

CRC SAFETY AND SECURITY MANAGEMENT PLAN

Light Rail Transit Project

Final Design Initial Issue

September 2011

DOCUMENT REVISION RECORD

CRC Safety and Security Management Plan Light Rail Transit Alignment

| Revision Number | Date Issued | Approval | Comments |
|-----------------|---------------------------------------|----------|----------|
| Rev. 00 | July 2008 – Initial Draft Issue | | |
| Rev. 01 | March 2010 – Second Draft Issue | | |
| Rev. 03 | September 2011 – Initial Issue for FD | | |

CRC Safety and Security Management Plan i

Draft Report Revision 03, September 2011

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APPROVAL PAGE

Columbia River Crossing Project: Light Rail Alignment CRC Safety and Security Management Plan

CRC Administrator Date

TriMet Executive Director Capital Projects Date

C-TRAN Executive Director/CEO Date

TriMet General Manager Date

CRC Safety and Security Management Plan i

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ACRONYMS

| | |
|------------|--|
| ADA | Americans with Disabilities Act |
| ANSI | American National Standards Institute |
| APTA | American Public Transportation Association |
| AREMA | American Railway Engineering and Maintenance-of-Way Association |
| CCTV | Closed-Circuit Television |
| CEO | Chief Executive Officer |
| CFR | Code of Federal Regulation |
| CIL | Certifiable Items List |
| Contractor | Contractor of any tier |
| CPTED | Crime Prevention Through Environmental Design |
| CRC | Columbia River Crossing Project |
| CRC SSC | Light Rail Transit Safety and Security Committee for the Project |
| CSSM | Construction Safety and Security Manual |
| CSSP | Construction (or Contractor's) Safety and Security Plan |
| C-TRAN | Clark County Public Transportation Benefit Area |
| DHS | Department of Homeland Security |
| DSS | Director of Safety and Security |
| DSSE | Deputy Safety and Security Executive |
| ED/CEO | Executive Director/CEO |
| CRC ESSC | Columbia River Crossing Executive Safety and Security Committee |
| FD | Final Design |
| FEIS | Final Environmental Impact Statement |
| FFGA | Full Funding Grant Agreement |
| FHWA | Federal Highway Administration |
| FLS(S)C | Fire/Life Safety (and Security) Committee |
| FRA | Federal Railroad Administration |

| | |
|---------|--|
| FTA | Federal Transit Administration |
| GM | General Manager |
| HA | Hazard Analysis |
| JHA | Job Hazard Analysis |
| LRT | Light Rail Transit |
| LRV | Light Rail Vehicle |
| LRVM | LRV Contract Manager |
| MOW | Maintenance of Way |
| NFPA | National Fire Protection Association |
| ODOT | Oregon Department of Transportation |
| OR-OSHA | Oregon Occupational Safety and Health Administration |
| PE | Preliminary Engineering |
| PHA | Preliminary Hazard Analysis |
| PMOC | Project Management Oversight Consultant |
| PMP | Project Management Plan |
| PROP | Pre-Revenue Operations and Start-up Plan |
| QA | Quality Assurance |
| QC | Quality Control |
| OCS | Overhead Catenary System |
| RAC | Rail Activation Committee |
| RAP | Rail Activation Plan |
| RE | Resident Engineer |
| (S)SEPP | (System) Security and Emergency Preparedness Plan |
| SIT | System Integration Testing |
| SITP | System Integration Testing Plan |
| SOA | State Oversight Agency |
| SOP | Standard Operating Procedure |

| | |
|--------|---|
| SSC | Safety and Security Committee |
| SSE | Safety and Security Executive |
| SSCP | Safety and Security Certification Program |
| SSCVR | Safety and Security Certification Verification Report |
| SSMP | Safety and Security Management Plan |
| SSPP | System Safety Program Plan |
| SUP | Start Up Plan |
| TAC | Technical Advisory Committee |
| TCRC | Transportation Change Review Committee |
| TDM | Transit Design Manager |
| TP | Traction Power |
| TPSS | Traction Power Substation |
| TRE | Transit Resident Engineer |
| TriMet | Tri-County Metropolitan Transportation District |
| TSA | Transportation Safety Administration |
| TVA | Threat and Vulnerability Analysis |
| WISHA | Washington Industrial Safety and Health Act |
| WSDOT | Washington State Department of Transportation |

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1. Management Commitment and Philosophy

1.1 Safety and Security Policy Statement

The Columbia River Crossing (CRC) Safety and Security Committee (CRC SSC) is made up of partner staff including representatives from Washington State Department of Transportation (WSDOT), Oregon Department of Transportation (ODOT), Clark County Public Transportation Benefit Area (C-TRAN), and Tri-County Metropolitan Transportation District (TriMet), as well as local law enforcement in both Portland, Oregon and Vancouver, Washington. The Columbia River Crossing Light Rail Transit (LRT) project is of paramount importance to both transit agencies that serve the region. Together, the project team will strive to build a safe, secure, comfortable, reliable, and innovative project that will deliver transportation options to our growing region. Safety and security are values that affect all levels of the LRT activities, including planning, design, construction, testing, and operations. All LRT Project personnel and contractors are charged with the responsibility of ensuring the safety and security of all C-TRAN and TriMet customers, employees, contractors, the public, and property.

The CRC SSC is empowered and authorized to develop, implement, and administer a comprehensive, integrated, and coordinated System Safety and Security Program that identifies, prevents, and controls hazardous conditions affecting LRT resources and customers. This commitment to safety and security begins at the planning, design, construction, testing, and start-up phases of the LRT project. All LRT engineering, operations, security and safety staff, project consultants, and construction firms are charged with the responsibility of ensuring the safety and security of customers, LRT Project Team employees, and the general public who come in contact with the LRT.

The LRT Transit Manager is delegated the authority to implement the Safety and Security Management Plan (SSMP), a component of the LRT Project Management Plan (PMP), in collaboration with the TriMet's Safety and Security Executive and C-TRAN's Director of Operations. Furthermore, all LRT staff, including consultants and construction personnel, are directed to comply with the provisions of the SSMP and to fully cooperate in achieving both C-TRAN and TriMet's goal for safe and secure transit.

The SSMP lays out the strategies and describes the integration of safety and security activities for an effective safety and security plan designed to reduce the potential for accidents/incidents and increase the efficiency of operations. The SSMP describes the activities, methods for assuring their performance, and identifies the responsible person or entity for each.

Nancy Boyd
CRC Administrator
Washington State Department of Transportation

Date

1.2 Purpose of the Safety and Security Management Plan

The purpose of the SSMP is to provide a blueprint for managing safety and security throughout all phases of the LRT project. It defines the activities and methods for designing and constructing the highest practical levels of safety and security into the project, identifying, evaluating, and resolving potential safety hazards and security vulnerabilities of the LRT system, testing to assure the system operates safely and securely as designed, start-up activities to assure operational safety and security, and establishes responsibility and accountability for safety and security during each phase – preliminary engineering through start-up – of the LRT project. The SSMP:

- States management's commitment to achieve the highest practical level of safety and security for C-TRAN and TriMet customers, employees, contractor personnel, and the public.
- Describes safety and security activities at each project phase
- Describes Integration of safety and security functions and activities throughout the CRC, C-TRAN, and TriMet's organizational structure and activities.
- Defines the safety and security responsibilities of LRT project personnel for each described activity.
- Identifies the documentation and verification of safety and security activities.
- Describes the framework for assuring construction safety and security.

1.3 Applicability and Scope

The scope of the SSMP is comprehensive. It covers all project developmental activities from preliminary engineering, to final design, construction, acceptance testing and start-up, up to the start of revenue operations or into revenue operations if needed to ensure any restrictions to full safety and security certification are satisfactorily resolved. The SSMP also encompasses the equipment, operating and maintenance plans, facilities, and procedures for the following:

- **Systemwide Elements:** includes the passenger vehicles, train control system, voice and data communications, Closed-Caption Television (CCTV), grade crossing and traffic control system, central instrument houses, track, fare collection, supervisory control, traction power, overhead catenary system, fire protection and suppression systems, and auxiliary vehicles and equipment.
- **Fixed Facilities:** includes stations, park-and-ride facilities, yard and shop, structures, and the operations control center. Equipment installed in stations stops such as lighting is considered part of the facility.
- **Safety, Security, System Assurance, and Maintenance Plans and Procedures:** includes Emergency Preparedness Plan, Training Programs, Accident/Incident

Investigation, Reporting Procedures, Rulebook and Standard Operating Procedures (SOPs).

As the State Oversight Agency (SOA) provides oversight of the existing light rail system under the 49 Code of Federal Regulation (CFR) 659 rule, the SOA will be generally involved in all phases of the project; however will be more heavily involved during the testing and startup phases. Both Oregon and Washington SOA offices will have responsibility over their respective jurisdictions. CRC SSC will coordinate SOA involvement.

The SSMP will be updated regularly and submitted for review at entry to Preliminary Engineering (PE), entry into Final Design (FD), and entry into the Full Funding Grant Agreement.

1.4 SSMP Goal

The goal of the SSMP is achieve the highest practical level of safety and security, starting in preliminary engineering and continued throughout final design, construction, testing and start up. A systematic approach to hazard and threat/vulnerability management for the LRT project will be overseen by the CRC throughout all phases of the LRT project. In addition, a proactive Construction Safety and Security Program that achieves zero accidents for employees and the public and minimizes construction-related security breaches will be established.

This SSMP goal will be accomplished through the following:

- Clear definition of acceptable levels of safety and security for each project element.
- Verification that acceptable levels of safety and security are designed and constructed into the LRT project.
- Certification of safety and security elements throughout the project development process, starting in design and continuing through testing and startup
- Final verification of safety and security certification to support initiation of the project into revenue service.

2. Integration of Safety and Security into Project Development Process

2.1 Safety and Security Activities

The following matrix identifies the major safety and security-related activities that will be performed during the design, construction, and testing of the CRC Project.

