



Report of Findings

To

Sound Transit

Performance Audit: Project Controls During Construction

Table of Contents

I. Executive Summary.....2

II. Audit Objectives.....2

III. Methodology.....3

IV. Project Selection Criteria.....5

V. Audit Results.....8

VI. Recommendations.....9

Appendices:

Appendix No. 1.....10

Appendix No. 2.....11

Appendix No. 3.....12

I. Executive Summary

Sound Transit (ST) has retained the services of Talson Solutions, LLC (Talson) to complete a Performance Audit of Design, Engineering, and Construction Management (DECM) Project Controls during the construction phase of capital projects. The primary audit objective is to determine whether project controls are designed well and working effectively to ensure on-time and on-budget construction project delivery.

The audit was a part of ST's performance audit program included in the Sound Transit's System Plan, ST3, an extensive capital program using varying amounts of local, state, and federal funding sources. The capital projects support various modes of transportation including light and heavy rail and bus programs. The approved ST3 will expand transit services in every direction over the next two decades with an overall budget of \$50+ billion. Project controls during construction focuses on those activities as defined in Sound Transit Project Control Policies and Procedures (PCPP) to monitor and assist in the successful completion of capital projects and ensure compliance with federal rules and regulations under Federal Transit Administration (FTA) and agreements with the Washington State Department of Transportation (WSDOT).

The PCPP is comprehensive and extensively used by agency, consultant and contractor personnel to evaluate and manage construction performance and identify risks that may possibly prevent on-time and on-budget project completion. The PCPP is well-organized and addresses industry best practices for budget analysis, change management, document control, schedule analysis and risk management. The PCPP's are regularly updated to address new contract strategies such as design-build.

Talson confirmed that project personnel are required to be familiar with aspects of the PCPP through agency training. Through Talson's extensive review of four capital projects at various construction stages, Talson observed a high-degree of compliance to the PCPP as verified through project personnel interviews and documentation within ST's SharePoint and LiveLink document storage system. Non-critical exceptions were noted within components of the PCPP, but not without the approval, knowledge and support of ST management. These exceptions will be addressed in Section V. Audit Results.

DECM Project Controls is effectively using the PCPP as a comprehensive tool to adequately address ST's robust capital program. However, ST and its contractors will continuously require skilled project control personnel to adequately perform the level of effort to effectively implement the PCPP and address ongoing risks in major capital programs.

II. Audit Objectives

The objectives for the Performance Audit were:

- (1) To determine whether project controls are designed well and working effectively to ensure on-time and on-budget construction project delivery.

- (2) To identify opportunities for continuous improvement with practical recommendations.

Talson evaluated the effectiveness of DECM Project Controls to assess if ST as an agency and the assigned project teams utilize relevant and complete processes, policies and controls in place to oversee and manage capital projects during construction.

III. Methodology

Talson's methodology to meet the audit objectives primarily consisted of the following tasks:

- A. Become familiar with ST through documentation review of PCPP and progress reporting for projects contained in the Link Light Rail Program and Sounder Program
- B. Hold initial meetings with ST personnel to gain a greater understanding of Project Control's Organization, PCPP and current implementation on capital projects
- C. Assess ST's capital project activity for audit sample
- D. Test PCPP through review of available SharePoint, LiveLink and other storage system documentation
- E. Conduct a project site visit and interview Project Control and Project team personnel in Seattle, WA
- F. Become familiar with the PCPP in relation to project and construction management practices promoted by the Project Management Institute, National Transit Institute, and Construction Management Association of America
- G. Perform additional documentation review

Talson selected nine of twenty-two policies contained in the PCPP that are most critical during the construction phase for a more detailed assessment to the audit objectives. The nine policies and procedure were:

- (1) Scheduling
- (2) Configuration Management
- (3) Document Control
- (4) Progress Payments and Invoices
- (5) Change Orders and Change Notices
- (6) Capital Program Control Board
- (7) Contingency Management
- (8) Risk Management
- (9) Earned Value Management System

The following key documents were utilized in determining the criteria for the agreed audit review areas for the sample projects:

- Sound Transit Project Control Policies and Procedures
- Sound Transit Construction Manual, Revision 05, May 23, 2017 (STCM)
- DECM Project Management Plan, Northgate Link Extension, December 2016 (NLE PMP)

- Project Management Plan, Link Operations and Maintenance Facility East, July 2017 (OMF East PMP)
- Project Management Plan, Tacoma Trestle Track & Signal Project, September 2017 (TT PMP)

Talson used the following additional documentation as its primary source for document review, evidence and analysis to determine its findings and conclusions. Described below with each listed document are the primary areas reviewed by Talson. Reference documents were obtained directly from ST's project teams and/or within ST's SharePoint and LiveLink document management and storage platforms.

