Low System Improvement Program

Safety Certification Plan

for the

San Diego Light Rail Vehicle Procurement

Revision: 1
Date: 07/14/11

Prepared for:

San Diego Metropolitan Transit System – Rail (MTS)

Wayne Terry, Chief Operating Officer - Rail Date

Prepared by: Parsons Brinckerhoff

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REVISION TRACKING

Rev. #	Rev. Date	Section(s) Affected	Comments
0	07/06/2011	n/a	Initial issue
1	7/14/2011	1.1, 1.4.2, Exhibit 3-1 (new exhibit), 5.3, 6.2.1	Incorporates comments from CPUC on Rev 0.

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List of Acronyms

Acronym	Definition
CCR	California Code of Regulations
CFR	Code of Federal Regulations
IIP	In-plant Inspection Program (PB personnel)
COC	Certificate of Conformance
CPUC	California Public Utilities Commission
FD	Final Design
FTA	Federal Transit Administration
GO	General Order
HTM	Hazard Tracking Matrix
LRV	Light Rail Vehicle
MTS	Metropolitan Transit System, (System Operator)
PB	Parsons Brinckerhoff (consultant to SANDAG)
PE	Preliminary Engineering
SANDAG	San Diego Association of Governments
SCP	Safety Certification Plan
SRC	Safety Review Committee
STSI	Siemens Transportation Systems, Inc.

SECTION 1 INTRODUCTION

The Federal Transit Administration (FTA), under Code of Federal Regulations (CFR) 49, Part 659, requires each State to designate an agency to oversee the safety of rail fixed guide way systems. The California Public Utilities Commission (CPUC) is designated as the state safety oversight agency for California. The CPUC has issued General Order (GO) 164-D to implement the provisions of 49 CFR 659. The CPUC requires a safety certification program to be in place for major projects, as part of General Order 164-D.

This Safety Certification Plan (SCP) applies to the design, manufacture, testing, start-up, commissioning and support of pre-revenue service and operational readiness of the Light Rail Vehicle (LRV) for operation on the San Diego Trolley system. The plan may be revised and expanded as the project progresses.

1.1 Purpose

The SCP describes the process, responsibilities, documentation, and procedures needed for safety certification of 57 new light rail vehicles (LRV) to be built by Siemens Transportation Systems, Inc. (STSI) of Sacramento, CA as an option exercised against the Salt Lake City Utah Transit Authority (UTA) vehicle order SLC4, identified as MTS order SD8. These vehicles are functionally and operationally identical to an earlier order of 11 similar vehicles manufactured by STSI under order SD7 in 2004 and previously certified by the CPUC. The intent of the SCP is to identify the processes to verify and document that the design, manufacture, and commissioning of the LRV systems and equipment are in compliance with safety requirements; any changes necessary in the operations and maintenance manuals have been provided; and operations and maintenance personnel have been trained in any areas not identical to earlier SD7 vehicles. Additionally, it provides a framework for ensuring that appropriate safety related activities have been performed and documented to support each Certificate of Conformance (COC) issued in the LRV certification process.

1.2 Objectives

The SCP objectives are to verify by documentation that prior to commissioning of each LRV for revenue service the following objectives are accomplished.

- Identified, assessed, and resolved system safety hazards to acceptable levels for all conditions, associated with the design, manufacture and operation of LRV;
- Reviewed the MTS Low-Floor Light Rail Vehicle Procurement Technical Specifications to verify that they conform to the design requirements of General order (GO) 143-B with respect to safety;

- Determined that the safety features in Light Rail Vehicle have been designed, built, inspected, and tested, in accordance with the conformed MTS Low-Floor Light Rail Vehicle Procurement Technical Specifications;
- Verified as-built drawings and plans properly identify the completed LRV design;
- Trained, qualified and/or certified all personnel who will operate and maintain the LRV in areas not identical to earlier SD7 vehicles;

1.3 Definition of Safety Certification

Safety Certification is the process of verifying compliance with a set of formal safety requirements. For LRV certification the process will ensure that the required verification activities are performed and documented, and Certificates of Conformance are signed and issued by responsible parties.

Contractual acceptance and safety certification are separate processes and actions. Contractual acceptance does not constitute safety certification, and safety certification need not imply acceptance with respect to contract performance.

1.4 Responsibility

The MTS System Safety Manager, Superintendent of Light Rail Vehicle Maintenance and/or the MTS Contractor Parsons Brinckerhoff are responsible for overseeing the activities of the LRV Safety Certification Plan (SCP). The MTS System Safety Manager chairs the Safety Review Committee (SRC) defined in Section 3.1. A summary of the safety certification program responsibilities is shown in Table 1-1.

