SOUNDTRANSIT

Internal Audit Report

Safety Assurance Audit

Report Number: 2020 - 02 | Report Date: May 7, 2020

Executive Summary

Audit Report No.: 2020 - 02 **May 7, 2020**

WE AUDITED the current Safety Assurance processes at Sound Transit and procedures for Internal Safety Audits conducted by Safety Assurance Division staff, which cover Rail Operations (Link Light Rail, Sounder, and Tacoma Link Light Rail) at Sound Transit.

AUDIT OBJECTIVE was to determine whether the agency has effective controls in place to ensure:

- Safety risks to passengers are identified, communicated and effectively mitigated.
- The Internal Safety Audit Program provides thorough assessment and complies with federal, state and agency guidance. Monitoring and follow-up of issues and recommendations are addressed timely.

The audit examined processes in place from January 1, 2017 to December 31, 2019.

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WHAT DID WE FIND?

In alignment with Board Resolution R2017-13 and Sound Transit (ST or agency) Strategic Plan, the agency is committed to building a transit system that ensures the safety of all its passengers and the public. Pursuant to applicable policies and regulations (i.e., FTA rule 49 CFR 673), the agency has adopted a “comprehensive” Safety Management System (SMS) framework (i.e., formal, top-down, organization-wide, data-driven) for management and mitigation of safety risks.

The ST Safety & Quality Management (SQM) Department is comprised of four divisions: (1) Construction & System Safety, (2) Transit Safety Systems, (3) Quality, and (4) Safety Assurance. Hazardous conditions and their potential risk impacts are identified at all project phases and continuously throughout the project lifecycle (i.e., preliminary engineering, design, construction, testing, start-up, initiation of operations, operations, etc.). Construction & System Safety and Transit Safety System Divisions primarily administer and facilitate the Hazard and Risk Management process across the agency and partner with other departments (i.e., ST Operations) to ensure hazards have been lowered to an acceptable level.

Transit Safety Systems captures and analyzes operational safety data in Quickbase. Quickbase is comprised of several modules that track safety data such as “events” (i.e. accidents, incidents, etc.), audit findings, Corrective Action Plans (CAPs), hazards, etc.

The Safety Assurance Division periodically conducts internal safety audits of the agency to ensure safety plans are being effectively implemented per federal and WSDOT requirements. These internal safety audits note any findings of non-compliance within safety plans and recommend areas for continuous improvement.

Our audit concluded that Safety Assurance’s Internal Safety Audit Program provides reasonable assessment and complies with federal, state, and agency guidance. Issues and recommendations are monitored and addressed within a reasonable period of time. However, SQM’s current ‘hazard identification/risk management process’ is not effective to ensure safety risks to passengers are proactively identified, communicated, and effectively mitigated.

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Background

In alignment with Board Resolution R2017-13[1] and Sound Transit (ST or agency) Strategic Plan, the agency is committed to building a transit system that ensures the safety of all its passengers and the public. Pursuant to applicable policies and regulations (i.e., rule 49 CFR 673[2]), the agency has adopted a "comprehensive" Safety Management System (SMS) framework (i.e., formal, top-down, organization-wide, data-driven) for management and mitigation of safety risks.

The ST Safety & Quality Management (SQM) Department is comprised of four divisions: (1) Construction & System Safety, (2) Transit Safety Systems, (3) Quality[3], and (4) Safety Assurance[4]. Hazardous conditions and their potential risk impacts are identified at all project phases and continuously throughout the project lifecycle (i.e., preliminary engineering, design, construction, testing, start-up, initiation of operations, operations, etc.). Construction & System Safety and Transit Safety Systems divisions primarily administer and facilitate the Hazard and Risk Management process (below) across the agency and partner with other departments (i.e., ST Operations) to ensure hazards have been lowered to an acceptable level.

Sound Transit Hazard and Risk Management Process

Safety programs and processes are guided by several regulatory agencies (i.e., FTA, WSDOT) and program standards as well as internal policies and procedures (i.e., Agency Safety and Security Management Plan (SSMP), Safety and Security Certification Plan (SSCP), and modal specific System Safety Program Plans (SSPPs)). Although safety actions are spread across groups, functions and regulations, Sound Transit emphasizes that it is foremost "committed to the safety of passengers, employees, contractors, emergency responders and the public".

Transit Safety Systems captures and analyzes operational safety data in the Quickbase system. Quickbase is comprised of several modules that track safety data such as "events" (i.e. accidents, incidents), audit findings, Corrective Action Plans (CAPs), hazards, etc.