Sound Transit Project Progress Reports: Prepared by Project Control & Value Engineering. These reports were used to corroborate evidence with respect to risk management, closely monitored issues and cost and schedule performance.

Sound Transit Change Orders, Change Notices and Provisional Sum Authorizations: Talson reviewed four (4) types of changes within each project and verified adherence to PCPP-08 (Change Orders and Change Notices) and STCM-6.4 for procedural evaluation and oversight by the applicable project and agency team personnel.

In addition, due to the potential adverse risks and impacts of change orders during the construction phase, Talson conducted a detailed review of twenty-two approved change orders using the N-180 and OMF East projects to assess Project Control's performance and identify potential risks that may result from delays in the management of change orders and related approvals. Talson's analysis focused on the evaluation / negotiation period from ST's receipt of a change proposal from the contractor to the agreed upon change order value prior to ST management approval. Refer to Appendix No. 1 for the list of change orders reviewed.

Project Risk Assessment Reports and Risk Registers: Talson analyzed the individual project risk assessment reports and risk registers as required by PCPP-13 (Risk Management) and the PMP. Projects are required to have periodic updates at various project milestones. Talson assessed for updating processes for review of Risk Registers and periodic updates and adherence to policy and procedure, PCPP-13.

Capital Program Control Board (CCB) Meeting Minutes: Talson used meeting minutes to obtain evidence to corroborate approvals relating to authority levels for contract change orders and construction change notices as well as changes to baseline contract documents and schedules.

Miscellaneous Project Team Documentation: SharePoint and LiveLink provided routine project information in conformance to the PCPP, STCM and PMP. Relevant documents reviewed included Agreements, multiple meeting minutes and reports, progress payments, and schedules.

In addition to conducting a site walk-through of OMF East, Talson conducted interviews of project team personnel. Listed below are the titles of the key personnel interviewed and respective projects:

N-180: Project Control Manager, Sr. Project Control Specialist, Scheduler and Construction Manager

OMF East: Construction Manager, Resident Engineer, Scheduler, Project Control Specialist, and Project Control Manager

Tacoma Trestle: Construction Manager, Project Control Specialist and Project Director

I-90: Director - Document Control and Configuration

Appendix No. 2 and No. 3 illustrate the audit review areas and the type of key documentation reviewed for each sample project.

The audit was completed during the period, from October 2018 through January 2019. Talson conducted the performance audit in accordance with Generally Accepted Government Auditing Standards and in accordance with the International Standards for the Professional Practice of Internal Auditing issued by the Institute of Internal Auditors. Talson believes that the evidence obtained provides a reasonable basis for the findings and conclusions based on the audit objectives.

IV. Project Selection Criteria

The selection process for the audit sample was a risk based approach that identified projects currently under construction and/or near completion within ST's Link Light Rail Program and Sounder Program. An approximate total of \$501 million in construction contracts were selected that represented 11% and 68% of committed in progress construction cost for the Link Light Rail Program and Sounder Program, respectively. Details of the projects for testing were selected from the July 2018 Link Light Rail Program Progress Report and the June 2018 Sounder Program Progress Report and included the I-90 Stage 3 project for highway / bus related capital improvements. Talson used the following primary considerations for selection of major capital projects for the performance audit:

- Project type, status, contract value, contract change orders
- Contract delivery strategy
- Funding sources and governmental interfaces
- Project complexities / current issues
- Compliance to ST, local and federal requirements

The following four (4) projects were selected for the performance audit:

(1) Contract N180, Northgate Link Extension (N-180)

Contains 4.3 miles of track work from University of Washington Station to Northgate Station. This contract includes the furnishing, installation, and testing of all track work and related elements for two parallel tunnels, an elevated guideway, three stations and pocket track. The contract also includes construction of floating slabs, track slab, components of 26kV power distribution, and other systems necessary to support track. A stair tower at the Maple Leaf Portal is also included. This project is funded by a federal grant and is subject to federal requirements. Potential construction issues include floating slab installation and FRT testing, DF track construction in work areas 1, 3, and 5, and the tracking and scheduling of work to be completed to ensure schedule success.

