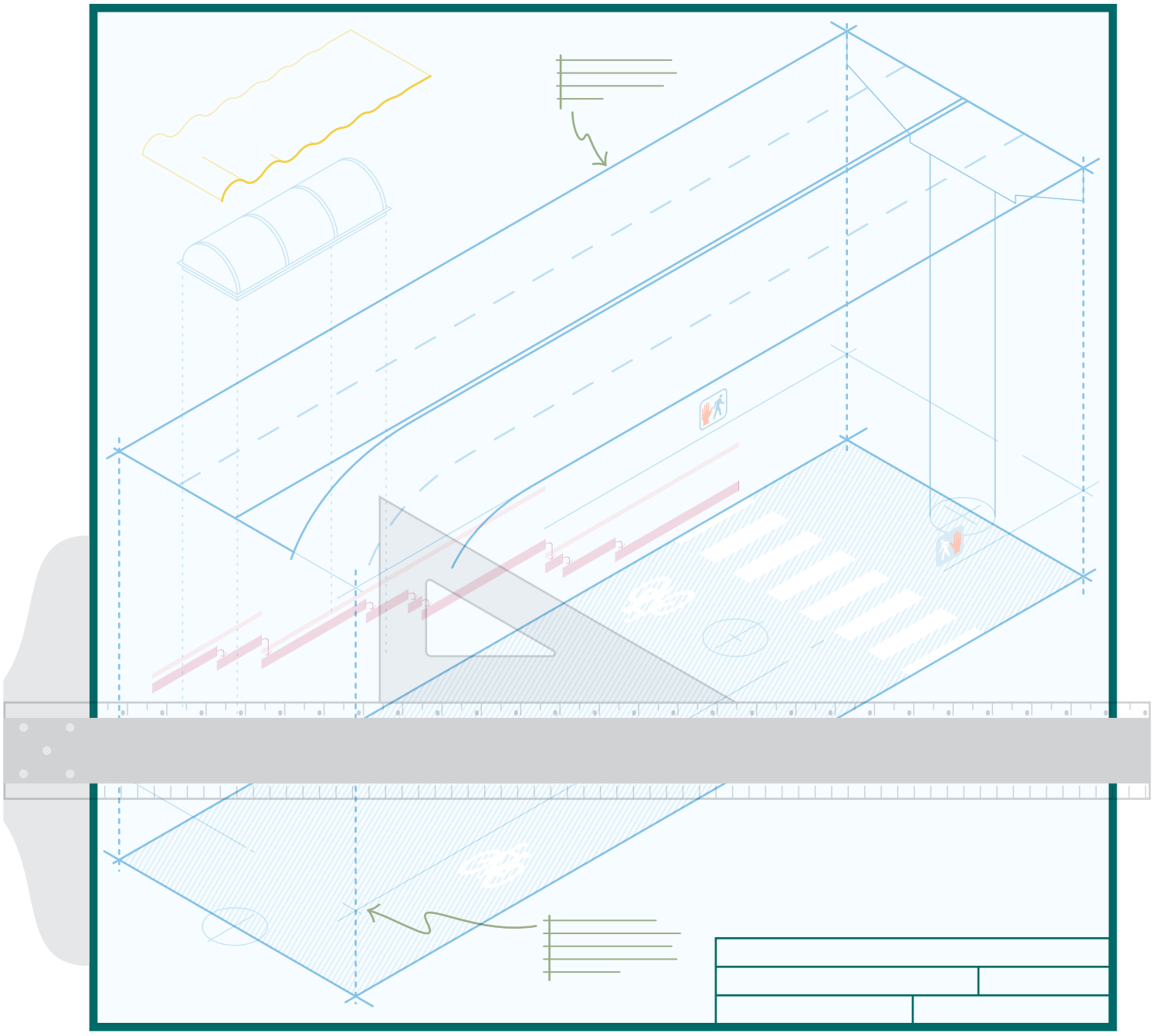

Transportation Capital Projects Delivery Study

San Francisco
County Transportation
Authority

Draft Report: July 2023

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Executive Summary

Study Purpose and Methods

On July 27, 2021, at the request of Chair Rafael Mandelman and then Vice Chair Aaron Peskin, through Resolution 22-04, the Transportation Authority Board appropriated Prop K sales tax funds for Transportation Authority staff to lead a review of current City and County of San Francisco (City) business practices for delivery of large-scale transportation capital projects. The goal of the review was to identify lessons learned and to develop recommendations to improve project delivery performance and outcomes, e.g., on-time, on-budget and of high quality, toward promotion of San Francisco as an "Owner of Choice." The study scope assessed the current state of inter-agency capital project delivery practices, including review of existing case studies on recent complex interdepartmental projects, expert interviews and workshops. Key contributors included an inter-departmental Executive Roundtable comprised of City department Executives and a Management Working Group (MWG) comprised of senior management from each corresponding department.

Findings

The study findings are based on information gathered from previous studies, workshops with the inter-departmental Executive Roundtable and MWG, focus groups, one-on-one interviews, and surveys.

Many recent studies have found that large, complex transportation projects are challenging to deliver on-time and on-budget, due to factors within and outside of project owners' control.

UC Berkeley's Center for Law, Energy & the Environment reports that California has a relatively mixed record in terms of delivering rail transit projects:

On average, according to a national and international comparison of costs and timelines…, California rail transit projects do not significantly over- or under-perform compared to their national or international counterparts. But these projects have nonetheless become slower and costlier to build compared to previous decades, which harms the public acceptance of future investment.[1] Teams delivering large transportation projects in San Francisco experience major challenges due to the complex interdepartmental owner's entity, geographic constraints on traditional laydown areas and storage access, unreliably mapped infrastructure in seismically

1 Ethan Elkind, Emmett Institute on Climate Change and the Environment, "Back in the Fast Lane: How to Speed Public Transit Planning & Construction in California" (August 2014), available at https://law.ucla.edu/sites/default/files/PDFs/Publications/Emmett%20Institute/_CEN_EMM_PUB%20Back%20in%20the%20Fast%20Lane.pdf.

sensitive and varying geotechnical conditions, and difficulty with contracting methods, among other factors.

The Transportation Authority study team led the MWG through a series of Process Improvement workshops and exercises and found that there was a need for reform and innovation in the City's Capital Project Delivery processes. The primary findings included the need to:

- Streamline the City department decision making processes by focusing on timely decision-making and improved communication across departments. This includes establishing clear roles and responsibilities across departments to achieve a "One City" project delivery objective.
- Develop a consistent set of Project Management procedures, standards and practices across departments. This pairs with empowering project managers and giving them the resources to perform their work effectively, while holding them accountable for project delivery.
- Provide additional training for Project Managers and expand access to state-of-the art project management tools and software to improve tracking of project scope, schedule, and budget.
- Accelerate hiring of needed project staff and streamline procurement of consultants.
- Improve collaborative risk identification and management processes.

Recommendations

The MWG developed the following five recommendations. These recommendations were evaluated both in terms of potential positive impact on interdepartmental project delivery and ease of implementation.

