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SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT

SYSTEM SAFETY AND SECURITY PROGRAM PLAN

Final Design Edition

January 1985

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Prepared by

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1.0 INTRODUCTION

1.0 INTRODUCTION

The SCRTD Metro Rail Safety and Security Program consists of a series of required activities which take place during the various phases of the Metro Rail Project, all directed toward meeting the elements of safety and security established by the Metro Rail System Design Criteria.¹ The program includes the application of a management structure, safety and security analysis techniques, and a methodology necessary to achieve acceptable levels of safety and security commensurate with the phases of the Metro Rail Project.

1.1 AUTHORITY

California enabling legislation in 1964, under Public Utilities Code Part 3, created the Southern California Rapid Transit District (SCRTD). The law included the mandate to develop a rapid transit system. Under California and Federal legislation, various government agencies exert authority over and responsibility for various safety and security aspects of the Metro Rail Project. This authority is summarized below:

1.1.1 Safety

Chapter 5, Article 5, Section 30646 of the Public Utilities Code empowered the Public Utilities Commission (PUC) to provide oversight and regulate the safety aspects of the transit property. Under this authority, the PUC governs the safety appliances and procedures of SCRTD property, monitors the use of appliances from the aspect of safety, and conducts inspections to monitor adherence to the rules and regulations.

Other state and local agencies with some level of responsibility and/or authority over safety-related activities, procedures, and equipment include the California Occupational Safety and Health Administration (Cal/OSHA), under California Administrative Code (C.A.C.) Title 8, and the city and county fire and police departments. Cal/OSHA has regulatory and

1 SCRTD Metro Rail System Design Criteria and Standards, Volume I, Section 2--Fire/Life Safety, Section 3--System Safety, and Section 4--Security.

enforcement powers over construction activities and employee safety. The fire jurisdictions, under C.A.C. Title 19, have jurisdiction over fire and panic safety. Within the Metro Rail Project, a Fire/Life Safety Committee and a Security Subcommittee have been formed to oversee the design, construction/acquisition, testing and start-up activities which relate to fire/life safety and security issues. The proposed NFPA 130 (Standard for Fixed Guideway Transit System) is used for guidance only; the Fire/Life Safety Committee has established the Metro Rail fire and life safety criteria, which along with local building codes, form the basis for life/safety considerations.

Because the Metro Rail Program is partially federally funded, all program planning, including system safety and security, falls under the purview of the Urban Mass Transportation Administration (UMTA) and is subject to their review. The National Transportation Safety Board (NTSB) has the responsibility and authority to conduct investigations of transportation accidents and to make recommendations.

1.1.2 Security

Chapter 5, Article 1, Section 30504 of the Public Utilities Code authorizes the District to maintain a suitable security force of transit police officers and security guards.

Peace Officer powers of the Transit Police Department, at present, are covered under Section 830.4 sub(j) of the Penal Code which states the following:

"The following persons are peace officers while engaged in the performance of their duties in or about the properties owned, operated, or administered by their employing agency, or when they are required by their employer to perform their duties anywhere within the political subdivision which employs them. Such officers shall also have the authority of peace officers anywhere in the state as to an offense committed, or which there is probable cause to believe has been committed, with respect to persons or property the protection of which is the duty of such officer or when making an arrest pursuant to Section 836 of the Penal Code as to any public offense with respect to which there is an immediate danger to person or property or of the escape of the perpetrator of the offense. Such peace officers may carry firearms only if authorized by and under such terms and conditions as are specified by their employing agency:

- (j) Transit police officers of a county, city or district."

The Transit Police Department will work cooperatively through agreements with the City of Los Angeles Police Department, the Los Angeles County Sheriff's Department, and the Los Angeles County Coroner/Medical Examiner in the execution of law enforcement. The present agreements with these agencies will be modified for Metro Rail.

1.2 POLICY

It is a policy, from the highest levels of SCRTD management, that safety and security be a primary consideration throughout the evolution of the Metro Rail system, from preliminary engineering through revenue operations. To fulfill the obligation of this policy, all applicable codes and regulations, augmented by modern system safety and security engineering technology and industry standards, are used to ensure that the system achieves a level of safety and security that equals or betters that of other rail transit systems.

During the Preliminary Engineering and Final Design phases, safety and security can be achieved by eliminating, minimizing or controlling hazards through analysis, review and design selection. This includes provisions for emergencies such as an emergency communications network, on-site emergency equipment and access by emergency forces. Metro Rail design requirements that have the effect of deterring and detecting criminal activities will be made part of the system by inclusion in the design criteria and specifications.

1.3 GOALS

The goals of the System Safety and Security Program Plan (SSSPP) are to define design group activities and management controls, plans and monitoring processes to ensure that:

- Safety and security considerations, compatible with the system requirements, are incorporated in the Metro Rail facilities, equipment, and plans during the design phase to minimize the potential of accidents or criminal activity when operations commence.
- Hazards associated with the Metro Rail system are identified, and then eliminated or minimized to obtain an acceptable level of safety and security.
- A safety philosophy is inculcated within the Metro Rail system that emphasizes preventive measures over corrective measures to eliminate unsafe conditions.

- Historical data generated by the newer transit properties (which have characteristics similar to the SCRTD Metro Rail) are analyzed and used to support the SCRTD Metro Rail system safety program.
- Safety, security and fire/life safety considerations are coordinated with reliability, maintainability, and quality assurance activities identified in the System Assurance Program Plan.

The objective of these goals is to prevent patrons, personnel, and SCRTD property from being exposed to hazards or unsafe conditions. An additional goal is to assure that no single point failure results in an unsafe condition.

1.4 PURPOSE

The purpose of this plan is to set forth the requirements for identifying, evaluating and minimizing safety and security risks throughout all phases of the SCRTD Metro Rail Project. It identifies safety and security related activities which occur during Preliminary Engineering, Continuing Preliminary Engineering, Final Design, Construction/Acquisition, Pre-Operational Testing and Start-Up Operations. The plan defines formal requirements including the:

- Functional structure of the safety and security management organization
- Implementation of established safety and security criteria
- Mechanisms for identifying and assessing safety hazards and security problems early in the design phase
- Methods to eliminate, minimize or control the identified critical or catastrophic hazards and/or security problems.

1.5 SCOPE

The scope of the SSSPP encompasses the management and technical safety activities performed during Preliminary Engineering, Continuing Preliminary Engineering, Final Design, Construction/Acquisition, Pre-Operational Testing, and Start-Up Operations phases of the Metro Rail Project. The emphasis of this edition of the plan is to identify the safety and security tasks associated with Final Design and Construction/Acquisition and to review progress on the safety and security tasks of Preliminary and Continuing Preliminary Engineering.

Tasks associated with subsequent phases, (Pre-Operational Testing and Start-Up Operations) are identified herein on Exhibits 3-1 and 4-1, but are not detailed in this edition of the program plan. These task descriptions will be part of a subsequent update.

This edition of the System Safety and Security Program Plan, for use during the Final Design phase, defines the safety and security related activities which will be performed to support system designers in the completion of system and subsystem specifications and in conducting the contract award process. It also establishes programs for the monitoring of SCRTD Metro Rail contractors and subcontractors during construction and acquisition of Metro Rail facilities and equipment.

Construction safety activities are covered in the Metro Rail Construction Safety Manual. This System Safety and Security Program Plan addresses requirements directed at designing, constructing, and testing the Metro Rail system so that it can safely transport patrons and employees during revenue service. It is intended that the Construction Safety Manual and this program plan complement one another.

This edition of the System Safety and Security Program Plan combines and updates three prior documents:

- System Safety Program Plan, WBS16DAD, May 1983
- System Security Program Plan, WBS16DAD, June 1983
- Fire/Life Safety Program Plan, January 1984.

For the remainder of the Metro Rail Project, the SSSPP will contain the Metro Rail safety, fire/life safety, and security programs.

1.6 UPDATE PROCEDURES

The System Safety and Security Program Plan will be updated prior to the start of each new phase of Metro Rail activity (Construction/Acquisition, Pre-Operational Testing, Start-Up Operations) to:

- Review progress on tasks accomplished in the prior phase
- Refine and improve the current task descriptions and activities for the present phase
- Identify new tasks which may be required as the system progresses
- Explain in detail the safety-related tasks and responsibilities for the next phase.

The analysis, review and revision process is the responsibility of the Supervisor of Metro Rail Safety and Systems Assurance. Inputs for these periodic updates will be solicited from SCRTD Systems Design and Analysis, Fixed Facilities, Construction Management, the General Consultant, the Systems Engineering and Analysis Consultant, the Construction Manager, the Fire/Life Safety Committee, and the Security Subcommittee.

1.7 GLOSSARY OF TERMS

The following presents a glossary of terms used in this System Safety and Security Program Plan.

SCRTD	Southern California Rapid Transit District; an agency created by the California legislature--charged with the development of a rapid transit system.
UMTA	Urban Mass Transportation Administration; an Administration of the U.S. Department of Transportation--the federal agency that assists state and local governments in financing transportation, both in capital equipment procurements and in operating subsidies.
CPUC	California Public Utilities Commission; the agency empowered to maintain overview and regulation in transit safety for the State of California.
Cal/OSHA	California Occupational Safety and Health Administration; the agency having regulatory and enforcement powers over construction activities and working conditions once the Metro Rail system is operational.
NTSB	National Transportation Safety Board; which has the responsibility for, and authority to, conduct accident investigations and make recommendations at the Federal Government level.
MRTC	Metro Rail Transit Consultants; also known as the General Consultant (G.C.), a joint venture of Daniel, Mann, Johnson, Mendenhall/Parsons, Brinckerhoff, Quade & Douglas/Kaiser Engineers/Harry Weese and Associates (DMJM/PBQD/KE/HWA).

BAH	Booz, Allen and Hamilton; also known as the Systems Engineering and Analysis (S.E.A.) Consultant.
PDCD	Ralph M. Parsons Company, Dillingham Construction, Inc., and DeLeuw, Cather & Company, also known as the Construction Manager (C.M.).
LAFD	Los Angeles City Fire Department.
LACFD	Los Angeles County Fire Department.
LAPD	Los Angeles Police Department.
LACSD	Los Angeles County Sheriff's Department.
LACCME	Los Angeles County Coroner/Medical Examiner.
Fire/Life Safety ²	That portion of safety which deals with fire protection, fire suppression and emergency preparedness.
System Safety ³	The application of operating, technical and management safety techniques to the system to reduce hazards to the lowest level possible within system resources.

1.8 APPLICABLE DOCUMENTS

The following list of documents were either used in the preparation of this program plan, or are references and related information:

Metro Rail Fire/Life Safety, System Safety, and Security Criteria, SCRTD Metro Rail System Design Criteria and Standards, Volume I, Sections 2, 3, and 4.

Safety, Security and System Assurance Plans--SCRTD Metro Rail Project Milestone Report 7.

Metro Rail Project Definition and Objectives, WBS 13DAH, Booz, Allen & Hamilton, December 1981.

Review of Codes, Guidelines, Regulations, and Other Information, Subsystems, WBS 12F, Kaiser Engineers, March 1982.

2,3 Milestone 7, Safety, Fire/Life Safety, Security and Systems Assurance, March 1983, Chapter I, Key Terms.

Content Guidelines for the Development of System Safety Program Plans for Fixed Guideway Transit Systems in the Acquisition Phase, Booz, Allen & Hamilton, April 1981, Contract Number: DOTUM-60-80-C071004.

MIL-STD-882B, System Safety Program Requirements, Department of Defense, March 30, 1984 (Pre-Print Copy).

Baltimore Region Rapid Transit System Safety Program Plan, State of Maryland Department of Transportation, December 1978.

MARTA--System Safety Program Plan, Parsons, Brinckerhoff, Quade and Douglas/Tudor Engineering Co., February 1977.

BARTD System Safety Program Plan, Bay Area Rapid Transit District, 1978.

Draft Milestone--6 Report, Safety and Security, Dade County Transit Improvement Program, Kaiser Engineers, March 1975.

Safety and System Assurance Program Plan, Pittsburgh Light Rail Transit Reconstruction, Booz, Allen & Hamilton, April 1979.

System Safety Analysis: A Description of the Formats and Methodologies for System Safety Analysis of Fixed Guideway Transit Systems, Booz, Allen & Hamilton, January 1981, Contract Number: DOTUM-60-80-C071004.

California Public Utilities Code, Part 3, Southern California Rapid Transit District.

System Design Criteria--SCRTD Metro Rail Project Milestone Report 2.

2.0 SYSTEM DESCRIPTION

2.0 SYSTEM DESCRIPTION

2.1 PHYSICAL PLANT

The initial Metro Rail line will be a conventional two-track, steel wheel, steel rail system. It will be approximately 18 miles long consisting of underground trainway; it will serve the central business district, Wilshire Boulevard and the Hollywood and North Hollywood areas. Eighteen stations are presently planned with the distance between stations ranging from 0.4 miles in the downtown area to 2.5 miles through the Santa Monica mountains. A map of the proposed system is shown in Exhibit 2-1.

2.1.1 Stations

Stations will be subway construction with multiple entry/exit points to street level. Additional exits will be provided for use in emergencies. Escalators, stairs and elevators will provide vertical circulation between street, fare collection and platform levels. Plans call for equipping the station for both attended and unattended operation.

Some stations will have adjacent parking facilities, pick-up/drop-off areas and/or bus pull-in areas to accommodate patrons arriving by automobile or by bus.

While station layout will not be identical, most station elements will be standardized for economy and ease of use, and to establish an identity for the system as a whole.

