 10 percent, Lund said. At the higher levels, the difference is much more pronounced, approximately \$60,000 to \$70,000 per year. A project manager earns about \$100,000 at SEPTA, but about \$160,000 as a consultant in the Philadelphia area. He did note that SEPTA paid better than the City of Philadelphia or the state’s transportation department.

He has noticed that “young people, today, have a different mindset” than previous generations because they are not thinking about a job as a lifetime career at an organization. Potential employees are also not necessarily looking at benefits. “One of the key things SEPTA offered was a defined pension plan. But, younger candidates are just looking at how much money I’m putting into my pocket.”

Lund was never very successful at SEPTA hiring experienced managers from the outside because the pay scales were not attractive. The exceptions occurred when someone was particularly attracted by public service. The agency had better success hiring individuals

directly out of school. “We could be competitive at the entry level. We offered opportunities of design and field work, and young engineers wanted field work. They didn’t want to just do calculating and drawing all day.” Lund said that SEPTA gave young people “opportunities to learn.”

Lund admitted, “If we could hire and keep for someone for four years, we were probably lucky. They would get experience, their PE [professional engineers] license. And jump.”

In 2022, he took a position as principal program manager at the firm, Gannett Fleming. He noted how his supervisor and the person who his supervisor reports to were both hired by SEPTA. They left after approximately five or six years to work for consultants. Now, they are working on SEPTA projects as consultants.

Training

Early in Lund’s career, he took continuing education courses relating to scheduling, and technical fields such electrical inspection, electrical wiring, and fire protection systems. He also learned about contracting. “I had to know documents inside and out better than contractors.” Lund also took multi-day courses to become a certified code enforcement officer so that he could understand the permitting process and building codes.

Because he came from the design side, he sought out construction management experience so he could become a more effective project and program manager. Managing a project involves taking a concept through design to construction and closeout, while construction managers are responsible for only one phase of the project.

At SEPTA, Lund started a rotational training program where young engineers are rotated to different department so they could get experience in various fields such as design, analyzing data from track monitoring systems, and managing projects. After the engineers complete their training programs, they can go back to the department where they were hired, or they could go to another group. The department heads, he said, “didn’t necessarily like it because they were losing productivity for a year. But it was a way to keep the young engineers and develop talent.”

Lund said that SEPTA does not have “a true project management program.” He noted, “That’s much needed in the industry.” Project managers and engineers learn most of their skills from hands-on work experience rather than from any formal training. Sometimes, he said, “they learned to do things the wrong way, if they’re learning from someone who is not doing it well.”

Several schools in the Philadelphia area offer graduate and certificate programs in project management and construction management. For example, SEPTA has paid for engineers to pursue a master's in construction management at Drexel University.

Lund said that training is “supposed to be” a part of every employee’s annual performance review. Each employee is also supposed to have a development plan that helps employees identify ways they can fulfill their career goals.

Skills and attributes of project managers

Lund identified the following skills and attributes that he has looked for when hiring project managers. He noted that these measures are hard to judge in an interview.

He looks for individuals who are flexible and think outside the box when problems occur. They need to know how to weigh the pros and cons of various options, and not to be stuck in always doing things the way they have been done before. Lund had an important caveat to the concept of thinking outside the box. He noted how the project manager needs to follow rules and procedures.

He gave an example of thinking outside the box. SEPTA recently completed a 3.5-mile long rail restoration project to a station in Middletown, Pennsylvania. Before the station had closed in the 1980s, it was called the Wawa Station (it is located near the convenience store’s headquarters.) When SEPTA started actively thinking about naming rights, Wawa did not seem very interested. To get their attention, Lund changed the station name on the drawings to Middletown. After Wawa agreed to pay \$5.4 million for ten years of naming rights, the new Wawa Station officially opened in 2022.

Before selecting a project manager, Lund would identify the skill set need to manage it. Then, he said, “reality sets in and you look to see who you have on the bench that will actually be available. You’re not necessarily going to hire someone from outside the organization because of staffing constraints. You have to go through and see who’s on the bench that I could pull off a job and move. They might not have the exact skill set, but they are the closest. That’s part of the reality. There’s just so many heads. Even if you could find someone, maybe you can’t because of money. It’s a long-term commitment to bring in someone.”

Institutional knowledge

Lund explained why he would have preferred hiring more permanent employees rather than consultants. “Permanent employees are more invested in the organization and the project. There’s a different mindset than when you’re hired and gone, versus you’re the

owner and I'm going to be with SEPTA for a long time and I'll have to deal with it forever."

He also said that permanent employees have a different perspective on how something will impact riders. "Consultants will primarily think about how something is best for construction, and staying on-time and on-budget. But, if I lose riders in the long-term that's not the best thing." He also noted that employees have a better understanding of the operating rules, how to schedule trains and outages, and how to accommodate impacted riders and neighbors. Referring to SEPTA's customers, "we have to live with them forever."