1. **Establish a Capital Project Management Office (CPMO):** Create a CPMO led by a Director of Transportation Project Delivery and supported by existing department leadership with additional subject matter experts for major interdepartmental capital projects. The goals of the new office would be to provide consistent, coordinated decision-making support, champion needed project management resources and promote effective inter-departmental and external coordination and communications:

   » The CPMO would issue project management guidelines and be a resource for large, complex projects and provide consistency reviews on a quarterly basis and/or at major project development milestones such as Planning, Environmental, 35%, 65%, 100% design, Right of Way Certification, and through Construction.

   » The CPMO would help procure needed technical expertise (city staff or consultants) and promote needed investments (such as joint training or technologies) to ensure that projects have proper resources for success.

   » The CPMO would ensure timely decision-making, where needed. The new Director would report to the City Administrator's Office (CAO), working closely with the Capital Planning Committee.

   City departments are already incorporating many project delivery lessons learned and best practices on projects like the Geary Rapid and L Taraval Rail Replacement projects. Potential projects that could pilot the CPMO approach include:

   » Better Market Street Project

   » The Portal (DTX) Project Delivery

   » Other large, complex projects involving multiple City departments

2. **Strengthen Construction Cost Estimating processes:** Invest in construction cost estimating expertise to perform detailed constructability reviews and detailed cost estimates beginning early in the design and pre-construction phase. The goal is to provide reliable cost estimates and contingencies to inform the project scope and budget.
3. **Invest in Right of Way and Utility Investigation Programs:** Increase utility identification services such as potholing, radar detection and other industry best practices to inform project designs and risk registers. The goal is to proactively plan, budget and implement necessary right-of-way and utility relocations in a timely manner to avoid costly delays and impacts to adjacent businesses and residences during the construction phase.
4. **Expand Collaborative Interdepartmental Risk Review and Management:** Require additional investment in cross department risk analysis during the planning, programming, design and construction phases. Expand staff knowledge of risk planning and mitigation across all engineering and project delivery disciplines. The goal is to proactively assess, manage and decrease risk as a project moves through the project development process.
5. **Facilitate Structured Collaborative Partnering:** Encourage interdepartmental team building using structured partnering (similar to the SFO Model) throughout the life of the project. The goal is for the teams to build trust, identify issues and resolve problems at the lowest responsible level. Additionally enhanced training for City Project Managers would support the ability to reduce significant impacts to budget, schedule and quality while emphasizing City department's "Teamwork, Transparency, Trust, Respect, and Communication."

In addition to the five primary recommendations listed above, the following additional recommendations were discussed with the MWG as worthy of consideration to institute:

6. **Invest in improved software solutions:** Improve overall project controls, design management, Requests for Information and submittal response, construction change order processing, timely payment, etc. The goal is to improve project management and issues tracking, as well as payment of vendors and contractors in a timely manner to avoid costly interest/finance charges and improve contractor relations.

7. **Provide Project Management Training:** Invest in joint City staff training on project management and, as appropriate, industry best practices for implementation of alternative project delivery methods such as Construction Manager/General Contractor or CM/GC and Progressive Design/Build. The goal is to develop and cultivate this new project delivery expertise to move towards quality-based selection for large, complex construction contracts.
8. **Strengthen Strategic Partnerships:** Launch initiative between City departments and third-party stakeholders, e.g., Bay Conservation and Development Corporation (BCDC), PG&E, Caltrans, affected property owners. The goal is to engage external stakeholders in a proactive way and develop improved coordination protocols and issue escalation procedures.

Study Development Process

The Transportation Capital Projects Delivery Study was requested by Transportation Authority Chair Mandelman and Vice-Chair Peskin in 2021 with the aim of understanding and uncovering barriers to efficient capital project delivery, identifying process and policy improvement opportunities, increasing collaboration between project partners, and improving measurement and accountability.

The study objectives were accomplished by identifying new practices that could reduce risk, improve schedule and cost management, while incorporating more empathetic communication and collaboration into business practices. The result would also include more clearly defined success standards, metrics, and performance tracking.

The study team conducted workshops, surveys, and interviews between January and June 2022. The workshops included an Executive Roundtable Kick-off, case study and report reviews, three sessions with the MWG, multiple surveys, and one-on-one interviews with each of the City departments. A detailed description of the study approach is included in Appendix A. The general inputs, process, and outputs can be summarized as follows:

Inputs

The inputs for this study included project case studies, best practice guides, participant surveys, workshops, expert interviews, and documents developed by the San Francisco Collaborative Partnering Steering Committee (see Background Materials presented in Appendix B). A list of the Project Case Studies is presented in Appendix C.

Process

Following convening of the Executive Roundtable, the workshops included key City departments senior management and technical staff regularly involved in complex transportation projects. The workshops gathered lessons learned, best practices, and barriers to successful project delivery through group discussions. The participants were given surveys on current practices and potential priority improvements in an effort to develop a set of research-based recommendations that would improve project delivery. A more detailed description of the workshop outcomes is presented in Appendix A. Some of the key discussion topics include:

WHAT IMPROVEMENTS ARE CURRENTLY BEING MADE?

- Improving collaboration and communication across City departments through partnering and other processes, despite separated department structure.
- Implementing Alternative Project Delivery which attracts top contractors and enables contractors to assist with planning and design, improving project outcomes.
- Empowering Project Managers and each member of the team to manage the project, identify risks and deal with issues in a timely manner.

WHAT TOOLS OR PRACTICES ARE FURTHER NEEDED?

- Streamlining of administrative processes and procedures for projects to:
  - » Ensure more timely execution and payment of monthly invoices and change orders,
  - » Simplify contracting rules preventing the development of cohesive project teams
  - » Simplify hiring requirements, to recruit and retain top talent
- Build a "One City" mentality by improving consistency of project management tools, training and decision-making procedures.
- Develop early budgeting and financial structures to improve cost estimation accuracy and consistency.

Recommendations

The following recommendations for Continued Process Improvement aim to foster improving transportation project delivery. The recommendations are first steps toward incorporating "Best Business" Practices which should lead to more timely delivery of projects and adherence to construction cost estimates.

To become an "Owner of Choice" requires many culture and practice changes: A "Team Building" mindset is imperative for the City to be successful. Building a "Trust Based" working environment is a fundamental building block. Timely functions from invoice payment to decision-making are also instrumental.

Success will require strong Executive Management commitment and an initial and continued investment to implement these recommendations.

This is a good time to improve the City's collective business practices as the next big wave of transportation infrastructure investment is under development.

Recommendation 1: Establish a Capital Projects Management Office

Create a Capital Project Management Office (CPMO) led by a Director of Transportation Project Delivery and supported by department leadership.

SUMMARY

Establish a CPMO within the City Administrator's Office which would be led by a Director of Transportation Project Delivery. The project-based CPMO would be comprised of liaisons from department leadership and be supported by key staff as well as a bench of independent subject matter experts to support, guide, advise on and provide peer review of select Interdepartmental Projects. Select large-sized projects requiring extensive interdepartmental coordination (for example the Better Market Street project) with high complexity (scope, duration/intensity, stakeholders/environment) are potential candidates.

