# SEWER SYSTEM IMPROVEMENT PROGRAM
# CONSTRUCTION MANAGEMENT PLAN


**San Francisco Public Utilities Commission**
**525 Golden Gate Avenue, 6th Floor**
**San Francisco, California 94102**

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# ACRONYMS / ABBREVIATIONS

| Acronym / Abbreviation | Definition |
|---|---|
| ADCS | Administrative/Document Control Specialist |
| AGM | Assistant General Manager |
| BEM | Bureau of Environmental Management |
| BIM | Building Information Modeling |
| CAB | Contracts Administration Bureau |
| CAR | Corrective Action Report |
| CEQA | California Environmental Quality Act |
| CIP | Capital Improvement Program |
| City | City and County of San Francisco |
| CM | Construction Management |
| CM/GC | CM/General Contractor |
| CMB | Construction Management Bureau |
| CMIS | Construction Management Information System |
| COR | Change Order Request |
| CPM | Critical Path Method |
| CSD | Combined Sewer Discharge |
| CSM | Construction Safety Manager |
| DB | Design Build |
| DRA | Dispute Resolution Advisor |
| DRB | Dispute Review Board |
| ECCC | Environmental Construction Compliance Coordinator |
| ECCM | Environmental Construction Compliance Manager |
| ECM | Environmental Compliance Manager |
| EMB | Engineering Management Bureau |
| ERT | Environmental Requirements Table |
| FAC | Forecast at Completion |
| FCA | Field Contracts Administrator |
| FTC | Forecasts to Completion |
| HLS | Homeland Security |
| IT | Information Technology |
| LOS | Level of Service |
| MMRP | Mitigation, Monitoring and Reporting Plan |
| MPM | Minor Project Modification |
| NCN | Non-Conformance-Notice |
| NEPA | National Environmental Policy Act |

| Acronym / Abbreviation | Definition |
|---|---|
| NPF | North Point Wet Weather Facility |
| NTP | Notice-to-Proceed |
| O&M | Operations and Maintenance |
| OE | Office Engineer |
| OSP | Oceanside Water Pollution Control Plant |
| PCO | Proposed Change Order |
| PCM | Program CM |
| PCSG | Program Controls and Support Group |
| PE | Project Engineer |
| PLA | Project Labor Agreement |
| PM | Project Manager |
| PMB | Project Management Bureau |
| PO | Purchase Order |
| QC | Quality Control |
| RE | Resident Engineer |
| RFI | Request-for-Information |
| RFP | Request-for-Proposal |
| RFS | Request-for-Substitution |
| ROW | Right-of-Way |
| RWQCB | Regional Water Quality Control Board |
| SCR | Special Condition Request |
| SEP | Southeast Water Pollution Control Plant |
| SFPUC | San Francisco Public Utilities Commission |
| SOR | System Outage Request |
| SQS | Supplier Quality Surveillance |
| SSIP | Sewer System Improvement Program |
| TIA | Time Impact Analysis |
| TI/YBI | Treasure Island/Yerba Buena Island |
| T/S | Transport/Storage |
| VECP | Value Engineering Change Proposal |
| WBS | Work Breakdown Structure |
| WWE | Wastewater Enterprise |

# 1.0 SSIP ORGANIZATION

## 1.1 Introduction and Purpose

This San Francisco Public Utilities Commission (SFPUC) Sewer System Improvement Program (SSIP) Construction Management (CM) Plan, together with the SFPUC Infrastructure CM Procedures and the SFPUC CM Business Processes, establish the guidelines and uniform procedures and policies to be followed by the CM organization for construction of the SSIP projects. Since numerous CM Consultants may soon be required to help manage a number of programs and projects, the SFPUC has elected to define the expectations and to provide guidance on an overall approach to managing the construction contracts.

The SSIP CM Plan provides guidance on *what* is expected regarding the various CM functions and the roles and responsibilities of the organizational structure to provide a consistent management approach.

An SFPUC Infrastructure CM Procedures will define *how* the CM functions are to be executed so that they integrate with SFPUC's overall organization and business practices. It is not the intent of this SSIP CM Plan to describe in detail the processes or all of the specific requirements of a particular CM function; that will be the purpose of the SFPUC Infrastructure CM Procedures that will complement this SSIP CM Plan and will be developed by the SFPUC's Construction Management Bureau (CMB). The SFPUC staff and the professional CM Consultants who will manage construction for the SSIP projects will be required to adopt and comply with this SSIP CM Plan in the process of managing the construction contracts to fit the unique requirements of each project.

*Section 1* of this Plan contains pertinent information regarding SSIP, the CM contracting strategy, the CM organization, and organizational management. *This section* also identifies the roles and responsibilities of various CM positions.

*Section 2* describes the general approach to all of the major CM functions and elements and their application to SSIP, including some pre-construction functions.

It is essential that all project staff involved in and responsible for the development of construction contract documents and specifications, read and become familiar with this SSIP CM Plan. This will ensure the contract documents are developed to reflect the requirements of this CM Plan. The use of and reliance on this SSIP CM Plan and the referenced SFPUC Infrastructure CM Procedures will not in any way limit the professional or contractual liability of the CM Consultants.

## 1.2 Scope

The SSIP CM Plan defines the scope of the SSIP projects, the CMt organization, the various CM functions, the associated business processes, any standard tools SFPUC has determined will be used, and the roles and responsibilities of the entities that will be involved.

*Appendix A* provides the most current project schedules related to the SSIP projects at the time of the publication of this SSIP CM Plan and any subsequent controlled revisions.

## 1.3 Description of the Sewer System Improvement Program

### 1.3.1 Program Description

The SSIP is a collection of capital improvements for the City and County of San Francisco's treatment and collection systems that are planned for construction prior to 2040 in order to bring the sewer system to a state of good repair, thereby also ensuring regulatory compliance. Which is the culmination of 7 years of Planning and a year-long series of SFPUC workshops to develop system improvements that will address the following sewer system challenges:

- Aging infrastructure and poor condition of existing facilities with little remaining useful life;
- Seismic deficiencies and lack of structural integrity;
- Limited operating flexibility and lack of redundancy;
- The ongoing need to protect the environment and public health, meet regulatory challenges, and conserve resources;
- Adaption to climate change; and,
- Improved stormwater management.

Wastewater Enterprise (WWE) is responsible for the management, operation, and maintenance of San Francisco's Mainland Sewer System and the operation and maintenance of the Treasure Island/Yerba Buena Island (TI/YBI) Sewer System, pursuant to a Treasure Island Development Authority/Navy Cooperative Agreement. Currently, these wastewater systems meet all discharge permit requirements of the State of California and U.S. Environmental Protection Agency. San Francisco's Mainland Sewer System treats all the sanitary and most of the stormwater flows, while the TI/YBI Sewer System treats only sanitary flows. All biosolids are treated and fully reused in both systems.

Within the City and County of San Francisco (City), the sewer system collects 92% of the City's wastewater and stormwater in a combined sewer system that consists of: three treatment facilities, four outfalls, 27 pump stations, 36 combined sewer discharge (CSD) structures (or nearshore outfalls), force mains, tunnels, transport/storage (T/S) structures, 25,000 catch basins, 24,800 manholes, and more than 987 miles of sewers. The large box sewers and tunnels of the T/S system form a moat around the City's perimeter that can retain and store sewage and stormwater for later treatment or provide a wet-weather primary equivalent (decant) treatment before discharging through CSD structures. Of the estimated total annual 40 billion gallons of wastewater flow, approximately 34 billion gallons per year receive full secondary treatment, 4.5 billion gallons per year receive primary or decant treatment and are discharged to deep water outfalls, and 1.8 billion gallons per year receive decant treatment and are discharged through the CSD structures.

The TI/YBI area is served by a separate system that currently relies on pumping to convey sewage to a secondary facility for treatment and discharge. The wastewater system is currently owned by the United States Navy, but operated and maintained by the SFPUC's WWE. The TI/YBI collection system consists of 10 miles of sewers and 29 wastewater pump stations (two located on YBI). Wastewater from YBI is pumped to

TI via a 6-inch submarine force main. The stormwater collection system includes six stormwater pump stations and 50 shallow water outfalls (at TI).

While facets of both TI/YBI and the City's sewer systems have been updated, many facilities and substantial parts of the collection system continue to age and deteriorate, limiting the reliability and flexibility of the wastewater systems to provide public services. Of the 781 miles of local sewers in San Francisco (36 inches diameter or less), the average age is 72 years, with 173 miles being over 100 years old. In addition to the local sewers, there are 120 miles of major sewers (greater than 36 inches in diameter) and 86 miles of brick sewers, T/S structures, tunnels, and force mains, many of which are vulnerable due to age, condition, and lack of redundancy. One example of a vulnerable sewer asset is the Bayside Channel Force Main, which conveys eastside wastewater and stormwater flows from the Mission Creek area to the Southeast Water Pollution Control Plant (SEP). Constructed in the 1970s, this asset is built in bay mud and fill, and has failed numerous times including during the 1989 Loma Prieta earthquake. The Channel Force Main has no redundancy, making it vulnerable to failure in a future earthquake.

Both SEP and the North Point Wet-Weather Facility (NPF) were built over 50 years ago. Many of the challenges for these treatment plants are related to aging infrastructure and reductions in reliability due to facility conditions; several of the key process units at these facilities are in need of complete replacement. Some of the technologies employed by these processes are outdated, the structural integrity of some of the units is compromised, and the basic supporting infrastructure (controls, electrical, mechanical) is no longer reliable. The design standards that governed the construction of the SEP did not take into account the current concepts and technologies available for mitigating negative impacts on the surrounding community. Even the Oceanside Water Pollution Control Plant (OSP), the most recently-constructed treatment facility in the City, is experiencing the effects of deferred maintenance, and its operational efficiency and reliability are being impacted. The Treasure Island Wastewater Treatment Plant facilities are not reliable and require complete replacement.

In addition, increased energy costs, the need to reduce greenhouse gas emissions, address future climate change challenges, and reduce consumption of natural resources require that the SFPUC consider sewer system upgrades and improvements.

### 1.3.2 Program Scope

The establishment of the wastewater guiding principles, and Goals and Levels of Service (LOS) which will apply to the SSIP, received considerable input and review from WWE staff, the SFPUC Commissioners, members of the public, and public organizations. These guiding principles reflect the core values, aspirations, and vision of the public and the SFPUC for the wastewater collection, treatment, and discharge facilities. The guiding principles have focused the development of the SSIP Goals and LOS, planning decisions, and Capital Improvement Programs (CIP). The guiding principles are to:

- Protect public health, safety, and the environment;
- Ensure the long-term sustainability and reliability of the sewer system;

- Minimize sewer system burdens on all sectors of the community and ensure that no sector of the community bears a disproportionate share of the burdens of system operations;
- Promote environmental stewardship, including the sustainable use of natural resources;
- Address the effects of climate change on the wastewater collection and treatment facilities;
- Develop and implement new technologies to treat wastewater and biosolids in an efficient, sustainable, and environmentally benign fashion; and,
- Maximize employment and educational opportunities.

The SSIP is structured to deliver the capital improvements that use the guiding principles to provide its customers with high-quality, efficient, and reliable wastewater services in a manner that values environmental and community interests and enhances sustainability. The estimated cost of the SSIP CIP is $6.9 billion; Phase 1 includes the treatment facilities, collection system, stormwater management, and flood resilience projects listed below.

#### 1.3.2.1 Treatment Facilities

- SEP Biosolids Digester Facilities
- SEP 020 Headworks
- SEP Oxygen Generation Plant
- SEP Primary and Secondary Clarifier Upgrades
- SEP 521/522 and Disinfection Upgrades
- SEP Facility-wide DCS Control Upgrades
- SEP Seismic Reliability and Condition Assessment Improvements
- SEP Power Feed and Primary Switchgear Upgrades
- SEP Oxygen Generation Plant 01
- OSP Digester Gas Utilization Upgrades
- OSP Condition Assessment Repairs
- OSP Odor Control Optimization
- Westside Pump Station Reliability Improvements
- NPF Outfall System Rehabilitation
- North Shore Wet Weather Pump Station Improvement and Disinfection

#### 1.3.2.2 Collection System

- Central Bayside System Improvement
- Drum and Jackson Streets Sewer System Improvements

- Cargo Way Sewer Box Odor Reduction/Flush Line
- Taraval Sewer Improvements
- Geary BRT Sewer Improvements Phase 2
- Hudson Ave Pump Station and Outfall Improvements
- Force Main Rehab at Embarcadero and Jackson Streets
- Mariposa Dry-Weather Pump Station and Force Main Improvements
- Marin Street Sewer Replacement
- Griffith Pump Station Improvements
- Richmond T/S Tunnel Rehabilitation
- Beach and Sansome Street CSD Rehabilitation
- CSD Backflow Prevention and Monitoring
- 5th, North 6th and Division Streets CSD Rehabilitation

#### 1.3.2.3 Stormwater Management

- Sunset Green Infrastructure
- Richmond Green Infrastructure
- Yosemite Green Infrastructure

#### 1.3.2.4 Flood Resilience Projects

- Wawona Street and 15th Avenue Stormwater Detention
- Cayuga Avenue Stormwater Detention
- Folsom Area Stormwater Improvement
- 17th and Folsom Permanent Barriers
- Hydraulic and Drainage Sewer Improvements – Joost Foerster, Urbano/Victoria, Wawona SWI, and Subproject #4

The execution of each SSIP project is organized by nine phases of implementation. The CIP Program Controls System employs a standard Work Breakdown Structure (WBS) using Primavera P6 Professional Project Management software by Oracle to schedule and budget each project. The phases of implementation are:

- Project Management
- Planning
- Environmental
- Right-of–Way (ROW) Establishment
- Design
- Bid and Award
- Construction

- Construction Management
- Closeout

Some phases are consecutive, some are concurrent, and some projects may not include the ROW phase.

## 1.4 Construction Management Contracting Strategy

The SFPUC anticipates developing and issuing several separate contracts for CM Services. For SEP projects, some of these will be for the construction of large facilities like those associated with the SEP Biosolids Digester Facilities Project and the SEP 020 Headworks Project. An overall SSIP CM Consultant contract for program auditing and reporting and several separate, as-needed CM contracts will also be developed and issued.

The following is an example of the various CM contracts for SEP. A final list of contracts will be published by the CMB:

- SEP Biosolids Digester Facilities CM/GC[1] contract
- SEP 020 Headworks CM/GC contract
- SEP Biosolids Digester Facilities CM Staff Augmentation contract (CM Consultant)
- SEP 020 Headworks CM Staff Augmentation contract (CM Consultant)
- SEP Improvement Projects CM Staff Pool contract

Descriptions and planned advertisement dates for each CM contract will be posted on the SFPUC website at: https://sfbid.sfwater.org/ The CM Consultant contracts will be staff augmentation CM contracts and may include multiple projects of various types with varying schedules. Not all projects included in a facility may be assigned to a CM Consultant. Some projects are underway and will be fully staffed and completed by SFPUC staff. Very few projects will be fully staffed by CM Consultants. SFPUC staff will be integrated into each project team organization and assigned to various CM positions. SFPUC will determine these positions on a project-by-project basis. This will vary from facility to facility and project to project. Each CM Request-for-Proposal (RFP) will identify which projects are included in the CM contract and which functions the CM Consultant and SFPUC will provide for each project.

## 1.5 SSIP Construction Management Organization

The following are SSIP CM Organization Charts for SSIP Projects that will be occurring.

*Figure 1* depicts the SSIP CM Organization. The project organization will reflect the specific needs of each project, but all CM functions must be addressed.

*Figure 2* depicts the SEP Program CM (PCM) Consultant Organization. Please note that in addition to staffing the SEP PCM Consultant Manager, the SEP Construction Contracts Manager, the SEP Construction Controls Manager, and the Construction

[1] CM/GC – CM/General Contractor

Safety Manager  positions, the SEP PCM Consultant Manager will also be responsible for the staffing of project level SSIP Outreach Liaison, Environmental Inspector, and Specialty Environmental Monitor positions.