Sources for Lund section

Bob Lund, interview with Plotch, November 1, 2022; Lund's resume.

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Incorporated comments on draft of this document made by Lund.

d. Zoe Robertson

Zoe Robertson left SEPTA in 2022 where she had been the senior director responsible for the capital program's project controls, quality assurance, and quality control. Robertson has an urban studies and urban planning background.

Hiring and retaining

Robertson said SEPTA has had trouble in the past few years attracting engineers just coming out of school. She thinks the "younger generation does not fully appreciate the value of health care benefits and pension" provided by the public sector.

She described the difference between salaries offered by SEPTA and consultants in the Philadelphia region. An entry-level engineer can earn approximately \$80,000 to \$100,000 at a consulting firm, but only about \$60,000 at SEPTA. Private firms are willing to pay construction schedulers with one or two years of experience approximately \$130,000, which is about \$40,000 to \$50,000 more than at SEPTA.

SEPTA had more trouble recruiting when the Covid-19 pandemic began in March 2020 and Robertson remembered that it got "really bad" after the Infrastructure Investment and Jobs Act was signed in November 2021. There was a "mass exodus" of staff -- one mile down Market Street -- from SEPTA's offices to Amtrak's Philadelphia office. Amtrak went on a big hiring spree and SEPTA could not match Amtrak's salaries.

Although SEPTA had expected a massive wave of retirement, the pace accelerated during Covid, and the agency had trouble finding qualified people, either internally or externally, to take on the jobs of retirees. Robertson referred to a brain drain that was most pronounced by a gap in the number of mid-career professionals who have 15 to 20 years of experience.

Retaining: Challenges in the Public Sector

Robertson, who went to work at Gannett Fleming in 2022, said that her work at SEPTA was much more stressful than is at the consulting firm. She cited SEPTA's responsibility to provide daily transit services and how "Each day 750,000 riders depend on SEPTA to get to their jobs, medical services, family, etc. Even employees that worked in the office, like me, felt the responsibility of working at a place that provides the essential service of moving people and has employees on the front lines."

People at SEPTA "really cared and were committed," she said, and the sense of responsibility was part of SEPTA's culture. "The whole building had that mentality."

Training

Robertson remembered SEPTA officials talking about the need for more training "ad nauseum." They knew training was important, but sometimes courses were not offered at convenient times, and "when you're short-staffed, there are no spare bodies to do the training."

Sources for Zoe Robertson section

Zoe Robertson, interview with Plotch, November 23, 2022.

Incorporated comments on draft of this document made by Robertson.

e. Evelio Hernandez

Evelio Hernandez is the assistant vice president for streetcar and systems engineering at DART, the Dallas Area Rapid Transit (DART). He manages project managers, engineers, designers, and contractors.

DART is now transitioning from an agency that built new rail lines to one that focuses on maintaining its assets. One of DART's last major projects was an extension of platforms at 28 light rail stations to accommodate trains with three cars.

Background

Hernandez has a bachelor's degree in mechanical engineering and a professional engineering license.

He took advantage of a unique opportunity to learn about DART's equipment and systems. Early in his professional career, he worked at GEC, a firm with a contract to help DART staff up its operations, maintenance, and engineering groups as it was opening new rail lines. For several years, Hernandez learned from the GEC team, which consisted of many seasoned professionals who had been working all across the country on light rail projects (including signals, communications, and power).

As DART was hiring maintainers for its new systems and vehicles, the agency's contractors provided the new staff with training program. Hernandez said, "I sat down in those training classes. I didn't realize how fortunate I was."

He later became a project manager at DART before getting promoted to assistant vice president. In 2012, he left DART to take a position at a private firm, the Shaw Group, working on delivering projects in Florida, Georgia and Texas.

He explained why he made the move. "Since DART delivered good projects and we participated in national industry forums, people got to know me. Shaw Group called me and said you could work out of Dallas. I said OK. It was hard to leave DART, but I couldn't turn it down. They offered me \$50,000 more per year, plus a \$30,000 signing bonus and a \$20,000 retention payment."

After an organizational merger, his unit at Shaw was disbanded, so Hernandez got in touch with his old friends at DART who offered him a position. Although his wife is retired, he has no plans to do so in the foreseeable future. About his work, he said, "I'm fortunate and I love it."

Training

One way that Hernandez stays informed of technical issues is by participating in APTA's Streetcar Committee. "We learn from each other," he said. Although DART is bringing in new people, equipment, tools, and implementing new procedures, "we don't do a lot of training," Hernandez said.