The CPMO would provide review of projects on a quarterly basis and/or at major project development milestones such as Planning, Environmental Clearance, 35%, 65%, 100% of design. Right of Way Certification, and Construction. In each of these stages, the CPMO would support application of best practices/agreed project management protocols and help procure needed technical expertise (City staff or consultants) as needed. The goal is to provide consistent, coordinated, and empowered decision-making support. The CPMO would also champion needed project management resources (training/technology/software systems) and promote effective overall communications.

OBJECTIVES

Provide interdepartmental empowered decision making by enabling the CPMO Director of Transportation Project Delivery to report directly to the City Administrator's Office (CAO), Capital Planning Committee.

- Create effective mechanisms to identify and support incorporation of best practices, for the City departments, to refine and implement them for large, complex interdepartmental projects.
- Inform initiatives related to other recommendations in this report concerning citywide policies that ensure access to project management resources and support services, e.g. joint trainings and partnering sessions, technologies and software systems, and staff hiring or procurement of specialized consultant support.
- Empower the CAO to serve as final decision-maker in case the interdepartmental CPMO cannot come to a resolution.
- Ensure consistent and effective communication across multi-agency teams and with external stakeholders.
- Provide a funding source to support the additional cost estimation, risk management and utility investigation services to support successful project delivery.

BENEFITS

The creation of a CPMO for large, complex, interdepartmental projects would ensure that these projects benefit from:

- More timely decision making
- Standardization of key processes across departments
- Consistent and more accurate project delivery estimates and results
- Reduction in costs and schedule overruns
- Improved overall communications with the numerous external stakeholders with the goal of better planning for construction implementation and minimizing negative impacts to adjacent residents and businesses
- Enable the creation of a "One-City" culture across the departments

SUGGESTED IMPLEMENTATION PROCESS

- Create a funding mechanism to support the new CPMO, e.g. potentially a small percentage of large, complex construction budgets, to establish and maintain the interdepartmental CPMO.

- The CPMO would be comprised of a Director of Transportation Project Delivery, department leadership), key staff and independent subject matter experts for large, complex interdepartmental projects.
- The CPMO would guide and advise project teams to ensure City protocols and processes pertaining to outreach and construction planning are followed, with an emphasis on evaluating construction implementation efforts and minimizing public disruption. Project reviews would be on a quarterly basis and/or at major project development milestones such as Planning, Environmental, 35%, 65%, 100% design, Right of Way Certification, and during Construction.
- The CPMO model would be established on a per project basis through a Memorandum of Understanding (MOU). See The Portal (DTX) Case Study discussed below.
- The initial projects that may be candidates for piloting of the CPMO approach are:
  - » Better Market Street Project
  - » The Portal (DTX) Project Delivery Phase
  - » Other large, complex projects involving multiple City departments
- CPMO would provide quarterly project updates to the CAO and potentially to funding agencies including the Transportation Authority, Metropolitan Transportation Commission (MTC)/Bay Area Toll Authority (BATA) and Caltrans.

THE PORTAL (DTX) CASE STUDY

The CPMO arrangement has some similarity in concept to the current project governance strategy in place for The Portal (Downtown Rail Extension) mega-project:

The Portal, also known as the Downtown Rail Extension (DTX), is an approximately $6.68 billion project that will bring Caltrain and California High-Speed Rail into the completed Salesforce Transit Center in the heart of Downtown San Francisco. The project will knit together 11 transit operators, unlocking connectivity across the mega-region and setting the stage for the coming generation of rail expansion in the Bay Area and California. The Portal has been environmentally cleared and is currently preparing for project procurement. The Portal is led by the Transbay Joint Powers Authority (TJPA), which is composed of the City and County of San Francisco, Caltrain, California High-Speed Rail Authority (CHSRA), and AC Transit. In 2020, the TJPA and five other partner agencies entered into the Peninsula Rail Program Memorandum of Understanding (MOU), which established an integrated management and governance approach to bring the project forward to full readiness for procurement and implementation. Signatories to the MOU are TJPA, the City and County, the two rail operators (Caltrain and CHSRA), and two major funding partners (the Transportation Authority and MTC).

The MOU codified the six agencies' agreement to collaboratively deliver on a comprehensive project development work program, and the MOU established a governance structure to manage and guide this work program, in support of the TJPA Board's overall mandate and authority. Under the MOU, an Executive Steering Committee (ESC), composed of senior executives from all six partner agencies, meets monthly to guide the work program and to make recommendations to the TJPA Board. The ESC is supported by an Integrated Program Management Team (IPMT) of senior technical staff and consultants representing the MOU agencies, with the IPMT responsible for executing on the agreed project development work program.

Over the past three years, The Portal's structured and collaborative approach to project development has borne fruit:

- In December 2021, the Federal Transit Administration (FTA) admitted the project into FTA's "New Starts" project pipeline, in anticipation of a multi-billion dollar federal investment in the project.
- The project team has undertaken an ongoing project risk management and review process, which includes quarterly risk workshops with the IPMT and regular reporting to the ESC. In May 2023, the first FTA risk workshop was conducted.
- Over the course of 2022 and early 2023, the project team completed a comprehensive, "bottom-up" capital cost estimate for the project. The process to develop this estimate included an independent third-party review.
- The project's primary contracts will be procured through a combination of Progressive Design Build and Construction Manager/General Contractor models, which will enable early contractor involvement in the preparation of design and finalization of construction-phase agreements. This contracting approach was the outcome of a project delivery alternatives study, which included industry sounding sessions with the contractor community.
- The project will pursue an Enabling Program of early scope activities intended to de-risk the large contracts to follow. Key early works will include right-of-way, utilities, demolition, and site preparation.
- In addition to federal New Starts funds, TJPA continues to pursue grant funding opportunities at the regional, state, and federal levels to supplement committed local funds from the Transit Center District and the Transportation Authority's sales tax program.
- The Portal project is advancing consistent with its TJPA Board-adopted master schedule. The work program over the next 24 months is focused on securing FTA funds through a Full Funding Grant Agreement, initiating implementation of the Enabling Program, and finalizing preparations for procurement of the primary contracts.
- The Transportation Authority and the MTC are currently co-leading development of recommendations for a governance structure to succeed the current MOU and meet the needs of project procurement and construction. Successful project delivery will continue to require a deeply integrated approach across all delivery partners and funding partners.

MEASURES OF SUCCESS

- Higher degree of on-time and on-budget project progress, with good quality resulting infrastructure.
- Improved communication and collaboration, accountability, and transparency between the project team, City departments and the public.
- Centralized office that can more quickly adopt emerging contracting methodologies, project management and Human Resources best practices to improve capital project delivery.
- Empowered Project Managers and team members to manage the project and decrease the time to approve change orders and other major scope decisions, subject to review by CPMO.
- Early budgeting and financing structures to improve cost estimation accuracy.
- Improved responsiveness to stakeholders and public resulting in fewer complaints; greater ability to manage challenges as they arise.

Recommendation 2: Strengthen Construction Cost Estimating Processes

Invest in reliable cost estimation techniques and knowledgeable constructability review expertise early in the design and pre-construction phases.