**Figure 1**
**SSIP Construction Management Organization Chart**

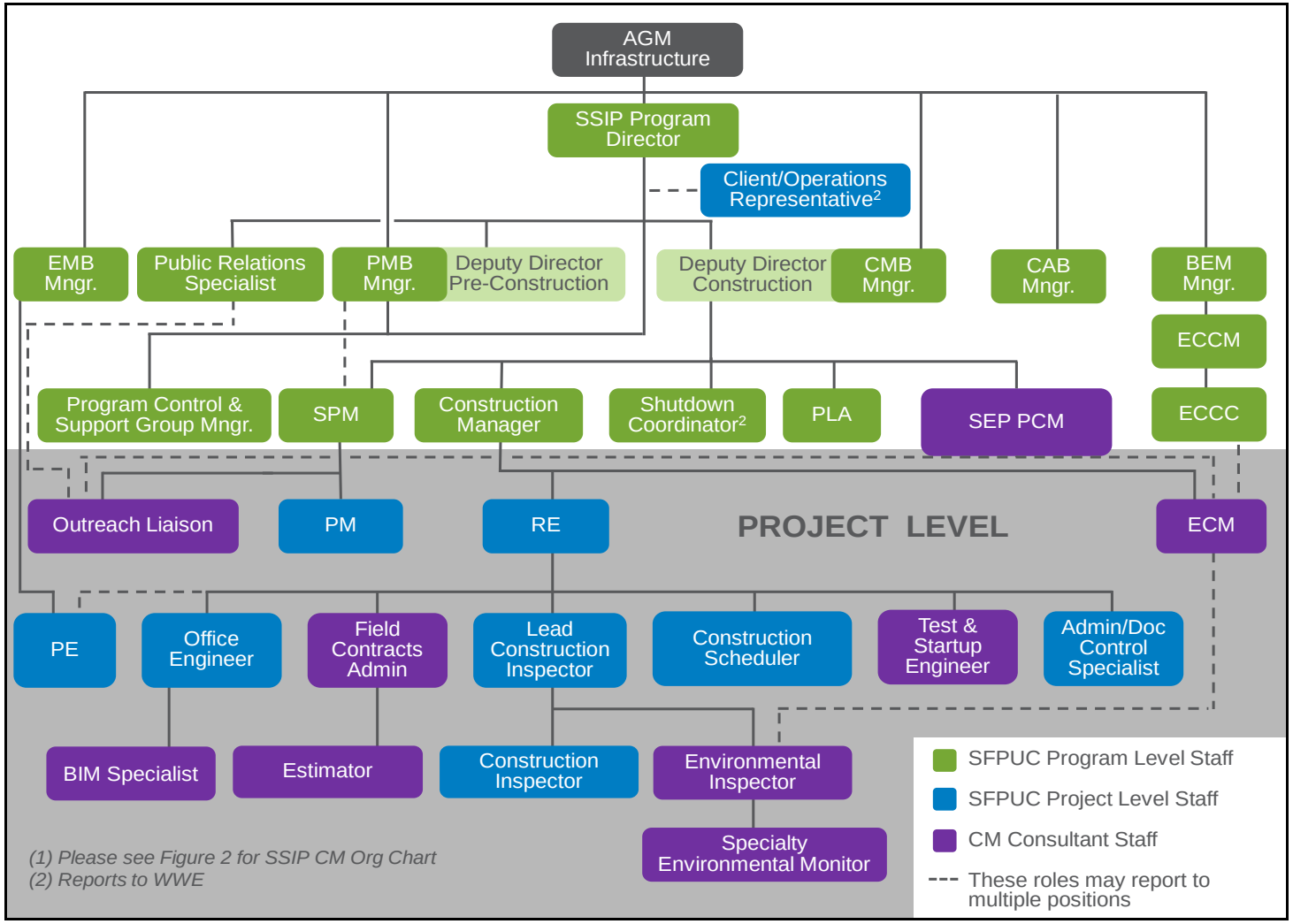
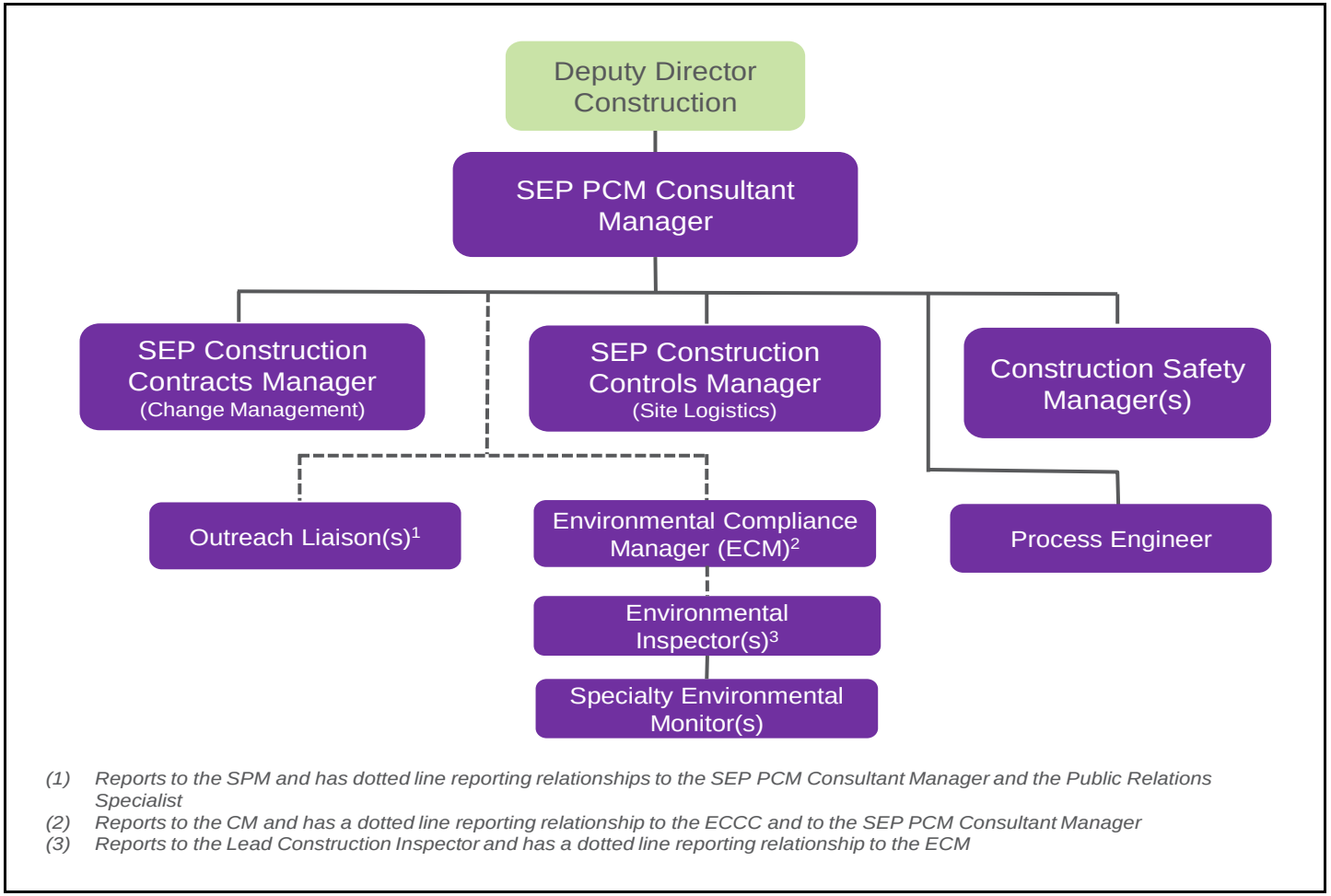


**Figure 2**
**Southeast Water Pollution Control Plant Program Construction Management Consultant Organization Chart**




*(1) Reports to the SPM and has dotted line reporting relationships to the SEP PCM Consultant Manager and the Public Relations Specialist*
*(2) Reports to the CM and has a dotted line reporting relationship to the ECCC and to the SEP PCM Consultant Manager*
*(3) Reports to the Lead Construction Inspector and has a dotted line reporting relationship to the ECM*

The SFPUC SSIP organization is led by a Program Director, with the support of both the Project Management Bureau (PMB) Manager during pre-construction and the CMB Manager during construction. The Program Director reports directly to the Assistant General Manager (AGM) for Infrastructure. The PMB Manager is responsible for the implementation of SSIP projects through the Bid and Award phase. CMB Manager is responsible for implementing SSIP projects from the start of the cconstruction phase through the ccloseout phase. The Project Manager (PM) directs the financial management of each project within a facility for all phases of implementation. The SSIP CM Organization reports to the PMB Manager through the Bid and Award phase, and, to the CMB Manager for the cconstruction and ccloseout phases.

### 1.5.1 SEP Program Construction Management Consultant

The SFPUC will use a consultant to provide CM oversight for SSIP construction projects. The functional positions the SEP PCM Consultant will provide are mainly auditing and reporting functions. The main role of the SEP PCM Consultant is to advise, assist, review, and, make recommendations to the Program Director and the CMB Manager on CM plans, procedures, business processes and systems, and construction issues. The SEP PCM Consultant also provides independent oversight of CM organizational effectiveness and compliance with program procedures. The objective of the SEP PCM Consultant's oversight is to maintain program standardization, conformity and consistency throughout the duration of the SSIP projects. This SSIP CM Plan requires that PMs, CMs, and REs comply with the approach and business processes defined by this SSIP CM Plan. The SEP PCM Consultant will monitor and audit the activities of the CM teams to ensure compliance with the SSIP CM Plan and the SFPUC Infrastructure CM Procedures during construction.

The SEP PCM Consultant will assist SFPUC in implementing an SFPUC Infrastructure Construction Management Information System (CMIS) to be used for the SSIP projects at the project and program level. SFPUC and every consultant and contractor working on the program will use the CMIS. The CMIS will standardize the construction business processes and reporting requirements defined in this SSIP CM Plan. The SEP PCM Consultant will be responsible for monitoring the use of the CMIS and for its maintenance and improvement as needed.

Based on the information collected from each project through Primavera P6 and CMIS, the SEP PCM Consultant will review the overall SSIP Construction Program Master Schedule, analyze schedule delays or problems, and suggest remedies and solutions. The SEP PCM Consultant will also review project cost records, trends and forecasts, analyze potential cost overruns or problems, and suggest remedies and solutions.

When requested, the SEP PCM Consultant will conduct constructability and schedule reviews in order to advise and recommend alternatives to save cost and time.

When requested, the SEP PCM Consultant will coordinate with the SFPUC Safety Manager to advise on safety compliance and ensure contractor compliance with Contract Health & Safety requirements. The SEP PCM Consultant might be asked to provide Safety Managers to oversee construction safety compliance by the contractors and CM teams.

When requested, the SEP PCM Consultant will advise on technical construction and engineering issues and work quality issues and recommend remedies.

When requested, the SEP PCM Consultant will review and analyze construction changes, claims and disputes.

When required, the SEP PCM Consultant will provide Environmental Compliance Managers (ECM), Environmental Inspectors and Specialty Environmental Monitors to provide environmental compliance monitoring during construction.

When required, the SEP PCM Consultant position reports to the CMB Manager. The Consultant will provide SSIP Outreach Liaisons to serve facilities and projects communication and public outreach requirements.

The SEP PCM Consultant reports to the CMB Manager.

### 1.5.2 Construction Management Staff Augmentation Consultants (CM Consultants)

To supplement the availability and experience of the SFPUC staff, Construction Management Staff Augmentation Consultants (CM Consultants) will be hired as described in *Section 1.4.* CM Consultants will be responsible for the management of the CM teams and implementation of the SSIP CM Plan for the specific projects assigned to them. The CM Consultants will be responsible for arranging the CM Office as specified by the SFPUC, staffing the CM functions assigned to them, and integrating the CM organization into the overall SSIP Construction Program organization. CM Consultants are responsible for the management of all CM staff assigned to them. The CM Consultants lead the resolution of all major project issues and ensures effective performance of the CM teams and compliance to all CM Plans and Procedures. The CM Consultants are also responsible for assisting the PM in coordination and interface with other projects not directly assigned to the CM Consultants. The CM Consultants report to the CM(s).

### 1.5.3 Pool Construction Management Consultants

Pool CM Consultants will perform all the duties of the CM position they are required to fill. The CM Consultant providing the pool position resource will be responsible for managing the pool resource and ensuring their compliance to the position's role and responsibilities. In addition, every position provided by the Pool CM Consultant will be responsible for the administrative duties described in this SSIP CM Plan. The organization chart will indicate who each Pool Construction Management Consultant will report to as determined by the position they are required to fill.

## 1.6 Roles and Responsibilities

The roles and responsibilities of positions within the CM organization related to the SSIP projects are summarized below. More specific responsibilities will be defined in the SFPUC Infrastructure CM Procedures. Not all positions will be required to provide for full-time staffing on every project. For some projects, if positions are combined, the appropriate qualifications for the combined functions must be satisfied.

### 1.6.1 Assistant General Manager for Infrastructure

The AGM for Infrastructure manages the SFPUC Infrastructure Division and reports to the General Manager.

### 1.6.2 Program Director

The Program Director manages and directs all aspects of the initiation, planning, monitoring, execution and delivery of the SSIP, including policy, systems and procedures to support all phases of the program. Also manages all staff, consultants and contractors involved in the SSIP through the SSIP organization. The Program Director reports to the AGM for Infrastructure.

### 1.6.3 Environmental Construction Compliance Manager

The Environmental Construction Compliance Manager (ECCM) oversees the overall effectiveness of environmental compliance with the requirements of the California Environmental Quality Act (CEQA) and/or National Environmental Protection Act (NEPA) documents, SFPUC Standard Construction Measures, regulatory resource agency permits during construction and post-construction.

The ECCM develops procedures for environmental compliance, training, ensures adherence to CEQA and/or NEPA Mitigation Monitoring and Reporting Plans (MMRP) and permit conditions, and provides an audit function for the Bureau of Environmental Management (BEM) Manager on conformance to the procedures during construction of all SSIP projects. Tracks and directs the resolution of non-compliant actions, communicates with regulatory agencies, including providing mandatory compliance reports, and reviews and approves change requests. Provides agency interface for non-compliance, and coordinates resolution with the Environmental Construction Compliance Coordinator (ECCC). Also, reviews and approves all CM Consultant scopes of work for environmental compliance services, provides oversight of the ECCC and coordinates with the CMB Manager. The ECCM reports to the BEM Manager.

### 1.6.4 Program Controls and Support Group Manager

The Program Controls and Support Group (PCSG) Manager develops scheduling and cost control systems, processes, tools and resource planning for the program controls support of all SFPUC Infrastructure construction contracts. Ddirects the efforts of staff and consultants involved in the development, administration and execution of the construction contracts Program Controls System, determines the flow of information from the CMIS and P6 construction schedules to the SSIP Program Controls System, and monitors the implementation of both to ensure they will support the SFPUC Infrastructure construction contracts Program Controls System. The PCSG Manager reports to the AGM for Infrastructure and to the Program Director on SSIP contracts.

### 1.6.5 Project Management Bureau Manager

The PMB Manager manages all CIP and all other infrastructure projects from initiation and planning through the Bid and Award phase. The PMB Manager manages the (PM) and the project teams, defines all processes and procedures related to project pre-construction execution through the Bid and Award phase, along with the resource requirements and manages the performance assessment of all assigned staff and

consultants. Ccollaborates with the CMB Manager for assignment and priorities of the PMs. The PMB Manager reports to the Program Director for CIP projects and to the AGM for Infrastructure.

### 1.6.6 Construction Management Bureau Manager

The CMB Manager manages the construction and closeout phases of all CIP projects and all other infrastructure construction projects. Manages the PMs, CMs, REs and the CM teams during the construction and closeout phases. Defines all processes and procedures related to project execution for the construction and closeout phases. Defines the resource requirements and manages the performance assessment of all assigned City staff and consultants. The CMB Manager reports to the AGM for Infrastructure.

### 1.6.7 Public Relations Specialist

The Public Relations Specialist is responsible for resolving construction issues associated with large construction projects so as to minimize impacts and eliminate conflicts that may affect schedule and cost. Communicates construction issues such as access to businesses and homes, temporary road closures to motor vehicles and bicycles, traffic detours, noise and dust impacts, recurring complaints from residents and businesses, claims for property damage, crisis communications and construction site safety. Works with a multi-disciplinary team, providing day-to-day communications strategy and program support services and provides additional resources on short notice if needed to assist with unforeseen events requiring communication/public affairs assistance. The Public Relations Specialist reports to the SSIP Program Director.

### 1.6.8 Project Manager(s)

The PM provides approvals or recommendations related to scope, budget and schedule of all assigned projects. The PM manages the coordination of all construction projects within an assigned facility and all activities related to the pre-purchase of material and equipment by SFPUC until hand-off to the REs. The PM reports to the PMB Manager through a project's Bid and Award phase, and to the CMB Manager through the project's construction and closeout phases.

### 1.6.9 Project Labor Agreement Administrator

The Project Labor Agreement (PLA) Administrator manages the implementation of and compliance with the PLA for the SSIP and participates in Pre-Bid and Pre-Construction meetings to explain the PLA requirements. Oorganizes and facilitates pre-job conferences in which work scopes are assigned to respective crafts and administers grievance procedures on jurisdiction claims and other disputes. Ccoordinates local area employment programs as provided for in the PLA, coordinates substance abuse testing, and provides support to contractors and to signatory unions in PLA implementation on individual projects. The PLA Administrator reports to the CMB Manager during the SSIP Program construction phase and other infrastructure PLA assigned construction projects.

### 1.6.10 Construction Coordinator

The Construction Coordinator monitors and forecasts system access and specific condition requests to facilitate SSIP construction/planning activities, minimize operational impacts, and minimize conflicts between infrastructure construction contracts. Mmaintains the SSIP Master Specific Condition Request Coordination Schedule and defines, coordinates and updates requirements for SSIP project activities that have an anticipated or potential operational impact. Aassures requirements are developed and defined during design and incorporated into the Contract Documents as needed to ensure consistency in project coordination approach and deliverables and interfaces with Operations, PMs, PEs, CMs and REs in the planning and execution scheduling of system access and shutdowns during construction. The Construction Coordinator supports the SEP PCM Consultant Manager and reports to the CMB Manager.

### 1.6.11 SEP CM Consultant Manager

The SEP CM Consultant Manager supports and assists the CMB Manager in overall functions and duties. Oversees the programmatic functions for CM and collaborates with the CMs and the CMB Manager to develop and maintain resource plans to support CM. Monitors and reviews budgets and forecasts and monitors the SSIP Construction Program Master Schedule. Rreviews contractors' proposed ways to accelerate delayed schedules, makes recommendations, and provides input on claims. Periodically, audits construction contracts and CM Consultant contracts to ensure compliance with this CM Plan, SFPUC Infrastructure CM Procedures and construction contract requirements. Pprovides third-party peer review on large construction Change Orders before they are signed by the RE. Eensures all CM teams and contractors are complying with the CMIS and P6 requirements as applied by SFPUC on construction contracts. Mmonitors the use of Dispute Review Boards (DRBs) and Dispute Resolution Advisors (DRA).

The SEP PCM Consultant Manager identifies major issues and proposed solutions and produces program level trend reports related to schedule and cost, quality control (QC), safety and contracts administration to the CMB Manager. The SEP CM Consultant Manager reports to the CMB Manager.

### 1.6.12 SEP Construction Contracts Manager

The SEP Construction Contracts Manager develops the requirements, business processes, procedures and training for the contracts administration function during construction. Mmonitors and audits contract administration procedures and requirements and ensures consistent enforcement of the contract terms by the project CM teams. Mmonitors projects to assure that prompt payment is maintained and provides program level trend reports related to field contract administration to the Program CM. Aaudits all Change Orders exceeding $1million in value and any Change Order involving a time extension. Ensures that CM teams are following SFPUC Infrastructure CM Procedures and contract terms. This role will be assigned to the SEP PCM Consultant Manager in the absence of a SEP Construction Contracts Manager. The SEP Construction Contracts Manager reports to the SEP PCM Consultant Manager.

### 1.6.13 Process Engineer

The Process Engineer participates in the implementation of new technologies, delivery mechanisms, emerging technologies and treatment process upgrades and modifications. Assists the WWE in the evaluation of potential construction impacts to the SEP. If construction at SEP impacts the treatment process, the Process Engineer will evaluate and suggest potential remediation efforts. The Process Engineer reports to the SEP PCM Consultant Manager.

### 1.6.14 Construction Safety Manager(s)

The Construction Safety Manager (CSM) develops the safety requirements for business processes, procedures and training of safety management and oversight during construction as set forth in the SFPUC Infrastructure Safety Approach. Reviews and ensures compliance with the safety requirements contained in the contract documents and provides program level trend reports related to safety to the SEP PCM Consultant Manager.

The CSM reviews the CM safety plans prepared by the CM teams for each project, the health & safety plans submitted by the contractor(s), and all contractor safety related submittals. Conducts reviews of contractor and CM Consultant compliance with contract terms relating to safety as set forth in the SFPUC Infrastructure Safety Approach and Contract Health & Safety requirements. Maintains records of safety compliance and effectiveness and assists in the investigation of safety incidents. The CSM reports to the SEP PCM Consultant Manager.

### 1.6.15 SEP Construction Controls Manager

The SEP Construction Controls Manager develops the CMIS and related business processes, procedures, and report formats in order to ensure standardization and conformity for CM throughout the SSIP Program. Conducts training and monitors and audits compliance by the project CM teams to procedures and processes related to schedule and cost control and the CMIS. Pprovides input on resources planning and provides QC reviews of construction reports generated by the CM organization. Reviews status updates developed by the Construction Scheduler for input to the SSIP Program Controls System and provides input to CM Consultant scopes and construction contract documents regarding schedule submittals, performance monitoring and reporting requirements, and provides support to the Shutdown Coordinator in identifying potential scheduling conflicts for system shutdowns. Mmonitors document and record controls for claims and ensures their proper storage at project completion. Preforms audits of construction contract costs and schedules and reports the audit findings to the SEP PCM Consultant Manager. This role will be assigned to the SEP PCM Consultant Manager in the absence of a SEP Construction Controls Manager. The SEP Construction Controls Manager reports to the SEP PCM Consultant Manager.