2.1.2 Vehicles

The passenger vehicle for the Metro Rail system will be a 75-ft.-long, standard gauge, steel wheel vehicle capable of operating at speeds up to 70 mph. The vehicles will run on 750v DC power. They will be capable of regenerative braking.

The basic unit will be a married pair, (two cars, coupled together, which share some equipment). Vehicles will operate in trains of as many as six cars. Trains will be automatically controlled with an operator performing some functions. Each vehicle will accommodate up to 220 passengers.

Stainless steel will be used in constructing the vehicle body. Fire-resisting materials will be used throughout. The interior will include seating for able-bodied and handicapped patrons and include handholds and stanchions for standing patrons.

Vehicles will be equipped with lighting, heating, ventilating, and air conditioning apparatus to maintain a comfortable environment for passengers.

2.1.3 Track and Facilities

The main storage yard and the shop facility for the starter line will be located in the vicinity of the southeastern terminus. A limited number of storage tracks will be located near the North Hollywood terminal. Crossover tracks, storage tracks, and pocket tracks will be situated at suitable locations to enable trains to turn back at both ends of the corridor and at selected midline locations. These tracks will also provide temporary storage for malfunctioning trains, and permit reverse running during emergency situations.

2.2 PROPOSED OPERATIONS

A Preliminary Engineering Operating Plan⁴ was developed using the results of analysis pertaining to potential ridership projections and system characteristics.

By the year 2000, it is estimated that Metro Rail will be carrying 364,000 passengers per day. The travel patterns of Metro Rail patrons are not expected to be concentrated toward the downtown business district, nor are they expected to be heavily peaked by direction of travel or time of day. Nearly two-thirds of the Metro Rail patrons will be riding a bus to the station.

Operating characteristics for the year 2000 are as follows:

- Operating hours of 20 hours per day (5:30 A.M. to 1:30 A.M.).
- Maximum train lengths of 6 cars.
- Minimum headways of 3 1/2 minutes between trains.
- Maximum headways of 15 minutes between trains.
- Peak hour travel time of 36 1/2 minutes between North Hollywood and Union Station--an average speed of 30 mph.

4 Preliminary Engineering Operating Plan Update, WBS 16DAA, Booz, Allen & Hamilton, November 1983.

The service provided in the preliminary operating plan requires a fleet of 130 vehicles, including spares.

Nothing in system design will preclude expanding service to a 24-hour operation, if desired.

A strategy for operational management under conditions other than normal will be developed as the system design progresses. Referred to as "Failure Management," the philosophy will consider:

- Operational "Slow-Down" when required for safety or other reasons; service stoppage will be a last resort.
- Automatically or manually initiated modifications of system operating strategies and recovery operations.
- Communicating service disruptions, e.g., train delays and service information, to patrons.

2.3 METRO RAIL PROJECT ORGANIZATION

The Metro Rail organizational structure is shown in Exhibit 2-2. The present organizational structure was established to direct the design, construction/acquisition, testing and start-up phases of the Metro Rail system. It is recognized that the Metro Rail organization structure will change to accommodate the maintenance and operations functions necessary for revenue service. Metro Rail staff involved with design, construction and procurement decisions affecting safety, security and system assurance include Systems Design and Analysis, Fixed Facilities and Construction Management personnel.

2.4 SAFETY ORGANIZATION

The Director of Systems Design and Analysis has the responsibility for coordinating the safety-related activities of the Metro Rail Project. The Supervisor of Safety and System Assurance (S & SA) reports to the Director of Systems Design and Analysis. The Supervisor of S & SA directs the work of his own staff as well as consultants and fire and police organization representatives who have contracts to supply technical expertise to the Metro Rail project in their respective areas. The S & SA organization is shown in Exhibit 2-3. Exhibits 2-4, 2-5 and 2-6 illustrate the project organizations of Metro Rail Transit Consultants, Booz, Allen & Hamilton, and Parsons, Dillingham Construction, DeLeuw, Cather & Co.

The Safety and System Assurance Organization is responsible for:

- Organizing and coordinating the implementation of the Metro Rail safety and security programs.
- Establishing safety and security goals and standards.
- Overseeing, guiding and supporting activities which may be required to execute the system safety and security program throughout all phases of the Metro Rail Project.
- Analyzing procedures, rules and practices to ensure adequate hazard control.
- Participating in design reviews and planning sessions pertaining to safety, security, system assurance and training.
- Periodically collecting safety and security related information from other properties to evaluate safety improvements for the Metro Rail System.
- Auditing design changes to the system to ensure that they do not degrade the safety and/or security of the Metro Rail System.
- Developing emergency preparedness plans and procedures for use in response to emergencies.
- Managing the Safety Certification Program, for use in evaluating the systems readiness from a safety view.
- Monitoring, in the testing and start-up operations phases, the reporting of accidents and failures to determine causes contributing to system deficiencies, and conducting investigations of all accidents and/or failures within the system.
- Informing management of the safety and security program status and monitoring activities.

3.0 SAFETY PROGRAM TASKS

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3.1 GENERAL

The SCRTD System Safety and Security Program focuses on the safety-related activities that are required throughout the life of the SCRTD Metro Rail system to provide for a high level of safety and security. The Metro Rail Program has been segmented into six phases:

- Preliminary Engineering
- Continuing Preliminary Engineering
- Final Design
- Construction/Acquisition
- Pre-Operational Test
- Start-Up Operations.

The elements of the System Safety and Security Program Plan include long-term strategies to implement safety as a systematic process. At the same time, it delineates activities to be performed by the safety organization to ensure their involvement during the evolution of the Metro Rail System.

Another document, the System Safety Program Plan--Operations, prepared in later phases of the project, will address organizations, tasks and responsibilities for safety during revenue service operations.

The System Safety and Security Program Plan is a dynamic document. While the long-term safety strategies remain basically constant, the short-term tasks develop as the system and subsystem parameters become better defined. The system safety and security program is periodically reviewed as the Metro Rail Project progresses. These reviews will be reflected in subsequent revisions of the System Safety and Security Program Plan. The analysis, review and revision process is the responsibility of the Metro Rail Safety and System Assurance Office with support from other groups (System Design and Analysis, Fixed Facilities, Construction Management, General Consultant, Systems Engineering Analysis Consultant, Construction Manager, and the Fire/Life Safety Committee and Security Subcommittee).

The tasks in this System Safety and Security Program Plan have been segregated into 2 chapters:

- Safety--Chapter 3 covers those tasks relating to both operational safety as well as fire and panic safety.
- Security--Chapter 4 covers those tasks relating to the security of patrons, employees and Metro Rail equipment.

Exhibit 3-1 lists the safety tasks which are presently identified for each phase of the Metro Rail Project. Task numbers in the left hand column of Exhibit 3-1 correspond to the paragraph numbers used in this chapter.

Exhibit 3-2 identifies the organizational responsibilities for preparing, initiating, supporting and/or reviewing and commenting on each task or activity. Subsequent revisions of this document may identify other organizations responsible for accomplishing the safety tasks. Within the matrix, task responsibilities are assigned by the following letter codes:

- P Primary responsibility--The identified participant is responsible for the conduct of the task and the preparation of the necessary documentation.
- S Secondary or support responsibility--The identified participant is to provide such support as may be necessary in the accomplishment and documentation of the task effort.
- RC Review and comment responsibilities--The identified participant is charged with examination of the data and information provided by the primary participant(s). Following each completed review, the designated participant submits Metro Rail review and comment forms to the Safety and System Assurance Supervisor.

The tasks have been segregated into five areas, representing the major efforts of the safety organization:

- Criteria Development
- Plans and Procedures
- Analyses and Studies

SAFETY ACTIVITIES AND TASKS

3-3 (a)

PARAGRAPH NUMBER	SAFETY TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ ACQUISITION	PRE- OPERATIONAL TESTING	START-UP OPERATIONS
	<u>CRITERIA DEVELOPMENT</u>						
3.2.1	Review All Applicable Codes, Guidelines and Regulations	●					
3.2.2	Develop Fire/Life Safety Criteria	●	●				
3.2.3	Develop System Safety Criteria	●	●				
3.2.4	Update and Revise Fire/Life Safety Criteria			●	●	●	●
3.2.5	Update and Revise System Safety Criteria			●	●	●	●
3.2.6	Conduct Peer Reviews on Fire Safety	●		●	●	●	●
3.2.7	Conduct Peer Reviews on System Safety	●		●	●	●	●
3.2.8	Develop Safety Input to Milestone Program	●					
3.2.9	Conduct Familiarization Trips to Other Transit Properties	●	●	●	●	●	●

Exhibit 3-1

SAFETY ACTIVITIES AND TASKS

PARAGRAPH NUMBER	SAFETY TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ ACQUISITION	PRE- OPERATIONAL TESTING	START-UP OPERATIONS
	<u>PLANS AND PROCEDURES</u>						
3.3.1	Prepare and Periodically Update the System Safety and Security Program Plan	•	•	•	•	•	•
3.3.2	Develop an Emergency Preparedness Plan			•	•	•	•
3.3.3	Develop Emergency/Disaster Response Procedures				•	•	•
3.3.4	Prepare a Safety Certification Methodology		•				
3.3.5	Prepare a Safety Certification Plan			•			
3.3.6	Prepare Safety Certification Procedures				•		
3.3.7	Prepare a Contractor Safety Monitoring Plan			•			
3.3.8	Outline Preliminary Safety Procedures and Training Course Requirements		•				
3.3.9	Prepare a Hazard Identification and Resolution Procedure			•			
3.3.10	Develop an Accident/Incident Investigation and Reporting Procedure				•		
3.3.11	Develop a Safety and Security Data Management System			•	•		

3-3 (b)

Exhibit 3-1 (continued)

SAFETY ACTIVITIES AND TASKS

PARAGRAPH NUMBER	SAFETY TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
3.3.12	Develop a Safety Operating Policies Rulebook			•	•		
3.3.13	Prepare a Fire Protection Features Manual				•		
3.3.14	Prepare a Fire and Police Communications Systems Handbook				•		
3.3.15	Prepare Safety Features Test Plans and Procedures				•		
3.3.16	Prepare Plans for Emergency Team Training Exercises and Drills				•		
	Establish the Operational Phase System Safety Organization					•	•
	Prepare the System Safety and Security Program Plan - Operations					•	•
	Establish a Continuing Safety Certification and Audit Program					•	•

3-3 (c)

SAFETY ACTIVITIES AND TASKS

PARAGRAPH NUMBER	SAFETY TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
	<u>ANALYSES AND STUDIES</u>						
3.4.1	Prepare and Update a Preliminary Hazard Analysis		●	●			
3.4.2	Prepare and Update Subsystem Hazard Analyses		●	●	●	●	
3.4.3	Prepare and Update Interface Hazard Analyses			●	●	●	
3.4.4	Prepare and Update Fault Tree Analyses			●	●	●	
3.4.5	Prepare and Update Critical/Catastrophic Items List			●	●	●	●
3.4.6	Prepare and Update Operating and Maintenance Hazard Analyses				●	●	●
3.4.7	Prepare and Methane/Combustible Gases Study		●				
3.4.8	Prepare a Seismic Risk Analysis		●				
3.4.9	Prepare a Study of Public Firefighting Capabilities and Requirements		●				
3.4.10	Prepare an Emergency Ventilation Analysis		●				
3.4.11	Prepare a Water Supply Analysis		●				
3.4.12	Prepare and Update a Station Emergency Egress Study		●	●			

3-3 (d)

Exhibit 3-1 (continued)

SAFETY ACTIVITIES AND TASKS

PARAGRAPH NUMBER	SAFETY TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
3.4.13	Prepare and Update Fire Hazard and Toxic Materials Lists			•	•		
3.4.14	Prepare Emergency Equipment Lists			•	•		
3.4.15	Prepare Safety Trade-Off Studies		•	•	•		

3-3 (e)

Exhibit 3-1 (continued)

SAFETY ACTIVITIES AND TASKS

3-3 (F)

PARAGRAPH NUMBER	SAFETY TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
	<u>DESIGN, CONSTRUCTION/PROCUREMENT AND TESTING SUPPORT</u>						
3.5.1	Provide General Design Support	●	●	●	●	●	
3.5.2	Provide General Construction/Procurement Support				●		
3.5.3	Participate in Design Reviews		●	●	●		
3.5.4	Participate in Contractor Audits, Inspections and Tests				●	●	
3.5.5	Participate in System Integration Test Program Development				●	●	
3.5.6	Participate in Training Course Program Development				●	●	
3.5.7	Participate in Public Education Program Development				●	●	
3.5.8	Participate on the Fire/Life Safety Committee	●	●	●	●	●	●
3.5.9	Participate on the Elderly/Handicapped Committee		●	●	●	●	●
3.5.10	Prepare Fire/Life Safety Criteria Conformance Checklists		●	●			
3.5.11	Prepare System Safety Criteria Conformance Checklists		●	●			
3.5.12	Prepare Specification Conformance Checklists			●	●		

Exhibit 3-1 (continued)

SAFETY ACTIVITIES AND TASKS

PARAGRAPH NUMBER	SAFETY TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
3.5.13	Develop a Construction/Facilities Safety Inspection Program			●	●		
3.5.14	Identify Safety Documentation Requirements for Contract Specifications		●	●			
3.5.15	Review Contractor Analyses and Reports			●	●	●	
3.5.16	Review Operating and Maintenance Manuals and Procedures				●	●	●
3.5.17	Conduct Coordination Meetings with Contractor Fire/Life Safety and System Safety Staff			●	●	●	●
3.5.18	Participate in Change Control Board Activities			●	●	●	
3.5.19	Direct the Safety Certification Program			●	●	●	●
	Participate in Testing Program					●	●
	Provide Operations/Maintenance Support					●	●
	Conduct Safety Training Courses					●	●
	Develop Safety Management Reports					●	●
	Conduct Emergency Training					●	●