1.4.1 MTS Responsibility

MTS is responsible for certifying the safety of the new Light Rail Vehicles, completion of safety-related testing, verification of supplements to the existing operations and maintenance manuals necessary to cover any changes as specified in the contract documents, and verification of completion of Contractor provided maintenance training and operations in areas not identical to earlier SD7 vehicles. In the performance of safety certification functions MTS will be assisted by the consultants as identified in Table 1-1. Each LRV will be tested and safety certified in accordance with this SCP. As each vehicle is certified, MTS will prepare a Certificate of Conformance, which will be maintained in the Light Rail Vehicle Procurement Safety Certification Verification Records and will be readily available for CPUC inspection. After completion of all the safety-certification tasks referenced in Table 1-2: Certifiable Factors and Scope, have been performed and documented on a single LRV, MTS will send the LRV Safety-Related Certification Conformance as shown in Table 1-2, Task #4, to the PUC for review and conditional approval to allow the completed vehicle to enter into revenue service. A final SCVR will be transmitted to show completion of the seven certifiable elements shown in Table 1-2 for the 57 vehicles.

1.4.2 CPUC Responsibility

The CPUC is responsible for review and approval of the Light Rail Vehicle Procurement Safety Certification Plan and inspection and audits of the LRV Safety Certification records. In addition the CPUC inspectors may participate in and witness LRV testing. Besides reviewing and approving the SCP, CPUC staff may request supporting documentation at all phases of the LRV Procurement, i.e. hazard analyses, conformance checklists, etc.

Table 1-1: Summary of Light Rail Vehicle Procurement Safety Certification Program Primary Responsibilities

#	Safety Certification Tasks	Responsibility
1.	**Safety Certification Plan (SCP) for Light Rail Vehicle**	
	Prepare Draft Safety Certification Plan (SCP)	PB
	Internal Review and Comment	SANDAG, MTS
	Incorporate Comments and Finalize for Submittal to CPUC	PB
	Send formal SCP to CPUC Staff for review & approval	PB
	CPUC Review and Comment	CPUC
	Respond to CPUC Comments	SANDAG, MTS, PB
	Formal Approval of SCP by Commission	CPUC
2.	**Develop GO 143-B Conformance Checklist**	
	Develop Checklist	PB
3.	**Conduct Independent Safety Audits**	
	Periodic Through Design	PB
	Periodic Through Construction	PB
4.	**Verify GO 143-B Conformance Checklist and Issue Certificate**	
	Complete the Checklist	PB
	Review of content and reference checks	PB
	Issue Certificate	MTS
5.	**Develop LRV Technical Specification Conformance Checklist**	
	Develop Checklist - Based on Contract Specifications	STSI
6.	**Verify Specification Conformance Checklist**	
	Inspect/Monitor Contractor Compliance with Specifications	IIP
	Complete Checklist	IIP
	Review of content and reference checks	PB
	Issue Certificate	MTS
7.	**Verify Each LRV Safety-Related Certification Conformance**	
	Receive/Review/Confirm Adequacy of Safety Tests Data	IIP
	Receive/Review/Confirm development of as built drawings for each LRV	PB

	Receive/Review/Confirm that Car History book contains particular LRV safety related data.	IIP/PB
	Issue Certificate for the certified LRV	MTS
8.	**Verify Multi-Vehicle Test conformance**	
	Receive/Review test data and confirm successful completion of multi-vehicle operation test.	IIP
	Issue Certificate	MTS
#	**Safety Certification Tasks**	**Responsibility**
9.	**Verify Operations & Maintenance Manuals Conformance**	
	Receive contractor provided supplements, as necessary, to the existing operations and maintenance manuals and route for review and approval	MTS
	Review/Comment/Approve supplements to the manuals	IIP/MTS
	Issue Certificate, if applicable	MTS
10.	**Verify completion of Operations and Maintenance Training**	
	Develop Maintenance Training Plan, if necessary, in areas not identical to earlier SD7 vehicles	STSI
	Conduct Maintenance Training Sessions, if necessary	STSI, MTS
	Confirm completion of Operations and Maintenance Training sessions, , as necessary	PB / MTS
	Issue Certificate, if applicable	MTS

1.5 Scope of Safety Certification Program

The Safety Certification Program scope encompasses safety certification of the Light Rail Vehicles, safety-related procedures, and hazard resolution activities for the LRV Procurement. The process can be categorized into distinct progress factors throughout the advancement of the project. Specifically, certification focuses on the following seven “Certifiable Factors”:

1. GO 143-B LRV Requirements Conformance
2. LRV Technical Specification Conformance
3. Hazard (Risk) Resolution Conformance
4. LRV Certification Conformance
5. Multi-Vehicle Acceptance Test Conformance
6. Supplements to Operations and Maintenance Manuals Conformance for any necessary changes to the existing manuals
7. Training Conformance in areas not identical to earlier SD7 vehicles

The certifiable factors will apply to LRV procurement as defined in Table 1-2. As each LRV is manufactured it will be tested and safety certified.

Some or all of the seven certifiable factors will apply to the entire 57 LRV Procurement or to each LRV as described in the scope in Table 1-2.

Certificates of Conformance required for the various certifiable factors necessitate the performance of a variety of system safety activities. The activities may be performed either independently, or integrated with other tasks such as acceptance testing. Regardless of whether the activities are performed independently or integrated with others, activity records must be developed and maintained as evidentiary support for the Certificates of Conformance.