The Safety Assurance Division periodically conducts internal safety audits of the agency to ensure safety plans are being effectively implemented per federal and WSDOT

[1] R2017-13 Adopting a Safety Policy mandates the adoption of a SMS and Safety Policy, in alignment with National Public Transportation Safety Plan.
[2] The final rule for 49 Code of Federal Regulations (CFR) 673 (effective 07/19/19), establishes the FTA requirement that public transit operators adopt an SMS including an Agency Safety Plan (ASP). On July 2020, the FTA will require all transit agencies to adopt and implement an SMS.
[3] Quality Assurance provides oversight of design and construction per FTA Quality Management System (QMS) guidelines
[4] Per Agency Organizational Chart, effective July 1, 2019

requirements[5]. These internal safety audits note any findings of non-compliance within safety plans and recommend areas for continuous improvement.

Audit Objectives

To determine whether the agency has effective controls to ensure:

- Safety risks to passengers are identified, communicated, and effectively mitigated.
- The Safety Assurance internal safety audit program provides thorough assessment and complies with federal, state and agency guidance. Issues and recommendations are monitored and addressed timely.

Scope and Methodology

We conducted this performance audit in accordance with Generally Accepted Government Auditing Standards and the International Standards for the Professional Practice of Internal Auditing. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusion based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusion based on our audit objectives.

We gained an understanding of current safety assurance[6] processes at Sound Transit and Safety Assurance division's internal safety auditing practices and related programs through document review, data analysis, and personnel interviews. We identified risks in the processes and assessed management controls in place to mitigate those risks. Based on the assessment, we determined to focus on management practices related to the safety of passengers across rail operations which includes Link Light Rail, Sounder and Tacoma Link Light Rail. Functions of the Construction and System Safety and Quality Divisions were out of scope.

We examined regulatory requirements, agreements, policies, procedures, safety data and assurance work from January 1, 2017 to December 31, 2019 as well as current management controls in place.

1. To determine whether the agency has the effective controls in place to ensure ST safety risks to passengers are identified, communicated and effectively mitigated we performed the following procedures:

    a. Compared agency's safety related documents (i.e., Safety Policy, SSPPs, etc.) to FTA recommended practices for Safety Management Systems going into effect July 20, 2020 in the areas of risk identification, mitigation and communication to gauge agency SMS maturity.
    b. Reviewed Agreements, Memorandums of Understanding (MOUs) and internal

[5] Washington State Rail Safety Oversight Program Standard, 2018 3rd Edition. Effective November 30, 2018.

[6] Per 49CFR, Para. 673.5 Definitions: Safety Assurance means processes within a transit agency's Safety Management System that function to ensure the implementation and effectiveness of safety risk mitigation, and to ensure that the transit agency meets or exceeds its safety objectives through the collection, analysis, and assessment of information.

and partner operating procedures (e.g., King County Metro Standard Operating Procedure (SOP) 6.1) to establish the criteria for identifying, reporting and resolving hazards during operations.

c. Compared 551 hazards/risks identified in pre-operations to those monitored during operations to determine whether risks are effectively transitioned between project phases.
d. Analyzed a sample of 14 risks rated at "unacceptable" levels for effective mitigation. This included 4 primary risks with 3 or 4 potential causes each.
e. Evaluated 33 safety action items for resolution in a timely manner.

2. To determine whether the agency has the effective controls to ensure that the Safety Assurance internal safety audit program provides thorough assessment and complies with federal, state and agency guidance, we performed the following procedures:

    a. Reviewed audit reports and planning work from the Internal Safety Audit Program for evidence of thorough procedures that identify areas of non-compliance, risk reduction and provide actionable recommendations based on observations.
    b. Compared current SSPPs for Link and Tacoma Link to the WSDOT Program Standard for fulfillment of required elements (21).
    c. Assessed whether SSPPs have been regularly updated/reviewed at least annually, per WSDOT Program Standard requirements.
    d. Examined audit communication between Sound Transit and WSDOT to determine whether Internal Safety Audits were conducted in accordance with the WSDOT Program Standard.
    e. Evaluated Corrective Action Plans (CAPs) and Internal Safety Audit Findings to determine whether items have been consistently tracked and resolved in a timely manner.

Auditor Independence

From 2017 to 2020, Patrick Johnson served as the Director, Safety Assurance Division, which is a part of the Safety Department.

As part of Sound Transit's Design-for-Growth efforts, the Safety & Quality Management Department was restructured and Patrick accepted the position of Director of Internal Audit Division, which conducted this audit on the Safety Assurance Division, and the Safety Department of Sound Transit.

Once this decision was made, he recused himself from all meetings, discussions, and his signature does not appear on the report of this audit. While he will be required to report upon any findings & recommendations of this audit, any corrective action responses which could be assigned to the Safety Department will not be reviewed, nor verified by him.

Therefore, the Audit team assigned to complete this audit remains as an independent review to the subject matter of this specific audit.