DART only has a few project managers. It relies upon consultants who help oversee projects and undertake project controls and systems integration. He has learned project management skills (such as scheduling and cost estimating) by experience and by watching how his consultants do so.

His department has a binder called “The Playbook” that provides information on how to manage projects, but it is not a formalized document.

Recruiting

In the summer of 2022, DART posted a position in Hernandez’s department for a project manager IV (the highest level for project managers at DART). The pay was approximately \$125,000 and the new hire would manage systems engineering and construction contracts relating to vehicles, signals, communication, fare collection, traction power design, and construction contracts and projects.

DART has a standard job description that Hernandez modifies as appropriate. The job posting identified the following minimum knowledge, skills, and abilities required:

- Bachelor’s degree from an accredited college or university in Civil Engineering, Mechanical Engineering, Construction Management, or related field.
- Eight years of progressively responsible experience managing engineering and/or construction projects and contracts, including overseeing the work of consultants. Transit experience is preferred.
- Registration as a Professional Engineer or Architect in the State of Texas, Project Management Professional Certification, or Certified Construction Manager is preferred.
- Working knowledge of federal, state, and local laws and regulations governing engineering and construction contracts; overseeing and organizing the work of others; systems, techniques, principles, materials, and equipment to be used, as well as high levels of proficiency in performing complex and challenging professional and technical work such as managing construction contracts, directing staff, and negotiating disputes. Excellent written and oral communication skills to effectively communicate with all levels, both inside and outside DART.
- High-level analytical and creative skills to find solutions to complex and technical problems.
- Ability to be dedicated to meeting the expectations and requirements of internal and external customers.
- Ability to provide challenging and stretching tasks and assignments to direct reports; supports equal and fair treatment and opportunity for all; cooperates with the developmental system in the organization.
- Ability to settle disputes fairly; can find common ground and cooperate with minimum noise.
- Ability to blend people into teams when needed; creates strong morale and spirit in their team; shares wins and successes; defines success in the whole team.

- Ability to scope out the length and difficulty of tasks and projects and measure performance against goals.
- Ability to use rigorous logic and methods to solve complex problems with practical solutions.
- Ability to figure out the processes necessary to accomplish tasks; facilitates effective brainstorming and builds consensus among team members; orchestrates multiple activities at once to achieve a goal; uses resources effectively and efficiently.

Hiring someone is challenging, Hernandez admitted, when you are “looking for someone who has 12 to 15 years of experience in transit design and construction. Some may have design; some may have construction. Some have highway experience, but not transit. The real challenge is some of these people come from the private side and our compensation isn’t the same.” He added, “If we posted \$100,000 and they want \$150,000 or more, there’s just so much we can offer.”

Given his own experience, he appreciates the benefits of the public sector. “In the consulting world, if they don’t have a job, you have to move on, or they let you go.”

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- DART, job posting for “Project Mgr IV-Systems Engineer,” posting dates: August 22, 2022 to September 11, 2022.
- DART, “Related Projects,” available April 2024, <https://www.dart.org/about/plans-projects-and-initiatives/expansion/d2-subway>
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f. Damian McShane



Damian McShane has had several positions at the Port Authority of New York and New Jersey including program manager, senior program manager, and program director. He is currently the assistant director for PATH Capital Programs at the Port Authority of New York and New Jersey.

McShane leads a department with 25 employees who are responsible for PATH's capital programs. PATH is the heavy rail system that connects Manhattan with the New Jersey cities of Jersey City, Hoboken and Newark.

McShane said "I cut my teeth" working on the rebuilding of the World Trade Center. "That was the ultimate training ground for project managers in the agency. As that organization disbanded, we created leaders in the agency."

He said the best place to learn how to manage a major transit is by working in a pressure situation with measurable deliverables where the project team has support staff for project controls, scheduling and finances. "It's a recipe for disaster without that support."

He was hired for his current position because of his World Trade Center experience. They "wanted me to duplicate it on a small scale." He had a vision of what he wanted to achieve regarding resources and breaking down silos between departments. Everything is resource driven, he said, from gaining access to tracks for construction (the PATH provides 24 /7 service) to having flag people protect contractors working on the railroad's right of way.

Recruiting and attributes seeking in project manager

When McShane first began identifying the needs of his department, he realized the importance of having project managers who were "politically astute." He gave this example of why it can be so important.

"Before we could shut down PATH's World Trade Center service for construction work, we needed to make sure that we vetted everything that we could dream of -- looking at outage times and durations, every service option, and productivity under different scenarios. Ultimately, we came up with alternative service plans. We worked with our government relations staff and made presentations to senior level management at the Port Authority, and to Hoboken City Hall and NYC's community boards. We told them what our plan was. We were responsible for articulating the need, strategy, and

alternatives, and why this was in everyone's best interest. We worked closely with others to identify alternative service plans and we came up with a program for expanding ferry service."