3-3 (g)

SAFETY ACTIVITIES AND TASKS

PARAGRAPH NUMBER	SAFETY TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
	<u>DOCUMENTATION</u>						
3.6.1	Establish Safety Library	●					
3.6.2	Establish Safety Documentation and Review Procedures		●	●			

3-3 (h)
(4)

Exhibit 3-1 (continued)

TASK RESPONSIBILITIES

PARAGRAPH NUMBER	SAFETY TASK/ACTIVITY	METRO RAIL								GENERAL CONSULTANT	CONSTRUCTION MANAGER	RAIL OPERATIONS	RAIL MAINTENANCE
		SYSTEM DESIGN & ANALYSIS						FIXED FACILITIES	CONSTRUCTION MANAGEMENT				
		SAFETY & SYSTEMS ASSURANCE	SYSTEMS ENGINEERING & ANALYSIS	SYSTEMS DESIGN	SYSTEMS ENGINEERING CONSULTANT	FIRE DEPTS. AND RESCUE SQUAD	POLICE DEPTS. & CORONERS OFFICE						
	<u>CRITERIA DEVELOPMENT</u>												
3.2.1	Review All Applicable Codes, Guidelines and Regulations	S	RC	RC		P		RC		S			
3.2.2	Develop Fire/Life Safety Criteria	S	RC	RC	RC	S		RC		P			
3.2.3	Develop System Safety Criteria	S	RC	RC	P	RC	RC			S			
3.2.4	Update and Revise Fire/Life Safety Criteria	S	RC	RC	RC	S	RC	RC	RC	P	RC		
3.2.5	Update and Revise System Safety Criteria	S	RC	RC	S	RC	RC	RC	RC	P	RC		
3.2.6	Conduct Peer Reviews on Fire Safety	P											
3.2.7	Conduct Peer Reviews on System Safety	P											
3.2.8	Develop Safety Input to Milestone Program	P			S	S	RC			S			
3.2.9	Conduct Familiarization Trips to Other Transit Properties	P			S	S				S			

P = Primary Responsibility
 S = Secondary or Support Responsibility
 RC = Review and Comment

3-4 (a)

TASK RESPONSIBILITIES

PARAGRAPH NUMBER	SAFETY TASK/ACTIVITY	METRO RAIL								GENERAL CONSULTANT	CONSTRUCTION MANAGER	RAIL OPERATIONS	RAIL MAINTENANCE
		SYSTEM DESIGN & ANALYSIS						FIXED FACILITIES	CONSTRUCTION MANAGEMENT				
		SAFETY & SYSTEMS ASSURANCE	SYSTEMS ENGINEERING & ANALYSIS	SYSTEMS DESIGN	SYSTEMS ENGINEERING CONSULTANT	FIRE DEPTS. AND RESCUE SQUAD	POLICE DEPTS. & CORONERS OFFICE						
	<u>PLANS AND PROCEDURES</u>												
3.3.1	Prepare and Periodically Update the System Safety and Security Program Plan	S	RC	RC	P	RC	RC	RC	RC	RC	RC	RC	
3.3.2	Develop an Emergency Preparedness Plan	S	RC	RC	P	S	S	RC	RC	S	S	RC	RC
3.3.3	Develop Emergency/Disaster Response	P	RC	RC	RC	S	S	RC	RC	RC	RC	RC	RC
3.3.4	Prepare a Safety Certification Methodology	S	RC	RC	P	RC	RC	RC	RC	RC	RC	RC	
3.3.5	Prepare a Safety Certification Plan	S	RC	RC	P	RC	RC	RC	RC	RC	RC	RC	
3.3.6	Prepare Safety Certification Procedures	S	RC	RC	P	RC	RC	RC	RC	RC	RC	RC	RC
3.3.7	Prepare a Contractor Safety Monitoring Plan	S		RC	RC	RC		RC	RC	P	RC		
3.3.8	Outline Preliminary Safety Procedures and Training Course Requirements	S	RC		P	RC	RC			RC			
3.3.9	Prepare a Hazard Identification and Resolution Procedure	S	RC	RC	P	RC	RC	RC	RC	RC	RC		

3-4(b)

P = Primary Responsibility
 S = Secondary or Support Responsibility
 RC = Review and Comment

TASK RESPONSIBILITIES

PARAGRAPH NUMBER	SAFETY TASK/ACTIVITY	METRO RAIL								GENERAL CONSULTANT	CONSTRUCTION MANAGER	RAIL OPERATIONS	RAIL MAINTENANCE
		SYSTEM DESIGN & ANALYSIS						FIXED FACILITIES	CONSTRUCTION MANAGEMENT				
		SAFETY & SYSTEMS ASSURANCE	SYSTEMS ENGINEERING & ANALYSIS	SYSTEMS DESIGN	SYSTEMS ENGINEERING CONSULTANT	FIRE DEPTS. AND RESCUE SQUAD	POLICE DEPTS. & CORONERS OFFICE						
3.3.10	Develop an Accident/Incident Investigation and Reporting Procedure	S	RC	RC	P	RC	RC	RC	RC	RC	RC	RC	RC
3.3.11	Develop a Safety and Security Data Management System	S	RC		P	RC	RC					RC	RC
3.3.12	Develop a Safety Operating Policies Rulebook	S	RC		P	RC	RC	RC	RC	RC	RC	RC	RC
3.3.13	Prepare a Fire Protection Features Manual	RC	RC	RC	RC	S		RC	RC	P	RC	RC	RC
3.3.14	Prepare a Fire and Police Communications Systems Handbook	RC	RC	RC	RC	S	S	RC	RC	P	RC	RC	RC
3.3.15	Prepare Safety Features Test Plans and Procedures	S	RC	RC	RC	S		RC	RC	S	P	RC	RC
3.3.16	Prepare Plans for Emergency Team Training Exercises and Drills	S	RC		RC	P	S	RC	RC	S	S	RC	RC

P = Primary Responsibility
 S = Secondary or Support Responsibility
 RC = Review and Comment

Exhibit 3-2 (continued)

3-4 (c)

TASK RESPONSIBILITIES

PARAGRAPH NUMBER	SAFETY TASK/ACTIVITY	METRO RAIL								GENERAL CONSULTANT	CONSTRUCTION MANAGER	RAIL OPERATIONS	RAIL MAINTENANCE
		SYSTEM DESIGN & ANALYSIS						FIXED FACILITIES	CONSTRUCTION MANAGEMENT				
		SAFETY & SYSTEMS ASSURANCE	SYSTEMS ENGINEERING & ANALYSIS	SYSTEMS DESIGN	SYSTEMS ENGINEERING CONSULTANT	FIRE DEPTS. AND RESCUE SQUAD	POLICE DEPTS. & CORONERS OFFICE						
	<u>ANALYSES AND STUDIES</u>												
3.4.1	Prepare and Update a Preliminary Hazard Analysis	RC	RC	RC	P	RC	RC	RC	RC	RC	RC		
3.4.2	Prepare and Update Subsystem Hazard Analyses	RC	RC	RC	RC	RC	RC	RC	RC	P	RC		
3.4.3	Prepare and Update Interface Hazard Analyses	RC	RC	RC	RC	RC	RC	RC	RC	P	RC	RC	RC
3.4.4	Prepare and Update Fault Tree Analyses	RC	RC	RC	RC	RC	RC	RC	RC	P	RC	RC	RC
3.4.5	Prepare and Update Critical/Catastrophic Items List	P			S					S	S	S	S
3.4.6	Prepare and Update Operating and Maintenance Hazard Analyses	S	RC	RC	P	RC	RC	RC	RC	RC	RC	S	S
3.4.7	Prepare a Methane/Combustible Gases Study	RC				RC		RC	RC	P			
3.4.8	Prepare a Seismic Risk Analysis	P	S	S		RC		RC	RC				
3.4.9	Prepare a Study of Public Firefighting Capabilities and Requirements	RC				P		RC	RC	S			

P = Primary Responsibility
 S = Secondary or Support Responsibility
 RC = Review and Comment

3-4 (d)

TASK RESPONSIBILITIES

PARAGRAPH NUMBER	SAFETY TASK/ACTIVITY	METRO RAIL								GENERAL CONSULTANT	CONSTRUCTION MANAGER	RAIL OPERATIONS	RAIL MAINTENANCE
		SYSTEM DESIGN & ANALYSIS						FIXED FACILITIES	CONSTRUCTION MANAGEMENT				
		SAFETY & SYSTEMS ASSURANCE	SYSTEMS ENGINEERING & ANALYSIS	SYSTEMS DESIGN	SYSTEMS ENGINEERING CONSULTANT	FIRE DEPTS. AND RESCUE SQUAD	POLICE DEPTS. & CORONERS OFFICE						
3.4.10	Prepare an Emergency Ventilation Analysis	RC		RC		RC		RC		P			
3.4.11	Prepare a Water Supply Analysis	RC		RC		RC		RC		P			
3.4.12	Prepare and Update a Station Emergency Egress Study	P	RC	RC		S		RC		S			
3.4.13	Prepare and Update Fire Hazard and Toxic Materials Lists	P		RC	RC	S		RC	RC	S	S		
3.4.14	Prepare Emergency Equipment Lists	S		RC	RC	P	S	RC	RC	S	RC		
3.4.15	Prepare Safety Trade-Off Studies	P	RC	RC	S	RC	RC	RC	RC	S	S	RC	RC

P = Primary Responsibility
 S = Secondary or Support Responsibility
 RC = Review and Comment

Exhibit 3-2 (continued)

3-4 (e)

TASK RESPONSIBILITIES

PARAGRAPH NUMBER	SAFETY TASK/ACTIVITY	METRO RAIL							GENERAL CONSULTANT	CONSTRUCTION MANAGER	RAIL OPERATIONS	RAIL MAINTENANCE	
		SYSTEM DESIGN & ANALYSIS						FIXED FACILITIES					CONSTRUCTION MANAGEMENT
		SAFETY & SYSTEMS ASSURANCE	SYSTEMS ENGINEERING & ANALYSIS	SYSTEMS DESIGN	SYSTEMS ENGINEERING CONSULTANT	FIRE DEPTS. AND RESCUE SQUAD	POLICE DEPTS. & CORONERS OFFICE						
	<u>DESIGN, CONSTRUCTION/PROCUREMENT AND TESTING SUPPORT</u>												
3.5.1	Provide General Design Support	S	S	S	S	S		S	S		S		
3.5.2	Provide General Construction/Procurement Support	S	S	S	S	S		S	S	S			
3.5.3	Participate in Design Reviews	P	S	S	S	S		S	S	S	S		
3.5.4	Participate in Contractor Audits, Inspections and Tests	P	S	S	S	S		S	S	S	S		
3.5.5	Participate in System Integration Test Program Development	P	S	S	S	S		S	S	S	S	S	
3.5.6	Participate in Training Course Program Development	P	S	S	S	S		S	S	S	S	S	
3.5.7	Participate in Public Education Program Development	P	S	S	S	S	S	S	S	S	S	S	
3.5.8	Participate on the Fire/Life Safety Committee	P			P	P	P			P	P		

3-4 (F)

P = Primary Responsibility
 S = Secondary or Support Responsibility
 RC = Review and Comment

Exhibit 3-2 (continued)

TASK RESPONSIBILITIES

PARAGRAPH NUMBER	SAFETY TASK/ACTIVITY	METRO RAIL								GENERAL CONSULTANT	CONSTRUCTION MANAGER	RAIL OPERATIONS	RAIL MAINTENANCE
		SYSTEM DESIGN & ANALYSIS						FIXED FACILITIES	CONSTRUCTION MANAGEMENT				
		SAFETY & SYSTEMS ASSURANCE	SYSTEMS ENGINEERING & ANALYSIS	SYSTEMS DESIGN	SYSTEMS ENGINEERING CONSULTANT	FIRE DEPTS. AND RESCUE SQUAD	POLICE DEPTS. & CORONERS OFFICE						
3.5.9	Participate on the Elderly/Handicapped Committee	P						P		P			
3.5.10	Prepare Fire/Life Safety Criteria Conformance Checklists	RC			RC	RC		RC	RC	P	RC		
3.5.11	Prepare System Safety Criteria Conformance Checklists	RC			RC	RC		RC	RC	P	RC		
3.5.12	Prepare Specification Conformance Checklists	RC			RC	RC		RC	RC	P	S		
3.5.13	Develop a Construction/Facilities Safety Inspection Program	RC				RC		RC	RC	S	P		
3.5.14	Identify Safety Documentation Requirements for Contract Specifications	S		S	S	S		S	S	P	S		
3.5.15	Review Contractor Analyses and Reports	RC	RC	RC	RC	RC		RC	RC	RC	RC	RC	RC
3.5.16	Review Operating and Maintenance Manuals and Procedures	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC	RC
3.5.17	Conduct Coordination Meetings with Contractor Fire/Life Safety and System Safety Staff	P									S		

P = Primary Responsibility
 S = Secondary or Support Responsibility
 RC = Review and Comment

Exhibit 3-2 (continued)

TASK RESPONSIBILITIES

PARAGRAPH NUMBER	SAFETY TASK/ACTIVITY	METRO RAIL								GENERAL CONSULTANT	CONSTRUCTION MANAGER	RAIL OPERATIONS	RAIL MAINTENANCE
		SYSTEM DESIGN & ANALYSIS						FIXED FACILITIES	CONSTRUCTION MANAGEMENT				
		SAFETY & SYSTEMS ASSURANCE	SYSTEMS ENGINEERING & ANALYSIS	SYSTEMS DESIGN	SYSTEMS ENGINEERING CONSULTANT	FIRE DEPTS. AND RESCUE SQUAD	POLICE DEPTS & CORONERS OFFICE						
3.5.18	Participate in Change Control Board Activities	P								P			
3.5.19	Direct Safety Certification Program	P	S	S	S	S	S	S	S	S	S	S	S
	<u>DOCUMENTATION</u>												
3.6.1	Establish Safety Library	P											
3.6.2	Establish Safety Documentation and Review Procedures	P											

P = Primary Responsibility
 S = Secondary or Support Responsibility
 RC = Review and Comment

Exhibit 3-2 (continued)

3-4 (h)

- Support for Design, Construction/Acquisition, Testing and Start-Up Operations
- Documentation.