SUMMARY

Improving the accuracy of the cost estimation process greatly improves the chances of completing projects within budget. Various departments indicated that engineers' construction cost estimates typically make use of an analogous construction estimation approach, which is derived by using the average of previously bid items in a given area, such as the average cost per square foot of asphalt that a department has experienced in the past and applying a factor to develop a unit price cost. This method can lead to inaccuracies and typically tends to lead to lower cost estimates. Without taking constructability, construction sequencing risks, and current market factors into account, potential construction challenges are not identified and, more often than not, result in cost and schedule overruns during construction.

In contrast, a cost base estimate (developed by a seasoned construction cost estimator) is developed from the base up identifying all project costs including actual current labor and materials pricing, a detailed analysis of project site conditions, constructability review, and risks including supply-chain challenges and market uncertainty around raw materials.

Best practices call for cost estimates to be updated at critical planning, design and through the procurement phase to ensure the estimate is reliable.

OBJECTIVES

The goals for the enhanced construction cost estimating recommendation are:

- Provide more reliable cost estimates that inform the appropriate level of project funding and contingency.
- Limit potential overruns due to a lack of information considered during estimation phase.
- Incorporate risk and escalation potential in cost estimates.

BENEFITS

Construction cost estimation provides the foundation for the planning of a construction project. The accuracy of an estimate frequently determines whether the construction project meets its scope objectives or not. The main value propositions that were identified for the construction estimation recommendation are:

- Project owners can more accurately determine the suitability and feasibility of a project.
- It assists the owner and procurement team in incorporating appropriate levels of contingency and securing sufficient funds to finance the project.
- Taking constructability and construction sequence into account will provide a more accurate project plan and construction schedule estimate, resulting in greater on-time, on-budget project delivery.
- The public experience is greatly improved if cost and time estimates are more accurate as they can better plan for the disruptions, both anticipated and unanticipated.

SUGGESTED IMPLEMENTATION PROCESS

- It is proposed that each agency make use of a base cost estimation approach taking base item values, constructability, and construction sequence into account.
- The CPMO with assistance from seasoned construction cost estimation experts should independently review a projects' estimate at the 35%, 65%, 95% and final design stages to confirm the estimate is reliable given current market conditions.

MEASURE OF SUCCESS

- More accurate construction cost estimates measured by contractor bids being closely aligned with the agency's construction cost estimate.
- More accurate identification of construction contingency needs.
- Reduced number of projects with cost and time overruns.
- Reduced number of change orders and commercial conflicts due to poor design and construction planning.

Recommendation 3: Invest in Right of Way and Utility Investigation Programs

Enhanced investment in right of way and utility investigation programs during the planning and design phase will help to inform interdepartmental project designs and help facilitate more timely construction implementation.

SUMMARY

Unknown utilities in a current or proposed construction area typically have significant negative impact on the schedule, cost, and overall constructability of a project and typically result in additional disturbance to adjacent property owners. Typical industry standard is for designers to review public records, walk the project site and request utility agency as-built drawings to assess the location of utilities. Underground Service Alerts (USA) requests are also typically sent to utility companies at the 35% design phase for utility companies to physically locate and mark underground utilities. Often the field marking locations and records have inherent inaccuracies and require further investigation to create an accurate underground utility report. This recommendation offers guidelines to ensure that adequate investigation and discovery has taken place to minimize the risk for delays and cost overruns, and to enable improved active risk management in this area.

OBJECTIVES

The goal is to enhance the City's current right of way and utility investigations and increase coordination efforts with adjacent businesses, residences and utility companies before and during construction so project teams can better plan and budget for and implement utility relocations and other related construction activities in a timely manner to avoid costly construction contract delays and minimize impacts to adjacent stakeholders.

BENEFITS

- Decrease in Construction Duration along Adjacent Property Owner's Frontage – Decreased business disruption and potential loss of access.
- Decrease in Contractor Utility Delay Claims – Utility delay claims are a common occurrence on projects. More extensive utility investigations should lead to less delay claims from contractors.
- Access to Information and Insight – There is immense advantage to pinpointing precisely where underground service lines exist before beginning a project. Even armed with charts, plans and specifications with utility maps (which are frequently incorrect or out of date), teams run the risk of striking critical underground infrastructure. Having visual verification is as accurate as it gets in terms of understanding the work area. Utility televising and use of ground penetrating radar can be worthwhile investments and benefit from consistent guidance documents.
- Hazard Mitigation for Work Crews – Data shows that construction crews face digging-related deaths and injuries every year. Without a reliable way to locate and bypass crucial underground utility infrastructure, the wellbeing of excavation operators is at risk, particularly with regard to strikes on natural gas lines.
- Accumulated Efficiencies – It is common to assume that a utility investigation is an extra step in the construction process that incurs even more time on the project clock. The truth, though, is that this method can actually save time in the long run. It is also worth noting that utility pothole investigations can be a much faster method of identification than relying on charts and maps.
- Overall Project Cost Savings – Project downtime is not the only contributor to unplanned expenses on a construction project. There is also the potential significant cost to repair unforeseen vital utility lines ranging from water, electrical and gas to telecommunications and fiber optic.
- Legal Compliance – As the industry has pushed for both safer working conditions and less risky digging methods, state and local regulations have evolved over time. State laws, for instance, generally prohibit the use of mechanized equipment within 18 to 36 inches around all sides of a marked utility.

- Third-Party Utility Coordination – Enhance third-party coordination efforts including piloting a structured partnering approach with utility companies to establish agreed upon construction timeframes and reduce response times.

SUGGESTED IMPLEMENTATION PROCESS

Pre-construction utility investigations such as potholing and ground penetrating radar should be implemented during the design phase on civil construction projects within the City. Potholing is typically the most accurate way to locate and mark the position of underground assets prior to moving forward with final excavation. Unfortunately, potholing can also be a disruptive activity in any public space, therefore it's important to plan accordingly for this critical activity during the design and construction phases. From safety and compliance advantages to time and cost savings, there is significant benefit to be derived from applying this practice during the design phase before major construction activities start.

MEASURE OF SUCCESS

- Reduced costly construction critical path delays caused by unforeseen underground utilities.
- Reduction in the number of public service interruptions due to incorrectly located or unknown service routes.
- No critical utility outages or construction personnel injuries due to incorrectly marked service routes.

Recommendation 4: Expand Collaborative Interdepartmental Risk Reviews and Management

Additional investment in analyzing projects for risk across all departments by incorporating active risk management best practices throughout the project development process.

SUMMARY

Department staff indicated that Risk Management is an area where improvements can be made. In this context, the Study looked at risk management as it encompasses the identification, analysis, and response to risk factors that form part of the life of a project. By improving the risk management approach across all departments, attempting to control, as much as possible, future outcomes by acting proactively rather than reactively, projects are less likely to experience budget and schedule overruns.

Therefore, effective risk management offers the potential to reduce both the possibility of a risk occurring and its potential impact.

OBJECTIVES

Proactively manage and decrease risk as a project moves through the project development process from planning, through design and construction by formalizing risk identification and assessment, developing and implementing risk mitigation measures, use of risk registers and action tracking, as well as training and application of pro-active communications and problem-solving strategies.

BENEFITS

Improving the risk management approach across all the departments will:

- Better manage and mitigate the project's exposure to risk.
- Minimize the financial loss from unidentified project risks.
- Improve the confidence of meeting the project cost, schedule, and performance targets.
- Have an auditable system for risk identification, assessment, and control.
- Ensure active real-time risk management throughout design and construction.