### 1.6.16 Outreach Liaison(s)

The Outreach Liaison plans and implements public outreach efforts for projects assigned to the program and facilitates construction execution by coordinating with all impacted residents, businesses and project stakeholders. Manages and coordinates

communications and public outreach efforts between projects. The Outreach Liaison reports to the PM and the SEP PCM Consultant Manager.

### 1.6.17 Client/Operations Representative(s)

The Client/Operations Representative provides operations support coordination between Operations and Maintenance (O&M), WWE, Resource Management and other SFPUC operating entities during all project phases. Coordinates through the REs with contractors to manage the system access requirements and shutdowns, including ensuring that SFPUC operations resources are planned and executed in support of each system shutdown. Reviews contractor test and startup plans, RFS submittals, change requests, and VECPs. Participates in Substantial Completion and Final Completion inspections and approves the turnover of completed facilities to the SFPUC for operation. The Client/Operations Representative reports to WWE management.

### 1.6.18 Environmental Construction Compliance Coordinator

The ECCC facilitates project compliance, interprets project requirements, provides project notifications and reports to resource agencies, and keeps the ECCM apprised of compliance during construction. Approves project non-compliance reports and coordinates resolution with the ECM and supports the ECCM with agency interface for non-compliance as requested. Coordinates with the SFPUC BEM permitting managers regarding regulatory resource agency site visits. Performs preliminary review of change requests submitted by the ECM on behalf of a project. Coordinates with the CM or RE as necessary. Facilitates development of CM Consultant scopes of work for providing environmental compliance services. The ECCC reports to the ECCM and provides oversight of the ECM.

### 1.6.19 CM(s)

The CM (CM) directs the CM organization for one of the large SSIP construction projects and/or for a group of smaller SSIP construction projects, including managing the REs and project implementation resources. Oversees the management of all assigned construction contracts to ensure compliance with all contract terms and conditions and the SSIP CM Plan and approach. Ensures forecasts and required reports are provided by the REs for inclusion in the SSIP Program Controls System and works closely with the PM relative to facility budget and schedule issues. Monitors for timely processing of submittals, Requests-for-Information (RFI), Request-for-Substitutions (RFS), Application for Payments and Change Orders. Resolves conflicts and problems arising in the projects between contractors and REs.

The CM is responsible for managing, with the exception of the SEP PCM Consultant contract, and the CM/General Contractor (CM/GC) contracts, all CM Consultant contracts assigned to them, including performance of CM Consultant staff, resource planning and hiring, and reporting. Reviews and approves the recommendations of REs regarding Change Orders within the parameters of the SSIP Change Order Authority Matrix, and all recommendations for construction and CM contracts contractual actions. Reviews and develops strategies to address claims from contractors and leads, and participates in constructability reviews. The CM reports to the CMB Manager.

### 1.6.20 Environmental Compliance Manager(s)

The ECM is a field based position who will develop an Environmental Requirements Table (ERT) that summarizes the MMRP, regulatory resource agency permit conditions, SFPUC Standard Construction Measures, and other environmental requirements, and ensures they are implemented during construction. Works closely with the ECCC. Assigns Specialty Environmental Monitors and Environmental Inspectors, maintains quality and consistency of project environmental inspection reports, maintains quality and consistency of environmental field inspections and monitoring, supports the ECCC with agency notifications and preparing agency reports, assists the RE with change request determinations, coordinates with project teams on compliance issues and reviews non-compliance reports. Develops and conducts environmental training of contractor and inspection staff.

The ECM may support agency interface for non-compliances as requested, and coordinates resolution with the SFPUC ECCC. Will also coordinate with the SFPUC ECCC regarding resource agency site visits, and sets up and maintains environmental compliance records and files in coordination with SFPUC document controls requirements. Prepares monthly compliance reports, reports required by the MMRP and/or permits, maintains permit binders, and prepares change requests and facilitates necessary supporting documentation, such as supplement biological survey reports. The ECM reports to the CM.

### 1.6.21 Resident Engineer(s)

The Resident Engineer (RE) manages the project construction contracts as the “City Representative” as defined in the SFPUC construction contract documents. Administers the construction contract, implements quality plans to assure all construction work is completed in conformance to the contract documents, implements environmental compliance requirements and procedures, manages schedules, costs, and COs, assists with Public Outreach efforts, and maintains all construction documentation and records.

The RE is the prime point of contact between the Contractor, the SFPUC and external stakeholders. Who supervises and directs the performance of the project CM team and ensures conformance to established policies and procedures for the management of the project. In this regard, the RE is responsible for all of the duties and responsibilities assigned to all members of the project team reporting to this position. Reviews and recommends for approval all change requests, Value Engineering Change Proposals (VECP) and Application for Payments. Determines and recommends when contractual action is necessary on the construction contract and elevates all such issues to the CM and the PM Approves schedule submittals, updates and revisions and prepares monthly assessments of project status. Supports and assists the CSM in the implementation of the SSIP Safety Approach. Also assists the Shutdown Coordinator in coordinating with the contractors to develop and implement project-specific system shutdown plans during construction. Manages the use of the Project Engineers (PE) for design support during construction and implements and executes the SSIP CM Plan. The RE reports to the CM.

### 1.6.22 Resident Engineer for CM/GC for Construction Projects and Design Build Construction Projects

This Specialized Resident Engineer role performs all of the duties of the RE. In addition, leads any constructability reviews required and oversees the CM/GC contract and Design Build (DB) contract, including performance of CM staff, resource planning and hiring, and reporting. Provides forecasting and reporting of construction and CM costs and schedules to the PM for inclusion in the Program Controls System. The RE for CM/GC Construction Projects and Design Build Projects reports directly to the CM for CM/GC and DB construction projects.

### 1.6.23 Administrative/Document Control Specialist(s)

The Administrative/Document Control Specialist (ADCS) provides clerical, administrative and document control/records management support to a CM office and support to the CM team. Establishes the CM office procedures and manages all administrative functions to effectively meet the needs of the CM office and it's staff. Maintains project records, correspondence and filing systems, and enters documents into the CMIS. Also, orders supplies as needed for the CM office. The ADCS reports to the RE.

### 1.6.24 Field Contracts Administrator(s)

The Field Contracts Administrator (FCA) provides support to the RE in the administration of the terms and conditions of the contract. Manages the contract change process including monitoring and tracking changes and claims resolution and coordinates with the RE and PE on the identification of change requests to be incorporated into COs. Prepares and manages COs, including preparing the Record of Negotiations and maintaining the contract files. Reviews Application for Payments and project correspondence to the Contractor for conformance with contractual requirements.

The FCA reviews and responds to RFIs that request clarification of contractual requirements. Assists the RE in contractual closeout to ensure all administrative and contractual requirements are met.

Not all projects will justify a full-time FCA. On small projects, some of the FCA's responsibilities may be assigned to other project team members by the RE. The FCA reports to the RE.

### 1.6.25 Construction Inspector(s)/Lead Construction Inspector

The Construction Inspector assures that the construction work is performed and completed in accordance with the contract documents. Conducts full surveillance and inspection of the work, monitors the Contractor's quality process, and coordinates field sampling and testing for verification of quality results as needed. Also, prepares daily inspection reports and other quality records, including deficiency and Non-Conformance-Notices (NCN).

On each project, one Construction Inspector will be designated as a "Lead" Construction Inspector for the project team to assist the RE in planning for and coordinating all inspection activities, compiling all daily inspection records, reviewing field construction related submittals, inspecting all material and equipment arriving on site, monitoring resolution of all quality issues and leading the Substantial Completion and Final

Completion inspections. Projects will be staffed with various specialty discipline Construction Inspectors as needed for the specific work activities. These disciplines may include, but are not limited to civil, piping, welding, corrosion, tunneling, mechanical, electrical/instrumentation, structural, in-factory inspections, geotechnical and surveying. The designated Lead Construction Inspector reports to the RE, and all other Construction Inspectors assigned to a project will report to the designated Lead Construction Inspector.

### 1.6.26 Office Engineer(s)

The Office Engineer (OE) assists the RE in the administration of the CM process. Manages the submittal and RFI, and Application for Payment processes. Schedules and documents project meetings, coordinates progress and safety reporting, coordinates, documents. Provides receipt of acceptance for SFPUC furnished equipment and materials from the Contractor and transfers to the SFPUC.

The OE coordinates turnover of as-built record drawings, O&M Manuals, spare parts, and warranties to SFPUC Operations.

But Not all projects will justify a full-time OE. On small projects, some of the OE responsibilities may be assigned to other project team members by the RE. The OE reports to the RE.

### 1.6.27 Project Engineer(s)

During the design phase, the PE is responsible for managing the Engineer of Record who develops the engineering design and contract documents for SSIP projects. The PE manages the design contracts, whether the design is performed by the Egineering Management Bureau (EMB), Design Consultants, the San Francisco Public Works or a combination of the various entities.

During construction, the PE provides the interface with the Engineer of Record by providing design support to the RE during construction, primarily through the review of technical submittals, RFIs, RFSs, and COs, and as requested by the RE for consultation or clarification of design issues. Participates in start-up and testing activities, final inspections and contract closeout activities. They are also responsible for ensuring that appropriate technical support is provided when requested by the RE and for executing any SFPUC Infrastructure CM Procedures requiring the Engineer of Record. The PE supports the RE during construction and reports to EMB Manager.

On CM/GC and D/B contracts, the PE will be responsible for managing the CM/GC and D/B contracts during the Pre-construction phase through the Bid and Award phase. The RE who will be heading the CM team, will be responsible for managing the CM/GC and D/B contracts from Construction NTP to close out.

### 1.6.28 Building Information Modeling Specialist

The Building Information Modeling (BIM) Specialist will be responsible for the enhancement, review, conditioning and validation of 3D building construction models on assigned projects including independent detailed quantity extraction for use in the evaluation of cost models, estimates, and budget development.

The BIM Specialist will track and compare maturing models with previous versions to support progressive cost estimating and Change Order analysis and negotiation. Coordinates design changes through multiple project phases and will be responsible for identifying 3D model inconsistencies and reconditioning data to provide accurate and usable data that reflects the intent of the design model.

Reviews all information updated or provided by the contractor on the BIM submittal updates every month and will check with the Lead Inspector for all as-built information, with the Scheduler for actual progress updates, with the PE, if needed, to verify the updates verses the baseline data. The BIM reports to the OE.

### 1.6.29 Test and Startup/Commissioning Engineer(s)

The Test and Startup/Commissioning Engineer manages SFPUC's responsibilities in support of testing, startup and commissioning activities as required by the contract documents by implementing and deploying the requirements of unit/component tests, function and system tests, acceptance tests, and start-up tests. The Test and Startup Engineer reviews the Contractor's Test and Startup Plans and schedules. Coordinates with SFPUC Operations, through the Client/Operations Representative, to minimize impacts on existing operating systems and facilities and with the contractor for vendor training and turnover. The Test and Startup/Commissioning Engineer reports to the RE.

### 1.6.30 Environmental Inspector(s)

The Environmental Inspector inspects, evaluates, verifies and documents construction activities are in compliance with environmental requirements and construction documents. Works closely with the ECM. Conducts routine inspections of environmental parameters including but not limited to site cleanliness, wildlife exclusion fencing, erosion and sediment control measures, hazardous material storage, protection of water quality and biological and cultural resources, dust suppression practices, noise abatement, and site restoration. Prepares daily environmental inspection reports when onsite. Provides environmental training to contractor crew personnel. Also drafts initial non-compliance reports and assists the ECM with preparation of other required reports as requested. The Environmental Inspector reports to the designated Lead Construction Inspector.

### 1.6.31 Specialty Environmental Monitor(s)

The Specialty Environmental Monitor monitors contractor activities where required by project environmental requirements in specific specialty areas to protect sensitive resources such as biological archaeological, historical, and paleontological resources. They will work closely with the ECM and Environmental Inspector conducting pre-construction surveys and providing clearance of work areas for Threatened and Endangered species and other resources, monitors work, and prepares a monitoring log. Evaluate proposed change requests and perform supplemental field surveys for biological, cultural, and other resources and prepare survey reports. The Specialty Environmental Monitor reports to the Environmental Inspector.

### 1.6.32 Construction Scheduler

The Construction Scheduler provides scheduling support to the RE during construction. Reviews and recommends for approval:

- The Contractor's Baseline Schedule and cost loaded Summary Schedule, along with any revisions to those schedules.
- Contractor's Time Impact Analysis (TIA) for change requests and schedule claims analysis, and develops independent TIAs as required.
- Contractor monthly progress schedule update, comparing it to the approved schedule and reported monthly progress.

Prepares a monthly update of the Summary Schedule according to the Contractor's performance, schedule updates and Application for Payment requests for the RE's Monthly Project Construction Progress Report. The Construction Scheduler analyzes and monitors cost and schedule trends, provides an independent assessment of progress and forecast at completion (FAC) of schedule and cost, and checks and verifies the Submittals Schedule and provides updates on long lead items to ensure on time arrival of materials and equipment to be properly installed, tested and operated according to the approved Baseline Schedule. The Construction Scheduler reports to the RE.

### 1.6.33 Estimator(s)

The Estimator provides cost estimating support for the review and assessment of change requests and VECPs.

On CM/GC contracts, the Estimator will prepare cost estimates at the 65% and 95% design milestones. Prepares for and attends meetings at the 65% and 90%/95% design milestones with the Project Design Consultant and the CM/GC to present, discuss and compare cost estimates, reconcile the differences among cost estimates, if any, and to develop an agreed estimate for the Direct Costs of Construction. If additional meetings are required to reconcile any differences, they will be held within fourteen (14) calendar days after the City Representative transmits the respective cost estimates to the CM/GC. The Estimator reports to the FCA.

### 1.6.34 SFPUC Infrastructure Bureaus

These bureaus provide technical and resource support to the SSIP Organization and are summarized below.

#### 1.6.34.1 Project Management Bureau

The PMB provides SFPUC project management staff resources assigned to the SSIP organization to work during Pre-Construction and Construction phases to provide resource planning to optimize use of SFPUC staff.

#### 1.6.34.2 Program Controls (PC)

The Program Controls (PC) provides SFPUC staff resources assigned to the SSIP as requested by the PMB and CMB. PC works with the PMB and CMB Managers on resource planning to optimize use of SFPUC staff.

#### 1.6.34.3 Engineering Management Bureau

The EMB provides engineering planning and design services, develops the contract documents for construction of SSIP projects, provides design support during construction as requested by PMB and CMB Managers, and manages design consultants, D/B and CM/GC contracts during the Pre-construction phase. The EMB prepares final as-built drawings and works with PMB and CMB Managers on resource planning to optimize use of City and SFPUC staff.

#### 1.6.34.4 Construction Management Bureau

The CMB provides SFPUC CM staff resources assigned to the SSIP organization in coordination with the CMB Manager. The CMB staff works with the PMB and CMB Managers on resource planning to optimize use of SFPUC staff and coordinates with other City departments to augment SFPUC CM staff. CMB staff Assist the PMs during the construction through closeout phases. The CMB Engineering Archives (EA) Group develops the records management requirements, procedures and training for the SSIP and monitors and enforces compliance with records management processes and procedures by the SSIP organization.

#### 1.6.34.5 The Contracts Administration Bureau

The Contracts Administration Bureau (CAB) manages all procurement activities for the SFPUC, including contractor pre-qualification, the advertisement and bidding for construction contracting and the procurement of vendors and consultants. The bureau also processes payment requests from consultants, vendors and contractors for payment by the City Controller and monitors compliance with prompt payment provisions.

#### 1.6.34.6 Bureau of Environmental Management

The BEM oversees construction for compliance with the CEQA and/or NEPA MMRPs, SFPUC Standard Construction Measures, and regulatory resource agency permit conditions during construction and post construction. The bureau establishes procedures, training and reporting templates for the SSIP CM, and interfaces with outside City agencies and regulatory resource agencies. Also facilitates approval of project changes including facilitating supplemental environmental review and acquiring permit amendments when project changes occur.

## 1.7 Communications Policies and Procedures

Clear and efficient communication plays a vital role in the success of the SSIP projects. It is very important to develop and maintain clear channels of communications between all SSIP stakeholders. The CM staff must be fully integrated into the overall SSIP management organization and maintain strong relationships and open communications with the various project team members and project consultants. Open channels of communications are of critical importance in matters such as engineering, contracts, legal, environmental issues, safety, health, quality, system shutdowns, construction operations, risk management, closeout and turnover to the operating department. Generally, lines of communication will follow the lines of the organization. The RE plays a crucial role in communication during construction. The CM staff must direct any

communications with outside agencies, contractors, and SFPUC's various bureaus and operations personnel through the RE to ensure a single and consistent message. Informal and ongoing communication between the RE, CM, PM, ECM and the CMB Manager are necessary; these positions form the nucleus of the daily management of the projects during construction.

Construction Management presents many challenges that require direct interface with many project participants. In particular, coordination and communication with the PE is required to assure that technical support is obtained in a timely manner. Ongoing communication with the ECM will also be vital to ensure changes that occur during construction do not violate CEQA and/or NEPA and regulatory resource agency requirements. The CMIS is a vital communications tool. The business processes necessary to ensure the input of accurate and timely data must be followed to maximize the use of this tool to communicate throughout the SSIP organizations.

The CM organization and CM contracting strategy also pose unique communication challenges. The organization of the SSIP by facilities, the use of Pool CM Consultants within a facility, the schedule and physical interface between projects, and the relationships between system access requirements and shutdowns will require that communication not only be vertical within, but also horizontal across the CM organization. REs, CMs, PMs and ECMs in particular must constantly be aware of the relationship a specific project issue or event may have on other projects and be pro-active about communicating with counter-parts in other facilities and projects to minimize any adverse impacts.

Open communication and coordination with the contractors must be extensive throughout the construction period. Weekly meetings will be scheduled with the contractors to review short and long range plans, resolve potential problems, and coordinate the activities of all project participants with the construction schedule.

It is important that written communication be relevant and clearly address an issue or decision so there are no misunderstandings that cause delays.

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# 2.0 CONSTRUCTION MANAGEMENT APPROACH

Note: The SSIP CM Consultant Manager, SSIP Construction Contracts Manager, and SSIP Construction Controls Manager collectively provide oversight of the Construction Management implementation process. For brevity, the term "SSIP Program CM Consultant" in the following discussion of approach may be used to describe the involvement of any of these positions as appropriate to their respective functional areas of responsibility. Specific SFPUC Infrastructure CM Procedures will more specifically define how each of these positions will be involved.

## 2.1 Pre-Construction Phase

### 2.1.1 Program Construction Scheduling and Sequencing

During the pre-construction phase, the PEs are responsible for updating the construction schedules and the PMs are responsible for including the results of these updates in their monthly project forecasting requirements. This information must be incorporated into the Master Project Schedule by the PCSG. REs will review the PE's construction schedules and sequences and provide input into the development of these schedules.

