3.0 Definitions of Terms within this Procedure

This section defines the risk management terms used in this CM Procedure.

3.1 Active Risk Manager (ARM)

An enterprise, web based, software application used as a tool by the Risk Analyst to assist in managing risk and performing program and project risk analysis.

3.2 Baseline Risk Register

The final risk register created by the Project Risk Group (See Section 3.10), during the Baseline Risk Register Development process (See Section 5.1.2), and generated from ARM.

3.3 Monthly Risk Management Meeting

A monthly meeting conducted by the Project CM or a designated project team member, with or without the Project Risk Group, to update the Risk Register. This meeting may be scheduled in conjunction with a scheduled Weekly Progress Meeting when a majority of the Project Risk Group members will be present.

3.4 Risk

A Project Risk is a potential event, failure or condition that, if it occurs, will have a negative impact to the project or program.

3.5 Risk Assessment

Risk Assessment is the formalized process of identifying Risks and evaluating their Probability of Occurrence (P) and Severity of Impact (S).

3.6 Risk Assessment Workshop

The Risk Assessment Workshop meeting is conducted by the Project CM with the attendance and support of the Project Risk Group. The objective of the meeting is to prepare the Risk Register by identifying and assessing risks and developing risk plans and mitigation actions for the project.

3.6.1 The Project Risk Group shall include as a minimum:

- Project CM
- Risk Team (the Program Risk Manager and / or the Risk Analyst)
- Operations Representative
- Project Engineer
- Lead QA Inspector
- Communications /Public Outreach personnel
- Environmental personnel
- Field Contracts Administration
- CM Program Safety personnel
- Construction Scheduler/Cost Specialist
- Construction Contractor

3.7 Risk Management Plan

A strategic plan prepared by the Project CM Team to define a strategic risk approach and plan which identifies, assesses, evaluates, mitigates, and manages risks for the purpose of significantly increasing the probability of delivering a successful project in order to meet project budget, schedule, quality, environmental conditions, health & safety, and community requirements. Please see Attachment 034 – 5 for required content.

3.8 Risk Mitigation Plan

A Risk Mitigation Plan is the strategy to reduce the probability of a risk event occurrence and/or consequence below an acceptable threshold. The strategy may include multiple actions in a mitigation risk plan, and each action may have a different action owner, action start and action end dates.

3.9 Risk Planning

Risk Planning is any pre-Risk Assessment Workshop activity performed to prepare the Project Risk Group and the Project CM. This typically includes a risk identification questionnaire and results in preliminary Risk Register to be used in the Risk Assessment Workshop. It facilitates the attendees to identify and analyze project risks and their attributes prior to the Risk Assessment Workshop.

3.10 Risk Register

A document that includes information developed from the risk assessment workshop. It will be used to identify, assess, analyze, and clarify ownership of risks and define how risks are to be strategized, controlled, mitigated and managed.

3.11 3-Point Estimate

A 3-Point estimate is prepared for the cost impact of every risk. The three-point estimate are made up of the following three values:

- the optimistic estimate (Low)
- the most likely estimate (Mid Range)
- the pessimistic estimate (High)

4.0 Responsibilities

4.1 Action Owner (Mitigation)

The Action Owner is responsible for the execution and follow-through of his / her assigned action(s) in the risk register. The Action Owner reports to the Risk Plan Owner for his / her corresponding risk.

4.2 Contractor

The Contactor is responsible to deliver the project as specified in his contract. The Contractor executes his assigned Risk Mitigation Measures to reduce or eliminate potential Risks.

4.3 Program CM Consultant - PCM

The PCM is responsible to perform Quality Assurance to the Risk Management Plan, Baseline Risk Register, monthly risk register updates, and monthly program top 10 risk register for compliance with data quality requirements as established in this procedure.

4.4 Program Project Pre-construction Construction Manager - PPPCM

The Program Project Preconstruction Construction Manager (PPPCM) is responsible to work with the Project CM to develop 3-point cost estimates for each SFPUC risk in developing the Baseline Risk Registers, if needed.