Table 2-1. Safety and Security Activities Matrix

| Safety and Security Activities | Preliminary Engineering | Final Design | Construction | Testing and Startup |
|--|-------------------------|--------------|--------------|---------------------|
| Develop & Implement SSMP | X | X | X | X |
| Develop & Implement Safety and Security Certification Plan (SSCP) | X | X | X | X |
| Update System Safety Program Plan (SSPP) | | | X | X |
| Update Security and Emergency Preparedness Plan (SEPP) | | | X | X |
| Identify & Establish Safety and Security Criteria | X | X | X | |
| Hazard Analysis Identification & Resolution | X | X | X | X |
| Threat and Vulnerability Assessment & Mitigation | X | X | X | X |
| Develop & Administer Safety and Security Committees | X | X | X | X |
| Perform Safety and Security Design Reviews | X | X | X | |
| Perform Construction Conformance Reviews | | | X | |
| Develop & Implement Rail Activation Plan | | X | X | X |
| Develop & Implement Systems Integration Test Plan (including Emergency Drills) | | X | X | X |
| Develop & Implement Start Up Plan | | | X | X |
| Develop & Implement Training Plan | | X | X | X |
| Develop/Update & Implement Rules and Standard & Emergency Operating Procedures | | | X | X |
| Develop & Implement Pre-Revenue Operations/Simulated Service | | | X | X |
| Develop & Implement a Budget & a Schedule for Safety and Security Activities | X | X | X | X |
| Develop & Implement Safety and Security Monitoring & Reporting | | X | X | X |
| Develop Safety and Security Audit Plan & Conduct Audits | | X | X | X |
| Obtain State Oversight Agency Approval for Revenue Operations | | | | X |

Following is a narrative description of the activities contained within Table 2.1 – Safety and Security Activities Matrix:

Develop and Implement SSMP

The project-specific Safety and Security Management Plan (SSMP) is developed in the PE phase of the project and updated in each of the succeeding phases, as appropriate. Implementation of the SSMP includes the management and oversight of all of the critical elements contained within.

Develop and Implement SSCP

The project-specific Safety and Security Certification Plan (SSCP) is developed in the PE phase of the project and updated in each of the succeeding phases, as appropriate. The implementation of the SSCP includes the development of Certifiable Elements, Certifiable Items Lists (CILs) and conformance checklists, followed by verification of design conformance, construction conformance, testing conformance, and operational requirements conformance, including Certificates of Conformance for each Certifiable Element as completed. The final steps in the process are the issuance of a System Certificate of Conformance, followed by the Safety and Security Certification Verification Report (SSCVR).

Update SSPP

The existing LRT System Safety Program Plan (SSPP) is reviewed annually and updated as required, in compliance with SOA (ODOT) requirements. The update that will include the CRC extension to the existing LRT system will likely begin late in the design phase and continue into the testing and startup phase before it is submitted to ODOT and WSDOT for necessary review and approval.

Update SEPP

As with the SSPP, the existing LRT System Security and Emergency Preparedness Plan (SEPP) is reviewed annually and updated as required, in compliance with SOA (ODOT) requirements. The update that will include the CRC extension to the existing LRT system will likely begin late in the design phase and continue into the testing and startup phase before it is submitted to ODOT and WSDOT for necessary review and approval.

Identify and Establish Safety and Security Criteria

This activity includes updating the agency's Design Criteria, with emphasis on safety and security-critical items for each element. Also included is the identification of all applicable codes, standards and regulations from which safety and security-critical items may be derived. Finally, items from the technical specifications, as they pertain to construction and/or operational elements, should be identified for safety and security certification. New criteria for operational elements may be identified even during the construction phase.

Hazard Analysis Identification and Resolution

This activity begins with performing a Preliminary Hazard Analysis (PHA) and continues with additional hazard analyses that may be warranted as the project continues through the design, construction, and testing and startup phases. The PHA will incorporate elements of the FHWA Hazard Analysis for both states, Oregon and Washington. A PHA matrix for each task will be developed in the PE phase, and expanded as needed by future HAs. All items on the matrix will

be tracked through design, construction, and startup for resolution. Peer reviews may be conducted if the SSC deems it warranted.

Threat and Vulnerability Assessment and Mitigation

Similar to the HA activity, this activity consists of performing a Preliminary Threat and Vulnerability Analysis (TVA) during PE and additional TVAs that may be warranted as the project continues through its phases. The TVA will incorporate the elements of the FHWA Threat and Vulnerability Analysis for both states, Oregon and Washington. A TVA matrix for each task will be developed in the PE phase, and expanded as needed by future TVAs. All items on the matrix will be tracked through design, construction, and startup for resolution. Peer reviews may be conducted if the SSC deems it warranted.

Develop and Administer Safety and Security Committees

This activity includes the formation of the Safety and Security Committee (SSC) and the Fire/Life Safety and Security Committee (FLSC) during the PE phase, and the Rail Activation Committee (RAC) during the final design phase. It also includes project integration with TriMet standing committees, such as the Transportation Change Review Committee (TCRC) where project integrates with current system. The activity also includes regular meetings and administration of each committee for its intended purpose throughout the design, construction and startup phases.

Perform Safety and Security Design Reviews

This activity involves the review of preliminary engineering and final design packages (drawings, specifications, and contract terms and conditions) from a safety and security perspective to confirm, and then certify, adherence to approved design criteria.

Perform Construction Conformance Reviews

This activity involves the review, inspection, and contractual testing of constructed elements to assure they conform to design requirements and that system elements have been designed and contractually tested to perform as designed, and all be certified as to conformance to the approved design.

Develop and Implement Rail Activation Plan (RAP)

This activity includes the development of a Rail Activation Plan during the final design phase, and its implementation through the construction and startup phases. A Rail Activation Plan (RAP) includes all activities necessary to demonstrate readiness of the agency and the community to enter revenue service, including a System Integration Test Plan (SITP) to cover all required tests and emergency drills and a Start-Up Plan (SUP) to cover all elements of readiness for revenue service from an operational and maintenance perspective, as well as the handoff from construction to operations.

Develop and Implement System Integration Test Plan (SITP), Including Emergency Drills

This activity includes the development of a System Integration Test Plan (SITP) during the final design phase, and its implementation through the construction and startup phases. A SITP is the

plan that describes the management of the integration tests and emergency drills needed for validation of the designed integration of the infrastructure and all system elements, operations, and emergency response and management. The SITP will identify all required SITs and Emergency Drills, a schedule for performing them, and detailed test and drill procedures.

Develop and Implement Start-Up Plan (SUP)

This activity includes the development of a Start-Up Plan (SUP) during the construction phase, and its implementation through the startup phase. A SUP includes all non-design, non-construction and non-SIT activities, such as staffing, training, public safety and security awareness, receipt of manuals and drawings, legal, marketing, materials management, service integration, Pre-Revenue Operations (including a day-by-day PRO Plan), among other things.

Develop and Implement Training Plan

This activity includes development of a training program in the final design phase and the implementation of the program through the construction and startup phases. The training program includes the training of maintenance and other TriMet personnel on contractor-furnished or installed equipment, facilities, and systems (including associated training syllabuses and manuals), as well as the training of operations personnel on the new alignment, vehicles, and operations control functionality. If needed, the Training Plan may also include TriMet supplied training as a supplement to contractor or vendor supplied training.

Develop/Update and Implement Rules and Standard and Emergency Operating Procedures (SOPs/EOPs)

This activity, which will be detailed in the SUP, includes the review of existing rules and SOPs/EOPs, and their revision or development of new rules or SOPs/EOPs that may be required to safely, securely, and effectively operate the CRC LRT extension. The review and development is planned to begin during the construction phase and be completed during the startup phase for use in training operating and maintenance personnel.

Develop and Implement Pre-Revenue Operations Plan

This activity, which is the final element of the SUP, involves the development of a day-by-day pre-revenue operation (PRO) plan during the construction phase, and its implementation and execution as the last step of the startup phase. It will include simulated normal revenue operation, single-track operation, other non-normal operation, and emergency operations. It may also include the repeat of some emergency drills as a means of familiarizing LRV operators, other TriMet personnel, C-TRAN personnel, and emergency response personnel who may not have participated during SIT, with the CRC alignment and its operation.

Develop and Implement Budget and Schedule for Safety and Security Activities

This activity involves the development of a budget and schedule for the safety and security activities identified in the SSMP. They will be monitored and managed throughout the design, construction, and startup phases.

Develop and Implement Safety and Security Monitoring and Reporting

This activity includes the development of methods and tools, approved by the SSC and PM, for monitoring and reporting progress against budget, schedule, and the activities identified in this SSMP. Initial development will be done during PE and the final monitoring tools and reporting requirements will be developed in FD, and used in all phases, with adjustments as needed, until unrestricted revenue operations are in progress.

Develop and Implement Safety and Security Audit Plan and Conduct Audits

This activity consists of the development of an audit plan for activities within this SSMP. Audit Plan development will begin during PE and be completed during FD. It will implement an audit program throughout the design, construction, and startup phases. The number and types of audits to be conducted will be determined by the SSC.

Obtain State Oversight Agency (SOA) Approval for Revenue Operations

This activity includes the completion of all Certification requirements, CEO approval of the SSCVR, SSPP and SEPP submission to and approval by the SOA, and any other requirements that may be identified by the SOA during the testing and start-up phase of the project.

2.2 Procedures and Resources

The TriMet Safety and Security Executive is assigned the task for overall administration of the SSMP. The Safety and Security Executive is supported by TriMet and C-TRAN Safety and Security staff and by safety/security consultant services, as required. The level of consultant services is dependent on the particular needs of the LRT project.

The project has budgeted for staffing resources necessary for the ongoing activities of the CRC SSC, including staff from WSDOT, ODOT, C-TRAN, and TriMet as well as local law enforcement in both Portland, Oregon and Vancouver, Washington detailed in the organization chart in Section 3.1.

CRC has established internal document management procedures and policies relative to the handling of records, and has implemented a policy for consistent TriMet and C-TRAN standards for identifying and managing sensitive security information, consistent with DHS guidelines. Procedures that will be used for other safety and security activities across the project phases are, or will be, based on those that are routinely used in the rail transit industry and were successfully used in the design, construction, and activation of other TriMet LRT segments, and ongoing TriMet LRT operations.

Begin Sample Procedures Description Portion of Section 2.2

Plans, Manuals, and Procedures

These documents address CRC's safety and security processes and procedures and will be updated as appropriate throughout the project and the latest approved version will be used in implementing the SSMP:

Design Criteria – Criteria developed during PE will be refined early in FD.

Final Design Quality Plan – The DQP will be completed early in FD.

Construction Quality Plan – The CQP will be completed in FD.

Safety and Security Certification Plan – The SSCP portion needed for design certification will be completed early in FD; the balance of the SSCP will be completed by the end of FD.

Construction Safety and Security Manual – The CSSM will be developed in time for issuance before the first construction contract is issued to bid

Rail Activation Plan - The RAP will be developed during the Construction Phase

System Integration Test Plan - The SITP will be during the Construction Phase

Pre-Revenue Operations & Start-Up Plan - The PROP will be developed during the Construction Phase. It will contain a detailed Red Tag Procedure.

System Safety Program Plan - There will be an updated WSDOT approved, SSPP developed during the late Construction Phase for submission to ODOT during the Testing and Start-up Phase.

System Security and Emergency Preparedness Plan - - There will be an updated WSDOT approved, SS&EPP developed during the late Construction Phase for submission to ODOT during the Testing and Start-up Phase.

Tri-Met SOPs, EOPs, Operating Rulebook, and Maintenance Procedures – The latest editions of each will be reviewed during the late construction phase and early Testing and Start-up phase and be revised as necessary to accommodate the operational and maintenance needs of the CRC extension of the LRT system.

