

**FEDERAL TRANSIT ADMINISTRATION**  
**PROJECT MANAGEMENT OVERSIGHT PROGRAM**

**Contract No.: DTFT60-04-D-00010**  
**Project No.: DC-27-5001, CLIN 0003, PG 12**  
**Task Order No. 5 – Sound Transit Capital Projects**

**Grantee: Central Puget Sound Regional Transit Authority**  
**D.b.a. Sound Transit**

**Central Link Light Rail Project**  
**University Link**  
**Monitoring Report, Part I – May 2008**

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**STV Incorporated**  
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## LIST OF ACRONYMS

AL	Airport Link
BCE	Baseline Cost Estimate
BFMP	Bus Fleet Management Plan
CAP	Corrective Action Plan
CCB	Change Control Board
CEO	Chief Executive Officer
CH (S)	Capitol Hill (Station)
CM	Construction Management Personnel
COS	City of Seattle
CP	Critical Path
CPI	Cost Performance Indices (Indicator)
CSI	Construction Specification Index
CS(S)M	Construction Safety (and Security) Manual
CSO	Chief Security Officer
CSP	Construction Safety Plan
CSSP	Construction Safety and Security Plan
DMC	Design Management Consultant
DSTT	Downtown Seattle Transit Tunnel
(D/F/S)EIS	(Draft/Final/Supplemental) Environmental Impact Statement
EMI	Electromagnetic Interference
EP	Engineering Procedure
EPBM	Earth Pressure Balance (Tunneling) Machine
ERMP	Emergency Response Management Plan
EV	Earned Value
FD	Final Design
FFGA	Full Funding Grant Agreement
FLSC	Fire Life Safety (Committee)
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
FTE	Full Time Equivalent
IS	Initial Segment
IS/AL	Initial Segment/Airport Link (combined)
KC(M)	King County (Metro)
LONP	Letter of No Prejudice
LRRP	Light Rail Review Panel
LRV	Light Rail Vehicle
LRT	Light Rail Transit
MIA	Master Implementation Agreement
MOU or A	Memorandum of Understanding or Agreement
MP	Management Plan
MS	Master Schedule
MVET	Motor Vehicle Excise Tax
NTP	Notice to Proceed or North-Link Transit Partnership

OCIP	Owner Controlled Insurance Plan
OP	Operations Plan
OSHA	Occupational Safety and Health Administration
PE	Preliminary Engineering
PMOC	Project Management Oversight Consultant
PMP	Project Management Plan
PS	Project Schedule
PSST	Pine Street Stub Tunnel
P&U	Possession and Use
QA	Quality Assurance
QAM	Quality Assurance Manager
QAPP	Quality Assurance Program Plan
QC	Quality Control
Q(P)RM	Quarterly (Progress) Review Meeting
RAMP	Real (Estate) Acquisition Management Plan
RE	Resident Engineer
RFI	Request for Information
RFP	Request for Proposal
RFMP	Rail Fleet Management Plan
ROD	Record of Decision
ROW	Right-of-Way
RTID	Regional Transportation Improvement District
SCC	Standard Cost Category
SCP	Safety Certification Program
SEM	Sequential Excavation Method(ology)
SOP	Standard Operating Procedure
SPI	Schedule Performance Index (Indicator)
SSEPP	System Security and Emergency Preparedness Plan
SSOA	State Safety Oversight Agency
SSP	System Security Plan
SSMP	Safety and Security Management Plan
SSPP	System Safety Program Plan
SSQA	Safety Security and QA
SSPS	System Safety Program Standards
ST	Sound Transit
TBM	Tunnel Boring Machine
TMOU	Technical Memorandum of Understanding
TO	Task Order
UL/U Link	University Link LRT Project
UW	University of Washington
VE(CP)	Value Engineering (Change Proposal)
WBS	Work Breakdown Structure
WS(DOT)	Washington State (Department of Transportation)
YOE	Year of Expenditure

## 1. EXECUTIVE SUMMARY

### A. Project Description

- **General Description:** The University Link Segment (UL or U Link) is planned as an extension of the phased Central Link Light Rail Project that will add to the 13.9-mile Initial Segment (IS) and the 1.7-mile Airport Link (AL or combined IS/AL) operating segments. The entire U Link alignment is below grade in bored twin tunnels and excavated cut-and-cover stations, extending in a northerly direction from the Pine Street Stub Tunnel (PSST), traveling beneath the Capitol Hill District of Seattle and the Lake Washington Ship Canal to its terminus located near Husky Stadium on the University of Washington (UW) campus.
- **Length:** The U Link alignment includes 3.15 miles of underground, double-tracked line.
- **Number of Stations:** The adopted alignment includes two underground stations; the University of Washington Station at the northern terminus of the alignment and an intermediate station in the Capitol Hill District of Seattle.
- **Additional Facilities:** Additional trackwork, tools and equipment will be added to the yards and shops to accommodate the increased fleet size.
- **Vehicles:** Twenty-seven (27) vehicles are planned for acquisition to support the demand derived from the U Link extension and revenue service system-wide.
- **Ridership Forecast:** The forecast of added patronage related to the U Link provided in the 2007 New Starts Report is 40,200 daily boardings for the U Link section of the alignment alone and an increase of 70,000 for the system related to the U Link for a total system patronage of 114,000 in operating year 2030.

### B. Project Status

- The Project is in Final Design (FD).

### C. Schedule

- Preliminary Engineering (PE): Federal Transit Administration (FTA) authorized PE on December 5, 2005.
- Record of Decision (ROD): FTA issued the ROD on June 7, 2006.
- Final Design (FD): FD was authorized on December 11, 2006.
- Full Funding Grant Agreement (FFGA) ST anticipates execution of an FFGA in the fourth quarter of 2008.
- Construction: The start of major civil construction is planned for the 4th Quarter of 2008.
- Total Project % Complete: The Project Baseline will be established with execution of the FFGA.
- Revenue Operations Date:

	FFGA ROD	FFGA as Amended	Forecast		Actual
			Grantee	PMOC	
University Link	N/A	N/A	09/24/16	N/A	N/A

- Other:
- Quarterly Progress Review Meeting: The next Quarterly Progress Review Meeting (QPRM) is scheduled for July 30, 2008.

### D. Cost Data

Source: September 2007 Financial Plan and April 2008 Progress Report.

(\$ in millions)	<u>FFGA Amount</u>	<u>FFGA as Amended</u>	<u>Current Cost Estimate</u>	<u>Expenditure to Date</u>
<b>Total Project Cost</b>	N/A	N/A	\$1798	\$153
<b>Total FTA Share</b>	N/A	N/A	\$762	N/A
<b>New Starts Share</b>	N/A	N/A	\$750	N/A
<b>Local Share</b>	N/A	N/A	\$1,036	\$153

Contingency: The Total Contingency balance is reported in Sound Transit's (ST) April Project Report at \$317.0 million, no change from the February 2008 status. The Project Cost Estimate is under review and is the subject of a Risk Assessment Update being performed by an FTA-assigned independent Project Management Oversight Consultant (PMOC). This effort is scheduled for completion in mid 2008. The assigned PMOC remains concerned with the potential for extraordinary escalation being driven by recent fluctuations in the currency and energy markets along with mounting risks related to ST's staffing issues and progression of the design effort.

### E. Technical Capacity Review

- **U Link Project Management Plan (PMP):** The U Link PMP is under development. ST issued a Staffing Plan in mid January and a revised PMP on January 31, 2008 with its FFGA Application submittal. An update to the Staffing information was not included in the package. The PMOC has initiated its review and has been providing comments and coordinating revisions to the Plan and related documents with ST.
- **Operations Plan (OP):** ST submitted UL OP Revision 3 dated April 11, 2008 in response to comments made on Revision 2. The PMOC's review found all Revision 2 comments satisfactorily addressed and in an April 11, 2008 memorandum recommended that the UL OP Revision 3 be accepted as a compliant FFGA submittal.
- **Maintenance Plan (MP):** ST provided UL MP Revision 1 dated February 22, 2008 to the PMOC for review. The PMOC reviewed the Plan and provided comments to ST in a March 7, 2008 memorandum, which included a marked electronic copy of the Plan. The PMOC found the Plan to be acceptable for purposes of an FFGA award, but identified some corrections that should be made in the next revision.
- **Real Estate Acquisition and Management Plan (RAMP):** The RAMP, Version 1 dated January 17, 2008, has been reviewed by the PMOC and found to be acceptable for purposes of the FFGA application.
- **Quality Assurance/Quality Control (QA/QC) Plan:** ST issued Revision 3 of the Link QA Program Plan in January 2008 with its FFGA Application. The PMOC review of the Plan finds it generally acceptable to support the FFGA process; however, the PMOC recommends that ST consider restructuring the Plan for application on an agency-wide basis.
- **System Safety Program Plan (SSPP):** In compliance with the revised 49 CFR Part 659, ST revised the Tacoma Link SSPP in late April 2006 and it was subsequently approved by Washington State Department of Transportation (WSDOT). The Tacoma Link SSPP is being used as the basis for development of the Central Link SSPP, which will initially only address the IS/AL. The SSPP will be revised to address UL in the later stages of construction.
- **System Security Plan (SSP):** ST revised the Tacoma Link SSP for consistency with the new WSDOT System Safety Program Standards (SSPS) that became effective in late April 2006 in compliance with the revised 49 CFR Part 659. The Revised Tacoma Link SSP was approved by WSDOT and is being used as the base to develop the Central Link SSP, which will initially only address the IS/AL. The SSP will be revised to address UL during the late-construction stage.
- **Safety and Security Management Plan (SSMP):** In late April ST submitted a Final Draft SSMP Revision 3, which was acceptable except for minor inconsistencies between text and figures. These changes were made and the PMOC *issued* a memorandum in early May recommending that the SSMP be accepted in support of the FFGA Application. The PMOC also suggests that ST include Budget and Schedule information in future SSMP revisions.
- **Rail Fleet Management Plan (RFMP):** ST issued Revision 5-Final of the Central Link RFMP on January 15, 2008. The PMOC reviewed the Plan in February and found it acceptable for purposes of an FFGA award, but found some data errors that should be corrected. *The ST Operations Manager indicated that an RFMP revision that addresses the data errors will be issued in July 2008.*
- **Bus Fleet Management Plan (BFMP):** Revision 3 of the BFMP dated January 2008 was received by the PMOC with the January 31, 2008 FFGA Application. The PMOC reviewed the Plan in February and found it acceptable for purposes of an FFGA award.