4.5 Program Risk Manager

The Program Risk Manager is responsible to oversee the development and implementation of the Risk Management Program. He or she works with the Program Director to assess and report Program Risk to stakeholders and coordinates with the Regional PM, Regional CM, PCM, and PPPCM to ensure the Risk Management Plan(s) are implemented accordingly.

4.6 Project CM

The Project CM leads the Risk Management Plan development, monthly update, approval, implementation and control.

4.7 Project Risk Group

The Project Risk Group, led by the Project CM or designated project team member, participates in preparation and implementation of the Risk Management Plan during the project construction phase.

4.8 City Regional CM - RCM

The City Regional CM reviews and comments on the project Risk Management Plan and reporting.

The City Regional CM is also responsible to review and comment on the monthly update report, which includes the Regional Top 10 risk register. He or she may designate the responsibility to the Consultant RCM.

4.9 Regional PM

The Regional PM reviews and approves the project Risk Management Plan and monthly update report, which includes the Regional Top 10 Risk Register. He or she may designate the responsibility to the Regional CM.

4.10 Risk Analyst

The Risk Analyst serves as the administrator of ARM. He or she also works with the Project teams to update the Risk Register and perform risk analysis. He or she will facilitate the development of and implementation of the risk register for the project teams from the perspective of ARM and risk management best practices.

4.11 Risk Plan Owner

The Risk Plan Owner is responsible for executing the Risk Plan by monitoring the progress of the Action Owners with their proposed actions. The Risk Plan Owner reports the progress of the actions to the Project CM at the Monthly Risk Management Meeting.

4.12 RM Team

Comprised of the Program Director, Program Risk Manager, Deputy Director of Construction, Deputy Director of Pre-Construction, and Program CM Consultant.

5.0 Implementation

5.1 Risk Management Plan Preparation and Submittal

For a visual flowchart depicting this process, refer to Attachment 034-1.

5.1.1 Risk Planning

5.1.1.1 The Project CM identifies and notifies the Project Risk Group attendees for the Risk Assessment Workshop.

5.1.1.2 The Project CM prepares and distributes a Pre-Risk Assessment Workshop questionnaire which asks the attendees to identify potential risks. (Attachment 034-6)

5.1.1.3 The Project Risk Group fills out the questionnaire and returns the questionnaire to the Project CM prior to the Risk Assessment Workshop.

5.1.1.4 The Project CM drafts the potential risks received from the Project Risk Group into a draft Risk Register (in Column C – Risk Description) using the standard WSIP Project Risk Register template (Attachment 034-3).

5.1.2 Risk Management Plan / Baseline Risk Register Development

5.1.2.1 Project CM is responsible for developing a Risk Management Plan. The Risk Management Plan includes the project description, major risks, and the approach for identifying, analyzing, and controlling risk. The Risk Management Plan must specify main roles and responsibilities associated with the mitigation and avoidance of project risk. The Baseline Risk Register,

which is developed during the Risk Assessment Workshop, is a component of the Risk Management Plan. The draft Risk Management Plan must be prepared in parallel with the development of 3-pt estimates. Please see Attachment 034 – 5 Risk Management Plan Required Content for a complete list of required content and Attachment 034 – 1 for a work flow.

5.1.2.2 Risk Assessment Workshop

5.1.2.1.1 The objective of this workshop is to:

- Identify all the risks to the project
- Assess the probability of occurrence of each risk
- Evaluate the potential impact to cost and schedule of each risk
- Determine a strategy and an action plan to reduce the probability of each risk occurring and/or reduce the severity of the impact to the project should the risk occur, and identify potential action items.

5.1.2.1.2 Workshop Process

5.1.2.1.2.1 The Project CM presents the draft of potential risks, Probability Scale, and Severity of Impact Scales for Cost and Schedule for use in the Workshop.

5.1.2.1.2.2 The Project CM calls for any additional risks. If there are additional risks, the Project CM will record them in Column C – Risk Description.

5.1.2.1.2.3 The Project CM may divide the session into smaller Risk Subgroups to perform specific event Risk Assessment.

5.1.2.1.2.4 The Project CM conducts and records the data as it is discussed and agreed to by the Project Risk Group. The Program Risk Manager or the Risk Analyst may facilitate the meeting upon request.