Table 1-2: Certifiable Factors and Scope

#	Certifiable Factor	Scope
1.	**GO 143-B LRV Requirements** Conformance	This certifiable factor will apply to the entire 57 LRV procurement. One Certificate of Conformance will be issued for Conformance with GO 143-B LRV Requirements.
2.	LRV Technical Specification Conformance	This certifiable factor will apply to the entire 57 LRV procurement. The certification will verify that the designed and as-manufactured LRV and equipment comply with the safety-related specification requirements. Some of the safety-related specification requirements which apply to each LRV will be verified separately under LRV Safety-Related Certification Conformance. One Certificate of Conformance will be issued for conformance with the system wide safety-related specification requirements.
3.	Hazard Resolution Conformance	This certifiable factor will apply to the entire 57 LRV procurement. The safety analyses will be performed by the vehicle manufacturer and will be verified under LRV Technical Specification Conformance. The Hazard Resolution Conformance will verify that all resolutions identified in the Manufacturer performed safety analyses have been implemented in the design or required cautions and procedures have been incorporated in the manuals. One Certificate of Conformance will be issued for Hazard Resolution Conformance.
4.	LRV Safety-Related Certification Conformance	This certifiable factor will apply to certification of safety-related specification requirements of each vehicle individually. A separate Certificate of Conformance will be issued for each LRV after successful completion and verification of the following items for each LRV. a) Safety related tests

#	Certifiable Factor	Scope
		b) Car history book
5.	Multi-Vehicle Acceptance Test Conformance	This certifiable factor will apply to the entire 57 LRV procurement and multi-vehicle operation in mixed configurations as specified in LRV Technical Specifications. One Certificate of Conformance will be issued after successful completion of the test.
6.	Supplements to Operations and Maintenance Manuals Conformance	This certifiable factor will apply to the entire 57 LRV procurement. One Certificate of Conformance will be issued, If applicable, for Supplements to Operations and Maintenance Manuals Conformance for any necessary changes to the existing manuals.
7.	Training Conformance	This certifiable factor will apply to the entire 57 LRV procurement for required operations and maintenance training, if necessary, in areas not identical to earlier SD7 vehicles. If applicable, one Certificate of Conformance will be issued for operations and maintenance training.

1.6 Safety Certification Plan Revisions

The SCP will be revised as necessary. Changes may be proposed by any department and submitted in writing to the MTS Project Manager for review and consideration. The Safety Review Committee, defined in Section 3.1, will review and approve the changes to the Plan. The revised Plan will be submitted to CPUC for approval of proposed revisions, in accordance with General Order 164-D. The revised Plan will become effective when the revisions are approved by CPUC Staff.

SECTION 2 CERTIFICATION PROCESS AND PROCEDURES

This section describes how the certification process will function and provides an overview and description of the process.

2.1 Background

The Safety Certification Program consists of seven Certifiable Factors which apply to the safety certification of the Light Rail Vehicle Procurement.

- **GO 143-B LRV Requirements Conformance**. The conformance process is to verify that the LRV technical specifications incorporate the safety related GO 143-B LRV requirements.
- **LRV Technical Specification Conformance**. The specification conformance process is to verify that the design and as-built LRV and equipment contain the safety related requirements identified in the specifications and other contract documents, including approved changes since the final design. The LRV procurement order is an option exercised against the Salt Lake City Utah Transit Authority (UTA) vehicle order SLC4, identified as MTS order SD8. These vehicles are functionally and operationally virtually identical to an earlier order of 11 similar vehicles provided by Siemens Transportation Systems, Inc. (STSI) under order SD7 and previously safety certified. The operator controls are exactly the same as the SD7 and most of the individual vehicle systems are likewise identical, even though the new vehicle is slightly shorter. Unless the system design has changed under SD8, many system certifications will be referenced back to UTA tests or earlier SD7 tests, etc.This certifiable factor will apply to the system wide safety certification of the Light Rail Vehicle Procurement. Some of the safety-related specification requirements apply to each LRV which would be verified under the LRV Safety-Related Certification Conformance process.
- **Hazard Resolution Conformance**. The hazard resolution conformance process is to verify that all identified hazards have been satisfactorily tracked and resolved through a resolution process. This certifiable factor will apply to the entire 57 Light Rail Vehicle Procurement. The safety analyses will be performed by Siemens Transportation Systems Incorporated and will be verified under LRV Technical Specification Conformance. The Hazard Resolution Conformance will verify that all resolutions identified in the Contractor performed safety analyses have been implemented in the design or required cautions and procedures have been incorporated in the manuals.
- **Each LRV Safety-related Certification Conformance**. The LRV safety-related certification conformance process consists of verification of the following items.

a) Safety Tests: Verification that safety tests are conducted on each vehicle to verify that sub-systems, equipment function safely as specified and do not contain or create known hazards.

b) Car History Book: Verification that the car history book contains particular LRV safety related data.