SUGGESTED IMPLEMENTATION PROCESS

Conduct industry standard risk management activities to identify and mitigate potential risk on projects:

- Develop Risk Management Plan.
- Hold interdepartmental risk identification workshops with subject matter experts.
- Follow industry standard risk management guidelines such as FTA and Caltrans to estimate potential likelihood and impact of events.
- Assign ownership of risks to those parties best suited to mitigate and resolve issues.
- Mitigate the impact of risks through early identification, mitigation strategy development and reduction.
- Track and monitor risk throughout project development and to the completion of construction.

MEASURE OF SUCCESS

- Comprehensive understanding of total project risk exposure to inform project cost estimates and program schedules. Detailed risk mitigation plan including action plans and insurance for possible events.
- Clearer understanding of risk ownership and responsibility which can help support negotiations for allocation/assignment of risks.
- Reduced project cost and schedule overruns due to foreseeable conditions and risk avoidance/minimization.
- Fewer claims/commercial and legal conflicts.

Recommendation 5: Facilitate Structured Partnering and Team Building

Enhanced investment in team building and "Structured Collaborative Partnering" where the approach includes improving trust, collective issue identification, dispute resolution processes, and establishing project goals.

SUMMARY

Structured Collaborative Partnering is a construction industry best practice focused on enhancing project delivery by aligning the project team around a common purpose. The structure, which is currently specified in all City public works projects, involves the team co-creating one set of goals from the outset of the project. The team also develops an Issue Resolution Ladder and issue escalation procedures, which at minimum helps prevent construction disputes and claims and has demonstrated consistent improvements to budget and schedule outcomes as well as team member satisfaction. This alignment is essential, particularly for projects delivered with support from multiple departments, which increases the complexity and heightens the need for rapid decision-making by a complex owner entity.

OBJECTIVES

- The goals are to identify and resolve problems at the lowest responsible level to optimize budget, schedule and quality while emphasizing City department's "Teamwork, Transparency, Trust, Respect, and Communication."
- To achieve the goals, the team builds an executive and project delivery structure that acknowledges and responds to the complexity of each project.

- It is recommended that Project Managers on CPMO-led projects be granted access to industry training on alternative delivery methods, building cohesive team structures, and emerging project management tools and practices.

BENEFITS

- Effective Structured Collaborative Partnering supports large, complex projects by building a forum to develop a high performing team. It is typical to develop an Executive Team that operates similar to a Board of Directors for the project; a Core team, that focuses on day-to-day operations and delivery of the project; and to offer a forum for key project stakeholders who will eventually operate and maintain the facility.
- According to the International Partnering Institute, effective Structured Collaborative Partnering at a level commensurate with the risk of the project saves project teams on average 4% schedule, 5% budget and improves personal satisfaction by more than 12%, while costing the project less than 0.1% of the project budget.
- Effective partnering further supports the project delivery team by preventing construction claims and improving timeliness of issue resolution. Unresolved issues slow momentum and leave schedule and budgetary risks unresolved to the end of the project.
- The cost of formally facilitated partnering is typically up to 0.1% of the project budget. Partnering is particularly effective for large, complex projects due to the sheer size and complexity of the project and the size of the team delivering it. Partnering creates a forum for the executive team to hear from the project delivery team and for the project delivery team to receive direct feedback from key project stakeholders and end-users to ensure the project delivers what is intended.

SUGGESTED IMPLEMENTATION PROCESS

Project teams should fully implement Structured Collaborative Partnering (first implemented by San Francisco International Airport on more recent projects and now being demonstrated through the TJPA's The Portal (Downtown Extension) project integrated team/MOU), which involves integrated Executive, Core and Stakeholder teams. City departments should also continue to focus on developing a collaborative project culture focused on exceptional project outcomes.

Project Managers and staff on CPMO-led projects should also be offered training in emerging best practices to improve retention, skill development and project execution.

MEASURE OF SUCCESS

- Reduction of litigated construction claims resulting from project disputes.
- Reduction in reliance on City Attorney's Office to resolve project issues while the project is being delivered.
- Enhanced teamwork and collaboration so projects teams more routinely want to build projects again.
- Participation in the San Francisco Collaborative Partnering Awards program.
- Optimize effective implementation of alternative delivery methods on interdepartmental projects.

In addition to the primary recommendations listed above the following additional recommendations were discussed with the MWG as viable recommendations to also consider instituting:

- **Invest in improved software solutions:** Improve overall project controls, design management, RFI Request for Information and submittal response, construction change order processing, timely payment, etc. Goal is to pay vendors and contractors in a timely manner to avoid costly interest/finance charges.
- **Provide Project Management Training:** Once a common set of project management practices and standards has been established, it is appropriate to invest in joint Project Management trainings. These may include topics such as industry best practices on implementation of alternative project delivery methods such as CMGC and Design/Build. Goal is to develop and cultivate this new project delivery expertise to move towards qualifications-based selection for select construction contracts.
- **Strengthen Strategic Partnerships:** Launch initiative between City departments and third-party stakeholders (e.g., BCDC, PG&E, Caltrans, etc.). Goal is to engage key stakeholders in a proactive way and develop issue escalation procedure.

Conclusion

Large, complex transportation projects are historically challenging to deliver, typically taking 20% longer than anticipated to finish in addition to costly budget overruns. Teams delivering these projects in San Francisco experience an even higher level of challenge due to the complex interdepartmental owner's entity, geographic limitations preventing traditional laydown and storage access, aging infrastructure and frequently unreliable mapping in an environmentally and seismically sensitive zone. In addition, market conditions currently add further cost escalations and inflation factors, making projects more challenging to cost estimate and fund.

The study team recommends the five following efforts to improve project delivery results:

1. Establish a Capital Projects Management Office (CPMO)
2. Strengthen Construction Cost Estimating processes
3. Invest in Right of Way and Utility Investigation
4. Collaborative Interdepartmental Risk Reviews and Management
5. Structured Partnering and Team Building

Each of these recommendations is intended to support systematic and cultural changes to promote continuous project delivery improvement toward becoming an "Owner of Choice." Ultimately, by incorporating all five of the recommendations, the City would optimize project delivery results and help strengthen public confidence in San Francisco City departments' ability to effectively program, design and deliver complex transportation projects.

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San Francisco County Transportation Authority

APPENDIX A

Study Development Process

Study Purpose

Identify lessons learned and develop recommendations to improve project delivery performance and outcomes, leading to projects that are on-time, on-budget, of high quality, and promote San Francisco as an "Owner of Choice."