The following sections, 3.2 thru 3.6, describe the tasks that were performed during the Preliminary and Continuing Preliminary Engineering phases and those that will be performed during Final Design and the Construction/Acquisition phase. Descriptions of the tasks to be performed in the Testing and Start-Up phases will be part of subsequent updates.

3.2 CRITERIA DEVELOPMENT

3.2.1 Review All Applicable Codes, Guidelines, and Regulations

During preliminary engineering, a study⁵ was performed to identify and document industry and government codes, guidelines and regulations that could affect the design of the Metro Rail system. Codes, guidelines and regulations were catalogued in the areas of:

- Passenger Vehicles
- Electrical Power
- Elevators and Escalators
- Communications
- Automatic Train Control.

3.2.2 Develop Fire/Life Safety Criteria

Fire/Life Safety Criteria⁶ have been developed during preliminary engineering. The Fire/Life Safety Criteria provide the requirements to be followed by design engineers to properly select equipment and to design facilities. The Fire/Life Safety Criteria will be integrated into all aspects of the design, architectural concepts, specification preparation, equipment selection, construction, procedures, and operations.

5 Review of Codes, Guidelines and Regulations, WBS 12F, Kaiser Engineers, November 1982.

6 Metro Rail Fire/Life Safety Criteria, SCRTD Metro Rail System Design Criteria and Standards, Volume I, Section 2.

3.2.3 Develop System Safety Criteria

System Safety Criteria⁷ have been developed during Preliminary Engineering. The System Safety Criteria provide the requirements to be followed by design engineers to properly select equipment and design facilities. Through the criteria, system safety will be integrated into all aspects of design, specification preparation, equipment selection, construction, procedures, and operations.

3.2.4 Update and Revise Fire/Life Safety Criteria

During the design process, changes may be made to the Fire/Life Safety Criteria based on results of studies and alternatives analysis. The Fire/Life Safety Criteria will be revised in accordance with established Metro Rail document control and configuration management practices.

3.2.5 Update and Revise System Safety Criteria

During the design process, changes may be made to the System Safety Criteria based on results of studies and alternatives analysis. The System Safety Criteria will be revised in accordance with established Metro Rail document control and configuration management practices.

3.2.6 Conduct Peer Reviews on Fire Safety

As part of the development of the Fire/Life Safety Criteria, industry peer comments were solicited from knowledgeable sources. A Fire Safety Peer Review Workshop⁸ was held at the SCRTD on October 14-15, 1981. Participants during the review included the SCRTD, California PUC, the Los Angeles Fire Departments, as well as transit safety experts from MARTA, WMATA, MUCTC, PATH, BART, UMTA, and Booz, Allen. Additional peer reviews may be held during subsequent phases of the project.

3.2.7 Conduct Peer Reviews on System Safety

As part of the development of the Safety Criteria, industry peer review comments were solicited from knowledgeable

7 Metro Rail System Safety Criteria, WBS 13DAD, Booz, Allen & Hamilton and Kaiser Engineers, September 1982. Incorporated into the SCRTD Metro Rail System Design Criteria and Standards, Volume I, Section 3.

8 SCRTD Peer Review Workshop on Fire Safety, October 14-15, 1981, Charles Harris, Inc.

sources. A Safety Peer Review Board meeting⁹ was held at the SCRTD on June 29-30, 1982. Participants included the SCRTD, CPUC, UMTA, TSC, CalTrans, the SCRTD Transit Police, Booz Allen, Kaiser Engineers, LAFD, LACFD, LAPD, and safety experts from MARTA, WMATA, BART, and PATCO. Additional peer reviews may be held during subsequent phases of the project.

3.2.8 Develop Safety Input to Milestone Program

As part of the Metro Rail public involvement and Milestone program, chapters on fire/life safety and system safety were incorporated into Milestone 7.¹⁰ It described the SCRTD's comprehensive safety program in the areas of Stations, Trainways, Passenger Vehicles, Ventilation Systems, Communications, Train Control, Electrification, Vehicle Yard and Maintenance Facilities, Emergency Procedures, Central Control Facility, and Operational Procedures and Training. The Milestone Report was adopted by the Board of Directors in March, 1983.

3.2.9 Conduct Familiarization Trips to Other Transit Properties

In preparation for development of the System Design Criteria and Standards, members of the SCRTD Fire/Life Safety (F/LS) Committee visited other rapid transit systems in the United States and Canada. In addition, members of the F/LS Committee also participated as observers in disaster drills at BART and WMATA. Additional familiarization trips will be taken on an as-required basis during upcoming phases of the project.

3.3 PLANS AND PROCEDURES

3.3.1 Prepare and Periodically Update the System Safety and Security Program Plan

Based on Metro Rail program goals and objectives for a safe system, the SCRTD maintains this System Safety and Security Program Plan. It defines the management and technical tasks that will be performed for each project phase. The System Safety and Security Program Plan is periodically updated prior to the start of each phase of the Metro Rail project.

9 UMTA/SCRTD/INDUSTRY Safety Peer Review Boards, June 29-30, 1982 Charles Harris, Inc.

10 Project Milestone Report #7, Safety, Fire/Life Safety, Security and Systems Assurance, March 1983, (Chapters II and III).

3.3.2 Develop an Emergency Preparedness Plan

Successful response to, and management of, emergencies is largely dependent on adequate preparation. The SCRTD will anticipate and plan for emergency situations through development of emergency procedures. The procedures will be contained in an Emergency Preparedness Plan (EPP). The EPP will include those items identified in the Fire/Life Safety Criteria, Sections 2.6.3.1, 2.6.3.2 and 2.6.2.1. A preliminary version of the EPP will be prepared during Final Design and refined in each subsequent phase of the project.

3.3.3 Develop Emergency/Disaster Response Procedures

Detailed procedures for each type of emergency listed in the EPP must be developed, reviewed, integrated and rehearsed. All Metro Rail program participants will provide input to the procedures. These participants include representatives of the Fire Department(s), Police Department(s), Rescue Squad, the Coroner/Medical Examiner's Office, and SCRTD and consultants staff.

3.3.4 Prepare a Safety Certification Methodology

During Continuing Preliminary Engineering, a process for evaluating the readiness of the Metro Rail system to safety be placed into revenue service was developed. The Safety Certification Methodology¹¹ described the overall program and process of safety certification and delineated specific tasks to implement the program, as well as the responsibilities of cognizant program participants.

3.3.5 Prepare a Safety Certification Plan

Following approval of the Safety Certification Methodology, a more detailed and comprehensive Safety Certification Plan will be prepared which will document specific responsibilities for program implementation, identify documentation and certification forms, and establish a Safety Review Team (SRT) to oversee the collection, review and approval of evidence needed for certification.

3.3.6 Prepare Safety Certification Procedures

Following approval of the Safety Certification Plan, specific procedures for executing the program will be documented. The procedures will assure an integrated approach to safety certification through participation in design reviews, audits, inspections and the testing program. Steps for completing the

11 Safety Certification Methodology, WBS 06, Booz Allen and Hamilton, October 1984.

forms and documentation developed in the Safety Certification-Plan will be identified and approved.

3.3.7 Prepare a Contractor Safety Monitoring Plan

A plan for reviewing the contractor prepared safety-related analyses, designs, submittals and documents will be developed. The plan will identify the safety documentation required from major contractors, and will provide a procedure for comprehensive review by the General Consultant, the Construction Manager, the SCRTD, and other safety program participants.

3.3.8 Outline Preliminary Safety Procedures and Training Course Requirements

During Final Design, an outline of required safety procedures and training course requirements will be developed. The outline will be used to further define the requirements for plans and procedures for Safety Certification and development of training courses or materials related to safety.

3.3.9 Prepare a Hazard Identification and Resolution Procedure

During Final Design, the SCRTD will prepare a procedure to systematically identify, evaluate, and resolve potential hazards that become apparent during Metro Rail design, construction, testing, start-up or revenue service. The hazards and the subsequent resolution will be based on information from:

- Hazard analyses prepared by consultants and SCRTD staff
- Hazard analyses prepared by contractors and suppliers
- Information from other transit systems
- Observations and experiences of program participants during construction and testing.

Those hazards of a critical (Category II) or catastrophic (Category I) nature will be catalogued in the Critical/Catastrophic Items List (C/CIL), as described in Section 3.4.5.

3.3.10 Develop an Accident/Incident Investigation and Reporting Procedure

During the Construction/Acquisition phase, the SCRTD will draft procedures to investigate any accidents, mishaps or incidents that occur during start-up operations or revenue service. The procedures will deal both with the investigation of accidents/incidents as well as reporting to government

agencies. A draft procedure will be prepared during Construction/ Acquisition and finalized during the testing program.

3.3.11 Develop a Safety and Security Data Management System

The SCRTD will develop a computer-based system to process, analyze and report safety accidents and security incidents. The system will be developed to provide the data base for reporting to SCRTD management and required government agencies relative to safety statistics of the Metro Rail. The analysis of the accidents/incidents will allow SCRTD safety managers to spot potentially hazardous trends in certain locations around the system. Development of the Safety and Security Data Management System will be closely coordinated with the Accident/ Incident Investigation and Reporting Procedure, described in 3.3.10 above. A general outline for the system will be developed during Final Design and then detailed as the Accident/ Incident Investigation and Reporting Procedure is developed.

3.3.12 Develop a Safety Operating Policies Rulebook

During Final Design, an outline will be prepared to serve as a baseline for development of safe operating rules and procedures for testing, start-up operations and revenue service. The Safety Operating Policies Rulebook will be expanded and finalized during the Construction/Acquisition phase. The Rulebook will cover:

- General Safety Procedures
- Mainline Operations
- Central Control Facility Operations
- Yard Operations
- Discipline Code.

The Safety Operating Policies Rulebook will also be used as input to the:

- Emergency Preparedness Plan
- Emergency/Disaster Response Procedures
- Standard Operating Procedures
- Operators Rulebook
- Training Course Materials.

3.3.13 Prepare a Fire Protection Features Manual

During the Construction/Acquisition phase, the safety organization will prepare a manual which describes the design, proper operation, and maintenance of all fire protection and suppression equipment and systems in the Metro Rail. The manual will be used for training course instruction as well as a basic reference document for Metro Rail maintenance and fire and police personnel.

3.3.14 Prepare a Fire and Police Communications Systems Handbook

During the Construction/Acquisition phase, the safety organization will prepare a handbook which contains descriptions and instructions on the use of all fire and police communications systems, channels, radios, telephones, etc. The handbook will be used for training course instruction as well as a basic reference document for emergency response forces (Fire, Police, OCC personnel).

3.3.15 Prepare Safety Features Test Plans and Procedures

During the Construction/Acquisition phase, the safety organization will help the Construction Manager develop the plans and procedures for conducting both acceptance and system-level tests of safety features such as sprinkler systems, alarms, emergency management panels, etc. The test plans and procedures will be incorporated into the Metro Rail System Integrated Test Program (See Section 3.5.5).

3.3.16 Prepare Plans for Emergency Team Training Exercises and Drills

During the Construction/Acquisition phase, the safety organization will prepare plans which describe the requirements, agendas, and schedules for emergency training and simulated disaster drills. The roles and responsibilities of program participants will be as defined in the Emergency Preparedness Plan. The actual drills and emergency exercises will take place during the Pre-Operational Testing phase.

3.4 ANALYSES AND STUDIES

As part of the system configuration and design process, it is necessary to identify potential fire, seismic, or toxic material and other safety hazards and recommend corrective actions to mitigate the hazards. In the preliminary stages of Metro Rail design, these analyses can only be scoped in a broad manner because the details of the subsystems are not known. Even at this early stage, however, analyses are useful because they identify potential problem areas. The System Safety and Security Program Plan delineates the development of several hazard analyses, including:

- A Preliminary Hazard Analysis
- System, Subsystem, and Interface Hazard Analyses
- Fault Tree Analyses
- A Critical/Catastrophic Items List.
- Operating and Maintenance Hazard Analyses.

As input to these hazard analyses, several studies and analyses that focus on safety issues were or will be conducted. These include preparation of:

- A Methane/Combustible Gases Study
- A Seismic Risk Analysis
- A Fire Fighting Capabilities Study
- An Emergency Ventilation Analysis
- A Water Supply Analysis
- Station Emergency Egress Studies
- Fire Hazard and Toxic Materials List(s)
- Emergency Equipment List(s).