## F. Safety

- See Attachment A and Section 3.E. in the PMOC Observation portion of the report.

## G. Major Issues/Problems

- Previous design development did not match the advertised level of completeness for design submittals in late 2007 and early 2008. Sound Transit is working with the design team and making improvements in this area. *The PMOC is currently reviewing the 90% design submittals for the U215 and U220 contract packages submitted in May to determine whether they meet industry standards and FTA expectations for 90% design submittals. Initial indications are that improvements are being realized in the subject submittals.*
- The U Link PMP remains under development. ST issued its most recent version of the U Link PMP on January 31, 2008 in conjunction with its FFGA application. A revised staffing plan was not provided as part of the submittal. ST asserts that its Baseline #5 Staffing Plan, delivered in mid January 2008 with a draft version of the PMP, is consistent with the U Link PMP that the PMOC received on January 31, 2008. The PMOC has provided some previous comments to Sound Transit on the allocation of engineering oversight resources resulting from its review of the subject Staffing Plan and design deliverables as described above. ST has indicated its disagreement with the PMOC's observations and conclusions regarding the adequacy of U Link engineering staff resources. *The PMOC notes that charging of staff hours for the Design Consultant has reportedly increased to a level of more than 10% above plan for February and March, and is on plan for April 2008.*
- *The PMOC continues to be concerned that, in its opinion, ST has not had enough appropriately qualified staff to properly administer and progress its projects that are currently in construction (IS/AL) while simultaneously designing and developing two additional projects.* Additionally, staff planning submitted to date has shown positions that, in the PMOC's opinion, require the full-time focus of at least one individual, are being filled instead by a single individual with assignments on two or more projects and in some cases two or more functions. It should be noted that the staffing levels had been increasing as a result of new hires and consultant mobilization, although remaining substantively behind ST's recently published Staffing Plans for the U Link Project. Although some Final Design work is being delayed, staffing had been less-than-planned and submittals did not fully meet contractual and/or industry standards. Performance indicators provided in ST's monthly report appear to reflect better-than-planned performance on an incremental and cumulative basis through *April 2008*. As discussed above, the nature of the U220 and U230 60% design submittals generated concern with respect to the adequacy of existing and planned resource levels, as well as the integrity of management control structure and information. Meetings to discuss the derivation of management information have continued since early in the project and will continue for the foreseeable future. It remains the PMOC's opinion that in-depth assessment of the situation and timely management action by ST are in order. FTA agreed to consider ST's use of consultant staff and matrixed engineering leads adequate as an initial response allowing for submittal of the FFGA application, pending the adequacy of the U230 60% design submittal. The PMOC will continue to monitor ST's oversight of the Final Design effort and staffing status as the design progresses.

- The PMOC has observed that, amongst other issues, ST's delay in conducting constructability-related activities has resulted in delays to fully developing the project Schedule (PS) and may be limiting the efficient progression of the design effort. A schedule for construction that reflects evidence of this type of analysis is described in FTA's Project and Construction Management Guidelines as an element of a completed Preliminary Engineering effort and is a requirement identified in 49 CFR 633 as an element of an acceptable PMP. The PMOC has recommended that ST perform the construction-related analysis and translate the results into the U Link PS in a manner that will demonstrate compliance with FTA Guidelines. In its letter inviting an FFGA application, the FTA conditioned its processing of the application on ST's "...delivery of an acceptable plan for the conduct of a comprehensive, end-to-end constructability review by February 15, 2008...and completion of the review, determined by delivery of an acceptable report...by March 31, 2008." A constructability workshop was conducted during March 2008. The subsequent Constructability Review Report was transmitted to the PMOC on March 31, 2008. The Report provided a summarization of the Workshop and evidence of some construction planning; however a fully developed and complete conceptual plan for the execution and coordination of the work at the primary work sites—at the I-5 under-crossing, Capitol Hill Station and University of Washington Husky Stadium—was not evident in the package. Subsequently, ST has delivered a more complete series of sketches that depict an apparently feasible plan for the staging of surface-level construction equipment and sequencing of work at the U215 Contract site. *ST has provided some basic sketches of the work staging for the two UW Station site contractors at the surface level. ST has indicated that it will prepare conceptual track layouts and staging for the U220 Crossover box at the tunnel level. This will help assure that the design is efficiently constructible and that costs have been appropriately estimated.*
- ST issued a Construction Management Consultant Request for Proposal (RFP) in October 2007. The PMOC reviewed the RFP as it relates to Project Control and is concerned with the defined level of staffing, specificity of staff qualifications and seemingly inadequately defined scope of services for the UL construction management program. It is the PMOC's opinion that comparison of the latest version of PMP (Version 0.2) with the RFP and existing Project Controls and Construction Management Procedures reveals apparent inconsistency and potential gaps in the functionality of the Project Control Office. The PMOC has held meetings with ST and expressed its concerns. ST has promised to address the 'gaps' in the Project Control Procedures and is currently working on developing detailed procedures that would be incorporated in the ST Project Control Procedures and PMP by February 2008. Drafts of the procedures were issued in May 2008 for review.

<b>ATTACHMENT A: SAFETY CHECKLIST - Central Link LRT Project - University Link</b>		
<b>Areas of Focus</b>	<b>Y/N</b>	<b>Status/Comment</b>
<b>State Safety Oversight Agency</b>		
Does the State have a designated State Safety Oversight Agency (SSOA) as defined in 49 CFR Part 659?	Y	Washington State Department of Transportation, Public Transportation and Rail Division Attn: Michael Flood 401 Second Ave., South Suite 300 Seattle, WA 98104 floodm@wsdot.wa.gov 206-464-1291
If so, does the SSOA's authority extend to pre-revenue operations?	Y	
Has the SSOA established its System Safety Program Standards (SSPS)?	Y	The SSOA has updated the SSPS to reflect the new requirements of 49 CFR Part 659 that took effect on May 1, 2005.
Has the SSOA received, reviewed and approved the grantee's System Safety Program Plan (SSPP)?	Y	The SSPP for Tacoma Link has been approved by the SSOA. The SSPP for the Central Link IS will be submitted for review during the IS Project Start-up phase to secure approval at least 120 days prior to the planned start of revenue operations, as specified in the IGA. The SSPP in effect at the time will be updated to address UL and will have to secure WSDOT approval prior to the start of UL revenue operations.
Does SSOA participate in Project Development? Participate in things such as; review design documents, attend review meetings, and comment on how the safety aspects of the project are being addressed.	Y	Occasional attendance at Quarterly Project Review Meetings.
Has the SSOA performed a pre-revenue safety review of the grantee's project?	N	Construction is not complete.
<b>System Safety</b>		
Is the grantee's overall Safety Program properly documented in its Project Management Plan (PMP)?	Y	The SSMP has been brought to an acceptable level of development for FD and is referenced in the draft versions of the PMP.
Do the grantee's PMP and associated Safety Program include an appropriate safety policy adopted by its top management?	Y	A Safety Policy is included in the SSMP.

Do the grantee's PMP and associated Safety Program establish a specific organizational entity, and/or individual, responsible for the Safety Program?	Y	The SSMP reflects the current organization that is generally consistent with the draft PMP.
Do the grantee's PMP and associated Safety Program specify staffing requirements, procedures and authority for the safety activities?	TBD	The PMP related staffing plans remain under development.
Do the grantee's PMP and associated Safety Program include a formal Safety Certification Program (SCP)?	TBD	The PMP remains under development, but will include a formal Safety and Security Certification Plan. The Safety and Security Certification Plan for IS/AL is under revision and the U Link SSCP is expected to be developed by using that plan as a model.
Do the grantee's PMP and associated Safety Program include the development/use of a Safety Design Criteria Manual or equivalent documents?	Y	The PMP remains under development. The current Design Criteria in place are based on IS/AL criteria and is being modified to reflect the technical aspects of an agreement with the UW.
Has the grantee developed, and the SSOA approved, the grantee's SSPP? What is the status of this process between the grantee and SSOA?	N	SSPP for Tacoma Link has been approved. Central Link SSPP is now under development, using the Tacoma Link SSPP as a base document. The SSOA must approve the SSPP before the IS goes into revenue operation and again prior to the start of both AL and UL operations.
Is the grantee implementing its Safety Program as defined in the PMP? Are the safety milestones being met? (Note: this assumes that the SSMP is properly referenced in the PMP.)	Y	The PMP remains under development. The Safety and Security Program is documented in the SSMP.
<b>Construction Safety</b>		
Is the grantee's Construction Safety Program (CSP) documented in the PMP?	N	The PMP remains under development, and construction has not yet begun.
Has the grantee implemented its CSP?	Y	The CSP has been implemented on the IS Project. It is expected that the UL CSP will build on the IS/AL CSP.
How do the grantee's Occupational Safety and Health Administration (OSHA) statistics compare to the national average for the same type of work? If the comparison is not	TBD	Construction has not started.