5.1.2.3 Baseline Risk Register Development: The Project CM prepares a draft Baseline Risk Register which documents the data collected from the Workshop and includes additional required information. Please refer to Attachment 034-3 (Risk Register Template - Column Notes) for detailed guidance on each column of the Risk Register.

5.1.2.3.1 Note that Column L - Severity of Impact to Cost is assessed for **SFPUC risks only**.

5.1.2.3.2 Note that Column N – Risk Score will be automatically calculated based on the qualitative input made by the Project Risk Group and recorded by the Project CM in Columns K, L, and M. See Attachment 034-4 for the Risk Score Matrix example.

5.1.2.4 The Project CM sends the draft Baseline Risk Register to the PCM and Risk Team for review.

5.1.2.5 The PCM and Risk Team will review it for Quality Assurance in order to establish general conformance to the prescribed format and content for the Risk Register as defined in this procedure and attachments.

5.1.2.6 The PCM and Risk Team will compile comments and send to Project CM for incorporation into the 2nd draft Risk Register.

5.1.2.7 The PPPCM will develop 3-point cost estimates for cost impacts to the SFPUC risk only with the assistance of the Project Risk Group or members of the Project Risk Group.

5.1.2.8 The PPPCM forwards the completed 3-point estimates for each risk and a scoring rationale to the Project CM for review and approval of the data..

5.1.2.9 The Project CM will forward the draft Baseline Risk Register to the PCM and Risk Team. The PCM and Risk Team will review the draft Baseline Risk Register and return to the Project CM

5.1.2.10 The Project CM reviews any comments provided by the PCM and Risk Team and updates the data as necessary. The Project CM forwards the final draft Baseline Risk Register to the Program Risk Manager for approval.

5.1.2.11 Once approved, the Risk Analyst loads the final Baseline Risk Register into ARM and posts the Baseline Risk Register at S drive (S:/WSIP Risk Management

Report/Risk Register/Monthly report) and notifies Project CM with an email.

5.1.2.12 The Project CM prepares and finalizes the content required for the Risk Management Plan, as indicated in Attachment 034-5 and submits it to the PCM and Program Risk Manager for review.

5.1.3 Risk Management Plan Submittal and Approval

5.1.3.1 The Project CM submits the Risk Management Plan to the PCM for review.

5.1.3.2 The PCM will forward the Risk Management Plan to the City Regional CM with a copy to the Program Risk Manager with a recommendation for approval.

5.1.3.3 The City Regional CM reviews the final Risk Management Plan.

5.1.3.4 The City Regional CM forwards it to the Regional PM for final approval and implementation.

5.2 Risk Management Plan Implementation and Reporting

For a visual flowchart depicting this process including suggested durations, refer to Attachment 034-2.

5.2.1 Risk Mitigation Implementation

5.2.1.1 The Project CM is responsible to monitor and update the Risk Management Plan including the Risk Register.

5.2.2 Risk Mitigation Reporting

5.2.2.1 **Monthly Update Meeting**: The Project CM will conduct a monthly meeting with the Project Risk Group to update Risk Register. The Risk Team may provide support as requested. On a quarterly basis, the Program Risk Manager and / or Risk Analyst will attend the Risk Register review and update meeting at the project field office.

5.2.2.2 The Project CM must submit electronically the updated risk register to the Risk Analyst within three (3) business days of the Monthly Update Meeting. The Project CM is not required to submit an update electronically for the Quarterly meeting which the Risk Team attends. The Project CM must change font color (red) for all changed data in the cells of the excel spreadsheet or use track changes for electronic updates.

5.2.2.3 Upon completion of the update, the Risk Analyst will update the risk data based on the electronic submissions and post to the S drive (S:/WSIP Risk Management

Report/Risk Register/Monthly report) the revised risk register. The Risk Analyst will notify the team with an email when the risk register is made available on the S drive.

5.2.2.4 The Project CM must review and provide any additional comments to the Risk Analyst within two (2) business days of the notification. If comments are not provided with the time frame, changes will be reflected in the next monthly update.