3.4.1 Prepare and Update a Preliminary Hazard Analysis (PHA)

During Continuing Preliminary Engineering, a Preliminary Hazard Analysis¹² of the Metro Rail system was conducted. The PHA addressed potentially hazardous conditions that could affect the safe operation of the Metro Rail System. The PHA was prepared in accordance with UMTA guidelines¹³, and will be used by all program participants as a top-level checklist for resolving system-level hazards. The PHA also serves as the framework for conducting other hazard analyses. The PHA will be periodically updated to document the resolution of system level hazards.

3.4.2 Prepare and Update Subsystem Hazard Analyses (SSHA)

During Final Design, the PHA will be expanded in depth to analyze the potential hazards associated with each subsystem. The expansion is needed to conduct the hazard analysis down to the component level. These studies will include consideration of the environmental conditions of operations, the effects of human and equipment interfaces, and the associated failures on the safety of the system. The results of these analyses will be used as inputs to specifications, as subjects of design reviews, and as information in the development of procedures to eliminate, reduce or control critical or catastrophic hazards. A draft SSHA¹⁴ was prepared during Continuing Preliminary Engineering and will be expanded and refined during Final Design and the Construction/Acquisition phase. SSHAs provided by contractors will be incorporated into the Metro Rail SSHA.

12 Preliminary Hazard Analysis of the SCRTD Metro Rail System, Booz Allen & Hamilton, May 1984.

13 System Safety Analysis: A Description of the Formats and Methodologies for System Safety Analysis of Fixed Guideway Transit Systems, Booz, Allen & Hamilton, January 1981, DOTUM-60-80-CO1004.

14 System Safety System/Subsystem Hazard Analysis, Metro Rail Transit Consultants, April 1984 (Draft).

3.4.3 Prepare and Update Interface Hazard Analyses (IHA)

After the initial PHA has indentified hazards in the over-all system, an initial IHA will be performed to consider the potential hazards caused by integrating the Metro Rail systems. After SSHAs from contractors are received and approved, the IHA will be revised to assure that hazards which may be present in the actual equipment integration have been identified and resolved.

3.4.4 Prepare and Update Fault Tree Analyses

Each of the Category I and II conditions identified by the PHA and SSHAs will be analyzed through fault tree analysis techniques. The purpose of these analyses is to provide a description of the combinations of possible occurrences which can result in a Category I or II hazard. The combinations to be considered in the analyses will be those of primary failures where components fail when the component is operating within design tolerances.

The results of these analyses also make available a means with which to measure the level of safety inherent in any particular configuration. The findings of the analyses will also be employed as inputs to specifications, as subjects of design and safety reviews, and as information in the development of procedures to eliminate, reduce, or control critical hazards. The results of these analyses will be presented in the fault tree analysis format shown in Exhibit 3-3. The generally recognized fault tree symbols are shown in Exhibit 3-4.

3.4.5 Prepare and Update Critical/Catastrophic Items List

During the process of development of PHA, IHA, and SSHAs, Category I and II failures will be identified. These failures will be compiled into a singular Critical/Catastrophic Items List (C/CIL) to provide management visibility of these items and to permit monitoring and control. The C/CIL will be a program control document that will be changed and updated through formal procedures and documentation. The C/CIL will be a part of the design and safety review process, acting as an "open or unresolved hazards file." The procedures for resolving the hazards will be documented in the Hazard Identification and Resolution Procedure (see Section 3.3.9).

The C/CIL format under consideration is shown in Exhibit 3-5. It is modeled after similar programs at WMATA, MARTA and the Baltimore Metro. To simplify the documentation process, each hazard is described on a single sheet. The C/CIL will be printed in colors to promote management visibility. The designated colors will be:

- Red--unresolved catastrophic items (Category I)

3-14

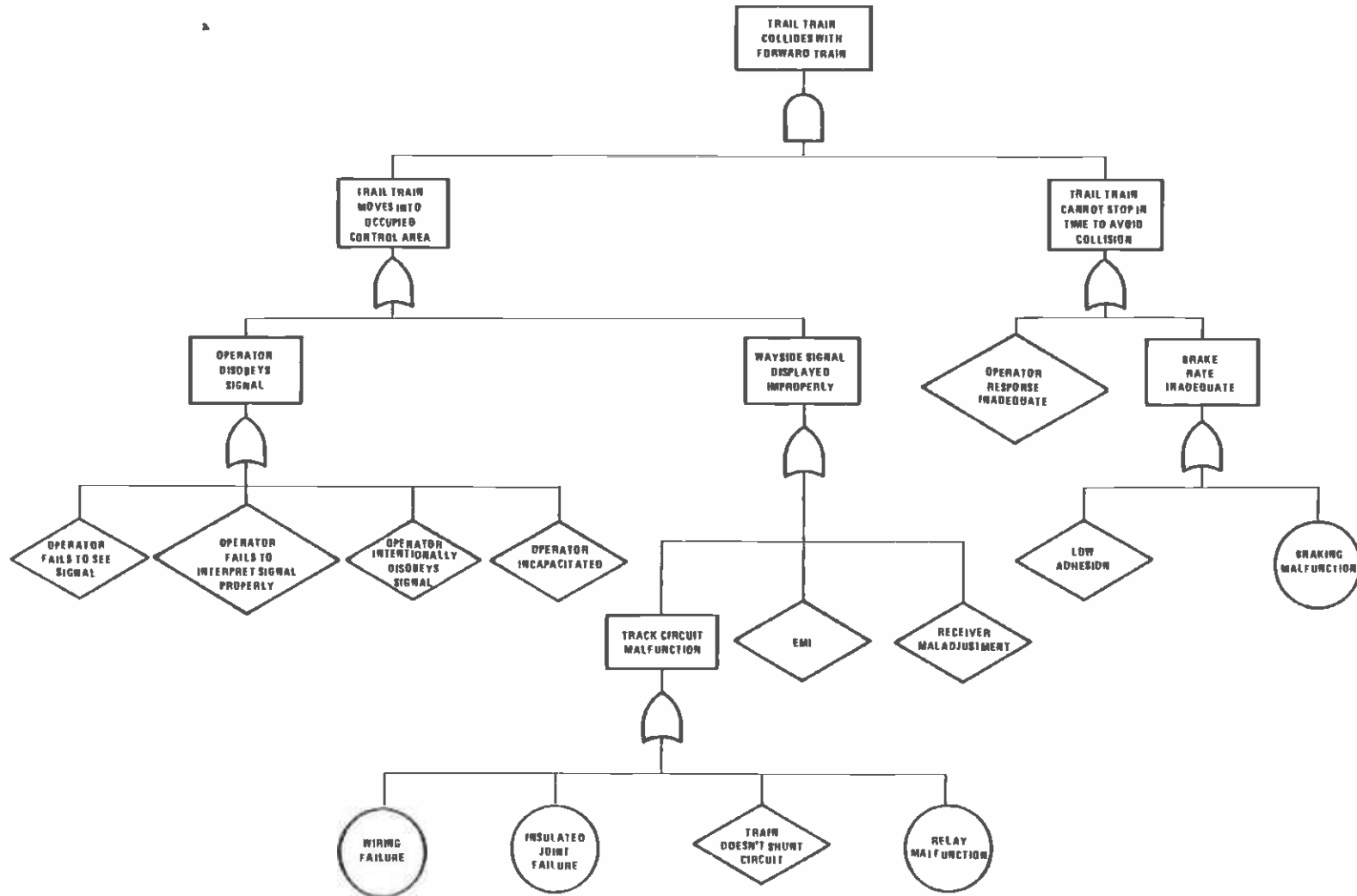


EXHIBIT 3-3

Fault Tree Analysis Structure

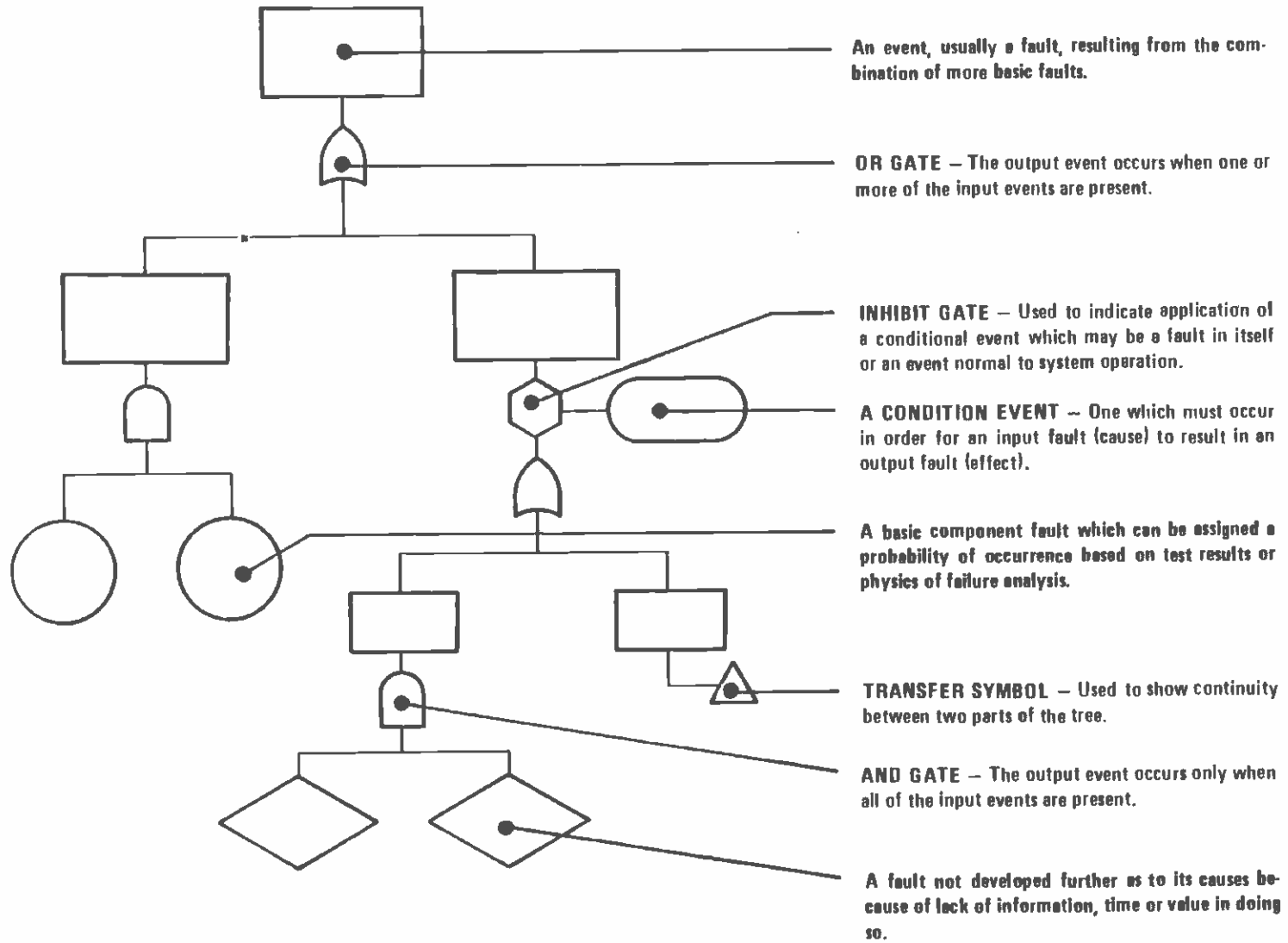


EXHIBIT 3-4
 Fault Tree Analysis Symbols

INSTRUCTIONS

1. HAZARD AREA – Location where the hazard exists. The ten hazard areas are indicated below:

- Vehicle
- Train Control and Communications
- Supervisory and Control System
- Fare Collection System
- Traction Power
- Work Train
- Stations (includes OCC)
- Lines and Trackwork
- Yard and Shop
- Operations

2. SUBSYSTEM INVOLVED – Subset of the hazard area that more precisely defines the location of the hazard. The subsystems of a vehicle are the brakes, communications, doors, car body, etc.

3. SOURCE OF INFORMATION – The source document from which the safety hazard was identified, such as the Vehicle SSHA, the PSHA, information from other properties.

4. DESCRIPTION OF HAZARD – A brief explanation of the condition that could result in an accident, such as "Doors open while vehicle is in motion".

5. EFFECT OF HAZARD – A brief description of the accident that could result from the hazard. The effect of the hazard "Doors open while vehicle is in motion" would be "Patrons fall out of vehicle onto track".

6. SEVERITY – The hazard assessment category.

- Catastrophic (I)
- Marginal (III)
- Critical (II)
- Negligible (IV)

7. PROBABILITY – The likelihood the hazard will occur

- Frequent (A)
- Remote (D)
- Reasonably Probable (B)
- Extremely Improbable (E)
- Occasional (C)

8. OTHER AFFECTED AREAS OR SUBSYSTEMS – Other hazard areas or subsystems from Items 1 and 2 which share or interface with the hazard.

9. RESOLUTION OF HAZARD – The design feature(s), safety device(s), warning device(s), procedure(s) or redesign and retrofit action(s) which resolve the hazard.

10. RESPONSIBILITY ORGANIZATION – The Section, or individual, consultant or contractor responsible for undertaking resolution action.