The schedule and the Budget for safety and security activities across the four project phases are included in Appendix A and Appendix B, respectively. They show costs and timeline for activities through the end of FD in detail and project the timing and cost for the Construction and start-up Phases. Details for these last two phases of the project will be developed during FD and be shown in the schedule and budget included in the SSMP submission accompanying the FFGA application.

2.3 Interface with Management

See Organization Chart 1 in Section 3.1 for the reporting relationships of the positions described in the section.

The CRC Safety and Security Executive (SSE) position will be filled by the TriMet Director of Safety and Security (DSS). This position will lead the safety and security effort for the LRT project. In addition, the SSE will be supported by a Deputy Safety and Security Executive (DSSE) position that will be filled by the C-TRAN Director of Operations, and two Senior

Safety and Security Specialists, one from TriMet and one from C-TRAN, who will provide technical support. The TriMet Specialist will be assigned full time to the CRC project, while the C-TRAN Specialist will be assigned to the LRT project on a part-time basis during Final Design, and increased in subsequent phases as appropriate. The Specialists will assist the DSS, DDSS, and the rest of the project management team in the fulfillment of the SSMP. As activities warrant, additional safety and security staff may be utilized or safety/security consultant services obtained.

The following are positions and descriptions of the positions which are directly involved with the implementation of the SSMP on the LRT project during one or more project phases:

CRC Administrator

The CRC Administrator (CA) position is being filled by WSDOT. The CA has final responsibility for the LRT project and is responsible for prioritizing and obligating the resources needed for successful completion of the project. The CA represents the Project to outside agencies and interests including the Federal Transit Administration, the Federal Highway Association, the U.S. Department of Transportation, state governments, and local governments, and has a role in negotiations/dispute resolution with contractors.

CRC Transit Manager

The CRC Transit Manager (TM) position is being filled by TriMet. The TM is responsible for day-to-day coordination of all activities related to the LRT project. The Transit Manager ensures integration and coordination between dedicated project staff, ODOT, WSDOT, and local jurisdiction efforts, consultants, and supporting division personnel. The TM defines LRT objectives and monitors work plans for all activities needed for successful completion of the project, including engineering, project control, construction management, safety and security, and community relations. The TM manages the quality assurance staff and, is responsible for management of the construction safety and security program, and leads the implementation and execution of the safety and security certification process. The TM assists in developing plans and procedures for readiness, coordinates with the Systems Engineering Director, and Operations for safety and security certification, and testing and start-up. The TM also coordinates directly with the CRC Structures Manager and the CRC Highway Engineering Manager to coordinate bridge construction and safety and security efforts with those of the LRT project. Other responsibilities include coordination with the Project Management Oversight Consultant (PMOC). This position reports to the Project Director and works closely with the Deputy Transit Manager, and is a member of the CRC SSC.

CRC Deputy Transit Manager

The Deputy Transit Manager (DTM) position is being filled by the C-TRAN High Capacity Transit Project Manager. The DTM is responsible for day-to-day coordination of all activities related to the LRT project in the Vancouver Washington portion of project and is an integral part of the Federal Transit Administration (FTA) approval process; including developing and maintaining relationships with Vancouver jurisdictional agencies and local stakeholders. The deputy is also the primary lead for downtown station and streetscape design and park-and-ride as well as maintaining adherence to CRC Transit Design Criteria. Other responsibilities include coordination with the PMOC and maintaining project schedules. This position works closely

with the Transit Manager and is responsible for assuming the duties of Transit Manager in his/her absence, and is a member of the CRC SSC.

CRC Transit Design Manager

The Transit Design Manager (TDM) position is being filled by TriMet. The TDM manages the final design contracts, including issuance of task orders and adherence to scope, schedule, and budget objectives, coordinates the activities of matrixed staff resources to resolve issues and ensure technical compliance with agency requirements, ensures safety and security issues are addressed in design, and initiates the design certification process. This position reports to the Transit Manager, and is a member of the CRC SSC.

CRC Transit Resident Engineers

The Transit Resident Engineer (TRE) positions are currently vacant but will be filled by either TriMet staffers or seconded consultant personnel during the final design phase to participate in developing specifications and special provisions and reviewing the design drawings for the contracts they will manage during construction. During the construction phase, TREs have the authority and responsibility for enforcing contract provisions, including construction safety and security provisions. These positions report to the Transit Manager.

CRC Light Rail Vehicle (LRV) Contract Manager

The LRV Contract Manager (LRVM) Position is currently vacant but will be filled by either a TriMet staffer or a seconded consultant during the final design phase to manage the Type 6 Vehicle contract, including contract requirements, issuance of task orders, and adherence to scope, schedule, budget objectives, and assuring each delivered LRV is fully safety and security certified. The LRVM coordinates with the CRC Transit Systems Engineering Manager (SEM) and the TriMet Rail Operations Manager (ROM) to assure LRV performance integrates with all system and operational elements of the project. This position reports to the Transit Manager.

CRC Safety and Security Executive

The CRC Safety and Security Executive (SSE) position is being filled by the TriMet Safety and Security Executive. The DSS is the focal point of system safety and security for the CRC project. The Safety and Security Executive has broad management authority and oversight of TriMet's corporate safety program, including rail, bus and paratransit services. This position is also responsible for the development of TriMet's security policies and procedures, training and staffing, and contract management.

Safety and Security Executive will manage or oversee all aspects of safety and security for the project, including development and management of the SSCP, generation of the CELs and CILs, the CSSM and inclusion of safety and security requirements in contract documents, safety and security audits and reporting, safety and security aspects of training, testing, and start-up activities, HA and TVA management, submitting and securing SOA approval of the SSPP and SEPP, and developing the SSCVR. The DSS reports to the CRC Administrator and has dotted-line interfaces with the CRC Transit, Structures Engineering, and Highway Engineering Managers, and Chairs the CRC SSC.

CRC Deputy Safety and Security Executive

The Deputy Safety and Security Executive (DSSE) position is being filled by the C-TRAN Director of Operations. The DSSE works closely with the SSE to oversee the safety and security staff and functions, with emphasis on safety and security aspects of street running in Vancouver, acts for the DSS in his/her absence, and is Vice Chair of the CRC SSC.

CRC Senior Safety and Security Specialists

The two CRC Senior Safety and Security Specialist positions are currently vacant but will be filled by one TriMet and one C-TRAN staffer during FD. The Specialists will perform the day-to-day activities needed to implement and administer the construction safety and security programs and monitor and oversee the system safety and security certification program. The Specialists participate on the Safety and Security Committee and coordinate with appropriate rail operations and CRC divisions as appropriate. The Specialists are responsible for assuring designs comply with federal, state, local, and CRC / TriMet safety and security standards. The Specialists review plans, design drawings and specifications for adherence to safety and security design criteria and standards, monitor and evaluate effectiveness of the construction safety and security plans through the performance of audits. They report to either the DSS or the DDSS, have dotted-line interface with the CRC Structures and Highway Engineering Managers for construction safety and security, and are members of the CRC SSC.

TriMet Systems Engineering Director

The Systems Engineering Director is responsible for day-to-day coordination of all systems activities related to the CRC project. The Systems Director ensures integration and coordination between dedicated project staff, consultants and supporting division and TriMet Operations and Maintenance personnel. They define project objectives and monitor work plans for all activities needed for successful completion of systems elements of the project, including signals, communications, traction electrification, vehicles and fare collection, as well as system integration, testing and startup. This position reports to the Executive Director, TriMet Capital Projects Division

CRC Structures Engineering Manager

The CRC Structures Engineering Manager position is filled by WSDOT, and is responsible for ensuring that all aspects of the conceptual design for structures associated with the CRC project meet the design standards and policies for WSDOT, ODOT, Federal Highway Administration (FHWA), and FTA. Responsible for managing the Consultant Design team's development of conceptual designs and costs estimates, as well as coordinating with the project stakeholders including ODOT, WSDOT, FHWA, FTA, City of Portland, City of Vancouver, Metro, RTC, Port of Portland, Port of Vancouver, TriMet, and C-TRAN. Review and approve design deliverables to ensure that the design concepts are constructible and fundable

CRC Highway Engineering Manager

The CRC Highway Engineering Manager position is filled by WSDOT, and is responsible for the day-to-day management of the Highway Engineering Team, including consultants and WSDOT and ODOT. This position works closely with the Environmental, Transit, Traffic, and

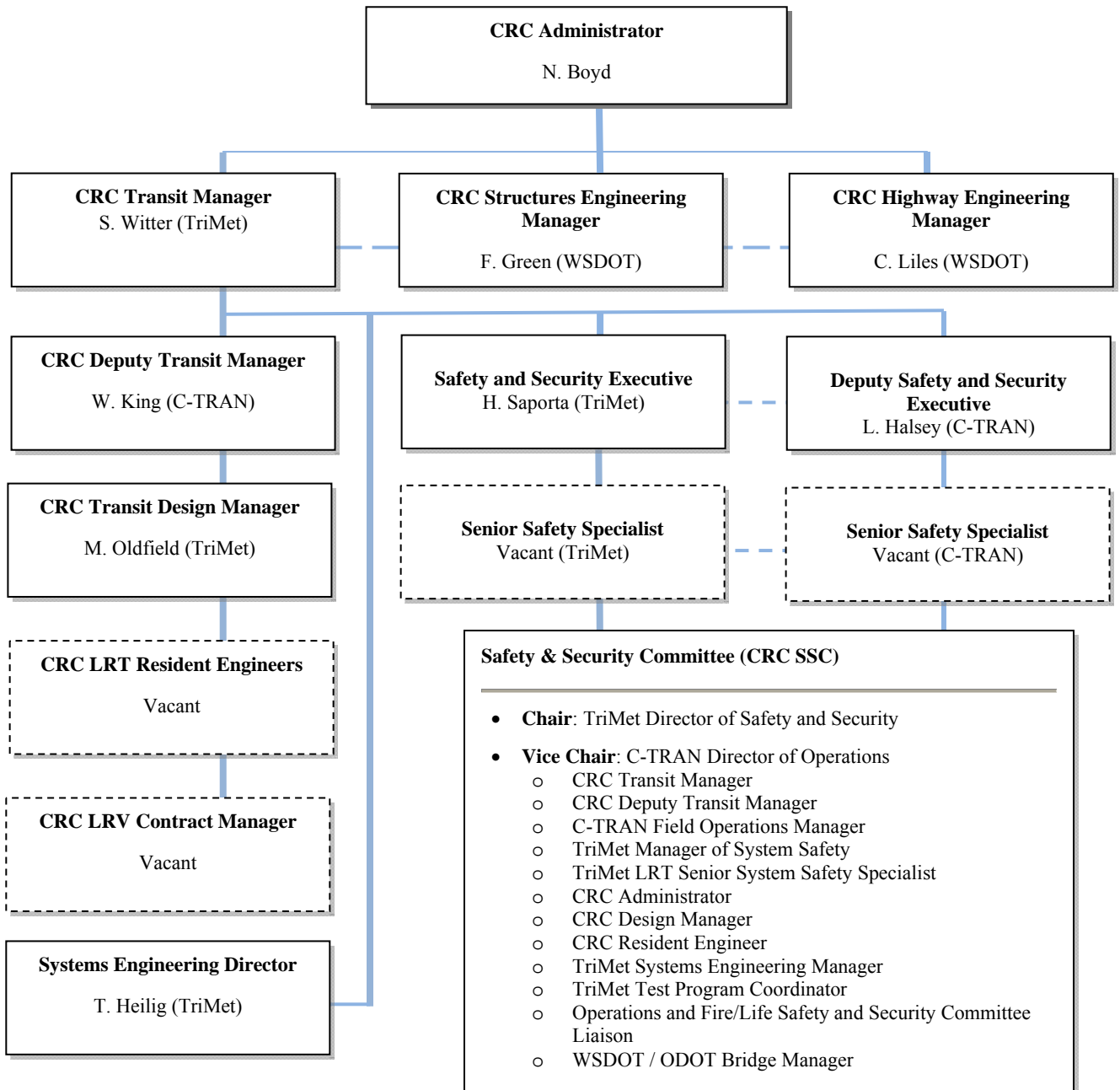
Communications Teams as well as ODOT, WSDOT, FHWA of Oregon and Washington, FTA, Cities and Ports of Portland and Vancouver, RTC, Metro, C-TRAN, Tri-Met, and other stakeholders. This position is responsible for delivering the WSDOT and ODOT design and construction program within the CRC area and is responsible for strategic planning and leadership necessary to ensure the successful delivery of area transportation design and construction.