favorable, what actions are being taken by the grantee to improve its safety record?		
Is the grantee using wrap-up insurance on this project? Is the grantee using safety incentives/disincentives on this project?	Y	Owner Controlled Insurance Plan (OCIP) is in place on the current Project and will be restructured for the U Link.
<b>Shared Track</b>		
Does this project have shared track?	N	
Has the Grantee coordinated with FRA regarding waivers for shared track usage?	N/A	
<b>Shared Corridor</b>		
Does this project include shared corridor? Please describe geography of shared corridor.	N	
What is the grantee doing to specifically address safety concerns in the shared corridor portion of the project?	N/A	

## 2. ACTION ITEMS

PR	ITEM	IDENTIFICATION	NATURE OF PROBLEM/ISSUE	D	A	I	COMMENTS	STATUS
1	31-1 02/06	U Link Project Management Plan	A PMP that is acceptable for the current phase of the Project does not exist.	Y	Y	N	ST delivered its most recent version of Revision 0 as part of its January 31, 2008 FFGA application submittal. ST and the PMOC will continue to conduct meetings to support the further development of the Plan.	R
1	32-1 12/06	U Link Constructability Review	FTA has instructed ST to conduct a Constructability Review for the U Link Project.	Y	Y	N	The FD authorization letter requires the conduct of a Constructability Review. The FTA letter required and ST had scheduled this effort for completion by June 2007. This did not occur and FTA has conditioned its acceptance of ST's FFGA application on the conduct of an end-to-end review and delivery of a report on the effort to FTA. ST conducted a Constructability Workshop during the week of March 17, 2008, and a Report was issued on March 31, 2008.	R

Legend: PR = Priority: 1 = Most Critical; 2 = Critical; 3 = Least Critical.

Grantee Action: D = Remedial Action Developed; A = Remedial Action Approved; I = Remedial Action Implemented.

Status: R = Review Ongoing; C = Completed, No Further Review Required.

### 3. PMOC OBSERVATION REPORT AND CURRENT ISSUES

#### A. Budget and Funding

The table below contains information provided by ST in its September 2007 U Link New Starts submittal and reportedly remains valid.

#### U Link Capital Costs

<b>Standard Cost Category (SCC)</b>	<b>\$'s YOE (millions)</b>	<b>Percent Of Total</b>
10 Guideway and Track	\$ 549	30
20 Stations	346	19
30 Yards, Shops, Supt. Facilities	7	<1
40 Site Work, Special Conditions	26	1
50 Systems	71	4
60 ROW/Real Estate	157	10
70 Vehicles	100	6
80 Professional Services	304	17
90 Unallocated Contingency	54	3
<b>Subtotal</b>	<b>\$1,614</b>	<b>90</b>
100 Finance Charges	\$184	10
<b>Total Project Cost</b>	<b>\$1,798</b>	<b>100</b>

Note: Minor rounding errors in some calculations

The Total Contingency for the U Link Project, resulting from the initial Risk Assessment process, is reported at \$329.3 million. ST reports the current Contingency Balance at \$317.0 million. The table of U Link Capital Costs, above, has been prepared in FTA's Standard Cost Category (SCC) format and reflects an Unallocated Contingency of \$54 million.

The PMOC has been monitoring the status of the U Link Contingency as established by the January 2007 Memorandum of Understanding (MOU) that was developed at the close of the initial Risk Assessment Workshop. Over the past several months, ST's Design Consultant has been making incremental design submittals that have been accompanied, shortly thereafter, by updates to the cost estimates that generally relate to the scope of the submittals. The PMOC observes that in accordance with ST's Contingency Management Plan and as would be expected under conventional circumstances, the value of the design allowance element of the total contingency would decrease as the level of design completeness increases. In fact, ST's Contingency Management Plan anticipates that when a design package reaches the 100% level of development, all of the design allowance would have been consumed. Although ST is reporting the incremental progression of the design packages in its monthly reports, the value of the design allowance has increased from \$121.5 million to \$127.5 million - counter to the expected trend. The PMOC has suggested that the Link Project Controls function review the sources of data and methodology being employed to develop the reported status. *In meetings during May, ST has*

*indicated that anomalies associated with the incorporation of known design changes have caused the design allowance to remain at an elevated level. ST has also indicated that this trend will be reversed over the next several reporting periods as the estimates are updated to reflect the continuing design evolution. The PMOC has suggested that unconsumed design allowance should be transferred into the Unallocated Contingency. ST has indicated that it will transfer the un-utilized value to either Allocated or Unallocated Contingency.*

The U Link funding profile displayed below is based on December 2007 revision to the September 2007 U Link Financial Plan.

**U Link Funding**  
(\$YOE millions)

Source	Amount	Percent of Estimate
Local Tax	\$249	14
Bonds	774	43
New Starts	750	42
Other Federal	12	<1
Other Local	13	1
<b>Total</b>	<b>\$1,798</b>	<b>100</b>

**B. Schedule**

ST's CCB adopted the February 2008 update with a data date of February 29, 2008 as the Current Baseline Schedule for the U Link Project.

The PMOC has reviewed the *April 2008* update of this Master Schedule (MS) and notes that there is continuing improvement in terms of both content and detail. The PMOC expects that the Schedule will continue to be enhanced as it evolves and suggests that ST should place greater emphasis on this area *as the pace of improvement is not keeping up with the need. Specifically, further development of the construction plans and related Basis and Assumptions, and their inter-relationships with the Baseline Cost Estimate is needed. These data elements need to be clearly defined, finalized and incorporated into the baseline planning documentation.*

As previously noted, it is the PMOC's opinion that the overall timeframe depicted in that early version of the Project Schedule provides an adequate time allowance for project execution, including approximately ten years for progression of the project from PE to revenue service, now planned for the third quarter of 2016. *Recent reviews and analysis of the Project Schedule in accordance with FTA's Program Guidance 34 indicates that additional time contingency should be added to the Project Schedule. Although the PMOC concurs with the addition of schedule contingency, it remains the PMOC's opinion that, given effective management and adequate resources, ST should be able to achieve revenue service for the U Link extension by September 2016.*

The observations below are based on reviewing the *April 2008 Project Schedule Update*.

### Schedule Structure

The current version of the UL PS template includes five sub-projects; FD Civil, FD Systems, Right-of-Way (ROW), Third-Party/Permitting, and Construction. The FD Civil and Systems sub-projects are being maintained by the respective consultants. ROW includes activities associated with the process of property acquisition and is maintained by ST project controls and ROW departments. Although continuing to evolve, the details of the timelines and logical interfaces for ROW have been finalized and are being tracked at the summary level.

Construction includes activities associated with procurement (bidding), design management, construction management, permitting and construction sequencing. The detailed activities in the construction schedule are being refined as a part of further development being performed by ST project controls. The PMOC encourages ST to continue to place emphasis on constructability and construction planning as a means to support needed schedule enhancement.

ST has selected the design-bid-build method of project delivery, which will require the close coordination of contractual schedule interfaces driven by assumed rates of progress. ST has developed milestones in the Project Schedule that illustrate these interface points. The PMOC has suggested that these interface points should be defined in detail and the construction contracts developed in a manner that explicitly explains and defines the duties, relationships and requirements for coordination of the work. This should be a result of the Constructability planning that is yet to be completed.

As part of the planning and scheduling function, the current Work Breakdown Structure (WBS) was analyzed for its ability to be used in support of an overall project controls Plan. The PMOC's review indicates that the development of the WBS is progressing. Developments to include Bid Items, Schedule of Value, Construction Specification Index (CSI) Code (specification identifiers), etc., into the coding structure remain in progress. These elements are needed so that the future Schedule management and updates can be properly and efficiently facilitated. In October 2007, the PMOC recommended that a detailed narrative on the activity coding and ID structure be developed to facilitate activity identification and support the efficient development, maintenance and assessment of the Basis and Assumptions for the PS. ST has developed such a narrative at a summary level and the PMOC has reviewed the initial versions. Continued intensive development and maintenance of the Basis and Assumptions is required through the construction planning, design and bidding process until such time as the contracts have been awarded and conformed, and the contractors' baseline schedules have been accepted. ST is developing a procedure to assure controlled revision of the Project Baseline Schedule at the point of acceptance of each Contractor's Baseline Schedule.

### Basis and Assumptions

The PMOC suggested that the Basis and Assumptions require further development, especially with respect to production rates, resource utilization and constructability. ST presented a draft Basis and Assumption document to the PMOC in October 2007. An updated version of that document, along with the baseline MS, was received at the end of March 2008.