11. INCORPORATED AS OF _____ – The status of the resolution action (i.e., complete or incomplete) as of the given date.

3-16

CRITICAL/CATASTROPHIC HAZARD		
1 HAZARD AREA	2 SUBSYSTEM INVOLVED	3 SOURCE OF INFORMATION
DESCRIPTION OF HAZARD 4		
EFFECT OF HAZARD 5 SEVERITY 6 PROBABILITY 7		
OTHER AFFECTED AREAS OR SUBSYSTEMS 8		
RESOLUTION(S) OF HAZARD 9	RESPON- SIBILITY 10	INCORPORATED AS OF: 11

EXHIBIT 3-5

Critical/Catastrophic Items List Format

- Yellow--unresolved critical items (Category II)
- Green--resolved items.

Iterations of the C/CIL will continue until all hazards are printed in the green color. This process will begin during the Final Design phase and will continue into revenue service as part of continuing hazard identification and resolution process.

3.4.6 Prepare and Update Operating and Maintenance Hazard Analyses (OHA)

The operating and/or maintenance hazard analysis is a systematic review and assessment of the activities required in the test, operation or maintenance of equipment to determine those conditions which could lead to injury, death or equipment damage.

An OHA can be applied to the operation of a system, subsystem or item of equipment, as well as to the activities of operations, testing, and maintenance. However, because of the detailed level of the analysis, only one activity can be analyzed at a time. Although an OHA can be performed on either human or automatic activities, its primary purpose is to identify and evaluate hazards associated with the man/machine interface. It uses a bottom-up approach to achieve these ends.

The results of the operating hazard analysis provide input to testing, operation, and maintenance procedures. The input is usually in the form of warning or caution devices, special emergency procedures, or revisions to existing or proposed safety procedures. The OHA will be performed before and during the integrated testing program and/or whenever a procedural problem is identified or changes are made to equipment.

The benefits derived from conducting an OHA are:

- Identification of hazards to employees involved in the test, operation or maintenance of equipment
- Identification of hazards to the system and passengers as a result of testing, operation or maintenance procedures
- Assurance that the hazards associated with the test, operation and maintenance of equipment have been eliminated or controlled
- Allocation of training resources to areas that provide the most benefit
- Documentation of why certain procedures were developed or changed.

The initial Operating and Maintenance Hazard Analysis will be performed near the completion of the Construction/Acquisition phase. The OHA will be updated during testing and start-up to document the resolution of hazards as procedures are written and approved.

3.4.7 Prepare a Methane/Combustible Gases Study

A study¹⁵ was conducted to determine whether or not a methane gas problem could exist for the Metro Rail system, to determine its magnitude, and to develop solutions to avoid or mitigate potential hazards. The report analyzed geological data, the anticipated performance of structures, equipment and systems and the projected operation of the transit system.

3.4.8 Prepare a Seismic Risk Analysis

A study¹⁶ was conducted to evaluate the consequences to the Metro Rail system and its patrons of various seismic events. Failure effects were evaluated for tunnels, stations, elevators, escalators, fare collection, auxiliary power and ventilation equipment, tracks and switches, traction power, train control, vehicles and communications systems.

3.4.9 Prepare a Study of Public Firefighting Capabilities and Requirements

A study¹⁷ was performed to determine the fire response capabilities of the Los Angeles City and County Fire Departments to provide fire protection, rescue and medical services for potential emergencies that may occur on Metro Rail. The need for providing additional personnel and equipment was evaluated. The study surveyed fire suppression/medical aid equipment, training, communication, and fire prevention inspection programs.

15 Study of Methane and Other Combustible Gases Effect on Underground Operation of the Metro Rail Project, Kaiser Engineers California and Gage-Babcock & Associates, March 1983.

16 Seismic Risk Analysis, WBS 12AAM, Lindvall-Richter and Associates, October 1982.

17 Study of Public Fire Fighting Capabilities and Requirements for the Metro Rail Project, Kaiser Engineers and Gage-Babcock & Associates, August 1983.

3.4.10 Prepare an Emergency Ventilation Analysis

A study¹⁸ was prepared to verify the adequacy of emergency and mid-tunnel fan capacities. The analysis focused on evaluating air-flow characteristics past a single 6-car train stalled in a tunnel during a multiple car fire.

3.4.11 Prepare a Water Supply Analysis

A study¹⁹ was conducted to analyze the water supply available at each station site to determine if it was adequate to meet fire protection needs. The study presented estimates of the volume and pressure needs at each station site and compared the available supply to the calculated demand.

3.4.12 Prepare and Update a Station Emergency Egress Study

There was no single accepted standard to define the proper number of exits required for emergency evacuation of a subway station. The F/LS Committee analyzed existing codes and standards and found that a combination of various codes and standards provided the most appropriate and cost effective approach toward determining exiting needs for postulated emergencies. Studies²⁰ were prepared to analyze whether the station emergency exiting criteria were adequate and achieved exit requirements and objectives.

3.4.13 Prepare and Update Fire Hazard and Toxic Materials Lists

A list of potentially hazardous materials used for Metro Rail construction or equipment, as well as for maintenance, will be prepared and periodically updated. The lists will be prepared as part of the design review process, and used by safety personnel to evaluate candidate materials for fire/life safety implications. The lists will identify the potentially hazardous effects of various materials, including solvents, insulation, finishes, sealants, coatings, adhesives, cleaning chemicals, etc. used in the Metro Rail system.

18 Environmental Control System, Parson, Brinckerhoff, Quade & Douglas, August 1984, Chapter 3.2--Emergency Operations

19 Analysis of Water Supply at Station Sites, Rolf Jensen and Assoc., March 1984.

20 Station Emergency Egress Study, WBS 13DAM, Volumes I and II, Harry Weese and Associates/Tibbets, Abbott, McCarthy & Stratton, August 1983.

Analysis of Exiting and Fire/Life Safety, Rolf Jensen and Associates, March 1984.

3.4.14 Prepare Emergency Equipment Lists

To properly plan for and manage emergencies, and as input to the procurement process, the safety organization will identify emergency equipment requirements. The lists will define what equipment is to be purchased for each station, the Central Control Facility, each appropriate local firehouse, kept on-board the transit vehicles, at the yard and shop, etc.; how and where it is to be stored, and who controls access to it. This emergency and fire fighting equipment is in addition to the ventilation, fire protection, control and communications systems installed as part of the fixed facilities.

3.4.15 Prepare Safety Trade-Off Studies

During the design, procurement, and construction process, situations may arise where trade-offs between safety, security and system assurance considerations must be addressed. The safety organization will coordinate with the security and system assurance organizations as well as outside agencies, such as the fire and police departments and the CPUC to resolve these issues. The resolution of these trade-offs will be presented to systems designers and Metro Rail management for approval and design implementation.

3.5 DESIGN, CONSTRUCTION, AND PROCUREMENT SUPPORT

The safety organization will participate directly and continuously with the General Consultant (G.C.) and the Construction Manager (C.M.) to assure that safety is adequately incorporated into the system and subsystem designs and procurement specifications as well as the end products delivered or installed. The safety organization will support the G.C. and C.M. in the manner described in the following sections.

3.5.1 Provide General Design Support

The safety organization is responsible for providing information and analysis pertinent to safety in the system and subsystem design. The information provided will include:

- Documentation and data significant to fire/life and operational safety in the design of other transit properties facilities and equipment.
- The resulting compromises achieved by the coordination of safety, security and system assurance considerations which impact on the system and subsystem designs and specifications.

3.5.2 Provide General Construction/Procurement Support

The safety organization is responsible for providing information, analyses, and support pertinent to safety in the construction, manufacture, acquisition, procurement, and installation of Metro Rail facilities and equipment. The safety organization will assist the Construction Manager and the Metro Rail Construction Department as required.

3.5.3 Participate in Design Reviews

The safety organization will participate in all design reviews where the safety of patrons, Metro Rail personnel, equipment or facilities could be affected by the design of the system. These reviews include Conceptual Design Reviews, Preliminary Design Reviews and Final or Critical Design Reviews. The results of the design reviews will be documented and action items assigned to resolve deficiencies.

3.5.4 Participate in Contractor Audits, Inspections, and Tests

The safety organization will participate in all contractor audits, inspections, and tests where the safety of patrons, Metro Rail personnel, equipment, or facilities could be affected by the improper construction or manufacture of system elements. These audits and inspections cover both facilities and systems elements. Included are First Article Configuration Identification (FACI) inspections, Mock-Up Reviews, Qualification(s) Tests, Performance Tests, and Acceptance Tests.

3.5.5 Participate in System Integration Test Program Development

The safety organization will participate in system integration and pre-revenue testing activities where the safety of patrons or Metro Rail employees may be affected. During the Construction/Acquisition phase, the safety organization will assist the Metro Rail Construction Department, the Construction Manager, and Metro Rail Operations and Maintenance personnel with developing integrated test plans and procedures for system verification and demonstration.

3.5.6 Participate in Training Course Program Development

The safety organization will assist various Metro Rail Departments and other SCRTD staff with developing the safety related aspects of training programs for:

- Train Operators
- Central Control Facility Personnel
- Facilities Maintenance Personnel
- Vehicle Maintenance Personnel
- Systems Maintenance Personnel
- Transit Police.

In addition, the safety organization will assist outside agencies with the development of training programs, emergency simulations, drills and exercises. These organizations include:

- Fire Departments
- Police Departments
- Department of Water and Power
- Rescue Squad
- Coroner/Medical Examiner's Office.

3.5.7 Participate in Public Education Program Development

The safety organization will assist SCRTD public relations staff and the Transit Police with developing safety and security education programs for school children and the general public. The safety organization will be responsible for the development and presentation of information relating to safety and security.

3.5.8 Participate on the Fire/Life Safety Committee

To insure supportive interaction between the Metro Rail safety organization, their consultants, and police and fire organizations, a Fire/Life Safety Committee was established. The organization of the Fire/Life Safety Committee is shown in Exhibit 3-6 and the charter in Exhibit 3-7. Along with its other coordinating responsibilities, the Committee acts as a review board of the activities, analyses and reports generated on safety issues. The Committee recommends necessary changes, additions, and/or improvements to on-going safety activities.

The Fire/Life Safety Committee meets on a periodic and scheduled basis. It will function throughout the Design, Construction/Acquisition, Testing and Revenue Operation phases of the Metro Rail program. Its safety emphasis will shift from design review in the early stages of the Metro Rail Program to the development and improvement of safety procedures in the Construction/Acquisition phase to investigation and reporting of accidents and incidents in the Revenue Operating phase.

3.5.9 Participate on the Elderly/Handicapped Committee

To assure the requirements of elderly and handicapped patrons and employees are adequately considered in the design and subsequent operation of the Metro Rail system, an Elderly/Handicapped Committee has been formed. The Committee (Exhibit 3-8) is charged with acting as a review board for analyses and reports generated on elderly/handicapped issues, as well as recommending changes, additions and deletions to system criteria and designs that could affect elderly and/or handicapped patrons or employees. The Metro Rail Elderly/Handicapped Committee coordinates these matters with the SCRTD Elderly and Handicapped Advisory Committee.

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT
FIRE/LIFE SAFETY COMMITTEE CHARTER

WHEREAS, the route alignment selected as the Metro Rail System preferred alternative extends through geographic areas within both the City of Los Angeles and Los Angeles County, each of which has separate and distinct fire service districts and separate building codes,

WHEREAS, it has been proven that experience gained from other municipalities who have built transit systems indicates the need for the continuous interchange of information between the fire district and the transit system's designers to establish a commonality of purpose, maintain efficient channels of communication and to input design preferences early in the design process,

BE IT RESOLVED THAT:

A permanent Fire/Life Safety Committee (hereafter referred to as the "Committee") is established to facilitate the interchange of information, make evaluations and recommendations, and set requirements relative to the design, construction, and operation of a rail rapid transit system for the purpose of minimizing the fire and life safety hazards to patrons, employees, and property.

The Committee will be comprised of representatives from the City of Los Angeles Fire Department, the Consolidated Fire Protection District of Los Angeles County, a representative of the General Consultant, and a representative of the Southern California Rapid Transit District, who will act as chairman of the Committee.

Pro-Tem members of the Committee will be a representative from the Los Angeles City Police Department, a representative from the Los Angeles County Sheriff's Department, a representative from the SCRDT Fixed Facilities Division and a representative from the Systems Engineering and Analysis Consultant.

The Committee will provide input to and comments on the fire protection criteria, emergency preparedness plans, and safety and security plans.

The Committee will establish requirements relative to fire and life safety using national standards, jurisdictional laws, codes, and ordinances, as guidelines.

The Committee will prepare "Fire Protection and Safety Agreements" for ratification by the participating agencies.

The Committee will provide a means for soliciting and gaining the understanding and cooperation of the various public service departments within the City and County of Los Angeles during the design and construction of the Metro Rail System.

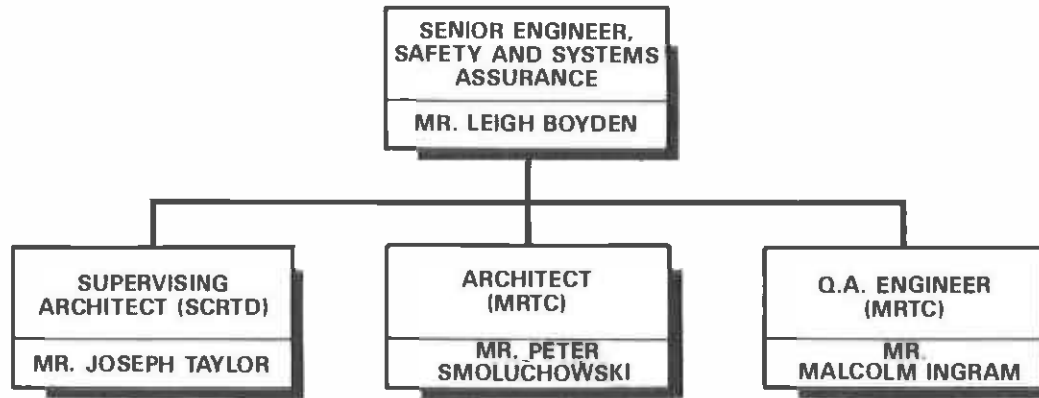
The signatures below indicate agreement with the Fire/Life Safety Committee Charter between the City of Los Angeles Fire Department, Consolidated Fire Protection District of Los Angeles County and the Southern California Rapid Transit District - Metro Rail Project.