3. Assignment of Safety and Security Responsibilities

3.1 Responsibility and Authority

Figure 3.1 shows the CRC project’s Safety and Security Organization, with incumbents as of the date of this plan.

Figure 3.1 CRC Safety and Security Organizational Chart (incumbents as of September 2011)



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The CRC Administrator has delegated the authority for the development and management of the SSMP to the Transit Manager, Safety and Security Executive, and Deputy Safety and Security Executive. Through the SSE and DSSE assignments, TriMet and C-TRAN have integrated safety and security responsibilities of the agencies into a single entity for the CRC project to demonstrate their commitment to the process and to highlight the priority of safety and security within both agencies as well as the interstate LRT project.

Section 2.3 of this document provides a list of positions, their incumbents, and their specific responsibilities for safety and security on the LRT project. Contractors will be added to this list as the project progresses and needed revisions to show contractor participation will be made in their FFGA SSMP submission.

A more detailed list of SSE responsibilities than provided in Section 2.3 is provided below.

- Manages the Safety and Security program.
- Develops and manages the SSCP.
- Coordinates the system safety effort with systems engineering, civil engineering, quality assurance, integration and testing, program management functions, and Chairs the CRC SSC.
- Assists in the identification of necessary technical safety criteria and requirements (including those associated with interfacing hardware, software, and facilities) and ensures their incorporation into designs, specifications, and planning documents.
- Ensures that submitted HA and TVA reports contain sufficient information to permit the Transit Manager and the CRC SSC to make informed decisions and recommendations.
- Reviews system safety and security tasks, prioritizes risks, and recommends engineering, procedural, or other changes necessary to reduce the risks to an acceptable level.
- Ensures the implementation, documentation, and tracking of all hazards, threats, and vulnerabilities from identification through resolution or mitigation.
- Works with other CRC personnel to develop the CSSM and contact safety and security language, review and approve each contractor's site-specific construction safety and security plan (CSSP).
- Ensures that contractor CSSPs include plans to address hazards, threats, and vulnerabilities in their activities and at their work sites.
- Oversees and audits contractor adherence to their CSSPs.
- Ensures the Fire Life Safety Committee is addressing concerns, recommending engineering, or procedural changes.

- Participates in all major design reviews, and provides lists of preliminary hazards, threats and vulnerabilities and other safety or security concerns, and completed HAs and TVAs appropriate to the level-of-design detail.
- Provides recommendations for corrective actions and controls, based on analyses and sound engineering and management principles.
- Develops reports and documents for ongoing safety and security activities and concerns.
- Participates in all major rail activation activities, including development and implementation of the RAP, SITP, and PROP, and conduct of SIT, PRO, and other Start-up activities. to review and accept the delivered project, system, sub-system or component, and provides a safety and security assessment and a safety and security certification package, with any exceptions documented.
- Revises the TriMet SSPP and SEPP to address the CRC extension, submits them to the SOA, and secures their approval.
- Participates in review of contractor delivered projects, training, emergency drill and PRO results needed to initiate revenue service, and provides a safety and security assessment and a safety and security certification package for operational readiness, with any exceptions documented.
- Maintains safety and security oversight of project tests, operations, or other activities at a level consistent with the potential for loss over the life of the system to ensure that, in all instances, hazards, threats, and vulnerabilities are controlled, eliminated, or mitigated by corrective action.
- Develops, and submits for RD approval, the final SSCVR, including full documentation of any exceptions to full certification and operational work-arounds.

3.2 Committee Structure

Columbia River Crossing Safety and Security Committee (CRC SSC)

The CRC SSC will be established in preliminary engineering and will oversee all safety and security elements of the LRT project. This committee will be active throughout all phases of the LRT project, and into revenue service if needed to resolve exceptions to full safety and security certification, without work-arounds. This committee will be the main avenue for addressing safety and security issues on the LRT project. The committee will be responsible for reviewing designs, providing comments on items like CCTV placement, operating concerns, maintenance issues, in addition to the full array of other safety and security critical items. Comments from the CRC SSC will be incorporated into the design of the project, and topics discussed at the meetings will be tracked through completion.

The CRC SSC will also be responsible for approving the SSCP and overseeing the management of the Safety and Security Certification Process detailed SSCP. The CRC SSC is responsible for coordination with the wide array of technical specialties necessary to ensure that a

comprehensive and complete approach has been developed for all activities related to safety and security certification for the LRT project and coordination with the safety and security aspects of the bridge project.

The CRC SSC is composed of the following:

- **Chair:** TriMet Safety and Security Executive
- **Vice Chair:** C-TRAN Director of Operations
 - CRC Transit Manager
 - CRC Deputy Transit Manager
 - C-TRAN Field Operations Manager
 - TriMet LRT Senior System Safety Specialist
 - CRC Administrator
 - CRC Design Manager
 - CRC Resident Engineer
 - TriMet Systems Engineering Director
 - TriMet Test Program Coordinator
 - Operations and Fire/Life Safety and Security Committee Liaison
 - WSDOT / ODOT Bridge Manager
- In addition to the identified members, meetings may be attended by involved TriMet and C-TRAN personnel, including Legal and Community Affairs staff, SOA personnel, FTA/PMOC personnel, or invited technical experts.

It is the responsibility of the SSC to oversee the timely development and completion of the various plans, procedures, and lists needed in all four project phases, as well as their management and execution. The SSC's oversight is instrumental in ensuring the design certification, construction certification, System Integration Test, and Pre-Revenue Operations and Start-UP Plans are timely developed and executed. Elements not yet certified will be tracked on an open-items list and any work-arounds that may be needed for the project to proceed must be approved by the CRC SSC. The CRC SSC must also approve any work-around necessary to begin revenue service, as well as any exceptions to full revenue operation.

The principal duties of the CRC SSC as they relate to Safety and Security Certification are to:

- Assist in the identification of hazards and vulnerabilities in the project and ensure that appropriate resolution or mitigation measures are developed.

- Advise designers, CMs, and project staff in development of appropriate resolution or mitigation measures, specifications, and certification lists.
- Ensure the continued development and evolution of certification lists as the project moves through design, construction, and testing and start-up.
- Monitor progress of certification list completion throughout the project.
- Maintain a matrix of open items and resolve certification issues as they arise.
- Review conformance assessments and provide decisions on acceptance or correction of non-conforming items, including the nature of the required correction.
- Oversee certification and integrated testing in the lead up to revenue service.
- Coordinate pre-revenue readiness, emergency preparedness, and safety/security outreach activities.
- Assist the DSS in developing the final SSCVR and approve it for submission to the PD.

The CRC SSC Chair (or designee) is responsible for arranging meetings, communicating decisions and queries to appropriate project staff for action, and preparing meeting agendas and minutes. The Chair (or designee) also maintains an open-items matrix and performs monitoring and auditing of safety and security activities and appropriate project and field office files.

The LRT-SCC is the forum for formal discussion of safety and security issues. Meeting minutes are documented and resolution of issues at the committee level is the goal. In the event that safety and security issues cannot be resolved at the committee level, the issue is brought to the Project Director. If input from the PD is not sufficient for the SCC to resolve the issue, it will be brought to the CRC Executive Safety and Security Committee (CRC ESSC) for final resolution.

CRC Executive Safety and Security Committee

Project safety and security issues that cannot be resolved at the CRC SSC will be brought to the CRC ESSC, which will be made up of the TriMet General Manager, CTRAN's General Manager, CRC SSC Chair, and the CRC Administrator. Decision made at the CRC ESSC will be directed to the CRC SSC to be put into place and tracked to completion.

Fire/Life Safety and Security Committee (FLSC)

An FLSC specific to the LRT project was formed in preliminary engineering. The FLSC members include CRC Administrator, CRC Deputy Project Director, CRC Design Manager, TriMet Rail Planning Manager, TriMet Director of Operations Support, TriMet Senior Safety Specialist, TriMet Safety and Security Executive, CTRAN Operations Manager, CTRAN Director of Operations, Portland Police, Vancouver Police, Portland Fire, Vancouver Fire, Portland Office of Emergency Management, ODOT Highway Emergency Response and other applicable stakeholders as needed. The FLSC helps to ensure compliance with fire and life safety codes and assists in emergency response preparedness prior to revenue service. This project

specific FLSC will serve as a subcommittee to the SSC once the SSC has been formed and starts meeting.

LRT Start Up Committee

A project-specific LRT Start-Up Committee will be set-up as a subcommittee to the CRC SSC. The purpose of the Start-Up Committee will be to coordinate the numerous public safety and security, outreach and public information activities that are necessary to successfully introduce the LRT project to the community. The membership of this subcommittee will be determined during FD and included in the FFGA SSMP submission.