Conclusion

The audit concluded that Safety Assurance Division's Internal Safety Audit Program provides reasonable assessments and complies with federal, state, and agency guidance. Issues and recommendations are monitored and addressed within a reasonable period of time. However, SQM current 'hazard identification/risk management process' is not effective to ensure safety risks to passengers are proactively identified, communicated, and effectively mitigated.

See Finding #1

Findings and Recommendations

1. Sound Transit's Hazard/Risk Management Process needs improvement

A well-designed systematic and structured hazard management process is essential in ensuring hazards are identified early on as well as throughout the project lifecycle to ensure proactive measures are taken so that hazards are lowered to an acceptable level before there are potential impacts to passengers. Accordingly, Agency plans (i.e., SSPP, SSMP, and SSCP) as well as other internal policies and procedures set hazard management process expectations to include hazard identification, analysis, investigation, elimination, tracking, and monitoring. Proactive approach to safety risk management focuses on use of data to anticipate future risks and detect problems before safety incidents occur.

Based on our review and audit procedures applied, we found a deficiency in the current hazard management processes related to:

(1) Incomplete/ineffective transition of identified operational hazards.

The condition above can be attributable to the agency's decentralized and reactive approach to the management of safety hazards and risks coupled with unclear roles & responsibilities. A decentralized risk approach may be appropriate as hazards/risks can be identified throughout project phases, however, in the current state without proper controls in place, information may not be appropriately disseminated and/or timely received by appropriate 'risk owners' further impeding the agency's readiness to effectively mitigate hazards before they escalate into accidents or incidents.

Incomplete/ineffective transition of identified operational hazards

Hazard Management at ST is complex, multi-disciplinary and in general is conducted in two-phases (1) during pre-revenue by Construction Safety and System Safety and (2) during revenue service by Transit Safety Systems.

Current controls during pre-operations include Preliminary Hazard Analysis (PHA) and Operational Hazard Analysis (OHA) to identify all reasonably foreseeable hazards which are then analyzed further using hazard analysis techniques. The development of safety hazard analyses is coordinated with the appropriate design, engineering and operations disciplines, as needed, for the identification of appropriate control measures.

PHA is an analysis performed to obtain an initial risk assessment of a concept or a system whereas OHA is an analysis performed of the proposed operation of said system to identify operation mitigations that will lower the risk to the lowest practical level[7]. PHA transitions into OHA as project nears completion and is updated throughout the design and construction of the project.

[7] Agency SSCP, Revision 3.0, August 2018, List of Definitions

Per the SSMP, hazards classified as "unacceptable" are not permissible at any point of operations[8]. If an unacceptable hazard is identified during operations, service must cease until the hazard has been addressed. Per SSCP, any operations-related hazards identified prior to entering revenue service is transitioned to the Transit Safety Systems[9] group for further refinement and tracking.

In administering and tracking hazards at ST, the following systems are utilized:

	Pre-Revenue System of Use		Revenue System of Use	
	2009-2016[10]	2016-present	2009-2019	2019-present
All Modes	Safety Link[11]	SSIMS[12]	SharePoint/MS Excel	Quickbase[13]

For purposes of our audit, we compared operational-related hazard data in Safety Link and Quickbase for completeness and accuracy.

(1) Pre-revenue

We identified 551 operational related hazards (i.e., "personnel injuries", "patron injuries", "fire, explosion or release of toxic materials", etc.) from SafetyLink as depicted below:

Pre-revenue Hazards identified					
Ranking	Unacceptable	Undesirable	Acceptable w/ review	Acceptable	Total
Initial Ranking	292	253	6	0	551
Residual Ranking	3[14]	274	273	1	551

Source: Safety Link

(2) Revenue

Hazardous conditions recognized during revenue service are recorded in the Quickbase "Conditions" Log, which tracks conditions independently from events (recorded in the "Event Log"). The Conditions Log contained 75 conditions in total (2012-2020).

Internal Audit compared the listing of hazards identified during pre-revenue (551) to those tracked during revenue service (75) and found:

1. Pre-revenue hazards are not transferred over to ST Operations Division, operational listing (Quickbase) does not contain hazard identified in pre-revenue.
2. Agency relies more on lagging indications such as incidents and events. Listing of conditions in Quickbase are primarily reflective of incidents/events exceeding frequency of acceptable risk thresholds rather than conditions identified prior to incidents/events.

[8] Agency SSMP, Revision 7, August 2018, 4.3.2, Hazard Risk Assessment Methodology

[9] Agency SSCP, Revision 3, August 2018, Section 4.3 names "Operations Safety Division". The division name has changed to "Transit Safety Systems" since then.

[10] 2009-2016 years are out of scope. However, hazard tracking is still relevant throughout lifecycle of the project.

[11] Based on management response, hazards identified and tracked in Safety Link were not migrated to SSIMS since they were related to mostly completed projects.