APPROVED
BOARD OF FIRE COMMISSIONERS

City of Los Angeles Fire Department

Consolidated Fire Protection District
of Los Angeles County

Southern California Rapid Transit District/
Metro Rail Project



SCRTD METRO RAIL ELDERLY/HANDICAPPED COMMITTEE

3.5.10 Prepare Fire/Life Safety Criteria Conformance Checklists

To assure that fire/life safety criteria are properly reflected in contract drawings and specifications, the safety organization is developing comprehensive checklists of items which must be verified during the Metro Rail design review process. The checklists will be used by the F/LS Committee members to assure a comprehensive and consistent review of specifications and drawings. Any discrepancies will be formally submitted to the General Consultant and will be resolved to the satisfaction of the Fire/Life Safety Committee.

3.5.11 Prepare System Safety Criteria Conformance Checklists

To assure that the system safety criteria are properly reflected in contract drawings and specifications, the safety organization is developing comprehensive checklists of items which must be verified during the Metro Rail design review process. The checklists will be used by SCRTD safety staff to assure a comprehensive and consistent review of specifications and drawings. Any discrepancies will be formally submitted to the General Consultant and will be resolved to the satisfaction of SCRTD safety management.

3.5.12 Prepare Specification Conformance Checklists

To assure that all safety criteria incorporated into the specifications are reflected in suppliers final designs, equipment and materials selection, the safety organization will refine those checklists developed in 3.5.10 and 3.5.11 above, and orient them to the procurement, construction and acquisition phase. The safety checklists will be incorporated into the Metro Rail design review, audit, inspection, and testing program to support the Safety Certification Program. The checklists will be prepared by the General Consultant and used by SCRTD and Construction Manager representatives during supplier design reviews, audits, inspections, and tests. Any safety discrepancies between the specification conformance checklists and the suppliers designs or final products will be resolved to the satisfaction of SCRTD safety management.

3.5.13 Develop a Construction/Facilities Safety Inspection Program

During Final Design, the safety organization will develop a program to assure that stations, tunnels and other facilities are being constructed in accordance with requirements of the Metro Rail System Design Criteria and Standards and the appropriate specification and drawing requirements relating to safety. The Construction Manager will be encouraged to utilize the expertise of F/LS Committee members, as appropriate, for the development of the inspection program.

3.5.14 Identify Safety Documentation Requirements for Contract Specifications

During Final Design, the safety organization is responsible for identifying contractor or supplier safety-related analyses, tests, tasks, and submittals that form part of the procurement specifications. The safety organization will assist the General Consultant in identifying and phrasing the requirements for safety analyses, test requirements and submittals in the procurement specifications.

3.5.15 Review Contractor Analyses and Reports

The safety organization will review any contractor analyses, reports, and submittals relating to safety. This includes change proposals, hazard analyses, critical/catastrophic items lists, fault tree analyses, test plans, CDRL items, etc.

3.5.16 Review Operating and Maintenance Manuals and Procedures

The safety organization will review operating and maintenance manuals and procedures which relate to safety. This includes operators rulebooks, maintenance safety checklists, standard operating procedures, warnings in maintenance manuals, etc.

3.5.17 Conduct Coordination Meetings with Contractor Fire/Life Safety and System Safety Staff

The SCRTD will coordinate fire/life safety and system safety planning with cognizant representatives of Metro Rail equipment suppliers, facility contractors, and subcontractors. The meetings will be held on an as-required basis to discuss designs, change requests, and submittals.

3.5.18 Participate in Change Control Board Activities

The safety organization will be represented on the Change Control Board to assess whether changes to the design of a facility or equipment could affect the safety or security of the Metro Rail system.

3.5.19 Direct the Safety Certification Program

The safety organization will direct the safety certification of the Metro Rail system. The Safety Certification program has been developed to assure the Metro Rail system can safely transport patrons in revenue service. Review of certification materials rests with the Safety Review Team (SRT).

3.6 DOCUMENTATION

As part of its activities, the safety organization will gather and maintain safety-related documentation as part of a safety, security, and system assurance library.

3.6.1 Establish Safety Library

The organization and maintenance of a safety-related library of Metro Rail data and other rapid rail properties data will be a continuing activity. The safety-related data bases will provide:

- Archival data of other properties' reports, records, and statistics (as it can be obtained)
- Monitoring status records of contractors' analyses, tasks, test certifications, etc.
- Qualitative data for investigation of incidents/accidents and quantitative data for statistical analysis of types of incidents/accidents
- The source data for a management information reporting system.

3.6.2 Establish Safety Documentation and Review Procedures

The safety organization will prepare procedures to review, comment on, and track changes to safety criteria, change notices, and other related documentation. This will include:

- The internal and contractor provided safety-related analyses
- The resolution of all hazards itemized in the Critical/Catastrophic Items List
- Incident/accident reports of all construction, test and operational anomalies
- Status reports of all contractor(s)' safety-related analyses
- Test and safety certification documents
- Status of safety training programs for operators, maintenance personnel, central control personnel, and station agents.

4.0 SECURITY PROGRAM TASKS

4.0 SECURITY PROGRAM TASKS

4.1 GENERAL

Exhibit 4-1 lists the security tasks which are presently identified for each phase of the Metro Rail Project. As previously stated, subsequent updating of this plan will refine some tasks while establishing others. Additionally, subsequent updating of this document may identify other organizations responsible for accomplishing the security tasks. Task numbers in the left hand column of Exhibit 4-1 correspond to the paragraph numbers used in this chapter.

Exhibit 4-2 identifies the organizational responsibilities for preparing, initiating, supporting and/or reviewing and commenting on each task or activity.

The tasks have been segregated into five areas, representing the major efforts of the security organization:

- Criteria Development
- Plans and Procedures
- Analyses and Studies
- Support for Design, Construction/Acquisition, Testing and Start-Up Operations
- Documentation.

The following sections, 4.2 thru 4.6, describe the tasks that were performed during the Preliminary and Continuing Preliminary Engineering phase and those that will be performed during Final Design and the Construction/Acquisition phase. Descriptions of the tasks to be performed in the Testing and Start-Up phases will be part of subsequent updates.

SECURITY ACTIVITIES AND TASKS

PARAGRAPH NUMBER	SECURITY TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
	<u>CRITERIA DEVELOPMENT</u>						
4.2.1	Develop Security Criteria	•	•				
4.2.2	Update and Revise Security Criteria			•	•	•	•
4.2.3	Conduct Peer Reviews on System Security	•	•	•	•	•	•
4.2.4	Develop Security Input to Milestone Program	•					
4.2.5	Conduct Familiarization Trips to Other Transit Properties	•	•	•	•	•	•

4-2 (a)

Exhibit 4-1

SECURITY ACTIVITIES AND TASKS

PARAGRAPH NUMBER	SECURITY TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
	<u>PLANS AND PROCEDURES</u>						
4.3.1	Prepare a Preliminary Transit Police Staffing Plan	•					
4.3.2	Prepare a Contractor Security Monitoring Plan			•			
4.3.3	Outline Preliminary Security Procedures and Training Course Requirements			•			
4.3.4	Finalize the Security Staffing and Organization Plan			•	•		
4.3.5	Develop a Security Incident Investigation and Reporting Procedure				•		
4.3.6	Develop Security Operating Procedures				•	•	

4-2 (b)

Exhibit 4-1 (continued)

SECURITY ACTIVITIES AND TASKS

PARAGRAPH NUMBER	SECURITY TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
	<u>ANALYSES AND STUDIES</u>						
4.4.1	Prepare a Security Profile of the Metro Rail Corridor	•					
4.4.2	Prepare a Security Policies Recommendations Study		•				
4.4.3	Prepare a Closed Circuit Television Evaluation		•				
4.4.4	Prepare a Closed Circuit Television Utilization Study			•			
4.4.5	Prepare an Access Control Study			•			
4.4.6	Prepare Transit Parking Security Studies			•			
4.4.7	Prepare a Fare Collection Equipment Security Analysis			•			
4.4.8	Prepare a Security Command Center Requirements Analysis			•			

4-2 (c)

Exhibit 4-1 (continued)

SECURITY ACTIVITIES AND TASKS

PARAGRAPH NUMBER	SECURITY TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
	<u>DESIGN, CONSTRUCTION/PROCUREMENT AND TESTING SUPPORT</u>						
4.5.1	Provide General Design Support	•	•	•			
4.5.2	Provide General Construction/Procurement Support				•		
4.5.3	Participate in Design Reviews		•	•	•		
4.5.4	Participate in Contractor Audits, Inspections and Tests				•	•	
4.5.5	Participate in System Integration Test Program Development				•	•	
4.5.6	Participate in Training Course Program Development				•		
4.5.7	Participate in Public Education Program Development				•		
4.5.8	Participate on the Fire/Life Safety Committee Security Subcommittee	•	•	•	•	•	•
4.5.9	Prepare Security Criteria Conformance Checklists		•	•	•		
4.5.10	Prepare Specification Conformance Checklists			•	•		
4.5.11	Review Contractor Analyses and Reports			•	•	•	
4.5.12	Develop Metro Rail Security Problem Forms and Management Reports				•	•	

4-2 (B)

SECURITY ACTIVITIES AND TASKS

PARAGRAPH NUMBER	SECURITY TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
	Participate in Testing Program					•	•
	Conduct Security Training Courses					•	•
	<u>DOCUMENTATION</u>						
4.6.1	Establish Security Library	•					
4.6.2	Establish Security Documentation and Review Procedures		•	•			

4-2 (e)

Exhibit 4-1 (continued)

TASK RESPONSIBILITIES

PARAGRAPH NUMBER	SECURITY TASK/ACTIVITY	METRO RAIL								GENERAL CONSULTANT	CONSTRUCTION MANAGER	RAIL OPERATIONS	RAIL MAINTENANCE
		SYSTEM DESIGN & ANALYSIS						FIXED FACILITIES	CONSTRUCTION MANAGEMENT				
		SAFETY & SYSTEMS ASSURANCE	SYSTEMS ENGINEERING & ANALYSIS	SYSTEMS DESIGN	SYSTEMS ENGINEERING CONSULTANT	FIRE DEPTS. AND RESCUE SQUAD	POLICE DEPTS. CORONERS & OFFICE						
	<u>CRITERIA DEVELOPMENT</u>												
4.2.1	Develop Security Criteria	S	RC	RC	P		RC	RC		S			
4.2.2	Update and Revise Security Criteria	S	RC	RC	RC		RC	RC	RC	P	RC		
4.2.3	Conduct Peer Reviews on System Security	P											
4.2.4	Develop Security Input to Milestone Program	P			S		RC			S			
4.2.5	Conduct Familiarization Trips to Other Transit Properties	P			S					S			

P = Primary Responsibility
 S = Secondary or Support Responsibility
 RC = Review and Comment

4-3 (a)

TASK RESPONSIBILITIES

PARAGRAPH NUMBER	SECURITY TASK/ACTIVITY	METRO RAIL								GENERAL CONSULTANT	CONSTRUCTION MANAGER	RAIL OPERATIONS	RAIL MAINTENANCE
		SYSTEM DESIGN & ANALYSIS						FIXED FACILITIES	CONSTRUCTION MANAGEMENT				
		SAFETY & SYSTEMS ASSURANCE	SYSTEMS ENGINEERING & ANALYSIS	SYSTEMS DESIGN	SYSTEMS ENGINEERING CONSULTANT	FIRE DEPTS. AND RESCUE SQUAD	POLICE DEPTS. & CORONERS OFFICE						
	<u>PLANS AND PROCEDURES</u>												
4.3.1	Prepare a Preliminary Transit Police Staffing Plan	S								P			
4.3.2	Prepare a Contractor Security Monitoring Plan	S		RC	RC				RC	RC	P	RC	
4.3.3	Outline Preliminary Security Procedures and Training Course Requirements	S	RC	RC	RC	RC				P	RC		
4.3.4	Finalize the Security Staffing and Organization Plan	S	RC			P				S	RC	RC	
4.3.5	Develop a Security Incident Investigation and Reporting Procedure	S				S				P	RC	RC	RC
4.3.6	Develop Security Operating Procedures	RC				RC		RC		P	RC	RC	RC

4-3 (b)

P = Primary Responsibility
 S = Secondary or Support Responsibility
 RC = Review and Comment