5.2.2.5 Once all project updates are completed for a region, the Risk Analyst will post to the S drive (S:/WSIP Risk Management Report/Risk Register/Monthly report) the Top 10 Regional Risks for City Regional CM and / or Regional PM. The Risk Analyst will notify the team with an email when the risk register is made available on the S drive. Any comments must be provided to the project team for their approval within 2 business days. Any comments provided after 2 business days will be reflected in the following monthly update.

5.2.2.6 All relevant statistical data used for the Monthly Construction Report will be provided to the Project CM as part of the risk register update. This statistical information will be used by the Project CM to fill out the Monthly Construction Progress Report risk section. The Project CM will attach the revised Risk Register in the Monthly Construction Progress report. The PCM reviews and provides comments on Monthly Construction Risk reports to Project CM for update in following month.

5.2.2.7 The Project CM will use the revised risk register for their next Monthly Update meeting. Project CM must use the latest version of the Risk Register posted on the S-drive.

5.2.2.8 The Risk Analyst will provide the Program Risk Manager with the Top 10 Program Risks for review prior to PCM review. The PCM will review and provide comments within one business day to the Program Risk Manager.

6.0 Other Procedural Requirements

6.1 Time Requirements

6.1.1 For estimated time requirements for the Risk Management Plan and Risk Register preparation and submittal refer to Attachment 034-1. For estimated time requirements for the Risk Management Plan Implementation, Risk Register, and Monthly Reporting refer to Attachment 034-2.

7.0 References

7.1 Technical Specifications

None

7.2 CM Procedures

None

7.3 Others

A Guide to Project Management Body of Knowledge, Third Edition, ANSI/PMI 99-001-2004, Chapter 11, Project Risk Management.

8.0 Attachments

034 -1 Phase I Risk Management Plan Development Flow Chart

034 -2 Risk Management Plan Implementation and Reporting Flow Chart

034 -3 Risk Register Template

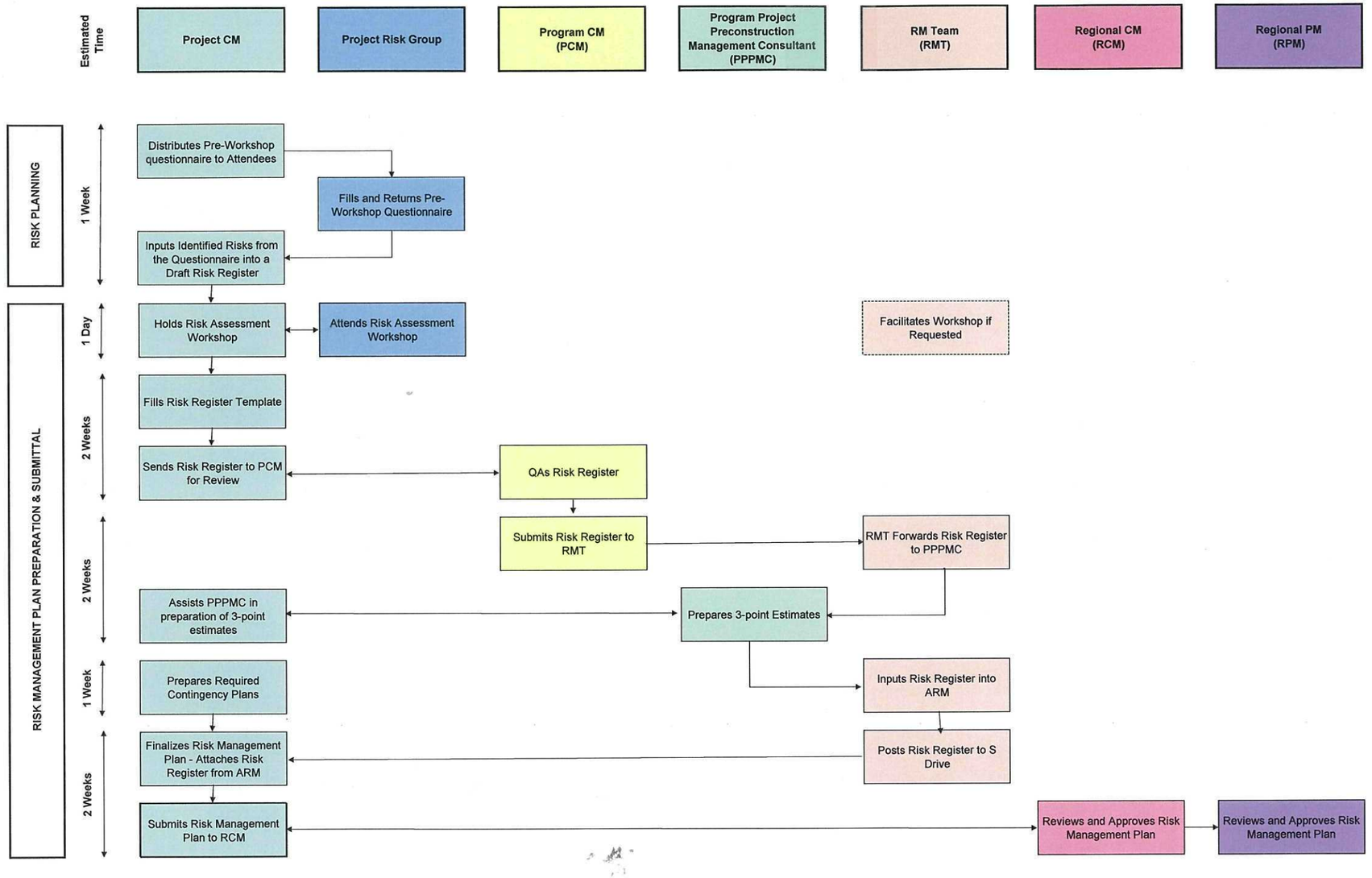
034 -4 Probability Scale, Severity of Impact Scales to Cost and Schedule, and Risk Score Matrix