Objectives

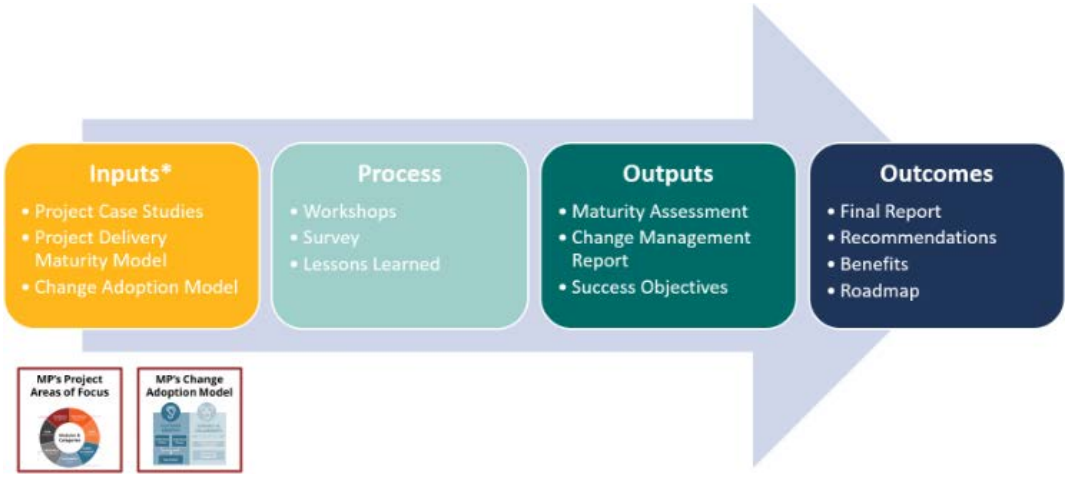
The study objectives that were identified are listed below:

1. Uncover barriers to efficient capital project delivery.
2. Identify process and policy improvement opportunities.
3. Increase collaboration between project partners.
4. Improve measurement & accountability.

Study Approach

The study approach that was followed was the review of all the provided inputs, go through a process improvement approach, produce some outputs, and then finally deliver several deliverables as outcomes.

The study approach and detail are outlined below:



To achieve the Transportation Authority's study objectives, the project team provided the departments with Project Delivery Maturity Model and Change Adoption Model assessment information to assist in performing preliminary self-assessments of each department's current business practices in critical project delivery areas.

INPUTS:
The inputs that were included in this study included Project Case Studies, surveys and documents developed by the San Francisco Collaborative Partnering Steering Committee. A list of the Project Case Studies is presented further in the Appendix.

PROCESS:
The process included conducting workshops, surveys and lessons learned sessions to develop a preliminary representative assessment of current project development efforts in the City. A more detailed description of the workshops, surveys and lessons learned sessions are outlined later in the report.

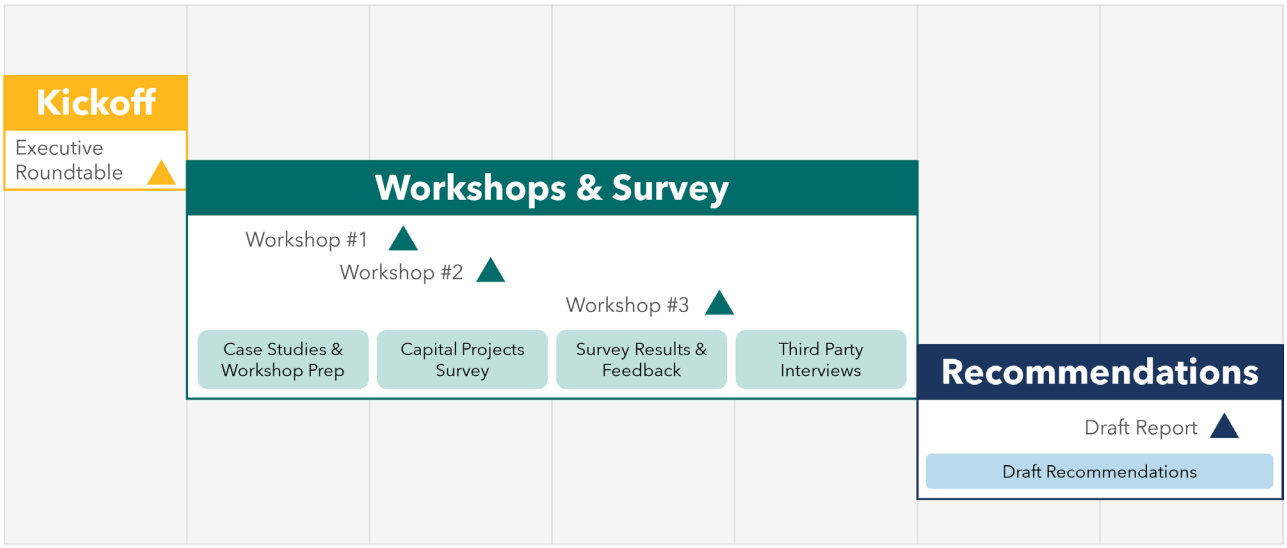
OUTPUTS:
The next step develops Outputs, where all the data that was gathered were analyzed and initial conclusions were drawn. All the preceding steps' outputs were considered in developing the Recommendation Report.

Study Timeline

The main course of the study ran over 4 months, including an Executive Kick-off, case study and report reviews, three Workshops with the Management Working Group, multiple surveys and one-on-one interviews with key departments. The information was discussed and analyzed by the MWG and a list of preliminary recommendations was developed for further vetting with the Executive Leadership team.

The final report was reviewed with Executive Leadership team July 2022, and comments and feedback were incorporated through the fall.

The overall study timeline is as shown below:



Executive Kick-off Meeting

The study launched in December 2021 with initial planning and coordination activities. The Executive kick-off Roundtable represented the formal start of the Capital Project Delivery Study. This kick-off was held on January 27, 2022.

The following study participants attended the Executive Kick-off Roundtable:

EXECUTIVE COMMITTEE	DEPARTMENT
Rafael Mandelman	Transportation Authority
Aaron Peskin	Transportation Authority
Sean Elsbernd	Mayor's Office
Andres Powers	Mayor's Office
Carmen Chu	City Administrator
Douglas Legg	City Administrator's Office
Ben Rosenfield	Controller's Office
Brian Strong	Office of Resilience & Capital Planning
Jeff Tumlin	San Francisco Municipal Transportation Agency
Dennis Herrera	San Francisco Public Utilities Commission
Carla Short	San Francisco Public Works
Patrick Rivera	San Francisco Public Works
Adam Van de Water	Transbay Joint Power Authority
Elaine Forbes	Port of San Francisco
Ivar Satero	San Francisco International Airport
Tilly Chang	Transportation Authority

In the Executive Roundtable Kickoff, the members responded to two questions:

WHAT ARE WE ALREADY DOING TO IMPROVE OUR RESULTS?

Improving collaboration and communication across departments through Partnering and other processes, despite separated department structure.

- Partnering to build more collaborative teams and culture.
- Developing good, long-range planning and communication programs to reduce unknowns.

Implementing Alternative Project Delivery which enables contractors to assist with planning and design, improving our outcomes.

- Engaging early and often with our multiple stakeholders to identify risks.
- Following SFO Model to support Collaborative Project Delivery/ Progressive Design-Build.
- Expanding Stakeholder Engagement to ensure the end-users and maintainers are key contributors.

Empowering Project Managers and members of the team to manage the project, identify risks and deal with issues in a timely manner.

- Departments have taken advantage of pandemic to focus on creativity, collaboration and lessons learned.

WHAT PRACTICES & TOOLS DO YOU WANT?

Streamline administrative processes and procedures for large projects.