- **Multi-Vehicle Acceptance Tests Conformance.** These tests are performed to verify the new vehicles operate in various multi-vehicle consist configurations safely as specified and do not contain or create known hazards. Testing will include verification of trainline operation of various consists of up to four cars. Several different consist configurations will be tested. Initially consists of new low-floor vehicles will be tested. When satisfactory trainline operation of the new cars is achieved then mixed configurations in various combinations of new vehicles with existing SD 100 and S70 vehicles will be conducted. Compatibility with older U2 type cars will not be tested as these vehicles are being retired.
- Supplements to **Operations and Maintenance Manuals Conformance**. The operations and maintenance manuals conformance is to verify that the required revisions to existing SD7 operations and maintenance manuals include appropriate safety warnings and instructions on safety features and emergency operations.
- **Training Conformance**. The training conformance process is to verify that any necessary additional training in systems and equipment not identical to earlier SD7 vehicles has been provided, and training in normal and emergency procedures has been given to system personnel.

Certificates of Conformance will be developed systemwide and for each LRV as defined in Table 1-2. As each LRV is manufactured, tested and safety certified, Certificates of Conformance will be issued and documented in the Light Rail Vehicle Procurement Safety Certification Verification Records and will be available for CPUC inspection and review. This process is illustrated in Exhibit 2-1.

Exhibit 2-1: Safety Certification Process

2.2 Certification Activities

The safety certification process is active throughout the life of the project. It is important to note that each LRV subsystem and equipment could have its own design, manufacture, and testing phases, therefore all certification activities will not occur simultaneously. Within each phase, activities are identified to determine the safety related certification activities expected to be accomplished at each project milestone. For the Light Rail Vehicle Procurement, the following Project phases have been identified:

- ***PE*** – Preliminary Engineering
- ***M*** – Final Design and Manufacturing
- ***AT*** – Acceptance Testing
- ***PR*** – Pre-Revenue Operations Commissioning (including pre-revenue start-up testing)

A list of the basic activities and the desired milestone goals are presented in Table 2-1. Checks (√) indicate the start of an activity; arrows (⇒) indicate an ongoing activity.

2.3 Safety Certification Steps

In general terms, the safety certification process of Light Rail Vehicle Procurement shall consist of five steps:

1. Create a list of certifiable factors
2. Define the conformance checklists and items to be tracked
3. Verify compliance with the requirements
4. Audit the compliance with requirements
5. Document the review and approval process.

- **Step 1** – Create a list of Certifiable Factors . The first step of the process is to identify the certification requirements for each certifiable factor applicable to Light Rail Vehicle Procurement. This is defined in Section 1.5 of the Plan.

- **Step 2** – Define the Conformance Checklists and Items to be tracked. The second step of the process involves the creation of various “Conformance Checklists" and certifiable items to be tracked for compliance with safety requirements. The purpose of the checklists is to provide a method to track and verify the compliance of each requirement. The GO 143-B Checklist will verify that safety-related requirements have been included in the LRV Technical Specifications. The LRV Technical Specification Conformance Checklist will

verify that safety required items have been constructed, tested and installed as specified.

Table 2-1: Safety Certification Activities

#	Task (as applicable)	Project Phase			
		PE	M	AT	PR
1.	Develop Safety Certification Plan	√	⇒	⇒	
2.	Specify Requirements of SCP into Contract Documents	√	⇒		
3.	Implement Certification Tracking System	√	⇒	⇒	⇒
4.	Develop GO 143-B Conformance Checklist	√	⇒		
5.	Verify GO 143-B Conformance Checklist and Issue Certificate		√		
6.	Develop LRV Technical Specification Conformance Checklist		√		
7.	Verify LRV Specification Conformance Checklist and Issue Certificate		√	⇒	
8.	Verify Implementation of Hazard Resolutions into Design and Manuals and Issue Certificate		√	⇒	
9.	Conduct Independent Safety/Security Audits		√	⇒	⇒
10.	Verify Multi-Vehicle Test Conformance and Issue Certificate			√	⇒
11.	Verify Supplements to Operations & Maintenance Manuals Conformance and Issue Certificate			√	⇒
12.	Complete Additional Operations & Maintenance Training, if necessary, and Issue Certificate			√	⇒
13.	Complete Light Rail Vehicle Procurement Safety Verification Records		√	⇒	⇒

The checklists form the backup documentation for the Certificates of Conformance. Each list, therefore, must be prepared and reviewed to ensure compliance with the goals of the SCP.

Regardless of the structure and scope of the various checklists, combined they need to identify the safety requirements for all certifiable factors covered in the Light Rail Vehicle Procurement SCP.

- **Step 3** –Verify Compliance with the Requirements. This step consists of using the conformance checklists to conduct appropriate reviews to verify that the safety related requirements identified in Step 2 are incorporated into the end product. Methods to accomplish this include: document reviews, contract deliverables, audits, inspections, and testing. As requirements are verified, the

appropriate checklists are completed, stating the method of verification, the date, and the name of the individual performing the verification. The responsible party verifies each line item in the checklist and signs off the completed checklist. When complete, the responsible party submits the checklists to the Safety Review Committee (SRC) for review and acceptance. The objectives and function of SRC is defined in Section 3.