034 -5 Risk Management Plan Required Contents

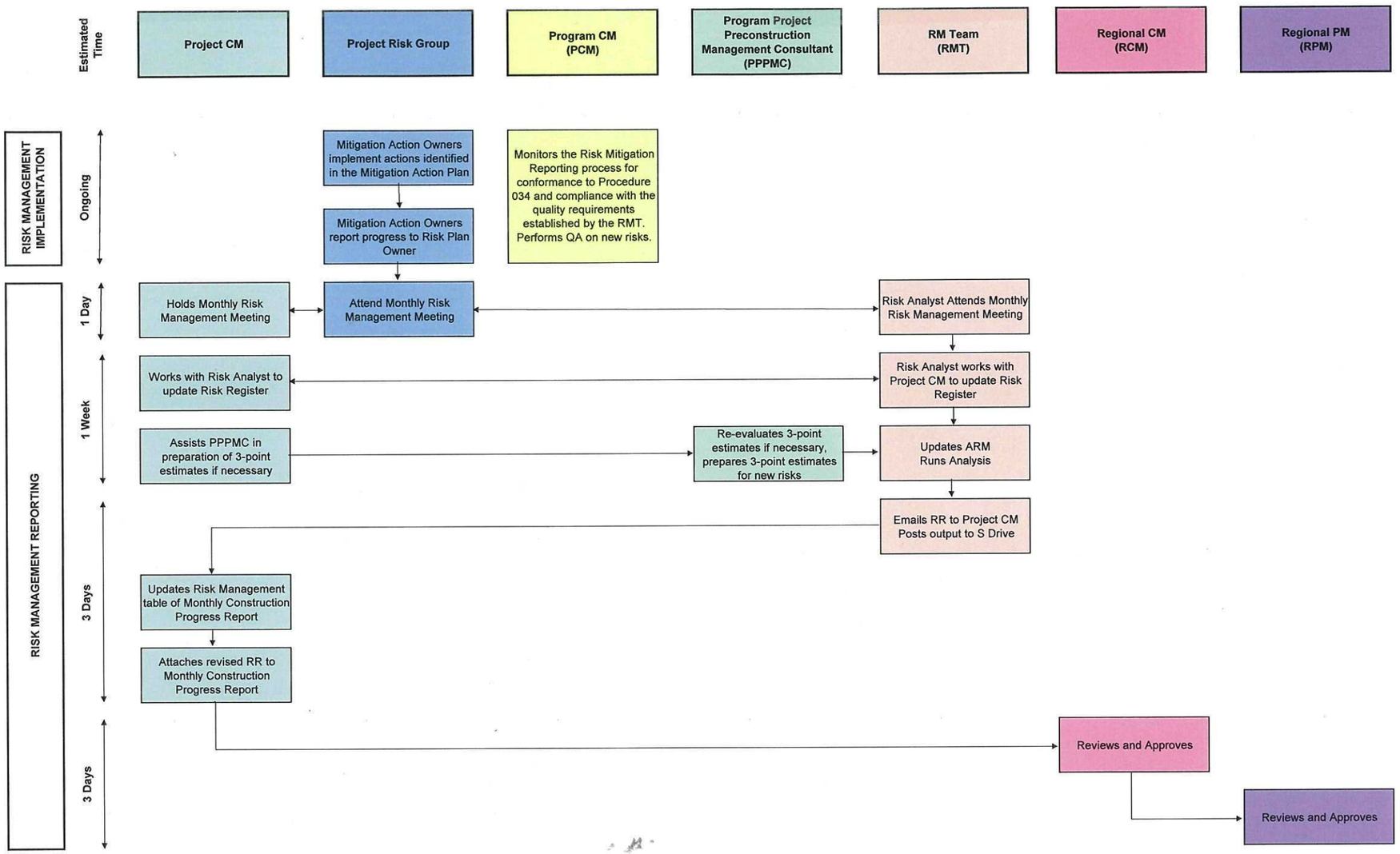
034 -6 Pre-Risk Assessment Workshop Questionnaire

