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Transmittal

CS Transmittal No. 2220

To:	Jeff Davis	**From:**	John Funghi
	FTA	**Project No./Contract No.:**	M544.1, CS-149
	201 Mission Street, Suite 1650	**Task No./Title:**	1-4 Risk Management
	San Francisco, CA 94105	**Project Phase:**	
Date:	April 30, 2013	**Subject:**	Risk and Contingency Management Plan
Reference:			

Sent via:	☐ *mail*	☐ *overnight*	☐ *messenger*	☐ *hand-delivered*
	☐ *fax – **No:***		☒ *email – **Address:***	jeffrey.s.davis@dot.gov

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☐ *other* _____		_____	

Item No.	***Copies***	***Description***	***Rev. No.***	***Date***
1	1	Risk and Contingency Management Plan	3	04/1/13

If enclosures are not as noted, kindly notify us at once.

Remarks: Enclosed please find updated Risk and Contingency Management Plan.

John Funghi
Program Director

JF:ES:smk

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CS File No. M544.1.5.0810

central T subway

Connecting people. Connecting communities.

Report

CSP Task 1-04

Risk Management

Risk and Contingency Management Plan

Revision 3

April 1, 2013

Prepared for:

SFMTA

CITY AND COUNTY OF SAN FRANCISCO
MUNICIPAL TRANSPORTATION AGENCY
821 Howard Street
San Francisco, CA 94103

Prepared by:

.

C S P Central Subway Partnership
creativity stewardship performance

central subway

Report

Task 1.04

Risk Management

Risk and Contingency Management Plan

Revision 3

April 1, 2013

Prepared by:_____ Date: 29 Apr 13

Eric Stassevitch, P.E., CCM
Program Manager Project Services (Risk Manager)

Approved by:_____ Date: 29 Apr 13

Ross Edwards
Program Manager Project Development/Delivery

Accepted by:_____ Date: 4-30-13

John Funghi
SFMTA Program Director

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APPENDICES

1. PURPOSE

The Central Subway Project (CSP) is committed to providing a quality transportation system that meets, or exceeds, its objectives and that is ultimately judged to be a successful project. The CSP recognizes that effective management of project risks is one way to significantly increase the chances of delivering a successful project and, as a result, has developed a Risk Management Program for this purpose. The Risk Management Program provides the Project's Senior Management with a systematic process for identifying, assessing, evaluating, managing, and documenting risks that could jeopardize the success of the Project. The Risk Management Program's objectives are to:

- Adequately address risks that jeopardize Project success;
- Provide the means to achieve an acceptable level of Project cost estimate and schedule certainty;
- Provide the means to manage Project budget and cost and schedule contingency; and
- Should an OCIP be utilized, provide the basis for an insurance review that will lead to an effective and affordable insurance program for the Project. This will be accomplished by demonstrating the value of the risk management program to insurance underwriters.

The purpose of this Plan is to define the CSP's risk management policy and outline the processes to be used for establishing and effectively executing a Risk Management Program for the CSP. The Plan is a dynamic document which will be reviewed periodically, and revisd as needed, at least annually, as CSP progresses.

2. BASIS OF THE RISK MANAGEMENT PROGRAM

The Risk Management Program is based on the following:

- Project Owner is responsible for final risk allocation options;
- The risk management process meets Project Owner's risk objectives;
- The program provides for a pragmatic and balanced assessment of Project Owner's objectives and the construction industry's reasonable risk allocation issues and concerns;
- The program indicates a realistic understanding of the nature and extent of insurance coverage and surety protection available to support the qualified transfer of risk.

3. DEFINITIONS

Risk – Any decision, activity, event, or lack thereof, which has the potential to jeopardize the success of the Project. A successful CSP will have met all of the following, as a minimum: 1) be deemed to have realized the opportunities (goals and objectives) identified for the Project; 2) completed within cost and schedule goals; 3) achieved the quality, safety and functional objectives set by Project Owner and the stakeholders; and, 4) engendered no adverse political or stakeholder reaction throughout its design, construction and startup.

Risk Assessment – The process of assigning both the likelihood of an identified risk occurring and the magnitude of its consequence should it occur.

Likelihood – An assigned probability, expressed either qualitatively or quantitatively, that an identified risk will occur. Appendix A provides a guide for assigning qualitative likelihood values.

Consequence – The magnitude, expressed either qualitatively or quantitatively, of the outcome of a project decision, activity or other risk event. Appendix A provides a guide for assigning qualitative consequence values.

Risk Rating – A rating established by computing the product of the assigned likelihood and consequence values.

Risk Evaluation – The process of comparing assessed risk ratings against pre-established criteria for the purpose of ranking the risks and identifying priorities.

Risk Management – The systematic process, guided by a project approved Risk Management Plan, which identifies, assesses, evaluates, mitigates, and manages risks for the purpose of significantly increasing the probability of delivering a successful project.

Risk Allocation – Allocation of risks involves establishing how a risk will be treated. Allocation of risks can include avoidance, acceptance, and transfer, reduction of the likelihood and/or the magnitude of the consequence, sharing, or the issuance of insurance when appropriate.

Risk Register – A living document that lists, as a minimum, the viable risks that the project has identified, their likelihood and consequence values, their allocation, mitigation plans, where required, ownership and status of mitigation efforts.

Risk Manager – An individual designated by the CSP Program Director to have overall responsibility for implementation of the Risk Management Plan.

Risk Mitigation Report – These are minutes of the Risk Mitigation Meetings. These reports will capture risk mitigation discussion; include updated Risk Mitigation Status Forms and meeting attendee's comments regarding the identification of new risks, as well as suggestions on the risks that need further consideration and the Risk Assessment Committee comments regarding risk focus and assessments of mitigation efforts.

Risk Mitigation Status Form - The Risk Mitigation Status forms are a part of the Risk Mitigation Reporting and are designed to capture discussion and decisions on risk mitigation which would not be appropriate for inclusion in the Risk Register owing to their level of detail.

Risk Assessment Committee – A group of CSP Senior Management personnel formed by the CSP Program Director and Risk Manager for the purpose of evaluating risk mitigation efforts, approving risk allocations, risk ratings and making strategic decisions regarding the risk program

Primary Mitigation – Mitigation actions/strategies agreed by the project to reduce the impact of the risks that have been identified by the project and that are included in the Risk Register. A successful primary mitigation effort will reduce the overall risk level of a project resulting in an increased probability of achieving: 1) Project Opportunities; 2) cost and schedule goals; 3) quality, safety and functional objectives; and, 4) a tolerable level of external adverse reactions to the project.

Secondary Mitigation – Preplanned measures identified by the project to reduce the cost and/or schedule for the purpose of meeting the minimum cost contingency, or schedule contingency, values specified at key dates as identified in the Project Execution Plan.

Tertiary Mitigation – Adjustment to the project budget by means of supplementing or "recharging" the project funds. Tertiary mitigation generally is a last resort reaction to incurred risk, occurring only when primary and secondary mitigation has been exhausted.

4. GENERAL

4.1 BACKGROUND

It is recognized that the CSP commenced because a decision was made to pursue an opportunity or set of opportunities. The term "opportunity" is used in this Plan to include the Project's objectives and

goals, that is, the reasons for which the Project has commenced. In the case of the CSP, these include: 1) Economic Revitalization; 2) Improved Environment; 3) Social Equity; 4) Travel and Mobility; 5) Cost Effectiveness; 6) Transit Supportive Land Use; and, 7) Stakeholder Acceptance.

The decision to embark on this Project was made with the understanding that some impediments (i.e., risks) could jeopardize achieving the above opportunities in whole or in part. The Risk Management Program for the Project is focused on maximizing these opportunities by identifying risks to them and systematically managing these risks. In addition, the Risk Program will address risks to, among other things, cost, schedule, quality, safety and functionality.

The Risk Management Program is structured around the following three fundamental activities:

- Assemble the means to perform the work required by the Project (Strategic Risks);
- Perform the project work (Technical Risks); and
- Monitor project cost and schedule as necessary (Cost and Schedule Risks).

The Risk Management Program defines the items that are necessary to effectively support each of the fundamental activities and then identifies their respective risks. This approach to risk identification is utilized because it is believed to be effective in achieving the following objectives:

- Provide a rational approach to the risk management process;
- Identify the full spectrum of project risks;
- Reduce the possibility of missing significant risks;
- Focus the risk identification process; and
- Provide rational categorization of the identified risks.

The first fundamental project activity is the process of assembling the means that are necessary to perform the Project work. The means consists of a project organization; resources to perform the work; project viability (i.e., political, community, and stakeholder support); and the necessary approvals, permits, ROW, funding, and other pre-conditional items required to proceed.

The second fundamental project activity is performing the project work. This consists of Preliminary Engineering, Final Design, construction and startup.

The third fundamental activity is the process of monitoring the project cost and schedule at critical points in time. This implies cost estimates and schedules for which the CSP has an acceptable level of confidence in their accuracy. To gain this confidence, the Risk Management Program identifies and evaluates uncertainties to the project cost and schedule items and makes this a part of the cost and schedule analysis.

4.2 PROJECT ENVIRONMENT

Understanding the environment in which the Project is to be designed and constructed is critical towards defining the context in which project decisions, activities, and events are developed.

The CSP must function in a dynamic environment where labor issues, the level of community organization and their expectations, the large set of stakeholders, and an ever-changing political climate each demand special attention to affect a successful project. In addition, the Project will be subject to the requirements of a number of funding and jurisdictional agencies that have a certain amount of control over cash availability, permits, approach to the work, and construction processes. Risks associated with the foregoing will be addressed.

To be successful, the Project must interact extensively with third party interfaces, which figure predominately in this environment. Risks to effective third party interaction will be identified and managed.

4.3 POLICY

The Risk Management Program will identify significant risks and respective allocation and mitigation plans, and prioritize actions. These items are documented in the Risk Register, which will be reviewed at stipulated intervals with management, and used as the basis of reporting. The Risk Register will be updated as deemed necessary by the CSP Risk Manager and as agreed at the Risk Mitigation meetings, but in no case less than monthly.

The Project's Senior Management is fully committed to the Risk Management Program and recognizes it to be an integral part of the Project's good management practices. Senior Management assures that this plan is understood, implemented, and maintained throughout the Project by all Project personnel. The Project will employ the following process to ensure full participation of Project personnel in the Risk Management Program:

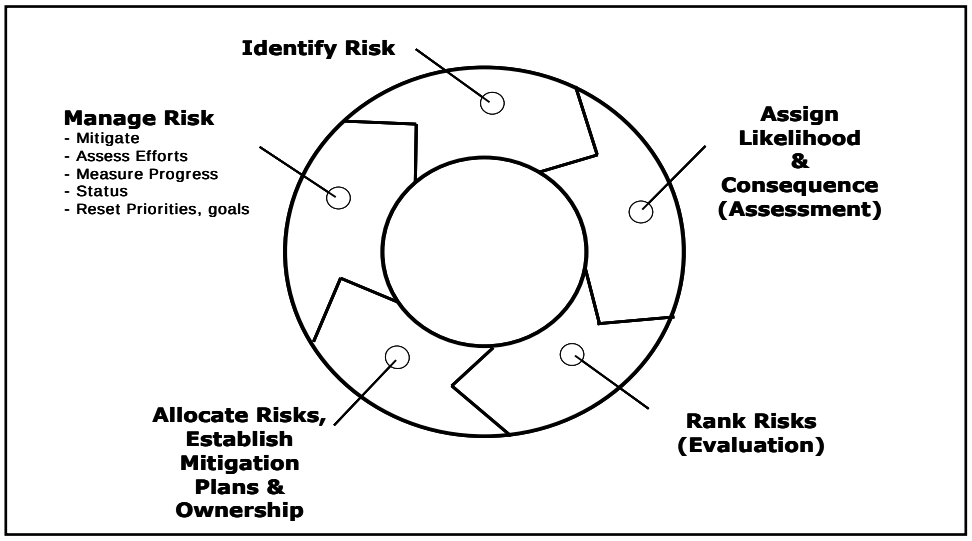
Risk Manager to conduct meeting(s) to inform all Project personnel of the following related to the Risk Management Program

- Guiding Documents
- Risk Management Process
- Status of risk management activities to date
- Process for full participation

5. RISK MANAGEMENT PROCESS

The risk management process is shown in the flowchart below and the elements of the process are explained following.

THE PROCESS



5.1 RISK IDENTIFICATION

The Risk Manager facilitates the effective identification of risks through workshops and brainstorming sessions, as well as through risk reviews with key personnel. Key personnel for these activities will be identified by the Program Director and Risk Manager to match the needs of a specific review session. CSP personnel are encouraged to identify risks, or suggest risk mitigations to the Risk Program, at any time and need not wait for a workshop. See foregoing 4.3 Policy for this process.

In general, risk workshops will take place at the outset of each new phase (e.g., Conceptual Design, Preliminary Engineering, Final Design, start of construction, or start of a critical contract package procurement, or after a set time has elapsed from the previous workshop). Risk Workshops will be held annually, as a minimum.

In addition, the Project will facilitate any FTA directed workshops and prepare documentation capturing the product of these workshops as necessary.

5.1.1 STRATEGIC RISKS

The CSP will identify strategic risks. Strategic risks are associated with the means to perform the work required by the Project and will consist, among other things, of the following:

- **Organization -** It is essential that the CSP has an effective organization as a first step toward delivering a successful project. Risks to an effective organization are identified. These may include risks associated with such items as interfacing within and between respective Project organizations; lines of authority; lines of communication; and provisions for integration of disciplines.
- **Resources -** Project resources must be adequate for the CSP to perform effectively. Risks associated with the Project's resource pool would include such items as staffing levels, personnel experience levels, engineering and administrative tools, and work facilities.
- **Viability -** It is essential to sustain the CSP's viability, that is, all necessary third party support for the CSP needs to be developed and maintained. This includes support from elected officials, the affected communities, and the numerous stakeholders to the Project. The risks associated with the viability of the CSP also include cost and schedule items (e.g., project approach, funding and financing, public outreach, industry outreach, and various public hearings), and the procurement process.
- **Precondition Items -** Several items must be available in time to support the CSP schedule. Risks associated with obtaining permits, ROW, agreements, FTA approvals, funding, etc. are identified.

5.1.2 TECHNICAL RISKS

The CSP will identify technical risks. Technical risks are associated with performing the work required by the Project and will consist, among other things, of the following:

- **Preliminary Engineering / Final Design -** Risks that emanate from the design activities are identified. These would include the possibility of design errors, inadequate or erroneous data, and incorrect conclusions leading to design positions. The entire spectrum of design activities is examined for possible risks to the Project. In addition, the allocation of risk that is intended by Project Owner, and is reflected in the procurement documents, must be properly addressed in the design documents.
- **Construction -** The risks that are expected to affect the construction activities and that can be mitigated in the design phase and the procurement process are identified.

5.1.3 COST/SCHEDULE RISKS

Cost uncertainties to the following items are identified: labor, material, equipment, indirect costs, contingencies, profit, insurances, design, scope creep, claims, etc. Schedule delays associated with any risk are identified.

5.2 RISK ASSESSMENT

The objective of assessment is to establish a rating for each risk by assigning two values to the risk: the likelihood of the occurrence, and the magnitude of its consequences. The product of these two values establishes the Risk Rating. Appendix A provides a guide for assigning qualitative likelihood and magnitude of consequence values.

The Risk Manager convenes a group of experienced individuals to develop these values which are assigned by consensus, or if deemed necessary by the Risk Manager, analysis may be performed, performance records evaluated, or other appropriate methods used. Initially these values may be qualitative, but eventually project requirements will necessitate quantitative values.

5.3 RISK EVALUATION

The objective of evaluation is to utilize the risk levels developed in the assessment process to prioritize risk and to exclude from immediate consideration any risk that falls below a predetermined threshold level. In this way, the project can focus on the higher-level risks in a systematic manner. The CSP's Senior Management has established the threshold risk level as six (6) or above. Risks below the threshold level are maintained in the Risk Register for further consideration to assure that over-time their risk rating does not increase.

5.4 ALLOCATE RISKS, ESTABLISH MITIGATION PLANS & OWNERSHIP

In general, risk workshops will be structured to allow participants the opportunity to, among other things, identify and assess risks, set preliminary risk allocations, establish mitigation plans for those risks requiring one and the assignment of ownership, i.e., designating an individual with responsibility for implementing the selected allocation. In instances where workshops do not allow for completely addressing mitigation strategies or assigning ownership, the Risk Assessment Committee will select personnel to complete these tasks.

Allocation of risks can include avoidance, acceptance, and transfer, reduction of the likelihood and/or the magnitude of the consequence, sharing, or the issuance of insurance when appropriate. Decisions made with regard to risk allocation are reviewed and approved by the CSP's Risk Assessment Committee. (see Appendix C) Discussions of risk allocations, actions and strategies will be carried out in the Risk Mitigation Meetings and reported in the Risk Mitigation Meeting Minutes.

RISK ASSESSMENT COMMITTEE

Title	Name
Project Director	John Funghi
Senior Deputy Program Manager	Jo Bhore
Deputy Program Manager	Albert Hoe
Program Manager Project Development/Delivery	Ross Edwards
Program Manager Project Services (Risk Manager)	Eric Stassevitch
Quality Assurance Manager	Mark Latch
Construction Manager	Art Wong
Construction Manager	Mark Benson

5.5 MANAGE RISKS

All Project personnel are part of the risk management process. Although key project personnel may be the only project members invited to workshops, the Risk Manager exercises best efforts and judgments to assure that all personnel are kept informed and encouraged to participate in the process so that risks are properly identified, assessed, evaluated and managed (See foregoing 4.3

Policy). The product of this effort is the Risk Register, culminating in agreed allocations and mitigation actions which are implemented on a time-scale agreed by the CSP Senior Management and Risk Manager.

A Risk Register, in combination with the Risk Mitigation Status Forms (Appendix B), systematically lists all viable, identified risks, provides an allocation and, where required, a mitigation plan for each risk, identifies an individual responsible for risk mitigation, a status of the mitigation efforts, and both an unmitigated and mitigated risk assessment. The Risk Manager is responsible for regularly updating the Risk Register, (See Appendix D), to reflect the addition of risks or changing mitigation plans and actions. A Risk Assessment Committee is established by the CSP Program Director and Risk Manager, comprised of CSP Senior Management personnel. This committee's charter is to assess the risk management effort implemented in accordance with the Risk Register and further defined by the Risk Mitigation Reports as described below. The Committee approves risk allocations and evaluates and judges the effectiveness of mitigation efforts approves risk ratings and makes strategic decisions regarding the risk program.

The success of the Risk Program is significantly influenced by the performance of the Risk Assessment Committee owing to the makeup of the Committee and the scope of their charter. The degree to which the Assessment Committee drives the process and the commitment they demonstrate greatly influences the development of a risk culture and, in turn, the success of the Risk Management Program. The Risk Assessment Committee is the only entity that can change a risk's likelihood and consequence values as a result of judging the effectiveness of the mitigation implementation work.

5.6 RISK MITIGATION REPORT

The Project's risk mitigation function will be implemented primarily through Risk Mitigation Meetings which will be held monthly as a minimum. The Risk Manager is responsible for setting the agenda and scheduling the Risk Mitigation Meetings as well as assuring that the Risk Assessment Committee is represented at the meeting. The agenda will include, among other things, a discussion of the last meeting minutes, identification of the risks to be presented at the upcoming meeting and supporting material to assist in the risk mitigation discussions. The Risk Manager will also include in the agenda opinions regarding identification of new risks, areas on which to focus, adequacy of mitigation efforts, etc.

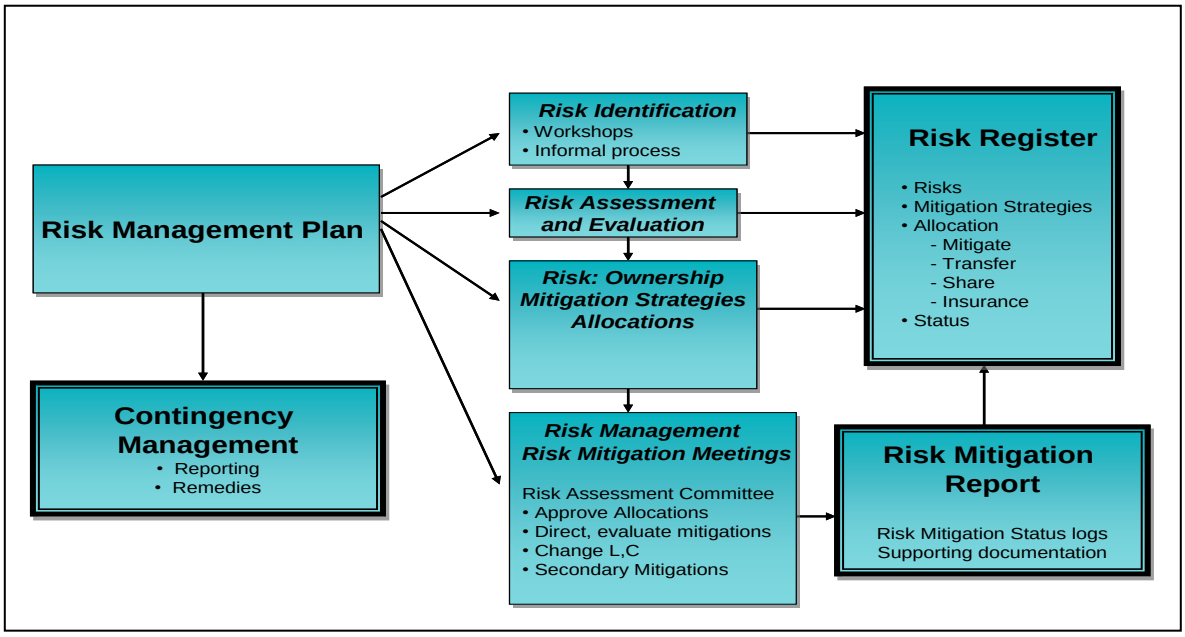
Risk Mitigation Reports are essentially minutes of the Risk Mitigation Meetings. These reports will capture risk mitigation discussion; include updated Risk Mitigation Status Forms and meeting attendee's comments regarding the identification of new risks, as well as suggestions on the risks that need further consideration and the Risk Assessment Committee comments regarding risk focus and assessments of mitigation efforts. Any Risk Assessment Committee changes to a risk's assessment values are, of course, captured in the Risk Mitigation Report minutes as well as on the respective Risk Mitigation Status Form. The Risk Mitigation Report will also include a Path Forward and updated Risk Register, when necessitated.

All risk management decisions, related comments and actions will be summarized in the Risk Mitigation Status Forms (see Appendix B for an example). The Risk Mitigation Status forms are a part of the Risk Mitigation Reporting and are designed to capture discussion and decisions on risk mitigation which would not be appropriate for inclusion in the Risk Register owing to their level of detail. The Risk Register will be updated by the Risk Manager to reflect a summary level of items in the Risk Mitigation Status forms. (See Appendix D) The Risk Register and the Risk Mitigation Reports will be placed in the document management system.

Regular reviews of the Risk Register will occur at the Risk Mitigation Meetings as directed by the CSP Program Director and the Risk Manager to add risks that have materialized as the project develops, update risk levels, and assess mitigation measures. The Risk Manager provides CSP Senior Management with risk program status and updates at regular project progress meetings at different levels of the project organization and by "Risk Mitigation Reports". The Risk Mitigation

Report will be issued immediately following each risk mitigation meeting held by the Risk Assessment Committee.

The flowchart below provides the relationship between various risk documents and processes.



As part of the Pre-FFGA Risk and Contingency Review, SFMTA proposed cost savings for design modifications and construction method changes to the underground stations of the Central Subway Project (CSP). After review, these proposed cost savings were revised downward and accepted by the FTA as primary mitigations and constitute an important element in addressing the $67.7 million gap between the current project amount of $1.5783 billion and the 50 percent cost of $1.646 billion resulting from the Risk Workshop model output. The PMOC recommended several actions be taken by SFMTA to address the risks.

SFMTA developed risk mitigation strategies to address the cost and schedule reductions for each of the three underground stations.

SFMTA continued to develop and refine the station bid design to incorporate the revised construction approach characterized as a primary mitigation strategy and report on it monthly.

At the 90% and 100% design phases, estimate checks were made by SFMTA to show that these cost savings have been incorporated in the design, schedule, and estimate.

SFMTA agreed to actively pursuing the primary mitigations proposed, and providing FTA/the PMOC documentation to verify that the cost and schedule savings proposed were accomplished.

A final report documenting these efforts is contained in Appendix F.

6. DELIVERY METHOD AND CONTRACTING

At the conclusion of Preliminary Engineering for the Central Subway, SFMTA adopted an approach to construction contracting, which includes both the delivery method (e.g., design-bid-build, design build, or other hybrid methods) and the packaging strategy (e.g., number and configuration of individual construction contracts). Because decisions about delivery method can affect contract

packaging, and vice versa, these approaches were evaluated concurrently by a Board of Consultants (BOC) and presented in a report dated December 2008. (See Appendix G)

The selection of a delivery method was based upon the following criteria: cost, schedule, social/political considerations, administration, and litigation/liability risk. The project team applied these criteria in evaluating the delivery methods deemed feasible for the Central Subway project. Using an evaluation process, the team concluded that the highest-ranked, and thus recommended, delivery method was multiple Firm-Fixed-Price/Design-Bid-Build contracts using a mechanism that can trigger negotiation if the bid prices exceed a certain threshold.

The key criteria for construction contract packaging strategy are: cost, risk, and community/environmental considerations. Taking these into account, the project team recommended the following contract packages:

- Contract 1: Early utility relocation (1)
- Contract 2: Early utility relocation (2)
- Contract 3: Tunnel Contract
- Contract 4: Union Square / Market Street Station
- Contract 5: Chinatown Station and Crossover
- Contract 6: Moscone Street Station
- Contract 7: Surface, Systems and Track work

One of the greatest risks on the Central Subway project is the market condition at the time of bidding (i.e., whether there will be a sufficient number of qualified bidders to generate economic competition). To mitigate this risk, the project team discussed potential changes to a number of contract terms and conditions in an attempt to attract qualified contractors and thereby obtain the most competitive bid prices. This is captured as Risk ID #108 and a Risk Mitigation Status Form is utilized for tracking mitigation efforts.

Delivery Methods & Contracting risks are largely tied to issues surrounding the Design-Bid-Build contracting strategy and Third Party agreements/interfaces. The primary mitigation activities for these risks involve evaluating and assigning each risk to the best party with the experience to mitigate it. The evaluation process will consist of costing each risk's full impact and mitigation for both CSP and the contractor's perspective and transferring those best mitigated by the contractor through the appropriate terms and conditions of the procurement documents. Once the data for each risk's allocation is vetted, changes to the cost estimate and/or the project schedule may be applicable.

In late August 2012, the contract delivery strategy came into question with the fourth construction contract bid significantly higher than estimated and facing a proposed re-bid; and the fifth construction contract anticipated bids being significantly higher despite clarifications provided in eight addenda. The Program convened Senior Managers to discuss alternatives to the current contracting strategy to address the potential higher costs of the remining contracts.

This resulted in a Program decision to revise the delivery strategy for the remaining contracts, recommending combining the four remaining contracts into one contract. Details of the workshops conducted, the formal recommendations, funding partner notification and participation, and implementation details are containined in a summary memo in Appendix G.

7. INSURANCE

In 2009 the City and County of San Francisco (CCSF) Division of Risk Management commissioned an independent review of the SFMTA Central Subway construction project to determine whether current risk-transfer and risk-financing practices should be changed or replaced to improve, reduce costs, or provide other potential benefits. For similar construction projects SFMTA has utilized tradition insurance programs (TIP), where the project participants all purchase and provide evidence

to SFMTA of their individual property/casualty, workers' compensation, and other required insurance coverage's.

The principal alternative to TIP is a form of controlled insurance program; either an owner controlled insurance program (OCIP), or multiple contractor-controlled insurance programs (CCIP). The review recommended modifying the Central Subway bid documents and insurance requirements to give the SFMTA maximum flexibility in deciding the ultimate insurance-delivery mechanism until such time that firm pricing and other terms and conditions of an Owner Controlled Insurance Program (OCIP) could be obtained. Proposals were issued for an OCIP and in August 2011, after a thorough analysis of the proposals received and the relative costs of the program, the SFMTA decided not to pursue an OCIP and to utilize TIP for the Central Subway Project. (See Appendix H)

In last quarter of 2011, the TIP approach was refined to address market conditions, specifically revising limits and responsibility for providing required insurance coverages for the tunnel contract (CN 1252) and the three underground stations (CN 1253,CN 1254,& CN1255). AON Risk Services was appointed as the exclusive Broker/Agent of Record, with respect to the following insurance coverages: Excess/Umbrella Liability Insurance – Excess of General Liabilty, Employers Liability, Non Owner & Hired Auto and $200M of Excess Liability. See Appendix H.

8. CONTINGENCY MANAGEMENT

8.1 THE RISK BASELINE DOCUMENTS

There were four risk workshops in which FTA and SFMTA participated from June 2008 to February 2009 to support FTA's programmatic decision to allow CSP to enter Final Design.

As an outcome to the Risk Workshops, graphs showing the minimum contingency requirements for cost and schedule as well as mitigation coordination were developed and documented in the "Risk Assessment Report Workshop #4", March 31, 2009.

All references to the Federal Transit Administration (FTA) are to the FTA Region IX, unless otherwise noted; and all dollar amounts are in Year of Expenditure (YOE$), unless otherwise noted.

The current baseline cost estimate is Rev 0, August 4, 2009. The current baseline schedule is Integrated Project Schedule updated as of May 31, 2009.

8.2 MANAGING CONTINGENCY DRAWDOWN CURVES

The CSP is obligated to effectively manage risks. The most obvious manifestation of this effective management of risks is for the Project to demonstrate that it is not consuming cost or schedule contingency more rapidly than that depicted by the buffer curve which is defined below and included as part of the Project cost and schedule contingency drawdown curves. The current curves provide the minimum contingencies, over time, that the Project must maintain for cost and schedule.

The minimum amounts and their respective "Hold Points" are taken from FTA PMOC "Final Report of Risk Assessment – Workshop #4", Chapter 6, March 31, 2009. Hold points are associated with strategic events and are also known as FTA Milestone Review Points. The current dates associated with them are based on the March 2013 schedule.

During the last quarter of 2011 and the first quarter of 2012 contingency management hold points structured on baseline documents established in 2009 were evaluated for relevance due to significant changes that had occurred on the Program. The Program advocated the need for changes to the baseline documents' milestones, hold points and minimum contingency levels due to: Changes to project configurations, delays to design submittals, re-sequencing of contract package procurement, delay to FFGA, and improved risk profiles for tunnel and station contracts. Workshops were held

with FTA and Program Senior Managers to develop revised hold points and minimum cost contingency levels. The output from the workshops was submitted and reviewed by FTA in April, May and July of 2012. In September 2012, the FTA approved the revisions to the Hold Points and minimum contingency levels recommended by the Program. See revised table below and Appendix E for details.

Minimum cost contingency amounts are shown in the following table

Table 1: Minimum Cost Contingency

	Hold Points	QTR	Minimum Contingency Level ($Millions)	Proposed Minimum Contingency Level ($Millions)
1a	Tunnels 100% Designed	1Q11	$280	$280
1b	~~UMS~~ *CTS*100% Designed	4Q11	$250	*$240*
1c	~~FFGA Award and NTP Tunnels October 2011b~~ *40% Bid (Tunnel and CTS)*	2Q12	$225	*$200*
1d	*FFGA Award*	3Q12	-	*$180*
2	CTS/UMS Commence October 2012	4Q12	$160	$160
3	Demobilize Tunnels January 2014	2Q14	$140	$140
4	Complete Station to Platform Levels *January* 2017 (CTS/MOS)	1Q17	$60	$60
5	Complete CTS/Tunnels Systems Installation *July 2018*	3Q18	$25	$25
	Revenue Service	4Q18	0	0

Minimum schedule contingency amounts are shown in the following table:

Table 2: Minimum Schedule Contingency

	Hold Points	QTR	Minimum Contingency Level (Months)
1	Tunnels 100% Designed May 2010	1Q11	14
2	UMS 100% Designed June 2011	4Q11	13
3	FFGA Award and NTP Tunnels October 2011	4Q11	12
4	CTS/UMS Commence October 2012	4Q12	10
5	Demobilize Tunnels October 2013	1Q14	8
6	Complete Station to Platform Levels October 2015 (UMS)	3Q16	6
7	Complete CTS/Tunnels Systems Installation June 2017	1Q18	4
	Revenue Service	4Q18	0

CSP will shall implement and maintain throughout the Project, an acceptable Contingency Management Plan that ensures that distributions of contingency are appropriately controlled resulting from deliberate and sufficiently independent CSP management actions with adequate internal controls that are tested regularly.

The CSP will actively conduct primary risk mitigation to reduce the overall level of risk. This will improve the CSP's chances of remaining above the buffer cost and schedule drawdown curves. In addition, the Project will develop secondary mitigation plans to provide the means to replace contingency expended greater than that depicted by the buffer curve for any period of time.

On a monthly basis, CSP will status actual cost contingency drawdown curves by reflecting, among other things, the impact of bid award amounts on planned contingency, approved change orders for all active contracts and changes to the current cost estimate. (see Appendix E)

Actual schedule contingency drawdown curves will be status monthly to reflect any recognized delays and schedule improvements. (See Appendix E)

The following definitions apply to the contingency drawdown curves:

Cost

- **Minimum Cost Contingency Drawdown Curve:** This curve commences in Q1 2009 at $280 million and is drawn down over time at seven hold points. This curve satisfies the FTA's assessment of the minimum cost contingency needed at these hold points.

- **Buffer Cost Contingency Drawdown Curve:** This curve is set at 25 percent above the Minimum Cost Contingency Drawdown curve. The area between the Buffer Cost Contingency Drawdown curve and Minimum Cost Contingency Drawdown curve can be considered a warning zone, i.e., when the Actual Cost Contingency Drawdown curve is in this area the Project should be prepared to address the possibility of the Actual Cost Contingency Drawdown curve dropping below the Minimum Cost Contingency Drawdown curve, necessitating action.
- **Planned Cost Contingency Drawdown Curve:** This curve commences at the Project's actual cost contingency value and is drawn down in accordance with expected usage considering each contract's inherent risks over the contract life.
- **Actual Cost Contingency Drawdown Curve:** This curve starts at the same point as the Planned Cost Contingency Drawdown curve. If and when actual drawdown becomes different than the planned drawdown, the Actual Cost Contingency Drawdown curve will originate at that point in time and continue on its own path.
- **Unreserved Contingency**: Those contingency funds that are readily and freely available to absorb cost increases to the Project. This contingency is the amount that exists at any time between the actual contingency curve and the minimum contingency curve where the actual curve is greater than the minimum.
- **Reserved Contingency**: Those contingency funds that are not readily and freely available to absorb cost increases to the Project. This contingency is the amount below the minimum contingency curve.

Schedule

- **Minimum Schedule Contingency Drawdown Curve:** This curve commences in Q1 2009 at 14 months and is drawn down over time at seven hold points. This curve satisfies the FTA's assessment of the minimum schedule contingency needed at these hold points.
- **Buffer Schedule Contingency Drawdown Curve:** This curve is set at 25 percent above the Minimum Schedule Contingency curve. The area between the Buffer Schedule Contingency curve and Minimum Schedule Contingency Drawdown curve can be considered a warning zone, i.e., when the Actual Schedule Contingency Drawdown curve is in this area the Project should be prepared to address the possibility of the Actual Cost curve dropping below the Minimum Schedule Contingency Drawdown curve, necessitating action.
- **Planned Schedule Contingency Drawdown Curve:** This curve commences at the Project's actual schedule contingency value and is drawn down in accordance with expected usage considering each contract's inherent risks over the contract life.
- **Actual Schedule Contingency Drawdown Curve:** This curve starts at the same point as the Planned Schedule Contingency Drawdown Curve. If and when actual drawdown becomes different than the planned drawdown, the actual drawdown curve will originate at that point in time and continue on its own path.
- **Unreserved Contingency:** These contingency amounts are readily available to the project to absorb schedule delays. Unreserved Contingency is the amount that exists at any time between the actual contingency curve and the minimum contingency curve where the actual curve is greater than the minimum**.**
- **Reserved Contingency:** These contingency amounts are not readily available to absorb schedule delays. Reserved Contingency is the amount that exists at any time below the minimum schedule contingency curve.

8.3 COST CONTINGENCY MANAGEMENT

The contingency reference in the FTA standard FFGA is interpreted as "total contingency." In "Final Report Risk Assessment Report – Workshop #4," March 31, 2009 this total contingency was reported to be $330 million at the commencement of the contingency management process which is Q1 2009. Recent reviews of the Project cost estimate have indicated that there is a Total Contingency of $184.9 million. The Total Contingency is developed and allocated as follows:

Table 3: Total Contingency

March 2013 Cost Report

Standard Cost Categories (SCC)		*Allocated Contnigencies*	*Escalated Allocated Contingencies*
10	Guideway & Track	*33,954,676*	*34,089,242*
20	Stations	*23,005,984*	*24,498,945*
40	Sitework	*17,453,597*	*17,991,527*
50	Systems	*7,017,633*	*7,288,146*
	Construction Subtotal	*81,431,890*	*83,867,860*
60	Right-of-Way	*1,017,571*	*1,017,571*
70	Vehicles	*1,700,000*	*2,276,941*
80	Professional Services	*23,550,071*	*23,550,071*
	SCC 10-80 Subtotal	*107,699,532*	*110,712,443*
90	**Unallocated Contingency**	*74,236,557*	*74,236,557*
	GRAND TOTALS	**181,936,089**	**184,949,000**

In order to ensure sufficient cost contingency for completion of the project, distribution, or consumption of total contingency, whether in the form of reservations, encumbrances, etc. shall be subject to the requirements as described below.

The point of contact for cost contingency management will be the CSP Project Control Manager (PCM). All changes to the cost estimate originate with, are identified, approved and documented by the PCM. The PCM will reflect any cost estimate changes on the actual cost contingency drawdown curve on a monthly basis and provide this information to the CSP Program Director and Risk Manager.

Where new cost contingency is created by, among other things, construction bids lower than estimated, contract under-runs, value engineering savings, recognized reductions in risk level resulting from primary mitigation and implemented secondary mitigations, these funds will be transferred back to the total contingency and reflected in the Actual Cost Contingency Drawdown curve.

Where contingency is consumed, the PCM and Risk Manager will evaluate the actual cost drawdown curve to determine if any action is required. Action will be required if the Actual Cost Contingency Drawdown curve should either drop below the Minimum Cost Contingency Drawdown curve or a trend is identified which suggests that the curve will drop below the minimum in the near future. These courses of action might include mitigation of risks identified by a trending analysis, application of secondary mitigation, or use of unreserved contingency. The action to be taken will be based on the CSP Program Director's decision.

Throughout the later half of 2011 continuing into early 2012 the Program recognized negative trending for cost contingency usage and addressed this trend with significant revisions to contingency management draw down curves, see Section 8.2 above. During the period of Jan 2012 thru September 2012, although the Program managed the cost contingency consistent with the revisions to the cost contingency curves, maintaining contingency above the proposed new minimums, the FTA requested the cost contingency values be shown as below the minimum contingency levels originally established until approved. FTA approved revisions to the hold points and minimum contingency levels. Appendix E containins both contingency draw down curves representings this period of time, the curve as being below the minimum contingency until FTA approval was received in September of 2012 and the curve managed to the approved revisions.

Should the contingency balance fall below the Minimum Contingency curve, and CSP is unable to bring the contingency up above the minimum contingency prior to the next FTA Milestone Review Point, CSP and FTA shall hold workshops to develop a Contingency Recovery Plan within 30 days. Within 30 days after completion of the Contingency Recovery Plan, CSP will provide a report of the findings to the SFMTA Board of Directors. Should the contingency balance remain below the Minimum Contingency, and the CSP is unable to increase the contingency balance above the Minimum Contingency within 90 days following the workshop, CSP shall initiate a Full Project Review. This review is to be conducted by a committee chosen by SFMTA (e.g. Experts Review Panel). CSP shall work with this committee to develop and implement a Contingency Recovery Plan in conformance with the FFGA requirements within 90 days.

Some trends that might adversely affect the Actual Cost Drawdown curve include: 1) schedule delays that persist in any given area such as design, procurement process, a specific contract, utility work, etc; 2) an inordinate number of contract change orders coming from a specific contract; 3) market conditions that are known to increase contract costs such as limited number of bidders, increasing fuel and material prices, etc.

The PCM and Risk Manager will also determine if a limited statistical analysis is warranted to assist in the trending analysis. For example, it may be beneficial to forecast the possible affects of an upcoming contract award with a probability of occurrence and range of impact values where the outcome might point to the actual drawdown curve dropping below the buffer curve. This will allow the Project to plan for addressing the issue before it materializes. The Risk Manager may convene a meeting of key project personnel to identify trends and to generate a project consensus of the data necessary to support analysis of these trends.

The CSP Program Director may make distributions of Unreserved Contingency on his own authority. However, the CSP Program Director must ensure that any planned distributions of the Reserved Contingency are subject to formal deliberations and approval by the Central Subway Project Officer before any action is taken. Requests for use of Reserved Contingency must be presented to the Central Subway Project Officer within 30 days of recognizing the need. The Central Subway Project Officer will assess the reason for using the Reserved Contingency and the project implications of such use prior to approval.

All transactions, whether additions or subtractions to the Actual Cost Contingency Drawdown curve, will be sufficiently documented in a timely manner, but no less than monthly. The CSP Program Director will assure that these transactions are appropriately controlled and result from deliberate and sufficiently independent management actions. The CSP Program Director will determine the adequacy of the contingency management process and may invoke independent agency audit, if necessary, to assure accuracy.

8.4 SCHEDULE CONTINGENCY MANAGEMENT

In order to ensure sufficient schedule contingency for completion of the project, distribution, or consumption of schedule contingency shall be subject to the requirements as described below.

The point of contact for schedule contingency management will be the CSP Project Control Manager (PCM). All changes to the schedule originate with, are identified, approved and documented by the PCM. The PCM will reflect any schedule changes on the Actual Schedule Contingency Drawdown curve on a monthly basis and provide this information to the CSP Program Director and Risk Manager.

CSP shall analyze the critical path and the next longest path(s) monthly. This information will be provided as part of the Monthly Report. CSP shall update the project schedule for major activities using forecast data resulting from progress curves. Such progress functions shall be applied to critical path activities and the next longest path.

Schedule contingency shall be further segregated into **Forced Lag**, **Buffer Float**, and **Contingency Float**, which are all elements of **Project Schedule Contingency** as defined below:

- **Forced Lag:** built-in float on the Critical Path; it is also referred to as "Project Interface Float."
- **Buffer Float:** duration between SFMTA targeted Revenue Service Date (RSD) and the Schedule RSD, or ST RSD - Schedule RSD.
- **Project Float:** equal to Forced Lag plus Buffer Float.
- **Contingency Float:** duration between FFGA RSD and SFMTA targeted RSD, or FFGA RSD - ST RSD.
- **Project Schedule Contingency:** sum of Forced Lag, Buffer Float, and Contingency Float.

Where new schedule contingency is created by, among other things, shortened critical path activities such as “work around”, improved productivity resulting in shorter activity durations than assumed, effective risk management resulting in less risk and thereby consumption of float, value engineering savings, implemented secondary mitigations, etc., these durations will be transferred back to the total contingency and reflected in the Actual Schedule Contingency Drawdown curve.

Where contingency is consumed, the PCM and Risk Manager will evaluate the Actual Schedule Contingency Drawdown curve to determine if any action is required. Action will be required if the Actual Contingency Drawdown curve should either drop below the Minimum Schedule Contingency Drawdown curve or a trend is identified which suggests that the curve will drop below the minimum in the near future. These courses of action might include mitigation of risks identified by a trending analysis, application of secondary mitigation, or use of unreserved contingency. The action to be taken will be based on the CSP Program Director’s decision. Schedule contingency dropped below the minimum required in September 2012, when approved changes to the Program Master Schedule were made to reflect the revised Contracting Delivery Strategy. **The Program is currently implementing strategies to return the subject float to agreed upon levels while initiating efforts to develop and implement a recovery plan should current strategies prove ineffective.**

For Project Schedule Contingency, in the event that any of the schedule contingency requirement are not met, CSP shall immediately implement appropriate strategies to bring subject float to the agreed upon levels prior to the next FTA Milestone Review Point. Should the implementation of these strategies fail, CSP will revise its schedule to reflect the changes to the critical path and provide an impact assessment within 90 calendar days. Should this impact assessment indicate that the project schedule contingency will fall below the “Minimum” Float, CSP shall initiate efforts to develop and implement a recovery plan in conformance with the FFGA requirements.

Some trends that might adversely affect the Actual Schedule Contingency Drawdown curve include: 1) schedule delays that persist in any given area such as design, procurement process, a specific contract, utility work, etc; 2) an inordinate number of contract change orders coming from a specific contract; 3) interface issues between two or more contracts that have the potential to worsen with no attention, etc.

The PCM and Risk Manager will also determine if a limited statistical analysis is warranted to assist in the trending analysis. For example, it may be beneficial to forecast the possible affects of an upcoming activity such as obtaining a required permit or parcel of property with a probability of

occurrence and range of impact values where the outcome might point to the actual drawdown curve dropping below the buffer curve. This will allow the Project to plan for addressing the issue before it materializes. The Risk Manager may convene a meeting of key project personnel to identify trends and to generate a project consensus of the date necessary to support analysis of these trends. As part of the above reffered to recovery plan development, the Program plans to perform a Monte Carlo risk anaylsis in an effort to evaluate if changes in risk profile have effected required minimum schedule contingencies.

The CSP Program Director may make distributions of Unreserved Contingency on his own authority. However, the CSP Program Director must ensure that any planned distributions of the Reserved Contingency are subject to formal deliberations and approval by the Central Subway Project Officer before any action is taken. Requests for use of Reserved Contingency must be presented to the Central Subway Project Officer within 30 days of recognizing the need. The Central Subway Project Officer will assess the reason for using the Reserved Contingency and the project implications of such use prior to approval.

All transactions, whether additions or subtractions to the Actual Schedule Contingency Drawdown curve, will be sufficiently documented in a timely manner, but no less than monthly. The CSP Program Director will assure that these transactions are appropriately controlled and result from deliberate and sufficiently independent management actions. The CSP Program Director will determine the adequacy of the contingency management process and may invoke independent agency audit, if necessary, to assure accuracy.

8.5 DOCUMENTING AND REPORTING CONTINGENCY MANAGEMENT

The cost and schedule drawdown curves will be updated monthly. The Project Risk Manager will transmit these monthly updates to the Risk Assessment Committee for their information.

The updated Project cost and schedule drawdown curves will be included in the Project's FTA Quarterly Report and will be reported on during FTA Quarterly presentations. Trending analysis and updated planned forecasts of both cost and schedule contingency drawdown will also be reported in Quarterly Reports.

8.6 PROJECT EXECUTION STRATEGY

The major goal of the project execution strategy is to complete the proposed New Starts Project within budget and on schedule. The primary strategy is to maintain a total contingency balance throughout the life of the project that is acceptable to both CSP and FTA and is totally sufficient to complete the Federal Project.

A "secondary" strategy is in the recognition that there is a "break point" in project execution where all market risk and early construction risk has been mitigated, beyond which, the application of contingency is the only effective way to treat project risk. Prior to this break point, risk mitigation often is required to preserve the contingency minimum balances. SFMTA may apply contingency, without mitigation, in those circumstances where such contingency is sufficient. This will require the integration of risk management and contingency management activities and the previously identified "Buffer Zone" above the Minimum Contingency (or "Minimum" Float for the schedule contingency) balances identified above. This strategy also recognizes that CSP management of the Project may create new contingency or preserve sufficient existing contingency to allow "recapture" of earlier, secondary mitigation efforts.

Risk mitigation activities and plans need to be coordinated with contingency activities and plans. As part of the ongoing project management process, specifically, the annual update and FTA review and approval of CSP's PMP, the Minimum Contingency amounts will be adjusted to reflect the current cost and schedule status as well as demonstrate conformance with the agreed upon Minimum Contingency.

In addition the following interim steps will be implemented:

- As a part of the FTA Quarterly Meeting, SFMTA will report on the level of available contingency as compared with the predicted levels on the minimum contingency curve. Such reporting shall be timely, current and include forecasting and trend analysis of all contingency elements.
- At each FTA Milestone Review Point, SFMTA and FTA will review the Risk Management Plan to examine potential risks remaining and to update the cost and schedule hold point dates and/or values.
- As part of an overall budget control process, SFMTA will review the cost for individual construction contracts at each design deliverable to see how the most current estimates compare with budget values. These reviews will be on-going and will take place between FTA Milestone Review Points.

9. DEVELOPING A SECONDARY MITIGATION PLAN

Separate and above the mitigation scope required by the CSP's primary cost and schedule mitigation effort, the CSP will develop a Secondary Mitigation Plan that provides the ability (where feasible) to slow the use of contingency reserve. Should the Project contingency reserve fall below the minimum cost or schedule contingency curve at any time, a recovery plan will be required. These Secondary Mitigation Plans will be instituted with required modification, on a time scale consistent with FTA requirements which are listed above in Section 8.2. Mutual agreement will be reached with FTA on the adequacy of the plans.

As part of the Secondary Mitigation Plans, the Project will develop secondary mitigation capacity in the amounts and for possible application in the time periods indicated in Section 8.2 above.

Minimum capacity values for both cost and schedule are listed above in Section 8.2. The Project must develop secondary mitigations 30 days prior to FTA Hold Points in order to achieve these minimum capacity values. Discussions regarding the identification of secondary mitigations, implementation, actions and strategies will be carried out in the Risk Mitigation Meetings and reported in the Risk Mitigation Meeting Minutes.

See Appendix F for current Secondary Mitigations.

APPENDIX A – LIKELIHOOD CONSEQUENCE AND RISK LEVEL

APPENDIX A

LIKELIHOOD, CONSEQUENCE AND RISK LEVEL

Likelihood	Description of Frequency of Event	Probability	Scale Value
Frequent	Event occurs many times during period of project or single event has high likelihood of occurrence	>90%	5
Probable	Event occurs several times during period of project or single event has moderate likelihood of occurrence	75 – 90%	4
Occasional	Event could occur during period of project	>50%	3
Remote	Event is unlikely to occur, but it is possible during period of project	10 – 50%	2
Improbable	Event is so unlikely that it can be assumed not to occur during period of project.	0 – 10%	1

Consequence	Description of Effect of Event				
	Cost	Schedule	Safety	Project Perception/ Political Reaction	Scale Value
Significant	> $10M	> 12 months	Multiple public accidents	Public perception very poor. Project seriously jeopardized. Serious political consequence to Owner	5
Very High	<> $3M - $10M	<> 6 -12 months	Single public accident and multiple workforce accidents	Project jeopardized. Requires considerable effort to regroup public/political support	4
High	<> $1M - $3M	<> 3 - 6 months	Single public accident or multiple workforce accidents	Some concern for project viability. Some political consequence experienced by Owner. Moderate effort required to re-establish viability.	3
Medium	<> $250K - $1M	<> 1 - 3 months	Single workforce accident	Minor concern for project viability and effect on Owner politically	2
Low	< $250K	< 1 Month	Poor Safety Practices	Minor public complaints and effect on owner politically	1

APPENDIX B – RISK MITIGATION STATUS FORM

APPENDIX B

RISK MITIGATION STATUS FORM

Risk Mitigation Status	
Risk Reference: 47	
Risk	**Mitigation Strategy**
Revisions to the SEM sequence during construction, which differ from the plan, could lead to significant delays if not sufficiently pre-planned.	1. Revisit sequence strategy during FD. 2. Address change through flexible bid schedule 3. Utilize contractor pre-qualification: Require experienced SEM Contractor, approved SEM procedures, and continuous SEM inspection. 4. Provide attractive T + C's (e.g. differing site conditions) 5. Conduct peer review for FD 6. Provide performance incentives including crew incentives for Production. 7. Require shotcrete, as needed. Include shotcrete & inspection costs in estimate.

Initial Assessment: 3,4,12 *
Current Assessment: ~~3~~,1,1,3*

Risk Owner: J. Smith

Status Log:
May 28, 2009 Meeting:

1. Revised the Risk and Mitigation statements.
2. Items 1 and 2: Must wait for Final Designer to develop these items
3. Item 3: Check with VTA on pre-quals used there; conduct a survey to generate a list of qualified, available SEM contractors (check with J. Bhore). Conduct some outreach at the upcoming RETC.
4. Item 4: Confer with J. Bhore
5. Item 5: Must wait for Final Designer to develop this item
6. Item 6: Confer with J. Bhore

* Initial Assement Values: (Cost Impact), (Schedule Impact), (Risk Rating)

* Current Assessment Values: (Probability) (Cost Impact), (Schedule Impact), (Risk Rating)

APPENDIX C – RISK ALLOCATION TABLE (MAR 2013)

APPENDIX D

PROJECT RISK ALLOCATION MATRIX

Central Subway Project San Francisco

REV : 19

DATE ISSUED : 03/14/13

Allocation - Avoid, Accept, Reduce, Transfer, Insure

Final Risk ID	Contract I.D	Risk Description	Mitigation Description	Risk Category	Rating	Risk Allocation	Assessment	Reference	Must Complete by Date
Underground Tunnel									
1	TUN	Additional night shift work required at portal launch box due to bus storage facility relocation delay	Work with TJPA to coordinate construction schedules and GGB to coordinate Traffic Routing.	C	1	Reduce/ Transfer	Potential for additional night shift work can be transferred to the contractor, but we need to define the parameters of the relocation delay based on discussions with TJPA. After defining the parameters, the SFMTA assumes the risk for any delay outside those limits.	Special Provisions	3/20/15 TUN1160
2	TUN	Approvals required to relocate 42"/48" sewer line as part Utility 1 package take longer than expected	PUC has accepted DPW's design for replacement of the 42" sewer line. Relocate utilities in advance of launch box excavation. Start utility relocations as early as possible.	D	-	Mitigate/ ~~Transfer~~	Mitigated by PUC's acceptance of design and inclusion of work in an advance utility relocation contract.	Utility Relocation Contract 1 includes the 42" swer work as accepted by PUC. Document PUC's design acceptance.	Retired 10/13/11
2a	TUN	42"/48" sewer line relocated as part Utility 1 package is damaged by subsequent construction of the launch box.	1. Make follow-on contractor responsible for repairs to any existing utility lines. 2. Properly as built actual location as part of Utility 1 package and provide to Contract 3 Contractor	C	2	Transfer	This risk is transferred to the contractor through the Protection of Existing Property specification.	CN1252 Section 01 76 29 Protection of Existing Property	10/24/12 TUN1080
3	TUN	Unacceptable settlement and impact on pavement or utilities from break-out (turn under) of TBMs from launch box.	Include jet grouting underneath utilities at TBM break out in plans and cost & schedule estimates .	D	-	Reduce	Risk is reduced by reducing the likelihood of settlement by jet grouting.	Jet grouting specification CN1252 Dwg. ES-163	Retired 1/12/12
4	TUN	Unacceptable settlement of buildings along tunnel alignment. (Old Navy Building / Virgin Music piled foundations)	1. Evaluate settlement impact to buildings along tunnel alignment. 2. Monitor all buildings between I-80 and Post Street and north of Sacramento Street for settlement. 3. Install tubámachettes for compensation grouting under the Whole Foods, Old Navy, Virgin Records, and the Columbus Avenue Bank of America buildings prior to the TBMs reaching these buildings. 4. Require EPBM TBM and contractor to demonstrate effective control of ground and correction of settlements by compensation grouting. 5. Require contractor to have contingency repair/restoration plan. 6. Require repair of adverse impacts to be approved by a Structural Engineer. 7. Include probable cost in estimate.	D	-	Reduce/ Transfer	This risk can is transferred to the contractor by setting threshold/allowable settlement values to give the contractor some leeway for settlement. SFMTA assumes responsibility for damage that occurs prior to reaching these thresholds. Requirements for tubamachettes, grouting, contingency plans, etc. are included in contract language. Risk can be reduced by compensation grouting of building foundations.	-Division 31 specifications and drawing notes, and payment provisions. -Effects of Central Subway Underground Construction on Existing Structures developed by Jacobs Associates/SOHA Engineers and PBAA/ong JV (Rev 3 May 11, 2009) -Bid item for compensation grouting -BP drawings include compensation grouting	Retired 1/12/12
5	TUN	Possibility that lowest level of tie-backs extending out from Moscone Center could be within the tunnel alignment.	1. Lower tunnel alignment 5' below the lowest expected tieback. 2. Include obstruction clause and allowance in contract documents.	C	1	Avoid/ Transfer	In case the contractor still runs into a tieback despite lowering the alignment, consider establishing a unit price allowance so that this potential impact is addressed before it happens. Also require spare cutter heads, etc. be kept on site to minimize impacts.	Division 31 specifications, drawing notes, and payment provisions.	7/2/13 TUN1118
6	TUN	Special ground stabilization required for Cross Passage #5	Include jet grouting at Cross Passage 5 in plans and cost & schedule estimates.	D	-	Reduce	Risk is reduced by jet grouting to stabilize ground. Reflect in contract language.	Division 31 specifications and drawing notes, and payment provisions.	Retired 1/12/12

APPENDIX D

PROJECT RISK ALLOCATION MATRIX

Central Subway Project San Francisco

REV : 19

DATE ISSUED : 03/14/13

Allocation - Avoid, Accept, Reduce, Transfer, Insure

Final Risk ID	Contract I.D	Risk Description	Mitigation Description	Risk Category	Rating	Risk Allocation	Assessment	Reference	Must Complete by Date
7	TUN	Potential for excessive settlement of BART tunnels - SIGNIFICANT COMPENSATION GROUT REQUIRED OVER ESTIMATE ALLOWANCES	1. Early and extensive co-ordination with BART. 2. Survey BART tunnels to determine exact locations. 3. Checking effect of maximum expected settlement on tunnels. 4. Require EPBM TBM, Contractor to demonstrate effective control of ground settlements and correction of settlements by compensation grouting, and pre-installation of compensation grout piping under BART tunnels prior to tunneling reaching Market St. Require repair/adjustment plan. 5. Develop contingency plan to provide bus bridge, if needed. 6. Require non-stop weekend excavation beneath BART tunnels. 7. Monitor movement of BART tunnels in real-time. 8. Repair/adjust as needed. 9. Include probable cost in estimate.	C	4	Reduce/ Transfer	This risk can be transferred to the contractor, but SFMTA needs to set threshold/allowable settlement values during final design to give the contractor some leeway for settlement. SFMTA assumes responsibility for damage that occurs prior to reaching these thresholds. Requirements for grouting, contingency plans, etc. need to be included in contract language.	Division 31 specifications and drawing notes.	8/28/13 TUN1120
8	TUN	Flowing groundwater in vicinity of UMS Station could make adequate annulus grouting difficult.	1. Use appropriate additives such as accelerators in primary annulus backfill grouting, if needed. 2. Use secondary grouting as needed.	C	1	Reduce/ Transfer	Grouting requirements to be included in contract language. If possible, allowable water flows can be defined to share the risk.	Division 31 specifications and drawing notes.	8/28/13 TUN1120
9	TUN	Mixed face (rock/soil) ground conditions beneath Stockton Street at Post Street. Potential for increase settlement tunneling through hard/soft interface (adjacent Union Square) newish buildings …damage to façade limited	1. Probe and grout ahead of the TBM. Secondary grouting, as needed. 2. Include above work in schedule and probable cost in estimate.	D	-	Transfer	Reflect in contract language and geotechnical baseline report.	Division 31 specifications, drawing notes, and GBR.	Retired 1/12/12
10	TUN	Unforeseen ground conditions beneath the Stockton Tunnel. - hard rock and / or fractured rock band - slows TBM	Additional investigation under the Stockton Street tunnel to confirm previous conclusion that the ground consists of highly fractured bedrock.	D	-	Transfer	Reflect in contract language and geotechnical baseline report.	Division 31 specifications, drawing notes, and GBR.	Retired 1/12/12
E	TUN	Underground obstructions tunnel and retrieval shaft	Include differing site conditions in GPs as well as DRB to adjudicate conflicts and minimize costs	C	5	Accept/ Transfer	Reflect in contract language and geotechnical baseline report.	Division 31 specifications, drawing notes, and GBR.	2/5/14 TUN1124
11	TUN	Buried valley beneath Stockton Street at Sacramento Street increases risk of settlement as TBM transitions from rock into soil. (old buildings and damage to façade more severe)	1. Probe and grout ahead of the TBM. 2. Secondary grouting, as needed. 3. Include above work in schedule and probable cost in estimate.	D	-	Transfer	Reflect in contract language and geotechnical baseline report.	Division 31 specifications, drawing notes, and GBR.	Retired 1/12/12
12	TUN	Uncertainty of Alluvium/Colma Contact with respect to tunnel crown beneath Stockton Street in Chinatown.	1. Perform additional site investigations. 2. Lower tunnel 25' to reduce uncertainty. 3. Reflect in contract language and geotechnical baseline report.	D	-	Transfer	Reflect in contract language and geotechnical baseline report.	Division 31 specifications, drawing notes, and GBR.	Retired 1/12/12
13	TUN	Damage / settlement 3x 5' to old brick sewer running parallel to tunnel alignment	Slip Line 3'x5' brick sewer before TBM reaches CTS.	C	1	Reduce/ Transfer	Still need to be sure contract language makes subsequent contractor responsible for damage.	Section 01 56 29.20	12/16/13 TUN1121
14	TUN	Excess settlement at break in to North Beach TBM Retrieval shaft due to low cover of alluvium.	1. Require ground treatment underneath utilities for TBM break in. 2. Include cost of ground treatment in cost estimate.	D	-	Reduce	Reflect in contract language.	Division 31 specifications and drawing notes.	Retired 1/12/12

APPENDIX D

PROJECT RISK ALLOCATION MATRIX

Central Subway Project San Francisco

REV : 19

DATE ISSUED : 03/14/13

Allocation - Avoid, Accept, Reduce, Transfer, Insure

Final Risk ID	Contract I.D	Risk Description	Mitigation Description	Risk Category	Rating	Risk Allocation	Assessment	Reference	Must Complete by Date
15	TUN	Major TBM machine failure	Closely monitor condition and maintenance of the machines.	C	2	Reduce/ Transfer	Require contractor to have maintenance plan, spare parts available, etc.	Division 31 specifications and drawing notes.	2/5/14 TUN1124
16	TUN	TBM loss and / or damaged in Transit	Provide provisions for insurance for TBM in transit to jobsite	C	5	Transfer	Contractor's insurance should cover the cost risk.	Verify insurance coverage is in place whether by contractor or OCIP.	5/20/13 TUN1095
17	TUN	Steep gradients result in accident and suspension or works	1. Require contractor Safety plan to address this risk. 2. CM inspections to ensure that safety plan and procedures are implemented. 3. Lower profile of tunnel from UMS to CTS	D	-	Transfer	Reflect in contract language.	Spec 01 35 29.10, Health & Safety	Retired 1/12/12
18	TUN	Market risk in single or re-bid in tunnel contract due to excess work in SF area	1. Engage in extensive contractor outreach and promote assurances of being a reasonable contract partner. 2. Invite contractor Industry Review comments. 3. Use Contract Terms and Conditions that are fair and reasonable to attract contractors to bid. 4. Provide quick alternative dispute resolution process, including obstruction clause and allowance for differing site conditions in contract documents.	M	-	Reduce	Contractor outreach efforts have increased awareness of the project. Inclusion of DRB has reduced risk to contractor.	-Spec 01 27 00.92 Dispute Review Board -GP Article 16 -GP Article 3.04	Retired 11/10/11
19	TUN	NFPA 101 approval to exceed 5% gradient at portal may not be approved (emergency stair wells would be required)	NFPA 101 does not apply to the Tunnel Portal.	R	-	Transfer			Retired 11/10/11
D	STS	Air Replenishment system Tunnels	1. Evaluate whether air replenishment system is required for Tunnels. 2. Include costs for system, if required.	D	-	Reduce	DP3 implementing concept approved by SFFD.	Approval of Variance to SFFD Bulletin 5.07	7/27/12 FDS 1940
114	TUN	Grout pipes for BART underpinning are too long and cannot be installed accurately from small shaft.	1. "Belling out" the bottom of the grout shaft on Ellis Street so that a larger directional drill rig can be utilized to more accurately install these grout pipes. 2. In addition, investigate the possibility of using the basement of the old Virgin Records Store (Block 328 Lot 002) for installation of grout pipes. 3. Investigate possibility of grouting from BART tunnel.	C	-	Avoid/ Transfer	Contractor is responsible for installation of grout pipes.	Reflected in drawing BP-127, Note 1	8/28/13 TUN1120
115	TUN	Jet grouted station end walls are installed by Tunnel contractor. Station Contractor assumes risk of possibly leakage problems due to insufficiently qualify of end walls.	1. In the 1252 contract, have tunnel contractor set aside a pre-determined amount of money in escrow that can be used to repair any leaks encountered by the station contractors after the in the jet grout end walls are excavated. 2. Alternatively, place an allowance in the station contracts for end wall leakage repair.	C	3	Transfer	Transfer cost of leak repair to Tunnel contractor using Warranties clause.	Spec 01 78 36, Warranties Spec 31 62 13.15 Secant and Tangent Pile Headwalls, 3.09 Spec 01 12 19 Contract Interface, 1.03	5/26/15 UMS1295
116	TUN	TBM procurement, delivery and assembly takes longer than assumed in schedule.	Accommodate delay to TBM procurement and delivery, on the order of 2 or 3 months, with current float shown on the construction schedule.	C	4	Accept	Contractor has entered into contract with TBM manufacturer with delivery date included.	Not used. TBM procurement on program critical path.	5/20/13 TUN1095
190	TUN	Tunnel haul routes longer than planned.	Include cost for 100 mile round trip haul to disposal site in Cost Estimate.	D	-	Transfer	Reflect in contract language.	Cost Estimate	Retired 3/8/12

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B	TUN	Storage and testing of excavated soils from tunnel limits advance rate of tunneling.	1. Provide adequate storage and handling facility to accommodate testing activity. 2. Work with SAR to develop acceptance criteria, to minimize or eliminate testing requirements. 3. Require the contractor to provide a detailed workplan for testing, sorting and stockpile prior to hauling.	C	6	Transfer	Reflect in contract language.	Spec 01 57 23 Management of Excavated Materials, 1.11, A.4.	2/5/14 TUN1124
R	TUN	Delay of Tunnel Contract NTP	Work with contractor and City Attorney to resolve outstanding issues.	C	-	Reduce	NTP 1 issued.	CN1252 NTP 1	Retired 2/9/2012
MOS Station									
20	TUN	Incomplete seal at TBM break in and break out at MOS station leads to excessive settlement	1. Slurry walls in addition to jet grout curtains will be installed at the north and south walls of the station by the tunneling contractor prior to arrival of first TBM at Moscone Station. 2. Include costs and schedules in estimates.	D	-	Avoid /Share	Reflect in contract language.	ES- Drawings Cost Estimate MPS	Retired 1/12/12
21	MOS	Incomplete cutoff of groundwater at MOS	1. Require additional grouting to limit leakage to permissible level. 2. Include probable grouting work in cost & schedule estimates.	C	1	Reduce/ Transfer	Jet grouting included in contract to cutoff groundwater.	ES- Drawings Cost Estimate MPS	4/28/15 MOS1150
22	MOS	Public complaints result in unanticipated restrictions on construction at MOS.	1. Public outreach. 2. Maintain regular and open communications so Public knows construction plans and progress at all times. 3. Require Contractor to assist Public Outreach efforts, maintain access to businesses and assist with deliveries and pick-ups, control noise and vibration, continuously cleanup site, and provide pedestrian and vehicle traffic and protection plans, informational signage, ADA ramps and minimum sidewalk widths. 4. Work with MOED to increase cleanup of the area and assist pedestrians across streets, as needed. 5. Monitor and enforce noise, vibration, ADA, traffic, and cleanup requirements. 6. Quickly process and resolve damage and accident claims from the Public. 7. Assumed this work in cost & schedule estimates.	C	1	Avoid/ Transfer	Public outreach is an on-going effort at the program level. Contractor is required to contribute to public outreach.	SP-6, B.	9/16/16 MOS1230
23	UTL	Time to relocate existing utilities at MOS (fiber optics - uty 1, large water main - uty 2),	1. Intensive utility coordination and investigation. 2. Relocate utilities out of the way of construction wherever possible. 3. Show utilities on reference plans. 4. Have utility contact information and procedure on plans. 5. Have contingency repair/restoration plans. 6. Include probable impacts to schedule & cost in estimates.	C	-	Reduce		Utility Relocation Contract 1 includes the 42" swer work as accepted by PUC. Document PUC's design acceptance. Include Division 1 specifications (01 56 29), Protection of Property.	9/14/12 N-TUN1035

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F	MOS	Underground obstructions Stations (MOS)	1. Provide adequate allowance for differing site conditions to address unknown underground obstructions. 2. Show field verified obstructions discovered during previous contracts on contract drawings. 3. Make as-built drawings of structures adjacent to the work available to the contractor as reference drawings.	C	8	Accept	Differing Site Conditions (DSC) will be paid for by contingency through change order process. Contract documents will show obstructions encountered in previous contracts. As-built drawings for adjacent buildings will be made available to bidders.	ES Drawings Spec 01 42 00 Reference	4/28/15 MOS1150
24	MOS	Buildings adjacent to Station are subject to combined tunnel and station excavation settlement. (Wolf building and college building)	1. Evaluate risk due to combined settlement to buildings along station. 2. Underpin two buildings and install tubámachettes for compensation grouting under other buildings at risk. 3. Monitor all buildings within the zone of influence of the excavation for settlement. 4. Require EPBM TBM, and Tunnel and Station contractors to demonstrate effective control of ground and correction of settlements by compensation grouting. 5. Require rigid concrete diaphragm ground support structure designed to ensure that adjacent structures are not affected by excavation. 6. Require contactors to have contingency repair/restoration plan. 7. Require repair of adverse impacts to be approved by a Structural Engineer. 8. Baseline the settlement after tunnels go thru and before MOS contractor starts. 9. Verify cumulative settlement that triggers mitigation actions. 10. Include probable cost in cost estimate.	D	2	Avoid/ Reduce	Will need to baseline the settlement after tunnels go thru and before MOS contractor starts. And verify cumulative settlement that triggers mitigation actions. Include contract language for grouting, excavation support design criteria, contingency plans, etc.	-Spec 31 09 15 Structural Instr. & Mon. 1.06, G. -Spec 31 09 13 Geotech. Instr. & Mon. 3.01, R.2.	4/28/15 MOS1150
25	MOS	Insufficient time in station schedule for fit out and finishes at MOS	Increase duration of activity..	D	-	Avoid/ Reduce	MPS to be evaluated prior to bid.	MPS	Retired 1/12/12
26	MOS	Mislocated Moscone Convention Center tiebacks. (angle v's position)	1. Review record drawings to locate. 2. Show probable location of tiebacks on reference plans. 3. Include allowance to locate and work around in contract documents and cost estimate.	D	-	Reduce/ Accept	Consider establishing a unit price allowance so that this potential impact is addressed before it happens.	ES Drawings DSC Clause	Retired 1/12/12

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27	MOS	Loss of business results in unanticipated restrictions on construction at MOS.	1. Public outreach. 2. Maintain regular and open communications so Merchants know construction plans and progress at all times. 3. Require Contractor to coordinate with merchants, maintain access to businesses and assist with deliveries and pick-ups, continuously cleanup site, and provide pedestrian and vehicle traffic and protection plans, informational signage, and minimum sidewalk widths. 4. Require barriers to protect pedestrians and shield them from noise and dirt from construction. 5. Work with MOEWD to increase cleanup of the area and assist pedestrians across streets. 6. Include this work in cost & schedule estimates.	C	2	Reduce/ Transfer	Include contract language for pedestrian barriers, cleanup, signage, etc.	SP-6, B. Division 1 Specs	4/28/15 MOS1150
177	MOS	Lack of staging area at MOS	1. Work with Traffic Engineer to identify staging area on street. 2. Include costs for staging area in cost estimate.	D	-	Mitigate/ Transfer	Staging areas included on street. Staging included in cost estimate.		Retired 5/24/12
M	MOS	Haul routes longer than planned at MOS	Include cost for 100 mile round trip haul to disposal site in Cost Estimate.	D	-	Mitigate/ Transfer	Costs for 100 mile round trip included in cost estimate.	Cost Estimate	Retired 3/8/12
C	MOS	Air Replenishment system at MOS stations	1. Evaluate whether air replenishment system is required for stations. 2. Include costs for system, if required.	D	-	Avoid/ Accept	SFFD has conditionally approved station air replenishment system.	SFFD Approval of CDs	Retired 3/8/12
UMS Station									
195	UMS	Constructability of design may cause redesign at UMS	1. Conduct constructability review. 2. Evaluate constructability review comment to evaluate whether redesign is warranted. 3. Incorporate recommendations through ECP procedure. 4. Evaluate cost and schedule impact.	D	-	Accept	Reflect in contract language.	Constructability Review Report	Retired 1/12/12
C	UMS	Air Replenishment system UMS station	1. Evaluate whether air replenishment system is required for stations. 2. Include costs for system, if required.	D	-	Avoid	SFFD has conditionally approved station air replenishment system.	SFFD Approval of CDs	Retired 3/8/12
F	UMS	Underground obstructions Stations (UMS)	1. Provide adequate allowance for differing site conditions to address unknown underground obstructions. 2. Show field verified obstructions discovered during previous contracts on contract drawings. 3. Make as-built drawings of structures adjacent to the work available to the contractor as reference drawings.	C	8	Accept	Differing Site Conditions (DSC) will be paid for by contingency through change order process. Contract documents will show obstructions encountered in previous contracts. As-built drawings for adjacent buildings will be made available to bidders.	ES Drawings Spec 01 42 00 Reference	8/12/15 UMS 1320
28	UMS	Incomplete cutoff of groundwater at UMS.	1. If needed, perform grouting to mitigate the intrusion of groundwater. 2. Include in cost & schedule estimates.	C	2	Reduce	Jet grouting included in contract to cutoff groundwater.	ES Drawings	8/12/15 UMS1320
29	UMS	Method and productivity for SEM excavation sequence proposed for Platform Cavern drifts at UMS more difficult than expected	Require experienced SEM Contractor, approved SEM procedures, and continuous SEM inspection. Require shotcrete, as needed. Include shotcrete & inspection costs in estimate.	C	-	Reduce	SEM not used at UMS.	N/A	Retired 11/10/11
30	UMS	Slow advance of platform cavern at UMS due to insufficiently experienced (SEM) labor.	Require demonstrated progress rates. Assumed learning curve in cost & schedule estimates.	C	-	Transfer	SEM not used at UMS.	N/A	Retired 11/10/11

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31	UMS	Limited number of NATM/SEM experienced contractors leads to delay in contract award and/or increase in bid prices at UMS.	Industry outreach with contractors, including international. Early education and polling of contractors. Invite contractors to review constructability of design.	M	-	Avoid	SEM not used at UMS.	N/A	Retired 11/10/11
32	UMS	Delay in advanced utility relocation delays ground treatment and start of construction. (Uty 2)	1. Intensive coordination with and commitment from utility owners. 2. Early completion incentive for utility relocation contract. 3. Enforce franchise agreements.	R	1	Reduce	Verify necessity of incentive based on available float.	Utility Coordination Meeting Minutes	7/31/12 N-ATT00100
33	UMS	Damage to utilities at UMS causes delay to construction and/or consequential cost. (very close to walls adjacent to relocated utility trenches)	1. Intensive utility coordination and investigation. 2. Relocate utilities out of the way of construction wherever possible. 3. Show utilities on reference plans. 4. Have utility contact information and procedure on plans. 5. Have contingency repair/restoration plans. 6. Include probable impacts to schedule & cost in estimates.	C	2	Avoid/ Reduce/ Transfer	Utility plans show existing and new utilities. Protection of Property spec transfers cost of damage to utilities to the contractor.	Spec 31 09 13 Geotech Instr. & Mon. Spec 01 76 29 Protection of Exisiting Property	7/19/16 UMS1410
34	UMS	Loss of business results in unanticipated restrictions on construction at UMS.	1. Public outreach. 2. Work closely with Merchant's Association. 3. Maintain regular and open communications so Merchants know construction plans and progress at all times. 4. Advertise that Stockton Street Merchants are Open for Business. 5. Require Contractor to coordinate with merchants, maintain access to businesses and assist with deliveries and pick-ups, continuously cleanup site, and provide pedestrian and vehicle traffic and protection plans, informational signage, and minimum sidewalk widths. 6. Require barriers to protect pedestrians and shield them from noise and dirt from construction. 7. Work with the Union Square BID or MOED to increase cleanup of the area and assist pedestrians across streets. 8. Include this work in cost & schedule estimates.	C	5	Reduce	Program has extensive public outreach effort. Contractor is required to provide signage for businesses. Contractor is required to provide access to all businesses during construction.	-Spec 01 56 10 Temporary Site Construction -Spec 01 55 00 Traffic Regulation -Bid Item Allowance 8	9/7/16 UMS1430
35	UMS	Ground support structure causes groundwater table to rise which results in leakage into adjacent structures.(new structure might create a dam that results into leaks into new and existing structures)	1. Perform detailed hydrogeologic modeling and analysis. 2. Monitor groundwater table at multiple locations and passive measures as necessary to mitigate. 3. Reference the Tech memo in contract documents. 4. Include probable costs in estimate.	C	1	Reduce/ Accept	Technical Memo determined leve of ground water rise was minimal.	Technical Memorandum UMS GROUNDWATER FLOW MODEL DEVELOPMENT AND RESULTS Revision 0 August 22, 2011	9/7/16 UMS1430
36	UMS	Damage to buildings or utilities as a result of heave from jet grouting at UMS.	Utilize tangent piles combined with surface jet grouting.	C	1	Reduce	Mitigation measures implemented in contract documents to reduce risk	-ES-Drawings -Jet Grouting Spec -Spec 31 32 13.29, 3.02.C.7 & 3.03.4.d	4/14/15 UMS1310

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37	UMS	Damage to adjacent buildings at UMS due to surface construction activities.	1. Require protective barriers. 2. Have an emergency and rapid response customer focused task force to fix damaged facilities. 3. Quickly repair and reimburse resulting costs. 4. Include probable cost in estimate.	C	1	Transfer	This is potentially an insurance issue unless the plan is to self insure. If self insured, then quick repair and reimbursement is feasible. If through insurance, the focus needs to be on expediting and tracking the insurance claims/reimbursement.	Spec 01 76 29 Protection of Exisiting Property	9/7/16 UMS1430
38	UMS	Tiebacks in Stockton Street mislocated (in path of walls and would have to be dug out within 20ft of surface level)'	1. Direct contractor to dig out the tiebacks on the plans. 2. Include allowance and differing site conditions clause in contract. 3. Include this work in the cost and schedule estimates.	C	3	Accept	Allowance for differing site conditions and differing site conditions clause included in contract.	No allowance include in contract. DSC costs covered as Allocated Contingency.	5/6/14 UMS1170
K	UMS	Repairs to buildings, utilities, when the settlement limits are not exceeded at UMS	1. Perform preconstruction survey of all properties. 2. Perform pressure tests on lines prior to construction. 3. Continuously monitor utilities during construction to detect leaks. 4. Include allowance in contract documents 5. Include probable costs in cost estimates	C	-	Accept	Allowance for repair of Group B utilites included in contract.	Allowance Item 4	Retired 5/24/12
I	UMS	Union Square Garage structural concerns. Many cracks exist, no control joints obvious signs of past expansions and support work.	1. Require construction of shear walls within USG before demolition. 2. Add tie backs to existing south wall of USG. 3. Add requirements in instrumentation spec to minimize movement during demolition. 4. Add additional cost to minimize cracking of existing structure during demolition and construction of station entrance at USG	D	-	Reduce/ Transfer	Reflect in contract language.	-Spec 31 09 15 Struct. Instr. & Mon., Group B building -ST Drawings	Retired 1/12/12
39	UMS	Modifications to Ellis Street Garage could trigger seismic retrofit.	The Department of Building Inspection accepted the proposed retrofit modifications to the Ellis Street garage proposed by the consultant team.	C	-	Reduce/ Transfer	Will need to baseline the settlement after tunnels go thru and before MOS contractor starts. And verify cumulative settlement that triggers mitigation actions. Include contract language for grouting, excavation support design criteria, contingency plans, etc.	No modifications at Ellis Street Garage	Retired 11/10/11

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40	UMS	Buildings adjacent to UMS station are subject to combined tunnel and station excavation settlement. (more sensitive structures)	1. Evaluate risk due to combined settlement to buildings along station. 2. Install tubámachettes for compensation grouting under Virgin Records building. 3. Monitor all buildings within the zone of influence of the excavation for settlement. 4. Require EPBM TBM, and Tunnel and Station contractors to demonstrate effective control of ground and correction of settlements by compensation grouting. 5. Require rigid concrete diaphragm ground support structure designed to ensure that adjacent structures are not affected by excavation. 6. Require contractors to have contingency repair/restoration plan. 7. Require repair of adverse impacts to be approved by a Structural Engineer. 8. Baseline the settlement after tunnels go thru and before UMS contractor starts. 9. And verify cumulative settlement that triggers mitigation actions. 10. Include probable cost in cost estimate.	D	-	Reduce/ Transfer	Will need to baseline the settlement after tunnels go thru and before MOS contractor starts. And verify cumulative settlement that triggers mitigation actions. Include contract language for grouting, excavation support design criteria, contingency plans, etc.	-Spec 31 09 15 Structural Instr. & Mon., section 3.01 C.1 -Spec 31 43 14 Compensation Grouting, section 3.05 B.	Retired 1/12/12
41	UMS	Secant pile walls may prove more expensive and / or take longer to install than expected (walls on incline)	Investigate other forms of types of pile wall to reduce costs.	D	-	Avoid	UMS design of primary ground support include tangent pile construction for platform section of station to avoid risk to cost and schedule.	ES Drawings	Retired 1/12/12
42	UMS	Insufficient space in UMS station to house equipment	Verify that the space provided is adequate for specified equipment.	D	-	Reduce		AR Drawings	Retired 1/12/12
43	UMS	Insufficient time in station schedule for fit out and finishes at UMS	Increase duration of activity.	D	-	Reduce	MPS shows longer duration for this activity	MPS	Retired 1/12/12
44	UMS	BART impose additional constraints and / or take longer to approve FD submissions (for connection) than planned delaying completion of design	Resume intensive meetings with BART at the commencement of Final Design.	R	-	Reduce		MOU with BART	Retired 5/24/12
45	UMS	Market risk - few bidders (less than 3 bonefied bids) for UMS station	1. Engage in extensive contractor outreach and promote assurances of being a reasonable contract partner. 2. Invite contractor Industry Review comments. 3. Use Contract Terms and Conditions that are fair and reasonable to attract contractors to bid. 4. Provide quick alternative dispute resolution process, including obstruction clause and allowance for differing site conditions in contract documents.	M	4	Reduce	Contractor outreach ongoing	Contractor Outreach Plan	10/30/12 FDS1692
138/197	UMS	Lack of staging area at UMS	1. Work with Traffic Engineer to identify staging area on street. 2. Investigate using Union Square as staging area. 3. Include costs for staging area in cost estimate.	D	-	Reduce	Additional staging areas identified on street during construction.	TR Drawings	Retired 5/24/12
N	UMS	Haul routes longer than planned at UMS	Include cost for 100 mile round trip haul to disposal site in Cost Estimate.	D	-	Transfer	Contractor responsible for handling and disposal of spoils.	Cost Estimate	Retired 1/12/12

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L	GEN	BART delays to apple entrance	Negotiate agreement with BART for use of Apple entrance for UMS station.	R	-	Reduce	BART to transfer ownership of entrance to SFMTA.	Transfer Agreement with BART	Retired 1/12/12
J	UMS	Macy's entrance conflict with new piles	1. Show known obstructions shown on as-built drawings on contract drawings. 2. Make as-built drawings available to contractor as reference drawings. 3. Have contractor field verify obstruction shown on as-built drawings and contract drawings	C	3	Transfer	Recover costs for removing temporary sheet piling in conflict with station from Macy's.	ES-Drawings	1/23/14 UMS1060
Q	UMS	As-built drawings and UMS construction drawings do not contain enough information to produce shop drawings without significant surveying effort delaying construction north entrance.	1. Investigate if electronic files of design can be given to the contractor. 2. Clearly define shop drawing criteria in the technical specifications. 3. Make as-built drawings available as reference drawings to the contractor	C	3	Reduce/ Transfer	Structural Steel specification requires contractor to survey USG to produce shop drawings.	Spec 05 17 00 Structural Steel	3/24/12 UMS1280
CTS Station									
46	CTS	Public complaints result in unanticipated restrictions on construction at CTS. (schedule and estimate for underground work assumes 6 day work week and 2 shifts per day)	1. Public outreach. 2. Maintain regular and open communications so Public knows construction plans and progress at all times. 3. Require Contractor to assist Public Outreach efforts, maintain access to businesses and assist with deliveries and pick-ups, control noise and vibration, continuously cleanup site, and provide pedestrian and vehicle traffic and protection plans, informational signage, ADA ramps and minimum sidewalk widths. 4. Require barriers to protect pedestrians and shield them from noise and dirt from construction. 5. Work with MOED to increase cleanup of the area and assist pedestrians across streets, as needed. 6. Monitor and enforce noise, vibration, ADA, traffic, and cleanup requirements. 7. Quickly process and resolve damage and accident claims from the Public. 8. Include this work in cost & schedule estimates.	C	6	Reduce/ Transfer	Program has extensive public outreach effort. Contractor is required to provide signage for businesses. Contractor is required to provide access to all businesses during construction.	-Public Outreach meetings during construction. -SP-6.B	10/9/17 CTS1500
47	CTS	Revisions to the SEM sequence during construction at CTS, which differ from the plan, could lead to significant delays if not sufficiently pre-planned.	1. Revisit sequence strategy during FD. 2. Address change through flexible bid schedule. 3. Utilize contractor pre-qualification: 4. Require experienced SEM Contractor, approved SEM procedures, and continuous SEM inspection. 5. Provide attractive T + C's (e.g. differing site conditions) Conduct peer review for FD 6. Provide performance incentives including crew incentives for production. 7. Require shotcrete, as needed. Include shotcrete & inspection costs in estimate. 8. Include language on drawing or in specification that allocates all risk to the contractor for change in sequence.	D	-	Accept/ Transfer	Flexible bid schedule (tool box bid items) added to contract to accept the costs associated with additional support that might be required to prevent settlement. Risk of delay for change of sequence will be transferred to the contractor.	Bid schedule ES drawings	4/22/16 N-CTS9730

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48	CTS	Incomplete drawdown of groundwater. (inside of box and inside of caverns)	1. Require additional grouting to limit leakage to permissible level. 2. Include probable grouting work in cost & schedule estimates. 3. Include allowance for dewatering within cavern during construction.	C	3	Transfer	Jet grouting include in contract language.	-Spec 01 20 00 Payment, Section 1.04, C.9. -Allowance Item 12 - Permeation Grouting -Bid Item TB-14, Drilled Gravity Dewatering Pipes	5/1/16 CTS1140
49	CTS	Market risk - few SEM qualified bidders (less than 3 bonefide bids) for CTS contract resulting in higher costs than planned.	1. Develop a Contractor Outreach Plan: 2. Engage in extensive contractor outreach and promote assurances of being a reasonable contract partner. 3. Invite contractor Industry Review comments. 4. Use Contract Terms and Conditions that are fair and reasonable to attract contractors to bid. 5. Use the SFPUC T&C's as a guide. 6. Provide quick alternative dispute resolution process, including obstruction clause and allowance for differing site conditions in contract documents. 7. Website	M	4	Reduce	Contractor outreach ongoing	-\\Cs2sa001\ncsm544.1\Presentation-PowerPoints\10-09-29 Tunneling Conference -\\Cs2sa001\ncsm544.1\Presentation-PowerPoints\11-01-11 Prime Sub Conference	8/29/12 FDS1792
195	UMS	Constructability of design may cause redesign at UMS	1. Conduct constructability review. 2. Evaluate constructability review comment to evaluate whether redesign is warranted. 3. Incorporate recommendations through ECP procedure. 4. Evaluate cost and schedule impact.	D	-	Mitigate		UMS Constructability Review Report	Retired 1/12/12
50	CTS	CTS station contractor delayed by tunnel contractor since station platform construction cannot start until tunnels have been finished.	1. Include provisions in CTS contract identifying the potential waiting period for tunnel contractor. 2. Actively monitor progress towards schedule milestones	C	3	Reduce/ Transfer	Can also put a date range in the station contract that the station contractor has to allow for. Tunnel contract transfers risk of delay to tunnel contractor through liquidated damages if milestones not met.	-Spec 01 11 00 Summary of Work, Sec 1.04, D -Spec 01 12 17 Work Seq. & Cnstr., Sec 1.04, B -Spec 01 12 19 Contract Interface, Secs 1.03 & 1.04	12/16/13 TUN1122

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51	CTS	Buildings adjacent to CTS station are subject to combined tunnel and station excavation settlement. (Mandarin Tower less so than other masonry buildings)	1. Evaluate risk due to combined settlement to buildings along station. 2. Install tubámachettes for compensation grouting under buildings at risk. 3. Monitor all buildings within the zone of influence of the excavation for settlement. 4. Require EPBM TBM, and Tunnel and Station Contractors to demonstrate effective control of ground and correction of settlements by compensation grouting. 5. Require continuous inspection of ground support system during excavation to ensure that settlements are limited. . 6. Require contractor to have contingency repair/restoration plan. 7. Repair of adverse impacts will have to be approved by a Structural Engineer. 8. Include probable cost in cost estimate. 9. Baseline the settlement after tunnels go thru and before CTS contractor starts. 10. And verify cumulative settlement that triggers mitigation actions.	D	-	Reduce/ Transfer	Will need to baseline the settlement after tunnels go thru and before MOS contractor starts. And verify cumulative settlement that triggers mitigation actions. Include contract language for grouting, excavation support design criteria, contingency plans, etc.	-Spec 31 09 15 Structural Instr. & Mon., section 3.01 C.1 -Spce 31 43 14 Compensation Grouting, section 3.05 B.	Retired 1/12/12
52	CTS	Unacceptable settlement and impact on major utilities at CTS. (OLD SEWERS AND OTHERS WITHIN 20FT SPACE BETWEEN TOP OF CAVERN AND STREET LEVEL)	1. Evaluate effect of potential settlement on utilities. 2. Slip-line sewer by TBM contractor. 3. Reinforce other utilities as needed, monitored during construction, and repair / replace, as needed. 4. Have contingency repair/restoration plan. 5. Utility contact information and procedure will be on plans. 6. Develop an allowance for utility repair. 7. Include probable cost in estimate.	C	6	Reduce/ Transfer	Settlement impact on utilities is addressed through replacement and monitoring during construction.	-Spec 31 09 15 Structural Instr. & Mon. -Spec 01 76 29 Protection of Existing Property -Submittals.	4/22/16 N-CTS9730
53	CTS	Insufficient space in CTS station to house equipment	Consultant team has been and will continue to verify that the space provided is adequate for specified equipment.	R	-	Reduce	Space is available for all necessary equipment.	AR Drawings	Retired 11/10/11
54	CTS	Insufficient time in station schedule for fit out and finishes at CTS	Increase duration of activity.	D	-	Reduce	Schedule has been vetted by project team.	MPS	Retired 3/8/12
55	CTS	Proximity at junction of head house boundary wall and school yard may result in relocation of school yard during wall construction	Modify project configuration to eliminate any encroachment, or relocation, of the school play area.	R	-	Avoid		ES Drawings	Retired 1/12/12
F	CTS	Underground obstructions stations (CTS)	1. Provide adequate allowance for differing site conditions to address unknown underground obstructions. 2. Make as-built drawings of structures adjacent to the work available to the contractor as reference drawings	C	8	Accept	Allowance for differing site conditions and differing site conditions clause included in contract.	Allocated Contingency to be used for DSC.	10/9/17 CTS1500
C	CTS	Air Replenishment system Stations (CTS)	1. Evaluate whether air replenishment system is required for stations. 2. Include costs for system, if required.	D	-	Avoid	SFFD requirements will be included in contracts.	SFFD Approval of DBI Permits for stations	Retired 3/8/12

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120	CTS	Geologists identify hard sandstone that could impact pipe canopy installation and other activities.	1. Perform additional boring in several locations in the vicinity of revised station configuration to best determine subsurface geologic profile. 2. Include information in GBR for contract documents	D	-	Transfer	GBR identifies ground conditions expected during tunneling.	GBR	Retired 1/12/12
121	CTS	Resolution of travel time issue from surface to CTS station platform for customers.	Reconfigure station layout to eliminate any additional travel time issues related to station platform to surface	D	-	Avoid	Design criteria will be satisfied.		Retired 12/15/10
122	CTS	Impact on Washington Street of the new headhouse design, Need to itemize all impacts and see if they are consistent with the SEIR. School bus access on Washington Street during construction	1. Reconfigure station layout to not create any new impacts, or increase magnitude of impacts currently identified in the SEIR 2. Include routing that is acceptable to SFUSD and prepare traffic control scenarios in contract drawings. 3. Develop primary mitigation to allow closure of Washington Street.	R	-	Avoid	Design is consistent with SEIR. Traffic routing approved by school principal.	-ES Drawings -TR Drawings -CS Drawings	Retired 1/12/12
G	CTS	Closure on Washington Street	Develop primary mitigation to allow closure of Washington Street.	R	-	Reduce	Traffic plans show closure of Washington Street.	TR Drawings	Retired 1/12/12
167-9	CTS	Lack of staging area at CTS	1. Work with Traffic Engineer to identify staging area on street. 2. Include costs for staging area in cost estimate.	D	-	Reduce	Risk reduced by adding staging areas on street. Staging included in cost estimate.	-TR Drawings -Cost Estimate	Retired 5/24/12
U	CTS	Proximity at junction of head house boundary wall and school yard may result in relocation of school yard during wall construction	0	C	1	Reduce			8/16/13 CTS1010
170/192	CTS	Haul routes longer than planned at CTS	Include cost for 100 mile round trip haul to disposal site in Cost Estimate.	D	-	Accept	Costs for 100 mile round trip included in cost estimate.	Cost Estimate	Retired 3/8/12
General									
56	GEN	Escalation more / less than expected (Increase in bid prices to hedge possible increases in cost of volatile commodities.)	1. In the current economic environment, escalation is just as likely to be less as more than anticipated. 2. For volatile materials and equipment, provide substantial payment for stored materials and equipment to encourage early procurement and an escalation clause for volatile commodities in contracts.	M	3	Transfer	Contractor will be responsible for any escalation of materials and equipment.	Not used because current market projections do not warrant escalation clause.	1/10/18 STS1042
Demolition, Clearing , Earthwork									

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57	MOS/CT	The process of acquiring property: acquisition/condemnation and relocation of tenants could significantly delay schedule beyond that presently planned.	1. Develop a real estate schedule. The schedule must be of sufficient detail and be agreed by project participants to identify key activity due dates. 2. Complete appraisals 3. PM/CM to provide relocation specialists to facilitate 4. Develop tenant relocation options including schedule and cost implications. 5. Engage Owners in negotiations as soon as possible to obtain and vacate property prior to demolition. 6. Draft Tenant Relocation Plan to be completed by 1/31/10.	R	4	Reduce	Possession of property expected 5/25/12, which will allow work to proceed.	-Possession/Right of Entry -90/30 Day Notices	6/6/12 FDS 1786
Site Utilities, Utility relocations									
58	UTL	Delay in vacation and interference with existing building services of sub-sidewalk basements delays utility relocations.	1. Send out NOI to property owners. 2. Send letter identifying course of action to owners and dates for completion. 3. Gather legal documents from DBI showing revocation status. 4. Engage Owners in negotiations as soon as possible. 5. Obtain assistance from PM/CM and Utility Designer to facilitate. 6. Provide design, permit expediting, and construction assistance to building owners.	R	-	Reduce	CN1250 complete and CN1251 expected completion in May 2012. Nuisance process has been instituted to reduce the risk.	-Notice to Vacate to each affected property -Nuisance Letters to uncooperative owners	Retired 5/24/12
59	UTL	Insufficient time in schedule to complete IGA's (joint utility trench issues) to meet relocation schedule (Agency resources etc)	1. Continue negotiations utility owners. 2. Obtain assistance from PM/CM and Utility Designer to facilitate. 3. PM/CM and utility designer to provide assistance to utility owners.	R	-	Reduce	Risk reduced by close coordination with utility agencies.	Utility Coordination Meetings	Retired 1/12/12
60	UTL	Utility companies do not complete relocations in timely manner. (UTY 1 and UTY 2)	1. Continue negotiations with utility owners. 2. PM/CM will assist utilities with access and to schedule their work. 3. Require Utility Relocation contractor to provide assistance to utilities. 4. Include in contract allowance for Contractor to assist Utilities and incentive for early completion. 5. Enforce franchise requirements.	C	-	Reduce	All utilities expected to be cutover by July 2012.	Utility Coordination Meetings	6/31/12 N-ATT00100
61	UTL	Utility relocation is delayed due to non-standard materials not being available. (UTY 1 and UTY 2) AWSS special material ?	Work with utilities and contractor to identify and acquire non-standard materials well in advance of time that they are needed.	C	-	Reduce	All AWSS work on CN1250 & CN1251 has been completed	Progress meetings	

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A	STS	Timely resolution of Sewer lines south of portal.	1. Develop alternatives that do not require creation of a new sewer line. 2. Work together with SFPUC to find mutually beneficial solutions. . 3. Provide evidence of solutions developed for similar situations from existing SFMTA and /or other transit agencies. 4. Develop detailed schedule of activities required for resolution including milestones for go - no go actions which will not impact the overall MPS.	R	2	Reduce	Close coordination with SFPUC will reduce the risk of delay to the program.	MOU with SFPUC	5/13/12 PDS 1870
Hazmat, Contaminated Material									
62	CTS	Hazardous materials during building demolition. (China Town)	Provide hazardous material procedure and bid item for removal and disposal.	D	-	Accept	Obtain hazmat survey has identified expected haz mat. Costs and procedure for handling are include in contract documents.	-Phase 1 ESA -Allowance	Retired 4/12/12
63	GEN	Hazardous materials in soils during excavation.	Provide hazardous material procedure and bid item for removal and disposal.	R	-	Accept	Soils will be pre-classified prior to bidding or classified at beginning of construction.	Bid item and Spec	Retired 5/24/12
64	MOS	Environmental remediation at 76 Gas station underestimated.	1. Conduct Phase II site investigation to confirm that the existing ground has been remediated. 2. Monitor during construction to verify.	R	-	Avoid	Phase 2 ESA completed. Remediation costs will be devaluated from offer for property.	Phase 2 ESA	Retired 3/8/12
Environmental Mitigations									
65	TUN	Archeological/Cultural findings during construction increases schedule and/or cost. (Portal) AROUND 10%	1. Provide on-call Archeologist. 2. Provide allowance and procedure in contract for Archeological/Cultural discoveries.	C	2	Accept	Will need to include archeological/cultural language in construction contract. Assuming SFMTA provides on-call Archeologist.	Special Provisions	10/24/12 TUN1080
66	MOS	Archeological/Cultural findings during construction increases schedule and/or cost.(Moscone) AROUND 10%	1. Provide on-call Archeologist. 2. Provide allowance and procedure in contract for Archeological/Cultural discoveries.	C	3	Accept	Will need to include archeological/cultural language in construction contract. Assuming SFMTA provides on-call Archeologist.	Special Provisions	4/28/15 TUN1150
67	UMS	Archeological/Cultural findings during construction increases schedule and/or cost. (UMS)…LESS THAN 1%	1. Provide on-call Archeologist. 2. Provide allowance and procedure in contract for Archeological/Cultural discoveries.	C	5	Accept	Will need to include archeological/cultural language in construction contract. Assuming SFMTA provides on-call Archeologist.	Special Provisions	8/12/15 UMS1320
68	CTS	Archeological/Cultural findings during construction increases schedule and/or cost. (CHINA TOWN) …AROUND 10%	1. Provide on-call Archeologist. 2. Provide allowance and procedure in contract for Archeological/Cultural discoveries.	C	5	Accept	Will need to include archeological/cultural language in construction contract. Assuming SFMTA provides on-call Archeologist.	Special Provisions	10/9/17 CTS1500
69	CTS	Historic preservation requirements for 933-949 Stockton.	1. Retain Historic Preservation Architect. 2. Perform Historic Architectural Building Survey/Historic Engineering Record Documentation. 3. Identify details of the facade to be preserved and their disposition and obtain concurrence of the City's Historic Preservation Officer. 4. Include cost to reuse in the station.	R	-	Accept	Display case will be installed in CTS station to record historically important items from the building.	Special Provisions	Retired 5/24/12
Auto/bus/van access ways, roads									
70	GEN	Change in traffic control requirements after bid.	1. Provide unit bid items to reimburse contractor for traffic management costs outside their control. 2. Include allowance in construction contracts for PCOs.	C	8	Accept		-Allowance for PCOs -PCOs provided at program level	5/22/17 STS1020

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71	TUN	Power supply interruptions to TBM's (no dual power feed currently planned)	Obtain TBM power directly from PG&E substation.	C	1	Accept	TBM power is delivered from Mission Substation at 8th & Mission Streets.		2/5/14 TUN1124
72	STS	Interface new Signaling and Train Control system to existing at Fourth and King	Connect new system in parallel with existing system until the new system has been tested and safety certified for operation.	C	5	Reduce	Parallel system is being implemented in the Systems contract.	-Start-up & Testing Plan Requirements -Start-up Spec (Division 1) -Cutover Plan Approval	3/4/16 STS1045
73	STS	Integration of new equipment at Transportation Management Center (TMC) at 1455 Market Street with existing equipment at Lenox OCC.	Connect new system in parallel with existing system until the new system has been tested and safety certified for operation.	D	-	Reduce	This risk reduced by closely coordinating the work with SFMTA Operations.	Start-up & Testing Plan Requirements	Retired 1/12/12
74	STS	Insufficient time in schedule for testing and commissioning S&C	Extend duration of activity.	R	-	Reduce	This risk reduced by extending the duration of the activity.	MPS	5/30/12 DP3C530
75	STS	Signals and Comms equipment may need to be stored off site	Require contractor to store equipment offsite or at the factory until it is needed.	C	2	Transfer	Contractor is responsible for equipment until it is accepted by the owner.	Special Provisions	11/6/17 STS1070
Traffic signals & Crossing Protn.									
76	GEN	CS system may need re-design to new system (not yet identified - Coordinating with SFMTA Accessible Services on the wayfinding system for the visually impaired.)	Include new Landmarking/Wayfinding system requirements into stations.	D	-	Accept	Any additional system requirements will be included as a contract modification.		7/27/12 FDS 1940
Fare Collections Systems									
77	STS	Translink behind schedule and fare system not available at ROD.	Translink is already under test on all Muni vehicles and at all Muni Stations. Muni Fare Inspectors already are equipped with Translink readers.	S	-	Avoid	Risk avoided.	N/A	Retired 11/10/11
78	GEN	Current scope defines Lenox as point of connection - a late change of differing location would cause redesign and additional costs -Location of Operation Central Control (OCC) and coordination with OCC project.	1. Combine SFMTA Systems and Systems Integration into one group reporting directly to the Deputy Director of TP&D to coordinate these projects. 2. The project will also provide assistance to the OCC project during Final Design to resolve any open issues.	R	-	Reduce	Close coordination with SFMTA will reduce the cost and schedule risk to the program.	100% STS Plans & Specs	Retired 1/12/12
Purchase or lease of Real Estate									
79	TUN	Delay in obtaining tunnel easements (3 #) (goes to condemnation) - Costs of ROW may cost more than expected	1. Engage Owners in negotiations as soon as possible. 2. PM/CM to provide real estate specialists to facilitate.	R	1	Reduce	All tunnel easement will be in possession before tunneling beneath properties begins.	Owner coordination meetings	9/7/2012
80	MOS	Delay in obtaining access to Moscone station sites (goes to condemnation).	1. Assure that adequate float is contained in the Moscone schedule for condemnation. 2. Engage Owners in negotiations as soon as possible. 3. PM/CM to provide real estate specialists to facilitate.	R	-	Reduce	Right of Possession for Moscone site is expected May 25, 2012.	Notice to Vacate for Possession	7/1/12 FDS 1240
81	GEN	Additional ROW requirements	1. Identify additional ROW. 2. Engage owners as soon as possible to acquire property. 3. Include costs in cost estimate.	R	-	Reduce	No additional ROW anticipated at this time.	Contingency	Retired 1/12/12
82	GEN	ROW issues may impact Vent Shafts and / or stair locations	Adjust project configuration to address risk	R	-	Avoid/ Reduce	Project design avoids ROW issues. All ROW need has been identified.	Project Design	Retired 1/12/12
PR79	UMS	Parking Garage appraised higher than anticipated.	Provide adequate contingency for potential higher costs	M	-	Accept		Independent review of appraisal	7/1/12 FDS 1240

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PR80	GEN	ROW costs higher than anticipated.	Provide adequate contingency for potential higher costs	M	2	Accept		Cost Estimate Allocated Contingency	7/1/12 FDS 1240
Vehicles									
83	GEN	Cost of vehicles may be more than estimated due to sole source and small order	Time the procurement of the vehicles to be part of the procurement of the existing Breda LRVs.	R	16	Reduce	Procurement of four CS LRVs to be included in a larger vehicle procurement to reduce the costs of small order.	SFMTA Vehicle Procurement Contract	11/17/17 STS 1500
84	GEN	More vehicles may be required than estimated	Confirm that the current number of vehicles required for 2030 service does not change w/wo the Very Short Line.	R	-	Accept	No additional vehicles than estimated required.	Fleet Report	Retired 2/9/2012
Preliminary Engineering									
86	TUN	Obtain FTA approval of a Letter of No Prejudice (LONP) to construct the TBM Launch Box Portal Structure, complete the Temporary Trolley Re-route, and incur associated construction management costs for these items.	1. Validate cost, schedule and budget impacts (Done) 2. Complete and submit request to enter Final Design (FD) and for LONP and supporting documentation (Done). 3. Address any questions that FTA may have with the requests to enter FD and for the LONP (Done). 4. Work with FTA to justify the benefits of the LONP. 5. Keep the SFMTA Board informed of LONP status: • Brief Board on continuous basis • Brief Board on Letter Requesting LONP • Brief Board after obtaining FTA LONP • Brief Board at time of request to advertise Tunnel contract	D	-	Reduce	TBMs ordered, launch box under construction, trolley reroute completed.	Approved LONP	Retired 2/9/2012
87	GEN	Insufficient design and processes in place to achieve project readiness to request entry into FD (October 2009)	Only two items remain to be submitted on the Checklist for Entry to Final Design.	R	-	Reduce	Implement design and processes to achieve project readiness and reduce this risk.	Request Entry to Final Design	Retired 10/13/11
4									
88	GEN	Bid protest delays award and NTP for Final Design.	Strictly adhere to Procurement Best Practices and Protest Procedures.	M	-	Reduce	Reduce risk by enforcing contract procurement requirements.	NTP for Final Design	Retired 11/10/11
89	GEN	3rd Party reviews of Design documents delays completion of Final Design.	Provide assistance to 3rd Parties to facilitate their reviews and obtain concurrent partial approval for underground work.	D	2	Reduce	Reduce risk of delay by closely coordinating with 3rd parties.	3rd Party Coordination meeting minutes	5/23/12 FDS 1930
90	GEN	Multiple outside design consultants & mix of SFMTA / City could result in delays and additional costs due to complexities in design coordination	Conduct regular coordination meeting, integration meetings, interdiscipline meeting, design oversight reviews and partnering to encourage and promote a positive work environment.	D	-	Reduce	Reduce risk by implementing options in design contracts to keep design delivery on schedule.	-Coordination meeting minutes -DP3 options (consultant design for City-planned work)	5/23/12 FDS 1930

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91	GEN	Obtain prompt approval of FTA Full Funding Grant Agreement (FFGA).	1. Final Design of 100% Tunneling and 65% Stations contracts. 2. Determine cost, schedule and budget impacts of 65% Final Design of Stations and 100% tunnels contracts. 3. SFMTA approval of FFGA application. 4. Complete and submit request FFGA and supporting documentation. 5. Assist FTA to promptly complete Technical and Financial Capacity Review and Risk Analysis updates. 6. Work with FTA at both the Regional and National levels to address any questions with regard to the FFGA request. 7. Work with Congress to address any questions with regard to the FFGA request.	R	-	Reduce	Reduce risk by addressing all FTA comments in a timely manner. All FFGA documentation submitted to FTA.	FFGA Application	1/23/12 HldPt1C
S	GEN	Delay of station design submittals	Work with designers, cost estimator and scheduler to complete design	D	-	Reduce	All station submittals were delivered on schedule.	100% Station Contract Documents	Retired 3/8/12
Project Management for Design and Construction									
92	GEN	Additional construction contracts (over current proposed 7) resulting in multiple contractor interfaces and the potential for increased contractor conflicts/delays and management costs.	Maintain current strategy of two Utility and five Construction contracts. Strategy has survived SBE reviews to date.	C	-	Reduce	Reduce risk by maintaining 7 construction contracts.	DP1, DP2, DP3	Retired 1/12/12
93	GEN	Reduction of current strategy of 4 major civil contracts result in too large for reasonable economic competition (opposite to risk #100)	Package individual contracts to attract bidders. Ensure that contracts are large enough to attract qualified bidders, but not too large to limit competition. Keep Contract packages to $250 million or below.	R	-	Reduce	Reduce risk by maintaining 4 major civil contracts.	TUN, CTS, UMS, MOS Construction Documents	Retired 11/10/11
94	GEN	Bid protests delay award and NTP for construction contracts	Strictly adhere to Procurement Best Practices and Protest Procedures.	M	2	Reduce	Reduce risk by enforcing contract procurement requirements.	General Provisions	2/19/13 FDS 1900
95	GEN	Contractor default during construction impacts schedule. (key sub-contractor)	Assist Bonding company in transition and to maintain schedule.	C	2	Reduce			11/17/17 STS 1500
96	GEN	Re-bid due to bid prices exceeding budget (by well over 10%) delays award of a contract or contracts. (negotiation with lowest bidder not possible)	1. Engage in contractor outreach and promote assurances of being a reasonable contract partner. 2. Use Contract Terms and Conditions that are fair and reasonable to attract contractors to bid. 3. For volatile materials & equipment provide substantial payment for stored materials and equipment and an escalation clause in contracts. 4. Provide quick alternative dispute resolution process, including obstruction clause and allowance for differing site conditions in contract documents. 5. Incorporate provision to allow negotiated price if bid exceeds 10% of the Engineer's estimate.	M	8	Accept	Bidding environment appears to be favorable. DBR and partnering clauses added to contract to attract bidders.	-Spec 01 27 00.92 Dispute Review Board -GP, Article 16	Retired 5/24/12

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97	GEN	Conflicts arising from Contractors working concurrently in the same work space results in delays and claims for additional costs (systems / civil interface)	Limit the number of contractors working in the same workspace by scheduling contracts appropriately and demobilizing contractors upon substantial completion.	C	5	Reduce		-MPS -Milestones in SPs -Div 1 Contract Interface	11/17/17 STS 1500
98	GEN	Unqualified Contractors submit bids below reasonable market expectations	Establish and enforce appropriate qualifications requirement for contractors to be deemed a responsible bidder.	M	5	Reduce	Reduce risk by specifying and enforcing bidder qualifications.	Spec 01 45 13 Bidder's Qualifications	12/18/12 FDS 1275
99	GEN	Breakdown in relationships between SFMTA and Contractors during construction results in increased claims and delays to the overall construction schedule.	1. Executive partnering and alternate dispute resolution. 2. Provide incentives in construction contracts in addition to penalties	C	8	Reduce	Reduce risk by allowing DRB and partnering.	-Spec 01 27 00.92 Dispute Review Board -GP, Article 16 -GP 3.04	7/27/12 FDS 1940
100	GEN	Procurement of long lead items delays work. (fans, rails and special track work, TPSS, Escalators, elevators, TBM)	1. Include schedule milestones for procurement of and substantial payment for stored long lead items in contract to encourage early procurement. 2. Monitor procurement of critical items.	M	2	Reduce/ Transfer	Duration of contracts sufficiently long to allow procurement of all items without delaying schedule.	MPS	11/17/17 STS 1500
101	GEN	More expensive staffing costs as a result of attracting labor into the expensive cost of living in San Francisco	Professional Services estimate has been revised to reflect cost in San Francisco.	M	-	Accept	All PSC have been awarded.	PSC Contracts	Retired 12/15/11
102	GEN	Late finish of early contract delays later contracts and extends PM / CM and incurs additional costs	1. Actively manage contracts and include incentive provisions for early completion in critical contracts. 2. Add buffer float to critical path to actively manage schedule contingency	C	3	Reduce			12/30/20 MS 0010
107	GEN	Market risk in achieving 100% bonding capacity (cost and reduction in contractors able to get bonding)	Structure construction contracts not to exceed $250 million	M	5	Reduce	All construction contracts less than $250 million.		7/27/12 FDS 1940
T	GEN	Delay on station emergency ventilation approval	1. Work with SFFD to develop a plan acceptable to each party. 2. Incorporate SFFD requirements into construction documents.	R	4	Reduce	Reduce risk by actively seeking input from SFFD on station emergency ventilation requirements.	SFFD Approval of DBI Permits for stations	7/27/12 FDS 1940
V	GEN	Incorporation of revised Planning Zoning/ development criteria for Moscone Station TOD impact MOS and CTS construction contract.	1. Participate and provide input of CSP constraints to SFMTA Real Estate during process of initial task to define best use. 2. Integrate work with SFMTA Real Estate into CSP.	D	6	Reduce	Reduce risk by closely coordinating Planning Department development criteria with the CSP.	SFMTA Real Estate coordination meeting minutes	12/13/16 N-CTS1225
Insurance, permits etc									
103	GEN	Difficulty in getting required permits.	1. Coordinate with permit officials and request permits as early as possible. 2. Obtain assistance obtaining permits from PM/CM & FD Consultants.	C	2	Reduce	Reduce risk by closely coordinating with permitting authorities throughout design and construction.	Permitting Agency Coordination Meetings	12/18/12 FDS 1275
104	STS	CPUC approval at Grade Crossing for G0164d takes longer to negotiate / obtain than schedule allows	1. Obtain Grade Crossing approvals at final CPUC inspection at the completion of construction. 2. Coordinate closely with CPUC until approval is received.	R	5	Reduce	Reduce risk by closely coordinating with CPUC.	-CPUC Coordination Meetings -Request for Time Extension on 2/2013 -SX-92 Form Approval	7/27/12 FDS 1940
105	GEN	Electrical service delays startup and testing.	1. Submit applications for new service as early as possible. 2. Coordinate closely with PG&E to ensure timely delivery of electrical service.	C	2	Reduce	Reduce this risk by closely coordinating with PG&E.	PG&E New Service Applications	11/17/17 STS 1500

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106	GEN	Risk of Labor dispute delaying the work.	Enforce designated gate for employees of the contract in dispute so that the rest of the work is not delayed.	C	2	Reduce			11/17/17 STS 1500
P	UMS	DBI review of Union Square Garage modifications triggers seismic upgrade	1. Work with DBI to define the process for their approval. 2. Perform a Pre-Application Review of the design with DBI to flesh out any discrepancy in design requirement interpretation by DBI vs. Designer.	R	4	Reduce	Reduce this risk by closely coordinating with DBI.	DBI Pre-Application Review	8/31/12 FDS1655
T	GEN	Delay on station emergency ventilation approval	1. Work with SFFD to develop a plan acceptable to each party. 2. Incorporate SFFD requirements into construction documents.	R	4	Reduce	Reduce this risk by closely coordinating with SFFD.	SFFD Approval of DBI Permits for stations	7/27/12 FDS 1940
Unallocated Contingency									
119	CTS	Schedule of CTS design deliverables could impact the 65% design completion.	Actively manage design development to ensure timely deliverable of required submittals to avoid impact to FFGA review process.	D	-	Reduce	CTS Station contract has been let.	100% construction documents	Retired 11/10/11
109	GEN	Additional Homeland security requirements imposed on Transit Agencies. (eg possible refuge in MOS, CTS, UMS for Earthquake, terrorist or other such event)	Work closely with FTA to identify requirements.	R	4	Transfer	Additional Homeland Security requirements are expected to be paid for by agency requesting change to design.		Retired 5/24/12
110	GEN	Unanticipated poor weather delays work. Delay could be extended by Holiday Moratorium period.	1. Schedule open excavations during dry season. 2. Durations to assume normal weather delay and moratoriums. 3. Include acceleration clauses in contracts. 4. Work cooperatively with Contractor to mitigate delays.	C	-	Reduce		Acceleration Clause GP 7.02	12/30/20 MS 0010
111	GEN	Major Earthquake stops work	Include Force Majeure clause in contracts.	C	4	Accept		Force Majeure Clause GP 7.02	12/30/20 MS 0010
112	GEN	Major safety event halts work	1. Require contractor Safety plan to address this risk. 2. CM inspections to ensure that safety plan and procedures are implemented.	C	4	Accept		Spec 01 35 29.10 Health & Safety, 1.06	12/30/20 MS 0010
113	GEN	Finance charges may be required (assumptions on FTA funding at $150m per annum optimistic) - finance costs would be in order of $100-150M	Obtain bridge financing from funding partners. Provide realistic finance charges given the project cash flow requirements.	R	-	Reduce	This risk is reduced because SFCTA has agreed to bridge financing.	Bridge Financing Plan	Retired 12/15/11

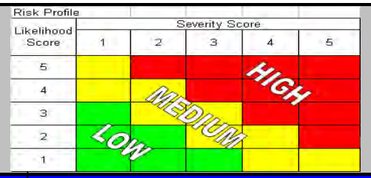
APPENDIX D – RISK REGISTER (REV 19)

PROJECT RISK REGISTER

Central Subway Project San Francisco

REV : 19

DATE ISSUED : 03/14/13



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Schedule Impact	< 1 Month	<> 1 - 3 Months	<> 3 - 6 Months	<> 6 - 12 Months	> 12 Months	>10 High

RISK RATING = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)
2

SCORE = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)

Final Risk ID	Contract I.D	Muni Risk REF. I.D	Type	Risk Description	Mitigation Description	Risk Category	Probability %	Cost Impact	Schedule Impact	Calc Impact	Calc %	Risk Rating	Score	Status	Must Complete by Date
Underground Tunnel															
1	TUN	10.07.1	Guideway Tunnels	Additional night shift work required at portal launch box due to bus storage facility relocation delay	Work with TJPA to coordinate construction schedules and GGB to coordinate Traffic Routing.	C	2	1	-	1	35%	1	2	No longer considered a risk. GGB not scheduled to be utilizing site until 2014	3/20/15 TUN1160
2a	TUN	10.07.2	Guideway Tunnels	42"/48" sewer line relocated as part Utility 1 package is damaged by subsequent construction of the launch box.	1. Make follow-on contractor responsible for repairs to any existing utility lines. 2. Properly as built actual location as part of Utility 1 package and provide to Contract 3 Contractor	C	1	1	2	2	10%	2	3	Sewer Installation complete, awaiting as built drawing. Sewer installed according to contract drawings. Contract 1252 provisions for protection of existing utilities puts all cost and schedule risk on Contractor.	10/24/12 TUN1080
5	TUN	10.07.13	Guideway Tunnels	Possibility that lowest level of tie-backs extending out from Moscone Center could be within the tunnel alignment.	1. Lower tunnel alignment 5' below the lowest expected tieback. 2. Include obstruction clause and allowance in contract documents.	C	1	1	1	1	10%	1	2	Contract Documents issued for bid, contain location of tiebacks from as built drawings, do not intersect tunnel alignment.	7/2/13 TUN1118
7	TUN	10.07.14	Guideway Tunnels	Potential for excessive settlement of BART tunnels - SIGNIFICANT COMPENSATION GROUT REQUIRED OVER ESTIMATE ALLOWANCES	1. Early and extensive co-ordination with BART. 2. Survey BART tunnels to determine exact locations. 3. Checking effect of maximum expected settlement on tunnels. 4. Require EPBM TBM, Contractor to demonstrate effective control of ground settlements and correction of settlements by compensation grouting, and pre-installation of compensation grout piping under BART tunnels prior to tunneling reaching Market St. Require repair/adjustment plan. 5. Develop contingency plan to provide bus bridge, if needed. 6. Require non-stop weekend excavation beneath BART tunnels. 7. Monitor movement of BART tunnels in real-time. 8. Repair/adjust as needed. 9. Include probable cost in estimate.	C	2	4	1	2	35%	4	10	Risk is considered active, with mitigation measures fully developed with the exception of Bus Bridge. Adjusted cost impact lower resulting in Risk rating increasing to 2 but still remains a low risk.	8/28/13 TUN1120
8	TUN	10.07.15	Guideway Tunnels	Flowing groundwater in vicinity of UMS Station could make adequate annulus grouting difficult.	1. Use appropriate additives such as accelerators in primary annulus backfill grouting, if needed. 2. Use secondary grouting as needed.	C	1	1	1	1	10%	1	2	Plans issued for bid contain mitigation measures	8/28/13 TUN1120
E	TUN		Guideway Tunnels	Underground obstructions tunnel and retrieval shaft	Include differing site conditions in GPs as well as DRB to adjudicate conflicts and minimize costs	C	2	2	3	3	35%	5	10	Mitigation measures have been implemented. Maintain adequate contingency throughout tunnel construction	2/5/14 TUN1124
PR1	TUN		Guideway Tunnels	Actual TBM production rate may be slower than forecasted.	Assign significant liquidated damages for not meeting specific schedule dates.	C	1	1	3	2	10%	2	4	Considered Risk inherent in the work and reflected in the Current Cost Estimate. Risk will be reflected in Contractor's Bid. LDs included in contract.	2/5/14 TUN1124
13	TUN		Guideway Tunnels	Damage / settlement 3x 5' to old brick sewer running parallel to tunnel alignment	Slip Line 3'x5' brick sewer before TBM reaches CTS.	C	1	1	-	1	10%	1	1	Tunnel profile has been lowered 25 ft and plans developed for replacement of at risk utilities in advance of tunnel drive.	12/16/13 TUN1121
15	TUN		Guideway Tunnels	Major TBM machine failure	Closely monitor condition and maintenance of the machines.	C	1	2	2	2	10%	2	4	Contractor has indicated that they plan to use a newly manufactured TBM for this project.	2/5/14 TUN1124
16	TUN		Guideway Tunnels	TBM loss and / or damaged in Transit	Provide provisions for insurance for TBM in transit to jobsite	C	1	5	4	5	10%	5	9	Costs covered by Contractor's insurance.	5/20/13 TUN1095
115	TUN		Guideway Tunnel	Jet grouted station end walls are installed by Tunnel contractor. Station Contractor assumes risk of possibly leakage problems due to insufficiently qualify of end walls.	1. In the 1252 contract, have tunnel contractor set aside a pre-determined amount of money in escrow that can be used to repair any leaks encountered by the station contractors after the in the jet grout end walls are excavated. 2. Alternatively, place an allowance in the station contracts for end wall leakage repair.	C	3	1	1	1	50%	3	6	Project configuration changes include headwall designs with multiple levels of redundancy. Warranty provisions added to contact language.	5/26/15 UMS1295
116	TUN		Guideway Tunnel	TBM procurement, delivery and assembly takes longer than assumed in schedule.	Accommodate delay to TBM procurement and delivery, on the order of 2 or 3 months, with current float shown on the construction schedule.	C	2	2	2	2	35%	4	8	Mitigation measures are being implemented	5/20/13 TUN1095
B	TUN		Guideway Tunnel	Storage and testing of excavated soils from tunnel limits advance rate of tunneling.	1. Provide adequate storage and handling facility to accommodate testing activity. 2. Work with SAR to develop acceptance criteria, to minimize or eliminate testing requirements. 3. Require the contractor to provide a detailed workplan for testing, sorting and stockpile prior to hauling.	C	2	3	3	3	35%	6	9	Contractor is attempting to obtain the use of additional Caltrans parcel between Fourth & Fifth and Harrison & Bryant to help facilitate this work and provide additional storage area. .	2/5/14 TUN1124
MOS Station															
21	MOS	20.03.01.2	Moscone Station	Incomplete cutoff of groundwater at MOS	1. Require additional grouting to limit leakage to permissible level. 2. Include probable grouting work in cost & schedule estimates.	C	1	1	-	1	10%	1	1	Mitigation measure to be made part of the contract documents	4/28/15 MOS1150

PROJECT RISK REGISTER

Central Subway Project San Francisco

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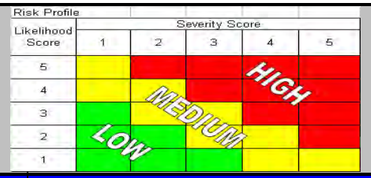

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RISK RATING = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)

2

SCORE = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)

Final Risk ID	Contract I.D	Muni Risk REF. I.D	Type	Risk Description	Mitigation Description	Risk Category	Probability %	Cost Impact	Schedule Impact	Calc Impact	Calc %	Risk Rating	Score	Status	Must Complete by Date
22	MOS	20.03.01.5	Moscone Station	Public complaints result in unanticipated restrictions on construction at MOS.	1. Public outreach. 2. Maintain regular and open communications so Public knows construction plans and progress at all times. 3. Require Contractor to assist Public Outreach efforts, maintain access to businesses and assist with deliveries and pick-ups, control noise and vibration, continuously cleanup site, and provide pedestrian and vehicle traffic and protection plans, informational signage, ADA ramps and minimum sidewalk widths. 4. Work with MOED to increase cleanup of the area and assist pedestrians across streets, as needed. 5. Monitor and enforce noise, vibration, ADA, traffic, and cleanup requirements. 6. Quickly process and resolve damage and accident claims from the Public. 7. Assumed this work in cost & schedule estimates.	C	1	1	-	1	10%	1	1	Implementation of mitigation measures part of Communication/Outreach plan and certain aspects to be included in the contract documents.	9/16/16 MOS1230
F	MOS		Moscone Station	Underground obstructions Stations (MOS)	1. Provide adequate allowance for differing site conditions to address unknown underground obstructions. 2. Show field verified obstructions discovered during previous contracts on contract drawings. 3. Make as-built drawings of structures adjacent to the work available to the contractor as reference drawings.	C	4	2	2	2	80%	8	16	Mitigation measures have been implemented.	4/28/15 MOS1150
27	MOS		Moscone Station	Loss of business results in unanticipated restrictions on construction at MOS.	1. Public outreach. 2. Maintain regular and open communications so Merchants know construction plans and progress at all times. 3. Require Contractor to coordinate with merchants, maintain access to businesses and assist with deliveries and pick-ups, continuously cleanup site, and provide pedestrian and vehicle traffic and protection plans, informational signage, and minimum sidewalk widths. 4. Require barriers to protect pedestrians and shield them from noise and dirt from construction. 5. Work with MOEWD to increase cleanup of the area and assist pedestrians across streets. 6. Include this work in cost & schedule estimates.	C	1	2	1	2	10%	2	3	Mitigation measures to be implemented and to the extent possible requirements will be written into contract documents to minimize disruptions to businesses.	4/28/15 MOS1150
UMS Station															
F	UMS		Union Square market Street Station	Underground obstructions Stations (UMS)	1. Provide adequate allowance for differing site conditions to address unknown underground obstructions. 2. Show field verified obstructions discovered during previous contracts on contract drawings. 3. Make as-built drawings of structures adjacent to the work available to the contractor as reference drawings.	C	4	2	2	2	80%	8		Mitigation measures have been implemented.	8/12/15 UMS 1320
28	UMS	20.03.02.2	Union Square market Street Station	Incomplete cutoff of groundwater at UMS.	1. If needed, perform grouting to mitigate the intrusion of groundwater. 2. Include in cost & schedule estimates.	C	1	2	1	2	10%	2	3	Mitigation measures in the form of consolidation grouting to be included in contract documents	8/12/15 UMS1320
32	UMS	20.03.02.9	Union Square Market Street Station	Delay in advanced utility relocation delays ground treatment and start of construction. (Uty 2)	1. Intensive coordination with and commitment from utility owners. 2. Early completion incentive for utility relocation contract. 3. Enforce franchise agreements.	R	1	1	1	1	10%	1	2	Advance utility relocation contract (1251) is underway with a projected completion date in advance of advertising UMS construction contract, reducing this risk of cost and schedule impacts	7/31/12 N-ATT00100
33	UMS	20.03.02.10	Union Square market Street Station	Damage to utilities at UMS causes delay to construction and/or consequential cost. (very close to walls adjacent to relocated utility trenches)	1. Intensive utility coordination and investigation. 2. Relocate utilities out of the way of construction wherever possible. 3. Show utilities on reference plans. 4. Have utility contact information and procedure on plans. 5. Have contingency repair/restoration plans. 6. Include probable impacts to schedule & cost in estimates.	C	2	1	1	1	35%	2	4	Although mitigation measure have been fully implemented, Increased probability due to proximity of new pile design to existing relocated utilities.	7/19/16 UMS1410
34	UMS	20.03.02.11	Union Square market Street Station	Loss of business results in unanticipated restrictions on construction at UMS.	1. Public outreach. 2. Work closely with Merchant's Association. 3. Maintain regular and open communications so Merchants know construction plans and progress at all times. 4. Advertise that Stockton Street Merchants are Open for Business. 5. Require Contractor to coordinate with merchants, maintain access to businesses and assist with deliveries and pick-ups, continuously cleanup site, and provide pedestrian and vehicle traffic and protection plans, informational signage, and minimum sidewalk widths. 6. Require barriers to protect pedestrians and shield them from noise and dirt from construction. 7. Work with the Union Square BID or MOED to increase cleanup of the area and assist pedestrians across streets. 8. Include this work in cost & schedule estimates.	C	2	3	2	3	35%	5	10	Mitigation measures to be implemented and to the extent possible requirements will be written into contract documents to minimize disruptions to businesses.	9/7/16 UMS1430

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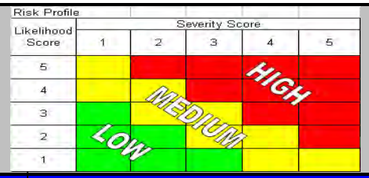

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Final Risk ID	Contract I.D	Muni Risk REF. I.D	Type	Risk Description	Mitigation Description	Risk Category	Probability %	Cost Impact	Schedule Impact	Calc Impact	Calc %	Risk Rating	Score	Status	Must Complete by Date
35	UMS	20.03.02.14	Union Square Market Street Station	Ground support structure causes groundwater table to rise which results in leakage into adjacent structures.(new structure might create a dam that results into leaks into new and existing structures)	1. Perform detailed hydrogeologic modeling and analysis. 2. Monitor groundwater table at multiple locations and passive measures as necessary to mitigate. 3. Reference the Tech memo in contract documents. 4. Include probable costs in estimate.	C	1	2	-	1	10%	1	2	Mitigation measures incorporated in design based on updated Hydrogeologic analysis and report	9/7/16 UMS1430
36	UMS	20.03.02.15	Union Square Market Street Station	Damage to buildings or utilities as a result of heave from jet grouting at UMS.	Utilize tangent piles combined with surface jet grouting.	C	1	1	-	1	10%	1	1	Mitigation measures implemented in contract documents to reduce risk	4/14/15 UMS1310
37	UMS	20.03.02.16	Union Square market Street Station	Damage to adjacent buildings at UMS due to surface construction activities.	1. Require protective barriers. 2. Have an emergency and rapid response customer focused task force to fix damaged facilities. 3. Quickly repair and reimburse resulting costs. 4. Include probable cost in estimate.	C	1	2	-	1	10%	1	2	Mitigation measures implemented in contract documents to reduce risk	9/7/16 UMS1430
38	UMS	20.03.02.17	Union Square market Street Station	Tiebacks in Stockton Street mislocated (in path of walls and would have to be dug out within 20ft of surface level)'	1. Direct contractor to dig out the tiebacks on the plans. 2. Include allowance and differing site conditions clause in contract. 3. Include this work in the cost and schedule estimates.	C	2	2	1	2	35%	3		Mitigation measures fully implemented, Advance utility relocation contract (1251) confirmed location of tiebacks. Risk rating has been reduced due to a lowering of the probability of event occurring	5/6/14 UMS1170
J	UMS		ROW	Macy's entrance conflict with new piles	1. Show known obstructions shown on as-built drawings on contract drawings. 2. Make as-built drawings available to contractor as reference drawings. 3. Have contractor field verify obstruction shown on as-built drawings and contract drawings	C	3	1	1	1	50%	3	6	Known obstructions are shown on the ES drawings. Allowance for differing site conditions added to UMS Station contract.	1/23/14 UMS1060
Q	UMS		Union Square market Street Station	As-built drawings and UMS construction drawings do not contain enough information to produce shop drawings without significant surveying effort delaying construction north entrance.	1. Investigate if electronic files of design can be given to the contractor. 2. Clearly define shop drawing criteria in the technical specifications. 3. Make as-built drawings available as reference drawings to the contractor	C	3	1	1	1	50%	3	6	Specifications require contractor to survey USG in order to develop shop drawings for structural steel.	3/24/12 UMS1280
CTS Station															
46	CTS	20.03.03.2	Chinatown Station and crossover cavern	Public complaints result in unanticipated restrictions on construction at CTS. (schedule and estimate for underground work assumes 6 day work week and 2 shifts per day)	1. Public outreach. 2. Maintain regular and open communications so Public knows construction plans and progress at all times. 3. Require Contractor to assist Public Outreach efforts, maintain access to businesses and assist with deliveries and pick-ups, control noise and vibration, continuously cleanup site, and provide pedestrian and vehicle traffic and protection plans, informational signage, ADA ramps and minimum sidewalk widths. 4. Require barriers to protect pedestrians and shield them from noise and dirt from construction. 5. Work with MOED to increase cleanup of the area and assist pedestrians across streets, as needed. 6. Monitor and enforce noise, vibration, ADA, traffic, and cleanup requirements. 7. Quickly process and resolve damage and accident claims from the Public. 8. Include this work in cost & schedule estimates.	C	2	5	1	3	35%	6	12	Implementation of mitigation measures part of Communication/Outreach plan and certain aspects to be included in the contract documents.	10/9/17 CTS1500
48	CTS	20.03.03.6	Chinatown Station and crossover cavern	Incomplete drawdown of groundwater. (inside of box and inside of caverns)	1. Require additional grouting to limit leakage to permissible level. 2. Include probable grouting work in cost & schedule estimates. 3. Include allowance for dewatering within cavern during construction.	C	2	2	1	2	35%	3	6	Mitigation measures have been included in contract documents	5/1/16 CTS1140
50	CTS	20.03.03.11	Chinatown Station and crossover cavern	CTS station contractor delayed by tunnel contractor since station platform construction cannot start until tunnels have been finished.	1. Include provisions in CTS contract identifying the potential waiting period for tunnel contractor. 2. Actively monitor progress towards schedule milestones	C	2	1	2	2	35%	3	6	Constraints on CTS contractor added to specification "Work Sequence and Constraints"	12/16/13 TUN1122
52	CTS	20.03.03.12	Chinatown Station and crossover cavern	Unacceptable settlement and impact on major utilities at CTS. (OLD SEWERS AND OTHERS WITHIN 20FT SPACE BETWEEN TOP OF CAVERN AND STREET LEVEL)	1. Evaluate effect of potential settlement on utilities. 2. Slip-line sewer by TBM contractor. 3. Reinforce other utilities as needed, monitored during construction, and repair / replace, as needed. 4. Have contingency repair/restoration plan. 5. Utility contact information and procedure will be on plans. 6. Develop an allowance for utility repair. 7. Include probable cost in estimate.	C	3	3	1	2	50%	6	12	Project configuration change, lowered station 25 ft. reducing the probability of this risk. Risk rating lowered.	4/22/16 N-CTS9730
F	CTS		Chinatown Station and crossover cavern	Underground obstructions stations (CTS)	1. Provide adequate allowance for differing site conditions to address unknown underground obstructions. 2. Make as-built drawings of structures adjacent to the work available to the contractor as reference drawings	C	4	2	2	2	80%	8		Mitigation measures have been implemented.	10/9/17 CTS1500

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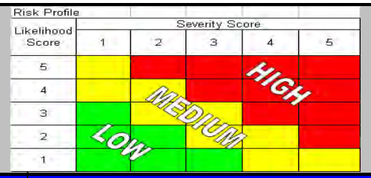

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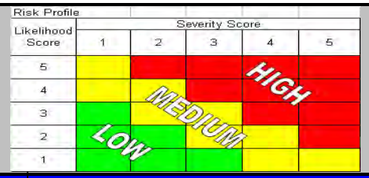
U	CTS		Chinatown Station and crossover cavern	Proximity at junction of head house boundary wall and school yard may result in relocation of school yard during wall construction		C	1	1	1	1	10%	1	2	Project configuration changed to eliminate encroachment. Risk converted to Construction risk from Risk 55.	8/16/13 CTS1010
General															
56	GEN	40.00.1	Unallocated Contingency	Escalation more / less than expected (Increase in bid prices to hedge possible increases in cost of volatile commodities.)	1. In the current economic environment, escalation is just as likely to be less as more than anticipated. 2. For volatile materials and equipment, provide substantial payment for stored materials and equipment to encourage early procurement and an escalation clause for volatile commodities in contracts.	M	2	3	-	2	35%	3	6	Current projected escalation rates remain below those reflected in Program budget.	1/10/18 STS1042
Demolition, Clearing , Earthwork															
Site Utilities, Utility relocations															
A	STS		Utilities	Timely resolution of Sewer lines south of portal.	1. Develop alternatives that do not require creation of a new sewer line. 2. Work together with SFPUC to find mutually beneficial solutions. . 3. Provide evidence of solutions developed for similar situations from existing SFMTA and /or other transit agencies. 4. Develop detailed schedule of activities required for resolution including milestones for go - no go actions which will not impact the overall MPS.	R	1	2	1	2	10%	2	3	$ 2.1 million in budget. Could be as high as $8 million. Continuing to work with SFPUC to find solution.	5/13/12 PDS 1870
Environmental Mitigations															
65	TUN	40.04.1	Environmental	Archeological/Cultural findings during construction increases schedule and/or cost. (Portal) AROUND 10%	1. Provide on-call Archeologist. 2. Provide allowance and procedure in contract for Archeological/Cultural discoveries.	C	1	2	1	2	10%	2	3	Additional boring taken in vicinity of portal indicated no evidence of Archeological/Cultural resources.	10/24/12 TUN1080
66	MOS		Environmental	Archeological/Cultural findings during construction increases schedule and/or cost.(Moscone) AROUND 10%	1. Provide on-call Archeologist. 2. Provide allowance and procedure in contract for Archeological/Cultural discoveries.	C	3	1	1	1	50%	3	6	Mitigated - Current exposure only to those amount above those currently identified	4/28/15 TUN1150
67	UMS		Environmental	Archeological/Cultural findings during construction increases schedule and/or cost. (UMS)…LESS THAN 1%	1. Provide on-call Archeologist. 2. Provide allowance and procedure in contract for Archeological/Cultural discoveries.	C	3	1	2	2	50%	5	9	Mitigation measures to be implemented in contract documents	8/12/15 UMS1320
68	CTS		Environmental	Archeological/Cultural findings during construction increases schedule and/or cost. (CHINA TOWN) …AROUND 10%	1. Provide on-call Archeologist. 2. Provide allowance and procedure in contract for Archeological/Cultural discoveries.	C	3	1	2	2	50%	5	9	Mitigation measures to be implemented in contract documents	10/9/17 CTS1500
Auto/bus/van access ways, roads															
70	GEN	40.08.1	Vehicle access	Change in traffic control requirements after bid.	1. Provide unit bid items to reimburse contractor for traffic management costs outside their control. 2. Include allowance in construction contracts for PCOs.	C	3	4	1	3	50%	8	15	Mitigation measures implemented.	5/22/17 STS1020
71	TUN	40.08.2	Vehicle access	Power supply interruptions to TBM's (no dual power feed currently planned)	Obtain TBM power directly from PG&E substation.	C	1	2	-	1	10%	1	2		2/5/14 TUN1124
Train Control and Signals															
72	STS	50.01.1	Train Control and Signals	Interface new Signaling and Train Control system to existing at Fourth and King	Connect new system in parallel with existing system until the new system has been tested and safety certified for operation.	C	2	2	3	3	35%	5	10	Awaiting approval of contract plans by Muni Operations.	3/4/16 STS1045
75	STS	50.01.1	Train Control and Signals	Signals and Comms equipment may need to be stored off site	Require contractor to store equipment offsite or at the factory until it is needed.	C	3	1	-	1	50%	2	3	Special Provisions address offsite storage.	11/6/17 STS1070
PR73	STS	50.01.1	Train Control and Signals	Delays or complications of design & construction by others – SF Dept. Of Technology, 3rd party utilities	Early engagement and coordination for agreements and plan development to avoid construction delays.	D	2	1	1	1	35%	2	4		5/30/12 DP3C530
PR78	STS	50.01.1	Train Control and Signals	Delays or complication by other SFMTA projects delays CSP: radio, fare collection, C3/TMC	1. Monitor other projects' developments. 2. Develop contingency plans as needed to avoid 1256 delay of revenue service.	C	2	1	1	1	35%	2	4		7/27/12 FDS 1940
Traffic signals & Crossing Protn.															
Purchase or lease of Real Estate															
79	TUN	60.01.1	ROW	Delay in obtaining tunnel easements (3 #) (goes to condemnation) - Costs of ROW may cost more than expected	1. Engage Owners in negotiations as soon as possible. 2. PM/CM to provide real estate specialists to facilitate.	R	1	1	-	1	10%	1	1	Right of possession obtained on all three parcels. Cost agreement reached with 1455 Stockton & 801 Market.	9/7/2012
Vehicles															
83	GEN	70.00.01	Vehicles	Cost of vehicles may be more than estimated due to sole source and small order	Time the procurement of the vehicles to be part of the procurement of the existing Breda LRVs.	R	4	4	4	4	80%	16	32	CSP vehicles to be included in overall SFMTA vehicle procurement contract.	11/17/17 STS 1500
															4
89	GEN	80.02.2	Final Design	3rd Party reviews of Design documents delays completion of Final Design.	Provide assistance to 3rd Parties to facilitate their reviews and obtain concurrent partial approval for underground work.	D	1	2	2	2	10%	2	4	3rd Party coordination meeting ongoing.	5/23/12 FDS 1930
Project Management for Design and Construction															
94	GEN	80.04.3	Project Management	Bid protests delay award and NTP for construction contracts	Strictly adhere to Procurement Best Practices and Protest Procedures.	M	1	2	2	2	10%	2	4	Mitigation measures being implemented	2/19/13 FDS 1900

PROJECT RISK REGISTER

Central Subway Project San Francisco

REV : 19

DATE ISSUED : 03/14/13



	Low (1)	Medium (2)	High (3)	Very High (4)	Significant (5)	Legend
Probability	< 10%	<> 10% - 50%	> 50%	<> 75% - 90%	> 90%	<3 Low
Cost Impact	< $250K	<> $250K - $1M	<> $1M - $3M	<> $3M - $10M	> $10M	3 - 9 Medium
Schedule Impact	< 1 Month	<> 1 - 3 Months	<> 3 - 6 Months	<> 6 - 12 Months	> 12 Months	>10 High

RISK RATING = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)
2
SCORE = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)

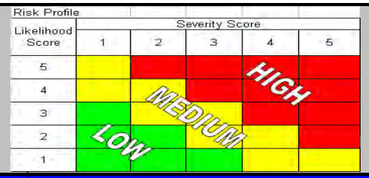
Final Risk ID	Contract I.D	Muni Risk REF. I.D	Type	Risk Description	Mitigation Description	Risk Category	Probability %	Cost Impact	Schedule Impact	Calc Impact	Calc %	Risk Rating	Score	Status	Must Complete by Date
95	GEN	80.04.4	Project Management	Contractor default during construction impacts schedule. (key sub-contractor)	Assist Bonding company in transition and to maintain schedule.	C	1	2	2	2	10%	2	4		11/17/17 STS 1500
97	GEN	80.04.6	Project Management	Conflicts arising from Contractors working concurrently in the same work space results in delays and claims for additional costs (systems / civil interface)	Limit the number of contractors working in the same workspace by scheduling contracts appropriately and demobilizing contractors upon substantial completion.	C	2	3	2	3	35%	5	10	Mitigation measures being implemented	11/17/17 STS 1500
PR82	GEN		General	Confined work spaces along alignment can impact productivity and result in significant cost and schedule impacts.	Account for cost and schedule impacts in estimate and schedule for contract packages	C	1	1	1	1	10%	1	2		11/17/17 STS 1500
99	GEN	80.04.8	Project Management	Breakdown in relationships between SFMTA and Contractors during construction results in increased claims and delays to the overall construction schedule.	1. Executive partnering and alternate dispute resolution. 2. Provide incentives in construction contracts in addition to penalties	C	2	5	3	4	35%	8	16	Mitigation measures being implemented	7/27/12 FDS 1940
100	GEN	80.04.9	Project Management	Procurement of long lead items delays work. (fans, rails and special track work, TPSS, Escalators, elevators, TBM)	1. Include schedule milestones for procurement of and substantial payment for stored long lead items in contract to encourage early procurement. 2. Monitor procurement of critical items.	M	1	2	2	2	10%	2	4	Not considered a project risk.	11/17/17 STS 1500
102	GEN	80.04.11	Project Management	Late finish of early contract delays later contracts and extends PM / CM and incurs additional costs	1. Actively manage contracts and include incentive provisions for early completion in critical contracts. 2. Add buffer float to critical path to actively manage schedule contingency	C	2	1	2	2	35%	3	6	LONP 1 & 2 initiated to reduce this risk. See Risk 86. The mitigation of risks associated with early contracts will address this risk. Risk rating reduced due to mitigation measures implemented	12/30/20 MS 0010
107	GEN	80.04.12	Testing and startup	Market risk in achieving 100% bonding capacity (cost and reduction in contractors able to get bonding)	Structure construction contracts not to exceed $250 million	M	2	5	-	3	35%	5	10	All contracts expected not to exceed $250 million	7/27/12 FDS 1940
T	GEN	80.04.12	Testing and startup	Delay on station emergency ventilation approval	1. Work with SFFD to develop a plan acceptable to each party. 2. Incorporate SFFD requirements into construction documents.	R	2	5	-	2	35%	4	10	SFFD agreed to the proposed plan by SFMTA	7/27/12 FDS 1940
V	GEN		MOS & CTS Stations	Incorporation of revised Planning Zoning/ development criteria for Moscone Station TOD impact MOS and CTS construction contract.	1. Participate and provide input of CSP constraints to SFMTA Real Estate during process of initial task to define best use. 2. Integrate work with SFMTA Real Estate into CSP.	D	3	2	2	2	50%	6			12/13/16 N-CTS1225
PR37	GEN		Testing and startup	Temporary construction power and ability to provide permanent power feed - PGE ability to provide power requirements to the program together with their other commitment	1. Identify temporary power requirements for station construction. 2. Investigate the timing of the permanent feed.	C	2	1	2	2	35%	3	6	Cost for First and Redundant electrical services need to be included in Cost Estimate.	5/3/18 STS1080
Insurance, permits etc															
103	GEN	80.06.1	Permits	Difficulty in getting required permits.	1. Coordinate with permit officials and request permits as early as possible. 2. Obtain assistance obtaining permits from PM/CM & FD Consultants.	C	1	2	1	2	10%	2	3		12/18/12 FDS 1275
104	STS	80.06.2	Approvals	CPUC approval at Grade Crossing for G0164d takes longer to negotiate / obtain than schedule allows	1. Obtain Grade Crossing approvals at final CPUC inspection at the completion of construction. 2. Coordinate closely with CPUC until approval is received.	R	2	3	2	3	35%	5	10	Providing preview of 90% submittal to CPUC and will resolve comments/issues from PE before finalizing design documents	7/27/12 FDS 1940
105	GEN	80.06.3	Testing and startup	Electrical service delays startup and testing.	1. Submit applications for new service as early as possible. 2. Coordinate closely with PG&E to ensure timely delivery of electrical service.	C	1	2	1	2	10%	2	3	Applications for new service have been submitted to PG&E.	11/17/17 STS 1500
106	GEN	80.06.4	Labor relations	Risk of Labor dispute delaying the work.	Enforce designated gate for employees of the contract in dispute so that the rest of the work is not delayed.	C	2	1	1	1	35%	2	4		11/17/17 STS 1500
Unallocated Contingency															
111	GEN		Unallocated Contingency	Major Earthquake stops work	Include Force Majeure clause in contracts.	C	1	5	3	4	10%	4	8	Force Majeure clause included in contracts.	12/30/20 MS 0010
112	GEN		Unallocated Contingency	Major safety event halts work	1. Require contractor Safety plan to address this risk. 2. CM inspections to ensure that safety plan and procedures are implemented.	C	1	5	3	4	10%	4	8	Health and Safety provisions included in contracts. CS Program provides full-time Safety Manager.	12/30/20 MS 0010
196	GEN		Project Management	The process of acquiring station licenses: acquisition/condemnation could significantly delay schedule and cost more than that presently planned.	1. Continue to negotiate with building owners 2. Required Notices and Appraisals to be completed 3. Commence condemnation process with City Attorneys	C		1	1	1	0%	4	-		
197	GEN		Project Management	The untimely delivery of FFGA funds to the project causes shortfalls in cash flow and the Central Subway will be unable to meet its financial commitments	1. Establish procedure and timeline for receipt of FFGA funds 2. Monitor status of available bridging funds 3. At the start of the 1st quarter of 2013, present the Director of Transportation with a Project cash flow that shows the "what-if" scenario that shows a delay in federal funds in Oct. of 2013	C				-	0%	-	-		

PROJECT RISK REGISTER

Central Subway Project San Francisco

REV : 19

DATE ISSUED : 03/14/13



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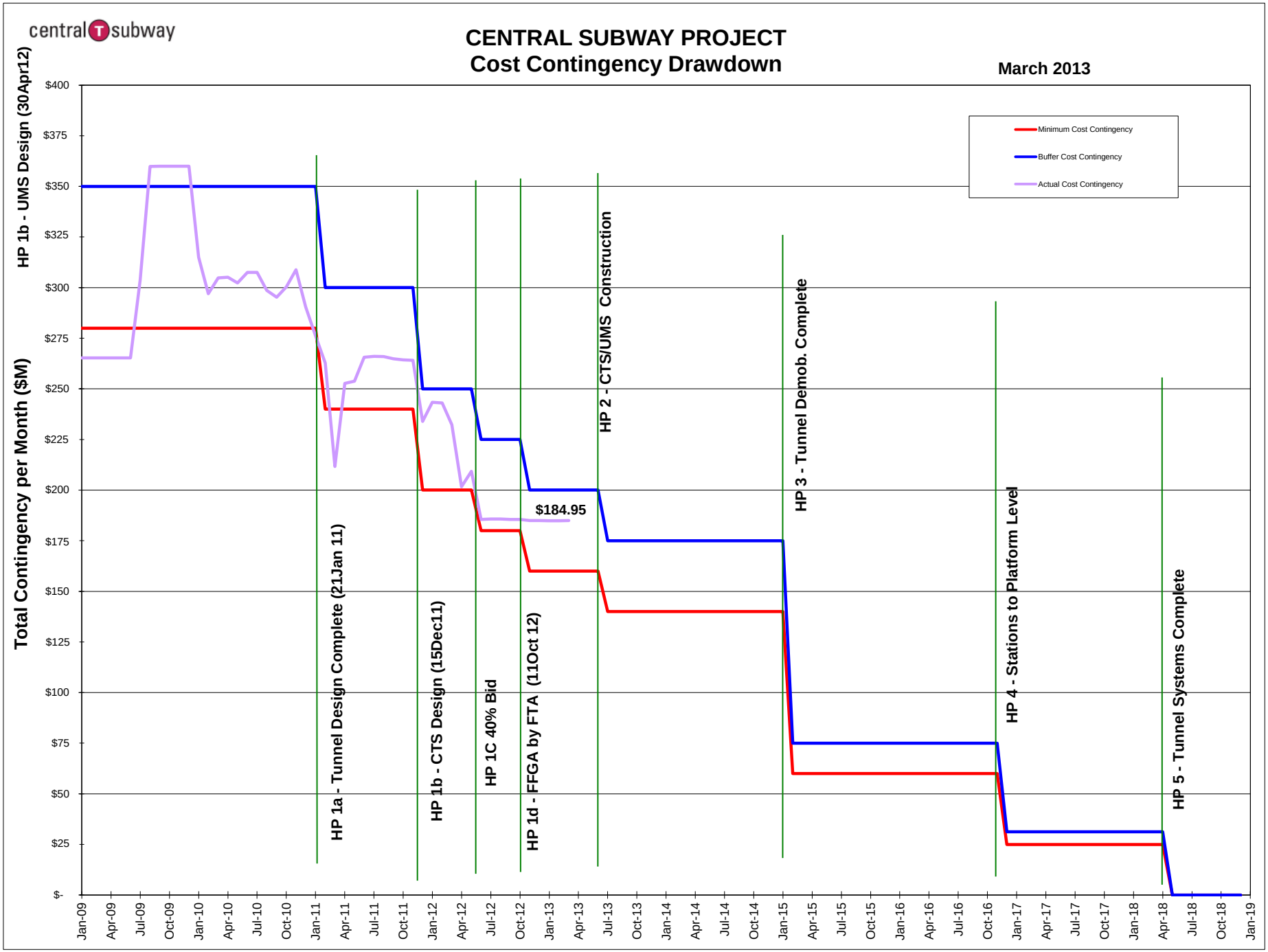
RISK RATING = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)
2

SCORE = PROBABILITY X (COST IMPACT + SCHEDULE IMPACT)

Final Risk ID	Contract I.D	Muni Risk REF. I.D	Type	Risk Description	Mitigation Description	Risk Category	Probability %	Cost Impact	Schedule Impact	Calc Impact	Calc %	Risk Rating	Score	Status	Must Complete by Date
198	GEN		Project Management	Outreach efforts to get more bidders - (SSTS) 1300 Contract	1. Develop a Contractor Outreach Plan: 2. Engage in extensive contractor outreach and promote assurances of being a reasonable contract partner.	M	1	5	2	4	10%	4	7		
201	GEN		Project Management	Bid Protest - (SSTS) 1300 Contract	1. Establish and enforce appropriate qualifications requirement for contractors to be deemed a responsible bidder.	M	1	1	1	1	10%	1	2		
202	SSTS		General	Cargo Preference (Ship America) must solicit U.S.- flag carriers. Civilian Agencies Cargo = at least 50% (governed by Cargo Preference Act of 1954	1. Require Ship America compliance agreement first tier contractors and subcontractors	C	1	1	1	1	10%	1	2		
203	SSTS		Project Management	Headwalls interface delay 1300 Contractor (SSTS)	1. Meet and develop recovery schedule 2. Review possible Adjustment to 1300 interface	C	3	3	2	3	50%	8	15		
204	SSTS		Utilities	AT&T Vault - New Sewer Work south of Bryant	1. Continue negotiations/coordination with utility owners. 2. Schedule analysis to confirm coordination	C	2	2	4	3	35%	6	12		
205	GEN		Project Management	Prolong period of CMod's creates additional cost/causes bad blood between Resident Engineer and Contractor	1. Cmod Task Force - 5 Areas of Improvement 2. Implement 3. Delegation of Authority	C	3	1	1	1	50%	3	6		
206	TUN		Project Management	Delay in Decision on Retrieval Shaft	1. Establish Task Force to focus on issues 2.Meet Regularly and Act promptly on issues 3. Keep Decision makers infomed 4.Keep Community Informed 5. Keep Stakeholders informed	C	3	4	1	3	50%	8	15		
207	TUN		Project Management	Implementing Pagoda Option for Retreival Shaft - Delay in Obtaining Property	1. Obtain clear undstanding of current status of property 2. Meet with Owner and determine best options for SFMTA needs. 3.Establish Special Use District to retain existing development rights,in addition to new land use entitlements. 4. Obtain Appraisal 5. Identify Funding 6, Confirm hazardous abatement	C	3	4	2	3	50%	9	18		
208	TUN		Project Management	Additional cost if we change direction going to the Pagoda	1. Develop Scope with designers currently under contract 2. Agree to alignment and details of new shaft location 3. Issue PCC to Contractor 4. Initial site works and borings if necessary 5. Obtain appropriate permits	C	3	3	2	3	50%	8	15		
209	TUN		Project Management	Implementring Pagoda Option - Obtaining Environmental Clearance	1. Engage Planning Dept to outline required actions 2. Develop necessary CEQA documents in concert with Planning Dept. 3. Meet with FTA and determine NEPA and SHPO requirements	C	3	1	1	1	50%	3	6		
210	Gen		Project Management	Mission Bay Loop Grant – Needs to be built to allow for train turnarounds (June 2013)	1. Identify timeline for grant funding	C	4	1	1	1	80%	4	8		
211	TUN		Project Management	Differing site conditions encountered during construction of Cross Passage 5 results in increased costs.		C					0%	-			
212	TUN		Project Management	UMS Inclined piles – 8" clearance between piles and tunnel results in damage or safety issues within the tunnel	1. Establish 1252 and 1300 contract requirements to construct within acceptable tolerances 2. Workshop to be held with BIH to discuss	C	1	5	3	4	10%	4			
213	TUN		Project Management	Micro Piles exist within tunnel path at UMS	1. Re-profile and realign tunnel to clear micropiles	C	2	3	1	2	35%	4			
214	TUN		Project Management	Micro Piles at UMS interfere with Tube-a-machete installation (60' deep micropiles)	1. Provide micro-pile as-built information to contractor 2. Realign tube-a-machettes clear of micro-piles	C	3	1	1	1	50%	3			
215	GEN		Permits	DPW Excavation permit reviews delay contract works	1. Obtain a blanket excavation permits from DPW covering the area of work for 1253, 1254, 1255, 1256	C	2	1	1	1	35%	2			

APPENDIX E - COST & SCHEDULE CONTINGENCY DRAWDOWN CURVES


central subway
CENTRAL SUBWAY PROJECT
Cost Contingency Drawdown
March 2013
HP 1b - UMS Design (30Apr12)
Total Contingency per Month ($M)
$400
$375
$350
$325
$300
$275
$250
$225
$200
$175
$150
$125
$100
$75
$50
$25
$-
Minimum Cost Contingency
Buffer Cost Contingency
Actual Cost Contingency
HP 1a - Tunnel Design Complete (21Jan 11)
HP 1b - CTS Design (15Dec11)
HP 1C 40% Bid
HP 1d - FFGA by FTA (11Oct 12)
HP 2 - CTS/UMS Construction
HP 3 - Tunnel Demob. Complete
HP 4 - Stations to Platform Level
HP 5 - Tunnel Systems Complete
$184.95
Jan-09
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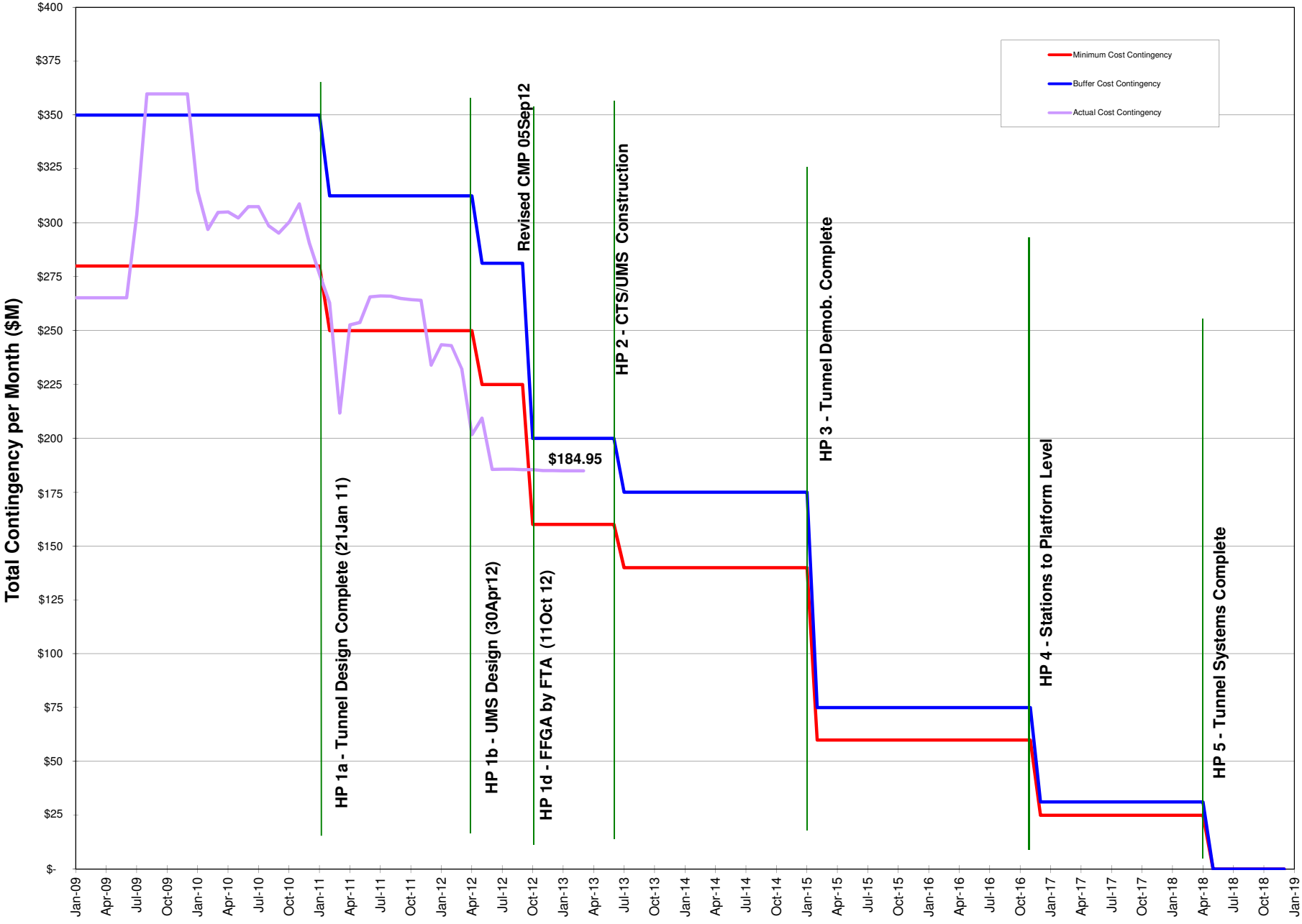
central subway

CENTRAL SUBWAY PROJECT
Cost Contingency Drawdown

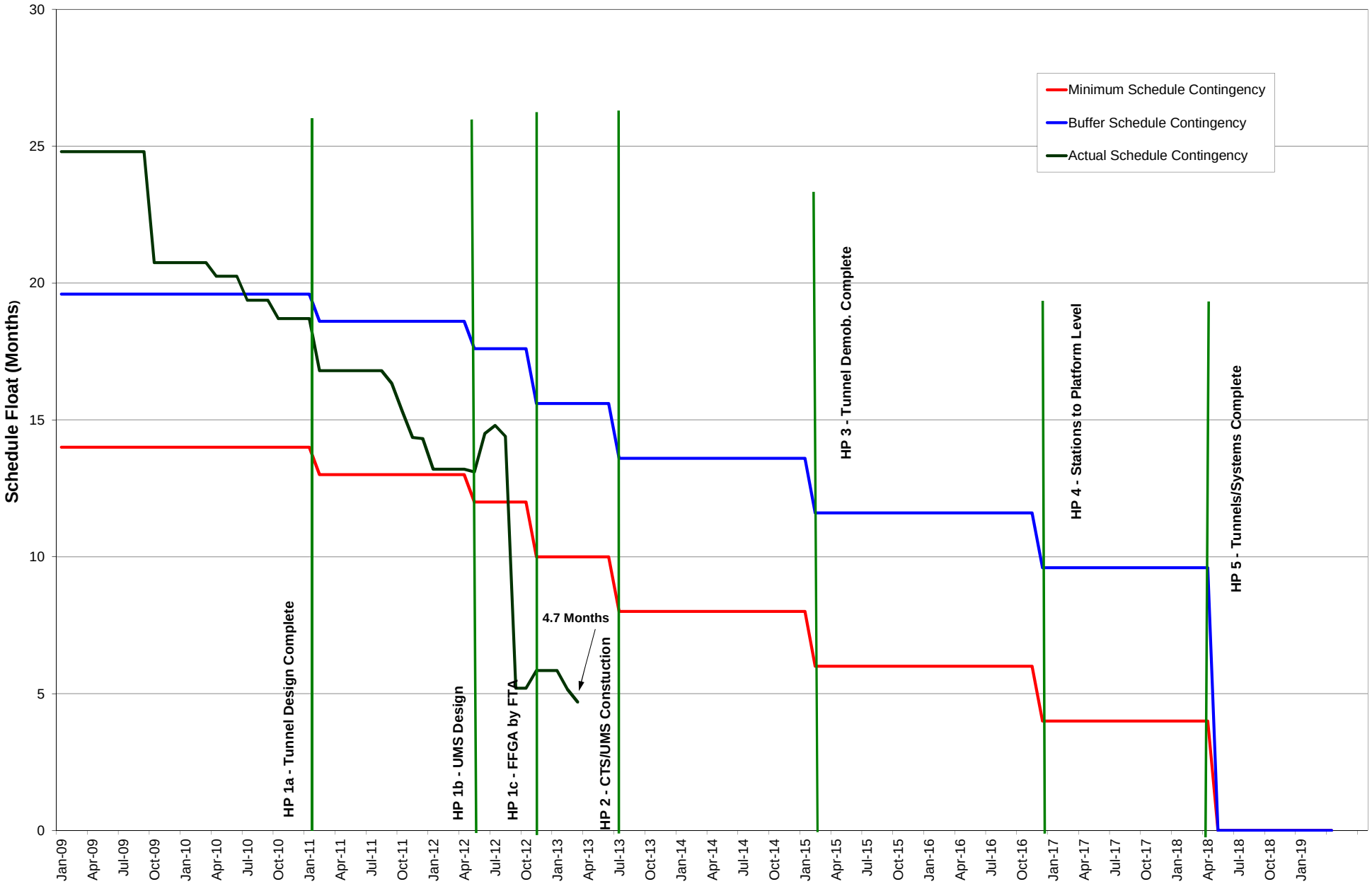
March 2013



central subway

CENTRAL SUBWAY PROJECT
Schedule Contingency Drawdown

March 2013



Stassevitch, Eric

From: Jeffrey.S.Davis@dot.gov
Sent: Wednesday, September 05, 2012 8:23 AM
To: Reiskin, Ed
Cc: Funghi, John; Hoe, Albert; Stassevitch, Eric; David.Kuehn@stvinc.com; Bradley.Lebovitz@stvinc.com; David.Marcus@stvinc.com; Jeffrey.S.Davis@dot.gov; Kim.Nguyen@dot.gov
Subject: Review and Acceptance of Central Subway Project 2012 Contingency Management Plan (CMP)
Attachments: MD 132_SFMTA CSP CMP Spot Report_08-28-12.docx; MD 132_Attachment 1_CS TR2039_CMP May 2012 Update_recd 07-17-12.pdf; MD 132_Attachment 2_Advanced Draft CMP_040612.pdf; MD 132_Attachment 3_PMOC comments_Advanced Draft CMP_042112.pdf; MD 132_Attachment 4_CS TR2001_CMP 2012 draft_recd 05-17-12.pdf; MD 132_Attachment 5_Cost Contingency Recovery Workshop Notes.pdf

Dear Mr. Reiskin:

Because the receipt of the Central Subway Project Full Funding Grant Agreement has taken longer than originally anticipated, we recognize that project development/risk mitigation, and resultant contingency usage, is no longer representative of the established contingency hold points and drawdown that was agreed to over three years ago. SFMTA proposes to revise the hold points and minimum cost contingency levels to more accurately reflect current project development and risk reduction. The PMOC participated with the project in developing a cost contingency drawdown that reflects this realistic reduced risk. SFMTA's proposal (Attachment 1) is the subject of this report. The PMOC recommends and FTA concurs in accepting the project's May 2012 Contingency Management Plan with revised cost contingency hold points and minimum cost contingency levels contained therein.