### 2.1.2 Constructability and Biddability Reviews

During the later stage of the design phase, the RE will conduct constructability and biddability reviews of design package deliverables for their assigned projects. These reviews will be conducted for:

- Completeness of design documents for constructability;
- Adequacy of Contractor's construction compound area; field office, storage and lay down;
- Incorporation of known underground and overhead interferences along project alignments;
- Potential health and safety issues, if any;
- Potential environmental issues, if any;
- Potential community issues, if any;
- Construction methods that may be specified that result in excessive costs;
- Construction schedule including shutdown constraints;
- Identification of inspection and testing protocols and acceptance of systems;
- Materials delivery plan or method;
- Potential conflicts within the specifications;
- Constructability impacts due to environmental requirements; and,
- Completeness and integration of all parts of the contract documents for biddability.

EMB will coordinate these reviews with the RE. Review comments, in a format defined by the SFPUC, are to be provided within 3 weeks of receipt of the design package.

### 2.1.3 Bid and Award Phase Assistance

The REs will be requested to provide support for pre-bid meetings and responses to questions submitted by bidders. This support will be as directed by the CM.

### 2.1.4 Preparation of the CM RFP, Interviews and Selection

The SFPUC will announce and publish a schedule of procurement of the CM Consultant's services on the SFPUC website. The SFPUC will manage all aspects of the procurement process, including determination of the makeup of the selection panel for each RFP. RFPs developed for specific projects will be assigned to the CM Consultants and will include a description of the construction management functions to be staffed by SFPUC personnel and the CM Consultants.

### 2.1.5 Construction Contracts Procurement Strategies and Bid Packaging

PMs have conducted an extensive analysis of procurement strategies and bid packaging for each SSIP project. Currently two CM/GC contracts and multiple contractor contract packages for each SSIP construction project are being planned. But some of these packages may be subject to change as project designs are finalized, the current plans will be reflected in the RFPs as they are advertised.

### 2.1.6 Construction Contracts Pre-Bid Conference

The SFPUC conducts a pre-bid conference during the advertisement for bids on all SSIP projects. This conference is scheduled and coordinated by the CAB. The PM , CM, PE and the SSIP CM Consultant will provide support and assistance in conducting each conference. Pre-bid conferences generally will cover the following topics:

- Scope of work;
- Addenda, if any;
- Qualifications to bid;
- Construction work hours and duration;
- Permits;
- Liquidated damages;
- Security;
- Safety approach;
- Prevailing wage requirements;
- First source hiring program;
- Contract Monitoring Division Disadvantaged Business Enterprise requirements;
- Partnering; and,
- Bonding/Insurance requirements.

### 2.1.7 Assistance with Permits and ROWs Requirements

It is anticipated that pre-construction permits and ROWs will be secured before the Notice-to-Proceed (NTP) date for any construction contract. The SFPUC takes a proactive approach to this process and has resources dedicated to permitting and ROW procurement. The RE will provide assistance in the interpretation of permit requirements and the development of special condition clauses in construction contracts for permit conditions, will advise on the extent of temporary construction easement needs, and will coordinate with contractors if work-arounds are needed to address any conflicts related to permit requirements or ROW and easement needs during construction. It will be the Contractor's responsibility to obtain many of the construction related permits. The RE will monitor the Contractor's schedules related to permit obtainment.

### 2.1.8 Project Offices

The contractors will be required to provide project offices for SFPUC and CM Consultant staff. Contract Specifications will determine potential locations for project offices, the CM positions requiring office space, office dimensions, and the office equipment required for each occupant. These contract requirements will be reviewed by the RE and CM before the Bid and Award phase.

### 2.1.9 Environmental MMRP and ERT

In coordination with the CEQA and/or NEPA Lead Agencies, BEM is responsible, for preparing an MMRP for each project prior to the start of construction. This plan is described in *Section 0*. The PM and PE are responsible for coordinating with BEM to ensure the requirements of the MMRP are included in the contract documents.

BEM is also responsible for working with the PM and PE to incorporate regulatory resource agency permit requirements and the SFPUC Standard Construction Measures in the contract documents. Prior to construction, the ECM develops an ERT that summarizes all environmental requirements.

### 2.1.10 Project Construction Management Safety Plan

The RE will be required to submit to the CM a copy of the Project CM Safety Plan prior to the construction NTP date and within a reasonable time to allow for review and comment by the CSM prior to the start of field construction activities. This Project CM Safety Plan will address safety of the CM team (i.e., City employees, CM Consultants, and subconsultants) as they conduct their activities. The plan will comply with the SFPUC Infrastructure Safety Approach and CM Procedures. The CSM will conduct a limited review of the Project CM Safety Plan for conformance to the specification requirements, not for the means and methods used by the RE.

### 2.1.11 Project Risk Management Plan

Each project will have risks associated with safety, cost, quality, schedule, environmental compliance, and operations. The RE is responsible for developing a project risk profile and plan for submittal to the CM, SSIP CM Consultant and PM for review. Each Project Risk Management Plan will include a description of each risk, probability of occurrence, mitigation measures, an action plan for each mitigation measure, the methodology to measure the effectiveness of each measure, and the frequency of review and updating. The contractors should be encouraged to participate

in the development of these plans and in the mitigation action plans. A sample of a Risk Register is included in Appendix B.

## 2.2 Construction Phase

### 2.2.1 Construction Management Plan Implementation

This SSIP CM Plan will be implemented during the lifetime of the construction contract period. CM Consultants will not deviate, alter or change the Sewer CM Plan without the prior approval of the CMB Manager.

### 2.2.2 Safety

Safety is the top priority of every member of the SSIP construction teams. The Safety Approach, available on the Infrastructure CM Program webpage, sets forth the safety-related responsibilities for construction contractors, CM Consultants, the CSM, and the SFPUC. Under the Safety Approach, construction contractors will have full and total responsibility for site safety associated with construction and their operations, for the safety of their personnel, and for ensuring a safe work environment for CM staff and visitors to the site. The SFPUC will comply with all legal and regulatory requirements for identifying pre-construction and construction site hazards, which include safety requirements in construction and CM contracts, provide safety training to SFPUC staff and ensure that SFPUC staff complies with safety requirements. The CSM will coordinate with the SFPUC to develop the requirements for the Safety Approach. Also participates in all investigations of safety incidents and maintains records of compliance and results of the Safety Program.

The CM team will take a limited role in monitoring and observing the Contractor for compliance with the Safety Approach. The CM team will **not** conduct safety inspections and should notify the Contractor of any observed project safety hazards that may require corrective action(s) to be initiated in a timely manner in order to ensure compliance with contract and regulatory requirements. The Contractor is responsible for selecting the appropriate corrective action(s). The CM team shall **not** provide any suggestions or provide guidance to the Contractor that could be construed as directing the means and methods of the Contractor.

If any member of the CM team observes a situation where there is imminent threat to life or limb, that CM team member should ensure that the Contractor takes immediate corrective action, and may direct the Contractor to stop the work involved. Should the Contractor fail to take action on an imminent danger to life and health concern after being advised of the unsafe condition, it is then the responsibility of the RE to notify the CSM and the CM for further action. The RE is expected to demonstrate interest in safety by establishing a firm, positive attitude among all staff toward the prevention of accidents.

It is important to emphasize that the construction contractors will be fully and totally responsible for all construction safety in connection with a project including construction means, methods and techniques.

#### 2.2.2.1 Contractor Safety Program

The Contractor will be required to submit to the RE a copy of the Contractor's Site-Specific Health and Safety Program (HASP), certified by the Contractor's qualified safety professional and PM, ten (10) working days prior to the start of site work activities. The submittal format will be specified in the contract documents. The CSM

will conduct a limited review of the Contractor's Site-Specific Health and Safety Program for conformance to the specification requirements, not for the means and methods used by the Contractor. Neither the RE nor the CSM will participate in developing the Contractor's Site-Specific Health and Safety Program. Other safety related submittals are defined in Section 00 73 19 - Health and Safety Requirements of the contract documents.

#### 2.2.2.2 CM Safety Plan Implementation

The Project CM Safety Plans submitted by the RE during the pre-construction phase will be managed and implemented during the lifetime of the construction contract period. the Project CM Safety Plan will not be altered or changed without the prior approval of the CM and the CSM.

#### 2.2.2.3 Accident Reporting and Safety Records

Any Occupational Safety and Health Administration recordable or lost time accident, no matter how minor, will immediately be brought to the attention of the RE, who will in turn notify the CSM. The Contractor must file a written report within 24-hours of the incident. The CSM will compile and maintain safety data of CM and Contractor work for monthly reporting to the CMB Manager or SSIP CM Consultant.

### 2.2.3 Construction Management Information System

The SFPUC is utilizing Primavera UNIFIER by ORACLE for the CMIS. An implementation is in the development and production. This will include definitions of business practices and processes for correspondence, submittals, RFIs, Change Requests, Application for Payments, QC records and document control that will support this SSIP CM Plan and the accompanying CM Procedures. The plan will provide direction for configuring and implementing features and applications to meet the business practices and processes, and provide for training of SFPUC staff and CM Consultants in the use of the CMIS. It is the SFPUC's intention to use the CMIS for processing of correspondence, submittals, RFIs, Change Requests and COs, Application for Payments, Meeting Minutes, and Action Items in an integrated manner that involves its use by the SFPUC, the CM Consultants, and the Contractors. The decision to utilize the CMIS for individual projects will depend on project size, complexity and location.

### 2.2.4 Building Information Modeling

The SFPUC intends to make use of the BIM models developed during the design phase for some of its larger and more complex construction projects and will continue refining and adding pertinent information to the models throughout the construction phase. BIM extends traditional two-dimensional building design to beyond 3D by augmenting the three primary spatial dimensions (height, width and depth) with time and cost as the fourth and fifth dimensions. BIM model elements can carry attributes for providing cost estimates and for material tracking and ordering.

The SFPUC may use of the BIM model developed during the design phase of some projects to allow the CM team to envision the virtual construction of a facility prior to its actual construction. Contractors and sub-contractors will be asked to provide critical information for input into the model so that it may be used to reduce construction uncertainty, improve safety, work out problems and simulate and analyze potential

impacts before construction takes place. The use of the BIM models will also help prevent errors by highlighting to the CM team where parts of the building may wrongly intersect. Contractors and sub-contractors will also be asked to provide as-built (redline information) so that the BIM Specialist can update the model as changes are implemented.

### 2.2.5 Construction Management Contract Management

CM Consultant contracts represent a significant investment by the SFPUC and are a significant part of the SSIP construction budget. Project budgets for CM soft costs have been developed based on initial resource loading of each project per the schedule information available at the time the budgets were developed for assumptions regarding resource allocations and billing rates. CM Consultants are required to resource load their contracts and work tasks to the same level of detail (specific resources by project) for import into the SSIP Master Project Schedule by the PC. In order to provide adequate visibility and control of costs for Construction Management, each CM Consultant must invoice according to the WBS structure used for each project in the Master Project Schedule and provide monthly status reports to the CMs and PMs. These reports will include the current status of expenditures and accruals, forecast costs to complete each task, forecast costs at completion of each task, a variance analysis and explanation, and major issues affecting the costs for the CM Consultant contract. Resource issues should also be discussed as they relate to upcoming needs or deviations from the schedule. These reports will not include status of the construction projects, except as necessary to explain impacts to the CM Consultant contracts.

The PM is responsible for managing the financial and scheduling aspects of S/he projects from initiation and planning to final close out. The CM is responsible for managing, with the exception of the SEP PCM Consultant contract and the CM/GC contracts, all CM Consultant contracts assigned to them. CM Consultants will report to the CM, and the SEP PCM Consultant will report to the CMB Manager on their contract, for all contract administration matters, including task orders, requests for staff substitutions or additions, approval of monthly invoices, and monthly reporting of contract status and budget forecasts. The CM (supported by CAB) will provide the necessary information needed by PM to manage the overall project's finances and schedule during the construction phase and final close out phase. The CM will also review CM Consultant contract invoices and make recommendations to the PM for payment or non-payment. The CM will also monitor CM Consultant contract status reports for variances and trends to be reported to the PM .

### 2.2.6 Public Outreach

The SFPUC's Public Information Office is responsible for all public outreach efforts for the SSIP construction projects. That effort is continuous throughout project execution and varies according to the needs of each SSIP project. The Public Information Office will work with the Public Relations Specialist to prepare facility and project outreach plans and provide staff support for the outreach efforts. During construction, an Outreach Liaison may be assigned to manage the outreach efforts for each of the SSIP construction projects. The CM teams and contractors will support the outreach efforts as required. The Outreach Liaison will attend each weekly project meeting during

construction to discuss ongoing and any special public outreach efforts that may be needed to deal with issues that arise during construction.

### 2.2.7 Program Security

The SFPUC Emergency Planning and Security Division determines security requirements for existing facilities and construction sites. The SFPUC will define the requirements and responsibilities for security for the CM Consultants and contractors working on the SSIP construction projects. These requirements and responsibilities will be included in each contract.

During construction, Emergency Planning and Security Division will monitor and audit conformance to the requirements. The Emergency Planning and Security Division representative will interface directly with the PM , CM and with the RE for project specific security issues during construction.

### 2.2.8 Project Labor Agreement

This section applies only if the SFPUC negotiates and adopts a PLA for for all SSIP projects. The purpose of the PLA is to insure against work stoppages of any nature and provide local construction workforce opportunities. If PLA is adopted, all contractors are required to work under the terms of the PLA. The PLA Administrator will be responsible for the oversight and management of this agreement on behalf of the SFPUC. If PLA is adopted, the following sub-sections apply:

#### 2.2.8.1 Project Labor Plan

Contractors will be required to prepare a project-specific plan addressing local workforce participation, recruitment and retention of apprentices, craft manpower requirements, and contingency plans to alleviate any craft shortages that might be experienced during construction. The Project Labor Plan identifies a responsible person who will address and resolve identified labor issues, as well as any grievances that might arise. The Project Labor Plan will be reviewed by the PLA Administrator and RE and be approved by the CM.

#### 2.2.8.2 Pre-Job Conference

The Pre-Job Conference is a required meeting under the terms and conditions of the PLA which must occur prior to the construction NTP date. The purpose of the meeting is for the Contractor and subcontractors to inform interested construction unions of project particulars including work hours, safety and health, parking, peak craft workforce and jurisdictional assignment of respective scopes of work. If disagreement with one or more craft assignments should occur, the union and/or unions are required to file a written appeal with the Contractor and the PLA Administrator, which is then adjudicated as prescribed in the PLA.

Substance abuse testing and local area employment considerations are also covered in the Pre-Job Conference. Participants include the PLA Administrator, SFPUC Labor Relations staff, project delivery staff, the Contractor and all named and/or known subcontractors and signatory unions. The Contractor and all field subcontractors are required to submit to the PLA Administrator signed Letters of Assent before performing any work on the respective project. The Contractor is responsible for conducting the Pre-Job Conference and the PLA Administrator is

responsible for scheduling acceptable dates and times for the Conference and for producing the Conference meeting minutes.

#### 2.2.8.3 Local Area Employment

Under the PLA, consideration is given to local area workers seeking employment. Special emphasis is placed on enrolling local area residents in apprenticeship programs and providing employment opportunities on SSIP projects. The Program Controls is responsible for providing program estimates for construction workforce demands, updated annually. During pre-construction, The Program Controls staff will review engineering drawings and related documents at 95% completion to provide greater detail on craft workforce demand to support the project. This information will be forwarded to the PLA Administrator, who will be responsible for working with the prime contractor and subcontractors and the affected unions to identify opportunities for local area hiring. Should any issues arise with the program, the PLA Administrator will be responsible for raising issues at the weekly progress meetings. Should the PLA Administrator require access to the job site and/or the Contractor or subcontractor during construction, the PLA Administrator will first notify the RE and then provide written reports of any significant decision or exchange.

#### 2.2.8.4 Substance Abuse Testing

Under Under the PLA, all new hires are required to pass a substance abuse test to be cleared for work. The Contractor must work with a pre-qualified third party administrator to implement this requirement. The PLA Administrator will coordinate this program. The requirement will be a standing agenda item at all Pre-Job Conferences for general notification and at all pre-construction meetings to discuss any issues that might arise prior to implementation of the project. The Contractor is responsible for certifying that all contractor and subcontractor workers on the job site have passed the pre-employment drug test and have been certified for work on the project. The PLA Administrator will provide QC through periodic audits of test results.

### 2.2.9 Construction Administration

#### 2.2.9.1 Project Office Mobilization/Demobilization

The contractors will be responsible for providing and maintaining project CM offices. The CM will identify the locations, define the requirements, dictate the timing of mobilization to these CM offices, and include the requirements in the contract documents. Close coordination is required between the CM, PM, RE and the SFPUC Information Technology (IT) Department to ensure logistics are fully planned and the office infrastructure, including computers, network and internet connections are in place when needed. The CM will work with the contractor to determine the optimal time to demobilize the CM offices.

#### 2.2.9.2 SFPUC Purchased Material and Equipment

The SFPUC at times identifies projects that require one or more pre-purchase contracts for equipment and/or material to be used by the construction contractors. The schedules for procurement, fabrication and delivery are the responsibility of the SFPUC PMs, working with the PEs. These procurement schedules are required to be included in the SSIP Master Project Schedule which is maintained by the PCSG

and updated as necessary by the PMs and Program Controls. The PEs are responsible for defining the QC requirements, the in-factory witness testing requirements and frequency (Supplier Quality Surveillance [SQS]), any storage requirements, and the delivery and turnover requirements by the vendors. These requirements must be integrated with the construction specifications developed by the PEs. The RE may assist the PE as requested. The CM will arrange for any needed in-factory inspections (SQS), either through the SEP PCM Consultant, the project's CM Consultant, a separate consultant, or SFPUC staff. The CM team will manage the delivery of the equipment to the work site, the acceptance inspection upon delivery, the transfer to the Contractor, and will maintain all records of inspections and turnover.

#### 2.2.9.3 Project Risk Management Plan

The Project Risk Management Plan submitted by the RE during the pre-construction phase will be managed and implemented during the lifetime of the project. The CM team will review the plan periodically, update the probability of occurrence, assess the status and effectiveness of each mitigation measure, and add new risks that may arise. The status of the Project Risk Management Plan will be included in the Monthly Project Construction Progress Report to the CM.

#### 2.2.9.4 Partnering

In 2013, San Francisco Mayor Edwin M. Lee signed Executive Directive 12-01 requiring the use of Collective Partnering. The extent of partnering may vary from project to project, but the CM is responsible for defining the requirements for partnering in each construction contract. The CM, RE and Contractor will collaborate to select a partnering facilitator, identify the project personnel who will be involved in each partnering session, and schedule the location and frequency of the sessions. The cost of partnering facilitation will be paid through a bid item or allowance in the construction contract. The CM or the RE will approve the partnering arrangements.