(2) Contract M200, The Link Operations and Maintenance Facility East (OMF East):

A design-build project located in Bellevue, Washington. The OMF East is required to store, maintain and deploy the expanded light rail vehicle fleet to operate the East link and Lynnwood Link extensions by 2023. This facility will be fully staffed and operational to support the commissioning and pre-revenue service of those extensions during 2022. This site is located along the adopted East Link alignment and is approximately 28 acres. Current construction issues include differing site conditions on soil infiltration rates and Beaver dams in the West Tributary.

(3) Tacoma Trestle Track & Signal Project (TT):

The replacement of an existing wood trestle with a double track concrete structure for the Sounder Commuter Rail in the Tacoma to Lakewood corridor. This contract includes the construction of a new bridge to accommodate double tracks, passenger platform, wetland mitigation, landscaping, deconstruction and demolition. The bridge work includes piles and pile caps, bridge columns, precast concrete and steel girders, retaining walls, track construction, railroad signals, roadway improvements, relocations sanitary sewers, and lighting. Coordination with the WSDOT contractor constructing the Sounder platform improvements are required. This project is funded by a federal grant and is subject to federal requirements.

(4) I-90 Two-Way Transit & HOV Operations, Stage 3 (I-90):

The I-90 Two-Way Transit and HOV Operations (Stage 3) project provides approximately four miles of HOV lanes in each direction. The Contract is partially funded by Federal Transit Administration and American Recovery and Reinvestment dollars provided by the Federal Railroad Administration. Current construction issues include delays with final commissioning of the Fire/Life/Safety Systems, causing delays in the substantial completion date. This project is part of the Sounder Program.

Table No. 1 below highlights the four projects selected and provides comparison data for the selection criteria.

Table No. 1 – Project Audit Sample

Criteria/ Project	N180 Trackwork	M200 OMF East	Tacoma Trestle Track & Signal	I90 Two Way Transit & HOV Operations
Data Date	July 2018	July 2018	June 2018	July 2018
Division/Agency	Link Light Rail	Link Light Rail	Sounder Commuter Rail/WSDOT	Transit and HOV Operations/WSDOT/City of Mercer Island
Contract Delivery Strategy	Design/Bid /Build	Design Build	General Contractor / Construction Manager	General Contractor / Construction Manager
Construction Contractor	Stacy and Witbeck	Hensel Phelps	Flatiron West	IMCO
Initial Contract Value	\$71.4M	\$218.9M	\$57.5M	\$122.0M
C/O Value	\$2.7M	\$2.9M	\$27.4M	(\$2.1M)
Cumulative	\$74.1M	\$221.8M	\$84.9M	\$120.1M
% C/O	3.8%	1.3%	48%	(1.0%)
Financial % Complete	56%	19%	98%	>95%
Contingency				
-Original	\$10.7M	\$21.9M	\$9.9M	\$35.7M
-Drawdown/Addtl	(\$2.7M)	(\$1.7M)	\$14.0M	(\$24.2M)
-Remaining	\$8.0M	\$20.2M	\$23.9M	\$11.5M
Schedule	On Time	Delayed	Complete	Near Completion
Completion Date	October 2019	December 2020	July 2018	Q4/2018

V. Audit Results

Conclusion - Findings

Talson has concluded that there are no findings resulting from the performance audit that require immediate attention to the PCPP or addressing by the agency, consultants and contractors performing project control activities on the capital projects reviewed. DECM Project Controls is performing effectively to ensure successful project delivery and identify risks during the construction phase. Talson was able to verify in ST's SharePoint document storage system, 100% of the sample documentation in each review area for the N-180 and OMF East projects.

Talson reviewed twenty-two change orders for the N-180 and OMF East projects and did not notice a material difference in the average duration for negotiations from ST's receipt of contractor proposal to an agreement with ST. For the N-180 project the average negotiation period was 44 days and the OMF East average negotiation period was 36 days. While some negotiation durations were longer than others, the durations appeared to be reasonable given the extent of review, analysis and revisions to the details and components of the change order (i.e. scope, estimates, proposals). Additionally, the project control teams did not express any adverse issues impacting construction activities resulting from the noted negotiation durations. Refer to Appendix No. 1 for the change orders reviewed and the actual duration for negotiation between the contractors and ST.

ST and the assigned project teams were compliant and effective with the DECM Project Controls Policies and Procedures. The project teams have a clear understanding of the policies and procedures and are performing within industry standards.