It is recommended that the PMOC participate in a quarterly review of risk contingency mitigation activities, plans, and actions, including updated costs, contingency curves, and drawdowns. The PMOC's findings/progress would be reported quarterly in the PMOC comprehensive monthly report.

If you have any questions or comments, please do not hesitate to contact me.

Sincerely,

Jeffrey Davis
Federal Transit Administration
201 Mission St., Suite 1650
San Francisco, CA 94105
415-744-2594 desk
415-744-2726 fax
email: Jeffrey.S.Davis@Dot.Gov

REVIEW OF CONTINGENCY MANAGEMENT PLAN (CMP)

Central Subway Project

San Francisco Municipal Transportation Agency (SFMTA)
San Francisco, California

Draft report delivered to FTA on August 22, 2012
Final report delivered to FTA on August 28, 2012

PMOC Contract No.: DTFT60-09-D-00015
Task Order No. 003
Project No.: DC-27-5139
Work Order Number: 006
OP Referenced: 40
CLIN 0003C

STV Incorporated, 225 Park Avenue South, New York, NY 10003
James Sampson, Program Manager
Voice – (303) 442-0708; Email – james.sampson@stvinc.com

EXECUTIVE SUMMARY

A. INTRODUCTION

The Project Management Oversight Contractor (PMOC) reviewed the San Francisco Municipal Transportation Agency's (SFMTA) Contingency Management Plan (CMP), revised draft dated May 2012, for the Central Subway Project (CSP). The May 2012 CMP, a section of the Grantee's Risk and Contingency Management Plan (RCMP), was received by the Federal Transit Administration (FTA) and the PMOC on July 17, 2012, and reviewed in conformance with FTA's Oversight Procedure (OP) 40, dated May 2010.

Contingency hold points and minimum cost contingency levels were established in the March 2009 Risk Assessment for Entry into Final Design (FD). The hold points and minimum levels were again reviewed and agreed to by FTA, SFMTA, and the PMOC at the Risk Refresh Workshop for Full Funding Grant Agreement (FFGA) in May 2011. Existing cost contingency has been monitored in accordance with these levels since entry into FD.

It became apparent, with the delay of the FFGA, that project development/risk mitigation, and resultant contingency usage, was no longer representative of the established contingency hold points and drawdown that was agreed to over three years ago. The Grantee proposed to revise the hold points and minimum cost contingency levels to more accurately reflect current project development and risk reduction. The PMOC recognized this need, and participated with the project in developing a cost contingency drawdown that reflects reduced risk. The Grantee's proposal (Attachment 1) is the subject of this report.

B. SUMMARY OF OBSERVATIONS/FINDINGS

In reviewing the revised CMP, the PMOC has taken into consideration the previously produced deliverables including the Risk Refresh Workshop for FFGA.

The general finding of this review is that the SFMTA May 2012 CMP satisfies the requirements of FTA's OP 40. Following are findings from the PMOC's review:

- The CMP is a living document requiring updates as the project develops and conditions affecting execution of the project evolve.
- The CMP revised hold points and minimum cost contingency levels were calculated utilizing risk considerations that reflect current project status and future cost contingency needs consistent with FTA guidelines. The calculations were achieved through a collaborative effort of FTA, SFMTA, and the PMOC.

C. RECOMMENDATIONS / PMOC OPINIONS

The PMOC recommends that FTA accept the project's May 2012 CMP with revised cost contingency hold points and minimum cost contingency levels contained therein.

It is recommended that the PMOC participate in a quarterly review of risk contingency mitigation activities, plans, and actions, including updated costs, contingency curves, and

drawdowns. The PMOC's findings/progress would be reported quarterly in the PMOC comprehensive monthly report.

TABLE OF CONTENTS

ATTACHMENTS:

Attachment 1 – CMP, dated May 2012, received July 17, 2012
Attachment 2 – Advanced Draft CMP dated 04/06/12
Attachment 3 – PMOC comments dated 04/21/12 on Advanced CMP
Attachment 4 – Draft CMP 2012, received May 17, 2012
Attachment 5 – PMOC meeting notes: CSP cost contingency recovery workshop held 05/25/12

I. INTRODUCTION

A. PROJECT DESCRIPTION

The CSP, Phase 2 of the Third Street Light Rail Project, consists of the design and construction of a 1.7-mile extension of Phase 1 of the Third Street light rail line from the Caltrain regional rail terminus at Fourth and King Streets to Chinatown. Three subway stations (Moscone, Union Square/Market Street, and Chinatown) and one surface station in the South of Market area will be constructed. With the addition of the CSP, the Third Street Light Rail Line will stretch 6.8 miles from the southeastern San Francisco neighborhoods of Visitation Valley and the Bayview to the dense urban core of the City, including the convention and museum districts, the Union Square retail and theater district, and Chinatown, bordered by the North Beach neighborhood and the Financial District.

The Project will operate as a surface double-track light rail in a primarily semi-exclusive median on Fourth Street between King and Bryant Streets. The rail line will transition to subway operation at a portal under the I-80 Freeway, between Bryant and Harrison Streets, and continue underground along Fourth Street in a twin-tunnel configuration, passing under the Bay Area Rapid Transit (BART)/SFMTA Market Street tube and continuing north under Stockton Street to the Chinatown Station (CTS).

B. RISK AND CONTINGENCY MANAGEMENT PLAN DEVELOPMENT

The early version of the SFMTA Project Management Plan (PMP), Revision 0, August 2009, contained Section 5, Risk Management. Included in the PMP's Risk Management section was a subsection called Contingency Management. A decision was made to create the stand-alone RCMP, which would be fully developed to incorporate risk identification, risk assessment and evaluation, allocation of risks, cost and schedule contingency management, and development of a secondary mitigation plan. The project proposed, and the PMOC recognized, that the cost contingency management section of the RCMP required updating to reflect current project status. A Draft CMP Update dated May 2012was submitted by SFMTA and received by FTA/the PMOC on July 17, 2012, and is the subject of this report.

II. PMOC'S REVIEW AND ANALYSIS

A. OP 40 SCOPE OF WORK

FTA's OP 40, Section 6.6, Development of Grantee's RCMP, provides guidance for the PMOC's review of the RCMP, which is to be structured as recommended in OP 40's Appendix G. The PMOC is to ensure that the RCMP considers all aspects of potential risk, including technical capacity and capability, project performance, and cost and schedule risk.

The PMOC's scope of work consisted of reviewing the May 2012 Draft CMP Update, a section of the RCMP.

B. HISTORY OF RISK DOCUMENTS

- The PMOC reviewed the SFMTA CSP Risk Documents for conformance with the requirements of PMP Operating Guidance No. 20 dated March 29, 2007. That guidance provided recommendation of including a Risk Management Plan (RMP) as part of the PMP.
- The PMOC produced a Risk Assessment spot report dated March 31, 2009.
- SFMTA submitted draft RMP No. 1 on May 29, 2009.
- SFMTA submitted drafts of the Project Execution Plan (PEP) and RMP on June 11, 2009.
- The PMOC reviewed the PEP and RMP and provided comments to SFMTA on July 6, 2009
- The PMOC transmitted a PMP spot report dated July 2009.
- FTA/PMOC received from SFMTA Revision 0 of the PEP and RMP on July 16, 2009.
- FTA/PMOC met with SFMTA to disposition Risk Document comments on August 13, 2009.
- SFMTA PMP Revision 0, August 14, 2009, including Section 5 Risk Management, was received.
- SFMTA submitted a revised PEP dated September 25, 2009, Revision 1a, on September 28, 2009, which incorporated PMOC comments.
- SFMTA submitted a revised PEP dated October 21, 2009, Revision 1a, and an RMP dated October 23, 2009, Revision 1a, both of which incorporated additional PMOC comments.
- The PMOC transmitted a spot report on its technical review of the Grantee's PEP, RMP, and Risk Mitigation Report on November 17, 2009.
- The RMP Revision 1a, October 23, 2009, was then further enhanced to include a more detailed section describing Contingency Management, which has now become the basis for the development of the RCMP.
- SFMTA PMP Revision 1, March 10, 2011
- SFMTA RCMP, Revision 1, April 01, 2011
- SFMTA RCMP, Revision 2, October 5, 2011
- *SFMTA Draft CMP, May 2012 Update (Attachment 1)*
- *SFMTA CMP Advance Draft received 04/06/2012 (Attachment 2)*

- *PMOC review comments dated 04/21/2012 on CMP Advance Draft (Attachment 3)*
- *SFMTA Draft CMP 2012, received May 17, 2012 (Attachment 4)*
- *PMOC meeting notes from Cost Contingency Recovery Workshop held 05/25/2012 (Attachment 5)*

C. COST CONTINGENCY

SFMTA has developed and implemented a cost contingency management process that ensures there is sufficient contingency available at key milestones for completion of the project; and that distribution, or consumption of total contingency, whether in the form of reservations or encumbrances is subject to certain restrictions and requirements in order to achieve this purpose.

The Minimum Cost Contingency amounts shown below, and their respective "Hold Points" contained in the RCMP were those agreed to and taken from the PMOC's "Final Report of Risk Assessment – Workshop #4," Chapter 6, March 31, 2009.

1a	Tunnels 100% Designed	$280 million
1b	UMS 100% Designed	$250 million
1c	FFGA Award and NTP Tunnels	$225 million
2	CTS/UMS Commence	$160 million
3	Demobilize Tunnels	$140 million
4	Complete Station to Platform Levels (CTS/MOS)	$60 million
5	Complete CTS/Tunnels Systems	$25 million
6	Revenue Service	0

The relevancy of the minimums and hold points have been an issue of discussion since February 2012 for a number of reasons including:

- Project development and utilization of cost contingency that superseded established amounts was not reflected in the drawdown during project implementation,
- The minimum contingency balances do not meet the minimum requirements of the RCMP, and
- Efforts to develop and implement a recovery plan to be immediately initiated in a manner acceptable to FTA.

To address these issues, the project developed revised hold points and minimum cost contingencies and provided a Draft copy of the CMP dated May 2012 to the PMOC for review and comment.

The PMOC has worked with the project to develop acceptable Minimum Cost Contingency levels and Hold Points. SFMTA provided an Advance Draft CMP, which was reviewed and commented on by the PMOC in April 2012. Additionally, the project conducted a Cost Contingency Workshop on May 25, 2012. The project presented risk-based contingency calculations that reflected current project development. These calculations were then used to develop the revised Minimum Cost Contingency levels and Hold Points, shown in Table 1 taken from SFMTA's May 2012 draft CMP. Proposed changes are in "Red."

Table 1: Minimum Cost Contingency

	Hold Points	QTR	Minimum Contingency Level ($Millions)	Proposed Minimum Contingency Level ($Millions)
1a	Tunnels 100% Designed	1Q11	$280	$280
1b	~~UMS~~ *CTS*100% Designed	4Q11	$250	*$240*
1c	~~FFGA Award and NTP Tunnels October 2011b~~ *40% Bid (Tunnel and CTS)*	2Q12	$225	*$200*
1d	*FFGA Award*	3Q12	-	*$180*
2	CTS/UMS Commence October 2012	4Q12	$160	$160
3	Demobilize Tunnels January 2014	2Q14	$140	$140
4	Complete Station to Platform Levels *January* 2017 (CTS/MOS)	1Q17	$60	$60
5	Complete CTS/Tunnels Systems Installation *July 2018*	3Q18	$25	$25
	Revenue Service	4Q18	0	0

III. CONCLUSIONS

The PMOC reviewed SFMTA's CMP, revised draft dated May 2012, for the CSP. The CMP, a section of the Grantee's RCMP, was reviewed in conformance with FTA's OP 40, dated May 2010.

A. SUMMARY OF OBSERVATIONS/FINDINGS

In reviewing the revised CMP, the PMOC has taken into consideration the previously produced deliverables including the Risk Refresh Workshop for FFGA.

The general finding of this review is that the SFMTA May 2012 CMP satisfies the requirements of FTA's OP 40. Following are findings from the PMOC's review:

- The CMP is a living document requiring updates as the project develops and conditions affecting execution of the project evolve.
- The CMP revised hold points and minimum cost contingency levels were calculated utilizing risk considerations that reflect current project status and future cost contingency needs consistent with FTA guidelines. The calculations were achieved through a collaborative effort of FTA, SFMTA and the PMOC.

B. RECOMMENDATIONS / PMOC OPINIONS

The PMOC recommends that FTA accept the project's May 2012 CMP with revised cost contingency hold points and minimum cost contingency levels contained therein.

It is recommended that the PMOC participate in a quarterly review of risk contingency mitigation activities, plans, and actions, including updated costs, contingency curves, and drawdowns. The PMOC's findings/progress would be reported quarterly in the PMOC comprehensive monthly report.

APPENDIX A: LIST OF ACRONYMS

CMP	Contingency Management Plan
CSP	Central Subway Project
CTS	Chinatown Station
FD	Final Design
FFGA	Full Funding Grant Agreement
FTA	Federal Transit Administration
MOS	Moscone Station
NTP	Notice to Proceed
OP	Oversight Procedure
PEP	Project Execution Plan
PMOC	Project Management Oversight Contractor
PMP	Project Management Plan
RCMP	Risk and Contingency Management Plan
RMP	Risk Management Plan
SFMTA	San Francisco Municipal Transportation Agency
UMS	Union Square Market Street (Station)

ATTACHMENT 1

central T subway

Connecting people. Connecting communities.

Transmittal

CS Transmittal No. 2039

To:	Jeff Davis FTA 201 Mission Street, Suite 1650 San Francisco, CA 94105	**From:**	John Funghi
		Project No./Contract No.:	M544.1, CS-149
		Task No./Title:	1-4.02 Contingency Management
		Project Phase:	
Date:	July 13, 2012	**Subject:**	Contingency Management Plan – 2012 Update

Reference: CS Transmittal No. 2001, dated 5/14/12, re: Contingency Management Plan – 2012 Update

Sent via:	☐ *mail*	☐ *overnight*	☐ *messenger*	☐ *hand-delivered*
	☐ *fax – No:*		☒ *email – Address:*	jeffrey.s.davis@dot.gov

The following:			***For your:***	***Due date:***
☐ *copy of letter/memo*	☐ *estimate*		☒ *information/use*	N/A
☐ *minutes/agenda*	☐ *schedule*		☐ *action*	
☐ *report*	☒ *deliverable*		☐ *review/comment*	
☐ *presentation*	☐ *review comment form*		☐ *response to comment*	
☐ *cd / dvd*	☐ *no review comment form*		☐ *concurrence*	
☐ *specifications*	☐ *review comments*		☐ *incorporation of comments*	
☐ *half-size drawings*	☐ *response to comments*		☐ *verification*	
☐ *full-size drawings*	☐ *concurrence with response*		☐ *signature*	
☐ *sketches/maps/layouts*	☐ *verification of incorporation*		☐ *acceptance/approval*	
☐ *reference material*	☐ *acceptance/approval*		☐ *other* _____	
☐ *other* _____			_____	

Item No.	***Copies***	***Description***	***Rev. No.***	***Date***
1	1	Contingency Management – 2012 Update (DRAFT)		May 2012

If enclosures are not as noted, kindly notify us at once.

Remarks: Attached please find revised draft of Contingency Management – 2012 Update.

John Funghi
Program Director

JF:smk

cc: David Kuehn, STV (w/attachments) david.kuehn@stvinc.com
Brad Lebovitz, STV (w/attachments) bradley.lebovitz@stvinc.com
Eric Stassevitch, CSP (w/attachments)
CS File No. M544.1.5.0810

Contingency Management – 2012 Update

To date, Contingency Management has been structured on baseline documents developed from the FTA Risk Assessment performed in March 2009 prior to entry into Final Design. A FTA Risk Refresh was performed in May 2011 in preparation for entering into a FFGA. At the time, several significant changes had occurred on the Program; however, no changes were made to the Contingency Drawdown Curves for both cost and schedule. Minimum cost contingency levels established by the baseline documents in early 2009 require updating at this phase of the project to reflect current project status. The Program is advocating the need for changes to the baseline documents' milestones, hold points and minimum contingency levels for reasons stated within.

Contributing factors necessitating the need for reexamining the original milestones hold points and drawdown curves are: Changes to project configurations, delays to design submittals, re-sequencing of contract package procurement, delay to FFGA, and improved risk profiles for tunnel and station contracts.

Table 1 exhibits the existing agreed to Milestones and Hold point that are an integral part of the Program's Risk and Contingency Management Plan (RCMP), the timing of the milestone (QTR) reflects the 2012 update of the RCMP. Proposed changes are shown by in italicized Red Text and new column for proposed minimum levels.

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	Hold Points	QTR	Minimum Contingency Level ($Millions)	Proposed Minimum Contingency Level ($Millions)
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Contingency Management – 2012 Update

Close examination of Contingency levels and rational utilized for minimum levels reveals that the original plan has a minimum of $225M at the time of FFGA. Expectations would have been that the tunnel bid was known and the only physical work completed or in progress would be the Advance Utility Relocations contracts. As can be seen from excerpts of the March 31, 2009 Risk Assessment Report (see below) prepared in advance of recommending entering the Final Design Phase, this rational was based on the assumption that the Tunnel bid would represent 40% of the total bid for all projects, thus addressing a significant level of risks.

Although the station designs would have been complete, the actual bid numbers would not have been known, only 100% estimates. Presumably this minimum value ($225M) addressed two points, maintaining the recommended 15% level of contingency at the time of FFGA and having ample contingency to address market risks associated with the underground station work in the City of San Francisco.

The next Hold point is the commencement of CTS and UMS, which would indicate that the bids are in for these two high risk underground station constructions. What can be seen is an expectation for a significant use of contingency as the minimum level drops precipitously to $160M. With the exception of some advance work being started on the TBM launch box (a low risk item) no other physical work was anticipated. This would imply an anticipated use of contingency to address the actual bid values for the two significant underground stations that were deemed extremely risky due to the use of SEM construction, the physical location of both stations, the many constraints imposed, the concern that there would be a limited number of bona fide bidders and most Contractors would be leery of doing business in the City of San Francisco because of perception of onerous requirements in City contracts and most importantly the potential for catastrophic impacts to surrounding buildings and businesses.

Implementation of the recommended changes to milestones and hold points, the program will be at the exact same minimum contingency level as shown in the table above for the same given point in time, commencement of the two underground stations. The program sees the need to adjust the hold points and minimum levels in approaching this strategic point in time due to contributing factors noted above. Specifically, the delay in design submittals, and FFGA, combined with the re- sequencing of the contract procurement; has not only changed the order in which previously identified key strategic events occur, but has necessitated the reevaluation and heightened importance of hold points as they relate specifically to contingency draw down. Examining these against the backdrop of rational utilized to establish the minimum levels as outlined above provides the necessary justification to rationalize the change in contingency draw down, milestones and hold points.

Contributing factor to adjust milestones	Resulting justification for use of contingency
Delays to design submittals	Constrains use of contingency for intended purpose
Re-sequencing of contract package procurement	Advances confirmation of high risk cost items
Delay to FFGA	Allows use of contingency for intended purpose
Improved risk profiles for tunnel and station contracts	Allows use of contingency for intended purpose

Contingency Management – 2012 Update

Changing the definition of Hold point #1b is significant in bringing forth a revised definition of the 40% of Bid. This should include the Tunnel Contract and CTS contract. Representing nearly 50% of the work, having known values, significant risk has been addressed, justifies changing this hold point definition. In addition, market risk has been incorporated in the estimates of the Stations and combined with the knowledge of the CTS bid, use of Contingency to make up the increased estimates for market risk is consistent with the original intent but comes at a different point in time. Concerns are itemized below combined with the program mitigation

Concerns that would contribute to Market Risk	Program Mitigation Measure to Address Risks
Use of SEM construction	Changes to project configurations – Lower CTS and eliminate bulb at UMS
The physical location of both stations	Special Provisions to address limitations; Additional cost included in estimates
The many constraints imposed	Included additional costs for constraints
Limited number of bona fide bidders	Successful Outreach efforts – Good Market Conditions – Large Interested Turnouts
Contractors would be leery of doing business in the City of San Francisco because of perception of onerous requirements in City contracts	Overhaul of General Provisions specific for Central Subway; – 15 Major Contractors combined for Tunnel bid – Good indication of interest
The potential for catastrophic impacts to surrounding buildings and businesses.	Extensive Building Instrumentation and Monitoring as well as compensation grouting to address potential settlement issues included in costs

The justification for these changes can be augmented by examining the rational for the establishment of the original milestones and hold points and then addressing the contributing factors above and how they preserve the integrity of the original contingency management objects for addressing those risks, but justifiably can be refined to better address the current project circumstances and status.

Muni Central Subway Project, San Francisco Page 15 of 87 Risk and Contingency Analysis and Recommendations March 31, 2009 – Annotations address how proposed change preserves intent

Milestone #3 - 40% through Bid and Award

- The group agreed to delete the links from station contract awards because they are not a requirement for this milestone to occur. *At the time 40% bid was presumed to be the tunnel contract.*
- The only activity directly related to this activity is the award of the tunnels contract. *Current projections are that the combination of Tunnel and CTS will represent more than 40% of Bid.*
- The changes brought this milestone date back almost a year, to September 13, 2011. *The inclusion of CTS in contracts considered part of the 40% moves this milestone later in time by nine months.*
- Milestone #2 (FFGA) and #3 (40% Bid) occur at the same time. This is because SFMTA intends to award the tunnels contract to allow the procurement of the tunnel boring machines (TBM's)

under an LONP prior to an FFGA. *The occurrence of the two milestones still is occurring at nearly the same time, and the rational for procuring the TBMs remains, but not as part of an LONP. Milestone #3 (40% Bid) however now occurs prior in time to Milestone #2 (FFGA) necessitating a change in numbering and minimum contingency value.*

- The tunnels contract would require a "break clause" and require identification of "compensation" in the bid to protect SFMTA in the event that FFGA is not awarded, Funds could not be sourced locally and the contract had to be terminated. *Incorporated as part of the contract documents*
- It was noted that there have been projects in the recent past that have been cancelled prior to FFGA. *Still applicable - has the same effect on both existing and proposed changes.*
- It would be likely that compensation for cancellation of the contract would be significant as costs would include the TBM's themselves, overheads expended and loss of profit expected from the contract works. *Still applicable - has the same effect on both existing and proposed changes*
- The RFP would also likely have to include a "costs for delay" in anticipation of delivery of the TBM's being held up awaiting construction of the launch box linked to a late award of the construction contract following the FFGA award. *Launch Box is subject of an approved LONP and scope of work associated with NTP 2, issued March 14, 2012 prior to FFGA award negating the impact of this perceived risk and "cost of delay". This issue has been altered and work associated with NTP 3 now becomes the risk, should FFGA be delayed to a point that the MPS would be impacted.*

Milestone#4 20% Construction

- Agreed date of October 24, 2012 - *January 2013 (utilizing rational noted below)*
- Project milestones are reflective of expected cash flow. At this stage the TBM's have been delivered, a good proportion of utility relocations have been undertaken and there has been a significant draw down on design costs with PM/CM staffing costs weighing in on cash flow expenditure. *TBMs expected to be delivered in December 2012, advance utility relocations will be complete, Final Design costs will be known and PM/CM staffing cost are currently well below plan.*

Milestone #5 50% Construction

- Agreed date of December 31, 2013.
- The reason there is only just over one year between 50% and 75% construction is because in this period tunnel excavation through to disassembling the TBM's is completed and the construction of all the station structures comprising mining, cavern construction and station platforms is well advanced with CTS progressed to head house excavation.

Milestone #6 75% Construction

- Agreed date of January 20, 2016.

Contingency Management – 2012 Update

Milestone #7 90% Construction

- Agreed date of May 4, 2017.

4.4.2 FTA Hold Points

"Hold" points are defined as points in time, which may be the same as project milestones but are more likely to be associated with strategic events where significant risk exposure is reduced. At "Hold" points minimum contingency amounts for project cost contingency and project float contingency are established and form ceilings below which the implementation of mitigation is believed unavoidable if the project is to be completed to the budget and agreed Revenue Operations Date.

Below are the agreed upon hold points:

1a.Tunnels 100% Design May 2010

1b. UMS Station 100% Design June 2011

1c. FFGA Award and NTP Tunnels October 2011

2. CTS/UMS stations commence works on site October 2012

3. Demobilize Tunnels October 2013

4. Complete Station to platform levels (CTS/MOS) October 2015

5. Complete CTS/Tunnels Systems Installation June 2017

The following discussions at Workshop #4 were pertinent to the agreement of the "Hold" points:

- The PMOC proposed at "Hold" point 1, after bid and award of the tunnels contract and following award of the FFGA– Milestone #2 and #3–a minimum level of $250 million in contingency should be retained

- After lengthy discussion it was agreed that having the first hold point at the award of the FFGA and holding $250 million in contingency until this time was an excessive amount to hold as a minimum through virtually all of final design and after award of the tunnels package. Two intermediate "Hold" points were agreed to recognize a gradual draw down against contingency during design. *This gradual draw down can be performed utilizing lower minimum levels and still preserve the intent of covering identified risks.*

- Hold" point 1a was taken to be when tunnel design was complete targeted for May 2010. This "Hold" point was added because there are expected to be no major changes to the design of tunnels from this major design element from this point forwards. The contingency requirement for this hold point was set at $280 million. *This hold point was met and minimum levels maintained.*

Contingency Management – 2012 Update

- "Hold" point 1b was taken to be at the finish of UMS station design. This hold point is at the completion of all station design, after which the risk of major changes in station design is most unlikely. The contingency requirement for this hold point was set at $250 million. *The risk of major changes is the station designs have been mitigated with the submittal of the 100%. However, significant cost increase not related to scope changes but due to costs that address perceived market risks due to special provisions and physical constraints required a greater use of contingency than originally planned at this point in time. This increase in cost was anticipated but later in time.*

- Minimum contingency at "Hold" point 1c (FFGA award) was agreed at $225 million reflecting a gradual draw down throughout final design, preparation of bid documents, and the RFP process. The tunnels contract would also be bid and awarded at this point with the manufacturing of the TBM under way. *More information will be known about program costs to justify a lowering of the minimum at this strategic point in time, specifically, nearly 50% of the bid will be known and lower risk profiles of remaining contracts justifies not holding such an excessive amount at this point.*

Muni Central Subway Project, San Francisco Page 16 of 87 Risk and Contingency Analysis and Recommendations March 31, 2009

A Cost Contingency Recovery Workshop was held on May 25, 2012 in accordance with Program Procedures PCP 06 to address that cost contingency had fallen below the minimum level and to develop a plan. The results of the workshop can be found in Figure 1.

The workshop revealed that FFGA guidance does not address the contingency level calculations of programs that have large expenditure prior to FFGA hence requiring holding a higher level of contingency based on Program's budgets, rather that percentage of cost to complete which takes into account the cost of reducing previously identified risks. The analysis indicates that the Program will have a 17% contingency at the time of FFGA as compared to the recommended 15%, when the calculations are made on the "risk" associated with the remaining work to be performed.

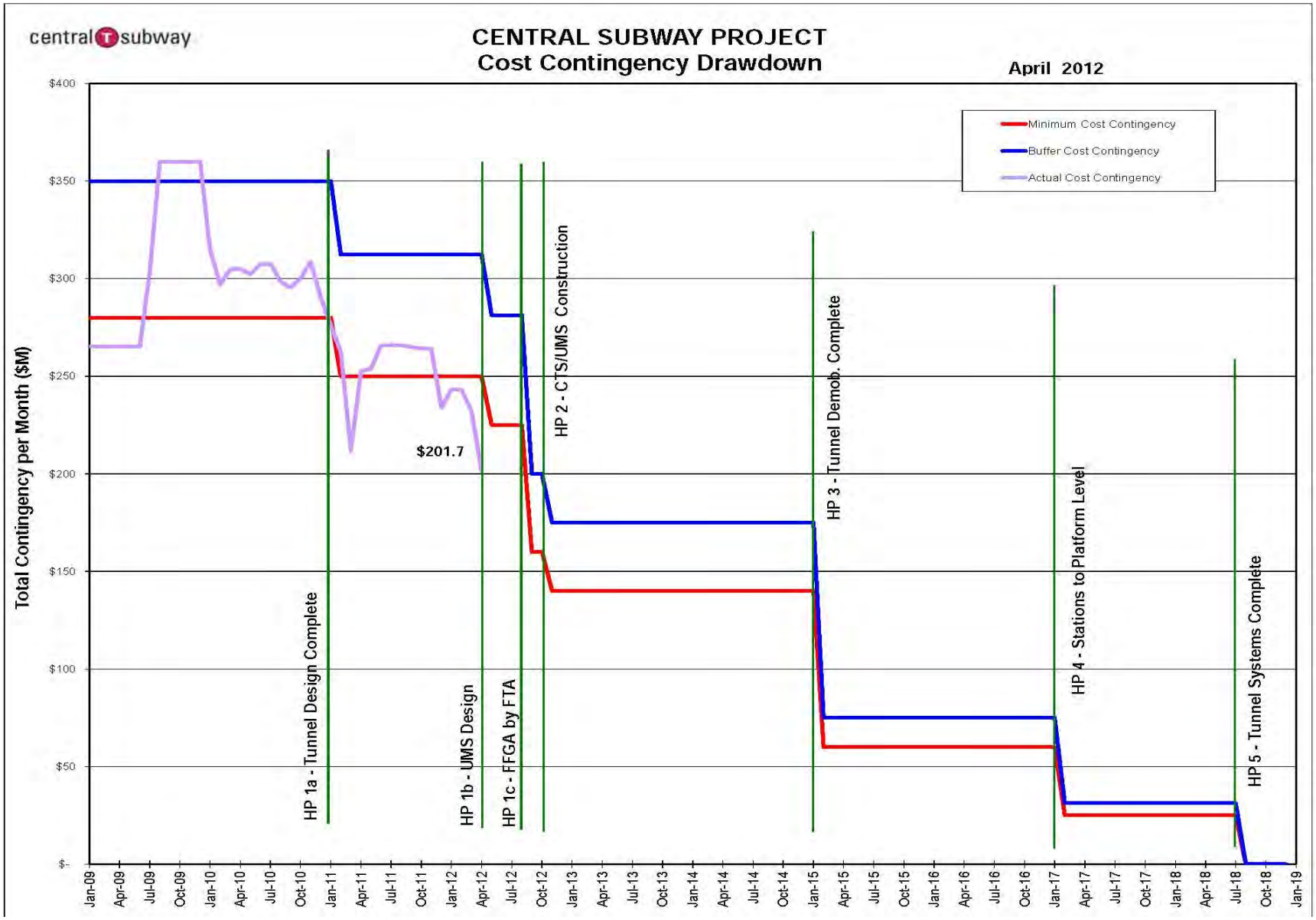
Taken together with the analysis of the milestones and hold points, the workshop resulted in recommending the revised levels of minimum contingency at the refined definitions of milestones and holdpoints. Figure 2 shows the current status of contingency below the established minimums. Figure 3 illustrates the new minimum contingency levels together with the refined definitions.

FIGURE 1

Analysis of Contingency Levels Based on Total Cost versus Cost to Complete as of the end of April 2012

	Project Cost Elements	CCE (YOE)	Expenditures to Date	Cost to Complete	PMOC DAK/BL			CENTRAL SUBWAY		
		As of April 2012	In Millions	In Millions	Recommended Contingency %	Total Contingency Dollar Calculated from CCE (YOE)	Total Contingency Dollar Calculated from Cost to Complete	Recommended Contingency %	Total Contingency Dollar Calculated from CCE (YOE)	Total Contingency Dollar Calculated from Cost to Complete
	Contract 1250 / UR1	11.4	11.3	0.1	1.0%	0.114	0.114	3.0%	0.342	0.342
	Contract 1251 / UR2	19.4	17.1	2.3	2.0%	0.388	0.388	2.0%	0.388	0.388
	Contract 1252 / Tunnel	233.5	13.2	220.3	14.0%	32.69	30.842	14.0%	32.69	30.842
	Contract 1253 / UMS	210		210	15.0%	31.5	31.5	17.0%	35.7	35.7
	Contract 1254 / CTS	235		235	17.0%	39.95	39.95	17.0%	39.95	39.95
	Contract 1255 / MOS	129		129	16.0%	20.64	20.64	14.0%	18.06	18.06
	Contract 1256 / STS	125		125	14.0%	17.5	17.5	15.0%	18.75	18.75
	Other Construction	17	3	14	10.0%	1.7	1.4	10.0%	1.7	1.4
						0	0		0	0
60	ROW	36	14	22	10.0%	3.6	2.2	8.0%	2.88	1.76
70	LRV	24		24	10.0%	2.4	2.4	10.0%	2.4	2.4
80										
	Preliminary Design	46.2	46.2	0	0.0%	0	0	0.0%	0	0
	Final Design	76.3	51.6	24.7	10.0%	7.63	2.47	5.0%	3.815	1.235
	Program Management	178.9	34.3	144.6	8.0%	14.312	11.568	8.0%	14.312	11.568
	CA/CM	15.5	2.8	12.7	5.0%	0.775	0.635	5.0%	0.775	0.635
	Insurance	6.8	5.7	1.1	0.0%	0	0	0.0%	0	0
	Legal	6.2	0.7	5.5	20.0%	1.24	1.1	20.0%	1.24	1.1
	Survey	0.3	0.2	0.1		0	0		0	0
	Start Up	7	0	7	20.0%	1.4	1.4	20.0%	1.4	1.4
	Subtotal Base	1377.5	200.1	1177.4		1,377.5	1,177.4		1,377.5	1,177.4
	Alloc Cont	122.8				175.8	164.1		174.4	165.5
	Unallocated Contingency	78				25.0	36.7		26.4	35.3
	Total Current Contingency	200.8		200.8		200.8	200.8		200.8	200.8
		1578.3		1378.2		1,578.3	1,378.2		1,578.3	1,378.2
	Percentage of Base					14.6%	17.1%		14.6%	17.1%

FIGURE 2


central subway
CENTRAL SUBWAY PROJECT
Cost Contingency Drawdown
April 2012
Minimum Cost Contingency
Buffer Cost Contingency
Actual Cost Contingency
Total Contingency per Month ($M)
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$100
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HP 1a - Tunnel Design Complete
HP 1b - UMS Design
HP 1c - FFGA by FTA
HP 2 - CTS/UMS Construction
HP 3 - Tunnel Demob. Complete
HP 4 - Stations to Platform Level
HP 5 - Tunnel Systems Complete
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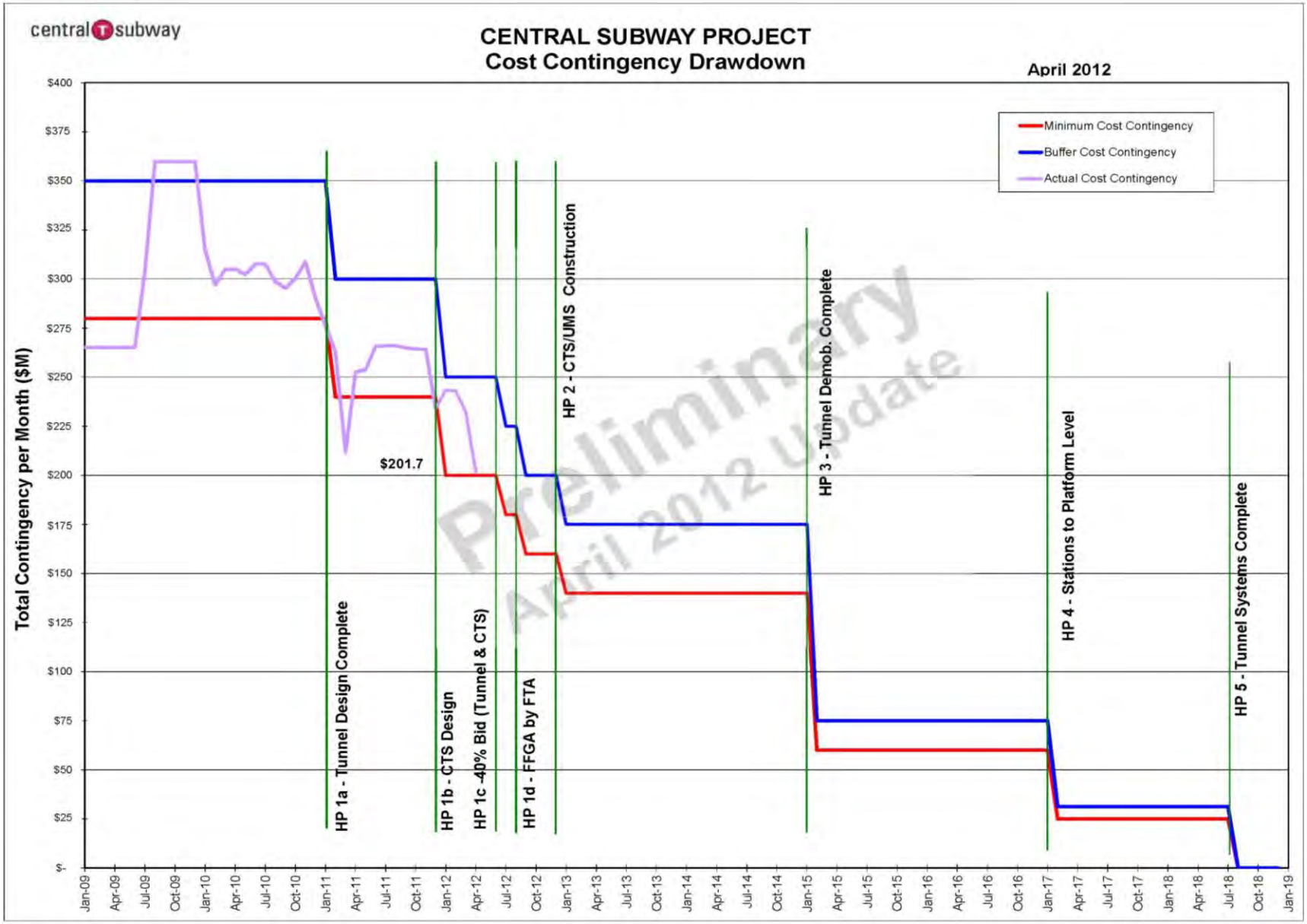
FIGURE 3



Contingency Management – 2012 Update

From: Stassevitch, Eric [mailto:Eric.Stassevitch@sfmta.com]
Sent: Friday, April 06, 2012 1:09 PM
To: David A. Kuehn
Cc: Funghi, John
Subject: Contingency Draw Down Revisions - Draft

David;

Advanced copy for your review, we plan to utilize this wording in the Update of the RCMP. Your comments would be appreciated.

-Eric

Contingency Management – 2012 Update

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Contingency Management – 2012 Update

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Re-sequencing of contract package procurement	Advances confirmation of high risk cost items
Delay to FFGA	Allow use of contingency for intended purpose
Improved risk profiles for tunnel and station contracts	Allow use of contingency for intended purpose

Contingency Management – 2012 Update

Changing the definition of Hold point #1b is significant in bringing forth a revised definition of the of 40% of Bid. This should include the Tunnel Contract and CTS contract. Representing nearly 50% of the work, having known values, significant risk has been addressed, justifies changing this hold point definition. In addition, market risk has been incorporated in the estimates of the Stations and combined with the knowledge of the CTS bid, use of Contingency to make up the increased estimates for market risk is consistent with the original intent but comes at a different point in time. Concerns are itemized below combined with the program mitigation

Concerns that would contribute to Market Risk	**Program Mitigation Measure to Address Risks**
Use of SEM construction	Changes to project configurations–Lower CTS and eliminate bulb at UMS
The physical location of both stations	Special Provisions to address limitations; Additional cost included in estimates
The many constraints imposed	Included additional costs for constraints
Limited number of bona fide bidders	Successful Outreach efforts–Good Market Conditions–Large Interested Turnouts
Contractors would be leery of doing business in the City of San Francisco because of perception of onerous requirements in City contracts	Overhaul of General Provisions specific for Central Subway; –15 Major Contractors combined for Tunnel bid–Good indication of interest
Concerns that would contribute to Market Risk	**Program Mitigation Measure to Address Risks**
The potential for catastrophic impacts to surrounding buildings and businesses.	Extensive Building instrumentation and Monitoring as well as compensation grouting to address potential settlement issues included in costs

The justification for these changes can be augmented by examining the rational for the establishment of the original milestones and hold points and then addressing the contributing factors above and how they preserve the integrity of the original contingency management objects for addressing those risks, but justifiably can be refined to better address the current project circumstances and status.

Muni Central Subway Project, San Francisco Page 15 of 87 Risk and Contingency Analysis and Recommendations March 31, 2009 – Annotations address how propose change preserve

Milestone #3 40% through Bid and Award

- The group agreed to delete the links from station contract awards because they are not a requirement for this milestone to occur. At the time 40% bid was presumed to be the tunnel contract.
- The only activity directly related to this activity is the award of the tunnels contract. Current projections are that the combination of Tunnel and CTS will represent more than 40% of Bid.
- The changes brought this milestone date back almost a year, to September 13, 2011. No longer significant due to the change in contracts considered part of the 40%.
- Milestone #2 (FFGA) and #3 (40% Bid) occur at the same time. This is because SFMTA intends to award the tunnels contract to allow the procurement of the tunnel boring machines (TBM's)

Contingency Management – 2012 Update

under an LONP prior to an FFGA. The occurrence of the two milestones still is occurring at nearly the same time, and the rational for procuring the TBMs remains but not as part of an LONP. Milestone #3 (40% Bid) however now occurs prior in time to Milestone #2 (FFGA) necessitating a change in numbering and minimum contingency value.

- The tunnels contract would require a "break clause" and require identification of "compensation" in the bid to protect SFMTA in the event that FFGA is not awarded, Funds could not be sourced locally and the contract had to be terminated. Incorporated as part of the contract documents
- It was noted that there have been projects in the recent past that have been cancelled prior to FFGA. Still applicable - has the same effect on both existing and proposed changes.
- It would be likely that compensation for cancellation of the contract would be significant as costs would include the TBM's themselves, overheads expended and loss of profit expected from the contract works. Still applicable - has the same effect on both existing and proposed changes
- The RFP would also likely have to include a "costs for delay" in anticipation of delivery of the TBM's being held up awaiting construction of the launch box linked to a late award of the construction contract following the FFGA award. Launch Box is subject of an approved LONP and scope of work associated with NTP 2, issued March 14, 2012 prior to FFGA award negating the impact of this perceived risk and "cost of delay"

Milestone#4 20% Construction

- Agreed date of October 24, 2012 - January 2013 (utilizing rational noted below)
- Project milestones are reflective of expected cash flow. At this stage the TBM's have been delivered, a good proportion of utility relocations have been undertaken and there has been a significant draw down on design costs with PM/CM staffing costs weighing in on cash flow expenditure. TBMs expected to be delivered in December 2012, advance utility relocations will be complete, Final Design costs will be known and PM/CM staffing cost are currently well below plan.

Milestone #5 50% Construction

- Agreed date of December 31, 2013.
- The reason there is only just over one year between 50% and 75% construction is because in this period tunnel excavation through to disassembling the TBM's is completed and the construction of all the station structures comprising mining, cavern construction and station platforms is well advanced with CTS progressed to head house excavation.

Milestone #6 75% Construction

- Agreed date of January 20, 2016.

Milestone #7 90% Construction

- Agreed date of May 4, 2017.

Contingency Management – 2012 Update

4.4.2 FTA Hold Points

'Hold' points are defined as points in time, which may be the same as project milestones but are more likely to be associated with strategic events where significant risk exposure is reduced. At 'Hold' points minimum contingency amounts for project cost contingency and project float contingency are established and form ceilings below which the implementation of mitigation is believed unavoidable if the project is to be completed to the budget and agreed Revenue Operations Date.

Below are the agreed upon hold points:

1a.Tunnels 100% Design May 2010

1b. UMS Station 100% Design June 2011

1c. FFGA Award and NTP Tunnels October 2011

2. CTS/UMS stations commence works on site October 2012

3. Demobilize Tunnels October 2013

4. Complete Station to platform levels (CTS/MOS) October 2015

5. Complete CTS/Tunnels Systems Installation June 2017

The following discussions at Workshop #4 were pertinent to the agreement of the 'Hold' points:

- The PMOC proposed at 'Hold' point 1, after bid and award of the tunnels contract and following award of the FFGA Milestone #2 and #3 a minimum level of $250 million in contingency should be retained

- After lengthy discussion it was agreed that having the first hold point at the award of the FFGA and holding $250 million in contingency until this time was an excessive amount to hold as a minimum through virtually all of final design and after award of the tunnels package. Two intermediate 'Hold' points were agreed to recognize a gradual draw down against contingency during design. This gradual draw down can be performed utilizing lower minimum levels and still preserve the intent of covering identified risks.

- Hold' point 1a was taken to be when tunnel design was complete targeted for May 2010. This 'Hold' point was added because there are expected to be no major changes to the design of tunnels from this major design element from this point forwards. The contingency requirement for this hold point was set at $280 million. This hold point was met and minimum levels maintained.

- 'Hold' point 1b was taken to be at the finish of UMS station design. This hold point is at the completion of all station design, after which the risk of major changes in station design is most unlikely. The contingency requirement for this hold point was set at $250 million. The risk of major changes is the station designs have been mitigated with the submittal of the 100%. However, significant cost increase not related to scope changes but cost the addressed perceived market risks due to special

Contingency Management – 2012 Update

provisions and physical constraints required a greater use of contingency than originally planned at this point in time. This increase in cost was anticipated but later in time.

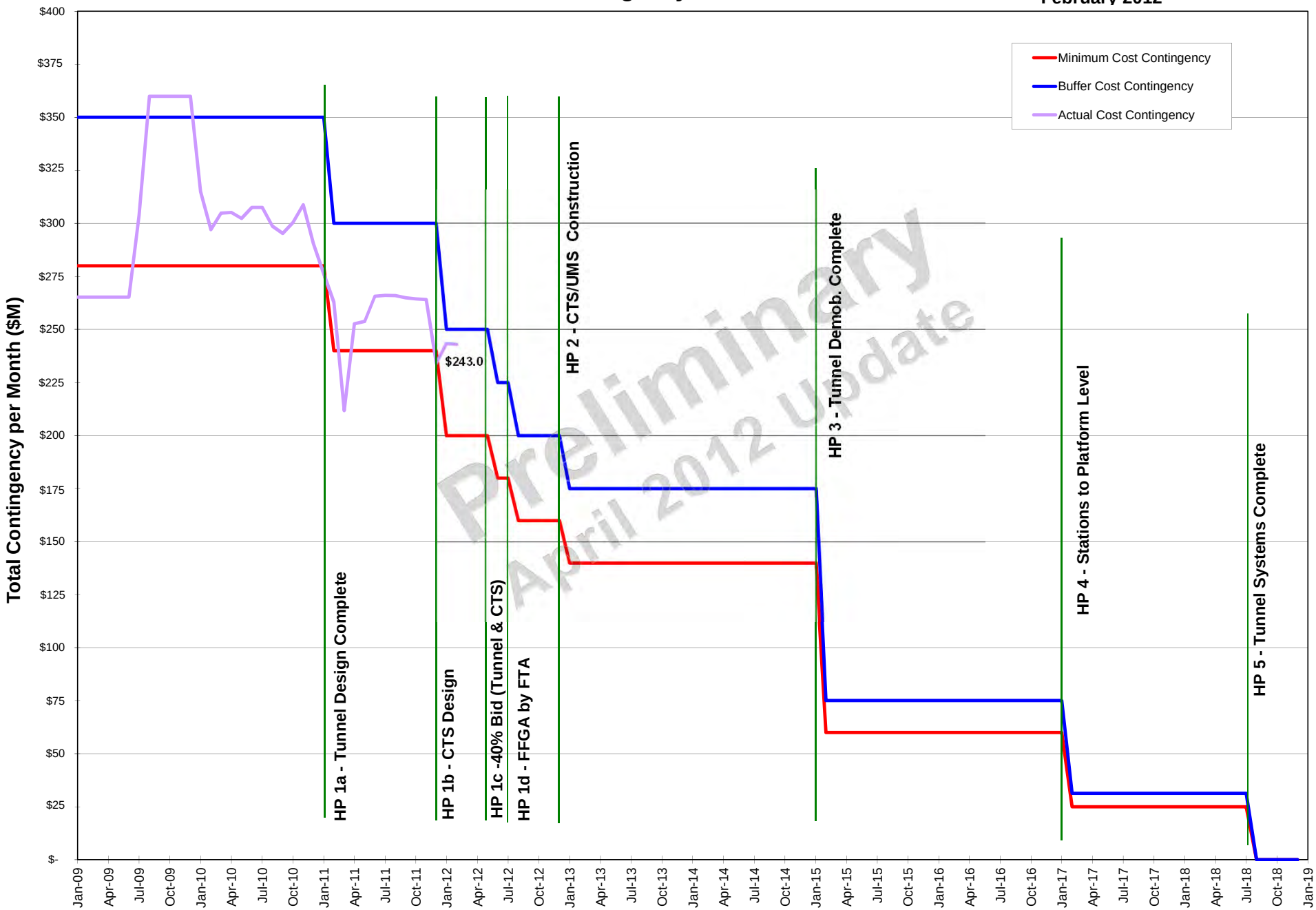
- Minimum contingency at "Hold" point 1c (FFGA award) was agreed at $225 million reflecting a gradual draw down throughout final design, preparation of bid documents, and the RFP process. The tunnels contract would also be bid and awarded at this point with the manufacturing of the TBM under way. More information will be known about program costs to justify a lowering of the minimu at this strategic point in time, specifically, nearly 50% of the bid will be known and lower risk profiles of remaining contracts justifies not holding such an excessive amount at this point.

Muni Central Subway Project, San Francisco Page 16 of 87 Risk and Contingency Analysis and Recommendations March 31, 2009

central subway

CENTRAL SUBWAY PROJECT
Cost Contingency Drawdown

February 2012



ATTACHMENT 3

From: David A. Kuehn
To: Stassevitch, Eric
Cc: Funghi, John
Subject: RE: Contingency Draw Down Revisions - Draft
Date: Saturday, April 21, 2012 10:24:38 AM
Attachments: SCAN3046_000.pdf

Eric:
We have reviewed the Draft proposed cost contingency draw down revisions. We cannot support, justify, or recommend the hold points or contingency minimum amounts proposed to the FTA. The PMOC cannot recommend anything less than a minimum contingency level of $225M at FFGA predicated on the attached table, based on our opinion of contingencies necessary during construction. The project has already consumed over 30% of the original contingency for design development of 2 contracts (tunnel and CTS) and bid of 1 contract (tunnel). The original hold point 1b minimum contingency level of $250 million was based on 3 contract bids (UR#1, UR#2,tunnel) and the 3 underground stations 100% designed and the 100% cost estimate for the 3 stations included in the BCE/CCE. The project has not yet achieved this milestone.
Any further reduction to the minimum contingency level prior to FFGA would not be consistent with the FTA recommended minimums, nor the establishment of these levels through the risk assessment process.
DAK.

From: Stassevitch, Eric [mailto:Eric.Stassevitch@sfmta.com]
Sent: Friday, April 06, 2012 1:09 PM
To: David A. Kuehn
Cc: Funghi, John
Subject: Contingency Draw Down Revisions - Draft

David;

Advanced copy for your review, we plan to utilize this wording in the Update of the RCMP. Your comments would be appreciated.

-Eric

Recommended Allocated contingency amounts at Entry into FFGA. [assuming all station are bid and 1256 Surface, Trackwork is close to bidding with 100% Estimate.

CENTRAL SUBWAY PROJECT SAN FRANCISCO, CA	**ALLOCATED & UNALLOCATED CONTINGENCY RECOMMENDED AMOUNTS**		
Current Estimated & Bid Cost Used in February 2012 PCR		Date: April 10, 2012	
All cost are Year of Expenditure CONTRACT PACKAGES	Current Est of YOE or Bid Amount Excluding Cont	PMOC Recommended Allocated Cont Percentages	PMOC Recommended Allocated Cont Amounts
1250 CS01 Utility Relocation #1	11,421,972	0.00%	0
1250 CS01 Utility Relocation #2	18,348,496	10.00%	1,834,850
1252 CS03 Guideway Tunnel	233,584,015	10.00%	23,358,402
1255 CS04 Moscone Station	117,274,852	11.00%	12,900,234
1253 CS05 Union Square/Market Street Station	189,095,676	12.00%	22,691,481
1254 CS06 Chinatown Station and Crossover Cavern	234,142,275	12.00%	28,097,073
1256 CS08 Surface, Trackwork and Systems	125,228,453	9.00%	11,270,561
Others	13,701,842	10.00%	1,370,184
Construction Total SCC 10 to SCC 50	942,797,581	10.77%	101,522,784
60 ROW, LAND, EXISTING IMPROVEMENTS	36,355,576	10.00%	3,635,558
70 VEHICLES	24,108,712	10.00%	2,410,871
80 PROFESSIONAL SERVICES	336,941,986	7.50%	25,270,649
TOTAL FOR SCC 10-80	**1,340,203,855**	**9.91%**	**132,839,862**
90 UNALLOCATED CONTINGENCY		7.85%	105,256,283
TOTAL PROJECT CONTINGENCY	**238,096,145**	**17.77%**	**238,096,145**
TOTAL PROJECT BUDGET COST	**1,578,300,000**		
check	1,578,300,000	17.77%	

central T subway

Connecting people. Connecting communities.

Transmittal

CS Transmittal No. 2001

To:	Jeff Davis	**From:**	John Funghi
	FTA	**Project No./Contract No.:**	M544.1, CS-149
	201 Mission Street, Suite 1650	**Task No./Title:**	1-4.02 Contingency Management
	San Francisco, CA 94105	**Project Phase:**	
Date:	May 14, 2012	**Subject:**	Contingency Management Plan – 2012 Update
Reference:			

Sent via:	☐ *mail*	☐ *overnight*	☐ *messenger*	☐ *hand-delivered*
	☐ *fax – **No:***		☒ *email – **Address:***	jeffrey.s.davis@dot.gov

The following:		***For your:***	***Due date:***
☐ *copy of letter/memo*	☐ *estimate*	☒ *information/use*	N/A
☐ *minutes/agenda*	☐ *schedule*	☐ *action*	
☐ *report*	☒ *deliverable*	☐ *review/comment*	
☐ *presentation*	☐ *review comment form*	☐ *response to comment*	
☐ *cd / dvd*	☐ *no review comment form*	☐ *concurrence*	
☐ *specifications*	☐ *review comments*	☐ *incorporation of comments*	
☐ *half-size drawings*	☐ *response to comments*	☐ *verification*	
☐ *full-size drawings*	☐ *concurrence with response*	☐ *signature*	
☐ *sketches/maps/layouts*	☐ *verification of incorporation*	☐ *acceptance/approval*	
☐ *reference material*	☐ *acceptance/approval*	☐ *other* _____	
☐ *other* _____		_____	

Item No.	***Copies***	***Description***	***Rev. No.***	***Date***
1	1	Contingency Management – 2012 Update (DRAFT)		

If enclosures are not as noted, kindly notify us at once.

Remarks: Enclosed please find draft Contingency Management – 2012 Update.

John Funghi
Program Director

JF:smk

cc: David Kuehn, STV (w/attachment)
Eric Stassevitch, CSP (w/o attachment)
CS File No. M544.1.5.0810

Contingency Management – 2012 Update

To date, Contingency Management has been structured on baseline documents developed from the FTA Risk Assessment performed in March 2009 prior to entry into Final Design. A FTA Risk Refresh was performed in May 2011 in preparation for entering into a FFGA. At the time, several significant changes had occurred on the Program; however, no changes were made to the Contingency Drawdown Curves for both cost and schedule. Minimum cost contingency levels established by the baseline documents in early 2009 require updating at this phase of the project to reflect current project status. The Program is advocating the need for changes to the baseline documents' milestones and hold points for reasons stated within.

Contributing factors necessitating the need for reexamining the original milestones, hold points and drawdown curves are: Changes to project configurations, delays to design submittals, re-sequencing of contract package procurement, delay to FFGA, and improved risk profiles for tunnel and station contracts.

Table 1 exhibits the existing agreed to Milestones and Hold point that are an integral part of the Program's Risk and Contingency Management Plan (RCMP), the timing of the milestone (QTR) reflects the 2012 update of the RCMP. Proposed changes are shown by in Red Text and new column for proposed minimum levels.

Table 1: Minimum Cost Contingency

	Hold Points	QTR	Minimum Contingency Level ($Millions)	Proposed Minimum Contingency Level ($Millions)
1a	Tunnels 100% Designed	1Q11	$280	$280
1b	~~UMS~~ CTS100% Designed	4Q11	$250	$240
1c	~~FFGA Award and NTP Tunnels October 2011b~~ 40% Bid (Tunnel and CTS)	2Q12	$225	$200
1d	FFGA Award	3Q12	-	$180
2	CTS/UMS Commence October 2012	4Q12	$160	$160
3	Demobilize Tunnels January 2014	2Q14	$140	$140
4	Complete Station to Platform Levels January 2017 (CTS/MOS)	1Q17	$60	$60
5	Complete CTS/Tunnels Systems Installation July 2018	3Q18	$25	$25
	Revenue Service	4Q18	0	0

Contingency Management – 2012 Update

Close examination of Contingency levels and rational utilized for minimum levels reveals that the original plan has a minimum of $225M at the time of FFGA. Expectations would have been that the tunnel bid was known and the only physical work completed or in progress would be the Advance Utility Relocations contracts. As can be seen from excerpts of the March 31, 2009 Risk Assessment Report (see below) prepared in advance of recommending entering the Final Design Phase, this rational was based on the assumption that the Tunnel bid would represent 40% of the total bid for all projects, thus addressing a significant level of risks.

Although the station designs would have been complete, the actual bid numbers would not have been known, only 100% estimates. Presumably this minimum value ($225M) addressed two points, maintaining the recommended 15% level of contingency at the time of FFGA and having ample contingency to address market risks associated with the underground station work in the City of San Francisco.

The next Hold point is the commencement of CTS and UMS, which would indicate that the bids are in for these two high risk underground station constructions. What can be seen is an expectation for a significant use of contingency as the minimum level drops precipitously to $160M. With the exception of some advance work being started on the TBM launch box (a low risk item) no other physical work was anticipated. This would imply an anticipated use of contingency to address the actual bid values for the two significant underground stations that were deemed extremely risky due to the use of SEM construction, the physical location of both stations, the many constraints imposed, the concern that there would be a limited number of bona fide bidders and most Contractors would be leery of doing business in the City of San Francisco because of perception of onerous requirements in City contracts and most importantly the potential for catastrophic impacts to surrounding buildings and businesses.

Implementation of the recommended changes to milestones and hold points, the program will be at the exact same minimum contingency level as shown in the table above for the same given point in time, commencement of the two underground stations. The program sees the need to adjust the hold points and minimum levels in approaching this strategic point in time due to contributing factors noted above. Specifically, the delay in design submittals, and FFGA, combined with the re- sequencing of the contract procurement; has not only changed the order in which previously identified key strategic events occur, but has necessitated the reevaluation and heightened importance of hold points as they relate specifically to contingency draw down. Examining these against the backdrop of rational utilized to establish the minimum levels as outlined above provides the necessary justification to rationalize the change in contingency draw down, milestones and hold points.

Contributing factor to adjust milestones	Resulting justification for use of contingency
Delays to design submittals	Constrains use of contingency for intended purpose
Re-sequencing of contract package procurement	Advances confirmation of high risk cost items
Delay to FFGA	Allows use of contingency for intended purpose
Improved risk profiles for tunnel and station contracts	Allows use of contingency for intended purpose

Contingency Management – 2012 Update

Changing the definition of Hold point #1b is significant in bringing forth a revised definition of the of 40% of Bid. This should include the Tunnel Contract and CTS contract. Representing nearly 50% of the work, having known values, significant risk has been addressed, justifies changing this hold point definition. In addition, market risk has been incorporated in the estimates of the Stations and combined with the knowledge of the CTS bid, use of Contingency to make up the increased estimates for market risk is consistent with the original intent but comes at a different point in time. Concerns are itemized below combined with the program mitigation

Concerns that would contribute to Market Risk	Program Mitigation Measure to Address Risks
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Contractors would be leery of doing business in the City of San Francisco because of perception of onerous requirements in City contracts	Overhaul of General Provisions specific for Central Subway; – 15 Major Contractors combined for Tunnel bid – Good indication of interest
The potential for catastrophic impacts to surrounding buildings and businesses.	Extensive Building Instrumentation and Monitoring as well as compensation grouting to address potential settlement issues included in costs

The justification for these changes can be augmented by examining the rational for the establishment of the original milestones and hold points and then addressing the contributing factors above and how they preserve the integrity of the original contingency management objects for addressing those risks, but justifiably can be refined to better address the current project circumstances and status.

Muni Central Subway Project, San Francisco Page 15 of 87 Risk and Contingency Analysis and Recommendations March 31, 2009 – Annotations address how proposed change preserves intent

Milestone #3 - 40% through Bid and Award

- The group agreed to delete the links from station contract awards because they are not a requirement for this milestone to occur. At the time 40% bid was presumed to be the tunnel contract.
- The only activity directly related to this activity is the award of the tunnels contract. Current projections are that the combination of Tunnel and CTS will represent more than 40% of Bid.
- The changes brought this milestone date back almost a year, to September 13, 2011. The inclusion of CTS in contracts considered part of the 40% moves this milestone later in time by nine months.
- Milestone #2 (FFGA) and #3 (40% Bid) occur at the same time. This is because SFMTA intends to award the tunnels contract to allow the procurement of the tunnel boring machines (TBM's)

under an LONP prior to an FFGA. The occurrence of the two milestones still is occurring at nearly the same time, and the rational for procuring the TBMs remains, but not as part of an LONP. Milestone #3 (40% Bid) however now occurs prior in time to Milestone #2 (FFGA) necessitating a change in numbering and minimum contingency value.

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Milestone#4 20% Construction

- Agreed date of October 24, 2012 - January 2013 (utilizing rational noted below)
- Project milestones are reflective of expected cash flow. At this stage the TBM's have been delivered, a good proportion of utility relocations have been undertaken and there has been a significant draw down on design costs with PM/CM staffing costs weighing in on cash flow expenditure. TBMs expected to be delivered in December 2012, advance utility relocations will be complete, Final Design costs will be known and PM/CM staffing cost are currently well below plan.

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- The reason there is only just over one year between 50% and 75% construction is because in this period tunnel excavation through to disassembling the TBM's is completed and the construction of all the station structures comprising mining, cavern construction and station platforms is well advanced with CTS progressed to head house excavation.

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- Agreed date of January 20, 2016.

Contingency Management – 2012 Update

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4.4.2 FTA Hold Points

"Hold" points are defined as points in time, which may be the same as project milestones but are more likely to be associated with strategic events where significant risk exposure is reduced. At "Hold" points minimum contingency amounts for project cost contingency and project float contingency are established and form ceilings below which the implementation of mitigation is believed unavoidable if the project is to be completed to the budget and agreed Revenue Operations Date.

Below are the agreed upon hold points:

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The following discussions at Workshop #4 were pertinent to the agreement of the "Hold" points:

- The PMOC proposed at "Hold" point 1, after bid and award of the tunnels contract and following award of the FFGA– Milestone #2 and #3–a minimum level of $250 million in contingency should be retained

- After lengthy discussion it was agreed that having the first hold point at the award of the FFGA and holding $250 million in contingency until this time was an excessive amount to hold as a minimum through virtually all of final design and after award of the tunnels package. Two intermediate "Hold" points were agreed to recognize a gradual draw down against contingency during design. This gradual draw down can be performed utilizing lower minimum levels and still preserve the intent of covering identified risks.

- Hold" point 1a was taken to be when tunnel design was complete targeted for May 2010. This "Hold" point was added because there are expected to be no major changes to the design of tunnels from this major design element from this point forwards. The contingency requirement for this hold point was set at $280 million. This hold point was met and minimum levels maintained.

Contingency Management – 2012 Update

- "Hold" point 1b was taken to be at the finish of UMS station design. This hold point is at the completion of all station design, after which the risk of major changes in station design is most unlikely. The contingency requirement for this hold point was set at $250 million. The risk of major changes is the station designs have been mitigated with the submittal of the 100%. However, significant cost increase not related to scope changes but due to costs that address perceived market risks due to special provisions and physical constraints required a greater use of contingency than originally planned at this point in time. This increase in cost was anticipated but later in time.

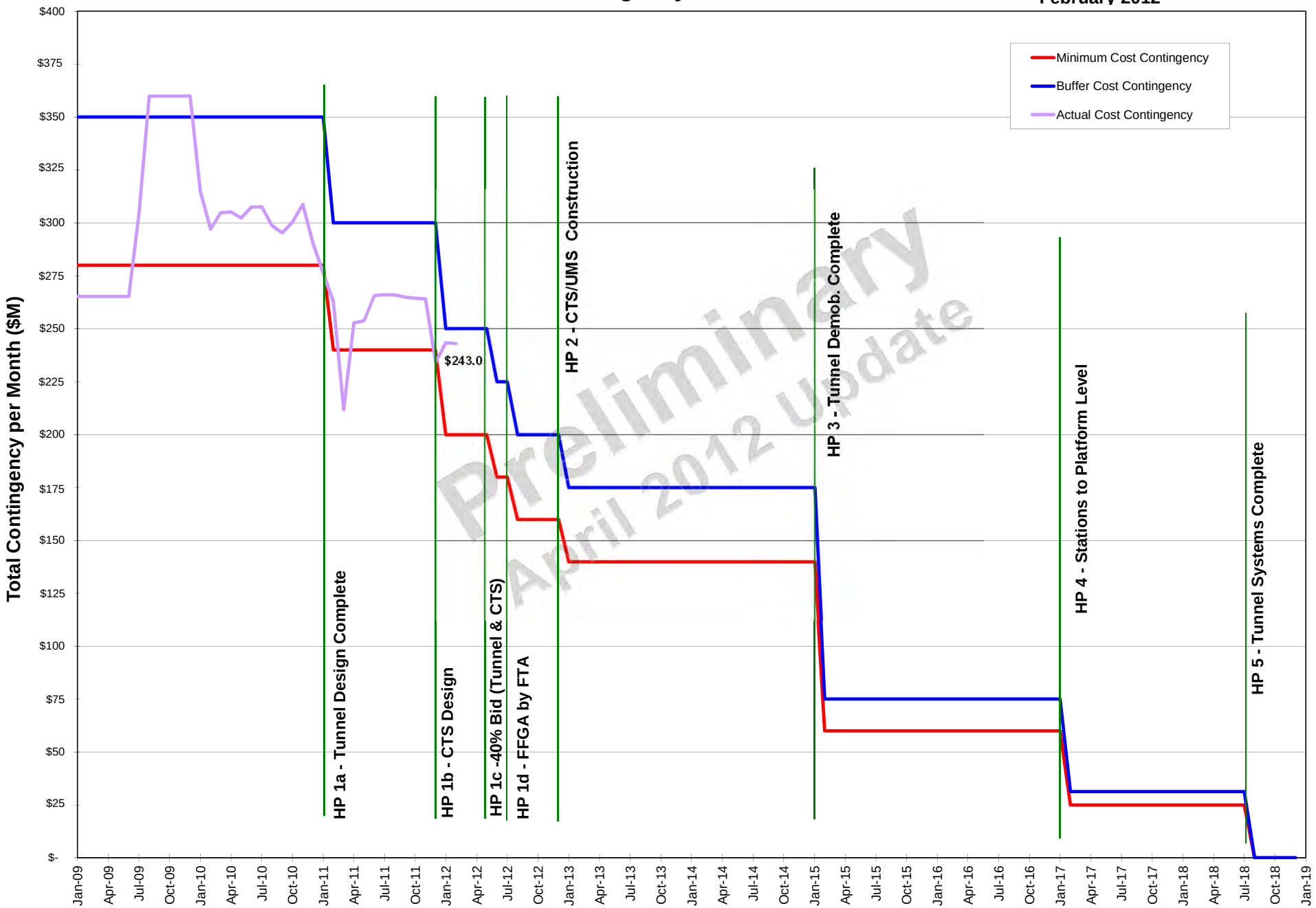
- Minimum contingency at "Hold" point 1c (FFGA award) was agreed at $225 million reflecting a gradual draw down throughout final design, preparation of bid documents, and the RFP process. The tunnels contract would also be bid and awarded at this point with the manufacturing of the TBM under way. More information will be known about program costs to justify a lowering of the minimum at this strategic point in time, specifically, nearly 50% of the bid will be known and lower risk profiles of remaining contracts justifies not holding such an excessive amount at this point.

Muni Central Subway Project, San Francisco Page 16 of 87 Risk and Contingency Analysis and Recommendations March 31, 2009

central T subway

CENTRAL SUBWAY PROJECT
Cost Contingency Drawdown

February 2012



From: Bradley H. Lebovitz
Sent: Friday, May 25, 2012 2:54 PM
To: David A. Kuehn
Cc: James Sampson
Subject: Cost Contingency Recovery Workshop Notes

Meeting at Howard St Office 9:30-1:00

Attendees: John F., Albert H, Ross E., Eric S., Luis Z

The Meeting focused on looking at the current contingency in a couple of different ways. Primarily we used the spreadsheet that you and I developed the other day.

Mainly, they will argue that the base dollar amount of $1.5783 billion can be lowered by getting credit for work that has been accomplished. To date expenditures are approx $200 million, which would be taken off of the $1.5783 billion and bring this down to $1.3783 billion. This would in essence drop the FFGA-15% contingency level from $206 million to around $180 million. Has this argument been used on other projects??

We can expect to see a spreadsheet developed at today's meeting with a narrative that would accompany and explain their arguments. They will also propose some new holdpoints.

Have a nice weekend.

Brad

ATTACHMENT 5

						Contingency				
		Contract/ Bid	Projected Cost	Escalation	unallocated	Design (1-2%)	Market (1-2%)	Construction (10-14%)	Reserve 1%	
1250	UR #1	11.4				0			0.1	
1251	UR #2	19.5				0		0.2	0.2	
1252	Guideway Tunnel	233.6				0		30.4	2.3	13% construction
1253	[UMS]		210				4.2	25.2	2.1	12 % construction
1254	[CTS]		235			0	4.7	32.9	2.35	14 % construction
1255	[MOS]		135			1.35	2.7	16.2	1.35	12 % construction
1256	STS		125			2.5	1.25	12.5	1.25	10 % construction
	OTHERS									
	Public Art Program		7.9			1.1				
	Fare Collection Equipment		2.4							
	Misc Contracts		1							
	Additional Insurance		9.8			0.4				
	Utility Coordination		1.1							
	Utility Fee Connection		0.5							
	Utility Form B		-12							
	Communication Connection		6							
60.01	Real Estate		36			3			0.3	
70.01	Light Rail Vehicle		18	6.1		2.3				
80.01	Preliminary Engineering	46.2								
80.02	Final Design		76.4			8			0.8	
80.03	PM Design & Construction		177			2		12	0.35	
80.04	CA & CM		15.5					0.8		
80.05	Insurances		6.8							
80.06	Legal: Permits,Fees		6.2					1.2		
80.07	Surveys, Testing Inspection		0.3							
80.08	Start-up		7					1.4		
90	**UNALLOCATED CONTINGENCIES**	0			18.8					adjusted to maintain 1578.3
	subtotal	310.7	1065.3	6.1	18.8	20.7	12.9	132.8	11.1	
	TOTAL								1578.3	
	TOTAL Contingency							14.20%	196.2	

Source: CSP April 30 Cost Report
For discussion purposes only.

APPENDIX F – PRIMARY AND SECONDARY MITIGATIONS (MAR 2013)

Central Subway Project
Secondary Mitigations

#	Mitigation Measures	Cost Savings to Carry Forward in Secondary Mitigation Plan ($ millions)	Must Implement By
	Included as Contact Options		
3	Defer UMS Union Square North Entrance - Develop Option for Contract Documents	6.7	Included in Contract 1300
21	MOS mezzanine level unfinished. Develop Option for Contract Documents	2.6	Included in Contract 1300
	Total Cost Savings to Carry Forward as of March, 2013	***9.3***	

central T subway

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CENTRAL SUBWAY PROJECT
Secondary Mitigations

MITIGATION MEASURE #3
Defer UMS Union Square North Entrance

Scope Description

The scope of the work included in this estimate is the deferral of the North Station Entrance. The scope of work is from the (to be) existing North Head Wall toward Union Square. This estimate removes all work done on the existing garage and removes the Union Square Entrance to the station. This estimate includes removal of any road work and landscaping to be done around the Union Square Entrance. The elevators and escalators at the entrance and the north end of the platform are included in this estimate.

Basis of Estimate

Standard progress estimate methods and assumptions were utilized from existing in progress estimates for designs above and beyond existing published 65% designs. Refer to the basis of estimate for the interim estimates for basic markups, labor rates, assumptions and general exclusions for this estimate. Contractor and subcontractor markups were included in this estimate.

Order of Magnitude Estimate

Estimated Cost Reduction = $23,148,389

C--Assembly Category Report
SUBMITTAL: 70%
SOFTWARE VERSION: SUCCESS 5.X
REPORT REVISION: Nov. 5 2003
ESTIMATE SAVED AS: UMS North Entrance.pws

CONSTRUCTION CONTRACT: PACKAGE 1253
DATABASE USED: RSM MODIFIED
PRINTING DATE: 09/22/2011

PROJECT: UNION SQUARE MARKET STREET STATION
PROJECT SITE: SAN FRANCISCO, CA
A/E NAME: SFMTA - DESIGN GROUP
PROJECT SIZE: 228,000.00SF
CONSTRUCTION FUNDS AVAILABLE, DOLLARS: $192,000,000

ESTIMATOR: HILL
CAT CODE:
UIC:
PROJECT #: UMS-70%
DATE OF ESTIMATE: 9/14/11

WBS CODE	DESCRIPTION	COST/WBS BASED ON 228,000 SF	COST/ WBS UNIT	TOTAL MARKED UP COSTS MATL	LABOR	EQUIP	UNIT COST	TOTAL
	SFMTA - UNION SQUARE MARKET STATION - PROGRESS, PROJECT TOTALS							**23,148,000**
	*****PROJECT SUBTOTALS****			9,412,461	10,250,954	3,484,974	0	23,148,389
BASE BID		**101.53/SF**		**9,412,461**	**10,250,954**	**3,484,974**	**0**	**23,148,389**
-UNION SQUARE - MARKET STATION		**101.53/SF**		**9,412,461**	**10,250,954**	**3,484,974**	**0**	**23,148,389**
UMUNION SQUARE - MARKET STATION - PACKAGE 1253		**101.53/SF**		**9,412,461**	**10,250,954**	**3,484,974**	**0**	**23,148,389**
UM20	STATIONS, STOPS, TERMINALS, INTERMODAL (NUMBER)	90.69/SF		9,197,388	8,268,505	3,210,351	0	20,676,244
UM2003	UNDERGROUND STATION, STOP, SHELTER, MALL, TERMINAL, PLATFORM	65.59/SF		6,773,474	6,025,405	2,155,854	0	14,954,734
UM200305	EXCAVATION & GROUND SUPPORT	24.28/SF	194630@ 28.44SF	1,750,368	2,386,198	1,399,237	0	5,535,803
UM200314	STRUCTURAL - STATION SURFACE LEVEL	4.61/SF	40325@ 26.05SF	695,674	316,141	38,792	0	1,050,607
UM200316	STRUCTURAL - STATION CONCOURSE LEVEL	5.58/SF	8064@ 157.70SF	612,993	582,311	76,349	0	1,271,653
UM200318	STRUCTURAL - STATION INTERMEDIATE STRUT LEVEL	8.21/SF	8064@ 232.25SF	894,092	824,366	154,443	0	1,872,902
UM200340	STRUCTURAL - GARAGE ENTRANCE LEVEL	1.60/SF	3012@ 120.87SF	207,419	134,215	22,431	0	364,065
UM200341	STRUCTURAL - GARAGE LEVEL 1	2.63/SF	3937@ 152.20SF	377,814	194,337	27,068	0	599,219
UM200342	STRUCTURAL - GARAGE LEVEL 2	2.81/SF	9089@ 70.58SF	336,283	257,858	47,388	0	641,529
UM200343	STRUCTURAL - GARAGE LEVEL 3	2.68/SF	9376@ 65.27SF	304,642	258,737	48,612	0	611,992
UM200344	STRUCTURAL - GARAGE LEVEL 4	2.99/SF	8039@ 84.91SF	358,691	268,120	55,767	0	682,578
UM200349	ARCHITECTURAL - STATION SURFACE LEVEL	2.56/SF	47104@ 12.39SF	311,136	187,751	84,953	0	583,841
UM200350	ARCHITECTURAL - STATION CONCOURSE LEVEL	4.10/SF	57663@ 16.22SF	415,273	358,218	161,539	0	935,029
UM200351	ARCHITECTURAL - INTERMEDIATE STRUT LEVEL	0.53/SF	18590@ 6.53SF	45,119	68,003	8,269	0	121,391
UM200358	ARCHITECTURAL - STATION STAIRS & LANDING	1.87/SF		368,783	51,590	6,207	0	426,580
UM200372	MECHANICAL - FIRE PROTECTION	0.44/SF	194630@ 0.51SF	41,616	38,684	18,984	0	99,284
UM200374	MECHANICAL - HVAC & EMERGENCY VENTILATION	0.25/SF	194630@ 0.29SF	16,963	38,085	1,335	0	56,384
UM200376	ELECTRICAL - LIGHTING	0.45/SF	16128@ 6.32SF	36,607	60,790	4,480	0	101,877
UM2007	ELEVATORS, ESCALATORS	25.09/SF		2,423,914	2,243,100	1,054,497	0	5,721,510
UM200768	CONVEYING - ELEVATORS/ESCALATORS	25.09/SF		2,423,914	2,243,100	1,054,497	0	5,721,510
UM40	SITEWORK & SPECIAL CONDITIONS	10.84/SF	8064@ 306.57SF	215,074	1,982,449	274,623	0	2,472,145
UM4001	DEMOLITION, CLEARING, EARTHWORK	0.41/SF		21,320	49,770	21,812	0	92,901
***	*FROM AECOM 65% ESTIMATE*							
UM400101	DEMOLITION, CLEARING, EARTHWORK	0.41/SF		21,320	49,770	21,812	0	92,901
UM4003	HAZ. MAT'L, CONTAM'D SOIL REMOVAL/MITIGATION, GROUND WATER TREATMENTS	0.37/SF	83706@ 1.00SF	35,021	32,566	15,982	0	83,569
***	*FROM AECOM 65% ESTIMATE*							
UM400301	HAZ. MAT'L, CONTAM'D SOIL REMOVAL/MITIGATION, GROUND WATER TREATMENTS	0.37/SF	83706@ 1.00SF	35,021	32,566	15,982	0	83,569
UM4006	PEDESTRIAN / BIKE ACCESS & ACCOMMODATION, LANDSCAPING	0.22/SF		25,756	20,501	3,790	0	50,047
***	*FROM AECOM 65% ESTIMATE*							
UM400601	PEDESTRIAN / BIKE ACCESS & ACCOMMODATION, LANDSCAPING	0.22/SF		25,756	20,501	3,790	0	50,047
UM4007	AUTO,BUS, VAN ACCESSWAYS INCL ROADS & PKG LOTS	0.34/SF		67,492	6,441	2,601	0	76,534
***	*FROM AECOM 65% ESTIMATE*							
UM400701	AUTO,BUS, VAN ACCESSWAYS INCL ROADS & PKG LOTS	0.34/SF		67,492	6,441	2,601	0	76,534
UM4008	TEMPORARY FACILITIES & OTHER INDIRECT COSTS DURING CONSTRUCTION	9.51/SF	83706@ 25.91SF	65,485	1,873,171	230,438	0	2,169,094
UM400801	TEMPORARY FACILITIES & OTHER INDIRECT COSTS DURING CONSTRUCTION	9.51/SF	8064@ 268.98SF	65,485	1,873,171	230,438	0	2,169,094

PROJECT: UNION SQUARE MARKET STREET STATION
PROJECT SITE: SAN FRANCISCO, CA
A/E NAME: SFMTA - DESIGN GROUP
PROJECT SIZE: 228,000.00 SF
CONSTRUCTION FUNDS AVAILABLE: 192,000,000 USD
CURRENCY: DOLLARS

ESTIMATOR: HILL
CAT CODE:
UIC:
PROJECT #: UMS-70%
DATE OF ESTIMATE: 9/14/11
BID DATE: FALL 2011

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
UNION SQUARE - MARKET STATION - PACKAG STATIONS, STOPS, TERMINALS, INTERMODAL (NUM UNDERGROUND STATION, STOP, SHELTER, MALL, TERM							
UMEXCAVATION & GROUND SUPPORT							
UM20 STATIONS, STOPS, TERMINALS, INTERMODAL (N							
UM2003 UNDERGROUND STATION, STOP, SHELTER, MALL, TE							
UM2003051301 Mass Excavation - North Entrance	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 2,222.22 CY/DAY							
02315.42 - 41	EXCAV/BULK BANK MEASURE/1-1/2 CY CPTY = 65 CY/HR/DRAGLINE		0.00	2.54	0.19	0.00	2.73
SUB-211/211	0.036 hrs/unit 603 TOTAL HRS	16,924.00 CY	0	43,032	3,242	0	46,273
* LINE ITEM ASSEMBLY	Factor:1.0000						
02315.41 - 04	EXCAV/BULK/DZR/200 HP/50' HAUL/COMMON EARTH		0.00	4.64	3.60	0.00	8.24
SUB-211/211	0.065 hrs/unit 1100 TOTAL HRS	16,924.00 CY	0	78,459	60,926	0	139,385
* LINE ITEM ASSEMBLY	Factor:1.0000						
01900.00 - 01	Heavy Eqpt Mobilization Low-boy no set up		0.00	0.00	78.00	0.00	78.00
SUB-211/213		8.00 HR	0	0	624	0	624
01900.00 - 01	Heavy Eqpt dEMobilization Low-boy no set up		0.00	0.00	78.00	0.00	78.00
SUB-211/213		8.00 HR	0	0	624	0	624
	Subtotal Direct Costs		0	121,490	65,416	0	186,906
	Subcontractor Markups		0	33,973	19,394	0	53,367
	Prime Contractor Markups		0	11,365	8,111	0	19,476
TOTAL UM2003051301 Mass Excavation - North Entrance		1,703 HRS	0	166,828	92,921	0	259,750
16,924.00 CY	*Level Unit Cost-->*		*0.00*	*9.86*	*5.49*	*0.00*	*15.35*
NOTE: DAILY PRODUCTIVITY = 2,222.22 CY/DAY							
UM2003051501 UMS_AA_ES.121 - Piles Type A (3'-0" Dia)	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 8.48 TN/DAY							
05120.68 - 01	STRUC STL PROJ/MONUMENTAL STRUC/BANKS/STORES/100-TN PROJ/MIN		1800.00	762.33	96.58	0.00	2,658.91
SUB-511/511	11.323 hrs/unit 4323 TOTAL HRS	381.80 TON	687,240	291,057	36,874	0	1,015,171
* LINE ITEM ASSEMBLY	Factor:1.1500						
03350.30 - 00	PUMP & PLACE - SPECIAL TREMIE		0.00	2.15	3.25	0.00	5.40
SUB-312/312	0.034 hrs/unit 106 TOTAL HRS	3,074.32 CY	0	6,611	9,992	0	16,603
* LINE ITEM ASSEMBLY	Factor:9.2600						
03310.53 - 50	CONCRETE, 5000PSI MIX		124.20	81.51	0.00	0.00	205.71
SUB-314/314	1.342 hrs/unit 4125 TOTAL HRS	3,074.32 CY	381,831	250,596	0	0	632,426
* LINE ITEM ASSEMBLY	Factor:9.2600						
02455.80 - 00	AUGER HOLE FOR 36" DIA PILE		0.00	34.20	2.74	0.00	36.94
SUB-211/211	0.48 hrs/unit 5572 TOTAL HRS	11,620.00 LF	0	397,433	31,861	0	429,294
* LINE ITEM ASSEMBLY	Factor:35.0000						
03350.35 - 00	PCC FNSHING/WALLS/SANDBLAST/HVY PENETRATION		1.41	6.09	0.40	0.00	7.90
SUB-312/312	0.098 hrs/unit 1515 TOTAL HRS	15,494.44 SF	21,847	94,407	6,214	0	122,469
* LINE ITEM ASSEMBLY	Factor:46.6700						
02455.60 - 04	PCC FILLED STL PILES/PIPE PILES/SPLICES FOR PIPE PILES/36" DIA		181.00	142.08	11.72	0.00	334.80
SUB-221/221	2.045 hrs/unit 182 TOTAL HRS	89.00 EA	16,109	12,645	1,043	0	29,797
	Subtotal Direct Costs		1,107,027	1,052,749	85,985	0	2,245,760
	Subcontractor Markups		224,867	191,929	20,032	0	436,827
	Prime Contractor Markups		127,382	90,992	10,139	0	228,514
TOTAL UM2003051501 UMS_AA_ES.121 - Piles Type A (3'-0" Dia)		15,823 HRS	1,459,276	1,335,670	116,156	0	2,911,101
332.00 LF	*Level Unit Cost-->*		*4,395.41*	*4,023.10*	*349.87*	*0.00*	*8,768.38*
NOTE: DAILY PRODUCTIVITY = 8.48 TN/DAY							
UM2003051601 UMS_A_ES.121 - Pile Casing Type A	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
PRODUCTIVITY = 3589.04 MH/EA							
02465.60 - 00	Type A Pile Casing - 2' 10" I.D. / 3' O.D.		16165.02	0.00	4041.26	0.00	20,206.28
SUB-511/511		2.00 EA	32,330	0	8,083	0	40,413
02465.62 - 00	Pile Casing Cutter Heads		2116.85	0.00	288.66	0.00	2,405.51
SUB-511/511		4.00 EA	8,467	0	1,155	0	9,622
02465.65 - 00	Clean & Prep casing for reuse		0.00	0.00	0.37	0.00	0.37
SUB-312/312		1,328.00 HR	0	0	491	0	491
02465.65 - 00	Clean & Prep Tremie		0.00	0.00	0.37	0.00	0.37
SUB-312/312		1,079.00 HR	0	0	399	0	399
02455.61 - 00	Steel Support shoes		0.60	0.00	0.15	0.00	0.75

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	PRODUCTIVITY = 3589.04 MH/EA						
	SUB-511/511	58,100.00 LBS	34,860	0	8,715	0	43,575
02465.60 - 00	Install Type A Pile Casing		0.00	3847.39	6842.50	0.00	10,689.89
	SUB-221/221 55.37 hrs/unit 6423 TOTAL HRS	116.00 EA	0	446,297	793,730	0	1,240,027
02465.60 - 00	Remove Type A Pile Casing		0.00	452.35	0.00	0.00	452.35
	SUB-221/221 6.51 hrs/unit 755 TOTAL HRS	116.00 EA	0	52,472	0	0	52,472
	Subtotal Direct Costs		75,657	498,769	812,573	0	1,387,000
	Subcontractor Markups		24,193	126,874	230,781	0	381,849
	Prime Contractor Markups		9,550	45,738	99,786	0	155,074
	TOTAL UM2003051601 UMS_A_ES.121 - Pile Casing Type A	7,178 HRS	109,400	671,381	1,143,141	0	1,923,922
	2.00 EA	*Level Unit Cost-->*	*54,700.12*	*335,690.63*	*571,570.25*	*0.00*	*961,961.00*
NOTE: PRODUCTIVITY = 3589.04 MH/EA							
	UM2003051801 UMS_AA_ES.191 - Z.Section Sheet Pile *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 7.174 TN/DAY						
02250.40 - 00	SHEET PILNG/STL/22 PSF/15' EXCAV		504.98	852.35	70.33	0.00	1,427.66
	SUB-221/221 12.267 hrs/unit 344 TOTAL HRS	28.04 TON	14,160	23,900	1,972	0	40,031
	* LINE ITEM ASSEMBLY Factor:0.0110						
01900.00 - 01	Heavy Eqpt Mobilization Low-boy no set up		0.00	0.00	78.00	0.00	78.00
	SUB-211/213	24.00 HR	0	0	1,872	0	1,872
02315.49 - 22	Haul/ hvy/ flatbed		0.00	59.60	55.00	0.00	114.60
	SUB-211/213 1 hrs/unit 88 TOTAL HRS	88.00 HR	0	5,245	4,840	0	10,085
01900.00 - 01	Heavy Eqpt dEMobilization Low-boy no set up		0.00	0.00	78.00	0.00	78.00
	SUB-211/213	24.00 HR	0	0	1,872	0	1,872
02455.60 - 01	Sheet Stl pile removal		0.00	10.01	3.15	0.00	13.16
	SUB-221/221 0.144 hrs/unit 367 TOTAL HRS	2,550.00 VLF	0	25,515	8,033	0	33,547
	Subtotal Direct Costs		14,160	54,660	18,588	0	87,408
	Subcontractor Markups		4,489	14,036	5,391	0	23,916
	Prime Contractor Markups		1,784	5,022	2,293	0	9,099
	TOTAL UM2003051801 UMS_AA_ES.191 - Z.Section Sheet Pile	799 HRS	20,432	73,718	26,272	0	120,423
	2,549.00 SF	*Level Unit Cost-->*	*8.02*	*28.92*	*10.31*	*0.00*	*47.24*
NOTE: DAILY PRODUCTIVITY = 7.174 TN/DAY							
	UM2003052011 Temp. Support - North Entrance *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 3.348 TN/DAY						
02250.40 - 02	SHEET PILING/WALES/CONNECTIONS & STRUTS/2/3 SALVAGE		275.00	236.38	0.00	0.00	511.38
	SUB-221/221 3.402 -142	(41.61)TON	(11,443)	(9,836)	0	0	(21,279)
	* LINE ITEM ASSEMBLY Factor:-0.1900						
05090.90 - 02	WELDNG STRUC/4 PASSES/07LB/LF/1/2"THK/CONTIN FILLET/TYP 6011		1.66	28.18	3.57	0.00	33.41
	SUB-511/511 0.419 hrs/unit 52 TOTAL HRS	124.83 LF	207	3,518	446	0	4,171
	* LINE ITEM ASSEMBLY Factor:0.5700						
05120.68 - 04	COLUMN BS PLATES/STRUC/LITE/100-TN PROJ/>150LBS EA/A992 STL		1.65	0.62	0.08	0.00	2.35
	SUB-511/511 0.009 hrs/unit 26 TOTAL HRS	2,805.39 LBS	4,629	1,738	220	0	6,587
	* LINE ITEM ASSEMBLY Factor:12.8100						
05090.08 - 00	ANCHOR BOLT/L-TYPE/PLAIN STL/2" DIA X 24" L/INCL NUT & WASHER		23.50	72.86	9.23	0.00	105.59
	SUB-511/511 1.082 hrs/unit 31 TOTAL HRS	28.47 EA	669	2,074	263	0	3,006
	* LINE ITEM ASSEMBLY Factor:0.1300						
02250.40 - 03	TEMPORARY STRUTS		2125.00	1826.59	0.00	0.00	3,951.59
	SUB-221/221 26.288 hrs/unit 1094 TOTAL HRS	41.61 TON	88,421	76,004	0	0	164,426
	* LINE ITEM ASSEMBLY Factor:0.1900						
	Subtotal Direct Costs		82,484	73,499	929	0	156,911
	Subcontractor Markups		26,164	18,785	259	0	45,208
	Prime Contractor Markups		10,391	6,746	114	0	17,251
	TOTAL UM2003052011 Temp. Support - North Entrance	1,061 HRS	119,039	99,030	1,301	0	219,370
	219.00 LF	*Level Unit Cost-->*	*543.56*	*452.19*	*5.94*	*0.00*	*1,001.69*
NOTE: DAILY PRODUCTIVITY = 3.348 TN/DAY							
	UM2003052512 DEWATERING *LEVEL CONTRACTOR ID APPLIED--PRIME*						
31231.92 - 03	Dewatering O&M - Power Charges for 30 pumps		9693.88	9613.92	4561.83	0.00	23,869.63
	SUB-111/111 164.19 hrs/unit 493 TOTAL HRS	3.00 mo	29,082	28,842	13,685	0	71,609
	Subtotal Direct Costs		29,082	28,842	13,685	0	71,609
	Subcontractor Markups		9,454	8,033	4,062	0	21,550
	Prime Contractor Markups		3,686	2,696	1,697	0	8,079
	TOTAL UM2003052512 DEWATERING	493 HRS	42,222	39,571	19,445	0	101,237
	UM2003142503 UMS_AD_ST.721 - BEAM 4 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	2999.14	480.05	60.82	0.00	3,540.01	

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
UM2003	**UNDERGROUND STATION, STOP, SHELTER, MALL, TE**						
UM2003142503	UMS_AD_ST.721 - BEAM 4 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
	SUB-511/511 7.13 hrs/unit 124 TOTAL HRS	17.39 TON	52,155	8,348	1,058	0	61,561
	* LINE ITEM ASSEMBLY Factor:0.0570						
	Subtotal Direct Costs		52,155	8,348	1,058	0	61,561
	Subcontractor Markups		16,678	2,225	295	0	19,198
	Prime Contractor Markups		6,583	773	129	0	7,485
	TOTAL UM2003142503 UMS_AD_ST.721 - BEAM 4	124 HRS	75,416	11,346	1,482	0	88,244
	305.00 LF *Level Unit Cost-->*		*247.27*	*37.20*	*4.86*	*0.00*	*289.32*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003142504	UMS_AE_ST.721 - BEAM 5 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STE	2999.53	480.12	60.83	0.00	3,540.47	
	SUB-511/511 7.131 hrs/unit 225 TOTAL HRS	31.61 TON	94,815	15,176	1,923	0	111,914
	* LINE ITEM ASSEMBLY Factor:0.0645						
	Subtotal Direct Costs		94,815	15,176	1,923	0	111,914
	Subcontractor Markups		30,319	4,045	537	0	34,901
	Prime Contractor Markups		11,968	1,405	235	0	13,608
	TOTAL UM2003142504 UMS_AE_ST.721 - BEAM 5	225 HRS	137,102	20,627	2,694	0	160,423
	490.00 LF *Level Unit Cost-->*		*279.80*	*42.10*	*5.50*	*0.00*	*327.39*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003142507	UMS_AH_ST.721 - BEAM 8 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STE	3000.39	480.25	60.84	0.00	3,541.48	
	SUB-511/511 7.133 hrs/unit 56 TOTAL HRS	7.79 TON	23,373	3,741	474	0	27,588
	* LINE ITEM ASSEMBLY Factor:0.1590						
	Subtotal Direct Costs		23,373	3,741	474	0	27,588
	Subcontractor Markups		7,474	997	132	0	8,603
	Prime Contractor Markups		2,950	346	58	0	3,355
	TOTAL UM2003142507 UMS_AH_ST.721 - BEAM 8	56 HRS	33,797	5,085	664	0	39,546
	49.00 LF *Level Unit Cost-->*		*689.74*	*103.77*	*13.56*	*0.00*	*807.06*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003142508	UMS_AI_ST.721 - BEAM 9 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STE	3000.47	480.27	60.84	0.00	3,541.59	
	SUB-511/511 7.134 hrs/unit 23 TOTAL HRS	3.16 TON	9,482	1,518	192	0	11,191
	* LINE ITEM ASSEMBLY Factor:0.0645						
	Subtotal Direct Costs		9,482	1,518	192	0	11,191
	Subcontractor Markups		3,032	404	54	0	3,490
	Prime Contractor Markups		1,197	141	24	0	1,361
	TOTAL UM2003142508 UMS_AI_ST.721 - BEAM 9	23 HRS	13,710	2,063	269	0	16,042
	49.00 LF *Level Unit Cost-->*		*279.80*	*42.10*	*5.50*	*0.00*	*327.39*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003142509	UMS_AJ_ST.721 - BEAM 10 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STE	3003.23	480.71	60.90	0.00	3,544.83	
	SUB-511/511 7.14 hrs/unit 20 TOTAL HRS	2.79 TON	8,379	1,341	170	0	9,890
	* LINE ITEM ASSEMBLY Factor:0.0570						
	Subtotal Direct Costs		8,379	1,341	170	0	9,890
	Subcontractor Markups		2,679	357	47	0	3,084
	Prime Contractor Markups		1,058	124	21	0	1,203
	TOTAL UM2003142509 UMS_AJ_ST.721 - BEAM 10	20 HRS	12,116	1,823	238	0	14,177
	49.00 LF *Level Unit Cost-->*		*247.27*	*37.20*	*4.86*	*0.00*	*289.32*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003142510	UMS_AK_ST.721 - BEAM 11 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STE	2996.25	479.59	60.76	0.00	3,536.60	
	SUB-511/511 7.123 hrs/unit 17 TOTAL HRS	2.40 TON	7,191	1,151	146	0	8,488
	* LINE ITEM ASSEMBLY Factor:0.0510						

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
UM2003 UNDERGROUND STATION, STOP, SHELTER, MALL, TE							
UM2003142510 UMS_AK_ST.721 - BEAM 11	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 13.46 TN/DAY							
	Subtotal Direct Costs		7,191	1,151	146	0	8,488
	Subcontractor Markups		2,299	307	41	0	2,647
	Prime Contractor Markups		908	107	18	0	1,032
	TOTAL UM2003142510 UMS_AK_ST.721 - BEAM 11	17 HRS	10,398	1,564	204	0	12,167
	47.00 LF	*Level Unit Cost-->*	*221.24*	*33.28*	*4.35*	*0.00*	*258.87*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003142511 UMS_AL_ST.721 - BEAM 12	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 13.46 TN/DAY							
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	2997.10	479.73	60.78	0.00	3,537.60	
SUB-511/511	7.126 hrs/unit 15 TOTAL HRS	2.07 TON	6,204	993	126	0	7,323
* LINE ITEM ASSEMBLY	Factor:0.0470						
	Subtotal Direct Costs		6,204	993	126	0	7,323
	Subcontractor Markups		1,984	265	35	0	2,284
	Prime Contractor Markups		783	92	15	0	890
	TOTAL UM2003142511 UMS_AL_ST.721 - BEAM 12	15 HRS	8,971	1,350	176	0	10,497
	44.00 LF	*Level Unit Cost-->*	*203.89*	*30.67*	*4.01*	*0.00*	*238.57*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003142514 UMS_AQ_ST.721 - BEAM 17	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 13.46 TN/DAY							
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	2989.13	478.45	60.62	0.00	3,528.20	
SUB-511/511	7.107 hrs/unit 10 TOTAL HRS	1.38 TON	4,125	660	84	0	4,869
* LINE ITEM ASSEMBLY	Factor:0.0250						
	Subtotal Direct Costs		4,125	660	84	0	4,869
	Subcontractor Markups		1,319	176	23	0	1,518
	Prime Contractor Markups		521	61	10	0	592
	TOTAL UM2003142514 UMS_AQ_ST.721 - BEAM 17	10 HRS	5,965	897	117	0	6,979
	55.00 LF	*Level Unit Cost-->*	*108.45*	*16.32*	*2.13*	*0.00*	*126.90*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003142515 UMS_AR_ST.721 - BEAM 18	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 13.46 TN/DAY							
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	3000.00	480.19	60.84	0.00	3,541.03	
SUB-511/511	7.132 hrs/unit 4 TOTAL HRS	0.62 TON	1,860	298	38	0	2,195
* LINE ITEM ASSEMBLY	Factor:0.0310						
	Subtotal Direct Costs		1,860	298	38	0	2,195
	Subcontractor Markups		595	79	11	0	685
	Prime Contractor Markups		235	28	5	0	267
	TOTAL UM2003142515 UMS_AR_ST.721 - BEAM 18	4 HRS	2,690	405	53	0	3,147
	20.00 LF	*Level Unit Cost-->*	*134.48*	*20.23*	*2.64*	*0.00*	*157.35*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003142516 UMS_AS_ST.721 - BEAM 19	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 13.46 TN/DAY							
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	3000.00	480.19	60.84	0.00	3,541.03	
SUB-511/511	7.132 hrs/unit 108 TOTAL HRS	15.12 TON	45,360	7,260	920	0	53,540
* LINE ITEM ASSEMBLY	Factor:0.0420						
	Subtotal Direct Costs		45,360	7,260	920	0	53,540
	Subcontractor Markups		14,505	1,935	257	0	16,697
	Prime Contractor Markups		5,725	672	113	0	6,510
	TOTAL UM2003142516 UMS_AS_ST.721 - BEAM 19	108 HRS	65,590	9,868	1,289	0	76,747
	360.00 LF	*Level Unit Cost-->*	*182.20*	*27.41*	*3.58*	*0.00*	*213.19*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003142517 UMS_AT_ST.721 - BEAM 20	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 13.46 TN/DAY							
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	2992.00	478.91	60.68	0.00	3,531.59	
SUB-511/511	7.113 hrs/unit 5 TOTAL HRS	0.75 TON	2,244	359	46	0	2,649
* LINE ITEM ASSEMBLY	Factor:0.0340						

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
UM2003 UNDERGROUND STATION, STOP, SHELTER, MALL, TE							
UM2003142517 UMS_AT_ST.721 - BEAM 20	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 13.46 TN/DAY							
	Subtotal Direct Costs		2,244	359	46	0	2,649
	Subcontractor Markups		718	96	13	0	826
	Prime Contractor Markups		283	33	6	0	322
TOTAL UM2003142517 UMS_AT_ST.721 - BEAM 20		5 HRS	3,245	488	64	0	3,797
22.00 LF	*Level Unit Cost-->*		*147.49*	*22.19*	*2.90*	*0.00*	*172.58*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003142518 UMS_AU_ST.721 - BEAM 21	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 13.46 TN/DAY							
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	2983.78	477.60	60.51	0.00	3,521.89	
SUB-511/511 7.095 hrs/unit	3 TOTAL HRS	0.37 TON	1,104	177	22	0	1,303
* LINE ITEM ASSEMBLY	Factor:0.0230						
	Subtotal Direct Costs		1,104	177	22	0	1,303
	Subcontractor Markups		353	47	6	0	406
	Prime Contractor Markups		139	16	3	0	158
TOTAL UM2003142518 UMS_AU_ST.721 - BEAM 21		3 HRS	1,596	240	31	0	1,868
16.00 LF	*Level Unit Cost-->*		*99.77*	*15.01*	*1.96*	*0.00*	*116.75*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003142519 UMS_AV_ST.721 - BEAM 22	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 13.46 TN/DAY							
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	3000.00	480.20	60.87	0.00	3,541.07	
SUB-511/511 7.133 hrs/unit	1 TOTAL HRS	0.15 TON	450	72	9	0	531
* LINE ITEM ASSEMBLY	Factor:0.0150						
	Subtotal Direct Costs		450	72	9	0	531
	Subcontractor Markups		144	19	3	0	166
	Prime Contractor Markups		57	7	1	0	65
TOTAL UM2003142519 UMS_AV_ST.721 - BEAM 22		1 HR	651	98	13	0	761
10.00 LF	*Level Unit Cost-->*		*65.07*	*9.79*	*1.28*	*0.00*	*76.14*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003142520 UMS_AW_ST.721 - BEAM 23	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 13.46 TN/DAY							
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	3022.22	483.74	61.28	0.00	3,567.24	
SUB-511/511 7.185 hrs/unit	4 TOTAL HRS	0.54 TON	1,632	261	33	0	1,926
* LINE ITEM ASSEMBLY	Factor:0.0340						
	Subtotal Direct Costs		1,632	261	33	0	1,926
	Subcontractor Markups		522	70	9	0	601
	Prime Contractor Markups		206	24	4	0	234
TOTAL UM2003142520 UMS_AW_ST.721 - BEAM 23		4 HRS	2,360	355	46	0	2,761
16.00 LF	*Level Unit Cost-->*		*147.49*	*22.19*	*2.90*	*0.00*	*172.58*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003142521 UMS_AX_ST.721 - BEAM 24	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 13.46 TN/DAY							
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	3011.65	482.06	61.07	0.00	3,554.78	
SUB-511/511 7.16 hrs/unit	7 TOTAL HRS	1.03 TON	3,102	497	63	0	3,661
* LINE ITEM ASSEMBLY	Factor:0.0470						
	Subtotal Direct Costs		3,102	497	63	0	3,661
	Subcontractor Markups		992	132	18	0	1,142
	Prime Contractor Markups		392	46	8	0	445
TOTAL UM2003142521 UMS_AX_ST.721 - BEAM 24		7 HRS	4,485	675	88	0	5,248
22.00 LF	*Level Unit Cost-->*		*203.89*	*30.67*	*4.01*	*0.00*	*238.57*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003142522 UMS_AY_ST.721 - BEAM 25	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 13.46 TN/DAY							
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	2996.67	479.66	60.77	0.00	3,537.09	
SUB-511/511 7.124 hrs/unit	13 TOTAL HRS	1.80 TON	5,394	863	109	0	6,367
* LINE ITEM ASSEMBLY	Factor:0.0620						

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
UM2003	**UNDERGROUND STATION, STOP, SHELTER, MALL, TE**						
UM2003142522	UMS_AY_ST.721 - BEAM 25 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
	Subtotal Direct Costs		5,394	863	109	0	6,367
	Subcontractor Markups		1,725	230	31	0	1,985
	Prime Contractor Markups		681	80	13	0	774
	TOTAL UM2003142522 UMS_AY_ST.721 - BEAM 25	13 HRS	7,800	1,173	153	0	9,126
	29.00 LF	*Level Unit Cost-->*	*268.95*	*40.46*	*5.29*	*0.00*	*314.70*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003143001	UMS_AJ_ST.722 - TYPE 1 CONC SLAB ON S D *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
03300.01 - 00	PURCHASE 4000 PSI CONCRETE		113.30	0.00	0.00	0.00	113.30
	SUB-120/120	55.26 CY	6,261	0	0	0	6,261
	* LINE ITEM ASSEMBLY Factor:0.0200						
03350.30 - 00	STRUCT CONCRETE - PUMP & PLACE		0.00	7.88	8.50	0.00	16.39
	SUB-312/312 0.126 hrs/unit 7 TOTAL HRS	55.26 CY	0	436	470	0	905
	* LINE ITEM ASSEMBLY Factor:0.0200						
03350.30 - 00	FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH		0.00	0.65	0.03	0.00	0.67
	SUB-312/312 0.01 hrs/unit 29 TOTAL HRS	2,763.00 SF	0	1,783	71	0	1,853
	* LINE ITEM ASSEMBLY Factor:1.0000						
03210.60 - 01	REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#3-#7/A615/GRD 60		0.80	0.66	0.05	0.00	1.51
	SUB-323/323 0.01 hrs/unit 97 TOTAL HRS	9,449.46 LBS	7,560	6,252	483	0	14,295
	* LINE ITEM ASSEMBLY Factor:3.4200						
05310.30 - 04	MTL DKING/STL/OPN TYPE/L SPAN/GALV/OVER 50 SQ/7-1/2" D/16 GA		10.00	1.55	0.20	0.00	11.74
	SUB-511/511 0.023 hrs/unit 64 TOTAL HRS	2,763.00 SF	27,630	4,279	542	0	32,451
	* LINE ITEM ASSEMBLY Factor:1.0000						
02220.13 - 00	BLDG FTGS & FNDN DEMO/FLRS/PCC SLAB ON GRD/PCC/WIRE MESH REINFR/4" THK		2.00	6.79	0.56	0.00	7.35
	SUB-221/221 0.098 hrs/unit 270 TOTAL HRS	2,763.00 SF	0	18,767	1,548	0	20,315
	* LINE ITEM ASSEMBLY Factor:1.0000						
03110.44 - 55	SCREED/24 GA MTL KEY JOINT/SEE DIV 03150-250		0.17	0.36	0.03	0.00	0.55
	SUB-311/311 0.005 hrs/unit 13 TOTAL HRS	2,763.00 SF	470	988	74	0	1,531
	* LINE ITEM ASSEMBLY Factor:1.0000						
09250.70 - 04	Material Stocking		0.00	0.18	0.11	0.00	0.29
	SUB-111/111 0.003 hrs/unit 28 TOTAL HRS	9,449.46 LBS	0	1,660	1,039	0	2,699
	* LINE ITEM ASSEMBLY Factor:3.4200						
02250.10 - 00	PCC PRESSURE GROUTING/EPOXY CEM GROUT/MAX		109.00	56.09	4.63	0.00	169.72
	SUB-221/221 0.807 hrs/unit 45 TOTAL HRS	55.26 CF	6,023	3,100	256	0	9,379
	* LINE ITEM ASSEMBLY Factor:0.0200						
07170.70 - 00	WATERPROOFING		4.91	4.71	0.09	0.00	9.71
	SUB-111/111 0.081 hrs/unit 222 TOTAL HRS	2,763.00 SF	13,566	13,024	252	0	26,842
	* LINE ITEM ASSEMBLY Factor:1.0000						
05120.44 - 00	ANGLE FRMG/STRUC STL/1/2"X1/2"X1/8"/FLD FABRCTD/INCL CUTTING & WELDING		0.18	9.29	1.18	0.00	10.65
	SUB-511/511 0.138 hrs/unit 14 TOTAL HRS	100.00 LF	18	929	118	0	1,065
02260.72 - 04	Drill for 3 5/8ö Bolt		0.00	32.31	8.12	0.00	40.43
	Drill for 3 5/8ö Bolt				812	0	4,043
	SUB-221/221 0.465 hrs/unit 47 TOTAL HRS	100.00 EA	0	3,231			
03150.08 - 00	3 5/8" Bolt		28.50	17.69	0.85	0.00	47.04
	SUB-311/311 0.239 hrs/unit 24 TOTAL HRS	100.00 EA	2,850	1,769	85	0	4,704
	Subtotal Direct Costs		64,378	56,215	5,750	0	126,344
	Subcontractor Markups		19,869	13,473	1,447	0	34,789
	Prime Contractor Markups		8,057	5,095	688	0	13,840
	TOTAL UM2003143001 UMS_AJ_ST.722 - TYPE 1 CONC SLAB ON S D	859 HRS	92,304	74,783	7,886	0	174,973
	2,763.00 SF	*Level Unit Cost-->*	*33.41*	*27.07*	*2.85*	*0.00*	*63.33*
NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY							
UM2003143002	UMS_AK_ST.722 - TYPE 2 CONC SLAB ON S D *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
03300.01 - 00	PURCHASE 4000 PSI CONCRETE		113.30	0.00	0.00	0.00	113.30
	SUB-120/120	159.03 CY	18,018	0	0	0	18,018
	* LINE ITEM ASSEMBLY Factor:0.0300						
03350.30 - 00	STRUCT CONCRETE - PUMP & PLACE		0.00	7.88	8.50	0.00	16.39
	SUB-312/312 0.126 hrs/unit 20 TOTAL HRS	159.03 CY	0	1,254	1,352	0	2,606
	* LINE ITEM ASSEMBLY Factor:0.0300						
03350.30 - 00	FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH		0.00	0.65	0.03	0.00	0.67
	SUB-312/312 0.01 hrs/unit 55 TOTAL HRS	5,301.00 SF	0	3,420	136	0	3,556
	* LINE ITEM ASSEMBLY Factor:1.0000						
03210.60 - 01	REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#3-#7/A615/GRD 60		0.80	0.66	0.05	0.00	1.51
	SUB-323/323 0.01 hrs/unit 405 TOTAL HRS	39,598.47 LBS	31,679	26,201	2,026	0	59,905
	* LINE ITEM ASSEMBLY Factor:7.4700						
05310.30 - 04	MTL DKING/STL/OPN TYPE/L SPAN/GALV/OVER 50 SQ/7-1/2" D/16 GA		10.00	1.55	0.20	0.00	11.74
	SUB-511/511 0.023 hrs/unit 122 TOTAL HRS	5,301.00 SF	53,010	8,209	1,040	0	62,259

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
		DAILY PRODUCTIVITY = 566.93 CY/DAY							
		* LINE ITEM ASSEMBLY Factor:1.0000							
02220.13 - 00		BLDG FTGS & FNDN DEMO/FLRS/PCC SLAB ON GRD/PCC/WIRE MESH REINFR/4" THK	0.00		6.79	0.56	0.00		7.35
	SUB-221/221	0.098 hrs/unit 518 TOTAL HRS	5,301.00	SF	0	36,005	2,971	0	38,976
	* LINE ITEM ASSEMBLY	Factor:1.0000							
03110.44 - 55		SCREED/24 GA MTL KEY JOINT/SEE DIV 03150-250			0.17	0.36	0.03	0.00	0.55
	SUB-311/311	0.005 hrs/unit 26 TOTAL HRS	5,301.00	SF	901	1,895	142	0	2,938
	* LINE ITEM ASSEMBLY	Factor:1.0000							
09250.70 - 04		Material Stocking			0.00	0.18	0.11	0.00	0.29
	SUB-111/111	0.003 hrs/unit 119 TOTAL HRS	39,598.47	LBS	0	6,956	4,356	0	11,312
	* LINE ITEM ASSEMBLY	Factor:7.4700							
02250.10 - 00		PCC PRESSURE GROUTING/EPOXY CEM GROUT/MAX			109.00	56.09	4.63	0.00	169.72
	SUB-221/221	0.807 hrs/unit 86 TOTAL HRS	106.02	CF	11,556	5,947	491	0	17,994
	* LINE ITEM ASSEMBLY	Factor:0.0200							
07170.70 - 00		WATERPROOFING			4.91	4.71	0.09	0.00	9.71
	SUB-111/111	0.081 hrs/unit 427 TOTAL HRS	5,301.00	SF	26,028	24,987	484	0	51,498
	* LINE ITEM ASSEMBLY	Factor:1.0000							
05120.44 - 00		ANGLE FRMG/STRUC STL/1/2"X1/2"X1/8"/FLD FABRCTD/INCL CUTTING & WELDING	0.18		9.29	1.18	0.00		10.65
	SUB-511/511	0.138 hrs/unit 54 TOTAL HRS	392.00	LF	71	3,642	461	0	4,174
02260.72 - 04		Drill for 3 5/8ö Bolt			0.00	32.31	8.12	0.00	40.43
		Drill for 3 5/8ö Bolt					3,182	0	15,847
	SUB-221/221	0.465 hrs/unit 182 TOTAL HRS	392.00	EA	0	12,666			
03150.08 - 00		3 5/8" Bolt			28.50	17.69	0.85	0.00	47.04
	SUB-311/311	0.239 hrs/unit 94 TOTAL HRS	392.00	EA	11,172	6,933	333	0	18,438
		Subtotal Direct Costs			152,435	138,113	16,973	0	307,521
		Subcontractor Markups			46,059	32,700	4,314	0	83,074
		Prime Contractor Markups			18,984	12,487	2,036	0	33,507
		TOTAL UM2003143002 UMS_AK_ST.722 - TYPE 2 CONC SLAB ON GRD	2,107	HRS	217,478	183,301	23,322	0	424,102
		5,301.00 SF *Level Unit Cost-->*			*41.03*	*34.58*	*4.40*	*0.00*	*80.00*

NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY

UM2003163001 UMS_02AA_ST.711 - Concrete Wall *LEVEL CONTRACTOR ID APPLIED--PRIME*

		DAILY PRODUCTIVITY = 74.361 CY/DAY							
05122.30 - 50		NELSON STUDS			3.11	3.10	1.46	0.00	7.67
	SUB-511/511	0.046 hrs/unit 121 TOTAL HRS	2,634.38	ea	8,193	8,159	3,846	0	20,198
	* LINE ITEM ASSEMBLY	Factor:0.3750							
03370.80 - 01		SHOTCRETE, 4000PSI FIBER			300.47	4.47	0.00	0.00	304.94
	SUB-314/314	0.074 hrs/unit 10 TOTAL HRS	133.47	CY	40,104	597	0	0	40,701
	* LINE ITEM ASSEMBLY	Factor:0.0190							
31661.64 - 61		FURNISH & INSTALL REINFORCING STEEL - SLURRY WALL (LOW HEADROOM AREA)	0.48		0.58	0.14	0.00		1.20
	SUB-323/323	0.009 hrs/unit 52 TOTAL HRS	5,732.40	lbs	2,752	3,339	803	0	6,893
	* LINE ITEM ASSEMBLY	Factor:0.8160							
07170.00 - 00		MIRA-DRAIN			0.58	0.97	0.03	0.00	1.58
	SUB-111/111	0.017 hrs/unit 13 TOTAL HRS	779.77	SF	452	756	24	0	1,232
	* LINE ITEM ASSEMBLY	Factor:0.1110							
03210.60 - 01		REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#3-#7/A615/GRD 60	0.80		0.66	0.05	0.00		1.51
	SUB-323/323	0.01 hrs/unit 249 TOTAL HRS	24,404.85	LBS	19,524	16,148	1,249	0	36,920
	* LINE ITEM ASSEMBLY	Factor:3.4740							
07170.70 - 00		WATERPROOFING			4.91	4.71	0.09	0.00	9.71
	SUB-111/111	0.081 hrs/unit 566 TOTAL HRS	7,025.00	SF	34,493	33,113	641	0	68,247
	* LINE ITEM ASSEMBLY	Factor:1.0000							
03310.22 - 00		STRUC PCC/READY MX/NORMAL WT/5K PSI			111.00	95.53	0.00	0.00	206.53
	SUB-311/311	1.291 hrs/unit 172 TOTAL HRS	133.47	CY	14,816	12,750	0	0	27,565
	* LINE ITEM ASSEMBLY	Factor:0.0190							
03310.70 - 05		PLACING CONC, INCL VIB, WALLS, 12" THICK, PUMPED "SF"			5.11	1.64	0.07	0.00	6.82
	SUB-221/221	0.024 hrs/unit 3 TOTAL HRS	133.47	SF	682	219	9	0	910
	* LINE ITEM ASSEMBLY	Factor:0.0190							
03310.70 - 05		WALL SACK & PATCH			0.13	1.20	0.06	0.00	1.39
	SUB-315/315	0.02 hrs/unit 138 TOTAL HRS	7,025.00	SF	913	8,400	436	0	9,749
	* LINE ITEM ASSEMBLY	Factor:1.0000							
		Subtotal Direct Costs			121,928	83,479	7,008	0	212,415
		Subcontractor Markups			21,854	16,685	1,849	0	40,388
		Prime Contractor Markups			13,751	7,322	847	0	21,921
		TOTAL UM2003163001 UMS_02AA_ST.711 - Concrete Wall	1,324	HRS	157,534	107,487	9,704	0	274,724
		7,025.00 SF *Level Unit Cost-->*			*22.42*	*15.30*	*1.38*	*0.00*	*39.11*

NOTE: DAILY PRODUCTIVITY = 74.361 CY/DAY

UM2003163210 WALE - W30X173 *LEVEL CONTRACTOR ID APPLIED--PRIME*

		DAILY PRODUCTIVITY = 13.46 TN/DAY							
05120.68 - 01		STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	3000.00		480.19	60.84	0.00		3,541.03
	SUB-511/511	7.132 hrs/unit 61 TOTAL HRS	8.50	TON	25,500	4,082	517	0	30,099
	* LINE ITEM ASSEMBLY	Factor:0.1000							

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
		DAILY PRODUCTIVITY = 13.46 TN/DAY							
05090.90 - 02		WELDNG STRUC/4 PASSES/07LB/LF/1/2"THK/CONTIN FILLET/TYP 6011			1.66	28.18	3.57	0.00	33.41
	SUB-511/511	0.419 hrs/unit 178 TOTAL HRS	425.00	LF	706	11,978	1,517	0	14,201
	* LINE ITEM ASSEMBLY	Factor:5.0000							
05120.48 - 00		MISC METALS			0.85	1.06	0.15	0.00	2.06
	SUB-511/511	0.016 hrs/unit 31 TOTAL HRS	1,938.00	LBS	1,647	2,059	291	0	3,997
	* LINE ITEM ASSEMBLY	Factor:22.8000							
05122.30 - 50		A325 HIGH STRENGTH BOLTS			1.94	1.95	0.91	0.00	4.80
	SUB-511/511	0.029 hrs/unit 2 TOTAL HRS	85.00	ea	165	166	77	0	408
	* LINE ITEM ASSEMBLY	Factor:1.0000							
03300.01 - 00		PURCHASE 4000 PSI CONCRETE			113.30	0.00	0.00	0.00	113.30
	SUB-120/120		40.80	CY	4,623	0	0	0	4,623
	* LINE ITEM ASSEMBLY	Factor:0.4800							
03350.30 - 00		STRUCT CONCRETE - PUMP & PLACE			0.00	7.88	8.50	0.00	16.39
	SUB-312/312	0.126 hrs/unit 5 TOTAL HRS	40.80	CY	0	322	347	0	669
	* LINE ITEM ASSEMBLY	Factor:0.4800							
03210.60 - 01		REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#3-#7/A615/GRD 60			0.80	0.66	0.05	0.00	1.51
	SUB-323/323	0.01 hrs/unit 43 TOTAL HRS	4,199.00	LBS	3,359	2,778	215	0	6,352
	* LINE ITEM ASSEMBLY	Factor:49.4000							
03110.01 - 01		FORMWORK - BEAMS			3.00	9.47	1.25	0.00	13.72
	SUB-311/311	0.128 hrs/unit 51 TOTAL HRS	396.95	sf	1,191	3,760	496	0	5,447
	* LINE ITEM ASSEMBLY	Factor:4.6700							
03110.01 - 01		FORMWORK - BEAMS, AT STRUT CONNECTIONS			3.00	12.31	1.25	0.00	16.56
	SUB-311/311	0.166 hrs/unit 50 TOTAL HRS	297.50	sf	893	3,663	372	0	4,928
	* LINE ITEM ASSEMBLY	Factor:3.5000							
02466.00 - 02		STRIP FDN FORMS, POST POUR CLEAN-UP, CURE			0.00	0.00	2.01	0.00	2.01
	SUB-221/221		694.45	CSFA	0	0	1,396	0	1,396
	* LINE ITEM ASSEMBLY	Factor:8.1700							
01101.01 - 08		SCAFFOLDING "COST PER SF "			1.15	0.88	0.41	0.00	2.44
	SUB-221/221	0.013 hrs/unit 16 TOTAL HRS	1,275.00	SF	1,466	1,121	522	0	3,108
	* LINE ITEM ASSEMBLY	Factor:15.0000							
02260.72 - 04		DRILL HOLE FOR BOLT/2" DIA FOR 1" BOLT/5' L			0.00	98.37	8.12	0.00	106.48
	SUB-221/221	1.416 hrs/unit 120 TOTAL HRS	85.00	EA	0	8,361	690	0	9,051
	* LINE ITEM ASSEMBLY	Factor:1.0000							
		Subtotal Direct Costs			39,549	38,289	6,440	0	84,279
		Subcontractor Markups			12,136	8,001	1,473	0	21,610
		Prime Contractor Markups			4,943	3,384	757	0	9,084
		TOTAL UM2003163210 WALE - W30X173	556	HRS	56,629	49,675	8,670	0	114,973
		85.00 LF	*Level Unit Cost-->*		*666.22*	*584.41*	*101.99*	*0.00*	*1,352.62*
		NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
		UM2003163212 WALE - W30X261 *LEVEL CONTRACTOR ID APPLIED--PRIME*							
		DAILY PRODUCTIVITY = 13.46 TN/DAY							
05120.68 - 01		STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STE	000.00			480.19	60.84	0.00	3,541.03
	SUB-511/511	7.132 hrs/unit 80 TOTAL HRS	11.20	TON	33,600	5,378	681	0	39,660
	* LINE ITEM ASSEMBLY	Factor:0.1400							
05090.90 - 02		WELDNG STRUC/4 PASSES/07LB/LF/1/2"THK/CONTIN FILLET/TYP 6011			1.66	28.18	3.57	0.00	33.41
	SUB-511/511	0.419 hrs/unit 167 TOTAL HRS	400.00	LF	664	11,273	1,428	0	13,365
	* LINE ITEM ASSEMBLY	Factor:5.0000							
05120.48 - 00		MISC METALS			0.85	1.06	0.15	0.00	2.06
	SUB-511/511	0.016 hrs/unit 29 TOTAL HRS	1,864.80	LBS	1,585	1,981	280	0	3,846
	* LINE ITEM ASSEMBLY	Factor:23.3100							
05122.30 - 50		A325 HIGH STRENGTH BOLTS			1.94	1.95	0.91	0.00	4.80
	SUB-511/511	0.029 hrs/unit 2 TOTAL HRS	80.00	ea	155	156	73	0	384
	* LINE ITEM ASSEMBLY	Factor:1.0000							
03300.01 - 00		PURCHASE 4000 PSI CONCRETE			113.30	0.00	0.00	0.00	113.30
	SUB-120/120		40.00	CY	4,532	0	0	0	4,532
	* LINE ITEM ASSEMBLY	Factor:0.5000							
03350.30 - 00		STRUCT CONCRETE - PUMP & PLACE			0.00	7.88	8.50	0.00	16.39
	SUB-312/312	0.127 hrs/unit 5 TOTAL HRS	40.00	CY	0	315	340	0	655
	* LINE ITEM ASSEMBLY	Factor:0.5000							
03210.60 - 01		REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#3-#7/A615/GRD 60			0.80	0.66	0.05	0.00	1.51
	SUB-323/323	0.01 hrs/unit 42 TOTAL HRS	4,132.80	LBS	3,306	2,735	211	0	6,252
	* LINE ITEM ASSEMBLY	Factor:51.6600							
03110.01 - 01		FORMWORK - BEAMS			3.00	9.47	1.25	0.00	13.72
	SUB-311/311	0.128 hrs/unit 50 TOTAL HRS	387.20	sf	1,162	3,668	484	0	5,313
	* LINE ITEM ASSEMBLY	Factor:4.8400							
03110.01 - 01		FORMWORK - BEAMS, AT STRUT CONNECTIONS			3.00	12.31	1.25	0.00	16.56
	SUB-311/311	0.166 hrs/unit 47 TOTAL HRS	280.00	sf	840	3,448	350	0	4,638
	* LINE ITEM ASSEMBLY	Factor:3.5000							
02466.00 - 02		STRIP FDN FORMS, POST POUR CLEAN-UP, CURE			0.00	0.00	2.01	0.00	2.01
	SUB-221/221		667.20	CSFA	0	0	1,342	0	1,342
	* LINE ITEM ASSEMBLY	Factor:8.3400							
01101.01 - 08		SCAFFOLDING "COST PER SF "			1.15	0.88	0.41	0.00	2.44
	SUB-221/221	0.013 hrs/unit 15 TOTAL HRS	1,200.00	SF	1,380	1,055	491	0	2,926