Rail Activation Committee (RAC)

The RAC will be formed during the construction phase of the project. The purpose of the RAC is to ensure coordination between LRT staff, TriMet Operations staff, C-TRAN Operations staff, and general contractor to bring the extension of TriMet’s light rail system online for testing, training, pre-revenue operations, other start-up committees, and ultimately revenue service. The RAC ensures that training on civil and systems items takes place on the alignment and the systems therein. Sequencing of testing, training, and turnover will be addressed in this committee as well. In addition, the coordination preview rides and other special events that could take place along the alignment during the final phases of testing and training will be covered in this committee. A System Integration Test Committee (SITC) and Pre-Revenue Operations and Start-UP Committee (PROC) will be formed as subcommittees to the RAC. The SITC will develop and manage the SITP, develop integration test and emergency drill procedures and conduct tests and drills. The PROC will develop and manage the PROP, identify and manage to completion all needed operational start-up activities, including development and conduct of a detailed day-by-day plan and conduct of pre-revenue operations at the conclusion of SIT. The membership of the RAC and its subcommittees will be determined during FD and included in the FFGA SSMP submission. Committee members may include:

- LRT staff: signal engineers, Overhead Catenary System (OCS) and Traction Power (TP) engineers, track engineers, RE, Communication engineer, Community Affairs
- C-TRAN/TriMet Operations staff: Maintenance of Way (MOW) signals supervisor, MOW track supervisor, MOW OCS supervisor, MOW, Traction Power System Supervisor (TPSS), Field Operations Manager, MOW engineering, MOW Communication Supervisor, Field Operations Coordinator, Safety, Operations Support, Rail Transportation Training Supervisor, Rail Equipment Maintenance Manager
- Seconded consultant personnel, specialty consultant personnel, contractor personnel.

Technical Advisory Committee (TAC)

The purpose of the TAC is to address design issues that affect operation of the LRT system, safety and security related items pertaining to design, construction, and operation of the LRT system, as well as address any other design related issues as they pertain to the transit portion of the CRC. The TAC has interaction with the highway division and structures division of the CRC project to ensure that the design of non-transit elements of the project take into consideration the

transit portion of the project. The TAC will be formed early in the FD phase and committee members will include: TriMet Operations Staff, TriMet MOW Staff, TriMet Director of Safety and Security, TriMet Senior Safety and Security Specialist, CRC project engineers from transit, highway, and structures divisions, C-TRAN Operations and Safety and Security Staff, design consultants, CRC Design Manager

Transit Change Review Committee (TCRC)

The TCRC is responsible for Configuration Control. The TCRC reviews any changes to design criteria, the current LRT alignment, changes to existing SOPs, development of new SOPs due to a change in the system or extension of the system, updating or creating new operating procedures, review any major safety/security incidents on the system, review any alterations to existing equipment or light rail vehicles, and review of new light rail vehicles. This committee is also involved in the startup of extensions, due to the approval authority for new SOPs, operating procedures, and training programs. Committee members include representatives from TriMet Operations, TriMet Maintenance, TriMet Maintenance of Way, TriMet Safety, TriMet Field Operations, TriMet Facilities Maintenance, TriMet Training Department, TriMet Systems Engineering, and TriMet Service Planning and Development. The names and titles of the members representing each of these departments will be provided in the FFGA SSMP submission.

3.3 Safety and Security Responsibilities Matrix

The Integrated Safety and Security Tasks/Responsibilities Matrix combines the responsibilities for both safety and security tasks for the project into a single management document. This matrix also reflects TriMet's and C-TRAN's ongoing commitment to the consolidation of the safety and security function's oversight and direction into a single department within each agency. The tasks matrix reflects in detail that safety and security functions are intrinsic to both project management and TriMet operations.

The "Integrated Safety and Security Tasks Matrix" shows the responsibilities of various individuals and committees as they relate to these specific tasks. Because of TriMet's commitment to integrating both safety and security into the LRT project, these tasks and accompanying responsibilities have been combined into a single matrix. Given the nature of the project, in many cases C-TRAN staff, which are similarly positioned to TriMet staff, may be engaged jointly or in similar activities as they prepare their own operational plans, customer service and outreach and collaborate on project related preparations. The CRC SSC will monitor these activities.

Table 3-1. Safety and Security Responsibilities Matrix

| Safety and Security Activities | Preliminary Engineering | Final Design | Construction | Testing and Startup |
|--|--|--|--|--|
| Develop & Implement SSMP | TriMet Safety and Security Executive | TriMet Safety and Security Executive | TriMet Safety and Security Executive | TriMet Safety and Security Executive |
| Develop & Implement Safety and Security Certification Plan (SSCP) | TriMet Safety and Security Executive | TriMet Safety and Security Executive | TriMet Safety and Security Executive | TriMet Safety and Security Executive |
| Update System Safety Program Plan (SSPP) | | | | TriMet Safety and Security Executive |
| Update Security and Emergency Preparedness Plan (SEPP) | | | | TriMet Safety and Security Executive |
| Identify & Establish Safety and Security Criteria | TriMet Safety and Security Executive | TriMet Safety and Security Executive | | |
| Hazard Analysis Identification & Resolution | TriMet Safety and Security Executive | TriMet Safety and Security Executive | | TriMet Safety and Security Executive |
| Threat and Vulnerability Assessment & Mitigation | TriMet Safety and Security Executive | TriMet Safety and Security Executive | | TriMet Safety and Security Executive |
| Develop & Administer Safety and Security Committees | TriMet Safety and Security Executive | TriMet Safety and Security Executive | TriMet Safety and Security Executive | TriMet Safety and Security Executive |
| Perform Safety and Security Design Reviews | TriMet/CTran Senior Safety Specialists | TriMet/CTran Senior Safety Specialists | | |
| Perform Construction Conformance Reviews | | | CRC Transit Design Manager | |
| Develop & Implement Rail Activation Plan | | | Startup Manager | Startup Manager |
| Develop & Implement Systems Integration Test Plan (including Emergency Drills) | | | Startup Manager | Startup Manager |
| Develop & Implement Start Up Plan | | | Startup Manager | Startup Manager |
| Develop & Implement Training Plan | | | TriMet Operations Training Manager | TriMet Operations Training Manager |
| Develop/Update & Implement Rules and Standard & Emergency Operating Procedures | | | TriMet Director of Operations Support | TriMet Director of Operations Support |
| Develop & Implement Pre-Revenue Operations/Simulated Service | | | TriMet Director of Operations Support | TriMet Director of Operations Support |
| Develop & Implement a Budget & a Schedule for Safety and Security Activities | TriMet Safety and Security Executive | TriMet Safety and Security Executive | TriMet Safety and Security Executive | TriMet Safety and Security Executive |
| Develop & Implement Safety and Security Monitoring & Reporting | TriMet/CTran Senior Safety Specialists | TriMet/CTran Senior Safety Specialists | TriMet/CTran Senior Safety Specialists | TriMet/CTran Senior Safety Specialists |
| Develop Safety and Security Audit Plan & Conduct Audits | | TriMet/CTran Senior Safety Specialists | TriMet/CTran Senior Safety Specialists | TriMet/CTran Senior Safety Specialists |
| Obtain State Oversight Agency Approval for Revenue Operations | | | | TriMet Safety and Security Executive |

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4. Safety and Security Analysis

4.1 Approach to Safety and Security

The LRT project uses a formal process for the identification and management of safety hazards and security threats and vulnerabilities. The purpose of the process is to:

- Identify and evaluate the effects of hazardous conditions and security threats and vulnerabilities on personnel, equipment, and the public.
- Define and evaluate countermeasures to eliminate or control the identified hazards and security threats and vulnerabilities.
- Provide timely notification of the identified hazards and threats and vulnerabilities to project personnel who must resolve them.
- Document the safety and security concepts incorporated and used during design, and provide the basis for developing procedures to either complement the design safety and security concepts or resolve the hazard and security threat/vulnerability through procedures or other means if the design did not adequately resolve the issue.

Prior to entering Final Design (FD) of the LRT project, safety and security-related reviews will be performed including a Peer Review and a Crime Prevention Through Environmental Design (CPTED) analysis by an outside contractor. The reports and recommendations generated by these reviews will influence design throughout the development of the LRT design. All of the items listed in these reviews will be accounted for throughout the course of the LRT project. While most of the items will be tracked on the CIL, others — such as the Peer Review Recommendations — will be tracked on a stand-alone matrix.

The CRC SSC will meet throughout the design of the LRT project to provide input and comments on the design of the project to reflect operational needs of TriMet and C-TRAN. The committee's input will enhance the safety and security of the customers, the public and TriMet and C-TRAN employees. Hazard analysis, field mockups and testing, as well as in-depth work sessions are used in this forum to assist in the decision making process.

A series of hazard and threat and vulnerability evaluations will be performed through a series of workshop with stakeholders from all engineering disciplines and LRT operations divisions.

A safety hazard or security vulnerability is any real or potential condition that can cause injury, death, or damage to or loss of equipment or property; a condition that may be a prerequisite to an accident, assault, or theft; or a situation that has the potential to do harm. The objective of the safety and security analyses workshops is to:

- Identify potential hazards, threats, or vulnerabilities resulting from inadequate, or potential failure of, system elements, and determine the potential impact on the overall system, people, property, and the environment.
- Identify hazardous activities that could affect the transit system's safe operation.
- Identify vulnerabilities that could threaten system security
- Identify potential accidents and security breaches, the consequences (e.g., fatalities, injuries, damage, etc.) associated with each potential condition.
- Identify measures that will prevent accidents and minimize vulnerabilities by eliminating or controlling the underlying causal factors.
- Document the hazard analyses and TVA results in a clear and concise manner, thereby facilitating resolution of the identified unresolved hazardous or vulnerable conditions and identifying the issues that have been resolved.

The various disciplines will bring subject matter expertise to the workshop sessions. Each workshop will be facilitated by a safety and security consultancy to ensure that the appropriate level of analysis is performed. . The workshop participants will provide input for the

- Identification of hazards and security threats and vulnerabilities
- Evaluation of the hazards and security issues
- Assist in the assignment of risk index
- Provide input to risk mitigation that will allow the transition of hazards to an acceptable disposition level.

When stakeholders need additional data or other information to understand the hazard or security issue, further analysis will be performed. The outcome of each workshop will be recorded in the form of a briefing note for the CRC SSC.

The workshop briefing notes, along with the recommended mitigation measures, will be presented to the CRC SSC for implementation and resolution. These findings will be tracked separately through the committee to ensure they are all addressed.

4.2 Requirements for Safety and Security Analysis

Safety Analysis

Hazard analysis includes a set of methodologies that first searches for the potential to do harm in the system. After finding such hazards, further analysis attempts to mitigate the hazard to an acceptable level. The objective of the hazard identification and analysis process is to identify and define as many hazardous conditions as possible and initiate the Hazard Resolution process before those conditions or associated activities cause an accident.

In preparation for the design and construction of the LRT project, an American Public Transportation Association (APTA) Peer Review will be conducted to assist in the evaluation of

the proposed alignment. It is anticipated that recommendations will be made by the panel on how to mitigate concerns identified during the course of the review. These recommendations will be addressed and tracked throughout the course of the project and into startup of the LRT project to ensure all concerns raised have been addressed and mitigated properly.

Hazard Identification

The hazards identified by the safety peer review group are derived from:

- TriMet and C-TRAN accident/incident data and experience.
- Accident/incident data from other light rail systems.
- Expert opinion of the representatives that work for transportation systems in other parts of the country that have similar operating environments as the LRT project.
- Hazard scenarios.
- Design data and drawings.