- **Step 4** - Audit the Compliance with Requirements. Safety and security certification audits will be conducted for each phase of the Safety and Security Certification process. The audit process is described in Section 6.2 2.

- **Step 5** – Document the Review and Approval Process. Documentation is essential to provide evidence of the various reviews, analyses, tests, inspections, training, and hazard resolution activities performed to verify the safety of the system. Once all the conformance checklists are executed, validated and reviewed, the responsible party must complete and sign the associated Certificate of Conformance, and submit it to the SRC for review and acceptance. Checklists shall be submitted to the CPUC staff upon request. Detailed documentation requirements for the issuance of certificates are further described in Section 5.

2.4 Filing System

A formal filing system shall be developed and maintained for the safety certification process to ensure that all Certificates of Conformance are accurately completed and signed by the appropriate levels of authority, and that all certificates are adequately supported by checklists or other records that verify the work performed.

2.5 Reporting of Progress

Details of the progress reporting, including milestone and final certification reporting requirements, are described in Section 6.

SECTION 3 PROGRAM MANAGEMENT

3.1 Safety Review Committee (SRC)

The Safety Review Committee (SRC) is a "working group" established to provide general guidance and support to the safety certification effort and to address detailed safety issues associated with certification activities. The objective of the SRC is to assure the timely implementation of the SCP.

The SRC is comprised of project representatives from SANDAG and MTS and is chaired by the MTS System Safety Manager. The MTS System Safety Manager will identify representation to SRC on an as needed basis as necessary. The CPUC staff may participate in SRC meetings and may serve as an ex-officio member of SRC.

The SRC reviews compliance with stated safety certification requirements for LRV Procurement, and recommends to the Chair acceptance of conformance documents following satisfactory verification. Status reports on safety certification are provided to the SRC at its meetings to review progress.

The SRC may perform audit and inspection activities of project functions to review safety compliance. For example, the SRC representatives may witness safety-related system tests to verify that test procedures are followed correctly, and that test results are acceptable.

For the Light Rail Vehicle procurement, the SRC will perform the following project-specific functions:

- Review and approve conformance checklists
- Participate in safety audits
- Review records, and may conduct site inspections for safety related items
- Review and approve submitted Certificates of Conformance
- Monitor and audit overall implementation of the Safety Certification Program
- Review Light Rail Vehicle Procurement Safety Verification Records.

Exhibit 3-1: Safety Review Committee Organizational Chart

SECTION 4 HAZARD MANAGEMENT

This section describes the safety analysis process as it applies to the Light Rail Vehicle Procurement. Within the Certification Program, the term “hazard” is defined to include identified or perceived hazards that may occur over the system’s lifecycle. As part of the Light Rail Vehicle Safety Certification Program the safety analysis requirements will be defined in the LRV technical specifications. The Vehicle Manufacturer (STSI) is responsible for the identification, analysis, and resolution of hazards as part of the vehicle design and throughout the course of the Certification Program. The hazard management process is intended to verify that known hazards have been satisfactorily identified, tracked, and resolved through a formal resolution process.

The goal of the safety analysis and resolution is to provide adequate information so that MTS can certify that the Light Rail Vehicle will provide an acceptable level of safety in revenue service.

4.1 Safety Analysis

Safety Analysis is a risk assessment of the safety of the Light Rail Vehicle with regard to known hazards. The purpose of safety analysis is to assess the severity and probability of the mishap risk associated with each identified hazard. The technical specifications will provide the definitions of the severity and probability and hazard acceptance criteria. Following safety analyses will be performed.

a) Preliminary Hazard Analysis (PHA)

b) Failure Mode and Effects Analyses

c) Operating and Support Hazard Analyses

d) Fault Tree Analysis on unresolved unacceptable hazards

The goal of safety analyses and identified hazard resolutions is to provide adequate information so that MTS can certify that the Light Rail Vehicle will provide an acceptable level of safety in revenue service.

4.2 Hazard Tracking

The technical specifications require Siemens Transportation Systems Incorporated to establish a hazard tracking process that will include documentation of hazard resolution activities through the use of a Hazard Mitigation Tracking Matrix. The tracking system will record identified hazards, track/record resolution and provide the current status. The effectiveness of the mitigation will be scrutinized to determine that no new hazards have been introduced. All identified hazards will be tracked through to resolution. As each hazard is eliminated or controlled to an acceptable level, the contractor will update the hazard matrix. The update will include a description of the measures taken to resolve the hazard.

4.3 Certification

When all hazards have been satisfactorily resolved, Siemens Transportation Systems Incorporated must complete and sign the Hazard Resolution Certificate of Conformance and submit the certificate to MTS for acceptance. The acceptance of the Certificate of Conformance is subject to review and approval by the SRC.

SECTION 5 CERTIFICATES OF CONFORMANCE

Throughout the project as conformance checklists are finalized, the responsible party is required to complete, sign, and submit respective Certificates of Conformance to appropriate parties identified in this Safety Certification Plan for review and acceptance.