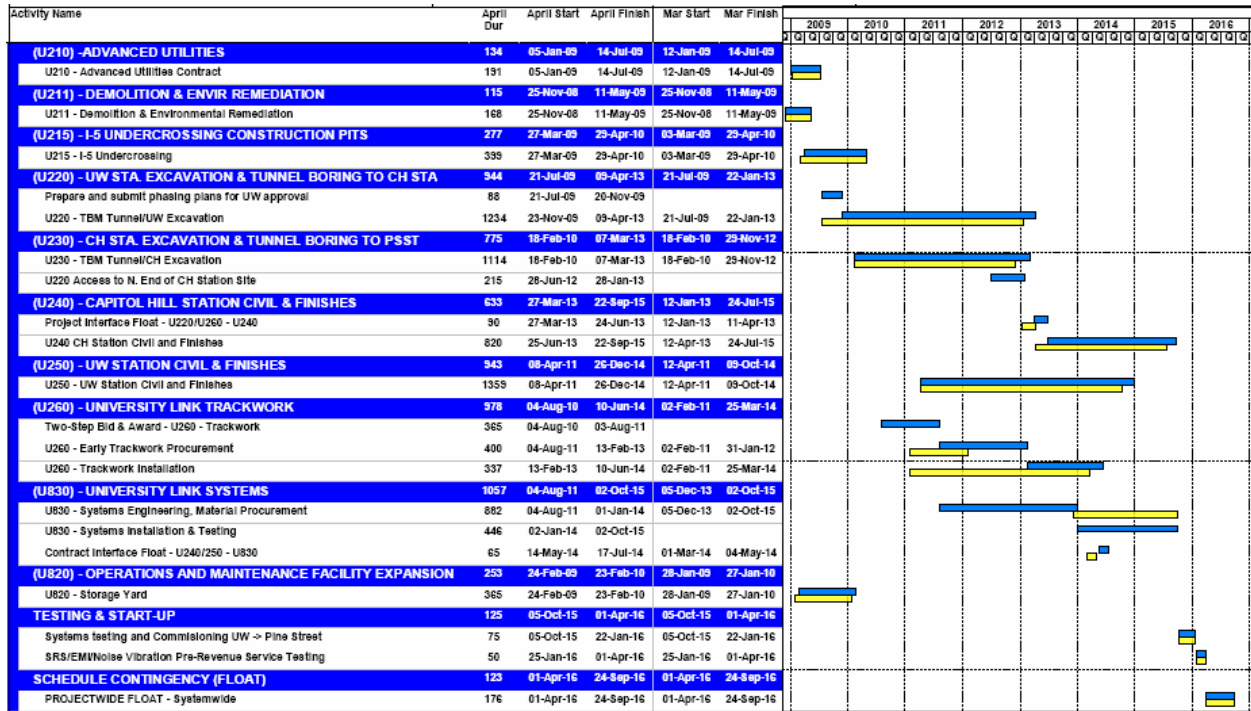
PMOC will review the Basis and Assumption document and comment on the following criteria:

- Consistency of sequencing with expected contractor-crewing requirements and adequacy of the physical environment for efficient execution of the work based on expected contracting methods and packaging strategies;
- Logic relative to the constraints of the physical environment on the construction;
- Work efforts of a similar nature that occur concurrently are identified and reasonably sequenced in the schedule to ensure that similar work activities can be accomplished with efficient crew sizing. This will also allow for the assessment of demand versus supply in the skilled-labor marketplace;
- Float at the critical interfaces as well as assumed progress rates are both identifiable and appropriate, and are consistent with physical constraints; and
- Embedded contingencies are identified and assessed as adequate relative to project duration.

The PMOC’s summary reviews indicate that further evolution of the detail forming the schedule basis information is required. Specifically, incorporation of detailed construction planning information is expected at the current stage of project evolution.

Critical Path (CP)/Project-Wide Float

The CP depicted in the *April 2008* update has changed from the prior month as a result of moving the U220 Contract Site Mobilization from July 21, 2009 to November 21, 2009. This change was made at the request of the University of Washington to eliminate the impact of construction on the 2009 college football season. ST has subsequently set aside the initial four months of the U220 contract following Notice-to-Proceed for preparation of phasing plans and UW approvals as shown in the Schedule layout below.



This change has effectively shifted the U220 tunneling activities within the CP. The CP now initiates with design activities for U220 (UW Tunnel and Crossover Package), proceeds through the completion of the U220 package, and then transitions to the Capitol Hill Station construction (U240), Systems Installation, Test and Rail Activation. Based on the 2007 Risk Assessment Process, the revenue service date is September 24, 2016. The current schedule structure provides for 174 days of float prior to Project completion; this value excludes embedded float at the contractual interfaces. The PMOC has reviewed the schedule and found that, in general, the activities in the current CP are reasonable and follow a logical sequence. A summary layout of the current CP is attached below.

Activity Name	ORIG Dur	Start	Finish	2009 2010 2011 2012 2013 2014 2015 2016													
				Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
<b>(U220) - UW STA. EXCAVATION &amp; TUNNEL BORING TO CH STA</b>	1094	18-Dec-08	09-Apr-13														
Bid and Award U220 (TBM UW > CH UW Sta)	217	18-Dec-09	20-Jul-10														
Prepare and submit phasing plans for UW approval	88	21-Jul-09	20-Nov-09														
U220 - TBM Tunnel/UW Excavation	1234	23-Nov-09	09-Apr-13														
<b>(U230) - CH STA. EXCAVATION &amp; TUNNEL BORING TO PSST</b>	19	15-Aug-12	11-Sep-12														
Remove TBM2	20	15-Aug-12	11-Sep-12														
<b>(U240) - CAPITOL HILL STATION CIVIL &amp; FINISHES</b>	330	27-Mar-13	14-Jul-14														
Project Interface Float - U220/U260 - U240	90	27-Mar-13	24-Jun-13														
U240 - Critical Path Activity Summary	287	25-Jun-13	14-Jul-14														
<b>(U260) - UNIVERSITY LINK TRACKWORK</b>	10	13-Mar-13	26-Mar-13														
U260 - Deliver/Distribute Rail	10	13-Mar-13	26-Mar-13														
<b>(U830) - UNIVERSITY LINK SYSTEMS</b>	353	14-May-14	02-Oct-15														
Contact Interface Float - U240/U250 - U830	85	14-May-14	17-Jul-14														
Substation & Comm. Equipment in CH Sta.	180	18-Jul-14	03-Apr-15														
Substation & Comm. Equipment in UW Sta.	180	22-Jan-15	02-Oct-15														
<b>TESTING &amp; START-UP</b>	125	05-Oct-15	01-Apr-16														
Systems testing and Commissioning UW -> Pine Street	75	05-Oct-15	22-Jan-16														
SRS/EMI/Noise/Vibration Pre-Revenue Service Testing	50	25-Jan-16	01-Apr-16														
Testing/Training Cmpplt(Ready for Revenue Srvce)	0		01-Apr-16														
<b>SCHEDULE CONTINGENCY (FLOAT)</b>	123	01-Apr-16	24-Sep-16														
PROJECTWIDE FLOAT - Systemwide	176	01-Apr-16	24-Sep-16														

FD activities that had been slipping for nearly all the contract packages in November and December 2007 had reportedly stopped since January 2008. Nevertheless, the PMOC remains concerned, not only from an overall schedule perspective, but with the timing of formalized geotechnical information to support the evolution of the design. The PMOC expects that issues identified with recent design submittals will cause consumption of float internal to the schedule network over the next several months.

The table below shows that when compared to this ‘temporary performance baseline,’ delivery dates for most of the design package have slipped.

Work Product/Package	30%		60%		90%		100% to ST	
	Sched	F/A*	Sched	F/A*	Sched	F/A*	Sched	F/A*
Geotechnical Baseline Rpt U220					3/31/08	4/28/08	10/1/08	10/29/08
Geotechnical Baseline Rpt U230					3/3/08	6/24/08	9/1/08	12/22/08
Traffic Plans	6/29/07	6/29/07	5/26/08	8/4/08	10/17/08	1/9/09	11/28/08	1/9/09
U210 Utility Relocation	7/24/07	7/24/07	9/18/07	9/18/07	11/2/07	2/25/08	12/14/07	5/21/08
U211 Demo. & Remediation			8/28/07	8/28/07	11/27/07	11/27/07	3/11/08	5/13/08
U215 I5 Undercrossing			12/21/07	12/21/07	4/10/08	4/24/08	8/15/08	8/29/08
U220 UWS Excavat. and Tunneling	6/15/07	6/15/07	10/22/07	10/22/07	3/31/08	4/28/08	10/1/08	10/29/08
U230 CHS Excavat. and Tunneling	6/15/07	6/15/07	12/12/07	12/12/07	6/10/08	7/1/08	12/8/08	12/22/08
U240 CHS Civil and Finishes	8/30/07	8/30/07	3/13/08	3/27/08	8/14/08	8/21/08	2/12/09	2/12/09
U250 UWS Civil and Finished	12/28/07	12/28/07	6/23/08	8/4/08	11/28/08	1/9/09	3/13/09	4/24/09
U260 Trackwork			11/16/07	11/16/07	5/16/08	7/25/08	10/31/08	10/31/08

\*F/A = Forecast/Actual

The PMOC's assessment of the submittal contents to date indicates that actual design progress may be overstated and in reality, delays are potentially occurring. *ST has taken action to address the observed deficiencies and has properly delayed some submittals to assure that the proper level of design maturity and submittal Quality is attained.*

### Schedule Administration

The PMOC has reviewed the content of ST's Request for Proposal (RFP) for Construction Management Services and found that in its opinion, the requirements for schedulers included in the request do not adequately address the skill and experience levels appropriate for a project of the complexity of the U Link Project. Further, the scope of the schedule administration included in the request appears to be inconsistent with oral representations provided by Link staff and with existing Project Controls procedures and the content of the most recent version of the PMP. The PMOC will work with ST to reconcile these apparent inconsistencies. Meetings have been held over the past several months to review ST's plans for Project Controls on the U Link Project and this effort will continue. ST has indicated that it will review and reconcile any inconsistencies between the PMP, Project Controls Policies and Procedures, and its consultants' Scope of Work. To that end, ST has submitted a draft of the proposed changes in the Project Control Policies and Procedures for Scheduling and Progress Payments for the PMOC to review. The PMOC has noted that these documents must also be coordinated with the General Conditions and Specifications contained in the construction and supply contracts as well, and will review these proposed modifications for consistency with other ST documents.