- Improve change management for large projects to facilitate timely payments.
- Simplify contracting rules which are not effective for developing cohesive project teams.
- Simplify hiring requirements – recruiting and placing top talent is very difficult with our extended recruitment process.

Improve consistency of project management and decision making within the City.

- Build as “One City” with more transparency and fewer silos.
- Retain experienced Project Managers within the City after they have finished large, complex projects.

Develop early budgeting and financial structures to improve cost estimation accuracy.

- Secure funding/budgeting procedures
- Simplify payment applications.
- Develop more consistency between departments in estimating and contingency funding.

Expert Interviews

The project team also interviewed former executive leadership for perspective on past measures of success and best practices. Former City Controller, Ed Harrington and Rudolf Nothenberg contributed to this process, providing insight on successful organization structures and tools utilized during their tenure in San Francisco projects delivery. Their perspectives were considered in development of proposed recommendations.

Management Working Group Workshops

The Management Working Group (MWG) was made up of Director and Deputy Director-Level staff from each of five San Francisco Departments who deliver construction projects, as well as the Mayor's Office, the Controller's Office and key Transit and Transportation Authority staff. This section covers the objectives of each of the MWG's three meetings and the detailed recommendations that they developed to enhance project delivery, particularly for large, complex projects developed by multiple departments.

The Management Working Group Members were:

MANAGEMENT WORKING GROUP	DEPARTMENT
Alex Sweet	Mayor's Office
Mark De La Rosa	Controller's Office
Douglas Legg	Office of Resilience and Capital Planning
Tom Maguire	San Francisco Municipal Transportation Agency
Jane Wang	San Francisco Municipal Transportation Agency
Bijan Ahmadzadeh	San Francisco Municipal Transportation Agency
Alan Johanson	San Francisco Public Utilities Commission
Algynon Collymore	San Francisco Public Utilities Commission
Albert Ko	San Francisco Public Works
Ron Alameida	San Francisco Public Works

MANAGEMENT WORKING GROUP	DEPARTMENT
John Thomas	San Francisco Public Works
Rod Iwashita	Port of San Francisco
Judi Mosqueda	San Francisco International Airport
Alfonso Rodriquez	Transbay Joint Power Authority
Anna Harvey	Transbay Joint Power Authority
Eric Cordoba	Transportation Authority
Yana Waldman	Transportation Authority

WORKSHOP #1:

The objective of Workshop 1, help on March 3, 2022 was to develop cohesion between the diverse MWG to serve the Capital Project Delivery Study, provide an overview of the scope and the timetable, and then gather key lessons learned to date on large interdepartmental projects.

In Workshop 1 the attendees responded to three questions:

1. What are the practices and tools you are using to improve collaboration and project delivery on your projects?
2. Where do we tend to struggle on our projects?
3. "If you could change one thing about capital project delivery in San Francisco, what would you change?"

The Feedback from Workshop 1 was that the departments need:

- Consistent and current technology tools across all Departments.
- To Function as "One City" when delivering projects.
- Improve regular cross-jurisdictional communication across levels.
- Develop a Work Plan/ Program Management plan that describes roles in issues escalation and resolution.
- Have advocacy for project delivery to support political challenges – i.e. Construction Translator to describe project challenges to Boards.
- Share resources to help each other, shared approach to retain expertise.
- More cross training between PMs

WORKSHOP #2:

In Workshop #2, held on March 17, 2022, the MWG focused on recent complex projects (i.e., large projects or with complex, Interdepartmental scopes). They identified what is working well (plus) and what is not working well (delta) for managing these key elements. They focused in the four key areas highlighted by the Executive Roundtable

and the Transportation Authority Board: Managing scope and adjusting based on project needs; managing Schedule; administering the Budget; and Mitigating Risk?"

Preliminary Survey Results

1. Unexpected issues occur regularly which could be positively impacted by better planning.
2. Formal project management exists within departments but is either inconsistent or not applied effectively across departments.
3. Procedural bottlenecks are not often the cause of delays/barriers.
4. The various departments were split on whether Alternative Delivery made a big difference in being successful.
5. Process limitations are frequently identified in multi-agency meetings.
6. Lessons learned are captured but implementation could improve to positively impact future projects.

POST-WORKSHOP 2 SURVEY:

After Workshop #2, the MWG was provided with a survey focused on key best practices in project delivery.

Survey Results

Responses

In total 26 staff members involved in project delivery responded from across the SFMTA, SFPUC, SFDPW, SFO, and the Transportation Authority.

Trends

- Unexpected issues occur regularly which could be positively impacted by better planning.
- Formal Project Management exist within departments but are either inconsistent or not applied effectively across departments
- Procedural bottlenecks are not often the cause of delays/barriers.
- The various departments were split on whether Alternative Delivery made a big difference in being successful.
- Process limitations are frequently identified in multi-agency meetings.
- Lessons learned are captured but implementation could improve to positively impact future projects.

One-on-one interviews were conducted with each of the individual departments that are involved in the large scale projects.

The preliminary recommendations were also discussed with the departments to get some feedback and assess whether there would be major challenges, objection, or resistance to implementing these strategies.

The feedback of all these sessions were consolidated to come up with a final set of strategies that would be presented during Workshop 3.

WORKSHOP #3:

Workshop 3 was held on April 28, 2022. The first objective of the workshop was to review the Group Results in the four key project delivery areas: Project Management, Project Performance, Collaboration, and Project Occurrences. The MWG then walked through each of the eleven recommendations developed through the workshops, the survey data and vetted through a series of one-on-one interviews with large scale project experts. The second objective was to distill these eleven proposed strategies into a smaller number of actionable recommendations. To vet the recommendations, the consultant team updated each of the proposed strategies based on feedback from the MWG and then had the MWG Members respond to a survey where they first ranked each recommendation in terms of most potential impact and then ranked them in terms of ease of implementation.

Preliminary Recommendations

Due Diligence

1. **Enhanced Utility Investigation Program:** For urban interdepartmental projects to inform project designs. Goal is to proactively plan/budget for and implement utility relocations in a timely manner to avoid costly delays.
2. **Construction Cost Estimating:** Invest in bottoms up estimation expertise, constructability review throughout the design process, bring in outside expertise. Goal is to prepare reliable cost estimates in order to seek appropriate level of funding.
3. **Interdepartmental Risk Management:** Analyze projects for risk across all departments and maintain active risk management best practices throughout the project. Goal is to proactively manage and decrease risk as a project moves through the project development process.

Partnering/Stakeholder Management

1. **Enhanced investment in "Structured Collaborative Partnering" (similar to SFO model):** between City departments emphasizing "Teamwork, Transparency, Trust, Respect, and Communication." Include demonstration of Issue/dispute resolution processes and procedures. Goal is to identify and resolve problems at the lowest responsible level to reduce significant impact to budget, schedule and quality.
2. **Stakeholder Engagement Process:** Invest in process (similar to SFO model) to integrate internal City stakeholders to support the delivery of interdepartmental projects.
3. **Strategic Partnerships:** Launch initiative between City departments and third-party stakeholders (e.g., BCDC, PG&E, Caltrans, etc.). Goal is to engage key stakeholders in a proactive way and develop issue escalation procedure.