#### 2.2.9.5 Pre-Construction Conference

Upon award of the contract, but prior to the commencement of work, a Pre-Construction Conference will be scheduled by the CM or the RE. The primary purpose of the conference is to discuss administrative procedures, establish field communication protocols, discuss project constraints (including environmental and permit conditions), and discuss contractual and technical requirements. The agenda will be distributed by the RE to all parties prior to the conference. The RE will conduct the conference with primary assistance from the CM, the FCA and the OE, if available. Other attendees should include; the PM, the designated Lead Construction Inspector, the CSM, the PLA Administrator, the Construction Scheduler, the PE, the ECM, the Client/Operations Representative, the SSIP Outreach Liaison, the Shutdown Coordinator (if required), and any other staff considered essential to conducting the meeting. The Contractor's attendees should include the PM, Project Superintendent, Safety Manager, Scheduler, major subcontractors, and any other key personnel as determined by the Contractor. An attendance list for the meeting must be recorded on a sign-in roster. Senior SFPUC management staff are also encouraged to attend.

The following agenda items (but not limited to) should also be addressed and agreed upon, as required, at the Pre-Construction Conference. Identification of each party's (SFPUC's and Contractor's) administrative and contractual requirements as they relate to each item should be discussed.

- Introduction of attendees; relationships, roles and responsibilities;
- Contract authority as it relates to both the SFPUC and the Contractor;
- Contract administration process, workflow for submittals, approvals and documentation;
- Submittal requirements, including required early submittals;
- Application for Payment requirements, including Contracts Monitoring Division submittal requirements;
- Change request requirements and other commercial items;
- Contract technical requirements;
- PLA requirements, if applicable to the project and other contract compliance requirements;
- Public outreach;
- Schedule requirements and Baseline Schedule submittal;
- Contractor Health and Safety Plan requirements;
- Contractor QC compliance and handling of quality issues as required by the contract;
- Environmental compliance requirements and permit conditions;
- Coordination requirements with other projects;
- Security requirements;
- System Shutdown Plans, as applicable to the project;
- Incentives, if included in the contract;
- VECP, if included in the contract;
- Partnering;
- Contractor's presentation of its plans, methods, and schedules for accomplishing the work, including record drawings;
- Interface with operations; and,
- DRB/DRA, if applicable.

The RE is responsible for producing detailed minutes of the Pre-construction conference. Feedback for corrections and clarifications are important to establish a clear record of the meeting.

#### 2.2.9.6 Construction Status Meetings (Weekly Progress Meetings)

Construction Status Meetings provide a forum for timely collaborative discussion and issue resolution and provide documented responses to issues discussed. These meetings are an important component of a pro-active claims management strategy.

The RE and the CM team must meet with the Contractor on a weekly basis to review short-range and long-range plans, progress achieved to date, resolve potential problems, and coordinate the activities of all project participants with the construction schedule so that inspections, tests, and other items may be effectively scheduled.

The RE has the primary responsibility for conducting the Construction Status Meetings, manages and sets the agenda for the meetings, produces meeting minutes, and ensures distribution to all attendees.

The agenda items for construction status meetings should include, but not be limited to:

- Introduction of new attendees and their areas of responsibility;
- Review, and if necessary amendment, of minutes from the previous meeting;
- Status of previous action items;
- Project schedule and progress of work and comparison with the latest approved Baseline Schedule. Contractor will present their 4-week look-ahead schedule to review progress of the previous week and the planned work for the next three weeks;
- Contractor's invoice and payment status;
- Safety Report, which should include a review of all safety incidents and near-misses that have occurred since the previous meeting. The Safety Report must also identify accidents and the crafts involved, and corrective methods to be initiated by the Contractor. The Safety Report will include a review of the most frequent incidents and the corrective actions selected by the contractor to eliminate their reoccurrence. No member of the CM team will give instructions to the Contractor regarding corrective actions that might be construed as directing the Contractor's work;
- PLA items if applicable;
- Analysis of work accomplished since previous meeting, offsite fabrication status and issues, material delivery status and issues, actual and potential schedule slippage, problems arising from proposed changes, and other factors that might affect the work;
- Discussion of work performed in the previous week and upcoming work and the work sequence on the critical path and on the 4-week look-ahead schedule derived from the approved project schedule. The RE must discuss all activities in the 4-week schedule and document the Contractor's responses regarding status;

- Discussion of corrective measures to be taken to maintain the construction schedule;
- Discussion of all quality issues, including observations, problems, and performance. The discussion will include Nonconformance Report status, including plans for closing all open nonconformance reports, and any outstanding quality reports, test results, or submittals;
- Partnering check-ins;
- Discussion of work coordination with other contracts, including actual and anticipated problems and delays;
- Discussion of potential changed conditions, time extensions, and other relevant issues;
- Status of submittals and RFI;
- Status of commercial issues, including status of the change log;
- Environmental compliance issues, including pre-construction surveys that may be needed;
- Status of follow-up to any partnering sessions, as applicable;
- System shutdowns, minimum 3 months lead time;
- Start up, minimum of 6 months lead time;
- Lessons learned;
- Interface requirements with SFPUC Operations;
- Public outreach issues;
- Housekeeping;
- Other business; and,
- New action items.

The RE and Contractor will be responsible for ensuring of the attendance at these meetings by any members of their respective project teams necessary for a full discussion of the items on the agenda.

#### 2.2.9.7 Contractor's Application for Payment and Monthly Schedule Update

Application for Payments will be reviewed and processed in a timely manner, using acceptable cost control practices in accordance with contract requirements. The records maintained by the RE must be accurate and comprehensive to provide an audit trail at all times throughout the project.

The Contractor will submit an Application for Payment for each pay period, accompanied by a Schedule Update and Summary Schedule to reflect the agreed upon percentage completion of the work, any outstanding test results, and inspection and monitoring reports. The progress report will contain the following information

concerning progress as well as other information described in *Section 2.2.12 - Project Controls:*

- Progress to date, measured as a percent complete and actual earned value of each work activity and in total.
- A plot of the plan's and actual earned value curves in total and for each level specified in the contract documents, with a written analysis of budget, cost, and schedule status in narrative and report format. A narrative of any action taken by the Contractor to address any projected problems with schedule, budget, cost, manpower, quality and safety.
- A listing of work activities behind schedule, work activities due to start within the next report period, critical path items causing schedule delays or slippage, and the remedial measures proposed to be taken to improve or maintain the schedule.
- A plot showing an early dates curve, late dates curve and actual curve to indicate the progress of the work and whether the contractor is on, behind or ahead of the Baseline Schedule. This plot may be prepared by the Construction Scheduler.

The Application for Payment must indicate the percentages of completion and materials in storage for the payments that are requested. Appropriate supporting documentation must be included.

One of the initial submittals required by the Contractor is a detailed Schedule of Values. The Schedule of Values provides the basis for the Contractor's progress measurement and must present all bid items in sufficient detail to allow accurate progress measurement and payment. The total of all items on the Schedule of Values must equal the award amount of the contract and must correlate directly to the manner in which the construction schedule is organized and presented.

The RE has primary responsibility for implementing the Application for Payment procedures, verifying the accuracy of the Application for Payments submitted by the Contractor at the end of each monthly work period, negotiating agreement with the Contractor for quantities contained in the Application for Payments, and forwarding the Application for Payment to the PM for approval along with a recommendation for payment. The RE maintains inspection reports, pay quantities records, and other supporting documentation required for auditing purposes.

The Construction Scheduler assists the RE by verifying progress reported by the contractor and comparing it to the Schedule of Values, and verifying that approved changes are incorporated accurately in the Schedule of Values and the Application for Payment request.

The FCA maintains an Application for Payment file and assists the RE, with the help of the Lead Construction Inspector, in reviewing the pay request and assessing the progress of the work and conformance of the work to contract requirements. The OE is responsible for the monthly review of the Contractor's as-built drawings, which is a condition of payment.

The CM monitors the Application for Payment process for each assigned project and resolves any payment conflicts that may arise between contractors and the RE.

The PM is responsible for approving and processing the Application for Payment through CAB and informing/notifying the Project Controls when submitted. The Project Controls is responsible for capturing the Application for Payment in the program database for monthly progress updating and SSIP quarterly reports.

#### 2.2.9.8 Submittal Management

A submittal is any item required by the contract documents to be submitted or offered by the Contractor in accomplishing the work. A submittal consists of a Submittal Transmittal cover from the Contractor and the data submitted for review. The PE is responsible for defining the required submittals in the construction documents before advertisement for bid. If the RE is available and under contract prior to bidding, should assist the PE in developing the submittal requirements.

Submittals may include, but are not limited to, design drawings, calculations, shop and working drawings, certificates, installation or erection drawings, lists of materials, operating instructions, catalog cuts, data sheets, brochures, samples, mock-ups, installation instructions, plans to accomplish certain portions of work, schedules, quality plans, safety/security management plans, geo-technical information and monitoring plans, safety plans, system shutdown plans, traffic control plans, utilities relocation and support, test schedules, plans and reports, O&M manuals, training plans, permits, environmental, hazardous waste and pollution control plans, progress reports, spare parts lists, vehicle and engine lists and maintenance logs, pre-construction surveys, species relocation plan, construction water discharge plan, noise and vibration plan, re-vegetation plan, storm water pollution prevention plan, cultural resource monitoring and protection plans, neighborhood notification and community communication plans, nighttime lighting plans, and other items used to administer construction or perform the work.

Where CMIS is utilized on a project, all submittals are processed through the RE and submitted using the CMIS. The ADCS initially logs the submittal in the Submittal Log and attaches any hard copy backup transmittal information received from the Contractor. The OE performs an initial review for completeness and conformance to submittal requirements and determines who should perform the review. If the submittal does not conform to contractual requirements it will be immediately returned to the Contractor with reasons noted and documented in the Submittal Log.

Technical submittals that affect the design are to be reviewed by the PE. Other submittals may be reviewed by the RE, Construction Scheduler, CSM, FCA, ECM, Shutdown Coordinator, Client/Operations Representative, and SSIP Outreach Liaison as appropriate. Submittals returned to a Contractor with a status other than “Approved No Exception Noted” should note the reasons for revisions or rejection so that the Contractor knows what is required for approval and can shorten the number of cycles and the time required for approval of each submittal.

The Contractor prepares complete submittal packages in accordance with the contract documents. The Contractor prepares a Submittal Log and submits the Log with the Baseline Critical Path Method (CPM) Schedule to the RE for review by the

Construction Scheduler. Once approved, the Submittal Log is entered into the CMIS. The Contractor designates appropriate submission dates for all submittals, taking into account the submittal review times specified in the contract documents. These dates will allow the work to be accomplished in accordance with the accepted project schedule. Each submittal must be included in the Contractor's final Baseline Schedule submittal. The Contractor and the RE will maintain their respective copies of the Submittal Log through construction.

Submittals require the Contractor to identify the appropriate specification section.

Submittal responses will be coded in one of five ways as follows:

- No Exceptions Taken;
- No Action Taken;
- Make Corrections' Noted;
- Revise and Resubmit; and,
- Rejected.

Submittals returned with "No Exceptions Taken", No Action Taken or "Make Corrections' Noted" will be considered as acceptable submittals provided the Contractor complies with the corrections noted. Any other coding requires action by the Contractor to provide an acceptable submittal before any work is fabricated, manufactured, or constructed.

The OE will oversee the logging and routing of submittals and ensure that each submittal is reviewed, appropriately commented upon, and returned to the Contractor within the time set forth in the contract documents. Who also ensures that the review of all submittals by the designated reviewer is timely. Timely review and complete documentation are important components of a pro-active claims management plan. The SFPUC Infrastructure CM Procedures and contract documents will define the expected turn-around time for responding to submittals. Submittal Registers will be part of the CMIS and reports will be generated that highlight pending and overdue submittals (by the Contractor and the CM team). These reports will be monitored by the Program CM and CM and action initiated as necessary.

#### 2.2.9.9 Request for Information (RFI) Management

An RFI is a document transmitted to the RE by the Contractor that requests clarification, interpretation, information, or guidance concerning an aspect of the contract documents.

The RE is responsible for managing the Contractor's RFIs, coordinating their review, verifying use of the correct format, and for tracking to ensure that the RFI is addressed in a timely manner. The RE establishes and maintains an RFI status tracking system in the CMIS and maintains RFI documents in a readily retrievable manner in the CMIS.

The Contractor may submit an RFI at any time that clarification, guidance, or additional information concerning construction requirements is necessary. All RFIs are processed through the OE who performs an initial review for completeness and

conformance to submittal requirements. If the submittal does not conform to contractual requirements it will be immediately returned to the Contractor with reasons noted and documented in the RFI Log.

The OE will review the RFI to determine whether the CM staff can address it in the field by referencing contract documents. RFIs relating to the technical plans or specifications that cannot be answered by the CM staff will be forwarded to the PE. Other RFIs may be reviewed by the RE, Field Contracts Administrator, OE, Construction Scheduler, CSM, ECM, Shutdown Coordinator, Client/Operations Representative, SSIP Outreach Liaison, or CM as appropriate.

Requirements for documenting RFIs will be specified in the construction contract documents and should:

- Address only one issue. Unrelated items should not be included in the same Request for Information.
- Identify the item of concern in a clear manner. Provide reference to elements like drawing number, specification section, equipment nomenclature and submittal references to allow for a complete understanding of the question.
- Specifically state what information is required and identify any concurrent delay or impact to the schedule pending receipt of response to the RFI.

Timely and complete responses to RFIs are important components of a pro-active claims management plan. The SFPUC Infrastructure CM Procedures and contract documents will define the expected turn-around time for responding to RFIs. The RE is responsible for monitoring the response time for RFIs and follow-up as needed to ensure that the RFIs are addressed as expeditiously as possible. RFI Logs will be part of the CMIS and reports will be generated that highlight pending and overdue responses. These reports will be monitored by the SSIP CM Consultant and CM and action initiated as necessary.

#### 2.2.9.10 Request for Substitution (RFS) Management

The contractor may propose a change of a product, equipment or service required by the contract documents as a RFS even if the words “or equal” or “or approved equal” or similar references are used.

Fifty percent of any cost savings resulting from an accepted RFS will be credited to the City (refer to Contract Specifications).

An RFS submitted by the contractor which will result in an increase in the Contractor’s bid prices and/or contract time will be rejected.

An RFS will be considered if received within 35 days after Notice of Award. If received more than 35 days after award of the contract, any RFS may be considered or rejected at the sole discretion of the City.

RFS requests are required to use standard formats that are included in the contract documents. The CM is responsible for reviewing such requests with the PE and the

Client/Operations Representative. Prompt disposition and response to RFSs are required with thorough documentation of the basis of the response. If a substitution is approved that results in cost savings, the Contractor will be required to submit a deductive Change Order.

Requirements for documenting RFSs will be specified in the contract documents and should:

- Address only one issue. Unrelated items should not be included in the same RFS.
- Provide reference to elements like drawing number, specification section, equipment nomenclature, and submittal references and a clear description of the deviation that is being requested.
- Provide a detailed cost and schedule impact proposal if the RFS is approved.

Timely and complete responses to RFSs are an important component to a pro-active claims management plan. The CM is responsible for monitoring the response time for RFSs and following up as needed to ensure an RFS is addressed as expeditiously as possible.

#### 2.2.9.11 Contract Drawing, Specification and Record Drawing Control

The RE is responsible for ensuring efficient control of contract drawings, specifications and record drawings. A copy of the contract documents will be maintained by the RE and continuously annotated to reflect all changes that have been approved. A protocol for correlating approved changes in the contract file to the changes annotated on the contract documents is a requirement of the SSIP CM Plan and SFPUC Infrastructure CM Procedures. The Contractor is required to maintain As-built “red-line” record drawings which are to be audited monthly by the CM team. The PE will produce a final set of record drawings called “Final As-Built” after the completion of construction and before project closeout. A portion of the Contractor’s progress payments may be withheld if the Contractor cannot successfully demonstrate consistency in producing progress record drawings in the manner stipulated in the contract documents.

#### 2.2.9.12 Claims Management

If the Contractor disputes any directive, determination, Proposed Change Order (PCO), Unilateral Change Order, payment, or other act by the RE or City impacting or potentially impacting the performance of the work, the Contractor may submit a Notice of Potential Claim, followed by a Claim. The contract documents describe the process and the time required to file a claim and the form and content of a formal claims submittal.

The entire organization works together to prevent claims. A major part of this effort involves precluding and limiting contract changes. Claims management includes “prevention” that must start during the design phase by producing comprehensive and complete contract documents, and be continued through construction by exercising a proactive approach in solving issues and problems as they arise.

The principal means of preventing claims is development of properly conceived contractual terms that clearly assign risks to the parties best suited to deal with them, and complete, coordinated design drawings and specifications detailing the technical and operational requirements of the contract documents. During contract document reviews, the CM staff will focus on these issues to begin the claims prevention measures before the inception of each contract.

The following actions are components of a pro-active claims management program:

- Ensure that detailed planning and scheduling of the work is accomplished by both the Contractor and the CM staff, including a Baseline Schedule that will help discourage submittal of time-related claims by accurately identifying critical work items and quantifying resource requirements planned for each item of work. The Baseline Schedule will also be used for monitoring concurrent delays and identifying problem areas for quick resolution. While the Contractor retains responsibility for means and methods, including how the work is scheduled, identifying deficiencies in the schedule, and carefully documenting those deficiencies can prove useful in countering a claim at a later time.
- Carefully monitor and rapidly respond to correspondence, submittals, RFIs and RFSs to identify potential problems and minimize the Contractor's opportunities to claim delays.
- Pro-actively manage the procurement, fabrication, QC and delivery of SFPUC pre-purchased equipment and material.
- Maintain open communication and keep an open mind when listening to the Contractor's ideas or complaints and work with the Contractor position to solve problems early.
- Participate proactively in "partnering" with the Contractor during the term of the contract. During the initial partnering session, an "issue resolution ladder" should be developed to organize and empower staff settlement of problems or disagreements at the lowest organizational level possible.
- Participate in the early establishment of a DRB or DRA. Bring deadlocked issues before the DRB or DRA in an expeditious manner to obtain an independent review of the claim. The CM team is responsible for preparing timely, persuasive and complete presentations to the DRB or DRA and for compiling evidence or other documentation, as appropriate.
- Maintain a "tough but fair" attitude with the Contractor to assure that the SFPUC is not taken advantage of and the Contractor is treated fairly, particularly on Change Order issues.
- Maintain constant job "presence" at the worksite and in the offices to allow constant observation of the work and quick response to problems. Be as knowledgeable as the Contractor as to the "history" of the project and maintain thorough and comprehensive records to

display a true picture of events or facts in order to fairly discuss and resolve potentially emerging disputes.

- Always beat any contractual deadlines for responding to the Contractor, but ensure the response is complete and adequate to protect the interests of the SFPUC.

Management of the claims process by the RE must be conducted in accordance with the provisions of the contract. The RE is responsible for the initial management of claims for their project. The first duty is to review a Notice of Potential Claim for conformance to the contract documents, for making all attempts to resolve the issue with the Contractor so as to avoid a formal claim, and to advise the CM, the PM and the CMB Manager of the receipt of a Notice of Potential Claim. The CM is responsible for notifying the CMB Manager should a formal claim be submitted by the Contractor, the RE reviews the claim for conformance to the requirements of the contract documents, notifies the CM and the PM, and may take the lead in initiating discussions with the SFPUC CM team for responding to the claim. The Construction Scheduler, Estimator, FCA, Construction Inspectors and PE, as needed, will provide support in analyzing a claim and preparing a negotiation plan. The formal claim, with a draft response and negotiation plan, along with supporting documentation, is presented to the CM, SSIP CM Consultant and PM. Upon finalization of the negotiation plan, the RE and FCA will meet with the Contractor to discuss the claim.