Like every other agency interviewed, McShane said he's "having some problems" hiring qualified and experienced project managers. That is why he has been trying to bring in employees from other parts of the Port Authority, including operations staff, and trying to develop them into effective project managers.

McShane said finding candidates with appropriate education and technical skills is not a problem. "The most difficult thing to find in a candidate is someone who can make decisions under pressure. People try to avoid making decisions. Compounding the problem is conflict avoidance." Finding people with communication skills is also very important to McShane.

He looks for people who can come in and are "willing to drive a project. Confronting problems is a challenge" for many people. McShane talked about he has worked with some great engineers who are not good project managers. They could design a complex structure, but not necessarily solve a problem.

Decision-making and communication skills are important because of the scrutiny that accompanies every decision. Identifying the most appropriate solutions requires communicating with other people and incorporating their input. Project managers need to evaluate options and articulate the best course of action, and they must run potential solutions and recommendations through several layers of management.

The ability to make decisions in a prompt manner is also critically important because a substantial amount of PATH construction work is scheduled for nights and weekends, so that the agency can minimize service outages to its customers. Decisions must be made without having to consult McShane and other senior officials. For example, if an overnight construction crew does not have all the equipment and people that they expected or a sudden downpour occurs, the project manager must quickly decide whether work should proceed or whether it should be modified or rescheduled. That places a great deal of responsibility on the project manager.

When interviewing candidates, McShane drills down in to understand how they have reacted to situations and addressed problems in their careers. That helps him determine if they are capable of making decisions. He gave an example of someone who said he was responsible for building a bridge. McShane would ask detailed questions about using

CAD, drafting design documents, interacting with the design team, consulting with contractors, and identifying shortfalls.

Retaining

Similar to SEPTA's experience, McShane's department has recently lost some experienced project managers to Amtrak. "Retaining is a problem," he said. He has noticed that "younger people don't seem to be as patient. We train people, give them lots of responsibility. We provide them support and expose them. And, then they run off." He has noticed that the contractors and engineering firms he works with are also having trouble hiring sufficient qualified staff.

In recent years, the Port Authority has relied more on outside firms for design. Since the agency is no longer conducting its own cutting-edge engineering, the work is less appealing. The agency's engineers are spending less time designing and more time managing contracts.

McShane has seen how some people can burn out from the pressures of managing large projects. Meanwhile, other individuals can become addicted to that pressure and relish working in an ever-changing, intense environment. Teams, he said, need some people who are happy with a slow day at work.

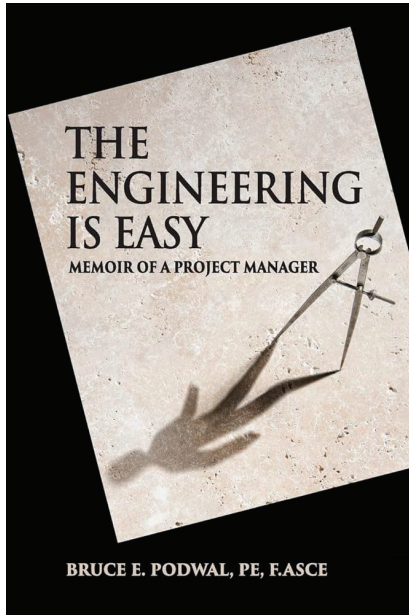
Sources for Damian McShane section

Damian McShane, interview with Plotch, December 16, 2022.

McShane's LinkedIn page.

Draft of this document reviewed by McShane.

g. Bruce Podwal



Over a six-decade career, Bruce Podwal managed major transportation projects across the globe including in Guam, Hong Kong, Houston, New York, and Turkey. He served on the board of directors and was president of several subsidiaries at Parsons Brinckerhoff, a 12,000 person engineering firm. Podwal has both a bachelor's and master's degree in engineering.

Early in his career, Podwal found most engineering tasks easy, and he presumed that managing engineering projects would be simple. However, he initially failed to grasp that management skills do not necessarily flow from technical competence. He learned the hard way about the challenges of managing and leading a team to a successful project completion.

Podwal explained the following:

Difference between a small project and a very large one

- Complexity is proportional to size; greater size means greater complexity. Continuous support and training are required to make the transition from managing small to managing large projects.
- Managing a very large project requires leadership, day-to-day guidance, and control of a complex array of interrelated projects, phases, and activities.
- The heads of very large projects have to trust their deputies and associates to share the management burden. They cannot micromanage. They must delegate so people know they are trusted, and so the managers can get their work done.