Contracting

1. **Establish a DBE/SBE/LBE technical assistance program to support increased demand.**
2. **Training:** Invest in training on Alternative Project Delivery for agency staff. Many City staff would benefit from learning industry best practices for implementation of alternative project delivery methods (e.g., CMGC, Design/Build etc.). Goal is to develop and cultivate this new project delivery expertise in order to move towards qualifications-based selection for select construction contracts.
3. **Invest/Improve agency software solutions,** to improve overall project controls, design management, RFI and submittal response, construction change order processing, timely payment, etc. Goal is to pay vendors and contractors in a timely manner to avoid costly interest/finance charges.

Accountability

1. **Capital Project Management Office (CPMO):** Establish/Invest (1.5 – 2% of project budget) for a CPMO comprised of department leadership and outside experts to PEER review Major Capital Projects or as directed, on a Quarterly basis and/or at major project development milestones such as Planning, Environmental, 35%, 65%, 100% design, including Construction. Goal is to provide centralized, empowered decision making.

2. **Large Project Delivery:** Invest in project delivery design, construction management, constructability review expertise to advise/assist/support project delivery. Goal is to better prepare projects for successful construction implementation.

MWG RECOMMENDATION SURVEY RESULTS

RANK	MOST IMPACTFUL
1	**Interdepartmental Risk Management**
2	**Enhanced investment in "Structured Collaborative Partnering"**
3	**Enhanced Utility Investigation Program**
4	**Construction Cost Estimating**
5	**Capital Project Management Office (CPMO)**
6	Stakeholder Engagement Process
7	Strategic Partnerships with 3rd Party Stakeholders
8	Alternative Delivery Method Training
9	DBE Support
10	Software Improvement

RANK	MOST ACHIEVABLE RANKING
1	**Construction Cost Estimating**
2	**Interdepartmental Risk Management**
3	**Enhanced investment in "Structured Collaborative Partnering"**
4	**Stakeholder Engagement Process**
5	**Enhanced Utility Investigation Program**
6	Alternative Delivery Method Training
7	Strategic Partnerships with 3rd Party Stakeholders
8	Capital Project Management Office (CPMO)
9	DBE Support
10	Software Improvement

RANK	EASE OF IMPLEMENTATION RANKING
1	**Construction Cost Estimating**
2	**Enhanced Utility Investigation Program**
3	**Interdepartmental Risk Management**
4	Enhanced investment in "Structured Collaborative Partnering"
5	Strategic Partnerships with 3rd Party Stakeholders
6	Stakeholder Engagement Process
7	Alternative Delivery Method Training
8	DBE Support
9	Capital Project Management Office (CPMO)
10	Software Improvement

APPENDIX B:

Background

Major transportation projects delivered in the City carry inherent technical and institutional complexity. To improve reliability of on-time, on-budget delivery of complex interdepartmental transportation capital projects, several processes and project management tools need to be budgeted for and implemented.

Major project challenges that have already been identified include: the need for more accurate assessment of project site conditions and estimating costs, improved risk management, enhanced communication across departments, and increased accountability and timely decision-making.

Globally, one McKinsey analysis suggests that rail projects with price tags of $1 billion or more incur overruns of nearly 45 percent on average. The study attributes over 70 percent of time and budget overruns to poor project execution, including "incomplete design, lack of clear scope, ill-advised shortcuts, and even mathematical errors in scheduling and risk assessment."[1]

Some prior and current efforts to address these needs include:

- Project Management trainings to standardize knowledge and best practices;
- The San Francisco Collaborative Partnering Steering Committee established in 2016 to help the City become an "Owner of Choice" by enhancing communication collaboration and policies; and
- Infrastructure "task forces" established to promote coordination and timely decision-making.

There has been improvement, but it is acknowledged that there is room for significantly more improvement and the need for a more robust comprehensive adoption program supporting a sustainable change.

The consultant team worked with the MWG to develop process improvement and change adoption exercises to:

- Identify and implement opportunities to improve the delivery of complex multi-departmental projects in the areas of:
  - » Project Management and Controls
  - » Scope, Schedule and Budget Adherence
  - » Communications / Reporting

1 Nicklas Garemo et al., McKinsey & Company, "Megaprojects: The good, the bad, and the better" (July 1, 2015), available at https://www.mckinsey.com/business-functions/operations/our-insights/megaprojects-the-good-the-bad-and-the-better, Transport Reviews, 23:1, 71-88, available at https://doi.org/10.1080/01441640309904

  - » Risk Management
  - » Issue Resolution
- Develop a roadmap to transform capital project delivery with supporting change adoption across city departments with a focus on improved Scope, Accountability, Issue and Risk Management, Cost and Schedule.
- Develop a plan for improving communication, coordination and timely decision making across departments.

APPENDIX C:

Reference Reports & Case Studies

Several large projects recently delivered in the City have been heavily scrutinized. The resulting project audits and investigations formed part of the project reports and case studies reviewed by the various departments and study team. Other relevant documentation included Best Practice Guides, Partnering Documents developed by the San Francisco Collaborative Partnering Steering Committee (SFCPSC) as well as quarterly status reports. The Project reports and Case Studies that were reviewed are outlined below.

Reports

- SFMTA Capital Programs Audit: The San Francisco Municipal Transportation Agency Needs to Improve Accountability and Collaboration in Its Capital Planning and Project Delivery Processes | City & County of San Francisco Office of the Controller City Services Auditor, Audits Division | February 2021
- Van Ness Avenue: What Lies Beneath Civil Grand Jury Report | City and County of San Francisco Civil Grand Jury 2020 – 2021 | June 2021

Best Practice Guides

- Improving Project Delivery | San Francisco County Transportation Authority | March 2021
- SFO Delivering Exceptional Projects | Geoff Neumayr, Judi Mosqueda, Kris Opbroek | June 2014
- Small Streets Project Delivery, Appendix H of SFTP Report 2040 | Victoria Eisen | October 2017
- Major Project Delivery, Appendix H of SFTP Report 2040 | San Francisco County Transportation Authority | October 2017
- Best Practices for Project Closeout | SFCPSC Education and Training Subcommittee | March 2021
- Back in the Fast Lane: How to Speed Public Transit Planning & Construction in California | Ethan Elkind | August 2014
- Megaprojects: The good, the bad, and the better | Nicklas Garemo et al., McKinsey & Company | July 2015

Partnering Documents – Developed by the San Francisco Collaborative Partnering Steering Committee (SFCPSC)

- San Francisco Partnering Field Guide | Rob Reaugh, OrgMetrics LLC | March 2021
- SFCPSC Partnering Steering Committee 2020 Charter | Rob Reaugh, OrgMetrics LLC | June 2020
- 2021 San Francisco Collaborative Partnering Awards Application | Nicolas King, SFDPW | June 2021
- SFCPSC Partnering Enhancement Proposal (PEP) – 1.4.1 Interdepartmental Project Issue Resolution | SFCPSC | September 2017
- San Francisco Collaborative Partnering Steering Committee – Sample Meeting Reports | SFCPSC | June 2016 – October 2021
- 2021 San Francisco Contractors Survey Results | SFCPSC | March 2021
- 2021 San Francisco Staff Partnering Survey Results | SFCPSC | October 2021