[12] Pre-revenue project documentation is assembled and maintained in SSIMS per SSCP, Section 5.0, Revision 3, August 2018. Completed projects in SSIMS were limited due to implementation of the system in 2016.

[13] ST started utilizing Quickbase early 2019 and SharePoint prior to 2019. All data from SharePoint has been consolidated into Quickbase around May 2019.

[14] Rating of 1C may not have been considered 'unacceptable' prior to 2016 per management explanation on 3/4/2020.

Additionally, 51 of 75 hazardous conditions (or 68%) recorded in the "Conditions Log" did not have 'risk ratings' (initial or residual), indicative of incomplete performance of the hazard assessment process. Per management, conditions in the "Conditions Log" should receive hazard ratings.

The conditions above may be attributable to an overall 'siloed' process for 'operational' hazard analysis coupled with different systems utilized for various modes. Quickbase system has been implemented starting Q2 2019 and SQM team is developing processes to capture total 'universe' of operational related hazards. However, roles & responsibilities are unclear as to the 'handover' of operational hazards identified prior to revenue service.

As Agency policy mandates a 'proactive' approach to SMS ineffective transition of current operational hazards may impose risks in the future. "Siloed" processes can lead to possible safety hazards to passengers if not identified and mitigated timely. The purpose of hazard identification is to reasonably identify foreseeable hazards and analyze by the Agency to take preventative/proactive measures to ensure the hazards are effectively mitigated.

Recommendations:

We recommend management:

1. Improve Agency Hazard/Risk Management Process

The following actions are suggested for management consideration:

- Define processes for ensuring relevant hazard information is captured, maintained, and communicated throughout the project lifecycle
- Define roles and responsibilities of hazard management process including handover between pre-revenue to revenue services
- Define how hazards are identified proactively
- Determine appropriate mechanism for ensuring hazard information is stored
- Define processes for effective mitigation of hazards identified prior to revenue service.

Management Response:

Official Response to the Safety Assurance Audit performed by ST's Internal Audit Division

5/7/2020

The Safety Department concurs with the finding and other recommendations as noted in the recently completed Safety Assurance Audit conducted by the Internal Audit Division. Furthermore, in close partnership with the Operations Department and other key agency stakeholders, Safety is developing a work plan to review existing processes, identify gaps, and develop new procedures to improve the hazard management process in a consolidated Hazard Management Manual. This will include the identification of clear handover points – and related processes – internal to the Safety Department.

Finding/Issue 1: Sound Transit's Hazard/Risk Management Process needs improvement

AGENCY RESPONSE: The Safety Department concurs with the finding. We are developing a collaborative work plan to review existing processes, identify gaps, and develop new procedures to improve the hazard management process in a consolidated Hazard Management Manual, as described in the Safety Assurance Audit Management Letter in response to the finding and subsequent recommendations.

As detailed in the Safety Assurance Audit Management Letter, the Transit Safety group in the Safety Department has held preliminary internal meetings to establish a draft work plan for the Hazard Management Manual. We have also assigned responsibilities and timelines for the completion of this document. The initial draft will include:

- Safety Risk Identification (including event/condition review schedules and criteria that would trigger hazard reviews for safety trends)
- Safety Risk Analysis (including the rating standards for frequency and severity of hazards)
- Safety Risk Management (including the hazard closure criteria and committee elevation criteria of Hazards/CAPs/SAIRs, and the transfer of hazards management responsibilities between specific functions within the Safety Department, prior to revenue service)
- Safety Database data entry/retention guide and requirements
- Other Hazard Management activities as defined by Transit Safety System Specialists and relevant stakeholders

As Safety prepares this work plan, we intend to partner with Operations, Design Engineering and Construction Management (DECM), and other key agency stakeholders, as appropriate, to ensure alignment as the final draft is finalized and the actions are implemented.

Action Steps and Timeframe: The Safety Department is committed to the development and implementation of a Transit Safety Hazard Management Manual by **1st Quarter 2021 (specific date to be confirmed).** As part of the manual, we will:

- Clarify roles and responsibilities within and outside of the Safety Department;
- Clearly define critical (internal to Safety) handover points for Hazard Management products;
- Hold coordination meetings (workshops) within and outside of Safety to achieve an overall framework for process improvement opportunities, inclusive of the identification of critical handover points, by **2nd Quarter 2020.** As that occurs, Safety will develop draft processes to test/pilot implementation activities for the next PHA/OHA handoff opportunity (TBD upon completion of Safety Certification activities on current/upcoming projects);
- Enter known Hazardous Conditions within the current Safety Metrics Application (Quick Base) and rate all entered Conditions by **3rd Quarter 2020.**

The Safety Department will keep Internal Audit and other relevant parties informed through the implementation of this work plan. We will be happy to provide access to additional information, as required.

We thank the Internal Audit Division for its work, insight, and support through the completion of this audit.