The FCA is responsible for documenting all claims negotiations and maintaining record files as part of the contract files.

#### 2.2.9.13 Dispute Resolution Advisor (DRA) and Dispute Review Board (DRB)

DRBs will be required for each SSIP construction contract with a value equal to or greater than $200 million. For contract values of $5 million to under $200 million a DRA will be required.

A DRB will be comprised of an SFPUC nominee, a Contractor nominee, and a third member chosen by the two nominees. Alternatively, the Contractor and the RE can evaluate project risks and jointly select the DRB members. The DRB will visit the project for an update on progress at least twice a year, and more frequently if agreed to by the SFPUC and Contractor. Either party to the contract may initiate review of an issue by the DRB. The expenses for the DRB will be shared equally by the SFPUC and the Contractor.

A DRA will be comprised of a single nominee selected by the City and the Contractor. The DRA will hold an initial meeting with the parties at the start of the project; subsequent meetings may be scheduled or will be scheduled only to hear disputes between the parties. Either party to the contract may initiate a review of an issue by the DRA. The expenses for the DRA will be shared equally by the SFPUC and the Contractor.

#### 2.2.9.14 Progress and Status Reporting

The RE and the Construction Scheduler will measure the Contractor's progress and performance using the Contractor's submitted and approved Baseline Schedule and

the S-curve comparisons between Baseline, actual and target dates. The RE and the Construction Scheduler will verify the Contractor's compliance with the scope of work, the approved resource loaded schedule, and the correct assessment of completion for any given activity. The RE prepares the report and submits it to the CM. The CM is responsible for reviewing each project report and forwarding all project reports with a summary of the overall progress to the PM for inclusion in the SSIP Quarterly report.

Quarterly Project Construction Progress Reports are intended to summarize the progress and major issues of a project; they are not intended to be a voluminous document. A standard format will be established by the SEP PCM Consultant to include:

- Current status of the project safety plans and records;
- Progress planned and achieved thru the end of the reporting period;
- Schedule issues and forecast completion of schedule milestones;
- Cost and forecast of contract costs at completion;
- Summary of quality issues;
- Summary of submittal and RFI requests;
- Change request status and summary of trends;
- Summary of environmental compliance;
- Public outreach activities; and,
- Outstanding issues that could affect cost, schedule, quality, coordination with other projects.

The CMIS and the cost-loaded Summary Schedule will be the primary repository and source of data for the Quarterly Project Construction Progress Report. The SSIP Construction Controls Manager will develop the data requirements and business practices for the use of the CMIS. The CMIS will provide various status reports in various formats for different CM functional areas (e.g., Change Order Logs, Submittal Logs, and Non-conformance Logs) that will be useful to REs, CMs, PMs, and the SEP PCM Consultant to monitor project issues and variances, and to use as attachments to the monthly reports. The SEP PCM Consultant will define the formats of functional reports to ensure consistent content.

The project reporting process and business practices for the CMIS system will be integrated with the procedures and requirements for SSIP Level reporting to ensure timely and consistent input from construction is provided.

#### 2.2.9.15 Value Engineering Change Proposal

A VECP is a proposed change to the contract design and/or specifications that would reduce the cost of the project and/or provide greater value with equal quality or better. If accepted, the resulting cost savings are shared with the Contractor.

VECP proposals can be submitted with supporting documentation to the RE at any time during construction. Project team members, including the CM, PM and the PE will review the proposal for merit. The Client/Operations Representative will be involved in the review if the change will affect facility or system operations. The Construction Scheduler and Estimator will analyze the proposal for contract schedule and cost impacts. The SPFUC retains full authority to accept or deny a VECP proposal. If a VECP is accepted, the RE assisted by the FCA, will lead the negotiations with the Contractor to finalize the proposal and any schedule and cost ramifications. An accepted VECP will be processed as a change to the contract.

#### 2.2.9.16 SFPUC Operations and Maintenance Coordination

Coordination with the SFPUC Bureaus and Operations departments is an ongoing activity prior to construction, during construction and closeout. The Client/Operations Representative is the point of initial contact with SFPUC Operations. SFPUC Operations will be involved in system shutdown planning and execution, RFSs, and change requests that affect the specifications or maintenance requirements of equipment, design changes to system or facility configurations, and schedule variances and recovery plans that impact system shutdowns of facility operations. Operations may also be requested to review certain submittals and spare parts lists, and will participate in the Substantial Completion and Final Completion inspections and any “Acceptance of Work” requirements.

The RE must work closely with the Client/Operations Representative or any Operations staff assigned to assist or coordinate any part of the work. The RE and CM will exercise sound judgment in regards to the level of involvement of Operations during construction. Operations must respond in a timely manner to any requests by the CM team to facilitate decision making and avoid delay claims by the Contractor.

SFPUC Operations will also be responsible for implementing post-construction environmental requirements after Final Completion.

#### 2.2.9.17 System Shutdown Management and Coordination

SSIP construction projects may require numerous system access activities and shutdowns to accomplish the work. Some access activities are stand-alone in the sense that they can be completed without impact to the operation of the overall system. Other access requirements impact other parts of the operating system, as well as other concurrent or planned access events. While some can be accomplished at any time, many are restricted to certain seasons of the year. All system access activities and shutdowns must be carefully planned and coordinated and the requirements and constraints must be fully defined in the contract documents by the PEs. The Client/Operations Representative and the Construction Coordinator will review the final contract documents to ensure that access events are adequately defined.

After each construction contract is awarded and an NTP date is issued to the Contractor, the Construction Coordinator, in cooperation with the Client/Operations Representative, the RE and the Contractor, will review the Contractor’s Baseline Schedule as it pertains to access requirements. This will ensure that the schedule supports the overall system restrictions and that all the necessary resources will be

available to accomplish the shutdown. The permitting requirements are also reviewed to ensure that all the necessary permits will be in place to support the schedule.

The RE is responsible for monitoring the Contractor's schedule for access activities and updating the planned dates on a monthly basis as a minimum. Any variances must be forwarded to the Construction Coordinator by the RE for review against the SSIP Master Schedule for potential impacts to other projects.

Each access event will require the Contractor to prepare and submit a Specific Condition Request (SCR) for any hot taps or other impacts on Operations activities or a System Outage Request (SOR) for system shutdown to the RE no later than 30 days prior to any system shutdown or any impact on Operations according to the contract requirements. The RE will pass the SCR/SOR on to the Client/Operations Representative who will then prepare a Operational Change Request (OCR) and coordinate with the Operations Superintendent or Operations Chief who will prepare a comprehensive specific condition procedure that will include a detailed schedule, the activities that need to be performed to shut the system down, and the activities that need to be performed to bring the system back on line. An equipment and manpower plan will also be prepared that identifies both the equipment and operations and maintenance personnel needed to support the access event and start-up activities.

The RE will schedule SCR meetings with the Contractor, Construction Coordinator and Client/Operations Representative both one week before and one day before a access event is scheduled to confirm the status of the plans and procedure and the schedule for the work. In addition, all access requests should be a separate item of discussion at each weekly Construction Status Meeting to ensure timely and cooperative execution.

Once the system is isolated, the Client/Operations Representative will inform the RE who will coordinate lock-out tag-out LOTO (if applicable) and inform the Contractor to commence with the work.

Upon completion of the Contractor's work, the RE will notify the Client/Operations Representative that the work is complete and the system is ready to be returned to service.

#### 2.2.9.18 Testing and Startup/Commissioning

Testing, interconnection, startup and commissioning are complex portions of construction projects that are required for satisfactory completion of the contract; therefore, will require thorough planning and proper execution. Testing and Startup is defined as all tests, initial operations, and other activities related to providing a complete, operational, and functional system as required for Substantial Completion. Testing and Startup includes all factory testing, functional testing, all performance testing, all pre-commissioning and commissioning activities, all manufacturer's services, all certification of proper installation, and all troubleshooting, checkout, and shakedown activities. Providing the specified documentation supporting the performance of these activities and the documentation required to report test results is also part of Testing and Startup.

Each SSIP construction project will require some level of Testing and Startup/Commissioning. The requirements will vary by type of project and the facilities involved. The contractors must comply with the contract specification's section for Testing and Startup. The PE, in collaboration with the Client/Operations Representative, is responsible for defining the testing and startup requirements in each construction contract. The RE reviews the contract documents for testing and startup and provides a Test and Startup Engineer as part of the CM team. Depending on the extent of the work, and as specified by the PE, the Contractor may be required to provide a full-time Startup Manager as necessary to accomplish the work and submit testing and startup plans as defined in the contract documents. The contract documents must include lead time requirements for these plans to ensure adequate time for development and review. The Test and Startup Engineer coordinates with the Contractor and the Client/Operations Representative to develop and review testing and startup plans, and to ensure the appropriate support staff is available from the CM team and SFPUC Operations.

Standard requirements for testing plan content, processes and documentation will be developed by the design team in collaboration with SFPUC Operations. The PEs will adapt and refine those standards to each construction contract.

Testing and Startup includes the following major functions, with related activities, as appropriate to the project requirements:

- In-Factory Tests and Source Inspections SQS;
- In-factory testing and source inspections are the verification that specific equipment components conform to the required performance specified by the contract documents before the equipment is delivered to the construction site;
- Functional Testing;
- Component test and check out is the verification that each component is in compliance with the contract documents and is ready to perform its intended function. This is often referred to as "Operational Readiness Testing" and confirms that the installed components will function as intended;
- Sub-system test and startup is the verification that a discrete group of related components is functioning as intended and is ready to perform its intended function as part of the overall system;
- System test and startup is the operation and verification that all related components and sub-systems are functioning as intended and are ready for performance testing, final commissioning and operation;
- Performance Testing; and,
- Performance testing is the verification step that the complete work functions on an extended basis as defined by the contract documents. Successful performance testing is a requirement of Substantial Completion.

#### 2.2.9.19 Spare Parts and Warranties

Two types of spare parts are usually required in every contract. The first type must be supplied by the manufacturer when any equipment is purchased. These are standard types of spare parts that are included in the equipment purchase price. The second type is required by some contracts to be purchased to cover a certain number of years of usage. Spare parts are expected to be transmitted before the Certificate of Substantial Completion is issued. All spare parts should have a shelf life expectancy to exceed the time required by the contract. They all should be labeled and inputted into the inventory control system.

Project warranties are usually required to be submitted before contract completion. The Contractor must provide all manufacturer warranties for the supplied equipment as well as the Contractor's own certificate of warranty for the project.

#### 2.2.9.20 Acceptance and Closeout

##### 2.2.9.20.1 Substantial Completion and Contractual Milestones

Standard requirements to achieve Substantial Completion will be specified in the contract documents. Any additional requirements unique to the project are required to be included in the contract documents by the PE and reviewed by the CM and the PM. The RE will review the final contract documents and provide input to these requirements. In general, Substantial Completion will be defined to include:

- Completion of all work required by the Contract Documents;
- Full operation of all components and systems of the work, including acceptance of all commissioning, testing and startup requirements;
- Completion of all surface restoration;
- Closeout of all quality deficiencies and non-conformance;
- Delivery and acceptance of required spare parts, operations manuals, and vendor documentation; and,
- Completion of all required vendor training.

Contractual interim milestones will be defined by the PM and PE as appropriate to each project and will be clearly described in the contract documents, including all requirements necessary to achieve the milestones. Contractual interim milestones should be applied judiciously to provide schedule control, when part of a project must be operational or fully restored before Substantial Completion, or to complete critical system shutdowns. It is important to carefully and completely define the work that must be achieved for a contractual interim milestone. Contractual interim milestones must be enforceable with Liquidated Damages. Incentives for early completion can be considered if there is a clear and definable benefit to the SFPUC.

To facilitate efficient completion, the RE will convene a planning meeting with the Contractor when the work associated with Substantial Completion or an interim contractual milestone is approximately 90% complete. The objective of the meeting is to collaborate with the Contractor and discuss what requirements are needed to achieve the milestone.

Contractual interim milestone completion and Substantial Completion must be formally requested by the Contractor to the RE in accordance with the procedures set forth in the contract documents. The request by the Contractor will include a punch list prepared by the Contractor and approved by the RE that defines the work remaining for achieving Substantial Completion. Upon receipt of a request, the RE will mobilize the project staff necessary to perform a formal inspection of the work. The RE will prepare a Punch List/Substantial Completion that documents any required work or submittals necessary for the RE to recommend acceptance. The Contractor must satisfy all the contractual requirements before a Notice of Substantial Completion is prepared by the RE. Approval of contractual interim milestones or Substantial Completion should not be granted unless all of the contractual requirements have been met.

If the RE determines that sufficient work has been completed to achieve Substantial Completion, the Substantial Completion inspection will result in a Punch List/Final Completion prepared by the RE of all remaining items of work that are required by the Contractor before Final Completion will be granted. In some cases, a Contractor may request Substantial Completion before the work is sufficiently completed. In these cases, the RE should not attempt to prepare a punch list until the work is sufficiently completed. Caution must also be practiced when granting completion of an interim milestone that is early in the construction schedule. If extensive punch list items are needed, some leverage may be lost to force the Contractor to complete the punch list before Final Completion.

#### 2.2.9.20.2 Final Completion

After Substantial Completion, the Contractor must meet additional requirements for Final Completion and release of final payment. These requirements will be defined in the contract documents and will include successful completion of all punch list items, demobilization from the project site, submittal of all required warranties, release of any subcontractor or vendor liens, and turnover of all remaining project documents required by the contract documents, including final as-built drawings.

The RE and FCA will manage final completion of the contract.

#### 2.2.9.20.3 Project Administration Closeout and Turnover

##### 2.2.9.20.3.1 Project History and Lessons Learned

The RE is responsible for preparing and submitting to the CM and the PM a Project History and Lessons Learned Report. This report will summarize the scope of the project, information about the Contractor, key subcontractors and key CM personnel, a summary of the cost and/or

schedule growth, major issues, and lessons learned. Lessons learned will be input by the RE to the CMIS for access by all SSIP projects and other infrastructure project participants. Lessons learned should not be prepared at the end of the project, but they should be discussed at any time during construction when they become evident and posted to the CMIS for other project design and CM teams to use. Judgment must be exercised in documenting lessons learned when a particular issue may be subject to future claims.

#### 2.2.9.20.3.2 Project File Transfer

Project files maintained in the RE construction offices will be reviewed, duplicates removed, indexed and delivered to the CM, who will in turn deliver the files to Engineering Archives for archiving. The SFPUC Infrastructure CM Procedures will provide guidance on the SFPUC's records retention policy, including electronic files, hard copy files and documents that will be retained.

#### 2.2.9.20.3.3 Warranty Turnover to SFPUC

The contract documents will specify warranties that are required to be provided by the Contractor as a condition of Final Completion. The RE is responsible for monitoring the turnover of warranties and coordinating with the Contractor for the receipt of all warranties. Warranties will be formally submitted by the RE to the CM, who will in turn deliver the warranties to Infrastructure Records Management and to Operations.

### 2.2.10 Quality Control

#### 2.2.10.1 Quality Control (QC) Requirements

QC is the element of Quality Management that focuses on verifying compliance with the requirements of the contract documents. Verification is performed by individuals who are independent of, and at least as qualified as those who produced the product or performed the work. QC will be performed by the CM team, mainly the Construction Inspectors led by the Lead Construction Inspector.

The criteria for acceptance are based on the CM QC Procedures and the construction contract requirements.

#### 2.2.10.2 QC Inspection

##### 2.2.10.2.1 Construction Inspections

The RE is responsible for providing resources for inspection of the Contractor's work. Inspections will be conducted commensurate with the type and sequencing of the work. Construction Inspectors are to observe, inspect and test the work and verify the Contractor is complying with the requirements of the contract documents. Construction Inspectors will provide Daily Inspection Reports, document and inform the Contractor of quality deficiencies observed, and prepare NCNs when required. One Construction Inspector on each project

will be designated as the “Lead Construction Inspector”, whose duties (in addition to performing construction inspections) will include assisting the RE with planning for inspections and resources, reviewing and compiling the individual Daily Inspection Reports and monitoring the resolution and closeout of deficiencies and non-conformance’s.

#### 2.2.10.3 Quality Management of SFPUC Purchased Material and Equipment

QC requirements for vendors providing SFPUC purchased material and equipment will be defined by the PE in each Purchase Order (PO). The PE and PM are responsible for developing the requirements for the Quality Plan required from each vendor for inclusion in each PO and for identifying the necessary QC resources to perform inspection activities on behalf of the SFPUC. The RE should review each PO to confirm that the quality requirements are Satisfied. All SFPUC purchased material and equipment shall be inspected by the Project CM team whenthey are delivered to the construction site, and their turnover to the Contractor shall be documented. The PE is also responsible for defining the requirements for site storage, preventive maintenance, and acceptance inspection and verification by the Contractor in the construction contracts.

#### 2.2.10.4 In-Factory Witness Testing and Source Inspections (SQS)

In-factory witness testing and source inspections may be required for SFPUC pre-purchased equipment and for Contractor furnished equipment. The PM and PEs are responsible for determining the scope of in-factory witness testing and source inspections required for a project, the inspection and testing requirements and the documentation required. In-factory witness testing and source inspections may be performed by either the SSIP CM Consultant, a third party or SFPUC staff. The CM will determine who will perform the witness testing or source inspection. Witness testing and source inspection records are to be included in the construction project files, regardless of when they originate or who within the overall project team is responsible for performing the witness testing or inspection.

#### 2.2.10.5 Materials Testing

The CM team must perform materials testing to verify that the Contractor work conforms to the requirements of the contract documents and must ensure records of all tests are inputted into the CMIS. The Contractor will be required to perform some material testing as required by some sections in the contract documents and as defined by the PE. The RE will perform periodic independent materials testing on the work to verify Contractor results or when systemic quality problems indicate independent testing is needed.

#### 2.2.10.6 Survey Control

The Contractor must perform survey control during construction and provide records of all surveys to the RE. The RE will establish control monuments and may conduct surveys to verify Contractor results as mutually agreed to by the CM and PE.

### 2.2.10.7 Quality Records and Documentation

#### 2.2.10.7.1 Daily Inspection Reports

Each Construction Inspector and Environmental Inspector must record daily inspections and observations on Daily Inspection Reports. Recording information in a Daily Inspection Report establishes factual entries that may not otherwise be recalled and reconstructed at a later date and provides recorded evidence regarding the Contractor's compliance with contract specification requirements.

Each Construction Inspector and Environmental Inspector will prepare a Daily Inspection Report for each day of work that the Inspector is on the construction site or at a fabrication facility. The Lead Construction Inspector will review all reports and compile them, along with any records provided by the Contractor for the work and any independent materials testing or survey results, in an overall daily record for entry into the CMIS. The RE is responsible for approving all Daily Inspection Reports and archiving them pursuant to SFPUC Infrastructure CM Procedures.