Skills of a good project manager

- Project managers need discipline, calm, and restraint.
- Project managers need to be good problem solvers who can envision options to get to desired endpoints, evaluate advantages and disadvantages of each option, and confidently move forward with the option that makes the most sense.
- Much of the *science* of project management is a list of dos and don'ts that one has to be rigorous about following. The *art* of project management is knowing what to do in the gray areas – this type of knowledge often can be gained only through the experience of making mistakes and observing the mistakes of those around you.
- It is difficult for individuals who are not engineers to manage a pure engineering project. They may not get the respect of engineers, if they cannot review the work that will be done. But, it is not as important to be an engineer, when a project is in

the planning phases, or it involves extensive interaction with elected officials and the general public.

Peer Reviews

- He highly recommends that project managers review other projects, periodically.
- Podwal was frequently asked to review someone else's project. The reviews helped him identify things that he should be doing on his own projects, and made him realize when he had been falling into bad habits.
- He has found that performing a peer review can help the reviewer as much as the reviewed.

Project Management one-liners

The following are some of the one-liners that Podwal liked to say, when he saw someone (or himself) making a mistake.

- Good project managers learn from their mistakes; excellent project managers also learn from the mistakes of others.
- Cost + schedule + quality = a constant. (It's usually wishful thinking to expect something to be cheap, fast, and good.)
- Building a cathedral. (Schedule monthly meetings of all staff so they can see how their effort is an important part of a major undertaking).
- Give credit, take blame.
- Criticize the action not the person.
- The engineering is easy. (Never underestimate the amount of effort require to do the administration and management of a project.)
- Govern by schedule, and costs usually come within budget.
- If it isn't in writing, it doesn't exist. (The best minutes are prepared and distributed right after a meeting ends, when facts and nuances are still in everyone's minds.)
- Read your contract from cover to cover (including every attachment, appendix, and reference document), at least once a month.
- There is no one-size fits all for a project organization structure.

Sources for Podwal

Bruce Podwal, *The Engineering is Easy: Memoir of a Project Manager*, 2019.

Plotch, interview with Podwal, February 2, 2023.

Incorporated comments on draft of this document made by Podwal.

Appendix 4. Interviews with advisory committee members

This appendix summarizes interviews conducted with six of the study’s advisory committee members. Note that insights from Michael Horodniceanu and Peter Rogoff were incorporated into the Seattle and New York sections of this report.

Advisory committee members

Matt Colvin	Transportation Trades Dept, AFL-CIO
Pat Foye	CEO, ASTM N.A.
Michael Horodniceanu	NYU
Rich Juliano	American Road & Transp. Builders
Jeff Paniati	CEO, Institute of Transp. Engineers
Karen Rae	Senior Strategic Advisor at STV
Peter Rogoff	Contorta Group (former FTA Administrator)
Denise Roth	Pres. U.S. Advisory Services at WSP
Beverly Scott	Senior Fellow, Transportation Learning Center
Kimberly Slaughter	CEO, SYSTRA USA

Organizational Issues

The committee members discussed the importance of ensuring agencies are prepared to manage large transit projects.

- Staffing up for a project and developing a culture for project delivery is extremely challenging. Transit agencies should conduct organizational assessments (a comprehensive review of their people, processes, and systems) so they are prepared to plan and build large transit projects. An agency with extensive experience operating and maintaining bus services may need to undertake numerous changes before it is prepared to take on a large capital project.
- State highway departments tend to have “more horsepower and history” in constructing major new facilities.
- When contractors decide whether to bid on a project and how much they should bid, they consider the agency and the project manager. If contractors have a high level of uncertainty about either of them, they are not going to bid on a project.
- In Denver, when there was not a solid prospect to fund future expansion projects, people who were passionate about making changes followed their CEO, Phil Washington, when he went from Denver’s Regional Transportation District (RTD) to LA Metro. They knew he would be successful, and he had a reputation for empowering people and building them into successful roles.

- In the Minnesota's Twin Cities area, collaboration is inherent in nature of the people who live and work there. People have conflicts, and they disagree with each other, but they are generally nice and work together. Staff can also see career ladders, potential for growth, and numerous opportunities.

Training

- The committee members noted that private consulting firms (e.g., HDR, HNTB, SYSTRA) do a better job training project managers than transit agencies do for five reasons: (1) Solid project managers are the key to a consulting firm's bottom lines; they make a profit for the firm; (2) They make sure clients and their staff are happy; (3) They are responsible for delivering projects on time, on quality and on budget; (4) If they do a good job and build solid relationships, the client and others will want to hire the firm, again; (5) Since project managers are such an important asset, training is seen as an investment to make them successful. Training involves everything (e.g., understanding different personalities, receiving information, improving communications styles, using a spreadsheet).
- In the public sector, more training is done on the job (e.g., mentoring, trial and error).
- Some public agencies rely on the National Transit Institute's programs, but they are not as extensive as they need to be, nor as robust as those offered in the private sector.
- Selected agency staff should be given an opportunity to rotate through different departments so they can understand the business from different departments and strengthen interdepartmental relationships.
- Eno and APTA leadership programs are valuable for agency staff.