034 -7 Revision Control Log

Attachment 034 - 1
Phase I Risk Management Plan Development Flow Chart



Attachment 034 - 2
Risk Management Plan Implementation and Reporting Flow Chart



Attachment 034 – 3
Risk Register Template

REGION/PROJECT: Peninsula

CONTRACTOR: JMB Construction, Inc.

PROJECT CM: Ryan Cayabyab

CM CONSULTANT: N/A

Baden and San Pedro Valve Lot Improvements
Contract No. WD-2556
PROJECT RISK REGISTER
Award Amount: $11,536,500 - Award Duration: 681 Days

HETCH HETCHY WATER SYSTEM IMPROVEMENT PROGRAM

Status Update: 03/19/10

Prepared By: Ryan Cayabyab / Alan Johanson

Prepared Date: 03/19/10

Approved By:

Approved Date:

RISK IDENTITY & CAUSE										CURRENT ASSESSMENT				MITIGATION							
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
											Severity of Impact (S)					Mitigation Action Items					
Risk ID	Risk Category	Risk Description (Hazard/Risk Scenario)	Location	Cause	Effect	Risk Plan Owner	Status	Trigger Date	Expiration Date	Probability of Occurrence (P)	Impact to Costs, $ (S_cost)	Impact to Schedule, calendar days (S_schedule)	Risk Score (R)	Strategy	Risk Plan	Action Items	Action Owner	Action Start	Action End	Action Status	Contingency Plan
EXAMPLE:																					
002	Operations	Shutdown #2 is delayed or extended and thus impacts regional water supply system	San Andreas Pipeline #2 (BSP/3)	Unforseen complications during installation (under pipe) of valve R58P & (N) 42-inch Pipeline tie-in within tight timeframe	Delays concurrent pump testing and installation (critical path) and shutdowns	Fong, Leland	Open	5/27/2010	6/30/2010	3 - Possible	2 - Minor	4 - Major	#VALUE!	Mitigate	Coordinate with Client/Operations Rep, SFPUC Shutdown Coordinator, Project Controls, Water Quality Bureau, Operations Staff, and Contractor	Coordination Meetings	Cayabyab, Ryan	9/1/2009	5/26/2010	Active	Required
																Timely review and approval of requires WS&TD System Operation Change Requiest Form	Fong, Leland	1/30/2010	5/26/2010	Proposed	
																Understanding how the shutdown affects overall system	Cayabyab, Ryan	11/1/2009	3/30/2010	Active	

Attachment 034 – 4
Page 1 of 2
Probability Scale, Severity of Impact Scales to Cost and Schedule, and Risk Score Matrix