New safety hazards and security vulnerabilities will be identified through field assessments and surveys, design reviews, testing programs, and start-up activities.

The categorization of hazards is consistent with risk-based criteria for severity and reflects the principle that not all hazards pose an equal amount of risk. Table 4-1 summarizes the Hazard Severity categories.

Table 4-1. Hazard Severity Categories

| Category | Severity | Characteristics |
|----------|--------------|---|
| I | Catastrophic | Death or system loss |
| II | Critical | Severe injury, severe occupational illness or major system damage |
| III | Marginal | Minor injury, minor occupational illness or minor system damage |
| IV | Negligible | Less than minor injury, occupational illness or system damage |

The probability rating of a particular event or specific hazard may be defined by the number of times the event or hazard is likely to occur during the planned life expectancy of the LRT. The hazard probability is derived from TriMet and C-TRAN safety data, historical safety data from similar light rail systems, and from expert opinion, such as the peer review group representatives. Table 4-2 is a summary of the Hazard Probability categories.

Table 4-2. Hazard Probability Categories

| Description | Level | Specific Individual Event | Fleet or Inventory |
|--------------------|--------------|---|--|
| Frequent | A | Likely to occur frequently | Continuously experienced |
| Probable | B | Will occur several times in the system's lifecycle | Will occur frequently |
| Occasional | C | Likely to occur sometime in the system's lifecycle | Will occur several times |
| Remote | D | Unlikely, but possible to occur in the system's lifecycle | Unlikely, but can be expected to occur |
| Improbable | E | So unlikely it can be assumed occurrence may not be experienced | Unlikely to occur but possible |

Hazard Risk Assessment

The Risk Assessment Matrix, below, is then used to assess the level of risk for each identified hazard and to determine what action(s) must be taken to correct or lower the risk to an acceptable level.

Table 4-3. Risk Assessment Matrix

| <i>Frequency of Occurrence</i> | Hazard Categories | | | |
|--------------------------------|--|------------------------------|-------------------------------|--------------------------------|
| | I <i>Catastrophic</i> | II <i>Critical</i> | III <i>Marginal</i> | IV <i>Negligible</i> |
| (A) Frequent | 1A | 2A | 3A | 4A |
| (B) Probable | 1B | 2B | 3B | 4B |
| (C) Occasional | 1C | 2C | 3C | 4C |
| (D) Remote | 1D | 2D | 3D | 4D |
| (E) Improbable | 1E | 2E | 3E | 4E |
| Hazard Risk Index | Criteria By Index | | | |
| 1A, 1B, 1C, 2A, 2B, 3A | Unacceptable to Project sponsors (TriMet, C-TRAN, WSDOT, ODOT) | | | |
| 1D, 2C, 2D, 3B, 3C | Undesirable - Requires concurrence from the GMs | | | |
| 1E, 2E, 3D, 3E, 4A, 4B | Acceptable with review –Requires Review by TriMet Security and Safety staff and CRC SSC | | | |
| 4C, 4D, 4E | Acceptable | | | |

When the Hazard Severity Index is combined with the Hazard Probability Index, the result is the Risk Assessment Index. Each Risk Assessment Index requires a specific level of action. A hazard with a risk index of "Unacceptable" is not permitted. The design must be re-evaluated to eliminate, or minimize, and control the hazard to an acceptable level.

Hazard Resolution and Control

The Hazard Resolution and Control process involves the analysis and corrective action taken to reduce the risk associated with an identified hazard to the lowest practical level. The order of precedence for satisfying system safety requirements and resolving the identified hazards is as follows:

- Design for minimum risk. Design new facilities and equipment to eliminate hazards. If an identified hazard cannot be eliminated, its associated risks must be reduced to an acceptable level (see Risk Assessment Criteria) through the design selection.
- Utilization of safety devices. In the event that an identified hazard cannot be eliminated or its associated risk cannot be reduced through design selection, risk must be reduced to an acceptable level through the use of protective safety features or devices. Provision must be made and procedures must be issued for periodic inspection and functional checks of safety devices.
- Warning devices. When neither design nor safety devices can effectively eliminate identified hazards or reduce risk to an acceptable level, warning devices must be used to detect the condition and produce an adequate warning signal to alert individuals to the hazard. Warning devices should be standardized to minimize the probability of incorrect reaction of personnel to these warning signals.
- Develop Special Procedures and Training. When it is impossible or impractical to eliminate hazards through design selection or adequately reduce its associated risks through safety or warning devices, then approved procedures and special training programs must be used. Procedures may include the use of personal protective

equipment. Precautionary notations and warning signs must be standardized. TriMet employees who perform critical tasks require certification of personal proficiency.

- **Note:** Warning, caution, and other forms of written advisories cannot be used as the only method of risk reduction for Category I (Catastrophic) and Category II (Critical) hazards.

4.3 Security Analysis

Planning in advance of a terrorist act, crimes committed on transit property or other security incident is essential in providing passengers and employees with a safe and secure environment. A security incident may result in serious injuries or death, destruction of property and facilities, and the inability to continue transit operations to the region. To evaluate the susceptibility to potential threats and identify design corrective actions that can reduce or mitigate the risk of serious consequences from a security incident, LRT will conduct a peer review Security Risk Assessment as previously stated above. The outcomes of the peer review will be provided to the design team so that they can be addressed during design to the extent possible. Additional assessments will be made as the project advances toward revenue service by Security and Safety staff from both TriMet and C-TRAN and coordinated through the CRC SSC.

Threat

A threat is defined as any action with the potential to:

- Cause loss of, or damage to, an asset.
- Death or injury to personnel and the public.

The CRC SSC will assess security threats from theft, vandalism, graffiti, auto theft, robbery, trespassing, sabotage, terrorism, and other criminal activities that may occur within the LRT system. The frequency and severity of the threats against people and property will be determined through input from TriMet Transit Police and City of Vancouver Police. People and property are defined as follows:

- **People:** Passengers, employees, and the general public.
- **Property:** Stations, Light Rail Vehicles, Wayside facilities (communication rooms/cabinets and signal rooms/cabinets), fare vending machines, etc.

Vulnerability

Vulnerability is the susceptibility of the system that can be taken advantage of to carry out a particular type of security event. Vulnerabilities may be created by:

- Design and construction of the stations, guideway, wayside facilities, park-and-ride lots and other physical assets.
- Equipment and technology used in the LRT project.

- Operating procedures.
- Policing and security practices.
- Proximity of transit system to potential targets that are not transit related.

LRT Safety and Security staff, TriMet Transit Police and City of Vancouver Police assists in the identification of vulnerabilities and in developing countermeasures to minimize the vulnerability to an acceptable level.




Criticality Matrix

To illustrate consequences, the frequency of threat and the likelihood of occurrence (vulnerability) are combined into a risk level (criticality) matrix (Table 4-4). The consequences are assessed in terms of severity of impact and probability of occurrence for a given threat. The criticality matrix organizes the resulting consequences into categories of high, serious, and low.

The matrix aids TriMet, C-TRAN, and the CRC SSC to prioritize vulnerabilities and to focus first on the most serious threats requiring resolution. Threats with vulnerabilities identified as “High” require further investigation of the potential occurrence and indicate that the condition cannot remain as-is, but must be mitigated. A “Serious” rating in the matrix indicates that countermeasures should be implemented, if at all possible, within fiscal constraints. A “Low” rating means that with review by TriMet and C-TRAN, the risk may be accepted without providing any countermeasures.

Table 4-4. Criticality Matrix

| Frequency of Occurrence | Hazard Categories | | | |
|-------------------------|-------------------|----------------|-----------------|------------------|
| | I Catastrophic | II Critical | III Marginal | IV Negligible |
| (A) Frequent | H (IA) | H (IIA) | H (IIIA) | S (IVA) |
| (B) Probable | H (IB) | H (IIB) | S (IIIB) | S (IVB) |
| (C) Occasional | H (IC) | S (IIC) | L (IIIC) | L (IVC) |
| (D) Remote | S (ID) | S (IID) | L (IIID) | L (IVD) |
| (E) Improbable | S (IE) | L (IIE) | L (IIIE) | L (IVE) |

| Hazard Risk Index | Risk Decision Criteria | Characteristics |
|---|---|---|
| IA, IB, IC, IIA, IIB |  | High (H): Threat must be mitigated |
| ID, IE, IIC, IIIA, IIIB, IVA |  | Serious (S): Threat should be mitigated if possible within fiscal constraints |
| IID, IIE, IIIC, IIID, IIIE, IVA, IVB, IVC, IVD, IVE |  | Low (L): Threat is acceptable with review by management |

Source: Federal Transit Administration Public Transportation System Security and Emergency Preparedness Planning Guide

Threat and Vulnerability Resolution Process

Security threats and vulnerabilities are addressed to minimize crime exposure on the LRT. Threat and vulnerability resolution includes:

Redesign of the identified system element to eliminate or minimize the vulnerability.

- Security awareness program for operating and maintenance personnel.
- Procedures to minimize the impact of a security event.
- Physical enhancements.

Other Safety and Security Analyses

Additional formal hazard analyses will be performed throughout design of the project to address changing conditions encountered during the design process. A detailed hazard matrix and a rating from the Risk Matrix will be used to provide guidance to designers regarding design all options. This matrix will be used to track items to completion to ensure the chosen design is incorporated into the project.

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5. Development of Safety and Security Design Criteria

5.1 Approach to Development of Safety and Security Requirements and Design Criteria

CRC Design Criteria provide guidelines and information that govern the LRT project design. These criteria help to ensure that safety and security are “designed into” the LRT project, including the concepts of “Crime Prevention through Environmental Design” (CPTED), which helps to ensure the effective use of the physical environment to reduce the fear and incidence of crime.

LRT staff, in consultation with TriMet’s Director of Operational Support and C-TRAN Director of Operations, is responsible for developing the criteria. The criteria are updated to reflect lessons learned on all previous projects as well as industry advances.

Safety and security design criteria form the basis for the technical specifications and contract drawings. Basic safety and user requirements are included in procurement specifications for facilities, hardware, and systems, and are coordinated with all LRT project staff, including Safety and Security staff. Many of the safety and security requirements in the specifications take the form of specific deliverables, such as manuals, reports, approved contract submittals, factory test procedures and results, and inspection reports.

The Safety and Security Certification Program assures that the LRT project is constructed and tested in accordance with the safety and security requirements of the technical specifications.

Codes and Standards

In addition to the CRC Design Criteria, the American Railway Engineering and Maintenance-of-Way Association (AREMA) design standards may be used to direct the LRT design.

Additional sources of design criteria for safety and security are derived from:

- The technical specifications from previous contracts.
- Applicable federal, state, and local codes and regulations, including Uniform Building Code, Oregon Occupational Safety and Health Administration (OR-OSHA), Washington Industrial Safety and Health Act (WISHA), etc.
- Standards defined by industry Associations and boards, such as APTA, the American National Standards Institute (ANSI) and the National Fire Protection Association (NFPA).
- Project performance requirements.