Daily Inspection Reports will be used to record the weather for the day, Contractor equipment and labor resources observed to be working, all inspections performed, observations, significant daily events, communications and problems pertaining to the quality of the work. All entries will be clear, concise and factual. Personal opinions are not to be recorded. Inspections will be documented in detail, recording how the work is being done, comparing the work to the contract documents and making a statement as to whether the work is in compliance with the contract documents, including environmental compliance requirements.

Daily Inspection Reports will include the following information:

- Project name, contract number, date and Construction Inspector's name;
- Weather conditions;
- Contractor's name and resources, labor and equipment on each item of work inspected;
- Subcontractor name and resources, labor and equipment on each item of work inspected;
- Work being performed;
- Schedule activity for each item of work inspected;
- Hold or Witness points inspected;
- Observations of inspections and time of inspection, including out of sequence schedule activities observed;
- Description of deficiencies issued and/or corrected;
- NCNs issued;

- Re-inspections of work resulting in closeout of non-conformances;
- Issues and claims;
- Conflicts and potential disputes;
- Notice of changed condition;
- Change Order work tracked; and,
- Force account/time and material work tracked.

Each Inspector must complete and submit the Daily Inspection Report before the end of the following day of their daily work shift.

#### 2.2.10.8 Quality Deficiency and Non-conformance Documentation

Each Quality deficiencies and non-conformance's are defined as work, materials, equipment and other Contractor's deliverables that do not conform to contract specification requirements. A deficiency should be communicated to the Contractor at the time it is observed and documented in the Daily Inspection Report. When a deficiency is not corrected in a pre-established time frame or when the Contractor's inaction will impact the progress of the work, the RE will issue an NCN to the Contractor. The NCN describes and records a breach in quality, and requests the Contractor to perform corrective action within an acceptable period of time that avoids impact to the progress of work, The Contractor's response is submitted through a Corrective Action Report (CAR), and must include the cause of the problem, remedial action, long term action, and timeline to correct the problem. The CAR must be reviewed by the Lead Construction Inspector and/or PE, and approved by the RE before implementation. The Lead Construction Inspector will re-inspect the work for compliance with the corrective action plan. When the work required to correct the NCN is complete to the satisfaction of the Lead Construction Inspector, the NCN should be closed officially.

### 2.2.11 Construction Contracts Management

#### 2.2.11.1 Change Management

Proposed changes to the contract can be initiated by the SFPUC (through a PCO) or by the Contractor (through a Change Order Request [COR]). Change Management is a process used to formalize the documentation, evaluation and approval or rejection of changes to the contract. The Contractor will comply with the general conditions of the contract pertaining to all PCOs and CORs. The RE is responsible for managing the change management process in conformance with the requirements in the contract documents, leading the negotiation of cost and/or time impacts and providing recommendations for the disposition of changes. The FCA assists the RE in managing the change process, maintains all change management files and records of negotiations, and maintains the Change Log. The PE will support the preparation of SFPUC requested changes and will review all technical changes.

Any SFPUC owner requested changes exceeding fifty thousand ($50,000) shall be submitted to the Change Control Board for approval before it is negotiated with the Contractor. Other project CM team members, including the Construction Scheduler, Estimator, Client/Operations Representative, the ECM and CM will provide analysis and support as needed. Any changes that will result in divergence from the CEQA documents, in particular the MMRP, and/or resource agency permits must be reviewed by the ECM. Depending on the type of Change Order, value of the Change Order and per the approval authority established for the Project, SFPUC management will be responsible for the approval or rejection of all changes, with the exception that “no cost” and “no time” changes (Field Orders) may be approved by the RE. The timely resolution of change and the thoroughness of documentation associated with each change is an important part of a pro-active claims management plan. The construction contract documents include requirements for the necessary documentation that must accompany all changes.

#### 2.2.11.2 Change Processing

Upon receipt of a COR from the Contractor or a SFPUC requested PCO, the change will be added to the Change Log. CORs are reviewed by the FCA for conformance to the documentation requirements of the contract documents. If the COR is non-conforming, it will be returned to the Contractor via written correspondence explaining the reasons for non-conformance. PCOs and conforming CORs will be discussed by the RE with the CM and the PM during schedule internal change management meetings. The RE is responsible for verifying that a COR or PCO has been discussed with the ECM to determine if a potential CEQA variance will result. The review of a COR or PCO by the CM and PM may be limited to changes that exceed a certain threshold or affect a material change in the project description. It is important to ensure that the approval authority (SFPUC) is given the opportunity to comment on the acceptability of a change before negotiations are undertaken by the RE and the Contractor. Depending on the Change Order value a Change Order shall be routed by the RE for the proper approval authority level according to the Infrastructure Change Order Authority Matrix (found at the Infrastructure CM Procedure for Change Management) before final agreement is reached. Periodic Change Order meetings with SFPUC upper management shall be conducted to update them of the status of major Change Orders.

CORs and PCOs that are initially accepted by the CM and PM will be negotiated with the Contractor. The RE shall apprise the CM and PM on the status of negotiations and potential time and/or cost impact.

#### 2.2.11.3 Change Log

The FCA will maintain a log of all changes in the CMIS. The format of the Change Log will be specified in the SFPUC Infrastructure CM Procedures and include tracking of the Change Order process all the way through to a Change Order’s certification by the SF Controller’s Office to ensure visibility of the status

of each change at any point in time. The status of changes will be coded in one of four ways:

- Potential changes are changes that have been received, but negotiations have not been completed.
- Pending changes are changes that have been accepted and negotiated, but not yet certified by the City Controller.
- Approved changes are changes that have been certified.
- Rejected (or closed) changes are changes that have been rejected or otherwise withdrawn by the Contractor.

The Change Log will also include an estimated cost and/or time impact. Estimated costs and time impacts will be updated as changes are negotiated. Changes will be categorized by the RE according to the following categories:

- Owner Requests – any change initiated by the SFPUC (Client);
- Differing Site Conditions – new information not reasonably available during design, or not considered "foreseeable" through due diligence on the part of the Contractor;
- Design Errors – changes due to errors or deficiencies in the design;
- Design Omissions – omissions in the design that should have been included in the original bid, if known;
- Regulatory Requirements – changes mandated by regulatory agencies that are different than approved permit conditions at the time of bid;
- Risk Mitigation – any work or changes from the contract necessary to mitigate risk and avoid its occurrence; and,
- Other – changes required for all other reasons, including emergency work, adjustment of bid quantities, force major events, incentive payments, accepted Substitutions, and VECPs.

Reports derived from the Change Log will be used for the monthly forecast to complete to monitor the status of each change within the overall process and to highlight changes that are not being processed in a timely manner. These reports are required to be submitted by the RE as part of the Monthly Project Construction Progress Report and will be monitored by the SSIP CM and the CM who may initiate action as necessary.

#### 2.2.11.4 Cost and Schedule Trending

Cost and schedule trending is a technique used for continuous monitoring of construction events that may affect cost or schedule. The objectives of trending are to:

- Provide early warning of potential cost or schedule impacts and the need for corrective action;
- Minimize unexpected cost and schedule fluctuations;
- Provide documentation for cost and schedule forecasting and project reports; and,
- Provide a history of cost and schedule evolution.

A trend is any potential deviation from the approved schedule or contract amount that is not yet a potential change. Trends may result from the following:

A risk that materialized or from issues that are identified and tracked in the CMIS, analysis of the rate of expenditure of unit price items or allowance items vs. progress; actual vs. planned schedule progress; or quality issues. In short, trends are anything that is occurring that is not yet a proposed change but that the RE identified and believes has a high probability of becoming a change to the contract amount or schedule.

The responsibility for recognizing and reporting trends rests with all project CM personnel. Any project CM team member who identifies or suspects a change from the approved schedule or cost, or changes to previously identified trends, should promptly notify the Construction Scheduler to perform an analysis of impacts and notify the FCA to include the proper change in the Trend Log. A Trend Log is a list of trends that the FCA maintains in the CMIS and updates every month. To accomplish this, each project CM team member must know the scope of work and the budget for their area of responsibility.

The RE ensures that the CM team is aware of and uses the trending system for early detection of cost or schedule variances. The FCA documents, updates, monitors and reports trends using the Trend Log.

#### 2.2.11.5 Time Impact Analysis

If a COR or PCO involves an impact to the approved construction schedule, the Contractor will be required to include a Time Impact Analysis (TIA) with the COR or PCO quotation. The Construction Scheduler will review the time impacts and provide an alternate impact analysis if required to support negotiation of the change. The RE and Construction Scheduler are responsible for coordinating with other REs to determine if a time impact will create an impact on another project. This coordination is also necessary when the project team is developing a PCO. For PCOs, the Construction Scheduler will prepare a TIA prior to a request for quotation from the Contractor, for use by the CM and PM to determine if the change should be submitted to the Contractor.

#### 2.2.11.6 Cost Proposal

If a COR or PCO quotation involves an impact to the contract cost, the Contractor will be required to include a cost proposal with the COR or PCO quotation. According to the SFPUC Infrastructure CM Procedure on Construction Change Management, the CM team's Estimator or PE shall prepare a detailed

estimate for PCOs or CORs that exceed two hundred thousand dollars ($200,000). This detailed estimate shall be reviewed by the RE, CM and PM prior to negotiating the change with the Contractor.

#### 2.2.11.7 Supplemental Environmental Impact Analysis

If a COR or PCO involves a material change to the project description that has a potential to affect the physical environment and has the potential to change the project environmental requirements, the RE will review the change with the ECM for an initial supplemental impact analysis. The ECM will review the change to determine if a CEQA Minor Project Modification (MPM) will be required and to determine if an MPM approval should be requested from the CEQA Lead Agency (San Francisco Planning Department). If the project is subject to NEPA, the change may also require approval from the NEPA Lead Agency. If it is decided that a CEQA MPM and/or NEPA supplemental approval will be pursued, implementation of the change will be held in abeyance until approval is received.

#### 2.2.11.8 Contract Change Order Processing

When the SFPUC and the Contractor agree on the total scope and/or cost and/or time of a change, the FCA will prepare a Change Order for submittal to the appropriate management levels within the SFPUC according to the Infrastructure Construction Project Change Order Authority Matrix (The Change Order Authority Matrix is described in the SFPUC Infrastructure CM Procedure on Construction Change Management.) When a change is approved that affects the contractual design or specifications, the FCA is responsible for ensuring the contract documents are conformed to reflect the approved changes. The Contractor is responsible for updating and submitting the Schedule of Values in the next monthly schedule update with the approved change incorporated. If negotiations are not successful and the CM and PM decide to proceed with the change, the FCA will prepare a Unilateral Change Order for City approval. An alternative to a Unilateral Change Order is agreement with the Contractor to proceed with the change on a Force Account basis.

#### 2.2.11.9 Claims Processing

Claims will be processed in a similar manner as a change, except that upon receipt of a Notice of Potential Claim, the RE will immediately forward the notice to the CM and PM. An analysis of the merit of a claim is required from the RE. If a claim is determined to have merit, the CM and PM will lead the development of a negotiation plan. The SSIP CM will assist as requested in determining merit and help with preparing the negotiation strategy. The negotiation strategy will identify who will lead the claims analysis efforts, who will be involved in the analysis, and who will lead the negotiations. If the Contractor submits a Notice of Potential Claim, they shall submit a certified claim within 45 days from the Notice date in order for the negotiation to start. Otherwise the claim shall be rejected. Refer to the Construction Contract Specification Section 00 72 00, Article 13 – Contract and Government Code Claims for guidelines.

### 2.2.12 Project Controls

#### 2.2.12.1 Document Controls and Records Managment

Document control and records management includes the indexing (or logging), filing, distribution, control and retrieval of all documentation of any kind that is received or generated during the construction of the project. Complete, thorough documentation is a cornerstone of claims avoidance and claims management. Because it is not possible to predict which part of the contract may be the subject of a claim, thorough documentation of every aspect of the contract is essential.

The CMIS will include a document control and records management module that all project CM teams will be required to use. The CM Business Processes will codify the specific use of the CMIS and describe the indexing and filing format that must be used. The CMIS administrator will develop the CMIS application for document control and provide training to each project CM team in its use. Some of the project documents include:

- Quarterly Reports
- Requests for Information (RFI)
- Inspectors' Daily Reports
- Meeting Minutes
- Transmittals
- Submittals
- Contracts
- Proposals
- Photographs
- Safety Records
- Quality Records
- Warranties
- Videos
- Material Certifications
- Contractor's Daily Reports
- Change Orders
- Meeting Agenda
- Email Correspondence
- Application for Payments
- Agreements
- Drawings
- Punch Lists
- PLA Records
- Environmental Compliance
- Plans/Records
- Correspondence
- Permits
- Monitoring and Inspection Plans
- Weekly Monitoring Reports

The ADCS is responsible for receiving, date stamping, distributing, logging, filing, indexing for retrieving, and archiving all project documents for project use and historical purposes. Electronic backup will be properly identified and stored in accordance with SFPUC Infrastructure CM Procedures.

#### 2.2.12.2 SFPUC Master Project Schedules

The Program Controls Manager maintains Master Project Schedules in P6 that includes all phases of a project. Actual progress, earned value, cost, and forecast information is included in these master schedules. These schedules are the basic source of information for Infrastructure Quarterly Reports. Data for the construction phase of a project must be inputted with the appropriate level of detail to the Master Project Schedules. The cost loaded Summary Schedule provided by the Contractor and reviewed by the Construction Scheduler will be

the basis of the summary level of detail for the construction phase that will be included in the Master Project Schedules. The PCSG Manager will identify, with the assistance of the RE, the level of detail needed to be reported on a monthly basis for importing to P6. The RE is responsible for ensuring timely reporting and for the quality control of data submitted for the Master Project Schedule updates.

#### 2.2.12.3 SFPUC Prepurchased Material and Equipment Schedules

The PM is responsible for developing the schedule for the pre-purchase of equipment and material by the SFPUC. Separate WBS level schedules in P6 are required for each vendor. These schedules begin with activities during the design phase to produce the procurement plans and specifications, continue through the procurement phase, and include sufficient schedule detail for fabrication, testing and delivery. Pre-purchased material and equipment schedules are a part of the Master Project Schedules and must be fully integrated with the schedules for design, bidding and construction to ensure that the design schedule supports the lead time requirements for the pre-purchased material or equipment, and to ensure the material and equipment will be delivered on time.

After the construction NTP is issued, the RE will monitor the schedule for pre-purchased material and equipment, incorporate reporting of progress into the Monthly Project Construction Progress Report, and provide any assistance requested by the PM to expedite, inspect, witness test and manage the delivery and turnover to the Contractor.

#### 2.2.12.4 Schedule Management

Schedule management is one of the most important CM functions. How well the schedule is reviewed, monitored, enforced, and documented is critical to claims avoidance and management. The RE, with assistance from the Construction Scheduler and the Lead Construction Inspector, is responsible for all aspects of schedule management. The Contractor's Baseline Schedule is used to establish the plan for the work, to monitor the Contractor's progress and to plan and identify upcoming activities so that the project team can handle issues that may impede the Contractor's progress. The Contractor "owns" the Baseline Schedule, including the means and methods to execute the work. In addition to the prescribed requirements in the contract documents, schedule management will follow these general guidelines:

- The RE approves the format of the Contractor's Baseline Schedule, and ensures that it is compliant with the schedule management requirements as outlined in Contract Specification Section Construction Progress Schedule. The means and methods by which a Contractor sequences and schedules the work is the Contractor's decision (unless otherwise specified in the contract documents). Format approval includes checking that the submittal meets the requirements of the contract documents, that all contractual milestones and shutdown requirements are met with reasonable durations for work activities, that all activities have predecessors and successors, that activities are reasonably

resource loaded, and that the construction critical path is free floating without any artificially constrained activities. Observations regarding any work that appears to have been omitted, scheduled out of sequence, or loaded with insufficient resources should be noted for the Contractor's response.

- The RE must enforce the contractual requirements to establish a timely Baseline Schedule and preserve it unchanged.
- If changes to the Baseline Schedule are required, then the RE will request the Contractor to submit a timely revision to the Baseline Schedule in accordance to the specification requirements.
- The RE and Contractor should agree on the work completion percentages and activity durations using mutually agreed upon information.
- Changes to contract schedule milestones can only be authorized by the appropriate level of SFPUC management according to the Infrastructure Change Order Authority Matrix.
- The RE must enforce all scheduling specifications and, if contractually allowed, recommend the withholding of all or part of the Contractor's progress payment until all schedule provisions are satisfied.
- The RE must verify that the Contractor, as required by the contract documents, is maintaining accurate as-built information for schedule activities. The Daily Inspection Reports will note the actual start and finish of activities and the observation of any out of sequence work. Additionally, actual starts and completions must be noted on the RE's copy of the schedule to provide information for an as-built schedule.
- The RE must spend sufficient time at each weekly Construction Status Meeting to thoroughly discuss the 4-week look-ahead schedule, the status of each planned activity, out of sequence work, schedule recovery, and concerns regarding sufficient resources to meet the schedule. The Construction Scheduler will provide an analysis of the 4-week look-ahead schedule for conformance with the current approved schedule.

#### 2.2.12.5 Schedule Contractor's Schedule Requirements

The contract documents include the requirements for an acceptable construction Baseline Schedule, Summary Schedule, monthly updates, 4-week look-ahead schedules, recovery schedules and for incorporating changes. The specifications also identify the parameters of any contractual milestones, work constraints and system shutdown limitations that must be included in the Contractor's schedule. The RE must enforce all the requirements of the schedule specifications.

CPM scheduling software must be used by the Contractor. Where applicable, the activities in the schedule must correspond to the Construction Specification

Institute's standard code of accounts. Supplemental coding should include area, responsibility, phase, and/or any other criteria that would enhance progress reporting. The highest level must correspond to the Project WBS. Generally, each schedule activity shall describe a rational and specific work activity to allow effective control of the work in progress.

All activities within the schedule must be accurately cost loaded with a maximum monetary and time limit, and shall match, on an item by item basis, the Schedule of Values. The sum of the cost of the activities in the schedule shall equal the total contract value as bid.

Large materials and/or equipment items to be purchased by the Contractor shall have activities and/or milestones in the schedule indicating the delivery of individual items. These activities will be loaded with the percentage of the cost allowed to be paid to the Contractor upon delivery of the approved material or equipment to the site or approved storage area. The remaining percentage of unpaid cost of the approved delivered material and/or equipment and the cost of installing these materials and/or equipment shall be in separate activities.

Additional requirements will include equipment and manpower resource loading, scheduling of all contractual milestones and work restrictions, system shutdowns, Contractor required permits, and major submittals.

A cost loaded Summary Schedule of approximately 15 to 20 activities, that reflects the contractual milestones and system shutdown activities will be required from the Contractor. This summary schedule will be derived from the approved Baseline Schedule. Any approved updates and revisions will be tied up to the Schedule of Values, and will be used by the RE for reporting progress and forecasts to the SFPUC Infrastructure Program Control System.