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
		DAILY PRODUCTIVITY = 13.46 TN/DAY							
		* LINE ITEM ASSEMBLY Factor:15.0000							
02260.72 - 04		DRILL HOLE FOR BOLT/2" DIA FOR 1" BOLT/5' L			0.00	98.37	8.12	0.00	106.48
	SUB-221/221	1.416 hrs/unit 113 TOTAL HRS	80.00	EA	0	7,869	649	0	8,519
		* LINE ITEM ASSEMBLY Factor:1.0000							
		Subtotal Direct Costs			47,224	37,878	6,329	0	91,431
		Subcontractor Markups			14,614	7,982	1,452	0	24,049
		Prime Contractor Markups			5,914	3,353	744	0	10,011
		TOTAL UM2003163212 WALE - W30X261	551	HRS	67,753	49,213	8,526	0	125,492
		80.00 LF *Level Unit Cost-->*			*846.91*	*615.16*	*106.57*	*0.00*	*1,568.64*
		NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
		UM2003163411 UMS_AA_ST.732- WALE CONNECTION_TYPE 1_CONCOURSE LEVEL *LEVEL CONTRACTOR ID APPLIED--PRIME*							
		DAILY PRODUCTIVITY = 6000 LBS/DAY							
05120.48 - 00		MISC METALS			0.85	1.06	0.15	0.00	2.06
	SUB-511/511	0.016 hrs/unit 32 TOTAL HRS	1,996.48	LBS	1,697	2,121	299	0	4,118
		* LINE ITEM ASSEMBLY Factor:499.1200							
05122.30 - 50		A325 HIGH STRENGTH BOLTS			1.94	1.95	0.91	0.00	4.80
	SUB-511/511	0.029 hrs/unit 5 TOTAL HRS	176.00	ea	341	344	160	0	845
		* LINE ITEM ASSEMBLY Factor:44.0000							
02260.72 - 04		DRILL HOLE FOR BOLT/2" DIA FOR 1" BOLT/5' L			0.00	98.37	8.12	0.00	106.48
	SUB-221/221	1.416 hrs/unit 249 TOTAL HRS	176.00	EA	0	17,313	1,428	0	18,741
		* LINE ITEM ASSEMBLY Factor:44.0000							
		Subtotal Direct Costs			2,038	19,777	1,888	0	23,704
		Subcontractor Markups			652	5,061	535	0	6,247
		Prime Contractor Markups			257	1,816	232	0	2,305
		TOTAL UM2003163411 UMS_AA_ST.732- WALE CONNECTION_TYPE 1_CONCOURSE LEVEL	286	HRS	2,948	26,654	2,654	0	32,256
		4.00 EA *Level Unit Cost-->*			*736.90*	*6,663.49*	*663.60*	*0.00*	*8,063.98*
		NOTE: DAILY PRODUCTIVITY = 6000 LBS/DAY							
		UM2003163412 UMS_AB_ST.732- WALE CONNECTION_TYPE 2_CONCOURSE LEVEL *LEVEL CONTRACTOR ID APPLIED--PRIME*							
		DAILY PRODUCTIVITY = 6000 LBS/DAY							
05120.48 - 00		MISC METALS			0.85	1.06	0.15	0.00	2.06
	SUB-511/511	0.016 hrs/unit 4 TOTAL HRS	272.24	LBS	231	289	41	0	561
		* LINE ITEM ASSEMBLY Factor:272.2400							
05122.30 - 50		A325 HIGH STRENGTH BOLTS			1.94	1.95	0.91	0.00	4.80
	SUB-511/511	0.029 hrs/unit 1 TOTAL HRS	28.00	ea	54	55	25	0	134
		* LINE ITEM ASSEMBLY Factor:28.0000							
02260.72 - 04		DRILL HOLE FOR BOLT/2" DIA FOR 1" BOLT/5' L			0.00	98.37	8.12	0.00	106.48
	SUB-221/221	1.416 hrs/unit 40 TOTAL HRS	28.00	EA	0	2,754	227	0	2,982
		* LINE ITEM ASSEMBLY Factor:28.0000							
		Subtotal Direct Costs			286	3,098	294	0	3,677
		Subcontractor Markups			91	792	83	0	967
		Prime Contractor Markups			36	284	36	0	357
		TOTAL UM2003163412 UMS_AB_ST.732- WALE CONNECTION_TYPE 2_CONCOURSE LEVEL	45	HRS	413	4,175	413	0	5,001
		NOTE: DAILY PRODUCTIVITY = 6000 LBS/DAY							
		UM2003163601 UMS_AA_ST.741 - STRUTS *LEVEL CONTRACTOR ID APPLIED--PRIME*							
		DAILY PRODUCTIVITY = 25.87 TN/DAY							
02250.40 - 02		SHEET PILING/WALES/CONNECTIONS & STRUTS/2/3 SALVAGE			275.00	236.38	0.00	0.00	511.38
	SUB-221/221	3.402 hrs/unit 67 TOTAL HRS	19.76	TON	5,434	4,671	0	0	10,105
		* LINE ITEM ASSEMBLY Factor:0.1040							
05090.90 - 02		WELDNG STRUC/4 PASSES/07LB/LF/1/2"THK/CONTIN FILLET/TYP 6011			1.66	28.18	3.57	0.00	33.41
	SUB-511/511	0.419 hrs/unit 351 TOTAL HRS	837.52	LF	1,390	23,604	2,990	0	27,984
		* LINE ITEM ASSEMBLY Factor:4.4080							
05120.48 - 00		MISC METALS			0.85	1.06	0.15	0.00	2.06
	SUB-511/511	0.016 hrs/unit 1655 TOTAL HRS	104,859.86	LBS	89,131	111,411	15,729	0	216,271
		* LINE ITEM ASSEMBLY Factor:551.8940							
05122.30 - 50		A325 HIGH STRENGTH BOLTS			1.94	1.95	0.91	0.00	4.80
	SUB-511/511	0.029 hrs/unit 2 TOTAL HRS	82.08	ea	159	160	75	0	394
		* LINE ITEM ASSEMBLY Factor:0.4320							
05950.65 - 06		PAINTS & PROTECTIVE COTGS/EPOXY TOPCOAT/SPRAYED			0.21	0.47	0.06	0.00	0.73
	SUB-511/511	0.007 hrs/unit 21 TOTAL HRS	2,983.00	SF	626	1,386	176	0	2,188
		* LINE ITEM ASSEMBLY Factor:15.7000							
05950.65 - 06		PAINTS & PROTECTIVE COTGS/EPOXY PRIMER/SPRAYED			0.24	0.39	0.05	0.00	0.68
	SUB-511/511	0.006 hrs/unit 9 TOTAL HRS	1,491.50	SF	358	577	73	0	1,009
		* LINE ITEM ASSEMBLY Factor:7.8500							
02260.72 - 04		DRILL HOLE FOR BOLT/2" DIA FOR 1" BOLT/5' L			0.00	98.37	8.12	0.00	106.48
	SUB-221/221	1.416 hrs/unit 116 TOTAL HRS	81.70	EA	0	8,037	663	0	8,700
		* LINE ITEM ASSEMBLY Factor:0.4300							

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
		DAILY PRODUCTIVITY = 25.87 TN/DAY							
		Subtotal Direct Costs			97,099	149,846	19,706	0	266,650
		Subcontractor Markups			31,034	39,784	5,502	0	76,321
		Prime Contractor Markups			12,255	13,863	2,411	0	28,528
		TOTAL UM2003163601 UMS_AA_ST.741 - STRUTS	2,220	HRS	140,388	203,493	27,619	0	371,500
		190.00 LF *Level Unit Cost-->*			*738.88*	*1,071.01*	*145.36*	*0.00*	*1,955.26*
		NOTE: DAILY PRODUCTIVITY = 25.87 TN/DAY							
		UM2003164011 UMS_AE_ST.751 - 7 INCH CONCRETE SLAB ON STEEL DECK *LEVEL CONTRACTOR ID APPLIED--PRIME*							
		DAILY PRODUCTIVITY = 566.93 CY/DAY							
03300.01 - 00		PURCHASE 4000 PSI CONCRETE			113.30	0.00	0.00	0.00	113.30
	SUB-120/120		161.28	CY	18,273	0	0	0	18,273
	* LINE ITEM ASSEMBLY	Factor:0.0200							
03350.30 - 00		STRUCT CONCRETE - PUMP & PLACE			0.00	7.88	8.50	0.00	16.38
	SUB-312/312	0.127 hrs/unit 20 TOTAL HRS	161.28	CY	0	1,272	1,371	0	2,643
	* LINE ITEM ASSEMBLY	Factor:0.0200							
03350.30 - 00		FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH			0.00	0.65	0.03	0.00	0.67
	SUB-312/312	0.01 hrs/unit 83 TOTAL HRS	8,064.00	SF	0	5,202	207	0	5,409
	* LINE ITEM ASSEMBLY	Factor:1.0000							
03210.60 - 01		REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#3-#7/A615/GRD 60			0.80	0.66	0.05	0.00	1.51
	SUB-323/323	0.01 hrs/unit 368 TOTAL HRS	36,046.08	LBS	28,837	23,850	1,844	0	54,531
	* LINE ITEM ASSEMBLY	Factor:4.4700							
05310.30 - 04		MTL DKING/STL/OPN TYPE/L SPAN/GALV/OVER 50 SQ/7-1/2" D/16 GA			10.00	1.55	0.20	0.00	11.74
	SUB-511/511	0.023 hrs/unit 185 TOTAL HRS	8,064.00	SF	80,640	12,487	1,582	0	94,709
	* LINE ITEM ASSEMBLY	Factor:1.0000							
02220.13 - 00		BLDG FTGS & FNDN DEMO/FLRS/PCC SLAB ON GRD/PCC/WIRE MESH REINFR/4" THK			0.00	6.79	0.56	0.00	7.35
	SUB-221/221	0.098 hrs/unit 788 TOTAL HRS	8,064.00	SF	0	54,772	4,519	0	59,291
	* LINE ITEM ASSEMBLY	Factor:1.0000							
03110.44 - 55		SCREED/24 GA MTL KEY JOINT/SEE DIV 03150-250			0.17	0.36	0.03	0.00	0.55
	SUB-311/311	0.005 hrs/unit 39 TOTAL HRS	8,064.00	SF	1,371	2,882	216	0	4,469
	* LINE ITEM ASSEMBLY	Factor:1.0000							
09250.70 - 04		Material Stocking			0.00	0.18	0.11	0.00	0.29
	SUB-111/111	0.003 hrs/unit 108 TOTAL HRS	36,046.08	LBS	0	6,332	3,965	0	10,297
	* LINE ITEM ASSEMBLY	Factor:4.4700							
		Subtotal Direct Costs			129,121	106,798	13,704	0	249,623
		Subcontractor Markups			41,856	25,170	3,421	0	70,448
		Prime Contractor Markups			16,352	9,647	1,638	0	27,638
		TOTAL UM2003164011 UMS_AE_ST.751 - 7 INCH CONCRETE SLAB ON	1,693	HRS	187,329	141,615	18,763	0	347,708
		STEEL DECK			*23.23*	*17.56*	*2.33*	*0.00*	*43.12*
		8,064.00 SF *Level Unit Cost-->*							
		NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY							
		UM2003183001 UMS_02AA_ST.711 - Concrete Wall *LEVEL CONTRACTOR ID APPLIED--PRIME*							
		DAILY PRODUCTIVITY = 74.361 CY/DAY							
05122.30 - 50		NELSON STUDS			3.11	3.10	1.46	0.00	7.67
	SUB-511/511	0.046 hrs/unit 74 TOTAL HRS	1,603.13	ea	4,986	4,965	2,341	0	12,291
	* LINE ITEM ASSEMBLY	Factor:0.3750							
03370.80 - 01		SHOTCRETE, 4000PSI FIBER			300.48	4.47	0.00	0.00	304.95
	SUB-314/314	0.074 hrs/unit 6 TOTAL HRS	81.22	CY	24,405	363	0	0	24,768
	* LINE ITEM ASSEMBLY	Factor:0.0190							
31661.64 - 61		FURNISH & INSTALL REINFORCING STEEL - SLURRY WALL (LOW HEADROOM AREA)			0.48	0.58	0.14	0.00	1.20
	SUB-323/323	0.009 hrs/unit 31 TOTAL HRS	3,488.40	lbs	1,674	2,032	488	0	4,195
	* LINE ITEM ASSEMBLY	Factor:0.8160							
07170.00 - 00		MIRA-DRAIN			0.58	0.97	0.03	0.00	1.58
	SUB-111/111	0.017 hrs/unit 8 TOTAL HRS	474.53	SF	275	460	15	0	750
	* LINE ITEM ASSEMBLY	Factor:0.1110							
03210.60 - 01		REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#3-#7/A615/GRD 60			0.80	0.66	0.05	0.00	1.51
	SUB-323/323	0.01 hrs/unit 152 TOTAL HRS	14,851.35	LBS	11,881	9,827	760	0	22,467
	* LINE ITEM ASSEMBLY	Factor:3.4740							
07170.70 - 00		WATERPROOFING			4.91	4.71	0.09	0.00	9.71
	SUB-111/111	0.08 hrs/unit 344 TOTAL HRS	4,275.00	SF	20,990	20,150	390	0	41,531
	* LINE ITEM ASSEMBLY	Factor:1.0000							
03310.22 - 00		STRUC PCC/READY MX/NORMAL WT/5K PSI			111.01	95.53	0.00	0.00	206.53
	SUB-311/311	1.291 hrs/unit 105 TOTAL HRS	81.22	CY	9,016	7,759	0	0	16,775
	* LINE ITEM ASSEMBLY	Factor:0.0190							
03310.70 - 05		PLACING CONC, INCL VIB, WALLS, 12" THICK, PUMPED "SF"			5.11	1.64	0.07	0.00	6.82
	SUB-221/221	0.024 hrs/unit 2 TOTAL HRS	81.22	SF	415	133	5	0	554
	* LINE ITEM ASSEMBLY	Factor:0.0190							
03310.70 - 05		WALL SACK & PATCH			0.13	1.20	0.06	0.00	1.39
	SUB-315/315	0.02 hrs/unit 84 TOTAL HRS	4,275.00	SF	556	5,111	266	0	5,933
	* LINE ITEM ASSEMBLY	Factor:1.0000							

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
		DAILY PRODUCTIVITY = 74.361 CY/DAY							
		Subtotal Direct Costs			74,198	50,801	4,265	0	129,263
		Subcontractor Markups			13,299	10,154	1,125	0	24,578
		Prime Contractor Markups			8,368	4,456	515	0	13,340
		TOTAL UM2003183001 UMS_02AA_ST.711 - Concrete Wall	806	HRS	95,866	65,410	5,905	0	167,181
		4,275.00 SF *Level Unit Cost-->*			*22.42*	*15.30*	*1.38*	*0.00*	*39.11*
		NOTE: DAILY PRODUCTIVITY = 74.361 CY/DAY							
		UM2003183201 UMS_AA_ST.781 - CONCRETE BEAM - 60 X 36 *LEVEL CONTRACTOR ID APPLIED--PRIME*							
		DAILY PRODUCTIVITY = 566.93 CY/DAY							
03210.60 - 01		REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#8-#18/A615/GRD 60			0.81	0.44	0.03	0.00	1.29
	SUB-323/323	0.007 hrs/unit 8 TOTAL HRS	1,133.34	LBS	921	500	39	0	1,459
	* LINE ITEM ASSEMBLY	Factor:188.8900							
03210.60 - 01		REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#3-#7/A615/GRD 60			0.80	0.66	0.05	0.00	1.51
	SUB-323/323	0.01 hrs/unit 2 TOTAL HRS	199.98	LBS	160	132	10	0	303
	* LINE ITEM ASSEMBLY	Factor:33.3300							
03310.22 - 00		STRUC PCC/READY MX/NORMAL WT/4000PSI			106.00	91.22	0.00	0.00	197.22
	SUB-311/311	1.233 hrs/unit 4 TOTAL HRS	3.36	CY	356	306	0	0	663
	* LINE ITEM ASSEMBLY	Factor:0.5600							
03350.30 - 00		STRUCT CONCRETE - PUMP & PLACE			0.00	7.88	8.50	0.00	16.38
	SUB-312/312	0.126 hrs/unit	3.36	CY	0	26	29	0	55
	* LINE ITEM ASSEMBLY	Factor:0.5600							
03350.30 - 00		FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH			0.00	0.65	0.03	0.00	0.67
	SUB-312/312	0.01 hrs/unit	48.00	SF	0	31	1	0	32
	* LINE ITEM ASSEMBLY	Factor:8.0000							
03310.70 - 05		WALL SACK & PATCH			0.13	1.20	0.06	0.00	1.39
	SUB-315/315	0.02 hrs/unit 1 TOTAL HRS	48.00	SF	6	57	3	0	67
	* LINE ITEM ASSEMBLY	Factor:8.0000							
03110.01 - 01		FORMWORK - BEAMS			3.00	9.47	1.25	0.00	13.72
	SUB-311/311	0.128 hrs/unit 8 TOTAL HRS	66.00	sf	198	625	83	0	906
	* LINE ITEM ASSEMBLY	Factor:11.0000							
02466.00 - 02		STRIP FDN FORMS, POST POUR CLEAN-UP, CURE			0.00	0.00	2.01	0.00	2.01
	SUB-221/221		66.00	CSFA	0	0	133	0	133
	* LINE ITEM ASSEMBLY	Factor:11.0000							
01101.01 - 08		SCAFFOLDING "COST PER SF "			1.15	0.88	0.41	0.00	2.44
	SUB-221/221	0.013 hrs/unit 1 TOTAL HRS	90.00	SF	104	79	37	0	219
	* LINE ITEM ASSEMBLY	Factor:15.0000							
03210.61 - 00		STANDARD COUPLERS, #8			15.60	13.43	0.13	0.00	29.16
	SUB-311/311	0.181 hrs/unit 3 TOTAL HRS	18.18	EA	284	244	2	0	530
	* LINE ITEM ASSEMBLY	Factor:3.0300							
03110.01 - 01		FORM SAVERS			20.00	14.58	1.92	0.00	36.50
	SUB-311/311	0.197 hrs/unit 4 TOTAL HRS	19.14	ea	383	279	37	0	699
	* LINE ITEM ASSEMBLY	Factor:3.1900							
03210.63 - 60		THREADING OF REBAR, #8			0.00	5.38	0.26	0.00	5.64
	SUB-311/311	0.073 hrs/unit 3 TOTAL HRS	36.36	EA	0	196	9	0	205
	* LINE ITEM ASSEMBLY	Factor:6.0600							
09250.70 - 04		Material Stocking			0.00	0.18	0.11	0.00	0.29
	SUB-111/111	0.003 hrs/unit 4 TOTAL HRS	1,333.32	LBS	0	234	147	0	381
	* LINE ITEM ASSEMBLY	Factor:222.2200							
		Subtotal Direct Costs			2,411	2,711	529	0	5,651
		Subcontractor Markups			404	248	105	0	758
		Prime Contractor Markups			269	216	61	0	546
		TOTAL UM2003183201 UMS_AA_ST.781 - CONCRETE BEAM - 60 X 36	39	HRS	3,085	3,175	695	0	6,955
		6.00 LF *Level Unit Cost-->*			*514.13*	*529.22*	*115.85*	*0.00*	*1,159.20*
		NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY							
		UM2003183202 UMS_AB_ST.781 - CONCRETE BEAM - 108 X 36 *LEVEL CONTRACTOR ID APPLIED--PRIME*							
		DAILY PRODUCTIVITY = 566.93 CY/DAY							
03210.60 - 01		REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#8-#18/A615/GRD 60			0.81	0.44	0.03	0.00	1.29
	SUB-323/323	0.007 hrs/unit 16 TOTAL HRS	2,295.00	LBS	1,865	1,012	78	0	2,955
	* LINE ITEM ASSEMBLY	Factor:382.5000							
03210.60 - 01		REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#3-#7/A615/GRD 60			0.80	0.66	0.05	0.00	1.51
	SUB-323/323	0.01 hrs/unit 4 TOTAL HRS	405.00	LBS	324	268	21	0	613
	* LINE ITEM ASSEMBLY	Factor:67.5000							
03310.22 - 00		STRUC PCC/READY MX/NORMAL WT/4000PSI			106.00	91.22	0.00	0.00	197.22
	SUB-311/311	1.233 hrs/unit 7 TOTAL HRS	6.00	CY	636	547	0	0	1,183
	* LINE ITEM ASSEMBLY	Factor:1.0000							
03350.30 - 00		STRUCT CONCRETE - PUMP & PLACE			0.00	7.88	8.50	0.00	16.39
	SUB-312/312	0.127 hrs/unit 1 TOTAL HRS	6.00	CY	0	47	51	0	98
	* LINE ITEM ASSEMBLY	Factor:1.0000							
03350.30 - 00		FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH			0.00	0.65	0.03	0.00	0.67
	SUB-312/312	0.01 hrs/unit 1 TOTAL HRS	72.00	SF	0	46	2	0	48
	* LINE ITEM ASSEMBLY	Factor:12.0000							

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
		DAILY PRODUCTIVITY = 566.93 CY/DAY							
03310.70 - 05		WALL SACK & PATCH			0.13	1.20	0.06	0.00	1.39
	SUB-315/315	0.02 hrs/unit 1 TOTAL HRS	72.00	SF	9	86	4	0	100
	* LINE ITEM ASSEMBLY	Factor:12.0000							
03110.01 - 01		FORMWORK - BEAMS			3.00	9.47	1.25	0.00	13.72
	SUB-311/311	0.128 hrs/unit 12 TOTAL HRS	90.00	sf	270	852	113	0	1,235
	* LINE ITEM ASSEMBLY	Factor:15.0000							
02466.00 - 02		STRIP FDN FORMS, POST POUR CLEAN-UP, CURE			0.00	0.00	2.01	0.00	2.01
	SUB-221/221		90.00	CSFA	0	0	181	0	181
	* LINE ITEM ASSEMBLY	Factor:15.0000							
01101.01 - 08		SCAFFOLDING "COST PER SF "			1.15	0.88	0.41	0.00	2.44
	SUB-221/221	0.013 hrs/unit 1 TOTAL HRS	90.00	SF	104	79	37	0	219
	* LINE ITEM ASSEMBLY	Factor:15.0000							
03210.61 - 00		STANDARD COUPLERS, #8			15.60	13.43	0.13	0.00	29.16
	SUB-311/311	0.181 hrs/unit 7 TOTAL HRS	36.84	EA	575	495	5	0	1,074
	* LINE ITEM ASSEMBLY	Factor:6.1400							
03110.01 - 01		FORM SAVERS			20.00	14.58	1.92	0.00	36.50
	SUB-311/311	0.197 hrs/unit 8 TOTAL HRS	38.70	ea	774	564	74	0	1,412
	* LINE ITEM ASSEMBLY	Factor:6.4500							
03210.63 - 60		THREADING OF REBAR, #8			0.00	5.38	0.26	0.00	5.64
	SUB-311/311	0.073 hrs/unit 5 TOTAL HRS	73.68	EA	0	396	19	0	415
	* LINE ITEM ASSEMBLY	Factor:12.2800							
09250.70 - 04		Material Stocking			0.00	0.18	0.11	0.00	0.29
	SUB-111/111	0.003 hrs/unit 8 TOTAL HRS	2,700.00	LBS	0	474	297	0	771
	* LINE ITEM ASSEMBLY	Factor:450.0000							
		Subtotal Direct Costs			4,556	4,868	882	0	10,307
		Subcontractor Markups			785	482	178	0	1,445
		Prime Contractor Markups			511	391	101	0	1,003
		TOTAL UM2003183202 UMS_AB_ST.781 - CONCRETE BEAM - 108 X 71 HRS			5,852	5,742	1,161	0	12,755
		36			*975.40*	*956.95*	*193.52*	*0.00*	*2,125.87*
		6.00 LF *Level Unit Cost-->*							
		NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY							
		UM2003183404 UMS_AD_ST.733-WALE - W30X261 *LEVEL CONTRACTOR ID APPLIED--PRIME*							
		DAILY PRODUCTIVITY = 13.46 TN/DAY							
05120.68 - 01		STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STE	8000.00			480.19	60.84	0.00	3,541.03
	SUB-511/511	7.132 hrs/unit 193 TOTAL HRS	27.02	TON	81,060	12,975	1,644	0	95,679
	* LINE ITEM ASSEMBLY	Factor:0.1400							
05090.90 - 02		WELDNG STRUC/4 PASSES/07LB/LF/1/2"THK/CONTIN FILLET/TYP 6011			1.66	28.18	3.57	0.00	33.41
	SUB-511/511	0.419 hrs/unit 404 TOTAL HRS	965.00	LF	1,602	27,196	3,446	0	32,244
	* LINE ITEM ASSEMBLY	Factor:5.0000							
05120.48 - 00		MISC METALS			0.85	1.06	0.15	0.00	2.06
	SUB-511/511	0.016 hrs/unit 75 TOTAL HRS	4,736.22	LBS	4,026	5,032	710	0	9,768
	* LINE ITEM ASSEMBLY	Factor:24.5400							
05122.30 - 50		A325 HIGH STRENGTH BOLTS			1.94	1.95	0.91	0.00	4.80
	SUB-511/511	0.029 hrs/unit 6 TOTAL HRS	202.65	ea	393	396	184	0	973
	* LINE ITEM ASSEMBLY	Factor:1.0500							
03300.01 - 00		PURCHASE 4000 PSI CONCRETE			113.30	0.00	0.00	0.00	113.30
	SUB-120/120		96.50	CY	10,933	0	0	0	10,933
	* LINE ITEM ASSEMBLY	Factor:0.5000							
03350.30 - 00		STRUCT CONCRETE - PUMP & PLACE			0.00	7.88	8.50	0.00	16.38
	SUB-312/312	0.126 hrs/unit 12 TOTAL HRS	96.50	CY	0	761	820	0	1,581
	* LINE ITEM ASSEMBLY	Factor:0.5000							
03210.60 - 01		REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#3-#7/A615/GRD 60			0.80	0.66	0.05	0.00	1.51
	SUB-323/323	0.01 hrs/unit 102 TOTAL HRS	9,970.38	LBS	7,976	6,597	510	0	15,083
	* LINE ITEM ASSEMBLY	Factor:51.6600							
03110.01 - 01		FORMWORK - BEAMS			3.00	9.47	1.25	0.00	13.72
	SUB-311/311	0.128 hrs/unit 120 TOTAL HRS	934.12	sf	2,802	8,848	1,168	0	12,818
	* LINE ITEM ASSEMBLY	Factor:4.8400							
03110.01 - 01		FORMWORK - BEAMS, AT STRUT CONNECTIONS			3.00	12.31	1.25	0.00	16.56
	SUB-311/311	0.166 hrs/unit 112 TOTAL HRS	675.50	sf	2,027	8,318	844	0	11,189
	* LINE ITEM ASSEMBLY	Factor:3.5000							
02466.00 - 02		STRIP FDN FORMS, POST POUR CLEAN-UP, CURE			0.00	0.00	2.01	0.00	2.01
	SUB-221/221		1,609.62	CSFA	0	0	3,237	0	3,237
	* LINE ITEM ASSEMBLY	Factor:8.3400							
01101.01 - 08		SCAFFOLDING "COST PER SF "			1.15	0.88	0.41	0.00	2.44
	SUB-221/221	0.013 hrs/unit 37 TOTAL HRS	2,895.00	SF	3,329	2,545	1,184	0	7,058
	* LINE ITEM ASSEMBLY	Factor:15.0000							
02260.72 - 04		DRILL HOLE FOR BOLT/2" DIA FOR 1" BOLT/5' L			0.00	98.37	8.12	0.00	106.48
	SUB-221/221	1.416 hrs/unit 287 TOTAL HRS	202.65	EA	0	19,934	1,645	0	21,579
	* LINE ITEM ASSEMBLY	Factor:1.0500							

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
	Subtotal Direct Costs		114,149	92,601	15,392	0	222,142
	Subcontractor Markups		35,327	19,571	3,538	0	58,437
	Prime Contractor Markups		14,296	8,200	1,811	0	24,307
	TOTAL UM2003183404 UMS_AD_ST.733-WALE - W30X261	1,347 HRS	163,772	120,373	20,741	0	304,886
	193.00 LF	*Level Unit Cost-->*	*848.56*	*623.69*	*107.47*	*0.00*	*1,579.72*
	NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY						
	UM2003183611 UMS_AA_ST.733- WALE CONNECTION_TYPE 1_INTERMEDIATE LEVE	*LEVEL CONTRACTOR ID APPLIED--PRIME*					
	DAILY PRODUCTIVITY = 6000 LBS/DAY						
05120.48 - 00	MISC METALS		0.85	1.06	0.15	0.00	2.06
	SUB-511/511 0.016 hrs/unit 13 TOTAL HRS	855.34 LBS	727	909	128	0	1,764
	* LINE ITEM ASSEMBLY Factor:427.6700						
05122.30 - 50	A325 HIGH STRENGTH BOLTS		1.94	1.95	0.91	0.00	4.80
	SUB-511/511 0.029 hrs/unit 3 TOTAL HRS	88.00 ea	171	172	80	0	423
	* LINE ITEM ASSEMBLY Factor:44.0000						
02260.72 - 04	DRILL HOLE FOR BOLT/2" DIA FOR 1" BOLT/5' L		0.00	98.37	8.12	0.00	106.48
	SUB-221/221 1.416 hrs/unit 125 TOTAL HRS	88.00 EA	0	8,656	714	0	9,370
	* LINE ITEM ASSEMBLY Factor:44.0000						
	Subtotal Direct Costs		898	9,737	923	0	11,557
	Subcontractor Markups		287	2,490	261	0	3,038
	Prime Contractor Markups		113	894	113	0	1,120
	TOTAL UM2003183611 UMS_AA_ST.733- WALE CONNECTION_TYPE 1_INTERMEDIATE LEVEL	141 HRS	1,298	13,121	1,297	0	15,716
	2.00 EA	*Level Unit Cost-->*	*649.08*	*6,560.32*	*648.57*	*0.00*	*7,857.97*
	NOTE: DAILY PRODUCTIVITY = 6000 LBS/DAY						
	UM2003183612 UMS_AB_ST.733- WALE CONNECTION_TYPE 2_INTERMEDIATE LEVE	*LEVEL CONTRACTOR ID APPLIED--PRIME*					
	DAILY PRODUCTIVITY = 6000 LBS/DAY						
05120.48 - 00	MISC METALS		0.85	1.06	0.15	0.00	2.06
	SUB-511/511 0.016 hrs/unit 16 TOTAL HRS	984.60 LBS	837	1,046	148	0	2,031
	* LINE ITEM ASSEMBLY Factor:246.1500						
05122.30 - 50	A325 HIGH STRENGTH BOLTS		1.94	1.95	0.91	0.00	4.80
	SUB-511/511 0.029 hrs/unit 3 TOTAL HRS	112.00 ea	217	219	102	0	538
	* LINE ITEM ASSEMBLY Factor:28.0000						
02260.72 - 04	DRILL HOLE FOR BOLT/2" DIA FOR 1" BOLT/5' L		0.00	98.37	8.12	0.00	106.48
	SUB-221/221 1.416 hrs/unit 159 TOTAL HRS	112.00 EA	0	11,017	909	0	11,926
	* LINE ITEM ASSEMBLY Factor:28.0000						
	Subtotal Direct Costs		1,054	12,282	1,159	0	14,495
	Subcontractor Markups		337	3,140	328	0	3,805
	Prime Contractor Markups		133	1,127	142	0	1,403
	TOTAL UM2003183612 UMS_AB_ST.733- WALE CONNECTION_TYPE 2_INTERMEDIATE LEVEL	177 HRS	1,524	16,549	1,629	0	19,702
	4.00 EA	*Level Unit Cost-->*	*381.09*	*4,137.20*	*407.26*	*0.00*	*4,925.55*
	NOTE: DAILY PRODUCTIVITY = 6000 LBS/DAY						
	UM2003183801 UMS_AI_ST.741 - Strut 9	*LEVEL CONTRACTOR ID APPLIED--PRIME*					
	DAILY PRODUCTIVITY = 25.87 TN/DAY						
02250.40 - 02	SHEET PILING/WALES/CONNECTIONS & STRUTS/2/3 SALVAGE		275.07	236.45	0.00	0.00	511.52
	SUB-221/221 3.403 hrs/unit 62 TOTAL HRS	18.22 TON	5,012	4,308	0	0	9,320
	* LINE ITEM ASSEMBLY Factor:0.2430						
05090.90 - 02	WELDNG STRUC/4 PASSES/07LB/LF/1/2"THK/CONTIN FILLET/TYP 6011		1.66	28.18	3.57	0.00	33.41
	SUB-511/511 0.419 hrs/unit 138 TOTAL HRS	330.60 LF	549	9,317	1,180	0	11,046
	* LINE ITEM ASSEMBLY Factor:4.4080						
05120.48 - 00	MISC METALS		0.85	1.06	0.15	0.00	2.06
	SUB-511/511 0.016 hrs/unit 653 TOTAL HRS	41,392.05 LBS	35,183	43,978	6,209	0	85,370
	* LINE ITEM ASSEMBLY Factor:551.8940						
05122.30 - 50	A325 HIGH STRENGTH BOLTS		1.94	1.95	0.91	0.00	4.80
	SUB-511/511 0.029 hrs/unit 1 TOTAL HRS	32.40 ea	63	63	29	0	156
	* LINE ITEM ASSEMBLY Factor:0.4320						
05950.65 - 06	PAINTS & PROTECTIVE COTGS/EPOXY TOPCOAT/SPRAYED		0.21	0.47	0.06	0.00	0.73
	SUB-511/511 0.007 hrs/unit 8 TOTAL HRS	1,177.50 SF	247	547	69	0	864
	* LINE ITEM ASSEMBLY Factor:15.7000						
05950.65 - 06	PAINTS & PROTECTIVE COTGS/EPOXY PRIMER/SPRAYED		0.24	0.39	0.05	0.00	0.68
	SUB-511/511 0.006 hrs/unit 3 TOTAL HRS	588.75 SF	141	228	29	0	398
	* LINE ITEM ASSEMBLY Factor:7.8500						
02260.72 - 04	DRILL HOLE FOR BOLT/2" DIA FOR 1" BOLT/5' L		0.00	98.37	8.12	0.00	106.48
	SUB-221/221 1.416 hrs/unit 46 TOTAL HRS	32.40 EA	0	3,187	263	0	3,450
	* LINE ITEM ASSEMBLY Factor:0.4320						

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
		DAILY PRODUCTIVITY = 25.87 TN/DAY							
		Subtotal Direct Costs			41,195	61,629	7,780	0	110,604
		Subcontractor Markups			13,159	16,335	2,172	0	31,666
		Prime Contractor Markups			5,198	5,700	952	0	11,850
		TOTAL UM2003183801 UMS_AI_ST.741 - Strut 9	912	HRS	59,553	83,663	10,904	0	154,120
		75.00 LF *Level Unit Cost-->*			*794.04*	*1,115.51*	*145.39*	*0.00*	*2,054.93*
		NOTE: DAILY PRODUCTIVITY = 25.87 TN/DAY							
		UM2003183802 UMS_AJ_ST.741 - Strut 10 *LEVEL CONTRACTOR ID APPLIED--PRIME*							
		DAILY PRODUCTIVITY = 25.87 TN/DAY							
02250.40 - 02		SHEET PILING/WALES/CONNECTIONS & STRUTS/2/3 SALVAGE			274.91	236.31	0.00	0.00	511.22
	SUB-221/221	3.401 hrs/unit 53 TOTAL HRS	15.63	TON	4,297	3,693	0	0	7,990
	* LINE ITEM ASSEMBLY	Factor:0.1250							
05090.90 - 02		WELDNG STRUC/4 PASSES/07LB/LF/1/2"THK/CONTIN FILLET/TYP 6011			1.66	28.18	3.57	0.00	33.41
	SUB-511/511	0.419 hrs/unit 231 TOTAL HRS	551.00	LF	915	15,529	1,967	0	18,411
	* LINE ITEM ASSEMBLY	Factor:4.4080							
05120.48 - 00		MISC METALS			0.85	1.06	0.15	0.00	2.06
	SUB-511/511	0.016 hrs/unit 1089 TOTAL HRS	68,986.75	LBS	58,639	73,297	10,348	0	142,284
	* LINE ITEM ASSEMBLY	Factor:551.8940							
05122.30 - 50		A325 HIGH STRENGTH BOLTS			1.94	1.95	0.91	0.00	4.80
	SUB-511/511	0.029 hrs/unit 2 TOTAL HRS	54.00	ea	105	105	49	0	259
	* LINE ITEM ASSEMBLY	Factor:0.4320							
05950.65 - 06		PAINTS & PROTECTIVE COTGS/EPOXY TOPCOAT/SPRAYED			0.21	0.47	0.06	0.00	0.73
	SUB-511/511	0.007 hrs/unit 14 TOTAL HRS	1,962.50	SF	412	912	116	0	1,439
	* LINE ITEM ASSEMBLY	Factor:15.7000							
05950.65 - 06		PAINTS & PROTECTIVE COTGS/EPOXY PRIMER/SPRAYED			0.24	0.39	0.05	0.00	0.68
	SUB-511/511	0.006 hrs/unit 6 TOTAL HRS	981.25	SF	236	380	48	0	664
	* LINE ITEM ASSEMBLY	Factor:7.8500							
02260.72 - 04		DRILL HOLE FOR BOLT/2" DIA FOR 1" BOLT/5' L			0.00	98.37	8.12	0.00	106.48
	SUB-221/221	1.416 hrs/unit 76 TOTAL HRS	54.00	EA	0	5,312	438	0	5,750
	* LINE ITEM ASSEMBLY	Factor:0.4320							
		Subtotal Direct Costs			64,603	99,228	12,966	0	176,797
		Subcontractor Markups			20,646	26,338	3,621	0	50,605
		Prime Contractor Markups			8,153	9,179	1,586	0	18,919
		TOTAL UM2003183802 UMS_AJ_ST.741 - Strut 10	1,470	HRS	93,402	134,745	18,173	0	246,321
		125.00 LF *Level Unit Cost-->*			*747.22*	*1,077.96*	*145.39*	*0.00*	*1,970.56*
		NOTE: DAILY PRODUCTIVITY = 25.87 TN/DAY							
		UM2003184001 UMS_01AB_ST.772 - 36 INCH CONCRETE SLAB ON GRADE *LEVEL CONTRACTOR ID APPLIED--PRIME*							
		DAILY PRODUCTIVITY = 566.93 CY/DAY							
03300.01 - 00		PURCHASE 4000 PSI CONCRETE			113.30	0.00	0.00	0.00	113.30
	SUB-120/120		1,048.32	CY	118,775	0	0	0	118,775
	* LINE ITEM ASSEMBLY	Factor:0.1300							
03350.30 - 00		STRUCT CONCRETE - PUMP & PLACE			0.00	7.88	8.50	0.00	16.39
	SUB-312/312	0.126 hrs/unit 133 TOTAL HRS	1,048.32	CY	0	8,266	8,911	0	17,177
	* LINE ITEM ASSEMBLY	Factor:0.1300							
03350.30 - 00		FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH			0.00	0.65	0.03	0.00	0.67
	SUB-312/312	0.01 hrs/unit 167 TOTAL HRS	16,128.00	SF	0	10,405	414	0	10,819
	* LINE ITEM ASSEMBLY	Factor:2.0000							
03210.60 - 00		REINFORCING IN PLACE, A615 GR 60, PCC DECK, #3 TO #7			0.52	0.50	0.02	0.00	1.04
	SUB-323/323	0.008 hrs/unit 1478 TOTAL HRS	192,648.96	LBS	99,407	95,664	4,680	0	199,751
	* LINE ITEM ASSEMBLY	Factor:23.8900							
03210.60 - 01		REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#3-#7/A615/GRD 60			0.80	0.66	0.05	0.00	1.51
	SUB-323/323	0.01 hrs/unit 267 TOTAL HRS	26,127.36	LBS	20,902	17,287	1,337	0	39,526
	* LINE ITEM ASSEMBLY	Factor:3.2400							
03110.01 - 00		FORMWORK - DECK SUPPORT BEAM			5.00	10.95	1.86	0.00	17.81
	SUB-311/311	0.148 hrs/unit 1193 TOTAL HRS	8,064.00	sf	40,320	88,316	14,999	0	143,635
	* LINE ITEM ASSEMBLY	Factor:1.0000							
02466.00 - 02		STRIP FDN FORMS, POST POUR CLEAN-UP, CURE			0.00	0.00	2.01	0.00	2.01
	SUB-221/221		8,064.00	CSFA	0	0	16,216	0	16,216
	* LINE ITEM ASSEMBLY	Factor:1.0000							
07170.70 - 00		WATERPROOFING			4.91	4.71	0.09	0.00	9.71
	SUB-111/111	0.081 hrs/unit 649 TOTAL HRS	8,064.00	SF	39,594	38,010	736	0	78,340
	* LINE ITEM ASSEMBLY	Factor:1.0000							
03110.44 - 55		SCREED/24 GA MTL KEY JOINT/SEE DIV 03150-250			0.17	0.36	0.03	0.00	0.55
	SUB-311/311	0.005 hrs/unit 39 TOTAL HRS	8,064.00	SF	1,371	2,882	216	0	4,469
	* LINE ITEM ASSEMBLY	Factor:1.0000							
09250.70 - 04		Material Stocking			0.00	0.18	0.11	0.00	0.29
	SUB-111/111	0.003 hrs/unit 656 TOTAL HRS	218,776.32	LBS	0	38,430	24,065	0	62,496
	* LINE ITEM ASSEMBLY	Factor:27.1300							
02250.10 - 00		PCC PRESSURE GROUTING/EPOXY CEM GROUT/MAX			109.00	56.09	4.63	0.00	169.72
	SUB-221/221	0.807 hrs/unit 65 TOTAL HRS	80.64	CF	8,790	4,524	373	0	13,687
	* LINE ITEM ASSEMBLY	Factor:0.0100							

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
02315.21 - 05	BORROW/SELECT GRANULAR FILL/1 CY BCKT/LOADING &/OR SPREADING/SHOVEL	12.60	1.36	0.11	0.00	14.07
SUB-221/221	0.02 hrs/unit 3 TOTAL HRS	153.22 CY	1,931	208	17	0	2,156
* LINE ITEM ASSEMBLY	Factor:0.0190						
	Subtotal Direct Costs		331,089	303,993	71,964	0	707,045
	Subcontractor Markups		97,647	51,601	13,773	0	163,021
	Prime Contractor Markups		41,004	25,996	8,200	0	75,200
TOTAL UM2003184001 UMS_01AB_ST.772 - 36 INCH CONCRETE SLAB		4,651 HRS	469,740	381,589	93,937	0	945,266
ON GRADE			*58.25*	*47.32*	*11.65*	*0.00*	*117.22*
	8,064.00 SF	*Level Unit Cost-->*					
NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY							
UM2003401101 HSS 6 X 6 X 1/4	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	3003.16	480.69	60.90	0.00	3,544.75
SUB-511/511	7.139 hrs/unit 8 TOTAL HRS	1.14 TON	3,424	548	69	0	4,041
* LINE ITEM ASSEMBLY	Factor:0.0095						
	Subtotal Direct Costs		3,424	548	69	0	4,041
	Subcontractor Markups		1,095	146	19	0	1,260
	Prime Contractor Markups		432	51	8	0	491
TOTAL UM2003401101 HSS 6 X 6 X 1/4		8 HRS	4,951	745	97	0	5,793
	120.00 LF	*Level Unit Cost-->*	*41.25*	*6.21*	*0.81*	*0.00*	*48.27*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003401102 HSS 16 X 6 X 1/4	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	3002.60	480.61	60.89	0.00	3,544.09
SUB-511/511	7.139 hrs/unit 18 TOTAL HRS	2.54 TON	7,627	1,221	155	0	9,002
* LINE ITEM ASSEMBLY	Factor:0.0223						
	Subtotal Direct Costs		7,627	1,221	155	0	9,002
	Subcontractor Markups		2,439	325	43	0	2,807
	Prime Contractor Markups		963	113	19	0	1,095
TOTAL UM2003401102 HSS 16 X 6 X 1/4		18 HRS	11,028	1,659	217	0	12,904
	114.00 LF	*Level Unit Cost-->*	*96.74*	*14.55*	*1.90*	*0.00*	*113.19*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003401103 HSS 16 X 6 X 3/8	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	3002.07	480.52	60.88	0.00	3,543.48
SUB-511/511	7.137 hrs/unit 43 TOTAL HRS	6.00 TON	18,012	2,883	365	0	21,261
* LINE ITEM ASSEMBLY	Factor:0.0265						
	Subtotal Direct Costs		18,012	2,883	365	0	21,261
	Subcontractor Markups		5,760	768	102	0	6,630
	Prime Contractor Markups		2,274	267	45	0	2,585
TOTAL UM2003401103 HSS 16 X 6 X 3/8		43 HRS	26,046	3,919	512	0	30,476
	227.00 LF	*Level Unit Cost-->*	*114.74*	*17.26*	*2.25*	*0.00*	*134.26*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003401104 HSS 20 X 8 X 5/8	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	3000.00	480.19	60.84	0.00	3,541.03
SUB-511/511	7.132 hrs/unit 57 TOTAL HRS	8.03 TON	24,090	3,856	489	0	28,434
* LINE ITEM ASSEMBLY	Factor:0.0550						
	Subtotal Direct Costs		24,090	3,856	489	0	28,434
	Subcontractor Markups		7,703	1,028	136	0	8,867
	Prime Contractor Markups		3,041	357	60	0	3,457
TOTAL UM2003401104 HSS 20 X 8 X 5/8		57 HRS	34,834	5,241	685	0	40,759
	146.00 LF	*Level Unit Cost-->*	*238.59*	*35.90*	*4.69*	*0.00*	*279.17*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003401301 UMS_AA_ST.171 - CONCRETE BEAM - 70 X 44	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
03210.60 - 01	REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#8-#18/A615/GRD 60	0.81	0.44	0.03	0.00	1.29
SUB-323/323	0.007 hrs/unit 71 TOTAL HRS	10,463.97 LBS	8,502	4,616	357	0	13,475
* LINE ITEM ASSEMBLY	Factor:282.8100						
03210.60 - 01	REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#3-#7/A615/GRD 60	0.80	0.66	0.05	0.00	1.51
SUB-323/323	0.01 hrs/unit 19 TOTAL HRS	1,846.67 LBS	1,477	1,222	94	0	2,794
* LINE ITEM ASSEMBLY	Factor:49.9100						

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
		DAILY PRODUCTIVITY = 566.93 CY/DAY							
03310.22 - 00		STRUC PCC/READY MX/NORMAL WT/4000PSI			106.00	91.22	0.00	0.00	197.22
	SUB-311/311	1.233 hrs/unit 36 TOTAL HRS	29.23	CY	3,098	2,666	0	0	5,765
	* LINE ITEM ASSEMBLY	Factor:0.7900							
03350.30 - 00		STRUCT CONCRETE - PUMP & PLACE			0.00	7.88	8.50	0.00	16.39
	SUB-312/312	0.127 hrs/unit 4 TOTAL HRS	29.23	CY	0	230	248	0	479
	* LINE ITEM ASSEMBLY	Factor:0.7900							
03350.30 - 00		FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH			0.00	0.65	0.03	0.00	0.67
	SUB-312/312	0.01 hrs/unit 4 TOTAL HRS	351.50	SF	0	227	9	0	236
	* LINE ITEM ASSEMBLY	Factor:9.5000							
03310.70 - 05		WALL SACK & PATCH			0.13	1.20	0.06	0.00	1.39
	SUB-315/315	0.02 hrs/unit 7 TOTAL HRS	351.50	SF	46	420	22	0	488
	* LINE ITEM ASSEMBLY	Factor:9.5000							
03110.01 - 01		FORMWORK - BEAMS			3.00	9.47	1.25	0.00	13.72
	SUB-311/311	0.128 hrs/unit 62 TOTAL HRS	487.29	sf	1,462	4,616	609	0	6,687
	* LINE ITEM ASSEMBLY	Factor:13.1700							
02466.00 - 02		STRIP FDN FORMS, POST POUR CLEAN-UP, CURE			0.00	0.00	2.01	0.00	2.01
	SUB-221/221		487.29	CSFA	0	0	980	0	980
	* LINE ITEM ASSEMBLY	Factor:13.1700							
01101.01 - 08		SCAFFOLDING "COST PER SF "			1.15	0.88	0.41	0.00	2.44
	SUB-221/221	0.013 hrs/unit 7 TOTAL HRS	555.00	SF	638	488	227	0	1,353
	* LINE ITEM ASSEMBLY	Factor:15.0000							
03210.61 - 00		STANDARD COUPLERS, #8			15.60	13.43	0.13	0.00	29.16
	SUB-311/311	0.181 hrs/unit 30 TOTAL HRS	167.98	EA	2,621	2,256	22	0	4,898
	* LINE ITEM ASSEMBLY	Factor:4.5400							
03110.01 - 01		FORM SAVERS			20.00	14.58	1.92	0.00	36.50
	SUB-311/311	0.197 hrs/unit 35 TOTAL HRS	176.49	ea	3,530	2,573	339	0	6,441
	* LINE ITEM ASSEMBLY	Factor:4.7700							
03210.63 - 60		THREADING OF REBAR, #8			0.00	5.38	0.26	0.00	5.64
	SUB-311/311	0.073 hrs/unit 24 TOTAL HRS	335.96	EA	0	1,807	87	0	1,894
	* LINE ITEM ASSEMBLY	Factor:9.0800							
09250.70 - 04		Material Stocking			0.00	0.18	0.11	0.00	0.29
	SUB-111/111	0.003 hrs/unit 37 TOTAL HRS	12,310.64	LBS	0	2,163	1,354	0	3,517
	* LINE ITEM ASSEMBLY	Factor:332.7200							
		Subtotal Direct Costs			21,374	23,283	4,349	0	49,006
		Subcontractor Markups			3,633	2,231	872	0	6,735
		Prime Contractor Markups			2,392	1,865	499	0	4,756
		TOTAL UM2003401301 UMS_AA_ST.171 - CONCRETE BEAM - 70 X 44	36	HRS	27,399	27,378	5,720	0	60,497
		37.00 LF *Level Unit Cost-->*			*740.50*	*739.96*	*154.60*	*0.00*	*1,635.06*

NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY

UM2003401302 UMS_AB_ST.171 - CONCRETE BEAM - 108 X 44 *LEVEL CONTRACTOR ID APPLIED--PRIME*

		DAILY PRODUCTIVITY = 566.93 CY/DAY							
03210.60 - 01		REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#8-#18/A615/GRD 60			0.81	0.44	0.03	0.00	1.29
	SUB-323/323	0.007 hrs/unit 70 TOTAL HRS	10,285.00	LBS	8,357	4,537	351	0	13,244
	* LINE ITEM ASSEMBLY	Factor:467.5000							
03210.60 - 01		REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#3-#7/A615/GRD 60			0.80	0.66	0.05	0.00	1.51
	SUB-323/323	0.01 hrs/unit 19 TOTAL HRS	1,815.00	LBS	1,452	1,201	93	0	2,746
	* LINE ITEM ASSEMBLY	Factor:82.5000							
03310.22 - 00		STRUC PCC/READY MX/NORMAL WT/4000PSI			106.00	91.22	0.00	0.00	197.22
	SUB-311/311	1.233 hrs/unit 33 TOTAL HRS	26.84	CY	2,845	2,448	0	0	5,293
	* LINE ITEM ASSEMBLY	Factor:1.2200							
03350.30 - 00		STRUCT CONCRETE - PUMP & PLACE			0.00	7.88	8.50	0.00	16.38
	SUB-312/312	0.126 hrs/unit 3 TOTAL HRS	26.84	CY	0	212	228	0	440
	* LINE ITEM ASSEMBLY	Factor:1.2200							
03350.30 - 00		FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH			0.00	0.65	0.03	0.00	0.67
	SUB-312/312	0.01 hrs/unit 3 TOTAL HRS	278.74	SF	0	180	7	0	187
	* LINE ITEM ASSEMBLY	Factor:12.6700							
03310.70 - 05		WALL SACK & PATCH			0.13	1.20	0.06	0.00	1.39
	SUB-315/315	0.02 hrs/unit 5 TOTAL HRS	278.74	SF	36	333	17	0	387
	* LINE ITEM ASSEMBLY	Factor:12.6700							
03110.01 - 01		FORMWORK - BEAMS			3.00	9.47	1.25	0.00	13.72
	SUB-311/311	0.128 hrs/unit 46 TOTAL HRS	359.26	sf	1,078	3,403	449	0	4,930
	* LINE ITEM ASSEMBLY	Factor:16.3300							
02466.00 - 02		STRIP FDN FORMS, POST POUR CLEAN-UP, CURE			0.00	0.00	2.01	0.00	2.01
	SUB-221/221		359.26	CSFA	0	0	722	0	722
	* LINE ITEM ASSEMBLY	Factor:16.3300							
01101.01 - 08		SCAFFOLDING "COST PER SF "			1.15	0.88	0.41	0.00	2.44
	SUB-221/221	0.013 hrs/unit 4 TOTAL HRS	330.00	SF	380	290	135	0	805
	* LINE ITEM ASSEMBLY	Factor:15.0000							
03210.61 - 00		STANDARD COUPLERS, #8			15.60	13.43	0.13	0.00	29.16
	SUB-311/311	0.181 hrs/unit 30 TOTAL HRS	165.00	EA	2,574	2,215	21	0	4,811
	* LINE ITEM ASSEMBLY	Factor:7.5000							
03110.01 - 01		FORM SAVERS			20.00	14.58	1.92	0.00	36.50
	SUB-311/311	0.197 hrs/unit 34 TOTAL HRS	173.58	ea	3,472	2,530	333	0	6,335

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
		DAILY PRODUCTIVITY = 566.93 CY/DAY							
		* LINE ITEM ASSEMBLY Factor:7.8900							
03210.63 - 60		THREADING OF REBAR, #8			0.00	5.38	0.26	0.00	5.64
	SUB-311/311	0.073 hrs/unit 24 TOTAL HRS	330.22	EA	0	1,776	86	0	1,862
		* LINE ITEM ASSEMBLY Factor:15.0100							
09250.70 - 04		Material Stocking			0.00	0.18	0.11	0.00	0.29
	SUB-111/111	0.003 hrs/unit 36 TOTAL HRS	12,100.00	LBS	0	2,126	1,331	0	3,457
		* LINE ITEM ASSEMBLY Factor:550.0000							
		Subtotal Direct Costs			20,193	21,251	3,774	0	45,219
		Subcontractor Markups			3,492	2,144	763	0	6,400
		Prime Contractor Markups			2,265	1,710	434	0	4,410
		TOTAL UM2003401302 UMS_AB_ST.171 - CONCRETE BEAM - 108 X 44	308	HRS	25,950	25,106	4,972	0	56,028
		*22.00 LF Level Unit Cost--> *			*1,179.57*	*1,141.17*	*225.99*	*0.00*	*2,546.73*

NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY

UM2003401501 UMS_AM_ST.751 - 8 IN CONCRETE SLAB ON S.D. *LEVEL CONTRACTOR ID APPLIED--PRIME*

DAILY PRODUCTIVITY = 566.93 CY/DAY

03300.01 - 00		PURCHASE 4000 PSI CONCRETE			113.30	0.00	0.00	0.00	113.30
	SUB-120/120		60.24	CY	6,825	0	0	0	6,825
		* LINE ITEM ASSEMBLY Factor:0.0200							
03350.30 - 00		STRUCT CONCRETE - PUMP & PLACE			0.00	7.88	8.50	0.00	16.38
	SUB-312/312	0.126 hrs/unit 8 TOTAL HRS	60.24	CY	0	475	512	0	987
		* LINE ITEM ASSEMBLY Factor:0.0200							
03350.30 - 00		FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH			0.00	0.65	0.03	0.00	0.67
	SUB-312/312	0.01 hrs/unit 31 TOTAL HRS	3,012.00	SF	0	1,943	77	0	2,020
		* LINE ITEM ASSEMBLY Factor:1.0000							
03210.60 - 01		REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#3-#7/A615/GRD 60			0.80	0.66	0.05	0.00	1.51
	SUB-323/323	0.01 hrs/unit 138 TOTAL HRS	13,463.64	LBS	10,771	8,908	689	0	20,368
		* LINE ITEM ASSEMBLY Factor:4.4700							
05310.30 - 04		MTL DKING/STL/OPN TYPE/L SPAN/GALV/OVER 50 SQ/7-1/2" D/16 GA			10.00	1.55	0.20	0.00	11.74
	SUB-511/511	0.023 hrs/unit 69 TOTAL HRS	3,012.00	SF	30,120	4,664	591	0	35,375
		* LINE ITEM ASSEMBLY Factor:1.0000							
02220.13 - 00		BLDG FTGS & FNDN DEMO/FLRS/PCC SLAB ON GRD/PCC/WIRE MESH REINFR/4" THK			6.00	6.79	0.56	0.00	7.35
	SUB-221/221	0.098 hrs/unit 294 TOTAL HRS	3,012.00	SF	0	20,458	1,688	0	22,146
		* LINE ITEM ASSEMBLY Factor:1.0000							
03110.44 - 55		SCREED/24 GA MTL KEY JOINT/SEE DIV 03150-250			0.17	0.36	0.03	0.00	0.55
	SUB-311/311	0.005 hrs/unit 15 TOTAL HRS	3,012.00	SF	512	1,077	81	0	1,669
		* LINE ITEM ASSEMBLY Factor:1.0000							
09250.70 - 04		Material Stocking			0.00	0.18	0.11	0.00	0.29
	SUB-111/111	0.003 hrs/unit 40 TOTAL HRS	13,463.64	LBS	0	2,365	1,481	0	3,846
		* LINE ITEM ASSEMBLY Factor:4.4700							
05120.44 - 00		ANGLE FRMG/STRUC STL/1/2"X1/2"X1/8"/FLD FABRCTD/INCL CUTTING & WELDING			0.18	9.29	1.18	0.00	10.65
	SUB-511/511	0.138 hrs/unit 32 TOTAL HRS	230.00	LF	41	2,137	271	0	2,449
02260.72 - 04		Drill for 3 5/8ö Bolt			0.00	32.31	8.12	0.00	40.43
		Drill for 3 5/8ö Bolt					1,867	0	9,298
	SUB-221/221	0.465 hrs/unit 107 TOTAL HRS	230.00	EA	0	7,431			
03150.08 - 00		3 5/8" Bolt			28.50	17.69	0.85	0.00	47.04
	SUB-311/311	0.239 hrs/unit 55 TOTAL HRS	230.00	EA	6,555	4,068	196	0	10,818
		Subtotal Direct Costs			54,825	53,526	7,452	0	115,802
		Subcontractor Markups			15,647	11,861	1,884	0	29,393
		Prime Contractor Markups			6,740	4,780	893	0	12,413
		TOTAL UM2003401501 UMS_AM_ST.751 - 8 IN CONCRETE SLAB ON S.D.	789	HRS	77,211	70,168	10,229	0	157,608
		*3,012.00 SF Level Unit Cost--> *			*25.63*	*23.30*	*3.40*	*0.00*	*52.33*

NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY

UM2003411101 BEAM W21 X 44 *LEVEL CONTRACTOR ID APPLIED--PRIME*

DAILY PRODUCTIVITY = 13.46 TN/DAY

05120.68 - 01		STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL			2998.52	479.95	60.81	0.00	3,539.28
	SUB-511/511	7.129 hrs/unit 29 TOTAL HRS	4.05	TON	12,144	1,944	246	0	14,334
		* LINE ITEM ASSEMBLY Factor:0.0220							
		Subtotal Direct Costs			12,144	1,944	246	0	14,334
		Subcontractor Markups			3,883	518	69	0	4,470
		Prime Contractor Markups			1,533	180	30	0	1,743
		TOTAL UM2003411101 BEAM W21 X 44	29	HRS	17,560	2,642	345	0	20,547
		*184.00 LF Level Unit Cost--> *			*95.44*	*14.36*	*1.88*	*0.00*	*111.67*

NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY

UM2003411102 BEAM W12 X 14 *LEVEL CONTRACTOR ID APPLIED--PRIME*

DAILY PRODUCTIVITY = 13.46 TN/DAY

05120.68 - 01		STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL			3011.32	482.00	61.06	0.00	3,554.38

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
UM2003	**UNDERGROUND STATION, STOP, SHELTER, MALL, TE**						
UM2003411102	BEAM W12 X 14 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
	SUB-511/511 7.158 hrs/unit 4 TOTAL HRS	0.53 TON	1,596	255	32	0	1,884
	* LINE ITEM ASSEMBLY Factor:0.0070						
	Subtotal Direct Costs		1,596	255	32	0	1,884
	Subcontractor Markups		510	68	9	0	587
	Prime Contractor Markups		201	24	4	0	229
	TOTAL UM2003411102 BEAM W12 X 14	4 HRS	2,308	347	45	0	2,700
	76.00 LF	*Level Unit Cost-->*	*30.37*	*4.57*	*0.60*	*0.00*	*35.53*
	NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY						
UM2003411103	BEAM W27 X 129 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL		2998.28	479.92	60.80	0.00	3,538.99
	SUB-511/511 7.128 hrs/unit 50 TOTAL HRS	6.97 TON	20,898	3,345	424	0	24,667
	* LINE ITEM ASSEMBLY Factor:0.0645						
	Subtotal Direct Costs		20,898	3,345	424	0	24,667
	Subcontractor Markups		6,683	892	118	0	7,692
	Prime Contractor Markups		2,638	310	52	0	2,999
	TOTAL UM2003411103 BEAM W27 X 129	50 HRS	30,218	4,546	594	0	35,359
	108.00 LF	*Level Unit Cost-->*	*279.80*	*42.10*	*5.50*	*0.00*	*327.39*
	NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY						
UM2003411104	BEAM W6 X 16 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL		2990.77	478.71	60.65	0.00	3,530.13
	SUB-511/511 7.11 hrs/unit 9 TOTAL HRS	1.30 TON	3,888	622	79	0	4,589
	* LINE ITEM ASSEMBLY Factor:0.0080						
	Subtotal Direct Costs		3,888	622	79	0	4,589
	Subcontractor Markups		1,243	166	22	0	1,431
	Prime Contractor Markups		491	58	10	0	558
	TOTAL UM2003411104 BEAM W6 X 16	9 HRS	5,622	846	110	0	6,578
	162.00 LF	*Level Unit Cost-->*	*34.70*	*5.22*	*0.68*	*0.00*	*40.61*
	NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY						
UM2003411105	BEAM W27 X 84 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL		3001.57	480.44	60.87	0.00	3,542.88
	SUB-511/511 7.136 hrs/unit 55 TOTAL HRS	7.64 TON	22,932	3,671	465	0	27,068
	* LINE ITEM ASSEMBLY Factor:0.0420						
	Subtotal Direct Costs		22,932	3,671	465	0	27,068
	Subcontractor Markups		7,333	978	130	0	8,441
	Prime Contractor Markups		2,895	340	57	0	3,291
	TOTAL UM2003411105 BEAM W27 X 84	55 HRS	33,160	4,989	652	0	38,800
	182.00 LF	*Level Unit Cost-->*	*182.20*	*27.41*	*3.58*	*0.00*	*213.19*
	NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY						
UM2003411106	BEAM W8 X 48 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL		3000.00	480.19	60.84	0.00	3,541.03
	SUB-511/511 7.132 hrs/unit 33 TOTAL HRS	4.68 TON	14,040	2,247	285	0	16,572
	* LINE ITEM ASSEMBLY Factor:0.0240						
	Subtotal Direct Costs		14,040	2,247	285	0	16,572
	Subcontractor Markups		4,490	599	79	0	5,168
	Prime Contractor Markups		1,772	208	35	0	2,015
	TOTAL UM2003411106 BEAM W8 X 48	33 HRS	20,302	3,054	399	0	23,755
	195.00 LF	*Level Unit Cost-->*	*104.11*	*15.66*	*2.05*	*0.00*	*121.82*
	NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY						
UM2003411107	BEAM W18 X 35 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL		2998.38	479.93	60.80	0.00	3,539.12
	SUB-511/511 7.128 hrs/unit 33 TOTAL HRS	4.64 TON	13,913	2,227	282	0	16,422
	* LINE ITEM ASSEMBLY Factor:0.0175						

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
UM2003 UNDERGROUND STATION, STOP, SHELTER, MALL, TE							
UM2003411107 BEAM W18 X 35 *LEVEL CONTRACTOR ID APPLIED--PRIME*							
DAILY PRODUCTIVITY = 13.46 TN/DAY							
	Subtotal Direct Costs		13,913	2,227	282	0	16,422
	Subcontractor Markups		4,449	594	79	0	5,121
	Prime Contractor Markups		1,756	206	35	0	1,997
	TOTAL UM2003411107 BEAM W18 X 35	33 HRS	20,117	3,027	395	0	23,539
	265.00 LF	*Level Unit Cost-->*	*75.91*	*11.42*	*1.49*	*0.00*	*88.83*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003411108 BEAM HSS 12 X 8 X 5/8 *LEVEL CONTRACTOR ID APPLIED--PRIME*							
DAILY PRODUCTIVITY = 13.46 TN/DAY							
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	2999.36	480.09	60.82	0.00	3,540.28	
	SUB-511/511 7.131 hrs/unit 47 TOTAL HRS	6.61 TON	19,826	3,173	402	0	23,401
	* LINE ITEM ASSEMBLY Factor:0.0382						
	Subtotal Direct Costs		19,826	3,173	402	0	23,401
	Subcontractor Markups		6,340	846	112	0	7,298
	Prime Contractor Markups		2,502	294	49	0	2,845
	TOTAL UM2003411108 BEAM HSS 12 X 8 X 5/8	47 HRS	28,668	4,313	563	0	33,544
	173.00 LF	*Level Unit Cost-->*	*165.71*	*24.93*	*3.26*	*0.00*	*193.90*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003411301 COLUMN W8 X 13 *LEVEL CONTRACTOR ID APPLIED--PRIME*							
DAILY PRODUCTIVITY = 13.46 TN/DAY							
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	2997.76	479.84	60.79	0.00	3,538.39	
	SUB-511/511 7.127 hrs/unit 5 TOTAL HRS	0.67 TON	2,009	321	41	0	2,371
	* LINE ITEM ASSEMBLY Factor:0.0065						
	Subtotal Direct Costs		2,009	321	41	0	2,371
	Subcontractor Markups		642	86	11	0	739
	Prime Contractor Markups		254	30	5	0	288
	TOTAL UM2003411301 COLUMN W8 X 13	5 HRS	2,904	437	57	0	3,398
	103.00 VLF	*Level Unit Cost-->*	*28.20*	*4.24*	*0.55*	*0.00*	*32.99*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003411302 COLUMN HSS 8 X 8 X 5/8 *LEVEL CONTRACTOR ID APPLIED--PRIME*							
DAILY PRODUCTIVITY = 13.46 TN/DAY							
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	3001.74	480.47	60.87	0.00	3,543.08	
	SUB-511/511 7.136 hrs/unit 24 TOTAL HRS	3.32 TON	9,966	1,595	202	0	11,763
	* LINE ITEM ASSEMBLY Factor:0.0297						
	Subtotal Direct Costs		9,966	1,595	202	0	11,763
	Subcontractor Markups		3,187	425	56	0	3,668
	Prime Contractor Markups		1,258	148	25	0	1,430
	TOTAL UM2003411302 COLUMN HSS 8 X 8 X 5/8	24 HRS	14,410	2,168	283	0	16,862
	112.00 VLF	*Level Unit Cost-->*	*128.66*	*19.36*	*2.53*	*0.00*	*150.55*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003411501 BRACING - 5 X 5 X 3/8 ANGLE *LEVEL CONTRACTOR ID APPLIED--PRIME*							
DAILY PRODUCTIVITY = 13.46 TN/DAY							
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	2990.84	478.73	60.65	0.00	3,530.22	
	SUB-511/511 7.111 hrs/unit 7 TOTAL HRS	0.95 TON	2,841	455	58	0	3,354
	* LINE ITEM ASSEMBLY Factor:0.0062						
	Subtotal Direct Costs		2,841	455	58	0	3,354
	Subcontractor Markups		909	121	16	0	1,046
	Prime Contractor Markups		359	42	7	0	408
	TOTAL UM2003411501 BRACING - 5 X 5 X 3/8 ANGLE	7 HRS	4,109	618	81	0	4,807
	154.00 LF	*Level Unit Cost-->*	*26.68*	*4.01*	*0.52*	*0.00*	*31.22*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003411701 UMS AN ST.751 - 8IN CONC SLAB ON SF *LEVEL CONTRACTOR ID APPLIED--PRIME*							
DAILY PRODUCTIVITY = 566.93 CY/DAY							
03300.01 - 00	PURCHASE 4000 PSI CONCRETE		113.30	0.00	0.00	0.00	113.30
	SUB-120/120	161.68 CY	18,318	0	0	0	18,318
	* LINE ITEM ASSEMBLY Factor:0.0200						
03350.30 - 00	STRUCT CONCRETE - PUMP & PLACE		0.00	7.88	8.50	0.00	16.39
	SUB-312/312 0.127 hrs/unit 20 TOTAL HRS	161.68 CY	0	1,275	1,374	0	2,649
	* LINE ITEM ASSEMBLY Factor:0.0200						

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
03350.30 - 00	FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH		0.00	0.65	0.03	0.00	0.67
	SUB-312/312 0.01 hrs/unit 84 TOTAL HRS	8,084.00 SF	0	5,215	207	0	5,423
	* LINE ITEM ASSEMBLY Factor:1.0000						
03210.60 - 01	REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#3-#7/A615/GRD 60		0.80	0.66	0.05	0.00	1.51
	SUB-323/323 0.01 hrs/unit 369 TOTAL HRS	36,135.48 LBS	28,908	23,909	1,849	0	54,667
	* LINE ITEM ASSEMBLY Factor:4.4700						
05310.30 - 04	MTL DKING/STL/OPN TYPE/L SPAN/GALV/OVER 50 SQ/7-1/2" D/16 GA		10.00	1.55	0.20	0.00	11.74
	SUB-511/511 0.023 hrs/unit 186 TOTAL HRS	8,084.00 SF	80,840	12,518	1,586	0	94,944
	* LINE ITEM ASSEMBLY Factor:1.0000						
02220.13 - 00	BLDG FTGS & FNDN DEMO/FLRS/PCC SLAB ON GRD/PCC/WIRE MESH REINFR/4" THK		0.00	6.79	0.56	0.00	7.35
	SUB-221/221 0.098 hrs/unit 790 TOTAL HRS	8,084.00 SF	0	54,908	4,530	0	59,438
	* LINE ITEM ASSEMBLY Factor:1.0000						
03110.44 - 55	SCREED/24 GA MTL KEY JOINT/SEE DIV 03150-250		0.17	0.36	0.03	0.00	0.55
	SUB-311/311 0.005 hrs/unit 39 TOTAL HRS	8,084.00 SF	1,374	2,889	216	0	4,480
	* LINE ITEM ASSEMBLY Factor:1.0000						
09250.70 - 04	Material Stocking		0.00	0.18	0.11	0.00	0.29
	SUB-111/111 0.003 hrs/unit 108 TOTAL HRS	36,135.48 LBS	0	6,348	3,975	0	10,322
	* LINE ITEM ASSEMBLY Factor:4.4700						
05120.44 - 00	ANGLE FRMG/STRUC STL/1/2"X1/2"X1/8"/FLD FABRCTD/INCL CUTTING & WELDING		0.18	9.29	1.18	0.00	10.65
	SUB-511/511 0.138 hrs/unit 47 TOTAL HRS	338.00 LF	61	3,140	398	0	3,599
02260.72 - 04	Drill for 3 5/8ö Bolt		0.00	32.31	8.12	0.00	40.43
	Drill for 3 5/8ö Bolt				2,743	0	13,664
	SUB-221/221 0.465 hrs/unit 157 TOTAL HRS	338.00 EA	0	10,921			
03150.08 - 00	3 5/8" Bolt		28.50	17.69	0.85	0.00	47.04
	SUB-311/311 0.239 hrs/unit 81 TOTAL HRS	338.00 EA	9,633	5,978	287	0	15,898
	Subtotal Direct Costs		139,135	127,102	17,167	0	283,403
	Subcontractor Markups		41,979	28,848	4,321	0	75,148
	Prime Contractor Markups		17,322	11,401	2,055	0	30,777
	TOTAL UM2003411701 UMS_AN_ST.751 - 8IN CONC SLAB ON SF	1,882 HRS	198,436	167,350	23,543	0	389,329
	8,084.00 SF *Level Unit Cost-->*		*24.55*	*20.70*	*2.91*	*0.00*	*48.16*
	NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY						
	UM2003421101 BEAM W12 X 50 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL		2968.75	475.19	60.21	0.00	3,504.15
	SUB-511/511 7.058 hrs/unit 3 TOTAL HRS	0.48 TON	1,425	228	29	0	1,682
	* LINE ITEM ASSEMBLY Factor:0.0250						
	Subtotal Direct Costs		1,425	228	29	0	1,682
	Subcontractor Markups		456	61	8	0	525
	Prime Contractor Markups		180	21	4	0	205
	TOTAL UM2003421101 BEAM W12 X 50	3 HRS	2,061	310	40	0	2,411
	19.00 LF *Level Unit Cost-->*		*108.45*	*16.32*	*2.13*	*0.00*	*126.90*
	NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY						
	UM2003421102 BEAM W6 X 16 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL		3000.00	480.20	60.83	0.00	3,541.03
	SUB-511/511 7.133 hrs/unit 3 TOTAL HRS	0.40 TON	1,200	192	24	0	1,416
	* LINE ITEM ASSEMBLY Factor:0.0080						
	Subtotal Direct Costs		1,200	192	24	0	1,416
	Subcontractor Markups		384	51	7	0	442
	Prime Contractor Markups		151	18	3	0	172
	TOTAL UM2003421102 BEAM W6 X 16	3 HRS	1,735	261	34	0	2,030
	50.00 LF *Level Unit Cost-->*		*34.70*	*5.22*	*0.68*	*0.00*	*40.61*
	NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY						
	UM2003421103 BEAM W24 X 84 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL		3000.84	480.32	60.85	0.00	3,542.01
	SUB-511/511 7.134 hrs/unit 51 TOTAL HRS	7.18 TON	21,546	3,449	437	0	25,432
	* LINE ITEM ASSEMBLY Factor:0.0420						

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
UM2003 UNDERGROUND STATION, STOP, SHELTER, MALL, TE							
UM2003421103 BEAM W24 X 84	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 13.46 TN/DAY							
	Subtotal Direct Costs		21,546	3,449	437	0	25,432
	Subcontractor Markups		6,890	919	122	0	7,931
	Prime Contractor Markups		2,720	319	53	0	3,092
	TOTAL UM2003421103 BEAM W24 X 84	51 HRS	31,155	4,687	612	0	36,455
	171.00 LF	*Level Unit Cost-->*	*182.20*	*27.41*	*3.58*	*0.00*	*213.19*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003421104 BEAM W8 X 18	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 13.46 TN/DAY							
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STE	3000.00	480.19	60.84	0.00	3,541.03	
SUB-511/511	7.132 hrs/unit 19 TOTAL HRS	2.70 TON	8,100	1,297	164	0	9,561
* LINE ITEM ASSEMBLY	Factor:0.0090						
	Subtotal Direct Costs		8,100	1,297	164	0	9,561
	Subcontractor Markups		2,590	346	46	0	2,982
	Prime Contractor Markups		1,022	120	20	0	1,163
	TOTAL UM2003421104 BEAM W8 X 18	19 HRS	11,713	1,762	230	0	13,705
	300.00 LF	*Level Unit Cost-->*	*39.04*	*5.87*	*0.77*	*0.00*	*45.68*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003421105 BEAM HSS 12 X 8 X 5/8	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 13.46 TN/DAY							
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STE	3000.32	480.24	60.84	0.00	3,541.40	
SUB-511/511	7.133 hrs/unit 24 TOTAL HRS	3.32 TON	9,961	1,594	202	0	11,757
* LINE ITEM ASSEMBLY	Factor:0.0382						
	Subtotal Direct Costs		9,961	1,594	202	0	11,757
	Subcontractor Markups		3,185	425	56	0	3,667
	Prime Contractor Markups		1,257	148	25	0	1,430
	TOTAL UM2003421105 BEAM HSS 12 X 8 X 5/8	24 HRS	14,404	2,167	283	0	16,854
	87.00 LF	*Level Unit Cost-->*	*165.56*	*24.91*	*3.25*	*0.00*	*193.72*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003421301 BRACING - W6 X 16	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 13.46 TN/DAY							
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STE	3002.87	480.65	60.90	0.00	3,544.42	
SUB-511/511	7.139 hrs/unit 30 TOTAL HRS	4.18 TON	12,552	2,009	255	0	14,816
* LINE ITEM ASSEMBLY	Factor:0.0080						
	Subtotal Direct Costs		12,552	2,009	255	0	14,816
	Subcontractor Markups		4,014	535	71	0	4,620
	Prime Contractor Markups		1,584	186	31	0	1,802
	TOTAL UM2003421301 BRACING - W6 X 16	30 HRS	18,150	2,731	357	0	21,237
	523.00 LF	*Level Unit Cost-->*	*34.70*	*5.22*	*0.68*	*0.00*	*40.61*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
UM2003421511 3" DIA. TIE RODS AND TURNBUCKLES	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 2.9 TN/DAY							
02250.40 - 03	SHEET PILNG/STL/TIE ROD/UPSET/^ TURNBUCKLE/1-3/4" TO 4"/EXCLUDES WALE	2452.54	2108.14	0.00	0.00	4,560.67	
SUB-221/221	30.339 hrs/unit 59 TOTAL HRS	1.93 TON	4,733	4,069	0	0	8,802
* LINE ITEM ASSEMBLY	Factor:0.0120						
	Subtotal Direct Costs		4,733	4,069	0	0	8,802
	Subcontractor Markups		1,501	1,035	0	0	2,536
	Prime Contractor Markups		596	373	0	0	969
	TOTAL UM2003421511 3" DIA. TIE RODS AND TURNBUCKLES	59 HRS	6,830	5,477	0	0	12,307
	161.00 LF	*Level Unit Cost-->*	*42.42*	*34.02*	*0.00*	*0.00*	*76.44*
NOTE: DAILY PRODUCTIVITY = 2.9 TN/DAY							
UM2003421701 UMS AN ST.751 - 8IN CONC SLAB ON SF	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 566.93 CY/DAY							
03300.01 - 00	PURCHASE 4000 PSI CONCRETE		113.30	0.00	0.00	0.00	113.30
SUB-120/120		161.68 CY	18,318	0	0	0	18,318
* LINE ITEM ASSEMBLY	Factor:0.0200						
03350.30 - 00	STRUCT CONCRETE - PUMP & PLACE		0.00	7.88	8.50	0.00	16.39
SUB-312/312	0.127 hrs/unit 20 TOTAL HRS	161.68 CY	0	1,275	1,374	0	2,649
* LINE ITEM ASSEMBLY	Factor:0.0200						

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
		DAILY PRODUCTIVITY = 566.93 CY/DAY							
03350.30 - 00		FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH			0.00	0.65	0.03	0.00	0.67
	SUB-312/312	0.01 hrs/unit 84 TOTAL HRS	8,084.00	SF	0	5,215	207	0	5,423
	* LINE ITEM ASSEMBLY	Factor:1.0000							
03210.60 - 01		REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#3-#7/A615/GRD 60			0.80	0.66	0.05	0.00	1.51
	SUB-323/323	0.01 hrs/unit 369 TOTAL HRS	36,135.48	LBS	28,908	23,909	1,849	0	54,667
	* LINE ITEM ASSEMBLY	Factor:4.4700							
05310.30 - 04		MTL DKING/STL/OPN TYPE/L SPAN/GALV/OVER 50 SQ/7-1/2" D/16 GA			10.00	1.55	0.20	0.00	11.74
	SUB-511/511	0.023 hrs/unit 186 TOTAL HRS	8,084.00	SF	80,840	12,518	1,586	0	94,944
	* LINE ITEM ASSEMBLY	Factor:1.0000							
02220.13 - 00		BLDG FTGS & FNDN DEMO/FLRS/PCC SLAB ON GRD/PCC/WIRE MESH REINFR/4" THK			0.00	6.79	0.56	0.00	7.35
	SUB-221/221	0.098 hrs/unit 790 TOTAL HRS	8,084.00	SF	0	54,908	4,530	0	59,438
	* LINE ITEM ASSEMBLY	Factor:1.0000							
03110.44 - 55		SCREED/24 GA MTL KEY JOINT/SEE DIV 03150-250			0.17	0.36	0.03	0.00	0.55
	SUB-311/311	0.005 hrs/unit 39 TOTAL HRS	8,084.00	SF	1,374	2,889	216	0	4,480
	* LINE ITEM ASSEMBLY	Factor:1.0000							
09250.70 - 04		Material Stocking			0.00	0.18	0.11	0.00	0.29
	SUB-111/111	0.003 hrs/unit 108 TOTAL HRS	36,135.48	LBS	0	6,348	3,975	0	10,322
	* LINE ITEM ASSEMBLY	Factor:4.4700							
05120.44 - 00		ANGLE FRMG/STRUC STL/1/2"X1/2"X1/8"/FLD FABRCTD/INCL CUTTING & WELDING			0.18	9.29	1.18	0.00	10.65
	SUB-511/511	0.138 hrs/unit 74 TOTAL HRS	538.00	LF	97	4,999	633	0	5,729
02260.72 - 04		Drill for 3 5/8ö Bolt			0.00	32.31	8.12	0.00	40.43
		Drill for 3 5/8ö Bolt					4,367	0	21,750
	SUB-221/221	0.465 hrs/unit 250 TOTAL HRS	538.00	EA	0	17,383			
03150.08 - 00		3 5/8" Bolt			28.50	17.69	0.85	0.00	47.04
	SUB-311/311	0.239 hrs/unit 129 TOTAL HRS	538.00	EA	15,333	9,515	457	0	25,305
		Subtotal Direct Costs			144,871	138,959	19,195	0	303,025
		Subcontractor Markups			41,991	30,987	4,849	0	77,826
		Prime Contractor Markups			17,871	12,424	2,300	0	32,595
		TOTAL UM2003421701 UMS_AN_ST.751 - 8IN CONC SLAB ON SF	2,050	HRS	204,733	182,370	26,343	0	413,446
		8,084.00 SF	*Level Unit Cost-->*		*25.33*	*22.56*	*3.26*	*0.00*	*51.14*

NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY

UM2003421702 UMS_AP_ST.626 - 8 IN CONCRETE SLAB *LEVEL CONTRACTOR ID APPLIED--PRIME*

CODE	SUB/CREW	DESCRIPTION	QTY	UM	MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
		DAILY PRODUCTIVITY = 566.93 CY/DAY							
03300.01 - 00		PURCHASE 4000 PSI CONCRETE			113.30	0.00	0.00	0.00	113.30
	SUB-120/120		43.60	CY	4,940	0	0	0	4,940
	* LINE ITEM ASSEMBLY	Factor:0.0200							
03350.30 - 00		STRUCT CONCRETE - PUMP & PLACE			0.00	7.88	8.50	0.00	16.39
	SUB-312/312	0.126 hrs/unit 6 TOTAL HRS	43.60	CY	0	344	371	0	714
	* LINE ITEM ASSEMBLY	Factor:0.0200							
03350.30 - 00		FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH			0.00	0.65	0.03	0.00	0.67
	SUB-312/312	0.01 hrs/unit 23 TOTAL HRS	2,180.00	SF	0	1,406	56	0	1,462
	* LINE ITEM ASSEMBLY	Factor:1.0000							
03210.60 - 00		REINFORCING IN PLACE, A615 GR 60, PCC DECK, #3 TO #7			0.52	0.50	0.02	0.00	1.04
	SUB-323/323	0.008 hrs/unit 89 TOTAL HRS	11,575.80	LBS	5,973	5,748	281	0	12,003
	* LINE ITEM ASSEMBLY	Factor:5.3100							
03110.01 - 00		FORMWORK - DECK SUPPORT BEAM			5.00	10.95	1.86	0.00	17.81
	SUB-311/311	0.148 hrs/unit 323 TOTAL HRS	2,180.00	sf	10,900	23,875	4,055	0	38,830
	* LINE ITEM ASSEMBLY	Factor:1.0000							
02466.00 - 02		STRIP FDN FORMS, POST POUR CLEAN-UP, CURE			0.00	0.00	2.01	0.00	2.01
	SUB-221/221		2,180.00	CSFA	0	0	4,384	0	4,384
	* LINE ITEM ASSEMBLY	Factor:1.0000							
03110.44 - 55		SCREED/24 GA MTL KEY JOINT/SEE DIV 03150-250			0.17	0.36	0.03	0.00	0.55
	SUB-311/311	0.005 hrs/unit 11 TOTAL HRS	2,180.00	SF	371	779	58	0	1,208
	* LINE ITEM ASSEMBLY	Factor:1.0000							
09250.70 - 04		Material Stocking			0.00	0.18	0.11	0.00	0.29
	SUB-111/111	0.003 hrs/unit 35 TOTAL HRS	11,575.80	LBS	0	2,033	1,273	0	3,307
	* LINE ITEM ASSEMBLY	Factor:5.3100							
		Subtotal Direct Costs			22,184	34,186	10,478	0	66,848
		Subcontractor Markups			3,718	2,048	1,704	0	7,469
		Prime Contractor Markups			2,477	2,649	1,165	0	6,291
		TOTAL UM2003421702 UMS_AP_ST.626 - 8 IN CONCRETE SLAB	485	HRS	28,379	38,882	13,347	0	80,608
		2,180.00 SF	*Level Unit Cost-->*		*13.02*	*17.84*	*6.12*	*0.00*	*36.98*

NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY

UM2003421703 UMS_AO_ST.626 - 14 IN CONCRETE SLAB *LEVEL CONTRACTOR ID APPLIED--PRIME*

CODE	SUB/CREW	DESCRIPTION	QTY	UM	MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
		DAILY PRODUCTIVITY = 566.93 CY/DAY							
03300.01 - 00		PURCHASE 4000 PSI CONCRETE			113.30	0.00	0.00	0.00	113.30
	SUB-120/120		33.40	CY	3,784	0	0	0	3,784
	* LINE ITEM ASSEMBLY	Factor:0.0400							
03350.30 - 00		STRUCT CONCRETE - PUMP & PLACE			0.00	7.88	8.50	0.00	16.39

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
	SUB-312/312 0.126 hrs/unit 4 TOTAL HRS	33.40 CY	0	263	284	0	547
	* LINE ITEM ASSEMBLY Factor:0.0400						
03350.30 - 00	FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH		0.00	0.65	0.03	0.00	0.67
	SUB-312/312 0.01 hrs/unit 9 TOTAL HRS	835.00 SF	0	539	21	0	560
	* LINE ITEM ASSEMBLY Factor:1.0000						
03210.60 - 00	REINFORCING IN PLACE, A615 GR 60, PCC DECK, #3 TO #7		0.52	0.50	0.02	0.00	1.04
	SUB-323/323 0.008 hrs/unit 69 TOTAL HRS	9,018.00 LBS	4,653	4,478	219	0	9,350
	* LINE ITEM ASSEMBLY Factor:10.8000						
03110.01 - 00	FORMWORK - DECK SUPPORT BEAM		5.00	10.95	1.86	0.00	17.81
	SUB-311/311 0.148 hrs/unit 124 TOTAL HRS	835.00 sf	4,175	9,145	1,553	0	14,873
	* LINE ITEM ASSEMBLY Factor:1.0000						
02466.00 - 02	STRIP FDN FORMS, POST POUR CLEAN-UP, CURE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	835.00 CSFA	0	0	1,679	0	1,679
	* LINE ITEM ASSEMBLY Factor:1.0000						
03110.44 - 55	SCREED/24 GA MTL KEY JOINT/SEE DIV 03150-250		0.17	0.36	0.03	0.00	0.55
	SUB-311/311 0.005 hrs/unit 4 TOTAL HRS	835.00 SF	142	298	22	0	463
	* LINE ITEM ASSEMBLY Factor:1.0000						
09250.70 - 04	Material Stocking		0.00	0.18	0.11	0.00	0.29
	SUB-111/111 0.003 hrs/unit 27 TOTAL HRS	9,018.00 LBS	0	1,584	992	0	2,576
	* LINE ITEM ASSEMBLY Factor:10.8000						
	Subtotal Direct Costs		12,754	16,307	4,771	0	33,833
	Subcontractor Markups		2,875	1,595	834	0	5,303
	Prime Contractor Markups		1,495	1,309	536	0	3,340
	TOTAL UM2003421703 UMS_AO_ST.626 - 14 IN CONCRETE SLAB	237 HRS	17,124	19,211	6,140	0	42,476
	835.00 SF	*Level Unit Cost-->*	*20.51*	*23.01*	*7.35*	*0.00*	*50.87*
NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY							
	UM2003431101 BEAM W12 X 50 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	3000.00	480.19	60.83	0.00	3,541.03	
	SUB-511/511 7.132 hrs/unit 10 TOTAL HRS	1.45 TON	4,350	696	88	0	5,134
	* LINE ITEM ASSEMBLY Factor:0.0250						
	Subtotal Direct Costs		4,350	696	88	0	5,134
	Subcontractor Markups		1,391	186	25	0	1,601
	Prime Contractor Markups		549	64	11	0	624
	TOTAL UM2003431101 BEAM W12 X 50	10 HRS	6,290	946	124	0	7,360
	58.00 LF	*Level Unit Cost-->*	*108.45*	*16.32*	*2.13*	*0.00*	*126.90*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
	UM2003431102 BEAM W12 X 58 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STL	2999.34	480.08	60.82	0.00	3,540.24	
	SUB-511/511 7.131 hrs/unit 65 TOTAL HRS	9.05 TON	27,144	4,345	550	0	32,039
	* LINE ITEM ASSEMBLY Factor:0.0290						
	Subtotal Direct Costs		27,144	4,345	550	0	32,039
	Subcontractor Markups		8,680	1,158	154	0	9,991
	Prime Contractor Markups		3,426	402	67	0	3,896
	TOTAL UM2003431102 BEAM W12 X 58	65 HRS	39,250	5,905	771	0	45,927
	312.00 LF	*Level Unit Cost-->*	*125.80*	*18.93*	*2.47*	*0.00*	*147.20*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
	UM2003431301 UMS_AN_ST.751 - 8IN CONC SLAB ON SF *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
03300.01 - 00	PURCHASE 4000 PSI CONCRETE		113.30	0.00	0.00	0.00	113.30
	SUB-120/120	166.82 CY	18,901	0	0	0	18,901
	* LINE ITEM ASSEMBLY Factor:0.0200						
03350.30 - 00	STRUCT CONCRETE - PUMP & PLACE		0.00	7.88	8.50	0.00	16.39
	SUB-312/312 0.127 hrs/unit 21 TOTAL HRS	166.82 CY	0	1,315	1,418	0	2,733
	* LINE ITEM ASSEMBLY Factor:0.0200						
03350.30 - 00	FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH		0.00	0.65	0.03	0.00	0.67
	SUB-312/312 0.01 hrs/unit 86 TOTAL HRS	8,341.00 SF	0	5,381	214	0	5,595
	* LINE ITEM ASSEMBLY Factor:1.0000						
03210.60 - 01	REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#3-#7/A615/GRD 60		0.80	0.66	0.05	0.00	1.51
	SUB-323/323 0.01 hrs/unit 381 TOTAL HRS	37,284.27 LBS	29,827	24,670	1,908	0	56,404
	* LINE ITEM ASSEMBLY Factor:4.4700						
05310.30 - 04	MTL DKING/STL/OPN TYPE/L SPAN/GALV/OVER 50 SQ/7-1/2" D/16 GA		10.00	1.55	0.20	0.00	11.74
	SUB-511/511 0.023 hrs/unit 192 TOTAL HRS	8,341.00 SF	83,410	12,916	1,636	0	97,962
	* LINE ITEM ASSEMBLY Factor:1.0000						
02220.13 - 00	BLDG FTGS & FNDN DEMO/FLRS/PCC SLAB ON GRD/PCC/WIRE MESH REINFR/4" THK	8.00	6.79	0.56	0.00	7.35	
	SUB-221/221 0.098 hrs/unit 815 TOTAL HRS	8,341.00 SF	0	56,653	4,675	0	61,328

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
	* LINE ITEM ASSEMBLY Factor:1.0000						
03110.44 - 55	SCREED/24 GA MTL KEY JOINT/SEE DIV 03150-250		0.17	0.36	0.03	0.00	0.55
	SUB-311/311 0.005 hrs/unit 40 TOTAL HRS	8,341.00 SF	1,418	2,981	223	0	4,622
	* LINE ITEM ASSEMBLY Factor:1.0000						
09250.70 - 04	Material Stocking		0.00	0.18	0.11	0.00	0.29
	SUB-111/111 0.003 hrs/unit 112 TOTAL HRS	37,284.27 LBS	0	6,549	4,101	0	10,651
	* LINE ITEM ASSEMBLY Factor:4.4700						
05120.44 - 00	ANGLE FRMG/STRUC STL/1/2"X1/2"X1/8"/FLD FABRCTD/INCL CUTTING & WELDING		0.18	9.29	1.18	0.00	10.65
	SUB-511/511 0.138 hrs/unit 87 TOTAL HRS	630.00 LF	113	5,853	742	0	6,708
02260.72 - 04	Drill for 3 5/8ö Bolt		0.00	32.31	8.12	0.00	40.43
	Drill for 3 5/8ö Bolt				5,113	0	25,469
	SUB-221/221 0.465 hrs/unit 293 TOTAL HRS	630.00 EA	0	20,356			
03150.08 - 00	3 5/8" Bolt		28.50	17.69	0.85	0.00	47.04
	SUB-311/311 0.239 hrs/unit 151 TOTAL HRS	630.00 EA	17,955	11,142	536	0	29,633
	Subtotal Direct Costs		151,625	147,817	20,565	0	320,007
	Subcontractor Markups		43,330	32,773	5,200	0	81,303
	Prime Contractor Markups		18,645	13,202	2,464	0	34,312
	TOTAL UM2003431301 UMS_AN_ST.751 - 8IN CONC SLAB ON SF 2,178 HRS		213,600	193,792	28,230	0	435,622
	8,341.00 SF *Level Unit Cost-->*		*25.61*	*23.23*	*3.38*	*0.00*	*52.23*

NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY

UM2003431302 UMS_AP_ST.626 - 8 IN CONCRETE SLAB *LEVEL CONTRACTOR ID APPLIED--PRIME*

	DAILY PRODUCTIVITY = 566.93 CY/DAY						
03300.01 - 00	PURCHASE 4000 PSI CONCRETE		113.30	0.00	0.00	0.00	113.30
	SUB-120/120	43.60 CY	4,940	0	0	0	4,940
	* LINE ITEM ASSEMBLY Factor:0.0200						
03350.30 - 00	STRUCT CONCRETE - PUMP & PLACE		0.00	7.88	8.50	0.00	16.39
	SUB-312/312 0.126 hrs/unit 6 TOTAL HRS	43.60 CY	0	344	371	0	714
	* LINE ITEM ASSEMBLY Factor:0.0200						
03350.30 - 00	FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH		0.00	0.65	0.03	0.00	0.67
	SUB-312/312 0.01 hrs/unit 23 TOTAL HRS	2,180.00 SF	0	1,406	56	0	1,462
	* LINE ITEM ASSEMBLY Factor:1.0000						
03210.60 - 00	REINFORCING IN PLACE, A615 GR 60, PCC DECK, #3 TO #7		0.52	0.50	0.02	0.00	1.04
	SUB-323/323 0.008 hrs/unit 89 TOTAL HRS	11,575.80 LBS	5,973	5,748	281	0	12,003
	* LINE ITEM ASSEMBLY Factor:5.3100						
03110.01 - 00	FORMWORK - DECK SUPPORT BEAM		5.00	10.95	1.86	0.00	17.81
	SUB-311/311 0.148 hrs/unit 323 TOTAL HRS	2,180.00 sf	10,900	23,875	4,055	0	38,830
	* LINE ITEM ASSEMBLY Factor:1.0000						
02466.00 - 02	STRIP FDN FORMS, POST POUR CLEAN-UP, CURE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	2,180.00 CSFA	0	0	4,384	0	4,384
	* LINE ITEM ASSEMBLY Factor:1.0000						
03110.44 - 55	SCREED/24 GA MTL KEY JOINT/SEE DIV 03150-250		0.17	0.36	0.03	0.00	0.55
	SUB-311/311 0.005 hrs/unit 11 TOTAL HRS	2,180.00 SF	371	779	58	0	1,208
	* LINE ITEM ASSEMBLY Factor:1.0000						
09250.70 - 04	Material Stocking		0.00	0.18	0.11	0.00	0.29
	SUB-111/111 0.003 hrs/unit 35 TOTAL HRS	11,575.80 LBS	0	2,033	1,273	0	3,307
	* LINE ITEM ASSEMBLY Factor:5.3100						
	Subtotal Direct Costs		22,184	34,186	10,478	0	66,848
	Subcontractor Markups		3,718	2,048	1,704	0	7,469
	Prime Contractor Markups		2,477	2,649	1,165	0	6,291
	TOTAL UM2003431302 UMS_AP_ST.626 - 8 IN CONCRETE SLAB 485 HRS		28,379	38,882	13,347	0	80,608
	2,180.00 SF *Level Unit Cost-->*		*13.02*	*17.84*	*6.12*	*0.00*	*36.98*

NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY

UM2003431303 UMS_AO_ST.626 - 14 IN CONCRETE SLAB *LEVEL CONTRACTOR ID APPLIED--PRIME*

	DAILY PRODUCTIVITY = 566.93 CY/DAY						
03300.01 - 00	PURCHASE 4000 PSI CONCRETE		113.30	0.00	0.00	0.00	113.30
	SUB-120/120	33.40 CY	3,784	0	0	0	3,784
	* LINE ITEM ASSEMBLY Factor:0.0400						
03350.30 - 00	STRUCT CONCRETE - PUMP & PLACE		0.00	7.88	8.50	0.00	16.39
	SUB-312/312 0.126 hrs/unit 4 TOTAL HRS	33.40 CY	0	263	284	0	547
	* LINE ITEM ASSEMBLY Factor:0.0400						
03350.30 - 00	FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH		0.00	0.65	0.03	0.00	0.67
	SUB-312/312 0.01 hrs/unit 9 TOTAL HRS	835.00 SF	0	539	21	0	560
	* LINE ITEM ASSEMBLY Factor:1.0000						
03210.60 - 00	REINFORCING IN PLACE, A615 GR 60, PCC DECK, #3 TO #7		0.52	0.50	0.02	0.00	1.04
	SUB-323/323 0.008 hrs/unit 69 TOTAL HRS	9,018.00 LBS	4,653	4,478	219	0	9,350
	* LINE ITEM ASSEMBLY Factor:10.8000						
03110.01 - 00	FORMWORK - DECK SUPPORT BEAM		5.00	10.95	1.86	0.00	17.81
	SUB-311/311 0.148 hrs/unit 124 TOTAL HRS	835.00 sf	4,175	9,145	1,553	0	14,873
	* LINE ITEM ASSEMBLY Factor:1.0000						

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
02466.00 - 02	STRIP FDN FORMS, POST POUR CLEAN-UP, CURE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	835.00 CSFA	0	0	1,679	0	1,679
	* LINE ITEM ASSEMBLY Factor:1.0000						
03110.44 - 55	SCREED/24 GA MTL KEY JOINT/SEE DIV 03150-250		0.17	0.36	0.03	0.00	0.55
	SUB-311/311 0.005 hrs/unit 4 TOTAL HRS	835.00 SF	142	298	22	0	463
	* LINE ITEM ASSEMBLY Factor:1.0000						
09250.70 - 04	Material Stocking		0.00	0.18	0.11	0.00	0.29
	SUB-111/111 0.003 hrs/unit 27 TOTAL HRS	9,018.00 LBS	0	1,584	992	0	2,576
	* LINE ITEM ASSEMBLY Factor:10.8000						
	Subtotal Direct Costs		12,754	16,307	4,771	0	33,833
	Subcontractor Markups		2,875	1,595	834	0	5,303
	Prime Contractor Markups		1,495	1,309	536	0	3,340
	TOTAL UM2003431303 UMS_AO_ST.626 - 14 IN CONCRETE SLAB	237 HRS	17,124	19,211	6,140	0	42,476
	835.00 SF	*Level Unit Cost-->*	*20.51*	*23.01*	*7.35*	*0.00*	*50.87*
NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY							
	UM2003441101 COLUMN W24 X 84 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STE		3000.00	480.19	60.84	0.00	3,541.03
	SUB-511/511 7.132 hrs/unit 121 TOTAL HRS	17.01 TON	51,030	8,168	1,035	0	60,233
	* LINE ITEM ASSEMBLY Factor:0.0420						
	Subtotal Direct Costs		51,030	8,168	1,035	0	60,233
	Subcontractor Markups		16,318	2,177	289	0	18,784
	Prime Contractor Markups		6,441	756	127	0	7,324
	TOTAL UM2003441101 COLUMN W24 X 84	121 HRS	73,789	11,101	1,450	0	86,341
	405.00 VLF	*Level Unit Cost-->*	*182.20*	*27.41*	*3.58*	*0.00*	*213.19*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
	UM2003441102 COLUMN HSS 8 X 8 X 5/8 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13.46 TN/DAY						
05120.68 - 01	STRUC STL PROJ/INDSTRUC BLDGS/STL BEARNG/100-TN PROJ/1 STRY/A992 STE		2998.59	479.96	60.81	0.00	3,539.37
	SUB-511/511 7.129 hrs/unit 39 TOTAL HRS	5.46 TON	16,372	2,621	332	0	19,325
	* LINE ITEM ASSEMBLY Factor:0.0297						
	Subtotal Direct Costs		16,372	2,621	332	0	19,325
	Subcontractor Markups		5,235	698	93	0	6,027
	Prime Contractor Markups		2,067	243	41	0	2,350
	TOTAL UM2003441102 COLUMN HSS 8 X 8 X 5/8	39 HRS	23,674	3,562	465	0	27,701
	184.00 VLF	*Level Unit Cost-->*	*128.66*	*19.36*	*2.53*	*0.00*	*150.55*
NOTE: DAILY PRODUCTIVITY = 13.46 TN/DAY							
	UM2003441301 UMS_AG_ST.751 - 6IN CONC SLAB ON S D *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
03300.01 - 00	PURCHASE 4000 PSI CONCRETE		113.30	0.00	0.00	0.00	113.30
	SUB-120/120	152.74 CY	17,306	0	0	0	17,306
	* LINE ITEM ASSEMBLY Factor:0.0190						
03350.30 - 00	STRUCT CONCRETE - PUMP & PLACE		0.00	7.88	8.50	0.00	16.39
	SUB-312/312 0.127 hrs/unit 19 TOTAL HRS	152.74 CY	0	1,204	1,298	0	2,503
	* LINE ITEM ASSEMBLY Factor:0.0190						
03350.30 - 00	FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH		0.00	0.65	0.03	0.00	0.67
	SUB-312/312 0.01 hrs/unit 83 TOTAL HRS	8,039.00 SF	0	5,186	206	0	5,393
	* LINE ITEM ASSEMBLY Factor:1.0000						
03210.60 - 01	REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#3-#7/A615/GRD 60		0.80	0.66	0.05	0.00	1.51
	SUB-323/323 0.01 hrs/unit 274 TOTAL HRS	26,850.26 LBS	21,480	17,766	1,374	0	40,620
	* LINE ITEM ASSEMBLY Factor:3.3400						
05310.30 - 04	MTL DKING/STL/OPN TYPE/L SPAN/GALV/OVER 50 SQ/7-1/2" D/16 GA		10.00	1.55	0.20	0.00	11.74
	SUB-511/511 0.023 hrs/unit 185 TOTAL HRS	8,039.00 SF	80,390	12,448	1,577	0	94,416
	* LINE ITEM ASSEMBLY Factor:1.0000						
02220.13 - 00	BLDG FTGS & FNDN DEMO/FLRS/PCC SLAB ON GRD/PCC/WIRE MESH REINFR/4" THI		6.00	6.79	0.56	0.00	7.35
	SUB-221/221 0.098 hrs/unit 786 TOTAL HRS	8,039.00 SF	0	54,602	4,505	0	59,107
	* LINE ITEM ASSEMBLY Factor:1.0000						
03110.44 - 55	SCREED/24 GA MTL KEY JOINT/SEE DIV 03150-250		0.17	0.36	0.03	0.00	0.55
	SUB-311/311 0.005 hrs/unit 39 TOTAL HRS	8,039.00 SF	1,367	2,873	215	0	4,455
	* LINE ITEM ASSEMBLY Factor:1.0000						
09250.70 - 04	Material Stocking		0.00	0.18	0.11	0.00	0.29
	SUB-111/111 0.003 hrs/unit 81 TOTAL HRS	26,850.26 LBS	0	4,717	2,954	0	7,670
	* LINE ITEM ASSEMBLY Factor:3.3400						
05120.44 - 00	ANGLE FRMG/STRUC STL/1/2"X1/2"X1/8"/FLD FABRCTD/INCL CUTTING & WELDING		0.18	9.29	1.18	0.00	10.65
	SUB-511/511 0.138 hrs/unit 77 TOTAL HRS	557.00 LF	100	5,175	656	0	5,931
02260.72 - 04	Drill for 3 5/8ö Bolt		0.00	32.31	8.12	0.00	40.43
	Drill for 3 5/8ö Bolt				4,521	0	22,518

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
	SUB-221/221 0.465 hrs/unit 259 TOTAL HRS	557.00 EA	0	17,997			
03150.08 - 00	3 5/8" Bolt		28.50	17.69	0.85	0.00	47.04
	SUB-311/311 0.239 hrs/unit 133 TOTAL HRS	557.00 EA	15,875	9,851	473	0	26,199
	Subtotal Direct Costs		136,517	131,820	17,779	0	286,116
	Subcontractor Markups		38,953	29,056	4,453	0	72,462
	Prime Contractor Markups		16,782	11,761	2,126	0	30,669
	TOTAL UM2003441301 UMS_AG_ST.751 - 6IN CONC SLAB ON S D	1,936 HRS	192,252	172,637	24,358	0	389,247
	8,039.00 SF *Level Unit Cost-->*		*23.91*	*21.47*	*3.03*	*0.00*	*48.42*

NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY

UM2003441302 UMS_AP_ST.626 - 8 IN CONCRETE SLAB *LEVEL CONTRACTOR ID APPLIED--PRIME*

	DAILY PRODUCTIVITY = 566.93 CY/DAY						
03300.01 - 00	PURCHASE 4000 PSI CONCRETE		113.30	0.00	0.00	0.00	113.30
	SUB-120/120	43.60 CY	4,940	0	0	0	4,940
	* LINE ITEM ASSEMBLY Factor:0.0200						
03350.30 - 00	STRUCT CONCRETE - PUMP & PLACE		0.00	7.88	8.50	0.00	16.39
	SUB-312/312 0.126 hrs/unit 6 TOTAL HRS	43.60 CY	0	344	371	0	714
	* LINE ITEM ASSEMBLY Factor:0.0200						
03350.30 - 00	FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH		0.00	0.65	0.03	0.00	0.67
	SUB-312/312 0.01 hrs/unit 23 TOTAL HRS	2,180.00 SF	0	1,406	56	0	1,462
	* LINE ITEM ASSEMBLY Factor:1.0000						
03210.60 - 00	REINFORCING IN PLACE, A615 GR 60, PCC DECK, #3 TO #7		0.52	0.50	0.02	0.00	1.04
	SUB-323/323 0.008 hrs/unit 89 TOTAL HRS	11,575.80 LBS	5,973	5,748	281	0	12,003
	* LINE ITEM ASSEMBLY Factor:5.3100						
03110.01 - 00	FORMWORK - DECK SUPPORT BEAM		5.00	10.95	1.86	0.00	17.81
	SUB-311/311 0.148 hrs/unit 323 TOTAL HRS	2,180.00 sf	10,900	23,875	4,055	0	38,830
	* LINE ITEM ASSEMBLY Factor:1.0000						
02466.00 - 02	STRIP FDN FORMS, POST POUR CLEAN-UP, CURE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	2,180.00 CSFA	0	0	4,384	0	4,384
	* LINE ITEM ASSEMBLY Factor:1.0000						
03110.44 - 55	SCREED/24 GA MTL KEY JOINT/SEE DIV 03150-250		0.17	0.36	0.03	0.00	0.55
	SUB-311/311 0.005 hrs/unit 11 TOTAL HRS	2,180.00 SF	371	779	58	0	1,208
	* LINE ITEM ASSEMBLY Factor:1.0000						
09250.70 - 04	Material Stocking		0.00	0.18	0.11	0.00	0.29
	SUB-111/111 0.003 hrs/unit 35 TOTAL HRS	11,575.80 LBS	0	2,033	1,273	0	3,307
	* LINE ITEM ASSEMBLY Factor:5.3100						
	Subtotal Direct Costs		22,184	34,186	10,478	0	66,848
	Subcontractor Markups		3,718	2,048	1,704	0	7,469
	Prime Contractor Markups		2,477	2,649	1,165	0	6,291
	TOTAL UM2003441302 UMS_AP_ST.626 - 8 IN CONCRETE SLAB	485 HRS	28,379	38,882	13,347	0	80,608
	2,180.00 SF *Level Unit Cost-->*		*13.02*	*17.84*	*6.12*	*0.00*	*36.98*

NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY

UM2003441303 UMS_AO_ST.626 - 14 IN CONCRETE SLAB *LEVEL CONTRACTOR ID APPLIED--PRIME*

	DAILY PRODUCTIVITY = 566.93 CY/DAY						
03300.01 - 00	PURCHASE 4000 PSI CONCRETE		113.30	0.00	0.00	0.00	113.30
	SUB-120/120	33.40 CY	3,784	0	0	0	3,784
	* LINE ITEM ASSEMBLY Factor:0.0400						
03350.30 - 00	STRUCT CONCRETE - PUMP & PLACE		0.00	7.88	8.50	0.00	16.39
	SUB-312/312 0.126 hrs/unit 4 TOTAL HRS	33.40 CY	0	263	284	0	547
	* LINE ITEM ASSEMBLY Factor:0.0400						
03350.30 - 00	FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH		0.00	0.65	0.03	0.00	0.67
	SUB-312/312 0.01 hrs/unit 9 TOTAL HRS	835.00 SF	0	539	21	0	560
	* LINE ITEM ASSEMBLY Factor:1.0000						
03210.60 - 00	REINFORCING IN PLACE, A615 GR 60, PCC DECK, #3 TO #7		0.52	0.50	0.02	0.00	1.04
	SUB-323/323 0.008 hrs/unit 69 TOTAL HRS	9,018.00 LBS	4,653	4,478	219	0	9,350
	* LINE ITEM ASSEMBLY Factor:10.8000						
03110.01 - 00	FORMWORK - DECK SUPPORT BEAM		5.00	10.95	1.86	0.00	17.81
	SUB-311/311 0.148 hrs/unit 124 TOTAL HRS	835.00 sf	4,175	9,145	1,553	0	14,873
	* LINE ITEM ASSEMBLY Factor:1.0000						
02466.00 - 02	STRIP FDN FORMS, POST POUR CLEAN-UP, CURE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	835.00 CSFA	0	0	1,679	0	1,679
	* LINE ITEM ASSEMBLY Factor:1.0000						
03110.44 - 55	SCREED/24 GA MTL KEY JOINT/SEE DIV 03150-250		0.17	0.36	0.03	0.00	0.55
	SUB-311/311 0.005 hrs/unit 4 TOTAL HRS	835.00 SF	142	298	22	0	463
	* LINE ITEM ASSEMBLY Factor:1.0000						
09250.70 - 04	Material Stocking		0.00	0.18	0.11	0.00	0.29
	SUB-111/111 0.003 hrs/unit 27 TOTAL HRS	9,018.00 LBS	0	1,584	992	0	2,576
	* LINE ITEM ASSEMBLY Factor:10.8000						

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
	Subtotal Direct Costs		12,754	16,307	4,771	0	33,833
	Subcontractor Markups		2,875	1,595	834	0	5,303
	Prime Contractor Markups		1,495	1,309	536	0	3,340
	TOTAL UM2003441303 UMS_AO_ST.626 - 14 IN CONCRETE SLAB	237 HRS	17,124	19,211	6,140	0	42,476
	835.00 SF	*Level Unit Cost-->*	*20.51*	*23.01*	*7.35*	*0.00*	*50.87*
	NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY						
	UM2003441501 UMS_AA_ST.606 - CONCRETE FOOTING - NF1 (5' x 12' x 2')	*LEVEL CONTRACTOR ID APPLIED--PRIME*					
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
34111.01 - 02	ENGINEERING LAYOUT (SURVEY CREW)		0.00	123.48	4.57	0.00	128.05
	SUB-120/120 1.704 hrs/unit 2 TOTAL HRS	1.00 mh	0	123	5	0	128
	* LINE ITEM ASSEMBLY Factor:1.0000						
03310.70 - 20	FOUNDATION EXCAVATION		0.00	14.38	6.25	0.00	20.63
	SUB-221/221 0.207 hrs/unit 2 TOTAL HRS	8.67 CY	0	125	54	0	179
	* LINE ITEM ASSEMBLY Factor:8.6700						
03310.70 - 20	BACKFILL FOUNDATIONS BY HAND / MACHINE		0.00	23.91	3.20	0.00	27.10
	SUB-111/111 0.408 hrs/unit 2 TOTAL HRS	4.22 CY	0	101	14	0	114
	* LINE ITEM ASSEMBLY Factor:4.2200						
03210.60 - 01	REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#8-#18/A615/GRD 60		0.81	0.44	0.03	0.00	1.29
	SUB-323/323 0.007 hrs/unit 6 TOTAL HRS	816.00 LBS	663	360	28	0	1,051
	* LINE ITEM ASSEMBLY Factor:816.0000						
03310.22 - 00	STRUC PCC/READY MX/NORMAL WT/4000PSI		106.00	91.22	0.00	0.00	197.22
	SUB-311/311 1.233 hrs/unit 5 TOTAL HRS	4.44 CY	471	405	0	0	876
	* LINE ITEM ASSEMBLY Factor:4.4400						
03350.30 - 00	STRUCT CONCRETE - PUMP & PLACE		0.00	7.88	8.50	0.00	16.39
	SUB-312/312 0.127 hrs/unit 1 TOTAL HRS	4.44 CY	0	35	38	0	73
	* LINE ITEM ASSEMBLY Factor:4.4400						
02466.00 - 02	FORMS IN PLACE, FTG, PILE CAP, PLYWOOD, 3 USE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	68.00 CSFA	0	0	137	0	137
	* LINE ITEM ASSEMBLY Factor:68.0000						
02466.00 - 02	STRIP FDN FORMS, POST POUR CLEAN-UP, CURE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	68.00 CSFA	0	0	137	0	137
	* LINE ITEM ASSEMBLY Factor:68.0000						
02466.00 - 02	FORMS IN PLACE, DOWEL SUPPORTS FOR FTG 1 USE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	34.00 LF	0	0	68	0	68
	* LINE ITEM ASSEMBLY Factor:34.0000						
03350.30 - 00	FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH		0.00	0.65	0.03	0.00	0.67
	SUB-312/312 0.01 hrs/unit 1 TOTAL HRS	60.00 SF	0	39	2	0	40
	* LINE ITEM ASSEMBLY Factor:60.0000						
09250.70 - 04	Material Stocking		0.00	0.18	0.11	0.00	0.29
	SUB-111/111 0.003 hrs/unit 2 TOTAL HRS	816.00 LBS	0	143	90	0	233
	* LINE ITEM ASSEMBLY Factor:816.0000						
04080.07 - 00	ANCHOR BOLTS/HOOKED TYPE/3/4" DIA X 8" L/INCLUDES NUT & WASHER		1.86	3.96	0.29	0.00	6.12
	SUB-422/422 0.058 hrs/unit	4.00 EA	7	16	1	0	24
	* LINE ITEM ASSEMBLY Factor:4.0000						
05120.68 - 04	COLUMN BS PLATES/STRUC/LITE/100-TN PROJ/>150LBS EA/A992 STL		1.65	0.62	0.08	0.00	2.35
	SUB-511/511 0.009 hrs/unit 2 TOTAL HRS	249.87 LBS	412	155	20	0	587
	* LINE ITEM ASSEMBLY Factor:249.8700						
	Subtotal Direct Costs		1,553	1,502	592	0	3,647
	Subcontractor Markups		362	273	158	0	793
	Prime Contractor Markups		183	130	72	0	385
	TOTAL UM2003441501 UMS_AA_ST.606 - CONCRETE FOOTING - NF1 (5' x 12' x 2')	22 HRS	2,099	1,904	822	0	4,825
	NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY						
	UM2003441502 UMS_AB_ST.606 - CONCRETE FOOTING - NF2 (5' x 12' x 2')	*LEVEL CONTRACTOR ID APPLIED--PRIME*					
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
34111.01 - 02	ENGINEERING LAYOUT (SURVEY CREW)		0.00	123.48	4.57	0.00	128.05
	SUB-120/120 1.704 hrs/unit 2 TOTAL HRS	1.00 mh	0	123	5	0	128
	* LINE ITEM ASSEMBLY Factor:1.0000						
03310.70 - 20	FOUNDATION EXCAVATION		0.00	14.38	6.25	0.00	20.63
	SUB-221/221 0.207 hrs/unit 2 TOTAL HRS	8.67 CY	0	125	54	0	179
	* LINE ITEM ASSEMBLY Factor:8.6700						
03310.70 - 20	BACKFILL FOUNDATIONS BY HAND / MACHINE		0.00	23.91	3.20	0.00	27.10
	SUB-111/111 0.408 hrs/unit 2 TOTAL HRS	4.22 CY	0	101	14	0	114
	* LINE ITEM ASSEMBLY Factor:4.2200						
03210.60 - 01	REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#8-#18/A615/GRD 60		0.81	0.44	0.03	0.00	1.29
	SUB-323/323 0.007 hrs/unit 6 TOTAL HRS	816.00 LBS	663	360	28	0	1,051
	* LINE ITEM ASSEMBLY Factor:816.0000						
03310.22 - 00	STRUC PCC/READY MX/NORMAL WT/4000PSI		106.00	91.22	0.00	0.00	197.22
	SUB-311/311 1.233 hrs/unit 5 TOTAL HRS	4.44 CY	471	405	0	0	876
	* LINE ITEM ASSEMBLY Factor:4.4400						
03350.30 - 00	STRUCT CONCRETE - PUMP & PLACE		0.00	7.88	8.50	0.00	16.39

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
	SUB-312/312 0.127 hrs/unit 1 TOTAL HRS	4.44 CY	0	35	38	0	73
	* LINE ITEM ASSEMBLY Factor:4.4400						
02466.00 - 02	FORMS IN PLACE, FTG, PILE CAP, PLYWOOD, 3 USE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	68.00 CSFA	0	0	137	0	137
	* LINE ITEM ASSEMBLY Factor:68.0000						
02466.00 - 02	STRIP FDN FORMS, POST POUR CLEAN-UP, CURE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	68.00 CSFA	0	0	137	0	137
	* LINE ITEM ASSEMBLY Factor:68.0000						
02466.00 - 02	FORMS IN PLACE, DOWEL SUPPORTS FOR FTG 1 USE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	34.00 LF	0	0	68	0	68
	* LINE ITEM ASSEMBLY Factor:34.0000						
03350.30 - 00	FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH		0.00	0.65	0.03	0.00	0.67
	SUB-312/312 0.01 hrs/unit 1 TOTAL HRS	60.00 SF	0	39	2	0	40
	* LINE ITEM ASSEMBLY Factor:60.0000						
09250.70 - 04	Material Stocking		0.00	0.18	0.11	0.00	0.29
	SUB-111/111 0.003 hrs/unit 2 TOTAL HRS	816.00 LBS	0	143	90	0	233
	* LINE ITEM ASSEMBLY Factor:816.0000						
04080.07 - 00	ANCHOR BOLTS/HOOKED TYPE/3/4" DIA X 8" L/INCLUDES NUT & WASHER		1.86	3.96	0.29	0.00	6.12
	SUB-422/422 0.058 hrs/unit	4.00 EA	7	16	1	0	24
	* LINE ITEM ASSEMBLY Factor:4.0000						
05120.68 - 04	COLUMN BS PLATES/STRUC/LITE/100-TN PROJ/>150LBS EA/A992 STL		1.65	0.62	0.08	0.00	2.35
	SUB-511/511 0.009 hrs/unit 2 TOTAL HRS	249.87 LBS	412	155	20	0	587
	* LINE ITEM ASSEMBLY Factor:249.8700						
	Subtotal Direct Costs		1,553	1,502	592	0	3,647
	Subcontractor Markups		362	273	158	0	793
	Prime Contractor Markups		183	130	72	0	385
	TOTAL UM2003441502 UMS_AB_ST.606 - CONCRETE FOOTING - NF2 (5' x 12' x 2')	22 HRS	2,099	1,904	822	0	4,825

NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY

UM2003441503 UMS_AC_ST.606 - CONCRETE FOOTING - NF3 (5' x 16' x 2'-6 *LEVEL CONTRACTOR ID APPLIED--PRIME*

	DAILY PRODUCTIVITY = 566.93 CY/DAY						
34111.01 - 02	ENGINEERING LAYOUT (SURVEY CREW)		0.00	123.48	4.57	0.00	128.05
	SUB-120/120 1.704 hrs/unit 2 TOTAL HRS	1.00 mh	0	123	5	0	128
	* LINE ITEM ASSEMBLY Factor:1.0000						
03310.70 - 20	FOUNDATION EXCAVATION		0.00	14.38	6.25	0.00	20.63
	SUB-221/221 0.207 hrs/unit 3 TOTAL HRS	13.22 CY	0	190	83	0	273
	* LINE ITEM ASSEMBLY Factor:13.2200						
03310.70 - 20	BACKFILL FOUNDATIONS BY HAND / MACHINE		0.00	23.91	3.20	0.00	27.10
	SUB-111/111 0.408 hrs/unit 2 TOTAL HRS	5.81 CY	0	139	19	0	157
	* LINE ITEM ASSEMBLY Factor:5.8100						
03210.60 - 01	REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#8-#18/A615/GRD 60		0.81	0.44	0.03	0.00	1.29
	SUB-323/323 0.007 hrs/unit 9 TOTAL HRS	1,360.00 LBS	1,105	600	46	0	1,751
	* LINE ITEM ASSEMBLY Factor:1360.0000						
03310.22 - 00	STRUC PCC/READY MX/NORMAL WT/4000PSI		106.00	91.22	0.00	0.00	197.22
	SUB-311/311 1.233 hrs/unit 9 TOTAL HRS	7.41 CY	785	676	0	0	1,461
	* LINE ITEM ASSEMBLY Factor:7.4100						
03350.30 - 00	STRUCT CONCRETE - PUMP & PLACE		0.00	7.88	8.50	0.00	16.38
	SUB-312/312 0.126 hrs/unit 1 TOTAL HRS	7.41 CY	0	58	63	0	121
	* LINE ITEM ASSEMBLY Factor:7.4100						
02466.00 - 02	FORMS IN PLACE, FTG, PILE CAP, PLYWOOD, 3 USE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	105.00 CSFA	0	0	211	0	211
	* LINE ITEM ASSEMBLY Factor:105.0000						
02466.00 - 02	STRIP FDN FORMS, POST POUR CLEAN-UP, CURE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	105.00 CSFA	0	0	211	0	211
	* LINE ITEM ASSEMBLY Factor:105.0000						
02466.00 - 02	FORMS IN PLACE, DOWEL SUPPORTS FOR FTG 1 USE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	42.00 LF	0	0	84	0	84
	* LINE ITEM ASSEMBLY Factor:42.0000						
03350.30 - 00	FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH		0.00	0.65	0.03	0.00	0.67
	SUB-312/312 0.01 hrs/unit 1 TOTAL HRS	80.00 SF	0	52	2	0	54
	* LINE ITEM ASSEMBLY Factor:80.0000						
09250.70 - 04	Material Stocking		0.00	0.18	0.11	0.00	0.29
	SUB-111/111 0.003 hrs/unit 4 TOTAL HRS	1,360.00 LBS	0	239	150	0	389
	* LINE ITEM ASSEMBLY Factor:1360.0000						
04080.07 - 00	ANCHOR BOLTS/HOOKED TYPE/3/4" DIA X 8" L/INCLUDES NUT & WASHER		1.86	3.96	0.29	0.00	6.12
	SUB-422/422 0.058 hrs/unit	4.00 EA	7	16	1	0	24
	* LINE ITEM ASSEMBLY Factor:4.0000						
05120.68 - 04	COLUMN BS PLATES/STRUC/LITE/100-TN PROJ/>150LBS EA/A992 STL		1.65	0.62	0.08	0.00	2.35
	SUB-511/511 0.009 hrs/unit 2 TOTAL HRS	249.87 LBS	412	155	20	0	587
	* LINE ITEM ASSEMBLY Factor:249.8700						

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
	Subtotal Direct Costs		2,310	2,248	894	0	5,452
	Subcontractor Markups		514	389	238	0	1,140
	Prime Contractor Markups		270	193	108	0	571
	TOTAL UM2003441503 UMS_AC_ST.606 - CONCRETE FOOTING - NF3 (5' x 16' x 2'-6")	34 HRS	3,094	2,829	1,240	0	7,164
	NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY						
	UM2003441504 UMS_AD_ST.606 - CONCRETE FOOTING - NF4 (5' x 15' x 2'-3 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
34111.01 - 02	ENGINEERING LAYOUT (SURVEY CREW)		0.00	123.48	4.57	0.00	128.05
	SUB-120/120 1.704 hrs/unit 2 TOTAL HRS	1.00 mh	0	123	5	0	128
	* LINE ITEM ASSEMBLY Factor:1.0000						
03310.70 - 20	FOUNDATION EXCAVATION		0.00	14.38	6.25	0.00	20.63
	SUB-221/221 0.207 hrs/unit 2 TOTAL HRS	11.56 CY	0	166	72	0	239
	* LINE ITEM ASSEMBLY Factor:11.5600						
03310.70 - 20	BACKFILL FOUNDATIONS BY HAND / MACHINE		0.00	23.90	3.20	0.00	27.10
	SUB-111/111 0.408 hrs/unit 2 TOTAL HRS	5.31 CY	0	127	17	0	144
	* LINE ITEM ASSEMBLY Factor:5.3100						
03210.60 - 01	REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#8-#18/A615/GRD 60		0.81	0.44	0.03	0.00	1.29
	SUB-323/323 0.007 hrs/unit 8 TOTAL HRS	1,147.50 LBS	932	506	39	0	1,478
	* LINE ITEM ASSEMBLY Factor:1147.5000						
03310.22 - 00	STRUC PCC/READY MX/NORMAL WT/4000PSI		106.00	91.22	0.00	0.00	197.22
	SUB-311/311 1.233 hrs/unit 8 TOTAL HRS	6.25 CY	663	570	0	0	1,233
	* LINE ITEM ASSEMBLY Factor:6.2500						
03350.30 - 00	STRUCT CONCRETE - PUMP & PLACE		0.00	7.88	8.50	0.00	16.39
	SUB-312/312 0.127 hrs/unit 1 TOTAL HRS	6.25 CY	0	49	53	0	102
	* LINE ITEM ASSEMBLY Factor:6.2500						
02466.00 - 02	FORMS IN PLACE, FTG, PILE CAP, PLYWOOD, 3 USE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	90.00 CSFA	0	0	181	0	181
	* LINE ITEM ASSEMBLY Factor:90.0000						
02466.00 - 02	STRIP FDN FORMS, POST POUR CLEAN-UP, CURE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	90.00 CSFA	0	0	181	0	181
	* LINE ITEM ASSEMBLY Factor:90.0000						
02466.00 - 02	FORMS IN PLACE, DOWEL SUPPORTS FOR FTG 1 USE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	40.00 LF	0	0	80	0	80
	* LINE ITEM ASSEMBLY Factor:40.0000						
03350.30 - 00	FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH		0.00	0.65	0.03	0.00	0.67
	SUB-312/312 0.01 hrs/unit 1 TOTAL HRS	75.00 SF	0	48	2	0	50
	* LINE ITEM ASSEMBLY Factor:75.0000						
09250.70 - 04	Material Stocking		0.00	0.18	0.11	0.00	0.29
	SUB-111/111 0.003 hrs/unit 3 TOTAL HRS	1,147.50 LBS	0	202	126	0	328
	* LINE ITEM ASSEMBLY Factor:1147.5000						
04080.07 - 00	ANCHOR BOLTS/HOOKED TYPE/3/4" DIA X 8" L/INCLUDES NUT & WASHER		1.86	3.96	0.29	0.00	6.12
	SUB-422/422 0.058 hrs/unit	4.00 EA	7	16	1	0	24
	* LINE ITEM ASSEMBLY Factor:4.0000						
05120.68 - 04	COLUMN BS PLATES/STRUC/LITE/100-TN PROJ/>150LBS EA/A992 STL		1.65	0.62	0.08	0.00	2.35
	SUB-511/511 0.009 hrs/unit 2 TOTAL HRS	249.87 LBS	412	155	20	0	587
	* LINE ITEM ASSEMBLY Factor:249.8700						
	Subtotal Direct Costs		2,015	1,963	777	0	4,755
	Subcontractor Markups		455	345	207	0	1,006
	Prime Contractor Markups		236	169	94	0	499
	TOTAL UM2003441504 UMS_AD_ST.606 - CONCRETE FOOTING - NF4 (5' x 15' x 2'-3")	29 HRS	2,705	2,476	1,079	0	6,260
	NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY						
	UM2003441505 UMS_AE_ST.606 - CONCRETE FOOTING - NF5 (5' x 12' x 2') *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
34111.01 - 02	ENGINEERING LAYOUT (SURVEY CREW)		0.00	123.48	4.57	0.00	128.05
	SUB-120/120 1.704 hrs/unit 2 TOTAL HRS	1.00 mh	0	123	5	0	128
	* LINE ITEM ASSEMBLY Factor:1.0000						
03310.70 - 20	FOUNDATION EXCAVATION		0.00	14.38	6.25	0.00	20.63
	SUB-221/221 0.207 hrs/unit 2 TOTAL HRS	8.67 CY	0	125	54	0	179
	* LINE ITEM ASSEMBLY Factor:8.6700						
03310.70 - 20	BACKFILL FOUNDATIONS BY HAND / MACHINE		0.00	23.91	3.20	0.00	27.10
	SUB-111/111 0.408 hrs/unit 2 TOTAL HRS	4.22 CY	0	101	14	0	114
	* LINE ITEM ASSEMBLY Factor:4.2200						
03210.60 - 01	REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#8-#18/A615/GRD 60		0.81	0.44	0.03	0.00	1.29
	SUB-323/323 0.007 hrs/unit 6 TOTAL HRS	816.00 LBS	663	360	28	0	1,051
	* LINE ITEM ASSEMBLY Factor:816.0000						
03310.22 - 00	STRUC PCC/READY MX/NORMAL WT/4000PSI		106.00	91.22	0.00	0.00	197.22
	SUB-311/311 1.233 hrs/unit 5 TOTAL HRS	4.44 CY	471	405	0	0	876
	* LINE ITEM ASSEMBLY Factor:4.4400						
03350.30 - 00	STRUCT CONCRETE - PUMP & PLACE		0.00	7.88	8.50	0.00	16.39
	SUB-312/312 0.127 hrs/unit 1 TOTAL HRS	4.44 CY	0	35	38	0	73

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
	* LINE ITEM ASSEMBLY Factor:4.4400						
02466.00 - 02	FORMS IN PLACE, FTG, PILE CAP, PLYWOOD, 3 USE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	68.00 CSFA	0	0	137	0	137
	* LINE ITEM ASSEMBLY Factor:68.0000						
02466.00 - 02	STRIP FDN FORMS, POST POUR CLEAN-UP, CURE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	68.00 CSFA	0	0	137	0	137
	* LINE ITEM ASSEMBLY Factor:68.0000						
02466.00 - 02	FORMS IN PLACE, DOWEL SUPPORTS FOR FTG 1 USE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	34.00 LF	0	0	68	0	68
	* LINE ITEM ASSEMBLY Factor:34.0000						
03350.30 - 00	FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH		0.00	0.65	0.03	0.00	0.67
	SUB-312/312 0.01 hrs/unit 1 TOTAL HRS	60.00 SF	0	39	2	0	40
	* LINE ITEM ASSEMBLY Factor:60.0000						
09250.70 - 04	Material Stocking		0.00	0.18	0.11	0.00	0.29
	SUB-111/111 0.003 hrs/unit 2 TOTAL HRS	816.00 LBS	0	143	90	0	233
	* LINE ITEM ASSEMBLY Factor:816.0000						
04080.07 - 00	ANCHOR BOLTS/HOOKED TYPE/3/4" DIA X 8" L/INCLUDES NUT & WASHER		1.86	3.96	0.29	0.00	6.12
	SUB-422/422 0.058 hrs/unit	4.00 EA	7	16	1	0	24
	* LINE ITEM ASSEMBLY Factor:4.0000						
05120.68 - 04	COLUMN BS PLATES/STRUC/LITE/100-TN PROJ/>150LBS EA/A992 STL		1.65	0.62	0.08	0.00	2.35
	SUB-511/511 0.009 hrs/unit 2 TOTAL HRS	249.87 LBS	412	155	20	0	587
	* LINE ITEM ASSEMBLY Factor:249.8700						
	Subtotal Direct Costs		1,553	1,502	592	0	3,647
	Subcontractor Markups		362	273	158	0	793
	Prime Contractor Markups		183	130	72	0	385
	TOTAL UM2003441505 UMS_AE_ST.606 - CONCRETE FOOTING - NF5 (5' x 12' x 2')	2 HRS	2,099	1,904	822	0	4,825

NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY

UM2003441506 UMS_AF_ST.606 - CONCRETE FOOTING - NF6 (5' x 14' x 2'-3 *LEVEL CONTRACTOR ID APPLIED--PRIME*

	DAILY PRODUCTIVITY = 566.93 CY/DAY						
34111.01 - 02	ENGINEERING LAYOUT (SURVEY CREW)		0.00	123.48	4.57	0.00	128.05
	SUB-120/120 1.704 hrs/unit 2 TOTAL HRS	1.00 mh	0	123	5	0	128
	* LINE ITEM ASSEMBLY Factor:1.0000						
03310.70 - 20	FOUNDATION EXCAVATION		0.00	14.38	6.25	0.00	20.63
	SUB-221/221 0.207 hrs/unit 2 TOTAL HRS	10.83 CY	0	156	68	0	223
	* LINE ITEM ASSEMBLY Factor:10.8300						
03310.70 - 20	BACKFILL FOUNDATIONS BY HAND / MACHINE		0.00	23.90	3.20	0.00	27.10
	SUB-111/111 0.408 hrs/unit 2 TOTAL HRS	5.00 CY	0	120	16	0	136
	* LINE ITEM ASSEMBLY Factor:5.0000						
03210.60 - 01	REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#8-#18/A615/GRD 60		0.81	0.44	0.03	0.00	1.29
	SUB-323/323 0.007 hrs/unit 7 TOTAL HRS	1,071.00 LBS	870	472	37	0	1,379
	* LINE ITEM ASSEMBLY Factor:1071.0000						
03310.22 - 00	STRUC PCC/READY MX/NORMAL WT/4000PSI		106.00	91.22	0.00	0.00	197.22
	SUB-311/311 1.233 hrs/unit 7 TOTAL HRS	5.83 CY	618	532	0	0	1,150
	* LINE ITEM ASSEMBLY Factor:5.8300						
03350.30 - 00	STRUCT CONCRETE - PUMP & PLACE		0.00	7.88	8.50	0.00	16.39
	SUB-312/312 0.126 hrs/unit 1 TOTAL HRS	5.83 CY	0	46	50	0	96
	* LINE ITEM ASSEMBLY Factor:5.8300						
02466.00 - 02	FORMS IN PLACE, FTG, PILE CAP, PLYWOOD, 3 USE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	85.50 CSFA	0	0	172	0	172
	* LINE ITEM ASSEMBLY Factor:85.5000						
02466.00 - 02	STRIP FDN FORMS, POST POUR CLEAN-UP, CURE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	85.50 CSFA	0	0	172	0	172
	* LINE ITEM ASSEMBLY Factor:85.5000						
02466.00 - 02	FORMS IN PLACE, DOWEL SUPPORTS FOR FTG 1 USE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	38.00 LF	0	0	76	0	76
	* LINE ITEM ASSEMBLY Factor:38.0000						
03350.30 - 00	FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH		0.00	0.65	0.03	0.00	0.67
	SUB-312/312 0.01 hrs/unit 1 TOTAL HRS	70.00 SF	0	45	2	0	47
	* LINE ITEM ASSEMBLY Factor:70.0000						
09250.70 - 04	Material Stocking		0.00	0.18	0.11	0.00	0.29
	SUB-111/111 0.003 hrs/unit 3 TOTAL HRS	1,071.00 LBS	0	188	118	0	306
	* LINE ITEM ASSEMBLY Factor:1071.0000						
04080.07 - 00	ANCHOR BOLTS/HOOKED TYPE/3/4" DIA X 8" L/INCLUDES NUT & WASHER		1.86	3.96	0.29	0.00	6.12
	SUB-422/422 0.058 hrs/unit	4.00 EA	7	16	1	0	24
	* LINE ITEM ASSEMBLY Factor:4.0000						
05120.68 - 04	COLUMN BS PLATES/STRUC/LITE/100-TN PROJ/>150LBS EA/A992 STL		1.65	0.62	0.08	0.00	2.35
	SUB-511/511 0.009 hrs/unit 2 TOTAL HRS	249.87 LBS	412	155	20	0	587
	* LINE ITEM ASSEMBLY Factor:249.8700						

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
	Subtotal Direct Costs		1,908	1,853	735	0	4,496
	Subcontractor Markups		433	327	196	0	957
	Prime Contractor Markups		224	159	89	0	472
	TOTAL UM2003441506 UMS_AF_ST.606 - CONCRETE FOOTING - NF6 (5' x 14' x 2'-3")	28 HRS	2,565	2,340	1,020	0	5,925
	NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY						
	UM2003441507 UMS_AG_ST.606 - CONCRETE FOOTING - NF7 (7'-10" x 10' x	*LEVEL CONTRACTOR ID APPLIED--PRIME*					
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
34111.01 - 02	ENGINEERING LAYOUT (SURVEY CREW)		0.00	123.48	4.57	0.00	128.05
	SUB-120/120 1.704 hrs/unit 2 TOTAL HRS	1.00 mh	0	123	5	0	128
	* LINE ITEM ASSEMBLY Factor:1.0000						
03310.70 - 20	FOUNDATION EXCAVATION		0.00	14.38	6.25	0.00	20.63
	SUB-221/221 0.207 hrs/unit 2 TOTAL HRS	9.61 CY	0	138	60	0	198
	* LINE ITEM ASSEMBLY Factor:9.6100						
03310.70 - 20	BACKFILL FOUNDATIONS BY HAND / MACHINE		0.00	23.91	3.20	0.00	27.11
	SUB-111/111 0.408 hrs/unit 2 TOTAL HRS	4.76 CY	0	114	15	0	129
	* LINE ITEM ASSEMBLY Factor:4.7600						
03210.60 - 01	REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#8-#18/A615/GRD 60		0.81	0.44	0.03	0.00	1.29
	SUB-323/323 0.007 hrs/unit 6 TOTAL HRS	889.17 LBS	722	392	30	0	1,145
	* LINE ITEM ASSEMBLY Factor:889.1700						
03310.22 - 00	STRUC PCC/READY MX/NORMAL WT/4000PSI		106.00	91.22	0.00	0.00	197.22
	SUB-311/311 1.233 hrs/unit 6 TOTAL HRS	4.84 CY	513	442	0	0	955
	* LINE ITEM ASSEMBLY Factor:4.8400						
03350.30 - 00	STRUCT CONCRETE - PUMP & PLACE		0.00	7.88	8.50	0.00	16.38
	SUB-312/312 0.126 hrs/unit 1 TOTAL HRS	4.84 CY	0	38	41	0	79
	* LINE ITEM ASSEMBLY Factor:4.8400						
02466.00 - 02	FORMS IN PLACE, FTG, PILE CAP, PLYWOOD, 3 USE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	59.55 CSFA	0	0	120	0	120
	* LINE ITEM ASSEMBLY Factor:59.5500						
02466.00 - 02	STRIP FDN FORMS, POST POUR CLEAN-UP, CURE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	59.55 CSFA	0	0	120	0	120
	* LINE ITEM ASSEMBLY Factor:59.5500						
02466.00 - 02	FORMS IN PLACE, DOWEL SUPPORTS FOR FTG 1 USE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	35.66 LF	0	0	72	0	72
	* LINE ITEM ASSEMBLY Factor:35.6600						
03350.30 - 00	FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH		0.00	0.65	0.03	0.00	0.67
	SUB-312/312 0.01 hrs/unit 1 TOTAL HRS	78.30 SF	0	51	2	0	53
	* LINE ITEM ASSEMBLY Factor:78.3000						
09250.70 - 04	Material Stocking		0.00	0.18	0.11	0.00	0.29
	SUB-111/111 0.003 hrs/unit 3 TOTAL HRS	889.17 LBS	0	156	98	0	254
	* LINE ITEM ASSEMBLY Factor:889.1700						
04080.07 - 00	ANCHOR BOLTS/HOOKED TYPE/3/4" DIA X 8" L/INCLUDES NUT & WASHER		1.86	3.96	0.29	0.00	6.12
	SUB-422/422 0.058 hrs/unit	4.00 EA	7	16	1	0	24
	* LINE ITEM ASSEMBLY Factor:4.0000						
05120.68 - 04	COLUMN BS PLATES/STRUC/LITE/100-TN PROJ/>150LBS EA/A992 STL		1.65	0.62	0.08	0.00	2.35
	SUB-511/511 0.009 hrs/unit 2 TOTAL HRS	249.87 LBS	412	155	20	0	587
	* LINE ITEM ASSEMBLY Factor:249.8700						
	Subtotal Direct Costs		1,655	1,625	583	0	3,863
	Subcontractor Markups		383	292	155	0	829
	Prime Contractor Markups		195	140	71	0	406
	TOTAL UM2003441507 UMS_AG_ST.606 - CONCRETE FOOTING - NF7 (7'-10" x 10' x 1'-8")	24 HRS	2,233	2,057	809	0	5,098
	NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY						
	UM2003441508 UMS_AH_ST.606 - CONCRETE FOOTING - NF8 (8'-7" x 7' x 1'	*LEVEL CONTRACTOR ID APPLIED--PRIME*					
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
34111.01 - 02	ENGINEERING LAYOUT (SURVEY CREW)		0.00	123.48	4.57	0.00	128.05
	SUB-120/120 1.704 hrs/unit 2 TOTAL HRS	1.00 mh	0	123	5	0	128
	* LINE ITEM ASSEMBLY Factor:1.0000						
03310.70 - 20	FOUNDATION EXCAVATION		0.00	14.38	6.25	0.00	20.63
	SUB-221/221 0.207 hrs/unit 2 TOTAL HRS	7.58 CY	0	109	47	0	156
	* LINE ITEM ASSEMBLY Factor:7.5800						
03310.70 - 20	BACKFILL FOUNDATIONS BY HAND / MACHINE		0.00	23.90	3.20	0.00	27.10
	SUB-111/111 0.408 hrs/unit 2 TOTAL HRS	3.86 CY	0	92	12	0	105
	* LINE ITEM ASSEMBLY Factor:3.8600						
03210.60 - 01	REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#8-#18/A615/GRD 60		0.81	0.44	0.03	0.00	1.29
	SUB-323/323 0.007 hrs/unit 5 TOTAL HRS	682.04 LBS	554	301	23	0	878
	* LINE ITEM ASSEMBLY Factor:682.0400						
03310.22 - 00	STRUC PCC/READY MX/NORMAL WT/4000PSI		106.00	91.22	0.00	0.00	197.22
	SUB-311/311 1.233 hrs/unit 5 TOTAL HRS	3.71 CY	393	338	0	0	732
	* LINE ITEM ASSEMBLY Factor:3.7100						
03350.30 - 00	STRUCT CONCRETE - PUMP & PLACE		0.00	7.88	8.50	0.00	16.39
	SUB-312/312 0.126 hrs/unit	3.71 CY	0	29	32	0	61