### **ROW Acquisitions**

Current ROW requirements involve three groups of acquisitions; (1) full takes and relocations for the Capitol Hill Station, (2) University of Washington acquisitions (via agreement), and (3) tunnel easements.

At the Capitol Hill Station, ST has closed or obtained Possession and Use (P&U) on all the required parcels. Relocations are underway with approximately 70% of all relocations complete and 100% of residential relocations complete. With one exception, all remaining commercial

tenants have identified replacement locations and are waiting for completion of tenant improvements to move. Completion of relocation activities in the Capitol Hill Station area is targeted for June 30, 2008, and progress is on or ahead of schedule.

An agreement with University of Washington has been signed, covering required ROW.

Significant progress has been made in the acquisition process for the 224 tunnel easements (222 easements and 2 monitoring parcels). Acquisition surveys have been received for all private parcels, noise and vibration studies were completed that indicate impacts are below acceptable levels, and appraisals or appraisal reviews currently are underway and completed for approximately 70% of the parcels. Offers have been made on *approximately 55% of the parcels and closing has occurred on 11 parcels to date*. Offers have been made on *approximately 50% of the parcels*. Public parcels to be acquired (WSDOT, Seattle Parks) were approved by the ST Board. Revised parcel-by-parcel schedules have been developed and integrated into the PS with appropriate logic linkages and milestones along with input on actual progress from the Real Estate department, which forecasts completion of tunnel-easement acquisitions by June 2009. While this is after the bid-advertised date for U220 (Capitol Hill to UW), which is the earlier of the two tunnel contracts (U220 and U230), this is not anticipated to have any construction impact because ROW is not required for more than a year after the Notice-to-Proceed (NTP) date. *ST Real Estate is awaiting design information from Civil Engineering on required tie-back easements that will be added to ROW parcel requirements.*

The ROW cost estimates reflect the most recent baseline cost estimates and allocated contingency of \$131.4 million. The PMOC has reviewed the new ROW budget with ST and finds it sufficient for anticipated ROW costs.

ST has submitted an updated RAMP, which the PMOC has reviewed and found to be acceptable, as part of the FFGA submission requirements.

### **Third Party Agreements:**

ST has incorporated a sub-project into the Master Schedule that addresses the Third-Party Permit Schedule requirements. The PMOC suggested that ST continue to retrospectively review the current Third-Party interfaces/relationships on the IS/AL projects for potential lessons learned as these agreements are developed and/or amended to address U Link requirements. The PMOC has seen evidence that Lessons Learned is being addressed by the U Link Project team to some degree.

City of Seattle (COS): The University Link Supplement agreement between ST and COS was approved by City Council ordinance and went into effect on May 21, 2007. This agreement with COS is a supplement to the existing MOU covering City services in support of U Link FD through December 2008. ST perceives that it maintains a strong, ongoing relationship with COS and that the agreement contains appropriate provisions for future modifications. In addition, an amendment to the existing transitway agreement between ST and COS was approved by a City Council Ordinance on September 24, 2007. This amendment reflected the revised UL and North Link route alignment, and included process requirements for City review and approval of a

proposed pedestrian bridge at the UW Station. The COS's Light Rail Review Panel (LRRP) reviewed the UW Station design on December 6, 2007 and unanimously endorsed the concept. The LRRP approval is one of the steps in the COS pedestrian bridge approval process. The formal permit application for the pedestrian bridge was transmitted to SDOT in January 2008. *Task Orders with the City utility agencies are being coordinated.*

Washington State Department of Transportation (WSDOT): Plans for modification to the earth support system in place at the point where the U Link Tunnels will transition beneath the I-5 corridor (the U215 contract area) require approval by WSDOT. WSDOT representatives have proposed the development of an "asset protection agreement" covering the zone of influence within the WSDOT right-of-way. This agreement would include an approved ground movement monitoring plan that establishes pre-construction conditions as a baseline, with provisions that continue through, and for a set time, after completion of the construction. Additionally, an emergency response plan that defines thresholds and mitigative and/or remedial actions may be appropriate to safeguard the I-5 right-of-way.

University of Washington (UW): Following the July 2000 Memorandum of Agreement (MOA) between UW and ST, a more specific Master Implementation Agreement (MIA) was executed in July 2007.

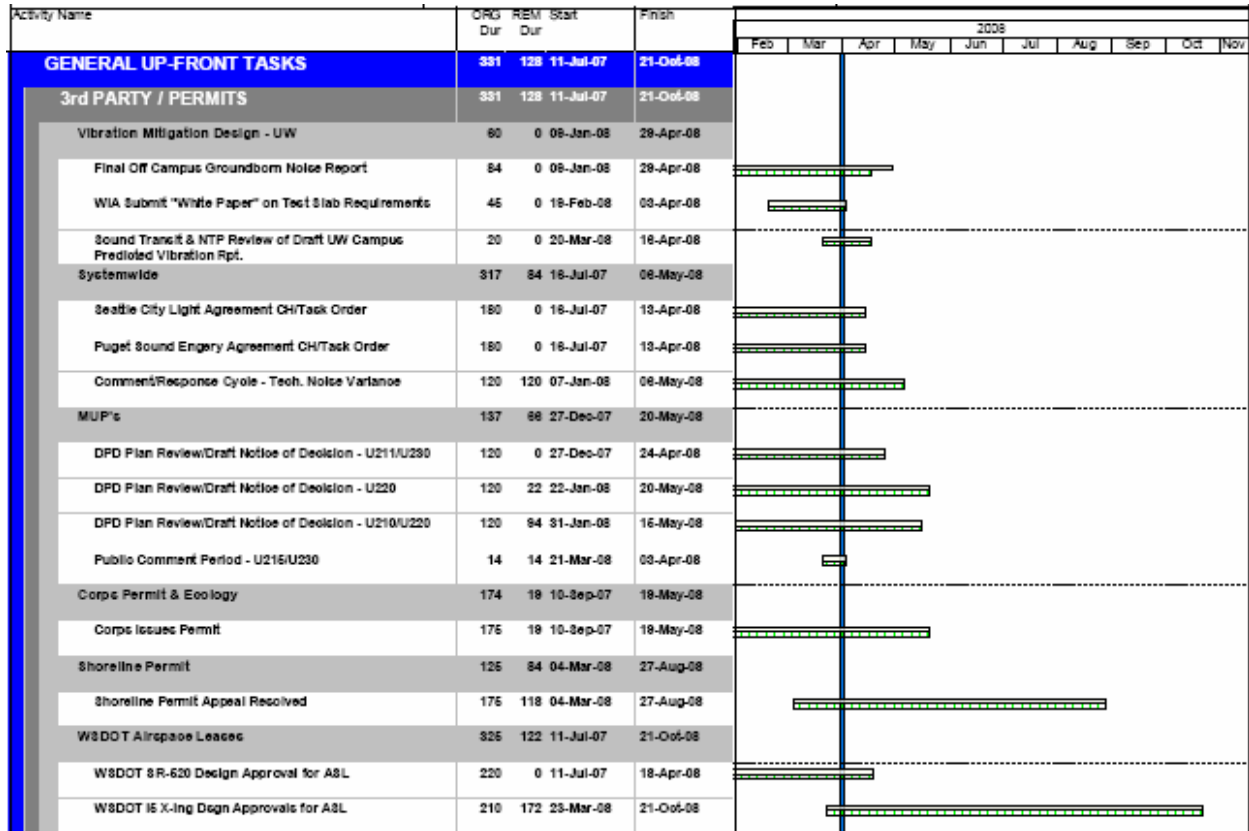
Based on its review of the MIA, the PMOC believes that some provisions have significant cost risk potential that will need to be considered in ST's continuing risk assessment and will likely lead to increased Contingency requirements. For example, design coordination requirements include acquiring recommendations from the University staff, the Architectural Commission and Landscape Advisory Committee, and securing final approval from the University Board of Regents. Additionally, the Agreement includes Liquidated Damage provisions for exceeding technical thresholds, as well as construction schedule performance and phased limitations on the staging areas that support system construction and equipment installation. At the time the agreements were executed, a substantive construction plan did not exist.

The PMOC will continue to monitor the ST/UW interface. The FTA and PMOC participated in a meeting with ST's primary UW point of contact to discuss the UW review and decision-making, levels of authority and formal approval process. The PMOC is at ease with the level of involvement by the UW representatives; however, the PMOC continues to perceive risk associated with the committee/board approval process. UW approvals that ST had indicated were scheduled for the end of March 2008 include:

- Draft UW Campus Predicted Vibration Levels Report,
- Final Off-Campus Ground-born Noise Report, and
- White Paper on Test Slab Requirements.

*ST now indicates that the preponderance of these reports will be completed in an incremental manner beginning in May 2008 and continuing through November 2008. ST reports that in May it executed the UW Easement and Operating Agreements for the Construction Staging areas. Plans for June 2008 include transmitting the 90% predictions for Vibration and EMI and Prototype Floating Slab Test Design Criteria for review and comment.*

The schedule layout below shows a compilation of the currently ongoing Third Party-related activities. This latest Schedule Update shows that some of those activities, especially related to review of ST design criteria by UW, continue to slip. Due to the available float in the schedule, however, ST does not expect this delay to impact the overall schedule. The PMOC plans to monitor those activities closely in the coming months because of potential impact on the overall design schedule.



### Value Engineering

ST performed a formal Value Engineering (VE) review in July 2007 and conducted another in October 2007. The PMOC commends the U Link Project for these efforts. The PMOC has performed a limited review of the VE Reports and, in the PMOC's opinion, the effort meets the intent of the FTA Guidelines.