#### 2.2.12.6 Baseline Schedule Review and Approval

The contract documents will specify the time frame after the NTP has been issued for submission of the construction Baseline Schedule by the Contractor. The RE, with the assistance of the Construction Scheduler, will thoroughly review the Contractor schedule submittal, and produce reviews for the Contractor's response. Upon acceptance by the RE, the Contractor's schedule will become the accepted Baseline CPM Schedule. Timely review by the RE is required to avoid delay claims or the potential for the work proceeding without an approved schedule. Review and approval of the Contractor's schedule (or any updates) by the RE will not relieve the Contractor of responsibility for complying with the contract time requirements, adhering to sequences of work indicated in, or required by the contract scope of work, or from completing any work within the durations specified in the contract documents. Lack of submittal of an acceptable Baseline Schedule or failing to submit a schedule update may result in withholding of payment.

##### *2.2.12.6.1 Monthly Schedule Updates*

The Contractor must submit updates to the accepted Baseline CPM Schedule each month with the Application for Payment. The RE should

not accept the Application for Payment if it is not accompanied by the schedule update. The monthly schedule update is reviewed by the RE and the Construction Scheduler who will check for accurate representation of progress of each activity, out of sequence work performed or planned, incorporation of approved changes, logic changes to improve the Contractor's claims negotiating position, and "recovery" schedules, if necessary.

#### *2.2.12.6.2 Recovery Schedules*

If at any time the Contractor falls behind the accepted schedule and cannot prosecute the work as planned within the established timeframes, or if the accepted schedule no longer represents the actual prosecution of the work, the Contractor must, at the request of the RE, submit a recovery schedule to revise the project approved Baseline CPM Schedule supported by a narrative explaining the work plan intended to recover the lost time within the contract performance period or interim milestone period. The revised schedule must show the schedule impact before and after the revision. If a recovery schedule is accepted by the RE, the Contractor must incorporate the revisions into the Baseline Schedule.

#### *2.2.12.6.3 4-Week Look-Ahead Schedules*

Four-Week Look-Ahead Schedules are required to be submitted each week by the Contractor prior to the weekly Construction Status Meeting. These schedules are a fragnet of the approved schedule that includes all activities from the past week and the upcoming 3 weeks. Look-Ahead Schedules are reviewed by the Construction Scheduler to assure they match the approved schedule and include all the necessary work activities from the approved schedule. The Look-Ahead Schedule is discussed thoroughly at the weekly Construction Status Meeting to ensure that the CM team and the Contractor have the same expectations regarding the work plan for the upcoming 3 week period and to determine if any activity such as required approved submittals, work preparation, site investigation, special inspection, habitat or endangered species surveys, or pre-construction surveys are required in advance of the work that is scheduled.

#### *2.2.12.6.4 Revisions to the Approved Schedule*

Any variance or deviation to the approved Baseline CPM Schedule, whether for completed work, planned work, approved changes, or recovery plans, require the contractor to submit a revised schedule and a revised Summary Schedule be submitted by the Contractor. The RE reviews any revised schedule submittals in the same manner as the initial baseline submittal. A thorough review is required with comments and concerns documented and provided to the Contractor for response. If required to support the understanding of a complex VECP or Change Order, the Contractor will submit a TIA demonstrating the effect of the VECP to the near-term and overall schedule.

#### *2.2.12.6.5 Schedule Analysis and Variance Reporting*

According to the schedule management requirements as outlined in Contract Specification Section  on Construction Progress Schedule, the Contractor must prepare and submit a variance analysis as part of the monthly schedule update. The Variance analysis identifies the source and cause of any significant variance and includes the Contractor's plan to recover any significant impact to the schedule activity completion dates. Significant variances are those which may impact timely completion of an activity, delay completion of a milestone, or otherwise delay the project. Variance analyses shall be prepared against the current approved Baseline CPM Schedule.

A thorough, but concise discussion of the status of the schedule, and the variances, is a requirement of the RE's Monthly Project Construction Progress Report. In addition, the Construction Scheduler is responsible for determining the overall percent complete from an analysis of the monthly schedule update for input to the Master Project Schedule. The SSIP CM will monitor schedule variance reports and report all concerns to the CMB Manager and the Program Director. The RE will be responsible for providing the results of discussions held with the Contractor to mitigate any schedule variances.

#### *2.2.12.6.6 Construction Cost Control*

The RE is responsible for monitoring the cost of project construction, identifying and tracking cost changes and trends, and forecasting costs to complete. The initial basis for tracking and controlling the contract costs is the Contractor's Schedule of Values. The contract documents specify the requirements for the Schedule of Values and the RE must review it for completeness, conformance to the requirements and integration with the Contractor's approved schedule. Ongoing cost control includes a thorough review and assessment of the Contractor's Application for Payment Request against the progress achieved in order to avoid recommending overpayment for work not yet completed. The RE should discuss any concerns with the Contractor and attempt to reach a common agreement on how much will be paid each month.

Cost trends are developed by the FCA and the Construction Scheduler and used with the Change Log by the RE to develop monthly forecasting of costs to complete. Cost trends can include anticipated changes in the contract that would lead to an increase or decrease in the contract's overall cost, evaluation of the Contractor's rate of expenditure of unit price or allowance items against actual progress achieved, and use of force account work. Trends must be well thought out to provide the most complete and accurate picture of the status of the project and the program.

Cost control is equally as important for the CM Consultant contracts and the same rigor is to be applied in documenting actual costs and forecasting costs to complete by the RE and the CM.

#### *2.2.12.6.7 Forecasting of Cost and Schedule*

Forecasting of cost and schedule of the construction contract and the CM Consultant contract is performed each month by the RE and reported to the CM and PM. Forecasting will be in the form of Forecasts to Completion (FTC). When added to the costs expended and progress achieved, a FAC is produced. FAC is the standard metric used in all CIP and Infrastructure construction reports to compare with approved budgets and schedule and earned value. Many of the processes and systems discussed earlier in this CM Plan are an integral part of the forecasting process. Trends and changes form the basis for forecasting both schedule and cost to complete. All potential and pending changes listed on the Change Log are included in the FTC. In addition, the RE is responsible for including all trends from the Trend Log in the FTC. Sound judgment is required so as not to underestimate or overestimate the FTC.

For construction contracts, the RE must provide their assessment independent of what the Contractor may be reporting. For CM Consultant contracts, forecasts must be to the same level of WBS and resource detail as the approved contract scope of work.

Negative variances on CM Consultant contracts are required to be explained and need to include a recovery plan. Negative variances on construction contracts need to be well managed and evaluated against the contract approved contingency and discussed with the CM, PM, CMB Manager and the Program Director.

FTC will be used by the CM and PM as part of their input to the monthly update of the Master Project Schedule. The forecasts reported by the CM and PM should reflect their independent assessment of the input received from the RE. Formats for forecasting will be developed by the SSIP Construction Controls Manager.

### 2.2.13 Environmental Compliance

An environmental review document will be prepared pursuant to the CEQA and/or NEPA for each SSIP construction project. These documents are prepared under the direction of CEQA lead agency of the San Francisco Planning Department) and/or NEPA Lead Agency (e.g., United States Forest Service) in coordination with the SFPUC BEM. They stipulate specific mitigation measures that must be implemented during project construction and operations, and are more specifically described in the project MMRP that is prepared during the environmental review process. Infrastructure construction projects may also be subject to the jurisdiction of regulatory resource agencies, such as the US Army Corps of Engineers, U. S. Fish and Wildlife Service, California Department of Fish and Wildlife, California Coastal Commission, San Francisco Bay Conservation and Development Commission and the Regional Water Quality

Control Board (RWQCB). BEM is responsible for obtaining required permits prior to construction. In addition, the SFPUC has adopted Standard Construction Measures that are implemented on all projects.

Compliance with the environmental requirements specified in the SFPUC Standard Construction Measures, MMRP and environmental permits is legally required during construction and operation of SSIP construction projects. It is the responsibility of the PM and PE to work closely with BEM to ensure that all these requirements are included in the Contract Documents. A clear and complete definition of the requirements for environmental compliance is an important part of a pro-active claims management plan.

Environmental compliance is critical to maintaining good relationships with the San Francisco Planning Department, Federal Agencies, the resource regulatory agencies, and the public. The ECCM will work with the PM to develop and implement an environmental compliance inspection program tailored to the project. Failure to comply with a project's environmental requirements can result in project delays, shutdowns, and fines and penalties.

#### *2.2.13.1 Environmental Requirements*

The environmental requirements found in the SFPUC Standard Construction Measures, MMRP and permit conditions will be incorporated in the contract documents. The MMRP is typically presented in a table format, and includes the mitigation measure number, the description of the mitigation measure, the responsible implementing party, the implementation schedule (pre, during, or post construction), a description of the supporting project-specific plans to ensure compliance, and implementation success criteria. The ECM will compile all requirements into a project ERT prior to the start of construction.

The ECCM must report to the CEQA Lead Environmental Agency (the San Francisco Planning Department) on a regular basis to document compliance with the SFPUC Standard Construction Measures and the MMRP. The types and frequency of reporting will be detailed in the SFPUC Infrastructure CM Procedures. The ECM will compile the environmental requirements into tables to use for tracking compliance during construction and reporting. The RE is responsible for assuring the necessary documentation is provided to support the necessary environmental reporting.

#### *2.2.13.2 Environmental Training*

The SFPUC has developed an Environmental Inspector Manual that provides guidelines on performing environmental inspection. An electronic copy of this manual will be provided to the ECM and each Environmental Inspector to review prior to the start of work. All Contractor personnel will be required to attend environmental training prior to working on the project. The ECM in coordination with the ECCC will develop project specific training programs and materials and conduct the training.

#### *2.2.13.3 Environmental Compliance Coordination During Construction*

The SFPUC Infrastructure CM Procedures will address coordination between BEM, the project CM team, and the Contractor. The ECCM is responsible for environmental compliance oversight. The ECCM works under the supervision of the BEM Manager and coordinates with the CMB Manager and the CM when necessary. The ECCM assigns a BEM ECCC to each project and manages the ECCC. The ECCM will be involved in resolving non-compliances and resource agency coordination. The ECCM will review all consultant scopes of work for providing environmental compliance services. The ECCM will review all Change Orders that will have an environmental impact.

The ECCC works under the supervision of the ECCM and provides oversight of the ECM. The ECCC is responsible for facilitating project compliance, interpreting project requirements, providing notifications and reports to resource agencies, and keeping the ECCM apprised of compliance during construction. The ECCC also coordinates with the RE and CM as necessary. The ECCC will facilitate development of consultant scopes of work for providing environmental compliance services.

The ECM works under the oversight of the ECCC and the supervision of the CM to assure environmental compliance during construction of a project. The ECM is responsible for direct coordination with the CM regarding compliance implementation on a daily basis and the ECCC on a regular basis as needed. The ECM shall notify the ECCC immediately of all non-compliance issues. The ECM is responsible for tracking compliance, preparing reports, managing the activities of the Environmental Inspectors and Specialty Environmental Monitors, and coordinating with BEM.

The Environmental Inspectors and Specialty Environmental Monitors work under the oversight of the ECM and under the supervision of the Lead Construction Inspector to inspect and monitor environmental compliance during construction. The Environmental Inspectors and Specialty Environmental Monitors are required to coordinate with and inform the ECM and the Lead Construction Inspector of compliance implementation activities on a daily basis. The Environmental Inspectors will provide training to construction crew personnel.

#### *2.2.13.4 Supplemental Environmental Compliance Plans*

Some environmental requirements in the SFPUC Standard Construction Measures, MMRP and permit conditions call for project-specific plans that detail implementing procedures to meet the requirements.

Typical plans that the SFPUC and its environmental consultants will prepare as part of the pre-construction permitting effort may include, but are not limited to:

- Conceptual Revegetation/Restoration Plan;

- Archaeological Monitoring Plan;
- Paleontological Resources Monitoring Plan;
- Historical Resources Protection Plan; and,
- Biological Resources Survey Plan.

Many of these plans will be drafted as requirements of the environmental permits. The plans and/or requirements applicable to the Contractor will be included in the contract documents by the PE. The Contractor will be required to finalize the Plans prior to construction.

Typical plans the Contractor may be required to develop per the SFPUC Standard Construction Measures, MMRP, and/or permit conditions include, but are not limited to:

- Groundwater Dewatering and Management Plan
- Dust Control Plan;
- Asbestos Dust Mitigation Plan;
- Hazardous Material Spill Prevention Control and Counter-measure Plan;
- Contaminated Soils Mitigation Plan;
- Tree Protection Plan;
- Wildlife Exclusion Fencing Plan;
- Noise and Vibration Control Plan;
- Nighttime Lighting Plan;
- General Controlled-Detonation Plan;
- Frack-out Contingency Plan - or tunneling activities that use pressurized drilling fluids;
- Traffic Control Plan;
- Stormwater Pollution Prevention Plan Plan - projects subject to State Water Resources Control Board permit;
- Erosion and Sediment Control Plan; and,
- Creek Bypass Plan.

Plans to be prepared by the Contractor will be identified in the contract documents. The contract documents will include schedule specific requirements for preparation and submittal of these plans to ensure they are approved by the SFPUC and, as required, by other agencies prior to their respective need to support the construction schedule. The PM and PE are responsible for working with the ECCM during development of the final bid documents to incorporate the necessary schedule requirements. The RE is responsible for monitoring the timely submittal of the

Contractor's plans. The ECCC and ECM are responsible for obtaining timely review of the plans by the SFPUC and other applicable agencies.

Some of these plans may require review by agencies other than the SFPUC. For project-specific plans prepared by the Contractor, it is the responsibility of the RE and ECM to coordinate with the ECCC to have the plans reviewed and approved by the appropriate agencies.

#### *2.2.13.5 Construction Environmental Compliance Inspection and Monitoring.*

The Contractor is responsible for complying with the project's environmental requirements. The Environmental Inspectors and Specialty Environmental Monitors are responsible for for inspecting and monitoring construction activities to ensure that the Contractor is in compliance with environmental requirements. The Environmental Inspectors and Specialty Monitors are to work with the ECM, CM, Lead Construction Inspector and Contractor to prevent delays in construction due to non-comliant work. Daily Environmental Inspection Reports and Specialty Environmental Monitoring Logs must be prepared by the Environmental Inspectors and Specialty Environmental Monitors for each day they are on the construction site. Environmental inspection and monitoring includes, but is not limited to evaluating and documenting that:

- Activities remain within the approved work area.
- Dust-control and odor control mitigation measures are being implemented.
- The site Erosion and Sediment Control Plan and/or the Storm Water Pollution Prevention Plan requirements are implemented.
- Construction noise and lighting levels are minimized.
- Biological and/or cultural pre-construction surveys are performed as required.
- Sensitive habitats, trees, wetlands, and surface waters are fenced and protected from construction activities.
- Wildlife is protected from construction activities, including relocation, if necessary.
- Dewatering is managed to avoid adverse impacts to surface waters.
- Critical creek flows and surface and ground water quality are maintained.
- Hazardous materials are properly stored and spills are minimized and reported, if spills occur.
- Cultural and/or paleontology resources are protected during construction.

- Traffic controls reduce construction impacts on traffic in the affected area.
- Revegetation and restoration measures are implemented to stabilize the construction area and restore the area to the pre-construction condition.

The ECM and the Environmental Inspectors will assist the Lead Construction Inspector and RE in interpreting implementation of the environmental requirements and will be pro-active in identifying, communicating and documenting environmental requirements to avoid potential non-compliance. The Specialty Environmental Monitors will conduct pre-construction surveys, monitor work in specified sensitive areas for specific resource protection, and conduct additional environmental surveys as needed for environmental approval of any project changes initiated through the Change Order process or identified by the RE and/or CM, as necessary.

#### *2.2.13.6 Environmental Review of Project Changes*

When project changes are proposed, the ECM will be responsible for coordinating with the ECCC to review the request and determine if it is covered by the CEQA and/or NEPA document and permits or requires supplemental environmental review. Approval of some project changes may require review by the San Francisco Planning Department and/or regulatory resource agencies with jurisdiction over the proposed change. The ECCC in coordination with the ECCM will determine the appropriate procedures for approval of the change, including supplemental environmental review and agency consultation, if necessary. For minor changes, a MPM will be prepared. The ECM will inform the CM of the anticipated timeframe to obtain approvals. No work can proceed until approval for the change in the project is received.

#### *2.2.13.7 Environmental Compliance Documentation and Records*

The ECCM is responsible for establishing the requirements for tracking and documenting environmental compliance. The ECM is responsible for implementing the tracking and documenting system. Documentation will include, but not be limited to, Daily Environmental Inspection Reports, Monthly Compliance Reports, Monitoring Logs, MMRP required reports, resource agency permit required reports, and reports on non-compliances and their resolution. Reports will be submitted to the RE and the ECCC. The ECM will maintain the record of all environmental compliance documentation throughout construction.

The ECCM must report to the CEQA Lead Agency (the San Francisco Planning Department) on a regular basis to document compliance with the SFPUC Standard Construction Measures and the MMRP. The ECCM may also be required to report to the NEPA Lead Agency on a regular basis. The types and frequency of reporting will be detailed in the SFPUC

Infrastructure CM Procedures. The ECM will compile the environmental requirements into tables to use for tracking compliance during construction and reporting. The RE is responsible for assuring that documentation is provided to support the necessary environmental reporting.

During construction closeout, the ECM will compile the complete record of construction environmental compliance documentation and provide it to the RE and ECCC for inclusion with the project files as part of project Closeout.

#### *2.2.13.8 Non-Environmental Permit Compliance Monitoring*

The RE is responsible for monitoring the Contractor's compliance with non-environmental permit conditions, such as encroachment permits, notifying the CM and PM of permit violations, preparing documentation of inspections, reviewing Contractor submittals required by any permits, and preparing any reports required by regulatory agencies.

#### *2.2.13.9 Post Construction Activities*

During the warranty period, the SFPUC will monitor revegetated and restored areas to ensure that the success criteria identified in the construction specifications are met and to identify and implement any necessary remedial actions. After the warranty period, post–construction monitoring and maintenance is the responsibility of SFPUC Operations to ensure that the success criteria in the project permits are met and to identify and implement any necessary remedial actions.

#### *2.2.13.10 Resource Agency Inspections*

Regulators from the resource agencies that issue permits for the project may periodically conduct site visits to inspect the project for compliance. To the extent feasible, the ECCM or the ECCC will coordinate these site visits with the regulators and the ECM and RE. But these visits may be unannounced. Agencies that may conduct inspections include, but are not limited to:

- US Army Corps of Engineers
- RWQCB
- U.S. Fish and Wildlife Service
- U.S. Forest Service
- California Department of Fish and Wildlife
- California Air Resources Control Board
- Bay Area Air Quality Management District
- State Historic Preservation Office
- National Marine Fisheries Service
- San Francisco Bay Conservation and Development Commission

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# APPENDIX A

## PROJECT SCHEDULE (EXAMPLE)

# APPENDIX B

## RISK REGISTER (EXAMPLE)

# APPENDIX C

## CHANGE ORDER AUTHORITY MATRIX (EXAMPLE)