Institutional knowledge

- Agencies need to document institutional knowledge rather than relying upon people's memories. At one time, agencies hoped to hire a young professional who would work at their organization for 40 years. For various reasons, that rarely happens today. Because of the turnover, the need to document and transfer knowledge is even more important requiring agencies to change how they think about retaining knowledge.
- When projects move planning to design to preliminary engineering, that usually involves separate departments with an agency. A wealth of information gleaned throughout a project can be lost. Experience should follow the project, which means understand project development and program delivery in a different kind of way.

Using consultants

- The private sector can attract professionals with higher salaries.
- Agencies often must rely on consultants because elected officials are not willing for public agencies to pay high enough salaries to attract talent.
- When transit agencies are building one project after another, it is more cost effective for them to hire in-house staff.
- Using consultants allows agencies to scale up and down, based on their needs.
- There is no optimal ratio to determine the appropriate number of consultants needed for every staff member. The size of the consulting team depends on the agency's location, the size of its capital program, and the availability of its staff. If an agency has multiple large projects, it can have a larger core staff and develop a pipeline of talent. If an agency is only undertaking one project, it makes sense to have more consultants.

Hiring and promoting

- Agencies need to institute rigorous assessments to understand how employees are managing their work and whether they have the skills and experience to move up.
- Private companies are readily hiring young professionals. The biggest gap they have is finding experienced project managers who can serve as mentors.
- Transportation agencies need more people go into a wide range of fields relating to large projects. Not just engineers, but also planners, financial managers, and architects.

Challenges faced by project managers

Transit agencies and their stakeholders expect a lot from people who manage projects and deliver it well:

- Project managers have to deal with promises that were made because of political pressure. Often projects have been underfunded and the costs underestimated. Project managers can start their jobs knowing that they are doomed to not succeed because they were not the ones who came up with the funding and cost estimates. Those who insist that a project manager meet a deadline, oftentimes are not aware that the schedules are not realistic.
 - Each project is sui generis (unique) – a one off.

Project manager experience and skills

- When hiring a project manager, transit agencies shouldn't just think about the skills and experience required by one person. No one person has skills to successfully lead a project. They need a strong team with a wide range of expertise, such as legal and financial.

- Technical knowledge is the easy side. Managing multiple sets of stakeholders is hard.
- A project manager is like a football coach; the head coach should not be calling the offensive plays. Managers need to listen and communicate with their coaches. They need to orchestrate, and deal with both the political and technical sides of projects. They must hire the right people, and look at the whole project, not getting too immersed in details and stuck in the weeds.
- Need different level of temperament and greater level of sophistication to manage a large project compared to a small project.
- Best project managers are those who don't think they can do it all themselves. The most successful ones are relationship builders who hold people accountable. They don't have an attitude that they are the smartest person in the room.
- Want a phenomenal leader and manager who can build trust.
- Don't necessarily need to be an engineer. Need to have enough knowledge and experience to understand the project. No engineer has enough knowledge for the entire breadth of a project.
- Need to find someone with a dedicated record of success.
- Sometimes project managers are unsuccessful when they feel like they have to be in charge, and they are the experts. It takes a certain level of confidence and vulnerability to be comfortable in knowing and admitting what one doesn't know.

Sources for advisory committee member section

This section was based on interviews conducted by Philip Plotch with Matt Colvin, Jeff Paniati, Karen Rae, Beverly Scott, and Kimberly Slaughter.

Appendix 5. Recommended training programs

This appendix describes training programs, recommended by multiple interviewees, that are offered by the (a) American Public Transportation Association, (b) Eno Center for Transportation, and (c) National Transit Institute.

Some programs are online, some in-person, while others are hybrid. Strictly online courses are typically not as effective as those offered in person. When participants schedule time away from the office and sit alongside their peers at other agencies, they have more of an immersive experience. Online courses can attract many more participants and dramatically lower the time and costs incurred by agencies. However, if class participants check their email and try to perform their day-to-day work while taking an online course, they are not getting as much out of the lessons. Likewise, the participants do not have the same level of interaction with each other and with the instructors.

a. American Public Transportation Association

The Leadership APTA program is designed to improve senior and executive-level leadership skills. The year-long program includes executive roundtables, skill-building workshops, conferences, and team-driven capstone projects. The program is designed for experienced leaders (working for public transportation systems and related organizations) who aspire to hold senior and executive leadership positions in their organizations, in APTA, and the public transportation industry.