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
		DAILY PRODUCTIVITY = 566.93 CY/DAY							
		* LINE ITEM ASSEMBLY Factor:3.7100							
02466.00 - 02		FORMS IN PLACE, FTG, PILE CAP, PLYWOOD, 3 USE			0.00	0.00	2.01	0.00	2.01
	SUB-221/221		52.04	CSFA	0	0	105	0	105
		* LINE ITEM ASSEMBLY Factor:52.0400							
02466.00 - 02		STRIP FDN FORMS, POST POUR CLEAN-UP, CURE			0.00	0.00	2.01	0.00	2.01
	SUB-221/221		52.04	CSFA	0	0	105	0	105
		* LINE ITEM ASSEMBLY Factor:52.0400							
02466.00 - 02		FORMS IN PLACE, DOWEL SUPPORTS FOR FTG 1 USE			0.00	0.00	2.01	0.00	2.01
	SUB-221/221		31.16	LF	0	0	63	0	63
		* LINE ITEM ASSEMBLY Factor:31.1600							
03350.30 - 00		FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH			0.00	0.65	0.03	0.00	0.67
	SUB-312/312	0.01 hrs/unit 1 TOTAL HRS	60.06	SF	0	39	2	0	40
		* LINE ITEM ASSEMBLY Factor:60.0600							
09250.70 - 04		Material Stocking			0.00	0.18	0.11	0.00	0.29
	SUB-111/111	0.003 hrs/unit 2 TOTAL HRS	682.04	LBS	0	120	75	0	195
		* LINE ITEM ASSEMBLY Factor:682.0400							
04080.07 - 00		ANCHOR BOLTS/HOOKED TYPE/3/4" DIA X 8" L/INCLUDES NUT & WASHER			1.86	3.96	0.29	0.00	6.12
	SUB-422/422	0.058 hrs/unit	4.00	EA	7	16	1	0	24
		* LINE ITEM ASSEMBLY Factor:4.0000							
05120.68 - 04		COLUMN BS PLATES/STRUC/LITE/100-TN PROJ/>150LBS EA/A992 STL			1.65	0.62	0.08	0.00	2.35
	SUB-511/511	0.009 hrs/unit 2 TOTAL HRS	249.87	LBS	412	155	20	0	587
		* LINE ITEM ASSEMBLY Factor:249.8700							
		Subtotal Direct Costs			1,367	1,322	488	0	3,178
		Subcontractor Markups			325	245	131	0	700
		Prime Contractor Markups			162	115	59	0	336
		TOTAL UM2003441508 UMS_AH_ST.606 - CONCRETE FOOTING - NF8 (8'-7" x 7' x 1'-8")	2.0	HRS	1,854	1,682	678	0	4,214
		NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY							
		UM2003441509 UMS_AI_ST.606 - CONCRETE FOOTING - NF9 (8'-8" x 8' x 1'			*LEVEL CONTRACTOR ID APPLIED--PRIME*				
		DAILY PRODUCTIVITY = 566.93 CY/DAY							
34111.01 - 02		ENGINEERING LAYOUT (SURVEY CREW)			0.00	123.48	4.57	0.00	128.05
	SUB-120/120	1.704 hrs/unit 2 TOTAL HRS	1.00	mh	0	123	5	0	128
		* LINE ITEM ASSEMBLY Factor:1.0000							
03310.70 - 20		FOUNDATION EXCAVATION			0.00	14.38	6.25	0.00	20.63
	SUB-221/221	0.207 hrs/unit 2 TOTAL HRS	8.61	CY	0	124	54	0	178
		* LINE ITEM ASSEMBLY Factor:8.6100							
03310.70 - 20		BACKFILL FOUNDATIONS BY HAND / MACHINE			0.00	23.91	3.20	0.00	27.10
	SUB-111/111	0.408 hrs/unit 2 TOTAL HRS	4.32	CY	0	103	14	0	117
		* LINE ITEM ASSEMBLY Factor:4.3200							
03210.60 - 01		REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#8-#18/A615/GRD 60			0.81	0.44	0.03	0.00	1.29
	SUB-323/323	0.007 hrs/unit 5 TOTAL HRS	787.65	LBS	640	347	27	0	1,014
		* LINE ITEM ASSEMBLY Factor:787.6500							
03310.22 - 00		STRUC PCC/READY MX/NORMAL WT/4000PSI			106.00	91.22	0.00	0.00	197.22
	SUB-311/311	1.233 hrs/unit 5 TOTAL HRS	4.29	CY	455	391	0	0	846
		* LINE ITEM ASSEMBLY Factor:4.2900							
03350.30 - 00		STRUCT CONCRETE - PUMP & PLACE			0.00	7.89	8.50	0.00	16.39
	SUB-312/312	0.127 hrs/unit 1 TOTAL HRS	4.29	CY	0	34	36	0	70
		* LINE ITEM ASSEMBLY Factor:4.2900							
02466.00 - 02		FORMS IN PLACE, FTG, PILE CAP, PLYWOOD, 3 USE			0.00	0.00	2.01	0.00	2.01
	SUB-221/221		55.68	CSFA	0	0	112	0	112
		* LINE ITEM ASSEMBLY Factor:55.6800							
02466.00 - 02		STRIP FDN FORMS, POST POUR CLEAN-UP, CURE			0.00	0.00	2.01	0.00	2.01
	SUB-221/221		55.68	CSFA	0	0	112	0	112
		* LINE ITEM ASSEMBLY Factor:55.6800							
02466.00 - 02		FORMS IN PLACE, DOWEL SUPPORTS FOR FTG 1 USE			0.00	0.00	2.01	0.00	2.01
	SUB-221/221		33.34	LF	0	0	67	0	67
		* LINE ITEM ASSEMBLY Factor:33.3400							
03350.30 - 00		FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH			0.00	0.65	0.03	0.00	0.67
	SUB-312/312	0.01 hrs/unit 1 TOTAL HRS	69.36	SF	0	45	2	0	47
		* LINE ITEM ASSEMBLY Factor:69.3600							
09250.70 - 04		Material Stocking			0.00	0.18	0.11	0.00	0.29
	SUB-111/111	0.003 hrs/unit 2 TOTAL HRS	787.65	LBS	0	138	87	0	225
		* LINE ITEM ASSEMBLY Factor:787.6500							
04080.07 - 00		ANCHOR BOLTS/HOOKED TYPE/3/4" DIA X 8" L/INCLUDES NUT & WASHER			1.86	3.96	0.29	0.00	6.12
	SUB-422/422	0.058 hrs/unit	4.00	EA	7	16	1	0	24
		* LINE ITEM ASSEMBLY Factor:4.0000							
05120.68 - 04		COLUMN BS PLATES/STRUC/LITE/100-TN PROJ/>150LBS EA/A992 STL			1.65	0.62	0.08	0.00	2.35
	SUB-511/511	0.009 hrs/unit 2 TOTAL HRS	249.87	LBS	412	155	20	0	587
		* LINE ITEM ASSEMBLY Factor:249.8700							

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
	Subtotal Direct Costs		1,514	1,477	536	0	3,527
	Subcontractor Markups		354	269	143	0	766
	Prime Contractor Markups		179	128	65	0	371
	TOTAL UM2003441509 UMS_AI_ST.606 - CONCRETE FOOTING - NF (8'-8" x 8' x 1'-8")	922 HRS	2,047	1,873	743	0	4,664
	NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY						
	UM2003441510 UMS_AJ_ST.606 - CONCRETE FOOTING - WALL FOUNDATION *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 566.93 CY/DAY						
34111.01 - 02	ENGINEERING LAYOUT (SURVEY CREW)		0.00	123.48	4.57	0.00	128.05
	SUB-120/120 1.704 hrs/unit 3 TOTAL HRS * LINE ITEM ASSEMBLY Factor:0.0200	1.74 mh	0	215	8	0	223
03310.70 - 20	FOUNDATION EXCAVATION		0.00	14.38	6.25	0.00	20.63
	SUB-221/221 0.207 hrs/unit 6 TOTAL HRS * LINE ITEM ASSEMBLY Factor:0.3300	28.71 CY	0	413	179	0	592
03310.70 - 20	BACKFILL FOUNDATIONS BY HAND / MACHINE		0.00	23.91	3.20	0.00	27.10
	SUB-111/111 0.408 hrs/unit 9 TOTAL HRS * LINE ITEM ASSEMBLY Factor:0.2400	20.88 CY	0	499	67	0	566
03210.60 - 01	REINFRCNG STL/IN PLACE/TYPICAL/AVG/UND 10 TN JOB/#8-#18/A615/GRD 60		0.81	0.44	0.03	0.00	1.29
	SUB-323/323 0.007 hrs/unit 10 TOTAL HRS * LINE ITEM ASSEMBLY Factor:17.0000	1,479.00 LBS	1,202	652	50	0	1,905
03310.22 - 00	STRUC PCC/READY MX/NORMAL WT/4000PSI		106.00	91.22	0.00	0.00	197.22
	SUB-311/311 1.233 hrs/unit 10 TOTAL HRS * LINE ITEM ASSEMBLY Factor:0.0900	7.83 CY	830	714	0	0	1,544
03350.30 - 00	STRUCT CONCRETE - PUMP & PLACE		0.00	7.88	8.50	0.00	16.39
	SUB-312/312 0.126 hrs/unit 1 TOTAL HRS * LINE ITEM ASSEMBLY Factor:0.0900	7.83 CY	0	62	67	0	128
02466.00 - 02	FORMS IN PLACE, FTG, PILE CAP, PLYWOOD, 3 USE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221 * LINE ITEM ASSEMBLY Factor:2.0000	174.00 CSFA	0	0	350	0	350
02466.00 - 02	STRIP FDN FORMS, POST POUR CLEAN-UP, CURE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221 * LINE ITEM ASSEMBLY Factor:2.0000	174.00 CSFA	0	0	350	0	350
02466.00 - 02	FORMS IN PLACE, DOWEL SUPPORTS FOR FTG 1 USE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221 * LINE ITEM ASSEMBLY Factor:1.0000	87.00 LF	0	0	175	0	175
03350.30 - 00	FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH		0.00	0.65	0.03	0.00	0.67
	SUB-312/312 0.01 hrs/unit 2 TOTAL HRS * LINE ITEM ASSEMBLY Factor:2.5000	217.50 SF	0	140	6	0	146
09250.70 - 04	Material Stocking		0.00	0.18	0.11	0.00	0.29
	SUB-111/111 0.003 hrs/unit 4 TOTAL HRS * LINE ITEM ASSEMBLY Factor:17.0000	1,479.00 LBS	0	260	163	0	422
	Subtotal Direct Costs		2,032	2,955	1,414	0	6,401
	Subcontractor Markups		413	545	385	0	1,343
	Prime Contractor Markups		234	256	172	0	662
	TOTAL UM2003441510 UMS_AJ_ST.606 - CONCRETE FOOTING - WALL FOUNDATION	45 HRS	2,679	3,757	1,971	0	8,406
	87.00 LF *Level Unit Cost-->*		*30.79*	*43.18*	*22.65*	*0.00*	*96.62*
	NOTE: DAILY PRODUCTIVITY = 566.93 CY/DAY						
	UM2003491211 RAILINGS *LEVEL CONTRACTOR ID APPLIED--PRIME*						
05521.35 - 00	Stainless Steel Guard Rail, 3 rails, 1-1/2" dia - Union Square Entrance (Ramps)		200.00	20.59	1.32	0.00	221.90
	SUB-511/511 0.306 hrs/unit 98 TOTAL HRS	320.00 lf	64,000	6,587	421	0	71,008
	Subtotal Direct Costs		64,000	6,587	421	0	71,008
	Subcontractor Markups		20,465	1,756	117	0	22,339
	Prime Contractor Markups		8,078	610	52	0	8,740
	TOTAL UM2003491211 RAILINGS	98 HRS	92,544	8,953	590	0	102,086
	320.00 LF *Level Unit Cost-->*		*289.20*	*27.98*	*1.84*	*0.00*	*319.02*
	UM2003491711 COILING GRILLES *LEVEL CONTRACTOR ID APPLIED--PRIME*						
08331.61 - 02	Overhead Coiling Grille (24'x14'h) - Union Square Entrance		11178.08	11093.83	5260.27	0.00	27,532.18
	SUB-821/821 157.71 hrs/unit 158 TOTAL HRS	1.00 ea	11,178	11,094	5,260	0	27,532
	Subtotal Direct Costs		11,178	11,094	5,260	0	27,532
	Subcontractor Markups		3,806	3,219	1,635	0	8,660
	Prime Contractor Markups		1,433	1,046	659	0	3,139
	TOTAL UM2003491711 COILING GRILLES	158 HRS	16,418	15,360	7,554	0	39,331
	UM2003492011 CEILING FINISHES *LEVEL CONTRACTOR ID APPLIED--PRIME*						
09590.01 - 01	Suspended Aluminum Acoustical Ceiling System		10.00	2.37	0.17	0.00	12.54
	SUB-911/911 0.035 hrs/unit 25 TOTAL HRS	700.00 sf	7,000	1,656	119	0	8,775

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
UM2003 UNDERGROUND STATION, STOP, SHELTER, MALL, TE							
UM2003492011 CEILING FINISHES	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
	Subtotal Direct Costs		7,000	1,656	119	0	8,775
	Subcontractor Markups		2,086	397	31	0	2,515
	Prime Contractor Markups		869	150	14	0	1,033
TOTAL UM2003492011 CEILING FINISHES		25 HRS	9,955	2,204	165	0	12,323
700.00 SF	*Level Unit Cost-->*		*14.22*	*3.15*	*0.24*	*0.00*	*17.60*
UM2003492111 FLOOR FINISHES	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
09600.01 - 00 Terrazzo Flooring			15.53	15.40	7.31	0.00	38.23
SUB-421/421 0.22 hrs/unit	88 TOTAL HRS	400.00 sf	6,210	6,159	2,922	0	15,291
	Subtotal Direct Costs		6,210	6,159	2,922	0	15,291
	Subcontractor Markups		2,091	1,709	888	0	4,688
	Prime Contractor Markups		794	575	364	0	1,734
TOTAL UM2003492111 FLOOR FINISHES		88 HRS	9,095	8,443	4,175	0	21,713
400.00 SF	*Level Unit Cost-->*		*22.74*	*21.11*	*10.44*	*0.00*	*54.28*
UM2003492611 CONCRETE PAVEMENT	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
32131.32 - 31 Exterior Concrete Ramps			10.00	1.71	0.11	0.00	11.83
SUB-211/211 0.024 hrs/unit	24 TOTAL HRS	1,000.00 sf	10,000	1,712	114	0	11,826
	Subtotal Direct Costs		10,000	1,712	114	0	11,826
	Subcontractor Markups		3,369	479	34	0	3,882
	Prime Contractor Markups		1,279	160	14	0	1,453
TOTAL UM2003492611 CONCRETE PAVEMENT		24 HRS	14,648	2,351	162	0	17,160
1,000.00 SF	*Level Unit Cost-->*		*14.65*	*2.35*	*0.16*	*0.00*	*17.16*
UM2003492711 PLANTS & TURF	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
32934.31 - 01 Reconstruct Terraced Planting Area - Union Square Entrance			29109.59	28874.83	13698.63	0.00	71,683.05
SUB-211/211 404.85 hrs/unit	405 TOTAL HRS	1.00 ls	29,110	28,875	13,699	0	71,683
32934.31 - 01 Plants - Lawn / Palm Tree - Union Square Entrance			9703.20	9624.94	4566.21	0.00	23,894.35
SUB-211/211 134.95 hrs/unit	135 TOTAL HRS	1.00 ls	9,703	9,625	4,566	0	23,894
	Subtotal Direct Costs		38,813	38,500	18,265	0	95,577
	Subcontractor Markups		13,077	10,766	5,415	0	29,257
	Prime Contractor Markups		4,963	3,602	2,265	0	10,829
TOTAL UM2003492711 PLANTS & TURF		540 HRS	56,852	52,867	25,945	0	135,664
UM2003493211 UMS_05_AR.863 - Exterior Glazed Curtain Wall	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 135.021 SF/DAY							
08441.31 - 00 Glazed Aluminum Curtain Wall			29.11	28.90	13.70	0.00	71.71
SUB-824/824 0.474 hrs/unit	663 TOTAL HRS	1,400.00 sf	40,753	40,465	19,178	0	100,396
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		40,753	40,465	19,178	0	100,396
	Subcontractor Markups		14,004	11,698	5,989	0	31,691
	Prime Contractor Markups		5,237	3,813	2,407	0	11,457
TOTAL UM2003493211 UMS_05_AR.863 - Exterior Glazed Curtain Wall		663 HRS	59,994	55,976	27,574	0	143,545
1,400.00 SF	*Level Unit Cost-->*		*42.85*	*39.98*	*19.70*	*0.00*	*102.53*
NOTE: DAILY PRODUCTIVITY = 135.021 SF/DAY							
UM2003493212 UMS_A_AR.332 - Glazed Canopy Cover	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 202.532 SF/DAY							
10731.60 - 00 Canopy - Glazing over Structural Steel Fame - Union Square Entrance			19.41	19.27	9.13	0.00	47.81
SUB-824/824 0.316 hrs/unit	351 TOTAL HRS	1,111.00 sf	21,561	21,408	10,146	0	53,115
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		21,561	21,408	10,146	0	53,115
	Subcontractor Markups		7,409	6,189	3,169	0	16,766
	Prime Contractor Markups		2,771	2,017	1,273	0	6,061
TOTAL UM2003493212 UMS_A_AR.332 - Glazed Canopy Cover		351 HRS	31,740	29,614	14,588	0	75,942
1,111.00 SF	*Level Unit Cost-->*		*28.57*	*26.66*	*13.13*	*0.00*	*68.35*
NOTE: DAILY PRODUCTIVITY = 202.532 SF/DAY							
UM2003493213 UMS_02_AR.862 - Glazing	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 155.72 SF/DAY							
08800.00 - 00 GLAZING			25.23	25.07	11.87	0.00	62.17
SUB-824/824 0.411 hrs/unit	37 TOTAL HRS	90.00 sf	2,271	2,257	1,068	0	5,596
* LINE ITEM ASSEMBLY	Factor:1.0000						

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
UM2003 UNDERGROUND STATION, STOP, SHELTER, MALL, TE							
UM2003493213 UMS_02_AR.862 - Glazing	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 155.72 SF/DAY							
	Subtotal Direct Costs		2,271	2,257	1,068	0	5,596
	Subcontractor Markups		780	652	334	0	1,766
	Prime Contractor Markups		292	213	134	0	639
	TOTAL UM2003493213 UMS_02_AR.862 - Glazing	37 HRS	3,343	3,121	1,536	0	8,000
	90.00 SF	*Level Unit Cost-->*	*37.14*	*34.68*	*17.07*	*0.00*	*88.89*
NOTE: DAILY PRODUCTIVITY = 155.72 SF/DAY							
UM2003493411 UMS_AC_AR.851 - Station Emergency Vent Grate Cover	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 685.71 SF/DAY							
05531.95 - 00	Metal Grating - Union Square Entrance		24.50	9.45	0.60	0.00	34.56
	SUB-511/511 0.14 hrs/unit 45 TOTAL HRS	320.00 sf	7,840	3,025	194	0	11,059
	* LINE ITEM ASSEMBLY Factor:1.0000						
	Subtotal Direct Costs		7,840	3,025	194	0	11,059
	Subcontractor Markups		2,507	806	54	0	3,367
	Prime Contractor Markups		990	280	24	0	1,293
	TOTAL UM2003493411 UMS_AC_AR.851 - Station Emergency Vent	45 HRS	11,337	4,111	271	0	15,720
	Grate Cover		*35.43*	*12.85*	*0.85*	*0.00*	*49.12*
	320.00 SF	*Level Unit Cost-->*					
NOTE: DAILY PRODUCTIVITY = 685.71 SF/DAY							
UM2003493412 UMS_03_AR.863 - Louvers	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 454.98 SF/DAY							
08911.91 - 00	Louvers in Curtain Wall (6'H x 4'W, typ) - Union Square Entrance		14.36	14.24	6.76	0.00	35.36
	SUB-911/911 0.211 hrs/unit 10 TOTAL HRS	47.00 sf	675	669	318	0	1,662
	* LINE ITEM ASSEMBLY Factor:1.0000						
	Subtotal Direct Costs		675	669	318	0	1,662
	Subcontractor Markups		201	161	83	0	445
	Prime Contractor Markups		84	61	38	0	183
	TOTAL UM2003493412 UMS_03_AR.863 - Louvers	10 HRS	960	891	439	0	2,290
	47.00 SF	*Level Unit Cost-->*	*20.42*	*18.95*	*9.35*	*0.00*	*48.72*
NOTE: DAILY PRODUCTIVITY = 454.98 SF/DAY							
UM2003493611 UMS_AB_AR.851 - Metal Roof Cover	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 503.14 SF/DAY							
07411.32 - 00	Standing Seam Roofing - Union Square Entrance Elevator		9.70	9.38	4.57	0.00	23.64
	SUB-711/711 0.159 hrs/unit 48 TOTAL HRS	302.00 sf	2,930	2,831	1,379	0	7,141
	* LINE ITEM ASSEMBLY Factor:1.0000						
	Subtotal Direct Costs		2,930	2,831	1,379	0	7,141
	Subcontractor Markups		950	766	404	0	2,120
	Prime Contractor Markups		371	263	171	0	805
	TOTAL UM2003493611 UMS_AB_AR.851 - Metal Roof Cover	48 HRS	4,252	3,860	1,954	0	10,066
	302.00 SF	*Level Unit Cost-->*	*14.08*	*12.78*	*6.47*	*0.00*	*33.33*
NOTE: DAILY PRODUCTIVITY = 503.14 SF/DAY							
UM2003502311 SPECIAL COATINGS	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
09962.30 - 01	Graffiti Resistant Coating		0.48	0.48	0.23	0.00	1.20
	SUB-991/991 0.008 hrs/unit 71 TOTAL HRS	9,000.00 sf	4,366	4,344	2,055	0	10,765
	* LINE ITEM ASSEMBLY Factor:1.0000						
	Subtotal Direct Costs		4,366	4,344	2,055	0	10,765
	Subcontractor Markups		1,386	1,149	582	0	3,116
	Prime Contractor Markups		550	402	252	0	1,204
	TOTAL UM2003502311 SPECIAL COATINGS	71 HRS	6,303	5,894	2,889	0	15,085
	9,000.00 SF	*Level Unit Cost-->*	*0.70*	*0.65*	*0.32*	*0.00*	*1.68*
UM2003503011 UMS_01AB_AR.803 - 1.5 HR Rated Fire Door 3070	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 7.465 EA/DAY							
08131.31 - 33	SINGLE METAL DOOR, HM PAINTED (INCL HARDWARE & HM FRAME) 3'-0"X7'-0"		531.74	527.71	250.23	0.00	1,309.68
	SUB-821/821 7.502 hrs/unit 23 TOTAL HRS	3.00 ea	1,595	1,583	751	0	3,929
	* LINE ITEM ASSEMBLY Factor:1.0000						

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
UM2003	**UNDERGROUND STATION, STOP, SHELTER, MALL, TE**						
	UM2003503011 UMS_01AB_AR.803 - 1.5 HR Rated Fire Door 3070 *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 7.465 EA/DAY						
	Subtotal Direct Costs		1,595	1,583	751	0	3,929
	Subcontractor Markups		543	459	233	0	1,236
	Prime Contractor Markups		205	149	94	0	448
	TOTAL UM2003503011 UMS_01AB_AR.803 - 1.5 HR Rated Fire Door 3070	23 HRS	2,343	2,192	1,078	0	5,613
	3.00 EA Level Unit Cost-->		*780.98*	*730.62*	*359.36*	*0.00*	*1,870.96*
	NOTE: DAILY PRODUCTIVITY = 7.465 EA/DAY						
	UM2003503411 UMS_01AM_AR.801 - Concrete with Sealer Floor Finish *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 36000 SF/DAY						
09600.01 - 01	Concrete Floor Sealer		0.25	0.12	0.01	0.00	0.37
	SUB-312/312 0.002 hrs/unit 6 TOTAL HRS	3,064.00 sf	767	355	17	0	1,138
	* LINE ITEM ASSEMBLY Factor:1.0000						
	Subtotal Direct Costs		767	355	17	0	1,138
	Prime Contractor Markups		73	26	2	0	101
	TOTAL UM2003503411 UMS_01AM_AR.801 - Concrete with Sealer Floor Finish	6 HRS	840	381	18	0	1,239
	3,064.00 SF Level Unit Cost-->		*0.27*	*0.12*	*0.01*	*0.00*	*0.40*
	NOTE: DAILY PRODUCTIVITY = 36000 SF/DAY						
	UM2003503415 Terrazzo Finish (not shown on drawings) *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 254.545 SF/DAY						
09600.01 - 01	EPOXY-RESIN TERRAZZO FLOOR		15.53	15.39	7.31	0.00	38.23
	SUB-421/421 0.22 hrs/unit 1100 TOTAL HRS	5,000.00 sf	77,650	76,961	36,550	0	191,161
	* LINE ITEM ASSEMBLY Factor:1.0000						
09420.90 - 00	PRECAST TERRAZZO/BASE/COVE/6" H		12.15	10.70	0.75	0.00	23.60
	SUB-421/421 0.153 hrs/unit 38 TOTAL HRS	250.00 LF	3,038	2,675	187	0	5,900
	* LINE ITEM ASSEMBLY Factor:0.0500						
	Subtotal Direct Costs		80,688	79,636	36,737	0	197,061
	Subcontractor Markups		27,169	22,101	11,160	0	60,430
	Prime Contractor Markups		10,315	7,437	4,581	0	22,334
	TOTAL UM2003503415 Terrazzo Finish (not shown on drawings)	1,138 HRS	118,172	109,174	52,478	0	279,824
	5,000.00 SF Level Unit Cost-->		*23.63*	*21.83*	*10.50*	*0.00*	*55.96*
	NOTE: DAILY PRODUCTIVITY = 254.545 SF/DAY						
	UM2003503611 UMS_01AC_AR.801 - Paint Ceiling Finish *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 13714.29 SF/DAY						
05950.65 - 06	PAINTS & PROTECTIVE COTGS/EPOXY ENAMEL/SPRAYED		0.38	0.47	0.06	0.00	0.90
	SUB-511/511 0.007 hrs/unit 21 TOTAL HRS	3,064.00 SF	1,164	1,423	180	0	2,768
	* LINE ITEM ASSEMBLY Factor:1.0000						
	Subtotal Direct Costs		1,164	1,423	180	0	2,768
	Subcontractor Markups		372	379	50	0	802
	Prime Contractor Markups		147	132	22	0	301
	TOTAL UM2003503611 UMS_01AC_AR.801 - Paint Ceiling Finish	21 HRS	1,684	1,935	253	0	3,871
	3,064.00 SF Level Unit Cost-->		*0.55*	*0.63*	*0.08*	*0.00*	*1.26*
	NOTE: DAILY PRODUCTIVITY = 13714.29 SF/DAY						
	UM2003503614 UMS_AA_AR.621 - Linear Metal Ceiling Finish *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 375 SF/DAY						
09590.01 - 01	METAL CEILING PANELS		17.47	17.31	8.22	0.00	43.00
	SUB-911/911 0.256 hrs/unit 1280 TOTAL HRS	5,000.00 sf	87,350	86,536	41,100	0	214,986
	* LINE ITEM ASSEMBLY Factor:1.0000						
09590.01 - 01	CEILING SUSPENSION SYSTEM		5.82	5.75	2.74	0.00	14.31
	SUB-911/911 0.085 hrs/unit 425 TOTAL HRS	5,000.00 sf	29,100	28,733	13,700	0	71,533
	* LINE ITEM ASSEMBLY Factor:1.0000						
	Subtotal Direct Costs		116,450	115,269	54,800	0	286,519
	Subcontractor Markups		34,700	27,660	14,385	0	76,744
	Prime Contractor Markups		14,456	10,449	6,617	0	31,522
	TOTAL UM2003503614 UMS_AA_AR.621 - Linear Metal Ceiling Finish	1,705 HRS	165,606	153,377	75,801	0	394,785
	5,000.00 SF Level Unit Cost-->		*33.12*	*30.68*	*15.16*	*0.00*	*78.96*
	NOTE: DAILY PRODUCTIVITY = 375 SF/DAY						
	UM2003504211 UMS_AA_AR.122 - Arch. Modular Panel Wall Finish *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 268.16 SF/DAY						
09770.01 - 01	Architectural Modular Panel Wall Finish System		36.89	24.20	10.89	0.00	71.98

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
UM2003 UNDERGROUND STATION, STOP, SHELTER, MALL, TE							
UM2003504211 UMS_AA_AR.122 - Arch. Modular Panel Wall Finish	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 268.16 SF/DAY							
SUB-911/911	0.358 hrs/unit 537 TOTAL HRS	1,500.00 sf	55,335	36,305	16,335	0	107,975
* LINE ITEM ASSEMBLY	Factor:1.0000						
Subtotal Direct Costs			55,335	36,305	16,335	0	107,975
Subcontractor Markups			16,489	8,712	4,288	0	29,488
Prime Contractor Markups			6,869	3,291	1,972	0	12,133
TOTAL UM2003504211 UMS_AA_AR.122 - Arch. Modular Panel Wall Finish		537 HRS	78,693	48,307	22,595	0	149,595
1,500.00 SF	*Level Unit Cost-->*		*52.46*	*32.20*	*15.06*	*0.00*	*99.73*
NOTE: DAILY PRODUCTIVITY = 268.16 SF/DAY							
UM2003504212 UMS_01AE_AR.801 - Concrete Paint Wall Finish	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 13714.29 SF/DAY							
05950.65 - 06 PAINTS & PROTECTIVE COTGS/EPOXY ENAMEL/SPRAYED			0.38	0.47	0.06	0.00	0.90
SUB-511/511	0.007 hrs/unit 18 TOTAL HRS	2,560.00 SF	973	1,189	151	0	2,313
* LINE ITEM ASSEMBLY	Factor:1.0000						
Subtotal Direct Costs			973	1,189	151	0	2,313
Subcontractor Markups			311	317	42	0	670
Prime Contractor Markups			123	110	18	0	251
TOTAL UM2003504212 UMS_01AE_AR.801 - Concrete Paint Wall Finish		18 HRS	1,407	1,616	211	0	3,234
2,560.00 SF	*Level Unit Cost-->*		*0.55*	*0.63*	*0.08*	*0.00*	*1.26*
NOTE: DAILY PRODUCTIVITY = 13714.29 SF/DAY							
UM2003504413 UMS_01AJ_AR.121 - 10IN CMU WALL 3HR	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 746.67 SF/DAY							
04221.03 - 45 CMU 10" THK, CONCRETE FILLED, REINFORCED			9.52	10.33	1.45	0.00	21.30
SUB-422/422	0.15 hrs/unit 143 TOTAL HRS	955.00 sf	9,092	9,864	1,385	0	20,340
* LINE ITEM ASSEMBLY	Factor:1.0000						
07812.60 - 02 SPRAYED CEMITIOUS FIRPRFNG/VERMICULITE CEM/TROWELED OR SPRAYED/1/2"THK			2.60	0.84	0.07	0.00	3.51
SUB-991/991	0.014 hrs/unit 13 TOTAL HRS	955.00 SF	2,483	807	62	0	3,352
* LINE ITEM ASSEMBLY	Factor:1.0000						
01101.01 - 08 SCAFFOLDING "COST PER SF "			1.15	0.88	0.41	0.00	2.44
SUB-221/221	0.013 hrs/unit 12 TOTAL HRS	955.00 SF	1,098	839	391	0	2,328
* LINE ITEM ASSEMBLY	Factor:1.0000						
09250.70 - 04 MATERIAL STOCKING			0.00	0.44	0.11	0.00	0.55
SUB-111/111	0.007 hrs/unit 7 TOTAL HRS	955.00 SF	0	418	105	0	523
* LINE ITEM ASSEMBLY	Factor:1.0000						
Subtotal Direct Costs			12,673	11,928	1,942	0	26,543
Subcontractor Markups			4,044	3,172	546	0	7,762
Prime Contractor Markups			1,599	1,104	238	0	2,941
TOTAL UM2003504413 UMS_01AJ_AR.121 - 10IN CMU WALL 3HR		176 HRS	18,315	16,204	2,726	0	37,246
955.00 SF	*Level Unit Cost-->*		*19.18*	*16.97*	*2.85*	*0.00*	*39.00*
NOTE: DAILY PRODUCTIVITY = 746.67 SF/DAY							
UM2003504414 UMS_01AF_AR.121 - 12IN CMU WALL 2HR	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 687.117 SF/DAY							
04221.03 - 45 CMU 12" THK, CONCRETE FILLED, REINFORCED			11.64	11.22	1.75	0.00	24.61
SUB-422/422	0.163 hrs/unit 175 TOTAL HRS	1,075.00 sf	12,513	12,065	1,881	0	26,460
* LINE ITEM ASSEMBLY	Factor:1.0000						
07812.60 - 02 SPRAYED CEMITIOUS FIRPRFNG/VERMICULITE CEM/TROWELED OR SPRAYED/1/4"THK			1.31	0.56	0.04	0.00	1.92
SUB-991/991	0.009 hrs/unit 10 TOTAL HRS	1,075.00 SF	1,408	606	46	0	2,060
* LINE ITEM ASSEMBLY	Factor:1.0000						
01101.01 - 08 SCAFFOLDING "COST PER SF "			1.15	0.88	0.41	0.00	2.44
SUB-221/221	0.013 hrs/unit 14 TOTAL HRS	1,075.00 SF	1,236	945	440	0	2,621
* LINE ITEM ASSEMBLY	Factor:1.0000						
09250.70 - 04 MATERIAL STOCKING			0.00	0.44	0.11	0.00	0.55
SUB-111/111	0.007 hrs/unit 8 TOTAL HRS	1,075.00 SF	0	471	118	0	589
* LINE ITEM ASSEMBLY	Factor:1.0000						
Subtotal Direct Costs			15,158	14,086	2,486	0	31,729
Subcontractor Markups			4,840	3,747	698	0	9,286
Prime Contractor Markups			1,913	1,304	305	0	3,521
TOTAL UM2003504414 UMS_01AF_AR.121 - 12IN CMU WALL 2HR		207 HRS	21,910	19,137	3,488	0	44,536
1,075.00 SF	*Level Unit Cost-->*		*20.38*	*17.80*	*3.24*	*0.00*	*41.43*
NOTE: DAILY PRODUCTIVITY = 687.117 SF/DAY							

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
UM2003 UNDERGROUND STATION, STOP, SHELTER, MALL, TE							
UM2003512011 UMS_01AM_AR.801 - Concrete with Sealer Floor Finish	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 36000 SF/DAY							
09600.01 - 01	Concrete Floor Sealer		0.25	0.12	0.01	0.00	0.37
SUB-312/312	0.002 hrs/unit 15 TOTAL HRS	8,064.00 sf	2,018	934	44	0	2,996
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		2,018	934	44	0	2,996
	Prime Contractor Markups		193	68	4	0	266
TOTAL UM2003512011 UMS_01AM_AR.801 - Concrete with Sealer Floor Finish		15 HRS	2,211	1,003	48	0	3,262
			0.27	*0.12*	*0.01*	*0.00*	*0.40*
	8,064.00 SF	*Level Unit Cost-->*					
NOTE: DAILY PRODUCTIVITY = 36000 SF/DAY							
UM2003512211 UMS_01AC_AR.801 - Paint Ceiling Finish	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 13714.286 SF/DAY							
05950.65 - 06	PAINTS & PROTECTIVE COTGS/EPOXY ENAMEL/SPRAYED		0.38	0.47	0.06	0.00	0.90
SUB-511/511	0.007 hrs/unit 56 TOTAL HRS	8,064.00 SF	3,064	3,746	475	0	7,285
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		3,064	3,746	475	0	7,285
	Subcontractor Markups		980	998	132	0	2,111
	Prime Contractor Markups		387	347	58	0	792
TOTAL UM2003512211 UMS_01AC_AR.801 - Paint Ceiling Finish		56 HRS	4,431	5,091	665	0	10,188
	8,064.00 SF	*Level Unit Cost-->*	*0.55*	*0.63*	*0.08*	*0.00*	*1.26*
NOTE: DAILY PRODUCTIVITY = 13714.286 SF/DAY							
UM2003512413 UMS_01AC_AR.121 - 8IN CMU WALL 2HR	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 541.063 SF/DAY							
04221.03 - 46	CMU 8" THK, CONCRETE FILLED, REINFORCED - 2 HOUR RATED		7.88	14.28	1.32	0.00	23.48
SUB-422/422	0.207 hrs/unit 593 TOTAL HRS	2,860.00 SF	22,537	40,831	3,775	0	67,143
* LINE ITEM ASSEMBLY	Factor:1.0000						
01101.01 - 08	SCAFFOLDING "COST PER SF "		1.15	0.88	0.41	0.00	2.44
SUB-221/221	0.013 hrs/unit 36 TOTAL HRS	2,860.00 SF	3,289	2,514	1,170	0	6,973
* LINE ITEM ASSEMBLY	Factor:1.0000						
09250.70 - 04	MATERIAL STOCKING		0.00	0.44	0.11	0.00	0.55
SUB-111/111	0.007 hrs/unit 21 TOTAL HRS	2,860.00 SF	0	1,252	315	0	1,566
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		25,826	44,597	5,260	0	75,682
	Subcontractor Markups		8,249	11,871	1,480	0	21,600
	Prime Contractor Markups		3,259	4,128	645	0	8,032
TOTAL UM2003512413 UMS_01AC_AR.121 - 8IN CMU WALL 2HR		651 HRS	37,334	60,596	7,384	0	105,314
	2,860.00 SF	*Level Unit Cost-->*	*13.05*	*21.19*	*2.58*	*0.00*	*36.82*
NOTE: DAILY PRODUCTIVITY = 541.063 SF/DAY							
UM2003512611 UMS_01AE_AR.801 - Concrete Paint Wall Finish	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 13714.29 SF/DAY							
05950.65 - 06	PAINTS & PROTECTIVE COTGS/EPOXY ENAMEL/SPRAYED		0.38	0.47	0.06	0.00	0.90
SUB-511/511	0.007 hrs/unit 14 TOTAL HRS	2,080.00 SF	790	966	122	0	1,879
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		790	966	122	0	1,879
	Subcontractor Markups		253	258	34	0	544
	Prime Contractor Markups		100	89	15	0	204
TOTAL UM2003512611 UMS_01AE_AR.801 - Concrete Paint Wall Finish		14 HRS	1,143	1,313	172	0	2,628
			0.55	*0.63*	*0.08*	*0.00*	*1.26*
	2,080.00 SF	*Level Unit Cost-->*					
NOTE: DAILY PRODUCTIVITY = 13714.29 SF/DAY							
UM2003582011 UMS_01AD_AR.121 - 7.5FT Precast Stairs 01	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 83.69 RISR/DAY							
03412.35 - 00	Precast Concrete Stairs, 7'-6" wide		500.00	81.84	5.35	0.00	587.20
SUB-313/313	1.147 hrs/unit 52 TOTAL HRS	45.00 risr	22,500	3,683	241	0	26,424
05513.35 - 00	Stair Nosing		2.08	2.06	0.98	0.00	5.12
SUB-421/421	0.029 hrs/unit 10 TOTAL HRS	337.50 lf	702	696	330	0	1,729
05511.35 - 00	STAIR LANDING		92.00	9.56	0.61	0.00	102.17
SUB-511/511	0.142 hrs/unit 9 TOTAL HRS	65.00 sf	5,980	621	40	0	6,641

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
		DAILY PRODUCTIVITY = 83.69 RISR/DAY							
		Subtotal Direct Costs			29,182	5,001	611	0	34,794
		Subcontractor Markups			2,149	359	111	0	2,619
		Prime Contractor Markups			2,996	392	69	0	3,457
		TOTAL UM2003582011 UMS_01AD_AR.121 - 7.5FT Precast Stairs 01	71	HRS	34,327	5,751	791	0	40,870
		45.00 RISR *Level Unit Cost-->*			*762.83*	*127.81*	*17.59*	*0.00*	*908.22*
		NOTE: DAILY PRODUCTIVITY = 83.69 RISR/DAY							
		UM2003582013 UMS_01AB_AR.123 - 6.5FT Precast Stairs 06 *LEVEL CONTRACTOR ID APPLIED--PRIME*							
		DAILY PRODUCTIVITY = 83.69 RISR/DAY							
03412.35 - 00		Precast Concrete Stairs, 6'-6" wide - Stair 6			450.00	81.84	5.36	0.00	537.20
	SUB-313/313	1.147 hrs/unit 134 TOTAL HRS	117.00	risr	52,650	9,575	627	0	62,852
05513.35 - 00		Stair Nosing			2.08	2.06	0.98	0.00	5.12
	SUB-421/421	0.029 hrs/unit 22 TOTAL HRS	760.50	lf	1,582	1,569	745	0	3,896
05511.35 - 00		STAIR LANDING			92.00	9.56	0.61	0.00	102.17
	SUB-511/511	0.142 hrs/unit 19 TOTAL HRS	132.00	sf	12,144	1,262	81	0	13,486
		Subtotal Direct Costs			66,376	12,406	1,452	0	80,235
		Subcontractor Markups			4,416	772	249	0	5,436
		Prime Contractor Markups			6,771	963	163	0	7,897
		TOTAL UM2003582013 UMS_01AB_AR.123 - 6.5FT Precast Stairs 06	175	HRS	77,562	14,142	1,864	0	93,568
		117.00 RISR *Level Unit Cost-->*			*662.93*	*120.87*	*15.93*	*0.00*	*799.72*
		NOTE: DAILY PRODUCTIVITY = 83.69 RISR/DAY							
		UM2003582215 UMS_01AA_AR.122 - 4FT Elec/Fan Rm Access Stairs *LEVEL CONTRACTOR ID APPLIED--PRIME*							
		DAILY PRODUCTIVITY = 148.377 RISR/DAY							
05511.35 - 00		Pre-engineered Stairs, 4'-0" wide			453.33	43.56	12.80	0.00	509.69
	SUB-511/511	0.647 hrs/unit 10 TOTAL HRS	16.00	risr	7,253	697	205	0	8,155
05513.35 - 00		Stair Nosing			2.08	2.06	0.98	0.00	5.12
	SUB-421/421	0.029 hrs/unit 2 TOTAL HRS	64.00	lf	133	132	63	0	328
05511.35 - 00		Stair Landing			92.00	9.56	0.61	0.00	102.17
	SUB-511/511	0.142 hrs/unit 5 TOTAL HRS	34.00	sf	3,128	325	21	0	3,474
		Subtotal Direct Costs			10,514	1,154	288	0	11,957
		Subcontractor Markups			3,364	309	82	0	3,755
		Prime Contractor Markups			1,327	107	35	0	1,470
		TOTAL UM2003582215 UMS_01AA_AR.122 - 4FT Elec/Fan Rm Access Stairs	17	HRS	15,206	1,570	406	0	17,182
		16.00 RISR *Level Unit Cost-->*			*950.39*	*98.13*	*25.35*	*0.00*	*1,073.87*
		NOTE: DAILY PRODUCTIVITY = 148.377 RISR/DAY							
		UM2003582411 UMS_02_AR.887 - SS Hand Railings, Flr Mtd *LEVEL CONTRACTOR ID APPLIED--PRIME*							
		DAILY PRODUCTIVITY = 313.73 LF/DAY							
05521.35 - 00		Stainless Steel Hand Railings, Center Floor Mounted - Stair 2			200.00	20.59	1.31	0.00	221.90
	SUB-511/511	0.306 hrs/unit 28 TOTAL HRS	93.00	lf	18,600	1,915	122	0	20,636
		* LINE ITEM ASSEMBLY Factor:1.0000							
		Subtotal Direct Costs			18,600	1,915	122	0	20,636
		Subcontractor Markups			5,948	510	34	0	6,492
		Prime Contractor Markups			2,348	177	15	0	2,540
		TOTAL UM2003582411 UMS_02_AR.887 - SS Hand Railings, Flr Mtd	28	HRS	26,895	2,602	170	0	29,668
		93.00 LF *Level Unit Cost-->*			*289.20*	*27.98*	*1.83*	*0.00*	*319.01*
		NOTE: DAILY PRODUCTIVITY = 313.73 LF/DAY							
		UM2003582414 UMS_04_AR.724 - Steel Guardrail with Handrail *LEVEL CONTRACTOR ID APPLIED--PRIME*							
		DAILY PRODUCTIVITY = 313.73 LF/DAY							
05521.35 - 01		Steel Guardrail/Handrail Combination, 3'-6" high, Galvanized / Painted			150.01	20.58	1.30	0.00	171.89
	SUB-511/511	0.306 hrs/unit 39 TOTAL HRS	126.50	lf	18,976	2,604	165	0	21,745
		* LINE ITEM ASSEMBLY Factor:1.0000							
		Subtotal Direct Costs			18,976	2,604	165	0	21,745
		Subcontractor Markups			6,068	694	46	0	6,808
		Prime Contractor Markups			2,395	241	20	0	2,656
		TOTAL UM2003582414 UMS_04_AR.724 - Steel Guardrail with Handrail	39	HRS	27,439	3,539	231	0	31,209
		126.50 LF *Level Unit Cost-->*			*216.91*	*27.97*	*1.83*	*0.00*	*246.71*
		NOTE: DAILY PRODUCTIVITY = 313.73 LF/DAY							
		UM2003582611 UMS_01AE_AR.121 - 7.5FT Precast Stairs 01 Finish *LEVEL CONTRACTOR ID APPLIED--PRIME*							
		DAILY PRODUCTIVITY = 266.67 LF/DAY							
09600.01 - 00		Terrazzo Stair Treads & Risers			100.00	14.70	1.62	0.00	116.32
	SUB-421/421	0.21 hrs/unit 71 TOTAL HRS	337.50	lf	33,750	4,961	545	0	39,256

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
UM2003 UNDERGROUND STATION, STOP, SHELTER, MALL, TE							
UM2003582611 UMS_01AE_AR.121 - 7.5FT Precast Stairs 01 Finish	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 266.67 LF/DAY							
* LINE ITEM ASSEMBLY	Factor:1.0000						
09600.01 - 00	Terrazzo Stair Landing		91.99	6.89	0.75	0.00	99.63
SUB-421/421	0.098 hrs/unit 6 TOTAL HRS	65.00 sf	5,980	448	49	0	6,476
	Subtotal Direct Costs		39,730	5,409	594	0	45,733
	Subcontractor Markups		13,378	1,501	180	0	15,059
	Prime Contractor Markups		5,079	505	74	0	5,658
TOTAL UM2003582611 UMS_01AE_AR.121 - 7.5FT Precast Stairs 01 Finish		77 HRS	58,187	7,415	848	0	66,450
			172.41	*21.97*	*2.51*	*0.00*	*196.89*
337.50 LF	*Level Unit Cost-->*						
NOTE: DAILY PRODUCTIVITY = 266.67 LF/DAY							
UM2003582613 UMS_01AC_AR.123 - 6.5FT Precast Stairs 06 Finish	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 266.67 LF/DAY							
09600.01 - 00	Terrazzo Stair Treads & Risers		100.00	14.70	1.62	0.00	116.32
SUB-421/421	0.21 hrs/unit 160 TOTAL HRS	760.50 lf	76,051	11,178	1,228	0	88,458
* LINE ITEM ASSEMBLY	Factor:1.0000						
09600.01 - 00	Terrazzo Stair Landing		91.99	6.89	0.75	0.00	99.63
SUB-421/421	0.098 hrs/unit 13 TOTAL HRS	132.00 sf	12,143	909	99	0	13,152
	Subtotal Direct Costs		88,194	12,088	1,328	0	101,609
	Subcontractor Markups		29,697	3,355	403	0	33,455
	Prime Contractor Markups		11,275	1,129	166	0	12,570
TOTAL UM2003582613 UMS_01AC_AR.123 - 6.5FT Precast Stairs 06 Finish		173 HRS	129,166	16,571	1,896	0	147,633
			169.84	*21.79*	*2.49*	*0.00*	*194.13*
760.50 LF	*Level Unit Cost-->*						
NOTE: DAILY PRODUCTIVITY = 266.67 LF/DAY							
UM2003720111 FIRE SUPPRESSION SYSTEM	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
PRODUCTIVITY = 0.020 MH/SF							
21000.01 - 01	Fire Protection (Sprinkler System)		1.75	1.73	0.82	0.00	4.30
SUB-154/154	0.02 hrs/unit 324 TOTAL HRS	16,128.00 SF	28,169	27,882	13,256	0	69,307
	Subtotal Direct Costs		28,169	27,882	13,256	0	69,307
	Subcontractor Markups		9,815	8,167	4,071	0	22,052
	Prime Contractor Markups		3,633	2,635	1,657	0	7,925
TOTAL UM2003720111 FIRE SUPPRESSION SYSTEM		324 HRS	41,616	38,684	18,984	0	99,284
42,751.00 SF	*Level Unit Cost-->*		*0.97*	*0.90*	*0.44*	*0.00*	*2.32*
NOTE: PRODUCTIVITY = 0.020 MH/SF							
UM2003740111 HVAC	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
PRODUCTIVITY = 0.067 MH/LB							
23000.01 - 02	HVAC Duct Lining		6.00	5.68	0.16	0.00	11.84
SUB-151/151	0.074 hrs/unit 15 TOTAL HRS	200.00 SF	1,200	1,136	33	0	2,369
23000.01 - 03	HVAC Ductwork Furnish & Install		0.50	5.83	0.16	0.00	6.49
SUB-152/152	0.067 hrs/unit 229 TOTAL HRS	3,400.00 LB	1,702	19,822	559	0	22,082
	Subtotal Direct Costs		2,902	20,958	592	0	24,451
	Subcontractor Markups		519	5,029	148	0	5,697
	Prime Contractor Markups		327	1,900	71	0	2,298
TOTAL UM2003740111 HVAC		244 HRS	3,748	27,887	810	0	32,446
3,400.00 LB	*Level Unit Cost-->*		*1.10*	*8.20*	*0.24*	*0.00*	*9.54*
NOTE: PRODUCTIVITY = 0.067 MH/LB							
UM2003740112 REFRIGERANT PIPING	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
PRODUCTIVITY = 0.231 MH/LF							
23230.00 - 01	Type J Tubing 2", Ftgs & Hangers		25.00	20.93	1.36	0.00	47.28
SUB-153/153	0.227 hrs/unit 43 TOTAL HRS	190.00 LF	4,750	3,976	258	0	8,984
	Subtotal Direct Costs		4,750	3,976	258	0	8,984
	Subcontractor Markups		1,476	985	70	0	2,531
	Prime Contractor Markups		595	363	31	0	989
TOTAL UM2003740112 REFRIGERANT PIPING		43 HRS	6,821	5,324	359	0	12,504
190.00 LF	*Level Unit Cost-->*		*35.90*	*28.02*	*1.89*	*0.00*	*65.81*
NOTE: PRODUCTIVITY = 0.231 MH/LF							
UM2003740113 DAMPERS	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
PRODUCTIVITY = 13.404 MH/EA							
23331.30 - 00	Volume Control Dampers		200.00	272.84	7.69	0.00	480.54
SUB-152/152	3.155 hrs/unit 35 TOTAL HRS	11.00 EA	2,200	3,001	85	0	5,286

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
UM2003	**UNDERGROUND STATION, STOP, SHELTER, MALL, TE**						
UM2003740113	DAMPERS *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	PRODUCTIVITY = 13.404 MH/EA						
	Subtotal Direct Costs		2,200	3,001	85	0	5,286
	Subcontractor Markups		672	761	22	0	1,455
	Prime Contractor Markups		275	275	10	0	560
	TOTAL UM2003740113 DAMPERS	35 HRS	3,146	4,038	117	0	7,301
	11.00 EA	*Level Unit Cost-->*	*286.02*	*367.08*	*10.66*	*0.00*	*663.76*
	NOTE: PRODUCTIVITY = 13.404 MH/EA						
UM2003740115	DIFFUSERS, REGISTERS, AND GRILLES *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	PRODUCTIVITY = 0.749 MH/EA						
23371.30 - 00	CEILING SUPPLY DIFFUSER, 24"X24"		165.30	84.14	6.39	0.00	255.83
	SUB-152/152 0.973 hrs/unit 1 TOTAL HRS	1.00 EA	165	84	6	0	256
23371.30 - 01	CEILING EXHAUST REGISTER, 24"X24"		180.82	68.75	4.57	0.00	254.14
	SUB-152/152 0.795 hrs/unit 1 TOTAL HRS	1.00 EA	181	69	5	0	254
23371.30 - 02	WALL EXHAUST REGISTER, 16"X16"		85.96	44.53	3.20	0.00	133.70
	SUB-152/152 0.515 hrs/unit 1 TOTAL HRS	2.00 EA	172	89	6	0	267
23371.30 - 02	WALL SUPPLY REGISTER, 16"X16"		85.96	44.53	3.20	0.00	133.70
	SUB-152/152 0.515 hrs/unit 1 TOTAL HRS	2.00 EA	172	89	6	0	267
23371.30 - 00	CEILING SUPPLY DIFFUSER, 15"X15"		130.98	68.66	4.96	0.00	204.60
	SUB-152/152 0.794 hrs/unit 1 TOTAL HRS	1.00 EA	131	69	5	0	205
	Subtotal Direct Costs		821	400	29	0	1,249
	Subcontractor Markups		251	101	8	0	360
	Prime Contractor Markups		102	37	3	0	143
	TOTAL UM2003740115 DIFFUSERS, REGISTERS, AND GRILLES	5 HRS	1,174	538	40	0	1,752
	7.00 EA	*Level Unit Cost-->*	*167.72*	*76.82*	*5.69*	*0.00*	*250.22*
	NOTE: PRODUCTIVITY = 0.749 MH/EA						
UM2003740116	FAN COIL UNITS *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	PRODUCTIVITY = 6.752 MH/EA						
23821.90 - 04	Fan Coil, 3/4-ton		1450.05	222.14	6.30	0.00	1,678.49
	SUB-152/152 2.569 hrs/unit 3 TOTAL HRS	1.00 EA	1,450	222	6	0	1,678
	Subtotal Direct Costs		1,450	222	6	0	1,678
	Subcontractor Markups		443	56	2	0	501
	Prime Contractor Markups		181	20	1	0	202
	TOTAL UM2003740116 FAN COIL UNITS	3 HRS	2,074	299	9	0	2,381
	NOTE: PRODUCTIVITY = 6.752 MH/EA						
UM2003760111	WIRE & CABLES *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	PRODUCTIVITY = 0.009 MH/LF						
26051.99 - 03	Wire, copper 600 volt, #12 XHHW		0.24	0.80	0.06	0.00	1.10
	SUB-161/161 0.009 hrs/unit 57 TOTAL HRS	6,250.00 LF	1,501	5,026	360	0	6,887
	* LINE ITEM ASSEMBLY Factor:1.0000						
	Subtotal Direct Costs		1,501	5,026	360	0	6,887
	Subcontractor Markups		518	1,447	110	0	2,075
	Prime Contractor Markups		193	473	45	0	711
	TOTAL UM2003760111 WIRE & CABLES	57 HRS	2,213	6,946	515	0	9,673
	6,250.00 LF	*Level Unit Cost-->*	*0.35*	*1.11*	*0.08*	*0.00*	*1.55*
	NOTE: PRODUCTIVITY = 0.009 MH/LF						
UM2003760112	CONDUITS & SUPPORTS *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	PRODUCTIVITY = 0.131 MH/LF						
26053.30 - 51	GRS Conduit 3/4" incl Fittings		3.15	10.88	0.78	0.00	14.81
	SUB-161/161 0.123 hrs/unit 253 TOTAL HRS	2,050.00 LF	6,457	22,303	1,597	0	30,357
26053.30 - 51	GRS Conduit 1-1/2", incl Fittings (Ltg)		6.88	16.81	1.20	0.00	24.90
	SUB-161/161 0.19 hrs/unit 152 TOTAL HRS	800.00 LF	5,504	13,449	963	0	19,916
	Subtotal Direct Costs		11,961	35,751	2,561	0	50,273
	Subcontractor Markups		4,129	10,295	780	0	15,204
	Prime Contractor Markups		1,539	3,366	319	0	5,225
	TOTAL UM2003760112 CONDUITS & SUPPORTS	405 HRS	17,629	49,413	3,660	0	70,702
	2,850.00 LF	*Level Unit Cost-->*	*6.19*	*17.34*	*1.28*	*0.00*	*24.81*
	NOTE: PRODUCTIVITY = 0.131 MH/LF						

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
UM2003 UNDERGROUND STATION, STOP, SHELTER, MALL, TE							
UM2003760113 STATION LIGHT FIXTURES	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
PRODUCTIVITY = 0.305 MH/EA							
16510.44 - 00	FLUORESCENT FIXTURE/INT/ACRYL LENS/RECESS CEILING MNTD/2-32 W		55.00	14.26	0.94	0.00	70.20
SUB-161/161	0.161 hrs/unit 30 TOTAL HRS	185.00 EA	10,175	2,638	173	0	12,987
	Subtotal Direct Costs		10,175	2,638	173	0	12,987
	Subcontractor Markups		3,512	760	53	0	4,325
	Prime Contractor Markups		1,309	248	22	0	1,579
TOTAL UM2003760113 STATION LIGHT FIXTURES		30 HRS	14,996	3,646	248	0	18,891
185.00 EA	*Level Unit Cost-->*		*81.06*	*19.71*	*1.34*	*0.00*	*102.11*
NOTE: PRODUCTIVITY = 0.305 MH/EA							
UM2003760114 EMERGENCY LIGHTING AND BATTERY UNITS	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
PRODUCTIVITY = 3.214 MH/EA							
26521.31 - 00	SINGLE FACE ILLUMINATED EXIT SIGN WITH BATTERY UNIT - WALL MOUNTED		550.00	283.78	20.32	0.00	854.10
SUB-161/161	3.213 hrs/unit 3 TOTAL HRS	1.00 EA	550	284	20	0	854
26521.31 - 00	DUAL FACES ILLUMINATED EXIT SIGN WITH BATTERY UNIT - WALL MOUNTED		649.92	283.87	20.40	0.00	954.19
SUB-161/161	3.214 hrs/unit 3 TOTAL HRS	1.00 EA	650	284	20	0	954
	Subtotal Direct Costs		1,200	568	41	0	1,808
	Subcontractor Markups		414	163	12	0	590
	Prime Contractor Markups		154	53	5	0	213
TOTAL UM2003760114 EMERGENCY LIGHTING AND BATTERY UNITS		6 HRS	1,768	785	58	0	2,611
2.00 EA	*Level Unit Cost-->*		*884.25*	*392.29*	*29.10*	*0.00*	*1,305.63*
NOTE: PRODUCTIVITY = 3.214 MH/EA							
SUBTOTAL UM20037601 ELECTRICAL - LIGHTING			24,837	43,983	3,135	0	71,955
MARKUP			*1.474*	*1.382*	*1.429*	*0.000*	*1.416*
TOTAL UM20037601 ELECTRICAL - LIGHTING			36,607	60,790	4,480	0	101,877
UM2007 ELEVATORS, ESCALATORS							
UM2007681211 UMS_01AL_AR.121 - Hydraulic Elevator 2-stops	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 0.05267 EA/DAY							
14242.31 - 00	Hydraulic Elevator, Glass Cab/Door, 5000 lbs, 2 Stops		97031.96	96473.48	45662.10	0.00	239,167.54
SUB-141/141	1063.3 hrs/unit 2127 TOTAL HRS	2.00 ea	194,064	192,947	91,324	0	478,335
* LINE ITEM ASSEMBLY	Factor:1.0000						
14242.31 - 00	Elevator Related Misc Items not in Vendor Quote (Allowance)		9703.19	9647.35	4566.21	0.00	23,916.76
SUB-141/141	106.33 hrs/unit 213 TOTAL HRS	2.00 ea	19,406	19,295	9,132	0	47,834
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		213,470	212,242	100,457	0	526,169
	Subcontractor Markups		71,258	61,488	29,165	0	161,910
	Prime Contractor Markups		27,231	20,011	12,397	0	59,639
TOTAL UM2007681211 UMS_01AL_AR.121 - Hydraulic Elevator 2-stops		2,339 HRS	311,959	293,741	142,018	0	747,718
2.00 EA	*Level Unit Cost-->*		*155,979.66*	*146,870.30*	*71,009.05*	*0.00*	*373,859.01*
NOTE: DAILY PRODUCTIVITY = 0.05267 EA/DAY							
UM2007681311 UMS_01AB_AR.121 - Escalator 4FT x 25FT	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 0.0376 EA/DAY							
14311.01 - 00	Escalators, Stainless Steel, 48" wide x 25' floor to floor height		135844.75	135062.86	63926.94	0.00	334,834.56
SUB-141/141	1488.6 hrs/unit 2977 TOTAL HRS	2.00 ea	271,690	270,126	127,854	0	669,669
* LINE ITEM ASSEMBLY	Factor:1.0000						
14311.01 - 00	Escalator Related Misc Items not in Vendor Quote (Allowance)		15525.12	15435.75	7305.94	0.00	38,266.81
SUB-141/141	170.13 hrs/unit 340 TOTAL HRS	2.00 ea	31,050	30,872	14,612	0	76,534
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		302,740	300,997	142,466	0	746,203
	Subcontractor Markups		101,056	87,201	41,361	0	229,618
	Prime Contractor Markups		38,619	28,379	17,581	0	84,579
TOTAL UM2007681311 UMS_01AB_AR.121 - Escalator 4FT x 25FT		3,317 HRS	442,415	416,578	201,407	0	1,060,400
2.00 EA	*Level Unit Cost-->*		*221,207.51*	*208,288.79*	*100,703.75*	*0.00*	*530,200.05*
NOTE: DAILY PRODUCTIVITY = 0.0376 EA/DAY							
UM2007681312 UMS_01_AR.123 - Escalator 4FT x 70FT	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
DAILY PRODUCTIVITY = 0.0114 EA/DAY							
14311.01 - 00	Escalators, Stainless Steel, 48" wide x 70' floor to floor height		446347.03	443777.99	210045.66	0.00	1,100,170.68
SUB-141/141	4891.1 hrs/unit 9782 TOTAL HRS	2.00 ea	892,694	887,556	420,091	0	2,200,341
* LINE ITEM ASSEMBLY	Factor:1.0000						
14311.01 - 00	Escalator Related Misc Items not in Vendor Quote (Allowance)		15525.12	15435.75	7305.94	0.00	38,266.81
SUB-141/141	170.13 hrs/unit 340 TOTAL HRS	2.00 ea	31,050	30,872	14,612	0	76,534

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	DAILY PRODUCTIVITY = 0.0114 EA/DAY						
	* LINE ITEM ASSEMBLY Factor:1.0000						
	Subtotal Direct Costs		923,744	918,427	434,703	0	2,276,875
	Subcontractor Markups		308,351	266,075	126,203	0	700,629
	Prime Contractor Markups		117,838	86,593	53,645	0	258,075
	TOTAL UM2007681312 UMS_01_AR.123 - Escalator 4FT x 70FT	10,122 HRS	1,349,933	1,271,096	614,551	0	3,235,580
	2.00 EA	*Level Unit Cost-->*	*674,966.51*	*635,547.83*	*307,275.54*	*0.00*	*1,617,789.89*
	NOTE: DAILY PRODUCTIVITY = 0.0114 EA/DAY						
	UM2007681317 UMS_01AC_AR.313 - Glass Escalator Enclosure *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	DAILY PRODUCTIVITY = 72.23 SF/DAY						
08800.00 - 00	GLASS ESCALATOR ENCLOSURE		62.03	54.05	19.18	0.00	135.26
	SUB-824/824 0.886 hrs/unit 3101 TOTAL HRS	3,500.00 sf	217,105	189,171	67,130	0	473,406
	* LINE ITEM ASSEMBLY Factor:1.0000						
	Subtotal Direct Costs		217,105	189,171	67,130	0	473,406
	Subcontractor Markups		74,602	54,688	20,965	0	150,255
	Prime Contractor Markups		27,899	17,827	8,425	0	54,151
	TOTAL UM2007681317 UMS_01AC_AR.313 - Glass Escalator Enclosure	3,101 HRS	319,606	261,686	96,520	0	677,812
	3,500.00 SF	*Level Unit Cost-->*	*91.32*	*74.77*	*27.58*	*0.00*	*193.66*
	NOTE: DAILY PRODUCTIVITY = 72.23 SF/DAY						
	SUBTOTAL UM20076813 ESCALATORS		1,443,589	1,408,596	644,299	0	3,496,484
	MARKUP		*1.463*	*1.384*	*1.416*	*0.000*	*1.423*
	TOTAL UM20076813 ESCALATORS		2,111,954	1,949,359	912,479	0	4,973,792
UM40	**SITEWORK & SPECIAL CONDITIONS**						
UM4001	**DEMOLITION, CLEARING, EARTHWORK**						
	UM4001011101 ASPHALT & CONCRETE PAVEMENT REMOVAL *LEVEL CONTRACTOR ID APPLIED--PRIME*						
02411.31 - 75	Demolish & Remove Concrete Sidewalks (to 6" thick)		0.00	12.55	5.11	0.00	17.66
	SUB-211/211 0.176 hrs/unit 17 TOTAL HRS	96.00 sy	0	1,205	490	0	1,695
02411.31 - 75	Demolish & Remove Street Pavement (6" to 12" thick) - Gas Line		0.00	15.70	6.36	0.00	22.06
	SUB-221/221 0.226 hrs/unit 181 TOTAL HRS	800.00 sy	0	12,560	5,087	0	17,647
02411.31 - 76	Demolish & Remove Concrete Curb & Gutters		0.00	4.18	1.70	0.00	5.89
	SUB-211/211 0.059 hrs/unit 10 TOTAL HRS	165.00 lf	0	690	281	0	971
	Subtotal Direct Costs		0	14,455	5,859	0	20,313
	Subcontractor Markups		0	3,725	1,676	0	5,401
	Prime Contractor Markups		0	1,329	721	0	2,050
	TOTAL UM4001011101 ASPHALT & CONCRETE PAVEMENT REMOVAL	207 HRS	0	19,509	8,255	0	27,764
	6,298.00 SY	*Level Unit Cost-->*	*0.00*	*3.10*	*1.31*	*0.00*	*4.41*
	UM4001011102 SELECTIVE DEMOLITION *LEVEL CONTRACTOR ID APPLIED--PRIME*						
02411.39 - 30	Sawcut AC Pavement		0.00	7.53	0.54	0.00	8.07
	SUB-211/211 0.106 hrs/unit 17 TOTAL HRS	160.00 lf	0	1,205	86	0	1,291
02411.39 - 39	Remove Existing Landscaping / Planters / Steps / Railings/ Walks		97031.93	96249.47	45662.13	0.00	238,943.53
	SUB-211/211 1349.5 hrs/unit 202 TOTAL HRS	0.15 ls	14,555	14,437	6,849	0	35,842
	* LINE ITEM ASSEMBLY Factor:0.1500						
	Subtotal Direct Costs		14,555	15,642	6,935	0	37,132
	Subcontractor Markups		4,904	4,374	2,056	0	11,334
	Prime Contractor Markups		1,861	1,463	860	0	4,184
	TOTAL UM4001011102 SELECTIVE DEMOLITION	219 HRS	21,320	21,479	9,851	0	52,650
	UM4001011103 BUILDING DEMOLITION *LEVEL CONTRACTOR ID APPLIED--PRIME*						
02411.61 - 32	Demolish Existing Footings - Garage		0.00	62.75	25.57	0.00	88.32
	SUB-111/111 1.072 hrs/unit 109 TOTAL HRS	102.00 cy	0	6,400	2,608	0	9,009
	Subtotal Direct Costs		0	6,400	2,608	0	9,009
	Subcontractor Markups		0	1,783	774	0	2,557
	Prime Contractor Markups		0	598	323	0	922
	TOTAL UM4001011103 BUILDING DEMOLITION	109 HRS	0	8,781	3,706	0	12,487
	102.00 CY	*Level Unit Cost-->*	*0.00*	*86.09*	*36.33*	*0.00*	*122.42*
	SUBTOTAL UM40010111 CIVILWORK		14,555	36,497	15,402	0	66,454
	MARKUP		*1.465*	*1.364*	*1.416*	*0.000*	*1.398*
	TOTAL UM40010111 CIVILWORK		21,320	49,770	21,812	0	92,901

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
UM4003 HAZ. MAT'L, CONTAM'D SOIL REMOVAL/MITIGATION							
UM4003011311 DISPOSAL	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
02812.00 - 01	Transportation of Class I (Non-RCRA) Hazardous Waste		38.81	38.50	18.27	0.00	95.58
SUB-211/211	0.54 hrs/unit 246 TOTAL HRS	456.00 ton	17,699	17,556	8,329	0	43,583
02812.00 - 01	Testing Soil		155.25	154.00	73.06	0.00	382.31
SUB-211/211	2.159 hrs/unit 86 TOTAL HRS	40.00 ea	6,210	6,160	2,922	0	15,292
	Subtotal Direct Costs		23,909	23,716	11,251	0	58,876
	Subcontractor Markups		8,055	6,632	3,336	0	18,023
	Prime Contractor Markups		3,057	2,219	1,395	0	6,671
TOTAL UM4003011311 DISPOSAL		333 HRS	35,021	32,566	15,982	0	83,569
11,720.00 SF	*Level Unit Cost-->*		*2.99*	*2.78*	*1.36*	*0.00*	*7.13*
SUBTOTAL UM40030113 EXCAVATION & GROUND SUPPORT - INSTRUMENT			23,909	23,716	11,251	0	58,876
MARKUP			*1.465*	*1.373*	*1.420*	*0.000*	*1.419*
TOTAL UM40030113 EXCAVATION & GROUND SUPPORT - INSTRUMENTATI			35,021	32,566	15,982	0	83,569
UM4006 PEDESTRIAN / BIKE ACCESS & ACCOMMODATION, LA							
UM4006019611 CONCRETE PAVEMENT	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
32131.32 - 30	3-1/2" Thick Concrete Pavement (Sidewalk), Dark Sparkle Finish		5.00	3.15	0.62	0.00	8.77
SUB-211/211	0.044 hrs/unit 44 TOTAL HRS	1,000.00 sf	5,000	3,152	620	0	8,772
	Subtotal Direct Costs		5,000	3,152	620	0	8,772
	Subcontractor Markups		1,685	881	184	0	2,750
	Prime Contractor Markups		639	295	77	0	1,011
TOTAL UM4006019611 CONCRETE PAVEMENT		44 HRS	7,324	4,329	881	0	12,533
UM4006019612 BRICK PAVING	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
32141.61 - 00	Brick Curb Ramp with Detectable Surface Tiles		600.00	545.41	36.53	0.00	1,181.95
SUB-211/211	7.647 hrs/unit 15 TOTAL HRS	2.00 ea	1,200	1,091	73	0	2,364
	Subtotal Direct Costs		1,200	1,091	73	0	2,364
	Subcontractor Markups		404	305	22	0	731
	Prime Contractor Markups		153	102	9	0	265
TOTAL UM4006019612 BRICK PAVING		15 HRS	1,758	1,498	104	0	3,359
UM4006019613 CONCRETE CURB & GUTTER	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
32161.31 - 30	Concrete Curb Ramp with Detectable Surface Tiles (Special Finish)		700.00	504.35	99.09	0.00	1,303.44
SUB-211/211	7.072 hrs/unit 28 TOTAL HRS	4.00 ea	2,800	2,017	396	0	5,214
32161.31 - 30	Concrete Curb Ramp with Detectable Surface Tiles		500.00	504.38	99.22	0.00	1,103.60
SUB-211/211	7.072 hrs/unit 99 TOTAL HRS	14.00 ea	7,000	7,061	1,389	0	15,450
32161.31 - 31	CIP Detectable Surface Tiles (Not at Curb Ramps)		6.00	6.09	0.72	0.00	12.81
SUB-211/211	0.085 hrs/unit 23 TOTAL HRS	264.00 sf	1,584	1,608	190	0	3,381
	Subtotal Direct Costs		11,384	10,687	1,975	0	24,045
	Subcontractor Markups		3,835	2,988	586	0	7,409
	Prime Contractor Markups		1,456	1,000	245	0	2,700
TOTAL UM4006019613 CONCRETE CURB & GUTTER		150 HRS	16,674	14,675	2,806	0	34,155
83,706.00 SF	*Level Unit Cost-->*		*0.20*	*0.18*	*0.03*	*0.00*	*0.41*
SUBTOTAL UM40060196 STREET RESTORATION 1			17,584	14,930	2,668	0	35,181
MARKUP			*1.465*	*1.373*	*1.420*	*0.000*	*1.423*
TOTAL UM40060196 STREET RESTORATION 1			25,756	20,501	3,790	0	50,047
UM4007 AUTO,BUS, VAN ACCESSWAYS INCL ROADS & PKG LO							
UM4007019615 ASPHALT PAVING	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
32121.61 - 31	Asphalt Concrete (Type A, 1/2-inch Max with Medium Grading)		88.27	8.99	3.51	0.00	100.76
SUB-211/211	0.126 hrs/unit 66 TOTAL HRS	522.00 ton	46,077	4,691	1,831	0	52,599
	Subtotal Direct Costs		46,077	4,691	1,831	0	52,599
	Subcontractor Markups		15,524	1,312	543	0	17,378
	Prime Contractor Markups		5,891	439	227	0	6,557
TOTAL UM4007019615 ASPHALT PAVING		66 HRS	67,492	6,441	2,601	0	76,534
522.00 TON	*Level Unit Cost-->*		*129.30*	*12.34*	*4.98*	*0.00*	*146.62*
SUBTOTAL UM40070196 STREET RESTORATION 1			46,077	4,691	1,831	0	52,599
MARKUP			*1.465*	*1.373*	*1.420*	*0.000*	*1.455*
TOTAL UM40070196 STREET RESTORATION 1			67,492	6,441	2,601	0	76,534

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
UM4007 AUTO,BUS, VAN ACCESSWAYS INCL ROADS & PKG LO							
UM4007019615 ASPHALT PAVING	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
UM4008 TEMPORARY FACILITIES & OTHER INDIRECT COSTS							
UM4008011103 TRAFFIC CONTROL	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
65% ESTIMATE INFORMATION USED							
01552.60 - 01	Traffic Water Filled Barrier		388.13	385.00	182.65	0.00	955.78
SUB-997/211	5.398 hrs/unit 32 TOTAL HRS	6.00 ea	2,329	2,310	1,096	0	5,735
01552.60 - 01	Construction Area Traffic Signs		388.13	385.00	182.65	0.00	955.78
SUB-997/211	5.398 hrs/unit 11 TOTAL HRS	2.00 ea	776	770	365	0	1,912
01552.60 - 01	Temporary Traffic Pavement Markings & Striping		0.97	0.96	0.46	0.00	2.39
SUB-997/211	0.013 hrs/unit 5 TOTAL HRS	400.00 lf	388	385	183	0	956
01552.60 - 01	Traffic Control Supervisor		0.00	66.89	0.00	0.00	66.89
SUB-997/120	0.923 hrs/unit 554 TOTAL HRS	600.00 hr	0	40,133	0	0	40,133
01552.60 - 01	SF Parking & Traffic Control Officer		0.00	61.74	0.00	0.00	61.74
SUB-997/120	0.852 hrs/unit 1704 TOTAL HRS	2,000.00 hr	0	123,487	0	0	123,487
01552.60 - 01	Off Duty SFPD Uniform Officer		0.00	87.47	0.00	0.00	87.47
SUB-997/120	1.207 hrs/unit 483 TOTAL HRS	400.00 hr	0	34,988	0	0	34,988
01552.60 - 01	Traffic Control Crew		0.00	51.45	0.00	0.00	51.45
SUB-997/120	0.71 hrs/unit 426 TOTAL HRS	600.00 hr	0	30,872	0	0	30,872
01552.60 - 02	Detour Signs		194.07	192.50	91.33	0.00	477.89
SUB-997/211	2.699 hrs/unit 11 TOTAL HRS	4.00 ea	776	770	365	0	1,912
01552.60 - 02	Temporary Tow-Away Signs		38.81	38.50	18.27	0.00	95.58
SUB-997/211	0.54 hrs/unit 1 TOTAL HRS	2.00 ea	78	77	37	0	191
01552.60 - 03	Channelizer		115.00	59.28	2.74	0.00	177.02
SUB-997/211	0.831 hrs/unit 4 TOTAL HRS	5.00 ea	575	296	14	0	885
01552.60 - 03	Temporary Pavement Markers		6.00	17.83	0.00	0.00	23.83
SUB-997/211	0.25 hrs/unit 5 TOTAL HRS	20.00 ea	120	357	0	0	477
01552.60 - 03	Barricade		350.00	285.29	125.00	0.00	760.29
SUB-997/211	4 hrs/unit 56 TOTAL HRS	14.00 ea	4,900	3,994	1,750	0	10,644
	Subtotal Direct Costs		9,942	238,439	3,809	0	252,190
	Subcontractor Markups		2,709	50,973	895	0	54,577
	Prime Contractor Markups		1,210	21,157	450	0	22,817
TOTAL UM4008011103 TRAFFIC CONTROL		3,292 HRS	13,861	310,570	5,155	0	329,585
8,064.00 SF	*Level Unit Cost-->*		*1.72*	*38.51*	*0.64*	*0.00*	*40.87*
NOTE: 65% ESTIMATE INFORMATION USED							
UM4008011104 DEWATERING	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
65% ESTIMATE INFORMATION USED							
31231.92 - 02	Dewatering operation, maintenance Allowance, (incl. wells, pumps, piping, etc)		38812.80	104227.60	18264.80	0.00	161,305.20
SUB-221/221	1500 hrs/unit 150 TOTAL HRS	0.10 ls	3,881	10,423	1,826	0	16,131
* LINE ITEM ASSEMBLY	Factor:0.1000						
31231.92 - 02	Water disposal		38812.80	416910.50	160000.00	0.00	615,723.30
SUB-221/221	6000 hrs/unit 600 TOTAL HRS	0.10 ls	3,881	41,691	16,000	0	61,572
* LINE ITEM ASSEMBLY	Factor:0.1000						
	Subtotal Direct Costs		7,763	52,114	17,826	0	77,703
	Subcontractor Markups		2,461	13,256	5,071	0	20,788
	Prime Contractor Markups		978	4,779	2,190	0	7,947
TOTAL UM4008011104 DEWATERING		750 HRS	11,201	70,149	25,087	0	106,437
NOTE: 65% ESTIMATE INFORMATION USED							
UM4008011121 FIELD OVERHEAD, DETAIL ITEMS	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
01101.01 - 05	Project Director		0.00	168.11	0.00	0.00	168.11
SUB-997/1101	1 hrs/unit 500 TOTAL HRS	500.00 MH	0	84,056	0	0	84,056
* LINE ITEM ASSEMBLY	Factor:100.0000						
01101.01 - 05	Project Manager		0.00	144.10	0.00	0.00	144.10
SUB-997/1102	1 hrs/unit 880 TOTAL HRS	880.00 MH	0	126,809	0	0	126,809
* LINE ITEM ASSEMBLY	Factor:176.0000						
01101.01 - 05	General Superintendent		0.00	87.76	0.00	0.00	87.76
SUB-997/1104	1 hrs/unit 880 TOTAL HRS	880.00 MH	0	77,229	0	0	77,229
* LINE ITEM ASSEMBLY	Factor:176.0000						
01101.01 - 05	Asst. Superintendent		0.00	68.68	0.00	0.00	68.68
SUB-997/1105	1 hrs/unit 1750 TOTAL HRS	1,750.00 MH	0	120,190	0	0	120,190
* LINE ITEM ASSEMBLY	Factor:350.0000						
01101.01 - 05	Project Engineer		0.00	138.09	0.00	0.00	138.09
SUB-997/1103	1 hrs/unit 1750 TOTAL HRS	1,750.00 MH	0	241,658	0	0	241,658
* LINE ITEM ASSEMBLY	Factor:350.0000						
01101.01 - 05	Admin / Secretary		0.00	48.04	0.00	0.00	48.04
SUB-997/1106	1 hrs/unit 1750 TOTAL HRS	1,750.00 MH	0	84,068	0	0	84,068
* LINE ITEM ASSEMBLY	Factor:350.0000						
01101.01 - 05	Payroll / Timekeeper		0.00	38.42	0.00	0.00	38.42

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	SUB-997/1107	1 hrs/unit 880 TOTAL HRS	880.00	MH	0	33,814	0	0	33,814
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 05	Cost Engineer - Accountant "Pre Construction"				0.00	72.05	0.00	0.00	72.05
	SUB-997/1108	1 hrs/unit 400 TOTAL HRS	400.00	MH	0	28,820	0	0	28,820
	* LINE ITEM ASSEMBLY	Factor:80.0000							
01101.01 - 05	Project Scheduler				0.00	72.05	0.00	0.00	72.05
	SUB-997/1110	1 hrs/unit 880 TOTAL HRS	880.00	MH	0	63,405	0	0	63,405
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 05	Project Estimator				0.00	86.46	0.00	0.00	86.46
	SUB-997/1111	1 hrs/unit 200 TOTAL HRS	200.00	MH	0	17,293	0	0	17,293
	* LINE ITEM ASSEMBLY	Factor:40.0000							
01101.01 - 05	Qualtity Control				0.00	96.06	0.00	0.00	96.06
	SUB-997/1112	1 hrs/unit 880 TOTAL HRS	880.00	MH	0	84,535	0	0	84,535
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 05	Estimator "Chief - Senior"				0.00	138.09	0.00	0.00	138.09
	SUB-997/1113	1 hrs/unit 50 TOTAL HRS	50.00	MH	0	6,905	0	0	6,905
	* LINE ITEM ASSEMBLY	Factor:10.0000							
01101.01 - 05	Estimator				0.00	96.06	0.00	0.00	96.06
	SUB-997/1114	1 hrs/unit 150 TOTAL HRS	150.00	MH	0	14,409	0	0	14,409
01101.01 - 05	Purchasing				0.00	45.79	0.00	0.00	45.79
	SUB-997/1115	1 hrs/unit 4 TOTAL HRS	4.00	MH	0	183	0	0	183
01101.01 - 05	Safety Engineer				0.00	72.05	0.00	0.00	72.05
	SUB-997/1116	1 hrs/unit 35 TOTAL HRS	35.00	MH	0	2,522	0	0	2,522
01101.01 - 05	Daily Cleaning "Laborer"				0.00	45.63	0.00	0.00	45.63
	SUB-997/1119	1 hrs/unit 22 TOTAL HRS	22.00	MH	0	1,004	0	0	1,004
01101.01 - 11	Punch List				0.10	0.15	0.05	0.00	0.30
	SUB-997/NoCrew	0.013 hrs/unit 204 TOTAL HRS	16,128.00	SF	1,613	2,419	806	0	4,838
01101.01 - 11	Final Cleaning "In House Forces"				0.03	0.08	0.01	0.00	0.12
	SUB-997/NoCrew	0.013 hrs/unit 204 TOTAL HRS	16,128.00	SF	484	1,290	161	0	1,935
01101.01 - 11	Final Cleaning "Glass"				0.02	0.03	0.00	0.00	0.05
	SUB-997/NoCrew	0.013 hrs/unit 204 TOTAL HRS	16,128.00	SF	323	484	0	0	806
01101.01 - 08	Printing (Dwgs,O&M,Subm)				0.75	0.00	0.00	0.00	0.75
	SUB-997/NoCrew	96 hrs/unit 38400 TOTAL HRS	400.00	PGS	300	0	0	0	300
01101.01 - 11	Warranty Costs				0.00	0.02	0.00	0.00	0.02
	SUB-997/NoCrew	0.013 hrs/unit 204 TOTAL HRS	16,128.00	SF	0	323	0	0	323
	Subtotal Direct Costs				2,719	991,415	968	0	995,102
	Subcontractor Markups				741	211,944	227	0	212,912
	Prime Contractor Markups				331	87,971	114	0	88,417
	TOTAL UM4008011121 FIELD OVERHEAD, DETAIL ITEMS		50,227	HRS	3,791	1,291,330	1,309	0	1,296,431
	5.00 MTH	*Level Unit Cost-->*			*758.21*	*258,266.07*	*261.88*	*0.00*	*259,286.15*
	UM4008011122 GC EXPENSES	*LEVEL CONTRACTOR ID APPLIED--PRIME*							
01101.01 - 06	On Site Vehicle Pm				0.00	0.00	3.50	0.00	3.50
	SUB-997/NoCrew	1 hrs/unit 880 TOTAL HRS	880.00	HR	0	0	3,080	0	3,080
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 06	On Site Vehicle Super				0.00	0.00	3.50	0.00	3.50
	SUB-997/NoCrew	96 hrs/unit 72000 TOTAL HRS	750.00	HR	0	0	2,625	0	2,625
	* LINE ITEM ASSEMBLY	Factor:150.0000							
01101.01 - 06	On Site Vehicle Others				0.00	0.00	3.25	0.00	3.25
	SUB-997/NoCrew	96 hrs/unit 168960 TOTAL HRS	1,760.00	HR	0	0	5,720	0	5,720
	* LINE ITEM ASSEMBLY	Factor:352.0000							
01107.01 - 00	Drug Testing Services				0.00	44.19	0.00	0.00	44.19
	SUB-997/GC-1122	1 hrs/unit 60 TOTAL HRS	60.00	HR	0	2,651	0	0	2,651
01101.01 - 07	Security Check				0.00	44.19	0.00	0.00	44.19
	SUB-997/GC-1122	1 hrs/unit 60 TOTAL HRS	60.00	HR	0	2,651	0	0	2,651
01101.01 - 07	Professional Survey & Layout				0.00	78.53	0.00	0.00	78.53
	SUB-997/GC-1123	1 hrs/unit 300 TOTAL HRS	300.00	HR	0	23,558	0	0	23,558
01101.01 - 08	Field Office "Storefront"				0.00	0.00	35.00	0.00	35.00
	SUB-997/NoCrew	96 hrs/unit 84480 TOTAL HRS	880.00	HR	0	0	30,800	0	30,800
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08	Computers - Monitors				0.00	0.00	0.55	0.00	0.55
	SUB-997/NoCrew	96 hrs/unit 675840 TOTAL HRS	7,040.00	HR	0	0	3,872	0	3,872
	* LINE ITEM ASSEMBLY	Factor:1408.0000							
01101.01 - 08	Software				0.30	0.00	0.00	0.00	0.30
	SUB-997/NoCrew	96 hrs/unit 675840 TOTAL HRS	7,040.00	HR	2,112	0	0	0	2,112
	* LINE ITEM ASSEMBLY	Factor:1408.0000							
01101.01 - 08	Printers				0.00	0.00	1.10	0.00	1.10
	SUB-997/NoCrew	96 hrs/unit 168960 TOTAL HRS	1,760.00	HR	0	0	1,936	0	1,936
	* LINE ITEM ASSEMBLY	Factor:352.0000							
01101.01 - 08	Office Furniture				0.00	0.00	1.75	0.00	1.75
	SUB-997/NoCrew	96 hrs/unit 84480 TOTAL HRS	880.00	HR	0	0	1,540	0	1,540
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08	Office Supplies				4.50	0.00	0.00	0.00	4.50

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	SUB-997/NoCrew	96 hrs/unit 84000 TOTAL HRS	875.00	HR	3,938	0	0	0	3,938
	* LINE ITEM ASSEMBLY	Factor:175.0000							
01101.01 - 08	Postage - Special Delievery Services				0.30	0.00	0.00	0.00	0.30
	SUB-997/NoCrew	96 hrs/unit 84480 TOTAL HRS	880.00	HR	264	0	0	0	264
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08	First Aid Supplies				0.25	0.00	0.00	0.00	0.25
	SUB-997/NoCrew	96 hrs/unit 84480 TOTAL HRS	880.00	HR	220	0	0	0	220
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08	Cups - Ice - Drinking Water				0.30	0.00	0.00	0.00	0.30
	SUB-997/NoCrew	96 hrs/unit 84480 TOTAL HRS	880.00	HR	264	0	0	0	264
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08	Printing - Blue Prints				0.40	0.00	0.00	0.00	0.40
	SUB-997/NoCrew	96 hrs/unit 84480 TOTAL HRS	880.00	HR	352	0	0	0	352
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08	Photo Copier Machine				0.60	0.00	0.22	0.00	0.82
	SUB-997/NoCrew	96 hrs/unit 84480 TOTAL HRS	880.00	HR	528	0	194	0	722
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08	Photo Copier Supplies				0.15	0.00	2.00	0.00	2.15
	SUB-997/NoCrew	96 hrs/unit 84480 TOTAL HRS	880.00	HR	132	0	1,760	0	1,892
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08	Storage & Tool Trailers				0.00	0.00	2.00	0.00	2.00
	SUB-997/NoCrew	96 hrs/unit 168960 TOTAL HRS	1,760.00	HR	0	0	3,520	0	3,520
	* LINE ITEM ASSEMBLY	Factor:352.0000							
01101.01 - 08	Equip Rental/Small Tools				0.00	0.00	3.00	0.00	3.00
	SUB-997/NoCrew	96 hrs/unit 84480 TOTAL HRS	880.00	HR	0	0	2,640	0	2,640
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08	Small Tools Expendable				1.50	0.00	0.00	0.00	1.50
	SUB-997/NoCrew	96 hrs/unit 84480 TOTAL HRS	880.00	HR	1,320	0	0	0	1,320
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08	Telephone Exp, Incl Cell				1.10	0.00	0.00	0.00	1.10
	SUB-997/NoCrew	96 hrs/unit 168960 TOTAL HRS	1,760.00	HR	1,936	0	0	0	1,936
	* LINE ITEM ASSEMBLY	Factor:352.0000							
01101.01 - 08	Internet Connections - Service				0.00	0.00	0.25	0.00	0.25
	SUB-997/NoCrew	96 hrs/unit 675840 TOTAL HRS	7,040.00	HR	0	0	1,760	0	1,760
	* LINE ITEM ASSEMBLY	Factor:1408.0000							
01101.01 - 08	Network / Communications Eqpt				0.00	0.00	1.20	0.00	1.20
	SUB-997/NoCrew	96 hrs/unit 84480 TOTAL HRS	880.00	HR	0	0	1,056	0	1,056
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08	Field Radios				0.00	0.00	2.20	0.00	2.20
	SUB-997/NoCrew	96 hrs/unit 84480 TOTAL HRS	880.00	HR	0	0	1,936	0	1,936
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08	Temporary Toilets (5)				0.00	0.00	1.20	0.00	1.20
	SUB-997/NoCrew	96 hrs/unit 168960 TOTAL HRS	1,760.00	HR	0	0	2,112	0	2,112
	* LINE ITEM ASSEMBLY	Factor:352.0000							
01101.01 - 08	Temporary Lighting & Elec Hourly Charges				0.00	0.00	2.00	0.00	2.00
	SUB-997/NoCrew	96 hrs/unit 84480 TOTAL HRS	880.00	HR	0	0	1,760	0	1,760
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 12	Temporary Fencing				12.85	5.19	1.36	0.00	19.40
	SUB-997/221	0.075 hrs/unit 4 TOTAL HRS	60.00	LF	771	312	81	0	1,164
01101.01 - 12	Silt Fence				1.25	5.19	0.00	0.00	6.44
	SUB-997/221	0.075 hrs/unit 4 TOTAL HRS	60.00	LF	75	312	0	0	387
01101.01 - 10	Safety "General Signage"				0.02	0.88	0.00	0.00	0.90
	SUB-997/221	0.013 hrs/unit 19 TOTAL HRS	1,500.00	SF	30	1,318	0	0	1,348
01101.01 - 08	Special Scaffolding "Rental"				0.00	0.00	12.00	0.00	12.00
	SUB-997/NoCrew	96 hrs/unit 5760 TOTAL HRS	60.00	LF	0	0	720	0	720
01101.01 - 08	Special Scaffolding "Setup Labor"				0.00	22.00	0.00	0.00	22.00
	SUB-997/NoCrew	96 hrs/unit 5760 TOTAL HRS	60.00	LF	0	1,320	0	0	1,320
01101.01 - 08	Special Scaffolding "Take Down Labor"				0.00	2.75	0.00	0.00	2.75
	SUB-997/NoCrew	96 hrs/unit 5760 TOTAL HRS	60.00	LF	0	165	0	0	165
01101.01 - 08	Fire Protection Equipment				0.00	0.00	0.15	0.00	0.15
	SUB-997/NoCrew	96 hrs/unit 72000 TOTAL HRS	750.00	HR	0	0	113	0	113
	* LINE ITEM ASSEMBLY	Factor:150.0000							
01101.01 - 08	Temp Water Services				3.50	0.00	0.00	0.00	3.50
	SUB-997/NoCrew	96 hrs/unit 144000 TOTAL HRS	1,500.00	SF	5,250	0	0	0	5,250
01101.01 - 08	Weather Protection Materials				0.07	0.02	0.00	0.00	0.09
	SUB-997/NoCrew	96 hrs/unit 144000 TOTAL HRS	1,500.00	SF	105	30	0	0	135
01101.01 - 08	Temp Heat/Winter Weather Hourly Charges				0.00	0.00	0.07	0.00	0.07
	SUB-997/NoCrew	96 hrs/unit 38400 TOTAL HRS	400.00	HR	0	0	28	0	28
	* LINE ITEM ASSEMBLY	Factor:80.0000							
01101.01 - 08	Trash Hauling				3.75	0.00	0.00	0.00	3.75
	SUB-997/NoCrew	96 hrs/unit 72000 TOTAL HRS	750.00	HR	2,813	0	0	0	2,813
	* LINE ITEM ASSEMBLY	Factor:150.0000							
01101.01 - 09	Man / Material Lift "Rental"				0.00	0.00	23.00	0.00	23.00
	SUB-997/NoCrew	0.013 hrs/unit 5 TOTAL HRS	400.00	HR	0	0	9,200	0	9,200
01101.01 - 09	Man / Material Lift "Operator"				0.00	69.48	0.00	0.00	69.49
	SUB-997/221	1 hrs/unit 600 TOTAL HRS	600.00	MH	0	41,691	0	0	41,691

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
		* LINE ITEM ASSEMBLY Factor:120.0000							
01101.01 - 11		Street Cleaning			0.00	0.00	65.00	0.00	65.00
	SUB-997/NoCrew	0.013 hrs/unit 8 TOTAL HRS	600.00	HR	0	0	39,000	0	39,000
01101.01 - 08		Printing (Dwgs,O&M,Subm)			0.75	0.00	0.00	0.00	0.75
	SUB-997/NoCrew	96 hrs/unit 115200 TOTAL HRS	1,200.00	PGS	900	0	0	0	900
		Subtotal Direct Costs			21,009	74,008	115,452	0	210,469
		Subcontractor Markups			5,724	15,821	27,132	0	48,678
		Prime Contractor Markups			2,557	6,567	13,637	0	22,760
		TOTAL UM4008011122 GC EXPENSES	4,731,381	HRS	29,290	96,396	156,221	0	281,908
		5.00 MTH *Level Unit Cost-->*			*5,858.02*	*19,279.28*	*31,244.21*	*0.00*	*56,381.51*
		UM4008011123 HOISTING *LEVEL CONTRACTOR ID APPLIED--PRIME*							
15906.00 - 15		RENT CRAWLER MNTD/LATTICE BOOM CRANE/350 TON/80' BOOM			115.00	1818.86	280.00	0.00	2,213.86
	SUB-155/155	24 hrs/unit 720 TOTAL HRS	30.00	DY	3,450	54,566	8,400	0	66,416
15906.00 - 16		RENT CRANE TRUCK MOUNT/CABLE 6X4 DRIVE 20 TON/10' RADIUS			85.00	1212.57	225.00	0.00	1,522.57
	SUB-155/155	16 hrs/unit 256 TOTAL HRS	16.00	DY	1,360	19,401	3,600	0	24,361
01900.00 - 14		52 Meter Concrete Boom Pump			0.00	0.00	175.00	0.00	175.00
	SUB-211/211		100.00	HRS	0	0	17,500	0	17,500
		NOTE: Quantity is for 125 days.							
		Subtotal Direct Costs			4,810	73,967	29,500	0	108,277
		Subcontractor Markups			1,891	23,624	9,441	0	34,956
		Prime Contractor Markups			641	7,134	3,724	0	11,500
		TOTAL UM4008011123 HOISTING	976	HRS	7,342	104,725	42,666	0	154,733
		8,064.00 SF *Level Unit Cost-->*			*0.91*	*12.99*	*5.29*	*0.00*	*19.19*
		SUBTOTAL UM40080111 UNION SQUARE MARKET ST. STATION (UMS)			46,243	1,429,943	167,556	0	1,643,742
		MARKUP			*1.416*	*1.310*	*1.375*	*0.000*	*1.320*
		TOTAL UM40080111 UNION SQUARE MARKET ST. STATION (UMS)			65,485	1,873,171	230,438	0	2,169,094

**.*% OF PROJECT PERFORMED BY SUBCONTRACTORS

656 DETAIL LINE ITEMS

central T subway

Connecting people. Connecting communities.

CENTRAL SUBWAY PROJECT
Secondary Mitigations

MITIGATION MEASURE #21
MOS Mezzanine Level Unfinished

Scope Description

The scope of the work included in this estimate is the deferral of North End Grand Stair. This Grand Stair is located on the platform level and extends to the concourse. Also included in this estimate is any "fit-out" work to be done on the mezzanine level. This work includes any walls, finishes, HVAC or lighting. There is a minimal amount of work that would remain on the mezzanine level which includes: minor lighting and exhaust, fire protection (sprinklers), minimal walls and doors to keep the public from using this space.

Basis of Estimate

Standard progress estimate methods and assumptions were utilized from existing in progress estimates for designs above and beyond existing published 65% designs. Refer to the basis of estimate for the interim estimates for basic markups, labor rates, assumptions and general exclusions for this estimate. Contractor and subcontractor markups were included in this estimate.

Order of Magnitude Estimate

Estimated Cost Reduction = $1,413,057

PROJECT: MOSCONE STATION
PROJECT SITE: SAN FRANCISCO, CA
A/E NAME: SFMTA - DESIGN GROUP
PROJECT SIZE: 1.00LS
CONSTRUCTION FUNDS AVAILABLE, DOLLARS: $130,000,000

ESTIMATOR: HILL
CAT CODE:
UIC:
PROJECT #: MOS-70%
DATE OF ESTIMATE: 8/26/11 REV 0e

WBS CODE	DESCRIPTION	COST/WBS BASED ON 1 LS	COST/ WBS UNIT	TOTAL MARKED UP COSTS MATL	LABOR	EQUIP	UNIT COST	TOTAL
	MOS PROGRESS ESTIMATE 8/26/2011 REV 0e, PROJECT TOTALS							**1,413,000**
PROJECT LEVEL NOTE:	BASE COST - REDUCTION IN GC FACILITIES + SUB OH & SALES TAX+REVISED GC_SUB MU							
	*****PROJECT SUBTOTALS****			500,512	698,562	213,983	0	1,413,057
BASE BID				**500,512**	**698,562**	**213,983**	**0**	**1,413,057**
-1255 MOSCONE STATION				**500,512**	**698,562**	**213,983**	**0**	**1,413,057**
MSMOSCONE STATION - PKG 1255				**500,512**	**698,562**	**213,983**	**0**	**1,413,057**
MS20	STATIONS - STOPS			496,643	517,682	196,000	0	1,210,324
MS2003	UNDERGROUND STATION			496,643	517,682	196,000	0	1,210,324
MS200334	ARCHITECTURAL - HEADHOUSE MEZZANINE LEVEL			148,582	139,741	67,688	0	356,012
MS200336	ARCHITECTURAL - STATION MEZZANINE LEVEL			179,321	169,112	81,636	0	430,069
MS200340	ARCHITECTURAL - STATION CONCOURSE LEVEL			80,601	75,351	36,778	0	192,730
MS200348	ARCHITECTURAL - STATION STAIRS & LANDING			40,263	7,017	1,831	0	49,110
MS200374	MECHANICAL - HVAC & EMERGENCY VENTILATION			6,580	29,990	916	0	37,486
	*** *AECOM INFORMATION AND ORGANIZATION WAS USED FOR HVAC & EMERGENCY VENTILATION.*							
MS200376	ELECTRICAL - LIGHTING			41,297	96,470	7,151	0	144,918
	*** *HILL ASSEMBLIES WERE INTEGRATED WITH AECOM INFORMATION FOR LIGHTING.*							
MS40	SITEWORK & SPECIAL CONDITIONS			3,870	180,880	17,983	0	202,733
**	*AECOM INFORMATION AND ORGANIZATION WAS USED FOR SITEWORK & SPECIAL CONDITIONS.*							
MS4008	TEMPORARY FACILITIES			3,870	180,880	17,983	0	202,733
MS400800	MOSCONE STATION			3,870	180,880	17,983	0	202,733

PROJECT: MOSCONE STATION
PROJECT SITE: SAN FRANCISCO, CA
A/E NAME: SFMTA - DESIGN GROUP
PROJECT SIZE: 1.00 LS
CONSTRUCTION FUNDS AVAILABLE: 130,000,000 USD
CURRENCY: DOLLARS

ESTIMATOR: HILL
CAT CODE:
UIC:
PROJECT #: MOS-70%
DATE OF ESTIMATE: 8/26/11 REV 0e
BID DATE: FALL 2011

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
1255 MOSCONE STATION MOSCONE STATION - PKG 1255MS STATIONS - STOPS							
MSUNDERGROUND STATION							
MS20 STATIONS - STOPS							
MS2003 UNDERGROUND STATION							
MS20033411 METAL DOORS	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
65% ESTIMATE INFORMATION USED							
08131.31 - 31	Single Metal Door with 2' Transom (Incl. Hardware & Frame)		776.26	770.40	365.30	0.00	1,911.96
SUB-997/821	10.952 hrs/unit 66 TOTAL HRS	6.00 ea	4,658	4,622	2,192	0	11,472
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		4,658	4,622	2,192	0	11,472
	Subcontractor Markups		1,269	988	515	0	2,772
	Prime Contractor Markups		567	410	259	0	1,236
TOTAL MS20033411 METAL DOORS		66 HRS	6,493	6,021	2,966	0	15,480
6.00 EA	*Level Unit Cost-->*		*1,082.23*	*1,003.46*	*494.29*	*0.00*	*2,579.98*
NOTE: 65% ESTIMATE INFORMATION USED							
MS20033413 CEILING FINISHES	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
65% ESTIMATE INFORMATION USED							
09590.01 - 00	Glass Fiber Reinforced Concrete (GRFC) Ceiling System		7.76	7.70	3.65	0.00	19.11
SUB-911/911	0.114 hrs/unit 373 TOTAL HRS	3,274.00 sf	25,415	25,202	11,960	0	62,577
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		25,415	25,202	11,960	0	62,577
	Subcontractor Markups		7,573	6,047	3,139	0	16,760
	Prime Contractor Markups		3,155	2,285	1,444	0	6,884
TOTAL MS20033413 CEILING FINISHES		373 HRS	36,143	33,534	16,543	0	86,220
3,274.00 SF	*Level Unit Cost-->*		*11.04*	*10.24*	*5.05*	*0.00*	*26.33*
NOTE: 65% ESTIMATE INFORMATION USED							
MS2003141313 8" CMU	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
04221.03 - 45	CMU 8" Thk, Concrete Filled, Reinforced		9.70	9.52	4.57	0.00	23.79
SUB-422/421	0.136 hrs/unit 918 TOTAL HRS	6,750.00 sf	65,475	64,227	30,848	0	160,550
* LINE ITEM ASSEMBLY	Factor:1.0000						
01101.01 - 08	Scaffolding "Cost per sf "		1.15	0.89	0.41	0.00	2.44
SUB-111/421	0.013 hrs/unit 85 TOTAL HRS	6,750.00 SF	7,763	5,974	2,761	0	16,498
* LINE ITEM ASSEMBLY	Factor:1.0000						
09250.70 - 04	Material Stocking		0.00	0.52	0.11	0.00	0.63
SUB-911/421	0.007 hrs/unit 50 TOTAL HRS	6,750.00 SF	0	3,530	743	0	4,273
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		73,238	73,732	34,351	0	181,320
	Subcontractor Markups		23,461	19,630	9,622	0	52,713
	Prime Contractor Markups		9,248	6,825	4,206	0	20,279
TOTAL MS2003141313 8" CMU		1,054 HRS	105,946	100,186	48,179	0	254,312
6,750.00 SF	*Level Unit Cost-->*		*15.70*	*14.84*	*7.14*	*0.00*	*37.68*
MS20033611 METAL DOORS	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
65% ESTIMATE INFORMATION USED							
08131.31 - 31	Single Metal Door with 2' Transom (Incl. Hardware & Frame)		776.26	770.40	365.30	0.00	1,911.96
SUB-997/821	10.952 hrs/unit 66 TOTAL HRS	6.00 ea	4,658	4,622	2,192	0	11,472
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		4,658	4,622	2,192	0	11,472
	Subcontractor Markups		1,269	988	515	0	2,772
	Prime Contractor Markups		567	410	259	0	1,236
TOTAL MS20033611 METAL DOORS		66 HRS	6,493	6,021	2,966	0	15,480
6.00 EA	*Level Unit Cost-->*		*1,082.23*	*1,003.46*	*494.29*	*0.00*	*2,579.98*
NOTE: 65% ESTIMATE INFORMATION USED							

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
MS2003 UNDERGROUND STATION							
MS20033612 ACCESS DOORS AND FRAMES	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
65% ESTIMATE INFORMATION USED							
08311.31 - 03	Roll Up Door, 10' x10' high, Fire Rated		1164.38	1155.61	547.95	0.00	2,867.94
SUB-821/821	16.428 hrs/unit 49 TOTAL HRS	3.00 ea	3,493	3,467	1,644	0	8,604
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		3,493	3,467	1,644	0	8,604
	Subcontractor Markups		1,189	1,006	511	0	2,706
	Prime Contractor Markups		448	327	206	0	981
TOTAL MS20033612 ACCESS DOORS AND FRAMES		49 HRS	5,130	4,800	2,361	0	12,291
3.00 EA	*Level Unit Cost-->*		*1,710.16*	*1,599.95*	*786.91*	*0.00*	*4,097.01*
NOTE: 65% ESTIMATE INFORMATION USED							
MS20033613 SPECIAL COATINGS	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
65% ESTIMATE INFORMATION USED							
09962.30 - 01	Concrete Sealer		0.19	0.19	0.09	0.00	0.48
SUB-997/312	0.003 hrs/unit 41 TOTAL HRS	13,243.00 sf	2,570	2,546	1,209	0	6,326
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		2,570	2,546	1,209	0	6,326
	Subcontractor Markups		700	544	284	0	1,529
	Prime Contractor Markups		313	226	143	0	682
TOTAL MS20033613 SPECIAL COATINGS		41 HRS	3,583	3,317	1,636	0	8,536
13,243.00 SF	*Level Unit Cost-->*		*0.27*	*0.25*	*0.12*	*0.00*	*0.64*
NOTE: 65% ESTIMATE INFORMATION USED							
MS20033614 SIGNAGE & DIRECTORIES	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
65% ESTIMATE INFORMATION USED							
10142.31 - 30	Station Signage Allowance		4657.53	4618.63	2191.78	0.00	11,467.94
SUB-823/911	68.316 hrs/unit 68 TOTAL HRS	1.00 ls	4,658	4,619	2,192	0	11,468
	Subtotal Direct Costs		4,658	4,619	2,192	0	11,468
	Subcontractor Markups		1,410	1,119	591	0	3,121
	Prime Contractor Markups		580	419	266	0	1,266
TOTAL MS20033614 SIGNAGE & DIRECTORIES		68 HRS	6,648	6,157	3,049	0	15,855
NOTE: 65% ESTIMATE INFORMATION USED							
MS20033615 FIRE EQUIPMENT CABINETS	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
65% ESTIMATE INFORMATION USED							
10441.35 - 30	Fire Extinguisher Cabinet, Recessed Stainless Steel		291.10	288.66	136.99	0.00	716.75
SUB-823/911	4.27 hrs/unit 34 TOTAL HRS	8.00 ea	2,329	2,309	1,096	0	5,734
10441.35 - 30	Fire Hose Cabinet		388.13	384.18	182.65	0.00	954.96
SUB-823/154	4.468 hrs/unit 9 TOTAL HRS	2.00 ea	776	768	365	0	1,910
	Subtotal Direct Costs		3,105	3,078	1,461	0	7,644
	Subcontractor Markups		940	746	394	0	2,080
	Prime Contractor Markups		387	280	177	0	844
TOTAL MS20033615 FIRE EQUIPMENT CABINETS		43 HRS	4,432	4,103	2,033	0	10,568
10.00 EA	*Level Unit Cost-->*		*443.21*	*410.31*	*203.27*	*0.00*	*1,056.78*
NOTE: 65% ESTIMATE INFORMATION USED							
MS2003141313 8" CMU	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
04221.03 - 45	CMU 8" Thk, Concrete Filled, Reinforced		9.70	9.52	4.57	0.00	23.79
SUB-422/421	0.136 hrs/unit 1326 TOTAL HRS	9,750.00 sf	94,575	92,773	44,558	0	231,905
* LINE ITEM ASSEMBLY	Factor:1.0000						
01101.01 - 08	Scaffolding "Cost per sf "		1.15	0.89	0.41	0.00	2.44
SUB-111/421	0.013 hrs/unit 123 TOTAL HRS	9,750.00 SF	11,213	8,629	3,988	0	23,830
* LINE ITEM ASSEMBLY	Factor:1.0000						
09250.70 - 04	Material Stocking		0.00	0.52	0.11	0.00	0.63
SUB-911/421	0.007 hrs/unit 73 TOTAL HRS	9,750.00 SF	0	5,099	1,073	0	6,172
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		105,788	106,501	49,618	0	261,907
	Subcontractor Markups		33,888	28,354	13,899	0	76,140
	Prime Contractor Markups		13,359	9,859	6,075	0	29,292
TOTAL MS2003141313 8" CMU		1,522 HRS	153,034	144,714	69,592	0	367,339
9,750.00 SF	*Level Unit Cost-->*		*15.70*	*14.84*	*7.14*	*0.00*	*37.68*

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
MS2003 UNDERGROUND STATION							
MS20034011 SPRAYED INSULATION	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
65% ESTIMATE INFORMATION USED							
07212.91 - 00	Sprayed Acoustic Insulation		2.77	2.68	1.31	0.00	6.76
SUB-711/711	0.045 hrs/unit 120 TOTAL HRS	2,650.00 sf	7,354	7,106	3,461	0	17,921
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		7,354	7,106	3,461	0	17,921
	Subcontractor Markups		2,384	1,921	1,015	0	5,321
	Prime Contractor Markups		931	660	428	0	2,019
TOTAL MS20034011 SPRAYED INSULATION		120 HRS	10,670	9,687	4,904	0	25,261
2,650.00 SF	*Level Unit Cost-->*		*4.03*	*3.66*	*1.85*	*0.00*	*9.53*
NOTE: 65% ESTIMATE INFORMATION USED							
MS20034013 METAL DOORS	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
65% ESTIMATE INFORMATION USED							
08131.31 - 31	Single Metal Door with 2' Transom (Incl. Hardware & Frame)		776.26	770.41	365.30	0.00	1,911.96
SUB-997/821	10.952 hrs/unit 33 TOTAL HRS	3.00 ea	2,329	2,311	1,096	0	5,736
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		2,329	2,311	1,096	0	5,736
	Subcontractor Markups		635	494	258	0	1,386
	Prime Contractor Markups		283	205	129	0	618
TOTAL MS20034013 METAL DOORS		33 HRS	3,247	3,010	1,483	0	7,740
3.00 EA	*Level Unit Cost-->*		*1,082.23*	*1,003.46*	*494.29*	*0.00*	*2,579.99*
NOTE: 65% ESTIMATE INFORMATION USED							
MS20034016 CEILING FINISHES	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
65% ESTIMATE INFORMATION USED							
09590.01 - 01	Ceiling Suspension System		5.82	5.77	2.74	0.00	14.33
SUB-911/911	0.085 hrs/unit 226 TOTAL HRS	2,650.00 sf	15,428	15,299	7,260	0	37,988
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		15,428	15,299	7,260	0	37,988
	Subcontractor Markups		4,597	3,671	1,906	0	10,174
	Prime Contractor Markups		1,915	1,387	877	0	4,179
TOTAL MS20034016 CEILING FINISHES		226 HRS	21,941	20,357	10,043	0	52,340
2,650.00 SF	*Level Unit Cost-->*		*8.28*	*7.68*	*3.79*	*0.00*	*19.75*
NOTE: 65% ESTIMATE INFORMATION USED							
MS20034018 SPECIAL COATINGS	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
65% ESTIMATE INFORMATION USED							
09962.30 - 01	Concrete Sealer		0.19	0.19	0.09	0.00	0.48
SUB-997/312	0.003 hrs/unit 8 TOTAL HRS	2,650.00 sf	514	510	242	0	1,266
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		514	510	242	0	1,266
	Subcontractor Markups		140	109	57	0	306
	Prime Contractor Markups		63	45	29	0	136
TOTAL MS20034018 SPECIAL COATINGS		8 HRS	717	664	327	0	1,708
2,650.00 SF	*Level Unit Cost-->*		*0.27*	*0.25*	*0.12*	*0.00*	*0.64*
NOTE: 65% ESTIMATE INFORMATION USED							
MS2003141313 8" CMU	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
04221.03 - 45	CMU 8" Thk, Concrete Filled, Reinforced		9.70	9.52	4.57	0.00	23.79
SUB-422/421	0.136 hrs/unit 381 TOTAL HRS	2,805.00 sf	27,209	26,690	12,819	0	66,717
* LINE ITEM ASSEMBLY	Factor:1.0000						
01101.01 - 08	Scaffolding "Cost per sf "		1.15	0.89	0.41	0.00	2.44
SUB-111/421	0.013 hrs/unit 35 TOTAL HRS	2,805.00 SF	3,226	2,483	1,147	0	6,856
* LINE ITEM ASSEMBLY	Factor:1.0000						
09250.70 - 04	Material Stocking		0.00	0.52	0.11	0.00	0.63
SUB-911/421	0.007 hrs/unit 21 TOTAL HRS	2,805.00 SF	0	1,467	309	0	1,776
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		30,434	30,640	14,275	0	75,349
	Subcontractor Markups		9,749	8,157	3,999	0	21,905
	Prime Contractor Markups		3,843	2,836	1,748	0	8,427
TOTAL MS2003141313 8" CMU		438 HRS	44,027	41,633	20,021	0	105,681
2,805.00 SF	*Level Unit Cost-->*		*15.70*	*14.84*	*7.14*	*0.00*	*37.68*

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
MS2003 UNDERGROUND STATION							
MS20034811 STAIRS	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
	65% ESTIMATE INFORMATION USED						
05511.35 - 00	Concrete Stair Tread and Riser, 6' Wide, Stair 5		450.01	188.41	54.00	0.00	692.43
SUB-997/120	2.6 hrs/unit 44 TOTAL HRS	17.00 risr	7,650	3,203	918	0	11,771
05511.35 - 00	Metal Pan Stair Tread and Riser, 6' Wide, Stairs		675.01	49.01	14.39	0.00	738.41
SUB-511/511	0.728 hrs/unit 12 TOTAL HRS	17.00 risr	11,475	833	245	0	12,553
05511.35 - 00	Stair Nosing		2.08	2.06	0.98	0.00	5.12
SUB-511/421	0.029 hrs/unit 3 TOTAL HRS	112.00 lf	233	231	110	0	574
05511.35 - 00	Stair Landing		92.00	0.00	0.00	0.00	92.00
SUB-511/120		30.00 sf	2,760	0	0	0	2,760
	Subtotal Direct Costs		22,118	4,267	1,272	0	27,658
	Subcontractor Markups		6,711	968	315	0	7,994
	Prime Contractor Markups		2,757	383	152	0	3,292
TOTAL MS20034811 STAIRS		60 HRS	31,587	5,618	1,739	0	38,944
NOTE: 65% ESTIMATE INFORMATION USED							
MS20034812 RAILINGS	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
	65% ESTIMATE INFORMATION USED						
05521.35 - 01	Metal Railing		120.00	20.58	1.31	0.00	141.90
SUB-511/511	0.306 hrs/unit 15 TOTAL HRS	50.00 lf	6,000	1,029	66	0	7,095
	* LINE ITEM ASSEMBLY Factor:1.0000						
	Subtotal Direct Costs		6,000	1,029	66	0	7,095
	Subcontractor Markups		1,919	274	18	0	2,211
	Prime Contractor Markups		757	95	8	0	861
TOTAL MS20034812 RAILINGS		15 HRS	8,676	1,399	92	0	10,167
50.00 LF	*Level Unit Cost-->*		*173.52*	*27.97*	*1.84*	*0.00*	*203.33*
NOTE: 65% ESTIMATE INFORMATION USED							
MS20037413 HVAC	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
	AECOM INFORMATION AND ORGANIZATION WAS USED FOR HVAC & EMERGENCY VENTILATION.						
23000.01 - 03	HVAC Ductwork Furnish & Install		0.50	5.83	0.16	0.00	6.49
SUB-152/152	0.067 hrs/unit 236 TOTAL HRS	3,500.00 lb	1,752	20,405	575	0	22,732
23000.01 - 03	Motorized Dampers		500.00	194.32	5.48	0.00	699.80
SUB-152/152	2.247 hrs/unit 7 TOTAL HRS	3.00 ea	1,500	583	16	0	2,099
23000.01 - 03	Dampers		100.00	194.33	5.48	0.00	299.81
SUB-152/152	2.247 hrs/unit 7 TOTAL HRS	3.00 ea	300	583	16	0	899
	Subtotal Direct Costs		3,552	21,571	608	0	25,731
	Subcontractor Markups		1,084	5,473	161	0	6,718
	Prime Contractor Markups		443	1,977	74	0	2,494
TOTAL MS20037413 HVAC		249 HRS	5,079	29,021	843	0	34,943
NOTE: AECOM INFORMATION AND ORGANIZATION WAS USED FOR HVAC & EMERGENCY VENTILATION.							
MS20037416 DIFFUSERS, REGISTERS, AND GRILLES	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
	AECOM INFORMATION AND ORGANIZATION WAS USED FOR HVAC & EMERGENCY VENTILATION.						
23371.30 - 00	Ceiling Diffuser, 24"x24"		164.96	94.44	6.81	0.00	266.21
SUB-153/152	1.092 hrs/unit 3 TOTAL HRS	3.00 ea	495	283	20	0	799
23371.30 - 01	Wall Register		149.95	63.03	4.57	0.00	217.55
SUB-153/152	0.729 hrs/unit 1 TOTAL HRS	1.00 ea	150	63	5	0	218
23371.30 - 02	Grilles		100.02	94.40	6.79	0.00	201.21
SUB-153/152	1.092 hrs/unit 4 TOTAL HRS	4.00 ea	400	378	27	0	805
	Subtotal Direct Costs		1,045	724	52	0	1,821
	Subcontractor Markups		325	179	14	0	518
	Prime Contractor Markups		131	66	6	0	203
TOTAL MS20037416 DIFFUSERS, REGISTERS, AND GRILLES		8 HRS	1,501	969	73	0	2,543
NOTE: AECOM INFORMATION AND ORGANIZATION WAS USED FOR HVAC & EMERGENCY VENTILATION.							
MS20037612 MOS_01AF_EL.111 - WIRE	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
	HILL ASSEMBLIES WERE INTEGRATED WITH AECOM INFORMATION FOR LIGHTING.						
26051.99 - 03	Wire, copper 600 volt, #12 XHHW		0.24	0.80	0.06	0.00	1.10
SUB-161/161	0.009 hrs/unit 137 TOTAL HRS	15,000.00 lf	3,608	12,067	868	0	16,544
	* LINE ITEM ASSEMBLY Factor:1.0000						

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
MS2003 UNDERGROUND STATION							
MS20037612 MOS_01AF_EL.111 - WIRE	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
HILL ASSEMBLIES WERE INTEGRATED WITH AECOM INFORMATION FOR LIGHTING.							
	Subtotal Direct Costs		3,608	12,067	868	0	16,544
	Subcontractor Markups		1,245	3,475	264	0	4,985
	Prime Contractor Markups		464	1,136	108	0	1,709
	TOTAL MS20037612 MOS_01AF_EL.111 - WIRE	137 HRS	5,318	16,679	1,241	0	23,238
	15,000.00 LF	*Level Unit Cost-->*	*0.35*	*1.11*	*0.08*	*0.00*	*1.55*
NOTE: HILL ASSEMBLIES WERE INTEGRATED WITH AECOM INFORMATION FOR LIGHTING.							
MS20037613 MOS_01AE_EL.111 - CONDUIT	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
HILL ASSEMBLIES WERE INTEGRATED WITH AECOM INFORMATION FOR LIGHTING.							
26053.30 - 51	GRS Conduit 3/4" incl Fittings		3.15	10.88	0.78	0.00	14.81
SUB-161/161	0.123 hrs/unit 462 TOTAL HRS	3,750.00 lf	11,812	40,797	2,922	0	55,531
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		11,812	40,797	2,922	0	55,531
	Subcontractor Markups		4,077	11,748	890	0	16,715
	Prime Contractor Markups		1,520	3,841	365	0	5,725
	TOTAL MS20037613 MOS_01AE_EL.111 - CONDUIT	462 HRS	17,408	56,387	4,176	0	77,972
	3,750.00 LF	*Level Unit Cost-->*	*4.64*	*15.04*	*1.11*	*0.00*	*20.79*
NOTE: HILL ASSEMBLIES WERE INTEGRATED WITH AECOM INFORMATION FOR LIGHTING.							
MS20037614 MOS_01_EL.121 - SINGLE POLE SWITCH	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
HILL ASSEMBLIES WERE INTEGRATED WITH AECOM INFORMATION FOR LIGHTING.							
26272.62 - 01	Light Switch incl Box & Cover		25.00	94.60	6.79	0.00	126.39
SUB-161/161	1.071 hrs/unit 4 TOTAL HRS	4.00 ea	100	378	27	0	506
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		100	378	27	0	506
	Subcontractor Markups		35	109	8	0	152
	Prime Contractor Markups		13	36	3	0	52
	TOTAL MS20037614 MOS_01_EL.121 - SINGLE POLE SWITCH	4 HRS	147	523	39	0	709
	4.00 EA	*Level Unit Cost-->*	*36.85*	*130.75*	*9.70*	*0.00*	*177.30*
NOTE: HILL ASSEMBLIES WERE INTEGRATED WITH AECOM INFORMATION FOR LIGHTING.							
MS20037621 MOS_01AC_EL.131 - FIXTURE F7	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
HILL ASSEMBLIES WERE INTEGRATED WITH AECOM INFORMATION FOR LIGHTING.							
26511.30 - 01	Fixture F7 - Linear Fluorescent 4', ELP#132		125.00	165.56	11.86	0.00	302.41
SUB-161/161	1.874 hrs/unit 187 TOTAL HRS	100.00 ea	12,500	16,555	1,186	0	30,241
* LINE ITEM ASSEMBLY	Factor:1.0000						
	Subtotal Direct Costs		12,500	16,555	1,186	0	30,241
	Subcontractor Markups		4,315	4,767	361	0	9,443
	Prime Contractor Markups		1,608	1,559	148	0	3,315
	TOTAL MS20037621 MOS_01AC_EL.131 - FIXTURE F7	187 HRS	18,423	22,882	1,695	0	43,000
	100.00 EA	*Level Unit Cost-->*	*184.23*	*228.82*	*16.95*	*0.00*	*430.00*
NOTE: HILL ASSEMBLIES WERE INTEGRATED WITH AECOM INFORMATION FOR LIGHTING.							
	SUBTOTAL MS200376 ELECTRICAL - LIGHTING		28,020	69,799	5,004	0	102,822
	MARKUP		*1.474*	*1.382*	*1.429*	*0.000*	*1.409*
	TOTAL MS200376 ELECTRICAL - LIGHTING		41,297	96,470	7,151	0	144,918
MS40 SITEWORK & SPECIAL CONDITIONS							
MS4008 TEMPORARY FACILITIES							
MS40080021 FIELD OVERHEAD, DETAIL ITEMS	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
01101.01 - 05	Project Director		0.00	168.11	0.00	0.00	168.11
SUB-997/1101	1 hrs/unit 100 TOTAL HRS	100.00 MH	0	16,811	0	0	16,811
* LINE ITEM ASSEMBLY	Factor:100.0000						
01101.01 - 05	Project Manager		0.00	144.10	0.00	0.00	144.10
SUB-997/1102	1 hrs/unit 176 TOTAL HRS	176.00 MH	0	25,362	0	0	25,362
* LINE ITEM ASSEMBLY	Factor:176.0000						
01101.01 - 05	General Superintendent		0.00	87.76	0.00	0.00	87.76
SUB-997/1104	1 hrs/unit 150 TOTAL HRS	150.00 MH	0	13,164	0	0	13,164
* LINE ITEM ASSEMBLY	Factor:150.0000						
01101.01 - 05	Asst. Superintendent		0.00	68.68	0.00	0.00	68.68
SUB-997/1105	1 hrs/unit 125 TOTAL HRS	125.00 MH	0	8,585	0	0	8,585
* LINE ITEM ASSEMBLY	Factor:125.0000						
01101.01 - 05	Project Engineer		0.00	138.09	0.00	0.00	138.09
SUB-997/1103	1 hrs/unit 176 TOTAL HRS	176.00 MH	0	24,304	0	0	24,304

CODE	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	* LINE ITEM ASSEMBLY Factor:176.0000							
01101.01 - 05	Admin / Secretary			0.00	48.04	0.00	0.00	48.04
	SUB-997/1106 1 hrs/unit 176 TOTAL HRS	176.00	MH	0	8,455	0	0	8,455
	* LINE ITEM ASSEMBLY Factor:176.0000							
01101.01 - 05	Payroll / Timekeeper			0.00	38.42	0.00	0.00	38.42
	SUB-997/1107 1 hrs/unit 80 TOTAL HRS	80.00	MH	0	3,074	0	0	3,074
	* LINE ITEM ASSEMBLY Factor:80.0000							
01101.01 - 05	Cost Engineer - Accountant "Pre Construction"			0.00	72.05	0.00	0.00	72.05
	SUB-997/1108 1 hrs/unit 80 TOTAL HRS	80.00	MH	0	5,764	0	0	5,764
	* LINE ITEM ASSEMBLY Factor:80.0000							
01101.01 - 05	Project Scheduler			0.00	72.05	0.00	0.00	72.05
	SUB-997/1110 1 hrs/unit 80 TOTAL HRS	80.00	MH	0	5,764	0	0	5,764
	* LINE ITEM ASSEMBLY Factor:80.0000							
01101.01 - 05	Project Estimator			0.00	86.46	0.00	0.00	86.46
	SUB-997/1111 1 hrs/unit 40 TOTAL HRS	40.00	MH	0	3,459	0	0	3,459
	* LINE ITEM ASSEMBLY Factor:40.0000							
01101.01 - 05	Qualtity Control			0.00	96.06	0.00	0.00	96.06
	SUB-997/1112 1 hrs/unit 150 TOTAL HRS	150.00	MH	0	14,409	0	0	14,409
	* LINE ITEM ASSEMBLY Factor:150.0000							
01101.01 - 05	Estimator "Chief - Senior"			0.00	138.09	0.00	0.00	138.09
	SUB-997/1113 1 hrs/unit 10 TOTAL HRS	10.00	MH	0	1,381	0	0	1,381
	* LINE ITEM ASSEMBLY Factor:10.0000							
	Subtotal Direct Costs			0	130,532	0	0	130,532
	Subcontractor Markups			0	27,905	0	0	27,905
	Prime Contractor Markups			0	11,582	0	0	11,582
	TOTAL MS40080021 FIELD OVERHEAD, DETAIL ITEMS	1,343	HRS	0	170,019	0	0	170,019
	MS40080022 GC EXPENSES *LEVEL CONTRACTOR ID APPLIED--PRIME*							
01101.01 - 06	On Site Vehicle Pm			0.00	0.00	3.50	0.00	3.50
	SUB-997/NoCrew 1 hrs/unit 176 TOTAL HRS	176.00	HR	0	0	616	0	616
	* LINE ITEM ASSEMBLY Factor:176.0000							
01101.01 - 06	On Site Vehicle Super			0.00	0.00	3.50	0.00	3.50
	SUB-997/NoCrew 96 hrs/unit 14400 TOTAL HRS	150.00	HR	0	0	525	0	525
	* LINE ITEM ASSEMBLY Factor:150.0000							
01101.01 - 06	On Site Vehicle Others			0.00	0.00	3.25	0.00	3.25
	SUB-997/NoCrew 96 hrs/unit 33792 TOTAL HRS	352.00	HR	0	0	1,144	0	1,144
	* LINE ITEM ASSEMBLY Factor:352.0000							
01101.01 - 08	Field Office "Storefront"			0.00	0.00	35.00	0.00	35.00
	SUB-997/NoCrew 96 hrs/unit 16896 TOTAL HRS	176.00	HR	0	0	6,160	0	6,160
	* LINE ITEM ASSEMBLY Factor:176.0000							
01101.01 - 08	Computers - Monitors			0.00	0.00	0.55	0.00	0.55
	SUB-997/NoCrew 96 hrs/unit 135168 TOTAL HRS	1,408.00	HR	0	0	774	0	774
	* LINE ITEM ASSEMBLY Factor:1408.0000							
01101.01 - 08	Software			0.30	0.00	0.00	0.00	0.30
	SUB-997/NoCrew 96 hrs/unit 135168 TOTAL HRS	1,408.00	HR	422	0	0	0	422
	* LINE ITEM ASSEMBLY Factor:1408.0000							
01101.01 - 08	Printers			0.00	0.00	1.10	0.00	1.10
	SUB-997/NoCrew 96 hrs/unit 33792 TOTAL HRS	352.00	HR	0	0	387	0	387
	* LINE ITEM ASSEMBLY Factor:352.0000							
01101.01 - 08	Office Furniture			0.00	0.00	1.75	0.00	1.75
	SUB-997/NoCrew 96 hrs/unit 16896 TOTAL HRS	176.00	HR	0	0	308	0	308
	* LINE ITEM ASSEMBLY Factor:176.0000							
01101.01 - 08	Office Supplies			4.50	0.00	0.00	0.00	4.50
	SUB-997/NoCrew 96 hrs/unit 16800 TOTAL HRS	175.00	HR	788	0	0	0	788
	* LINE ITEM ASSEMBLY Factor:175.0000							
01101.01 - 08	Postage - Special Delievery Services			0.30	0.00	0.00	0.00	0.30
	SUB-997/NoCrew 96 hrs/unit 16896 TOTAL HRS	176.00	HR	53	0	0	0	53
	* LINE ITEM ASSEMBLY Factor:176.0000							
01101.01 - 08	First Aid Supplies			0.25	0.00	0.00	0.00	0.25
	SUB-997/NoCrew 96 hrs/unit 16896 TOTAL HRS	176.00	HR	44	0	0	0	44
	* LINE ITEM ASSEMBLY Factor:176.0000							
01101.01 - 08	Cups - Ice - Drinking Water			0.30	0.00	0.00	0.00	0.30
	SUB-997/NoCrew 96 hrs/unit 16896 TOTAL HRS	176.00	HR	53	0	0	0	53
	* LINE ITEM ASSEMBLY Factor:176.0000							
01101.01 - 08	Printing - Blue Prints			0.40	0.00	0.00	0.00	0.40
	SUB-997/NoCrew 96 hrs/unit 16896 TOTAL HRS	176.00	HR	70	0	0	0	70
	* LINE ITEM ASSEMBLY Factor:176.0000							
01101.01 - 08	Photo Copier Machine			0.60	0.00	0.22	0.00	0.82
	SUB-997/NoCrew 96 hrs/unit 16896 TOTAL HRS	176.00	HR	106	0	39	0	144
	* LINE ITEM ASSEMBLY Factor:176.0000							
01101.01 - 08	Photo Copier Supplies			0.15	0.00	2.00	0.00	2.15
	SUB-997/NoCrew 96 hrs/unit 16896 TOTAL HRS	176.00	HR	26	0	352	0	378
	* LINE ITEM ASSEMBLY Factor:176.0000							
01101.01 - 08	Storage & Tool Trailers			0.00	0.00	2.00	0.00	2.00
	SUB-997/NoCrew 96 hrs/unit 33792 TOTAL HRS	352.00	HR	0	0	704	0	704

CODE	DESCRIPTION / SUB/CREW	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	* LINE ITEM ASSEMBLY Factor:352.0000							
01101.01 - 08	Equip Rental/Small Tools			0.00	0.00	3.00	0.00	3.00
	SUB-997/NoCrew 96 hrs/unit 16896 TOTAL HRS	176.00	HR	0	0	528	0	528
	* LINE ITEM ASSEMBLY Factor:176.0000							
01101.01 - 08	Small Tools Expendable			1.50	0.00	0.00	0.00	1.50
	SUB-997/NoCrew 96 hrs/unit 16896 TOTAL HRS	176.00	HR	264	0	0	0	264
	* LINE ITEM ASSEMBLY Factor:176.0000							
01101.01 - 08	Telephone Exp, Incl Cell			1.10	0.00	0.00	0.00	1.10
	SUB-997/NoCrew 96 hrs/unit 33792 TOTAL HRS	352.00	HR	387	0	0	0	387
	* LINE ITEM ASSEMBLY Factor:352.0000							
01101.01 - 08	Internet Connections - Service			0.00	0.00	0.25	0.00	0.25
	SUB-997/NoCrew 96 hrs/unit 135168 TOTAL HRS	1,408.00	HR	0	0	352	0	352
	* LINE ITEM ASSEMBLY Factor:1408.0000							
01101.01 - 08	Network / Communications Eqpt			0.00	0.00	1.20	0.00	1.20
	SUB-997/NoCrew 96 hrs/unit 16896 TOTAL HRS	176.00	HR	0	0	211	0	211
	* LINE ITEM ASSEMBLY Factor:176.0000							
01101.01 - 08	Field Radios			0.00	0.00	2.20	0.00	2.20
	SUB-997/NoCrew 96 hrs/unit 16896 TOTAL HRS	176.00	HR	0	0	387	0	387
	* LINE ITEM ASSEMBLY Factor:176.0000							
01101.01 - 08	Temporary Toilets (5)			0.00	0.00	1.20	0.00	1.20
	SUB-997/NoCrew 96 hrs/unit 33792 TOTAL HRS	352.00	HR	0	0	422	0	422
	* LINE ITEM ASSEMBLY Factor:352.0000							
01101.01 - 08	Temporary Lighting & Elec Hourly Charges			0.00	0.00	2.00	0.00	2.00
	SUB-997/NoCrew 96 hrs/unit 16896 TOTAL HRS	176.00	HR	0	0	352	0	352
	* LINE ITEM ASSEMBLY Factor:176.0000							
01101.01 - 08	Fire Protection Equipment			0.00	0.00	0.15	0.00	0.15
	SUB-997/NoCrew 96 hrs/unit 14400 TOTAL HRS	150.00	HR	0	0	23	0	23
	* LINE ITEM ASSEMBLY Factor:150.0000							
01101.01 - 08	Temp Heat/Winter Weather Hourly Charges			0.00	0.00	0.07	0.00	0.07
	SUB-997/NoCrew 96 hrs/unit 7680 TOTAL HRS	80.00	HR	0	0	6	0	6
	* LINE ITEM ASSEMBLY Factor:80.0000							
01101.01 - 08	Trash Hauling			3.75	0.00	0.00	0.00	3.75
	SUB-997/NoCrew 96 hrs/unit 14400 TOTAL HRS	150.00	HR	563	0	0	0	563
	* LINE ITEM ASSEMBLY Factor:150.0000							
01101.01 - 09	Man / Material Lift "Operator"			0.00	69.48	0.00	0.00	69.49
	SUB-997/221 1 hrs/unit 120 TOTAL HRS	120.00	MH	0	8,338	0	0	8,338
	* LINE ITEM ASSEMBLY Factor:120.0000							
	Subtotal Direct Costs			2,776	8,338	13,290	0	24,404
	Subcontractor Markups			756	1,783	3,123	0	5,662
	Prime Contractor Markups			338	740	1,570	0	2,647
TOTAL MS40080022 GC EXPENSES		862,088	HRS	3,870	10,861	17,983	0	32,714
	SUBTOTAL MS400800 MOSCONE STATION			2,776	138,870	13,290	0	154,936
	MARKUP			*1.394*	*1.303*	*1.353*	*0.000*	*1.308*
	TOTAL MS400800 MOSCONE STATION			3,870	180,880	17,983	0	202,733

**.*% OF PROJECT PERFORMED BY SUBCONTRACTORS

76 DETAIL LINE ITEMS

central T subway

Connecting people. Connecting communities.

CENTRAL SUBWAY PROJECT
Secondary Mitigations

MITIGATION MEASURE #34
Reduce Length of Platforms to 175 Feet – MOS & CTS

Scope Description

The scope of the work included in this estimate is the reduction of the platform length for both the Moscone Station and the Chinatown Station to 175 feet long. The Moscone Station platform's original length was considered to be 275 feet long and the Chinatown Station platform was based on a length of 350 feet. The only reductions in these stations is for the invert slab, platform slab and platform slab finish. This estimate does not take into consideration a reduction of the station sizes or exterior wall structure. This option can be included in a later estimate.

Basis of Estimate

Standard progress estimate methods and assumptions were utilized from existing in progress estimates for designs above and beyond existing published 65% designs. Refer to the basis of estimate for the interim estimates for basic markups, labor rates, assumptions and general exclusions for this estimate. Contractor and subcontractor markups were included in this estimate.