### Constructability:

Over time, the PMOC has been monitoring ST's activities relative to the Constructability Program and noted that ST was delaying the initiation of the effort. In its December 2006 letter authorizing the initiation of Final Design, FTA indicated that ST should complete an initial Constructability Review within 180 days. The PMOC reiterates its position that in accordance with FTA's Project and Construction Management Guidelines, a well-developed construction

plan is an integral element of a complete PE data set. Late in 2007, the PMOC had seen evidence that ST was beginning to more forthrightly address its construction planning, staffing and capacity issues; however, the constructability review requirement had not been met at the close of the year.

In January 2008, ST issued a document titled Constructability Program Plan, dated December 2007. In the PMOC's opinion, the substantive element of the document is its commitment to employ the process described in Link Engineering Procedure EP-08. EP-08 dictates that Constructability Reviews be conducted at the conceptual, PE and 60% stages of design development, with a follow-up review conducted at the 90% level of completion.

In its letter inviting an FFGA application for the U Link Project, FTA conditioned the continuation of the FFGA processing on ST's completion of an end-to-end constructability review for the major civil elements of the project by March 31, 2008. ST conducted a Constructability Workshop during the week of March 17, 2008. The PMOC observed the workshop and noted participation by Construction Management personnel (CM), the Design Consultant and other qualified independent personnel. During the workshop, many design issues were addressed in addition to the construction planning. While conceptual plans have been developed for some aspects of the construction, other significant issues with respect to coordination of work at the UW Station site, to include traffic management and the handling of excavated materials, remain to be fully addressed. The PMOC recognizes that the successful bidders will have the ultimate responsibility for the means and methods employed in the execution of the contract scopes of work. However, it remains the PMOC's opinion that ST has the responsibility, along with its design consultants, to ensure that the designs included in the contract packages are constructible within the constraints of the U Link Project budget and schedule. Moreover, the PMOC has informed ST that, in its further opinion, an acceptable Constructability Study Report for the civil construction will include a well-developed, feasible and practical concept for the conduct of the contract scopes of work by phase, addressing physical, functional and temporal constraints and interfaces at each of the primary work sites.

The PMOC's review of the March 31, 2008 Constructability Review Report indicates that while many issues have been addressed, significant aspects of the construction planning with respect to work plans, coordination of work, site access and traffic control remain to be fully addressed. At month-end April, ST delivered sketches for the U215 contract work area that represent a more fully developed and apparently feasible plan for the staging of surface-level heavy equipment. The PMOC's summary review suggests that a review and validation should be conducted of the design calculations that support the design and plans for incremental implementation of the ground support system for the shafts to be excavated on the east side of I-5. Specifically, assuring the capacity of the support system to accept the varying levels and dynamics of the loading during its incremental installation is a material consideration in the phasing and staging of the construction as depicted in the sketches that were provided. *ST has provided some informal information, demonstrating that loading factors have been considered in this element of the construction planning.*

*ST has provided additional sketches of the U220/U250 work site, also demonstrating that it is evaluating the coordination of work at that site. The PMOC continues to suggest that a*

*conceptual plan for supporting the operations of the two TBMs from the floor of the U220 Crossover Box be developed.*

### **C. Project Management**

The following narrative is intended to provide some information on the historical context and current status of the organizational evolution of ST, the Link Light Rail Department and the U Link Project, pertaining to the current status of the project and related PMP.

#### **PMP**

Heretofore, ST has not issued an acceptable Draft PMP for the U Link Project. Lines of responsibility and authority from the executive to the working levels are yet to be clarified and documented. ST has issued several versions of staffing plans for the Link Projects, the last one being Baseline #5. In the PMOC's opinion, all of the plans have proven to be inadequate in that they do not include realistic assessments of resources required for the individual projects and ST has yet to demonstrate its ability to staff those plans. It is the PMOC's opinion that the staffing deficiencies are now manifesting themselves in administrative and operational issues on the UL Project in part due to continued sharing of resources with the IS/AL projects. Examples of the types of issues being revealed on the U Link Project include the deficient content of the U220 contract unit 60% design submittal, the late conduct of in-depth constructability planning and delays to the planned upgrade of Project Policies and Procedures.

ST delivered its latest revision to the PMP on January 31, 2008 in conjunction with its FFGA application. The submittal did not include a revised staffing plan; however, ST indicates that its Baseline #5 Staffing Plan, provided in mid January 2008 with a draft version of the PMP, is consistent with the PMP provided with the application. Additionally, ST contends that the current PMP and Staffing Plan serves to adequately document and clarify lines of responsibility and authority from the executive to the working levels. The PMOC *has been reviewing* the PMP *and the supporting documentation* as part of its preparation of the FFGA Readiness Spot Report. *Selected commentary on some of the critical management plans and procedures include the following:*

Project Control Policies and Procedures: The PMOC reviewed the ST Project Control Policies and Procedures with respect to the UL Project Control function and staffing. The PMOC's review found that most of the procedures have not been updated to address Lessons Learned, changes to currently implemented practices, or those planned for implementation by utilizing consultant resources from the Design or Construction Management Consultants and are therefore inconsistent from several perspectives. Comparison of the latest version of the PMP (Version 0.2) with the Construction Management RFP and existing Project Controls Procedures has revealed apparent inconsistency and potential gaps in the functionality of the Project Control office. ST Project Controls has indicated that it is updating its Scheduling and Progress Payment Policies and Procedures to include clarification of roles and responsibilities to make them consistent with the revised U Link PMP. ST submitted a draft of its revised procedures to the PMOC for review in late February 2008. The PMOC recommended removing any ambiguity and bringing all the sections in the Project Control Policies and Procedures up to date. Key

Project Control Policies and Procedures are being updated to incorporate Lessons Learned, and be consistent with the U Link PMP. These procedures will be submitted to CCB for approval in mid-June. The PMOC has performed a review of the scheduling procedure and Sound Transit is incorporating the comments. *ST provided a revision to the PMOC in May 2008; PMOC comments were provided and the next version will be provided in June 2008.*

As part of the Risk Assessment process precedent to execution of an FFGA, the independent PMOC has made a preliminary observation indicating that ST has deviated from its Cost Estimating Procedures. *The PMOC believes that the observation and comments are, for the most part, in regard to the level of detail in the estimates provided for evaluation. These estimates are being revised and expanded to provide the appropriate level of detail.*

ST Construction Manual (April 2005 version): A similar review of this document also found it to be lacking in detail, specificity and consistency with the UL PMP and ST Project Control Policies and Procedures.

The PMOC recommends that ST conduct a top-down review of all the Project Management-related documents to remove any inconsistency amongst them. Furthermore, the PMOC recommends that workshops should be conducted to gather inputs from all the stakeholders to modify and update policies and procedures related to managing and controlling the UL projects. Additionally, ST should perform reviews of internal and consultant-developed policies and procedures for consistency with the consultant contract requirements and the planned requirements to be incorporated in the construction contracts General Conditions, Special Provisions and Specifications. Specificity and consistency in the various contract documents and policies and procedures is the means by which an effective and efficient management control system will be implemented. This clearly should be a Lessons Learned that ST takes away from the IS. *ST has tasked its Construction Management Consultant with reviewing and updating the construction-related manuals, policies and procedures.*

## **Organization**

In previous reports, the PMOC had expressed concern over the quality, safety and security aspects of ST's reorganization and, accordingly, recommended improvements. These concerns have been largely mitigated by ST's reorganization of the Safety, Security, and Quality Assurance (SSQA) functions into a single organizational unit under a Chief SSQA Officer who reports to the Chief Executive Officer (CEO). The new Chief SSQA Officer was appointed in September 2007 and he has completed defining the organization and secured CEO verbal approval in February 2008 on the structure and personnel complement. The SSQA staff is currently revising the outdated Construction Safety Manual into a Comprehensive Construction Safety and Security Manual (CSSM), which is planned for completion for inclusion in the first UL construction contract. As indicated in the UL SSMP, SSQA will also provide input to contract specifications, including identification of needed special provisions for safety and security on the individual bid packages for the UL Project. The key Chief Safety Officer position has been filled and the selected candidate began work in March 2008. That leaves one vacant safety position to be filled, the Rail Safety Manager. The rail safety functions, primarily related to safety during the IS/AL rail activation, are now being performed by a seconded Rail

Safety Consultant. The organization approved in March includes elevation of the current Security Officer to Chief Security Officer (CSO) and addition of a new Security Officer position that reports to the CSO.

As stated in previous reports as well as in other sections of this report, the PMOC remains concerned with the inconsistency of structure between the agency at the top level and that which transitions to the project levels. In the PMOC's opinion, the structure as depicted does not provide for the clear delineation of responsibilities.

*The PMOC has noted apparent communications disconnects within ST. One example is that while SSQA is working to upgrade the CSSM to more clearly spell out contractor Safety and Security requirements, contract specifications are being drafted in a manner that dilutes the contractor's and ST's responsibilities. The PMOC concurs with the language contained in the SSMP requiring SSQA and Resident Engineer approval of a contractor-prepared, site-specific Construction Safety and Security Plan (CSSP) prior to the start of work at any site. It is the PMOC's opinion that language addressing Construction Safety and Security being drafted by the U Link Engineering/Construction function indicating that the Contractor's Safety Plans will not be subject to ST review and approval and virtually ignoring the subject of Security, is inconsistent with good practice and therefore unacceptable. The PMOC strongly recommends that SSQA review and sign off on contract specifications to verify that they are consistent with the SSMP and the CSSM, and that they support ST's culture that places Safety and Security as the top priority.*

The PMOC notes that ST is in the process of reviewing its organizational structure and that FTA has requested that the PMOC be consulted as part of that process *and an initial meeting is planned for early June 2008.*

### **Project Staffing:**

In its December 5, 2005 letter authorizing entry into Preliminary Engineering, the FTA instructed ST to develop staffing plans that depict the agency's Resource Plan for the conduct of its temporally overlapping projects. After several iterations, ST issued a revision to the U Link and IS PMPs and staffing information for the projects during August 2006. The information was evaluated on a limited basis as part of the FD Readiness Assessment and although further revision was required to be fully consistent with FTA's Guidelines, FTA found the progress at that time to be generally acceptable as a basis for FTA to allow advancement of the U Link Project. However, shortly thereafter ST announced a reorganization that had material impact on the content of the PMP and further revision was required. Throughout the intervening timeframe, the PMOC has consistently maintained its opinion that ST's plans do not reflect an adequate level of appropriately qualified staff resources.