5.1 Issuance

Upon receipt of each completed Certificate of Conformance, the entity responsible for acceptance will review the conformance checklists and other relevant backup documents as necessary to verify that the documentation is completed properly. Relevant backup documents will depend on the nature of each Certificate of Conformance, but may include evidence of document reviews, submittal of contract deliverables, and resolution of identified hazards, inspection reports, and test records. Acceptance of each certificate, in part, will be based on the successful completion of the review and, if necessary, an independent audit by the SRC.

5.2 Exceptions

Exceptions, if any, must be noted on each applicable certificate and tracked through resolution. Each exception and associated restrictions/workarounds must be explained. Restrictions/workarounds must be adequate so that the level of safety is not reduced.

Exceptions will be tracked using a Safety Certification Open Items List. The SRC will monitor and track open items until resolution.

5.3 Format of Certificates of Conformance

Exhibits 5-1 through 5-7 show the sample format of the various Certificates of Conformance.

Exhibit 5-1: GO 143-B LRV Requirements Conformance Certificate

LIGHT RAIL VEHICLE
GO 143-B LRV REQUIREMENTS CONFORMANCE CERTIFICATION

Certificate of Conformance

Certifiable Factor No. 1 **Contract:** Light Rail Vehicle Procurement

In accordance with the requirements of the Light Rail Vehicle Safety Certification Plan, I certify, to the best of my knowledge, that:

1. The design contract documents incorporate GO 143-B safety-related requirements applicable to the Light Rail Vehicle.
2. The design contract documents for the Light Rail Vehicle incorporate applicable codes, and regulatory requirements.
3. Previous safety related design review comments for this Contract have been satisfactorily resolved.

Exceptions --- (Each exception and associated restrictions/workarounds must be explained. Restrictions/workarounds must be adequate so that the level of safety is not reduced. Use additional sheets if necessary.)

_____
Verified (Signature and Date)
MTS Project Manager

_____
Accepted (Signature and Date)
MTS Chief Operating Officer - Rail

_____
Concurred (Signature and Date)
MTS System Safety Manager

Exhibit 5-2: LRV Technical Specification Conformance Certificate

LIGHT RAIL VEHICLE
TECHNICAL SPECIFICATION CONFORMANCE CERTIFICATION

Certificate of Conformance

Certifiable Factor No. 2 **Contract:** Light Rail Vehicle Procurement

In accordance with the requirements of the Light Rail Vehicle Safety Certification Plan, I certify, to the best of my knowledge, that:

1. The LRV design, manufacturing and testing has been completed in accordance with the technical specifications and change notices/change order, except as noted in Exceptions below, and
2. Changes made after acceptance of the final design meet applicable code and regulatory requirements.

Exceptions --- (Each exception and associated restrictions/workarounds must be explained. Restrictions/workarounds must be adequate so that the level of safety is not reduced. Use additional sheets if necessary.)

_____
Verified (Signature and Date)
Authorized Representative Siemens Transportation Systems Incorporated

_____
Accepted (Signature and Date)
MTS Project Manager

_____
Concurred (Signature and Date)
MTS System Safety Manager

_____
Accepted (Signature and Date)
MTS Chief Operating Officer - Rail

Exhibit 5-3: Hazard Resolution Conformance Certification

LIGHT RAIL VEHICLE
HAZARD RESOLUTION CONFORMANCE CERTIFICATION

Certificate of Conformance

Certifiable Factor No. 3

Contract: Light Rail Vehicle Procurement _____

In accordance with the requirements of the Light Rail Vehicle Project Safety Certification Plan, I certify, to the best of my knowledge, that:

1. All Hazards identified as unacceptable or undesirable in accordance with technical Specifications have been tracked and resolved (e.g., identified hazards have been either eliminated or controlled to an acceptable level.)

Exceptions --- (Each exception and associated restrictions/workarounds must be explained. Restrictions/workarounds must be adequate so that the level of safety is not reduced. Use additional sheets if necessary.)

_____ _____
Verified (Signature and Date) Accepted (Signature and Date)
Authorized Representative Siemens Transportation Systems Incorporated MTS Project Manager

_____ _____
Concurred (Signature and Date) Accepted (Signature and Date)
MTS System Safety Manager MTS Chief Operating Officer - Rail

Exhibit 5-4: LRV Safety Related Conformance Certificate

LIGHT RAIL VEHICLE
LRV SAFETY-RELATED CONFORMANCE CERTIFICATION

Certificate of Conformance

Certifiable Factor No. 4 **Contract:** Light Rail Vehicle Procurement **LRV ID No.** _____

In accordance with the requirements of the Light Rail Vehicle Safety Certification Plan, I certify, to the best of my knowledge, that for the identified LRV:

1. Safety related tests have been performed as specified with satisfactory results
2. The as-built drawings have been verified and they accurately reflect the installation of the equipment and represent the configuration of the LRV.
3. The car history book includes the safety-related test data.

Exceptions --- (Each exception and associated restrictions/workarounds must be explained. Restrictions/workarounds must be adequate so that the level of safety is not reduced. Use additional sheets if necessary.)