Order of Magnitude Estimate

Estimated Cost Reduction = $5,374,771

PROJECT: MOSCONE STATION
PROJECT SITE: SAN FRANCISCO, CA
A/E NAME: SFMTA - DESIGN GROUP
PROJECT SIZE: 1.00LS
CONSTRUCTION FUNDS AVAILABLE, DOLLARS: $130,000,000

ESTIMATOR: HILL
CAT CODE:
UIC:
PROJECT #: MOS-70%
DATE OF ESTIMATE: 8/26/11 REV 0e

WBS CODE	DESCRIPTION	COST/WBS BASED ON 1 LS	COST/ WBS UNIT	TOTAL MARKED UP COSTS MATL	LABOR	EQUIP	UNIT COST	TOTAL
	MOS PROGRESS ESTIMATE 8/26/2011 REV 0e, PROJECT TOTALS							**5,375,000**
PROJECT LEVEL NOTE:	BASE COST - REDUCTION IN GC FACILITIES + SUB OH & SALES TAX+REVISED GC_SUB MU							
	*****PROJECT SUBTOTALS****			1,684,314	2,926,835	763,622	0	5,374,771
BASE BID				**1,684,314**	**2,926,835**	**763,622**	**0**	**5,374,771**
-1255 MOSCONE STATION				**770,745**	**1,080,837**	**171,377**	**0**	**2,022,959**
MSMOSCONE STATION - PKG 1255				**770,745**	**1,080,837**	**171,377**	**0**	**2,022,959**
MS20	STATIONS - STOPS			762,420	807,186	143,246	0	1,712,852
MS2003	UNDERGROUND STATION			762,420	807,186	143,246	0	1,712,852
MS200324	STRUCTURAL - STATION PLATFORM LEVEL			92,900	138,587	23,112	0	254,599
MS200325	STRUCTURAL - UNDER PLATFORM LEVEL			618,993	632,968	102,519	0	1,354,480
MS200344	ARCHITECTURAL - STATION PLATFORM LEVEL			50,527	35,631	17,615	0	103,773
MS40	SITEWORK & SPECIAL CONDITIONS			8,325	273,651	28,132	0	310,107
**	*AECOM INFORMATION AND ORGANIZATION WAS USED FOR SITEWORK & SPECIAL CONDITIONS.*							
MS4008	TEMPORARY FACILITIES			8,325	273,651	28,132	0	310,107
MS400800	MOSCONE STATION			8,325	273,651	28,132	0	310,107
-CHINATOWN STATION - PACKAGE 1254				**913,569**	**1,845,998**	**592,245**	**0**	**3,351,812**
CT STATIONS, STOPS, TERMINALS, INTERMODAL (NUMBER)				**913,569**	**1,845,998**	**592,245**	**0**	**3,351,812**
CT20	UNDERGROUND STATION, STOP, SHELTER, MALL, TERMINAL, PLATFORM			901,375	1,391,467	546,130	0	2,838,972
CT2003	EXCAVATION & GROUND SUPPORT - PLATFORM CAVERN			157,426	546,611	384,575	0	1,088,612
CT200310	CTS_017_ES.701-Platform_1_Exc/Supp.-Bench/Invert_Center	5@ 83981.81DY		60,202	192,237	133,877	0	386,316
CT200310	CTS_024_ES.701-Platform_2_Exc/Supp.-Bench/Invert_Center	7@ 100327.92DY		97,223	354,374	250,698	0	702,295
CT2003	STRUCTURAL - HEADHOUSE/STATION UNDER PLATFORM LEVEL			551,551	612,593	104,283	0	1,268,428
CT200350	CONCRETE SLABS			551,551	612,593	104,283	0	1,268,428
CT2003	STRUCTURAL - STATION PLATFORM LEVEL			142,654	186,452	41,913	0	371,018
CT200354	CONCRETE SLABS			142,654	186,452	41,913	0	371,018
CT2003	ARCHITECTURAL - STATION PLATFORM LEVEL			49,744	45,811	15,359	0	110,914
CT200366	FLOOR FINISHES	4596@ 24.13SF		49,744	45,811	15,359	0	110,914
MS40	SITEWORK & SPECIAL CONDITIONS			12,194	454,531	46,115	0	512,840
**	*AECOM INFORMATION AND ORGANIZATION WAS USED FOR SITEWORK & SPECIAL CONDITIONS.*							
MS4008	TEMPORARY FACILITIES			12,194	454,531	46,115	0	512,840
MS400800	CHINATOWN STATION			12,194	454,531	46,115	0	512,840

PROJECT: MOSCONE STATION
PROJECT SITE: SAN FRANCISCO, CA
A/E NAME: SFMTA - DESIGN GROUP
PROJECT SIZE: 1.00 LS
CONSTRUCTION FUNDS AVAILABLE: 130,000,000 USD
CURRENCY: DOLLARS

ESTIMATOR: HILL
CAT CODE:
UIC:
PROJECT #: MOS-70%
DATE OF ESTIMATE: 8/26/11 REV 0e
BID DATE: FALL 2011

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
MOSCONE STATION - PKG 1255 STATIONS - STOPSMS UNDERGROUND STATION							
MSSTRUCTURAL - STATION PLATFORM LEVEL							
MS20 STATIONS - STOPS							
MS2003 UNDERGROUND STATION							
MS2003241111 MOS_A_ST.441 - CONCRETE PLATFORM SLAB 8 IN THICK	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
ASSEMBLY USED - SEE QS SURVEY SHEET NO CONNECTION DETAIL PROVIDED, PRODUCTION 9.6							
03310.22 - 00	Struc PCC/ready mx/normal wt/4000PSI incl Flagger		106.00	91.22	0.00	0.00	197.22
SUB-997/311	1.233 hrs/unit 65 TOTAL HRS	52.86 CY	5,603	4,822	0	0	10,425
* LINE ITEM ASSEMBLY	Factor:0.0200						
03350.30 - 00	Struct Concrete - Pump & Place		0.00	7.88	8.50	0.00	16.38
SUB-997/312	0.127 hrs/unit 7 TOTAL HRS	52.86 CY	0	417	449	0	866
* LINE ITEM ASSEMBLY	Factor:0.0200						
03350.30 - 00	Finishing floors, monolithic, screed, float & machine finish		0.00	0.65	0.03	0.00	0.67
SUB-997/312	0.01 hrs/unit 27 TOTAL HRS	2,643.00 SF	0	1,705	68	0	1,773
* LINE ITEM ASSEMBLY	Factor:1.0000						
02466.00 - 02	Strip Forms, Post pour clean-up, Cure		0.09	0.66	0.23	0.00	0.98
SUB-997/221	0.01 hrs/unit 27 TOTAL HRS	2,847.76 CSFA	256	1,880	655	0	2,791
* LINE ITEM ASSEMBLY	Factor:1.0775						
07170.70 - 00	Waterproofing		4.91	4.71	0.09	0.00	9.71
SUB-997/111	0.081 hrs/unit 213 TOTAL HRS	2,643.00 SF	12,977	12,458	241	0	25,676
* LINE ITEM ASSEMBLY	Factor:1.0000						
03210.60 - 01	Reinfrcng stl/in place/typical/avg/und 10 tn job/#3-#7/A615/Grd 60		0.80	0.66	0.05	0.00	1.51
SUB-323/323	0.01 hrs/unit 238 TOTAL HRS	23,268.18 LBS	18,615	15,396	1,190	0	35,201
* LINE ITEM ASSEMBLY	Factor:8.8037						
03110.44 - 56	Strip Forms Clean-Up - Cure		0.09	1.48	0.58	0.00	2.15
SUB-997/311	0.02 hrs/unit 53 TOTAL HRS	2,643.00 SF	238	3,912	1,533	0	5,682
* LINE ITEM ASSEMBLY	Factor:1.0000						
03110.01 - 00	Formwork - Deck Support Beam		5.00	10.95	1.86	0.00	17.81
SUB-997/311	0.148 hrs/unit 813 TOTAL HRS	5,490.75 sf	27,454	60,134	10,213	0	97,800
* LINE ITEM ASSEMBLY	Factor:2.0775						
03110.44 - 55	Screed/24 ga Mtl key joInt/see Div 03150-250		0.17	0.36	0.03	0.00	0.55
SUB-997/311	0.005 hrs/unit 13 TOTAL HRS	2,643.00 SF	449	945	71	0	1,465
* LINE ITEM ASSEMBLY	Factor:1.0000						
09250.70 - 04	Material Stocking		0.00	0.18	0.11	0.00	0.29
SUB-911/111	0.003 hrs/unit 70 TOTAL HRS	23,268.18 LBS	0	4,087	2,560	0	6,647
* LINE ITEM ASSEMBLY	Factor:8.8037						
	Subtotal Direct Costs		65,592	105,754	16,980	0	188,326
	Subcontractor Markups		19,199	23,391	4,115	0	46,705
	Prime Contractor Markups		8,109	9,441	2,018	0	19,568
TOTAL MS2003241111 MOS_A_ST.441 - CONCRETE PLATFORM SLAB 8 IN THICK		1,253 HRS	92,900	138,587	23,112	0	254,599
			35.15	*52.44*	*8.74*	*0.00*	*96.33*
2,643.00 SF	*Level Unit Cost-->*						
NOTE: ASSEMBLY USED - SEE QS SURVEY SHEET NO CONNECTION DETAIL PROVIDED, PRODUCTION 9.642 PER CY							
MS2003251311 MOS_A_ST.441 - CONCRETE INVERT SLAB 72 IN THICK	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
ASSEMBLY USED - SEE QS SURVEY SHEET NO CONNECTION DETAIL PROVIDED, PRODUCTION 9.6							
03310.22 - 00	Struc PCC/ready mx/normal wt/4000PSI incl Flagger		106.00	91.22	0.00	0.00	197.22
SUB-997/311	1.233 hrs/unit 1501 TOTAL HRS	1,217.48 CY	129,053	111,057	0	0	240,110
* LINE ITEM ASSEMBLY	Factor:0.2200						
03350.30 - 00	Struct Concrete - Pump & Place		0.00	7.88	8.50	0.00	16.39
SUB-997/312	0.126 hrs/unit 168 TOTAL HRS	1,328.16 CY	0	10,473	11,289	0	21,762
* LINE ITEM ASSEMBLY	Factor:0.2400						
03350.30 - 00	Finishing floors, monolithic, screed, float & machine finish		0.00	0.65	0.03	0.00	0.67
SUB-997/312	0.01 hrs/unit 57 TOTAL HRS	5,534.00 SF	0	3,570	142	0	3,712
* LINE ITEM ASSEMBLY	Factor:1.0000						
02466.00 - 02	Strip Forms, Post pour clean-up, Cure		0.09	0.66	0.23	0.00	0.98
SUB-997/221	0.009 hrs/unit 68 TOTAL HRS	7,116.56 CSFA	640	4,698	1,637	0	6,975
* LINE ITEM ASSEMBLY	Factor:1.2860						
07170.70 - 00	Waterproofing		4.91	4.71	0.09	0.00	9.71
SUB-997/111	0.081 hrs/unit 445 TOTAL HRS	5,534.00 SF	27,172	26,085	505	0	53,762
* LINE ITEM ASSEMBLY	Factor:1.0000						
07130.00 - 00	Thermoplastic Sheet Waterproofing		6.30	1.89	0.91	0.00	9.10
SUB-997/711	0.032 hrs/unit 177 TOTAL HRS	5,534.00 sf	34,864	10,452	5,036	0	50,352

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	ASSEMBLY USED - SEE QS SURVEY SHEET NO CONNECTION DETAIL PROVIDED, PRODUCTION 9.6						
	* LINE ITEM ASSEMBLY Factor:1.0000						
03310.22 - 00	Struc PCC/ready mx/normal wt/2500PSI incl Flagger		98.50	84.76	0.00	0.00	183.26
	SUB-997/311 1.145 hrs/unit 127 TOTAL HRS	110.68 CY	10,902	9,382	0	0	20,284
	* LINE ITEM ASSEMBLY Factor:0.0200						
03210.60 - 00	Reinforcing in place, A615 Gr 60, PCC Deck, #3 to #7		0.80	0.50	0.02	0.00	1.32
	SUB-323/323 0.008 hrs/unit 89 TOTAL HRS	11,621.40 LBS	9,297	5,771	282	0	15,350
	* LINE ITEM ASSEMBLY Factor:2.1000						
	NOTE: ve: Adjust Reinforcing Assumptionto 2.1 lbs / sf Top mat only						
03110.44 - 56	Strip Forms Clean-Up - Cure		0.09	1.48	0.58	0.00	2.15
	SUB-997/311 0.02 hrs/unit 111 TOTAL HRS	5,534.00 SF	498	8,190	3,210	0	11,898
	* LINE ITEM ASSEMBLY Factor:1.0000						
03110.01 - 01	Form Savers		21.35	14.58	1.92	0.00	37.85
	SUB-323/311 0.197 hrs/unit 545 TOTAL HRS	2,767.00 ea	59,075	40,337	5,313	0	104,725
	* LINE ITEM ASSEMBLY Factor:0.5000						
03210.60 - 01	Reinfrcng stl/in place/typical/avg/und 10 tn job/#8-#18/A615/Grd 60		0.81	0.71	0.07	0.00	1.60
	SUB-323/323 0.011 hrs/unit 1339 TOTAL HRS	121,748.00 LBS	98,920	86,684	9,131	0	194,735
	* LINE ITEM ASSEMBLY Factor:22.0000						
	NOTE: VE: Reduce Reinforcing Assumption to 22lbs / sf for Vert wall Connections						
03110.01 - 00	Formwork - Deck Support Beam		5.00	10.95	1.86	0.00	17.81
	SUB-997/311 0.148 hrs/unit 1872 TOTAL HRS	12,650.56 sf	63,253	138,547	23,530	0	225,330
	* LINE ITEM ASSEMBLY Factor:2.2860						
03110.44 - 55	Screed/24 ga Mtl key joInt/see Div 03150-250		0.17	0.36	0.03	0.00	0.55
	SUB-997/311 0.005 hrs/unit 27 TOTAL HRS	5,534.00 SF	941	1,978	148	0	3,067
	* LINE ITEM ASSEMBLY Factor:1.0000						
09250.70 - 04	Material Stocking		0.00	0.18	0.11	0.00	0.29
	SUB-911/111 0.003 hrs/unit 400 TOTAL HRS	133,369.40 LBS	0	23,428	14,671	0	38,098
	* LINE ITEM ASSEMBLY Factor:24.1000						
	NOTE: VE: Reduce Stocking to reflect reduction in rebar						
	Subtotal Direct Costs		434,616	480,650	74,894	0	990,160
	Subcontractor Markups		130,344	109,197	18,676	0	258,217
	Prime Contractor Markups		54,033	43,121	8,949	0	106,102
	TOTAL MS2003251311 MOS_A_ST.441 - CONCRETE INVERT SLAB 9 IN THICK	679.26 HRS	618,993	632,968	102,519	0	1,354,480
	5,534.00 SF *Level Unit Cost-->*		*111.85*	*114.38*	*18.53*	*0.00*	*244.76*
	NOTE: ASSEMBLY USED - SEE QS SURVEY SHEET NO CONNECTION DETAIL PROVIDED, PRODUCTION 9.642 PER CY						
	MS20034415 FLOOR FINISHES *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	65% ESTIMATE INFORMATION USED						
09600.01 - 01	Epoxy-Resin Terrazzo Floor		15.53	15.40	7.31	0.00	38.23
	SUB-421/421 0.22 hrs/unit 339 TOTAL HRS	1,540.00 sf	23,909	23,712	11,251	0	58,871
09600.01 - 01	Furnish Tactile Warning Tiles		15.00	0.00	0.00	0.00	15.00
	SUB-997/120	580.00 sf	8,700	0	0	0	8,700
09600.01 - 01	Install Tactile Warning Tiles		3.88	3.86	1.83	0.00	9.57
	SUB-942/942 0.061 hrs/unit 36 TOTAL HRS	580.00 sf	2,251	2,238	1,059	0	5,549
	Subtotal Direct Costs		34,860	25,950	12,311	0	73,120
	Subcontractor Markups		11,256	7,254	3,767	0	22,277
	Prime Contractor Markups		4,411	2,427	1,538	0	8,376
	TOTAL MS20034415 FLOOR FINISHES	375 HRS	50,527	35,631	17,615	0	103,773
	2,120.00 SF *Level Unit Cost-->*		*23.83*	*16.81*	*8.31*	*0.00*	*48.95*
	NOTE: 65% ESTIMATE INFORMATION USED						
	SUBTOTAL MS200344 ARCHITECTURAL - STATION PLATFORM LEVEL		34,860	25,950	12,311	0	73,120
	MARKUP		*1.449*	*1.373*	*1.431*	*0.000*	*1.419*
	TOTAL MS200344 ARCHITECTURAL - STATION PLATFORM LEVEL		50,527	35,631	17,615	0	103,773
	MS40 SITEWORK & SPECIAL CONDITIONS						
	MS4008 TEMPORARY FACILITIES						
	MS40080014 DEWATERING *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	65% ESTIMATE INFORMATION USED						
31231.92 - 02	Dewatering operation, maintenance Allowance, (incl. wells, pumps, piping, etc)		43664.50	43300.00	20548.00	0.00	107,512.50
	SUB-221/221 623.15 hrs/unit 25 TOTAL HRS	0.04 ls	1,747	1,732	822	0	4,301
	* LINE ITEM ASSEMBLY Factor:0.0450						

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
MS4008 TEMPORARY FACILITIES							
MS40080014 DEWATERING	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
	65% ESTIMATE INFORMATION USED						
	Subtotal Direct Costs		1,747	1,732	822	0	4,301
	Subcontractor Markups		554	441	234	0	1,228
	Prime Contractor Markups		220	159	101	0	480
	TOTAL MS40080014 DEWATERING	25 HRS	2,520	2,331	1,157	0	6,008
	NOTE: 65% ESTIMATE INFORMATION USED						
MS40080021 FIELD OVERHEAD, DETAIL ITEMS	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
01101.01 - 05	Project Director		0.00	168.11	0.00	0.00	168.11
	SUB-997/1101 1 hrs/unit 150 TOTAL HRS	150.00 MH	0	25,217	0	0	25,217
	* LINE ITEM ASSEMBLY Factor:100.0000						
01101.01 - 05	Project Manager		0.00	144.10	0.00	0.00	144.10
	SUB-997/1102 1 hrs/unit 264 TOTAL HRS	264.00 MH	0	38,043	0	0	38,043
	* LINE ITEM ASSEMBLY Factor:176.0000						
01101.01 - 05	General Superintendent		0.00	87.76	0.00	0.00	87.76
	SUB-997/1104 1 hrs/unit 225 TOTAL HRS	225.00 MH	0	19,746	0	0	19,746
	* LINE ITEM ASSEMBLY Factor:150.0000						
01101.01 - 05	Asst. Superintendent		0.00	68.68	0.00	0.00	68.68
	SUB-997/1105 1 hrs/unit 188 TOTAL HRS	187.50 MH	0	12,878	0	0	12,878
	* LINE ITEM ASSEMBLY Factor:125.0000						
01101.01 - 05	Project Engineer		0.00	138.09	0.00	0.00	138.09
	SUB-997/1103 1 hrs/unit 264 TOTAL HRS	264.00 MH	0	36,456	0	0	36,456
	* LINE ITEM ASSEMBLY Factor:176.0000						
01101.01 - 05	Admin / Secretary		0.00	48.04	0.00	0.00	48.04
	SUB-997/1106 1 hrs/unit 264 TOTAL HRS	264.00 MH	0	12,682	0	0	12,682
	* LINE ITEM ASSEMBLY Factor:176.0000						
01101.01 - 05	Payroll / Timekeeper		0.00	38.42	0.00	0.00	38.42
	SUB-997/1107 1 hrs/unit 120 TOTAL HRS	120.00 MH	0	4,611	0	0	4,611
	* LINE ITEM ASSEMBLY Factor:80.0000						
01101.01 - 05	Cost Engineer - Accountant "Pre Construction"		0.00	72.05	0.00	0.00	72.05
	SUB-997/1108 1 hrs/unit 120 TOTAL HRS	120.00 MH	0	8,646	0	0	8,646
	* LINE ITEM ASSEMBLY Factor:80.0000						
01101.01 - 05	Project Scheduler		0.00	72.05	0.00	0.00	72.05
	SUB-997/1110 1 hrs/unit 120 TOTAL HRS	120.00 MH	0	8,646	0	0	8,646
	* LINE ITEM ASSEMBLY Factor:80.0000						
01101.01 - 05	Project Estimator		0.00	86.46	0.00	0.00	86.46
	SUB-997/1111 1 hrs/unit 60 TOTAL HRS	60.00 MH	0	5,188	0	0	5,188
	* LINE ITEM ASSEMBLY Factor:40.0000						
01101.01 - 05	Qualtity Control		0.00	96.06	0.00	0.00	96.06
	SUB-997/1112 1 hrs/unit 225 TOTAL HRS	225.00 MH	0	21,614	0	0	21,614
	* LINE ITEM ASSEMBLY Factor:150.0000						
01101.01 - 05	Estimator "Chief - Senior"		0.00	138.09	0.00	0.00	138.09
	SUB-997/1113 1 hrs/unit 15 TOTAL HRS	15.00 MH	0	2,071	0	0	2,071
	* LINE ITEM ASSEMBLY Factor:10.0000						
	Subtotal Direct Costs		0	195,798	0	0	195,798
	Subcontractor Markups		0	41,857	0	0	41,857
	Prime Contractor Markups		0	17,374	0	0	17,374
	TOTAL MS40080021 FIELD OVERHEAD, DETAIL ITEMS	2,015 HRS	0	255,029	0	0	255,029
	1.50 MTH	*Level Unit Cost-->*	*0.00*	*170,019.14*	*0.00*	*0.00*	*170,019.14*
MS40080022 GC EXPENSES	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
01101.01 - 06	On Site Vehicle Pm		0.00	0.00	3.50	0.00	3.50
	SUB-997/NoCrew 1 hrs/unit 264 TOTAL HRS	264.00 HR	0	0	924	0	924
	* LINE ITEM ASSEMBLY Factor:176.0000						
01101.01 - 06	On Site Vehicle Super		0.00	0.00	3.50	0.00	3.50
	SUB-997/NoCrew 96 hrs/unit 21600 TOTAL HRS	225.00 HR	0	0	788	0	788
	* LINE ITEM ASSEMBLY Factor:150.0000						
01101.01 - 06	On Site Vehicle Others		0.00	0.00	3.25	0.00	3.25
	SUB-997/NoCrew 96 hrs/unit 50688 TOTAL HRS	528.00 HR	0	0	1,716	0	1,716
	* LINE ITEM ASSEMBLY Factor:352.0000						
01101.01 - 08	Field Office "Storefront"		0.00	0.00	35.00	0.00	35.00
	SUB-997/NoCrew 96 hrs/unit 25344 TOTAL HRS	264.00 HR	0	0	9,240	0	9,240
	* LINE ITEM ASSEMBLY Factor:176.0000						
01101.01 - 08	Computers - Monitors		0.00	0.00	0.55	0.00	0.55
	SUB-997/NoCrew 96 hrs/unit 202752 TOTAL HRS	2,112.00 HR	0	0	1,162	0	1,162
	* LINE ITEM ASSEMBLY Factor:1408.0000						
01101.01 - 08	Software		0.30	0.00	0.00	0.00	0.30
	SUB-997/NoCrew 96 hrs/unit 202752 TOTAL HRS	2,112.00 HR	634	0	0	0	634
	* LINE ITEM ASSEMBLY Factor:1408.0000						
01101.01 - 08	Printers		0.00	0.00	1.10	0.00	1.10
	SUB-997/NoCrew 96 hrs/unit 50688 TOTAL HRS	528.00 HR	0	0	581	0	581

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	* LINE ITEM ASSEMBLY	Factor:352.0000							
01101.01 - 08		Office Furniture			0.00	0.00	1.75	0.00	1.75
	SUB-997/NoCrew	96 hrs/unit 25344 TOTAL HRS	264.00	HR	0	0	462	0	462
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Office Supplies			4.50	0.00	0.00	0.00	4.50
	SUB-997/NoCrew	96 hrs/unit 25200 TOTAL HRS	262.50	HR	1,181	0	0	0	1,181
	* LINE ITEM ASSEMBLY	Factor:175.0000							
01101.01 - 08		Postage - Special Delievery Services			0.30	0.00	0.00	0.00	0.30
	SUB-997/NoCrew	96 hrs/unit 25344 TOTAL HRS	264.00	HR	79	0	0	0	79
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		First Aid Supplies			0.25	0.00	0.00	0.00	0.25
	SUB-997/NoCrew	96 hrs/unit 25344 TOTAL HRS	264.00	HR	66	0	0	0	66
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Cups - Ice - Drinking Water			0.30	0.00	0.00	0.00	0.30
	SUB-997/NoCrew	96 hrs/unit 25344 TOTAL HRS	264.00	HR	79	0	0	0	79
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Printing - Blue Prints			0.40	0.00	0.00	0.00	0.40
	SUB-997/NoCrew	96 hrs/unit 25344 TOTAL HRS	264.00	HR	106	0	0	0	106
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Photo Copier Machine			0.60	0.00	0.22	0.00	0.82
	SUB-997/NoCrew	96 hrs/unit 25344 TOTAL HRS	264.00	HR	158	0	58	0	216
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Photo Copier Supplies			0.15	0.00	2.00	0.00	2.15
	SUB-997/NoCrew	96 hrs/unit 25344 TOTAL HRS	264.00	HR	40	0	528	0	568
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Storage & Tool Trailers			0.00	0.00	2.00	0.00	2.00
	SUB-997/NoCrew	96 hrs/unit 50688 TOTAL HRS	528.00	HR	0	0	1,056	0	1,056
	* LINE ITEM ASSEMBLY	Factor:352.0000							
01101.01 - 08		Equip Rental/Small Tools			0.00	0.00	3.00	0.00	3.00
	SUB-997/NoCrew	96 hrs/unit 25344 TOTAL HRS	264.00	HR	0	0	792	0	792
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Small Tools Expendable			1.50	0.00	0.00	0.00	1.50
	SUB-997/NoCrew	96 hrs/unit 25344 TOTAL HRS	264.00	HR	396	0	0	0	396
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Telephone Exp, Incl Cell			1.10	0.00	0.00	0.00	1.10
	SUB-997/NoCrew	96 hrs/unit 50688 TOTAL HRS	528.00	HR	581	0	0	0	581
	* LINE ITEM ASSEMBLY	Factor:352.0000							
01101.01 - 08		Internet Connections - Service			0.00	0.00	0.25	0.00	0.25
	SUB-997/NoCrew	96 hrs/unit 202752 TOTAL HRS	2,112.00	HR	0	0	528	0	528
	* LINE ITEM ASSEMBLY	Factor:1408.0000							
01101.01 - 08		Network / Communications Eqpt			0.00	0.00	1.20	0.00	1.20
	SUB-997/NoCrew	96 hrs/unit 25344 TOTAL HRS	264.00	HR	0	0	317	0	317
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Field Radios			0.00	0.00	2.20	0.00	2.20
	SUB-997/NoCrew	96 hrs/unit 25344 TOTAL HRS	264.00	HR	0	0	581	0	581
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Temporary Toilets (5)			0.00	0.00	1.20	0.00	1.20
	SUB-997/NoCrew	96 hrs/unit 50688 TOTAL HRS	528.00	HR	0	0	634	0	634
	* LINE ITEM ASSEMBLY	Factor:352.0000							
01101.01 - 08		Temporary Lighting & Elec Hourly Charges			0.00	0.00	2.00	0.00	2.00
	SUB-997/NoCrew	96 hrs/unit 25344 TOTAL HRS	264.00	HR	0	0	528	0	528
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Fire Protection Equipment			0.00	0.00	0.15	0.00	0.15
	SUB-997/NoCrew	96 hrs/unit 21600 TOTAL HRS	225.00	HR	0	0	34	0	34
	* LINE ITEM ASSEMBLY	Factor:150.0000							
01101.01 - 08		Temp Heat/Winter Weather Hourly Charges			0.00	0.00	0.07	0.00	0.07
	SUB-997/NoCrew	96 hrs/unit 11520 TOTAL HRS	120.00	HR	0	0	8	0	8
	* LINE ITEM ASSEMBLY	Factor:80.0000							
01101.01 - 08		Trash Hauling			3.75	0.00	0.00	0.00	3.75
	SUB-997/NoCrew	96 hrs/unit 21600 TOTAL HRS	225.00	HR	844	0	0	0	844
	* LINE ITEM ASSEMBLY	Factor:150.0000							
01101.01 - 09		Man / Material Lift "Operator"			0.00	69.48	0.00	0.00	69.49
	SUB-997/221	1 hrs/unit 180 TOTAL HRS	180.00	MH	0	12,507	0	0	12,507
	* LINE ITEM ASSEMBLY	Factor:120.0000							
		Subtotal Direct Costs			4,163	12,507	19,935	0	36,606
		Subcontractor Markups			1,134	2,674	4,685	0	8,493
		Prime Contractor Markups			507	1,110	2,355	0	3,971
TOTAL MS40080022 GC EXPENSES			1,293,132	HRS	5,804	16,291	26,975	0	49,070
1.50 MTH		*Level Unit Cost-->*			*3,869.66*	*10,860.62*	*17,983.27*	*0.00*	*32,713.54*
SUBTOTAL MS400800 MOSCONE STATION					5,910	210,037	20,757	0	236,704
MARKUP					*1.409*	*1.303*	*1.355*	*0.000*	*1.310*
TOTAL MS400800 MOSCONE STATION					8,325	273,651	28,132	0	310,107

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
BASE BID CHINATOWN STATION - PACKAGE 1254CT STATIONS, STOPS, TERMINALS, INTERMODAL (NUMBER									
CTUNDERGROUND STATION, STOP, SHELTER, MA									
CT20 STATIONS, STOPS, TERMINALS, INTERMODAL (N									
CT2003 UNDERGROUND STATION, STOP, SHELTER, MALL, TE									
CT20031024 CTS_017_ES.701-Platform_1_Exc/Supp.-Bench/Invert_Center		*LEVEL CONTRACTOR ID APPLIED--PRIME*							
01101.02 - 06		Small Tools and Supplies			2.74	1.97	0.40	0.00	5.11
	SUB-995/NoCrew		1,398.45	HRS	3,832	2,755	559	0	7,146
	* LINE ITEM ASSEMBLY	Factor:304.0100							
01510.00 - 00		Tunnel Shifter			0.00	76.58	0.00	0.00	76.58
	SUB-995/NoCrew		110.40	MH	0	8,454	0	0	8,454
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01510.00 - 00		Lead Miner			0.00	75.06	0.00	0.00	75.06
	SUB-995/NoCrew		110.40	MH	0	8,287	0	0	8,287
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01510.00 - 00		Tunnel Miner			0.00	69.26	0.00	0.00	69.26
	SUB-995/NoCrew		331.20	MH	0	22,939	0	0	22,939
	* LINE ITEM ASSEMBLY	Factor:72.0000							
01510.00 - 00		Concrete equip.oper.			0.00	72.72	0.00	0.00	72.72
	SUB-995/NoCrew		110.40	MH	0	8,028	0	0	8,028
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01510.00 - 00		Power Jumbo Oper.			0.00	67.85	0.00	0.00	67.85
	SUB-995/NoCrew		110.40	MH	0	7,491	0	0	7,491
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01510.00 - 00		Excavator<3.5cy			0.00	76.74	0.00	0.00	76.74
	SUB-995/NoCrew		110.40	MH	0	8,472	0	0	8,472
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01510.00 - 00		Loader oper.<4cy			0.00	74.65	0.00	0.00	74.65
	SUB-995/NoCrew		110.40	MH	0	8,241	0	0	8,241
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01200.12 - 10		Liebherr R900 excavator			0.00	0.00	181.73	0.00	181.73
	SUB-995/NoCrew		52.95	HRS	0	0	9,622	0	9,622
	* LINE ITEM ASSEMBLY	Factor:11.5100							
01200.15 - 10		Wheel Loader Cat 928/2.5cy			0.00	0.00	48.37	0.00	48.37
	SUB-995/NoCrew		110.40	HRS	0	0	5,340	0	5,340
	* LINE ITEM ASSEMBLY	Factor:24.0000							
15901.00 - 21		Shotc./robot, truck 25cy/hr			0.00	0.00	99.54	0.00	99.54
	SUB-995/NoCrew		26.22	HRS	0	0	2,610	0	2,610
	* LINE ITEM ASSEMBLY	Factor:5.7000							
15901.00 - 21		Shotcrete pump 54cy/hr			0.00	0.00	92.24	0.00	92.24
	SUB-995/NoCrew		26.22	HRS	0	0	2,419	0	2,419
	* LINE ITEM ASSEMBLY	Factor:5.7000							
05212.35 - 08		Steel Lattice Girders			1.85	0.00	0.00	0.00	1.85
	SUB-995/NoCrew		3,968.51	LB	7,342	0	0	0	7,342
	* LINE ITEM ASSEMBLY	Factor:862.7200							
03370.80 - 01		Shotcrete, 4000psi fiber			300.45	0.00	0.00	0.00	300.45
	SUB-314/314		132.99	CY	39,957	0	0	0	39,957
	* LINE ITEM ASSEMBLY	Factor:28.9100							
01510.00 - 00		Master Mechanic			0.00	57.27	0.00	0.00	57.27
	SUB-995/NoCrew		18.40	MH	0	1,054	0	0	1,054
	* LINE ITEM ASSEMBLY	Factor:4.0000							
01510.00 - 00		HD Mech/Welder			0.00	74.65	0.00	0.00	74.65
	SUB-995/NoCrew		55.20	MH	0	4,121	0	0	4,121
	* LINE ITEM ASSEMBLY	Factor:12.0000							
01510.00 - 00		Crane oper. >100t			0.00	82.65	0.00	0.00	82.65
	SUB-995/NoCrew		55.20	MH	0	4,562	0	0	4,562
	* LINE ITEM ASSEMBLY	Factor:12.0000							
01510.00 - 00		Oiler/bit sharpener			0.00	67.26	0.00	0.00	67.26
	SUB-995/NoCrew		55.20	MH	0	3,713	0	0	3,713
	* LINE ITEM ASSEMBLY	Factor:12.0000							
01510.00 - 00		Toplander			0.00	61.05	0.00	0.00	61.05
	SUB-995/NoCrew		55.20	MH	0	3,370	0	0	3,370
	* LINE ITEM ASSEMBLY	Factor:12.0000							
01510.00 - 00		Bottomlander			0.00	61.77	0.00	0.00	61.77
	SUB-995/NoCrew		55.20	MH	0	3,410	0	0	3,410
	* LINE ITEM ASSEMBLY	Factor:12.0000							
01510.00 - 00		Loader oper.>4cy			0.00	76.74	0.00	0.00	76.74
	SUB-995/NoCrew		55.20	MH	0	4,236	0	0	4,236
	* LINE ITEM ASSEMBLY	Factor:12.0000							
01510.00 - 00		General Labor			0.00	61.77	0.00	0.00	61.77
	SUB-995/NoCrew		55.20	MH	0	3,410	0	0	3,410
	* LINE ITEM ASSEMBLY	Factor:12.0000							
01200.15 - 20		Gantry Crane 100T			0.00	0.00	132.42	0.00	132.42
	SUB-995/NoCrew		55.20	HRS	0	0	7,310	0	7,310
	* LINE ITEM ASSEMBLY	Factor:12.0000							

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
01200.15 - 10		Wheel Loader Cat 966/4.8cy			0.00	0.00	80.33	0.00	80.33
	SUB-995/NoCrew		55.20	HRS	0	0	4,434	0	4,434
	* LINE ITEM ASSEMBLY	Factor:12.0000							
14270.20 - 09		Alimak Elevator			0.00	0.00	23.86	0.00	23.86
	SUB-995/NoCrew		55.20	HRS	0	0	1,317	0	1,317
	* LINE ITEM ASSEMBLY	Factor:12.0000							
11390.30 - 00		Water Treatment Plant			0.00	0.00	36.98	0.00	36.98
	SUB-995/NoCrew		55.20	HRS	0	0	2,041	0	2,041
	* LINE ITEM ASSEMBLY	Factor:12.0000							
15904.00 - 55		Pump, trash 200gpm/100ft head			0.00	0.00	2.68	0.00	2.68
	SUB-995/NoCrew		110.40	HRS	0	0	296	0	296
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01900.00 - 01		Compressor, stationary 1200cfm			0.00	0.00	75.30	0.00	75.30
	SUB-995/NoCrew		55.20	HRS	0	0	4,157	0	4,157
	* LINE ITEM ASSEMBLY	Factor:12.0000							
15830.10 - 10		Ventilation fan 40hp			0.00	0.00	9.56	0.00	9.56
	SUB-995/NoCrew		110.40	HRS	0	0	1,055	0	1,055
	* LINE ITEM ASSEMBLY	Factor:24.0000							
15830.10 - 10		Ventilation fan 150hp			0.00	0.00	28.33	0.00	28.33
	SUB-995/NoCrew		331.20	HRS	0	0	9,383	0	9,383
	* LINE ITEM ASSEMBLY	Factor:72.0000							
03371.36 - 01		Muck disposal			0.00	19.50	19.50	0.00	39.00
	SUB-995/NoCrew		1,297.02	LCY	0	25,292	25,292	0	50,584
	* LINE ITEM ASSEMBLY	Factor:281.9600							
03371.36 - 01		Shotcrete Disposal			0.00	20.55	20.55	0.00	41.10
	SUB-995/NoCrew		728.00	LCY	0	14,960	14,960	0	29,921
	* LINE ITEM ASSEMBLY	Factor:158.2600							
		Subtotal Direct Costs			51,130	142,794	90,795	0	284,720
		Subcontractor Markups			3,817	36,347	31,396	0	71,559
		Prime Contractor Markups			5,255	13,096	11,686	0	30,038
		TOTAL CT20031024 CTS_017_ES.701-Platform_1_Exc/Supp.-Bench/Invert_Center			60,202	192,237	133,877	0	386,316
					13,087.45	*41,790.63*	*29,103.73*	*0.00*	*83,981.81*
		4.60 DY	*Level Unit Cost-->*						
		CT20031036 CTS_024_ES.701-Platform_2_Exc/Supp.-Bench/Invert_Center	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
01101.02 - 06		Small Tools and Supplies			2.74	1.97	0.40	0.00	5.11
	SUB-995/NoCrew		2,744.21	HRS	7,519	5,406	1,098	0	14,023
	* LINE ITEM ASSEMBLY	Factor:392.0300							
01510.00 - 00		Tunnel Shifter			0.00	76.58	0.00	0.00	76.58
	SUB-995/NoCrew		168.00	MH	0	12,865	0	0	12,865
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01510.00 - 00		Lead Miner			0.00	75.06	0.00	0.00	75.06
	SUB-995/NoCrew		168.00	MH	0	12,610	0	0	12,610
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01510.00 - 00		Tunnel Miner			0.00	69.26	0.00	0.00	69.26
	SUB-995/NoCrew		504.00	MH	0	34,907	0	0	34,907
	* LINE ITEM ASSEMBLY	Factor:72.0000							
01510.00 - 00		Concrete equip.oper.			0.00	72.72	0.00	0.00	72.72
	SUB-995/NoCrew		168.00	MH	0	12,217	0	0	12,217
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01510.00 - 00		Power Jumbo Oper.			0.00	67.85	0.00	0.00	67.85
	SUB-995/NoCrew		168.00	MH	0	11,399	0	0	11,399
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01510.00 - 00		Excavator<3.5cy			0.00	76.74	0.00	0.00	76.74
	SUB-995/NoCrew		168.00	MH	0	12,892	0	0	12,892
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01510.00 - 00		Loader oper.<4cy			0.00	74.65	0.00	0.00	74.65
	SUB-995/NoCrew		168.00	MH	0	12,541	0	0	12,541
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01200.12 - 10		Liebherr R900 excavator			0.00	0.00	181.74	0.00	181.74
	SUB-995/NoCrew		80.57	HRS	0	0	14,643	0	14,643
	* LINE ITEM ASSEMBLY	Factor:11.5100							
01200.15 - 10		Wheel Loader Cat 928/2.5cy			0.00	0.00	48.37	0.00	48.37
	SUB-995/NoCrew		168.00	HRS	0	0	8,126	0	8,126
	* LINE ITEM ASSEMBLY	Factor:24.0000							
15901.00 - 21		Shotc./robot, truck 25cy/hr			0.00	0.00	99.54	0.00	99.54
	SUB-995/NoCrew		39.90	HRS	0	0	3,972	0	3,972
	* LINE ITEM ASSEMBLY	Factor:5.7000							
15901.00 - 21		Shotcrete pump 54cy/hr			0.00	0.00	92.24	0.00	92.24
	SUB-995/NoCrew		39.90	HRS	0	0	3,680	0	3,680
	* LINE ITEM ASSEMBLY	Factor:5.7000							
05212.35 - 08		Steel Lattice Girders			1.85	0.00	0.00	0.00	1.85
	SUB-995/NoCrew		6,266.33	LB	11,593	0	0	0	11,593
	* LINE ITEM ASSEMBLY	Factor:895.1900							
03370.80 - 01		Shotcrete, 4000psi fiber			300.46	0.00	0.00	0.00	300.46

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	SUB-314/314		210.00	CY	63,097	0	0	0	63,097
	* LINE ITEM ASSEMBLY	Factor:30.0000							
01510.00 - 00	Master Mechanic				0.00	57.27	0.00	0.00	57.27
	SUB-995/NoCrew		56.00	MH	0	3,207	0	0	3,207
	* LINE ITEM ASSEMBLY	Factor:8.0000							
01510.00 - 00	HD Mech/Welder				0.00	74.65	0.00	0.00	74.65
	SUB-995/NoCrew		168.00	MH	0	12,541	0	0	12,541
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01510.00 - 00	Crane oper. >100t				0.00	82.65	0.00	0.00	82.65
	SUB-995/NoCrew		168.00	MH	0	13,885	0	0	13,885
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01510.00 - 00	Oiler/bit sharpener				0.00	67.26	0.00	0.00	67.26
	SUB-995/NoCrew		168.00	MH	0	11,300	0	0	11,300
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01510.00 - 00	Toplander				0.00	61.05	0.00	0.00	61.05
	SUB-995/NoCrew		168.00	MH	0	10,256	0	0	10,256
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01510.00 - 00	Bottomlander				0.00	61.77	0.00	0.00	61.77
	SUB-995/NoCrew		168.00	MH	0	10,377	0	0	10,377
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01510.00 - 00	Loader oper.>4cy				0.00	76.74	0.00	0.00	76.74
	SUB-995/NoCrew		168.00	MH	0	12,892	0	0	12,892
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01510.00 - 00	General Labor				0.00	61.77	0.00	0.00	61.77
	SUB-995/NoCrew		168.00	MH	0	10,377	0	0	10,377
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01200.15 - 20	Gantry Crane 100T				0.00	0.00	132.42	0.00	132.42
	SUB-995/NoCrew		168.00	HRS	0	0	22,247	0	22,247
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01200.15 - 10	Wheel Loader Cat 966/4.8cy				0.00	0.00	80.33	0.00	80.33
	SUB-995/NoCrew		168.00	HRS	0	0	13,495	0	13,495
	* LINE ITEM ASSEMBLY	Factor:24.0000							
14270.20 - 09	Alimak Elevator				0.00	0.00	23.86	0.00	23.86
	SUB-995/NoCrew		168.00	HRS	0	0	4,008	0	4,008
	* LINE ITEM ASSEMBLY	Factor:24.0000							
11390.30 - 00	Water Treatment Plant				0.00	0.00	36.98	0.00	36.98
	SUB-995/NoCrew		168.00	HRS	0	0	6,213	0	6,213
	* LINE ITEM ASSEMBLY	Factor:24.0000							
15904.00 - 55	Pump, trash 200gpm/100ft head				0.00	0.00	2.68	0.00	2.68
	SUB-995/NoCrew		168.00	HRS	0	0	450	0	450
	* LINE ITEM ASSEMBLY	Factor:24.0000							
01900.00 - 01	Compressor, stationary 1200cfm				0.00	0.00	75.30	0.00	75.30
	SUB-995/NoCrew		168.00	HRS	0	0	12,650	0	12,650
	* LINE ITEM ASSEMBLY	Factor:24.0000							
15830.10 - 10	Ventilation fan 40hp				0.00	0.00	9.56	0.00	9.56
	SUB-995/NoCrew		168.00	HRS	0	0	1,606	0	1,606
	* LINE ITEM ASSEMBLY	Factor:24.0000							
15830.10 - 10	Ventilation fan 150hp				0.00	0.00	28.33	0.00	28.33
	SUB-995/NoCrew		504.00	HRS	0	0	14,278	0	14,278
	* LINE ITEM ASSEMBLY	Factor:72.0000							
03371.36 - 01	Muck disposal				0.00	19.50	19.50	0.00	39.00
	SUB-995/NoCrew		2,047.92	LCY	0	39,934	39,934	0	79,869
	* LINE ITEM ASSEMBLY	Factor:292.5600							
03371.36 - 01	Shotcrete Disposal				0.00	20.55	20.55	0.00	41.10
	SUB-995/NoCrew		1,149.47	LCY	0	23,622	23,622	0	47,243
	* LINE ITEM ASSEMBLY	Factor:164.2100							
	Subtotal Direct Costs				82,208	263,231	170,023	0	515,462
	Subcontractor Markups				6,528	67,002	58,791	0	132,321
	Prime Contractor Markups				8,487	24,142	21,884	0	54,512
	TOTAL CT20031036 CTS_024_ES.701-Platform_2_Exc/Supp.-				97,223	354,374	250,698	0	702,295
	Bench/Invert_Center				*13,889.07*	*50,624.90*	*35,813.95*	*0.00*	*100,327.92*
	7.00 DY	*Level Unit Cost-->*							

CT2003502011 CTS_AB_ST.222 - 84 INCH CONCRETE INVERT SLAB *LEVEL CONTRACTOR ID APPLIED--PRIME*

ASSEMBLY USED - SEE QS SURVEY SHEET. NO CONNECTION DETAIL PROVIDED. PRODUCTION 9.

03310.22 - 00	STRUC PCC/READY MX/NORMAL WT/4000PSI				106.00	91.22	0.00	0.00	197.22
	SUB-311/311 1.233 hrs/unit 1601 TOTAL HRS		1,299.09	CY	137,704	118,501	0	0	256,205
	* LINE ITEM ASSEMBLY	Factor:0.2600							
03350.30 - 00	STRUCT CONCRETE - PUMP & PLACE				0.00	7.88	8.50	0.00	16.39
	SUB-312/312 0.127 hrs/unit 164 TOTAL HRS		1,299.09	CY	0	10,243	11,042	0	21,286
	* LINE ITEM ASSEMBLY	Factor:0.2600							
03350.30 - 00	FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH				0.00	0.65	0.03	0.00	0.67
	SUB-312/312 0.01 hrs/unit 52 TOTAL HRS		4,996.50	SF	0	3,223	128	0	3,352
	* LINE ITEM ASSEMBLY	Factor:1.0000							
03210.60 - 00	REINFORCING IN PLACE, A615 GR 60, PCC DECK, #3 TO #7				0.52	0.50	0.02	0.00	1.04

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	ASSEMBLY USED - SEE QS SURVEY SHEET. NO CONNECTION DETAIL PROVIDED. PRODUCTION 9.						
	SUB-323/323 0.008 hrs/unit 3677 TOTAL HRS	479,314.25 LBS	247,326	238,015	11,644	0	496,985
	* LINE ITEM ASSEMBLY Factor:95.9300						
07170.70 - 00	WATERPROOFING		4.91	4.71	0.09	0.00	9.71
	SUB-111/111 0.08 hrs/unit 402 TOTAL HRS	4,996.50 SF	24,533	23,551	456	0	48,540
	* LINE ITEM ASSEMBLY Factor:1.0000						
03110.44 - 55	SCREED/24 GA MTL KEY JOINT/SEE DIV 03150-250		0.17	0.36	0.03	0.00	0.55
	SUB-311/311 0.005 hrs/unit 24 TOTAL HRS	4,996.50 SF	849	1,786	134	0	2,769
	* LINE ITEM ASSEMBLY Factor:1.0000						
09250.70 - 04	Material Stocking		0.00	0.18	0.11	0.00	0.29
	SUB-111/111 0.003 hrs/unit 1438 TOTAL HRS	479,314.25 LBS	0	84,197	52,725	0	136,921
	* LINE ITEM ASSEMBLY Factor:95.9300						
	Subtotal Direct Costs		410,412	479,517	76,128	0	966,057
	Subcontractor Markups		92,993	91,344	19,052	0	203,389
	Prime Contractor Markups		48,146	41,733	9,103	0	98,981
	TOTAL CT2003502011 CTS_AB_ST.222 - 84 INCH CONCRETE INVERT SLAB	7,359 HRS	551,551	612,593	104,283	0	1,268,428
	4,996.50 SF	*Level Unit Cost-->*	*110.39*	*122.60*	*20.87*	*0.00*	*253.86*
	NOTE: ASSEMBLY USED - SEE QS SURVEY SHEET. NO CONNECTION DETAIL PROVIDED. PRODUCTION 9.642 PER CY						
	CT2003541613 CTS_01AA_ST.220 - 12 INCH CONCRETE SLAB *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	ASSEMBLY USED - SEE QS SURVEY SHEET. NO CONNECTION DETAIL PROVIDED. PRODUCTION 9.						
03310.22 - 00	STRUC PCC/READY MX/NORMAL WT/4000PSI		106.00	91.22	0.00	0.00	197.22
	SUB-311/311 1.233 hrs/unit 287 TOTAL HRS	233.16 CY	24,715	21,269	0	0	45,983
	* LINE ITEM ASSEMBLY Factor:0.0400						
03350.30 - 00	STRUCT CONCRETE - PUMP & PLACE		0.00	7.88	8.50	0.00	16.39
	SUB-312/312 0.127 hrs/unit 29 TOTAL HRS	233.16 CY	0	1,838	1,982	0	3,820
	* LINE ITEM ASSEMBLY Factor:0.0400						
03350.30 - 00	FINISHING FLOORS, MONOLITHIC, SCREED, FLOAT & MACHINE FINISH		0.00	0.65	0.03	0.00	0.67
	SUB-312/312 0.01 hrs/unit 60 TOTAL HRS	5,829.00 SF	0	3,761	150	0	3,910
	* LINE ITEM ASSEMBLY Factor:1.0000						
03210.60 - 00	REINFORCING IN PLACE, A615 GR 60, PCC DECK, #3 TO #7		0.52	0.50	0.02	0.00	1.04
	SUB-323/323 0.008 hrs/unit 414 TOTAL HRS	53,976.54 LBS	27,852	26,803	1,311	0	55,966
	* LINE ITEM ASSEMBLY Factor:9.2600						
03110.01 - 00	FORMWORK - DECK SUPPORT BEAM		5.00	10.95	1.86	0.00	17.81
	SUB-311/311 0.148 hrs/unit 863 TOTAL HRS	5,829.00 sf	29,145	63,838	10,842	0	103,825
	* LINE ITEM ASSEMBLY Factor:1.0000						
02466.00 - 02	STRIP FDN FORMS, POST POUR CLEAN-UP, CURE		0.00	0.00	2.01	0.00	2.01
	SUB-221/221	5,829.00 CSFA	0	0	11,722	0	11,722
	* LINE ITEM ASSEMBLY Factor:1.0000						
07170.70 - 00	WATERPROOFING		4.91	4.71	0.09	0.00	9.71
	SUB-111/111 0.081 hrs/unit 469 TOTAL HRS	5,829.00 SF	28,620	27,475	532	0	56,628
	* LINE ITEM ASSEMBLY Factor:1.0000						
03110.44 - 55	SCREED/24 GA MTL KEY JOINT/SEE DIV 03150-250		0.17	0.36	0.03	0.00	0.55
	SUB-311/311 0.005 hrs/unit 28 TOTAL HRS	5,829.00 SF	991	2,083	156	0	3,230
	* LINE ITEM ASSEMBLY Factor:1.0000						
09250.70 - 04	Material Stocking		0.00	0.18	0.11	0.00	0.29
	SUB-111/111 0.003 hrs/unit 162 TOTAL HRS	53,976.54 LBS	0	9,482	5,937	0	15,419
	* LINE ITEM ASSEMBLY Factor:9.2600						
	Subtotal Direct Costs		111,323	156,549	32,632	0	300,504
	Subcontractor Markups		18,879	17,200	5,622	0	41,701
	Prime Contractor Markups		12,452	12,702	3,659	0	28,813
	TOTAL CT2003541613 CTS_01AA_ST.220 - 12 INCH CONCRETE SLAB	1,813 HRS	142,654	186,452	41,913	0	371,018
	5,829.00 SF	*Level Unit Cost-->*	*24.47*	*31.99*	*7.19*	*0.00*	*63.65*
	NOTE: ASSEMBLY USED - SEE QS SURVEY SHEET. NO CONNECTION DETAIL PROVIDED. PRODUCTION 9.642 PER CY						
	CT2003663012 CTS_01AG_AR.260 - TERRAZZO *LEVEL CONTRACTOR ID APPLIED--PRIME*						
	PRODUCTIVITY = 36.352 PER SF						
09600.01 - 01	EPOXY-RESIN TERRAZZO FLOOR		15.53	15.39	7.31	0.00	38.23
	SUB-421/421 0.22 hrs/unit 275 TOTAL HRS	1,250.00 sf	19,413	19,240	9,138	0	47,790
	* LINE ITEM ASSEMBLY Factor:1.0000						
09420.90 - 00	PRECAST TERRAZZO/BASE/COVE/6" H		12.15	10.70	0.75	0.00	23.60
	SUB-421/421 0.153 hrs/unit 19 TOTAL HRS	125.00 LF	1,519	1,338	94	0	2,950
	Subtotal Direct Costs		20,931	20,578	9,231	0	50,740
	Subcontractor Markups		7,048	5,711	2,804	0	15,563
	Prime Contractor Markups		2,676	1,922	1,151	0	5,749
	TOTAL CT2003663012 CTS_01AG_AR.260 - TERRAZZO	294 HRS	30,655	28,210	13,186	0	72,052
	1,250.00 SF	*Level Unit Cost-->*	*24.52*	*22.57*	*10.55*	*0.00*	*57.64*
	NOTE: PRODUCTIVITY = 36.352 PER SF						

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
CT2003	**UNDERGROUND STATION, STOP, SHELTER, MALL, TE**						
CT2003663015 CTS_01AB_AR.260 - PRE-WARNING TILE STRIP	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
09420.90 - 01	PRE-WARNING TILE STRIP - 1" THICK		17.70	21.48	1.50	0.00	40.69
SUB-421/421	0.307 hrs/unit 17 TOTAL HRS	55.00 SF	974	1,182	83	0	2,238
* LINE ITEM ASSEMBLY	Factor:1.0000						
Subtotal Direct Costs			974	1,182	83	0	2,238
Subcontractor Markups			328	328	25	0	681
Prime Contractor Markups			124	110	10	0	245
TOTAL CT2003663015 CTS_01AB_AR.260 - PRE-WARNING TILE STRIP		17 HRS	1,426	1,620	118	0	3,164
55.00 SF	*Level Unit Cost-->*		*25.92*	*29.45*	*2.15*	*0.00*	*57.52*
CT2003663016 CTS_01AA_AR.820 - PLATFORM EDGE	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
PRODUCTIVITY = 130.304 PER SF							
09600.01 - 01	FURNISH TACTILE WARNING TILES		15.00	11.62	0.00	0.00	26.62
SUB-120/120	0.16 hrs/unit 67 TOTAL HRS	415.00 sf	6,225	4,823	0	0	11,048
* LINE ITEM ASSEMBLY	Factor:1.0000						
09600.01 - 01	INSTALL TACTILE WARNING TILES		3.88	3.83	1.83	0.00	9.54
SUB-942/942	0.061 hrs/unit 25 TOTAL HRS	415.00 sf	1,610	1,591	759	0	3,961
* LINE ITEM ASSEMBLY	Factor:1.0000						
11161.40 - 03	PLASTIC BUMPER		20.50	22.76	2.88	0.00	46.14
SUB-511/511	0.338 hrs/unit 68 TOTAL HRS	200.00 LF	4,100	4,552	577	0	9,228
03150.08 - 00	EXPANSION BOLT 3/8" DIA & 5" L		0.67	3.46	0.50	0.00	4.63
SUB-323/NoCrew	0.05 hrs/unit 10 TOTAL HRS	200.00 EA	134	692	100	0	926
Subtotal Direct Costs			12,069	11,658	1,436	0	25,164
Subcontractor Markups			4,052	3,234	439	0	7,725
Prime Contractor Markups			1,542	1,089	179	0	2,810
TOTAL CT2003663016 CTS_01AA_AR.820 - PLATFORM EDGE		170 HRS	17,663	15,981	2,055	0	35,699
415.00 SF	*Level Unit Cost-->*		*42.56*	*38.51*	*4.95*	*0.00*	*86.02*
NOTE: PRODUCTIVITY = 130.304 PER SF							
SUBTOTAL CT20036630 FLOOR FINISHES			33,974	33,418	10,750	0	78,142
MARKUP			*1.464*	*1.371*	*1.429*	*0.000*	*1.419*
TOTAL CT20036630 FLOOR FINISHES			49,744	45,811	15,359	0	110,914

CHINATOWN STATION - PACKAGE 1254 STATIONS, STOPS, TERMINALS, INTERMODAL (NMS SITEWORK & SPECIAL CONDITIONS

MSTEMPORARY FACILITIES

MS40 SITEWORK & SPECIAL CONDITIONS

MS4008 TEMPORARY FACILITIES

MS40080014 DEWATERING	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
65% ESTIMATE INFORMATION USED							
31231.92 - 02	Dewatering operation, maintenance Allowance, (incl. wells, pumps, piping, etc)		43664.50	43300.00	20548.00	0.00	107,512.50
SUB-221/221	623.15 hrs/unit 25 TOTAL HRS	0.04 ls	1,747	1,732	822	0	4,301
* LINE ITEM ASSEMBLY	Factor:0.0450						
Subtotal Direct Costs			1,747	1,732	822	0	4,301
Subcontractor Markups			554	441	234	0	1,228
Prime Contractor Markups			220	159	101	0	480
TOTAL MS40080014 DEWATERING		25 HRS	2,520	2,331	1,157	0	6,008
NOTE: 65% ESTIMATE INFORMATION USED							
MS40080021 FIELD OVERHEAD, DETAIL ITEMS	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
01101.01 - 05	Project Director		0.00	168.11	0.00	0.00	168.11
SUB-997/1101	1 hrs/unit 250 TOTAL HRS	250.00 MH	0	42,028	0	0	42,028
* LINE ITEM ASSEMBLY	Factor:100.0000						
01101.01 - 05	Project Manager		0.00	144.10	0.00	0.00	144.10
SUB-997/1102	1 hrs/unit 440 TOTAL HRS	440.00 MH	0	63,405	0	0	63,405
* LINE ITEM ASSEMBLY	Factor:176.0000						
01101.01 - 05	General Superintendent		0.00	87.76	0.00	0.00	87.76
SUB-997/1104	1 hrs/unit 375 TOTAL HRS	375.00 MH	0	32,910	0	0	32,910
* LINE ITEM ASSEMBLY	Factor:150.0000						
01101.01 - 05	Asst. Superintendent		0.00	68.68	0.00	0.00	68.68
SUB-997/1105	1 hrs/unit 313 TOTAL HRS	312.50 MH	0	21,463	0	0	21,463
* LINE ITEM ASSEMBLY	Factor:125.0000						
01101.01 - 05	Project Engineer		0.00	138.09	0.00	0.00	138.09
SUB-997/1103	1 hrs/unit 440 TOTAL HRS	440.00 MH	0	60,760	0	0	60,760
* LINE ITEM ASSEMBLY	Factor:176.0000						
01101.01 - 05	Admin / Secretary		0.00	48.04	0.00	0.00	48.04

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	SUB-997/1106	1 hrs/unit 440 TOTAL HRS	440.00	MH	0	21,137	0	0	21,137
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 05		Payroll / Timekeeper			0.00	38.42	0.00	0.00	38.42
	SUB-997/1107	1 hrs/unit 200 TOTAL HRS	200.00	MH	0	7,685	0	0	7,685
	* LINE ITEM ASSEMBLY	Factor:80.0000							
01101.01 - 05		Cost Engineer - Accountant "Pre Construction"			0.00	72.05	0.00	0.00	72.05
	SUB-997/1108	1 hrs/unit 200 TOTAL HRS	200.00	MH	0	14,410	0	0	14,410
	* LINE ITEM ASSEMBLY	Factor:80.0000							
01101.01 - 05		Project Scheduler			0.00	72.05	0.00	0.00	72.05
	SUB-997/1110	1 hrs/unit 200 TOTAL HRS	200.00	MH	0	14,410	0	0	14,410
	* LINE ITEM ASSEMBLY	Factor:80.0000							
01101.01 - 05		Project Estimator			0.00	86.46	0.00	0.00	86.46
	SUB-997/1111	1 hrs/unit 100 TOTAL HRS	100.00	MH	0	8,646	0	0	8,646
	* LINE ITEM ASSEMBLY	Factor:40.0000							
01101.01 - 05		Qualtity Control			0.00	96.06	0.00	0.00	96.06
	SUB-997/1112	1 hrs/unit 375 TOTAL HRS	375.00	MH	0	36,023	0	0	36,023
	* LINE ITEM ASSEMBLY	Factor:150.0000							
01101.01 - 05		Estimator "Chief - Senior"			0.00	138.09	0.00	0.00	138.09
	SUB-997/1113	1 hrs/unit 25 TOTAL HRS	25.00	MH	0	3,452	0	0	3,452
	* LINE ITEM ASSEMBLY	Factor:10.0000							
		Subtotal Direct Costs			0	326,329	0	0	326,329
		Subcontractor Markups			0	69,762	0	0	69,762
		Prime Contractor Markups			0	28,956	0	0	28,956
		TOTAL MS40080021 FIELD OVERHEAD, DETAIL ITEMS	3,358	HRS	0	425,048	0	0	425,048
		2.50 MTH *Level Unit Cost-->*			*0.00*	*170,019.14*	*0.00*	*0.00*	*170,019.14*
		MS40080022 GC EXPENSES *LEVEL CONTRACTOR ID APPLIED--PRIME*							
01101.01 - 06		On Site Vehicle Pm			0.00	0.00	3.50	0.00	3.50
	SUB-997/NoCrew	1 hrs/unit 440 TOTAL HRS	440.00	HR	0	0	1,540	0	1,540
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 06		On Site Vehicle Super			0.00	0.00	3.50	0.00	3.50
	SUB-997/NoCrew	96 hrs/unit 36000 TOTAL HRS	375.00	HR	0	0	1,313	0	1,313
	* LINE ITEM ASSEMBLY	Factor:150.0000							
01101.01 - 06		On Site Vehicle Others			0.00	0.00	3.25	0.00	3.25
	SUB-997/NoCrew	96 hrs/unit 84480 TOTAL HRS	880.00	HR	0	0	2,860	0	2,860
	* LINE ITEM ASSEMBLY	Factor:352.0000							
01101.01 - 08		Field Office "Storefront"			0.00	0.00	35.00	0.00	35.00
	SUB-997/NoCrew	96 hrs/unit 42240 TOTAL HRS	440.00	HR	0	0	15,400	0	15,400
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Computers - Monitors			0.00	0.00	0.55	0.00	0.55
	SUB-997/NoCrew	96 hrs/unit 337920 TOTAL HRS	3,520.00	HR	0	0	1,936	0	1,936
	* LINE ITEM ASSEMBLY	Factor:1408.0000							
01101.01 - 08		Software			0.30	0.00	0.00	0.00	0.30
	SUB-997/NoCrew	96 hrs/unit 337920 TOTAL HRS	3,520.00	HR	1,056	0	0	0	1,056
	* LINE ITEM ASSEMBLY	Factor:1408.0000							
01101.01 - 08		Printers			0.00	0.00	1.10	0.00	1.10
	SUB-997/NoCrew	96 hrs/unit 84480 TOTAL HRS	880.00	HR	0	0	968	0	968
	* LINE ITEM ASSEMBLY	Factor:352.0000							
01101.01 - 08		Office Furniture			0.00	0.00	1.75	0.00	1.75
	SUB-997/NoCrew	96 hrs/unit 42240 TOTAL HRS	440.00	HR	0	0	770	0	770
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Office Supplies			4.50	0.00	0.00	0.00	4.50
	SUB-997/NoCrew	96 hrs/unit 42000 TOTAL HRS	437.50	HR	1,969	0	0	0	1,969
	* LINE ITEM ASSEMBLY	Factor:175.0000							
01101.01 - 08		Postage - Special Delievery Services			0.30	0.00	0.00	0.00	0.30
	SUB-997/NoCrew	96 hrs/unit 42240 TOTAL HRS	440.00	HR	132	0	0	0	132
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		First Aid Supplies			0.25	0.00	0.00	0.00	0.25
	SUB-997/NoCrew	96 hrs/unit 42240 TOTAL HRS	440.00	HR	110	0	0	0	110
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Cups - Ice - Drinking Water			0.30	0.00	0.00	0.00	0.30
	SUB-997/NoCrew	96 hrs/unit 42240 TOTAL HRS	440.00	HR	132	0	0	0	132
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Printing - Blue Prints			0.40	0.00	0.00	0.00	0.40
	SUB-997/NoCrew	96 hrs/unit 42240 TOTAL HRS	440.00	HR	176	0	0	0	176
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Photo Copier Machine			0.60	0.00	0.22	0.00	0.82
	SUB-997/NoCrew	96 hrs/unit 42240 TOTAL HRS	440.00	HR	264	0	97	0	361
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Photo Copier Supplies			0.15	0.00	2.00	0.00	2.15
	SUB-997/NoCrew	96 hrs/unit 42240 TOTAL HRS	440.00	HR	66	0	880	0	946
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Storage & Tool Trailers			0.00	0.00	2.00	0.00	2.00
	SUB-997/NoCrew	96 hrs/unit 84480 TOTAL HRS	880.00	HR	0	0	1,760	0	1,760
	* LINE ITEM ASSEMBLY	Factor:352.0000							

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
01101.01 - 08	Equip Rental/Small Tools		0.00	0.00	3.00	0.00	3.00
	SUB-997/NoCrew 96 hrs/unit 42240 TOTAL HRS	440.00 HR	0	0	1,320	0	1,320
	* LINE ITEM ASSEMBLY Factor:176.0000						
01101.01 - 08	Small Tools Expendable		1.50	0.00	0.00	0.00	1.50
	SUB-997/NoCrew 96 hrs/unit 42240 TOTAL HRS	440.00 HR	660	0	0	0	660
	* LINE ITEM ASSEMBLY Factor:176.0000						
01101.01 - 08	Telephone Exp, Incl Cell		1.10	0.00	0.00	0.00	1.10
	SUB-997/NoCrew 96 hrs/unit 84480 TOTAL HRS	880.00 HR	968	0	0	0	968
	* LINE ITEM ASSEMBLY Factor:352.0000						
01101.01 - 08	Internet Connections - Service		0.00	0.00	0.25	0.00	0.25
	SUB-997/NoCrew 96 hrs/unit 337920 TOTAL HRS	3,520.00 HR	0	0	880	0	880
	* LINE ITEM ASSEMBLY Factor:1408.0000						
01101.01 - 08	Network / Communications Eqpt		0.00	0.00	1.20	0.00	1.20
	SUB-997/NoCrew 96 hrs/unit 42240 TOTAL HRS	440.00 HR	0	0	528	0	528
	* LINE ITEM ASSEMBLY Factor:176.0000						
01101.01 - 08	Field Radios		0.00	0.00	2.20	0.00	2.20
	SUB-997/NoCrew 96 hrs/unit 42240 TOTAL HRS	440.00 HR	0	0	968	0	968
	* LINE ITEM ASSEMBLY Factor:176.0000						
01101.01 - 08	Temporary Toilets (5)		0.00	0.00	1.20	0.00	1.20
	SUB-997/NoCrew 96 hrs/unit 84480 TOTAL HRS	880.00 HR	0	0	1,056	0	1,056
	* LINE ITEM ASSEMBLY Factor:352.0000						
01101.01 - 08	Temporary Lighting & Elec Hourly Charges		0.00	0.00	2.00	0.00	2.00
	SUB-997/NoCrew 96 hrs/unit 42240 TOTAL HRS	440.00 HR	0	0	880	0	880
	* LINE ITEM ASSEMBLY Factor:176.0000						
01101.01 - 08	Fire Protection Equipment		0.00	0.00	0.15	0.00	0.15
	SUB-997/NoCrew 96 hrs/unit 36000 TOTAL HRS	375.00 HR	0	0	56	0	56
	* LINE ITEM ASSEMBLY Factor:150.0000						
01101.01 - 08	Temp Heat/Winter Weather Hourly Charges		0.00	0.00	0.07	0.00	0.07
	SUB-997/NoCrew 96 hrs/unit 19200 TOTAL HRS	200.00 HR	0	0	14	0	14
	* LINE ITEM ASSEMBLY Factor:80.0000						
01101.01 - 08	Trash Hauling		3.75	0.00	0.00	0.00	3.75
	SUB-997/NoCrew 96 hrs/unit 36000 TOTAL HRS	375.00 HR	1,406	0	0	0	1,406
	* LINE ITEM ASSEMBLY Factor:150.0000						
01101.01 - 09	Man / Material Lift "Operator"		0.00	69.48	0.00	0.00	69.49
	SUB-997/221 1 hrs/unit 300 TOTAL HRS	300.00 MH	0	20,846	0	0	20,846
	* LINE ITEM ASSEMBLY Factor:120.0000						
	Subtotal Direct Costs		6,939	20,846	33,226	0	61,010
	Subcontractor Markups		1,891	4,456	7,808	0	14,155
	Prime Contractor Markups		844	1,850	3,924	0	6,619
TOTAL MS40080022 GC EXPENSES		2,155,220 HRS	9,674	27,152	44,958	0	81,784
2.50 MTH		*Level Unit Cost-->*	*3,869.66*	*10,860.62*	*17,983.27*	*0.00*	*32,713.54*
SUBTOTAL MS400800 CHINATOWN STATION			8,686	348,907	34,047	0	391,640
MARKUP			*1.404*	*1.303*	*1.354*	*0.000*	*1.309*
TOTAL MS400800 CHINATOWN STATION			12,194	454,531	46,115	0	512,840

**.*% OF PROJECT PERFORMED BY SUBCONTRACTORS

196 DETAIL LINE ITEMS

central T subway

Connecting people. Connecting communities.

REPORT ON CONSTRUCTION COST SAVINGS FOR PRIMARY MITIGATIONS TO UNION SQUARE/MARKET STREET, CHINATOWN, AND MOSCONE STATIONS

January 31, 2013

SFMTA | Municipal Transportation Agency

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EXECUTIVE SUMMARY

A. Introduction

FTA issued a report in September 2011 documenting the Pre – FFGA Risk and Contingency Review, in which the Project Management Oversight Contractor (PMOC) presented an evaluation of the cost savings proposed by the San Francisco Municipal Transportation Agency (SFMTA). SFMTA had assessed an amount of $87,704,000 to be saved.in their revised ten percentile (P10) Baseline Cost Estimate (BCE) for design modifications and construction method changes to the underground stations of the Central Subway Project (CSP). In performing the evaluation the PMOC had to note that the estimate information provided by SFMTA was for a P10 scenario; and for adjustment to the existing 65 percent estimate, a more middle-of-the-road realistic savings amount needed to be calculated. The PMOC evaluation resulted in both a projected time and cost savings in the amount of $35 million.

These proposed cost savings are identified as primary mitigations and constitute an important element in addressing the $67.7 million gap between the current project amount of $1.5783 billion and the 50 percent cost of $1.646 billion resulting from the Risk Workshop model output. The PMOC recommended several actions be taken by SFMTA to address the risks.

B. Summary of Actions Taken to Address PMOC Recommendations

SFMTA agreed to accept the PMOC recommended savings amount of $34,745,313 for the evolving station design modifications and the construction method changes for the stations together with the reduced construction period for all three stations.

SFMTA developed risk mitigation strategies to address the cost and schedule reductions for each of the three underground stations.

SFMTA continued to develop and refine the station bid design to incorporate the revised construction approach characterized as a primary mitigation strategy and report on it monthly.

At the 90% and 100% design phases, estimate checks were made by SFMTA to show that these cost savings have been incorporated in the design, schedule, and estimate.

SFMTA agreed to actively pursuing the primary mitigations proposed, and providing FTA/the PMOC documentation to verify that the cost and schedule savings proposed were accomplished.

C. SFMTA Mitigation Strategies

- Revise contract documents for street and lane closure to allow for larger staging areas and better access to the site.
- Address ambiguities in the contract documents to allow for multiple shift work.

- Adjust cost estimates to reflect production rates for the construction change from top-down to bottom-up as it applies to Union Square / Market Street Station (UMS) and Moscone Station (MOS).
- Adjust cost estimates to reflect closing Stockton Street for UMS and occupying more lanes for MOS, improved access and productivity as a consequence of a larger lay down area and the adoption of the conventional bottom-up construction method.
- The SFMTA considers the savings contained in this report for the stations involving design and construction method changes are realistic and conservative, based upon the issued for bid design information.

D. SUMMARY OF COST SAVING FROM PRIMARY MITIGATIONS

The comparison of cost savings indicate that although a substantial saving of $20M was represented when comparing the 100% Estimate to the 65% Estimate values, the saving fell short of the estimated saving generated by the PMOC in September 2011. The approximately $14M of unrealized savings can be primarily attributed to different methods of estimating and utilization of more conservative approach to productively and unit rates.

SUMMARY:Station Mitigation Year of Expenditure Cost Calculation

PMOC RECOMMENDATION SAVING FOR STATION CONSTRUCTION CHANGE ESTIMATE [Based upon SFMTA Estimates]						Date: June 27, 2011
	CENTRAL SUBWAY PROJECT , SAN FRANCISCO				NEW INFO	
		Revised Est. Cost for Station	Original 65% Design Est.	Estimate Difference	100% Engineer's Estimate	SFMTA Estimate Difference
SCC	CATEGORY ITEM	YOE	YOE	YOE Savings	YOE	YOE Savings
	Combined Total Savings for Station Mitigation SCC 20.03 & SCC 40.08	**492,218,185**	526,963,495	**34,745,313**	**506,503,651**	**20,459,844**

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REPORT ON CONSTRUCTION COST SAVINGS FOR PRIMARY MITIGATIONS AT UNION SQUARE/MARKET ST., CHINATOWN, AND MOSCONE STATIONS

I. INTRODUCTION

A. SFMTA Actions to address PMOC Recommendations

SFMTA accepted the evaluation of the PMOC for the recommended savings amount of $34,745,313 for the evolving station design modifications and the construction method changes for the stations together with the reduced construction period for all three stations. These proposed design and construction method changes were reviewed separately as mitigation cost savings. Risks were identified for each of the three stations to address the required design modifications and construction method changes and mitigation strategies developed for each. Risk status reports were created, mitigations identified and ownership assigned. Risk status reports were updated and reported on monthly until complete. Cost estimates were revised at the 90% and 100% design documents to reflect design modifications and construction method changes.

B. Primary Mitigation Strategy

Three broad mitigations were identified for each of the three stations. (1)Allow for greater street/lane closures; (2) clarify multiple shift work; (3) provide open access for better production rates- specifically bottoms up construction rather than top down at UMS and YBA/MOS and improved reliable access to CTS head house for excavation and spoil removals. Six specific primary mitigations for each station were developed to address risks associated with the direct and indirect costs for each. Using a more center-of-the-road realistic or conservative savings amount the results were compared to the 65% estimate.

C. Supporting Documentation

The SFMTA developed the following documents to verify that the cost and schedule savings proposed were accomplished.

- Primary Mitigation Status Reports, dated June 14, 2012.
- Central Subway 100% Estimate Results for SCC 20.03 and 40.08 dated October 5, 2012.
- Success 100% detail estimate backup for SCC 20.03 and 40.08 Underground Stations

II. GENERAL OBSERVATIONS

The PMOC evaluation of savings for SCC 20.03 and 40.08 dated September 2011, was developed utilizing a revised estimated cost for Stations compared to the original 65% estimate as the following statement of savings was made for design and construction method changes to the underground stations.

Table 1

SUMMARY:Station Mitigation Year of Expenditure Cost Calculation

PMOC RECOMMENDATION SAVING FOR STATION CONSTRUCTION CHANGE ESTIMATE [Based upon SFMTA Estimates]					Date: June 27, 2011	
	CENTRAL SUBWAY PROJECT , SAN FRANCISCO				NEW INFO	
		Revised Est. Cost for Station	Original 65% Design Est.	Estimate Difference	100% Engineer's Estimate	SFMTA Estimate Difference
SCC	CATEGORY ITEM	YOE	YOE	YOE Savings	YOE	YOE Savings
	Combined Total Savings for Station Mitigation SCC 20.03 & SCC 40.08	**492,218,185**	526,963,495	**34,745,313**	**506,503,651**	**20,459,844**

New information was added to the above table to provide a direct comparison to the PMOC evaluation. The 100% estimates present a more conservative estimate for the proposed saving, incorporating the design and construction method modifications. To accurately compare the values, the above numbers have maintained the same allocated contingency and escalation values that were utilized in the PMOC analysis and are presented for actual Year of Expenditure (YOE) costs.

Additional design information included review of the structural design components to verify that bottom up construction was not precluded; street /lane closures specification and drawings were revised to allow for greater time periods and more space; language clarified to allow for the complete closure of Stockton Street; specification requirements for work hours and requirements for working outside normal work hours were revised to clarify conditions to be met. The change in construction method, top down versus bottoms up, is applicable only to UMS and MOS stations and involves closing the street during some of the construction and giving the contractor a large staging area. For CTS excavation, grouting, and soil removal productions were adjusted from those that had been used and incorporated in the 65 percent Design Estimate.

III. SUPPORTING DOCUMENTATION

The documents utilized by SFMTA to substantiate the cost savings associated with the design and construction method changes for the stations were based upon the Primary Mitigation Status forms, the 100% Estimate information for each of the three stations, as well as the detailed output from the estimating software used in estimate preparation.

Back-up estimate information for SCC 20.03 and SCC 40.08, is provided to substantiate the 100% Estimate cost savings shown in the report. A review of the estimate and the unit quantities and prices used, demonstrate that the unit costs used were in most cases very conservative numbers. The back-up information shows the thoroughness of the estimate, as adjustments in cost for individual items of work for the new construction method.

A. **Major Cost Saving** between the 65% Design and 100% Estimates

The numbers given below are comparing how the primary mitigations influenced cost saving between 65% Estimates and 100% Estimates. Major savings are shown for both standard cost categories (SCC) 20.03 and 40.08. Key elements of work are delineated to provide a meaningful comparison to the PMOC evaluations performed in September 2011. Not all elements are influenced by the primary mitigations. Some elements show cost increases which are unrelated to primary mitigations. These cost increases are primarily due to additional detailed information available for 100% estimate that was not available at the 65% estimate.

For consistency in the evaluation of the cost savings the same allocated contingency percentages used by PMOC in their September 2011 Report have been employed and added to the base cost.

The same principle that has been used for allocated contingencies has also been adopted for calculating escalation costs. All presentations in the tables below are shown in Year of Expenditure (YOE) dollars.

B. Comparison of Cost Savings for Station Modification and Construction Method Changes under SCC 20.03 PMOC SFMTA

Overall cost savings between estimates for these combined elements is relatively small due to significant increases in costs not influenced by the primary mitigations. The cost savings generated by the primary mitigations are detailed below for each station

1. Union Square/Market Street Station

Of the three underground stations, UMS showed the largest cost savings. Table 2 compares the 65 percent base estimate amount for SCC 20.03 with the 100 percent estimate.

Table 2

		REVISED ESTIMATE COST FOR	Original 65% Design Est.	Estimate Difference	100% Engineer's Estimate
SCC	CATEGORY ITEM	YOE	YOE	YOE Savings	YOE
20	**STATIONS, STOPS AND TERMINALS**				
20.03	**Underground Stations**	382,388,597	410,684,845	28,296,248	403,420,115
	1253 Union Square Market Street Station				
	Excavation improved access and performance	75,663,408	85,981,146	10,317,738	65,693,943
	Instrumentation & Compensation Grouting	8,830,335	9,295,090	464,755	15,362,806
	Structural	32,064,930	34,664,790	2,599,860	40,056,640
	Architectural	14,312,204	14,604,289	292,085	20,179,177
	Mechanical	9,148,389	9,335,090	186,701	10,092,677
	Electrical	7,523,602	7,677,144	153,542	7,242,196
	Total Cost for 1253 UMS	147,542,869	161,557,549	14,014,680	158,627,440

There is a very large cost savings represented in the excavation which is a savings of nearly $20M between the estimates. This was achieved by improving productivity by implementing mitigation measures to allow street closure, better access and laydown and ability to work multiple shifts, some design changes that simplified construction, and the change from a top-down construction procedure to the more traditional bottom-up method. Time and cost were saved in ground support and excavation with more efficient use of equipment. Employing the new construction method will entail closure of Stockton Street.

2. Chinatown Station

This station showed the second largest savings. Table 3 compares the 65 percent base estimate amount for SCC 20.03 with the 100 percent estimate.

Table 3

		REVISED ESTIMATE COST FOR	Original 65% Design Est.	Estimate Difference	100% Engineer's Estimate
SCC	CATEGORY ITEM	YOE	YOE	YOE Savings	YOE
20	**STATIONS, STOPS AND TERMINALS**				
	1254 Chinatown Station				
	Excavation improved access and performance Headhouse	27,861,197	30,956,886	3,095,689	34,210,569
	SEM Excavation	51,107,527	52,150,537	1,043,010	35,141,870
	Structural	29,337,210	30,881,274	1,544,064	34,780,289
	Architectural	10,711,279	10,929,876	218,597	14,245,129
	Mechanical	8,975,095	9,158,259	183,164	10,784,528
	Electrical	5,324,705	5,433,372	108,667	7,483,861
	Total Cost for 1254 CTS	133,317,012	139,510,204	6,193,192	136,646,244

The very large approximately $18M cost savings between the estimates can be found in the SEMexcavation. Implementation of primary mitigations related to improved access and working outside regular working hours multiple shifts seven days a week produced this significant saving.

3. Moscone Station

Of the three underground stations, MOS showed the smallest cost savings. Table 4 compares the 65 percent base estimate amount for SCC 20.03 with the 100% estimate.

Table 4

		REVISED ESTIMATE COST FOR	Original 65% Design Est.	Estimate Difference	100% Engineer's Estimate
SCC	**CATEGORY ITEM**	YOE	YOE	YOE Savings	YOE
20	**STATIONS, STOPS AND TERMINALS**				
	1255 Moscone Station				
	Excavation improved access and performance	42,308,869	48,078,261	5,769,392	46,836,552
	Compensation Grouting	3,395,541	3,574,253	178,712	1,827,448
	Instrumentation	1,846,537	1,893,884	47,347	2,417,206
	Structural	29,017,169	30,544,388	1,527,219	32,596,702
	Demolition	1,747,349	1,839,315	91,966	423,370
	Architectural	7,532,243	7,685,962	153,719	10,157,079
	Mechanical	10,911,764	11,134,454	222,690	8,124,789
	Electrical	4,769,244	4,866,575	97,331	5,763,284
	Total Cost for 1255 MOS	101,528,716	109,617,092	8,088,376	108,146,431

There is approximately $4M in cost savings for excavation and compensation grouting elements of work. Similar to UMS this was achieved by some design changes that simplified construction, and the change from a top-down construction procedure to the more traditional bottom-up method. With the more efficient use of equipment and a larger staging area, time and cost were saved in ground support and excavation.

C. Comparison of Cost Savings for SFMTA Station Modification and Construction Method Changes under SCC 40.08 Temporary Facilities and other Indirect Costs

The 65% Estimates prepared by SFMTA had incorrectly allocated general contractor's site administration and general conditions cost under this section, instead of distributing these costs to the SCCs of work. These costs have been added to the temporary work costs such as dewatering, traffic control, and Trolley bus overhead cable diversion. Table 5 compares the 65 percent base estimate amount for SCC 40.08 with the 100% estimate.

Table 5

PMOC RECOMMENDATION SAVING FOR STATION CONSTRUCTION CHANGE ESTIMATE [Based upon SFMTA Estimates]					Date: June 27. 2011
	CENTRAL SUBWAY PROJECT , SAN FRANCISCO				
		REVISED ESTIMATE COST FOR	Original 65% Design Est.	Estimate Difference	100% Engineer's Estimate
SCC	CATEGORY ITEM	YOE	YOE	YOE Savings	YOE
40	Sitework & Special Conditions				
40.08	Temporary Facilities	109,829,589	116,278,650	6,449,064	103,083,536

The $13M overall savings is primarily due to reallocation of the dollars to the correct SCC item. The primary drivers of changes in cost are related to duration of time for the contract or work element. Although the overall contract durations remain relatively unchanged, in fact all three underground stations increased in duration, the work elements affected by the primary mitigations were overall shorter in duration. The tables below for the individual stations demonstrate how most of the cost savings were generated in CTS, the result of reallocation to proper SCC.

1. Union Square/Market Street Station

Table 6

		REVISED ESTIMATE COST FOR	Original 65% Design Est.	Estimate Difference	100% Engineer's Estimate
SCC	CATEGORY ITEM	YOE	YOE	YOE Savings	YOE
40	Sitework & Special Conditions				
40.08	Temporary Facilities	109,829,589	116,278,650	6,449,064	103,083,536
	1253 Union Square Market Street Station				
	Field Supervision	19,157,485	21,286,095	2,128,610	18,078,085
	Project Expenses	7,699,456	8,104,689	405,234	11,323,723
	Traffic Control	3,369,832	3,547,191	177,360	3,980,388
	Overhead Traction Power	682,372	682,372	-	800,390
	Total Cost for 1253 UMS	30,909,144	33,620,347	2,711,205	34,182,587

2. Chinatown Station

Table 7

		REVISED ESTIMATE COST FOR	Original 65% Design Est.	Estimate Difference	100% Engineer's Estimate
SCC	CATEGORY ITEM	YOE	YOE	YOE Savings	YOE
40	Sitework & Special Conditions				
40.08	Temporary Facilities	109,829,589	116,278,650	6,449,064	103,083,536
	1254 Chinatown Station				
	Field Supervision	11,961,239	13,001,346	1,040,108	28,612,130
	Project Expenses Overhead & Profit	30,194,215	31,128,057	933,842	9,747,716
	Traffic Control	1,614,967	1,664,914	49,947	1,498,958
	Dewatering	433,017	433,017	-	1,002,280
	Overhead Traction Power	149,684	149,684	-	156,240
	Contractors Contingency	8,300,957	8,300,957	-	1,081,318
	Total Cost for 1254 CTS	52,654,079	54,677,975	2,023,897	42,098,642

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3. Moscone Station

Table 8

		REVISED ESTIMATE COST FOR	Original 65% Design Est.	Estimate Difference	100% Engineer's Estimate
SCC	CATEGORY ITEM	YOE	YOE	YOE Savings	YOE
40	Sitework & Special Conditions				
40.08	Temporary Facilities	109,829,589	116,278,650	6,449,064	103,083,536
	1255 Moscone Station				
	Field Supervision	17,137,920	18,628,174	1,490,254	15,474,932
	Project Expenses	6,670,265	6,876,563	206,298	8,929,176
	Traffic Control	562,949	580,360	17,411	593,980
	Dewatering	1,073,239	1,073,239	-	989,904
	Overhead Traction Power	821,992	821,992	-	814,315
	Total Cost for 1255 MOS	26,266,366	27,980,328	1,713,962	26,802,307

APPENDIX A – REVISED BASE COST FOR STATION MITIGATION

Table A-1: Mitigation Base Cost Calculations

PMOC RECOMMENDATION SAVING FOR STATION CONSTRUCTION CHANGE ESTIMATE [Based upon SFMTA Estimates]												
	CENTRAL SUBWAY PROJECT , SAN FRANCISCO											Date: June 27. 2011
		REVISED BASE ESTIMATE COST FOR STATION MITIGATION							100% Engineer's Estimate			
SCC	CATEGORY ITEM	Direct Base Cost	Ins Bonds Fee	Base Cost 2010	Percentage Reduction	Adjusted Amount	Revised Base Estimate Amount	Revised Base 2012 Dollars	Direct Base Cost	Ins Bonds Fee	Base Cost 2012 Dollars	
20	STATIONS, STOPS AND TERMINALS											
20.03	Underground Stations	273,983,783	15,479,361	289,463,144	6.87%	19,889,060	269,574,084	287,659,539	298,846,447	12,982,487	311,828,934	
	1253 Union Square Market Street Station											
	Excavation improved access and performance	58,937,271	4,021,881	62,959,152	12.00%	7,555,098	55,404,054	59,121,056	47,993,109	2,084,917	50,078,026	
	Instrumentation & Compensation Grouting	6,371,481	434,790	6,806,271	5.00%	340,314	6,465,957	6,899,752	12,347,198	536,387	12,883,585	
	Structural	23,761,583	1,621,491	25,383,074	7.50%	1,903,731	23,479,343	25,054,549	31,047,558	1,348,768	32,396,326	
	Architectural	10,010,764	683,135	10,693,899	2.00%	213,878	10,480,021	11,183,115	15,874,121	689,604	16,563,725	
	Mechanical	6,398,900	436,661	6,835,561	2.00%	136,711	6,698,850	7,148,269	7,687,175	333,946	8,021,121	
	Electrical	5,262,432	359,109	5,621,541	2.00%	112,431	5,509,110	5,878,711	5,394,495	234,348	5,628,843	
	Total Cost for 1253 UMS	110,742,431	7,557,067	118,299,498	8.67%	10,262,162	108,037,336	115,285,452	120,343,656	5,227,969	125,571,625	
	1254 Chinatown Station											
	Excavation improved access and performance Headhouse	21,919,958	747,821	22,667,779	10.00%	2,266,778	20,401,001	21,769,684	26,793,482	1,163,962	27,957,444	
	SEM Excavation	36,926,763	1,259,793	38,186,556	2.00%	763,731	37,422,825	39,933,485	24,956,333	1,084,153	26,040,486	
	Structural	21,866,419	745,994	22,612,413	5.00%	1,130,621	21,481,792	22,922,984	27,124,180	1,178,329	28,302,509	
	Architectural	7,739,229	264,031	8,003,260	2.00%	160,065	7,843,195	8,369,387	11,258,262	489,081	11,747,343	
	Mechanical	6,484,782	221,235	6,706,017	2.00%	134,120	6,571,897	7,012,799	8,424,439	365,974	8,790,413	
	Electrical	3,847,263	131,253	3,978,516	2.00%	79,570	3,898,946	4,160,522	5,949,208	258,445	6,207,653	
	Total Cost for 1254 CTS	98,784,414	3,370,127	102,154,541	4.44%	4,534,886	97,619,655	104,168,861	104,505,904	4,539,945	109,045,849	
	1255 Moscone Station											
	Excavation improved access and performance	28,270,933	1,996,589	30,267,522	12.00%	3,632,103	26,635,419	28,422,363	31,678,939	1,376,196	33,055,135	
	Compensation Grouting	2,101,729	148,431	2,250,160	5.00%	112,508	2,137,652	2,281,065	869,988	37,794	907,782	
	Instrumentation	1,113,640	78,649	1,192,289	2.50%	29,807	1,162,482	1,240,472	1,705,633	74,096	1,779,729	
	Structural	17,960,682	1,268,444	19,229,126	5.00%	961,456	18,267,670	19,493,229	23,099,074	1,003,470	24,102,544	
	Demolition	1,081,552	76,383	1,157,935	5.00%	57,897	1,100,038	1,173,839	-	-	-	
	Architectural	4,519,492	319,182	4,838,674	2.00%	96,773	4,741,901	5,060,030	7,528,074	327,035	7,855,109	
	Mechanical	6,547,271	462,390	7,009,661	2.00%	140,193	6,869,468	7,330,334	4,952,068	215,128	5,167,196	
	Electrical	2,861,639	202,099	3,063,738	2.00%	61,275	3,002,463	3,203,895	4,163,111	180,854	4,343,965	
	Total Cost for 1255 MOS	64,456,938	4,552,167	69,009,105	7.38%	5,092,012	63,917,093	68,205,226	73,996,887	3,214,573	77,211,460	
40	Sitework & Special Conditions											
40.08	Temporary Facilities	78,215,010	4,055,449	82,270,459	5.53%	4,546,253	77,724,206	82,938,645	74,643,857	3,242,678	77,886,535	
	1253 Union Square Market Street Station											
	Field Supervision	14,590,924	995,685	15,586,609	10.00%	1,558,661	14,027,948	14,969,069	13,418,033	582,906	14,000,939	
	Project Expenses	5,555,500	379,108	5,934,608	5.00%	296,730	5,637,878	6,016,117	8,949,991	388,806	9,338,797	
	Traffic Control	2,431,484	165,925	2,597,409	5.00%	129,870	2,467,539	2,633,083	3,061,891	133,015	3,194,906	
	Overhead Traction Power	467,744	31,919	499,663	0.00%	-	499,663	533,185	641,814	27,882	669,696	
	Total Cost for 1253 UMS	23,045,652	1,572,637	24,618,289	8.06%	1,985,262	22,633,027	24,151,454	26,071,729	1,132,608	27,204,337	
	1254 Chinatown Station											
	Field Supervision	9,205,996	314,072	9,520,068	8.00%	761,605	8,758,463	9,346,059	23,703,121	1,029,711	24,732,832	
	Project Expenses Overhead & Profit	22,041,161	751,956	22,793,117	3.00%	683,794	22,109,323	23,592,616	5,094,311	221,307	5,315,618	
	Traffic Control	1,178,893	40,219	1,219,112	3.00%	36,573	1,182,539	1,261,874	1,128,983	49,045	1,178,028	
	Dewatering	306,611	10,460	317,071	0.00%	-	317,071	338,343	828,718	36,001	864,719	
	Overhead Traction Power	105,988	3,616	109,604	0.00%	-	109,604	116,957	119,805	5,205	125,010	
	Contractors Contingency	5,877,743	200,525	6,078,268	0.00%	-	6,078,268	6,486,053	-	-	-	
	Total Cost for 1254 CTS	38,716,392	1,320,848	40,037,240	3.70%	1,481,972	38,555,268	41,141,902	30,874,938	1,341,269	32,216,207	
	1255 Moscone Station											
	Field Supervision	10,953,721	773,589	11,727,310	8.00%	938,185	10,789,125	11,512,957	9,804,070	425,908	10,229,978	
	Project Expenses	4,043,550	285,569	4,329,119	3.00%	129,874	4,199,245	4,480,969	6,332,268	275,086	6,607,354	
	Traffic Control	341,263	24,101	365,364	3.00%	10,961	354,403	378,180	396,215	17,212	413,427	
	Dewatering	631,085	44,569	675,654	0.00%	-	675,654	720,983	631,983	27,455	659,438	
	Overhead Traction Power	483,347	34,136	517,483	0.00%	-	517,483	552,200	532,654	23,140	555,794	
	Total Cost for 1255 MOS	16,452,966	1,161,964	17,614,930	6.13%	1,079,019	16,535,911	17,645,288	17,697,190	768,801	18,465,991	

Table A-2: Station Mitigation Year of Expenditure Cost Calculation

Table A-2:Station Mitigation Year of Expenditure Cost Calculation

PMOC RECOMMENDATION SAVING FOR STATION CONSTRUCTION CHANGE ESTIMATE [Based upon SFMTA Estimates]						Date: June 27. 2011						
	CENTRAL SUBWAY PROJECT , SAN FRANCISCO											
		REVISED ESTIMATE COST FOR STATION MITIGATION					Original 65% Design Est.	Estimate Difference	100% Engineer's Estimate			
SCC	CATEGORY ITEM	Revised Base	Allocated Cont	Base + Allocated Cont	Escalation	YOE	YOE	YOE Savings	Base Cost 2012	Allocated Cont	Escalation	YOE
20	**STATIONS, STOPS AND TERMINALS**											
20.03	**Underground Stations**	269,574,084	63,306,086	332,880,170	49,508,427	382,388,597	410,684,845	28,296,248	310,102,448	63,306,086	30,011,581	403,420,115
	1253 Union Square Market Street Station											
	Excavation improved access and performance	55,404,054	10,943,638	66,347,692	9,315,716	75,663,408	85,981,146	10,317,738	50,078,026	10,943,638	4,672,280	65,693,943
	Instrumentation & Compensation Grouting	6,465,957	1,277,183	7,743,140	1,087,195	8,830,335	9,295,090	464,755	12,883,585	1,277,183	1,202,038	15,362,806
	Structural	23,479,343	4,637,737	28,117,080	3,947,850	32,064,930	34,664,790	2,599,860	32,396,326	4,637,737	3,022,577	40,056,640
	Architectural	10,480,021	2,070,057	12,550,078	1,762,126	14,312,204	14,604,289	292,085	16,563,725	2,070,057	1,545,396	20,179,177
	Mechanical	6,698,850	1,323,185	8,022,035	1,126,354	9,148,389	9,335,090	186,701	8,021,121	1,323,185	748,371	10,092,677
	Electrical	5,509,110	1,088,182	6,597,292	926,310	7,523,602	7,677,144	153,542	5,628,843	1,088,182	525,171	7,242,196
	Total Cost for 1253 UMS	108,037,336	21,339,982	129,377,318	18,165,551	147,542,869	161,557,549	14,014,680	125,571,625	21,339,982	11,715,833	158,627,440
	1254 Chinatown Station											
	Excavation improved access and performance Headhouse	20,401,001	3,629,318	24,030,319	3,830,878	27,861,197	30,956,886	3,095,689	27,957,444	3,629,318	2,623,806	34,210,569
	SEM Excavation	37,422,825	6,657,484	44,080,309	7,027,218	51,107,527	52,150,537	1,043,010	26,040,486	6,657,484	2,443,900	35,141,870
	Structural	21,481,792	3,821,590	25,303,382	4,033,828	29,337,210	30,881,274	1,544,064	28,302,509	3,821,590	2,656,190	34,780,289
	Architectural	7,843,195	1,395,297	9,238,492	1,472,787	10,711,279	10,929,876	218,597	11,747,343	1,395,297	1,102,488	14,245,129
	Mechanical	6,571,897	1,169,134	7,741,031	1,234,064	8,975,095	9,158,259	183,164	8,790,413	1,169,134	824,980	10,784,528
	Electrical	3,898,946	693,619	4,592,565	732,140	5,324,705	5,433,372	108,667	6,207,653	693,619	582,588	7,483,861
	Total Cost for 1254 CTS	97,619,655	17,366,442	114,986,097	18,330,915	133,317,012	139,510,204	6,193,192	109,045,849	17,366,442	10,233,953	136,646,244
	1255 Moscone Station											
	Excavation improved access and performance	26,635,419	10,251,128	36,886,547	5,422,322	42,308,869	48,078,261	5,769,392	33,055,135	10,251,128	3,530,288	46,836,552
	Compensation Grouting	2,137,652	822,715	2,960,367	435,174	3,395,541	3,574,253	178,712	907,782	822,715	96,951	1,827,448
	Instrumentation	1,162,482	447,402	1,609,884	236,653	1,846,537	1,893,884	47,347	1,779,729	447,402	190,075	2,417,206
	Structural	18,267,670	7,030,647	25,298,317	3,718,852	29,017,169	30,544,388	1,527,219	23,099,074	7,030,647	2,466,981	32,596,702
	Demolition	1,100,038	423,370	1,523,408	223,941	1,747,349	1,839,315	91,966	-	423,370	-	423,370
	Architectural	4,741,901	1,825,007	6,566,908	965,335	7,532,243	7,685,962	153,719	7,528,074	1,825,007	803,998	10,157,079
	Mechanical	6,869,468	2,643,840	9,513,308	1,398,456	10,911,764	11,134,454	222,690	4,952,068	2,643,840	528,881	8,124,789
	Electrical	3,002,463	1,155,553	4,158,016	611,228	4,769,244	4,866,575	97,331	4,163,111	1,155,553	444,620	5,763,284
	Total Cost for 1255 MOS	63,917,093	24,599,662	88,516,755	13,011,961	101,528,716	109,617,092	8,088,376	75,484,974	24,599,662	8,061,795	108,146,431
40	**Sitework & Special Conditions**											
40.08	**Temporary Facilities**	77,724,206	17,693,660	95,417,866	14,411,725	109,829,589	116,278,650	6,449,064	77,858,654	17,693,660	7,531,222	103,083,536
	1253 Union Square Market Street Station											
	Field Supervision	14,027,948	2,770,858	16,798,806	2,358,679	19,157,485	21,286,095	2,128,610	14,000,939	2,770,858	1,306,288	18,078,085
	Project Expenses	5,637,878	1,113,617	6,751,495	947,961	7,699,456	8,104,689	405,234	9,338,797	1,113,617	871,310	11,323,723
	Traffic Control	2,467,539	487,398	2,954,937	414,895	3,369,832	3,547,191	177,360	3,194,906	487,398	298,085	3,980,388
	Overhead Traction Power	499,663	98,695	598,358	84,014	682,372	682,372	-	641,814	98,695	59,881	800,390
	Total Cost for 1253 UMS	22,633,027	4,470,568	27,103,595	3,805,549	30,909,144	33,620,347	2,711,205	27,176,455	4,470,568	2,535,563	34,182,587
	1254 Chinatown Station											
	Field Supervision	8,758,463	1,558,122	10,316,585	1,644,655	11,961,239	13,001,346	1,040,108	24,732,832	1,558,122	2,321,176	28,612,130
	Project Expenses Overhead & Profit	22,109,323	3,933,227	26,042,550	4,151,665	30,194,215	31,128,057	933,842	5,315,618	3,933,227	498,871	9,747,716
	Traffic Control	1,182,539	210,372	1,392,911	222,056	1,614,967	1,664,914	49,947	1,178,028	210,372	110,558	1,498,958
	Dewatering	317,071	56,407	373,478	59,539	433,017	433,017	-	864,719	56,407	81,154	1,002,280
	Overhead Traction Power	109,604	19,498	129,102	20,581	149,684	149,684	-	125,010	19,498	11,732	156,240
	Contractors Contingency	6,078,268	1,081,318	7,159,586	1,141,371	8,300,957	8,300,957	-	-	1,081,318	-	1,081,318
	Total Cost for 1254 CTS	38,555,268	6,858,944	45,414,212	7,239,867	52,654,079	54,677,975	2,023,897	32,216,207	6,858,944	3,023,491	42,098,642
	1255 Moscone Station											
	Field Supervision	10,789,125	4,152,392	14,941,517	2,196,403	17,137,920	18,628,174	1,490,254	10,229,978	4,152,392	1,092,562	15,474,932
	Project Expenses	4,199,245	1,616,156	5,815,401	854,864	6,670,265	6,876,563	206,298	6,607,354	1,616,156	705,665	8,929,176
	Traffic Control	354,403	136,399	490,802	72,148	562,949	580,360	17,411	413,427	136,399	44,154	593,980
	Dewatering	675,654	260,038	935,692	137,547	1,073,239	1,073,239	-	659,438	260,038	70,428	989,904
	Overhead Traction Power	517,483	199,163	716,646	105,347	821,992	821,992	-	555,794	199,163	59,359	814,315
	Total Cost for 1255 MOS	16,535,911	6,364,148	22,900,059	3,366,309	26,266,366	27,980,328	1,713,962	18,465,991	6,364,148	1,972,168	26,802,307
	Combined Total Savings for Station Mitigation SCC 20.03 & SCC 40.08	347,298,289	80,999,746	428,298,035	63,920,152	**492,218,185**	526,963,495	**34,745,313**	387,961,102	80,999,746	37,542,803	**506,503,651**

Table A-3 SUMMARY:Station Mitigation Year of Expenditure Cost Calculation

PMOC RECOMMENDATION SAVING FOR STATION CONSTRUCTION CHANGE ESTIMATE [Based upon SFMTA Estimates] 2011					Date: June 27.	
	CENTRAL SUBWAY PROJECT , SAN FRANCISCO				NEW INFO	
		Revised Est. Cost for Station	Original 65% Design Est.	Estimate Difference	100% Engineer's Estimate	SFMTA Estimate Difference
SCC	CATEGORY ITEM	YOE	YOE	YOE Savings	YOE	YOE Savings
	Combined Total Savings for Station Mitigation SCC 20.03 & SCC 40.08	**492,218,185**	526,963,495	**34,745,312**	**506,503,651**	**20,459,844**

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APPENDIX B

EXPANDED ESTIMATE BACKUP

DETAILED BACKUP FOR PRIMARY MITIGATION REPORT - REFERENCE CODES MAY BE FOUND IN BACKUP ATTACHED

APPENDIX A - REVISED BASE COST FOR STATION MITIGATION

Table A-1: Mitigation Base Cost Calculations

PMOC RECOMMENDATION SAVING FOR STATION CONSTRUCTION CHANGE ESTIMATE [Based upon SFMTA Estimates] Date: June 27. 2011

CENTRAL SUBWAY PROJECT , SAN FRANCISCO

		REVISED BASE ESTIMATE COST FOR STATION MITIGATION							100% Engineer's Estimate		
SCC	CATEGORY ITEM	Direct Base Cost	Ins Bonds Fee	Base Cost 2010	Percentage Reduction	Adjusted Amount	Revised Base Estimate Amount	Revised Base 2012 Dollars	Direct Base Cost	Ins Bonds Fee	Base Cost 2012 Dollars
20	**STATIONS, STOPS AND TERMINALS**										
20.03	**Underground Stations**	273,983,783	15,479,361	289,463,144	6.87%	19,889,060	269,574,084	287,659,539	298,846,447	12,982,487	311,828,934
	1253 Union Square Market Street Station										
	Excavation improved access and performance	58,937,271	4,021,881	62,959,152	12.00%	7,555,098	55,404,054	59,121,056	47,993,109	2,084,917	50,078,026
	UM200306								6,114,258		
	UM200308								35,266,557		
	UM200310								4,725,110		
	UM200311								667,369		
	UM200312								1,219,815		
	Instrumentation & Compensation Grouting	6,371,481	434,790	6,806,271	5.00%	340,314	6,465,957	6,899,752	12,347,198	536,387	12,883,585
	UM200313								12,347,198		
	Structural	23,761,583	1,621,491	25,383,074	7.50%	1,903,731	23,479,343	25,054,549	31,047,558	1,348,768	32,396,326
	UM200314								2,732,780		
	UM200316								4,335,757		
	UM200318								4,870,709		
	UM200320								5,261,999		
	UM200322								3,367,683		
	UM200326								5,674,087		
	UM200330								384,531		
	UM200334								462,022		
	UM200336								1,646,879		
	UM200344								192,232		
	UM200338								2,084,987		
	UM200348								33,892		
	Architectural	10,010,764	683,135	10,693,899	2.00%	213,878	10,480,021	11,183,115	15,874,121	689,604	16,563,725
	UM200349								2,250,645		
	UM200350								5,149,640		
	UM200351								736,088		
	UM200353								1,390,140		
	UM200354								2,092,253		
	UM200356								2,781,825		
	UM200358								1,473,530		
	Mechanical	6,398,900	436,661	6,835,561	2.00%	136,711	6,698,850	7,148,269	7,687,175	333,946	8,021,121
	UM200370								675,521		
	UM200372								1,069,290		
	UM200374								5,942,364		
	Electrical	5,262,432	359,109	5,621,541	2.00%	112,431	5,509,110	5,878,711	5,394,495	234,348	5,628,843
	UM200376								1,495,743		
	UM200378								3,898,752		
	Total Cost for 1253 UMS	110,742,431	7,557,067	118,299,498	8.67%	10,262,162	108,037,336	115,285,452	120,343,656	5,227,969	125,571,625
	1254 Chinatown Station										
	Excavation improved access and performance Headhouse	21,919,958	747,821	22,667,779	10.00%	2,266,778	20,401,001	21,769,684	26,793,482	1,163,962	27,957,444
	CT200306								25,581,984		
	CT200312								361,114		
	CT200313								712,256		
	CT200314								138,128		
	SEM Excavation	36,926,763	1,259,793	38,186,556	2.00%	763,731	37,422,825	39,933,485	24,956,333	1,084,153	26,040,486
	CT200308								5,255,477		
	CT200310								19,700,856		
	Structural	21,866,419	745,994	22,612,413	5.00%	1,130,621	21,481,792	22,922,984	27,124,180	1,178,329	28,302,509
	CT200330								857,808		
	CT200332								4,425,263		
	CT200334								272,200		
	CT200335								142,555		
	CT200336								36,920		
	CT200338								763,469		
	CT200340								2,292,111		
	CT200343								2,372,917		
	CT200344								2,085,062		
	CT200345								2,364,176		
	CT200346								2,300,475		
	CT200348								1,869,398		
	CT200350								5,905,862		
	CT200352								826,065		
	CT200354								609,899		
	Architectural	7,739,229	264,031	8,003,260	2.00%	160,065	7,843,195	8,369,387	11,258,262	489,081	11,747,343
	CT200355								205,199		
	CT200356								998,367		
	CT200357								1,433,820		
	CT200359								687,742		
	CT200360								1,807,535		
	CT200362								1,734,192		
	CT200364								377,151		
	CT200366								1,878,855		
	CT200368								270,517		
	CT200372								1,864,884		
	Mechanical	6,484,782	221,235	6,706,017	2.00%	134,120	6,571,897	7,012,799	8,424,439	365,974	8,790,413

	CT200378								675,912		
	CT200379								1,867,372		
	CT200380								5,881,155		
	Electrical	3,847,263	131,253	3,978,516	2.00%	79,570	3,898,946	4,160,522	5,949,208	258,445	6,207,653
	CT200382								766,395		
	CT200383								5,182,813		
	Total Cost for 1254 CTS	98,784,414	3,370,127	102,154,541	4.44%	4,534,886	97,619,655	104,168,861	104,505,904	4,539,945	109,045,849
	1255 Moscone Station										
	Excavation improved access and performance	28,270,933	1,996,589	30,267,522	12.00%	3,632,103	26,635,419	28,422,363	31,678,939	1,376,196	33,055,135
	MS200301								20,468,749		
	MS200302								11,210,190		
	Compensation Grouting	2,101,729	148,431	2,250,160	5.00%	112,508	2,137,652	2,281,065	869,988	37,794	907,782
	MS200303								869,988		
	Instrumentation	1,113,640	78,649	1,192,289	2.50%	29,807	1,162,482	1,240,472	1,705,633	74,096	1,779,729
	MS200304								1,705,633		
	Structural	17,960,682	1,268,444	19,229,126	5.00%	961,456	18,267,670	19,493,229	23,099,074	1,003,470	24,102,544
	MS200308								211,635		
	MS200310								3,070,823		
	MS200312								2,674,266		
	MS200314								1,494,766		
	MS200316								3,250,042		
	MS200318								1,841,269		
	MS200320								3,375,696		
	MS200322								2,432,295		
	MS200324								4,748,282		
	Demolition	1,081,552	76,383	1,157,935	5.00%	57,897	1,100,038	1,173,839	-	-	-
	Architectural	4,519,492	319,182	4,838,674	2.00%	96,773	4,741,901	5,060,030	7,528,074	327,035	7,855,109
	MS200332								988,713		
	MS200334								500,550		
	MS200336								350,760		
	MS200338								731,190		
	MS200340								2,369,133		
	MS200342								132,552		
	MS200344								1,483,208		
	MS200346								971,968		
	Mechanical	6,547,271	462,390	7,009,661	2.00%	140,193	6,869,468	7,330,334	4,952,068	215,128	5,167,196
	MS200370								508,268		
	MS200372								1,103,039		
	MS200374								3,340,761		
	Electrical	2,861,639	202,099	3,063,738	2.00%	61,275	3,002,463	3,203,895	4,163,111	180,854	4,343,965
	MS200376								669,789		
	MS200378								3,493,322		
	Total Cost for 1255 MOS	64,456,938	4,552,167	69,009,105	7.38%	5,092,012	63,917,093	68,205,226	73,996,887	3,214,573	77,211,460
40	**Sitework & Special Conditions**										
40.08	**Temporary Facilities**	78,215,010	4,055,449	82,270,459	5.53%	4,546,253	77,724,206	82,938,645	74,643,858	3,242,678	77,886,536
	1253 Union Square Market Street Station										
	Field Supervision	14,590,924	995,685	15,586,609	10.00%	1,558,661	14,027,948	14,969,069	13,418,033	582,906	14,000,939
	UM4008011121 - Field Overhead								12,350,829		
	UM4008011125 - Inspection Requirements								1,067,204		
	Project Expenses	5,555,500	379,108	5,934,608	5.00%	296,730	5,637,878	6,016,117	8,949,991	388,806	9,338,797
	UM4008011104 - Dewatering								1,342,226		
	UM4008011122 - GC Expenses								3,537,172		
	UM4008011123 - Hoisting								3,589,410		
	UM4008011124 - SP & DIV 1 Requirements								481,183		
	Traffic Control	2,431,484	165,925	2,597,409	5.00%	129,870	2,467,539	2,633,083	3,061,892	133,015	3,194,907
	UM4008011103 - Traffic Control								3,061,892		
	Overhead Traction Power	467,744	31,919	499,663	0.00%	-	499,663	533,185	641,814	27,882	669,696
	UM4008011101 - Overhead Traction Power								641,814		
	Total Cost for 1253 UMS	23,045,652	1,572,637	24,618,289	8.06%	1,985,262	22,633,027	24,151,454	26,071,730	1,132,608	27,204,338
	1254 Chinatown Station										
	Field Supervision	9,205,996	314,072	9,520,068	8.00%	761,605	8,758,463	9,346,059	23,703,121	1,029,711	24,732,832
	CT4008001201 - PM & Field Supervision								23,703,121		
	Project Expenses Overhead & Profit	22,041,161	751,956	22,793,117	3.00%	683,794	22,109,323	23,592,616	5,094,311	221,307	5,315,618
	CT40080022 - GC Expenses								3,057,936		
	CT40080015 - Temporary Construction								349,276		
	CT40080024 - SP & DIV 1 Requirements								521,153		
	CT40080026 - Inspection Requirements								1,165,946		
	Traffic Control	1,178,893	40,219	1,219,112	3.00%	36,573	1,182,539	1,261,874	1,128,983	49,045	1,178,028
	CT40080011 - Traffic Control								1,128,983		
	Dewatering	306,611	10,460	317,071	0.00%	-	317,071	338,343	828,718	36,001	864,719
	CT1007970113 - Dewatering								828,718		
	Overhead Traction Power	105,988	3,616	109,604	0.00%	-	109,604	116,957	119,805	5,205	125,010
	CT4008001301 - Overhead Traction Power								119,805		
	Contractors Contingency	5,877,743	200,525	6,078,268	0.00%	-	6,078,268	6,486,053	-	-	-
	Total Cost for 1254 CTS	38,716,392	1,320,848	40,037,240	3.70%	1,481,972	38,555,268	41,141,902	30,874,938	1,341,269	32,216,207
	1255 Moscone Station										
	Field Supervision	10,953,721	773,589	11,727,310	8.00%	938,185	10,789,125	11,512,957	9,804,070	425,908	10,229,978
	MS4008011104 - Field Overhead								9,271,664		
	MS4008011106 - Inspection Requirements								532,406		
	Project Expenses	4,043,550	285,569	4,329,119	3.00%	129,874	4,199,245	4,480,969	6,332,268	275,086	6,607,354
	MS4008011105 - GC Expenses								5,799,436		
	MS4008011107 - SP & DIV 1 Requirements								532,832		
	Traffic Control	341,263	24,101	365,364	3.00%	10,961	354,403	378,180	396,215	17,212	413,427
	MS4008011102 - Traffic Control								396,215		

Dewatering	631,085	44,569	675,654	0.00%	-	675,654	720,983	631,983	27,455	659,438
MS4008011103 - Dewatering								631,983		
Overhead Traction Power	483,347	34,136	517,483	0.00%	-	517,483	552,200	532,654	23,140	555,794
MS4008011101 - Overhead Contact System								532,654		
Total Cost for 1255 MOS	16,452,966	1,161,964	17,614,930	6.13%	1,079,019	16,535,911	17,645,288	17,697,190	768,801	18,465,991

PRIME CONTRACTOR SUMMARY REPORT

Project Element: UMS 100% REV 0

Prime Contractor: PRIME CONTRACTOR

Markup Description	Markup	Total
UMS 100% REV 0		
Cost to Prime for PRIME PRIME CONTRACTOR		**$170,169,170**
PRIME HOME OFFICE OVERHEAD & PROFIT	**7.000%**	**$11,911,842**
% Applied only to: Labor, Equipment, Material, Other1,		
SMALL TOOLS & MISC.	**1.500%**	**$2,731,215**
% Applied only to: Labor, Equipment, Material,		
INSURANCE & BOND	**4.000%**	**$7,392,489**
Total Estimate with Prime Contractor Markups	**12.949%**	**$192,204,716**

All codes referenced in Table A-1: "Mitigation Base Cost Calculations" have been highlighted below. The codes beginning with "UM2003..." were derived at a higher level in the estimate folder structure than the costs associated with codes beginning with "UM4008...". The supporting values for codes beginning with "UM2003..." may be arrived at by dividing the highlighted costs below by the prime contractor markup. For example, the cost highlighted for UM200308 below is $39,833,294. To arrive at the direct cost the prime contractor mark up is backed out of the amount as follows:

UM200308: $39,833,294 / ($192,204,716 / $170,169,170) = $35,266,557.

The direct costs for codes beginning with "UM4008..." may be arrived at by adding the costs highlighted below at a lower level in the estimate folder structure. For example, the direct cost for UM4008011103 can be arrived at by adding the associated costs before prime contractor markup as follows:

UM4008011103: $2,991,931 + $69,961 = $3,061,892

C--Assembly Category Report
SUBMITTAL: 100%
SOFTWARE VERSION: SUCCESS 5.X
REPORT REVISION: Nov. 5 2003
ESTIMATE SAVED AS: UMS 100% Estimate - Revised Markups per Program.pws

CONSTRUCTION CONTRACT: PACKAGE 1253
DATABASE USED: RSM MODIFIED
PRINTING DATE: 04/30/2012

PROJECT: UNION SQUARE MARKET STREET STATION
PROJECT SITE: SAN FRANCISCO, CA
A/E NAME: SFMTA - DESIGN GROUP
PROJECT SIZE: 1.00LS
CONSTRUCTION FUNDS AVAILABLE, DOLLARS: $192,500,000

ESTIMATOR: HILL INTERNATIONAL
CAT CODE:
UIC:
PROJECT #: UMS-90%
DATE OF ESTIMATE: 04/30/12

WBS CODE	DESCRIPTION	COST/WBS BASED ON 1 LS	COST/ WBS UNIT	TOTAL MARKED UP COSTS MATL	LABOR	EQUIP	UNIT COST	TOTAL
	UMS 100% REV 0a, PROJECT TOTALS							**192,205,000**
PROJECT LEVEL NOTE:	The markups used in this estimate differ from the markups Hill International recommends for this project.							
	*****PROJECT SUBTOTALS****			75,979,930	87,438,934	28,785,852	0	192,204,716
BASE BID				**75,979,930**	**87,438,934**	**28,785,852**	**0**	**192,204,716**
-UNION SQUARE - MARKET STATION				**75,979,930**	**87,438,934**	**28,785,852**	**0**	**192,204,716**
UMUNION SQUARE - MARKET STATION - PACKAGE 1253				**75,979,930**	**87,438,934**	**28,785,852**	**0**	**192,204,716**
UM20	STATIONS, STOPS, TERMINALS, INTERMODAL (NUMBER)			65,466,783	58,614,015	21,340,966	0	145,421,763
UM2003	UNDERGROUND STATION, STOP, SHELTER, MALL, TERMINAL, PLATFORM			61,298,706	55,010,196	19,618,296	0	135,927,198
UM200306	EXCAVATION & GROUND SUPPORT - NORTH CONCOURSE BOX	57040@ 121.07SSF		2,330,014	2,798,250	1,777,741	0	6,906,005
UM200308	EXCAVATION & GROUND SUPPORT - STATION BOX	57040@ 698.34SSF		17,357,459	15,405,565	7,070,270	0	39,833,294
UM200310	EXCAVATION & GROUND SUPPORT - SOUTH CONCOURSE BOX	57040@ 93.57SSF		1,666,837	2,419,812	1,250,325	0	5,336,974
UM200311	EXCAVATION & GROUND SUPPORT - STATION EE NO. 3/4	57040@ 13.22SSF		218,457	330,492	204,839	0	753,788
UM200312	EXCAVATION & GROUND SUPPORT - ELLIS ANNEX	57040@ 24.15SSF		547,489	596,630	233,652	0	1,377,771
UM200313	EXCAVATION & GROUND SUPPORT - INSTRUMENTATION/COMPENSATION GROUTING	57040@ 244.50SSF		5,696,291	5,072,989	3,176,781	0	13,946,061
UM200314	STRUCTURAL - STATION SURFACE LEVEL	32799@ 94.11SF		2,047,420	926,910	112,323	0	3,086,653
UM200316	STRUCTURAL - STATION CONCOURSE LEVEL	33630@ 145.62SF		2,135,984	2,373,622	387,597	0	4,897,203
UM200318	STRUCTURAL - STATION INTERMEDIATE STRUT LEVEL	28915@ 190.26SF		2,299,239	2,677,503	524,684	0	5,501,427
UM200320	STRUCTURAL - STATION MEZZANINE LEVEL	19733@ 301.19SF		2,348,896	3,108,974	485,516	0	5,943,386
UM200322	STRUCTURAL - STATION PLATFORM STRUT LEVEL	21081@ 180.44SF		1,873,313	1,666,708	263,750	0	3,803,772
UM200326	STRUCTURAL - STATION PLATFORM LEVEL	22212@ 288.53SF		3,004,914	2,259,474	1,144,447	0	6,408,836
UM200330	STRUCTURAL - STATION EE NO. 3/4	2044@ 212.49SF		236,973	175,883	21,470	0	434,325
UM200334	STRUCTURAL - ELLIS ANNEX SURFACE LEVEL	2408@ 216.72SF		337,404	164,163	20,282	0	521,850
UM200336	STRUCTURAL - ELLIS ANNEX CONCOURSE LEVEL	5168@ 359.93SF		943,888	679,433	236,815	0	1,860,137
UM200344	STRUCTURAL - VENTILATION SHAFT 1&2			90,402	118,803	7,919	0	217,125
UM200338	STRUCTURAL - GARAGE	41623@ 56.58SF		1,183,778	986,460	184,738	0	2,354,976
UM200348	STRUCTURAL - ENTRANCE AT POWELL STREET BART/MUNI STATION	2580@ 14.84SF		27,716	9,106	1,459	0	38,281
UM200349	ARCHITECTURAL - STATION SURFACE LEVEL	32799@ 77.50SF		1,068,439	1,328,899	144,747	0	2,542,085
UM200350	ARCHITECTURAL - STATION CONCOURSE LEVEL	49062@ 118.55SF		2,663,103	2,274,321	879,053	0	5,816,477
UM200351	ARCHITECTURAL - INTERMEDIATE STRUT LEVEL	28304@ 29.37SF		381,626	389,414	60,366	0	831,406
UM200353	ARCHITECTURAL - STATION MEZZANINE LEVEL	19131@ 82.07SF		667,110	772,284	130,758	0	1,570,152
UM200354	ARCHITECTURAL - STATION PLATFORM STRUT LEVEL	4351@ 543.14SF		1,093,848	1,081,547	187,789	0	2,363,183
UM200356	ARCHITECTURAL - STATION PLATFORM LEVEL	21898@ 143.49SF		1,482,105	1,359,907	300,037	0	3,142,049
UM200358	ARCHITECTURAL - STATION STAIRS & LANDING	4680@ 355.63SF		1,319,844	308,774	35,722	0	1,664,340
UM200370	MECHANICAL - PLUMBING	194630@ 3.92SF		428,527	320,985	13,483	0	762,995
UM200372	MECHANICAL - FIRE PROTECTION	194630@ 6.21SF		342,863	773,934	90,957	0	1,207,755
UM200374	MECHANICAL - HVAC & EMERGENCY VENTILATION	194630@ 34.49SF		4,500,974	1,767,164	443,715	0	6,711,853
UM200376	ELECTRICAL - LIGHTING	194630@ 8.68SF		523,610	1,080,087	85,732	0	1,689,430
UM200378	ELECTRICAL - POWER DISTRIBUTION	194630@ 22.63SF		2,480,180	1,782,103	141,326	0	4,403,609
UM2007	ELEVATORS, ESCALATORS	11@ 863142.33EA		4,168,076	3,603,819	1,722,670	0	9,494,566
UM200768	CONVEYING - ELEVATORS/ESCALATORS	13@ 730351.20EA		4,168,076	3,603,819	1,722,670	0	9,494,566
UM40	SITEWORK & SPECIAL CONDITIONS	57040@ 672.31SSF		5,201,261	25,954,697	7,192,574	0	38,348,532
UM4001	DEMOLITION, CLEARING, EARTHWORK	57040@ 23.18SSF		0	1,045,420	276,564	0	1,321,984
UM400102	DEMOLITION, CLEARING, EARTHWORK	57040@ 23.18SSF		0	1,045,420	276,564	0	1,321,984
UM4002	SITE UTILITIES, UTILITY RELOCATION	57040@ 59.12SSF		1,354,696	1,805,530	212,157	0	3,372,384
UM400202	CIVIL - STOCKTON ST/GEARY ST/ O'FARRELL ST	57040@ 43.93SSF		1,010,194	1,332,602	162,874	0	2,505,670
UM400204	CIVIL - ELLIS STREET	57040@ 15.19SSF		344,502	472,928	49,283	0	866,714
UM4003	HAZ. MAT'L, CONTAM'D SOIL REMOVAL/MITIGATION, GROUND WATER TREATMENTS	57040@ 8.82SSF		209,857	194,735	98,756	0	503,348
UM400301	HAZ. MAT'L, CONTAM'D SOIL REMOVAL/MITIGATION, GROUND WATER TREATMENTS	57040@ 8.82SSF		209,857	194,735	98,756	0	503,348
UM4004	ENVIRONMENTAL MITIGATION WETLANDS HISTORIC ARCHEOLOGIC	57040@ 8.00SSF		190,260	176,550	89,534	0	456,344
UM400401	ENVIRONMENTAL MITIGATION WETLANDS HISTORIC ARCHEOLOGIC	57040@ 8.00SSF		190,260	176,550	89,534	0	456,344
UM4006	PEDESTRIAN / BIKE ACCESS & ACCOMMODATION, LANDSCAPING	57040@ 9.63SSF		328,715	187,069	33,705	0	549,489

C--Assembly Category Report
SUBMITTAL: 100%
SOFTWARE VERSION: SUCCESS 5.X
REPORT REVISION: Nov. 5 2003
ESTIMATE SAVED AS: UMS 100% Estimate - Revised Markups per Program.pws

CONSTRUCTION CONTRACT: PACKAGE 1253
DATABASE USED: RSM MODIFIED
PRINTING DATE: 04/30/2012

PROJECT: UNION SQUARE MARKET STREET STATION
PROJECT SITE: SAN FRANCISCO, CA
A/E NAME: SFMTA - DESIGN GROUP
PROJECT SIZE: 1.00LS
CONSTRUCTION FUNDS AVAILABLE, DOLLARS: $192,500,000

ESTIMATOR: HILL INTERNATIONAL
CAT CODE:
UIC:
PROJECT #: UMS-90%
DATE OF ESTIMATE: 04/30/12

WBS CODE	DESCRIPTION	COST/WBS BASED ON 1 LS	COST/ WBS UNIT	TOTAL MARKED UP COSTS MATL	LABOR	EQUIP	UNIT COST	TOTAL
UM400611	PEDESTRIAN / BIKE ACCESS & ACCOMMODATION, LANDSCAPING		57040@ 9.63SSF	328,715	187,069	33,705	0	549,489
UM4007	AUTO,BUS, VAN ACCESSWAYS INCL ROADS & PKG LOTS		57040@ 47.29SSF	1,534,163	861,519	301,490	0	2,697,172
UM400701	AUTO,BUS, VAN ACCESSWAYS INCL ROADS & PKG LOTS		57040@ 47.29SSF	1,534,163	861,519	301,490	0	2,697,172
UM4008	TEMPORARY FACILITIES & OTHER INDIRECT COSTS DURING CONSTRUCTION		57040@ 516.27SSF	1,583,570	21,683,875	6,180,367	0	29,447,812
UM400801	TEMPORARY FACILITIES & OTHER INDIRECT COSTS DURING CONSTRUCTION		57040@ 516.27SSF	1,583,570	21,683,875	6,180,367	0	29,447,812
UM50	SYSTEMS		215129@ 39.21BSF	5,311,886	2,870,222	252,312	0	8,434,420
UM5003	TPSS STATIONS		215129@ 21.12BSF	3,519,777	924,357	98,886	0	4,543,020
UM500301	TPSS STATIONS		215129@ 21.12BSF	3,519,777	924,357	98,886	0	4,543,020
UM5005	COMMUNICATIONS		215129@ 17.18BSF	1,735,049	1,816,443	143,510	0	3,695,002
UM500501	COMMUNICATIONS		215129@ 17.18BSF	1,735,049	1,816,443	143,510	0	3,695,002
UM5006	FARE COLLECTION SYSTEMS		215129@ 0.91BSF	57,060	129,423	9,915	0	196,398
***	*FROM AECOM 65% ESTIMATE*							
UM500682	FARE COLLECTION SYSTEMS		215129@ 0.91BSF	57,060	129,423	9,915	0	196,398

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
UM4007 AUTO,BUS, VAN ACCESSWAYS INCL ROADS & PKG LO									
UM4007019808 CONCRETE CURB & GUTTER		*LEVEL CONTRACTOR ID APPLIED--PRIME*							
		Subtotal Direct Costs			5,355	5,007	335	0	10,697
		Subcontractor Markups			455	75	28	0	559
		Prime Contractor Markups			752	658	47	0	1,457
		TOTAL UM4007019808 CONCRETE CURB & GUTTER	70	HRS	6,563	5,740	410	0	12,713
		765.00 LF *Level Unit Cost-->*			*8.58*	*7.50*	*0.54*	*0.00*	*16.62*
UM4007019811 TEMP ROAD STRIPING, LETTERS, SYMBOLS		*LEVEL CONTRACTOR ID APPLIED--PRIME*							
32172.31 - 30		Line, Solid White, 8"			0.72	1.28	0.26	0.00	2.27
	SUB-211/211	0.018 hrs/unit 6 TOTAL HRS	341.00	LF	247	438	88	0	773
01552.60 - 01		Line, Broken White, 4"			0.27	0.36	0.47	0.00	1.10
	SUB-211/211	0.005 hrs/unit 2 TOTAL HRS	475.00	LF	128	169	225	0	523
01552.60 - 31		Line, Double Yellow, 4"			0.50	0.43	0.47	0.00	1.40
	SUB-211/211	0.006 hrs/unit 4 TOTAL HRS	590.00	LF	295	252	280	0	827
32172.31 - 30		Symbol, Arrow			75.00	35.66	25.00	0.00	135.66
	SUB-211/211	0.5 hrs/unit 1 TOTAL HRS	2.00	EA	150	71	50	0	271
32172.31 - 30		Symbol, Word			125.00	71.32	25.00	0.00	221.32
	SUB-211/211	1 hrs/unit 4 TOTAL HRS	4.00	EA	500	285	100	0	885
		Subtotal Direct Costs			1,320	1,216	742	0	3,279
		Subcontractor Markups			112	18	63	0	194
		Prime Contractor Markups			186	160	104	0	450
		TOTAL UM4007019811 TEMP ROAD STRIPING, LETTERS, SYMBOLS	17	HRS	1,618	1,394	910	0	3,922
		57,040.00 SSF *Level Unit Cost-->*			*0.03*	*0.02*	*0.02*	*0.00*	*0.07*
		SUBTOTAL UM40070198 ELLIS STREET			293,511	48,259	29,294	0	371,064
		MARKUP			*1.225*	*1.146*	*1.225*	*0.000*	*1.215*
		TOTAL UM40070198 ELLIS STREET			359,697	55,326	35,900	0	450,923
UM4008 TEMPORARY FACILITIES & OTHER INDIRECT COSTS									
UM4008011101 OVERHEAD TRACTION POWER		*LEVEL CONTRACTOR ID APPLIED--PRIME*							
34230.01 - 02		PROVIDE STEEL POLE TYPE 765N			3138.01	2958.99	1448.58	0.00	7,545.58
	SUB-511/511	43.95 hrs/unit 132 TOTAL HRS	3.00	EA	9,414	8,877	4,346	0	22,637
34230.01 - 02		PROVIDE STEEL POLE TYPE 770			4482.88	4241.68	2069.41	0.00	10,793.97
	SUB-165/165	71.914 hrs/unit 288 TOTAL HRS	4.00	EA	17,932	16,967	8,278	0	43,176
34230.01 - 02		PROVIDE POLE FOUNDATION FOR 765N			2241.43	2116.43	1034.70	0.00	5,392.58
	SUB-314/314	34.834 hrs/unit 70 TOTAL HRS	2.00	EA	4,483	4,233	2,069	0	10,785
34230.01 - 02		PROVIDE POLE FOUNDATION FOR 770			3056.51	2892.04	1410.96	0.00	7,359.50
	SUB-165/165	49.032 hrs/unit 245 TOTAL HRS	5.00	EA	15,283	14,460	7,055	0	36,798
34230.01 - 02		PROVIDE 2/0 TROLLEYWIRE			21.00	3.77	0.28	0.00	25.05
	SUB-165/165	0.064 hrs/unit 172 TOTAL HRS	2,682.00	LF	56,322	10,124	746	0	67,192
34421.61 - 01		GUYWIRE			0.89	1.59	0.12	0.00	2.59
	SUB-161/161	0.018 hrs/unit 41 TOTAL HRS	2,295.00	LF	2,030	3,649	275	0	5,954
02890.90 - 00		SIGNAL MAST ARM AND CONNECTION - 20'			1500.00	952.45	225.56	0.00	2,678.01
	SUB-165/165	16.148 hrs/unit 32 TOTAL HRS	2.00	EA	3,000	1,905	451	0	5,356
16531.00 - 00		R/D (E) POLE FOUNDATION			815.07	827.08	376.26	0.00	2,018.41
	SUB-221/221	11.903 hrs/unit 36 TOTAL HRS	3.00	EA	2,445	2,481	1,129	0	6,055
34411.31 - 03		REMOVE & DISPOSE WIRING			0.00	9.45	0.70	0.00	10.15
	SUB-161/161	0.107 hrs/unit 176 TOTAL HRS	1,646.00	LF	0	15,556	1,153	0	16,709
16060.80 - 00		GRND WIRE/COPPER WIRE/BARE STRANDED/1/0			1.78	2.65	0.13	0.00	4.56
	SUB-161/161	0.03 hrs/unit 4 TOTAL HRS	140.00	LF	249	371	18	0	638
26052.68 - 00		GROUND ROD COPPER, 3/4" X 10' L			38.36	189.19	13.94	0.00	241.48
	SUB-161/161	2.142 hrs/unit 15 TOTAL HRS	7.00	EA	269	1,324	98	0	1,690
16531.00 - 00		R/S (E) TROLLEY POLE			350.00	567.35	220.56	0.00	1,137.91
	SUB-221/221	8.165 hrs/unit 33 TOTAL HRS	4.00	EA	1,400	2,269	882	0	4,552
34230.01 - 02		PROVIDE TANGENT SPAN			3675.05	5674.55	418.80	0.00	9,768.40
	SUB-165/165	96.207 hrs/unit 1347 TOTAL HRS	14.00	EA	51,451	79,444	5,863	0	136,758
34230.01 - 00		SPECIAL WORK STOCKTON - ELLIS STREET			81506.85	76999.58	37625.57	0.00	196,132.00
	SUB-211/211	1079.6 hrs/unit 1080 TOTAL HRS	1.00	LS	81,507	77,000	37,626	0	196,132
27210.50 - 01		SPARES - ALLOWANCE - TRACTION POWER			52500.00	0.00	0.00	0.00	52,500.00
	SUB-161/161		1.00	LS	52,500	0	0	0	52,500
		Subtotal Direct Costs			298,284	238,659	69,988	0	606,931
		Subcontractor Markups			25,354	3,580	5,949	0	34,883
		Prime Contractor Markups			41,909	31,368	9,833	0	83,110
		TOTAL UM4008011101 OVERHEAD TRACTION POWER	3,670	HRS	365,546	273,607	85,770	0	724,924
		57,040.00 SSF *Level Unit Cost-->*			*6.41*	*4.80*	*1.50*	*0.00*	*12.71*

CODE / SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
UM4008	**TEMPORARY FACILITIES & OTHER INDIRECT COSTS**							
UM4008011103 TRAFFIC CONTROL	*LEVEL CONTRACTOR ID APPLIED--PRIME*							
65% ESTIMATE INFORMATION USED								
01552.60 - 01	Traffic Control Supervisor			0.00	66.89	0.00	0.00	66.89
SUB-997/120	0.923 hrs/unit 5538 TOTAL HRS	6,000.00	hr	0	401,333	0	0	401,333
01552.60 - 01	SF Parking & Traffic Control Officer			0.00	61.74	0.00	0.00	61.74
SUB-997/120	0.852 hrs/unit 17041 TOTAL HRS	20,000.00	hr	0	1,234,870	0	0	1,234,870
01552.60 - 01	Off Duty SFPD Uniform Officer			0.00	87.47	0.00	0.00	87.47
SUB-997/120	1.207 hrs/unit 4828 TOTAL HRS	4,000.00	hr	0	349,880	0	0	349,880
01552.60 - 01	Traffic Control Crew			0.00	51.45	0.00	0.00	51.45
SUB-997/120	0.71 hrs/unit 4260 TOTAL HRS	6,000.00	hr	0	308,717	0	0	308,717
01552.60 - 01	Traffic Water Filled Barrier, Rental			25.00	175.66	25.00	0.00	225.66
SUB-111/111	3 hrs/unit 1617 TOTAL HRS	539.00	EA	13,475	94,681	13,475	0	121,631
02820.13 - 07	Sign, Detour			150.00	184.46	25.00	0.00	359.46
SUB-153/153	2 hrs/unit 78 TOTAL HRS	39.00	EA	5,850	7,194	975	0	14,019
01562.95 - 03	Temp Roadway Decking			60.00	60.76	20.00	0.00	140.76
SUB-314/314	1 hrs/unit 1067 TOTAL HRS	1,067.00	SF	64,020	64,829	21,340	0	150,189
01552.60 - 09	Sign, Changable Message (CMS)			10188.36	8558.66	4703.20	0.00	23,450.21
SUB-211/211	120 hrs/unit 480 TOTAL HRS	4.00	EA	40,753	34,235	18,813	0	93,801
01552.60 - 06	Rework Traffic Signal for Traffic Re-Route			5000.00	1711.73	3000.00	0.00	9,711.73
SUB-211/211	24 hrs/unit 432 TOTAL HRS	18.00	EA	90,000	30,811	54,000	0	174,811
07121.32 - 00	Covered Walkway, 6' W, at Boring Machine			50.00	134.65	10.00	0.00	194.65
SUB-511/511	2 hrs/unit 572 TOTAL HRS	286.00	LF	14,300	38,511	2,860	0	55,671
07121.32 - 00	Covered Walkway Relocation			200.00	1346.52	150.00	0.00	1,696.52
SUB-511/511	20 hrs/unit 640 TOTAL HRS	32.00	EA	6,400	43,089	4,800	0	54,289
01552.60 - 01	Traffic Water Filled Barrier, Rental			25.00	175.66	25.00	0.00	225.66
SUB-111/111	3 hrs/unit 435 TOTAL HRS	145.00	EA	3,625	25,471	3,625	0	32,721
	Subtotal Direct Costs			238,423	2,633,619	119,888	0	2,991,931
	Subcontractor Markups			20,266	39,504	10,190	0	69,961
	Prime Contractor Markups			33,498	346,148	16,844	0	396,490
TOTAL UM4008011103 TRAFFIC CONTROL		36,988	HRS	292,188	3,019,272	146,922	0	3,458,382
83,706.00 SF	*Level Unit Cost-->*			*3.49*	*36.07*	*1.76*	*0.00*	*41.32*
NOTE: 65% ESTIMATE INFORMATION USED								
UM4008011104 DEWATERING	*LEVEL CONTRACTOR ID APPLIED--PRIME*							
65% ESTIMATE INFORMATION USED								
31231.92 - 02	Drill Well - 6" dia.			20.00	54.65	59.95	0.00	134.60
SUB-221/211	0.766 hrs/unit 920 TOTAL HRS	1,200.00	lf	24,000	65,585	71,941	0	161,526
31231.92 - 02	Steel Casing - 6" dia.			35.00	24.29	26.65	0.00	85.94
SUB-221/211	0.341 hrs/unit 409 TOTAL HRS	1,200.00	lf	42,000	29,149	31,974	0	103,122
31231.92 - 02	Steel Pipe Screen - 6" dia.			45.00	24.29	26.64	0.00	95.93
SUB-221/211	0.341 hrs/unit 82 TOTAL HRS	240.00	lf	10,800	5,829	6,395	0	23,024
31231.92 - 02	Submersible pump - 6" dia.- 25 HP - 250 GPM			2658.68	2637.24	1251.14	0.00	6,547.05
SUB-221/211	36.976 hrs/unit 887 TOTAL HRS	24.00	ea	63,808	63,294	30,027	0	157,129
31231.92 - 02	Observation well - 6" dia.			9002.24	8929.64	4236.35	0.00	22,168.22
SUB-221/211	125.2 hrs/unit 250 TOTAL HRS	2.00	ea	18,004	17,859	8,473	0	44,336
31231.92 - 02	Flow meter - 6" dia.			564.73	560.17	265.75	0.00	1,390.65
SUB-221/211	7.854 hrs/unit 94 TOTAL HRS	12.00	ea	6,777	6,722	3,189	0	16,688
31231.92 - 02	Dewatering operation, maintenance Allowance, (incl. wells, pumps, piping, etc)			38812.79	104227.62	18264.84	0.00	161,305.25
SUB-221/221	1500 hrs/unit 1500 TOTAL HRS	1.00	ls	38,813	104,228	18,265	0	161,305
31231.92 - 02	Water disposal			38812.79	416910.49	160000.00	0.00	615,723.28
SUB-221/221	6000 hrs/unit 6000 TOTAL HRS	1.00	ls	38,813	416,910	160,000	0	615,723
	Subtotal Direct Costs			243,015	709,577	330,263	0	1,282,854
	Subcontractor Markups			20,656	10,644	28,072	0	59,372
	Prime Contractor Markups			34,143	93,263	46,402	0	173,808
TOTAL UM4008011104 DEWATERING		10,142	HRS	297,815	813,483	404,736	0	1,516,034
83,706.00 SF	*Level Unit Cost-->*			*3.56*	*9.72*	*4.84*	*0.00*	*18.11*
NOTE: 65% ESTIMATE INFORMATION USED								
UM4008011121 FIELD OVERHEAD, DETAIL ITEMS	*LEVEL CONTRACTOR ID APPLIED--PRIME*							
01101.01 - 05	Project Director			0.00	168.11	0.00	0.00	168.11
PRIME/1101	1 hrs/unit 5500 TOTAL HRS	5,500.00	MH	0	924,620	0	0	924,620
* LINE ITEM ASSEMBLY	Factor:100.0000							
01101.01 - 05	Project Manager			0.00	144.10	0.00	0.00	144.10
PRIME/1102	1 hrs/unit 9680 TOTAL HRS	9,680.00	MH	0	1,394,899	0	0	1,394,899
* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 05	General Superintendent			0.00	87.76	0.00	0.00	87.76
PRIME/1104	1 hrs/unit 9680 TOTAL HRS	9,680.00	MH	0	849,517	0	0	849,517
* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 05	Asst. Superintendent			0.00	68.68	0.00	0.00	68.68

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ESTIMATE NAME:
PRINTING DATE: 04/30/2012

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	PRIME/1105	1 hrs/unit 19250 TOTAL HRS	19,250.00	MH	0	1,322,090	0	0	1,322,090
	* LINE ITEM ASSEMBLY	Factor:350.0000							
01101.01 - 05	Project Engineer				0.00	138.09	0.00	0.00	138.09
	PRIME/1103	1 hrs/unit 19250 TOTAL HRS	19,250.00	MH	0	2,658,239	0	0	2,658,239
	* LINE ITEM ASSEMBLY	Factor:350.0000							
01101.01 - 05	Admin / Secretary				0.00	48.04	0.00	0.00	48.04
	PRIME/1106	1 hrs/unit 19250 TOTAL HRS	19,250.00	MH	0	924,750	0	0	924,750
	* LINE ITEM ASSEMBLY	Factor:350.0000							
01101.01 - 05	Payroll / Timekeeper				0.00	38.42	0.00	0.00	38.42
	PRIME/1107	1 hrs/unit 9680 TOTAL HRS	9,680.00	MH	0	371,953	0	0	371,953
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 05	Cost Engineer - Accountant "Pre Construction"				0.00	72.05	0.00	0.00	72.05
	PRIME/1108	1 hrs/unit 4400 TOTAL HRS	4,400.00	MH	0	317,022	0	0	317,022
	* LINE ITEM ASSEMBLY	Factor:80.0000							
01101.01 - 05	Project Scheduler				0.00	72.05	0.00	0.00	72.05
	PRIME/1110	1 hrs/unit 9680 TOTAL HRS	9,680.00	MH	0	697,449	0	0	697,449
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 05	Project Estimator				0.00	86.46	0.00	0.00	86.46
	PRIME/1111	1 hrs/unit 2200 TOTAL HRS	2,200.00	MH	0	190,220	0	0	190,220
	* LINE ITEM ASSEMBLY	Factor:40.0000							
01101.01 - 05	Qualtity Control				0.00	96.06	0.00	0.00	96.06
	PRIME/1112	1 hrs/unit 9680 TOTAL HRS	9,680.00	MH	0	929,882	0	0	929,882
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 05	Estimator "Chief - Senior"				0.00	138.09	0.00	0.00	138.09
	PRIME/1113	1 hrs/unit 550 TOTAL HRS	550.00	MH	0	75,950	0	0	75,950
	* LINE ITEM ASSEMBLY	Factor:10.0000							
01101.01 - 05	Estimator				0.00	96.06	0.00	0.00	96.06
	PRIME/1114	1 hrs/unit 1500 TOTAL HRS	1,500.00	MH	0	144,093	0	0	144,093
01101.01 - 05	Purchasing				0.00	45.79	0.00	0.00	45.79
	PRIME/1115	1 hrs/unit 40 TOTAL HRS	40.00	MH	0	1,832	0	0	1,832
01101.01 - 05	Safety Engineer				0.00	72.05	0.00	0.00	72.05
	PRIME/1116	1 hrs/unit 350 TOTAL HRS	350.00	MH	0	25,218	0	0	25,218
01101.01 - 05	Daily Cleaning "Laborer"				0.00	45.63	0.00	0.00	45.63
	PRIME/1119	1 hrs/unit 220 TOTAL HRS	220.00	MH	0	10,039	0	0	10,039
01101.01 - 11	Punch List				0.10	0.15	0.05	0.00	0.30
	PRIME/NoCrew	0.013 hrs/unit 2429 TOTAL HRS	192,000.00	SF	19,200	28,800	9,600	0	57,600
01101.01 - 11	Final Cleaning "In House Forces"				0.03	0.08	0.01	0.00	0.12
	PRIME/NoCrew	0.013 hrs/unit 2429 TOTAL HRS	192,000.00	SF	5,760	15,360	1,920	0	23,040
01101.01 - 11	Final Cleaning "Glass"				0.02	0.03	0.00	0.00	0.05
	PRIME/NoCrew	0.013 hrs/unit 2429 TOTAL HRS	192,000.00	SF	3,840	5,760	0	0	9,600
01101.01 - 08	Printing (Dwgs,O&M,Subm)				0.75	0.00	0.00	0.00	0.75
	PRIME/NoCrew	96 hrs/unit 384000 TOTAL HRS	4,000.00	PGS	3,000	0	0	0	3,000
01101.01 - 11	Warranty Costs				0.00	0.02	0.00	0.00	0.02
	PRIME/NoCrew	0.013 hrs/unit 2429 TOTAL HRS	192,000.00	SF	0	3,840	0	0	3,840
		Subtotal Direct Costs			31,800	10,891,533	11,520	0	10,934,853
		Subcontractor Markups			4,118	1,410,366	1,492	0	1,415,976
		Prime Contractor Markups			4,651	1,592,998	1,685	0	1,599,334
		TOTAL UM4008011121 FIELD OVERHEAD, DETAIL ITEMS	514,625	HRS	40,569	13,894,897	14,697	0	13,950,163
		55.00 MTH	*Level Unit Cost-->*		*737.62*	*252,634.50*	*267.21*	*0.00*	*253,639.33*
	UM4008011122 GC EXPENSES	*LEVEL CONTRACTOR ID APPLIED--PRIME*							
01101.01 - 06	On Site Vehicle Pm				0.00	0.00	3.50	0.00	3.50
	PRIME/NoCrew	1 hrs/unit 9680 TOTAL HRS	9,680.00	HR	0	0	33,880	0	33,880
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 06	On Site Vehicle Super				0.00	0.00	3.50	0.00	3.50
	PRIME/NoCrew	96 hrs/unit 792000 TOTAL HRS	8,250.00	HR	0	0	28,875	0	28,875
	* LINE ITEM ASSEMBLY	Factor:150.0000							
01101.01 - 06	On Site Vehicle Others				0.00	0.00	3.25	0.00	3.25
	PRIME/NoCrew	96 hrs/unit ****** TOTAL HRS	19,360.00	HR	0	0	62,920	0	62,920
	* LINE ITEM ASSEMBLY	Factor:352.0000							
01107.01 - 00	Drug Testing Services				0.00	44.19	0.00	0.00	44.19
	PRIME/GC-1122	1 hrs/unit 600 TOTAL HRS	600.00	HR	0	26,514	0	0	26,514
01101.01 - 07	Security Check				0.00	44.19	0.00	0.00	44.19
	PRIME/GC-1122	1 hrs/unit 600 TOTAL HRS	600.00	HR	0	26,514	0	0	26,514
01101.01 - 07	Professional Survey & Layout				0.00	78.53	0.00	0.00	78.53
	PRIME/GC-1123	1 hrs/unit 3000 TOTAL HRS	3,000.00	HR	0	235,575	0	0	235,575
01101.01 - 08	Field Office "Storefront"				0.00	0.00	35.00	0.00	35.00
	PRIME/NoCrew	96 hrs/unit 929280 TOTAL HRS	9,680.00	HR	0	0	338,800	0	338,800
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08	Rails - Platforms - Stairs - Ramps				********.**	********.**	********.**	********.**	**,***,***.**
	PRIME/221	******	0.00	HR	0	0	0	0	0
01101.01 - 08	Setup Temp Office/Remove				********.**	********.**	********.**	********.**	**,***,***.**
	PRIME/221	******	0.00	HR	0	0	0	0	0

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ESTIMATE NAME:
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CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
01101.01 - 08		Computers - Monitors			0.00	0.00	0.55	0.00	0.55
	PRIME/NoCrew	96 hrs/unit ****** TOTAL HRS	77,440.00	HR	0	0	42,592	0	42,592
	* LINE ITEM ASSEMBLY	Factor:1408.0000							
01101.01 - 08		Software			0.30	0.00	0.00	0.00	0.30
	PRIME/NoCrew	96 hrs/unit ****** TOTAL HRS	77,440.00	HR	23,232	0	0	0	23,232
	* LINE ITEM ASSEMBLY	Factor:1408.0000							
01101.01 - 08		Printers			0.00	0.00	1.10	0.00	1.10
	PRIME/NoCrew	96 hrs/unit ****** TOTAL HRS	19,360.00	HR	0	0	21,296	0	21,296
	* LINE ITEM ASSEMBLY	Factor:352.0000							
01101.01 - 08		Office Furniture			0.00	0.00	1.75	0.00	1.75
	PRIME/NoCrew	96 hrs/unit 929280 TOTAL HRS	9,680.00	HR	0	0	16,940	0	16,940
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Office Supplies			4.50	0.00	0.00	0.00	4.50
	PRIME/NoCrew	96 hrs/unit 924000 TOTAL HRS	9,625.00	HR	43,313	0	0	0	43,313
	* LINE ITEM ASSEMBLY	Factor:175.0000							
01101.01 - 08		Office Equipment			********.**	********.**	********.**	********.**	**,***,***.**
	PRIME/NoCrew	******	0.00	HR	0	0	0	0	0
01101.01 - 08		Postage - Special Delievery Services			0.30	0.00	0.00	0.00	0.30
	PRIME/NoCrew	96 hrs/unit 929280 TOTAL HRS	9,680.00	HR	2,904	0	0	0	2,904
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		First Aid Supplies			0.25	0.00	0.00	0.00	0.25
	PRIME/NoCrew	96 hrs/unit 929280 TOTAL HRS	9,680.00	HR	2,420	0	0	0	2,420
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Cups - Ice - Drinking Water			0.30	0.00	0.00	0.00	0.30
	PRIME/NoCrew	96 hrs/unit 929280 TOTAL HRS	9,680.00	HR	2,904	0	0	0	2,904
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Printing - Blue Prints			0.40	0.00	0.00	0.00	0.40
	PRIME/NoCrew	96 hrs/unit 929280 TOTAL HRS	9,680.00	HR	3,872	0	0	0	3,872
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Photo Copier Machine			0.60	0.00	0.22	0.00	0.82
	PRIME/NoCrew	96 hrs/unit 929280 TOTAL HRS	9,680.00	HR	5,808	0	2,130	0	7,938
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Photo Copier Supplies			0.15	0.00	2.00	0.00	2.15
	PRIME/NoCrew	96 hrs/unit 929280 TOTAL HRS	9,680.00	HR	1,452	0	19,360	0	20,812
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Storage & Tool Trailers			0.00	0.00	2.00	0.00	2.00
	PRIME/NoCrew	96 hrs/unit ****** TOTAL HRS	19,360.00	HR	0	0	38,720	0	38,720
	* LINE ITEM ASSEMBLY	Factor:352.0000							
01101.01 - 08		Setup Temp Tool Trailers			0.00	0.00	500.00	0.00	500.00
	PRIME/NoCrew	96 hrs/unit 384 TOTAL HRS	4.00	HR	0	0	2,000	0	2,000
01101.01 - 08		Equip Rental/Small Tools			0.00	0.00	3.00	0.00	3.00
	PRIME/NoCrew	96 hrs/unit 929280 TOTAL HRS	9,680.00	HR	0	0	29,040	0	29,040
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Small Tools Expendable			1.50	0.00	0.00	0.00	1.50
	PRIME/NoCrew	96 hrs/unit 929280 TOTAL HRS	9,680.00	HR	14,520	0	0	0	14,520
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Telephone Exp, Incl Cell			1.10	0.00	0.00	0.00	1.10
	PRIME/NoCrew	96 hrs/unit ****** TOTAL HRS	19,360.00	HR	21,296	0	0	0	21,296
	* LINE ITEM ASSEMBLY	Factor:352.0000							
01101.01 - 08		Internet Connections - Service			0.00	0.00	0.25	0.00	0.25
	PRIME/NoCrew	96 hrs/unit ****** TOTAL HRS	77,440.00	HR	0	0	19,360	0	19,360
	* LINE ITEM ASSEMBLY	Factor:1408.0000							
01101.01 - 08		Network / Communications Eqpt			0.00	0.00	1.20	0.00	1.20
	PRIME/NoCrew	96 hrs/unit 929280 TOTAL HRS	9,680.00	HR	0	0	11,616	0	11,616
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Field Radios			0.00	0.00	2.20	0.00	2.20
	PRIME/NoCrew	96 hrs/unit 929280 TOTAL HRS	9,680.00	HR	0	0	21,296	0	21,296
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		Temporary Toilets (5)			0.00	0.00	1.20	0.00	1.20
	PRIME/NoCrew	96 hrs/unit ****** TOTAL HRS	19,360.00	HR	0	0	23,232	0	23,232
	* LINE ITEM ASSEMBLY	Factor:352.0000							
01101.01 - 08		Temporary Plumbing			********.**	********.**	********.**	********.**	**,***,***.**
	PRIME/221	******	0.00	LF	0	0	0	0	0
01101.01 - 08		Temporary Holding Tanks			********.**	********.**	********.**	********.**	**,***,***.**
	PRIME/NoCrew	******	0.00	HR	0	0	0	0	0
01101.01 - 08		Project Sign			1650.00	0.00	0.00	0.00	1,650.00
	PRIME/NoCrew	96 hrs/unit 384 TOTAL HRS	4.00	EA	6,600	0	0	0	6,600
01101.01 - 08		Temporary Lighting & Elec Hourly Charges			0.00	0.00	2.00	0.00	2.00
	PRIME/NoCrew	96 hrs/unit 929280 TOTAL HRS	9,680.00	HR	0	0	19,360	0	19,360
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 12		Temporary Fencing			12.85	5.19	1.36	0.00	19.40
	PRIME/221	0.075 hrs/unit 45 TOTAL HRS	600.00	LF	7,710	3,116	813	0	11,640
01101.01 - 12		Truck Entrances			0.00	5.19	4500.00	0.00	4,505.19
	PRIME/221	0.075 hrs/unit	1.00	EA	0	5	4,500	0	4,505
01101.01 - 12		Silt Fence			1.25	5.19	0.00	0.00	6.44
	PRIME/221	0.075 hrs/unit 45 TOTAL HRS	600.00	LF	750	3,116	0	0	3,866