Observations (Non-Critical)

Tacoma Trestle Project

After the initial construction contract award, the project received additional American Recovery and Reinvestment Act (ARRA) funding for new work scopes that resulted in a \$20.7 million changer order or 36% of the initial contract award value. Due to Federal Railroad Administration and ST's requirement to work under the ARRA's program constraints (i.e., full billing including close-out prior to June 30, 2017). ST along with WSDOT developed a streamlined or expedited invoicing process that was outside or non-compliant with the PCPP. The following observations were noted during the review:

- Contrary to the PCPP, the Contractor provided monthly schedule updates and earned value reports separately from the progress payments from January 2017 through project completion. The ARRA funding and required timelines necessitated this change and was agreed by the ST Project team. The majority of the schedule updates were not approved with ST comments provided to the Contractor.

- There was no evidence of any approved monthly CPM schedule updates by the Contractor, only the CPM baseline was approved. Upon Sound Transit review, there was no contractor resubmittal.
- Although DCC transmitted contract Issue for Construction documents to the Contractor through the controlled distribution process, there is no evidence that changes in contract drawings and specifications were distributed through the same process or contained .transmittal cover sheets.

The above items occurred with knowledge by DECM Project Controls and ST management. It was understood at the time of change order award, completion of the work under the ARRA constraints would be challenging for the Contractor.

VI. Recommendations

As ST's capital program continues to grow, the increased usage of agency, consultant and contractor project controls personnel will be challenged to continually comply with the PCPP and ensure the effective evaluation of project performance during construction. Although not fully reviewed under the scope of the audit, ST should ensure the following is in place to maintain effective DECM Project Controls:

- (1) Monitor assigned level of skilled project controls personnel to contract scope and level of effort to the support projects
- (2) Maintain required training of all DECM Project Control personnel
- (3) Planned periodic reviews of PCPP to address "lesson learned" as construction progresses, new contract strategies and industry developments including new project controls software
- (4) Monitor the available level of skilled agency, consultant and contractor personnel for assignment to future capital projects.

Appendix No. 1 - Change Orders Reviewed

CO No.	CO Value	Contractor Proposal Submittal Date	ST & Contractor Negotiations Agreement Date	Days of Negotiations	ST CO Date	CCB Approval Required
OMF East - M200						
002	\$335,365	8/24/2017	8/31/2017	7	9/21/2017	Yes
003	(\$136,690)	8/24/2017	9/11/2017	18	9/21/2017	No
007	\$42,735	8/24/2017	10/2/2017	39	11/2/2017	No
010	\$766,139	10/22/2017	11/9/2017	18	12/18/2017	Yes
013	\$1,148,436	11/18/2017	1/22/2018	65	3/8/2018	Yes
014	\$45,318	2/1/2018	3/29/2018	56	4/19/2018	No
015	\$62,950	3/1/2018	4/16/2018	46	6/1/2018	No
016	\$141,937	4/4/2018	6/7/2018	64	7/6/2018	No
018	(\$50,104)	7/17/2018	9/4/2018	49	11/2/2018	No
019	\$8,480	6/26/2018	6/27/2018	1	11/2/2018	No
Average Negotiation Duration 36 Days						
Northgate - N180						
001	\$0	2/15/2017	2/16/2018	1	3/24/2017	No
003R	\$1,159,502	3/6/2017	3/16/2017	10	4/3/2017	Yes
004	\$32,658	5/11/2017	6/6/2017	26	6/6/2017	No
007	\$210,754	7/28/2017	8/11/2017	14	8/21/2017	No
009	\$23,283	9/19/2017	10/4/2017	25	10/18/2017	No
011	\$380,222	8/18/2017	10/31/2017	100	12/1/2017	Yes
012R	\$382,520	10/6/2017	12/1/2017	60	12/20/2017	Yes
017	\$20,900	8/18/2017	10/31/2017	74	1/30/2017	No
022	\$87,052	4/20/2018	5/25/2018	35	6/5/2018	No
025	\$0	3/8/2018	4/3/2018	25	4/13/2018	No
036	\$29,131	6/13/2018	9/19/2018	98	9/28/2018	No
042	\$76,786	9/4/2018	11/7/2018	63	11/26/2018	No
Average Negotiation Duration 44 Days						