_____
Verified (Signature and Date)
Siemens Transportation Systems Incorporated

_____
Concurred (Signature and Date)
MTS System Safety Manager

_____
Concurred (Signature and Date)
PB Inspector

_____
Accepted (Signature and Date)
MTS Project Manager

_____
Accepted (Signature and Date)
MTS Chief Operating Officer - Rail

Exhibit 5-5: Multi-Vehicle Acceptance Test Conformance Certificate

LIGHT RAIL VEHICLE
MULTI-VEHICLE TEST CONFORMANCE CERTIFICATION

Certificate of Conformance

Certifiable Factor No. 5

Contract: Light Rail Vehicle Procurement

In accordance with the requirements of the Light Rail Vehicle Safety Certification Plan, I certify, to the best of my knowledge, that:

1. Multi-Vehicle acceptance tests have been performed as specified with satisfactory results.
2. The testing / inspections did not disclose any noncompliance with the specified requirements applicable to this certifiable factor.

Exceptions --- (Each exception and associated restrictions/workarounds must be explained. Restrictions/workarounds must be adequate so that the level of safety is not reduced. Use additional sheets if necessary.)

_____
Verified (Signature and Date)
Siemens Transportation Systems Incorporated

_____
Concurred (Signature and Date)
MTS System Safety Manager

_____
Concurred (Signature and Date)
PB Inspector

_____
Accepted (Signature and Date)
MTS Project Manager

_____
Accepted (Signature and Date)
MTS Chief Operating Officer - Rail

Exhibit 5-6: Supplements to Operations and Maintenance Manuals Conformance

LIGHT RAIL VEHICLE
OPERATIONS AND MAINTENANCE MANUALS CONFORMANCE CERTIFICATION

Certificate of Conformance

Certifiable Factor No. 6 **Contract:** Light Rail Vehicle Procurement _____

In accordance with the requirements of the Light Rail Vehicle Safety Certification Plan, I certify, to the best of my knowledge, that:

1. Supplements to the Operations and Maintenance manuals, if required, have been delivered in accordance with contract requirements.
2. The Supplements to the Operations and Maintenance Manuals are adequate and appropriate for the intended application.
3. All known elements and issues regarding Supplements to the Operations and Maintenance Manuals – which impact safety – have been resolved.

Exceptions --- (Each exception and associated restrictions/workarounds must be explained. Restrictions/workarounds must be adequate so that the level of safety is not reduced. Use additional sheets if necessary.)

_____ _____
Verified (Signature and Date) Accepted (Signature and Date)
MTS Vehicles Maintenance Manager MTS Project Manager

_____ _____
Concurred (Signature and Date) Accepted (Signature and Date)
MTS System Safety Manager MTS Chief Operating Officer - Rail

Exhibit 5-7: Operations and Maintenance Training Conformance Certificate

LIGHT RAIL VEHICLE
OPERATIONS and MAINTENANCE TRAINING CONFORMANCE CERTIFICATION

Certificate of Conformance

Certifiable Factor No. 7 **Contract:** Light Rail Vehicle Procurement _____

In accordance with the requirements of the Light Rail Vehicle Safety Certification Plan, I certify, to the best of my knowledge, that:

1. Adequate Operations training has been performed with appropriate MTS Operations staff, and contains instructions on safety features for normal and emergency operations.
2. Adequate Maintenance Training, if necessary, has been performed by the Contractor
3. All known elements and issues concerning operations and maintenance training – which impact safety have been satisfactorily resolved.
4. Adequate emergency response training has been performed with appropriate local agency first responders, and contains instructions on safety features for normal and emergency operations.

Exceptions --- (Each exception and associated restrictions/workarounds must be explained. Restrictions/workarounds must be adequate so that the level of safety is not reduced. Use additional sheets if necessary

_____	_____
Verified (Signature and Date)	Accepted (Signature and Date)
MTS Assistant Superintendent of LRV Maintenance	MTS Superintendent of LRV Maintenance
_____	_____
Concurred (Signature and Date)	Accepted (Signature and Date)
MTS System Safety Manager	MTS Project Manager
_____	_____
Accepted (Signature and Date)	Accepted (Signature and Date)
MTS Transportation Training Supervisor (Operations)	MTS Chief Operating Officer - Rail

SECTION 6 REPORTING REQUIREMENTS AND CERTIFICATION DOCUMENTATION

6.1 Periodic Reports

Reporting requirements are necessary to periodically inform key SANDAG, MTS, Project individuals, and outside oversight agencies of the status of the Safety Certification Program. The MTS System Safety Manager will develop and distribute periodic progress reports of the Light Rail Vehicle Certification Program that contain the following information:

- Certificates completed during the period
- Audit activities during the period
- Problems encountered during the period
- Outstanding issues to be resolved
- Progress on resolving problems
- Overall certification milestone progress to date
- Planned activities for next period.

6.2 Additional Safety Certification Documents

6.2.1 Conformance Checklists

As described in Section 2, Conformance Checklists are developed to list the safety requirements as they apply to the Certifiable Factors they are supporting. A sample GO 143-B conformance checklist format is shown in Exhibit 6-1 and the technical specification conformance checklist format is shown in Exhibit 6-2.