Beginning in October 2006, ST's Agency Progress Reports have included summary level plan-versus-actual staffing information and some limited summary level narrative. ST has implemented revised planning on several occasions and the information provided in its reports through *April 2008* indicates that the staffing level for the U Link Project remains approximately ten percent behind the most current plan on a cumulative basis.

During October 2007, ST's Facilities Design Consultant made its first major design submittal, a package on the U220 60% UW Crossover Box and Tunnels to Capitol Hill Station. The PMOC has performed a summary review of the submittal, comparing it against the requirements of the Design Consultant's Quality Program. Although the submittal was reportedly subjected to a rigorous Quality review prior to delivery, the PMOC's observations indicate that the submittal does not conform to the documented requirements. It is the PMOC's opinion that the observed deficiencies can be linked to a less-than-optimal level of appropriately qualified resources being applied to the project work. ST's U Link Project Management has indicated its disagreement with the PMOC's observations, stating that the delays and observed deficiencies "...are not related to the number or qualifications of the ST staff assigned to oversee this design." From the PMOC's perspective, adequacy of the resources can only be demonstrated through the quality and timeliness of the submittals, the ultimate constructability of the design, and the efficiency that the contracts and overall project can be, and are, administered.

According to ST's current version, the planning and progress for the design effort reported in ST's *March 2008* report indicates a cumulative Cost Performance Index (CPI) value of 1.16, along with Schedule Performance Index (SPI) values of 0.89, based on Early Start Dates, and 1.21, based on Late Start Dates. These values continue to indicate equal-to or better-than-planned performance in the design costs and are indeterminate with respect to schedule. The narrative in the current report indicates that the level of design progress from the schedule perspective exceeded the plan by 30%, all while the PMOC notes that known slips in the design deliverable schedule forecast are going unaddressed. ST has committed to provide more narrative details and analysis of the earned value results that provide a clearer picture of final design status and progress. The reported consultant staffing for the civil design consultant only has exceeded the incremental budget based on efforts to address constructability issues and the development of general conditions for the contract packages for February and March. For April, the staffing is reported as meeting 98% of the plan. However, the PMOC's observations continue to contravene aspects of the progress indicators. As increased consultant resources have reportedly been necessary to arrest reported slips in the design schedule, reviews of recent submittals reveal weakness in some elements. The latest schedule update on U Link design activities also indicates delays in the design deliverable schedule, although the recent trend of increasing delay appears to have been arrested for the most part in January 2008 per ST's project reports.

It is the PMOC's opinion that the U220 and U230 submittals along with the late conduct of constructability reviews and planning are current objective evidence that additional qualified resources are needed for the efficient implementation of the U Link Project. The PMOC has observed that ST neither had nor had planned for internal staff, nor had it assigned dedicated full-time personnel from its Design Management Consultant (DMC) to continuously oversee the development of the individual major facilities contract packages (most with values well in excess of \$100 million). In fact, ST's related staffing plan submittal indicates only one dedicated, internally-employed, full-time Civil Engineer planned during 2008, a timeframe when design activity is expected to be at its peak. It is the PMOC's opinion that the lack of continuous oversight resulted in the delivery of a non-conforming submittal in the case of the U220 contract

unit. Meetings were conducted with ST and FTA during December 2007 to address the PMOC's observations. Conclusions of the meetings are summarized as follows:

1. Upgrades to the U220 Design package are required. ST has issued an interim or "70%" submittal for the U220 contract package. This submittal represents an improvement in strict adherence to quality-related requirements; however in the PMOC's opinion, the lack of elemental decisions and correlation of baseline geotechnical information leaves significant portions of the design at a completion level that is substantively less than 70%.
2. A formal agreement on survey monuments between ST and UW must be established. ST has provided documentation addressing this subject and the PMOC considers the matter closed.
3. Prior to FTA inviting ST to submit an FFGA application for the U Link Project, ST must deliver a 60% contract unit package submittal for the U230 Scope of Work that meets industry standards and the requirements of its design consultant's contract. The U230 60% submittal represented an improvement in quality and completeness, and was judged by the FTA to be a show of "good faith" and adequate to allow ST to submit an FFGA application for the U Link Project.
4. Both the FTA and PMOC remain concerned with the allocation of responsibilities and level of resources applied to development of the U Link Project contract unit. ST has assigned responsibility for the integrity of each contract package to individual technical managers and this change is reflected in the revised PMP provided on January 31, 2008, with the U Link FFGA Application. FTA has accepted this change on an interim basis.

The PMP that was delivered with the U Link FFGA application has added the concept of Contract Unit Managers; however it is the PMOC's perception that the same limited resources appear to be assigned as support to themselves from a technical perspective. Per the revised PMP, these individuals are now charged with responsibility for the integrity of the design relative to their functional assignment across the project, as well as the integrity of two or more contract units and the related interfaces along with the commercial aspects of the individual packages. Overall, this design work represents approximately \$1 billion in constructed value per the most recent estimate. In the PMOC's opinion, it is an unrealistic expectation for a single ST employee or consultant to provide effective oversight of the individually assigned volume of work simultaneously from both the line and functional perspectives. It is the PMOC's opinion that changes implemented in the current version of the PMP to allocate additional responsibility to a static resource pool may not lead to ST's anticipated improvement in performance.

As first stated in the November 2007 PMOC report, it is the PMOC's opinion that the UL Project is at a critical juncture that requires a conscious decision on the part of ST management to continue to advance the project in accordance with its current resource-constrained scheme and accept the associated risk, or reconsider and reformulate its execution concept and take action to implement change. At this point in the progression of the project, it is the PMOC's opinion that the ability to mitigate the long-term influence of the historical and current limited level of resources applied to the UL design development is waning, and may have been lost at this point. The UL Project Management has reiterated its opinion that the resources being applied to the Project are adequate. Link and ST management have reportedly authorized eight additional full-

time positions to be made available to the U Link Project. It is clear that as the reported actual resources continue to underrun the plan, the basic or additionally authorized resources are not being applied to the project. The PMOC will continue to monitor ST's application of the additional authorized resources.

#### **D. Quality**

The PMOC has received a copy of the Link Quality Assurance Program Plan (QAPP) and initiated its review and developed some initial observations; however, the review is not complete. Although not an issue that would make the plan unacceptable for the advancement of the U Link Project, there are some issues of note.

As currently written, the Link QAPP contains all of the 15 required Quality Program elements defined in the FTA's February 2002 Quality Assurance and Quality Control Guidelines. The PMOC has observed, however, that actual implementation of the QA Program is in some cases inconsistent with the Plan, and with sound practice. For example, as the UL Project design development progressed, the PMOC noted that ST uses QA personnel, both internal and consultant, to perform design checking and reviews. These are engineering tasks. Performance of these tasks by QA personnel is inconsistent with the Link QAPP Section 1.0 Organization, which in part states:

“...Quality Assurance/Quality Control personnel will not be assigned duties other than those related directly to Quality.”

In the PMOC's opinion, this has been driven in part by ST's long-standing reluctance to apply the needed level of resources in critical areas where the responsibility for the work actually resides.

Although the Safety, Security and Quality functions have been consolidated and the reporting structure has been reformulated to address an agency-wide perspective, the QAPP is written as a Link plan, co-signed by the Link Director versus an ST plan co-signed by the CEO. Quality, like safety or security, is an issue of internal culture. The “Link” QAPP is written as if Quality is a principle that should not necessarily apply to the entire ST organization. This is an issue that the PMOC has brought forward in the past. Quality, like Safety, should be a guiding principle in all of the Agency's pursuits. The need for this is evident and highlighted by well-publicized issues such as those relating to the Mercer Island Park and Ride and the Totem Lake Overpass. As with safety or security, Quality is a principle that must be adopted by an organization's leadership to be effectively implemented. In keeping with good business practice recognized worldwide, the PMOC recommends that the QAPP be written as an Agency document that applies to all of ST's activities as endorsed and directed by the CEO.

Through its monitoring, the PMOC has become aware that the Quality Assurance function has historically controlled the maintenance of the Link Design Criteria, under normal circumstances this is commonly an engineering function. It is the PMOC's opinion that in order to maintain functional integrity, this responsibility clearly belongs with the Link engineering function. The PMOC recommends that the allocation of this responsibility be reviewed for consistency with

proper functional allocation such that appropriate systematic checks and balances are maintained. ST has indicated that this recommendation is under consideration.

## **Final Design (FD)**

ST's Quality Assurance staff has reported that it worked with the Link Design organization in developing engineering procedures to define requirements for the conduct and product content that result from the U Link FD effort. Early in 2007, ST had reported that the procedure development was complete. The Link Engineering Procedures were issued in late November 2007.