Only employees of APTA member organizations are eligible to participate. Candidates must have at least 10 to 15 years of significant work experience in the public or private sector, including at least three years or more of transit industry experience, plus a track record of demonstrated career progressions and successes. Candidates must be at a director-level or equivalent position or higher. The tuition fee for the program is \$7,500 (not including travel and hotel expenses).

The program includes the following:

<i>Timeline</i>	<i>Elements</i>
September to October at APTA's TRANSform Conference	Joint workshop session with previous class. Opportunities to attend APTA committee meetings, hear capstone presentations given by members of previous class, participate in conference sessions and related events.

November	Virtual meeting.
December	In-person workshop in Washington, DC.
January to April	Virtual meetings and workshops.
May	Workshops in conjunction with APTA Legislative Conference.
Spring and Summer	Capstone project teamwork including team planning and discussions, industry interviews, teleconferences, virtual practice sessions.
June	Capstone Executive Session.
September at APTA's TRANSform conference	Opportunities for graduating class members to deliver leadership project presentations during committee meetings/conference sessions.

Recent capstone projects have included:

- Cultivating a Positive and Productive Organizational Culture
- Developing the Transit Workforce: A Strategic Approach to Growing the Talent Acquisition Ecosystem
- Reframing Existing Indicators
- Safe for All: An Innovative Systems Approach to Enhancing System Safety
- Transit Financial Cliff – A Toolkit for a Soft Landing
- Transit Impacts on Gentrification – Where Do the People Go?
- Unlocking the Power of Artificial Intelligence in Public Transportation

Sources: APTA's web site

- <https://learning.aptagateway.com/emerging-leaders-2023-capstone-projects>
- <https://www.apta.com/research-technical-resources/aptau/leadership-programs/leadership-apta/program-timeline/>
- <https://www.apta.com/research-technical-resources/aptau/leadership-programs/leadership-apta/>
- <https://www.apta.com/research-technical-resources/aptau/leadership-programs/leadership-apta/goals/>
- <https://www.apta.com/research-technical-resources/aptau/leadership-programs/leadership-apta/eligibility-2>

b. Eno Center for Transportation

Transportation Senior Executive

Eno's Transportation Senior Executive program (TSE) is designed to refine leadership and high-level intrapersonal skills, and help participants apply strategic techniques to

real-world challenges. The program is tailored specifically for senior-level managers in the transportation industry.

The TSE week-long program, held once a year in the D.C. area, includes the following topics:

- Organizational Culture and Performance
- Organizational Communication
- Harnessing Critical Leadership Skills
- Collaboration and Innovation
- Cultivating Board and CEO Relationships
- Building Teams and Inspiring Talent
- Attracting and Retaining Talent
- Change Resiliency
- Adaptive Leadership
- Conscious/Mindful Leadership
- Transportation Funding & Legislation

The cost to attend TSE program is \$6,300 not including travel and hotel expenses.

Eno/MAX (Multi-Agency Exchange)

Each year, three to four agencies are grouped together to form an Eno/MAX cohort. Each agency selects eight high-performing employees to participate in the program. They are typically front-line to mid-level managers, many of whom have gone through internal management development and training programs. This cohort of students then visits each agency in their group during the year. Three days of Eno's leadership skill instruction is built into the course.

For the participants, the program benefits are:

- Improve technical knowledge and performance
- Forge connections within a peer network
- Gain insights into the home agency's role in the industry at large
- Hone leadership techniques and elevate career skills
- Provide tools to advance career

Transportation Mid-Manager program

Eno's Transportation Mid-Manager program (TMM) is designed for mid-level managers, in both the private and public sectors, across all transportation modes. Participants have at least two years of experience in the transportation industry and a

minimum of 3 years at the supervisory level. They engage with their peers, along with Eno's executive coaches, leadership faculty, experts, guest speakers, and staff.

The weeklong program is designed to improve leadership skills. Participants take part in individualized coaching sessions, learn strategies to elevate communication skills, and improve their strategic and critical thinking skills. Tuition is \$5,200.

Sources: Eno's website

TSE: enotrans.org/course/tse25/#program-schedule—logistics

Eno/MAX: enotrans.org/professional-development/eno-max/

TMM: enotrans.org/course/tmm25/

TMM2: enotrans.org/course/tmm2-2025/

c. National Transit Institute

The National Transit Institute (NTI) provides training programs for transit professionals. Most of the program attendees work at public sector transit agencies; others work for municipal, county, and state governments, as well as MPOs. The training programs are funded by the FTA. Billy Terry, the former NTI executive director, says that that NTI is a vital asset for transit agencies because most agencies do not have enough resources to properly train their staffs.

NTI offers approximately 40 different courses taught about 180 times per year. Nearly all of them are conducted virtually. One of the distinct advantages of their courses is that they are tailored to transit projects that must follow FTA regulations.