Appendix No. 2 – Audit Results¹: N180 and M200-OMF East Projects

Review Area	Documentation Reviewed	N-180	OMF East
PCPP 03: Scheduling	Baseline Approval	SP - V	SP - V
	Monthly Updates, 3 Week Look Ahead,	SP - V	SP - V
	DECM Oversight	SP - V	SP - V
PCPP 04: Configuration Management	Baseline Document Organization	SP - V	SP - V
	CCB Role in Baseline Changes	SP - V	SP - V
	Retainage of Configuration Information	SP - V	SP - V
PCPP 05: Document Control	DECM and Contractor Document Control Training	SP - V	SP - V
	Document Control Audits & Follow-up	SP - V	SP - V
	Contract Document Content and Transmittal	SP - V	SP - V
PCPP 07: Progress Payments and Invoices	Approval	SP - V	SP - V
	Support Documentation	SP - V	SP - V
	DECM Policy Compliance	SP - V	SP - V
PCPP 08: Change Orders and Change Notices	Status Review and Monitoring	SP - V	SP - V
	Timely Review by ST	SP - V	SP - V
	Verification of Change Details	SP - V	SP - V
PCPP 09: Capital Program Control Board (CCB)	Approval within Authority Levels	SP - V	SP - V
	Implemented Change Request Workflow	SP - V	SP - V
	Appropriate Frequency of Meetings	SP - V	SP - V
PCPP 12: Contingency Management	Contingency Usage Approval	SP - V	SP - V
	Contingency Evaluation and Monitoring	SP - V	SP - V
	Contingency Forecasting and Reporting	SP - V	SP - V
PCPP 13: Risk Management	Risk Assessment Reports	SP - V	SP - V
	Risk Register Update	SP - V	SP - V
	DECM Oversight	SP - V	SP - V
PCPP 20: Earned Value Management System	Baseline Acceptance, Cost & Schedule Performance Indices (CPI & SPI)	SP - V	SP - V
	Contractor Submittals	SP - V	SP - V
	DECM Review and Reporting	SP - V	SP - V
Interviewees ²		PCM, PCL, S, CM	CM, RE, S, PCS, PCM

¹ Source: SP: SharePoint; Result: V: Verified, NV: Not Verified

² PD: Project Director, DCM: Document Control Manager, PCM: Project Control Manager, PCL: Project Control Lead, PCS: Project Control Specialist, S: Scheduler, CM: Construction Manager, RE: Resident Engineer

Appendix No. 3 – Audit Results³: Tacoma Trestle and I-90 Stage 3 Projects

Review Area	Documentation Reviewed	Tacoma Trestle	I-90
PCPP 03: Scheduling	Baseline Approval	SP - V	LL - V
	Monthly Updates, 3 Week Look Ahead	<i>SP - NV</i>	LL - V
	DECM Oversight	SP - V	LL - V
PCPP 04: Configuration Management	Baseline Document Organization	SP - V	LL - V
	CCB Role in Baseline Changes	SP - V	LL - V
	Retainage of Configuration Information	SP - V	LL - V
PCPP 05: Document Control	DECM and Contractor Document Control Training	SP - V	LL - V
	Document Control Audits & Follow-up	SP - V	LL - V
	Contract Document Content and Transmittal	SP - V	LL - V
PCPP 07: Progress Payments and Invoices	Approval	SP - V	LL - V
	Support Documentation	SP - V	LL - V
	DECM Policy Compliance	SP - V	LL - V
PCPP 08: Change Orders and Change Notices	Status Review and Monitoring	<i>SP - NV</i>	LL - V
	Timely Review by ST	SP - V	LL - V
	Verification of Change Details	SP - V	LL - V
PCPP 09: Capital Program Control Board (CCB)	Approval within Authority Levels	SP - V	LL - V
	Implemented Change Request Workflow	SP - V	LL - V
	Appropriate Frequency of Meetings	SP - V	LL - V
PCPP 12: Contingency Management	Contingency Usage Approval	SP - V	LL - V
	Contingency Evaluation and Monitoring	SP - V	LL - V
	Contingency Forecasting and Reporting	SP - V	LL - V
PCPP 13: Risk Management	Risk Assessment Reports	SP - V	LL - V
	Risk Register Update	SP - V	LL - V
	DECM Oversight	SP - V	LL - V
PCPP 20: Earned Value Management System	Baseline Acceptance, Schedule Performance Index (SPI)	<i>SP - NV</i>	LL - V
	Contractor Submittals	SP - V	LL - V
	DECM Review and Reporting	SP - V	LL - V
Interviewees ⁴		CM, PCS, PD	DCM

³ Source: SP: SharePoint; LL: LiveLink Result: V: Verified, NV: Not Verified

⁴ PD: Project Director, DCM: Document Control Manager, PCM: Project Control Manager, PCL: Project Control Lead, PCS: Project Control Specialist, S: Scheduler, CM: Construction Manager, RE: Resident Engineer