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CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
01101.01 - 10		Safety "General Signage"			0.02	0.88	0.00	0.00	0.90
	PRIME/221	0.013 hrs/unit 190 TOTAL HRS	15,000.00	SF	300	13,185	0	0	13,485
01101.01 - 08		Special Scaffolding "Rental"			0.00	0.00	12.00	0.00	12.00
	PRIME/NoCrew	96 hrs/unit 57600 TOTAL HRS	600.00	LF	0	0	7,200	0	7,200
01101.01 - 08		Special Scaffolding "Setup Labor"			0.00	22.00	0.00	0.00	22.00
	PRIME/NoCrew	96 hrs/unit 57600 TOTAL HRS	600.00	LF	0	13,200	0	0	13,200
01101.01 - 08		Special Scaffolding "Take Down Labor"			0.00	2.75	0.00	0.00	2.75
	PRIME/NoCrew	96 hrs/unit 57600 TOTAL HRS	600.00	LF	0	1,650	0	0	1,650
01101.01 - 08		Fire Protection Equipment			0.00	0.00	0.15	0.00	0.15
	PRIME/NoCrew	96 hrs/unit 792000 TOTAL HRS	8,250.00	HR	0	0	1,238	0	1,238
	* LINE ITEM ASSEMBLY	Factor:150.0000							
01101.01 - 08		Temp Water Services			3.50	0.00	0.00	0.00	3.50
	PRIME/NoCrew	96 hrs/unit ****** TOTAL HRS	15,000.00	SF	52,500	0	0	0	52,500
01101.01 - 08		Weather Protection Materials			0.07	0.02	0.00	0.00	0.09
	PRIME/NoCrew	96 hrs/unit ****** TOTAL HRS	15,000.00	SF	1,050	300	0	0	1,350
01101.01 - 08		Temp Heat/Winter Weather Hourly Charges			0.00	0.00	0.07	0.00	0.07
	PRIME/NoCrew	96 hrs/unit 422400 TOTAL HRS	4,400.00	HR	0	0	308	0	308
	* LINE ITEM ASSEMBLY	Factor:80.0000							
01101.01 - 08		Trash Hauling			3.75	0.00	0.00	0.00	3.75
	PRIME/NoCrew	96 hrs/unit 792000 TOTAL HRS	8,250.00	HR	30,938	0	0	0	30,938
	* LINE ITEM ASSEMBLY	Factor:150.0000							
01101.01 - 09		Man / Material Lift "Rental"			0.00	0.00	23.00	0.00	23.00
	PRIME/NoCrew	0.013 hrs/unit 53 TOTAL HRS	4,224.00	HR	0	0	97,152	0	97,152
01101.01 - 09		Man / Material Lift "Foundation"			********.**	********.**	********.**	********.**	**,***,***.**
	PRIME/311	******	0.00	CY	0	0	0	0	0
01101.01 - 09		Man / Material Lift "Doors - Exclosures - Platforms"			335.00	0.00	0.00	0.00	335.00
	PRIME/NoCrew	0.013 hrs/unit	6.00	HR	2,010	0	0	0	2,010
01101.01 - 09		Man / Material Lift "Set Up"			0.00	0.00	1800.00	0.00	1,800.00
	PRIME/NoCrew	0.013 hrs/unit	5.00	HR	0	0	9,000	0	9,000
01101.01 - 09		Man / Material Lift "Take Down"			0.00	0.00	1800.00	0.00	1,800.00
	PRIME/NoCrew	0.013 hrs/unit	5.00	HR	0	0	9,000	0	9,000
01101.01 - 09		Man / Material Lift "Operator"			0.00	69.48	0.00	0.00	69.49
	PRIME/221	1 hrs/unit 6600 TOTAL HRS	6,600.00	MH	0	458,602	0	0	458,602
	* LINE ITEM ASSEMBLY	Factor:120.0000							
01101.01 - 09		Forklift			********.**	********.**	********.**	********.**	**,***,***.**
	PRIME/NoCrew	******	0.00	HR	0	0	0	0	0
01101.01 - 09		Forklift "Operator"			********.**	********.**	********.**	********.**	**,***,***.**
	PRIME/NoCrew	******	0.00	HR	0	0	0	0	0
01101.01 - 09		Forklift "Fuel & Maintenance"			********.**	********.**	********.**	********.**	**,***,***.**
	PRIME/NoCrew	******	0.00	HR	0	0	0	0	0
01101.01 - 09		Skiploader			********.**	********.**	********.**	********.**	**,***,***.**
	PRIME/NoCrew	******	0.00	HR	0	0	0	0	0
01101.01 - 09		Skip Loader "Operator"			********.**	********.**	********.**	********.**	**,***,***.**
	PRIME/221	******	0.00	MH	0	0	0	0	0
01101.01 - 09		Skiploader "Fuel & Maintenance"			********.**	********.**	********.**	********.**	**,***,***.**
	PRIME/NoCrew	******	0.00	HR	0	0	0	0	0
01101.01 - 11		Street Cleaning			0.00	0.00	65.00	0.00	65.00
	PRIME/NoCrew	0.013 hrs/unit 76 TOTAL HRS	6,000.00	HR	0	0	390,000	0	390,000
01101.01 - 08		Printing (Dwgs,O&M,Subm)			0.75	0.00	0.00	0.00	0.75
	PRIME/NoCrew	96 hrs/unit ****** TOTAL HRS	12,000.00	PGS	9,000	0	0	0	9,000
01521.32 - 00		Small tools			0.00	0.00	866666.67	0.00	866,666.67
	PRIME/120		1.00	ls	0	0	866,667	0	866,667
		Subtotal Direct Costs			232,578	781,777	2,117,294	0	3,131,649
		Subcontractor Markups			30,117	101,234	274,173	0	405,523
		Prime Contractor Markups			34,017	114,343	309,676	0	458,036
TOTAL UM4008011122 GC EXPENSES			51,625,017	HRS	296,712	997,354	2,701,142	0	3,995,208
		55.00 MTH	*Level Unit Cost-->*		*5,394.76*	*18,133.70*	*49,111.68*	*0.00*	*72,640.15*
UM4008011123 HOISTING		*LEVEL CONTRACTOR ID APPLIED--PRIME*							
15906.00 - 15		RENT CRAWLER MNTD/LATTICE BOOM CRANE/350 TON/80' BOOM			115.00	570.58	1840.00	0.00	2,525.58
	SUB-211/211	8 hrs/unit 4800 TOTAL HRS	600.00	DY	69,000	342,346	1,104,000	0	1,515,346
15906.00 - 16		RENT CRANE TRUCK MOUNT/CABLE 6X4 DRIVE 20 TON/10' RADIUS			85.00	570.58	1150.00	0.00	1,805.58
	SUB-211/211	8 hrs/unit 2560 TOTAL HRS	320.00	DY	27,200	182,585	368,000	0	577,785
01900.00 - 14		52 Meter Concrete Boom Pump			0.00	71.32	175.00	0.00	246.32
	SUB-211/211	1 hrs/unit 2000 TOTAL HRS	2,000.00	HRS	0	142,644	350,000	0	492,644
	NOTE: Quantity is for 125 days.								
15906.00 - 31		RENT CRANE-TELESCOPING BOOM/40 TON BUCKET RIG			230.00	570.58	1150.00	0.00	1,950.58
	SUB-211/211	8 hrs/unit 3200 TOTAL HRS	400.00	DY	92,000	228,231	460,000	0	780,231

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
		Subtotal Direct Costs			188,200	895,806	2,282,000	0	3,366,006
		Subcontractor Markups			15,997	13,437	193,970	0	223,404
		Prime Contractor Markups			26,442	117,740	320,618	0	464,800
		TOTAL UM4008011123 HOISTING	12,560	HRS	230,639	1,026,983	2,796,588	0	4,054,210
		83,706.00 SF	*Level Unit Cost-->*		*2.76*	*12.27*	*33.41*	*0.00*	*48.43*
		UM4008011124 SP & DIV 1 REQUIREMENTS	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
01101.01 - 50		MAINTAIN STATION FROM COMPLETION TO REVENUE STATION (ASSUME A 5 MAN CREW FOR 3 MONTH)	12.00	MON	1,037.00	8.85	0.00		97.87
	SUB-211/211	1 hrs/unit 977 TOTAL HRS	977.00	MH	17,293	69,682	8,646	0	95,621
01101.01 - 50		ASSESSMENTS FOR CANCELLED SHUTDOWN WITHIN 5 DAYS			0.00	5705.77	0.00	0.00	5,705.77
	SUB-211/211	80 hrs/unit 640 TOTAL HRS	8.00	EA	0	45,646	0	0	45,646
01101.01 - 50		ASSESSMENTS FOR ADDITIONAL SHUTDOWN			2000.00	6846.92	1250.00	0.00	10,096.92
	SUB-211/211	96 hrs/unit 768 TOTAL HRS	8.00	EA	16,000	54,775	10,000	0	80,775
01101.01 - 50		ADDED COST FOR CITY PERSONNEL TO RESTORE OH CONTACT SYSTEM			150.00	4279.33	1200.00	0.00	5,629.33
	SUB-211/211	60 hrs/unit 300 TOTAL HRS	5.00	EA	750	21,397	6,000	0	28,147
01101.01 - 50		COST FOR MUNI INSPECTOR WHEN MOVING WIRES			0.00	713.22	50.00	0.00	763.22
	SUB-211/211	10 hrs/unit 50 TOTAL HRS	5.00	EA	0	3,566	250	0	3,816
01101.01 - 50		PAY 50% OF DRB COSTS			0.00	150.00	0.00	0.00	150.00
	SUB-997/GC-1132	1 hrs/unit 1134 TOTAL HRS	1,134.00	MH	0	170,100	0	0	170,100
01101.01 - 50		COST TO ESCROW BID DOCUMENTS			250.00	0.00	0.00	0.00	250.00
	SUB-211/211		60.00	MO	15,000	0	0	0	15,000
01101.01 - 50		PAY FOR OFF DUTY POLICE OFFICERS			0.00	74.67	0.00	0.00	74.67
	SUB-997/GC-1131	1 hrs/unit 400 TOTAL HRS	400.00	HR	0	29,867	0	0	29,867
		Subtotal Direct Costs			49,043	395,033	24,896	0	468,973
		Subcontractor Markups			4,169	5,926	2,116	0	12,210
		Prime Contractor Markups			6,890	51,921	3,498	0	62,309
		TOTAL UM4008011124 SP & DIV 1 REQUIREMENTS	4,269	HRS	60,102	452,880	30,511	0	543,492
		83,706.00 SF	*Level Unit Cost-->*		*0.72*	*5.41*	*0.36*	*0.00*	*6.49*
		UM4008011125 INSPECTION REQUIREMENTS	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
01101.01 - 50		WELDING - TESTING & INSPECTION			0.00	71.32	0.00	0.00	71.32
	SUB-211/211	1 hrs/unit 2080 TOTAL HRS	2,080.00	MH	0	148,350	0	0	148,350
01101.01 - 50		EXCAVATION TRACKING OBSERVATIONS - ACCOUNTING 2 MEN 18 MONTHS			0.00	71.32	0.00	0.00	71.32
	SUB-211/211	1 hrs/unit 6336 TOTAL HRS	6,336.00	MH	0	451,897	0	0	451,897
14505.00 - 55		PCC INSPECTION TECHNICIAN/PER DAY			0.00	71.32	0.00	0.00	71.32
	SUB-312/211	1 hrs/unit 2400 TOTAL HRS	2,400.00	MH	0	171,173	0	0	171,173
14505.00 - 55		CMU INSPECTION TECHNICIAN/PER DAY			0.00	71.32	0.00	0.00	71.32
	SUB-312/211	1 hrs/unit 1530 TOTAL HRS	1,530.00	MH	0	109,123	0	0	109,123
14505.00 - 55		REBAR INSPECTION TECHNICIAN/PER DAY			0.00	71.32	0.00	0.00	71.32
	SUB-312/211	1 hrs/unit 2080 TOTAL HRS	2,080.00	MH	0	148,350	0	0	148,350
14505.00 - 34		MASONRY TESTING/COMPRESSIVE STRENGTH/PER 5 BRICKS/ASTM C 67			0.00	14.80	0.00	0.00	14.80
	SUB-422/311	0.2 hrs/unit 60 TOTAL HRS	300.00	EA	0	4,440	0	0	4,440
14505.00 - 19		PCC TESTING/COMPRESSIVE STRENGTH TEST/INCL PICKED UP BY LAB/AVG			0.00	14.80	0.00	0.00	14.80
	SUB-422/311	0.2 hrs/unit 180 TOTAL HRS	900.00	EA	0	13,320	0	0	13,320
14505.00 - 42		REINFRCNG STL/TENSILE TEST/#9 TO #11 BAR			0.00	8.08	0.00	0.00	8.08
	SUB-511/511	0.12 hrs/unit 12 TOTAL HRS	100.00	EA	0	808	0	0	808
14505.00 - 42		REINFRCNG STL/TENSILE TEST/#14 BAR & LARGER			0.00	8.08	0.00	0.00	8.08
	SUB-511/511	0.12 hrs/unit 24 TOTAL HRS	200.00	EA	0	1,616	0	0	1,616
14505.00 - 58		NON-DESTRUCIVE MTL TESTING/RADIOGRAPHY			0.00	16.83	0.00	0.00	16.83
	SUB-511/511	0.25 hrs/unit 13 TOTAL HRS	50.00	EA	0	842	0	0	842
14505.00 - 58		NON-DESTRUCIVE MTL TESTING/ULTRASONIC			0.00	10.10	0.00	0.00	10.10
	SUB-511/511	0.15 hrs/unit 23 TOTAL HRS	150.00	EA	0	1,515	0	0	1,515
		Subtotal Direct Costs			0	1,051,433	0	0	1,051,433
		Subcontractor Markups			0	15,771	0	0	15,771
		Prime Contractor Markups			0	138,194	0	0	138,194
		TOTAL UM4008011125 INSPECTION REQUIREMENTS	14,737	HRS	0	1,205,399	0	0	1,205,399
		SUBTOTAL UM40080111 UNION SQUARE MARKET ST. STATION (UMS)			1,281,343	17,597,438	4,955,849	0	23,834,630
		MARKUP			*1.236*	*1.232*	*1.247*	*0.000*	*1.236*
		TOTAL UM40080111 UNION SQUARE MARKET ST. STATION (UMS)			1,583,570	21,683,875	6,180,367	0	29,447,812

UM50 SYSTEMS

UM5003 TPSS STATIONS

UM5003018011 MEDIUM VOLTAGE SINGLE CONDUCTOR CABLE *LEVEL CONTRACTOR ID APPLIED--PRIME*

PRODUCTIVITY = 0.083 MH/LF

26051.31 - 61		1/C #500KCMil , EPR 2.4/5KV Cu Cable			11.88	6.62	0.47	0.00	18.98
	SUB-161/161	0.075 hrs/unit 19 TOTAL HRS	250.00	LF	2,970	1,655	119	0	4,744

Hill International

PRIME CONTRACTOR SUMMARY REPORT

Project Element: MOS 100% ESTIMATE

Prime Contractor: PRIME CONTRACTOR

Markup Description	Markup	Total
MOS 100% ESTIMATE		
Cost to Prime for PRIME PRIME CONTRACTOR		**$105,474,402**
PRIME HOME OFFICE OVERHEAD & PROFIT	7.000%	$7,383,208
SMALL TOOLS & MISC	2.100%	$2,370,010
INSURANCE & BOND	4.000%	$4,609,105
Total Estimate with Prime Contractor Markups	**13.617%**	**$119,836,725**

All codes referenced in Table A-1: "Mitigation Base Cost Calculations" have been highlighted below. The codes beginning with "MS2003..." were derived at a higher level in the estimate folder structure than the costs associated with codes beginning with "MS4008...". The supporting values for codes beginning with "MS2003..." may be arrived at by dividing the highlighted costs below by the prime contractor markup. For example, the cost highlighted for MS200301 below is $20,468,749. To arrive at the direct cost the prime contractor mark up is backed out of the amount as follows:

MS200301: $23,255,954 / ($119,836,725 / $105,474,402) = $20,468,749

The direct costs for codes beginning with "MS4008..." may be arrived at by adding the costs highlighted below at a lower level in the estimate folder structure. For example, the direct cost for MS4008011102 can be arrived at by adding the associated costs before prime contractor markup as follows:

MS4008011102: $378,438 + $17,777 = $396,215

C--Assembly Category Report
SUBMITTAL: 100%
SOFTWARE VERSION: SUCCESS 5.X
REPORT REVISION: Nov. 5 2003
ESTIMATE SAVED AS: MOS 100% Estimate - Program Markups.PWS

CONSTRUCTION CONTRACT: PACKAGE 1255
DATABASE USED: SFMTA SPECIALIZE
PRINTING DATE: 05/31/2012

PROJECT: MOSCONE STATION
PROJECT SITE: SAN FRANCISCO, CA
A/E NAME: SFMTA - DESIGN GROUP
PROJECT SIZE: 1.00LS
CONSTRUCTION FUNDS AVAILABLE, DOLLARS: $150,000,000

ESTIMATOR: HILL INTERNATIONAL
CAT CODE:
UIC:
PROJECT #: MOS-100%
DATE OF ESTIMATE: 5/24/12

WBS CODE	DESCRIPTION	COST/WBS BASED ON 1 LS	COST/ WBS UNIT	TOTAL MARKED UP COSTS MATL	LABOR	EQUIP	UNIT COST	TOTAL
	MOS 100% ESTIMATE, PROJECT TOTALS							**119,837,000**
PROJECT LEVEL NOTE:	The markups used in this estimate differ from the markups Hill International recommends for this project.							
	*****PROJECT SUBTOTALS****			48,743,062	54,588,376	16,505,287	0	119,836,725
BASE BID				**48,743,062**	**54,588,376**	**16,505,287**	**0**	**119,836,725**
-1255 MOSCONE STATION				**48,743,062**	**54,588,376**	**16,505,287**	**0**	**119,836,725**
MSMOSCONE STATION - PKG 1255				**48,743,062**	**54,588,376**	**16,505,287**	**0**	**119,836,725**
MS20	STATIONS - STOPS	106682@ 822.71SF		40,376,646	35,539,366	11,852,808	0	87,768,820
MS2003	UNDERGROUND STATION	106682@ 788.07SF		38,817,040	34,119,574	11,136,339	0	84,072,953
MS200301	EXCAVATION & GROUND SUPPORT - STATION BOX	73528@ 316.29SF		9,819,977	10,140,346	3,295,631	0	23,255,954
MS200302	EXCAVATION & GROUND SUPPORT - HEADHOUSE	73528@ 173.22SF		5,614,785	5,635,911	1,485,972	0	12,736,668
MS200303	EXCAVATION & GROUND SUPPORT - COMPENSATION GROUTING	73528@ 13.44SF		362,878	363,136	262,439	0	988,453
MS200304	EXCAVATION & GROUND SUPPORT - INSTRUMENTATION & MONITORING	73528@ 26.36SF		827,082	839,290	271,515	0	1,937,887
MS200308	STRUCTURAL - HEADHOUSE ROOF LEVEL	2847@ 84.46SF		103,200	118,655	18,598	0	240,453
MS200310	STRUCTURAL - HEADHOUSE SURFACE LEVEL	12080@ 288.82SF		1,483,788	1,498,729	506,457	0	3,488,973
MS200312	STRUCTURAL - STATION SURFACE LEVEL	21403@ 141.96SF		1,423,764	1,049,047	565,607	0	3,038,418
MS200314	STRUCTURAL - HEADHOUSE MEZZANINE LEVEL	14123@ 120.25SF		712,040	726,323	259,943	0	1,698,306
MS200316	STRUCTURAL - STATION MEZZANINE LEVEL	18650@ 197.99SF		1,658,105	1,459,460	575,031	0	3,692,596
MS200318	STRUCTURAL - HEADHOUSE CONCOURSE LEVEL	14250@ 146.81SF		899,619	892,037	300,337	0	2,091,993
MS200320	STRUCTURAL - STATION CONCOURSE LEVEL	18650@ 205.65SF		1,635,134	1,542,452	657,775	0	3,835,361
MS200322	STRUCTURAL - HEADHOUSE PLATFORM/INVERT LEVEL	14017@ 197.15SF		1,277,017	963,064	523,417	0	2,763,498
MS200324	STRUCTURAL - STATION PLATFORM/INVERT LEVEL	18650@ 289.27SF		2,439,739	2,041,799	913,312	0	5,394,850
MS200332	ARCHITECTURAL - HEADHOUSE SURFACE LEVEL	4942@ 227.31SF		499,959	472,846	150,539	0	1,123,345
MS200334	ARCHITECTURAL - HEADHOUSE MEZZANINE LEVEL	12935@ 43.97SF		252,078	244,247	72,384	0	568,709
MS200336	ARCHITECTURAL - STATION MEZZANINE LEVEL	18813@ 21.18SF		143,185	231,846	23,492	0	398,523
MS200338	ARCHITECTURAL - HEADHOUSE CONCOURSE LEVEL	11937@ 69.59SF		389,466	351,406	89,883	0	830,755
MS200340	ARCHITECTURAL - STATION CONCOURSE LEVEL	18867@ 142.67SF		1,443,089	917,102	331,543	0	2,691,735
MS200342	ARCHITECTURAL - HEADHOUSE PLATFORM LEVEL	11968@ 12.58SF		70,955	68,687	10,959	0	150,601
MS200344	ARCHITECTURAL - STATION PLATFORM LEVEL	19017@ 88.61SF		1,038,533	518,947	127,695	0	1,685,174
MS200346	ARCHITECTURAL - STAIRS & LANDING	579@ 1907.29RISR		886,606	200,734	16,979	0	1,104,319
MS200370	MECHANICAL - PLUMBING	106682@ 5.41SF		266,569	286,464	24,445	0	577,478
MS200372	MECHANICAL - FIRE PROTECTION	106682@ 11.75SF		438,427	667,148	147,664	0	1,253,238
MS200374	MECHANICAL - HVAC & EMERGENCY VENTILATION	106682@ 35.58SF		2,214,252	1,240,486	340,930	0	3,795,668
MS200376	ELECTRICAL - LIGHTING	106682@ 7.13SF		334,947	393,913	32,133	0	760,994
MS200378	ELECTRICAL - POWER DISTRIBUTION	106682@ 37.20SF		2,581,844	1,255,502	131,657	0	3,969,004
MS2007	ELEVATORS, ESCALATORS	8@ 461983.37EA		1,559,606	1,419,792	716,469	0	3,695,867
MS200752	CONVEYING - ELEVATORS / ESCALATORS	8@ 461983.37EA		1,559,606	1,419,792	716,469	0	3,695,867
MS40	SITEWORK & SPECIAL CONDITIONS	73528@ 343.38SF		3,784,094	16,994,796	4,469,264	0	25,248,154
MS4001	DEMOLITION, CLEARING, EARTHWORK	73528@ 4.91SF		1,621	248,944	110,623	0	361,188
MS400102	CIVILWORK	73528@ 1.03SF		1,621	55,900	17,961	0	75,483
MS400103	GAS STATION DEMOLITION (4TH / FOLSOM)			0	193,044	92,661	0	285,705
MS4002	SITE UTILITIES, UTILITY RELOCATION	73528@ 26.79SF		756,102	1,019,377	193,997	0	1,969,476
MS400201	SITE UTILITIES, UTILITY RELOCATION	73528@ 26.79SF		756,102	1,019,377	193,997	0	1,969,476
MS4003	HAZ. MAT'L, CONTAM'D SOIL REMOVAL/MITIGATION, GROUND WATER TREATMENTS	73528@ 19.23SF		602,851	533,071	278,229	0	1,414,152
MS400306	EXCAVATION & GROUND SUPPORT - HEADHOUSE			330,565	292,281	152,561	0	775,407
MS400311	EXCAVATION & GROUND SUPPORT - STATION BOX			272,286	240,790	125,668	0	638,744
MS4004	ENVIRONMENTAL MITIGATION WETLANDS HISTORIC ARCHEOLOGIC	73528@ 6.41SF		200,954	177,593	92,765	0	471,313
MS400400	MOSCONE STATION	73528@ 6.41SF		200,954	177,593	92,765	0	471,313
MS4006	PEDESTRIAN / BIKE ACCESS - LANDSCAPING	73528@ 3.47SF		148,233	91,535	15,515	0	255,282
MS400601	STREET RESTORATION	73528@ 3.47SF		148,233	91,535	15,515	0	255,282
MS4007	AUTO,BUS, VAN ACCESSWAYS INCL ROADS & PKG LOTS	73528@ 9.11SF		325,334	311,417	32,998	0	669,748
MS400701	AUTO,BUS, VAN ACCESSWAYS INCL ROADS & PKG LOTS	73528@ 9.11SF		325,334	311,417	32,998	0	669,748
MS4008	TEMPORARY FACILITIES	73528@ 273.46SF		1,748,999	14,612,859	3,745,138	0	20,106,995
MS400801	TEMPORARY FACILITIES & OTHER INDIRECT COSTS DURING CONSTRUCTION	73528@ 273.46SF		1,748,999	14,612,859	3,745,138	0	20,106,995
MS50	SYSTEMS	106682@ 63.93SF		4,582,321	2,054,215	183,215	0	6,819,751
MS5003	TPSS STATIONS	106682@ 38.44SF		3,266,919	775,758	58,314	0	4,100,991
MS500301	TPSS STATIONS	106682@ 38.44SF		3,266,919	775,758	58,314	0	4,100,991
MS5005	COMMUNICATIONS	106682@ 24.87SF		1,295,225	1,235,980	121,552	0	2,652,757
MS500501	COMMUNICATIONS	106682@ 24.87SF		1,295,225	1,235,980	121,552	0	2,652,757
MS5006	FARE COLLECTION SYSTEMS	106682@ 0.62SF		20,178	42,477	3,349	0	66,003

C--Assembly Category Report
SUBMITTAL: 100%
SOFTWARE VERSION: SUCCESS 5.X
REPORT REVISION: Nov. 5 2003
ESTIMATE SAVED AS: MOS 100% Estimate - Program Markups.PWS

CONSTRUCTION CONTRACT: PACKAGE 1255
DATABASE USED: SFMTA SPECIALIZE
PRINTING DATE: 05/31/2012

PROJECT: MOSCONE STATION
PROJECT SITE: SAN FRANCISCO, CA
A/E NAME: SFMTA - DESIGN GROUP
PROJECT SIZE: 1.00LS
CONSTRUCTION FUNDS AVAILABLE, DOLLARS: $150,000,000

ESTIMATOR: HILL INTERNATIONAL
CAT CODE:
UIC:
PROJECT #: MOS-100%
DATE OF ESTIMATE: 5/24/12

WBS CODE	DESCRIPTION	COST/WBS BASED ON 1 LS	COST/ WBS UNIT	TOTAL MARKED UP COSTS MATL	LABOR	EQUIP	UNIT COST	TOTAL
MS500682	FARE COLLECTION SYSTEMS		106682@ 0.62SF	20,178	42,477	3,349	0	66,003

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	SUB-161/161	25.702 hrs/unit 26 TOTAL HRS	1.00	EA	10,500	2,270	167	0	12,938
		Subtotal Direct Costs			24,326	159,642	15,523	0	199,491
		Subcontractor Markups			2,068	2,395	1,319	0	5,782
		Prime Contractor Markups			3,594	22,064	2,293	0	27,952
		TOTAL MS4007019613 TRAFFIC SIGNALS	1,826	HRS	29,988	184,100	19,136	0	233,224
		MS4007019614 ROADS & SIDEWALKS *LEVEL CONTRACTOR ID APPLIED--PRIME*							
02740.30 - 00		ASPHALTIC CONC PAVEMENT, AND LG PAVED AREAS, WEARING COURSE, 2" THICK	3.25		1.17	0.05	0.00		4.47
	SUB-221/221	0.017 hrs/unit 90 TOTAL HRS	5,360.00	SY	17,447	6,264	265	0	23,975
32131.32 - 30		10" THICK CONCRETE BASE	39.62		2.00	0.53	0.00		42.15
	SUB-211/211	0.028 hrs/unit 104 TOTAL HRS	3,719.00	SY	147,362	7,427	1,982	0	156,771
02785.60 - 03		AC SURF TRTM/PVMT OVRLAY/POLYPROPYLENE/ADVERSE COND/6 OZ PER SY	0.14		0.17	0.01	0.00		0.32
	SUB-211/211	0.002 hrs/unit 169 TOTAL HRS	69,664.00	SF	9,391	12,029	996	0	22,416
32131.32 - 30		8" THICK CONCRETE BASE	30.48		2.12	0.41	0.00		33.01
	SUB-211/211	0.03 hrs/unit 6 TOTAL HRS	193.00	SY	5,883	409	80	0	6,371
02740.31 - 00		PLANT-MX AC PAVNG/FOR HWAYS & LG PAVED AREAS/WEARNG COURSE/3-1/2" THK	0.66		0.09	0.01	0.00		0.76
	SUB-211/211	0.001 hrs/unit 27 TOTAL HRS	21,429.00	SF	14,212	1,943	161	0	16,315
02740.31 - 00		PLANT-MIX AC PAVING/FOR HWAYS & LG PAVED AREAS/WEARING COURSE/2" THK	0.38		0.07	0.01	0.00		0.45
	SUB-211/211	0.001 hrs/unit 1 TOTAL HRS	940.00	SF	361	61	5	0	427
02740.31 - 52		AC PCC PAVING/FILL POT HOLES/COLD PATCH/2" THK	0.50		1.22	0.10	0.00		1.82
	SUB-221/221	0.018 hrs/unit 604 TOTAL HRS	34,509.00	SF	17,393	41,972	3,568	0	62,932
		Subtotal Direct Costs			212,047	70,104	7,057	0	289,208
		Subcontractor Markups			18,024	1,052	600	0	19,675
		Prime Contractor Markups			31,329	9,689	1,043	0	42,060
		TOTAL MS4007019614 ROADS & SIDEWALKS	1,001	HRS	261,400	80,844	8,699	0	350,943
		73,528.00 SF *Level Unit Cost-->*			*3.56*	*1.10*	*0.12*	*0.00*	*4.77*
		SUBTOTAL MS40070196 STREET RESTORATION 1			263,910	270,043	26,768	0	560,721
		MARKUP			*1.233*	*1.153*	*1.233*	*0.000*	*1.194*
		TOTAL MS40070196 STREET RESTORATION 1			325,334	311,417	32,998	0	669,748
		MS4008 TEMPORARY FACILITIES							
		MS40008011101 OVERHEAD CONTACT SYSTEM *LEVEL CONTRACTOR ID APPLIED--PRIME*							
34230.01 - 02		PROVIDE STEEL POLE TYPE 765N			3138.01	2958.99	1448.58	0.00	7,545.58
	SUB-511/511	43.95 hrs/unit 88 TOTAL HRS	2.00	EA	6,276	5,918	2,897	0	15,091
34230.01 - 02		PROVIDE STEEL POLE TYPE 770			4482.88	4241.68	2069.41	0.00	10,793.97
	SUB-165/165	71.914 hrs/unit 144 TOTAL HRS	2.00	EA	8,966	8,483	4,139	0	21,588
34230.01 - 02		PROVIDE POLE FOUNDATION FOR 765N			2241.43	2116.43	1034.70	0.00	5,392.58
	SUB-314/314	34.834 hrs/unit 70 TOTAL HRS	2.00	EA	4,483	4,233	2,069	0	10,785
34230.01 - 02		PROVIDE POLE FOUNDATION FOR 770			3056.51	2892.04	1410.95	0.00	7,359.51
	SUB-165/165	49.032 hrs/unit 98 TOTAL HRS	2.00	EA	6,113	5,784	2,822	0	14,719
16120.40 - 60		SPLICE CABLES - OUTDOOR - ARIAL	0.00		294.91	0.00	0.00		294.91
	SUB-165/165	5 hrs/unit 40 TOTAL HRS	8.00		0	2,359	0	0	2,359
34230.01 - 02		PROVIDE 2/0 TROLLEYWIRE	21.00		3.77	0.28	0.00		25.05
	SUB-165/165	0.064 hrs/unit 126 TOTAL HRS	1,969.00	lf	41,349	7,433	548	0	49,329
34230.01 - 04		REMOVE EXISTING TROLLEY / LT POLES, WIRES & FDN	840.00		2265.97	67.72	0.00		3,173.69
	SUB-111/111	38.699 hrs/unit 116 TOTAL HRS	3.00	EA	2,520	6,798	203	0	9,521
34421.61 - 01		TRAIN CONTROL - CABLE 12C#14 (SWITCH CONTROL)	7.67		3.62	0.27	0.00		11.55
	SUB-161/161	0.041 hrs/unit 11 TOTAL HRS	267.00	lf	2,047	967	72	0	3,085
34421.61 - 01		GUYWIRE	0.89		1.59	0.12	0.00		2.59
	SUB-161/161	0.018 hrs/unit 31 TOTAL HRS	1,746.00	LF	1,545	2,776	210	0	4,530
34420.02 - 01		SWITCH CONTROL RECEIVER	2625.00		189.19	13.96	0.00		2,828.15
	SUB-161/161	2.142 hrs/unit 4 TOTAL HRS	2.00	EA	5,250	378	28	0	5,656
34230.01 - 03		PROSPECT HOLE FOR DEPTH GREATER THAN 3 FEET	262.74		833.96	45.16	0.00		1,141.85
	SUB-165/165	14.139 hrs/unit 28 TOTAL HRS	2.00	EA	525	1,668	90	0	2,284
34230.01 - 03		PROSPECT HOLE FOR DEPTH UP TO 3 FEET	210.00		624.04	33.40	0.00		867.44
	SUB-221/221	8.981 hrs/unit 18 TOTAL HRS	2.00	EA	420	1,248	67	0	1,735
34230.01 - 02		PROVIDE TANGENT SPAN	3675.05		5674.55	418.80	0.00		9,768.40
	SUB-165/165	96.207 hrs/unit 192 TOTAL HRS	2.00	EA	7,350	11,349	838	0	19,537
34230.01 - 01		SPECIAL WORK 4TH - FOLSOM	81506.85		76999.58	37625.57	0.00		196,132.00
	SUB-211/211	1079.6 hrs/unit 1080 TOTAL HRS	1.00	LS	81,507	77,000	37,626	0	196,132
34230.01 - 01		SPECIAL WORK 4TH - HOWARD	20376.71		19249.91	9406.39	0.00		49,033.01
	SUB-211/211	269.9 hrs/unit 270 TOTAL HRS	1.00	LS	20,377	19,250	9,406	0	49,033
34230.01 - 01		SPECIAL WORK 4TH - CLEMENTINA	40753.43		38499.75	18812.79	0.00		98,065.97
	SUB-211/211	539.8 hrs/unit 540 TOTAL HRS	1.00	LS	40,753	38,500	18,813	0	98,066

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
		Subtotal Direct Costs			229,480	194,144	79,826	0	503,450
		Subcontractor Markups			19,506	2,912	6,785	0	29,203
		Prime Contractor Markups			33,904	26,833	11,794	0	72,531
		TOTAL MS4008011101 OVERHEAD CONTACT SYSTEM	2,856	HRS	282,890	223,889	98,405	0	605,185
		3,982.00 LF *Level Unit Cost-->*			*71.04*	*56.23*	*24.71*	*0.00*	*151.98*
		MS4008011102 TRAFFIC CONTROL *LEVEL CONTRACTOR ID APPLIED--PRIME*							
01552.60 - 01		TRAFFIC WATER FILLED BARRIER			407.54	384.93	188.13	0.00	980.60
	SUB-111/111	6.574 hrs/unit 565 TOTAL HRS	86.00	EA	35,048	33,104	16,179	0	84,331
01552.60 - 01		CHANGEABLE MESSAGE SIGNS			6113.02	5774.95	2821.92	0.00	14,709.89
	SUB-211/211	80.97 hrs/unit 486 TOTAL HRS	6.00	EA	36,678	34,650	16,932	0	88,259
01552.60 - 01		CONSTRUCTION AREA AND SPECIAL TRAFFIC SIGNS			81.51	77.03	37.63	0.00	196.17
	SUB-211/211	1.08 hrs/unit 11 TOTAL HRS	10.00	EA	815	770	376	0	1,962
01552.60 - 01		TEMPORARY TRAFFIC PAVEMENT MARKINGS & STRIPING			1.02	0.93	0.47	0.00	2.42
	SUB-211/211	0.013 hrs/unit 52 TOTAL HRS	4,000.00	LF	4,074	3,709	1,895	0	9,678
01552.60 - 01		TRAFFIC SUPERVISOR PROVIDED BY TRAFFIC SUBCONTRACTOR			0.00	56.60	0.00	0.00	56.60
	SUB-120/120	0.781 hrs/unit 351 TOTAL HRS	450.00	HR	0	25,468	0	0	25,468
01552.60 - 01		SF PARKING & TRAFFIC CONTROL OFFICER			0.00	61.74	0.00	0.00	61.74
	SUB-120/120	0.852 hrs/unit 341 TOTAL HRS	400.00	HR	0	24,697	0	0	24,697
01552.60 - 01		OFF DUTY SFPD UNIFORM OFFICER			0.00	87.47	0.00	0.00	87.47
	SUB-120/120	1.207 hrs/unit 241 TOTAL HRS	200.00	HR	0	17,493	0	0	17,493
01552.60 - 01		TRAFFIC CONTROL CREW			0.00	51.45	0.00	0.00	51.45
	SUB-120/120	0.71 hrs/unit 355 TOTAL HRS	500.00	HR	0	25,726	0	0	25,726
01552.60 - 02		PROJECT SIGNS			1222.60	1154.99	564.39	0.00	2,941.98
	SUB-211/211	16.194 hrs/unit 32 TOTAL HRS	2.00	EA	2,445	2,310	1,129	0	5,884
01552.60 - 02		DETOUR SIGNS			203.76	192.50	94.06	0.00	490.32
	SUB-211/211	2.699 hrs/unit 119 TOTAL HRS	44.00	SF	8,966	8,470	4,139	0	21,574
01552.60 - 02		TEMPORARY TOW-AWAY SIGNS			40.75	38.51	18.81	0.00	98.07
	SUB-211/211	0.54 hrs/unit 11 TOTAL HRS	20.00	SF	815	770	376	0	1,961
01552.60 - 03		CHANNELIZER			105.00	59.27	2.82	0.00	167.09
	SUB-211/211	0.831 hrs/unit 42 TOTAL HRS	50.00	EA	5,250	2,963	141	0	8,355
01552.60 - 03		TEMPORARY PAVEMENT MARKERS			6.30	5.16	0.00	0.00	11.46
	SUB-211/211	0.072 hrs/unit 14 TOTAL HRS	200.00	EA	1,260	1,032	0	0	2,292
01552.60 - 03		BARRICADE			52.50	43.01	0.00	0.00	95.50
	SUB-211/211	0.603 hrs/unit 45 TOTAL HRS	75.00	EA	3,938	3,225	0	0	7,163
01552.60 - 03		FLASHING BEACON (PORTABLE)			525.00	387.42	0.00	0.00	912.42
	SUB-120/120	5.346 hrs/unit 27 TOTAL HRS	5.00	EA	2,625	1,937	0	0	4,562
01552.60 - 09		TEMPORARY SIGNALS			10188.36	9624.92	4703.19	0.00	24,516.48
	SUB-211/211	134.95 hrs/unit 270 TOTAL HRS	2.00	EA	20,377	19,250	9,406	0	49,033
		Subtotal Direct Costs			122,290	205,575	50,573	0	378,438
		Subcontractor Markups			10,395	3,084	4,299	0	17,777
		Prime Contractor Markups			18,068	28,413	7,472	0	53,952
		TOTAL MS4008011102 TRAFFIC CONTROL	2,962	HRS	150,753	237,071	62,344	0	450,167
		MS4008011103 DEWATERING *LEVEL CONTRACTOR ID APPLIED--PRIME*							
31231.92 - 02		DRILL WELL - 6" DIA			21.00	54.63	61.75	0.00	137.38
	SUB-211/211	0.766 hrs/unit 919 TOTAL HRS	1,200.00	LF	25,200	65,559	74,098	0	164,858
31231.92 - 02		STEEL CASING - 6" DIA			36.75	24.32	27.44	0.00	88.51
	SUB-211/211	0.341 hrs/unit 286 TOTAL HRS	840.00	LF	30,870	20,430	23,049	0	74,348
31231.92 - 02		STEEL PIPE SCREEN - 6" DIA			47.25	24.32	27.44	0.00	99.01
	SUB-211/211	0.341 hrs/unit 123 TOTAL HRS	360.00	LF	17,010	8,756	9,878	0	35,644
31231.92 - 02		SUBMERSIBLE PUMP - 6" DIA- 25 HP - 250 GPM			2791.61	2637.21	1288.67	0.00	6,717.50
	SUB-211/211	36.976 hrs/unit 887 TOTAL HRS	24.00	EA	66,999	63,293	30,928	0	161,220
31231.92 - 02		OBSERVATION WELL - 6" DIA			9452.35	8929.67	4363.44	0.00	22,745.47
	SUB-211/211	125.2 hrs/unit 250 TOTAL HRS	2.00	EA	18,905	17,859	8,727	0	45,491
31231.92 - 02		FLOW METER - 6" DIA			592.97	560.16	273.72	0.00	1,426.85
	SUB-211/211	7.854 hrs/unit 94 TOTAL HRS	12.00	EA	7,116	6,722	3,285	0	17,122
31231.92 - 02		DEWATERING OPERATION, MAINTENANCE ALLOWANCE, (INCL WELLS, PUMPS, PIPING, ETC)			40,753	38488.76	18812.79	0.00	98,054.98
	SUB-221/221	553.91 hrs/unit 554 TOTAL HRS	1.00	LS	40,753	38,489	18,813	0	98,055
		Subtotal Direct Costs			206,852	221,107	168,778	0	596,738
		Subcontractor Markups			17,582	3,317	14,346	0	35,245
		Prime Contractor Markups			30,561	30,560	24,936	0	86,056
		TOTAL MS4008011103 DEWATERING	3,114	HRS	254,996	254,984	208,060	0	718,039
		MS4008011104 FIELD OVERHEAD, DETAIL ITEMS *LEVEL CONTRACTOR ID APPLIED--PRIME*							
01101.01 - 05		PROJECT DIRECTOR			0.00	168.11	0.00	0.00	168.11
	PRIME/NoCrew	1 hrs/unit 5000 TOTAL HRS	5,000.00	MH	0	840,564	0	0	840,564
	* LINE ITEM ASSEMBLY	Factor:100.0000							

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
01101.01 - 05	PROJECT MANAGER		0.00	144.10	0.00	0.00	144.10
	PRIME/NoCrew 1 hrs/unit 8800 TOTAL HRS	8,800.00 MH	0	1,268,090	0	0	1,268,090
	* LINE ITEM ASSEMBLY Factor:176.0000						
01101.01 - 05	GENERAL SUPERINTENDENT		0.00	87.76	0.00	0.00	87.76
	PRIME/NoCrew 1 hrs/unit 11000 TOTAL HRS	11,000.00 MH	0	965,360	0	0	965,360
	* LINE ITEM ASSEMBLY Factor:220.0000						
01101.01 - 05	ASST. SUPERINTENDENT		0.00	68.68	0.00	0.00	68.68
	PRIME/NoCrew 1 hrs/unit 8800 TOTAL HRS	8,800.00 MH	0	604,384	0	0	604,384
	* LINE ITEM ASSEMBLY Factor:176.0000						
01101.01 - 05	PROJECT ENGINEER		0.00	138.09	0.00	0.00	138.09
	PRIME/NoCrew 1 hrs/unit 8800 TOTAL HRS	8,800.00 MH	0	1,215,195	0	0	1,215,195
	* LINE ITEM ASSEMBLY Factor:176.0000						
01101.01 - 05	ADMIN / SECRETARY		0.00	48.04	0.00	0.00	48.04
	PRIME/NoCrew 1 hrs/unit 8800 TOTAL HRS	8,800.00 MH	0	422,743	0	0	422,743
	* LINE ITEM ASSEMBLY Factor:176.0000						
01101.01 - 05	PAYROLL / TIMEKEEPER		0.00	38.42	0.00	0.00	38.42
	PRIME/NoCrew 1 hrs/unit 4000 TOTAL HRS	4,000.00 MH	0	153,699	0	0	153,699
	* LINE ITEM ASSEMBLY Factor:80.0000						
01101.01 - 05	COST ENGINEER - ACCOUNTANT "PRE CONSTRUCTION"		0.00	72.05	0.00	0.00	72.05
	PRIME/NoCrew 1 hrs/unit 4000 TOTAL HRS	4,000.00 MH	0	288,202	0	0	288,202
	* LINE ITEM ASSEMBLY Factor:80.0000						
01101.01 - 05	PROJECT SCHEDULER		0.00	72.05	0.00	0.00	72.05
	PRIME/NoCrew 1 hrs/unit 4000 TOTAL HRS	4,000.00 MH	0	288,202	0	0	288,202
	* LINE ITEM ASSEMBLY Factor:80.0000						
01101.01 - 05	PROJECT ESTIMATOR		0.00	72.05	0.00	0.00	72.05
	PRIME/NoCrew 1 hrs/unit 2000 TOTAL HRS	2,000.00 MH	0	144,101	0	0	144,101
	* LINE ITEM ASSEMBLY Factor:40.0000						
01101.01 - 05	QUALITY CONTROL		0.00	86.46	0.00	0.00	86.46
	PRIME/NoCrew 1 hrs/unit 7500 TOTAL HRS	7,500.00 MH	0	648,479	0	0	648,479
	* LINE ITEM ASSEMBLY Factor:150.0000						
01101.01 - 05	ESTIMATOR "CHIEF - SENIOR"		0.00	96.06	0.00	0.00	96.06
	PRIME/NoCrew 1 hrs/unit 500 TOTAL HRS	500.00 MH	0	48,031	0	0	48,031
	* LINE ITEM ASSEMBLY Factor:10.0000						
01101.01 - 05	PURCHASING		0.00	96.06	0.00	0.00	96.06
	PRIME/NoCrew 1 hrs/unit 40 TOTAL HRS	40.00 MH	0	3,842	0	0	3,842
01101.01 - 05	SAFETLY ENGINEER		0.00	45.79	0.00	0.00	45.79
	PRIME/NoCrew 1 hrs/unit 8800 TOTAL HRS	8,800.00 MH	0	402,952	0	0	402,952
	* LINE ITEM ASSEMBLY Factor:176.0000						
01101.01 - 05	DAILY CLEANING "LABORER"		0.00	31.99	0.00	0.00	31.99
	PRIME/NoCrew 1 hrs/unit 22000 TOTAL HRS	22,000.00 MH	0	703,780	0	0	703,780
	* LINE ITEM ASSEMBLY Factor:440.0000						
01101.01 - 11	PUNCH LIST		0.05	0.16	0.10	0.00	0.32
	PRIME/111 0.003 hrs/unit 292 TOTAL HRS	106,682.00 SF	5,601	17,101	10,988	0	33,690
01101.01 - 11	FINAL CLEANING "IN HOUSE FORCES"		0.01	0.09	0.03	0.00	0.13
	PRIME/111 0.001 hrs/unit 156 TOTAL HRS	106,682.00 SF	1,120	9,121	3,296	0	13,537
01101.01 - 11	FINAL CLEANING "GLASS"		0.00	0.04	0.02	0.00	0.06
	PRIME/111 0.001 hrs/unit 78 TOTAL HRS	106,682.00 SF	0	4,560	2,198	0	6,758
01101.01 - 08	PRINTING (DWGS, O&M, SUBMITTALS)		0.00	0.00	0.77	0.00	0.77
	PRIME/211	4,000.00 PGS	0	0	3,090	0	3,090
01101.01 - 11	WARRANTY COSTS		0.20	0.59	0.20	0.00	0.99
	PRIME/111 0.01 hrs/unit 1077 TOTAL HRS	106,682.00 SF	21,336	63,091	21,336	0	105,764
	Subtotal Direct Costs		28,057	8,091,498	40,909	0	8,160,464
	Subcontractor Markups		3,821	1,101,810	5,570	0	1,111,201
	Prime Contractor Markups		4,341	1,251,842	6,329	0	1,262,511
TOTAL MS4008011104 FIELD OVERHEAD, DETAIL ITEMS		105,643 HRS	36,219	10,445,149	52,808	0	10,534,176
50.00 MTH	*Level Unit Cost-->*		*724.37*	*208,902.98*	*1,056.17*	*0.00*	*210,683.51*
MS40080011105 GC EXPENSES	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
01101.01 - 06	ON SITE VEHICLE PM		3.67	0.00	0.00	0.00	3.68
	PRIME/211	8,800.00 HR	32,340	0	0	0	32,340
	* LINE ITEM ASSEMBLY Factor:176.0000						
01101.01 - 06	ON SITE VEHICLE SUPER		3.67	0.00	0.00	0.00	3.68
	PRIME/211	7,500.00 HR	27,563	0	0	0	27,563
	* LINE ITEM ASSEMBLY Factor:150.0000						
01101.01 - 06	ON SITE VEHICLE OTHERS		3.41	0.00	0.00	0.00	3.41
	PRIME/211	17,600.00 HR	60,060	0	0	0	60,060
	* LINE ITEM ASSEMBLY Factor:352.0000						
01107.01 - 00	DRUG TESTING SERVICES		0.00	70.81	0.00	0.00	70.81
	PRIME/NoCrew 1 hrs/unit 300 TOTAL HRS	300.00 HR	0	21,242	0	0	21,242
01101.01 - 07	SECURITY CHECK		0.00	48.04	0.00	0.00	48.04
	PRIME/NoCrew 1 hrs/unit 300 TOTAL HRS	300.00 HR	0	14,412	0	0	14,412
01101.01 - 07	PROFESSIONAL SURVEY & LAYOUT		0.00	50.43	0.00	0.00	50.43
	PRIME/NoCrew 1 hrs/unit 1200 TOTAL HRS	1,200.00 HR	0	60,517	0	0	60,517
01101.01 - 08	FIELD OFFICE		14.18	0.00	0.00	0.00	14.18

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	PRIME/211		8,800.00	HR	124,740	0	0	0	124,740
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		COMPUTERS - MONITORS			0.58	0.00	0.00	0.00	0.58
	PRIME/211		70,400.00	HR	40,656	0	0	0	40,656
	* LINE ITEM ASSEMBLY	Factor:1408.0000							
01101.01 - 08		SOFTWARE			0.00	0.00	0.31	0.00	0.31
	PRIME/211		70,400.00	HR	0	0	21,754	0	21,754
	* LINE ITEM ASSEMBLY	Factor:1408.0000							
01101.01 - 08		PRINTERS			1.16	0.00	0.00	0.00	1.16
	PRIME/211		17,600.00	HR	20,328	0	0	0	20,328
	* LINE ITEM ASSEMBLY	Factor:352.0000							
01101.01 - 08		OFFICE FURNITURE			1.84	0.00	0.00	0.00	1.84
	PRIME/211		8,800.00	HR	16,170	0	0	0	16,170
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		OFFICE SUPPLIES			0.00	0.00	4.63	0.00	4.64
	PRIME/211		8,750.00	HR	0	0	40,556	0	40,556
	* LINE ITEM ASSEMBLY	Factor:175.0000							
01101.01 - 08		POSTAGE - SPECIAL DELIEVERY SERVICES			0.00	0.00	0.31	0.00	0.31
	PRIME/211		8,800.00	HR	0	0	2,719	0	2,719
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		FIRST AID SUPPLIES			0.00	0.00	0.26	0.00	0.26
	PRIME/211		8,800.00	HR	0	0	2,266	0	2,266
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		CUPS - ICE - DRINKING WATER			0.00	0.00	0.31	0.00	0.31
	PRIME/211		8,800.00	HR	0	0	2,719	0	2,719
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		PRINTING - BLUE PRINTS			0.00	0.00	0.41	0.00	0.41
	PRIME/211		8,800.00	HR	0	0	3,626	0	3,626
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		PHOTO COPIER MACHINE			0.23	0.00	0.62	0.00	0.85
	PRIME/211		8,800.00	HR	2,033	0	5,438	0	7,471
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		PHOTO COPIER SUPPLIES			2.10	0.00	0.16	0.00	2.25
	PRIME/211		8,800.00	HR	18,480	0	1,360	0	19,840
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		STORAGE & TOOL TRAILERS			2.10	0.00	0.00	0.00	2.10
	PRIME/211		17,600.00	HR	36,960	0	0	0	36,960
	* LINE ITEM ASSEMBLY	Factor:352.0000							
01101.01 - 08		SETUP TEMP TOOL TRAILERS			525.00	0.00	0.00	0.00	525.00
	PRIME/211		4.00	HR	2,100	0	0	0	2,100
01101.01 - 08		EQUIP RENTAL / SMALL TOOLS			3.15	0.00	0.00	0.00	3.15
	PRIME/211		8,800.00	HR	27,720	0	0	0	27,720
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		SMALL TOOLS EXPENDABLE			0.00	0.00	1.54	0.00	1.55
	PRIME/211		8,800.00	HR	0	0	13,596	0	13,596
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		TELEPHONE EXP. INCL. CELL			0.00	0.00	1.13	0.00	1.13
	PRIME/211		17,600.00	HR	0	0	19,941	0	19,941
	* LINE ITEM ASSEMBLY	Factor:352.0000							
01101.01 - 08		INTERNET CONNECTIONS - SERVICE			0.26	0.00	0.00	0.00	0.26
	PRIME/211		70,400.00	HR	18,480	0	0	0	18,480
	* LINE ITEM ASSEMBLY	Factor:1408.0000							
01101.01 - 08		NETWORK / COMMUNICATIONS EQUIP.			1.26	0.00	0.00	0.00	1.26
	PRIME/211		8,800.00	HR	11,088	0	0	0	11,088
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		FIELD RADIOS			2.31	0.00	0.00	0.00	2.31
	PRIME/211		8,800.00	HR	20,328	0	0	0	20,328
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 08		TEMPORARY TOILETS (5)			1.26	0.00	0.00	0.00	1.26
	PRIME/211		17,600.00	HR	22,176	0	0	0	22,176
	* LINE ITEM ASSEMBLY	Factor:352.0000							
01101.01 - 08		PROJECT SIGN			0.00	0.00	1699.50	0.00	1,699.50
	PRIME/211		4.00	HR	0	0	6,798	0	6,798
01101.01 - 08		TEMPORARY LIGHTING & ELEC. HOURLY CHARGES			2.10	0.00	0.00	0.00	2.10
	PRIME/211		8,800.00	HR	18,480	0	0	0	18,480
	* LINE ITEM ASSEMBLY	Factor:176.0000							
01101.01 - 12		TEMPORARY FENCING			1.43	3.66	13.24	0.00	18.33
	PRIME/221	0.053 hrs/unit 32 TOTAL HRS	600.00	LF	857	2,198	7,941	0	10,996
01101.01 - 12		TRUCK ENTRANCES			4725.00	3.66	0.00	0.00	4,728.66
	PRIME/221	0.053 hrs/unit	1.00	HR	4,725	4	0	0	4,729
01101.01 - 12		SILT FENCE			0.00	3.66	1.29	0.00	4.95
	PRIME/221	0.053 hrs/unit 32 TOTAL HRS	600.00	LF	0	2,198	773	0	2,971
01101.01 - 10		SAFETY "GENERAL SIGNAGE"			0.00	0.62	0.02	0.00	0.64
	PRIME/221	0.009 hrs/unit 135 TOTAL HRS	15,000.00	SF	0	9,348	309	0	9,657
01101.01 - 08		SPECIAL SCAFFOLDING "RENTAL"			12.60	0.00	0.00	0.00	12.60
	PRIME/211		600.00	LF	7,560	0	0	0	7,560

CODE SUB/CREW	DESCRIPTION	QTY UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
01101.01 - 08	SPECIAL SCAFFOLDING "SETUP LABOR"		0.00	125.49	0.00	0.00	125.49
PRIME/NoCrew	2.75 hrs/unit 1650 TOTAL HRS	600.00 LF	0	75,292	0	0	75,292
01101.01 - 08	SPECIAL SCAFFOLDING "TAKE DOWN LABOR"		0.00	35.09	0.00	0.00	35.09
PRIME/NoCrew	0.344 hrs/unit 206 TOTAL HRS	600.00 LF	0	21,053	0	0	21,053
01101.01 - 08	FIRE PROTECTION EQUIPMENT		0.16	0.00	0.00	0.00	0.16
PRIME/211		7,500.00 HR	1,181	0	0	0	1,181
* LINE ITEM ASSEMBLY	Factor:150.0000						
01101.01 - 08	TEMP. WATER SERVICES		0.00	0.00	3.61	0.00	3.61
PRIME/211		15,000.00 SF	0	0	54,075	0	54,075
01101.01 - 08	WEATHER PROTECTION MATERIALS		0.00	0.01	0.07	0.00	0.09
PRIME/221	hrs/unit 3 TOTAL HRS	15,000.00 SF	0	217	1,082	0	1,299
01101.01 - 08	TEMP. HEAT/WINTER WEATHER HOURLY CHARGES		0.07	0.00	0.00	0.00	0.07
PRIME/211		4,000.00 HR	294	0	0	0	294
* LINE ITEM ASSEMBLY	Factor:80.0000						
01101.01 - 08	TRASH HAULING		0.00	0.00	3.86	0.00	3.86
PRIME/211		7,500.00 HR	0	0	28,969	0	28,969
* LINE ITEM ASSEMBLY	Factor:150.0000						
01101.01 - 09	MAN / MATERIAL LIFT "RENTAL"		24.15	0.00	0.00	0.00	24.15
PRIME/211		4,224.00 HR	102,010	0	0	0	102,010
01101.01 - 09	MAN / MATERIAL LIFT "DOORS - EXCLOSURES - PLATFORMS"		0.00	0.00	345.05	0.00	345.05
PRIME/211		6.00 HR	0	0	2,070	0	2,070
01101.01 - 09	MAN / MATERIAL LIFT "SET UP"		1890.00	0.00	0.00	0.00	1,890.00
PRIME/211		5.00 HR	9,450	0	0	0	9,450
01101.01 - 09	MAN / MATERIAL LIFT "TAKE DOWN"		1890.00	0.00	0.00	0.00	1,890.00
PRIME/211		5.00 HR	9,450	0	0	0	9,450
01101.01 - 09	MAN / MATERIAL LIFT "OPERATOR"		0.00	71.32	0.00	0.00	71.32
PRIME/211	1 hrs/unit 6000 TOTAL HRS	6,000.00 MH	0	427,933	0	0	427,933
* LINE ITEM ASSEMBLY	Factor:120.0000						
01101.01 - 11	STREET CLEANING		68.25	0.00	0.00	0.00	68.25
PRIME/211		1,500.00 HR	102,375	0	0	0	102,375
01101.01 - 11	PUNCH LIST		0.05	0.16	0.10	0.00	0.32
PRIME/111	0.003 hrs/unit 292 TOTAL HRS	106,682.00 SF	5,601	17,101	10,988	0	33,690
01101.01 - 11	FINAL CLEANING "IN HOUSE FORCES"		0.01	0.09	0.03	0.00	0.13
PRIME/111	0.001 hrs/unit 156 TOTAL HRS	106,682.00 SF	1,120	9,121	3,296	0	13,537
01101.01 - 11	FINAL CLEANING "GLASS"		0.00	0.04	0.02	0.00	0.06
PRIME/111	0.001 hrs/unit 78 TOTAL HRS	106,682.00 SF	0	4,560	2,198	0	6,758
01101.01 - 08	PRINTING (DWGS, O&M, SUBMITTALS)		0.00	0.00	0.77	0.00	0.77
PRIME/211		12,000.00 PGS	0	0	9,270	0	9,270
01101.01 - 11	WARRANTY COSTS		0.00	0.02	0.00	0.00	0.02
PRIME/111	hrs/unit 39 TOTAL HRS	106,682.00 SF	0	2,280	0	0	2,280
01521.32 - 00	EQUIPMENT		0.00	0.00	240086.76	0.00	240,086.76
PRIME/120		1.00 LS	0	0	240,087	0	240,087
01900.00 - 26	CRANES & EXCAVATORS SELF PROPELLED; RT-9100		0.00	142.64	258.47	0.00	401.11
PRIME/211	2 hrs/unit 16000 TOTAL HRS	8,000.00 HR	0	1,141,154	2,067,746	0	3,208,900
02305.25 - 02	MOBIL OR DMOBL/CRANE/CRAWLER-MNTD/OVER 75 TON		0.00	852.38	72.44	0.00	924.82
PRIME/221	12.267 hrs/unit 25 TOTAL HRS	2.00 EA	0	1,705	145	0	1,850
	Subtotal Direct Costs		744,324	1,810,334	2,549,721	0	5,104,379
	Subcontractor Markups		101,354	246,511	347,192	0	695,057
	Prime Contractor Markups		115,155	280,078	394,469	0	789,702
TOTAL MS4008011105 GC EXPENSES		26,446 HRS	960,833	2,336,923	3,291,382	0	6,589,138
50.00 MTH	*Level Unit Cost-->*		*19,216.65*	*46,738.46*	*65,827.64*	*0.00*	*131,782.76*
MS40080011106 INSPECTION REQUIREMENTS	*LEVEL CONTRACTOR ID APPLIED--PRIME*						
01101.01 - 50	WELDING - TESTING & INSPECTION		0.00	71.32	0.00	0.00	71.32
SUB-211/211	1 hrs/unit 1040 TOTAL HRS	1,040.00 MH	0	74,175	0	0	74,175
01101.01 - 50	EXCAVATION TRACKING OBSERVATIONS - ACCOUNTING 2 MEN 18 MONTHS		0.00	71.32	0.00	0.00	71.32
SUB-211/211	1 hrs/unit 3168 TOTAL HRS	3,168.00 MH	0	225,948	0	0	225,948
14505.00 - 55	PCC INSPECTION TECHNICIAN/PER DAY		0.00	71.32	0.00	0.00	71.32
SUB-312/211	1 hrs/unit 1200 TOTAL HRS	1,200.00 MH	0	85,587	0	0	85,587
14505.00 - 55	CMU INSPECTION TECHNICIAN/PER DAY		0.00	71.32	0.00	0.00	71.32
SUB-312/211	1 hrs/unit 765 TOTAL HRS	765.00 MH	0	54,561	0	0	54,561
14505.00 - 55	REBAR INSPECTION TECHNICIAN/PER DAY		0.00	71.32	0.00	0.00	71.32
SUB-312/211	1 hrs/unit 1040 TOTAL HRS	1,040.00 MH	0	74,175	0	0	74,175
14505.00 - 34	MASONRY TESTING/COMPRESSIVE STRENGTH/PER 5 BRICKS/ASTM C 67		0.00	14.80	0.00	0.00	14.80
SUB-422/311	0.2 hrs/unit 30 TOTAL HRS	150.00 EA	0	2,220	0	0	2,220
14505.00 - 19	PCC TESTING/COMPRESSIVE STRENGTH TEST/INCL PICKED UP BY LAB/AVG		0.00	14.80	0.00	0.00	14.80
SUB-422/311	0.2 hrs/unit 90 TOTAL HRS	450.00 EA	0	6,660	0	0	6,660
14505.00 - 42	REINFRCNG STL/TENSILE TEST/#9 TO #11 BAR		0.00	8.08	0.00	0.00	8.08
SUB-511/511	0.12 hrs/unit 6 TOTAL HRS	50.00 EA	0	404	0	0	404
14505.00 - 42	REINFRCNG STL/TENSILE TEST/#14 BAR & LARGER		0.00	8.08	0.00	0.00	8.08
SUB-511/511	0.12 hrs/unit 12 TOTAL HRS	100.00 EA	0	808	0	0	808

CODE	SUB/CREW / DESCRIPTION			QTY UM	MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	Subtotal Direct Costs				0	524,538	0	0	524,538
	Subcontractor Markups				0	7,868	0	0	7,868
	Prime Contractor Markups				0	72,497	0	0	72,497
	TOTAL MS4008011106 INSPECTION REQUIREMENTS			7,351 HRS	0	604,903	0	0	604,903
	MS4008011107 SP & DIV 1 REQUIREMENTS *LEVEL CONTRACTOR ID APPLIED--PRIME*								
01101.01 - 50	MAINTAIN STATION FROM COMPLETION TO REVENUE STATION (ASSUME A 5 MAN CREW FOR 3 MONTH)				17.70	71.32	8.85	0.00	97.87
	PRIME/211	1 hrs/unit	977 TOTAL HRS	977.00 MH	17,293	69,682	8,646	0	95,621
01101.01 - 50	ASSESSMENTS FOR CANCELLED SHUTDOWN WITHIN 5 DAYS				0.00	5705.77	0.00	0.00	5,705.77
	PRIME/211	80 hrs/unit	640 TOTAL HRS	8.00 EA	0	45,646	0	0	45,646
01101.01 - 50	ASSESSMENTS FOR ADDITIONAL SHUTDOWN				2000.00	6846.92	1250.00	0.00	10,096.92
	PRIME/211	96 hrs/unit	768 TOTAL HRS	8.00 EA	16,000	54,775	10,000	0	80,775
01101.01 - 50	ADDED COST FOR CITY PERSONNEL TO RESTORE OH CONTACT SYSTEM				150.00	4279.33	1200.00	0.00	5,629.33
	PRIME/211	60 hrs/unit	300 TOTAL HRS	5.00 EA	750	21,397	6,000	0	28,147
01101.01 - 50	COST FOR MUNI INSPECTOR WHEN MOVING WIRES				0.00	713.22	50.00	0.00	763.22
	PRIME/211	10 hrs/unit	50 TOTAL HRS	5.00 EA	0	3,566	250	0	3,816
01101.01 - 50	PAY 50% OF DRB COSTS				0.00	150.00	0.00	0.00	150.00
	PRIME/GC-1132	1 hrs/unit	1134 TOTAL HRS	1,134.00 MH	0	170,100	0	0	170,100
01101.01 - 50	COST TO ESCROW BID DOCUMENTS				250.00	0.00	0.00	0.00	250.00
	PRIME/211			60.00 MO	15,000	0	0	0	15,000
01101.01 - 50	PAY FOR OFF DUTY POLICE OFFICERS				0.00	74.67	0.00	0.00	74.67
	PRIME/GC-1131	1 hrs/unit	400 TOTAL HRS	400.00 HR	0	29,867	0	0	29,867
	Subtotal Direct Costs				49,043	395,033	24,896	0	468,973
	Subcontractor Markups				6,678	53,791	3,390	0	63,859
	Prime Contractor Markups				7,587	61,116	3,852	0	72,555
	TOTAL MS4008011107 SP & DIV 1 REQUIREMENTS			4,269 HRS	63,308	509,941	32,138	0	605,387
	SUBTOTAL MS40080111 MOSCONE STATION (MS)				1,380,047	11,442,229	2,914,703	0	15,736,979
	MARKUP				*1.267*	*1.277*	*1.285*	*0.000*	*1.278*
	TOTAL MS40080111 MOSCONE STATION (MS)				1,748,999	14,612,859	3,745,138	0	20,106,995

MS50 SYSTEMS

MS5003 TPSS STATIONS

MS5003018011 MEDIUM VOLTAGE SINGLE CONDUCTOR CABLE *LEVEL CONTRACTOR ID APPLIED--PRIME*

PRODUCTIVITY = 0.083 MH/LF

CODE	SUB/CREW / DESCRIPTION			QTY UM	MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
26051.31 - 61	1/C #750KCMIL , EPR 24/5KV CU CABLE				22.00	7.07	0.51	0.00	29.58
	SUB-161/161	0.08 hrs/unit	676 TOTAL HRS	8,448.00 LF	185,856	59,693	4,308	0	249,857
26051.31 - 61	1/C #500KCMIL , EPR 24/5KV CU CABLE				11.88	6.62	0.47	0.00	18.97
	SUB-161/161	0.075 hrs/unit	26 TOTAL HRS	350.00 LF	4,158	2,319	165	0	6,641
26051.31 - 61	#2, 1/C CABLE, 15KV, XLP SHIELDING				3.15	3.98	0.29	0.00	7.41
	SUB-161/161	0.045 hrs/unit	16 TOTAL HRS	365.00 LF	1,150	1,451	105	0	2,706
26051.31 - 62	#2/0, 1/C CABLE, 15KV, XLP SHIELDING (PRIMARY PWR)				3.94	4.24	0.31	0.00	8.49
	SUB-161/161	0.048 hrs/unit	31 TOTAL HRS	650.00 LF	2,559	2,756	201	0	5,516
	Subtotal Direct Costs				193,723	66,218	4,779	0	264,720
	Subcontractor Markups				16,466	993	406	0	17,866
	Prime Contractor Markups				28,621	9,152	706	0	38,479
	TOTAL MS5003018011 MEDIUM VOLTAGE SINGLE CONDUCTOR CABLE			750 HRS	238,811	76,363	5,891	0	321,065
	8,151.00 LF		*Level Unit Cost-->*		*29.30*	*9.37*	*0.72*	*0.00*	*39.39*

NOTE: PRODUCTIVITY = 0.083 MH/LF

MS5003018012 CABLE CONNECTORS *LEVEL CONTRACTOR ID APPLIED--PRIME*

PRODUCTIVITY = 17.138 MH/EA

CODE	SUB/CREW / DESCRIPTION			QTY UM	MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
26051.92 - 51	MULTI-TAP CONNECTOR BLOCK (12 WAY)				2100.00	1513.61	0.42	0.00	3,614.03
	SUB-161/161	17.137 hrs/unit	69 TOTAL HRS	4.00 EA	8,400	6,054	2	0	14,456
	Subtotal Direct Costs				8,400	6,054	2	0	14,456
	Subcontractor Markups				714	91	0	0	805
	Prime Contractor Markups				1,241	837	0	0	2,078
	TOTAL MS5003018012 CABLE CONNECTORS			69 HRS	10,355	6,982	2	0	17,339
	4.00 EA		*Level Unit Cost-->*		*2,588.76*	*1,745.51*	*0.52*	*0.00*	*4,334.79*

NOTE: PRODUCTIVITY = 17.138 MH/EA

MS5003018013 CABLE TERMINATIONS *LEVEL CONTRACTOR ID APPLIED--PRIME*

PRODUCTIVITY = 6.425 MH/EA

CODE	SUB/CREW / DESCRIPTION			QTY UM	MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
26051.93 - 51	5KV CABLE TERMINATION, 1/C - #3/0 - 500KCMIL, INCL TEST				210.00	378.38	27.92	0.00	616.30
	SUB-161/161	4.284 hrs/unit	69 TOTAL HRS	16.00 EA	3,360	6,054	447	0	9,861
26051.93 - 51	5KV CABLE TERMINATION, 1/C - 750KCMIL, INCL TEST				262.50	567.66	41.87	0.00	872.03

PRIME CONTRACTOR SUMMARY REPORT

Project Element: SFMTA - CHINATOWN STATION 100% REV 0

Prime Contractor: PRIME CONTRACTOR

Markup Description	Markup	Total
SFMTA - CHINATOWN STATION 100% REV 0		
Cost to Prime for PRIME PRIME CONTRACTOR		**$174,981,060**
PRIME HOME OFFICE OVERHEAD	**2.500%**	**$4,374,526**
% Applied only to: Labor, Equipment, Material, Other1,		
PRIME PROFIT	**3.500%**	**$6,277,446**
% Applied only to: Labor, Equipment, Material, Other1,		
BOND	**0.800%**	**$1,485,064**
% Applied only to: Labor, Equipment, Material, Other1,		
BUILDERS RISK	**0.350%**	**$653,963**
% Applied only to: Labor, Equipment, Material,		
INSURANCE	**2.100%**	**$3,943,213**
Total Estimate with Prime Contractor Markups	**9.563%**	**$191,715,272**

All codes referenced in Table A-1: "Mitigation Base Cost Calculations" have been highlighted below. The codes and costs were derived at a high level in the estimate folder structure. The supporting values for codes may be arrived at by dividing the highlighted costs below by the prime contractor markup. For example, the cost highlighted for CT200308 below is $19,700,733. To arrive at the direct cost the prime contractor mark up is backed out of the amount as follows:

CT200310: $21,584,802 / ($191,715,272 / $174,981,060) = $19,700,733

Note: The total estimate amount shown on these reports differs from the CTS 100% Engineers Estimate as alterations to the estimate were necessary to provide appropriate backup to the primary mitigation table. All of these number are still accurate and represent the actual dollar amounts contained int he CTS 100% Engineer's Estimate. If the calculation supplied above is used then it may calculate something that is ~$100 off of what is shown in Table A-1 as this calculation is a general application contrary to what is shown in the table which contains exact numbers extracted from the Engineer's Estimate. This is unique to the CTS Engineer's Estimate as the mark ups were applied in a slightly different manner than the other estimates. The reason the total estimate value above is because subcontractors mark up for profit was removed to better identify costs needed to populate Table A-1.

PROJECT: CHINATOWN STATION
PROJECT SITE: SAN FRANCISCO, CA
A/E NAME: SFMTA - DESIGN GROUP
PROJECT SIZE: 1.00LS
CONSTRUCTION FUNDS AVAILABLE, DOLLARS: $250,000,000

ESTIMATOR: HILL
CAT CODE:
UIC:
PROJECT #: CTS-100%
DATE OF ESTIMATE: 2/16/12 REV 0

WBS CODE	DESCRIPTION	COST/WBS BASED ON 1 LS	COST/ WBS UNIT	TOTAL MARKED UP COSTS MATL	LABOR	EQUIP	UNIT COST	TOTAL
	SFMTA - CHINATOWN STATION 100% REV 0, PROJECT TOTALS							**191,715,000**
	*****PROJECT SUBTOTALS****			77,450,215	81,329,249	32,658,672	277,137	191,715,272
BASE BID				**77,450,215**	**81,329,249**	**32,658,672**	**277,137**	**191,715,272**
-CHINATOWN STATION - PACKAGE 1254				**77,450,215**	**81,329,249**	**32,658,672**	**277,137**	**191,715,272**
CT GUIDEWAY & TRACK ELEMENTS				**7,253,991**	**9,683,474**	**5,673,791**	**69,284**	**22,680,541**
CT10	GUIDEWAY UNDERGROUND TUNNEL			7,253,991	9,683,474	5,673,791	69,284	22,680,541
CT1007	GUIDEWAY: UNDERGROUND TUNNEL	522@ 30699.59DY		4,784,225	6,689,648	4,535,965	0	16,009,838
CT100720	GUIDEWAY: UNDERGROUND TUNNEL	522@ 30699.59DY		4,784,225	6,689,648	4,535,965	0	16,009,838
CT1007	STRUCTURAL - FINAL LINING GEOMETRY CROSSOVER CAVERN			1,988,004	2,077,321	348,711	0	4,414,035
CT100731	STRUCTURAL - FINAL LINING GEOMETRY CROSSOVER CAVERN			1,988,004	2,077,321	348,711	0	4,414,035
CT1007	TUNNEL EXCV BY SEM	94@ 24007.10DY		481,762	916,506	789,116	69,284	2,256,668
CT100797	TUNNEL EXCV BY SEM	94@ 24007.10DY		481,762	916,506	789,116	69,284	2,256,668
CT STATIONS, STOPS, TERMINALS, INTERMODAL (NUMBER)		**106586@ 1128.13B-SF**		**52,049,384**	**47,541,596**	**20,538,468**	**113,374**	**120,242,822**
CT20	UNDERGROUND STATION, STOP, SHELTER, MALL, TERMINAL, PLATFORM	106586@ 1074.26B-SF		49,549,991	45,393,709	19,444,472	113,374	114,501,545
CT2003	EXCAVATION & GROUND SUPPORT - HEADHOUSE	106586@ 262.97B-SF		12,071,479	11,182,955	4,774,210	0	28,028,644
CT200306	MASS EXCAVATION	49938@ 17.03CY		305,575	522,766	22,103	0	850,444
CT200306	WORKING SLABS	13313@ 3.73SF		25,389	20,621	3,601	0	49,611
CT200306	SHORING	7498@ 879.85LF		3,686,643	2,869,393	41,062	0	6,597,099
CT200306	SLURRY WALLS	75744@ 261.52SF		7,710,717	7,471,928	4,626,271	0	19,808,916
CT200306	OTHER WALLS	730@ 350.94LF		101,084	113,079	42,027	0	256,190
CT200306	INSTRUMENTATION			242,071	185,168	39,145	0	466,384
CT2003	EXCAVATION & GROUND SUPPORT - CROSS CUT CAVERN			1,724,834	2,447,473	1,541,559	44,090	5,757,956
CT200308	EXCAVATION & GROUND SUPPORT - CROSS CUT CAVERN			1,724,834	2,447,473	1,541,559	44,090	5,757,956
CT2003	EXCAVATION & GROUND SUPPORT - PLATFORM CAVERN			7,105,632	8,660,854	5,749,032	69,284	21,584,802
CT200310	EXCAVATION & GROUND SUPPORT - PLATFORM CAVERN			7,105,632	8,660,854	5,749,032	69,284	21,584,802
CT2003	EXCAVATION & GROUND SUPPORT - NORTH EMERGENCY EXIT			115,387	179,759	100,505	0	395,651
CT200312	EXCAVATION & GROUND SUPPORT - NORTH EMERGENCY EXIT			115,387	179,759	100,505	0	395,651
CT2003	EXCAVATION & GROUND SUPPORT - NORTH EMERGENCY EXIT TUNNEL			108,249	424,612	247,515	0	780,376
CT200313	EXCAVATION & GROUND SUPPORT - NORTH EMERGENCY EXIT TUNNEL			108,249	424,612	247,515	0	780,376
CT2003	EXCAVATION & GROUND SUPPORT - SOUTH EMERGENCY EXIT			18,291	84,273	48,774	0	151,338
CT200314	EXCAVATION & GROUND SUPPORT - SOUTH EMERGENCY EXIT			18,291	84,273	48,774	0	151,338
CT2003	STRUCTURAL - FINAL LINING GEOMETRY CROSS CUT CAVERN			423,269	440,934	75,646	0	939,848
CT200330	STRUCTURAL - FINAL LINING GEOMETRY CROSS CUT CAVERN			423,269	440,934	75,646	0	939,848
CT2003	STRUCTURAL - FINAL LINING GEOMETRY PLATFORM CAVERN			2,070,207	2,394,837	383,451	0	4,848,495
CT200332	STRUCTURAL - FINAL LINING GEOMETRY PLATFORM CAVERN			2,070,207	2,394,837	383,451	0	4,848,495
CT2003	STRUCTURAL - FINAL LINING NORTH EMERGENCY EXIT SHAFT			117,593	154,308	26,333	0	298,234
CT200334	STRUCTURAL - FINAL LINING NORTH EMERGENCY EXIT SHAFT			117,593	154,308	26,333	0	298,234
CT2003	STRUCTURAL - FINAL LINING NORTH EMERGENCY EXIT TUNNEL			54,416	88,892	12,881	0	156,189
CT200335	STRUCTURAL - FINAL LINING NORTH EMERGENCY EXIT TUNNEL			54,416	88,892	12,881	0	156,189
CT2003	STRUCTURAL - FINAL LINING GEOMETRY SOUTH EMERGENCY EXIT			14,202	22,904	3,345	0	40,451
CT200336	STRUCTURAL - FINAL LINING GEOMETRY SOUTH EMERGENCY EXIT			14,202	22,904	3,345	0	40,451
CT2003	STRUCTURAL - HEADHOUSE ROOF LEVEL	6625@ 126.26SF		316,630	456,098	63,759	0	836,488
CT200338	CONCRETE SLABS	824@ 56.28SF		18,878	21,754	5,740	0	46,372
CT200338	CONCRETE BEAMS	204@ 334.22LF		27,010	30,119	11,052	0	68,181

PROJECT: CHINATOWN STATION
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ESTIMATOR: HILL
CAT CODE:
UIC:
PROJECT #: CTS-100%
DATE OF ESTIMATE: 2/16/12 REV 0

WBS CODE	DESCRIPTION	COST/WBS BASED ON 1 LS	COST/ WBS UNIT	TOTAL MARKED UP COSTS MATL	LABOR	EQUIP	UNIT COST	TOTAL
CT200338	CONCRETE WALLS		4924@ 65.65SF	108,747	173,304	41,187	0	323,239
CT200338	STEEL BEAMS		975@ 165.55LF	138,154	20,463	2,793	0	161,410
CT200338	SLAB ON STEEL DECK		3232@ 73.42SF	23,840	210,458	2,987	0	237,285
CT2003	STRUCTURAL - HEADHOUSE SURFACE LEVEL		8780@ 286.03SF	1,015,664	1,105,737	389,927	0	2,511,329
CT200340	CONCRETE SLABS		8359@ 85.80SF	319,498	278,472	119,250	0	717,220
CT200340	CONCRETE WALLS		6391@ 63.27SF	137,597	216,056	50,717	0	404,370
CT200340	CONCRETE BEAMS		862@ 1222.61LF	423,481	424,560	205,850	0	1,053,891
CT200340	CONCRETE COLUMNS		92@ 466.97VLF	12,641	23,202	7,119	0	42,962
CT200340	STEEL COLUMNS		250@ 283.59LF	60,683	8,988	1,227	0	70,898
CT200340	STEEL BEAMS		253@ 185.96LF	40,268	5,965	814	0	47,047
CT200340	SLAB ON STEEL DECK		3612@ 48.43SF	21,496	148,495	4,951	0	174,942
CT2003	STRUCTURAL - HEADHOUSE UPPER MEZZANINE LEVEL		9347@ 278.15SF	1,451,884	857,128	290,851	0	2,599,862
CT200343	CONCRETE SLABS		7130@ 47.79SF	145,715	145,067	49,980	0	340,762
CT200343	CONCRETE WALLS		6946@ 73.42SF	228,197	229,033	52,723	0	509,953
CT200343	CONCRETE BEAMS		846@ 1056.25LF	363,310	361,233	169,048	0	893,591
CT200343	STEEL BEAMS		344@ 2393.69LF	704,788	104,394	14,247	0	823,428
CT200343	CONCRETE COLUMNS		38@ 845.45VLF	9,873	17,401	4,853	0	32,127
CT2003	STRUCTURAL - HEADHOUSE LOWER MEZZANINE LEVEL		9959@ 229.39SF	1,037,116	918,093	329,269	0	2,284,478
CT200344	CONCRETE SLABS		7331@ 51.99SF	162,831	163,089	55,239	0	381,159
CT200344	CONCRETE WALLS		8144@ 91.94SF	345,164	326,119	77,508	0	748,791
CT200344	CONCRETE BEAMS		853@ 1076.29LF	371,057	369,854	177,168	0	918,078
CT200344	CONCRETE COLUMNS		80@ 1017.59VLF	25,361	39,375	16,671	0	81,407
CT200344	STEEL BEAMS		154@ 1006.77LF	132,704	19,656	2,683	0	155,042
CT2003	STRUCTURAL - HEADHOUSE INTERMEDIATE LEVEL		7433@ 348.48SF	1,263,441	946,105	380,739	0	2,590,285
CT200345	CONCRETE SLABS		4644@ 68.08SF	124,760	120,036	71,383	0	316,178
CT200345	CONCRETE WALLS		7260@ 159.68SF	527,271	464,036	167,940	0	1,159,247
CT200345	CONCRETE BEAMS		639@ 1003.67LF	265,619	261,930	113,798	0	641,347
CT200345	CONCRETE COLUMNS		72@ 1308.10VLF	29,346	45,317	19,519	0	94,183
CT200345	STEEL BEAMS		267@ 1420.71LF	316,446	54,785	8,098	0	379,329
CT2003	STRUCTURAL - HEADHOUSE CONCOURSE LEVEL		12139@ 207.64SF	1,055,017	1,031,174	434,301	0	2,520,492
CT200346	CONCRETE SLABS		9607@ 49.18SF	201,035	198,659	72,733	0	472,428
CT200346	CONCRETE WALLS		6847@ 119.32SF	354,986	336,673	125,301	0	816,960
CT200346	CONCRETE BEAMS		1075@ 1033.92LF	447,863	447,297	216,307	0	1,111,467
CT200346	CONCRETE COLUMNS		72@ 1308.10VLF	29,346	45,317	19,519	0	94,183
CT200346	STEEL BEAMS		94@ 184.01LF	14,804	2,193	299	0	17,297
CT200346	STEEL POSTS			6,983	1,034	141	0	8,159
CT2003	STRUCTURAL - HEADHOUSE PLATFORM LEVEL		12375@ 165.51SF	848,606	851,240	348,342	0	2,048,187
CT200348	CONCRETE SLABS		10776@ 47.56SF	217,885	216,016	78,626	0	512,527
CT200348	CONCRETE WALL		6109@ 48.34SF	123,936	143,589	27,810	0	295,335
CT200348	CONCRETE BEAMS		1040@ 1122.14LF	483,052	456,133	227,843	0	1,167,028
CT200348	CONCRETE COLUMNS		54@ 1357.36VLF	23,733	35,501	14,063	0	73,298
CT2003	STRUCTURAL - HEADHOUSE/STATION UNDER PLATFORM LEVEL		12241@ 528.61SF	2,640,783	2,256,566	1,573,349	0	6,470,698
CT200350	CONCRETE SLABS		31556@ 166.94SF	2,194,865	1,656,874	1,416,173	0	5,267,912
CT200350	CONCRETE WALLS		16130@ 67.51SF	409,893	543,800	135,178	0	1,088,870
CT200350	CONCRETE COLUMNS		95@ 1179.84VLF	33,954	55,585	21,957	0	111,495
CT200350	STEEL POSTS			2,072	307	42	0	2,421
CT2003	STRUCTURAL - STATION CONCOURSE LEVEL		7488@ 120.87SF	347,421	414,762	142,886	0	905,069
CT200352	CONCRETE BEAMS		463@ 826.53LF	151,400	156,910	74,372	0	382,682
CT200352	CONCRETE WALLS		5239@ 64.00SF	108,652	183,099	43,531	0	335,281
CT200352	CONCRETE SLABS		3548@ 46.91SF	69,682	72,134	24,626	0	166,442
CT200352	STEEL BEAMS		80@ 110.59LF	7,573	1,122	153	0	8,847
CT200352	STEEL COLUMNS		134@ 88.19LF	10,114	1,498	204	0	11,817
CT2003	STRUCTURAL - STATION PLATFORM LEVEL		20199@ 33.08SF	242,899	326,075	99,255	0	668,229
CT200354	CONCRETE SLABS		6528@ 42.36SF	107,871	125,779	42,870	0	276,520
CT200354	CONCRETE BEAMS		64@ 806.94LF	18,503	19,658	13,483	0	51,644
CT200354	CONCRETE WALLS		5148@ 64.06SF	107,700	179,332	42,724	0	329,755
CT200354	STEEL COLUMNS		113@ 64.37LF	6,226	922	126	0	7,274
CT200354	STEEL POSTS			2,599	385	53	0	3,036
CT2003	ARCHITECTURAL - HEADHOUSE ROOF LEVEL		6625@ 33.94SF	84,858	119,157	20,810	0	224,825
CT200355	SPECIALTIES		78@ 22.72SF	498	980	294	0	1,772
CT200355	GLAZING		223@ 70.66SF	5,185	9,544	1,028	0	15,757
CT200355	EXTERIOR CLOSURES		5@ 3948.55EA	9,843	8,032	1,868	0	19,743
CT200355	ROOFING		3946@ 14.73SF	26,702	24,656	6,774	0	58,132
CT200355	METALS		6625@ 19.54SF	42,630	75,945	10,846	0	129,420
CT2003	ARCHITECTURAL - HEADHOUSE SURFACE LEVEL		8780@ 124.58SF	519,189	423,887	150,775	0	1,093,851
CT200356	SIGNAGE & DIRECTORIES		7@ 5650.83EA	29,358	2,440	7,758	0	39,556
CT200356	BIRD CONTROL DEVICES		8780@ 0.70SF	2,556	2,359	1,211	0	6,126
CT200356	SITE EQUIPMENT		8780@ 0.21SF	767	708	363	0	1,838

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DATE OF ESTIMATE: 2/16/12 REV 0

WBS CODE	DESCRIPTION	COST/WBS BASED ON 1 LS	COST/ WBS UNIT	TOTAL MARKED UP COSTS MATL	LABOR	EQUIP	UNIT COST	TOTAL
CT200356	TREES			797	301	93	0	1,191
CT200356	FLOOR FINISHES		6602@ 10.80SF	29,382	31,391	10,542	0	71,315
CT200356	CEILING FINISHES		1429@ 3.08SF	1,874	1,854	670	0	4,397
CT200356	WALL FINISHES		5490@ 11.67SF	25,792	26,108	12,193	0	64,093
CT200356	PARTITIONS		460@ 31.46SF	8,205	4,934	1,332	0	14,472
CT200356	DOORS		13@ 10136.13EA	57,748	60,292	13,730	0	131,770
CT200356	EMERGENCY HATCHES		2@ 12113.88EA	10,347	9,077	4,804	0	24,228
CT200356	ROOFING		2296@ 4.54SF	4,668	5,305	443	0	10,416
CT200356	METALS		8780@ 0.76SF	4,819	1,415	440	0	6,674
CT200356	GLAZING		5911@ 91.49SF	266,723	190,751	83,324	0	540,797
CT200356	ARTWORK COORDINATION			66,226	71,974	12,357	0	150,556
CT200356	INTUMESCENT PAINT/FIREPROOFING			9,927	14,980	1,515	0	26,422
	*** *PRODUCTIVITY = 475 SF/DAY*							
CT2003	ARCHITECTURAL - HEADHOUSE UPPER MEZZANINE LEVEL		9347@ 168.07SF	623,113	780,838	166,999	0	1,570,950
CT200357	SIGNAGE & DIRECTORIES			8,548	1,168	2,316	0	12,032
CT200357	FLOOR FINISHES		4230@ 15.66SF	28,357	25,642	12,237	0	66,236
CT200357	CEILING FINISHES		6010@ 41.85SF	107,783	94,204	49,527	0	251,514
CT200357	WALL FINISHES		12326@ 3.32SF	17,484	16,605	6,874	0	40,962
CT200357	DOORS		12@ 7689.30EA	42,269	41,100	8,903	0	92,272
CT200357	CMU WALLS		9028@ 40.17SF	145,515	192,266	24,874	0	362,655
CT200357	GLAZING		875@ 160.23SF	64,893	52,115	23,193	0	140,201
CT200357	INTUMESCENT PAINT/FIREPROOFING			208,263	314,285	31,790	0	554,338
	*** *PRODUCTIVITY = 475 SF/DAY*							
CT200357	ARTWORK COORDINATION			0	43,455	7,285	0	50,740
CT2003	ARCHITECTURAL - HEADHOUSE LOWER MEZZANINE LEVEL		9959@ 75.66SF	319,275	354,253	79,989	0	753,517
CT200359	FLOOR FINISHES		4337@ 4.75SF	12,618	6,400	1,599	0	20,617
CT200359	CEILING FINISHES		3355@ 18.34SF	26,156	23,492	11,869	0	61,517
CT200359	WALL FINISHES		18204@ 4.60SF	35,321	32,756	15,645	0	83,722
CT200359	DOORS		14@ 6609.63EA	43,084	40,850	8,601	0	92,535
CT200359	CMU WALLS		10835@ 39.90SF	174,866	227,583	29,901	0	432,350
CT200359	GLAZING		447@ 133.63SF	25,544	22,338	11,848	0	59,730
CT200359	SIGNAGE & DIRECTORIES			1,687	834	526	0	3,047
CT2003	ARCHITECTURAL - HEADHOUSE CONCOURSE LEVEL		12139@ 163.14SF	816,554	888,242	275,612	0	1,980,408
CT200360	SIGNAGE & DIRECTORIES		6@ 10300.05EA	45,692	3,988	12,121	0	61,800
CT200360	FLOOR FINISHES		8269@ 32.23SF	115,021	102,255	49,207	0	266,483
CT200360	CEILING FINISHES		5357@ 37.27SF	85,291	75,076	39,273	0	199,641
CT200360	WALL FINISHES		32108@ 14.30SF	187,914	190,774	80,397	0	459,086
CT200360	DOORS		23@ 6699.83EA	69,368	70,379	14,349	0	154,096
CT200360	CMU WALLS		13505@ 36.46SF	191,827	265,375	35,141	0	492,342
CT200360	SPECIALTIES		28@ 391.16EA	8,186	2,545	222	0	10,952
CT200360	GLAZING		1050@ 158.82SF	76,923	62,003	27,831	0	166,757
CT200360	METALS		12139@ 0.44SF	2,962	1,970	444	0	5,375
CT200360	FURNISHINGS		31@ 176.42LF	3,007	1,913	549	0	5,469
CT200360	INTUMESCENT PAINT/FIREPROOFING			30,364	45,821	4,635	0	80,819
	*** *PRODUCTIVITY = 475 SF/DAY*							
CT200360	ARTWORK COORDINATION			0	66,143	11,443	0	77,586
CT2003	ARCHITECTURAL - STATION CONCOURSE LEVEL		7488@ 253.75SF	866,305	694,641	339,104	0	1,900,050
CT200362	SIGNAGE & DIRECTORIES		8@ 5107.52EA	30,592	2,206	8,062	0	40,860
CT200362	FLOOR FINISHES		3954@ 33.45SF	55,923	50,845	25,500	0	132,268
CT200362	DOORS			4,929	4,990	995	0	10,913
CT200362	CEILING FINISHES		47358@ 27.87SF	583,565	489,224	246,981	0	1,319,770
CT200362	CMU WALLS		655@ 32.34SF	9,190	10,283	1,708	0	21,181
CT200362	WALL FINISHES		10596@ 3.19SF	11,552	18,275	3,948	0	33,775
CT200362	GLAZING		1832@ 142.04SF	117,390	95,123	47,703	0	260,215
CT200362	FURNISHINGS		64@ 262.35LF	7,804	7,872	1,028	0	16,704
CT200362	METALS		317@ 198.51LF	44,324	15,586	3,017	0	62,927
CT200362	SPECIALTIES			1,035	238	162	0	1,435
CT2003	ARCHITECTURAL - HEADHOUSE PLATFORM LEVEL		12375@ 33.39SF	172,104	205,745	35,372	0	413,221
CT200364	FLOOR FINISHES		9824@ 0.96SF	4,247	4,168	979	0	9,395
CT200364	DOORS		9@ 13463.16EA	55,967	53,863	11,339	0	121,168
CT200364	CEILING FINISHES		12862@ 2.48SF	13,642	13,775	4,474	0	31,892
CT200364	WALL FINISHES		20138@ 1.35SF	11,532	12,157	3,426	0	27,115
CT200364	CMU WALLS		5010@ 44.24SF	85,592	121,226	14,803	0	221,621
CT200364	SIGNAGE & DIRECTORIES			1,125	556	350	0	2,031
CT2003	ARCHITECTURAL - STATION PLATFORM LEVEL		20199@ 101.91SF	1,035,500	724,111	298,938	0	2,058,549
CT200366	SIGNAGE & DIRECTORIES			297,836	19,564	78,155	0	395,555
CT200366	KIOSKS		4@ 11979.87EA	20,105	18,331	9,484	0	47,919

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WBS CODE	DESCRIPTION	COST/WBS BASED ON 1 LS	COST/ WBS UNIT	TOTAL MARKED UP COSTS MATL	LABOR	EQUIP	UNIT COST	TOTAL
CT200366	FLOOR FINISHES		6225@ 40.67SF	112,809	101,132	39,216	0	253,157
CT200366	CEILING FINISHES		3422@ 35.57SF	53,231	45,311	23,194	0	121,736
CT200366	WALL FINISHES		11151@ 1.93SF	9,050	9,928	2,502	0	21,480
CT200366	DOORS		14@ 7161.85EA	45,994	44,806	9,466	0	100,266
CT200366	CMU WALLS		2969@ 35.04SF	38,533	57,924	7,588	0	104,045
CT200366	METALS		20199@ 8.82SF	90,612	75,680	11,875	0	178,167
CT200366	SPECIALTIES		16@ 303.14EA	3,499	1,243	108	0	4,850
CT200366	GLAZING		621@ 133.63SF	35,487	31,034	16,460	0	82,981
CT200366	FURNISHINGS		13@ 28.52LF	246	115	10	0	371
CT200366	SMOKE EVACUATION CURTAIN			257,915	197,952	78,617	0	534,483
CT200366	ARTWORK COORDINATION			70,185	121,090	22,264	0	213,539
CT2003	ARCHITECTURAL - UNDER PLATFORM LEVEL		17355@ 17.08SF	135,216	133,505	27,669	0	296,390
CT200368	FLOOR FINISHES		8184@ 0.59SF	2,039	1,845	964	0	4,848
CT200368	CEILING FINISHES		13381@ 5.98SF	37,957	33,695	8,317	0	79,969
CT200368	WALL FINISHES		14323@ 1.14SF	7,140	8,077	1,102	0	16,320
CT200368	DOORS		5@ 13560.98EA	33,909	26,196	7,699	0	67,805
CT200368	CMU WALLS		3292@ 37.68SF	51,922	63,104	9,008	0	124,034
CT200368	SIGNAGE & DIRECTORIES			2,249	587	578	0	3,414
CT2003	ARCHITECTURAL - HEADHOUSE STAIRS & LANDING		5361@ 381.32SF	1,567,579	452,418	24,340	0	2,044,337
CT200372	STAIRS		527@ 2364.55RISR	862,181	369,158	14,780	0	1,246,119
CT200372	STAIR FINISHES		5361@ 33.81SF	156,818	21,263	3,167	0	181,248
CT200372	RAILING		2300@ 262.98LF	543,410	57,461	3,992	0	604,863
CT200372	EMERGENCY HATCH			5,170	4,536	2,400	0	12,106
CT2003	MECHANICAL - PLUMBING		106586@ 6.95B-SF	360,142	346,187	34,228	0	740,557
CT200378	MECHANICAL - PLUMBING		106586@ 6.95B-SF	360,142	346,187	34,228	0	740,557
CT2003	MECHANICAL - FIRE PROTECTION		106586@ 19.20B-SF	847,274	943,017	255,676	0	2,045,967
CT200379	MECHANICAL - FIRE PROTECTION		106586@ 19.20B-SF	847,274	943,017	255,676	0	2,045,967
CT2003	MECHANICAL - HVAC & EMERGENCY VENTILATION		106586@ 60.45B-SF	4,420,293	1,577,283	446,053	0	6,443,629
CT200380	MECHANICAL - HVAC & EMERGENCY VENTILATION		106586@ 60.45B-SF	4,420,293	1,577,283	446,053	0	6,443,629
CT2003	ELECTRICAL - LIGHTING		106586@ 7.88B-SF	287,508	504,685	47,500	0	839,693
CT200382	ELECTRICAL - LIGHTING		106586@ 7.88B-SF	287,508	504,685	47,500	0	839,693
CT2003	ELECTRICAL - POWER DISTRIBUTION		106586@ 53.28B-SF	3,452,061	2,000,960	225,476	0	5,678,497
CT200383	ELECTRICAL - POWER DISTRIBUTION		106586@ 53.28B-SF	3,452,061	2,000,960	225,476	0	5,678,497
CT20	ELEVATORS, ESCALATORS		10@ 574127.65EA	2,499,393	2,147,887	1,093,996	0	5,741,276
CT2007	CONVEYING - ELEVATORS / ESCALATORS		10@ 574127.65EA	2,499,393	2,147,887	1,093,996	0	5,741,276
CT200776	ELEVATORS		4@ 386919.70EA	713,277	564,455	269,947	0	1,547,679
CT200776	ESCALATORS		6@ 698932.94EA	1,786,116	1,583,433	824,049	0	4,193,598
CT	**SITEWORK & SPECIAL CONDITIONS**		**14775@ 2639.75SF**	**11,394,837**	**21,380,316**	**6,132,664**	**94,478**	**39,002,296**
CT40	DEMOLITION, CLEARING, EARTHWORK		14775@ 22.89SF	63,800	211,216	63,158	0	338,174
CT4001	CIVILWORK		14775@ 22.89SF	63,800	211,216	63,158	0	338,174
CT400102	SELECTIVE DEMOLITION		14775@ 10.10SF	13,289	89,793	46,119	0	149,201
CT400102	BUILDING DEMOLITION		225710@ 0.84CF	50,511	121,423	17,038	0	188,973
CT40	SITE UTILITIES, UTILITY RELOCATION		14775@ 151.79SF	814,288	1,221,432	206,966	0	2,242,686
CT4002	CIVILWORK		14775@ 151.79SF	814,288	1,221,432	206,966	0	2,242,686
CT400202	UTILITY INSTALLATION		1850@ 629.05LF	434,726	628,140	100,554	0	1,163,419
CT400202	UTILITY REMOVAL		331@ 942.16LF	119,592	137,107	55,155	0	311,854
CT400202	UTILITY ABANDONMENT		698@ 213.75LF	27,765	107,029	14,401	0	149,196
CT400202	JOINT TRENCH			129,874	242,528	20,520	0	392,922
CT400202	ROADS & SIDEWALKS		9@ 1684.25EA	6,097	6,183	2,878	0	15,158
CT400202	DEWATERING		1890@ 21.84LF	0	39,851	1,419	0	41,270
CT400202	ASPHALT PAVING		477@ 55.34SY	4,631	19,575	2,191	0	26,397
CT400202	UTILITY SERVICE DEMOLITION		7@ 1643.13EA	4,827	4,396	2,279	0	11,502
CT400202	SELECTIVE DEMOLITION, PIPE			0	378	26	0	404
CT400202	WATER UTILITIES DISTRIBUTION		14775@ 3.49SF	39,189	11,039	1,276	0	51,505
CT400202	AWSS SYSTEM		14775@ 4.81SF	45,763	21,654	3,584	0	71,001
CT400202	ELECTRIC UNDERGROUND		95@ 84.83LF	1,823	3,553	2,683	0	8,059
CT40	HAZ. MAT'L, CONTAM'D SOIL REMOVAL/MITIGATION, GROUND WATER TREATMENTS		14775@ 13.09SF	80,974	74,262	38,185	0	193,421
CT4003	EXCAVATION & GROUND SUPPORT - HEADHOUSE			60,755	55,665	28,546	0	144,966
CT400306	DISPOSAL		1090@ 133.00TON	60,755	55,665	28,546	0	144,966
CT4003	EXCAVATION & GROUND SUPPORT - CROSS CUT CAVERN			3,507	3,226	1,672	0	8,405
CT400308	DISPOSAL		17@ 494.44EA	3,507	3,226	1,672	0	8,405
CT4003	EXCAVATION & GROUND SUPPORT - PLATFORM CAVERN			9,697	8,919	4,623	0	23,239
CT400310	DISPOSAL		47@ 494.44EA	9,697	8,919	4,623	0	23,239
CT4003	TUNNEL WORK - CROSSOVER CAVERN			7,015	6,452	3,344	0	16,811
CT400320	DISPOSAL		34@ 494.44EA	7,015	6,452	3,344	0	16,811
CT40	ENVIRONMENTAL MITIGATION WETLANDS HISTORIC ARCHEOLOGIC		14775@ 33.30SF	206,313	188,885	96,841	0	492,039
CT4004	CHINATOWN STATION			206,313	188,885	96,841	0	492,039

PROJECT: CHINATOWN STATION
PROJECT SITE: SAN FRANCISCO, CA
A/E NAME: SFMTA - DESIGN GROUP
PROJECT SIZE: 1.00LS
CONSTRUCTION FUNDS AVAILABLE, DOLLARS: $250,000,000

ESTIMATOR: HILL
CAT CODE:
UIC:
PROJECT #: CTS-100%
DATE OF ESTIMATE: 2/16/12 REV 0

WBS CODE	DESCRIPTION	COST/WBS BASED ON 1 LS	COST/ WBS UNIT	TOTAL MARKED UP COSTS MATL	LABOR	EQUIP	UNIT COST	TOTAL
CT400400	GENERAL			206,313	188,885	96,841	0	492,039
CT40	PEDESTRIAN / BIKE ACCESS - LANDSCAPING		14775@ 9.44SF	52,494	71,872	15,124	0	139,491
CT4006	STREET RESTORATION		4588@ 13.06SF	30,342	21,930	7,634	0	59,906
CT400695	CONCRETE PAVEMENT		4588@ 13.06SF	30,342	21,930	7,634	0	59,906
CT4006	STRUCTURES		159@ 500.53LF	22,153	49,942	7,490	0	79,584
CT400698	STRUCTURES		159@ 500.53LF	22,153	49,942	7,490	0	79,584
CT40	AUTO,BUS, VAN ACCESSWAYS INCL ROADS & PKG LOTS		14775@ 119.73SF	326,872	500,629	941,500	0	1,769,001
CT4007	STREET RESTORATION		9167@ 192.97SF	326,872	500,629	941,500	0	1,769,001
CT400795	STREET LIGHTING			14,653	16,998	5,745	0	37,395
CT400795	ADJUSTMENT OF CITY-OWNED FRAMES & CASTING		15@ 1457.92EA	13,290	6,995	1,583	0	21,869
CT400795	CONCRETE PAVEMENT		9167@ 12.78SF	108,173	7,841	1,148	0	117,162
CT400795	CONCRETE CURB & GUTTER		643@ 24.53LF	7,498	7,599	673	0	15,770
CT400795	TRAFFIC SIGNALS			180,050	459,454	932,206	0	1,571,711
CT400795	M-SF CONTROLLER			3,207	1,742	144	0	5,094
CT40	TEMPORARY FACILITIES		14775@ 2289.51SF	9,850,096	19,112,019	4,770,890	94,478	33,827,484
CT4008	CHINATOWN STATION		14775@ 2289.51SF	9,850,096	19,112,019	4,770,890	94,478	33,827,484
CT400800	TRAFFIC CONTROL		14775@ 83.72SF	298,398	917,359	21,201	0	1,236,959
CT400800	PROJECT MANAGEMENT & FIELD SUPERVISION		14775@ 1819.14SF	9,034,272	15,368,129	2,380,853	94,478	26,877,732
CT400800	OVERHEAD TRACTION POWER		15@ 8750.85EA	53,973	51,779	25,510	0	131,263
CT400800	TEMPORARY CONSTRUCTION		14775@ 25.90SF	94,820	228,948	58,913	0	382,680
CT400800	GC EXPENSES		59@ 57271.74MTH	303,459	795,525	2,251,412	0	3,350,397
CT400800	SP & DIV 1 REQUIREMENTS			65,173	472,823	33,001	0	570,996
CT400800	INSPECTION REQUIREMENTS			0	1,277,457	0	0	1,277,457
CT	**SYSTEMS**			**6,752,002**	**2,723,863**	**313,748**	**0**	**9,789,614**
CT50	TPSS STATIONS			4,254,767	824,217	108,406	0	5,187,389
CT5003	ELECTRICAL - TRACTION POWER			4,254,767	824,217	108,406	0	5,187,389
CT500384	ELECTRICAL - TRACTION POWER			4,254,767	824,217	108,406	0	5,187,389
CT50	COMMUNICATIONS			2,476,417	1,863,322	202,244	0	4,541,983
CT5005	COMMUNICATIONS			2,476,417	1,863,322	202,244	0	4,541,983
CT500501	COMMUNICATIONS - ACCESS CONTROL & CCTV			1,261,476	648,033	72,525	0	1,982,034
CT500501	COMMUNICATIONS - TELEPHONE & RADIO SYSTEMS			729,738	662,318	71,943	0	1,463,999
CT500501	COMMUNICATIONS - FIRE ALARM SYSTEMS			257,194	360,552	39,273	0	657,019
CT500501	COMMUNICATIONS - PUBLIC ADDRESS			228,009	192,420	18,503	0	438,932
CT50	FARE COLLECTION SYSTEM			20,819	36,324	3,099	0	60,241
CT5006	FARE COLLECTION			20,819	36,324	3,099	0	60,241
CT500687	FARE COLLECTION			20,819	36,324	3,099	0	60,241

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	SUB-211/211	1.08 hrs/unit 13 TOTAL HRS	12.00	EA	932	924	438	0	2,294
		NOTE: DAILY PRODUCTIVITY = 74 EA/DAY							
01552.61 - 53		TEMPORARY BARRIER (TYPE K)			50.00	59.70	23.37	0.00	133.07
	SUB-211/211	0.837 hrs/unit 80 TOTAL HRS	95.00	lf	4,750	5,671	2,220	0	12,641
		NOTE: DAILY PRODUCTIVITY = 95.6 LF/DAY							
01101.01 - 12		TEMPORARY FENCING			1.43	3.66	13.23	0.00	18.33
	SUB-221/221	0.053 hrs/unit 22 TOTAL HRS	417.00	LF	595	1,528	5,519	0	7,643
		NOTE: DAILY PRODUCTIVITY = 1660 LF/DAY							
01552.61 - 43		FLASHING BEACON (PORTABLE)			500.15	387.54	0.00	0.00	887.69
	SUB-120/120	5.348 hrs/unit 5 TOTAL HRS	1.00	EA	500	388	0	0	888
		NOTE: DAILY PRODUCTIVITY = 6 EA/DAY							
01107.70 - 00		CONTROL MONUMENT			5250.00	499.62	160.43	0.00	5,910.05
	SUB-120/120	6.895 hrs/unit 283 TOTAL HRS	41.00	EA	215,250	20,484	6,578	0	242,312
		NOTE: DAILY PRODUCTIVITY = 4.6 EA/DAY							
01552.60 - 41		TRAFFIC SUPERVISOR PROVIDED BY TRAFFIC SUBCONTRACTOR			0.00	56.89	0.00	0.00	56.89
	SUB-120/120	0.785 hrs/unit 3591 TOTAL HRS	4,575.00	HR	0	260,254	0	0	260,254
01552.60 - 51		SF PARKING & TRAFFIC CONTROL OFFICER			0.00	62.03	0.00	0.00	62.03
	SUB-120/120	0.856 hrs/unit 3595 TOTAL HRS	4,200.00	HR	0	260,531	0	0	260,531
01552.60 - 61		OFF DUTY SFPD UNIFORM OFFICER			0.00	87.61	0.00	0.00	87.61
	SUB-120/120	1.209 hrs/unit 1028 TOTAL HRS	850.00	HR	0	74,470	0	0	74,470
01552.60 - 71		TRAFFIC CONTROL CREW			0.00	52.06	0.00	0.00	52.07
	SUB-211/211	0.73 hrs/unit 1679 TOTAL HRS	2,300.00	HR	0	119,750	0	0	119,750
		Subtotal Direct Costs			224,550	746,502	15,943	0	986,995
		Subcontractor Markups			47,801	90,780	3,407	0	141,988
		Prime Contractor Markups			26,048	80,078	1,851	0	107,976
		TOTAL CT4008001101 TRAFFIC CONTROL	10,331	HRS	298,398	917,359	21,201	0	1,236,959
		CT40080012O1 PROJECT MANAGEMENT & FIELD SUPERVISION *LEVEL CONTRACTOR ID APPLIED--PRIME*							
31712.31 - 00		DEWATERING WELL, SURFACE			643.97	15013.50	0.00	0.00	15,657.47
	SUB-211/111	256.41 hrs/unit 5128 TOTAL HRS	20.00	EA	12,879	300,270	0	0	313,149
31712.31 - 00		EQUIPMENT OWNERSHIP NOT IN DIRECT COST			399027.40	0.00	830000.00	0.00	1,229,027.40
	SUB-997/NoCrew	8000 hrs/unit 8000 TOTAL HRS	1.00	LS	399,027	0	830,000	0	1,229,027
31712.31 - 00		GENERAL MOBILIZATION			1484900.00	153562.81	27792.69	0.00	1,666,255.50
	SUB-997/211	2153.1 hrs/unit 2153 TOTAL HRS	1.00	LS	1,484,900	153,563	27,793	0	1,666,256
31712.31 - 00		DEMOBILIZATION / PUNCHLIST			194026.48	49204.78	12821.92	0.00	256,053.18
	SUB-997/211	689.89 hrs/unit 690 TOTAL HRS	1.00	LS	194,026	49,205	12,822	0	256,053
31712.31 - 00		GENERAL PLANT OPERATIONS / MAINTENANCE			1448628.31	508800.42	0.00	0.00	1,957,428.73
	SUB-995/995	5456.1 hrs/unit 5456 TOTAL HRS	1.00	LS	1,448,628	508,800	0	0	1,957,429
31712.31 - 00		WEEKEND MAINTENANCE			153.42	0.00	1411.69	0.00	1,565.11
	SUB-997/NoCrew	78.15 hrs/unit 7893 TOTAL HRS	101.00	DAY	15,495	0	142,581	0	158,076
31712.31 - 00		FIELD SUPERVISION			0.00	9324297.88	0.00	0.00	9,324,297.88
	SUB-997/211	130735 hrs/unit 130735 TOTAL HRS	1.00	LS	0	9,324,298	0	0	9,324,298
31712.31 - 00		OVERHEAD MAINTENANCE / SERVICE			2251335.00	1744433.58	131297.40	0.00	4,127,065.98
	SUB-997/120	24072 hrs/unit 24072 TOTAL HRS	1.00	LS	2,251,335	1,744,434	131,297	0	4,127,066
31712.31 - 00		FINANCING CHARGES			746204.57	578192.19	0.00	0.00	1,324,396.76
	SUB-995/120	7978.8 hrs/unit 7979 TOTAL HRS	1.00	LS	746,205	578,192	0	0	1,324,397
31712.31 - 00		MOCK-UPS & SUBMITTALS			175000.00	163193.63	40000.00	0.00	378,193.63
	SUB-995/995	1750 hrs/unit 1750 TOTAL HRS	1.00	LS	175,000	163,194	40,000	0	378,194
31712.31 - 00		GANTRY CRANE			85000.00	0.00	540000.00	0.00	625,000.00
	SUB-997/NoCrew	4000 hrs/unit 4000 TOTAL HRS	1.00	LS	85,000	0	540,000	0	625,000
		Subtotal Direct Costs			6,812,497	12,821,955	1,724,493	0	21,358,945
		Subcontractor Markups			1,169,243	902,476	272,458	0	2,344,177
		Prime Contractor Markups			763,373	1,312,604	190,988	0	2,266,966
		TOTAL CT4008001201 PROJECT MANAGEMENT & FIELD SUPERVISION	19,836	HRS	8,745,113	15,037,035	2,187,939	0	25,970,087
		14,775.00 SF *Level Unit Cost-->*			*591.89*	*1,017.74*	*148.08*	*0.00*	*1,757.70*
		SUBTOTAL CT40080012 PROJECT MANAGEMENT & FIELD SUPERVISION			7,031,376	13,094,972	1,870,431	75,000	22,071,779
		MARKUP			*1.285*	*1.174*	*1.273*	*1.260*	*1.218*
		TOTAL CT40080012 PROJECT MANAGEMENT & FIELD SUPERVISION			9,034,272	15,368,129	2,380,853	94,478	26,877,732

CT10 GUIDEWAY & TRACK ELEMENTS

CT1007 GUIDEWAY UNDERGROUND TUNNEL

CT1007970113 CTS_050_ES.701-Dewatering *LEVEL CONTRACTOR ID APPLIED--PRIME*

01101.02 - 06		Small Tools and Supplies			2.74	1.97	0.40	0.00	5.11
	SUB-995/NoCrew		320.00	HRS	877	630	128	0	1,635
01510.00 - 00		Labor FM			0.00	66.00	0.00	0.00	66.00
	SUB-995/NoCrew		120.00	MH	0	7,920	0	0	7,920
01510.00 - 00		Flagman			0.00	60.33	0.00	0.00	60.33

CODE	SUB/CREW	DESCRIPTION	QTY	UM	TOTAL COSTS MATERIAL	LABOR	EQUIPMENT	UNIT COST (SUB QUOTE)	TOTAL
	SUB-995/NoCrew		240.00	MH	0	14,479	0	0	14,479
31231.92 - 02	DRILL WELL - 6" DIA				21.00	54.63	61.75	0.00	137.38
	SUB-211/211	0.766 hrs/unit 590 TOTAL HRS	770.00	lf	16,170	42,067	47,546	0	105,784
31231.92 - 02	STEEL CASING - 6" DIA				36.75	24.32	27.44	0.00	88.51
	SUB-211/211	0.341 hrs/unit 263 TOTAL HRS	770.00	lf	28,298	18,727	21,128	0	68,153
31231.92 - 02	STEEL PIPE SCREEN - 6" DIA				47.25	24.32	27.44	0.00	99.01
	SUB-211/211	0.341 hrs/unit 143 TOTAL HRS	420.00	lf	19,845	10,215	11,524	0	41,584
31231.92 - 02	SUBMERSIBLE PUMP - 6" DIA- 25 HP - 250 GPM				2791.61	2637.21	1288.67	0.00	6,717.50
	SUB-211/211	36.976 hrs/unit 259 TOTAL HRS	7.00	EA	19,541	18,460	9,021	0	47,022
31231.92 - 02	OBSERVATION WELL - 6" DIA				9452.35	8929.67	4363.44	0.00	22,745.47
	SUB-211/211	125.2 hrs/unit 376 TOTAL HRS	3.00	EA	28,357	26,789	13,090	0	68,236
31231.92 - 02	SUBMERSIBLE PUMP - Backup				2791.61	0.00	0.00	0.00	2,791.61
	SUB-211/211		7.00	EA	19,541	0	0	0	19,541
31231.92 - 02	WATER DISPOSAL				115.00	106.98	58.00	0.00	279.98
	SUB-995/211	1.5 hrs/unit 1125 TOTAL HRS	750.00	LDS	86,250	80,237	43,500	0	209,987
31231.92 - 02	SPARE PARTS				0.00	53491.59	0.00	75000.00	128,491.59
	SUB-995/211	750 hrs/unit 750 TOTAL HRS	1.00	LS	0	53,492	0	75,000	128,492
		Subtotal Direct Costs			218,879	273,017	145,938	75,000	712,834
		Subcontractor Markups			45,039	29,175	30,136	11,533	104,350
		Prime Contractor Markups			25,241	28,902	16,840	7,945	70,982
	TOTAL CT1007970113 CTS_050_ES.701-Dewatering		3,505	HRS	289,159	331,094	192,914	94,478	907,645
	34.00 DY	*Level Unit Cost-->*			*8,504.68*	*9,738.05*	*5,673.94*	*2,778.78*	*26,695.45*
	SUBTOTAL CT40080012 PROJECT MANAGEMENT & FIELD SUPERVISION				7,031,376	13,094,972	1,870,431	75,000	22,071,779
	MARKUP				*1.285*	*1.174*	*1.273*	*1.260*	*1.218*
	TOTAL CT40080012 PROJECT MANAGEMENT & FIELD SUPERVISION				9,034,272	15,368,129	2,380,853	94,478	26,877,732

CT40 SITEWORK & SPECIAL CONDITIONS

CT4008 TEMPORARY FACILITIES

CT4008001301 OVERHEAD TRACTION POWER *LEVEL CONTRACTOR ID APPLIED--PRIME*

34230.01 - 01	PROSPECT HOLE FOR DEPTH < 3'				0.00	566.58	40.64	0.00	607.22
	SUB-221/221	8.154 hrs/unit 16 TOTAL HRS	2.00	EA	0	1,133	81	0	1,214
34230.01 - 01	PROSPECT HOLE FOR DEPTH > 3'				0.00	755.37	53.88	0.00	809.25
	SUB-221/221	10.871 hrs/unit 11 TOTAL HRS	1.00	EA	0	755	54	0	809
34230.01 - 02	PROVIDE STEEL POLE TYPE 761N				2134.70	2120.84	1004.57	0.00	5,260.11
	SUB-161/165	35.957 hrs/unit 144 TOTAL HRS	4.00	EA	8,539	8,483	4,018	0	21,040
34230.01 - 02	PROVIDE SPECIAL POLE FOUNDATION				4851.60	4820.13	2283.11	0.00	11,954.84
	SUB-161/165	81.721 hrs/unit 327 TOTAL HRS	4.00	EA	19,406	19,281	9,132	0	47,819
34230.01 - 03	PROVIDE PULL OFF				3105.02	3084.86	1461.19	0.00	7,651.07
	SUB-161/165	52.301 hrs/unit 105 TOTAL HRS	2.00	EA	6,210	6,170	2,922	0	15,302
34230.01 - 04	PROVIDE TANGENT OR INVERT SPAN				3105.02	3084.86	1461.19	0.00	7,651.07
	SUB-161/165	52.301 hrs/unit 105 TOTAL HRS	2.00	EA	6,210	6,170	2,922	0	15,302
		Subtotal Direct Costs			40,365	41,992	19,131	0	101,488
		Subcontractor Markups			8,897	5,267	4,153	0	18,317
		Prime Contractor Markups			4,711	4,520	2,227	0	11,458
	TOTAL CT4008001301 OVERHEAD TRACTION POWER		707	HRS	53,973	51,779	25,510	0	131,263
	15.00 EA	*Level Unit Cost-->*			*3,598.23*	*3,451.93*	*1,700.69*	*0.00*	*8,750.85*

CT4008001511 CTS_AB_CV.201 - Temporary Alternate Curb Ramp A *LEVEL CONTRACTOR ID APPLIED--PRIME*

DAILY PRODUCTIVITY = 11.3 EA/DAY

32161.31 - 30	CONCRETE CURB RAMP WITH DETECTABLE SURFACE TILES				525.00	504.46	102.22	0.00	1,131.68
	SUB-211/211	7.073 hrs/unit 21 TOTAL HRS	3.00	ea	1,575	1,513	307	0	3,395
	* LINE ITEM ASSEMBLY	Factor:1.0000							
		Subtotal Direct Costs			1,575	1,513	307	0	3,395
		Subcontractor Markups			335	181	64	0	580
		Prime Contractor Markups			183	162	35	0	380
	TOTAL CT4008001511 CTS_AB_CV.201 - Temporary Alternate Curb Ramp A		21	HRS	2,093	1,856	406	0	4,356
	3.00 EA	*Level Unit Cost-->*			*697.67*	*618.74*	*135.49*	*0.00*	*1,451.90*

NOTE: DAILY PRODUCTIVITY = 11.3 EA/DAY

CT4008001512 CTS_AA_CV.201 - Temporary 3.5IN Thick Asphalt Sidwalk *LEVEL CONTRACTOR ID APPLIED--PRIME*

DAILY PRODUCTIVITY = 247 TN/DAY

02740.30 - 02	AC PAVING, WEARING COURSE, 3.5" THICK				89.25	24.77	13.13	0.00	127.15
	SUB-221/221	0.356 hrs/unit 9 TOTAL HRS	26.62	TN	2,376	659	350	0	3,385
	* LINE ITEM ASSEMBLY	Factor:0.0200							
01552.35 - 00	AGGREGATE BASE COURSE, 8" THICK				10.55	1.15	0.86	0.00	12.57
	SUB-211/211	0.016 hrs/unit 1 TOTAL HRS	59.89	TN	632	69	52	0	753

APPENDIX C

PRIMARY MITIGATION STATUS REPORTS

PRIMARY MITIGATIONS

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PRIMARY MITIGATIONS

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centralTsubway

Connecting people. Connecting communities.

Moscone Station — 20.03.01

Primary Mitigation ID	MOS 20.03.01	**Risk Owner**	Chin	**CP Affected**	1255	**Risk Type**	Risk	**Origination Date**	6/8/2011	**Last Update**	5/10/2012	**Date of Next Handling Step**	
Mitigation Title	Work performed utilizing street or lane closures with approval from Permit issuing authority and all affected stakeholders									**CSP Risk Cateogry**	Stations	**FTA Risk Cateogry**	Construction
Handling Approach	Mitigate	**Handling Approach Strategy**	Work with City Agencies and stakeholders to arrive at concensus regarding street and/or lane closures. Use convincing evidence that short term disruptions outweigh cost and schedule impacts.					**Root Cause**	Regulations for Working San Francisco Streets stipulates maintaining minimum through traffic lanes during normal and moratorium time periods unless permitted by DPT.				
Update Summary	100% drawings show continuous lane closures to allow staging area on west side of Fourth St. adjacent to the headhouse.												
Retirement Date		**Risk Expiration Deadline**	Prior to Contact Bid	**Retirement Rationale**	Provide evidence of ability tor contractor to obtain Special Traffic Permit to conduct work with street and/or lane closures at the project site.							Current Risk Level	

Handling Activity	Description of Activity to complete the Handling Activity		Expected Deliverable	Task Owner	Start Date	Finish Date	Update	Task Status
20.03.01.01	Research and document traffic requirements governing construction in the ROW and for street/lane closures.		Copy of applicable traffic stipulation which apply to street and lanes closures.	Chin	6/8/2011	7/26/2011	Regualtions for Working in SF Streets - "Blue Book"	Complete
20.03.01.02	Work with Traffic Engineer to overcome project constraints.		Traffic routing plans will delineate appropriate lane closures.	Chin	7/26/2011	2/19/2012	100% Final Design TR plans, dated 2/19/12 and Specification section 01 55 26 delineate lane closures	Complete
20.03.01.03	Obtain concurrences from SFFD		Documentation showing acceptance from SFFD	Chin	12/19/2011	3/19/2012		In Process
20.03.01.04	Coordinate design documents with approvals for agreed-upon street/lane closures for the project area.		Update traffic plans, construction sequence drawings, general requirements and special provisions.	Chin	7/26/2011	2/19/2012	100% plans updated to include lane closures on Fourth Street.	Complete
20.03.01.05	Perform Public Outreach for notification (CAG).		Public relations campaign.	Norris	2/19/2012	5/15/2012	Public outreach will be performed after contract award once contractor's schedule and work plans submittals become available. Contract documents require contractor to participate in Public Outreach.	Complete
20.03.01.06	Obtain concurrences from community		Documentation showing acceptance from Moscone Convention Center, Yerba Buena Gardens, Wolff House	Norris	2/19/2012	5/15/2012	Public outreach will be performed after contract award once contractor's schedule and work plans submittals become available. Contract documents require contractor to participate in Public Outreach.	Complete
20.03.01.07	Coordinate revised design approach with the construction schedule.		Addendum to Contract Documents and updated project documents.	Chin	2/19/2012	5/17/2012	Addendum related to public comment is not anticipated at this time.	Complete
20.03.01.08	Impact (Cost Benefit)							
20.03.01.09	Excavation Support	Improved efficiency and use of multiple shifts for restocking the job and servicing of equipment.	Cost Estimate Update	Berry	12/19/2011	5/15/2012	Incorporated into 100% cost estimate	Complete
20.03.01.10	Excavation	Improved efficiency and use of multiple shifts for restocking the job and servicing of equipment.	Cost Estimate Update	Berry	12/19/2011	5/15/2012	Incorporated into 100% cost estimate	Complete
20.03.01.11	Structure	Improved efficiency and use of multiple shifts for restocking the job and servicing of equipment.	Cost Estimate Update	Berry	12/19/2011	5/15/2012	Incorporated into 100% cost estimate	Complete

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Moscone Station — 20.03.02

Primary Mitigation ID	MOS 20.03.02	**Risk Owner**	Chin	**CP Affected**	1255	**Risk Type**	Risk	**Origination Date**	6/8/2011	**Last Update**	5/10/2012	**Date of Next Handling Step**	
Mitigation Title	Work outside normal work hours with approval from Permit issuing authority and all affected stakholders									**CSP Risk Cateogry**	Stations	**FTA Risk Cateogry**	Construction
Handling Approach	Mitigate	**Handling Approach Strategy**	Work with City Agencies and stakeholderto to arrive at concensus regarding work hours. Use convincing evidence that shorterm disruptions outweigh cost and schedule impacts.					**Root Cause**	Noise Control Ordinance stipulates maintaining certain noise levels for work outside of normal working hours unless permitted by DPW.				
Update Summary	FEIR contains expected noise levels. BIH Noise & Vibration Control Plan will provide additional information on noise.												
Retirement Date		**Risk Expiration Deadline**	Prior to Contact Bid	**Retirement Rationale**	Provide evidence of abilityfor contractor to obtain permit to perform work outside of normal work hours.								Current Risk Level

Handling Activity	Description of Activity to complete the Handling Activity		Expected Deliverable	Task Owner	Start Date	Finish Date	Update	Task Status
20.03.02.01	Research, identify and confirm applicablity of city codes, local ordinances and EIR for work outside of normal working hours.		Documentation of applicable city codes, rules, regulations (SF Blue Book), local ordinances (Noise Control) & EIR which apply to work outside normal hours.	Chin	6/8/2011	7/26/2011	Regulations for Working in SF Streets - "Blue Book" SF Police Code - Section 2908	Complete
20.03.02.02	Describe expected noise level from construction activities.		Expected noise levels generated during construction.	Benson	7/26/2011	4/2/2012		In Process
20.03.02.03	Obtain concurrence with City Agencies prior to bid opening.		Concurrence establishing the agreement on the work hours with DPW & DBI	Chin	7/26/2011	6/1/2012	Program feels that contract is sufficiently clear in contract documents on contractor's ability to obtain a night noise permit without obtaining concurrence from City Agencies prior to construction.	Complete
20.03.02.04	Implement and coordinate Contract Documents and project documentation based on agreed-upon work hours.		100% Construction Documents	Chin	7/26/2011	2/19/2012	Contract documents allow night work per SF Police Code Section 2908.	Complete
20.03.02.05	Perform Public Outreach for notification prior to construction.		Public Relations Campaign (Moscone Convention Center, Yerba Buena Gardens, Wolff House, BOS, SFPD, OES)	Norris	2/19/2012	5/15/2012	Public outreach will be performed after contract award once contractor's schedule and work plans submittals become available. Contract documents require contractor to participate in Public Outreach.	Complete
20.03.02.06	Coordinate and update revised construction sequencing and plans to the construction schedule.		Addendum to Contract Documents and updated project documents.	Chin	2/19/2012	8/1/2012	No addendum is anticipated at this time.	Complete
20.03.02.07	Impact (Cost Benefit)							
20.03.02.08	Excavation Support	Improved efficiency (minimizing startup/shutdown times per shift cycle) for cost improvement.	Cost Estimate Update	Berry	12/19/2011	5/15/2012	Incorporated into 100% cost estimate	Complete
20.03.02.09	Excavation	Improved efficiency (minimizing startup/shutdown times per shift cycle) for cost improvement.	Cost Estimate Update	Berry	12/19/2011	5/15/2012	Incorporated into 100% cost estimate	Complete
20.03.02.10	Structure	Improved efficiency for cost improvement.	Cost Estimate Update	Berry	12/19/2011	5/15/2012	Incorporated into 100% cost estimate	Complete
20.03.02.11	Architecture	Improved efficiency for cost improvement.	Cost Estimate Update	Berry	7/26/2011	5/15/2012	Incorporated into 100% cost estimate	Complete
20.03.02.12	MEP	Improved efficiency for cost improvement.	Cost Estimate Update	Berry	12/19/2011	5/15/2012	Incorporated into 100% cost estimate	Complete

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Moscone Station — 20.03.03

Primary Mitigation ID	MOS 20.03.03	**Risk Owner**	Chin	**CP Affected**	1255	**Risk Type**	Risk	**Origination Date**	6/8/2011	**Last Update**	5/10/2012	**Date of Next Handling Step**	
Mitigation Title	Work performed with open access at street level with approval from Permit issuing authority and all effected stakeholders									**CSP Risk Cateogry**	Stations	**FTA Risk Cateogry**	Construction
Handling Approach	Mitigate	**Handling Approach Strategy**	Work with City Agencies and stakeholders to arrive at concensus regarding open access for the excavation and construction of the station box. Use convincing evidence that some surface disruptions outweigh cost and schedule impacts.					**Root Cause**	Interpretation of EIR compliance and interpretation of the Preliminary Engineering (PE) final documents may preclude use of additional open access points at street level.				
Update Summary	Constructability review completed. Design will be completed using the 65% FD concepts. 100% drawings show lane closures to allow staging area on west side of Fourth St. adjacent to the headhouse.												
Retirement Date		**Risk Expiration Deadline**	Prior to Contact Bid	**Retirement Rationale**	Provide evidence of ability tor contractor to perform work with improved efficiency.							Current Risk Level	

Handling Activity	Description of Activity to complete the Handling Activity		Expected Deliverable	Task Owner	Start Date	Finish Date	Update	Task Status
20.03.03.01	Perform Constructability Review.		Constructability Assessment Technical Memorandum	Chin	6/8/2011	8/15/2011	Constructability Review conducted in August 2011.	Complete
20.03.03.02	Develop cost reduction options and perform a ROM Cost Comparison Analysis between options.		Sketches of Cost-Savings Options (for estimating) and QTO of significant cost driver elements.	Chin	8/15/2011	12/19/2011	Several cost-saving options were generated from constructability review.	Complete
20.03.03.03	Implement selected cost-saving option.		Updated Contract Drawings and Specifications; General Requirements and Special Provisions.	Chin	12/19/2011	2/19/2012	Design did not change as a result of the constructability review.	Complete
20.03.03.04	Impact (Cost Benefit)							
20.03.03.05	Excavation Support	Improved efficiency for cost improvement.	Cost Estimate Update	Berry	12/19/2011	5/15/2012	Incorporated into 100% cost estimate	Complete
20.03.03.06	Excavation	Improved efficiency for cost improvement.	Cost Estimate Update	Berry	12/19/2011	5/15/2012	Incorporated into 100% cost estimate	Complete
20.03.03.07	Structure	Bottoms-up method will be less senstive to traffic and on-site restrictions for cost improvement.	Cost Estimate Update	Berry	12/19/2011	5/15/2012	Incorporated into 100% cost estimate	Complete
20.03.03.08	Architecture	Improved efficiency and sequencing of work including supply of material and equipment to site.	Cost Estimate Update	Berry	12/19/2011	5/15/2012	Incorporated into 100% cost estimate	Complete
20.03.03.09	MEP	Improved efficiency and sequencing of work including supply of material and large equipment to site by improved access.	Cost Estimate Update	Berry	12/19/2011	5/15/2012	Incorporated into 100% cost estimate	Complete

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Moscone Station — 40.08.01

Primary Mitigation ID	MOS 40.08.01	**Risk Owner**	Chin	**CP Affected**	1255	**Risk Type**	Risk	**Origination Date**	6/8/2011	**Last Update**	5/10/2012	**Date of Next Handling Step**	
Mitigation Title	Work performed utilizing street or lane closures with approval from Permit issuing authority, and all affected stakeholders									**CSP Risk Cateogry**	Stations	**FTA Risk Cateogry**	Construction
Handling Approach	Mitigate	**Handling Approach Strategy**	Work with City Agencies and stakeholders to arrive at concensus regarding street and/or lane closures. Use convincing evidence that short term disruptions outweigh cost and schedule impacts.					**Root Cause**	Regulations for Working San Francisco Streets stipulates maintaining minimum through traffic lanes during normal and moratorium time periods.				
Status Update	100% drawings show lane closures to allow staging area on west side of Fourth St. adjacent to the headhouse.												
Retirement Date		**Risk Expiration Deadline**	Prior to Contact Bid	**Retirement Rationale**	Provide evidence of ability tor contractor to obtain Special Traffic Permit to conduct work with street and/or lane closures at the project site							Current Risk Level	

Handling Activity	Description of Activity to complete the Handling Activity	Expected Deliverable	Task Owner	Start Date	Finish Date	Update	Task Status
40.08.01.01	Research and document traffic requirements governing construction in the ROW and for street/lane closures.	Copy of applicable traffic stipulation which apply to street and lanes closures.	Chin	6/8/2011	7/26/2011	Regualtions for Working in SF Streets - "Blue Book"	Complete
40.08.01.02	Work with Traffic Engineer to overcome project constraints.	Traffic routing plans will delineate appropriate lane closures.	Chin	7/26/2011	12/19/2011	100% Final Design TR plans, dated 2/19/12 and Specification section 01 55 26 delineate lane closures	Complete
40.08.01.03	Obtain concurrences from SFFD & SFPD.	Documentation showing acceptance from SFFD.	Chin	12/19/2011	2/19/2012		Complete
40.08.01.04	Coordinate design documents with approvals for agreed-upon street/lane closures for the project area.	Update traffic plans, construction sequence drawings, general requirements and special provisions.	Chin	7/26/2011	2/19/2012	100% plans updated to include lane closures on Fourth Street.	Complete
40.08.01.05	Perform Public Outreach for notification (CAG).	Public relations campaign.	Norris	2/19/2012	5/15/2012	Public outreach will be performed after contract award once contractor's schedule and work plans submittals become available. Contract documents require contractor to participate in Public Outreach.	Complete
40.08.01.06	Obtain concurrences from community.	Documentation showing acceptance from Moscone Convention Center, Yerba Buena Gardens, Wolff House	Norris	2/19/2012	5/15/2012	Public outreach will be performed after contract award once contractor's schedule and work plans submittals become available. Contract documents require contractor to participate in Public Outreach.	Complete
40.08.01.07	Coordinate revised design approach with the construction schedule.	Addendum to Contract Documents and updated project documents.	Chin	2/19/2012	8/1/2012	Addendum related to public comment is not anticipated at this time.	Complete
40.08.01.08	Impact (Schedule Benefit)						
40.08.01.09	Project Management & Field Supervision	Construction Schedule Update	Berry	12/19/2011	5/15/2012	Included in MPS	Complete
40.08.01.10	Project Expenses	Construction Schedule Update	Berry	12/19/2011	5/15/2012	Included in MPS	Complete
40.08.01.11	Traffic Control	Construction Schedule Update	Berry	12/19/2011	5/15/2012	Included in MPS	Complete

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Moscone Station — 40.08.02

Primary Mitigation ID	MOS 40.08.02	**Risk Owner**	Chin	**CP Affected**	1255	**Risk Type**	Risk	**Origination Date**	6/8/2011	**Last Update**	5/10/2012	**Date of Next Handling Step**	
Mitigation Title	Work outside normal work hours with approval from Permit issuing authority and all affected stakholders									**CSP Risk Cateogry**	Stations	**FTA Risk Cateogry**	Construction
Handling Approach	Mitigate	**Handling Approach Strategy**	Work with City Agencies and stakeholderto arrive at concensus regarding work hours. Use convincing evidence that shorterm disruptions outweigh cost and schedule impacts.					**Root Cause**	Noise Control Ordinance stipulates maintaining certain noise levels for work outside of normal working hours.				
Status Update	FEIR contains expected noise levels. BIH Noise & Vibration Control Plan will provide additional information on noise.												
Retirement Date		**Risk Expiration Deadline**	Prior to Contact Bid	**Retirement Rationale**	Provide evidence of abilityfor contractor to obtain permit to perform work outside of normal work hours.							Current Risk Level	

Handling Activity	Description of Activity to complete the Handling Activity	Expected Deliverable	Task Owner	Start Date	Finish Date	Update	Task Status
20.03.02.01	Research, identify and confirm applicablity of city codes, local ordinances and EIR for work outside of normal working hours.	Documentation of applicable city codes, rules, regulations (SF Blue Book), local ordinances (Noise Control) & EIR which apply to work	Chin	6/8/2011	7/26/2011	Regulations for Working in SF Streets - "Blue Book" SF Police Code - Section 2908	Complete
20.03.02.02	Describe expected noise level from construction activities.	Expected noise levels generated during construction.	Benson	7/26/2011	3/2/2012		In Process
20.03.02.03	Obtain concurrence with City Agencies prior to bid opening.	Concurrence establishing the agreement on the work hours with DPW & DBI	Chin	7/26/2011	6/1/2012	Program feels that contract is sufficiently clear in contract documents on contractor's ability to obtain a night noise permit without obtaining concurrence from City Agencies prior to construction.	Complete
20.03.02.04	Implement and coordinate Contract Documents and project documentation based on agreed-upon work hours.	100% Construction Documents	Chin	7/26/2011	2/19/2012	Contract documents allow night work per SF Police Code Section 2908.	Complete
20.03.02.05	Perform Public Outreach for notification prior to construction.	Public Relations Campaign (Moscone Convention Center, Yerba Buena Gardens, Wolff House, BOS, SFPD, OES)	Norris	2/19/2012	5/15/2012	Public outreach will be performed after contract award once contractor's schedule and work plans submittals become available. Contract documents require contractor to participate in Public Outreach.	Complete
20.03.02.06	Coordinate and update revised construction sequencing and plans to the construction schedule.	Addendum to Contract Documents and updated project documents.	Chin	2/19/2012	8/1/2012	No addendum is anticipated at this time.	Complete
20.03.02.07	Impact (Schedule Benefit)						
20.03.02.08	Project Management & Field Supervision	Construction Schedule Update	Berry	12/19/2011	5/15/2012	Included in MPS	Complete
20.03.02.09	Project Expenses	Construction Schedule Update	Berry	12/19/2011	5/15/2012	Included in MPS	Complete
20.03.02.10	Traffic Control	Construction Schedule Update	Berry	12/19/2011	5/15/2012	Included in MPS	Complete

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Moscone Station — 40.08.03

Primary Mitigation ID	MOS 40.08.03	**Risk Owner**	Chin	**CP Affected**	1255	**Risk Type**	Risk	**Origination Date**	6/8/2011	**Last Update**	5/10/2012	**Date of Next Handling Step**	
Mitigation Title	Work performed with open access at street level with approval from Permit issuing authority and all effected stakeholders									**CSP Risk Cateogry**	Stations	**FTA Risk Cateogry**	Construction
Handling Approach	Mitigate	**Handling Approach Strategy**	Work with City Agencies and stakeholders to arrive at concensus regarding open access for the excavation and construction of the station box. Use convincing evidence that some surface disruptions outweigh cost and schedule impacts.					**Root Cause**	Interpretation of EIR compliance and interpretation of the Preliminary Engineering (PE) final documents may preclude use of additional open access points at street level.				
Status Update	Constructability review completed. Design will be completed using the 65% FD concepts. 100% drawings show lane closures to allow staging area on west side of Fourth St. adjacent to the headhouse.												
Retirement Date		**Risk Expiration Deadline**	Prior to Contact Bid	**Retirement Rationale**	Provide evidence of ability tor contractor to perform work with improved efficiency.							Current Risk Level	

Handling Activity	Description of Activity to complete the Handling Activity	Expected Deliverable	Task Owner	Start Date	Finish Date		Task Status
40.08.03.01	Perform Constructability Review.	Constructability Assessment Technical Memorandum	Chin	6/8/2011	8/15/2011	Constructability Review conducted in August 2011.	Complete
40.08.03.02	Develop cost reduction options and perform a ROM Cost Comparison Analysis between options.	Sketches of Cost-Savings Options (for estimating) and QTO of significant cost driver elements.	Chin	8/15/2011	12/19/2011	Several cost-saving options were generated from constructability review.	Complete
40.08.03.03	Implement selected cost-saving option.	Updated Contract Drawings and Specifications; General Requirements and Special Provisions.	Chin	12/19/2011	2/19/2012	Design did not change as a result of the constructability review.	Complete
40.08.03.04	Impact (Schedule Benefit)						
40.08.03.05	Project Management & Field Supervision	Construction Schedule Update	Berry	12/19/2011	5/15/2012	Included in MPS	Complete
40.08.03.06	Project Expenses	Construction Schedule Update	Berry	12/19/2011	5/15/2012	Included in MPS	Complete
40.08.03.07	Traffic Control	Construction Schedule Update	Berry	12/19/2011	5/15/2012	Included in MPS	Complete

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UMS Station – 20.03.01

Primary Mitigation ID	UMS 20.03.01	**Risk Owner**	Wang	**CP Affected**	1253	**Risk Type**	Risk	**Origination Date**	6/8/2011	**Last Update**	5/10/2012	**Date of Next Handling Step**	
Mitigation Title	Work performed utilizing street or lane closures with approval from Permit issuing authority, and all affected stakeholders									**CSP Risk Cateogry**	Stations	**FTA Risk Cateogry**	Construction
Handling Approach	Mitigate	**Handling Approach Strategy**	Work with City Agencies and stakeholders to arrive at concensus regarding street and/or lane closures. Use convincing evidence that short term disruptions outweigh cost and schedule impacts.					**Root Cause**	Regulations for Working San Francisco Streets stipulates maintaining minimum through traffic lanes during normal and moratorium time periods.				
Status Update	Union Square Garage will be used as an access and staging area. 100% TR drawings and specifications allows limited closure of Stockton Street to perform the work.												
Retirement Date		**Risk Expiration Deadline**	Prior to Contact Bid	**Retirement Rationale**	Provide evidence of ability tor contractor to obtain Special Traffic Permit to conduct work with street and/or lane closures at the project site.							Current Risk Level	

Handling Activity	Description of Activity to complete the Handling Activity		Expected Deliverable	Task Owner	Start Date	Finish Date	Update	Task Status
20.03.01.01	Research and document traffic requirements governing construction in the ROW and for street/lane closures.		Copy of applicable traffic stipulation which apply to street and lanes closures.	Wang	6/8/2011	7/26/2011	Regualtions for Working in SF Streets - "Blue Book"	Complete
20.03.01.02	Work with Traffic Engineer to overcome project constraints.		Traffic routing plans will delineate appropriate lane closures.	Wang	7/26/2011	2/19/2012	100% Final Design TR plans, dated 2/19/12 and Specification section 01 55 26 delineate lane closures	Complete
20.03.01.03	Obtain concurrences from SFFD.		Documentation showing acceptance from SFFD.	Wang	12/19/2011	2/19/2012	Approval from SFFD for traffic closure on Stockton Street received 2/10/12.	Complete
20.03.01.04	Coordinate design documents with approvals for agreed-upon street/lane closures for the project area.		Update traffic plans, construction sequence drawings, general requirements and special provisions.	Wang	7/26/2011	2/19/2012	100% plans updated to include lane closures on Stockton Street.	Complete
20.03.01.05	Perform Public Outreach for notification (CAG).		Public relations campaign	Norris	12/19/2011	2/15/2012	Public outreach will be performed after contract award once contractor's schedule and work plans submittals become available. Contract documents require contractor to participate in Public Outreach.	Complete
20.03.01.06	Obtain concurrences from community.		Documentation showing acceptance from BID, Hoteliers & Merchants,Dept. Rec & Park, BART.	Norris	2/19/2012	2/15/2012	Public outreach will be performed after contract award once contractor's schedule and work plans submittals become available. Contract documents require contractor to participate in Public Outreach.	Complete
20.03.01.07	Coordinate revised design approach with the construction schedule, if needed.		Addendum to Contract Documents and updated project documents.	Wang	4/4/2012	8/1/2012	Addendum related to public comment is not anticipated at this time.	Complete
20.03.01.08	Impact (Cost Benefit)							
20.03.01.09	Excavation Support	Improved efficiency and use of multiple shifts for restocking the job and servicing of equipment.	Cost Estimate Update	Berry	12/19/2011	4/20/2012	Incorporated into 100% cost estimate	Complete
20.03.01.10	Excavation	Improved efficiency and use of multiple shifts for restocking the job and servicing of equipment.	Cost Estimate Update	Berry	12/19/2011	4/20/2012	Incorporated into 100% cost estimate	Complete
20.03.01.11	Structure	Improved efficiency and use of multiple shifts for restocking the job and servicing of equipment.	Cost Estimate Update	Berry	12/19/2011	4/20/2012	Incorporated into 100% cost estimate	Complete

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UMS Station — 20.03.02

Primary Mitigation ID	UMS 20.03.02	**Risk Owner**	Wang	**CP Affected**	1253	**Risk Type**	Risk	**Origination Date**	6/8/2011	**Last Update**	5/10/2012	**Date of Next Handling Step**	
Mitigation Title	Work outside normal work hours with approval from Permit issuing authority and all affected stakholders									**CSP Risk Cateogry**	Stations	**FTA Risk Cateogry**	Construction
Handling Approach	Mitigate	**Handling Approach Strategy**	Work with City Agencies and stakeholderto arrive at concensus regarding work hours. Use convincing evidence that shorterm disruptions outweigh cost and schedule impacts.					**Root Cause**	Noise Control Ordinance stipulates maintaining certain noise levels for work outside of normal working hours.				
Status Update	FEIR contains expected noise levels. BIH Noise & Vibration Control Plan will provide additional information on noise.												
Retirement Date		**Risk Expiration Deadline**	Prior to Contact Bid	**Retirement Rationale**	Provide evidence of abilityfor contractor to obtain permit to perform work outside of normal work hours.								Current Risk Level