## **E. Safety and Security**

The final SSMP Revision 1, dated July 31, 2007, was reviewed by the PMOC in early August and found to be in full compliance with FTA requirements for the FD phase of the project, as stated in a PMOC Memorandum dated August 7, 2007. The PMOC's preliminary assessment of SSMP Revision 2 submitted with ST's FFGA application found that it did not provide the needed updates for an FFGA-level SSMP. The PMOC prepared a comment memo, including a marked version of the submitted Revision 2, and transmitted it to ST on February 7, 2008. ST revised the SSMP to address these comments and provided a draft of SSMP Revision 3 in early March, which was reviewed and discussed with ST staff. *Additional drafts were produced and reviewed, leading to formal submission of UL SSMP Revision 3 in late April. In its May 5, 2008, comment memorandum, the PMOC is recommending that UL SSMP Revision 3 be accepted for FFGA award. In its memo, the PMOC also strongly suggested that ST include a safety and security-activity budget as well as schedule detail in the SSMP in the very near future.* The FTA has decided to include this as a requirement for all projects that began FD after August 1, 2007. These are not requirements for the UL SSMP because its FD was begun prior to the 8/01/07 date. Nevertheless, a safety and security-specific budget along with schedule development and tracking are still highly recommended tools to assure identification of adequate staffing during every phase of the UL Project. This is especially so because of the ongoing concern over ST staff dividing time between the end of the IS/AL during the critical design and construction start phases of the UL Project.

As indicated previously, ST's reorganization of the Safety, Security and Quality assurance functions into a single organizational unit has been accomplished and staffing is progressing. ST developed a Corrective Action Plan (CAP) to address the 21 recommendations made in Safety and Security Assessment Spot Report No. 8 (September 2007) and the remaining four open recommendations from the ST CAP developed in response to the Downtown Seattle Transit Tunnel (DSTT) Construction Security Spot Report No. 5 (September 2005). The CAP has been accepted and progress in meeting the CAP is tracked and reported monthly in Appendix C of the PMOC's IS Monthly Report. Most of the corrective actions will have positive effects on every phase of the UL Project. Through the end of *May, 14* of the 25 recommendations being addressed in the CAP have been fully satisfied.

## **F. Environmental**

Attachment C of the June 2006 Record of Decision for the North Link is a Summary of Required Mitigation Measures. The PMOC has reviewed elements of the conformed Facilities FD Consultant contract and found that the ROD and subordinate documents are referenced.

## **G. Issues/Areas of Concern**

At this time, the PMOC's notable concerns are as follows:

- Design Quality/Management: As discussed above and in prior reports, the Facilities Design Consultant made its first major design submittal for Contract Unit U220 in October 2007; this is the 60% Design for the UW Crossover and Tunnels. The PMOC's summary review found that the package did not appear to conform to the Consultant's Quality Plan requirements. ST has decided to require an interim submittal for the U220 Contract package. The PMOC provided its observations and comments on the U215, U220 and U230 packages during January 2008. The PMOC will continue to monitor the efficacy of ST's Design Management and Control process.
- Cost and Schedule Management: The PMOC has reviewed the Construction Management RFP issued by ST in October 2007 for scope of services as it relates to the project control and is again concerned with the specified level of staffing, specificity of staff qualifications and seemingly inadequately defined scope of services for the UL construction program. It is the PMOC's opinion that comparison of the latest version of PMP (Version 0.2) with the RFP and existing Project Controls Procedures reveals apparent inconsistency and potential gaps in the functionality of the Project Control office as well as the CM function. ST Project Controls has indicated that it is updating its Scheduling and Progress Payment Policies and Procedures to include clarification of roles and responsibilities to make them consistent with the revised U Link PMP. ST submitted a draft of its revised Procedures to the PMOC for review in late February 2008; it has been jointly determined that additional revision is necessary. As part of the Risk Assessment process precedent to execution of an FFGA, the independent PMOC has made a preliminary observation indicating that ST has deviated from its Cost Estimating Procedures. *The resident PMOC has assessed this observation and generally concurred with respect to the needed level of detail provided in the estimates.*
- Cost and Schedule Reporting: It has been a continuing issue that known changes to work scope and cost trends have not been incorporated into the Cost and Schedule reporting in a timely manner. Additionally, Performance Indicators relating to the status of the FD effort do not appear to be consistent with the actual status of the design program. The PMOC has held meetings with ST and expressed its concerns. ST has promised to address the 'gaps' and is currently working on developing detailed procedures that would be incorporated in the ST Project Control Procedures and PMP in final form by March 2008. ST and its consultants are further modifying the in-place planning and reporting processes as well as continuing to analyze the methodology with which the base progress information is developed.
- Staffing levels to properly support the U Link Project: The PMOC continues to be concerned based on its long-held opinion that the Link Department staffing plans do not include an adequate number of appropriately qualified personnel dedicated to the project.

Currently, the reported staffing levels do not appear to coincide with newly established plans as discussed above. In the PMOC's opinion, the established plans do not appear to provide for an adequate level of staff resources to support efficient project execution. As a commitment precedent to FTA inviting ST's U Link FFGA application, ST and Link management have committed eight additional full-time positions to be applied to the U Link Project. The PMOC has been monitoring the level of resources actually employed on the project and notes that although design consultant resources have reportedly exceeded the planned level, overall project resources continue to be less than planned.

- The lack of an acceptable PMP: The PMOC recognizes ST's effort in preparing the U Link PMP; however, an acceptable plan is yet to be finalized. ST provided a revision to the U Link PMP with its January 31, 2008 FFGA application. The PMOC has been reviewing and coordinating its comments with ST as part of its FFGA Readiness Review Spot Report preparation and ST reports that revisions are in progress.
- The delay in performance of Constructability Review activities for UL during the PE: This is a concern, as it is essential to validate PE design assumptions that form the foundation of FD. Although yet to be complete, the PMOC has seen evidence that constructability is now being addressed. FTA has conditioned continued processing of the U Link FFGA application on completion of an in-depth constructability review of the major civil elements of the project by March 31, 2008. ST conducted a Constructability Workshop and issued a Report on March 31, 2008. However in the PMOC's opinion, finalization of complete plans for the conduct and coordination of all construction activities at each of the primary civil construction sites remains an issue.
- Changes in ST's Safety and Security organizational structure: The PMOC's concern that there were no Safety or Security professionals assigned to participate in oversight of FD is on the way to being resolved with the establishment of the SSQA organization and appointment of its Chief Officer in early September 2007. Adequate staffing must still be retained, however, to perform all needed Safety, Security and QA functions under the new manager's leadership, including UL design oversight.

**ATTACHMENT B: SUMMARY OF CONCERNS AND RECOMMENDATIONS**

**ITEM NO. KEY**

- 1.XX**      *Technical Capability and Capacity*
- 2.XX**      *Program and Project Management Plans*
- 3.XX**      *Project Development and Implementation*

**PRIORITY (PR)**

**GRANTEE ACTION**

**PMOC STATUS**

- |                           |                                      |   |
|---------------------------|--------------------------------------|---|
| <i>1 – Most Critical</i>  | <i>D – Remedial Action Developed</i> | <i>R – Review On-going</i>                        |
| <i>2 – Critical</i>       | <i>A – Remedial Action Approved</i>  | <i>C – Completed – No further review required</i> |
| <i>3 – Least Critical</i> | <i>I – Action Implemented</i>        |   |

**CATEGORY OF CONCERN**

- |                                      |                               |
|--------------------------------------|-------------------------------|
| <u><i>S – SCOPE</i></u>              | <u><i>B – BUDGET/COST</i></u> |
| <u><i>SC – SCHEDULE</i></u>          | <u><i>Q – QUALITY</i></u>     |
| <u><i>SS – SAFETY/SECURITY</i></u>   | <u><i>F - FFQA</i></u>        |
| <u><i>TC -TECHNICAL CAPACITY</i></u> | <u><i>M - MANAGEMENT</i></u>  |

<u>PR</u>	<u>ITEM NO.</u>	<u>IDENTIFICATION</u>	<u>Category</u>	<u>NATURE OF CONCERN</u>	<u>PMO RECOMMENDATION</u>	<u>D</u>	<u>A</u>	<u>I</u>	<u>STATUS</u>
1	12/06	Lack of an acceptable PMP and SSMP	S, B, SC, M	Rev. 0.2 of the 'Preliminary Release' version of the U Link PMP was reviewed as part of the U Link Final Design Readiness Assessment, but ST recently announced a reorganization that has a direct impact on the content of the PMP. Without a current PMP, it will be difficult for the PMOC to fully and adequately assess the technical capability and capacity of the organization.	The PMP remains under development. The SSMP for the FFGA Application has been developed by ST and reviewed by the PMOC. <i>An acceptance memo will be issued in early May.</i>	Y	Y	N	R

<u>PR</u>	<u>ITEM NO.</u>	<u>IDENTIFICATION</u>	<u>Category</u>	<u>NATURE OF CONCERN</u>	<u>PMO RECOMMENDATION</u>	<u>D</u>	<u>A</u>	<u>I</u>	<u>STATUS</u>
2	10/07	Maintenance and control of Link Design Criteria	M	Responsibility for maintenance and control of the Link Design Criteria currently rests with the Quality function. Control of the Design Criteria should appropriately reside with the line engineering function as administered through the configuration control system versus a staff oversight function.	The PMOC recommends that Link management consider reassignment of this responsibility. ST reports that this recommendation is under consideration.	N	N	N	R

Legend: Grantee Action: D = Remedial Action Developed; A = Remedial Action Approved; I = Remedial Action Implemented.  
PMO Contractor Status: R = Review Ongoing; C = Completed, No Further Review Required.