Probability (P)	
Scale	**Range**
5	**>80%**
4	**60%-80%**
3	**40%-60%**
2	**20%-40%**
1	**<20%**

Severity of Impact to Cost ($_{cost}$)	
Scale	**Range**
5	**>1% of total Project Cost**
4	**.8%-1% of total Project Cost**
3	**.6%-.8% of total Project Cost**
2	**.4%-.6% of total Project Cost**
1	**<.4% of total Project Cost**

Attachment 034 – 4
Page 2 of 2
Probability Scale, Severity of Impact Scales to Cost and Schedule, and Risk Score Matrix

Severity of Impact to Schedule ($_{Schedule}$)	
Scale	**Range**
5	>10% of total Project Schedule
4	8%-10% of total Project Schedule
3	6%-8% of total Project Schedule
2	4%-6% of total Project Schedule
1	<4% of total Project Schedule

Risk Score Matrix

Probability	5	8	16	18	23	25
	4	7	10	17	20	24
	3	3	9	12	19	22
	2	2	5	11	14	21
	1	1	4	6	13	15
		1	2	3	4	5
		Severity of Impact (Cost)				

Attachment 034 - 5
Risk Management Plan Required Content

<<<PROJECT NAME>>>

<<<PROJECT LOCATION>>>

1. **Introduction**
   a. Description of Project
   b. Major Risks to the Project Summarized
2. **Methodology**
   a. This may be similar to what is presented in this Procedure
3. **Definitions**
   a. This may be similar to what is presented in this Procedure.
   b. Any Project-specific definitions should be indicated with an asterisk (*)
4. **Roles and responsibilities**
   a. Identify the applicable persons involved and define each of their roles and responsibilities
5. **Risk Categories**
   a. This may be similar to what is presented in this Procedure
6. **Risk Register (Baseline)**
7. **Meeting Minutes**
   a. Meeting Minutes of any meetings held in the development of this Risk Management Plan
8. **Summary**
9. **Exhibits**

HETCH HETCHY WATER SYSTEM IMPROVEMENT PROGRAM

Pre-Risk Assessment Workshop Questionnaire

Preliminary Risk Assessment by: (Name)

RISK IDENTITY & CAUSE					MITIGATION
A	C	E	F	G	P
Risk ID	Risk Description (Hazard/Risk Scenario)	Cause	Effect	Risk Plan Owner	Risk Plan
Example:					
XX	Shutdown #2 is delayed or extended and thus impacts regional water supply system	Unforseen complications during installation (under pipe) of valve R58P & (N) 42-inch Pipeline tie-in within tight timeframe	Delays concurrent pump testing and installation (critical path) and shutdowns	Fong, Leland	Coordinate with Client/Operations Rep, SFPUC Shutdown Coordinator, Project Controls, Water Quality Bureau, Operations Staff, and Contractor
01					
02					
03					
04					
05					

Attachment 034 - 7
Revision Control Log

Revision No.	Revision Date	What changed?
Rev 2	March 23, 2011	• Section 3.0; 3.2, 3.4, 3.5, 3.6; 3.6.1, 3.7 and 3.11 Revised text • Section 4.0; 4.3, 4.8 and 4.12 Revised text • Section 5.0; 5.1, 5.1.2; 5.1.2.1, 5.1.2.3, 5.1.2.3.1, 5.1.2.3 to 5.1.2.11, 5.1.3; 5.1.3.2, 5.2; 5.2.1.1, 5.2.2.1, 5.2.2.9 and 5.2.2.10 Revised Text • Attachment 3; Removed • New Attachment 3; Added • New Attachment 5; Added • New Attachment 6, Added
Rev 1	June 18, 2010	• Section 2.0; bullet 1 - item 2; deleted: development and added: preparation • Section 3.0; throughout text changes • Section 4.0; throughout text changes • Section 5.0; throughout text changes • Section 6.0; 6.1.1; text changes • Section 8.0; Added 034-7 and Added 034-8 • Attachments 1, 2, 3, 4, 6 and 8 Revised • Attachment 7; Added
Rev 0	December 7, 2009	Signed