Handling Activity	Description of Activity to complete the Handling Activity		Expected Deliverable	Task Owner	Start Date	Finish Date	Update	Task Status
20.03.02.01	Research, identify and confirm applicablity of city codes, local ordinances and EIR for work outside of normal working hours.		Documentation of applicable city codes, rules, regulations (SF Blue Book), local ordinances (Noise Control) & EIR which apply to work outside	Wang	6/8/2011	7/26/2011	Regulations for Working in SF Streets - "Blue Book" SF Police Code - Section 2908	Complete
20.03.02.02	Describe expected noise level from construction activities.		Expected noise levels generated during construction.	Benson	7/26/2011	4/2/2012		In Process
20.03.02.03	Obtain concurrence with City Agencies prior to bid opening.		Concurrence establishing the agreement on the work hours with DPW & DBI	Wang	7/26/2011	6/1/2012	Program feels that contract is sufficiently clear in contract documents on contractor's ability to obtain a night noise permit without obtaining concurrence from City Agencies prior to construction.	Complete
20.03.02.04	Implement and coordinate Contract Documents and project documentation based on night noise permit being granted.		100% Construction Documents	Wang	7/26/2011	2/15/2012	Contract documents allow night work per SF Police Code Section 2908.	Complete
20.03.02.05	Perform Public Outreach for notification prior to construction.		Public Relations Campaign (BID, Hoteliers & Merchants,Dept. Rec & Park, BART, BOS SFPD, OES).	Norris	2/19/2012	2/15/2012	Public outreach will be performed after contract award once contractor's schedule and work plans submittals become available. Contract documents require contractor to participate in Public Outreach.	Complete
20.03.02.06	Coordinate and update revised construction sequencing and plans to the construction schedule.		Addendum to Contract Documents and updated project documents.	Wang	4/4/2012	8/1/2012	No addendum is anticipated at this time.	Complete
20.03.02.07	Impact (Cost Benefit)							
20.03.02.08	Excavation Support	Improved efficiency (minimizing startup/shutdown times per shift cycle) for cost improvement.	Cost Estimate Update	Berry	12/19/2011	4/20/2012	Incorporated into 100% cost estimate	Complete
20.03.02.09	Excavation	Improved efficiency (minimizing startup/shutdown times per shift cycle) for cost improvement.	Cost Estimate Update	Berry	12/19/2011	4/20/2012	Incorporated into 100% cost estimate	Complete
20.03.02.10	Structure	Improved efficiency for cost improvement.	Cost Estimate Update	Berry	12/19/2011	4/20/2012	Incorporated into 100% cost estimate	Complete
20.03.02.11	Architecture	Improved efficiency for cost improvement.	Cost Estimate Update	Berry	7/26/2011	4/20/2012	Incorporated into 100% cost estimate	Complete
20.03.02.12	MEP	Improved efficiency for cost improvement.	Cost Estimate Update	Berry	12/19/2011	4/20/2012	Incorporated into 100% cost estimate	Complete

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UMS Station – 20.03.03

Primary Mitigation ID	UMS 20.03.03	**Risk Owner**	Wang	**CP Affected**	1253	**Risk Type**	Risk	**Origination Date**	6/8/2011	**Last Update**	5/10/2012	**Date of Next Handling Step**	
Mitigation Title	Work performed with open access at street level with approval from Permit issuing authority and all effected stakeholders									**CSP Risk Cateogry**	Stations	**FTA Risk Cateogry**	Construction
Handling Approach	Mitigate	**Handling Approach Strategy**	Work with City Agencies and stakeholders to arrive at concensus regarding open access for the excavation and construction of the station box. Use convincing evidence that some surface disruptions outweigh cost and schedule impacts.					**Root Cause**	Interpretation of EIR compliance and interpretation of the Preliminary Engineering (PE) final documents may preclude use of additional open access points at street level.				
Status Update	100% construction documents dated 2/15/2012 show street closures to allow installation of roof beams from wall to wall.												
Retirement Date		**Risk Expiration Deadline**	Prior to Contact Bid	**Retirement Rationale**	Provide evidence of ability tor contractor to perform work with improved efficiency.							Current Risk Level	

Handling Activity	Description of Activity to complete the Handling Activity		Expected Deliverable	Task Owner	Start Date	Finish Date	Update	Task Status
20.03.03.01	Perform Constructability Review.		Constructability Assessment Technical Memorandum	Wang	8/1/2011	12/19/2011	Constructability Review conducted in August 2011.	Complete
20.03.03.02	Develop cost reduction options and perform a ROM Cost Comparison Analysis between options.		Sketches of Cost-Savings Options (for estimating) and QTO of significant cost driver elements.	Wang	12/19/2011	2/15/2012	No cost reduction options were generated from the constructability review. Contractor is not precluded from open access at street level provided that a 14-foot emergency lane is provided through the construction site.	Complete
20.03.03.03	Implement selected cost-saving option.		Updated Contract Drawings and Specifications; General Requirements and Special Provisions.	Wang	2/19/2012	8/1/2012	TR drawings and specifications allow the contractor to work with open access along Stockton Street provided that an emergency lane is provided through the construction site.	Complete
20.03.03.04	Impact (Cost Benefit)							
20.03.03.05	Excavation Support	Improved efficiency for cost improvement.	Cost Estimate Update	Berry	12/19/2011	4/20/2012	Incorporated into 100% cost estimate	Complete
20.03.03.06	Excavation	Improved efficiency for cost improvement.	Cost Estimate Update	Berry	12/19/2011	4/20/2012	Incorporated into 100% cost estimate	Complete
20.03.03.07	Structure	Bottoms-up method will be less senstive to traffic and on-site restrictions for cost improvement.	Cost Estimate Update	Berry	12/19/2011	4/20/2012	Incorporated into 100% cost estimate	Complete
20.03.03.08	Architecture	Improved efficiency and sequencing of work including supply of material and equipment to site.	Cost Estimate Update	Berry	12/19/2011	4/20/2012	Incorporated into 100% cost estimate	Complete
20.03.03.09	MEP	Improved efficiency and sequencing of work including supply of material and large equipment to site by improved access.	Cost Estimate Update	Berry	12/19/2011	4/20/2012	Incorporated into 100% cost estimate	Complete

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UMS Station – 40.08.01

Primary Mitigation ID	UMS 40.08.01	**Risk Owner**	Wang	**CP Affected**	1253	**Risk Type**	Risk	**Origination Date**	6/8/2011	**Last Update**	5/10/2012	**Date of Next Handling Step**	
Mitigation Title	Work performed utilizing street or lane closures with approval from Permit issuing authority, and all affected stakeholders									**CSP Risk Cateogry**	Stations	**FTA Risk Cateogry**	Construction
Handling Approach	Mitigate	**Handling Approach Strategy**	Work with City Agencies and stakeholders to arrive at concensus regarding street and/or lane closures. Use convincing evidence that short term disruptions outweigh cost and schedule impacts.					**Root Cause**	Regulations for Working San Francisco Streets stipulates maintaining minimum through traffic lanes during normal and moratorium time periods.				
Staus Update	Union Square Garage will be used as an access and staging area. 100% TR drawings and specifications allows limited closure of Stockton Street to perform the work.												
Retirement Date		**Risk Expiration Deadline**	Prior to Contact Bid	**Retirement Rationale**	Provide evidence of ability tor contractor to obtain Special Traffic Permit to conduct work with street and/or lane closures at the project site							Current Risk Level	

Handling Activity	Description of Activity to complete the Handling Activity	Expected Deliverable	Task Owner	Start Date	Finish Date	Update	Task Status
40.08.01.01	Research and document traffic requirements governing construction in the ROW and for street/lane closures.	Copy of applicable traffic stipulation which apply to street and lanes closures.	Wang	6/8/2011	7/26/2011	Regualtions for Working in SF Streets - "Blue Book"	Complete
40.08.01.02	Work with Traffic Engineer to overcome project constraints.	Traffic routing plans will delineate appropriate lane closures.	Wang	7/26/2011	2/19/2012	100% Final Design TR plans, dated 2/19/12 and Specification section 01 55 26 delineate lane closures	Complete
40.08.01.03	Obtain concurrences from SFFD.	Documentation showing acceptance from SFFD.	Wang	12/19/2011	2/15/2012	Approval from SFFD for traffic closure on Stockton Street received 2/10/12.	Complete
40.08.01.04	Coordinate design documents with approvals for agreed-upon street/lane closures for the project area.	Update traffic plans, construction sequence drawings, general requirements and special provisions.	Wang	7/26/2011	2/15/2012	100% plans updated to include lane closures on Stockton Street.	Complete
40.08.01.05	Perform Public Outreach for notification (CAG).	Public relations campaign.	Wang	2/19/2012	2/15/2012	Public outreach will be performed after contract award once contractor's schedule and work plans submittals become available. Contract documents require contractor to participate in Public Outreach.	Complete
40.08.01.06	Obtain concurrences from community.	Documentation showing acceptance from BID, Hoteliers & Merchants,Dept. Rec & Park, BART	Wang	2/19/2012	2/15/2012	Public outreach will be performed after contract award once contractor's schedule and work plans submittals become available. Contract documents require contractor to participate in Public Outreach.	Complete
40.08.01.07	Coordinate revised design approach with the construction schedule.	Addendum to Contract Documents and updated project documents.	Wang	2/19/2012	8/1/2012	Addendum related to public comment is not anticipated at this time.	Complete
40.08.01.08	Impact (Schedule Benefit)						
40.08.01.09	Project Management & Field Supervision	Construction Schedule Update	Berry	12/19/2011	4/20/2012	Incorporated into MPS	Complete
40.08.01.10	Project Expenses	Construction Schedule Update	Berry	12/19/2011	4/20/2012	Incorporated into MPS	Complete
40.08.01.11	Traffic Control	Construction Schedule Update	Berry	12/19/2011	4/20/2012	Incorporated into MPS	Complete

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UMS Station – 40.08.02

Primary Mitigation ID	UMS 40.08.02	**Risk Owner**	Wang	**CP Affected**	1253	**Risk Type**	Risk	**Origination Date**	6/8/2011	**Last Update**	5/10/2012	**Date of Next Handling Step**	
Mitigation Title	Work outside normal work hours with approval from Permit issuing authority and all affected stakholders									**CSP Risk Cateogry**	Stations	**FTA Risk Cateogry**	Construction
Handling Approach	Mitigate	**Handling Approach Strategy**	Work with City Agencies and stakeholderto arrive at concensus regarding work hours. Use convincing evidence that shorterm disruptions outweigh cost and schedule impacts.					**Root Cause**	Noise Control Ordinance stipulates maintaining certain noise levels for work outside of normal working hours.				
Status Update	FEIR contains expected noise levels. BIH Noise & Vibration Control Plan will provide additional information on noise.												
Retirement Date		**Risk Expiration Deadline**	Prior to Contact Bid	**Retirement Rationale**	Provide evidence of abilityfor contractor to obtain permit to perform work outside of normal work hours.							Current Risk Level	

Handling Activity	Description of Activity to complete the Handling Activity	Expected Deliverable	Task Owner	Start Date	Finish Date	Update	Task Status
20.03.02.01	Research, identify and confirm applicablity of city codes, local ordinances and EIR for work outside of normal working hours.	Documentation of applicable city codes, rules, regulations (SF Blue Book), local ordinances (Noise Control) & EIR which apply to work	Wang	6/8/2011	7/26/2011	Regulations for Working in SF Streets - "Blue Book" SF Police Code - Section 2908	Complete
20.03.02.02	Describe expected noise level from construction activities.	Expected noise levels generated during construction.	Benson	7/26/2011	4/2/2012		In Process
20.03.02.03	Obtain concurrence with City Agencies prior to bid opening.	Concurrence establishing the agreement on the work hours with DPW & DBI	Wang	7/26/2011	6/1/2012	Program feels that contract is sufficiently clear in contract documents on contractor's ability to obtain a night noise permit without obtaining concurrence from City Agencies prior to construction.	Complete
20.03.02.04	Implement and coordinate Contract Documents and project documentation based on agreed-upon work hours.	100% Construction Documents	Wang	7/26/2011	2/15/2012	Contract documents allow night work per SF Police Code Section 2908.	Complete
20.03.02.05	Perform Public Outreach for notification prior to construction.	Public Relations Campaign (BID, Hoteliers & Merchants,Dept. Rec & Park, BART, BOS SFPD, OES).	Norris	2/19/2012	2/15/2012	Public outreach will be performed after contract award once contractor's schedule and work plans submittals become available. Contract documents require contractor to participate in Public Outreach.	Complete
20.03.02.06	Coordinate and update revised construction sequencing and plans to the construction schedule.	Addendum to Contract Documents and updated project documents.	Wang	2/19/2012	8/1/2012	No addendum is anticipated at this time.	Complete
20.03.02.07	Impact (Schedule Benefit)						
20.03.02.08	Project Management & Field Supervision	Construction Schedule Update	Berry	12/19/2011	4/20/2012	Incorporated into MPS	Complete
20.03.02.09	Project Expenses	Construction Schedule Update	Berry	12/19/2011	4/20/2012	Incorporated into MPS	Complete
20.03.02.10	Traffic Control	Construction Schedule Update	Berry	12/19/2011	4/20/2012	Incorporated into MPS	Complete

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UMS Station — 40.08.03

Primary Mitigation ID	UMS 40.08.03	**Risk Owner**	Wang	**CP Affected**	1253	**Risk Type**	Risk	**Origination Date**	6/8/2011	**Last Update**	5/10/2012	**Date of Next Handling Step**	
Mitigation Title	Work performed with open access at street level with approval from Permit issuing authority and all effected stakeholders									**CSP Risk Cateogry**	Stations	**FTA Risk Cateogry**	Construction
Handling Approach	Mitigate	**Handling Approach Strategy**	Work with City Agencies and stakeholders to arrive at concensus regarding open access for the excavation and construction of the station box. Use convincing evidence that some surface disruptions outweigh cost and schedule impacts.					**Root Cause**	Interpretation of EIR compliance and interpretation of the Preliminary Engineering (PE) final documents may preclude use of additional open access points at street level.				
Status Update	100% construction documents dated 2/15/2012 show street closures to allow installation of roof beams from wall to wall.												
Retirement Date		**Risk Expiration Deadline**	Prior to Contact Bid	**Retirement Rationale**	Provide evidence of ability tor contractor to perform work with improved efficiency.							Current Risk Level	

Handling Activity	Description of Activity to complete the Handling Activity	Expected Deliverable	Task Owner	Start Date	Finish Date	Update	Task Status
40.08.03.01	Perform Constructability Review.	Constructability Assessment Technical Memorandum	Wang	8/1/2011	12/19/2011	Constructability Review conducted in August 2011.	Complete
40.08.03.02	Develop cost reduction options and perform a ROM Cost Comparison Analysis between options.	Sketches of Cost-Savings Options (for estimating) and QTO of significant cost driver elements.	Wang	12/19/2011	2/15/2012	No cost reduction options were generated from the constructability review. Contractor is not precluded from open access at street level provided that a 14-foot emergency lane is provided through the construction site.	Complete
40.08.03.03	Implement selected cost-saving option.	Addendum to Contract Documents and updated project documents.	Wang	2/19/2012	8/1/2012	TR drawings and specifications allow the contractor to work with open access along Stockton Street provided that an emergency lane is provided through the construction site.	Complete
40.08.03.04	Impact (Schedule Benefit)						
40.08.03.05	Project Management & Field Supervision	Construction Schedule Update	Berry	12/19/2011	4/20/2012	Incorporated into MPS	Complete
40.08.03.06	Project Expenses	Construction Schedule Update	Berry	12/19/2011	4/20/2012	Incorporated into MPS	Complete
40.08.03.07	Traffic Control	Construction Schedule Update	Berry	12/19/2011	4/20/2012	Incorporated into MPS	Complete

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CTS Station – 20.03.01

Primary Mitigation ID	CTS 20.03.01	**Risk Owner**	Chin	**CP Affected**	1254	**Risk Type**	Risk	**Origination Date**	6/8/2011	**Last Update**	5/10/2012	**Date of Next Handling Step**	
Mitigation Title	Work performed utilizing street or lane closures with approval from Permit issuing authority and all affected stakeholders									**CSP Risk Cateogry**	Stations	**FTA Risk Cateogry**	Construction
Handling Approach	Mitigate	**Handling Approach Strategy**	Work with City Agencies and stakeholders to arrive at concensus regarding street and/or lane closures. Use convincing evidence that short term disruptions outweigh cost and schedule impacts.					**Root Cause**	Regulations for Working San Francisco Streets stipulates maintaining minimum through traffic lanes during normal and moratorium time periods.				
Status Update	Washington Street will be closed to allow construction of the headhouse roof in Washington Street. Traffic will be detoured away from headhouse on Washington.												
Retirement Date		**Risk Expiration Deadline**	Prior to Contact Bid	**Retirement Rationale**	Provide evidence of ability tor contractor to obtain Special Traffic Permit to conduct work with street and/or lane closures at the project site.							Current Risk Level	

Handling Activity	Description of Activity to complete the Handling Activity		Expected Deliverable	Task Owner	Start Date	Finish Date		Task Status
20.03.01.01	Research and document traffic requirements governing construction in the ROW and for street/lane closures.		Copy of applicable traffic stipulation which apply to street and lanes closures.	Chin	6/8/2011	7/26/2011	Regualtions for Working in SF Streets - "Blue Book"	Complete
20.03.01.02	Work with Traffic Engineer to overcome project constraints.		Traffic routing plans will delineate appropriate lane closures.	Chin	7/26/2011	10/14/2011	100% Final Design TR plans, dated 2/19/12 and Specification section 01 55 26 delineate lane closures	Complete
20.03.01.03	Obtain concurrences from SFFD & SFPD.		Documentation showing acceptance from SFFD & SFPD.	Chin	10/14/2011	3/19/2012		In Process
20.03.01.04	Coordinate design documents with approvals for agreed-upon street/lane closures for the project area.		Update traffic plans, construction sequence drawings, general requirements and special provisions.	Chin	7/26/2011	12/14/2011	100% plans updated to include parking lane closures on Stockton Street.	Complete
20.03.01.05	Perform Public Outreach for notification (CAG).		Public relations campaign.	Norris	12/14/2011	12/14/2011	Public outreach will be performed after contract award once contractor's schedule and work plans submittals become available. Contract documents require contractor to participate in Public Outreach.	Complete
20.03.01.06	Obtain concurrences from community		Documentation showing acceptance from Local Constituents: Churches, Schools, Merchants and Businesses	Norris	12/14/2011	12/14/2011	Public outreach will be performed after contract award once contractor's schedule and work plans submittals become available. Contract documents require contractor to participate in Public Outreach.	Complete
20.03.01.07	Coordinate revised design approach with the construction schedule.		Addendum to Contract Documents and updated project documents.	Chin	12/14/2011	6/1/2012	Addendum related to public comment is not anticipated at this time.	Complete
20.03.01.08	Impact (Cost Benefit)							
20.03.01.09	Excavation Support	Improved efficiency and use of multiple shifts for restocking the job and servicing of equipment.	Cost Estimate Update	Berry	10/14/2011	11/14/2011	Incorporated into 100% cost estimate	Complete
20.03.01.10	Excavation	Improved efficiency and use of multiple shifts for restocking the job and servicing of equipment.	Cost Estimate Update	Berry	10/14/2011	11/14/2011	Incorporated into 100% cost estimate	Complete
20.03.01.11	Structure	Improved efficiency and use of multiple shifts for restocking the job and servicing of equipment.	Cost Estimate Update	Berry	10/14/2011	11/14/2011	Incorporated into 100% cost estimate	Complete

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CTS Station – 20.03.02

Primary Mitigation ID	CTS 20.03.02	**Risk Owner**	Chin	**CP Affected**	1254	**Risk Type**	Risk	**Origination Date**	6/8/2011	**Last Update**	5/10/2012	**Date of Next Handling Step**	
Mitigation Title	Work outside normal work hours with approval from Permit issuing authority and all affected stakholders.									**CSP Risk Cateogry**	Stations	**FTA Risk Cateogry**	Construction
Handling Approach	Mitigate	**Handling Approach Strategy**	Work with City Agencies and stakeholderto arrive at concensus regarding work hours. Use convincing evidence that shorterm disruptions outweigh cost and schedule impacts.					**Root Cause**	Noise Control Ordinance stipulates maintaining certain noise levels for work outside of normal working hours.				
Status Update	FEIR contains expected noise levels. BIH Noise & Vibration Control Plan will provide additional information on noise.												
Retirement Date		**Risk Expiration Deadline**	Prior to Contact Bid	**Retirement Rationale**	Provide evidence of abilityfor contractor to obtain permit to perform work outside of normal work hours.								Current Risk Level

Handling Activity	Description of Activity to complete the Handling Activity		Expected Deliverable	Task Owner	Start Date	Finish Date	Update	Task Status
20.03.02.01	Research, identify and confirm applicablity of city codes, local ordinances and EIR for work outside of normal working hours.		Documentation of applicable city codes, rules, regulations (SF Blue Book), local ordinances (Noise Control) & EIR which apply to work outside normal hours.	Wang	6/8/2011	7/26/2011	Regulations for Working in SF Streets - "Blue Book" SF Police Code - Section 2908	Complete
20.03.02.02	Describe expected noise level from construction activities.		Expected noise levels generated during construction.	Benson	7/26/2011	3/2/2012		In Process
20.03.02.03	Obtain concurrence with City Agencies prior to bid opening.		Concurrence establishing the agreement on the work hours with DPW & DBI	Wang	7/26/2011	4/1/2012	Program feels that contract is sufficiently clear in contract documents on contractor's ability to obtain a night noise permit without obtaining concurrence from City Agencies prior to construction.	Complete
20.03.02.04	Implement and coordinate Contract Documents and project documentation based on agreed-upon work hours.		100% Construction Documents	Wang	7/26/2011	12/14/2011	Contract documents allow night work per SF Police Code Section 2908.	Complete
20.03.02.05	Perform Public Outreach for notification prior to construction.		Public Relations Campaign (Churches, Schools, Merchants and Businesses, BOS, SFPD, OES).	Norris	12/19/2012	12/14/2011	Public outreach will be performed after contract award once contractor's schedule and work plans submittals become available. Contract documents require contractor to participate in Public Outreach.	Complete
20.03.02.06	Coordinate and update revised construction sequencing and plans to the construction schedule.		Addendum to Contract Documents and updated project documents.	Wang	2/19/2012	6/1/2012	No addendum is anticipated at this time.	Complete
20.03.02.07	Impact (Cost Benefit)							
20.03.02.08	Excavation Support	Improved efficiency (minimizing startup/shutdown times per shift cycle) for cost improvement.	Cost Estimate Update	Berry	10/14/2011	11/14/2011	Incorporated into 100% cost estimate	Complete
20.03.02.09	Excavation	Improved efficiency (minimizing startup/shutdown times per shift cycle) for cost improvement.	Cost Estimate Update	Berry	10/14/2011	11/14/2011	Incorporated into 100% cost estimate	Complete
20.03.02.10	Structure	Improved efficiency for cost improvement.	Cost Estimate Update	Berry	10/14/2011	11/14/2011	Incorporated into 100% cost estimate	Complete
20.03.02.11	Architecture	Improved efficiency for cost improvement.	Cost Estimate Update	Berry	10/14/2011	11/14/2011	Incorporated into 100% cost estimate	Complete
20.03.02.12	MEP	Improved efficiency for cost improvement.	Cost Estimate Update	Berry	10/14/2011	11/14/2011	Incorporated into 100% cost estimate	Complete

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CTS Station — 20.03.03

Primary Mitigation ID	CTS 20.03.03	**Risk Owner**	Chin	**CP Affected**	1254	**Risk Type**	Risk	**Origination Date**	6/8/2011	**Last Update**	5/10/2012	**Date of Next Handling Step**	
Mitigation Title	Work performed with open access at street level with approval from Permit issuing authority and all effected stakeholders.									**CSP Risk Cateogry**	Stations	**FTA Risk Cateogry**	Construction
Handling Approach	Mitigate	**Handling Approach Strategy**	Work with City Agencies and stakeholders to arrive at concensus regarding open access for the excavation and construction of the station box. Use convincing evidence that some surface disruptions outweigh cost and schedule impacts.					**Root Cause**	Interpretation of EIR compliance and interpretation of the Preliminary Engineering (PE) final documents may preclude use of additional open access points at street level.				
Status Update	100% construction documents provide access to the headhouse and caverns mainly from the headhouse site.												
Retirement Date		**Risk Expiration Deadline**	Prior to Contact Bid	**Retirement Rationale**	Provide evidence of ability tor contractor to perform work with improved efficiency.								Current Risk Level

Handling Activity	Description of Activity to complete the Handling Activity		Expected Deliverable	Task Owner	Start Date	Finish Date	Update	Task Status
20.03.03.01	Perform Constructability Review.		Constructability Assessment Technical Memorandum	Chin	1/15/2011	1/15/2011	Constructability Review conducted in January 2011.	Complete
20.03.03.02	Develop cost reduction options and perform a ROM Cost Comparison Analysis between options.		Sketches of Cost-Savings Options (for estimating) and QTO of significant cost driver elements.	Chin	7/26/2011	12/14/2011	Construction methodology did not change as a result of the constructability review.	Complete
20.03.03.03	Implement selected cost-saving option.		Updated Contract Drawings and Specifications; General Requirements and Special Provisions.	Chin	7/26/2011	12/16/2011	No cost-saving options for access were implemented.	Complete
20.03.03.04	Impact (Cost Benefit)							
20.03.03.05	Excavation Support	Improved efficiency for cost improvement.	Cost Estimate Update	Berry	10/14/2011	11/14/2011	Incorporated into 100% cost estimate	Complete
20.03.03.06	Excavation	Improved efficiency for cost improvement.	Cost Estimate Update	Berry	10/14/2011	11/14/2011	Incorporated into 100% cost estimate	Complete
20.03.03.07	Structure	Bottoms-up method will be less senstive to traffic and on-site restrictions for cost improvement.	Cost Estimate Update	Berry	10/14/2011	11/14/2011	Incorporated into 100% cost estimate	Complete
20.03.03.08	Architecture	Improved efficiency and sequencing of work including supply of material and equipment to site.	Cost Estimate Update	Berry	10/14/2011	11/14/2011	Incorporated into 100% cost estimate	Complete
20.03.03.09	MEP	Improved efficiency and sequencing of work including supply of material and large equipment to site by improved access.	Cost Estimate Update	Berry	10/14/2011	11/14/2011	Incorporated into 100% cost estimate	Complete

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CTS Station — 40.08.01

Primary Mitigation ID	CTS 40.08.01	**Risk Owner**	Chin	**CP Affected**	1254	**Risk Type**	Risk	**Origination Date**	6/8/2011	**Last Update**	5/10/2012	**Date of Next Handling Step**	
Mitigation Title	Work performed utilizing street or lane closures with approval from Permit issuing authority and all affected stakeholders.									**CSP Risk Cateogry**	Stations	**FTA Risk Cateogry**	Construction
Handling Approach	Mitigate	**Handling Approach Strategy**	Work with City Agencies and stakeholders to arrive at concensus regarding street and/or lane closures. Use convincing evidence that short term disruptions outweigh cost and schedule impacts.					**Root Cause**	Regulations for Working San Francisco Streets stipulates maintaining minimum through traffic lanes during normal and moratorium time periods.				
Status Update	Washington Street will be closed to allow construction of the headhouse roof in Washington St. Traffic will be detoured away from headhouse on Washington.												
Retirement Date		**Risk Expiration Deadline**	Prior to Contact Bid	**Retirement Rationale**	Provide evidence of ability tor contractor to obtain Special Traffic Permit to conduct work with street and/or lane closures at the project site.							Current Risk Level	

Handling Activity	Description of Activity to complete the Handling Activity	Expected Deliverable	Task Owner	Start Date	Finish Date	Update	Task Status
40.08.01.01	Research and document traffic requirements governing construction in the ROW and for street/lane closures.	Copy of applicable traffic stipulation which apply to street and lanes closures.	Chin	6/8/2011	7/26/2011	Regualtions for Working in SF Streets - "Blue Book"	Complete
40.08.01.02	Work with Traffic Engineer to overcome project constraints.	Traffic routing plans will delineate appropriate lane closures.	Chin	7/26/2011	10/14/2011	100% Final Design TR plans, dated 12/19/11 Drawing TR-021 shows complete closure of Stockton Street Specification section 01 55 26 delineate lane closures	Complete
40.08.01.03	Obtain concurrences from SFFD & SFPD.	Documentation showing acceptance from SFFD & SFPD.	Chin	10/14/2011	12/14/2011	Initial meeting held with SFFD.	Complete
40.08.01.04	Coordinate design documents with approvals for agreed-upon street/lane closures for the project area.	Update traffic plans, construction sequence drawings, general requirements and special provisions.	Chin	7/26/2011	12/14/2011	100% plans updated to include parking lane closures on Stockton Street.	Complete
40.08.01.05	Perform Public Outreach for notification (CAG).	Public relations campaign.	Norris	12/14/2011	12/14/2011	Public outreach will be performed after contract award once contractor's schedule and work plans submittals become available. Contract documents require contractor to participate in Public Outreach.	Complete
40.08.01.06	Obtain concurrences from community.	Documentation showing acceptance from Local Constituents: Churches, Schools, Merchants and Businesses	Norris	12/14/2011	12/14/2011	Public outreach will be performed after contract award once contractor's schedule and work plans submittals become available. Contract documents require contractor to participate in Public Outreach.	Complete
40.08.01.07	Coordinate revised design approach with the construction schedule.	Addendum to Contract Documents and updated project documents.	Chin	2/19/2012	4/26/2012	Addendum related to public comment is not anticipated at this time.	Complete
40.08.01.08	Impact (Schedule Benefit)						
40.08.01.09	Project Management & Field Supervision	Construction Schedule Update	Berry	10/14/2011	11/14/2011	Incorporated into MPS	Complete
40.08.01.10	Project Expenses	Construction Schedule Update	Berry	10/14/2011	11/14/2011	Incorporated into MPS	Complete
40.08.01.11	Traffic Control	Construction Schedule Update	Berry	10/14/2011	11/14/2011	Incorporated into MPS	Complete

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CTS Station — 40.08.02

Primary Mitigation ID	CTS 40.08.02	**Risk Owner**	Chin	**CP Affected**	1254	**Risk Type**	Risk	**Origination Date**	6/8/2011	**Last Update**	5/10/2012	**Date of Next Handling Step**	
Mitigation Title	Work outside normal work hours with approval from Permit issuing authority and all affected stakholders.									**CSP Risk Cateogry**	Stations	**FTA Risk Cateogry**	Construction
Handling Approach	Mitigate	**Handling Approach Strategy**	Work with City Agencies and stakeholderto arrive at concensus regarding work hours. Use convincing evidence that shorterm disruptions outweigh cost and schedule impacts.					**Root Cause**	Noise Control Ordinance stipulates maintaining certain noise levels for work outside of normal working hours.				
Status Update	FEIR contains expected noise levels. BIH Noise & Vibration Control Plan will provide additional information on noise.												
Retirement Date		**Risk Expiration Deadline**	Prior to Contact Bid	**Retirement Rationale**	Provide evidence of ability for contractor to obtain permit to perform work outside of normal work hours.								Current Risk Level

Handling Activity	Description of Activity to complete the Handling Activity	Expected Deliverable	Task Owner	Start Date	Finish Date	Update	Task Status
20.03.02.01	Research, identify and confirm applicablity of city codes, local ordinances and EIR for work outside of normal working hours.	Documentation of applicable city codes, rules, regulations (SF Blue Book), local ordinances (Noise Control) & EIR which apply to work	Wang	6/8/2011	7/26/2011	Regulations for Working in SF Streets - "Blue Book" SF Police Code - Section 2908	Complete
20.03.02.02	Describe expected noise level from construction activities.	Expected noise levels generated during construction.	Benson	7/26/2011	1/2/2012		In Process
20.03.02.03	Obtain concurrence with City Agencies prior to bid opening.	Concurrence establishing the agreement on the work hours with DPW & DBI	Wang	7/26/2011	4/1/2012	Program feels that contract is sufficiently clear in contract documents on contractor's ability to obtain a night noise permit without obtaining concurrence from City Agencies prior to construction.	Complete
20.03.02.04	Implement and coordinate Contract Documents and project documentation based on agreed-upon work hours.	100% Construction Documents	Wang	7/26/2011	12/14/2011	Contract documents allow night work per SF Police Code Section 2908.	Complete
20.03.02.05	Perform Public Outreach for notification prior to construction.	Public Relations Campaign (Churches, Schools, Merchants and Businesses, BOS, SFPD, OES).	Norris	12/19/2012	12/14/2011	Public outreach will be performed after contract award once contractor's schedule and work plans submittals become available. Contract documents require contractor to participate in Public Outreach.	Complete
20.03.02.06	Coordinate and update revised construction sequencing and plans to the construction schedule.	Addendum to Contract Documents and updated project documents.	Wang	2/19/2012	6/1/2012	No addendum is anticipated at this time.	Complete
20.03.02.07	Impact (Schedule Benefit)						
20.03.02.08	Project Management & Field Supervision	Construction Schedule Update	Berry	10/14/2011	11/14/2011	Incorporated into MPS	Complete
20.03.02.09	Project Expenses	Construction Schedule Update	Berry	10/14/2011	11/14/2011	Incorporated into MPS	Complete
20.03.02.10	Traffic Control	Construction Schedule Update	Berry	10/14/2011	11/14/2011	Incorporated into MPS	Complete

central T subway

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CTS Station — 40.08.03

Primary Mitigation ID	CTS 40.08.03	**Risk Owner**	Chin	**CP Affected**	1254	**Risk Type**	Risk	**Origination Date**	6/8/2011	**Last Update**	5/10/2012	**Date of Next Handling Step**	
Mitigation Title	Work performed with open access at street level with approval from Permit issuing authority and all effected stakeholders									**CSP Risk Cateogry**	Stations	**FTA Risk Cateogry**	Construction
Handling Approach	Mitigate	**Handling Approach Strategy**	Work with City Agencies and stakeholders to arrive at concensus regarding open access for the excavation and construction of the station box. Use convincing evidence that some surface disruptions outweigh cost and schedule impacts.					**Root Cause**	Interpretation of EIR compliance and interpretation of the Preliminary Engineering (PE) final documents may preclude use of additional open access points at street level.				
Status Update	Access to the headhouse and caverns is planned to occur mainly from the headhouse site.												
Retirement Date		**Risk Expiration Deadline**	Prior to Contact Bid	**Retirement Rationale**	Provide evidence of ability tor contractor to perform work with improved efficiency.								Current Risk Level

Handling Activity	Description of Activity to complete the Handling Activity	Expected Deliverable	Task Owner	Start Date	Finish Date	Update	Task Status
40.08.03.01	Perform Constructability Review.	Constructability Assessment Technical Memorandum	Chin	1/15/2011	1/15/2011	Constructability Review conducted in January 2011.	Complete
40.08.03.02	Develop cost reduction options and perform a ROM Cost Comparison Analysis between options.	Sketches of Cost-Savings Options (for estimating) and QTO of significant cost driver elements.	Chin	7/26/2011	12/14/2011	Construction methodology did not change as a result of the constructability review.	Complete
40.08.03.03	Implement selected cost-saving option.	Updated Contract Drawings and Specifications; General Requirements and Special Provisions.	Chin	7/26/2011	12/16/2011	No cost-saving options for access were implemented.	Complete
40.08.03.04	Impact (Schedule Benefit)						
40.08.03.05	Project Management & Field Supervision	Construction Schedule Update	Berry	10/14/2011	11/14/2011	Incorporated into MPS	Complete
40.08.03.06	Project Expenses	Construction Schedule Update	Berry	10/14/2011	11/14/2011	Incorporated into MPS	Complete
40.08.03.07	Traffic Control	Construction Schedule Update	Berry	10/14/2011	11/14/2011	Incorporated into MPS	Complete

APPENDIX G - CONSTRUCTION CONTRACTING STRATEGY

REVIEW OF CONSTRUCTION CONTRACTING STRATEGY

Central Subway Project

San Francisco Municipal Transportation Agency (SFMTA)
San Francisco, California

Draft report delivered to FTA on October 1, 2012
Final report delivered to FTA on October 16, 2012

PMOC Contract No.: DTFT60-09-D-00015
Task Order No. 003
Project No.: DC-27-5139
Work Order Number: 006
OP Referenced: 32D
CLIN 0003A

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EXECUTIVE SUMMARY

A. INTRODUCTION

The Central Subway Project (CSP) developed and adopted a construction delivery methodology during the Preliminary Engineering (PE) phase of the project, which recommended seven construction contracts for delivery of the Program. This strategy was developed in part to provide:

- Larger bidder pool, which would include contractors that are familiar with individual types of work and are better able to obtain insurance and bonding;
- Start of some construction contracts before all design is completed; and
- Better opportunities for small and local businesses for specific bid packages such as utility relocation.

The Project Management Oversight Contractor (PMOC) was requested by the Federal Transit Administration (FTA) to report on the recent developments for the CSP Revised Construction Contracting Strategy.

The Project awarded the first three of the seven construction contracts. The revised strategy now being evaluated is based on results and observations of the fourth and fifth construction contracts [Chinatown Station (CTS) and Union Square/Market Street Station (UMS)]. The Program convened Senior Managers to discuss alternatives to the current contracting strategy to address the potential higher cost of the remaining contracts. The team recommended combining the four remaining contracts (three Stations and the Systems) into one contract (+/- $720 million), and additionally, providing an option for the contracting community to choose individual contracts, which would be consistent with the current contracting strategy. A rough estimate of project savings is between $16 and $35 million.

Project Description

The CSP, Phase 2 of the Third Street Light Rail Transit Project, consists of the design and construction of a 1.7-mile extension of the Third Street light rail line from the Caltrain regional rail terminus at Fourth and King Streets to Chinatown. Three subway stations (Moscone, Union Square/Market Street, and Chinatown) and one surface station in the South of Market area will be constructed.

B. SUMMARY OF OBSERVATIONS/FINDINGS

In reviewing this new contracting strategy, the PMOC has taken into consideration the previously produced deliverables including the December 19, 2008 Working Paper – Construction Contracting Strategy-Construction Contracting Recommendations, Rev. 0 and Workshops held during two days in September 2012.

Following are findings from the PMOC's review:

- The CSP developed and adopted a construction delivery methodology during the PE phase of the project, which recommended seven construction contracts for delivery of the Program.

- Three of the seven construction contracts have been awarded. For the fourth contract, CTS, all bids were rejected in August 2012. The fifth contract for UMS was advertised in April 2012 with the bid opening currently extended until November 2012.
- CSP Senior Managers now recommend combining the four remaining contracts (three Stations and the Systems) into one contract and also providing the contracting community with the option to bid on individual contracts.
- Utilizing a combined contract approach for the remaining contracts has several advantages:
    - Cost savings due to economies of scale;
    - Schedule savings as some activities can be advanced concurrently; and
    - Less risk due to reduced interfaces between contracts.

C. RECOMMENDATIONS / PMOC OPINIONS

It is the PMOC's opinion that combining the four remaining construction contracts into one has both cost and schedule advantages. The biggest advantage is a reduction in risk for interface issues resulting between individual contracts.

The CSP needs to develop a detailed implementation plan.

The PMOC will continue to monitor the implementation of the revised Contracting Strategy as it develops in the coming weeks.

TABLE OF CONTENTS

I. INTRODUCTION

The CSP will include the construction of several stations, tunneled guideway sections, train systems, utility relocations, and traffic control in a dense urban environment. Underground construction in general, and this project in particular, is inherently complex and risky, invariably involving geologic unknowns and highly congested work conditions that can result in construction changes and impacts that can significantly affect cost and schedule. The design approach and contract clauses can help reduce these impacts, but success also depends on the project delivery and contract packaging, which must be suited to the project and to the owner's constraints.

The CSP developed and adopted a construction delivery methodology during the PE phase of the project, which recommended seven construction contracts for delivery of the Program.

Presently, this strategy has come into question with the fourth and fifth construction contracts (CTS and UMS). See Section II. A. for details.

The Program convened Senior Managers to discuss alternatives to the current contracting strategy to address the potential higher cost of the remaining contracts. The Managers had two meetings to discuss various alternatives including modification of the existing contracts and combining of contracts. The team recommended combining the four remaining contracts (three Stations and the Systems) into one contract (+/- $720 million), and additionally, providing an option for the contracting community to choose individual contracts, which would be consistent with the current contracting strategy.

II. PMOC'S REVIEW AND ANALYSIS

The objectives of this review are to verify that the Grantee has developed a rational plan for project delivery; that the plan is based on satisfying the Grantee's objectives for the project or its individual parts; that the plan is based on the unique characteristics of the project; that the plan was developed with consideration of the current and expected conditions of the local and national construction market place; that the project delivery method(s) chosen are appropriate for the associated project element; and that the plan takes into account the Grantee's technical capacity and capability.

History of Central Subway Contracting Strategy

A. DECEMBER 19, 2008, WORKING PAPER – Construction Contracting Strategy - Construction Contracting Recommendations, Rev 0.

This working paper (Attachment 1) constitutes the deliverable for Task 1.10, Construction Contracting Strategy, of the PE Scope of Services. It sets forth the project team's recommendations for project delivery, contract packaging, and certain related contract terms and conditions. In developing the report, the team considered input provided by a Board of Consultants at workshops and meetings, as well as other factors of importance to the project.

The CSP developed and adopted a construction delivery methodology as part of this PE task, recommending seven construction contracts for delivery of the Program. This strategy was developed in part to provide:

- Larger bidder pool, which would include contractors that are familiar with individual types of work and are better able to obtain insurance and bonding;
- Start of some construction contracts before all design is completed; and
- Better opportunities for small and local businesses for specific bid packages such as utility relocation.

The key criteria for contract packaging strategy are: cost, risk, and community/environmental considerations. Taking these into account, the project team recommended the following contract packages:

- Contract 1: Early utility relocation (1)
- Contract 2: Early utility relocation (2)
- Contract 3: Tunnel Contract
- Contract 4: Union Square / Market Street Station
- Contract 5: Chinatown Station and Crossover
- Contract 6: Moscone Station (MOS)
- Contract 7: Surface, Track, and Systems (STS)

B. SEPTEMBER 11, 2012 - WORKSHOP FOR CONTRACTING STRATEGY REPORT REVISION (see Attachment 2, Agenda, and Attachment 8, Draft Memo)

1. Review of the Central Subway Contracting Strategy Report

The CSP developed and adopted a construction delivery methodology as part of the PE task which recommended seven construction contracts for delivery of the Program.

This strategy has been utilized for the first three construction contracts by advancing two Utility Relocation contracts and the Tunnel contract.

2. Review of the Proposed Revision to the Contract Strategy for One Construction Contract

The original strategy has presently come into question with the fourth and fifth construction contracts. For the CTS contract, four bids were received June 12, 2012, with the lowest responsive bid being $30 million over the engineer's estimate. Subsequently, on August 24, 2012, the San Francisco Municipal Transportation Agency (SFMTA) rejected of all bids for CTS and planned to re-advertise the contract. Currently, bids for UMS are being prepared by Contracts with bid opening scheduled for September 6, 2012. Based on 200 plus questions and comments from the bidders and despite clarification provided in eight addenda, the CSP is anticipating bids that will be significantly higher than the engineer's estimate of $210 million.

The Program convened Senior Managers to discuss alternatives to the current contracting strategy to address the potential higher cost of the remaining contracts. The Managers had two meetings to discuss various alternatives including modification of the existing contracts and combining of contracts. The team recommended combining the four remaining contracts (three Stations and the Systems) into one contract.

3. Program Impacts

The advantages of a combined contract approach, as evaluated during PE, was the economies of scale available in a single contract, which was forfeited by multi-prime contracts with separate overhead and mobilization costs. The primary disadvantages of the combined contract approach, also evaluated during PE, have in actuality been overtaken by events described below. The previously evaluated advantages of the multiple-prime contract approach has been negated because: 1) the bidding pool for Stations and System contracts appears capable of obtaining insurance and bonding; 2) design is complete for the remaining contracts; 3) contract requirements include Small Business Enterprise (SBE) goals.

Utilizing a combined contract approach for the remaining contracts has several advantages:

a. Cost savings due to economies of scale;
b. Schedule savings as some activities can be advanced concurrently; and
c. Less risk due to reduced interfaces between contracts.

- Contractor Efficiency / Economy of Scale: Mobilization, management, reduced field offices. Estimated at 1-2.5 percent in savings.
- Concurrent Construction Opportunities: Currently, STS Civil work needs full access through the tunnels. Platform work by station contractors needs to be done prior to STS contractor access. STS work would be more efficient if work could happen at many access points. The revised approach gains both time and access opportunities for the STS contractor. Estimated at $5-10 million in savings.
- Interface Constraints: It is difficult for the CSP to maintain milestones. Contractor will absorb more risk, leading to a reduction in claims. Currently, the STS contractor has to buy into the station contractor work products. Fewer subcontractors.
- Schedule: Current Master Project Schedule versus revised, combined strategy schedule (Attachment 7). Many overlapping activities in the current schedule could present savings to schedule. Later start would be needed. Estimated savings at four months.
- Insurance / Bonding Capacity: The CSP currently has an excess liability policy of $150 million. Underwriters want to know who the contractor is and their risk. General liability for both Barnard and Amoroso were very high. It is possible to pre-qualify bidders to keep insurance cost down. Action: Ask insurer what the pre-qualification standards should be. Current insurance estimate is 2.1 percent, but bidders have been getting quotes in the 5.0 percent range. There is an issue of bonding capacity. There may be consideration of reducing the bond, but it would need SFMTA Board approval, which will take six to eight weeks.
- Potential cost savings: A rough estimate of project savings is between $16 and $35 million.

4. Revisit Initial Contracting Selection Matrix for One Contract Option

See Attachment 4.

5. Program Implementation Strategy

- The combined contract approach for Stations and Systems will be implemented by utilizing the currently developed contract drawings and specifications as four elements within the single procurement (elements are identified as contracts 1253, 1254, 1255, and 1256) consisting of:
    - One Proposal and Contract Forms that describe the structure of the procurement;
    - One General Provisions section;
    - One Special Provisions section that consolidates current separate Special Provisions;
    - Separate Division 01 – General Requirements (revises contract interface requirements and constraints);

    - Separate Division 02- 34 Technical Specifications for each element;
    - Separate Contract Drawings for each element (revised to address reference between elements);
    - Separate Reference Documents for each element.
- Revised Bid Sheets
- Bid / Award Period for 12 Weeks
- New Bid Date

6. Next Steps

- Refine potential cost and schedule benefits and market for insurance and bonding capacity.
- Notify SFMTA Board, funding partners, and elected officials of recommendation to change contracting strategy.
- Cancel UMS contract currently advertised.
- Prepare combined construction contract for advertising in October 2012. Clean up all the language in the plans that read "by others" and Not Included (NIC). Need to have very clear and concise contract documents.
- Educate community.
- Reach out to contractors.

C. SEPTEMBER 18, 2012 - FOLLOW-UP WORKSHOP (see Attachment 3, Agenda)

Action items from the September 11, 2012, Workshop that were discussed at the September 18, 2012, Follow-up Workshop are:

1. Follow-up with Contractors that have bid and those who have expressed interest in the program (but have not bid) such as Kiewit, Dragados, Kenny, Obayashi, and others.

   Project had discussions with two contractors about combining the contracts. They were in favor of combining. There was a follow-up meeting with Kiewit, where they stated they will definitely bid on a combined package. Contractors want clear drawings and Specifications and want to be confident that they can earn a profit. The CSP would like to communicate with the contracting community to widen the bidder pool. Contractors who pulled plans cannot be contacted.

2. Discuss with AON (insurance carrier) potential options to reduce insurance price quotes to contractors. What Qualifications (in lieu of Pre-Qualifications) are suggested?

   Discussions with the insurance carrier were favorable. Insurance will be high due to lack of insurer competition (see Attachment 5).

3. Evaluate perceived small business opportunities for large single contract. It may be a loss of opportunities for SBEs.

There has been continued discussion of how to determine the award. No clear direction was developed.

4. Further investigate the use of an "A plus B plus C" option to mitigate perceived reduction in opportunities; refine how to award.

   No clear direction was developed.

5. Further investigate need to reduce bonding capacity requirement to 50 percent, as regards Federal, State, and City regulations, including Administrative Code section 6.

   Reduced bonding may work. Bonding on a combined package is not a problem according to the contractors.

6. Provide a bid option if price of combined contract is too high. Deferred (multiple) Notices to Proceed, removable options, defer MOS, others.

   Fallback if bids are too high is still unresolved.

7. Develop an Implementation Plan for the Combined Package.

   In progress (see Attachment 6).

8. Establish CCO / SBE goals for large contract.

   The Contracting Office is currently determining SBE goals.

III. CONCLUSIONS

A. SUMMARY OF OBSERVATIONS/FINDINGS

The advantage of a combined contract approach, as evaluated during PE, was the economies of scale available in a single contract, which was forfeited by multi-prime contracts with separate overhead and mobilization costs. The primary disadvantages of the combined contract approach, also evaluated during PE, have in actuality been overtaken by events as the CSP has progressed to its current conditions. The previously evaluated advantages of the multiple-prime contract approach has been negated because: 1) the bidding pool for Stations and System contracts appears capable of obtaining insurance and bonding; 2) design is complete for the remaining contracts; and 3) contract requirements include SBE goals.

Utilizing a combined contract approach for the remaining contracts has several advantages:

- Cost savings due to economies of scale;
- Schedule savings as some activities can be advanced concurrently; and
- Less risk due to reduced interfaces between contracts.

A rough estimate of project savings is between $16 and $35 million.

The combined contract approach for Stations and Systems will be implemented by utilizing the currently developed contract drawings and specifications as four elements within the single procurement (elements identified as contracts 1253, 1254, 1255, and 1256) consisting of:

- One Proposal and Contract Forms that describe the structure of the procurement;
- One General Provisions section;
- One Special Provisions section that consolidates current separate Special Provisions;
- Separate Division 01 – General Requirements (revises contract interface requirements and constraints);
- Separate Division 02- 34 Technical Specifications for each element;
- Separate Contract Drawings for each element (revised to address reference between elements);
- Separate Reference Documents for each element.

B. RECOMMENDATIONS / PMOC OPINIONS

- It is the PMOC's opinion that combining the four remaining construction contracts into one has both cost and schedule advantages. The biggest advantage is a reduction in risk for interface issues resulting between individual contracts.
- The CSP should continue to develop options if they do not get enough bidders.
- The CSP needs to develop a detailed implementation plan, discuss how the combined package will be put together, and make adjustments to drawings and Technical Specifications that read as "by others" and NIC, currently shown on many of the drawings.
- The CSP should continue with outreach to contractors and the community.

- The PMOC is concerned that the local contracting community will push back because of perceived reduced opportunity with the one contract/combined package.
- The PMOC is not aware of the FTA bond requirements associated with the Grantee pursuing less than 100 percent performance and payment bonds. (FTA response is requested.)
- The CSP needs to develop very clear award definitions, which the PMOC has not seen, to avoid bid protests, possibly resulting in award and consequently project delay.
- The CSP needs to develop a Plan B Fallback in case the combined procurement exceeds the budget by 10 percent. The CSP will also need to receive buy-in from the Board to exercise Plan B.
- The CSP has to make a decision about the contracting strategy so the project can continue and the schedule can be maintained.

APPENDIX A: LIST OF ACRONYMS

CSP	Central Subway Project
CTS	Chinatown Station
FTA	Federal Transit Administration
MOS	Moscone Station
NIC	Not Included
OP	Oversight Procedure
PE	Preliminary Engineering
PMOC	Project Management Oversight Contractor
SBE	Small Business Enterprise
SFMTA	San Francisco Municipal Transportation Agency
STS	Surface, Track, and Systems
UMS	Union Square Market Street (Station)

Contract No: CS-138 – Central Subway
Routing Date 1-12-09
File No.: 1.10-01
Doc No.: 03931 Initials: AMC
MTA Project No. M544 PB/Wong Project No. 13217

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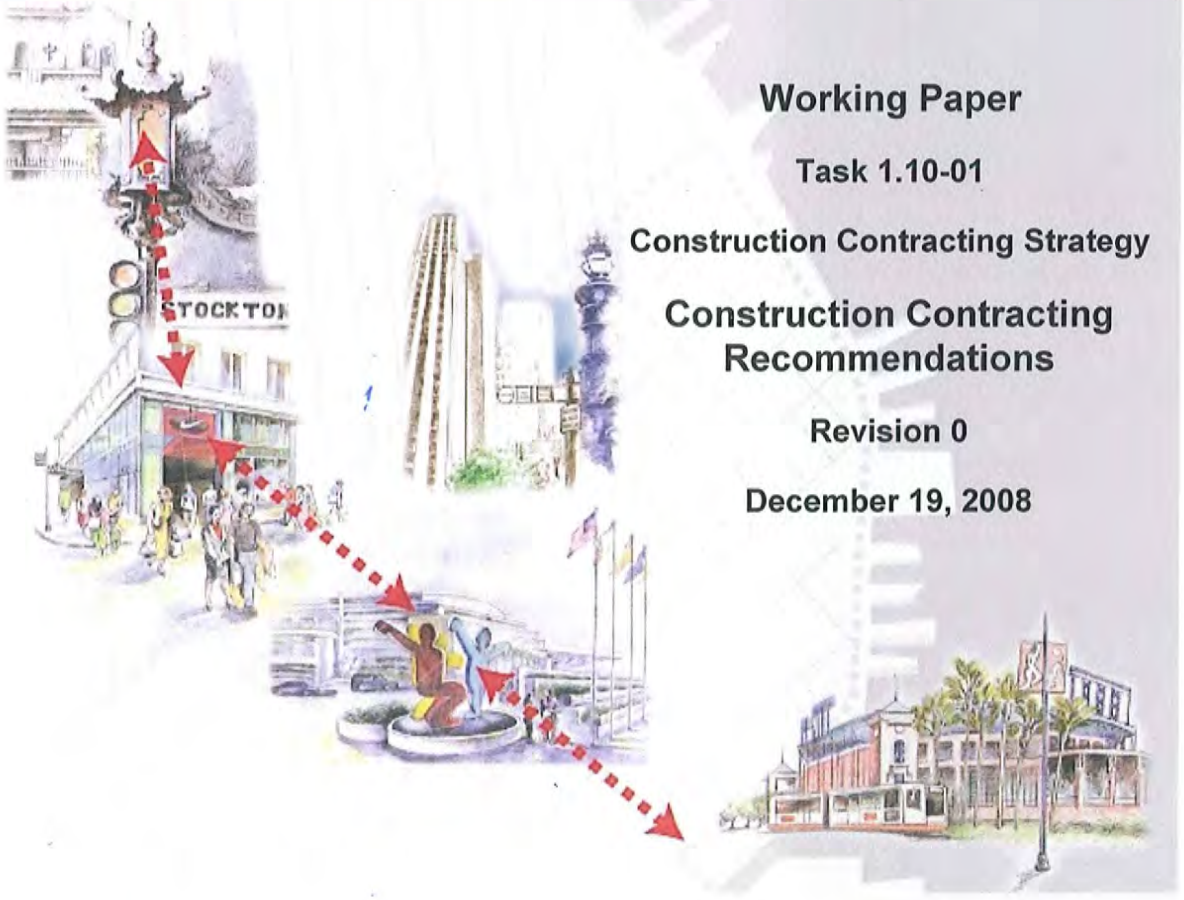

Working Paper

Task 1.10-01

Construction Contracting Strategy

Construction Contracting Recommendations

Revision 0

December 19, 2008

Prepared for:

SFMTA | CITY AND COUNTY OF SAN FRANCISCO
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central T subway

Working Paper

Task 1.10-01

Construction Contracting Strategy

Construction Contracting Recommendations

Revision 0

December 19, 2008

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1. EXECUTIVE SUMMARY

The furtherance of the final design for the Central Subway relies in part upon the approach to construction contracting, which includes both the delivery method (e.g., design-bid-build, design-build, or other hybrid methods) and the packaging strategy (e.g., number and configuration of individual construction contracts). Because decisions about delivery method can affect contract packaging, and vice versa, these approaches have been evaluated concurrently.

The selection of a delivery method is based upon the following criteria: cost, schedule, social/political considerations, administration, and litigation/liability risk. The project team applied these criteria in evaluating the delivery methods deemed feasible for the Central Subway project. Using an evaluation process, the team concluded that the highest-ranked, and thus recommended, delivery method was multiple Firm-Fixed-Price/Design-Bid-Build contracts using a mechanism that can trigger negotiation if the bid prices exceed a certain threshold.

The key criteria for contract packaging strategy are: cost, risk, and community/environmental considerations. Taking these into account, the project team recommends the following contract packages(1):

- Contract 1: Early utility relocation (1)
- Contract 2: Early utility relocation (2)
- Contract 3: Tunnel Contract
- Contract 4: Union Square / Market Street Station
- Contract 5: Chinatown Station and Crossover
- Contract 6: Moscone Street Station
- Contract 7: Surface, Systems and Trackwork

One of the greatest risks on the Central Subway project is the market condition at the time of bidding (i.e., whether there will be a sufficient number of qualified bidders to generate economic competition). To mitigate this risk, the project team discussed potential changes to a number of contract terms and conditions in an attempt to attract qualified contractors and thereby obtain the most competitive bid prices. In conjunction with recommendations by the Board of Consultants (BOC), the following recommendations are made:

- Use an Owner-Controlled Insurance Program (OCIP)
- Incorporate preconstruction surveys
- Establish contractor qualification procedures
- Use Partnering
- Consider separate procurement contracts for certain materials and equipment
- Incorporate schedule incentives into the contract
- Use differing site condition clauses and geotechnical baseline reports
- Use dispute review boards on underground segments of the work
- Incorporate escalation provisions for key commodities
- Use escrow bid documents
- Revise the City standard changes clause
- Incorporate provisions to allow payment for material stored on- and off-site
- Establish a separate allowance for TBM mobilization
- Enable retention release for completed subcontractor work

- Avoid the use of a Project Labor Agreement
- Address worker training, either through City Build or some other method
- Evaluate the impact of the 12B ordinance on the work
- Analyze each contract for reasonable Federal DBE goals

Further evaluation of these recommendations will be undertaken during preliminary and final design.

(1) The body of the report reflects the conclusions of the Board of Consultants for contract packaging based upon the information available at that time of the contracting strategy workshop. This resulted in the Board of Consultants recommending the following contract packages.

- *Contract 1: Early utility relocation*
- *Contract 2: Tunnel contract*
- *Contract 3: Chinatown Station*
- *Contract 4: Union Square Station / Moscone Station*
- *Contract 5: South portal to King Street (surface line)*
- *Contract 6: Systems, traction power, and controls (project-wide)*
- *Contract 7: Vehicles*

Subsequent to the Contracting Strategy Workshop a Guideway Tunnel Risk Assessment concluded that constructing the guideway tunnels in advance of the stations presented the least risk option for the project. As a result the excavation of Moscone Station could be uncoupled from the Tunnel contract. This resulted in a slight change to the BOC recommended contract strategy.

To support early construction of the guideway tunnels it was further recommended that utilities at the tunnel construction shaft be relocated in advance along with those utilities at UMS and MOS that need to be relocated to support early tunnel construction. Other utility relocations could be carried out as a separate contract or as part of the main works contract at each station. Two early utility relocation contracts were recommended.

Upon early completion of the tunnels the tunnel construction worksite area could be handed over to a surface, systems and trackwork contractor. The surface works south of Bryant Street could be used for fabrication of the trackwork. Systems installation in the tunnels is dependant upon installation of the trackwork. To avoid schedule delays it was decided to combine these three elements of the project into one contract.

Vehicle procurement would be a part of an overall SFMTA vehicle procurement program and therefore did not require a separate contract.

Notwithstanding the contracting packaging strategy recommended by the Board of Consultants , the revised contract packages at the time of this report are:

- *Contract 1: Early utility relocation (1)*
- *Contract 2: Early utility relocation (2)*
- *Contract 3: Tunnel Contract*
- *Contract 4: Union Square / Market Street Station*
- *Contract 5: Chinatown Station and Crossover*
- *Contract 6: Moscone Street Station*
- *Contract 7: Surface, Systems and Trackwork*

A detailed breakdown of the revised construction contract packages is provided in Appendix A.

2. INTRODUCTION

The Central Subway project will include the construction of several stations, tunneled guideway sections, train systems, utility relocations, and traffic control in a dense urban environment. Underground construction in general, and this project in particular, is inherently complex and risky, invariably involving geologic unknowns and highly congested work conditions that can result in construction changes and impacts that can significantly affect cost and schedule. The design approach and contract clauses can help reduce these impacts, but success also depends on the project delivery and contract packaging, which must be suited to the project and to the owner's constraints.

2.1 PURPOSE AND SCOPE

This working paper constitutes the deliverable for Task 1.10, Construction Contracting Strategy, of the Preliminary Engineering Scope of Services.[1] It sets forth the project team's recommendations for project delivery, contract packaging, and certain related contract terms and conditions. In developing this report, the team considered input provided by a Board of Consultants and at workshops and meetings, as well as other factors of importance to the project.

The first part of this report (Sections 2 through 4) addresses project delivery methods, including design-bid-build, design-build, and other hybrid approaches. First is a discussion of the evaluation criteria. Then, each of the project delivery methods are evaluated against the criteria. Lastly, the evaluation is summarized and a recommendation is made.

The second part of this report (Section 5) addresses the contract packaging strategy, including a recommendation as to what parts of the work should be advertised together in one contract, and what parts are better suited to being advertised as separate contracts. The evaluation is based on criteria similar to those used to evaluate project delivery, and evaluates benefits and drawbacks associated with potential combinations or segmentation of the project.

The third part of this report (Section 6) summarizes the agreed-upon strategy for mitigating market risk and discusses contract terms and conditions that should be included in the various prime contracts. The team recognizes that the Central Subway project will require the participation of contractors from outside the local area who are not familiar with standard practices in San Francisco, and therefore to encourage national and international contractors to submit bids, it is considered good strategy to include contract terms and conditions that specifically address risks inherent in underground construction.

2.2 PROJECT BACKGROUND

The Third Street Light Rail project was undertaken by the San Francisco Municipal Transportation Agency (SFMTA) to extend Muni rail transit service from Visitacion Valley to Chinatown in San Francisco. Phase 1 of the project (also known as the Initial Operating Segment) was placed into revenue service on April 7, 2007. Phase 2 (the Central Subway) would extend the line north on Fourth and Stockton Streets from King Street to Jackson Street.

The modified locally preferred alternative (LPA, Option B) of the Central Subway would extend 1.7 miles north from the T-Third line terminus at Fourth and King Streets to Chinatown. After stopping at the station platform on Fourth at King, light rail would continue north on Fourth Street to a surface station at Brannan Street, then proceed underground via a double-track portal between Bryant and

[1] A separate Technical Memorandum summarizing assumptions, alternatives evaluated, evaluation factors, and results was not developed, but the information is incorporated in this Working Paper.

Harrison Streets under 1-80. The LPA includes three subway stations: Moscone, Union Square/Market Street, and Chinatown.

To accommodate light rail south of the portal, Fourth Street would be converted from one-way southbound traffic to two-way traffic. Overhead wire for some electric trolley bus lines would be relocated, and some existing bus stops would be retained on Fourth Street. The trolleys would continue on a new turnaround loop via Brannan, Fifth, and Townsend.

2.3 EVALUATION APPROACH

To determine the most advantageous project delivery method and contract packaging approach, a contracting strategy workshop was held on May 31, 2007 and June 1, 2007 at the San Francisco Municipal Transportation Agency (SFMTA) offices. In attendance were the SFMTA's Board of Consultants[2], design team representatives, SFMTA staff, and the representatives of the Federal Transit Administration (FTA), the San Francisco County Transportation Authority (SFCTA), and the Project Management Oversight Consultants. A list of attendees is included in Appendix B. The Board of Consultants issued a report dated June 2007, which is attached as Appendix A. At this workshop the following activities were undertaken:

- Project field tour for representatives of the Board of Consultants.
- An overview presentation of the project by the design team, including geotechnical conditions, station construction methods, rail and systems.
- Discussion of the current cost estimate.
- Review of contracting alternatives, and a discussion of appropriate criteria.
- Discussion of contract packaging options proposed by the design team.
- Alternative contract packaging options.

The goal of this workshop was to generate recommendations for both project delivery methods and contract packaging approaches to be used as the project design is developed.

After concluding that further input was needed, particularly on the delivery methods, a subsequent meeting was held on September 20, 2007 at the Central Subway project office at 821 Howard Street. A list of attendees is included in Appendix B. This meeting included a discussion of various delivery methods during which each of the options was evaluated by the attendees using a numeric ranking process. The resulting comparison of various delivery methods was used as the basis of the team's recommendations. A representative of the Board of Consultants participated in the evaluation. The discussion also focused on a list of contract terms and conditions and proposed changes, additions, and deletions which might result in the receipt of more competitive bid prices.

At the conclusion of this session, an action plan was prepared which identifies specific activities to be undertaken to advance the agreed-upon recommendations.

[2] Eli Choueiry, Jack Lemley, William A. Prey, and J. Paul Silvestri, Jr.

3. PROJECT DELIVERY EVALUATION CRITERIA

Project delivery methods can significantly impact project cost, schedule, and quality – both directly and indirectly. Various project delivery methods have been proposed for use on the Central Subway project. To evaluate the relative advantages of the methods, the project team developed the following evaluation criteria:

1. Cost: The primary goal of SFMTA is to deliver a world-class transit system within the programmed budget. As related to project delivery, cost should be considered in two categories:
   - Initial cost: The expected bid price resulting from economic competition, which is affected by the number of bidders and the opportunity for bidders to take advantage of innovative means and methods of construction. Initial cost can also be affected by the size of the contract and by market forces from the insurance and bonding industry, which in turn affect the number of bidders. Payment provisions (e.g., whether provisions recognize the investment and cash flow requirements of the contractors) also influence initial cost, by impacting bidder contingencies.
   - Growth potential: The likelihood that Contract Change Orders (CCOs) will develop during the project. This factor is affected by the uncertainty of ground conditions, design changes during construction, potential for interference with adjacent contractors, revisions to environmental and public impact mitigation measures, negotiation and dispute resolution methods specified, and other risk allocation provisions.
2. Schedule: The project delivery method can impact time in two ways:
   - Construction start: Some contract delivery methods allow construction to begin earlier than do others (e.g., allow for an overlap of design and construction). As always, construction start is important to the Central Subway, because delays to project start will increase cost.
   - Delay potential: The likelihood that delays could occur during construction, which would increase cost, increase community impact, and delay the start of revenue operation.
3. Social/Political Considerations: The potential for dividing the work in pieces small enough for local and small businesses to compete, providing Disavantated Business Enterprise (DBE) contract opportunities and meeting other City Human Rights Commission (HRC) goals.
4. Administration:
   - Allowable: Whether the delivery method is allowable without enacting state legislation or changing the City Charter. Legislation introduces uncertainty and requires that a decision be made quickly so the legislative process and/or Board of Supervisors' approval can begin.
   - Coordination: Whether the delivery method requires a significant level of SFMTA administration, such as coordinating between contractors, additional management, etc.
   - Familiarity: How familiar SFMTA staff is with the delivery method, whether a training program must be developed, or if new staff with the requisite experience must be hired.
   - Control: The degree to which the SFMTA can control the elements of design and construction, particularly as these elements affect the community
5. Litigation/Liability Risk
   - Contract risk: The likelihood that the contract can be completed without significant claims and/or litigation.
   - Design risk: Whether both the SFMTA and Consultant designer bears the risk of design errors and omissions or allocates it to the construction contractor.

Options for project delivery may vary depending on the selected contract packaging strategy. The potential for phasing the project (e.g., the possibility of extending to North Beach or leaving a station unfinished) is also a consideration in the evaluation of contract packaging options.

4. PROJECT DELIVERY METHODS

This project delivery evaluation summarizes the various delivery methods and identifies the delivery method that will best meet the SFMTA's primary objective for the Central Subway. Because the delivery method depends to a certain extent upon the contract packaging strategy, the contract packaging approach was reviewed at the same time, and is discussed in Section 6 of this report.

The delivery methods considered include design-bid-build (DBB), design-build (DB), and alliancing. Each delivery method was further subdivided by the firmness of the contract price: firm-fixed-price (FFP), variable, and cost reimbursable. The delivery methods considered are shown in Table 1.

Table 1 Delivery Methods

1 Design Bid Build		
	A. Firm Fixed Price	
		I. Bid - Single Contract
		II. Bid - Multiple Prime Contracts
		III. Design Sequencing (Caltrans)
		IV. Bid/Negotiated Trigger Multiple Contracts
	B. Cost Reimbursable	
		I. CM/GC with GMP
		II. Portland Method
2 Design-Build		
	A. Bid	
	B. Negotiated	
3 Alliance		

4.1 DESIGN-BID-BUILD (DBB)

In the DBB delivery method, the design is completed by an engineer under contract to the owner, and then a contractor is selected to build the design. There are several methods of setting up the construction contract, as described below.

4.1.1 Firm Fixed Price (FFP)

The contractor agrees to build the project for a specific price, determined in advance. This can either be "bid," as is traditional for public works projects in this country, or "negotiated," as is sometimes done for U.S. Government programs (e.g., see Federal Acquisition Regulations, Part 15).

Typically, public agencies constructing underground infrastructure have contractors submit bids on a completed design. Bids are tendered by companies who respond to a public advertisement. Public procurement regulations generally establish a requirement that publicly-funded contracts be publicly advertised and awarded to the lowest responsive and responsible bidder. The purpose of such regulations is to avoid favoritism and obtain the lowest price. Many sectors of the construction industry establish the "price" using a lump sum bid. However, the price usually includes both lump sums and unit prices, and in some cases allowances. The unit prices are used to reduce bidders' contingencies, typically when the scope of work is dependent on conditions that cannot be entirely

defined before the bid.[3] This approach means that the owner only pays for the work if it is required. Differing Site Condition (DSC) clauses, which are required by the federal government and most other public agency procurement regulations, are used for the same reason.

Contracts of the magnitude of the Central Subway can be let as a single large contract or in a series of smaller contracts, frequently referred to as multiple prime contracts.

4.1.1.1 DBB-FFP – Bid – Single Contract

Many projects are awarded to a single contractor, which then subcontracts various pieces of the work as it deems necessary. In this manner, the contractor assumes the responsibility for coordination of all work on the site. This approach is not typically used for very large projects, because such contracts tend to exceed the bonding capacity for most contractors, thereby limiting competition. All design work must be completed before the project is advertised to contractors. Table 2 summarizes the assessment of this contract method for the Central Subway.

Table 2 Evaluation of DBB-FFP – Bid – Single Contract

Criteria	Impact	Comment
Initial Cost	Unfavorable	The large size of the single contract limits the field of bidders who can obtain insurance and bonding. Also, the bidders must include an allowance for coordinating the work of multiple subcontractors and mark-up on the cost of subcontractors' services. Thus, this delivery method tends to be more expensive than others. This type of contract is typically awarded after a round of competitive bidding; if there is more than one bidder, there is some economic competition. Even though the majority of the work is underground construction, there are only a limited number of firms in the underground industry and they are very specialized, so the competition is not likely to include prime contractors who would self-perform the underground work.
Cost Growth Potential	Neutral	These contracts typically include risk allocation provisions to minimize contingencies, and as a result the owner takes some of the risk, such as utility relocations, differing site conditions, and other delay events outside the contractor's control. On the other hand, the contractor is responsible for all of the coordination between various work areas.
Construction Start	Unfavorable	For a single, large DBB contract, the entire design must be completed before the project is advertised for construction. Thus, this delivery method may result in a later construction start than methods that allow separate construction packages to be issued as the design progresses.
Delay Potential	Neutral	Contracting to a single company may result in delays if resources aren't available. On the other hand, the contractor is responsible for all of the coordination between various work areas.

[3] The best examples of this are initial support systems in rock tunnel, pile driving, and many types of grouting.

Criteria	Impact	Comment
Social/Political Considerations	Unfavorable	All subcontracts are under the control of the prime contractor. Thus, the only way that the SFMTA can create opportunities for small and local businesses is to insert contract language in the prime agreement. The result is less control by the SFMTA and possibly less responsiveness to community concerns.
Allowable	Favorable	This is the method by which most construction contracts are procured.
Coordination	Favorable	All coordination with trades and subcontractors is done by the contractor, minimizing the amount of coordination to be done by the SFMTA.
Familiarity	Favorable	SFMTA staff is familiar with this method.
Control	Favorable	The SFMTA has control over the design and construction.
Contract Risk	Favorable	The limited interface between separate contractors minimizes the risk that contract disputes will arise from coordination difficulties.
Design Risk	Unfavorable	Design of all permanent facilities is the responsibility of the SFMTA. Thus, the risk of errors and omissions lies with the SFMTA and its designer.

4.1.1.2 DBB-FFP – Bid – Multiple Prime Contracts

In this method, the owner divides the project into various contract packages of smaller sizes. This is typically done on large projects to encourage competition in the bid prices. The contract packages can be divided by trade (e.g., shafts, tunnels, structural concrete work, mechanical, electrical, architectural finishes, and systems work) or by geography (e.g., tunnel reaches, stations). The latter is the method most widely used for large subway projects similar to the Central Subway. This method requires more owner coordination, but allows construction to begin before the entire project is designed. Table 3 summarizes the assessment of this contract method for the Central Subway.

Table 3 Evaluation of DBB-FFP – Bid – Multiple Prime Contracts

Criteria	Impact	Comment
Initial Cost	Neutral	The smaller contract size for the individual prime contracts can result in a larger bidder pool. Since the Central Subway contains many different types of work, the multiple-prime contracts would attract bidders who are familiar with individual types of work. Thus, a tunnel contractor might bid the tunnel package, and a building contractor might bid the station contracts. This delivery method can have a lower initial cost than other delivery methods. On the other hand, since there are multiple prime contractors, each contractor has separate overhead and mobilization costs, which forfeits the economies of scale that are available in a single large contract.

Criteria	Impact	Comment
Cost Growth Potential	Unfavorable	These contracts typically include risk allocation provisions to minimize contingencies. As a result the owner takes some of the risk, such as utility relocations, differing site conditions, and other delay events outside the contractor's control. Coordination difficulties between contractors can add cost.
Construction Start	Favorable	Because some contracts can be awarded before the entire system design is complete, construction can begin earlier in this method than in some other methods. For the Central Subway, this could allow the tunnel and utility relocation contracts to be let sooner.
Delay Potential	Unfavorable	These contracts include risk allocation provisions to minimize bidder contingencies. As a result the owner takes some of the risk, such as utility relocations, differing site conditions, and other delay events outside the contractor's control. Coordination difficulties between contractors could result in delay, even though the SFMTA would be managing contractors.
Social/ Political Considerations	Favorable	The SFMTA could provide opportunities for small and local businesses by developing bid packages specifically for the available contracting community. Examples might include advance utility relocation and restoration contracts.
Allowable	Favorable	This method is commonly used for large construction programs.
Coordination	Neutral	Although the coordination within each contract is the contractor's risk, the majority of the interface coordination is by the owner.
Familiarity	Favorable	SFMTA staff is familiar with this method.
Control	Favorable	The SFMTA has control over the design and construction.
Contract Risk	Neutral	Despite the large degree of control exercised by the SFMTA, there is a significant risk of interface coordination disputes.
Design Risk	Unfavorable	Design of all permanent facilities is the responsibility of the SFMTA. Thus, the risk of errors and omissions lies with the SFMTA and its designer.

4.1.1.3 DBB-FFP – Design Sequencing

Design sequencing is a method of contracting that allows design activities to be sequenced to permit each construction phase to commence when design for that phase is complete, instead of requiring that the design for the entire project be completed before construction begins. The contract for the entire project is awarded to one contractor when the plans and specifications are as little as 30 percent complete. This allows the successful contractor to work with the designers to incorporate innovative designs and construction methods to improve construction. With design sequencing, there is potential for faster performance, cost savings, and earlier delivery of the project to the public.

The California Department of Transportation (Caltrans) was authorized to conduct a pilot program to use design sequencing contracts for the design and construction of up to 12 transportation projects. The goal of the pilot program was to test whether design sequencing would be beneficial in the

administration of its highway improvement program. Although there are no published reports available as yet, and none of the projects that used this method were underground, discussions with Caltrans indicate that the results of the program have not been favorable. It is understood that Caltrans is abandoning the concept as a project delivery method because it has not resulted in projects being delivered in the original contract time and amount; and some have incurred cost overruns for which Caltrans has acknowledged responsibility due to their inability to complete the design in the required time frame. It is reported that the added construction cost due to these impacts outweighs any potential benefit to the public of earlier project delivery. This experience was deemed sufficient reason to dismiss this method and it was not evaluated for use on the Central Subway.

4.1.1.4 DBB-FFP – Bid/Negotiated Trigger Multiple Contracts

If bids for an FFP contract hit a certain "trigger" (e.g., the lowest bid exceeded 110 percent of the engineers' estimate), the FFP in the contract might be negotiated. This delivery method is essentially a subcase of the FFP – Bid Multiple Contracts methods discussed above, with the addition of the "trigger," the point at which the owner believes the bid process is not generating as favorable a price as negotiation. Negotiation allows the risks, responsibilities, and rewards to be discussed and agreed upon before execution of the contract. To negotiate successfully, the owner needs an estimating staff or a consultant with a detailed knowledge of construction and construction contract practice. Table 4 summarizes the assessment of this contract method for the Central Subway project.

Table 4 Evaluation of DBB-FFP – Bid/Negotiated Trigger Multiple Contracts

Criteria	Impact	Comment
Initial Cost	Favorable	Typically, a negotiated price will be higher due to the lack of economic competition. In this method, however, negotiation occurs after bidding, and only occurs to identify contingencies and get the price lower. Thus, this method is favorable for initial cost.
Cost Growth Potential	Neutral	The negotiation process allows for a discussion of risks and contingencies, thereby tending to reduce the unfavorable cost growth potential expected with an FFP – Bid delivery method.
Construction Start	Neutral	A multiple prime delivery method allows advertising to occur as the design is complete, and is typically favorable for construction start. In this case, however, the negotiation process adds time after receipt of bids and before the contractor is given NTP.
Delay Potential	Neutral	The negotiation process includes discussions of reasonable production rates, allowances for anticipated changes, and agreement on a reasonable completion schedule, thereby tending to reduce the unfavorable cost growth potential expected using an FFP – Bid delivery method.
Social Considerations	Favorable	The SFMTA could provide opportunities for small and local businesses by developing bid packages specifically for the available contracting community. Examples might include advance utility relocation and restoration contracts.

Criteria	Impact	Comment
Allowable	Neutral	Although the trigger mechanism provision is not currently allowed by the City Administrative Code, requiring approval by the Board of Supervisors, the SFMTA believes that approval might be possible because of the method's advantages.
Coordination	Neutral	Although the coordination within each contract is the contractor's risk, the majority of the interface coordination is by the SFMTA.
Familiarity	Favorable	After the negotiation process is complete, the contract form is standard, and SFMTA staff is familiar with this method.
Control	Favorable	The SFMTA has control over the design and construction.
Contract Risk	Neutral	The risk of disputes, claims, and litigation on the underground portion of the work is high on all FFPs, but theoretically during the negotiation process the teams would develop a common understanding of the various risks and how they would impact cost and schedule.
Design Risk	Unfavorable	Design of all permanent facilities is the responsibility of the SFMTA. Thus, the risk of errors and omissions lies with the SFMTA and its designer.

4.1.2 Cost Reimbursable

In this arrangement, the owner pays the contractor's actual direct cost to construct the project, plus a predetermined fee. There are a number of ways to determine the contractor's fee, which generally includes the costs of supervision, management, and profit. The most popular is the "award fee" concept, in which the contractor's fee is determined in advance and does not change if the total cost of the work varies from the original estimate.[4] With an award fee, the cost of doing the work is reimbursed under an agreed-upon set of standards, and the award fee is progressed on a percentage-of-completion basis. The award fee can include either the management staff and the profit, or the profit only, depending on the definition of cost.

In the commercial building industry, award fee contracts are bid by establishing a method for determining cost, usually based on subcontractor quotes, with the owner involved in the selection of quotes for inclusion. To these estimated subcontract costs, the general contractor (GC) adds the cost of its own work and its fee (profit). The contractor can be selected by comparing prices and selecting the low bidder, but it should be noted that in the absence of a guaranteed maximum price (GMP), these prices are simply a series of allowances which will be adjusted during the course of the project as the subcontractors' bids are received.

Such contracts are often equipped with a clause for a GMP. This provision protects the owner from cost overruns above a specific amount, but the contractor must cover risks by including some contingency money in the bid. The owner should view a GMP as a kind of insurance policy, with the premium being paid in the bid price.[5] If a GMP provision is not included, the result is a true cost

[4] The contractor's fee is not typically a direct percentage of the final agreed-upon cost, since this would be an incentive to increase the cost.

[5] Prior to the 2002 insurance crisis, there were cases of insurance companies providing such policies directly for the owners' benefit. The policies are generally no longer available.

reimbursable contract. In this report, the true cost reimbursable contract is referred to as the "Portland Method" and is treated as a separate delivery option.

When a project is being completed by several separate trades, the general contractor essentially serves as a construction manager, and is often called the CM at-risk[6] or the GC/CM. Its primary role is to procure subcontractors and sequence the various trades in a manner that facilitates efficient construction.

4.1.2.1 DBB – Cost Reimbursable – General Contractor/Construction Manager (GC/CM) with GMP

The GC/CM approach is most valuable when there are many different trades and subcontractors to be managed, and when the completion schedule depends on the sequencing of trades and subcontractors. On tunnel projects, this method does not lessen the inherent risks. If the prime contractor is a tunnel contractor, then the prime performs most of the work and only subcontracts a small portion of the work. Because few subcontractors are used, the schedule isn't as dependent upon successful coordination of the subcontractors' work. Tunnel-only contracts do not have the intricate scheduling needs of a building or process plant, and therefore the benefits of this contract form are not realized. However for station and systems contracts, there are multiple trades and subcontractors to be coordinated, and a limited working space. Such contracts may benefit from this delivery method.

On the Central Subway project, the tunnel and the systems work have a limited number of specialty subcontractors. Therefore, the benefits of at-risk GC/CM are not fully achieved for these portions of the Central Subway and were not evaluated. For the evaluation, the Cost Reimbursable – GC/CM (GMP) option was only considered for the station contracts. Table 5 summarizes the assessment of this contract method for the Central Subway project.

Table 5 Evaluation of DBB-Cost Reimbursable-GC/CM (GMP)

Criteria	Impact	Comment
Initial Cost	Unfavorable	Although there are a number of general building contractors who may compete for the construction of station-only contracts, because the total cost is fixed by the GMP, the bidders will include some contingency.
Cost Growth Potential	Favorable	Given the GMP, the SFMTA can be reasonably assured of the final cost.
Construction Start	Favorable	Because this method allows procurement of the contractor before the design is complete, it is possible for construction to begin on certain elements of the project before completion of design.
Delay Potential	Neutral	Although the primary objective of the GC is to manage schedule, the subsequent advertising of multiple subcontract packages has the potential to delay the overall contract completion.

[6] This is to differentiate from "agency" CM, in which the construction manager is reimbursed on an hourly basis for staff provided to manage and inspect the work. Agency CM is commonly used in the underground industry.

Criteria	Impact	Comment
Social Considerations	Neutral	Although the selection of subcontractors is more under the control of the prime contractor than other methods, the cost reimbursable nature of the contract does allow the owner to participate in the selection of subcontractors.
Allowable	Neutral	Although this type of contract is typical for buildings, the cost reimbursable nature of it might mean the Board of Supervisors would have to approve it.
Coordination	Neutral	Although the coordination within each contract is the contractor's risk, the majority of the interface coordination is by the SFMTA.
Familiarity	Neutral	Although this type of contract is typical for buildings, the SFMTA staff is not as familiar with being part of the subcontractor bidding/award process as with other methods.
Control	Favorable	The SFMTA has control over the design and construction.
Contract Risk	Neutral	Despite the large degree of control exercised by the SFMTA, there is a significant risk of interface coordination disputes.
Design Risk	Neutral	Because the prime contractor participates in the finalization of the design, particularly the trade work, the design risk is less than with other DBB methods, but not as low as with DB.

4.1.2.2 Portland Method

On the Willamette River CSO project currently under construction in Portland, Oregon, the Owner (the City of Portland Bureau of Environmental Services) has combined bid and negotiated features into one contract for a soft-ground tunnel, multiple deep shafts, and a large pump station constructed in a deep shaft. There are two separate contracts, each with a different contractor. One contract has been completed, and the second is just underway.

The unique contract process started at the 60 percent design stage. At this stage the contractor was selected after an evaluation of candidates' qualifications, technical approaches, and fees. After selection, the contractor participated in preconstruction phase design and construction planning, incorporating means and methods into the final design and forming a collaborative working relationship with the designer and owner. After completion of the design phase, an estimated reimbursable cost (ERC) was developed and used by the owner to obtain budget approval from the City Council. (A contingency was added to the ERC to cover uncertainties.) Notice to proceed (NTP) with construction was then provided. Portions of the construction work done by subcontractors were procured with FFP agreements (i.e., on the basis of price). The tunnel work and some other on-site work were self-performed by the general contractor on a cost reimbursable basis.[7] Subcontractors were selected after the ERC was finalized, but quotes from subcontractors were obtained to develop the ERC.

[7] For more details on the Portland Method, see **Portland, Oregon's Alternative Contract Approach to Tackle a Complex Underground Project**, by Gribbon, Irwin, Colzani, Boyce, and MacDonald; presented at the 2003 RETC conference; and **Portland, Oregon's Alternative Contract Approach – A Final Summary**, by Gribbon, Colzani, Strid, and MacDonald; presented at the 2007 RETC conference.

In the Portland Method, the contract can be terminated during the design stage if there is no agreement on the ERC between the contractor and the owner. At such time, the owner has the option of going to the second-ranked contractor. It should be noted that neither of the Portland CSO contracts were terminated in this manner.

With this type of contract delivery method, special attention must be paid to cost control. On the Portland contracts, four full-time personnel were employed by the owner exclusively for cost control. The contractors on each contract used regular personnel for cost control tracking (i.e., it was not an additional effort). Table 6 summarizes the assessment of this contract method for the Central Subway project.

Table 6 Evaluation of the Portland Method

Criteria	Impact	Comment
Initial Cost	Unfavorable	Without the benefit of an initial price competition, a negotiated price does not benefit from economic competition, and thus is generally higher than one achieved with open bidding.
Cost Growth Potential	Unfavorable	The contract form is cost-reimbursable, with minimal incentives for the contractor to control cost.
Construction Start	Favorable	The cost reimbursable method brings the contractor on before design is complete in order to take advantage of constructability input. Depending upon financing options, this could allow construction to begin before completion of design.
Delay Potential	Neutral	Because of the fixed fee, the Portland Method gives the contractor an incentive for completion before the anticipated time. In addition, the construction time is established as a result of preconstruction discussions with the contractor, and therefore should be reasonably achievable. Nonetheless, for the underground work, delays can result from changes in ground conditions which affect the contractor's productivity and thus the ability to complete on time.
Social/Political Considerations	Neutral	Although the selection of subcontractors is more under the control of the prime contractor than many other methods, the cost reimbursable nature of the contract does allow the owner to participate in the selection of subcontractors.
Allowable	Unfavorable	Not currently allowed. New legislation and/or approval by the Board of Supervisors would be required. Given the cost reimbursable nature, this could be an uphill battle.
Coordination	Unfavorable	The contractor coordinates all of the trades and subcontractors. However, the SFMTA would have to staff the project with sufficient management and accounting staff to manage the cost reimbursable aspects.
Familiarity	Unfavorable	SFMTA staff is not familiar with this contracting method. Feedback from Portland is that all parties need some time to adapt to their different responsibilities.

Criteria	Impact	Comment
Control	Favorable	The SFMTA has control over all elements of the design and construction.
Contract Risk	Neutral	The cost reimbursable nature of this method, and the lack of a GMP, makes it less likely that there will be significant disputes, claims, and litigation at the end of the project. However, there is a risk of not reaching agreement on a reasonable ERC with the selected contractor.
Design Risk	Neutral	Although the designer is still under contract to the SFMTA, the contractor participates in the completion of the design process, and thereby "buys in" to the design solution. The result is that there is little risk of a defective specification claim. Responsibility for design of the permanent facility remains with SFMTA thus the risk of errors and omissions lies with the SFMTA and its designer.

It should be noted that only the two CSO projects in Portland have utilized this contract delivery method. However, other owner agencies have been evaluating this method for upcoming projects. Caltrans is considering legislation to allow the Portland Method under California law, so it can be used for the Caldecott Tunnel Fourth Bore.

4.2 DESIGN-BUILD (DB)

This delivery method has been used in some industry sectors for a long time, but only in the last ten years or so has it been used in the underground industry in the U.S.[8] In a DB project, the owner employs one entity to complete design and construction, although for a large program, there may be multiple prime DB contractors. The primary advantages are in schedule and design risk. By overlapping the design and initial construction activities, the schedule can be compressed. With one entity completing design and construction, the owner faces less exposure from design error, and in effect, the problem of contractor claims for defective design is significantly reduced. However, despite the contractor providing its own geological interpretations, the DB approach does little to reallocate the risk associated with geotechnical conditions. On TBM tunnel projects, the schedule savings may not be realized because of the long lead time for procurement, fabrication, delivery, and launching of the tunnel mining equipment.

DB projects tend to be more expensive than DBB projects. This is because there are fewer competitors for the (usually) larger contracts, and more perceived risk. However, this is not always the case. The table below compares the DB and DBB methods.

Table 7 Design-Build Considerations

[8] For details, see Brierley & Hatem, Design-Build – Subsurface Projects, Zeni House Books, 2002

Design-Build Makes Sense If:	Apply to Central Subway	Design-Bid-Build Makes Sense If:	Apply to Central Subway
There are alternative means and methods o Maximizes innovation o Improves constructability	No	There are many third-party commitments o Restrictions on means and methods o Utilities with unidentified scope o Understandings with community groups/leaders o Multiple public agencies or municipal jurisdictions o Environmental constraints	Yes
Schedule is important and design is not yet complete	Yes		
There are minimal interfaces with adjacent contracts	No (Unless the entire project is done in one DB contract)	Work must be phased due to: o Real estate acquisition o Funding constraints o Undetermined utility relocation requirements o Regulatory approvals	Yes
The design criteria are well established o Design Build changes are costly	Yes	Owner has institutional resistance o Procurement policies and/or regulations o Engineering and administrative staff	Yes
Design risk must be shifted to the contractor	No		
The geology is relatively predictable	No	Owner wants (or doesn't want) a particular designer o Owner has less control over designer selection in design-build	Yes

In some cases, the additional cost of the DB method can be offset by early project delivery, especially for revenue-producing projects. However, in estimating the project completion, the additional procurement time associated with the DB process must be considered. The extra cost can sometimes be offset by alternate design approaches, such as shaft locations in other areas or different means and methods. The DB approach maximizes contractor innovation. Conversely, on projects where, for environmental or permitting reasons, there is not much opportunity for contractor innovation, there is little benefit to using the DB delivery method. If the final design is essentially complete, then there is little opportunity to achieve the innovation and schedule reductions that are the biggest advantages of DB.

DB contracts can either be bid, using a best value approach with a set of evaluation criteria and (commonly) a best and final offer (BAFO), or negotiated.

4.2.1 Design-Build – Bid

Table 8 summarizes the assessment of the best value "bid" approach for the Central Subway project.

Table 8 Evaluation of "Bid" Design-Build

Criteria	Impact	Comment

Criteria	Impact	Comment
Initial Cost	Unfavorable	Generally, the initial cost of DB contracts is higher than other methods.
Cost Growth Potential	Neutral	If there are no changes in design criteria and no differing site conditions, there is limited potential for cost growth. However, changes in a DB contract are very expensive, and DB work in underground structures has historically involved multiple changes.
Construction Start	Favorable	An early construction start is the primary advantage of the DB method. On the Central Subway, it is yet to be determined whether there is any ability to benefit from this advantage, because the Record of Decision and Full-Funding Grant Agreement will most likely be on the critical path.
Delay Potential	Neutral	Given that design and construction control is the responsibility of the contractor, the delay potential should be reduced. However, changes due to differing site conditions can seriously affect progress, and the nature of most DB contracts is that they are conceived with optimistic time predictions.
Social/Political Considerations	Neutral	All opportunities for subcontracting are under the control of the DB contractor, although contract language in the prime agreement can promote opportunities for small and local businesses.
Allowable	Favorable	DB is allowed in San Francisco.
Coordination	Neutral	Although the coordination within each contract is the contractor's risk if there are multiple contracts, the majority of the coordination between contracts is by the owner.
Familiarity	Neutral	Although this type of contract has been used extensively, and the CM should be familiar with it, SFMTA staff is not as familiar with it.
Control	Unfavorable	The DB contractor has control over most of the design and construction.
Contract Risk	Unfavorable	Because the DB contract results in an FFP, there is a high risk of disputes, claims, and litigation in the underground portion of the work.
Design Risk	Favorable	The contractor has responsibility for design.

4.2.2 Design-Build – Negotiated

The Los Angeles MTA is experimenting with a negotiated DB process on the Exposition Line, currently in the design phase. This project includes 8.6 miles of light rail line and 10 stations, all in an at-grade or aerial configuration. The total estimated cost of the project is $640 million. The negotiated DB is similar to bid DB, except that the final construction price is not determined in conjunction with the selection of the design-builder, but after completion of the final design by negotiation. The primary objective of this hybrid method is to take advantage of the contractor's early involvement in the design while reducing the contingencies included in the contract price. Another feature of this method is that the design and construction phase supervision services are included in the "fee." The

negotiated contract price includes only direct costs, which in many cases encompass subcontract work that can be competitively bid. Initial feedback from the MTA is that it had strong contractor interest and good competition in the selection process, but limited success in achieving the goal of minimizing contingencies. In addition, the MTA has had some difficulty in negotiating the first major construction package, and there is evidence that numerous design change orders are resulting from changing criteria. Table 9 summarizes the assessment of this contract method for the Central Subway project.

Table 9 Evaluation of Negotiated Design-Build

Criteria	Impact	Comment
Initial Cost	Neutral	Generally, the initial cost of DB contracts is higher than other methods, but the negotiated method is designed to address that deficiency.
Cost Growth Potential	Unfavorable	Changes in a DB contract are very expensive, and DB work in underground structures has historically involved multiple changes. The only experience with this method has indicated numerous change orders.
Construction Start	Favorable	An early construction start is the primary advantage of the DB method. On the Central Subway, it is yet to be determined whether there is any ability to benefit from this advantage, because the Record of Decision and Full-Funding Grant Agreement will most likely be on the critical path.
Delay Potential	Neutral	Given that design and construction control is the responsibility of the contractor, the delay potential should be reduced. However, changes due to differing site conditions can seriously affect progress, and the nature of most DB contracts is that they are conceived with optimistic time predictions.
Social/Political Considerations	Neutral	All opportunities for subcontracting are under the control of the DB contractor, although contract language in the prime agreement can promote opportunities for small and local businesses.
Allowable	Favorable	DB is allowed in San Francisco.
Coordination	Neutral	Although the coordination within each contract is the contractor's risk if there are multiple contracts, the majority of the coordination between contracts is by the owner.
Familiarity	Neutral	The negotiation phase is unusual, although during construction the CM should be familiar with this contract form. SFMTA staff is not as familiar with it.
Control	Unfavorable	The DB contractor has control over all elements of the design and construction.
Contract Risk	Unfavorable	Although designed to avoid such risk by postponing determination of the contract price until the design is complete, lessons learned in L.A. indicate that this risk has not been avoided.
Design Risk	Favorable	The contractor has responsibility for design.

4.3 ALLIANCE

In an alliance, risk is not allocated to the party best able to control it, but shared by all of the parties. The contractor and the owner together run the job, evaluate the risks, decide how to mitigate them, and share in the outcomes, whether good or bad. This delivery method is common outside the U.S., but has not yet been used for underground work in the U.S. The factor that can most impact the

success of this approach is how it is initiated. It is not conducive to a bidding environment, and as such the terms and conditions are typically negotiated with a preselected contractor. To select a contractor, the owner uses key project success factors, but it is not always easy to determine these factors and/or translate them into objective selection criteria.

The lack of any experience using this delivery method on underground projects in the U.S., coupled with the lack of qualified staff to develop and manage it, were deemed sufficient reasons to eliminate this method from further consideration, and it was not evaluated for use on the Central Subway.

5. PROJECT DELIVERY EVALUATION AND RECOMMENDATIONS

The identification of a "best" delivery method for a specific project depends not only on the technical issues of the project, but the risk philosophy and constraints placed upon the Owner by its governing Board. It is expected that the description of the methods and their advantages and disadvantages will help in deciding which delivery method is best suited to the Central Subway project. The numerical evaluation summarized below has been developed as a somewhat quantitative evaluation of the various methods. In reviewing this numerical evaluation it should be noted that a major factor is the weighting given to each of the criteria. After a discussion of the importance of the five main criteria and subcriteria, the project team agreed on the weighting in Table 10 (based on a scale of 1 to 10, with 10 being most important).

Table 10 Contract Delivery Numerical Evaluation

Cost		**% of Total**
Initial Cost:	10	
Growth Potential:	8	**34%**
Total Cost Points:	18	
Schedule		
Construction start:	8	
Delay potential:	6	**27%**
Total Schedule Points:	14	
Social/Political		
Total Social/Political Points:	6	**11%**
Administration		
Allowable	1	
Coordination:	3	
Familiarity:	1	**15%**
Control:	3	
Total Administration Points:	8	
Litigation/Liability Risk		
Contract Risk:	5	
Design Risk:	2	**13%**
Total Risk Points:	7	

In reviewing the weighting, it was agreed that the most important consideration was initial cost, with cost growth and initial construction start nearly as important. The other criteria were given lesser importance. A conscious effort was made to avoid counting the same factor more than once in different criteria.

The results of the team evaluation of the various delivery mthods is summarized in Table 11 on the next page. The highest ranked delivery method is the Design-Bid-Build (DBB) Firm-Fixed-Price (FFP), using the negotiation trigger mechanism for multiple prime contracts. The second-highest ranked delivery method is the CM/GC (with GMP) for the station contracts. This method was not considered viable for the tunnel contract(s) and does not apply there. The third-rated method was multiple prime DBB-FFP contracts, without the trigger mechanism.

The single large DBB/FFP contract is not recommended, and neither are any of the DB methods or the Portland Method. As was previously mentioned, design sequencing and alliance were determined to be inappropriate, and are therefore not rated.

Table 11 Contract Delivery Numerical Evaluation

Delivery Method				Cost		Schedule		Social / Political Considerations	Administration				Litigation/Liability Risk		Unweighted Total	Weighted Total	Recom-mended?
Alt. No.			Description	Initial	Growth Potential	Construc-tion Start	Delay Potential		Allowable	Coordina-tion	Familiarity	Control	Contract	Design			
			Weight (1 to 10) →	10	8	8	6	6	1	3	1	3	5	2			
1	Design-Bid-Build																
	A		Firm Fixed Price														
		1	Bid-Single Contract	-1	0	-1	0	-1	+1	+1	+1	+1	+1	-1	+1	-13	No
		2	Bid - Multiple Prime Contracts	0	-1	+1	-1	+1	+1	0	+1	+1	0	-1	+2	3	Yes
		3	Design Sequencing (Caltrans)	Not Recommended											NA	NA	No
		4	Bid/Negotiated Trigger Multiple Contracts	+1	0	0	0	+1	0	0	+1	+1	0	-1	+3	18	Yes
	B		Cost Reimbursable														
		1	GMP with GMP	-1	+1	+1	0	0	0	0	0	+1	0	0	+2	9	No
		2	Portland Method	-1	-1	+1	0	0	-1	-1	-1	+1	0	0	-3	-12	No
2	Design-Build																
	A	Bid		-1	0	+1	0	0	+1	0	0	-1	-1	+1	0	-7	No
	B	Negotiated		0	-1	+1	0	0	+1	0	0	-1	-1	+1	0	-5	No
3	Alliance			Not Recommended											NA	NA	
			Legend:	+1	Favorable												
				-1	Unfavorable												
				0	Neutral												

6. CONTRACT PACKAGING

6.1 INTRODUCTION

Contract packaging is the division of a project's work scope into separate contracts based on considerations similar to those used for selecting the delivery method. The key considerations affecting the Central Subway contract packaging approach are discussed below.

6.1.1 Cost Considerations

Contract packaging can affect the amount of indirect and overhead costs that will be incurred by the contractor. For example, if the civil (excavation and support) and architectural finishes contracts are combined, the contractor's indirect costs will be reduced. This could also apply to functions like traffic control (flaggers), dust control (tankers), etc. The efficiencies or inefficiencies that result from contract packaging choices can have significant impacts. For example, if contracts are combined into fewer, larger contracts a contractor may be able to reduce both the number of people it needs to perform work, and the duration for which it needs those people. The savings in salary, administration and other costs applies equally to SFMTA and construction management staff. Generally speaking, more staff is required for multiple contracts than for one contract.

Constructability factors can also affect cost. For instance, packages that allow similar means and methods to be used for various elements of the work will result in lower bid prices. Allowing similar means and methods can also optimize equipment commissioning and learning curve periods by allowing the same personnel to undertake multiple contract start-up phases. Logistics dictated by site accessibility for key operations such as tunneling and trackwork installation must also be considered.

The best price will be obtained by enhancing economic competition by ensuring the maximum number of qualified bidders for each contract package. The packages need to be sized large enough that well-qualified and experienced contractors will bid, and small enough not to be overly restrictive (due to bonding, insurance, management of subcontractors, etc.). The dividing line between "large enough" and "small enough" in monetary terms is highly variable, and depends on the type of work and industry practices for bonding and sharing financial risk. To the extent possible, contracts should also be structured to match current market conditions and the availability of labor and equipment at the time of bidding. Based on the most recent bidding results in the region, contracts in the range of $250 million seem to strike a good balance of qualifying without restricting.

6.1.2 Risk Considerations

One of the primary risks is to the estimated overall construction schedule. Schedule considerations include time benefits offered to other contractors (e.g., early handover to systems and start-up), third parties, and the community. For example, there are significant public relations advantages and benefits to the communities to open the Central Subway as early as possible. It is also important to achieve a balance between the design schedule and the construction schedule (e.g., allow enough time for design but begin construction as quickly as possible).

An analysis of contractor interfaces evaluates the potential that conflict will arise between separate contractors working concurrently in the same work space. Conflicts result in inefficiencies and increase the risk of claims attributed to delays or other impacts. Interfaces can also lead to increased safety risks like a congested working space. The largest factor in this risk is the number of contractors needing access to a single site during the same time frame. Limiting the number of contractors needing such access reduces this risk. At the May workshop, the SFMTA representatives noted that one of the comments from construction of the initial operating system is that the number of separate construction contracts should be reduced to minimize the need for SFMTA or CM staff to manage the contractor interfaces.

6.1.3 Community and Environmental Considerations

Regardless of the way contracts are packaged, it is important to the SFMTA to identify elements of work that can be performed by small and disadvantaged contractors. The breakdown of the contract packages should consider the scope, specific expertise required, dollar value, and schedule for such elements. There is also no contracting vehicle for set-aside contracts, and on-call "roster" contracts are limited to very small amounts (less than $100,000). In all contract packaging scenarios, efforts should be made to identify and encourage contracting opportunities for DBE firms. However, at this time it is not anticipated that consideration of this factor will impact the size or content of the contract packages. Once the contract packages have been determined, potential subcontracting opportunities can be assessed for inclusion in the individual contracts.

Traffic and business disruption impacts associated with each contract package are considered in the development of packaging alternatives, as some alternatives are more disruptive than others.

6.2 PACKAGING STRATEGY DISCUSSED AT WORKSHOP SESSION

Various packaging strategies were discussed in the May 31 and June 1 workshop. Subsequent to that session, the Board of Consultants issued a report dated June 2007 (Appendix A), which recommends the following:

- Contract 1: Tunnel construction contract
  - Public and private utility relocation for portals and launch and TBM retrieval shafts.
  - Portal and twin tunnels from Fourth Street to Columbus Street., excluding trackbed and walkway concrete.
- Contract 2: Union Square / Market Street Station (UMS)
  - Public and private utility relocation for station work.
  - All station work excluding systems.
- Contract 3: Chinatown Station
  - Public and private utility relocation for station work.
  - All SEM mined station work excluding systems.
- Contract 4: Moscone Station
  - Public and private utility relocation for station work.
  - All station work excluding systems.
- Contract 5: Track and related construction, systems, power, control, etc.
  - Trackwork and tunnel walkway concrete.
  - Traffic signals.
  - Fourth and Brannan Street station.
  - Street reconstruction.
  - Train control, overhead catenary system, electrical and communications.

The Board of Consultants recommends that the tunnel contract be advertised as soon as possible after receipt of the Record of Decision, even before securing the Full-Funding Grant Agreement from the FTA, perhaps using a two-step NTP method to limit risk. The primary reasons for this are to minimize escalation and avoid interference with subsequent station construction. In addition, the Board recommends the use of incentives/disincentives and A+B contracting methods for the tunnel work in order to advance schedule.

With respect to the station construction at Chinatown, the Board suggests that an alternative to the above scheme would include station mining as a separate contract, with the finish work included with

UMS station finishes. The rationale for this is primarily that the mining is a completely different construction approach than other work on the project.

6.3 PROPOSED PACKAGING STRATEGY

Subsequent to the Contracting Workshop a Guideway Tunnel Risk Assessment concluded that constructing the guideway tunnels in advance of the stations presented the least risk option for the project. As a result the excavation of Moscone Station could be uncoupled from the Tunnel contract. This resulted in a slight change to the BOC recommended contract strategy.

To support early construction of the guideway tunnels it was further recommended that utilities at the tunnel construction shaft be relocated in advance along with those utilities at UMS and MOS that need to be relocated to support early tunnel construction. Other utility relocations could be carried out as a separate contract or as part of the main works contract at each station. Two early utility relocation contracts were recommended.

Upon early completion of the tunnels the tunnel construction worksite area could be handed over to a surface, systems and trackwork contractor. The surface works south of Bryant Street could be used for fabrication of the trackwork. Systems installation in the tunnels is dependant upon installation of the trackwork. To avoid schedule delays it was decided to combine these three elements of the project into one contract.

Vehicle procurement would be a part of an overall SFMTA vehicle procurement program and therefore did not require a separate contract.

Notwithstanding the contracting packaging strategy recommended by the Board of Consultants, the revised contract packages at the time of publishing this report are:

- Contract 1: Early utility relocation (1)
- Contract 2: Early utility relocation (2)
- Contract 3: Tunnel Contract
- Contract 4: Union Square / Market Street Station
- Contract 5: Chinatown Station and Crossover
- Contract 6: Moscone Street Station
- Contract 7: Surface, Systems and Trackwork

A detailed breakdown of the revised construction contract packages is provided in Appendix A.

7. MITIGATION OF MARKET RISK

One of the greatest risks on any large infrastructure project is the market condition – particularly, whether there will be a sufficient number of qualified bidders to generate economic competition. The strategy for mitigating market risk on the Central Subway project is as follows:

1. Procure contracts using proven delivery methods with which bidders are comfortable.
2. Package individual contracts to attract bidders. Ensure that contract packages are large enough to attract qualified bidders, but not too large to limit competition.
3. Include work scope that is narrow enough to attract tunnel specialty contractors.
4. Make terms and conditions fair to both contracting parties, using the philosophy that makes each party responsible for the things they can control.
5. Use risk allocation techniques to distribute project risk, and clearly identify items which must be included as a contractor risk so that appropriate allocation can be made in the bid price.
6. Allow sufficient cash flow so that contractors are not required to finance the project.
7. Conduct contractor outreach and be responsive to contractor suggestions.
8. Publicize upcoming solicitations to facilitate contractor planning.
9. Facilitate the estimating process by lessening the burden for contractors to bid.
10. Enhance the perception/reputation of the SFMTA as a reasonable owner.

Previous sections of this report have addressed the delivery method and contract packaging. During the September 20 meeting, the project team discussed a number of contract terms and conditions in an attempt to plan for attracting qualified contractors and obtaining the most competitive bid prices. The Board of Consultants report suggested some modification to various City standard terms and conditions. The workshop participants discussed a number of these provisions. The following is a summary of the workshop discussion, followed by an action plan for further development.

7.1 OWNER-CONTROLLED INSURANCE PROGRAMS (OCIP)

Given the recommended delivery method of multiple prime contracts, each with a number of subcontractors, and the private property through which much of the construction will occur, it is recommended that the City pursue an owner-controlled insurance program. This will allow for more cost-effective purchase of a policy with a large coverage limit, provide standard coverage for all contractors and subcontractors, and eliminate insurance barriers for small local contractors. The safety provisions of an OCIP will also set drug testing requirements for all project employees, both supervisory and craft. It was noted that establishment of OCIP plans takes some time, and it is recommended that the SFMTA begin the process at least one year before coverage is needed for construction work.

7.2 INDEMNIFICATION

It was noted that the City's standard general provisions include an indemnification clause that complies with the California Civil Code and does not require the contractor to indemnify the City for the City's own negligent acts.

7.3 PRECONSTRUCTION SURVEYS

Tunneling and deep open-cut construction will be ongoing adjacent to privately-owned commercial properties. To minimize the risk of property damage claims, it is recommended that the MTA undertake a photographic and/or videographic preconstruction survey program to document the condition of adjacent buildings that could be damaged by Central Subway construction. Such a survey should be obtained from a firm experienced in such work, including structural engineers who

are familiar with the nature of damage to buildings caused by ground subsidence. It is also recommended that the survey be done in advance of construction, but not too far in advance, in order to capture only building damage caused by construction. It is common to perform the survey six months prior to tunnel excavation in the area. It was also noted that this work could be done under separate contract to the SFMTA, or under subcontract to the final designer, the construction manager, or the construction contractor.

7.4 LOSS OF BUSINESS AGREEMENTS

It is not uncommon for businesses in the area of subway construction to be impacted by construction activities, and such impacts could affect the profitability of the businesses. During the project workshop, it was noted that compensation for loss of business is against FTA and City of San Francisco policy. Nonetheless, it was noted that, especially in the Union Square area, open-cut construction could hinder patron's access to the front doors of businesses, and in some cases could hinder rear access and material and supply deliveries to sidewalk vaults. It was agreed that each location has to be evaluated on a case-by-case basis, but that it might be necessary to temporarily relocate some businesses out of the Union Square area. Further study on this topic is recommended.

7.5 CONTRACTOR PREQUALIFICATION

The Board of Consultants strongly recommends that contractor prequalification not be used, and that the SFMTA rely upon the sureties to ensure that the bidders are qualified to perform the work. During the September 20 meeting, this approach was discussed, and it was noted that the contract documents should indicate the requisite qualifications that bidders must demonstrate to be deemed a responsible bidder. This would enable bidders to determine, by looking at the bidding documents, whether they are qualified for the work.

It is recommended that the contract documents include a bidder qualification section which sets forth required experience for firms and individuals. The qualification information could be submitted either with the bid documents by all bidders, or within three days after the bid opening by the lowest two to three bidders.

7.6 PARTNERING/EXECUTIVE PARTNERING

Successful completion of this project will depend upon a respectful and cooperative relationship between all parties. To achieve this, the Board of Consultants has recommended the use of executive partnering. The concept of partnering is based on the principle that each party needs to understand the other parties' goals and objectives if they are to be as respectful and cooperative as possible. In its raw form, partnering is simply a method of improving communication between contracting parties. However, the execution of a successful partnering arrangement, with its potential benefits, is not always this straightforward. Individuals who possess the constructive attitude that partnering aims to promote often do not need partnering, whereas individuals who do need it are usually too closed-minded to benefit from it. The contractual option for the establishment of partnering agreements has become standard on most large construction projects, and is a part of the City's standard terms and conditions. It is recommended that it be used on the Central Subway project.

7.7 OWNER-FURNISHED MATERIALS/EQUIPMENT

In some cases, the schedule can be improved if the owner purchases certain materials and/or equipment before the general contract is awarded. This is especially true for long-lead-time items. For the Central Subway, it is not recommended that the City furnish the TBM or the precast concrete tunnel lining segments, since these are specific to the contractor's methods and preferences. On the other hand, it might make sense for the City to issue a separate procurement contract for materials such as the rail and overhead catenary system equipment, depending on the anticipated lead time

necessary for fabrication and the expected escalation for steel. This possibility should be evaluated further during the design phase. It is recommended that the City issue separate procurement packages for escalators, elevators, and fare collection equipment, as this equipment will be standardized across the system.

7.8 BIDDING SCHEDULE OPTIONS

Because much of the Central Subway work will be in the downtown area where the public is impacted by ongoing construction, it may be useful to give the contractor incentives to optimize its schedule. Several options to accomplish this have been proposed, and are discussed below.

7.8.1 A+B Contracts

A+B contracts are used frequently in highway construction. In A+B contracts, the contractor determines the length of time necessary for construction and bids both a total price and a number of days. The number of days is multiplied by the pre-established daily rate set forth in the bidding documents and added to the total price to determine the successful bidder (A+B). The contract is then written for the total bid price amount (A) and the bid number of days (B). This method values time and price in determining the low bidder, and a contractor could be the low bidder even with a higher price, if it bid a low number of days. It is recommended that such provisions be developed for various elements of the Central Subway system. For instance, this approach might be used for interim completion dates on the Union Square / Market Street station, e.g., letting the bidders furnish a number of days (B) that they would completely close Stockton Street for construction.

7.8.2 Incentives for Early Completion (Bonuses)

Contracts can also include incentive provisions (bonuses) for completing certain sections of work before the required date. Such provisions have been successfully used by Caltrans on several high-profile projects. However, it was noted in the workshop that incentives have been frowned upon by the City Attorney. Discussion with the City Attorney is required to determine whether incentives could be used on the Central Subway project.

7.9 RISK ALLOCATION MEASURES

Differing site condition clauses and geotechnical baseline reports are commonly used on all underground construction projects to minimize bidder contingencies. Although they can result in changes during construction, it is generally accepted that it is more cost effective to pay for conditions only if they are encountered, rather than putting the risk on the bidders, who will include contingencies in the base price. It was agreed during the workshop that differing site conditions clauses and geotechnical baseline reports should be used on the Central Subway project.

Dispute Review Boards are commonplace on many heavy civil and underground projects. It was noted during the workshop that DRB members have specialties that make them better suited to underground portions of the work than other portions. It was recommended that DRBs be used on the underground construction and that other dispute resolution methods, such as mediation, be used for other parts of the work.

Recent cost increases in commodities such as steel and cement have made the use of price adjustment (escalation) provisions more common in the last five years. Bidder contingencies may be avoided if the risk of a large price escalation on certain commodities is taken by the City instead of the bidders. It was noted that an escalation provision should also include de-escalation provision. It was recommended that escalation provisions be drafted for key permanent commodities, including steel and cement, and that such provisions also be considered for construction commodities such as fuel and copper.

The Board of Consultants recommended the use of escrow bid documents, which would help determine what was included in the contractor's bid estimate and thus assist in the negotiation of change orders. It was noted that the City standard terms and conditions include this provision. It is recommended for use on the Central Subway project.

The work will require the disposal of a significant amount of excavated soil and rock from the tunnel and stations. One suggestion is including a designated disposal site in the bidding documents. Thus, the bidders would not have to do any investigation before the bid to determine haul distances and disposal sites. On the other hand, it was pointed out that disposal sites are typically the contractor's responsibility and, absent the acquisition of specific property, the disposal options might change significantly from the design phase to the construction phase, resulting in additional risk to the City. It was agreed that investigation would be done into available options, and decision made later whether to furnish the disposal site to the contractor or make it the contractor's responsibility.

7.10 CHANGES PROVISIONS

The changes clause in the City standard terms and conditions includes a list of overhead items which may not be separately included in the cost of the change, and are considered to be covered in the overhead mark-up. It was pointed out that for underground construction, the overhead cost for such things as temporary utilities and the plant is a relatively large percentage of the direct cost. In order to adequately compensate the contractor for changed work, it would be useful to either change the percentage of allowable overhead, or delete some of the items listed as unallowable overhead.

It was also suggested that in order to encourage the contractor to agree on the value of changed work in advance, it might be useful to include a separate overhead and profit mark-up on prepriced changes. The separate mark-up would be larger than that allowed on time-and-materials work. This would compensate the contractor for the added risk of performance, while also encouraging agreement in advance.

It was agreed that these changes in the standard terms and conditions would be discussed further with the SFMTA contracts department.

7.11 PAYMENT PROVISIONS

In order to encourage bidders to bid, and thus achieve sufficient economic competition, some of the payment provisions in the City's standard terms and conditions should be re-evaluated.

It was recommended that, because of the very limited space on-site to store material, the payment provisions should include an allowance for material stored off-site.

Because the cost of the TBM is significant, it was agreed that TBM mobilization will be addressed with a separate provision, allowing payment to the contractor as expenditures are made, instead of as tunnel excavation is completed.

It was noted that standard SFMTA provisions allow payment of the lump sum using a negotiated schedule of values, not a cost loaded schedule. This was deemed appropriate for the Central Subway project.

The SFMTA standard terms and conditions require the prime contractor to release retention to the subcontractors within 40 days after the subcontractor's work is complete[9], but this does not correlate to when the City releases retention to the prime. It was noted that the City Administrative Code was

[9] August 2007 General Provisions -- Article 105

recently changed, and should be investigated to see if this is still the case. Some changes to the Administrative Code may be needed.

7.12 LABOR PROVISIONS

The Board of Consultants recommends that the contractors be made completely responsible for ensuring labor harmony on the project. Because of the multiple specialty trades that will be used on the Central Subway project, and because labor relations is traditionally the contractor's area of expertise, the implementation of a Project Labor Agreement (PLA) is not recommended.

Worker training will be necessary, since it is expected that there will be a shortage of craft workers in the trades. The Board of Consultants recommends a training/apprenticeship system similar to the one that was instituted on the Alameda Corridor program in southern California connecting the Port of Long Beach and Los Angeles to the Transcontinental Railroad. It was noted that a long lead time is necessary to develop the labor skills. It was agreed that the existing City Build system will be evaluated to determine whether it can be expected to provide the needed skills in the trades necessary for the Central Subway project.

It was noted that the City of San Francisco has a number of special ordinances related to labor: local hiring, minimum compensation, health benefits, nondiscrimination (12B), etc. It was agreed that the 12B ordinance would be reviewed to determine how it might impact work on the Central Subway project.

7.13 DBE PARTICIPATION

It was noted that if DBE goals are established for the construction contracts, it will be difficult for the tunnel and underground contracts to generate a large participation percentage. It was recommended that each contract be evaluated on its own merits to determine what participation goals would be reasonable.

Ways in which SFMTA will facilitate achievement of reasonable DBE goals will include:

- Analyzing project for small contracting opportunities suitable for DBE to prime.
- Arranging meetings to connect potential Prime Contractors with DBE firms. SFMTA could investigate whether attendance at these meetings could be made mandatory for inclusion in the bidding process.
- Require Prime Contractors to present in their bids how they will promote DBE participation.
- Increase public outreach focussed at identifying opportunities for DBE participation.

The SFMTA is planning a series of workshops to provide training in the areas of contract administration, construction estimating, and doing business with the Ctiy to DBE contractors. This effort will enhance the capablities of the DBE contractor to better understand and compete for City contracted work and better manage the work.

8. CONCLUSION

8.1 RECOMMENDATIONS

After considering the evaluation criteria set forth in Section 2, and incorporating input from stakeholders and a Board of Consultants at several workshop sessions, the following construction contracting strategy is recommended for the Central Subway.

8.1.1 Delivery Method

The recommendation is for use of multiple Firm-Fixed-Price/Design-Bid-Build contracts using a mechanism that can trigger negotiation if the bid prices exceed a certain threshold. The details of this concept will be presented in a subsequent report.

8.1.2 Contract Packaging

It is recommended that the following strategy, based on the contract packaging presented by the Board of Consultants, and modified by subsequent discussions, be implemented:

- Contract 1: Early utility relocation
- Contract 2: Tunnel contract / Moscone Station shell
- Contract 3: Chinatown Station
- Contract 4: Union Square Station / Moscone Station build-out
- Contract 5: South portal to King Street (surface line)
- Contract 6: Systems, traction power, and controls (project-wide)
- Contract 7: Vehicles

8.1.3 Mitigating Market Risk

In order to achieve cost and schedule goals, it may be necessary to incorporate certain special provisions into the City terms and conditions to encourage the participation of qualified contractors and make certain provisions applicable to the specialized underground work anticipated. Such provisions include:

1. Use of OCIP
2. Incorporation of preconstruction surveys
3. Establish contractor qualification procedures
4. Use of Partnering
5. Consider separate procurement contracts
6. Incorporate schedule incentives into the contract
7. Use differing site condition clauses, and geotechnical baseline reports
8. Use dispute review boards on underground segments of the work
9. Incorporate escalation provisions for key commodities
10. Use of escrow bid documents
11. Revisions to the City standard changes clause
12. Incorporate provisions to allow payment for material stored on and off-site
13. Establish a separate allowance for TBM mobilization
14. Enable retention release for completed subcontractor work
15. Avoid the use of a Project Labor Agreement

16. Address worker training, either through City Build or some other program
17. Evaluate the impact of the 12B ordinance on the work
18. Analyze each contract for reasonable W/M/LBE goals

8.2 ACTION PLAN

Upon acceptance of the proposed contracting strategy, the following action items will be pursued:

Table 12 Action Plan

Item	Description	Action By/When:
1	Prepare detailed plan for contract form, with trigger mechanism, for the SFMTA contract department's review	Design Team – Final Design
2	Evaluate feasibility of OCIP	SFMTA – Prelim Design
3	Include preconstruction surveys in construction contract	Design Team – Final Design
4	Study impact of construction on local businesses	Design Team – Prelim Design
5	Incorporate contractor qualification requirements in bid documents	Design Team – Final Design
6	Use standard City partnering language in contract	SFMTA – Final Design
7	Further evaluate specific materials and equipment that would be beneficial for the SFMTA to furnish to the construction contractors	Design Team – Final Design
8	Use A+B bidding schedules where warranted to encourage minimal construction impact	Design Team – Final Design
9	Discuss use of bonus incentives with City Attorney	SFMTA – Final Design
10	Incorporate the following provisions measures in the contract language: differing site condition clause, geotechnical baseline report, escrow bid documents, and dispute review boards	Design Team – Final Design
11	Prepare draft escalation provision for review by SFMTA contracts department	Design Team – Final Design
12	Evaluate options for disposal of excavated material	Design Team – Final Design
13	Discuss revisions to general conditions changes clause with SFMTA contracts department	Design Team – Prelim Design
14	Discuss revisions to general conditions payment provisions with SFMTA contracts department	Design Team – Final Design
15	Research City Administrative Code for requirements on	SFMTA – Prelim Design

Item	Description	Action By/When:
	prime contractor's release of subcontractor retention	
16	Evaluate City Build system to determine whether it can provide the necessary workforce for underground construction	SFMTA – Prelim Design
17	Review 12B ordinance to determine how it might impact work on the Central Subway project	SFMTA – Prelim Design
18	For each contract, determine trades utilized in each to help establish the appropriate DBE goals	Design Team – Final Design
19	Arranging meetings to connect potential Prime Contractors with DBE firms. SFMTA to investigate whether attendance at these meetings could be made mandatory for inclusion in the bidding process.	SFMTA – Final Design
20	Require Prime Contractors to present in their bids how they will promote DBE participation.	SFMTA – Final Design
21	Increase public outreach focussed at identifying opportunities for DBE participation.	SFMTA – Final Design

9. REFERENCES

Gribbon, P., Irwin, G., Colzani, G., Boyce, G., McDonald, J. (2003). "Portland, Oregon's Alternative Contract Approach to Tackle a Complex Underground Project," Proceedings of the 2003 Rapid Excavation and Tunneling Conference.

Gribbon, P., Colzani, G., Strid, J., McDonald, J. (2007). "Portland, Oregon's Alternative Contract Approach – A Final Summary," Proceedings of the 2007 Rapid Excavation and Tunneling Conference.

Brierley & Hatem, Design-Build – Subsurface Projects, Zeni House Books, 2002

City and County of San Francisco General Provisions, August 2007, Article 105

APPENDIX A – REVISED CONSTRUCTION CONTRACTING STRATEGY

APPENDIX A

REVISED CONSTRUCTION CONTRACTING STRATEGY

Utilities Contract 1

Utility Relocation of City utilities for Moscone Station (4th St between Howard and Folsom) and the Tunnel Staging Site and Portal (4th St between Harrison and Bryant and U/G duct bank for substation for TBMs, if needed), traffic routing, pavement restoration, and resurfacing, testing, and as-built and record documents.

Utilities Contract 2

Utility Relocation for UMS Station including Utility Corridor for all utilities, closure walls for buildings with sub-sidewalk basements, retaining walls, construct floor slabs or grade exiting floors with pourable fill, waterproofing of walls and sub-sidewalk spaces, conduit and pipe casings for private and City utilities, proofing conduits and pipe casings, relocation of City utilities, fill Utility Corridor, sidewalk and pavement restoration, traffic routing, testing, as-built and record documents, and spare parts.

Tunneling Contract

NTP 1 – TBM Procurement
NTP 2 – Tunnel Staging Site Prep, including substation for TBMs
NTP 3 – Launch Box construction and head walls for MOS and UMS.
NTP 4 – Proceed to tunnel to North Beach and extract TBMs at North Beach, including Extraction shaft and utility relocation for Extraction shaft, jet grouting, utility and overhead contact system adjustment, relocation and workaround as needed for jet grouting, Tunnel invert concrete, Cross Passages, installation of sump pump and temporary utilities in tunnel, conduit, pullboxes and pipe to be installed in invert concrete, proofing conduits and pipes, tunnel portal, pavement restoration and resurfacing, testing, manuals, as-built and record documents, and spare parts.

Union Square/Market Street Station

Includes traffic routing, temporary curb, temporary streetlights, temporary traffic signals, finishes, railings, Agent Booths, doors, AC substation, elevators, escalators, lighting, ventilation, fire alarm, suppression and protection, dry contacts, interface relays, interface panels, and wiring between interface panels and interface contacts and relays to station systems, conduit between devices and interface and power panels for systems to be installed later, doors, overhead contact system for temporary trolley coach reroute on Mason Street temporary power, restoration of Stockton Street overhead contact system (OCS) and removal of temporary OCS, streetlights, traffic signals, curbs, station waterproofing and waterproofing over underground spaces including sub-sidewalk basements, sidewalks, pavement restoration and resurfacing, testing, manuals, training, as-built and record documents, and spare parts.

Chinatown Station

Includes traffic routing, finishes, railings, Agent Booth, doors, AC substation, Traction Power substation, elevators, escalators, lighting, ventilation, fire alarm, suppression and protection, dry contacts, interface relays, interface panels, and wiring between interface panels and interface contacts and relays to station systems, conduit between devices and interface and power panels for systems to be installed later, station waterproofing and waterproofing over underground spaces, utility relocation as needed, repair of utilities disturbed during construction, sidewalk and pavement restoration and resurfacing, testing, manuals, training, as-built and record documents, and spare parts.

Moscone Station

Includes traffic routing, finishes, railings, Agent Booths, doors, AC substation, Traction Power substation, elevators, escalators, lighting, ventilation, fire alarm, suppression and protection, doors, dry contacts, interface relays, interface panels, and wiring between interface panels and interface contacts and relays to station systems, conduit between devices and interface and power panels for systems to be installed later, station waterproofing and waterproofing over underground spaces, pavement restoration and resurfacing, testing, manuals, training, as-built and record documents, and spare parts.

Surface, Track and Systems Contract

Includes Brannan Station, traffic routing, work from Bryant Street south including; track, switch machines, overhead contact, train signal, VTS, and traffic signal systems, ductbank, traction power feeders, adjustment or relocation of utilities in conflict with track slabs, curb, sidewalk, and pavement restoration and resurfacing.

Includes tunnel emergency walkways, railings, track, lighting, wet standpipes, undercar deluge, remaining conduit in tunnel and stations, Radio base stations and antennae (includes both SFMTA & Emergency Services systems), Overhead Catenary, Catenary Detectors, traction power feeders, switch machines, PA, CCTV, station and Power SCADA and communications, Emergency, Mayor's, Fire and Maintenance phone, Fare Collection and TVMs, and ATCS systems, NextMuni or other passenger information system, Central Control installations at three locations (OCC, Bryant & Presidio), Station Signage, demobilization and clean-up of tunnel staging area, testing, manuals, training, removal of temporary tunnel utilities, as-built and record documents, and spare parts.

APPENDIX B – BOARD OF CONSULTANTS REPORT

THE CITY AND COUNTY OF SAN FRANCISCO

THIRD STREET LIGHT RAIL TRANSIT – PHASE 2

CENTRAL SUBWAY

EVALUATION OF CONSTRUCTION CONTRACT DELIVERY METHODS AND RECOMMENDATIONS FOR CONSTRUCTION CONTRACT MATRIX

JUNE 2007

Prepared for:
San Francisco Municipal Railway

Prepared by:
Board of Consultants

Table of Contents

Attachments

Introduction

The San Francisco Municipal Railway, in conjunction with its preliminary engineering and environmental review consultant team PB/Wong, a joint venture, has selected a board of consultants to participate in a workshop to accomplish the following:

- Evaluate contract delivery methods that are
    - consistent with the current city charter, and include
    - recommendation for changes
- Develop recommendations for packaging
- Provide a report from the Board of Consultants

The workshop was conducted Thursday, May 31, 2007 and Friday June 1, 2007 at the main office of the Municipal Railway. The four member Board of Consultants consisted of:

Mr. Eli Choueiry – Deputy Executive Officer, Los Angeles Metropolitan Transportation Authority

Mr. Jack Lemley – President, Lemley International

Mr. William A. Prey – Construction Engineer, San Diego Transportation Authority

Mr. J. Paul Silvestri, Jr. – Principal, The National Constructors Group

The workshop was facilitated by Mr. William Edgerton, President of Jacobs Associates.

Initially, the workshop discussions centered around the construction contract matrix, which was the first step prior to discussion relative to delivery methods. During the workshop several considerations and general comments were discussed that are worthy of inclusion in this Board of Consultants report.

Suggested Construction Contract Matrix

Construction Contract (1)

Tunnel Construction

The Scope of Work encompasses tunnel construction from the 4th Street access shaft to the Columbus Street Shaft (see assumptions reference to length). Excluded is track and walkway concrete (see considerations tunnel for additional information).

Public and private utility relocation for portal and access shaft is included with this contract.

Construction Contract (2)

Union Square Market Street Station (UMS)

The Scope of Work is all inclusive with exception of systems contract.

Public and private utility relocation for the station is included with this contract.

Construction Contract (3)

China Town Station (CTS)

The Scope of Work is all inclusive with exception of systems contract.

Construction Contract (4)

Moscone Station (MOS)

The Scope of Work is all inclusive with exception of systems contract.

Public and private utility relocation for the station is included with this contract.

Construction Contract (5)

Track and Related Construction, Systems, Power, Control, et. al.

The Scope of Work includes track work, tunnel track and walkway concrete, embeds portal construction, traffic signals, 4th and Brandon Street Station, and street reconstruction.

System Scope of Work includes train control, overhead contact, electrical, and communications.

Owner Procurement

The Scope of Work may include traction power, fare equipment, etc.

Recommended Construction Contract Delivery Methods

Construction Contract (1)

Tunnel Construction

Standard unit price lump sum contract. It is suggested to include A+B contracting methods or incentives/disincentives for contract completion. Contract includes a clearly defined negotiation clause at Owners option if lump sum exceeds 10 percent of the engineers estimate. Other completion milestone dates with incentive/disincentive can be included.

Construction Contract (2)

Union Square Market Street Station (UMS)

Unit price lump sum contract with incentives/disincentives for milestone date for closure of Stockton Street, and completion milestones for Track and Systems Contract (5) access to the work area. Contract includes a clearly defined negotiation clause at Owners option if lump sum exceeds 10 percent of the engineers estimate.

Construction Contract (3)

China Town Station (CTS)

Unit price lump sum contract. Contract includes a clearly defined negotiation clause at Owner's option if lump sum exceeds 10 percent of the engineers estimate. Include completion milestone for Track and System Contract (5) access to the work area.

Construction Contract (4)

Moscone Station (MOS)

Unit price lump sum contract. Contract includes a clearly defined negotiation clause at Owner's option if lump sum exceeds 10 percent of the engineers estimate. Include completion milestone for Track and System Contract (5) access to the work area.

Construction Contract (5)

Track and Related Construction, Systems, Power, Control, et. al.

Unit price lump sum contact. Contract includes a clearly defined negotiation clause at Owner's option if lump sum exceeds 10 percent of the engineers estimate.

Considerations

Program Delivery Strategy

A program delivery strategy must be developed due to the limited availability of funds. The plan must consider possible alternative strategies that:

- Provide a basic operating system.
- Provide alternatives to the scope of the work if unforeseen conditions arise, causing increases in cost wherein scope must be modified to remain within the total capital expenditure budget.

- The suggested program delivery strategy provides flexibility in providing an operating system.

Considerations Relative to Obtaining the FTA Full Funding Grant Agreement (FFGA)

- The extensive process required to obtain the FFGA
- The agency should schedule the steps required by the FTA process to obtain the FFGA
- The BAFO procurement process (the recommended 10% above bid proposal negotiating process) may extend receipt of the FFGA
- The amount of "at risk" funding the San Francisco Municipal Railway Agency has available
- Obtaining from FTA the "letter of no prejudice" (LNP) to begin construction
- The extended durations of obtaining the FFGA experienced by other rail agencies
- The excessive added costs, schedule slippage, and loss of user benefits caused by extended duration of obtaining the FFGA
- The fact San Francisco is responsible for program cost overruns

Board of Consultant Recommendations

Tunnel Construction Contract

It is strongly recommended the tunnel contract be advertised for construction as soon as possible after receiving the Record of Decision, while final design of the stations is being completed. Experience dictates that execution of the full funding grant will be difficult at best to obtain until tunnel bids are received and the bids and/or negotiations are reasonably within the engineers cost estimate. This approach has proven to be successful for other FTA funded projects requiring the full funding grant agreement. To limit Muni exposure to the FFGA not be executed it is recommended the tunnel contract contain two Notices to Proceed (NTP). NTP #1 for procurement of TBM, utility relocation at the portal, and construction of the portal. NTP #2 would commence tunnel construction. Right-of-way must be procured prior to NTP #2; however, in excess of one year from NTP #1 is available to complete the right-of-way acquisition.

Procurement of a tunnel boring machine is the construction contractor's responsibility. The agency does not want to be held liable for contractors claims caused by the agencies procurement of a tunnel boring machine. Contractor's claims can include schedule delays, disruption, lack of production, and increased maintenance costs.

If the agency elects to wait until the FFGA has been executed to advertise the tunnel contract, the Board of Consultants recommends the tunnels be constructed prior to the stations being excavated to the top of the tunnel.

The recommended early start of tunnel construction may reduce construction costs up to $30 million and provide a check on construction cost estimates, while also reducing construction contract interface issues. It provides valuable geotechnical information for station construction, reducing disruption to the traveling public, pedestrians, and the business community. The overall duration of construction contracts being in place is longer, but the overall direct disruption is reduced. Subsequently, the remaining construction contracts would be let compatible with the critical path to revenue service (see enclosed simplified bar graph sequence).

The tunnel contract should be based on completion dates with incentives/disincentives or A+B contracting methods. The number of boring machines should be the contractor's responsibility to meet contractual dates. Tunnels ahead of stations will provide added valuable geotechnical data for station construction. Material from UMS can be removed through the tunnel. A waiver to allow China Town excavated materials to be removed at the Columbus exit shaft would greatly reduce public exposure to construction material handling.

China Town Station

The construction approach is substantially different from constructing a tunnel. The added geotechnical information provided by the tunnel being constructed first may reduce the cost, time, and risk of constructing this station. The handling of material in such a populated area is a significant public safety issue. It is therefore suggested the agency explore the possibility of utilizing the adjacent tennis courts as a laydown area during construction. The agency may consider the station mining work be a separate contract then combine the station finish work with Union Square Market Street Station.

Moscone Station

This station may be deferred if, as construction progresses, additional funds are required to complete an operating Phase 2 system. Therefore, it should remain completely independent being the last station to be advertised for bidding.

San Francisco Municipal Railway Experience

The San Francisco Municipal Railway experience and knowledge relating to the management of complex underground heavy civil engineering programs may be limited. The Board of Consultants opinion is the management structure must be directed by a strong internal leader who is a hands-on decision maker, supported by a technical and legal advisory committee, which meets per a pre-determined schedule. The combined team must be given decision-making authority.

To assign a third party construction manager as a decision maker has proven to add confusion and greatly increases the cost of a project of this scope. It must clearly be understood the budget for this program must be closely monitored for all categories of cost. The agency must not lose control of the program. If it does, construction management and construction costs will escalate and construction schedules will slip. Third parties should only be used to supplement the agencies staff on an as-required basis.

Conflict must be avoided in the leadership and decision making roles. The introduction of another layer of 3rd party oversight has in the past developed into a very costly expenditure for limited return, an overabundance of meetings, added documents for the file, and education of individuals not employed by the agency.

Board of Consultants Conclusions Derived From the Evaluation Matrix Assessment of Alternatives – Construction Contract Delivery Methods

Design-Build Delivery Method

- The singular advantage of design-build for the Central Subway Program would be acceleration in starting revenue service. Recent experience for heavy civil engineering programs delivered by the design-build process identifies an increase in the total capital cost. For this reason alone, the design-build delivery option was eliminated from consideration.
- Other considerations toward elimination include:
    - Owner design review and approval process (involvement of other City of San Francisco Departments)
    - Preliminary engineers superior knowledge of the program
    - Unknowns relative to FTA issuance of FFGA
    - Owners skills relative to alternative delivery approach for a "mega" project
    - Minimal possibilities for contractor innovation, providing substantial savings, could be addressed with contractors proposed cost savings handled during the bidding process
    - Potential for reduced construction contractor competition

Design-Bid-Build Delivery Method

- *Firm Fixed Price Design Sequencing* was eliminated from consideration based upon Caltrans' experiment with this method, resulting in both a financial and schedule disaster. This process for the tunnel contract has nothing to offer. Complex underground stations require a complete design for the construction engineering of the ground support system. Without that it is purely speculative relative to establishing a firm fixed price.
- *Cost Reimbursable – Portland, OR Approach* was eliminated from consideration based upon the Board's opinion that a cost reimbursable approach was not in the Owner's best interest for a complex heavy civil engineering underground program. Controlling costs would be extremely difficult, even with incentives and disincentives as part of the program.
- *Cost Reimbursable – Guaranteed Maximum* was eliminated from consideration as not providing the Owner any particular benefits, when compared to a standard design-bid-build contract. This delivery method historically has been utilized in building and industrial construction. A guaranteed maximum contract to attract contractors for heavy civil engineering underground construction would require differing site conditions, clauses, and clear identification of risks.
- *Firm Fixed Price Bid* was eliminated form consideration because it does not provide the Owner with the flexibility of negotiating with the contractors if the lowest responsible bid is over a specified threshold. Today's marketplace with a limited number of contractors

proposing on “mega” underground project, volatile permanent material costs, and the lack of qualified management personnel, competent contractors are analyzing and pricing risks and increasing margins to account for lack of competition and unknown owner management skills.

The evaluation matrix advantages for fixed price bid include:

- Owner design review and approval not required
- Qualified design engineers have designed the project
- No duplication of design effort
- Superior knowledge of design engineer
- Design schedule meets owner revenue dates with each tunnel option
- Standard FTA approval process
- Proven delivery method
- Owner familiar with delivery method
- Contractor competition and schedule
- Minimize design and construction interface

Firm Fixed Price – Negotiated (Best Value Selection) was selected because it provides all the advantages of a Firm Fixed Price Bid, plus it provides the owner flexibility to negotiate as recommended if the bid is more than 10% of the engineers estimate. Since San Francisco is a charter city, it may require approval of the Board of Supervisors and the Mayors office.

General Comments

- The program management team must be very deliberate in monitoring funding.
- Unknown tieback locations at Moscone Center can be identified as exploratory drilling operation during preliminary design. The concept is to drill four- to six-feet-diameter continuous holes to locate actual ends of the lower tiebacks and adjust the profile accordingly.
- Prequalification of contracts is *not* recommended – sureties will define experienced contractors.
- Bidding stipends are recommended.
- Base line geotechnical reports, an advisory board, dispute review boards, escrow bid documents, and executive partnering are recommended.
- Current contract special provisions will require modifications to attract bidders. Very explicit instructions should be given to the agencies general council. The contracts special provisions must be modified to be more “contractor friendly.” Competition for public works projects in the United States has greatly diminished. Eight to ten years ago, public works projects of this scope would have received six to eight bidders. Currently, the agency will be extremely fortunate to receive two to three bids for each project in this program.

Items that should be considered for in-depth modification to contract documents for the Central Subway include, but are not limited to:

Craft/Technical Training Program

Apprentices

Projects Set Aside for Small Business

Percentage Goals – Recognize the Type of Work (being realistic)

Define the Effect of Special City Labor Ordinances Relative to Construction

Progress Payments

- Mobilization (per C/T)
- Retention (per C/T)
- Bi-Weekly
- Final Payment

Management Structure

- Geotechnical Baseline for Tunnel
- City in Charge (Third Party Staff Only)
- Project Partnering
- Executive Partnering
- Escrow Bid Documents
- Dispute Review Board
- Management Board – Organizational (Various Titles)

Public Relations – Agency to employ specialized public relations firm

Incentive/Disincentives

OCIP Insurance Program

Acceptance Criteria – Status – Turnover to Systems Contractor

City Provide Dump Area for Excavated Material

Assumptions

- The tunnel is constructed to Washington Square.
- Funds are limited for the overall program.
- The total capital expenditure must be contained within the available funds.

APPENDIX C – MEETING ATTENDEE LISTS

CENTRAL SUBWAY
THIRD STREET LIGHT RAIL PHASE 2

MEETING ATTENDANCE SHEET

Construction Contracting Strategy Workshop

May 31 & June 1, 2007

May 31: 9 am to 5 pm; June 1: 8 am to 3 pm

SFMTA, 3rd Floor, Main Conference Room

1 South Van Ness Avenue

San Francisco, CA

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Gary Griggs	PB/Wong	415 243-4690	griggs@pbworld.com

CENTRAL SUBWAY
THIRD STREET LIGHT RAIL PHASE 2

MEETING ATTENDANCE SHEET

Construction Contracting Strategy Workshop

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May 31: 9 am to 5 pm; June 1: 8 am to 3 pm

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1 South Van Ness Avenue

San Francisco, CA

NAME	AFFILIATION	PHONE	E-MAIL (for minutes)
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CENTRAL SUBWAY
THIRD STREET LIGHT RAIL PHASE 2

MEETING ATTENDANCE SHEET

Construction Contracting Strategy Workshop

May 31 & June 1, 2007

May 31: 9 am to 5 pm; June 1: 8 am to 3 pm

SFMTA, 3rd Floor, Main Conference Room

1 South Van Ness Avenue

San Francisco, CA

NAME	AFFILIATION	PHONE	E-MAIL (for minutes)
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Delivery Methods and Contract Packaging Follow-up Meeting.

September 20th, 821 Howard St. Project office

Attendees list.

Bill Edgerton	Jacobs	edgerton@jacobssf.com
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Luis Zurinaga	SFCTA	Luis@SFCTA.ORG
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Gary Griggs	PB/Wong	gary.griggs@sfmta.com

central T subway

Connecting people. Connecting communities.

Meeting Agenda

Project No. M544.1
Program Management
Workshop for Contracting Strategy Report Revision
September 11, 2012
8 AM to 12 Noon
Central Subway Project Office
821 Howard Street, 2nd Floor
Main Conference Room

1. Introduction (All – 8:00 AM to 8:10 AM)
2. Program Update (John / Albert – 8:10 AM to 8:30 AM)
3. Review of the Central Subway Contracting Strategy Report (Ross – 8:30 AM to 8:45 AM)
4. Review of the Proposed Revision to the Contract Strategy for One Construction Contract (Albert – 8:45 AM to 9:00 AM)
5. Program Impacts
    - Contractor Efficiency / Economy of Scale (9:00 AM to 9:10 AM)
    - Concurrent Construction Opportunities (9:10 AM to 9:20 AM)
    - Interface Constraints (9:20 AM to 9:30 AM)
    - Schedule (9:30 AM to 9:40 AM)
    - Insurance / Bonding Capacity (9:40 AM to 9:50 AM)
    - Potential Cost Savings (9:50 AM to 10:00 AM)
6. Revisit Initial Contracting Selection Matrix for One Contract Option (10:00 AM to 11:00 AM)
7. Program Implementation Strategy (Ross – 11:00 AM to 11:30 AM)
    - Specialize General Provisions / Special Provisions
    - Revised Bid Sheets
    - Bid / Award Period for 12 Weeks
    - New Bid Date
8. Next Steps

AGENDA

9/18/12

Central Subway Program Contract Strategy Workshop

Action Items: (Assuming with $16 to $35 Million saving with 4 months schedule saving)

1. Follow up with Contractors that have bid and those who have expressed interest in the program (but have not bid) such as Kiewit, Dragados, Kenny, Obyshai, and others

2. Discuss with AON potential options to reduce insurance price quotes to Contractors. What Qualifications (in lieu of Pre-Qualifications) are suggested?

3. Evaluate perceived small business opportunities for large single contract.

4. Further investigate use of an "A plus B plus C" option to mitigate perceived reduction in opportunities; refine how to award.

5. Further investigate need to reduce bonding capacity requirement to 50%, as regards Federal, State and City regulations, including Administrative Code section 6

6. Provide a bid option if price of Combined contract is too high. Deferred (multiple) NTP's, delectable options, defer MOS, others.

7. Implementation Plan for Combined Package.

8. CCO / SBE goals for large contract.

Table 11 Contract Delivery Numerical Evaluation

Delivery Method				Cost		Schedule		Social / Political Considerations	Administration				Litigation/Liability Risk		Unweighted Total	Weighted Total	Recommended?
Alt. No.			Description	Initial	Growth Potential	Construction Start	Delay Potential		Allowable	Coordination	Familiarity	Control	Contract	Design			
			Weight (1 to 10)	10	8	8	6	6	1	3	1	3	5	2			
1	Design-Bid-Build																
	A		Firm Fixed Price														
		1	Bid - Single Contract	★ -1	0	★ -1	0	★ -1	1	1	1	1	1	-1	1	-13	No
		2	Bid - Multiple Prime Contracts	0	-1	1	-1	1	1	0	1	1	0	-1	2	3	Yes
		3	Design Sequencing (Caltrans)	Not Recommended											NA	NA	No
		4	Bid/Negotiated Trigger Multiple Contracts	1	0	0	0	1	0	0	1	1	0	-1	3	18	Yes
	B		Cost Reimbursable														
		1	GMP with GMP	-1	1	1	0	0	0	0	0	1	0	0	2	9	Yes
		2	Portland Method	-1	-1	1	0	0	-1	-1	-1	1	0	0	-3	-12	No
2	Design - Build																
	A	Bid		-1	0	1	0	0	1	0	0	-1	-1	1	0	-7	No
	B		Negotiated	0	-1	1	0	0	1	0	0	-1	-1	1	0	-5	No
3	Alliance			Not Recommended											NA	NA	No
			Legend:	1	Favorable												
				-1	Unfavorable												
				0	Neutral												

From the 12/19/08 Workshop Paper

★ Drivers originally have been taken over by events.