6.2.2 Safety and Security Certification Audits

The MTS System Safety Manager will establish an audit team. The audit team will be responsible to perform periodic audits of each portion of the safety and security certification documentation. The audit team will review the backup documentation for the safety and security certifiable elements and will generate a written report. The report will be submitted to Safety Review Committee for review and approval. A sample audit form is shown in Exhibit 6-3. The audit form will be used in conjunction with Technical Specification Conformance Checklist, Exhibit 6-2. The requirements to be audited will be selected from the checklist and the results/finding will be reported on the audit form, Exhibit 6-3.

6.2.3 Safety Certification Verification Records

The safety certification will progress as different phases of the LRV Procurement process are completed. As the safety-related work associated with certifiable factors is completed and each LRV is constructed, tested and safety certified, Certificates of Conformance will be issued and documented in the Light Rail Vehicle Procurement Safety Certification Verification Records. These records will be available for CPUC inspection and review.

Exhibit 6-1: Sample GO 143-B Conformance Checklist

GO 143-B LRV REQUIREMENTS CONFORMANCE CHECKLIST

CERTIFIABLE ELEMENT:	**DATE:**	
SUB-ELEMENT:	**PREPARED BY:**	**VERIFIED BY:**
CONTRACT NO.:	**REVISION:**	

REQ. I.D.	GO 143-B REQUIREMENT	VERIFICATION			VERIFICATION DOCUMENT REFERENCE
		Status	Initial	Date	

DEFINITIONS:

1. **CERTIFIABLE ELEMENT:** Refers to the portion of the contract to be certified, i.e.; LRV.
2. **SUB-ELEMENT:** Refers to a part of a certifiable element for which safety requirements have been developed.
3. **CONTRACT NO:** Specifies the contract number(s) assigned to the certifiable element.
4. **PREPARED BY:** Individual preparing the checklist and the organization represented by that individual.
5. **VERIFIED BY:** Individual verifying the checklist.
6. **REVISION:** The current revision number of the specific checklist.
7. **REQ. I.D.:** Contains consecutive identification numbers for each safety requirement.
8. **REQUIREMENT:** Identifies or references the GO 143-B requirements.
9. **VERIFICATION:** Initials/name of the design engineer or other person who verified that the requirement has been incorporated in the contract documents, the status of the item, and the date. NOTE: For all partially compliant and non-compliant indications, additional information must be provided in the "Verification Document Reference" column. The status will be indicated by the following symbols.
   C = Compliance; N = Noncompliance; P = Partial Compliance
10. **VERIFICATION DOCUMENT REFERENCE:** Identifies the specification section, drawing number, or file/location within the agency's document control system and/or contracts where the safety (or security) requirement has been incorporated.

Exhibit 6-2: Sample Specification Conformance Checklist

TECHNICAL SPECIFICATION CONFORMANCE CHECKLIST

				DATE:				
CERTIFIABLE ELEMENT:				PREPARED BY:		VERIFIED BY:		
CONTRACT NO.:				REVISION:				
Item No.	SAFETY REQUIREMENT	Specification Reference		EVIDENCE				
		Section Page.	Paragraph	Verification Responsibility	Verification Document Reference	Status	Verified By	Verified Date
1.								
2.								
3.								
4.								
5.								

DEFINITIONS:

1. **CERTIFIABLE ELEMENT:** Refers to certifiable element for which safety requirements have been developed.
2. **CONTRACT NO:** Specifies the contract number(s) assigned to the certifiable element.
3. **PREPARED BY:** Individual preparing the checklist and the organization represented by that individual.
4. **VERIFIED BY:** Individual verifying the checklist.
5. **REVISION:** The current revision number of the specific checklist.
6. **REQ. I.D.:** Contains consecutive identification numbers for each safety requirement.
7. **REQUIREMENT:** Identifies or references the specifications requirements.
8. **SPECIFICATION REFERENCE:** Specification section and page number from where safety requirement is taken.
9. **VERIFICATION RESPONSIBILITY:** Department/Organizations responsible for verifying the safety requirement.
10. **VERIFICATION DOCUMENT REFERENCE:** Document reference providing evidence of compliance with specified safety requirement.
11. **STATUS:** the status of the item. NOTE: For all partially compliant and non-compliant indications, additional information must be provided in the “Verification Document Reference” column. The status will be indicated by the following symbols.
    C = Compliance; N = Noncompliance; P = Partial Compliance
12. **VERIFIED:** Initials/name of the person who verified that the requirement has been incorporated in the manufactured/installed system/equipment.

Exhibit 6-3: Safety and Security Certification Audit Form

Safety and Security Certification Audit Form		
Certifiable Element:	Date of Audit:	Person Contacted:
Department/Organization:	Auditor:	
Technical Specification Requirement:		
Method of Verification		
Documentation		
Observation		
Findings/Remarks		
Findings	Remarks	
1. Meets Requirements		
2. Needs Improvements		
3. Unable to Audit		
Description of Corrective Action		
Implementation Schedule		