- Requirements derived from safety/security peer reviews.
- Safety and security studies, such as Transportation Research Board reports.
- Manual on Uniform Traffic Control Devices, Federal Highway Administration, 2003.
- Transit Security Design Considerations, FTA, November 2004.
- Pertinent safety and security criteria and studies from other transit systems.

5.2 Design Reviews

The Transit Design Manager coordinates design reviews with all LRT project staff. All reviews include TriMet and C-TRAN staff representing Safety and Security, Facilities Management, Operations and Maintenance to ensure that proposed designs complies with TriMet safety and security requirements and gives full consideration to concerns unique to C-TRAN's operating environment. Design reviews are conducted by the CRC SSC.

During design reviews, consideration is given to such items as:

- System interactions.
- Human factors.
- Environmental parameters.
- Isolation of energy sources.
- Materials compatibility.
- Use and long-term storage of critical materials.
- Emergency responses, including emergency egress and rescue paths.
- Fire sources and protection.
- Equipment layout.
- Lighting requirements.
- Operational requirements.
- Maintenance requirements.
- Controlling access to platforms either through CPTED principles or other design concepts to be considered by the project team.

Maximum use is made of existing data and expertise from TriMet and C-TRAN experiences.

5.3 Deviations and Changes

Changes or exceptions to safety and security critical components of the design criteria during the course of the design and construction of the LRT project will be brought to the CRC SSC for review and approval of the changes. Design Managers, Resident Engineers, or appropriate project staff will be required to provide the appropriate drawings, technical specification, and design criteria that requires and exception and reasons for the exception being necessary. The committee will review the information and either approve or not approve the exception. If the exception is not approved, the CRC SSC may require the project staff to return with additional alternatives to review until an acceptable solution is found. This process will be in place throughout the design and construction of the LRT project.

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6. Process for Ensuring Qualified Operations and Maintenance Personnel

6.1 Operations and Maintenance Personnel Requirements

LRT Project is responsible for ensuring qualified TriMet and C-TRAN Operations and Maintenance personnel are trained and have the resources needed prior to taking maintenance and operational responsibility of the line. A timeline for when resources and training needs to be completed by will be developed during the course of the project. Specific job classifications and numbers of personnel that will be required in each will be developed during the design phase and included in the SSMP revision submitted with the Project's Full Funding Grant Agreement (FFGA) application:

- Operations and Maintenance Personnel Requirements
- Plans, Rules, and Procedures
- Training Program
- Emergency Preparedness
- Public Awareness

Requirements related to these items will be addressed in the LRT Project Safety and Security Certification Plan, and the applicable TriMet Policies and Procedures.

6.2 Plans, Rules and Procedures

As the LRT project progresses through design and into construction, existing emergency plans, rules, and procedures will be updated and as needed to meet the needs of the LRT project. In addition, any new plans, rules, and procedures will be developed to close any gaps that may exist in the updated materials. Any updated or new procedures will be reviewed by the CRC SSC as well as TriMet's Transportation Change Review Committee (TCRC). New and updated procedures will be included in training programs for the effected personnel.

The individual plans, procedures, rules, manuals, and any other operating documentation required, will be included on certifiable items lists in the SSCP as they are identified. The macro schedule for their development will be shown on the Safety and Security Activity schedule that will be completed for inclusion in the FFGA SSMP submission. The detailed schedule will be included in the Rail Activation schedule that will be developed prior to the initiation of the Testing and Start-up Phase of the project

6.3 Training Program

Training curriculum will be developed during the course of design and construction of the LRT project for all facets of TriMet and C-TRAN Operations and Maintenance that will be affected by the project. As the LRT progresses, training staff will be able to develop course materials, new rules and procedures, update existing rules and procedures, as well as identify other organizations that would be required to or benefit from TriMet training programs Training for Operations and Maintenance employees regarding operating and maintenance procedures on the new alignment, emergency procedures, accident response procedures, inclement weather procedures, and any other procedures identified during design, construction, and startup and testing will be developed, formalized by the TCRC, and distributed to all affected employees . A schedule of training classes and topics for each affected work group will be developed in order to ensure all persons are trained.

6.4 Emergency Preparedness

Drills, field exercises, tabletops, and other activities related to the preparation of emergency response agencies from Oregon and Washington will be developed during the course of the construction of the LRT project. Tours of the project alignment will be given to the key players for each agency that may respond to an incident involving light rail on the CRC alignment, in order from a practical drill scenario to be developed.

Emergency responders that could be involved in a response to an incident involving the LRT alignment will also received familiarization training of the alignment, vehicles, right-of-way equipment, and emergency procedures currently establish in the TriMet light rail system. Unique areas of the alignment will be given special attention to ensure response protocol and procedures are developed for those particular areas.

Training for emergency responders from both Oregon and Washington will be developed in the FLSC meetings, in which responders can detail the type of support needed from LRT Project.

All specific exercises, tabletop drills, Emergency Drills, or other preparedness activities will be identified in the SITP and the Pre-Revenue Operations and Start-up Plan (PROP), their scheduled performance will shown on the project's Rail Activation schedule and detailed daily PRO schedule, and the criteria for success and evaluation methodology for each Emergency Drill will be included in the individual drill procedures.

6.5 Public Awareness

Prior to opening the new line, CRC is committed to establishing an ongoing, comprehensive public awareness campaign, for both security awareness and emergency preparedness. CRC staff will work closely with partner agencies (C-TRAN, TriMet, WSDOT, ODOT, and the Cities of Portland and Vancouver) to develop a campaign which capitalizes on existing safety and security outreach efforts. These campaigns may include elements of the Transit Watch and Operation Lifesaver programs.

The campaign will emphasize the changing environment with the addition of light rail, vehicle, and pedestrian safety at crossings and along the tracks; and the dangers of trespassing along the

rails. The comprehensive campaign will be targeted to students, motorists, pedestrians, transit riders, first responders, adjacent business and residential properties.

A variety of methods will be used to communicate the safety and security messages including presentations, tours, advertising and web outreach.

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7. Safety and Security Verification Process (Including Final Safety and Security Certification)

7.1 Design Criteria Verification Process

During PE, the Hazard Analysis (HA) and Threat and Vulnerability Assessment (TVA) will be an integral part of the design process. The design section of the SSCP details how the design safety and security requirements will be verified. Safety and security requirements include those identified in the design criteria, as well as those requirements resulting from the PE driven HA and TVA. Hazards identified during PE will be reviewed and documented in the SSCP.

A CIL will be developed, which will include a review of design elements and verification checklist. Completion of the CIL is part of the formal safety and security certification of Final Design. The detailed procedure for design certification, including delineation of authority and responsibility, is included in the SSCP.

7.2 Construction Specification Conformance Process

The construction section of the SSMP details the process used during procurement, construction, and installation to ensure project elements are consistent with the final design requirements and are safety certified.

Formal documentation will be required from contractors, installers, and vendors, including inspection and testing reports, to verify fulfillment of contractual requirements and safety/security standards. Tools used to confirm satisfaction with contract terms include audits (both on- and off-site) and witnessing of material tests performed by contractors and manufacturers. It must be demonstrated that:

- All elements of the system provided under construction, procurement, and installation contracts conform to the safety and security specification requirements.
- All required contractual testing has been satisfactorily performed and evidence submitted, if required.
- The as-built configuration contains the safety and security-related requirements identified in the applicable specifications and other contract documents.

Any changes to the established design configuration that have an effect on safety and security shall:

- Meet applicable code and regulatory rules and regulations;

- Be approved by the CRC SSC; and
- Pass safety and security certification.

Detailed procedures for construction certification, including delineation of authority and responsibility, are included in the SSCP.

7.3 Testing/Inspection Verification

Verification of testing and inspection requirements is done in two stages, both require that all safety and security elements be adequately inspected, tested and documented before acceptance. All contractually required inspections and tests (factory, material, and field) are overseen by the Quality Assurance (QA) Administrator, construction managers, Quality Control (QC), and by safety and security personnel as necessary. Tests that are required to assure proper integration of systems, or are safety or security sensitive are included in the SITP. During the construction, integration and start-up phases, many contractual and integrated tests are conducted for the purpose of validating proper operation of equipment furnished and constructed for the Project. Those that are necessary prior to substantial completion of construction are identified in the contract documents and will be performed by contractors under Project oversight. LRT testing and commissioning processes require a detailed RAP be prepared by the Project for the execution of the RAC.

Rail Activation Plan

The RAP is made up of three plans:

- **Safety and Security Certification Plan (SSCP):** The SSCP identifies requirements, processes and responsibilities for the CIL for each certifiable element, hazard and vulnerability resolution verification, and the certification of design, construction, integration testing, pre-revenue operations, training, development of needed operational plans and procedures, and all other required elements for safe and secure operation.
- **System Integration Testing Plan (SITP):** The SITP identifies tests and drills required to be performed and for each, prerequisites required planning and materials, test success criteria, and responsibilities for performing and witnessing the test or drill. System integration testing (SIT) is performed during the integration testing phase of the project, which begins after all contractual testing is done and substantial completion is given to the contractor. Each test or drill will have a RAC approved detail procedure, with appropriate data sheets. A testing schedule will be published as part of the SITP. Contractor personnel may perform tests, however, they must be overseen and witnessed by CRC personnel to verify results and document the test reports. After all SITs are satisfactorily completed, reports accepted, and results verified by the RAC, the SITs will be safety and security certified by the procedures in the SSCP. The SITP will contain the detailed SIT procedures and management roles and the SSCP will contain the details of SIT certification.

- **Pre-Revenue Operations and Start-Up Plan (PROP):** The PROP will be developed under RAC oversight during FD, refined during Construction, and finalized in the early SIT phase. It includes all operational scenarios that will be run at the conclusion of SIT to test schedules and ready operators and other operations and maintenance staff for revenue operations. The plan also identifies all other operational needs to be met prior to the start of service. These include Rulebook revisions, SOP updates, training, manuals, public education, and SOA requirements.

7.4 Hazard and Vulnerability Resolution Verification

The Hazard and Vulnerability Resolution Verification process is detailed in Section 4.2 of this document. The hazard and vulnerability identification and resolution process was described in Section 4. Each identified and management-approved hazard or vulnerability resolution or mitigation is added to design and construction requirements and recorded on a tracking list. The list is used by Project safety and security, designers, construction managers, and the RAC to follow each through the design, construction, and testing process. For each hazard or vulnerability resolution or mitigation, the means of verifying its adequacy is defined in the tracking documents and may vary from simple observation to comprehensive testing. The verification all hazard and vulnerability resolutions have been appropriately included in the design is included in the verification of FD. The verification all hazard and vulnerability resolutions have been appropriately constructed is included in the verification of construction. Those that require systems integration for resolution will be included in the appropriate tests within with SITP. The detailed procedures for hazard and vulnerability certification, within the design and construction certification requirements, are included in the SSCP.