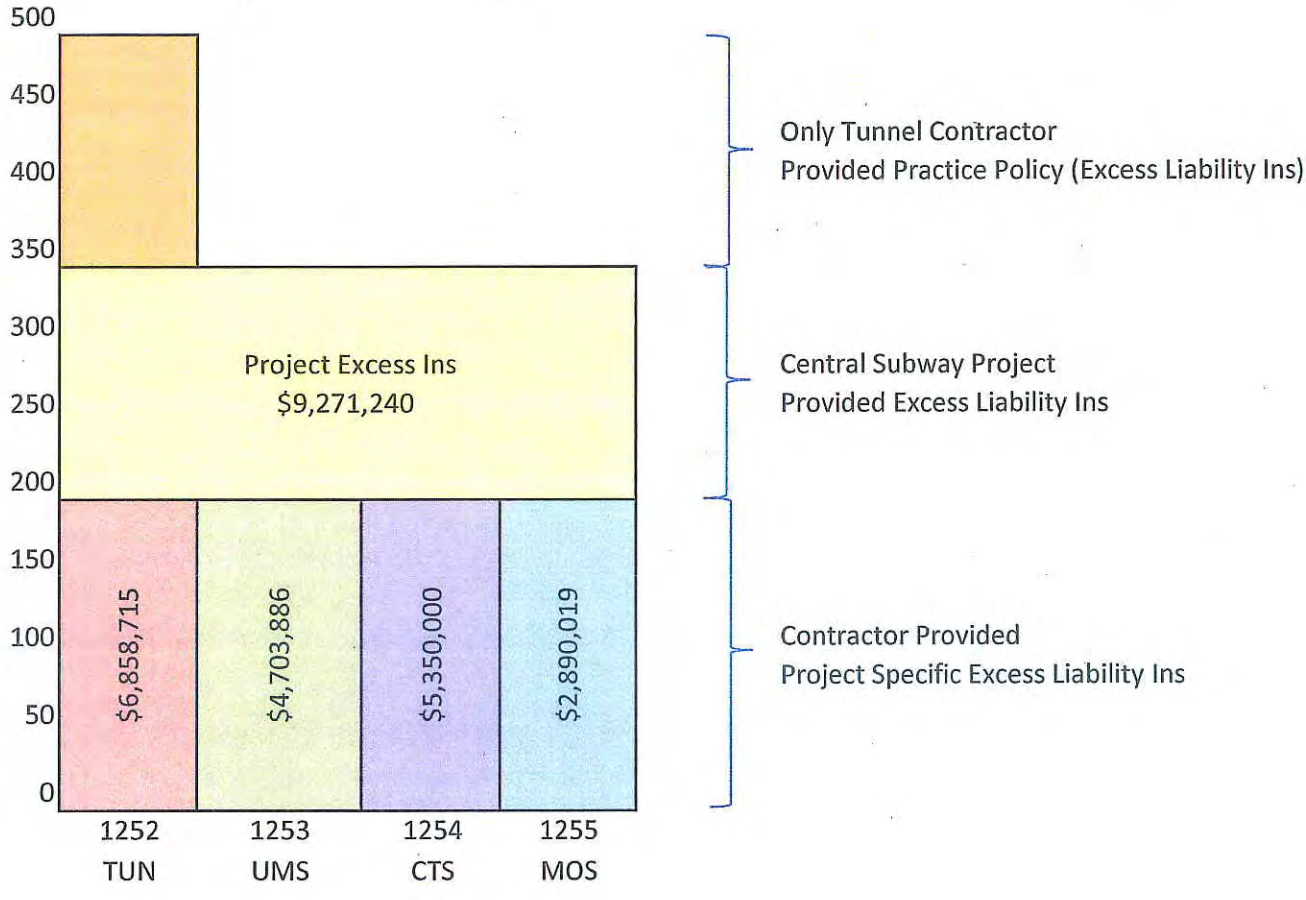
Contract Delivery Numerical Evaluation

Delivery Method				Cost		Schedule		Social / Political Considerations	Administration				Litigation/Liability Risk		Unweighted Total	Weighted Total	Recommended?
Alt. No.			Description	Initial	Growth Potential	Construction Start	Delay Potential		Allowable	Coordination	Familiarity	Control	Contract	Design			
Weight (1 to 10)				10	8	8	6	6	1	3	1	3	5	2			
1	Design-Bid-Build																
	A	Firm Fixed Price															
		1	Bid - Single Contract	-1	0	-1	0	-1	1	1	1	1	1	-1	1	-13	No
		2	Bid - Multiple Prime Contracts	0	-1	1	-1	1	1	0	1	1	0	-1	2	3	Yes
			Legend:	1	Favorable												
				-1	Unfavorable												
				0	Neutral												

↑
community needs
the perception this is same

CS 163-1
Excess Liability Insurance

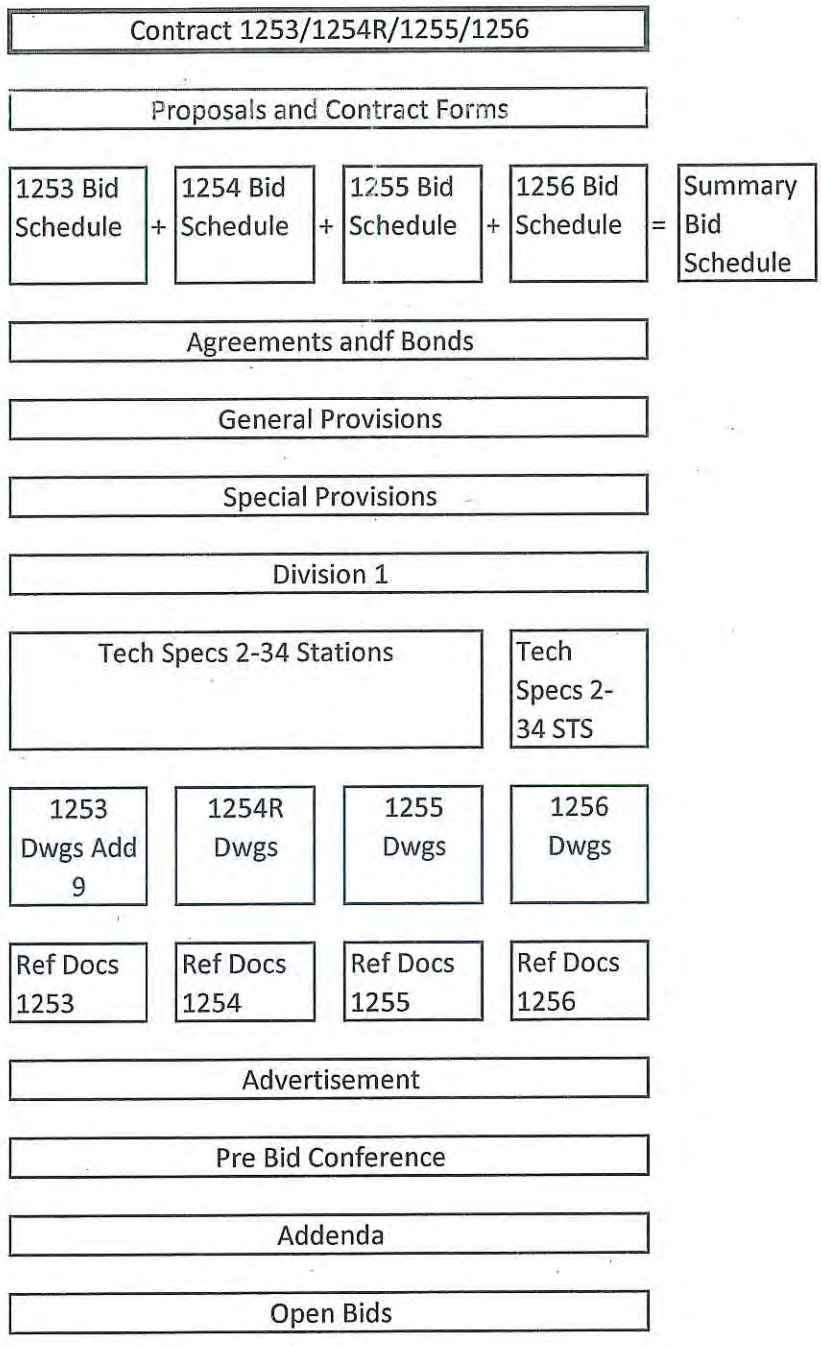
Established Program



- TUN premium is actual

- UMS CTS and MOS premiums are a proration of TUN premium based on construction cost

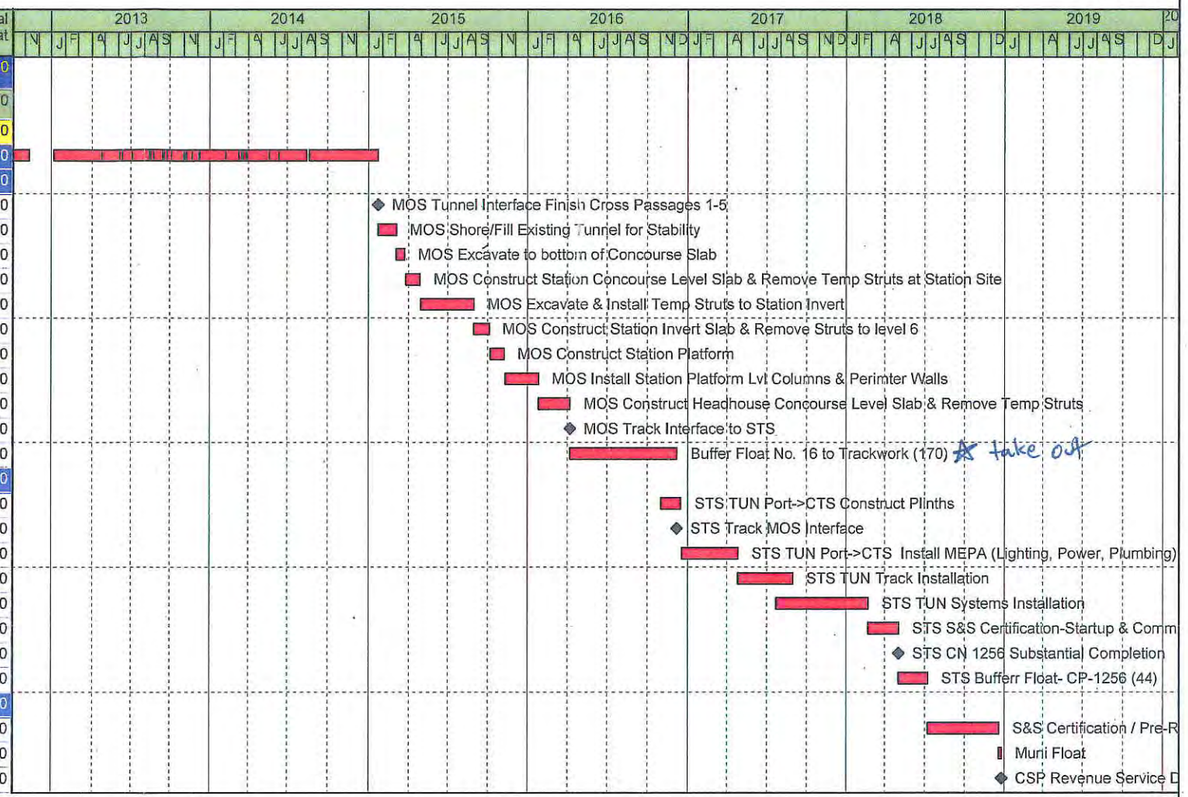
Contract Implementation Plan



CSP - CURRENT MASTER PROJECT SCHEDULE

29-Aug-12 13:42

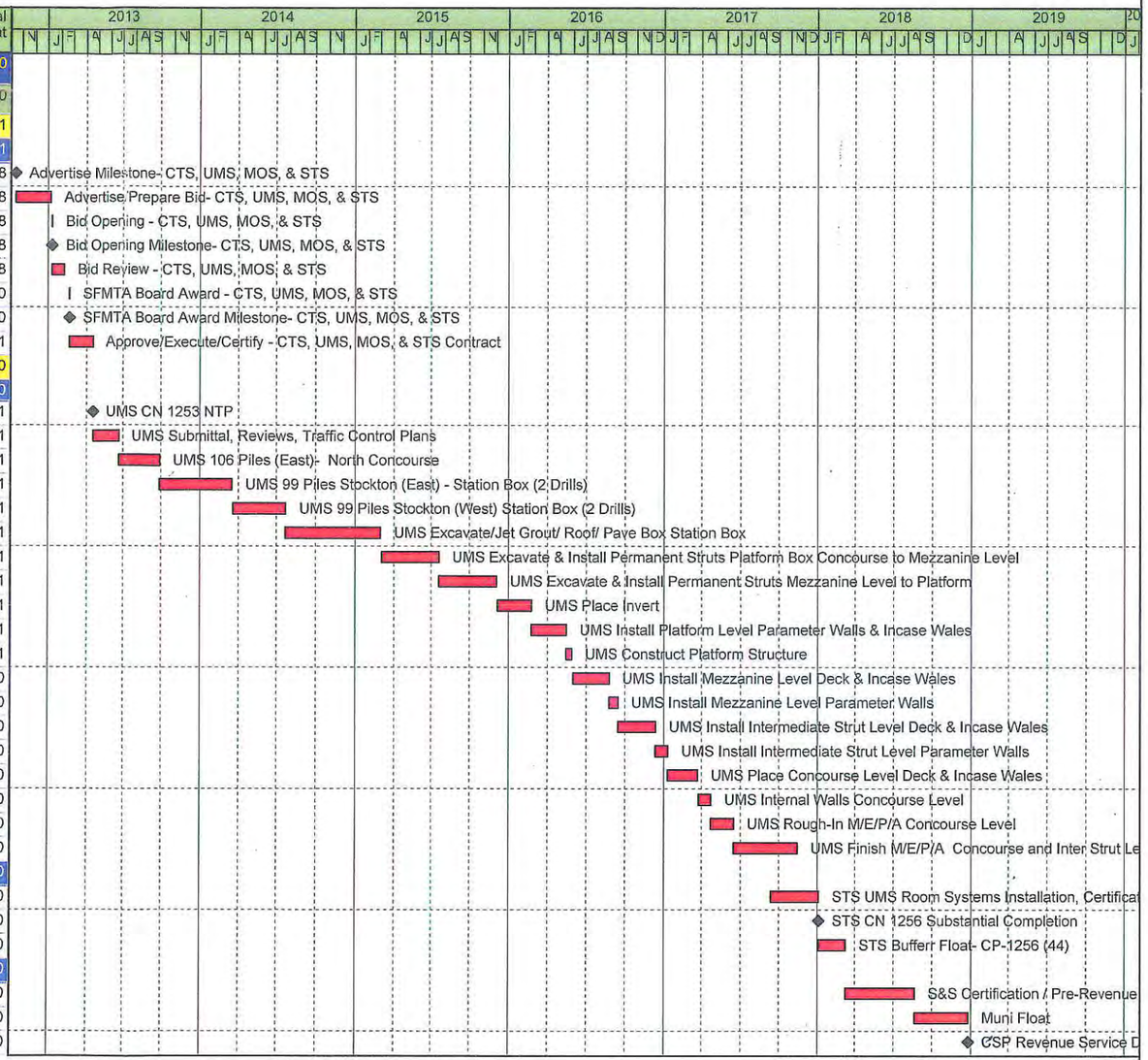
Activity ID	Activity Name	Org Dur	Start	Finish	Total Float
CSP - CURRENT MASTER PROJECT SCHEDULE		2404	11-Apr-12 A	26-Dec-18	0
CENTRAL SUBWAY PROJECT		2404	11-Apr-12 A	26-Dec-18	0
CONSTRUCTION PHASE		2404	11-Apr-12 A	26-Dec-18	0
Construction Tunnels CN-1252		969	11-Apr-12 A	21-Jan-15	0
Construction MOS Station CN-1255		685	21-Jan-15	06-Dec-16	0
N-MOS9910	MOS Tunnel Interface Finish Cross Passages 1-5	0		21-Jan-15	0
N-MOS9740	MOS Shore/Fill Existing Tunnel for Stability	28	22-Jan-15	03-Mar-15	0
N-MOS10150	MOS Excavate to bottom of Concourse Slab	15	04-Mar-15	24-Mar-15	0
MOS1140	MOS Construct Station Concourse Level Slab & Remove Temp Struts at Station Site	25	25-Mar-15	28-Apr-15	0
MOS1110	MOS Excavate & Install Temp Struts to Station Invert	85	29-Apr-15	27-Aug-15	0
MOS1160	MOS Construct Station Invert Slab & Remove Struts to level 6	25	28-Aug-15	02-Oct-15	0
MOS1180	MOS Construct Station Platform	25	05-Oct-15	06-Nov-15	0
N-MOS1180	MOS Install Station Platform Lvl Columns & Perimter Walls	50	09-Nov-15	25-Jan-16	0
N-MOS9745	MOS Construct Headhouse Concourse Level Slab & Remove Temp Struts	50	26-Jan-16	05-Apr-16	0
N-MOS10120	MOS Track Interface to STS	0		05-Apr-16	0
BUF0016	Buffer Float No. 16 to Trackwork (170)	170	06-Apr-16	06-Dec-16	0
Construction STS CN-1256		611	03-Nov-16	06-Jul-18	0
STS3030	STS TUN Port->CTS Construct Plinths	30	03-Nov-16	16-Dec-16	0
STS9720	STS Track MOS Interface	0		06-Dec-16	0
STS3040	STS TUN Port->CTS Install MEPA (Lighting, Power, Plumbing)	90	19-Dec-16	26-Apr-17	0
STS3070	STS TUN Track Installation	90	27-Apr-17	01-Sep-17	0
STS3080	STS TUN Systems Installation	147	24-Jul-17	21-Feb-18	0
STS3090	STS S&S Certification-Startup & Commissioning	50	22-Feb-18	02-May-18	0
STS1500	STS CN 1256 Substantial Completion	0		02-May-18	0
BUF1017	STS Bufferr Float- CP-1256 (44)	44	03-May-18	06-Jul-18	0
Project Startup		118	09-Jul-18	26-Dec-18	0
STU1010	S&S Certification / Pre-Revenue Activities	115	09-Jul-18	19-Dec-18	0
BUF0018	Muni Float	3	20-Dec-18	26-Dec-18	0
MS0009	CSP Revenue Service Date (Baseline Finish Date: 12-26-2018)	0		26-Dec-18*	0



Combined Stations and Systems in One Package

29-Aug-12 13:50

Activity ID	Activity Name	Org Dur	Start	Finish	Total Float
Combined Stations and Systems in One Package		2264	15-Oct-12	26-Dec-18	0
CENTRAL SUBWAY PROJECT		2264	15-Oct-12	26-Dec-18	0
PROCUREMENT PHASE		184	15-Oct-12	16-Apr-13	1
Bid/Award		184	15-Oct-12	16-Apr-13	1
FDS1940	Advertise Milestone- CTS, UMS, MOS, & STS	0	15-Oct-12*		8
FDS1895	Advertise/Prepare Bid- CTS, UMS, MOS, & STS	55	15-Oct-12	07-Jan-13	8
FDS1270	Bid Opening - CTS, UMS, MOS, & STS	1	08-Jan-13	08-Jan-13	8
FDS2070	Bid Opening Milestone- CTS, UMS, MOS, & STS	0		08-Jan-13	8
FDS1310	Bid Review - CTS, UMS, MOS, & STS	20	09-Jan-13	05-Feb-13	8
FDS1275	SFMTA Board Award - CTS, UMS, MOS, & STS	1	19-Feb-13	19-Feb-13	0
FDS2080	SFMTA Board Award Milestone- CTS, UMS, MOS, & STS	0		19-Feb-13	0
FDS1900	Approve/Execute/Certify - CTS, UMS, MOS, & STS Contract	40	20-Feb-13	16-Apr-13	1
CONSTRUCTION PHASE		2080	17-Apr-13	26-Dec-18	0
Construction UMS Station CN-1253		1672	17-Apr-13	13-Nov-17	0
FDS1700	UMS CN 1253 NTP	0	17-Apr-13		1
N-UMS1000	UMS Submittal, Reviews, Traffic Control Plans	45	17-Apr-13	19-Jun-13	1
N-UMS9880	UMS 106 Piles (East)- North Concourse	68	20-Jun-13	25-Sep-13	1
N-UMS9900	UMS 99 Piles Stockton (East) - Station Box (2 Drills)	105	26-Sep-13	18-Mar-14	1
N-UMS1003	UMS 99 Piles Stockton (West) Station Box (2 Drills)	105	19-Mar-14	22-Jul-14	1
N-UMS1016	UMS Excavate/Jet Grout/ Roof/ Pave Box Station Box	146	23-Jul-14	02-Mar-15	1
N-UMS1160	UMS Excavate & Install Permanent Struts Platform Box Concourse to Mezzanine Level	115	03-Mar-15	17-Jul-15	1
N-UMS1295	UMS Excavate & Install Permanent Struts Mezzanine Level to Platform	115	18-Jul-15	03-Dec-15	1
UMS1330	UMS Place Invert	62	04-Dec-15	22-Feb-16	1
UMS1315	UMS Install Platform Level Parameter Walls & Incase Wales	71	23-Feb-16	14-May-16	1
UMS1340	UMS Construct Platform Structure	11	16-May-16	27-May-16	1
N-UMS1222	UMS Install Mezzanine Level Deck & Incase Wales	61	31-May-16	24-Aug-16	0
N-UMS10030	UMS Install Mezzanine Level Parameter Walls	15	25-Aug-16	15-Sep-16	0
UMS1200	UMS Install Intermediate Strut Level Deck & Incase Wales	60	16-Sep-16	12-Dec-16	0
N-UMS1040	UMS Install Intermediate Strut Level Parameter Walls	20	13-Dec-16	11-Jan-17	0
UMS1180	UMS Place Concourse Level Deck & Incase Wales	50	12-Jan-17	23-Mar-17	0
UMS1210	UMS Internal Walls Concourse Level	25	24-Mar-17	21-Apr-17	0
UMS1230	UMS Rough-In M/E/P/A Concourse Level	45	22-Apr-17	14-Jun-17	0
UMS1440	UMS Finish M/E/P/A Concourse and Inter Strut Levels	128	15-Jun-17	13-Nov-17	0
Construction STS CN-1256		179	11-Sep-17	08-Mar-18	0
STS9970	STS UMS Room Systems Installation, Certification-Startup & Commissioning	80	11-Sep-17	04-Jan-18	0
STS1500	STS CN 1256 Substantial Completion	0		04-Jan-18	0
BUF1017	STS Bufferr Float- CP-1256 (44)	44	05-Jan-18	08-Mar-18	0
Project Startup		201	09-Mar-18	26-Dec-18	0
STU1010	S&S Certification / Pre-Revenue Activities	115	09-Mar-18	21-Aug-18	0
BUF0018	Muni Float	86	22-Aug-18	26-Dec-18	0
MS0009	CSP Revenue Service Date (Baseline Finish Date: 12-26-2018)	0		26-Dec-18*	0



TASK filter: Critical.

central T subway

Connecting people. Connecting communities.

Memorandum

CS Memorandum No. XXXX

To: John Funghi, Program Director
SFMTA – Central Subway Project

From: Construction Delivery Team

Luis Zurinaga, SFCTA
Ross Edwards, CSP
Eric Stassevitch, CSP
Roger Nguyen, SFMTA
Arthur Wong, SFMTA
Mark Benson, CSP
Albert Hoe, SFMTA

Date: August 31, 2012

Subject: Recommendation to Revise Central Subway Delivery Strategy by Combining Stations and Systems Construction Contracts

Background:

The Central Subway Program developed and adopted a construction delivery methodology as part of the Preliminary Engineering task which recommended seven construction contracts for delivery of the Program. This strategy was developed in part to provide:

- Larger bidder pool – Contractors familiar with individual types of work and better able to obtain insurance and bonding;
- Start of some construction contracts before all design is completed; and
- Better opportunities for small and local businesses for specific bid packages such as utility relocation.

This strategy has been utilized for the first three construction contracts by advancing two Utility Relocation contracts (SBE Prime) and the Tunnel contract (specialized tunnel experience).

Current Status:
However, this strategy has come into question with the fourth and fifth construction contracts. For the Chinatown Station contract, four bids received June 12, 2012, with the lowest responsive bid being $30 million over the engineer's estimate. Subsequently, on August 24, 2012, SFMTA rejected of all bids for Chinatown Station and planned to re-advertise the contract. Currently, bids for Union Square / Market Street Station are being prepared by Contracts with bid opening scheduled for September 6, 2012. Based on 200 plus questions and comments from the bidders and despite clarification provided in eight addenda, the Central Subway Program is anticipating bids that will be significantly higher than the engineer's estimate of $210 Million dollars.

The Program convened Senior Managers to discuss alternatives to the current contracting strategy to address the potential higher cost of the remaining contracts. The Managers had two meetings to discuss various alternatives including modification of the existing contracts and combining of contracts. The team recommended combining the four remaining contracts (3 Stations and Systems) into one contract. The advantages of a combined contract approach, as evaluated during PE, was the economies of scale available in a single contract which was forfeited by multi-prime contracts with separate overhead and mobilization costs. The primary disadvantages of the combined contract approach, also evaluated during PE, have in actuality been overtaken by events as described below. It was also identified that the combined contract approach is typically awarded after a round of competitive bidding. The previously evaluated advantages of the multiple-prime contract approach has been negated because: 1) the bidding pool for Stations and System contracts appears capable of obtaining insurance and bonding; 2) design is complete for the remaining contracts; 3) contract requirements include SBE goals.

The re-evaluation of utilizing a combined contract approach for the remaining contracts has several advantages:

- Cost saving due economy of scale;
- Schedule saving as some activities can be advanced concurrently; and
- Less risk due to reduced interfaces between contracts.

The combined contract approach for Stations and Systems will be implemented by utilizing the currently developed contract drawings and specifications as four Elements within the single procurement (Elements identified as contracts 1253, 1254, 1254, and 1255) consisting of:

- One Proposal and Contract Forms that describes the structure of the procurement;
- One General Provisions section;
- One Special Provisions section that consolidates current separate Special Provisions;
- Separate Division 01 – General Requirements (revises contract interface requirements and constraints);
- Separate Division 02- 34 Technical Specifications for each element;
- Separate Contract Drawings for each element (revised to address reference between elements);
- Separate Reference Documents for each element.

Recommendation:

- Extend the bid opening date of UMS Station contract from September 6, 2012 to November 15, 2012 and notify bidders that an alternative contracting strategy is being evaluated;
- Refine potential cost and schedule benefits and market for insurance and bonding capacity;
- Notify SFMTA board, funding partners (FTA and TA) and elected officials of recommendation to change contracting strategy;
- Cancel UMS contract currently advertised;

Prepare combined construction contract for advertising in October 2012.

Cc: CS File No. M544.1.
Jane Wang
Quon Chin
Carlos Campillo

APPENDIX H - CONSTRUCTION INSURANCE STUDY

December 14, 2011

Aon Risk Insurance Services West, Inc.
Construction Services Group
199 Fremont Street, Suite 1500
San Francisco, CA 94105

Attention: Regina Carter

RE: SFMTA Appoints Aon Risk Services as the Broker of Record
Project: San Francisco Central Subway Tunnel & Three Station Contracts
Coverages: Excess/Umbrella Liability – Excess of $200M

To Whom It May Concern:

This letter shall serve to advise that effective December 14, 2011, the San Francisco Municipal Transportation Agency ("SFMTA") has appointed Aon Risk Insurance Services, including all of Aon's affiliated and related companies such as Aon London, ("Aon"), as the exclusive Broker/Agent of Record with respect to the following insurance coverages:

Excess/Umbrella Liability Insurance – Excess of General Liability, Employers Liability, Non-Owned & Hired Auto and $200M of Excess Liability

Project:	SFMTA Central Subway Project
SFMTA Contracts:	CN-1252 Tunneling, CN-1253 Union Square/ Market Street Station, CN-1254 Chinatown and CN-1255 Moscone Station

The SFMTA has appointed Aon to negotiate and procure Excess Liability Quotations that are excess of the primary General Liability, Employers Liability, Non-Owned and Hired Auto, and $200M of Excess Liability coverage that will be placed by other parties for the above mentioned contracts.

In order to access an insurance market that is only accessible through the use of a 3rd party wholesale broker or intermediary, Aon shall have the right and ability to utilize any wholesale broker or intermediary.

This appointment rescinds all previous appointments and the authorization contained herein shall remain in full force and effect until cancelled in writing by us. We hereby waive any and all waiting periods as they relate to this appointment.

Aon is hereby authorized to negotiate directly with any interested company as respects changes to existing insurance quotations for this layer of insurance coverage. However, Aon shall not be responsible for any deficiencies in, or any return premiums and/or commissions due on, or any taxes, fines, or penalties related to, any insurance coverages not placed by Aon.

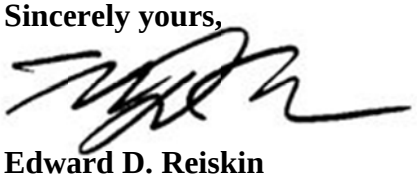
This letter also constitutes authorization to any underwriter to furnish Aon representatives with all information pertaining to any and all insurance quotes, contracts, rates, rating schedules, surveys, reserves, retention, or other data they may require as respects to this layer of Excess Liability Insurance. We request that you do not communicate such information to anyone else.

It is hereby acknowledged and agreed that Aon has made no representation as to the availability of insurance coverage, the reasonableness of the terms thereof or the financial solvency of any carrier.

This letter confirms that the SFMTA agrees that Aon is authorized to use SFMTA's logo, pictures and other publicly available information about SFMTA for the purpose of promoting SFMTA to any entity involved in the marketing process for Client's insurance needs under this Agreement.

Thank you for your courtesy and cooperation.

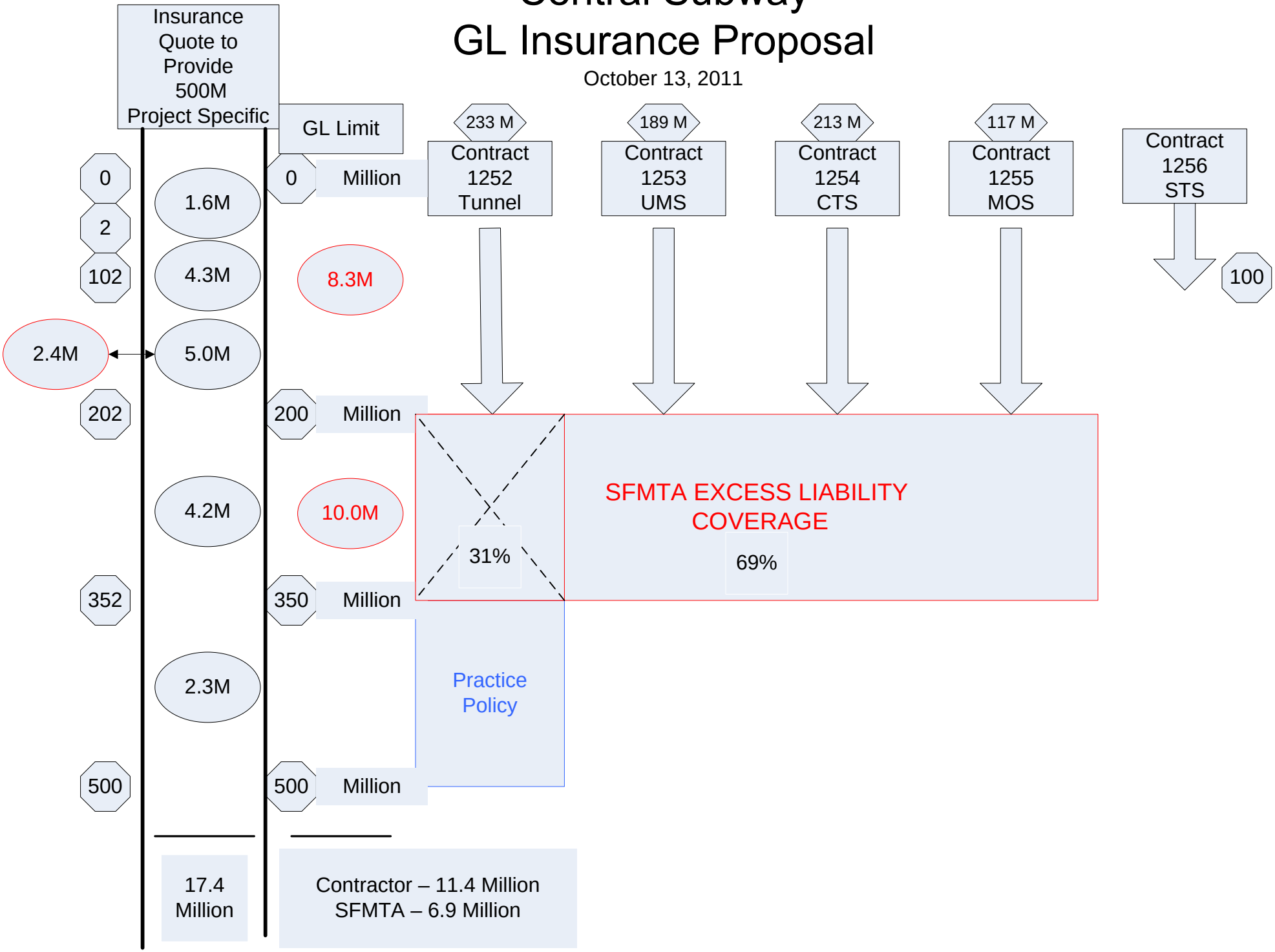
Sincerely yours,



Edward D. Reiskin
Director of Transportation
SF Municipal Transportation Agency

Central Subway
GL Insurance Proposal

October 13, 2011



August 22, 2011

Notice to all Proposers

Re: SFMTA Contract No. CS-163
Owner Controlled Insurance Program for the Central Subway Project (Third Street Light Rail Project Phase 2)
Notice of Rejection of Proposals

Dear Proposer:

The San Francisco Municipal Transportation Agency (SFMTA) would like to thank you for the proposal(s) you submitted in response to the Request for Proposals (RFP) for the above referenced contract.

After a thorough analysis of the proposals received and the relative costs of the program, the SFMTA has decided not to pursue an Owner Controlled Insurance Program (OCIP) for the Central Subway Project.

The SFMTA reserved the right to reject any and all proposals under Section 6.4 of the RFP for any reason. Accordingly, this is to notify you that all proposals received for all three tasks under the subject RFP are hereby rejected.

Proposers for Tasks 1 and 3 were provided broker of record letters for the limited purpose of obtaining insurance premium cost estimates. The SFMTA hereby rescinds those letters. The SFMTA requests that proposers inform all underwriters that they have contacted concerning an OCIP for the Central Subway Project that the SFMTA is not pursuing an OCIP for the Project.

We look forward to your participation in our future projects. Please feel free to contact Mr. Shahnam Farhangi at 415.701.4284 or via e-mail at Shahnam.Farhangi@sfmta.com if you have any questions.

Sincerely,

Edward D. Reiskin
Director of Transportation

cc: William Buchan, Aon Risk Insurance Services West, Inc.
Brian F. Cooper, Gallagher Construction Services
Ingrid Merriwether, Merriwether & Williams Insurance Services
John Funghi
Rob Stone
Shahnam Farhangi

SFMTA Central Subway Project No. M544.1
Contract No. CS-149 Doc No. 05875
File No.: M544.1. 1.2003
Routing Date: 10-23-09 Initials: DHC

CITY AND COUNTY OF SAN FRANCISCO (CCSF)

Task Order #WMG-1

Central Subway Construction Insurance Program (CIP) Advisory Study and Report

SEPTEMBER 25, 2009

Warren, McVeigh & Griffin, Inc.
RISK MANAGEMENT CONSULTANTS

1420 Bristol Street North, Suite 220
Newport Beach, CA 92660
Telephone 949-752-1058
Facsimile 949-955-1929

Warren, McVeigh & Griffin, Inc.
RISK MANAGEMENT CONSULTANTS

September 25, 2009

Matt Hansen
Director, Risk Management Division
City and County of San Francisco
25 Van Ness Avenue, Suite 410
San Francisco, CA 94102

Task Order #WMG-1
Central Subway Construction Insurance Program
Advisory Study and Report

This report presents the results of our construction insurance program advisory study for Central Subway Construction. Our activities in conducting this study included

- Interviews of and telephone conversations with City/SFMTA personnel, including SFMTA contractors
- Inspection of the Central Subway construction project site
- Interviews with insurance broker personnel specializing in OCIPs
- Interviews with risk managers of large construction projects
- Interview of representatives from California chapters of AGC and EUCA
- Review of existing construction contract and bid documents
- Review of numerous documents describing proposed Central Subway construction
- Review of various studies about obstacles to small and emerging contractor participation in construction projects
- Review of current workers' compensation rates for Central Subway construction
- Preparation of a draft report and this final report

All City/SFMTA staff we interviewed were extremely cooperating, making our work on this project highly rewarding. We stand ready to answer any questions that may arise from this report and to provide any further assistance that the City and SFMTA may require.

Warren, McVeigh & Griffin, Inc.

1420 Bristol Street North, Suite 220, Newport Beach, CA 92660
Telephone 949/752-1058 Facsimile 949/955-1929
www.griffincom.com

Contents

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1 Executive Summary

Purpose

The primary purpose of this study, which was commissioned by the Director, Risk Management Division, has been to provide an independent review of the San Francisco Municipal Transit Authority (SFMTA) Central Subway construction project to determine whether current risk-transfer and risk-financing practices should be changed or replaced to improve protection, reduce costs, or provide other potential benefits.

The body of the report contains many conclusions, recommendations, and observations. All such recommendations, observations, and conclusions are important and should be carefully considered. Those that we feel will be of greatest interest to City/SFMTA management are summarized below.

Principal Findings

The principal alternative to traditional insurance programs (TIP)[1] for Central Subway construction projects is a form of controlled insurance program (CIP), either an owner-controlled insurance program (OCIP)[2] or multiple contractor-controlled insurance programs (CCIP).[3]

In the absence of an OCIP, it is likely that some or all of the prime contractors for each of the Central Subway construction projects will use the CCIP approach for at least some (workers' compensation and liability) coverages.

An OCIP consolidating workers' compensation and general liability coverages has the potential to provide certain benefits to City/SFMTA when compared to the traditional insurance approach or when prime contractors employ CCIPs. The most important of these advantages are:

---

[1] The project participants (design professionals, contractors, and subcontractors) all purchase and provide evidence to City of their individual property/casualty, workers' compensation, and other required insurance coverages.

[2] An OCIP is a type of controlled insurance program (CIP). The project owner arranges a controlled insurance program or "wrap-up," which is a master insurance program covering all or most project participants for some or all construction project phases.

[3] A CCIP is similar to an OCIP except the prime contractor or construction manager arranges a controlled insurance program covering all or most construction project participants for some or all project phases.

- **Greater consistency in liability coverage for all tiers of enrolled contractors** compared to the traditional insurance approach, including coverage for the City's sole and active negligence. Even if CCIPs were employed by the various prime contractors, City/SFMTA should enjoy greater consistency and certainty of coverage under an OCIP because of variations that would likely exist between numerous contractor-controlled insurance programs.

- **The ability to purchase dedicated high-excess-liability limits, including 10-year completed-operations liability coverage,[4] for the OCIP term.[5]** Conversations with the City Risk Manager and City Attorney's Office personnel indicate such limits may need to be $300 million or higher. Even large contractors may not be able to arrange the necessary high limits of protection that include important extended completed-operations liability coverage dedicated for a single project such as this one.

- **Elimination of insurance-purchasing obstacles.** An OCIP would eliminate insurance-related purchasing obstacles for all contractors including Local Business Enterprise (LBE) contractors who enroll in an OCIP and who otherwise may not be able to obtain City-required insurance or the cost of which would be prohibitive. Such elimination of insurance-purchasing obstacles is, however, not proven by any empirical evidence to increase LBE participation.

- **Possible reduced litigation among contractors and City/SFMTA and streamlined claim-payment and settlement processes.** Because the owner and all enrolled contractors are insureds for both general liability and workers' compensation with a single insurer, claims-handling should be streamlined both from a litigation and claim-payment standpoint compared to traditional insurance.

- **Potential cost savings, perhaps as high as about $8 million, might be attainable with excellent loss prevention and claims control under a loss-sensitive OCIP premium rating plan.** Because prime contractor insurance rates for workers' compensation and general liability are currently believed to be similar to those available to City/SFMTA under an OCIP, the bulk of any potential cost savings would come from City/SFMTA being able to successfully implement aggressive and effective loss-prevention measures and effective control of the claim-settlement process under a loss-sensitive premium rating plan. Savings over contractor costs attainable from the aggregation of buying power under an OCIP is believed under current insurance market conditions to be minimal. This phenomenon could change, however, in the next 12 to 18 months and become more favorable to OCIPs.

  An alternative to a loss-sensitive rating plan that should be investigated for an OCIP is a guaranteed-rate, no-deductible program[6] for workers' compensation and/or general liability with a dividend[7] feature. Such a plan, if available, could limit the owners exposure to adverse loss conditions and should require far less administrative overhead to implement and manage[8]

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[4] The term *completed operations* refers to construction projects that are completed and for which liability later may arise, such as bodily injury or property damage, because of flaws in the completed construction.
[5] This may not always coincide with the project construction period because an OCIP normally can be written for a term no greater than four or five years.
[6] A *guaranteed-cost program* offers complete risk transfer at a fixed rate. Premium is based on payroll and subject to adjustment at audit. The only variable affecting premium between policy inception and audit is payroll.
[7] *Dividend* refers to a negotiated return premium amount based on achieving a certain loss ratio.
[8] A January 2003 *Owner Controlled Insurance Program (OCIP) Guidelines and Recommendations* report prepared by a City working group had similar recommendations regarding the use of OCIP on City projects.

In addition to City/SFMTA consolidation of workers' compensation and general liability insurance under a master OCIP program, separate owner-arranged programs for the following coverages should be considered:

Builders Risk. Certain components of the Central Subway project while under construction, such as while tunneling or during excavation, may be highly susceptible to damage or destruction from a number of causes including earthquake, earth movement, subsidence, and flood. In addition, because numerous contractors will be working on various and interconnecting parts of the project at the same time, the allocation of and responsibility for risk is complicated with a heightened potential for disputes and litigation over responsibility for damage to and delay of the project. Consolidating coverage under a City-directed insurance program should result in broader and possibly more cost-effective coverage than multiple individual contractor-purchased insurance programs.

Professional Liability. On complex infrastructure projects with significant catastrophe exposure such as the Central Subway construction, determining and arranging adequate levels of protection for design-error losses is challenging, especially when there is significant involvement from small and disadvantaged design firms. Because of various options of insuring this exposure (traditional contractor-provided insurance, separate insurance covering the project, and owners protective indemnity coverage), City/SFMTA will need to be able to retain the option to compare the cost of various alternatives against traditional contractor-provided coverage.

Pollution Liability. Prime construction contractors may carry or be required to carry a form of contractors pollution liability (CPL) insurance to cover losses arising out of construction activities. An alternative to relying solely on contractor-provided insurance would be for City/SFMTA to augment such coverage limits with excess CPL coverage, which would be for City and County's protection only. Other pollution coverages could include cost of remediation (in excess of expected costs) of known conditions and special insurance needed for contractors performing hazardous waste remediation and abatement work.

▪ ▪ ▪

With the potential for savings and other benefits described above comes possible added risks and responsibilities for City/SFMTA. These risks and responsibilities include:

- The possibility that City/SFMTA are unable to achieve desired loss-prevention and claims-management results and that instead of savings under the rating plan, the City/SFMTA incur unanticipated losses and higher-than-anticipated premiums that might be in excess of costs under contractor provided insurance. This risk may be reduced or eliminated depending on the specific nature of any loss-sensitive rating plan and various other terms and conditions negotiated with insurers or the use of a guaranteed-rate, no-deductible program.

- The possibilities that a single OCIP may not be available for the entire term of the planned construction or the planned construction goes beyond the negotiated OCIP term. Most OCIP s can be written only for a period of four to five years. The principal risk is that without appropriate renewal parameters negotiated at inception, the insurer may be under no obligation to continue providing insurance or that the terms and conditions offered could be more restrictive and expensive than the original four- to five-year program.

  Although it may be possible to negotiate a longer term OCIP, another alternative would be to eliminate the utility relocation and systems work contracts from the OICP, thereby reducing the planned project duration from six years to about four and one-half years.

- An awareness that there are difficulties and limitations to the extent that potential cost savings under an OCIP compared to traditional insurance can be verified and documented.

- Added transactional costs and difficulties may be encountered with insurance companies regarding City Attorney's Office approval of claim payments and settlements where deductibles are concerned. There is a fundamental conflict with City charter requirements mandating City Attorney approval where liability insurance policies contain deductibles. This conflict arises because under a typical high deductible OCIP premium-rating plan, the insurance company retains the ultimate authority for claims handing, payment, and settlement. Such conflict should be able to be resolved through negotiation with insurers prior to placement of coverage or eliminated if workers' compensation and/or liability coverages under the OCIP are written on a guaranteed-rate basis with no deductible; however, it was unclear to the insurance brokers we interviewed whether such a no-deductible program is available in the current insurance market.

Recommendations

Although this report indicates that a workers' compensation and general liability OCIP, as well as other owner-arranged insurance programs, should provide numerous benefits over traditional insurance and CCIP approaches, the specific form, cost, terms, and conditions of such programs can only be verified by selecting one or more insurance brokers from City's current pool of approved insurance brokers to negotiate firm pricing, terms, and conditions.

In order to agree on a plan of action, refine cost projections, and establish ultimate terms, conditions, and pricing of OCIP and possibly other owner-arranged insurance programs, City/SFMTA should:

1. Form a small working group composed of representatives from City Risk Management, City Attorney's Office, and SFMTA to guide a final evaluation process based on the appointment of an OCIP broker or brokers and competitively negotiate OCIP and other insurance alternatives.

2. In addition to various recommendations contained in this report such process should address and incorporate, where appropriate for Central Subway construction, recommendations outlined in City's January 2003 Owner Controlled Insurance Program (OCIP) Guidelines and Recommendations report. See Appendix A, which is the City's summary of these recommendations.

3. Develop an implementation plan for delivering internal administration, broker services, safety management, claims oversight, and creation of OCIP manuals and documents, as well as the measurement and reporting of results.

4. Modify Central Subway bid documents and insurance requirements in contracts to give City/SFMTA maximum flexibility in deciding on the ultimate insurance-delivery mechanism. Such decision could be made once firm pricing and other terms and conditions of an OCIP program have been determined.

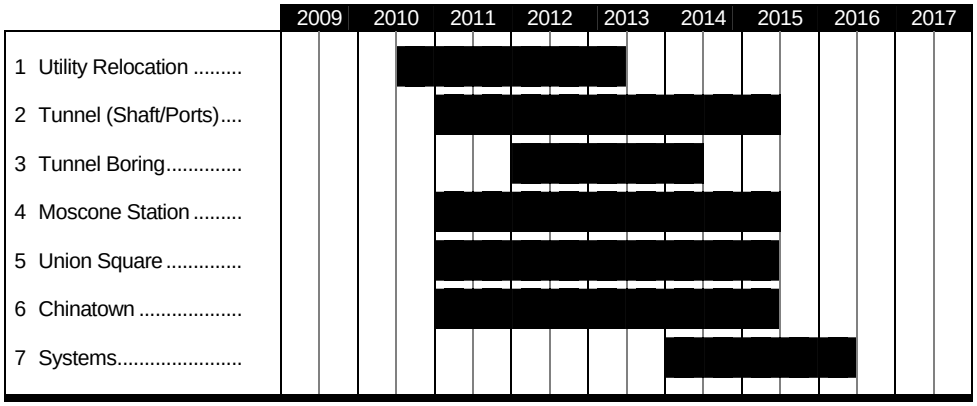
2 Background and Risk Profile

The San Francisco Municipal Transportation Agency (SFSFMTA) and the San Francisco County Transportation Authority (SFCTA) are planning the Central Subway project, a 1.7-mile extension of the Third Street light rail transit (LRT) line from its terminus at Fourth and King Streets, north under Market Street, and into Chinatown in the San Francisco central business district (CBD). Three new stations would be constructed along the Central Subway alignment and four light-rail vehicles would be purchased to augment the existing fleet. When completed; the combined Third Street LRT/Central Subway project would provide a continuous seven-mile light-rail system connecting the heavily transit-dependent communities of Bayshore in the south with Chinatown in the north.

The Financial District, Union Square, and Chinatown have very high levels of existing transit service. The Central Subway project is intended to provide a direct rapid transit link between these areas. Implementation of the Central Subway project is further expected to help carry large crowds attending events at convention and professional sports venues in the South of Market area (SOMA).

Construction hard costs are currently estimated to be about $934 million spanning a period of about six years as shown in the following exhibit.

EXHIBIT 1
PROJECT TIMETABLE—CENTRAL SUBWAY PROJECT



Major Risk Exposures

The following Exhibit 2 shows the major risk exposures to Central Subway construction project.

EXHIBIT 2
MAJOR RISK EXPOSURE CATEGORIES—CENTRAL SUBWAY PROJECT

	TYPE OF RISK					
	EMPLOYER / EMPLOYEE	PHYSICAL	PERFORMANCE	ECONOMIC	POLITICAL/ SOCIETAL	NATURAL HAZARD
Availability of labor, materials, and equipment				✓		
Construction management			✓			
Contractor and subcontractor defaults			✓	✓		
Contractor financial risks			✓			
Damage to work		✓				
Defective design			✓			
Defective workmanship			✓			
Earthquake						✓
Environmental impacts					✓	
Flood						✓
Funding sources				✓		
Governmental regulations					✓	
Inflationary trends				✓		
Managerial competence of contractors			✓			
Pedestrian and traffic control		✓				
Pollution liability and cleanup		✓				
Project security and control issues		✓				
Prolonged inclement weather						✓
Public acceptance of the project					✓	
Terrorism					✓	
Third-party bodily injury		✓				
Third-party property damage		✓				
Union agreements					✓	
Work stoppages and strikes				✓	✓	
Worker injuries	✓					

We reviewed the risk profile for the various Central Subway construction projects with SFMTA management staff, City Attorney's Office and Risk Management personnel, who all concurred that due to the proximity of work in dense urban surroundings and the planned tunnel undercrossing of the main BART artery, significant catastrophe exposures exist.

Below is a recap of various hazards that apply to Central Subway projects.

EMPLOYER RISKS

Worker Injuries

Controlling the frequency and costs of injuries to workers is crucial to project performance. As such, most construction projects are subject to heightened emphasis by employers and even project owners on preventing and controlling losses. Responsibility to follow minimum safety standards should be carefully spelled out and included in all construction contracts. Because of conflicts between SFPUC regulations relating to Central Subway construction and case law governing responsibility for worksite safety.[9] City/SFMTA may have a heightened duty or responsibility to monitor and ensure safe working conditions.

[9] See Section 6.

PHYSICAL RISKS

Third-Party Liability Exposures

In addition to occupational exposures, construction operations usually have significant third-party liability potential and such potential is present for various Central Subway construction projects. Third-party liability hazards are considered to be especially acute due to the very close proximity of construction projects to dense pedestrian traffic, retail, and government centers.

The highest risk of loss due to liability arising out of third-party damage or injuries could arise from

- Unexpected settling or other damage to the BART subway tunnel, which the Central Subway tunnel will closely cross below Market Street. Such settling or other damage could cause not only damage to the BART infrastructure but result in multiple injuries or deaths and possible long-tern interruption of BART service.

- Unexpected settling and possible interruption of operations to one or more businesses or buildings along the Central Subway route through the San Francisco central business district (CBD).

- Multiple injuries or deaths resulting from damage to or collapse of buildings from settling or subsidence caused by tunneling or excavation operations.

- Inadvertent damage to power, water, or sewer lines, both known and unknown and resultant loss of utility services to business and the public along with the cost of remediation and repairs.

Significant mitigation efforts, such as pre-construction site surveys, extensive soil sampling, and the placement of motion sensors, have been and continue to be developed in response to such concerns.

Other lesser but significant risks include anticipated high frequency of:

- Property damage claims by property owners along the Central Subway route

- Pedestrian injuries related to actual or alleged unsafe conditions at construction zones such as trip, slip-and-fall hazards, and falling debris

- Traffic-related property damage and bodily injury claims arising out of construction site traffic-control operations

In addition to the above, although a contractor's employee who is injured on the job generally has workers' compensation benefits mandated by the state as their sole remedy, such injured employees sometimes attempt to bring a civil action against the project owner. Such actions, which are known as "action-over" suits, often allege some form of contributory negligence against the project owner as an underlying cause of injury.

Damage to Work

Even though a contractor generally is responsible for work product until it is officially accepted by the project owner,[10] the owner has significant interest in such work while in progress. This is

[10] Exceptions can include acts of God such as earthquake, flood, and other perils.

because work damaged while in progress can impact other dependent projects or create unacceptable overall project delays. Work while in progress also can be much more susceptible to damage or collapse such as from earthquake or earth movement until it is structurally complete.

The nature of the project and the presence of multiple prime contractors working simultaneously in proximity to or within the main tunnel shafts may complicate determining which party is responsible for damage. For example, when more than one contractor is working on a project or where projects overlap, such as could occur at the point stations connect to the main tunnels, there could be disagreement and litigation over which party is at fault.

Security and Control of Premises

Closely related to preventing employee injuries, third-party liability claims, and damage to work in progress is the issue of security at construction sites. While not technically a peril, failure to regulate the flow of persons and material to and from the construction site both during and after working hours can increase the potential for accidents and injuries. This is especially true for pedestrians that must pass through construction zones and staging areas or street traffic that must be redirected around construction areas or to persons on the actual construction site without permission.

Pollution Liability and Cleanup

Major construction projects are often subject to a variety of pollution loss potentials. These can include but are not limited to existing site conditions (known or unknown) that are already polluted or contain naturally occurring hazardous materials, pollution incidents arising from contractor operations, and the use of fuels, lubricants, and other hazardous materials. Significant liability can arise out of spills or releases of toxic and hazardous materials such as from ruptured sewers and pipelines or from contractors' equipment and fuel storage. Not only can such releases result in bodily injury and property damage, but in the case of explosion and fire may necessitate the evacuation of persons and cause disruption of business. Spills that migrate to storm drains, sewers, or that otherwise contaminate bodies of water can be quite costly to mitigate and clean up and can result in long-term environmental damage.

PERFORMANCE RISKS

Performance risks exist in the context of the quality of design and construction in conformance with accepted practices. Problems in these areas can arise when a project is not properly designed or is not constructed in accordance with design specifications and the project must be reworked or rebuilt. Such design and workmanship errors may not manifest or be known for many years and can result in not only significant delays, but also costly and protracted litigation among the project owner, contractors and designers.

ECONOMIC RISKS

Economic risks, such as those involving the certainty of project funding, subcontractor defaults, labor and materials availability, inflationary impacts, and labor and work-stoppage issues, can significantly impact the overall success of any construction project.

Funding Source Disruption

Although Central Subway is largely funded by Federal New Starts[11] grant money, the project will rely on a mix of funding sources including sales tax, state bonds, and other sources. Some of these sources can be affected by changes in financial markets and the ability of the City/SFMTA to borrow or borrow at financially acceptable interest rates. Because of the unsettled nature of the current global financial crisis, possible abrupt changes in the availability and timing of project financing could have an unanticipated and detrimental impact on overall project performance.

Strikes and Labor Issues

Economic loss also can result from strikes and in availability of adequately trained and skilled workers. Unforeseeable events such as a major widespread earthquake in the San Francisco Bay area could seriously impact availability of quality labor resources for an indeterminate period of time.

Contractor Default

In today's economic climate there may be an increased risk of that the a contractor is not able to complete the project or that there are significant delays in project completion or problems with the quality of construction, Factors impacting such defaults include but are not limited to financial dislocations, inability to secure qualified labor and disruptive lawsuits.

POLITICAL AND SOCIETAL RISKS

Political and societal risks can be just as disruptive to large construction projects as accidental loss caused by construction-related exposures or natural disasters. All major construction activity in California is subject to challenge by any number of interest groups, and City/SFMTA projects are no exception. Projects involving environmental issues can be particularly disruptive because environmental challenges can result in prolonged litigation, significant delays or changes to the scope of construction, and even project cancellation.

NATURAL HAZARDS

Natural hazards are present on every construction project, but the most destructive of such hazards in California are earthquake, earth movement, subsidence (especially where soft earth tunneling is involved), and flood. Although most flood areas are readily identifiable, earthquake forecasting is currently an imprecise science and destructive earthquakes can occur anywhere and without warning.

Although many of the above risks of loss may be adequately treated with insurance, City and County may find that certain risks will be uninsurable, partially uninsurable, or for which full insurance turns out to be too costly, and must be assumed by the City/SFMTA, transferred contractually, mitigated, or possibly avoided.

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[11] A Federal Transportation Agency grant program for mass transportation and other high occupancy transportations projects such as but not limited to rapid rail, light rail, commuter rail, automated guideway transit, people movers, and exclusive facilities for buses.

3 Insurance Alternatives—Advantages and Disadvantages

The primary alternatives for insuring Central Subway construction projects are:

Traditional Insurance Program (TIP)—The project participants (owner, design professionals, contractors, and subcontractors) purchase and provide evidence of their individual property/casualty, workers' compensation, and other insurance coverages.

Owner-Controlled Insurance Program (OCIP)—The project owner arranges a controlled insurance program or "wrap-up," which is a master insurance program covering all or most project participants for some or all project phases.

Contractor-Controlled Insurance Program (CCIP)—A CCIP also is a type of controlled insurance program (CIP). A CCIP is similar to an OCIP except the general contractor arranges a controlled insurance program covering all or most project participants for some or all project phases.

The relative benefits of these various approaches are summarized in Exhibit 3 below within the broad framework of (1) cost, (2) program control, (3) administration, (4) risk transfer, (5) safety, and (6) construction industry issues.

EXHIBIT 3

ADVANTAGES/DISADVANTAGES OF INSURANCE-DELIVERY APPROACHES

INSURANCE DELIVERY	ADVANTAGES	DISADVANTAGES
Traditional Insurance Program (TIP)	• Simplest bidding approach for contractors • Claims are tendered to contractors who have added project owner as additional insured • Easier (but less effective) administration	• Claims handing can be complicated involving multiple insurers and cross claims • Requires project owner to draft adequate and appropriate insurance specifications • Requires project owner to verify contractor insurance is in compliance with contract specification. This may involve hundreds of insurance policies over the course of the project • Greater risk that insurance will be inadequate or unavailable due to reduction or exhaustion in limits • Strategy relies heavily on being able to continually verify contractor compliance

INSURANCE DELIVERY	ADVANTAGES	DISADVANTAGES
Owner-Controlled Insurance Program (OCIP)	• Possible cost savings • Greater control over design and implementation of the project insurance program • Greater control over and consistency in enforcing minimum safety standards • Possible coverage enhancements not available to individual contractors • Removes problems some contractors may have obtaining insurance under City/SFMTA contracts • Simplifies claim handling and reduces litigation among contractors because all contractors and the project owner are insureds	• Increased administrative burden and associated costs related to program design, safety and claims monitoring and oversight • OCIP program terms conditions and pricing may not be guaranteed for the entire period of construction • Verifying savings with certainty may not be possible • City Attorney's Office involvement in claims payments/settlements may result in added transactional costs
Contractor-Controlled Insurance Program (CCIP)	• Similar to OCIP except any program savings such as premium savings due to favorable loss experience would be retained by contractor	• Similar to OCIP except any program losses are the responsibility of the contractor • Have verification problems similar to TIP

Cost Issues

Although there are many purported benefits to the OCIP approach, the greatest emphasis often is placed by project owners on potential cost savings. Such cost savings under an OCIP may derive from a combination of (1) economies of scale through the aggregation of buying power, (2) the assumption of risk through large deductibles and loss-sensitive premium rating schemes, and (3) the differential of these combined costs compared to the total cost of insurance for the various construction contractors using a traditional insurance approach. These elements are discussed and illustrated below.

PURCHASING POWER

Under a TIP, contractors and subcontractors individually negotiate with and pay insurance premiums to many insurers. Under an OCIP or CCIP, coverages and premiums are aggregated under a master program. One underlying premise of controlled insurance program cost savings is that it is this large premium aggregation that gives the project owner or prime contractor greater leverage to negotiate more favorable coverage terms and rates than the various contractors could negotiate using a traditional insurance approach. The theory is that due to such economies of scale and irrespective of insurance market conditions, on average an OCIP or CCIP will always be more cost-efficient than the traditional insurance approach.

Over the last several years and up until recently there has been a dramatic reduction in workers' compensation pure premium rates,[12] which has acted to significantly reduce potential savings

[12] Pure premium rates are an estimate, arrived at using actuarial principles and methodologies and based on historical experience, of what an insurer will need to collect to pay the cost of claims arising under a policy, for as long as those claims are open. Claims' payments often extend for many years beyond the time a policy is written. Claims may be filed against a policy long after it has expired; and an insurer cannot collect additional premium from a policyholder on an expired policy if it turns out later that insufficient premium was collected while the policy was in force.

related to the aggregation of buying power under an OCIP or CCIP. Consider the changes in rates for common workers' compensation classification codes for the period 2002 to 2009.

EXHIBIT 4
PURE PREMIUM RATES 2002–2009
COMMON CONSTRUCTION WORKERS' COMPENSATION CLASSIFICATION CODES

	CARPENTER 5108	OPERATING ENGINEER 7219	EXCAVATION 6220	ELECTRICIAN 5140	CONCRETE 5213
2002	17.55	17.18	6.10	6.34	11.91
2003	19.62	20.03	6.91	7.84	13.59
2004	16.11	16.22	5.68	5.76	12.86
2005	11.64	12.16	3.52	3.96	8.69
2006	7.31	8.65	2.33	2.73	5.18
2007	6.87	8.00	2.39	2.90	5.07
2008	6.60	6.59	2.38	2.42	4.82
2009 *	8.61	8.37	3.35	2.67	5.58

* On March 27, 2009, the WCIRB submitted a pure premium rate filing to the California Insurance Commissioner recommending a 24.4% increase in advisory pure premium rates with respect to new and renewal policies as of the first anniversary rating date of a risk on or after July 1, 2009.

This downward trend in pure premium rates now appears to be reversing for some classification codes, as can been seen in rate changes over the last couple of years, but rates are still significantly lower than when rates peaked in 2002 and 2003. It also should be noted that such rates are advisory only and insurers are free to use whatever rates they feel are appropriate or competitive.

Based on our interview of major OCIP and CCIP brokers, there is a consensus that currently, and for the near future that there does not appear to be significant difference in contractor CCIP rates and owner maximum OCIP rates for large construction projects that would clearly favor the OCIP approach. As such, possible cost savings under an OCIP would be derived primarily from the ability of the project owner to prevent losses and control claims costs.

LOSS-SENSITIVE INSURANCE RATING PLANS

Under a TIP, contractors are free to use a variety of insurance-rating plans. These programs can include but may not be limited to guaranteed-rate plans, retrospective loss-sensitive rating plans, dividend plans, large-deductible plans, and self-insurance plans. Because the project owner does not directly participate financially in such plans, any dividend, return-premium, or cash-flow advantages inure to the benefit of each contractor. Likewise, any penalty or additional premium is the responsibility of the contractors and not the owner.

Under an OCIP, the owner may negotiate any available program that best suits its needs. These may include loss-sensitive plans, but also have included no-deductible, guaranteed-rate plans, although no-deductible, guaranteed-rate plans currently may be more difficult to negotiate than in the past. Under loss-sensitive plans, the final premium is based on actual expenses and incurred (i.e., paid and reserved) losses. Although the emphasis is on savings under such plans, there can exist the risk of significant additional premiums due to poor loss experience unless losses are capped in the aggregate for the OCIP policy period. Any dividend or additional premium usually

inures to the benefit or penalty of the project owner under an OCIP or to the prime contractor under a CCIP.

VERIFICATION ISSUES

Any such cost differential between an OCIP and traditional insurance presumes that the owner is able to verify or accurately estimate the various contractor's insurance costs and to believe that all or most of those costs are removed from the contractor's bid.

The conventional thinking in this area is that through market forces of the sealed bid, a contractor will remove all or most of these costs when instructed to do so. Project owners also have used a variety of other techniques to estimate or track the cost of the contractors' insurance and these approaches may be effective in many or even most instances. Some large or even small and medium-sized contractors, however, may not remove some or all of their insurance costs in instances where such costs are perceived by the contractor to be insignificant to the contractor's competitive position of its sealed bid. This could occur where

- the contractor already has significant financial advantage over its competitors, such as when a contractor may already be mobilized near the construction site.
- the contractor's insurance costs are highly loss-sensitive, such as in programs where very large deductibles are assumed by the contractor
- the contractor's insurance program is subject in part to a flat premium that is not adjustable, such as some excess liability programs
- there is collusion among or bid-rigging by contractors
- change-order provisions allow contractors to include certain insurance costs

Contractors may also be concerned that an OCIP does not sufficiently cover the contractor and therefore they may choose to continue with their own liability insurance, in which case there may be no or only limited reduction in the contractor's cost of insurance.

Unless the project owner has the right to audit a contractor's bid (usually through the contractor's completion of insurance premium verification forms at the time of enrollment), contractors may conceal their true cost of risk (as well as other costs) by reallocating costs within the bid. In such instances it may be difficult or impossible for the project owner to know the contractor's true cost of insurance or whether some or all of such costs have actually been excluded from the contractor's bid.

Also, in some instances a prime contractor may itself be using a CCIP that could have costs similar to or even more favorable than an OCIP although depending on the competitive climate such favorable costs may not be reflected in the contractor's bid. This might occur where the CCIP is written on a loss-sensitive premium rating plan and the contractor passes through the maximum cost of insurance. Any savings compared to the contractor's maximum cost generally would be kept by the contractor and not be shared with the project owner.

PREMIUM FUNDING

Under TIP, contractor insurance costs generally are passed along to the project owner because contractors will normally include such costs (including mark-up) in the contractors' bids. Thus, the

project owner indirectly pays insurance costs and overhead as hidden components of progress payments.

Under an OCIP, the owner may have to pay the entire program's insurance premium (or a significant portion) up front or sometimes may be able to negotiate periodic payments. Pre-funding is common under an OCIP, but because of the time value of money, OCIP savings estimates should be reduced accordingly. In recent years OCIP estimated premium payments may be spread out periodically over the OCIP period (such as annually), but this can vary depending on how effectively the OCIP is originally bid and negotiated.

OTHER COST CONSIDERATIONS

We have found that when discussing savings with owner representatives, they sometimes refer only to savings under the OCIP dividend or loss-sensitive premium plan, ignoring estimated contractor costs. Under a loss-sensitive OCIP, the owner may not know the true financial performance of the plan until all claims have been reported and closed. This may not be until many years after completion of the construction project.[13]

In addition, very few OCIP failures are publicized, although we are aware of some OCIPs that did *not* save money. We believe this under-reporting occurs because

- OCIP risk managers or administrators are reluctant to criticize the programs they have recommended and/or for which they are responsible, and

- insurance brokers, insurance companies, and some consultants who do ongoing OCIP administration work have a financial incentive to promote controlled insurance programs.

Some contractors, due to excellent management and safety practices, have very low experience modification factors and excellent experience over many years in arranging insurance. Such contractors may be able to secure pricing and coverage competitive with or even better than that provided by an OCIP. In the case of prime contractors, often these prime contractors function in the capacity of a broker by subcontracting out much of the work to other contractors.

While the OCIP theory of savings is plausible and widely accepted, and on average we believe savings have been achievable in the past, such savings for most public entities will never be known with certainty and there are many contingencies (especially on long-term projects) that could reduce savings or create situations where OCIP costs actually could be higher than under a TIP or CCIP.

Other often-overlooked cost elements of an OCIP are the significant internal and external administrative costs required to effectively manage such a program over (and even beyond) the construction period. These costs are especially important to identify when a loss-sensitive program approach is used because a large percentage of the overall costs are for safety, loss prevention, and claims management, which are of lesser concern when a guaranteed-rate, no-deductible OCIP is arranged.

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[13] Many loss sensitive OCIP rating plans have features that stop or limit the amount of losses that are considered in the rating scheme and essentially establish a maximum rate that will be charged against the rating basis which is usually payroll.

Coverage Comparison and Program Control

The following table illustrates responsibilities for purchasing various insurance coverages under each alternative insurance delivery approach.

EXHIBIT 5

COVERAGE RESPONSIBILITY UNDER ALTERNATIVE INSURANCE DELIVERY APPROACHES

COVERAGE	OCIP	TRADITIONAL	CCIP
Workers' Compensation	Owner buys for all construction contractor employees for length of project. Individual policies are issued for each contractor	The owner and each contractor, subcontractor, designer and engineers etc., buy their own insurance coverage and are responsible for annual renewals	Similar in concept to an OCIP, the general or prime contractor buys for all tiers of contractors. Like under an OCIP, individual policies are issued.
General Liability	Owner buys for all contractors and CM for length of project plus extensions	Each contractor, sub, owner, construction manager (CM), designer, buys own and renews annually	General contractor (GC) buys for all construction contractors, owner, and possibly CM
Completed Operation (Liability)	Owner can normally include this coverage in its primary and excess liability programs for the full 10 years of repose following policy completion	Such coverage may be difficult, impossible, or costly for some smaller contractors to obtain	Most large contractors should be able to obtaining this coverage but may have difficulty getting the full 10 years of coverage through all layers of excess coverage
Auto Liability	Each contractor and any subs buy their own policies	Each contractor and any subs buy their own policies	Each contractor and any subs buy their own policies
Excess Liability	Owner with contractors as additional insureds	The owner and each contractor, subcontractor, designer and engineers etc., buy their own insurance coverage and are responsible for annual renewals	Prime usually buys
Property/Builder's Risk	Owner usually buys	Owner or prime usually buys	Owner or prime usually buys
Design Errors and Omissions	Owner may buy, but design firms still carry their own practice coverage	Design firms, but owner could buy replacement or as excess	Owner or design firms could buy
Pollution Liability	Owner	Contractor or owner	Prime

An important potential benefit of an OCIP or a CCIP is the ability of the project owner to more easily ensure consistent (and often better) coverage for all or most project participants. Unless the owner's construction contract is clear and unambiguous regarding the types and amount of insurance coverage required and is continually monitored and enforced, the owner may not always end up with the coverage it intends.

SCOPE OF INSURANCE COVERAGE

Under contractor provided insurance, each contractor and subcontractor negotiates and provides insurance required by the bid specifications. In the case of City construction projects, the City and sometimes other entities are added as additional insureds under contractor's insurance in addition to other required endorsements. Under an OCIP, the owner, through its broker, negotiates uniform, comprehensive coverage terms directly with insurers.

Because an OCIP usually creates a single liability and workers' compensation insurance program, the limits and scope of coverage are known and uniform as opposed to insurance purchased by the

various contractors, which can be inconsistent and not compliant with the project owner's insurance requirements.

Because of the increased buying power historically[14] present under an OCIP (or CCIP), owners and contractors using such programs often have been able to obtain coverage enhancements compared to insurance required under standard bid requirements. Perhaps the most significant of these is completed operations liability coverage for a period of up to 10 years after completion of construction projects. Accidental pollution and other coverage enhancements also have been included as part of an overall OCIP approach but are purchased as separate coverage.

An OCIP (or CCIP) also can eliminate the risk under a TIP of receiving fraudulent or defective certificates of insurance except for insurance coverages that may still be required outside the OCIP or CCIP, such as automobile liability or other coverages, which may still require tracking.

LIMITATIONS OF ADDITIONAL INSURED STATUS UNDER CONTRACTOR-PROVIDED INSURANCE

Obtaining additional-insured status under a contractor's insurance policy is intended as a partial backup to any indemnity agreement whereby the contractor or subcontractor agrees to hold City harmless for claims brought against City arising out of the operations of the contractor and subcontractor. It is believed that under such an arrangement, even if the indemnity agreement were to prove invalid, City would have direct protection under the contractor's insurance as an additional insured. Important limitations to this approach are described below.

Civil Code Limitations

Section 2782 of the California Civil Code contains two provisions affecting insurance contracts that

- prohibit an owner of a construction project from forcing a contractor to indemnify the owner against liability or losses arising from the sole negligence or willful misconduct of the owner and

- void and make unenforceable any contract that attempts to make the contractor liable for a public agency's active negligence.

Another law, enacted several years ago, is Section 11580.04 of the California Insurance Code, which applies to additional-insured endorsements issued by an insurer for the benefit of a public agency in connection with any construction contract. Essentially this section makes coverage under such an endorsement inapplicable to the active negligence of the project owner.

DEDICATED LIMITS OF LIABILITY

Under a TIP, some small subcontractors may have difficulty purchasing the liability insurance coverages at the limits of liability required by the bid specifications. Even when limits appear to be adequate, annual aggregate limits may not always apply solely to City or SFMTA projects but may apply to all the contractors' work. In such situations, required aggregate limits of liability insurance

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[14] In the past few years drastic changes in California workers' compensation rates and other factors have in some instances made contractor insurance rates comparable or even more competitive than OCIP rates; however, this phenomenon could change in the future.

could be exhausted by losses on other projects and not available when needed. This problem of exhausted limits can be overcome, however, with properly worded insurance requirements.

Under an OCIP or a CCIP, the project owner or general contractor usually can purchase high limits of liability insurance more economically than many individual contractors. Typical required limits of liability for City construction projects can be as high as $50 million (or higher depending on loss exposure as determined by City Attorney's Office and the Director Risk Management Division). Under an OCIP, limits of $100 million to $500 million or higher should be available.

INSURANCE FOR PROJECT TERM

Under a TIP, contractors typically renew their insurance annually but some large contractors have semi-permanent rolling CCIPs that go on for many years. Because the financial status of some insurers could be weak and deteriorate over the course of the project, individual contractors could have their insurance cancelled or not renewed, resulting in a material breach of contract with the owner.

On the other hand, OCIP insurers also have been subject to financial dislocations and there have been a number of OCIP programs that have had to be replaced by the project owner at less than favorable terms and conditions. Having to replace a large and complicated OCIP would require much effort and could result in substantially increased cost, thereby reducing or eliminating any potential cost advantage an OCIP may have otherwise had.

Such a contingency necessitates that any OCIP for major construction be placed only with an insurer or insurers with the highest financial rating. Cancellations of OCIPs by an insurer have been rare but are possible if non-cancelable provisions are not negotiated.[15]

Even when an OCIP is placed with a large so-called "Blue Chip" insurer, there is no guarantee that an OCIP program will be renewed or extended beyond the initial term (which currently is not normally longer than four or five years), nor is there usually any guarantee that an OCIP would be renewed at similar coverage terms and pricing.

An even broader concern developed just last year when AIG, one of the world's largest and most respected insurers, sought and received financial assistance from the federal government. The company incurred billions of dollars in losses relating to mortgage-backed guarantees it was unable to pay. Today it is unclear what the future holds for this insurer or to what extent other insurers may be impacted by the growing and uncertain global financial collapse.

VALUE DIFFERENTIAL

OCIPs reduce the risk that the contractor's insurance will be inadequate or unavailable due to a reduction or exhaustion in limits or inadequate or unavailable coverage.

Although placing a value on the differences in coverage can be difficult or impossible to measure, some deliberation on this issue is necessary when considering overall financial analysis and program risk.

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[15] The impact of having an OCIP cancelled can be disastrous to OCIP performance, from both a cost and coverage standpoint. No OCIP should be entered into unless it contains a sound non-cancellation provision.

A review of existing risk management policy by persons or departments responsible for establishing and implementing risk management objectives is necessary and may help guide the project owner's analysis and ultimate decision process in this area.

Administration

CONTRACTOR INSURANCE COMPLIANCE

Under a TIP, owners spend considerable time and effort monitoring contractors' compliance with specifications or contract terms. Certificates of insurance and additional-insured endorsements need to be tracked continuously. An OCIP significantly reduces but does not eliminate the need for an owner to monitor such compliance. Once contractors have submitted proper documents and payrolls, they are automatically insured under the OCIP. Owners still must monitor compliance for non-OCIP coverages such as automobile liability and liability and workers' compensation for off-job site exposures.

PROJECT INSURANCE ADMINISTRATION

Under a TIP, the owner sets forth insurance requirements in bid specifications and the construction contract general conditions. Once the contract is let, the project owner monitors contractors' compliance but is not involved in administration of the contractors' insurance programs.

Under an OCIP, owners usually rely heavily on the OCIP insurance broker or other third-party administrator to carry out essential tasks such as contractor enrollment, policy issuance, bid-deduct verification, safety management and coordination, and claims review and audit functions. An OCIP reduces the insurance verification process but does not eliminate the need for hands-on involvement by the owner. On very large projects, the risk manager or other employee of the project owner may spend considerable time coordinating and auditing OCIP activities and reporting progress and other issues to management.

4 Cost Analysis

NOTE: The following analysis provides a rough cost projection for OCIP and contractor-provided insurance for Central Subway construction. Because the initial construction for Central Subway is still well into the future and numerous variables can impact actual cost, the following should be viewed as an illustration of potential cost differentials based on a loss-sensitive OCIP rating plan as opposed to a precise estimate of expected results of a negotiated OCIP program.

Financial comparisons between contractor-provided insurance programs and owner-controlled insurance programs (OCIP) require many sweeping assumptions regarding variables such as:

- Payrolls and wage data
- Labor classifications
- Contractors' premiums
- Loss ratios
- Insurance market conditions and rates in the future
- Contractor insurance costs

One of the reasons such assumptions are necessary is that feasibility studies such as this one are normally done without knowing all details of project construction or identity of the various prime contractors and their insurance cost. In addition to the above, we analyze only the following primary cost components: (1) workers' compensation premiums; (2) program administrative costs, such as brokerage fees, safety management and claims review and audit; and (3) internal administrative costs.

Analysis Scenarios

Our cost illustration addresses OCIP, and contractor-provided insurance approaches, and is based on the following basic program consisting of statutory workers' compensation insurance, primary general liability limits of $2 million per occurrence/$4 million aggregate and excess liability limits of $100 million.

We did not include the cost of builder's risk insurance or design professional liability in our analysis because (1) such coverages are never included in an OCIP premium-rating scheme for workers' compensation general liability and (2) it will be necessary to determine actual costs and available alternatives through an insurance broker.

HOW WORKERS' COMPENSATION PREMIUMS ARE CALCULATED

Under the California workers' compensation premium-rating scheme, all trades and occupations are classified by a four-digit workers' compensation classification code. The California Workers' Compensation Insurance Rating Bureau (WCIRB) establishes these classification codes. For each code there is a corresponding wage rate expressed as a dollar amount, which is applied to each $100 in payroll. The WCIRB collects statistical data and every year publishes an advisory "pure premium" or loss rate for every payroll classification. Such "pure premium" rates are estimated and arrived at using actuarial principles and methodologies and based on historical experience of the amount of premium an insurer would need to collect to pay the cost of claims arising under a workers' compensation policy for as long as claims remain open.

In California, there are no minimum rate requirements for premium development purposes. Insurers are free to use the state's advisory rates (for "pure premiums") or to charge whatever rates they feel appropriate, so long as they do not unfairly discriminate and do not violate any limitations imposed by the California Department of Insurance, which is a separate regulatory body in California.

In addition, most employers, including contractors, have an experience modification factor that is calculated annually by the rating bureau based on their payrolls and incurred losses from three prior policy periods. The experience rating formula compares actual reported loss information for that particular employer with average loss data for all employers (in California) who also are in the same classification codes. The contractors' individual experience modifications are applied to the insurers' rates. The basic formulas for calculating the workers' compensation (WC) premiums of a project are:

(1) WC Audited Payroll × Insurer's Rate per $100 Payroll × Contractor's Experience Modification = WC Premium

(2) WC Premiums × Insurer's Discount or Surcharge = Actual Premiums Charged to the Insured Contractor

Our illustration starts with an estimation of the costs of expected contractor costs for all major construction contracts combined. For this exercise we used a contractor's average experience modification factor of 1.00.

STEP 1: ESTIMATE THE TOTAL PROJECT PAYROLLS

Construction labor cost estimates, which form the basis of developing workers' compensation premium projections, were estimated using information gathered from insurance brokers experienced with tunnel transportation projects. From this data we derived various factors for estimating payroll as a percentage of construction hard costs and the various trade classifications within such payroll. This analysis indicated payroll to be approximately 18% of construction hard costs. For Central Subway projects, workers' compensation payroll is estimated to be:

$934,000,000 × .18 payroll conversion factor = $168,120,000

STEP 2: ESTIMATE CONTRACTOR'S WORKERS' COMPENSATION AND LIABILITY RATES AND CALCULATE PREMIUM

Based on our interviews with major insurance brokers regarding contractor rates and our own experience with recent major construction projects, we used a composite rate for all trade classifications of $7.00 per $100 of workers' compensation ratable payrolls developed in Step 1 above. For liability coverage, we used a rate of $5.00 per $100 of payroll, which developed total workers' compensation and liability premium of about $20 million as illustrated in the following exhibit.

EXHIBIT 6
CONTRACTOR'S WORKERS' COMPENSATION AND LIABILTY PREMIUM CALCULATION FOR ALL CENTRAL SUBWAY PROJECTS

TRADE	ESTIMATED WC RATABLE PAYROLL	ESTIMATED CONTRACTOR RATE	ESTIMATED WC PREMIUM
Estimated Net Contractors' WC Premium All trades combined	$168,120,000	7.00	$11,760,000

TRADE	ESTIMATED WC RATABLE PAYROLL	ESTIMATED CONTRACTOR RATE	ESTIMATED LIABILITY PREMIUM
Estimated Net Contractors' Liability[16] Premium	$168,120,000	5.00	$8,406,000

STEP 3: ESTIMATE OCIP PREMIUMS

OCIP Pricing

OCIPs can be rated in numerous ways, but in recent years the most common have been either on a large-deductible, loss-sensitive rating scheme or less common on guaranteed-rate basis with no deductibles.

Under a guaranteed-rate OCIP, the rate (not the premium) is negotiated in advance and guaranteed in some instances for the project term, but usually no more than four to five years. Under such an arrangement, it may be possible to insure losses on a "first-dollar" basis with minimal or no deductibles. Guaranteed-rate OCIPs have reduced risk because the rate is fixed regardless of project loss experience. In exchange for such a guarantee, the programs often are subject to a minimum premium which can be as high as 90% or more of the estimated program premium over the life of the construction project. In the current market it is unknown without actually approaching the insurance markets for bidding whether such a program would be available and at what cost

Such a guaranteed-rate OCIP contrasts with a large-deductible, loss-sensitive OCIP in that while the rate also is guaranteed, the owner assumes a greater risk or reward based on actual loss experience within negotiated parameters[17] (for example, per-loss or aggregate deductibles). Such programs place great emphasis on safety and loss prevention because good loss experience is rewarded with increased OCIP savings. Poor loss experience can reduce or eliminate savings or even produce costs that are higher than estimated contractor costs.

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[16] Based on primary general liability limits of $2 million per occurrence/$4 million aggregate and excess liability limits of $100 million.
[17] Some guaranteed-rate OCIPs have been written with dividend features that financially reward the project owner for good loss experience.

Any cost estimate of an OCIP for Central Subway projects in the absence of actual competitive bidding is speculative and would be influenced by a variety of insurance market conditions and program design factors. The following estimates are intended to illustrate likely magnitude of cost differentials between contractor and OCIP programs and are not insurance quotations.

The following is a simplified formula to illustrate insurance costs of an OCIP large-deductible, loss-sensitive rating plan with a $250,000 per-occurrence deductible and where overall premium would be capped at a negotiated amount:

OCIP Cost = (Fixed Insurance Company Costs) + (Losses × Loss Conversion Factor)

- Fixed costs include insurance company overhead and expenses for insurance in excess of the per-occurrence deductible and a charge to cap the aggregate deductible loss amounts that go into the rating formula. For workers' compensation payroll of $168,120,000, we estimated such fixed cost would be about $8.4 million or the equivalent of about a $5.00 rate per $100 of payroll. We estimated the aggregate stop loss at $9.5 million, which we believe is a reasonable maximum.

- Losses are variable and are directly related to the effectiveness of loss prevention and claims handling. We estimated a range of losses.

- The overhead to manage and adjust claims also must be factored. We used 10% as a loss-conversion factor, applied against insured losses.

Applying the above assumptions to the simplified rating formula yields the following OCIP insurance premium cost at various loss levels:

EXHIBIT 7
OCIP INSURANCE COST ESTIMATES AT VARIOUS LOSS LEVELS

LOSS AMOUNT ($)	OCIP INSURANCE PREMIUM ($ MILLION)
1,000,000	9.5
2,000,000	10.6
3,000,000	11.7
4,000,000	12.8
5,000,000	13.9
6,000,000	15.0
7,000,000	16.1
8,000,000	17.2
9,000,000	18.3
9,500,000	**18.9***
10,000,000	18.9*

* Maximum estimated OCIP premium based on $168 million in payroll

STEP 4: CONSIDER CONTRACTORS' BID CREDITS AND ADMINISTRATIVE MARK UP

When owners replace contractors' insurance with an OCIP, they must assume that most of the contractors' insurance costs are removed from their bids. General contractors typically attempt to do the same thing when they arrange a CCIP.

When it is assumed that the contractor will indeed remove such insurance costs from a sealed bid, a common estimate of this process is that contractors will remove no more than about 90% of their premium from a sealed bid. Under this assumption, contractors will keep about 10% (plus mark-ups) of their insurance costs in their bids for two reasons: (1) they have some coverages, such as general and umbrella liability, that may be spread over all their projects; and (2) they feel the need to include some funds for deductible losses or claims not covered under the OCIP program. Also, in some instances the contractor's liability program may provide broader coverage compared to the OCIP and the contractor and/or insurer may not be willing and able to exclude such broader coverage from the OCIP.

Under contractor provided insurance, the contractors' agents, brokers, and insurers carry out most of the administrative duties. Under an OCIP, the owner and the insurance broker have more direct administrative responsibility.

For contractor insurance, we estimate a general contractor would mark-up its total premiums by about 10% to cover its administrative costs, risk assumption, overhead, and profit, but such mark-up could be much higher.

For this cost illustration we assume that the bid deduction and administrative markup act to offset one another and as such would have no impact on overall cost.

STEP 5: CONSIDER OCIP ADMINISTRATIVE COSTS

Our estimate of total administrative overhead for implementing and managing a loss-sensitive OCIP over and beyond the OCIP period is about $3 million. (See section 5 for a detailed discussion.) To account for and acknowledge certain administrative work by City/SFMTA regarding verification of contractor insurance programs that would be required in the absence of an OCIP, we reduced such administrative cost to $2.5 million.

Conclusion

Exhibit 8 illustrates possible cost differential of OCIP premium and administration costs compared to contractor provided insurance at various loss levels.

EXHIBIT 8
COST DIFFERENTIALS—OCIP COMPARED TO TIP

	LOSS LEVEL ($ MILLIONS)										
PROGRAM	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	9.5	10.0
Contractor Costs	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	**20.2**	20.2
OCIP Insurance Costs	9.5	10.6	11.7	12.8	13.9	15.0	16.1	17.2	18.3	**18.9***	18.9*
OCIP Administration Overhead	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	**2.5**	2.5
OCIP Saving/Deficit	8.2	7.1	6.0	4.9	3.8	2.7	1.6	.5	(.6)	**(1.2)**	(1.2)

* Maximum estimated OCIP premium based on $168 million in payroll

Under an OCIP, the greatest potential for savings occur at low loss levels, but such savings diminish compared to contractor costs as loss levels and administration costs increase. Under the above model and assumptions, losses that go into the OCIP insurance premium rating plan would

be capped around $9.5 million, which would put the maximum premium at around $19 million and the maximum estimated cost, including administrative overhead, at about $21 million. At this level City/SFMTA would incur a loss over estimated contractor costs. It may be possible under actual competitive bidding, however, to negotiate an OCIP stop-loss level that protects City/SFMTA from incurring total costs in excess of estimated contractor costs.

Keep in mind that numerous contingencies could significantly impact the above rough cost projection, including but not limited to:

- The results of actual OCIP bidding that might yield rates, terms, and conditions such as stop-loss features that are different that those used in this analysis
- Actual project payrolls in excess of our estimate will act to reduce the impact of fixed costs favoring the OCIP approach
- Fixed costs such as for insurance brokerage fees, safety management, claims management, and internal administration costs that are different than what we project

In addition to the above, City/SFMTA would have to pre-fund estimated ultimate losses plus an amount for adverse loss experience. We estimate that the loss fund for a $934 million construction hard-cost budget could be as high as $10 million or more. Such a loss fund would be used to pay incurred losses plus a claim-adjustment (loss-conversion) fee equal to about 10% of losses. If the initial loss fund proves inadequate to cover expected ultimate losses, additional City funding would be required.

5 Other Insurance Considerations

CIPs can be arranged to include builder's risk coverage, design professional liability, and even forms of pollution and environmental coverages under separate programs. Such coverages are independent insurance placements that require analysis separate and apart from the workers' compensation and general liability insurance commonly included in OCIPs. The following is a discussion of these separate insurance issues.

Builder's Risk Insurance

Builder's risk insurance is a special form of insurance for property during the course of construction. Standard City construction contracts currently require contractors to carry such coverage in an amount no less than the value of the construction project.

There may be certain benefits for City/SFMTA to arrange insurance under a City-procured master builder's risk insurance policy. Benefits of such an approach could include:

- More uniform and broader protection for what is or will eventually become City/SFMTA property
- City/SFMTA would control all details of the insurance and may be in a better position than multiple prime contractors to negotiate costs and coverages as part of City's overall very large property insurance portfolio
- Possible coverage for loss of revenues or added financing costs for project delay and force majeure events when there is covered physical damage to the project

In addition, because numerous contractors will be working on various and interconnecting parts of the project at the same time, there may be an increased potential for disputes and possible litigation over which party is responsible for damage to and delay of the project.

There is still a relatively strong insurance market for such owner-arranged coverage and it should be possible for City/SFMTA to arrange a large loss-limit policy of between $400–$600 million with sublimits for flood, earthquake, and earth movement of perhaps $50–$100 million.

Under an owner-provided builder's-risk insurance program, it would be necessary to include the prime contractors as additional insureds and inform the prospective prime contractors not to include the cost of this insurance in their bids.

City/SFMTA should investigate with its current insurance brokers and underwriters the cost of incorporating coverage for property in the course of construction (builder's risk insurance) under

City's existing master property insurance program or a separate owner-controlled program, as an alternative to making builder's risk insurance a coverage required of the contractor.

Design Professional Liability

DESIGN PROFESSIONAL'S INSURANCE

Perhaps the most common and simplest approach regarding design professional liability is to require the design professional to provide City/SFMTA with evidence of a specific limit and form of professional liability insurance. However, one of the main problems with this approach is that the project owner may never be certain that the limits and scope of coverage required in the contract will be available when needed. Reasons for this problem include:

- Limits could be reduced or exhausted due to the payment or reserving of claims made on projects for other clients of the design professional.

- Unless the project owner obtains and reads the insurance policy, there could be unexpected exclusions, which is a fundamental problem with verifying all contractually required insurance coverages.

- Design professional liability insurance is almost always written on a claims-made basis and requires annual renewals by the contractor for coverage to remain in place for future claims arising out of completed design work. Verification of such renewals requires diligence by the project owner to ensure that proper coverage is in place.

Although these are all significant and legitimate concerns, they can often be mitigated if bidding processes are structured to favor high-quality and reputable firms with excellent track records as opposed to price alone. However, another problem often encountered is that many design firms carry only minimum limits of protection. Limits of $1 million to $5 million in the aggregate are not uncommon, even for large design firms, but such low limits are inadequate for Central Subway construction projects. The very high local and small business participation requirement of 30% exacerbates this problem as the smallest firms often have the greatest difficulty in obtaining necessary professional liability coverage.

Alternatives to the conventional approach described above includes the use of project professional liability and owners protective professional indemnity insurance, which are described below.

PROJECT PROFESSIONAL LIABILITY INSURANCE

Project professional liability insurance typically will provide broad coverage for all design firms on a construction project. Although there can be a variety of contractual arrangements with those providing professional services on any given project, in most instances, the lead design professional will hold contracts with the entire design team. In these instances, the policy structure is simple—all entities are named insureds. However, in other instances it may not be that simple.

Potential benefits from a project professional liability program can include:

- Primary protection for the design professionals and greater consistency in coverage.

- Insurance coverage for professional design liability for the life of the project.

- A dedicated project limit of protection.

- Contractor's pollution liability coverage can be included to provide coverage for pollution conditions arising out of construction work. Coverage for the peril of mold may also be available.

- Defense costs are covered for third-party claims arising from design errors.

- Coverage is project-specific for a period of up to 10 years.

- Limits of liability usually can be secured up to $25 million with a single insurer. Higher limits may be available through the use of multiple insurers.

Project professional liability, whether provided by the project owner, design builder, or design professional, often is the most costly alternative from a premium standpoint. The primary drawback to this approach is that there is a greater potential of exhausting the limit of liability in the event of a claim or claims because such coverage may apply to numerous insureds under the policy. In such instances defense costs alone may reduce or exhaust the limit of protection for damages.

OWNER'S PROTECTIVE PROFESSIONAL INDEMNITY INSURANCE

"Owner's protective professional indemnity insurance" (OPPI) has gained a degree of popularity in recent years due to the high cost of project professional liability insurance. Available to owners of construction projects as well as design-builders and general contractors, such insurance can provide first-party indemnity for damages excess of the design professional's own liability insurance.

Although the owner's protective policy is excess of the design professional's own professional liability insurance limit, the insurance company writing the owner's protective policy normally will specify the minimum underlying limit. Before coverage can apply to the project owner, the underlying design professional's professional liability policy must first be exhausted.

In addition to being a possible cost-effective alternative to project insurance, owner's professional protective indemnity liability coverage can have the following additional benefits:

- The policy supplements the design professional's professional liability program by providing direct indemnity benefits to the project owner.

- The policy indemnifies the owner for defense costs incurred because of third-party claims arising out of the design professional's services. Typically, the owner and the prime contractor must enjoin in a claim against the design professional.

- Limits of liability of up to $25 million with a single insurer may be available. Higher limits, through use of additional insurers, also may be available.

- Coverage possibly may be arranged on a project-specific basis for up to 10 years.

- In the event the underlying design professional's policy is available to pay loss, the self-insured retention under the "protective" policy typically would not apply.

Preliminary discussions about professional liability with SFMTA, City Attorney's Office, and City Risk Management Division indicate that the goals of any such coverage should include:

- Minimum impact on design consultant to encourage broad participation in the bid process
- High limits of protection for City
- Remove barriers of DBEs obtaining necessary professional liability insurance

Possible alternatives to current requirements for design professional liability insurance exist that warrant further examination and evaluation are shown in the exhibit below.

EXHIBIT 9

POSSIBLE ALTERNATIVES TO CURRENT REQUIREMENTS FOR DESIGN PROFESSIONAL LIABILITY

OPTION	(+)	(–)	COMMENTS
1. Require consultant to bid with project-specific insurance, identifying cost	• Non cancelable coverage for up to 10 years • limits are dedicated to the project • Covers all design firms and may include owner as an additional insured • Provides a benchmark for comparing cost of an owner provided project specific policy	• Highest cost	• Maximum limits available are likely $20-30 million as a primary layer. Additional limits would require use of multiple markets. • In addition to protection provided by the project specific policy City may purchase excess OPPI to provide additional limits
2. Owner arranges project specific coverage		• Due to very limited marketplace may be problematic for owner to obtain competing quote • High cost • Possible added liability for mistakes in arranging coverage for contractors • Owner responsible for allocating deductible • May create City Attorney office involvement issues due to deductible	
3. Require bid with high practice policy limits		• Impairment or exhaustion issues • Annual renewal problems • Protects consultants only • Problems with DBEs obtaining necessary limits • The owners effectively share the design firm's professional policy limit with other firms. Professional liability policies have a single aggregate policy limit that applies to all liabilities and defense costs arising from current and past work of the insured. If there is a claim, the owner has to hope it is near the front of the line to be sure of adequate protection. • Professional liability claims can arise well after project completion. As such an owner has to depend on a design firms ability to stay in business and continuously renew its insurance • Most professional liability underwriters for design firms will not name the owner as an additional insured. If the owner is sued for a professional loss caused by the design firm, the indemnification clause in the owner/design firm contract may provide protection but the practice policy will not defend the owner. • Some design firms will not work without a limitation of liability equal to their fees and a waiver of consequential damages. Not sure	

OPTION	(+)	(–)	COMMENTS
		if this apply on City contracts	
4. Require bid with minimum practice limits only, identifying cost, place OPPI policy as excess for benefit of City	• Allows City to purchase OPPI coverage excess of contractor obtained minimum practice policy limits. • Can be extended to apply excess to other professional services contracts with other consultants. • Coverage is provided to the owner for claims in excess of the design firms' annual primary professional liability policies up to the amount of the limit provided by the OP policy. • If the insurance of a design firm working on the owner's project is exhausted by payment of a claim-even a claim unrelated to the owner's project-the OP policy will drop down to a pre-agreed amount. • If the owner is sued directly for the actions of the design firms, the owner can be covered-giving the equivalent of additional insured protection. • Coverage and claim payments are direct between the owner and the insurance company. This eliminates meetings with the design team to explain a project policy. • Low limit requirements aids small DBE participation • Would give City great flexibility and greater control of marketplace. • Approximately 40%–60% of cost of project specific coverage • The design team does not have a reason to know or care that coverage is in place. Coverage and claim payments are direct between the owner and the insurance company. This eliminates meetings with the design team to explain a project policy.	• Practice requirements need to be very low for DBE • While coverage is provided on a first-party basis, the trigger for an owner's claim is the design firm's liability to the owner. This can create a significant problem in the event the design firm's contract with the owner has a limitation of liability and/or waiver of consequential damages clause. For example, if a design firm causes a $20 million loss but its liability is limited to $1 million, then the OP underwriter will only pay $1 million. This problem should be fixed by endorsement • With a standard project-specific policy, the owner has the benefit of one source of recovery regardless of the number of members of the design team involved in a claim. With the OP approach, this is not the case. If a claim involving several firms occurs, the owner will have to settle with several insurers to be able to determine the size of the OP claim.	• Minimum limits should be no more than $5-10 million so as not to preclude small DBE contractors. Requiring higher limits also may force prime to purchase project specific policy in order to reach DBE goals. • OPPI policy is for benefit of City only • Coverage applies on a first-party basis. To collect on a claim, the owner needs to prove to the underwriter that a design firm working on the project committed a "negligent" act, error, or omission resulting in a loss and that the amount of the loss exceeds any available professional insurance. Frequently, this is proven by the payment of a claim by a primary underwriter.
5. Require bid with both minimum practice limits and project-specific identifying costs of each	• Same benefits as above for each	• May cause bidding problems	

6 Safety, Claims, Insurance Broker, and Administration Considerations

Safety

Whether the project insurance delivery follows a traditional or OCIP approach, the responsibility for project safety is usually that of the individual contractors controlling the job site. Discussion with the City Attorney's Office indicates, however, that some conflict between California Public Utility Commission (PUC) regulations and Supreme court cases may in some instances blur this traditional distinction for work under Central Subway projects. The result is that City/SFMTA expect to have a heightened involvement in worksite safety oversight compared to other City construction projects.

Under a TIP approach, the project owner, through contract, generally requires the contractor to comply with various state, federal, and generally accepted safety practices, but does not control work-site safety. It usually is the contractor who is solely responsible for the condition of work-site safety during the performance of the work. Under a TIP, there are likely to be a variety of different safety programs and philosophies with different degrees of effectiveness. Larger contractors tend to have more sophisticated and better-developed safety programs than smaller contractors, who often have less-developed programs.

Loss-control and safety programs are critical to an OCIP's financial success should the OCIP be subject to a large deductible and loss-sensitive premium provisions. An OCIP, especially one that involves complex project, multiple prime contractors and is written on a loss-sensitive basis, generally will require a high degree of competent and experienced administrative involvement. Prime contractors for each construction project will still be responsible for job-site safety, but the owner becomes financially motivated to be more involved in developing project-wide safety standards and rules and to rigorously monitor and enforce compliance. This is because insurance costs under a loss-sensitive OCIP premium rating plan are lowest when safety programs result in fewer and less costly losses.

Aside from the potential for economic savings, public agencies sometime cite the fact that there exists a civic responsibility to ensure a safe work site to employees, contractors, and the public. One of the purported benefits of an OCIP is that on average they tend to experience lower loss ratios than non-CIP projects. However, the mere existence of an OCIP or CCIP does not guarantee that safety performance will be better than under a traditional insurance approach.

OCIPs that are written under a guaranteed-rate basis with no deductible have less of an emphasis on project safety from a financial standpoint because the rating basis does not change throughout the OCIP period regardless of loss history. Such OCIPs may require very little administration for the project owner.

For Central Subway, however, any OCIP insurer, regardless of the rating plan proposed will likely place great emphasis on City/SFMTA involvement and oversight of safety and the unsettled nature

of project safety legal responsibility will require that City/SFMTA implement far greater oversight of safe practices across all construction projects than would normally be the case.

INTERNAL INFRASTRUCTURE AND STAFFING PLAN FOR OCIP

Because construction expenditures and activity will gradually ramp up and then fall over time, staffing for high-quality safety activities will need to be flexible to respond to changing needs. Because it often is not practical to internally staff such positions, we estimate that the City/SFMTA may need to contract for up to two full-time safety positions during peak construction activity, as a separate services contract.

For Central Subway construction we believe the safety-management function should be performed by an independent contractor reporting to a management position within the SFMTA as opposed to the insurance broker in order to maintain greatest control over quality and performance of staff, which will include

- a highly experienced safety manager with specialization in tunnel work and
- one or more safety inspectors with general construction experience involving a variety of trades.

Safety staffing during ramp-up and closeout will be less intensive, but work in the beginning in preparation for construction can be significant, involving training, communication, and creation and coordination of a project safety manual[18] among the prime and subcontractors. In addition, the safety manager position would coordinate and interface with insurance company safety staff.

COST: Such costs for third-party services could be as high as $750,000 or more for the entire construction period and would be dependent on the actual number and phasing of staff needed, availability of qualified personnel, and the actual period of construction. A possible reporting structure for contract safety staffing is shown below.

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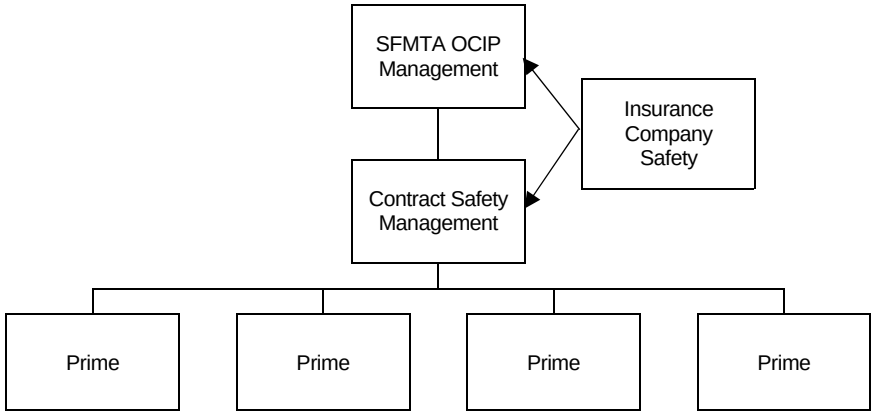
[18] A safety manual does not replace the requirement for each general contractor and subcontractor to establish and maintain a proper safety program as directed by the Federal Department of Labor, Occupational Safety and Health Act (Titles 29 CFR 1926 and 29 CFR 1910), the State of California, and all other applicable agencies. The maintenance of safe premises, operations, and equipment, and the protection and avoidance of unsafe conditions and practices are always the primary responsibility of the general contractor and various subcontractors performing the work. A project safety manual is a document created and used to assist in the development and implementation of appropriate safety standards. It provides a guideline to safety during the construction, renovation, and expansion activities to be completed by independent contractors. Such a program usually is based on applicable government regulations, insurance-related safety/risk management requirements, accepted safety practices within the construction industry, and common sense.

EXHIBIT 10
POSSIBLE REPORTING STRUCTURE FOR CONTRACT SAFETY STAFFING



A guaranteed-rate OCIP with no deductible may require no added staffing at all because the insurance company retains the risk of controlling loss; however, some minimal administrative burden would still exist relating to the review and monitoring of insurance company inspections and reports. In addition City/SFMTA may deem it prudent to create a similarly staffed safety management structure in the absence of an OCIP. This is due to the blurred responsibility for jobsite safety created by conflicts between California Public Utility Commission (PUC) safety regulations and case law.

Claims Handling

Under a TIP, the individual contractors' insurers (or sometimes a third-party claim administrator, but this is rare) handle claims. Under this arrangement, the project owner may receive reservation-of-rights letters from insurers due in part to the inability of public entities to legally be covered under the contractor's insurance for claims arising out of the project owner's sole or active negligence. Under such arrangement, claims disputes among various insurers representing different contractors could occur.

Normally under an OCIP, a single liability and workers' compensation insurer is responsible for claims reporting, investigation, reserving, and closing. This approach can significantly reduce overall claims costs by eliminating disputes relating to coverage, jurisdiction, subrogation, and cross-litigation.

CLAIMS REVIEWS AND AUDITS

Under a TIP, claims are handled by each contractor's individual insurer and possibly monitored by the contractor's insurance agent or broker or risk manager. Project owners have little involvement in this process unless they are being defended by a contractor's insurer, if there is a dispute arising out of the tendering of a claim to contractor's insurer, or if a community-relations problem arises out of poor handling of a third-party liability claim by contractor's insurer.

Under an OCIP, however, the project owner usually is highly motivated to pay closer attention to claims in order to control costs and ensure that claimants are properly treated. Quarterly claims

reviews and periodic claims audits often are conducted to ensure that OCIP claims are being handled according to industry best practices. These are particularly important issues when the OCIP is on a large deductibles plan. It is less important under a guaranteed-rate OCIP, where rates are known and not affected by losses. Under loss-sensitive plans it is recommended that the project owner contract with an outside third party to perform periodic claim audits of workers' compensation claims.

COST: Estimating the cost for such services is highly speculative as they would be based largely on the frequency and complexity of workers' compensation claims activity; however, we estimate these costs could run as high as $350,000 or more. This estimate is based on the performance of monthly claims reviews, annual audit, and a program stop-loss feature that would provide some downside limit to the number of claims that ultimately would be reviewed.

Where liability claims are concerned and where there is a liability deductible, City charter mandates involvement of City Attorney's Office staff to ensure the best interests of City/SFMTA are being served. A discussion of this process and issue follows.

City/SFMTA Involvement

It is current policy and law that where the City or SFMTA is at risk, such as where losses occur within an insurance deductible, that City Attorney's Office staff must review and participate in the claim-settlement process. This requirement has in the past created conflicts under other insurance policies, including OCIPs, because the interests of the insurance company (who generally have authority to settle claims within a deductible) and the interest of the City/SFMTA may be at odds.

In addition to procedural problems that can occur between City and the insurance company, such mandate for City Attorney involvement adds a cost to the overall administration of an OCIP that should be accounted for.

COST: Although such cost is difficult to project because it is based largely on the number and complexity of claims within a deductible, the amount can be significant. For example, in 2005 Warren, McVeigh & Griffin, Inc. audited a pilot OCIP for San Francisco Public Utility Commission (SFPUC) water infrastructure construction. Based on internal billings from the City Attorney's Office to SFPUC, the amount of claims work performed by the City Attorney's Office on that project amounted to about $100,000 for reported construction values at the time of about $150 million. With an expected construction hard cost of nearly $1 billion and using figures from the SFPUC pilot OCIP, City Attorney costs to SFMTA conceivably might be $700,000 or more. Again, this is speculative and would be based on the actual level and complexity of claims activity.

ALTERNATIVES

No-Deductible OCIP

An alternative to the more common deductible plan described in this report would be a guaranteed-rate, no-deductible plan. Such an OCIP is being used for the Laguna Honda Hospital Replacement Program. This OCIP, which is now in its fourth year of operation, does not contain deductibles and from a claim handling standpoint functions like straight insurance in that the City pays a fixed composite rate based on payroll. The rate is fixed and unaffected by the amount of losses. Claims are the responsibility of the insurance company and do not require involvement of City Attorney's Office staff.

Self Insured Retention (SIR) OCIP

Another alternative that might eliminate or reduce conflicts with insurance company claim staff would be for the City/SFMTA to arrange OCIP coverage subject to a large retention of perhaps up to $1,000,000 per occurrence. Under such a plan the City/SFMTA would be responsible for all losses within the retention amount with insurance attaching beyond the per-occurrence limit. Although such a plan should eliminate insurance company disputes regarding claim settlement within the retention, new conflict could arise in that the City/SFMTA would be in a position of defending contractors enrolled in the OCIP, which could involve any number of conflicts. To the extent such conflicts were to exist, City/SFMTA might be forced to appointment and pay for independent counsel. Doing so however might create more potential problems than it solves and may not be a practical alternative.

Insurance Broker Services

With safety and claims management services separately outsourced, required insurance broker services would be reduced and possibly limited to the following:

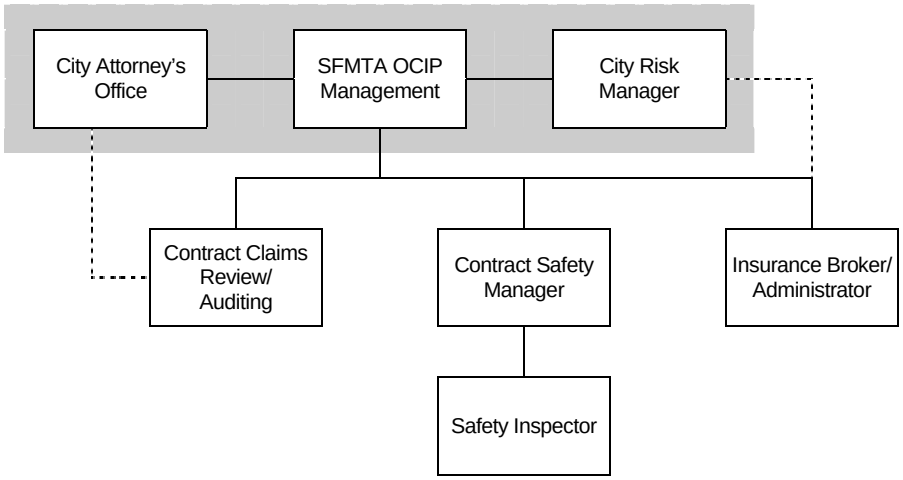
- OCIP marketing to insurers
- Designing and maintaining of risk management information systems
- Performing and documenting contractor enrollment
- Verifying contractor bid credits where applicable
- Attending meetings as necessary
- Providing OCIP education to City staff and contractors
- Tracking all OCIP documents
- Checking and issuing OCIP policies
- Designing and distributing OCIP procedure and information manuals (does not include safety)
- Reviewing and recommending revisions to bidding documents
- Providing periodic and ad hoc reports

COST: We estimate that these services could be as high as $500,000 or more over the project term. Because there remains administrative work possibly long after construction is completed, we added an additional $50,000 to our calculations for such runoff administration, for total estimated insurance broker remuneration of about $550,000. The annual cost of broker services could be much higher (or lower), however, depending on (1) the particular broker selected, (2) the extent (and quality) of services to be provided, and (3) the form of remuneration, including commissions, fees, or some combination of both.

Overall City/SFMTA Administration

Successfully organizing, implementing and managing an OCIP and related City/SFMTA arranged insurance requires clear objectives, goals and delineation of responsibilities and authority. For City/SFMTA this will involve a reporting structure involving multiple entities and interests. The following organization chart illustrates such a structure.

EXHIBIT 11
SAMPLE ORGANIZATION CHART



Although most administrative functions regarding OCIP management could be performed by the insurance broker and other third parties, there needs to be a central SFMTA point of contact for overall OCIP management and performance issues.

With many administrative functions outsourced, we believe a reasonable estimate of internal administrative burden could be between 1/3 and 1/2 full-time senior analyst level position within SFMTA, which we estimate could cost:

$100,000 Annual Payroll × 0.33 senior manager positions × 200% * =
$66,000 per Year

$100,000 Annual Payroll × 0.50 senior manager positions × 200% * =
$100,000 per Year

* 30% fringe benefits and 170% overhead

In addition, program and construction managers probably would incur a small administrative burden relative to an OCIP, involving communication and other related issues with contractors. In addition City Risk Management staff would be needed for initial OCIP placement and ongoing oversight.

COST: Based on the projected construction period, we estimate the SFMTA internal administrative burden for OCIP coordination, liaison, and oversight to be about $400,000 to $600,000. This amount could be much higher, however, where a very large deductible is employed, and the emphasis on claims, safety, and broker oversight is increased. Portions but not all of such oversight could be contracted to an outside third party.

7 Impacts on Outreach

Disadvantaged, Small, and Minority Business Enterprises

Because of the significant disadvantaged, small, and minority business enterprise outreach goals to be contained in major construction contracts for Central Subway construction (up to 30%), programs or efforts that help contractors meet such objectives is of high importance to City/SFMTA. It is a common perception that an OCIP or CCIP will aid in the participation of disadvantaged, small, and minority contractors because without an OCIP or CCIP in place, such contractors may be unable to obtain insurance required of the project owner or the cost of such required insurance would be prohibitive.

This issue was extensively studied and reported on by Warren, McVeigh & Griffin, Inc. in our *Analysis of Risk-Financing Practices and Alternatives for Water Systems Improvement Program (WSIP),* which we prepared for the City of San Francisco in 2007. An update of those findings including additional research is discussed below.

Published Studies

The U.S. Department of Transportation addressed disadvantaged, small, and minority business participation and other issues in its *Guide to FHWA Wrap Up Projects* in 2007 and Caltrans addressed similar issues in its 2006 *Insurance and Bond Availability And Risk Quantification* Study. Pertinent findings of these studies relative to participation of small businesses in construction projects concluded that:

- "Securing the required coverage and bonding by small, emerging or minority contractors is principally an issue of availability from the insurance and surety markets and not primarily a question of affordability." The study also concluded that an OCIP or CCIP should be considered to "significantly increase the number of small, emerging, minority, and disadvantaged business contractors."[19]

- "A wrap-up is both a race-neutral and race-conscious program to increase DBE participation on DOT projects. Wrap-ups help to level the playing field by eliminating or reducing conventional insurance expenses that for DBEs tend to be higher than those expenses for large contractors. In addition to the opportunity to work on construction

[19] *Guide to FHWA Funded Wrap Up Projects*, United States Department of Transportation, Federal Highway Administration, updated September 27, 2007.

> projects, wrap-ups also provide these firms with work experience references, recordkeeping experience and project safety training."[20]

Although the above studies clearly state that OCIPs and CCIP promote small business participation in construction projects,[21] neither of the studies provided empirical evidence that CIPs actually result in greater small business participation.

Insurance Brokers and Risk Managers

We interviewed insurance brokers and risk managers using the OCIP approach on large public entity construction projects to determine whether small contractors were expressing difficulty meeting project-owner insurance requirements and whether they maintained or were aware of documentation that would support conclusions of the above reports relative to increased small business participation.

In all instances, insurance brokers and risk managers we interviewed expressed a belief that the CIP concept—whether in the form of an OCIP or a CCIP—promoted small business participation. The principal reason given for this belief is that OCIPs and CCIPs "level the playing field" for small businesses by at least partially removing the requirement of contractors to obtain and pay for contractually required insurance.[22] Although the insurance brokers and risk managers we interviewed echoed the general beliefs expressed in the above reports, none of the persons interviewed were able to provide empirical evidence that CIPs actually result in greater small or disadvantaged business participation. Some risk managers expressed a willingness to attempt to track and measure such participation if an appropriate method for doing so could be devised.

SFPUC Small Business Survey

In conjunction with our *Analysis of Risk-Financing Practices and Alternatives for Water Systems Improvement Program (WSIP),* which we prepared for the City of San Francisco in 2007, the SFPUC conducted a survey of nearly 300 local small businesses to help determine (1) whether small contractors believed obtaining City-required insurance was problematic, and (2) to gauge experience with OCIP and CCIP programs. While this was an informal survey, it yielded interesting but inconclusive insight into this important issue. Specifically the study found that about two-thirds of those responding indicated they were currently in compliance with SFPUC's insurance requirements. Of those respondents indicating experience with CIPs, two-thirds reported a positive experience with OCIPs and three-fourths reported positive experience with CCIPs.

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[20] *Insurance and Bond Availability And Risk Quantification Study,* Caltrans, September 1, 2006.
[21] The studies appeared in conflict regarding the issue as to whether cost was an important inhibiting factor for small contractors.
[22] Contractors may still be required to provide evidence of coverage for exposures that are not covered by the OCIP or CCIP, such as but not limited to automobile liability or for work performed by the contractor away from the construction site.

Human Rights Commission

We were provided contact information for seven small businesses that were reported to have had or are currently having problems complying with City-required insurance and bond requirements in contracts. At the request of SFMTA we interviewed these businesses and found that:

- None reported problems complying with City/SFMTA insurance requirements
- All reported difficulty obtaining performance bonds
- One reported difficulty obtaining design professional liability in excess of $10 million

Due to the very small sample size, we are unable to draw any conclusion regarding these findings.

City Attorney's Office

We asked representatives of the City Attorney's Office whether they were aware of any significant problems reported by local small business enterprises obtaining necessary insurance required of City construction projects. While there were no significant issues regarding insurance requirements, the ability of small businesses to meet specific project bond requirements was reported to be a continuing problem.

Construction Contractor Associations

We interviewed representatives from the California Association of General Contractors (AGC) and the Engineering and Utility Contractors Association (EUCA) and reviewed EUCA's executive summary report, *Evaluation "Wrap-Up" Insurance Programs.* Although neither AGC nor EUCA articulated an official position regarding the issue of whether an OCIP would or could promote small business participation in public entity construction projects, both expressed a common concern regarding the argument that OCIPs increase small business opportunity. According to these groups, although an OCIP or CCIP would act to "level the playing field" for the small contractor, such leveling acts to penalize any other contractor, including another small business, that through good management and safety practices has developed favorable insurance pricing. According to these groups, such removal of a contractor's competitive advantage is an unfair practice that could lead to some contractors not bidding on projects using an OCIP approach.

8 Selecting Appropriate Insurance Program

We applied the following criteria to determine and measure overall feasibility for an OCIP for Central Subway construction projects:

1. Legal capability
2. Project size
3. Project duration
4. Type of construction
5. Number of prime contractors and subcontractors
6. Owner commitment
7. Owner control
8. Timing of decision
9. Insurance market conditions
10. Demonstrated savings
11. Insurance coverage considerations
12. Program risk Considerations

Legal Capability

For many years California Government Code 4420, subdivision (b), prohibited OCIPs for any public works project. TIPs are permitted on every construction project.

Paragraph 4420 (b) had originally read as follows:

> *No officer or employee, or person, firm, or corporation acting or purporting to act on behalf of any officer or employee, shall negotiate, make application for, obtain, or procure any surety bond or contract of insurance, except contracts for builder's risk or owner's protective liability, that can be obtained or procured by the bidder, contractor, or subcontractor.*

As of January 1, 1999, OCIPs were permitted for public agencies in California. The Code was amended by AB 1859 (Ackerman), filed September 22, 1998, as follows:

> *4420.8. (a) Notwithstanding subdivision (b) of Section 4420, commencing January 1, 1999, a state agency may utilize owner-controlled or wrap-up insurance programs if all of the following conditions are met:*
>
> *(1) The total cost of the public works project is over one hundred twenty-five million dollars ($125,000,000).*
>
> *(2) The program maintains completed operation coverage for a term for which the Insurance Commissioner has determined that coverage is reasonably commercially available, but in no event less than three years.*

(3) Bid specifications clearly specify for all bidders the insurance coverage provided under the program, and minimum safety requirements that must be met.

(4) The program does not prohibit a contractor or subcontractor from purchasing any additional insurance coverage that a contractor or subcontractor believes is necessary to protect themselves from any liability arising out of the contract.

(5) The program does not include surety insurance.

(b) Safety requirements for a public works project subject to this subdivision may be developed jointly between a state agency and the prime contractor. In the event that a state agency requires a safety program different than the prime contractor's usual and customary program, the program shall be mutually agreed upon, taking into account the prime contractor's experience, expertise, existing labor agreements relating to safety issues, and any unique safety issues relating to the project.

(c) This subdivision shall not affect any provision in a collective bargaining agreement specified in Section 3201.5 of the Labor Code that is submitted by the prime contractor with its construction bid.

(d) For purposes of this section, "owner-controlled or wrap-up insurance" means a series of insurance policies issued to cover all of the contractors and subcontractors on a given project for purposes of general liability and workers' compensation.

(e) For purposes of this section, "public works project" means construction being performed at one site or at a series of contiguous sites separated only by a street, roadway, waterway, or railroad right-of-way, or along a continuous system for the provision of water and power.

Furthermore, SB 981 (Polanco), filed September 27, 1999, amended Section 4420 to allow public agencies to use OCIPs for projects whose total cost exceeds $50 million. The key wording of SB 981 is:

...A state or local government agency may use owner-controlled or wrap-up insurance with regard to a construction or renovation project for which the total cost exceeds fifty million dollars ($50,000,000) if the agency meets all of the following conditions and certifies that it has made the following determinations:

(1) Prospective bidders, including contractors and subcontractors, meet minimum occupational safety and health qualifications established to bid on the project. The evaluation of prospective bidders shall be based on consideration of the following factors:

(A) Serious and willful violations of Part I (commencing with Section 6300) of Division 5 of the Labor Code, by a contractor or subcontractor during the past five-year period.

(B) The contractor's or subcontractor's workers' compensation experience modification factor.

(C) A contractor's or subcontractor's injury prevention program instituted pursuant to Section 33201.5 or 6401.7 of the Labor Code.

(2) The use of owner-controlled or wrap-up insurance will minimize the expenditure of public funds on the project in conjunction with the exercise of appropriate risk management.

(3) The program maintains completed operation coverage for a term for which the Insurance Commissioner has determined that coverage is reasonably commercially available, but in no event less than three years.

(4) *Bid specifications clearly specify for all bidders the insurance coverage provided under the program and minimum safety requirements that must be met.*

(5) *The program does not prohibit a contractor or subcontractor from purchasing any additional insurance coverage that a contractor or subcontractor believes is necessary to protect from any liability arising out of the contract.*

(6) *The program does not include surety insurance.*

CONCLUSION: The Central Subway projects legally qualify for an OCIP because they are "public works projects" with total costs in excess of the Code requirement of $125 million.

Project Size

Historically, the minimum project size for an OCIP or CCIP has been thought to be about $100 million in construction hard costs. It was at this level that most construction projects historically have started to generate sufficient premium volume to garner volume pricing and possible corresponding cost savings. In recent years, however, due primarily to the drastic reduction in workers' compensation insurance rates, even some projects in excess of $250 million have not proved financially viable for project owners.

The major exception to this requirement is where the project owner insures all or certain types of its construction projects under an owner-controlled "rolling wrap-up." A rolling wrap-up is a plan whereby an owner continuously adds new projects to its OCIP specifically arranged for this purpose. Under a rolling wrap-up, the projects are usually of a similar nature, such as school construction, home building, or road construction. Some rolling wrap-ups have continued for many years, becoming semi-permanent insurance programs.

CONCLUSION: The Central Subway projects are sufficiently large to compete favorably with TIP CCIP approaches from a cost standpoint under a loss-sensitive premium rating plan, although there is a lesser potential for saving than in the recent past due to current insurance market conditions. See Section 4.

Project Duration and Certainty

Ideally an OCIP should have certain start and completion dates. Although rolling[23] OCIPs have been written (using periodic renewals or extensions of the original OCIP) for periods in excess of 10 years, most OCIPs are of a duration far less than this, often three to five years. Arranging an OCIP for periods beyond five years may be problematic because insurers may be reluctant to guarantee rates for longer periods. In addition, potential interruptions or delays in construction could severely impact the financial success of an OCIP. For example, failure of projects to meet construction expenditure schedules may subject the owner to minimum premium payments although such terms are dependent on how coverage initially negotiated.

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[23] An OCIP is often written for a single large construction project, but an OCIP can combine multiple and often different kinds of projects under a master OCIP, sometimes for many years. Such an OCIP is commonly called a *rolling OCIP* or *rolling wrap-up* to connote an ongoing program combining multiple projects. Rolling OCIPs can also be used to incorporate very small projects that would not individually qualify for an OCIP due to their small size.

CONCLUSION: Because of the project duration of seven years, it may not be possible to include all construction in a single OCIP period. This situation could be exacerbated if project delays occur, such as due to funding problems or other unanticipated project problems. An alternative would be to eliminate the earliest and latest occurring contracts from the OCIP such as the utility and systems contracts which would compress the OICP policy period to about four and one-half years.

Type of Construction

Good candidates for OCIPs are any complex, labor-intensive projects that generate large workers' compensation premiums. This is so because most or all potential OCIP savings come from the workers' compensation component of the total premium. As such, the greater the workers' compensation premium, the greater the potential savings. Planned Central Subway construction projects are complex and labor-intensive, generating an estimated payroll in estimated to be in excess of nearly $200 million. Some OCIP underwriters may not be willing to offer favorable OCIP terms for certain types of project work such as blasting, demolition, and hazardous materials abatement work.

CONCLUSION: According to the payroll figures and assumptions contained in this report, Central Subway construction is sufficiently labor-intensive to generate high workers' compensation payroll, but due to current market conditions, the opportunity for savings most likely will come from the ability to prevent and control loss under a loss-sensitive premium rating plan as opposed to the aggregation of buying power alone.

Number of Contractors

An OCIP provides certain benefits to projects involving multiple general contractors and numerous subcontractors. Projects requiring the use of small-business or disabled veteran contractors or those where community outreach is a goal may benefit from the OCIP approach. This is so because under a TIP not all contractors may be able to secure the necessary coverage or limits, the relative cost of insurance for some contractors may be high, and the administrative burden in monitoring certificates and the likelihood of inconsistencies in coverage increases. The OCIP approach ensures that all contractors are provided with the same limits and scope of coverage while the aggregation of premium volume allows for potentially substantial cost savings. Based on our research, however, there does not appear to be any empirical evidence to support this notion.

In addition, it is generally believed that smaller contractors will have a higher cost of insurance than larger contractors with sophisticated risk management and safety programs. Projects that involve many small contractors may be more apt to generate greater savings under an OCIP than very large contractors, some of whom may have insurance programs that are priced competitively with an OCIP.

CONCLUSION: The Central Subway project involves multiple prime contractors and numerous subcontractors and will have a high (30%) small contractor outreach goal. Such disbursement of various project components among a large number of contractors would tend to favor an OCIP approach.

Owner Commitment

For an OCIP to be successful there must be buy-in from the project owner. While such buy-in starts with upper management, project managers must be convinced in the OCIP approach as well because it is the project managers who are critical in helping to garner contractor acceptance. With such commitment comes the requirement to change the safety culture and views on risk assumption and risk transfer. Maximizing the positive impact of project safety is crucial if OCIP program cost is to be subject to a loss-sensitive rating plan. Under these programs, an OCIP owner cannot delegate all safety, claims, and community issues to a general contractor.

CONCLUSION: Based on the various City/SFMTA management and staff we interviewed, there does not appear to be any pre-conceived bias for or against the OCIP concept. The final evaluation on the issue of owner commitment must come from senior management and its ability to garner acceptance and commitment from City/SFMTA staff and its contractors should an OCIP otherwise prove to be a desirable option for the Central Subway project.

Owner Control

Good candidates for OCIPs are single entities having contractual control of the construction project. The entity can be a public agency, private owner, or even a construction manager. The controlling entity needs a legal basis to enforce the OCIP requirements through such means as progress payments, payroll audits, bid analysis, insurance certificates for non-OCIP coverages, and safety standards.

CONCLUSION: An OCIP is feasible from a control standpoint.

Timing of Decision

A project that might otherwise be a good OCIP candidate may not qualify due to timing considerations. OCIPs often require much lead time. Given the nature of public entity bidding, just engaging the services of a competent insurance broker could take one to two months or more; however, this timeline should be streamlined due to City's pre-approval of a panel of insurance brokers. Because actual OCIP program marketing by an insurance broker or broker should take no more than 90 days, additional time will be needed for final review and approval of program costs. Because the various construction bid packages may be issued prior to such process taking place, such bid contracts will need to contain language giving City/SFMTA the option of utilizing either OCIP or traditional insurance.

CONCLUSION: From a lead-time standpoint, an OCIP should be feasible for Central Subway but will require City/SFMTA staff to work now to select an insurance broker and modifying standard bid specifications to allow for the option of an OCIP approach should actual marketing and securing of terms and conditions support moving forward.

Insurance Market Conditions

The OCIP theory assumes that OCIPs, due to their increased buying power and economies of scale, will save project owners money compared to contractor costs regardless of market conditions.

OCIPs should save money in a "hard" insurance market, when contractors pay high premiums or have difficulty obtaining required insurance coverages and limits. Under these conditions, owners, due to aggregated buying power, can often negotiate broader and more competitive insurance programs than individual contractors are able to do. The large premium volumes and opportunities for focused safety make OCIPs attractive to insurers, even when contractors are paying high rates.

OCIPs also can be attractive to insurers in "soft" insurance markets, but contractors' insurance programs become more competitive. The spread of savings for an owner under an OCIP diminishes or may even disappear.

CONCLUSION: Currently, based on our interviews of major insurance brokers there is not a significant cost differential between OCIP and contractor rates; however, a properly structured OCIP can still save money compared to contractor insurance when project owners assume a large deductible and are able to control losses.

Although it is difficult to project market conditions over time, workers' compensation advisory rates have been increasing over the past few years and we expect that this will begin to negatively impact contractor workers' compensation rates within the next 12 to 18 months, making OCIPs more attractive from a cost standpoint in the future.

Demonstrated Cost Savings

Section 4 of this report illustrates OCIP, CCIP, and traditional insurance costs.

CONCLUSION: We do not believe there would be significant buying power advantage under an OCIP compared to contractor-provided insurance and that savings, if they occur, will come primarily from the ability to prevent losses and control claim costs under a loss-sensitive premium rating scheme. We estimate that such savings could be as high as about $6 million if City/SFMTA are able to aggressively monitor and enforce safety compliance and review and audit insurance company workers' compensation claim handling and payments.

Insurance Coverage Considerations

CONCLUSION: Because workers' compensation insurance is standardized and subject to defined benefits, there generally is no benefit from a coverage standpoint whether such coverage is provided under a TIP, CCIP, or OCIP approach.

An OCIP should have clear benefits over traditional insurance and possibly CCIPs, the most important of which is coverage for completed-operations liability (possibly as long as 10 years following project completion), which may be difficult or impossible for some contractors to obtain especially in high excess layers of coverage for a specified project. In addition, OCIPs and CCIPs normally have large dedicated limits of protection that can be guaranteed and non-cancelable at least for the period of the OCIP or CCIP.

An OCIP also eliminates the inconsistencies in coverage that can occur under a TIP or multiple CCIPs, as the various individual contractor insurance programs are replaced with a consolidated and controlled insurance program.

APPENDIX A

Section 2—Summary of Working Group Recommendations from *Owner Controlled Insurance Program (OCIP) Guidelines and Recommendations,* OCIP Working Group, City and County of San Francisco, January 2003

Section

2

Summary of Working Group Recommendations

A. General Policy Recommendations

1) The Risk Management Office will oversee all OCIPs and may administer future OCIPs to ensure economies of scale, coordination of efforts, expertise and knowledge, and greater centralization and management of OCIPs.

2) A Construction Risk Management Committee (Committee) should be created. The Committee should be chaired by the Risk Manager and other members would include representatives from the City Attorney's Office, the Controller's Office, the Mayor's Office of Finance and Legislative Affairs, and a construction engineer from the Department of Public Works.

3) The Committee should be charged with the following duties: (1) to semiannually review and monitor the performance of all existing OCIPs, (2) to review and authorize expansions to existing OCIPs, and (3) to review and authorize all future OCIPs.

B. Feasibility Analysis, Bid/RFP and Contract Language

Feasibility

4) A feasibility study will be completed for any new OCIP or to expand any existing OCIPs.

5) With the approval of the Construction Risk Management Committee, a feasibility study will be completed either by City employees who have OCIP expertise or an RFP will be issued to find an independent, expert consultant who does not have any affiliation with insurance carriers and/or brokers.

6) The responsible department will be actively involved in the planning and implementation of the feasibility study.

7) The feasibility study will identify the risks involved in the project.

8) The feasibility study will survey the market and identify what coverages should be included.

9) The feasibility study will identify the pros and cons of conventional/Contractor Controlled Insurance Program/Owner Controlled Insurance Program coverages, and any other program alternatives as applicable.

10) The feasibility study will estimate the total costs, including premiums and administration, under conventional program, Contractor Controlled Insurance Program, Owner Controlled Insurance Program, and any other program alternatives as applicable.

11) The feasibility study will compare the administrative costs to estimated Consolidated Insurance Program savings and to total construction costs.

12) The feasibility study will be used as a monitoring tool throughout the OCIP administration process, realizing that change-orders must be factored in.

RFP and Contract for Brokerage Services

13) An RFP will be issued to obtain brokerage services.

14) The RFP should require that brokers fees be included in the response and that this be a factor in the evaluation process. The RFP should also require that the Broker secure premium indicators from underwriters to determine market pricing with the understanding that the premium indicators may not be binding.

15) The RFP should include the brokerage services contract with more details specified in the scope of work.

16) The contract should include all CCSF contracting requirements and that brokers can clearly articulate these requirements to the insurance carriers.

17) The contract should encompass City's processes and procedures upfront so that roles and responsibilities can be more clearly assigned to brokers and/or carriers. For example, claims management and protocols should be stated upfront in future RFPs and contracts.

18) Departments should use City-approved master RFP templates, with modifications incorporating Department- and project-specific requirements.

19) Departments should use City-approved master contract templates, with modifications incorporating Department- and project-specific requirements.

20) The OCIP Broker Report should include the calculation of losses per man-hour similar to the approach taken by BART, and include any other relevant metrics determined by the Department.

21) The broker's RFP should specify that claims protocols will be negotiated with the insurance carrier upfront, before any contract is executed, so that the City's Charter and ordinance requirements are followed, and that duplication of effort by the City and the insurance company is avoided.

22) The insurance carrier and/or broker will provide (1) PPOs/Pharmaceutical Network—extends to those covered by OCIP, (2) Physician review, (3) Medical bill review, and (4) Litigation review.

Bid and Contract for Contractors

23) The contract specifications should include a safety program modeled after the PUC program. The program will identify the minimum qualifications that contractors must meet and relates specifically to the City's operations. The three components of the PUC program are: (1) the Insurance Requirements (Document 00805), (2) the Safety Program and Procedures (Section 00814), and (3) the Insurance Manual. These documents are included in the Appendix and are templates that may be modified in the future incorporating Department- and project-specific requirements.

24) Depending on project funding, incentive/disincentive language should be added to construction contracts. The amount should be significant enough to effect change if contractor's safety programs are inadequate and should reflect contract size.

25) Depending on project funding, a contractor's Experience Modifier (EMR) should be used to pre-qualify contractors, because EMR gauges safety performance and experience. In the case of joint ventures, each partner's EMR will be used in proportion to its participation in the joint venture.

26) Contractors should bid with insurance costs in future construction projects.

27) Under an OCIP, contracts should include language clarifying that there is no financial recourse for contractors' private attorneys.

C. Insurance Program Design

Insurance Program Design Alternatives

28) For any proposed capital project potentially under an OCIP, a comparative analysis of all insurance program alternatives, along with the funding strategies, should be undertaken. This analysis should at a minimum include consideration of cost, control, coverage, safety program compliance and efficacy, and claims management.

29) In addition to reading the materials included in this report and its appendices, Gary Bird's The Wrap-Up Guide is required reading for any insurance program/risk manager – regardless of the insurance program being undertaken (but especially for those considering CCIPs and OCIPs).

30) If a risk assessment was not performed during the feasibility study, one should be completed during Insurance Program design and prior to going to the insurance market.

Funding Strategies – Guaranteed Cost vs. Loss Sensitive

31) If a risk assessment was not performed during the feasibility study, one should be completed during Insurance Program design and prior to going to the insurance market.

32) Guaranteed cost coverage should be considered for OCIPs because they not only limit the risk of higher losses, they also provide upfront cost certainty. Market

conditions must also be considered during this analysis, as well as the potential impact of insurance program growth due to project expansion or change orders.

33) Loss sensitive funding strategies should generally not be used for coverage other than worker's compensation due to the relative infrequency and high severity potential of the claims.

Coverage Terms

34) OCIP coverage terms should seek to include Extended Construction Completed Operations Coverage of up to the statutory limits.

35) All aspects of the insurance arrangement should be negotiated upfront, including coverages, funding strategies, payment terms and agreements, etc.

Alignment of Interests

36) Interests should be aligned and operationalized by including economic incentives or disincentives. Pass-through deductibles per occurrence should be considered, as well as other alignment strategies.

D. Safety and Loss Control

37) A safety program modeled after the PUC program should be implemented for OCIP projects, not a safety manual.

38) Departments should provide safety training to all City project personnel.

39) Depending on the size of the construction project, the department should determine the appropriate number of safety personnel and whether they should be City employees or non-City employees. Note: This administrative cost may diminish program savings, but where loss-sensitive funding is used, it becomes increasingly important.

40) Pre-employment, random and post accident drug and alcohol testing should be mandated for contractors to the extent allowed by law.

41) The safety reports included in the OCIP Monthly Broker Reports should be shared with Management on a monthly basis.

42) Safety reports included in OCIP Monthly Broker Reports should be sent to the City's Risk Management Office on a quarterly basis, as well as summarized semi-annually for the Committee.

43) The City's Risk Management Office should be notified when the aggregate deductible is reached (i.e., at 25%, at 50%, at 60%, at 70%, at 80%, at 90%, at 100%, and at project closeout).

44) The City's Risk Management Office and City Attorney's Office should be notified when there are major claims.

45) The City's Risk Management Office should make recommendations to department management about risks and liabilities.

46) The City's Risk Management Office should take appropriate actions based on risks and estimated or potential liabilities. For example, the Risk Management Office may conduct investigations and recommend action to Department management. Or the Risk Management Office may consult the City Attorney's Office and the Mayor's Office or seek an opinion from the appropriate state regulatory agency.

E. Administration

47) The administrative process detailed in Figure B on pages 40 through 42 should be adopted by all current and future OCIPs.

48) The contract should include language that gives the safety representative authority to require that identified work not proceed until the safety representative is present to observe.

49) OCIP and safety personnel should be given the authority to enforce the safety program.

F. Claims Management and Adjudication

General Liability Protocols

50) The draft General Liability Claims Protocol provided in the Appendix of this report should be adopted with the understanding that it will change based on negotiations with the insurance carrier. Also that for future OCIPs, these protocols will be drafted from the beginning, so the contents may change.

51) Should an injured worker file a worker's compensation claim and a third party liability claim, the City Attorney's Office must be notified to trigger the General Liability protocols.

Worker's Compensation Protocols

Legal Environment

52) The City department and insurance carrier will coordinate the handling of OCIP Worker's Compensation claims, therefore, the City Attorney's Office will be involved only on a periodic or quarterly basis to review claims and provide expertise as needed.

53) The City Attorney's Office or the City's Risk Management Office conduct periodic training in Worker's Compensation laws and other laws, to assure City departments are aware of changes in the legal environment.

of San Francisco Administrative Code Chapter 12B, which includes the Equal Benefits Ordinance.

63) OCIP Claims Management and Adjudication processes and procedures must comply with section 6.102 of the City Charter and must be coordinated with the City Attorney's Bureau of Claims Investigation and Administration from conception to closure to avoid duplication of efforts and costs. Coordination will include periodic claims reviews and joint enforcement of claims protocols.

64) We strongly encourage the City Attorney's Office and the departments to conclude its negotiations with the carriers and to finalize the various agreements, including the claims protocol and payment agreements.

APPENDIX B

Sample OCIP/CCIP Minimum Coverage Requirements

SAMPLE OCIP/CCIP MINIMUM COVERAGE REQUIREMENTS

Workers' Compensation

The Workers' Compensation Program will be written with individual policies and individual exposure modifications that apply to each contractor. For each of these contractors, a policy will be issued effective the date of the contract award to expire each year at a common expiration date and renewed thereafter until the job is complete.

If a policy is issued to a contractor but no work or payroll is applicable to the policy, **NO** minimum premium will be charged.

Coverage	*Limits*	*Deductible*	*Rating Basis*
Workers' Compensation with statutory benefits	Coverage A: Statutory Coverage B: $2 million each employee/ $2 million each accident/ $2 million each disease	Nil and/or $250,000 combined per occurrence	Use estimate of WC payrolls and classifications

Required Coverages

1. Broad form named insured
2. Cancellation Provision*
3. Designated Premises Endorsement
4. Assignment consent Endorsement
5. Waiver of Subrogation*
6. Undisclosed Exposures*
7. Alternate Employer (WC 00 03 01A)
8. Stop Gap — All Monopolistic States $2,000,000 each
9. Voluntary Compensation including: All states including monopolistic Stop-Gap Employers Liability for monopolistic states
10. USL&H (If Any Basis) (WC 00 01 06A)
11. Maritime/Jones Act (If Any Basis) (WC 00 02 01A)
12. FELA Act (If Any Basis) (WC 00 01 04)

** Coverage to be equivalent to specimen wording below*

Workers' Compensation Endorsements Specimen Wording

Cancellation Endorsement

The company agrees to provide continuous coverage to the Insured for the term of this project and,

therefore, waives its rights of cancellation except for non-payment of premium by the insured. Non-payment shall be deemed to have occurred if the company in accordance with the agreed-to payment schedule does not receive the payment. The company will provide thirty (30) days written notice for non-payment via certified mail to [ENTITY].

Waiver of Subrogation Endorsement

It is agreed that with respect to such insurance as is afforded by the policy by reason of the designation of California in 3 .A. of the information page, the company waives any right of recovery under subrogation or otherwise, which it may have or acquire against the Principal named below by reason of any payment made on account of injury, including death resulting there from, sustained by any employee of the Insured while engaged in the following described operations:

Undisclosed Exposures Endorsement

It is agreed that failure of the Insured to disclose all hazards existing as of the inception date of the policy shall not prejudice the Insured with respect to the coverage afforded by this policy, provided such failure or any omission is not intentional.

If is further agreed that the unintentional failure to enroll an eligible contractor or subcontractor, which the insured has agreed to furnish insurance under this project, does not prejudice coverage.

General Liability

In order to facilitate comparison of OCIP and CCIP alternatives, proposers are to provide a statement indicating:

A) Liability coverage includes coverage for [ENTITY] sole and active negligence,

OR

B) Liability coverage does not include coverage for [ENTITY] sole and active negligence

Coverage	*Limits*	*Deductible*	*Rating Basis*
Primary Commercial General Liability for bodily injury and property damage utilizing standard ISO insurance form or equivalent	$2 million per occurrence $4 million general aggregate $4 million products/completed operations aggregate per project Annual reinstatement of aggregates	Nil and/or $250,000 combined per occurrence	Use estimate of WDC payrolls and classifications

Extensions of Coverage

1. Broad Form Named Insured*
2. Contractual Liability: all oral, written and implied contracts
3. Personal injury liability: delete employee exclusions, delete contractual liability exclusion, add coverage for mental injury, mental anguish, emotional stress, humiliation, shock and discrimination except where prohibited by law
4. Cancellation Endorsement: Non-Cancelable*
5. Sole agent/assignment of premium

6. Insurance Company Waiver Endorsement*
7. Knowledge & Notice of Occurrence*
8. Undisclosed Exposures*
9. Bodily Injury and Damages amended to include mental anguish, shock, mental injury, or illness whether or not accompanied by physical injury
10. Additional Insureds: Blanket as Required Per Contract with the Insured (CG 20 10 11 85 Form B)
11. Products/Completed Operations extension endorsement-10 years following project completion
12. Cross Liability Coverage (No Exclusion in form)
13. Contractual Liability: Coverage to be "Joint and Several"
14. Delete PI/AI Contractual Liability Exclusion
15. Delete fellow employee exclusion
16. Delete alienated premises exclusion
17. Designated Premises Endorsement
18. Waiver of Subrogation where Required by a Contract
19. Non-Owned Watercraft Limitation Extended to 52 Feet
20. Time Element Pollution Coverage at Policy Limits, Reinstated Annually
21. Incidental Medical Malpractice*
22. Remain Silent on Punitive Damages
23. Hired/Non-Owned Automobile Liability for [ENTITY]'s Interest Only
24. Worldwide Coverage Including Suits Brought into the U.S., its Territories, and Canada
25. Amendment to the Damage to "Your Product" Exclusion
26. Remain Silent on Subsidence
27. Allocated expenses-included in retention and defense costs in addition to limits of liability
28. "In Rem" endorsement
29. Blanket coverage for explosion, collapse and underground hazards
30. Owners and contractors protective
31. Cross liability
32. Broad form property
33. Fire legal liability
34. Amend mobile equipment to include unlicensed self-propelled vehicles
35. Volunteers covered as insured

* *Coverage to be equivalent to specimen wording below*

Commercial General Liability Endorsements

Cancellation Endorsement

The company agrees to provide continuous coverage to the Insureds for [INSERT TERM] and, therefore, waives its rights of cancellation except for non-payment of premium by the insured. Non-payment shall be deemed to have occurred if the company in accordance with the agreed-to payment schedule does not receive payment. The company will provide thirty (30) days written notice for non-payment via certified mail to [ENTITY].

Insurance Company Waiver Endorsement

This policy is primary coverage, and the insurer agrees not to take action or recourse against any Insured for loss paid or expenses incurred because of any claim made against the policy.

Knowledge and Notice of Occurrence Endorsement

Knowledge of an "occurrence, claim, or suit" by an agent, servant or employee of any Insured shall not in itself constitute knowledge of the Insured unless individuals in the following positions shall have received such notice from the agent, servant or employee.

[INSERT POSITION OR NAME]

It is further agreed that knowledge of an occurrence by one or more Named Insured or Insureds shall not constitute knowledge of such occurrence by any other Named Insured or Insureds, and notice of any occurrence given to the Insurer or any of its authorized agents by one Named Insured shall constitute such notice by all Named Insured and Insureds.

Undisclosed Exposures Endorsement

It is agreed that failure of the Insured to disclose all hazards existing as of the inception date of the policy shall not prejudice the Insured with respect to the coverage afforded by this policy, provided such failure or any omission is not intentional.

It is further agreed that the unintentional failure to enroll an eligible contractor or subcontractor, which the insured has agreed to furnish insurance under this project, does not prejudice coverage.

Incidental Medical Malpractice

It is understood that the policy will cover "Bodily Injury" and "Property Damage" occurring during the policy period and arising out of malpractice, error or mistake committed at or in connection with the premises:

a) in rendering of or failure to render medical, surgical, dental, x-ray or nursing service or treatment or the furnishing of food or beverages in connection therewith, or

b) the furnishing or dispensing of drugs or medical, dental or surgical supplies or appliances.

In addition, remove item (1)(d) from item 1.a. of Section II—"Who Is an Insured" to provide coverage for employees providing professional health care services.

Excess Liability

Coverage	*Limits*	*Deductible*	*Rating Basis*
Excess Liability	$50 million following form excess of primary employers and general liability	Nil	Flat

Extensions of Coverage

1. Coverage to be following form
2. Insured not required to reinstate exhausted or reduced primary limits
3. Pay on behalf coverage
4. Defense costs in addition to coverage limit