NTI's classes are free! Many of its courses are filled up and have wait lists, right after the class dates are posted online.

Two General Project Management Courses

Two general NTI courses directly relating to managing large transit projects are: (i) Project Management for Transit Professionals, and (ii) Management of Transit Construction Projects. The courses attract a wide range of participants with a wide range of backgrounds, interests, and experience.

(a) Project Management for Transit Professionals

This introductory course, given over four half-days, is designed to help transit professionals appreciate the importance of analyzing, leading, and managing transit projects. Topics include: project lifecycle and associated deliverables, project

management plans, statements of work and work breakdown structures, developing realistic project schedules, using earned value to control and report project status, leadership and teamwork development, and communicating with stakeholders. The course relates to a wide range of projects that staff at a transit agency might manage, including the installation of new software.

(b) Management of Transit Construction Projects

This course, given over three full days, explores best practices in managing transit construction projects. The topics covered include project management plans, procurement, public involvement, managing risk, managing design, managing construction, quality assurance and quality control, managing testing and start-up, system operations and construction safety. Some of the requirements in the FTA Project and Construction Management Guidelines and the FTA Construction Project Management Handbook are incorporated into the course.

The course has five modules: developing a project management plan, developing a project-specific management organization plan, principles of managing and controlling construction projects, managing the project during the design phase, and managing the project during construction / start-up / close out.

Class activities are designed for the students to apply course concepts. For example, one activity demonstrates how a schedule is developed to construct a bus shelter. The students discuss potential activities (e.g. permitting, purchasing materials, placing concrete, erecting shelter, painting, etc.), the duration of potential activities, and the relationship between them. The instructor then describes a visual tool that can help project managers schedule activities and understand how they relate to each other.

Evaluations

Eno reviewed recent student course evaluations for the two courses and found that nearly all respondents either “agreed” or “strongly agreed” to the following statements:

- The pace of the training is appropriate.
- The course content met my expectations.
- The course content is applicable to my job/role.
- The course activities reinforced the course content.
- I would recommend this course to other staff at my agency or staff at peer agencies.

Eleven More Detailed Courses

The two general project management courses are ideal for professionals seeking a general overview of project management. The NTI also offers courses that provide much more details about specific topics including the following 11 courses:

FTA Real Estate Requirements: This course introduces students to the issues relating to the acquisition of real estate and the displacement of persons for FTA funded projects. Topics include appraisals, appraisal review, negotiation, relocation, and the development of acquisition management, and relocation plans.

Principles for Effective Management and Supervision: This course examines fundamental and advanced leadership actions, behaviors, and principles. It also presents concepts relating to motivating, coaching, leading, and communicating with teams, peers, and executive management.

Procurement I – Orientation to Transit Procurement: This is an overview of transit procurement and emphasizes “best practices” for contract procurements by FTA grantees.

Procurement II: Risk Assessment and Basic Cost or Price Analysis: This second of a four-part series is designed to strengthen the procurement practices of transit authorities by improving the ability to perform cost and price analysis.

Procurement III: RFPs and Competitive Contract Negotiations: This third procurement course provides participants with a negotiation skill set. The participants gain a greater understanding of when to negotiate and how negotiations are impacted by what is being procured.

Procurement IV: Contract Administration: This last procurement course focuses on how a good contract administration system should look and how it should function after contract award.

Public Involvement in Transportation Decision-Making: This course is designed to help participants strengthen their project decision-making skills, increase creativity in problem-solving, and make sure project solutions are more durable.

Quality Assurance and Quality Control in Transit: This course provides an overview of the essential components of quality assurance and quality control in transit agencies, relating to capital development, transit operations, maintenance, and vehicle acquisition.

Risk Assessment for Transit Capital Projects: Participants learn the purpose of a risk review, necessary preparations required to undertake a risk assessment, principles of the methods used for risk assessment, and how such assessments are applied to the project management process.

Transit Noise and Vibration Impact Assessment: This course presents FTA's procedures and methods for predicting and assessing noise and vibration impacts from proposed transit projects.

Understanding ADA: This course provides transit professionals with a basic understanding of the fundamentals of accessible public transportation under the Americans with Disabilities Act of 1990 (ADA).

Sources for NTI section

- NTI course descriptions.
- Philip Plotch, interview with Billy Terry (NTI executive director), via Zoom, May 7, 2024.
- Plotch took the Project Management for Transit Professionals course conducted online May 20 through May 24, 2024.
- Plotch, interview with Rob Jaffe (NTI Instructor), New York, June 20, 2024.
- Slides, instructor materials, handouts, and activities for the two general project management courses.
- Student evaluation summary reports for the two general project management courses.
- *Incorporated comments on draft of this document made by Jaffe.*