7.5 Operational Readiness Verification

Operational readiness will begin with the development of the Pre Revenue Start up and Operations Plan (PROP). The PROP will detail the necessary training, plans, SOPs, manuals, and qualifications needed for TriMet and C-TRAN Operations and Maintenance personnel to run and maintain the LRT system once in revenue service. Details for this plan will be developed by CRC project staff, CRC systems and civil contractors, TriMet Operations, TriMet Maintenance of Way, TriMet and C-TRAN safety, C-TRAN Operations, and TriMet Training. The PROP will be approved by the TCRC and the CRC SSC. Requirements from the PROP, such as training of operations and maintenance employees, will be tracked on an Operational Readiness safety certification list to ensure proper tracking, documents, and training has occurred for all affected employees.

Verification is required for:

- Development of all needed plans, rules and procedures;
- Preparation of and acceptance manuals documenting operation and maintenance requirements of systems, equipment, and facilities; and
- Proper training of operations and maintenance personnel, including simulation of revenue operations.

These requirements and means of verification are detailed in the PROP. The verification mechanism is also described in the SSCP.

7.6 Safety and Security Certification Requirements

One of the major activities of the CRC project is the implementation of the SSCP. The purpose of the SSCP is to ensure that prior to the start of revenue passenger service, design and operating hazards and security vulnerabilities are identified, evaluated, and properly controlled or mitigated, to the extent possible, with available resources. The SSCP provides traceable verification that all safety-critical and security systems, subsystems, procedures and training programs have been reviewed for conformance with all applicable safety and security requirements, including codes, standards, and industry practices. The program provides TriMet and C-TRAN's executive leadership with reasonable assurance that the LRT project can operate safely and securely.

TriMet will self-certify that all safety and security critical systems of the LRT that may impact passenger, employee, or public safety are operationally ready to enter safe and secure revenue service. The Safety Certification process is closely monitored by the SSC.

The goals of the SSCP are to verify that identified safety and security requirements have been met and to provide evidence that LRT equipment, systems and facilities are safe to use.

The objectives of the SSCP are to document that:

- Facilities and equipment have been constructed, manufactured, inspected, installed, and tested in accordance with safety and security requirements in the design criteria and contract documents.
- Operations and maintenance procedures and rules have been developed and implemented to ensure safe operations.
- Training programs have been developed for the training of operating personnel, and emergency response personnel.
- Transportation and maintenance personnel have been trained and qualified.
- Normal, and emergency procedures and plans have been developed.
- Emergency response agency personnel have been prepared to respond to emergency situations in or along the LRT system.
- Safety and security-related system integration tests have been conducted.
- All security-related issues have been addressed and resolved.

Safety and Security Certification Process

The certification process begins with system design and continues through the start of revenue operation. An outline of the certification process is shown below.

The Safety Certification Process includes the following components:

- The SSCP is developed for the LRT project.
- Certifiable Elements and Certifiable Items Lists are developed for the LRT project. The CRC SSC monitor system hazard identification and resolution process.
- Design Conformance Checklists are developed and completed checklists are approved to verify that safety and security criteria are included in specifications and drawings.
- Specification Conformance Checklists are developed and completed checklists approved to verify that facilities, systems and equipment are constructed, installed and tested in accordance with the design and specifications.
- Integrated Tests Conformance Checklists are developed and completed checklists approved to verify the functionality and compatibility of integrated systems and equipment.
- Certification of Start Up Requirements
- All open safety and security issues are resolved.
- Final Project Safety and Security Certificates are prepared under the guidance of the CRC SSC.

The Safety and Security Executive, through the CRC SSC, monitors certification progress in preparing and completing the conformance checklists in a timely manner, reviews documentation assessments of the documentation that supports conformance with the safety and security requirements, and any open or unresolved items. The committee, based on the documentation, assessments and open-items, determines whether to accept the completed checklists and open-items list as-is or to require corrective actions to bring the checklists and/or open-items to an acceptable level. Upon evidence of satisfactory conformance with the certification requirements, the Safety and Security Executive issues a written safety/security Certificate of Conformance for the individual system element or sub-element, as applicable, along with any restrictions or work-arounds. In the event the documentation or action is security sensitive, disclosure is limited to those with a need-to-know.

Final Certification

After a Certificate of Conformance is issued for each major element and sub-element and the CRC SSC is satisfied, the Safety and Security Executive recommends to the TriMet GM and C-TRAN ED/CEO the issuance of a System Safety & Security Certificate. The Certificate signifies that the LRT is safe and secure for revenue service. Restrictions and work-arounds not affecting the safety or security of the LRT may remain on certain systems, allowing TriMet to

operate the light rail system in a restricted mode. Such restrictions and work-arounds are documented and communicated in writing to all affected parties and remain in effect until fully resolved by the CRC SSC.

If the CRC SSC determines the safety and security requirements have not been met or insufficient evidence is available to demonstrate certification conformance, it has the responsibility and authority to recommend to the TriMet GM and C-TRAN ED/CEO that revenue service be delayed until corrective action is taken.

Final Verification Report

A Safety and Security Certification Verification Report (SSCVR) will be prepared for the CRC project, which will be approved by the CRC SSC. The report will summarize the safety and security certification status and the readiness for start of safe and secure LRT operations. The Final Report:

- Summarizes the safety and security certification process and describes status of:
 - Conformance checklist.
 - System testing activities.
 - Operations, maintenance and training activities.
 - Hazard and open items identification and resolution.
- Describes any operating restrictions.
- Recommends action that should be taken to eliminate the restrictions.
- Provides a recommended schedule for eliminating restrictions.

8. Construction Safety and Security

8.1 Construction Safety and Security Program Elements

Construction safety and security is a top priority in all regional highway and transit construction projects. TriMet has developed a construction safety and security program that is applicable to all light rail construction projects, including the LRT project. The specific requirements of the program are outlined in the TriMet document TriMet's Capital Projects and Facilities Construction Safety Program, dated November 2009. The purpose of the TriMet Capital Projects and Facilities Construction Safety Program document is to specify the construction contractor requirements in the development of site-specific safety and security plans that manage the safety and security risks associated with construction projects, including but not limited to contractor employee injury, property damage, public injury and pedestrian and vehicular traffic for the LRT project. Compliance with the safety and security requirements is a stipulated provision in all LRT construction contracts.

The minimum safety and security requirements to be covered by the contractor's site specific Construction Safety and Security Plan (CSSP), must be submitted for approval before any physical work will be allowed on the contract, and will be contained in a TriMet Construction Safety and Security Manual (CSSM). The CSSM will be developed early in the FD Phase and included as part of the specifications of all construction contracts. In addition, the CSSP will be required to meet any additional contract specific safety and security requirements, unique to the individual contract work, that are provided in the contract's Special Conditions or Technical Specifications.

Ultimate responsibility for the development of site-specific plans belongs with the construction contractor. The LRT Safety and Security office is tasked with reviewing and recommending approval/disapproval of the Contractor Safety and Security Plan, and for overseeing the contractor's construction safety and security program. The Transit Manager is responsible for enforcing the safety and security provisions of TriMet's Construction Safety and Security Program. It is intended that the project partners will work together to identify the best method of insuring the project. It is anticipated an outside insurer can assist the project by providing the following services:

- Perform on-site safety and security surveys.
- Assist with the investigation of accidents.
- Attend and participate in safety meetings with contractors.
- Monitor Compliance with the TriMet Construction Safety and Security Program.
- Ensure contractor is following the approved site-specific safety program.
- Analyze loss trends.

8.2 Construction Phase Hazard and Vulnerability Analysis

The purpose of this analysis will be to identify and resolve or mitigate hazards, threats, and vulnerabilities that may be unique to the construction phase of the project, including but not limited to theft of materials, vandalism, sabotage, and trespass.

A requirement of the site specific safety and security plans will be contractor performance of a job hazard analysis (JHA) for each specific construction activity. These JHAs are required to be submitted to the project RE for review and comment. The RE will forward each JHA to the DSS or DDSS for review and comment and incorporate received comments before granting approval of the JHA. The contractor will be required to review the JHA with all affected employees during the initial start up of the task, during and modification of the process, and after any incident. Updates will occur in the field as seen necessary by contractor or CRC project staff.

Site inspections will be performed on a regular basis as per the site specific safety and security plan developed in the last stages of final design. Inspections must be documented and items that are found out of compliance will be tracked to ensure proper mitigation has taken place. Site inspections will be performed by contractor and CRC personnel.

If safety and security issues arise that will affect the final configuration of the system during the course of construction, specific hazard analyses or TVAs would be performed by CRC safety and security staff, with support from technical experts as required. A thorough review of analyses will be done by the SSC, and resulting disposition decisions will be documented in the SSC meeting minutes. If an approved disposition affects the safety and security certification of an item, appropriate change will be made to the CIL and tracked accordingly.

8.3 Safety and Security Incentives

If incentives will be provided, they will be described in the FFGA SSMP submission.

9. Requirements for 49 CFR Part 659, Rail Fixed Guideway Systems; State Safety Oversight

An oversight committee will be established to provide oversight of the Columbia River Crossing Light Rail Project. The committee members will include representatives from ODOT, WSDOT, TriMet, and C-TRAN. The committee will work to ensure compliance with 49 CFR Part 659, Rail Fixed Guideway Systems; State Safety Oversight.

The oversight committee will review both the SSPP and the System Security and Emergency Preparedness Plan (SEPP) for conformance with the program standard and procedures. Each December, the System Safety Program Plan and the System Security Program Plan are updated; these updates will reflect the current status of the rail project. Approval of the SSPP and SEPP revised to include the CRC LRT extension will be received from the SOA prior to initiation of revenue operations.

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10. Federal Railroad Administration (FRA) Coordination

The requirements related to Federal Railroad Administration (FRA) coordination are not applicable to the LRT project.

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11. Department of Homeland Security (DHS) Coordination

Activities

TriMet's Safety and Security Executive holds a security clearance (secret-level) and works closely with the Department of Homeland Security (DHS) on matters related to transportation security. On November 18, 2008 TriMet received the Transportation Safety Administration (TSA) Partnership Award from the Department of Homeland Security for continued partnership on matters of Homeland Security.

Implementation Schedule

There are currently no programs managed by DHS relating to the Project; the Safety and Security Executive receives regular communications from DHS, works in close partnership with local TSA officials, participates in the Joint Terrorism Task Force, and attends the FTA/TSA Safety and Security Roundtable meetings to ensure TriMet remains current on Homeland Security matters and requirements.

Coordination Process

The Safety and Security Executive is responsible for coordinating with DHS and for informing the Columbia River Crossing Project team and the project Safety and Security Committee of any DHS requirements that are applicable to the Project during the design, construction, installation, and testing phases.

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Appendix A: Project Safety and Security Schedule

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