TASK RESPONSIBILITIES

PARAGRAPH NUMBER	SECURITY TASK/ACTIVITY	METRO RAIL								GENERAL CONSULTANT	CONSTRUCTION MANAGER	RAIL OPERATIONS	RAIL MAINTENANCE	
		SYSTEM DESIGN & ANALYSIS						FIXED FACILITIES	CONSTRUCTION MANAGEMENT					
		SAFETY & SYSTEMS ASSURANCE	SYSTEMS ENGINEERING & ANALYSIS	SYSTEMS DESIGN	SYSTEMS ENGINEERING CONSULTANT	FIRE DEPTS. AND RESCUE SQUAD	POLICE DEPTS. & CORONERS OFFICE							
	<u>ANALYSES AND STUDIES</u>													
4.4.1	Prepare a Security Profile of the Metro Rail Corridor	P										RC		
4.4.2	Prepare a Security Policies Recommendations Study	S	RC		P							RC		
4.4.3	Prepare a Closed Circuit Television Evaluation	RC	RC	RC	RC				RC	RC		P		
4.4.4	Prepare a Closed Circuit Television Utilization Study	RC	RC	RC	RC				RC	RC		P		
4.4.5	Prepare an Access Control Study	RC	RC	RC	RC	RC			RC	RC		P		
4.4.6	Prepare Transit Parking Security Studies	RC	RC	RC	RC				RC	RC		P		
4.4.7	Prepare a Fare Collection Equipment	RC	RC	RC	RC				RC	RC	RC	P	RC	
4.4.8	Prepare a Security Command Center Requirements Analysis	S	RC	RC	P	RC			RC	RC		S	RC	RC

P = Primary Responsibility
 S = Secondary or Support Responsibility
 RC = Review and Comment

4-3(c)

TASK RESPONSIBILITIES

PARAGRAPH NUMBER	SECURITY TASK/ACTIVITY	METRO RAIL								GENERAL CONSULTANT	CONSTRUCTION MANAGER	RAIL OPERATIONS	RAIL MAINTENANCE
		SYSTEM DESIGN & ANALYSIS						FIXED FACILITIES	CONSTRUCTION MANAGEMENT				
		SAFETY & SYSTEMS ASSURANCE	SYSTEMS ENGINEERING & ANALYSIS	SYSTEMS DESIGN	SYSTEMS ENGINEERING CONSULTANT	FIRE DEPTS. AND RESCUE SQUAD	POLICE DEPTS. & CORONERS OFFICE						
	<u>DESIGN, CONSTRUCTION/PROCUREMENT AND TESTING SUPPORT</u>												
4.5.1	Provide General Design Support	S	S	S	S			S	S	S		S	
4.5.2	Provide General Construction/Procurement Support	S	S	S	S			S	S	S	S		
4.5.3	Participate in Design Reviews	P	S	S	S			S	S	S	S	S	
4.5.4	Participate in Contractor Audits, Inspections and Tests	P	S	S	S			S	S	S	S	S	
4.5.5	Participate in System Integration Test Program Development	P	S	S	S			S	S	S	S	S	S
4.5.6	Participate in Training Course Program Development	P	S	S	S			S	S	S	S	S	S
4.5.7	Participate in Public Education Program Development	P	S	S	S	S		S	S	S	S	S	S
4.5.8	Participate on the Fire/Life Safety Committee Security Subcommittee	P			P			P		P	P	P	
4.5.9	Prepare Security Criteria Conformance Checklists	RC			RC			RC	RC	RC	P	RC	

P = Primary Responsibility
 S = Secondary or Support Responsibility
 RC = Review and Comment

4-3(d)

TASK RESPONSIBILITIES

PARAGRAPH NUMBER	SECURITY TASK/ACTIVITY	METRO RAIL								GENERAL CONSULTANT	CONSTRUCTION MANAGER	RAIL OPERATIONS	RAIL MAINTENANCE
		SYSTEM DESIGN & ANALYSIS						FIXED FACILITIES	CONSTRUCTION MANAGEMENT				
		SAFETY & SYSTEMS ASSURANCE	SYSTEMS ENGINEERING & ANALYSIS	SYSTEMS DESIGN	SYSTEMS ENGINEERING CONSULTANT	FIRE DEPTS. AND RESCUE SQUAD	POLICE DEPTS. & CORONERS OFFICE						
4.5.10	Prepare Specification Conformance Checklists	RC			RC		RC	RC	RC	P	RC		
4.5.11	Review Contractor Analyses and Reports	RC	RC	RC	RC		RC	RC	RC	RC	RC	RC	RC
4.5.12	Develop Metro Rail Security Problem Forms and Management Reports	S			S		P			S			
	<u>DOCUMENTATION</u>												
4.6.1	Establish Security Library	P											
4.6.2	Establish Security Documentation and Review Procedures	P											

P = Primary Responsibility
 S = Secondary or Support Responsibility
 RC = Review and Comment

Exhibit 4-2 (continued)

4.2 CRITERIA DEVELOPMENT

4.2.1 Develop Security Criteria

A System Security Criteria document²¹ has been developed as part of the planning during preliminary engineering. The security criteria provide the requirements to be followed by design engineers to properly select equipment and design facilities. Through the criteria, security concerns will be integrated into all aspects of the design, architectural concepts, specification preparation, equipment selection, construction, procedures and operations.

4.2.2 Update and Revise Security Criteria

During the design process, changes may be made to the Security Criteria based on results of trade-off studies and alternatives analysis. The Security Criteria will be revised in accordance with established Metro Rail document control and configuration management practices.

4.2.3 Conduct Peer Reviews on System Security

As part of the development of the Security Criteria, industry peer comments were solicited from knowledgeable sources. A Security Peer Workshop²² was held at the SCRTD sources on Jan 11-12, 1983. Participants included the SCRTD and representatives from WMATA, BART, MARTA, NYCTA, APTA, UMTA, TSC, CPUC, Cal Trans, LA County Police Dept, LA City Police Department, Booz Allen, and Kaiser Engineers. Additional peer reviews may be held during subsequent phases of the project.

4.2.4 Develop Security Input to Milestone Program

As part of the Metro Rail public involvement and milestone program, a chapter on security was incorporated into Milestone 7²³. It described the SCRTD's comprehensive security program in the areas of Stations, Communications, Vehicles, Central Control, Ways Structures and Right-of-Way, Transit Police and Public Education. The Milestone Report was adopted by the Board of Directors in March 1983.

21 Metro Rail Security Criteria, WBS 13DAD, Booz, Allen & Hamilton and Kaiser Engineers, September 1982, incorporated into the SCRTD Metro Rail Design Criteria, Volume I, Section 4, November 18, 1983.

22 UMTA/SCRTD Industry Security Peer Review, Jan 11-12, 1983. Charles Harris, Inc.

23 Project Milestone Report #7, Safety Fire/Life Safety Security and Systems Assurance, March 1983 (Chapter IV).

4.2.5 Conduct Familiarization Trips to Other Transit Properties

In preparation for development of the Security Criteria and the Security Policies Recommendations Study, members of the SCRTD Security Subcommittee visited other rapid transit systems in the U.S. and Canada. Additional familiarization trips will be taken on an as-required basis during upcoming phases of the project.

4.3 PLANS AND PROCEDURES

4.3.1 Prepare a Preliminary Transit Police Staffing Plan

During Preliminary Engineering, the security organization prepared a preliminary staffing plan for the SCRTD Transit Police. The plan compared the security personnel levels at other modern transit systems and recommended appropriate additional personnel requirements for the Metro Rail. The staffing plan was used as input to the operating cost estimates.

4.3.2 Prepare a Contractor Security Monitoring Plan

A plan for reviewing the contractor prepared security related analyses, designs, submittals and documents will be developed. The plan will identify analyses and documentation required from major contractors. The plan will describe the methods for auditing procurements that pertain to security, such as:

- Alarm systems
- Public address systems
- Fare collection equipment
- Closed circuit TV and monitoring equipment
- Cash and fare media handling equipment.

4.3.3 Outline Preliminary Security Procedures and Training Course Requirements

A preliminary plan that identifies the security related procedures and training requirements for train operators, Transit Police, LAPD, LACSD, central control personnel and station attendants will be developed. The guidelines will form the basis for developing security training programs, courses and procedures during the later phases of the project.

4.3.4 Finalize the Security Staffing and Organization Plan

During Final Design and Construction/Acquisition, the security organization will prepare a plan that describes the staffing and organization of the SCRTD Metro Rail Transit Police. The plan will take into account patrolling strategies, patronage forecasts, the operating schedule and designs involving CCTV monitoring.

4.3.5 Develop a Security Incident Investigation and Reporting Procedure

The Transit Police will modify present procedures, as used for bus operations, to reflect the needs of Metro Rail security. This procedure will describe the plans to investigate any criminal activities or security incidents that occur during start-up operations and revenue service. The procedure will deal with both the investigation of incidents and reporting to government agencies. A Security Incident Report Form will be developed to provide information required by the Safety and Security Data Management System (See Section 3.3.11).

4.3.6 Develop Security Operating Procedures

During Final Design, draft security operating procedures will be developed. The procedures will be coordinated with development of the Emergency Preparedness Plan. The procedures will be refined and finalized prior to test and start up operations.

4.4 ANALYSES AND STUDIES

As part of the system configuration and design process, it is necessary to identify security problems and recommend corrective actions to mitigate them. In the preliminary stages of Metro Rail design, these analyses can only be scoped in a broad manner because the details of the subsystems are not known. Even at this early stage, however, analyses are useful because they identify potential problem areas. The System Safety and Security Program Plan delineates the development of several security analyses, including:

- Security Profile of the Metro Rail Corridor
- Security Policies Recommendations Study
- CCTV Evaluation
- CCTV Utilization Study
- Access Control Study
- Transit Parking Security Study
- Fare Collection Equipment Security Analysis
- Security Command Center Requirements Analysis
- Security Equipment Lists.

These studies and analyses are described in the following sections.

4.4.1 Prepare a Security Profile of the Metro Rail Corridor

During Preliminary Engineering, an analysis²⁴ of the station sites along the Metro Rail route was conducted to evaluate potential crime problems in each area. The analysis considered variables including land use, population density, parking access and the number of entrances and platform levels in rating stations for their potential crime problems.

4.4.2 Prepare a Security Policies Recommendations Study

As a follow up to Milestone 7 and to identify security policies as a basis for security program planning, a study²⁵ was conducted to evaluate security designs and policing practices at four modern rail transit systems in the U.S. Crime prevention tactics were analyzed and evaluated in terms of their practical results on deterrence, detection and apprehension of criminals. Policies were developed for over 40 functional areas.

4.4.3 Prepare a Closed Circuit Television Evaluation

An evaluation²⁶ of alternative (CCTV) strategies and equipment was prepared during the continuing preliminary engineering phase. The evaluation covered subjects such as fixed vs. tilt/pan/zoom cameras, dedicated monitors vs. sequencing, station areas to be covered and their priority. The study identified several basic policy decisions the SCRTD needs to make concerning CCTV.

4.4.4 Prepare a Closed Circuit Television Utilization Study

During Final Design, a report will be prepared to reflect SCRTD decisions regarding the CCTV system and the resultant effect on equipment costs and requirements, locations, coverage, and manpower. The report will indicate how the system is to be designed and operated. The report prepared by the General Consultant will be used as input to the specifications for CCTV and the update of the operating cost estimate.

24 Metro Rail Crime Impact Analysis, George Rand Associates, January 1983.

25 Security Policies Recommendation Study, Prepared for the Security Subcommittee by Booz Allen and Hamilton, December 1983.

26 CCTV Coverage in Station Areas, Letter Report, MRTC, February 14, 1984.

4.4.5 Prepare an Access Control Study

A study²⁷ was conducted to evaluate alternative access control strategies for Metro Rail. The study evaluated the security access and restrictions on different areas of the system, types of access control, the advantages and disadvantages of each, and the cost implications of each.

4.4.6 Prepare Transit Parking Security Studies

As the drawings for station sites with parking lots are finalized, they will be evaluated for their security risks and recommendations made to mitigate security problems.

4.4.7 Prepare a Fare Collection Equipment Security Analysis

After determination of the type of fare collection equipment to be used for Metro Rail, an analysis will be conducted to identify security problems that can be minimized by design selection of special locks, access controls, alarms, etc. The analysis will be used in the preparation of the fare collection equipment specification(s).

4.4.8 Prepare a Security Command Center Requirements Analysis

The basic requirements for the location of the Security Dispatch Center were covered as part of a special study on the Central Control Facility.²⁸ During Final Design, further analysis will be conducted to refine the equipment and interface requirements for security personnel working in the Central Control Facility (CCF).

4.5 DESIGN, CONSTRUCTION, AND PROCUREMENT SUPPORT

The security organization will participate directly and continuously with the General Consultant and the Construction Manager to assure that security is adequately incorporated into the system and subsystem designs and procurement specifications as well as the end products. The security organization will support the General Consultant and Construction Manager in the manner described in the following sections.

27 Security Access Control Report, MRTC, September 1984.

28 Special Study of the Integration of Bus and Rail Operations Control Centers, Booz, Allen and Hamilton, July 1984, and Central Control Facility Functional Plan Presentation by SCRTD/MRTC/BAH, April 24, 1984.

4.5.1 Provide General Design Support

The security organization is responsible for providing information and analysis pertinent to safety in the system and subsystem design. The information provided will include:

- Documentation and data significant to security in the design of other transit properties facilities and equipment(s).
- The resulting compromises achieved by the coordination of safety, security and system assurance considerations which impact on the architectural and subsystem designs and specifications.

4.5.2 Provide General Construction/Procurement Support

The security organization is responsible for providing information, analyses and support pertinent to safety in the construction, manufacture, acquisition, procurement and installation of Metro Rail facilities and equipment. The security organization will assist the Construction Manager and the Metro Rail Construction Department as required.

4.5.3 Participate in Design Reviews

The security organization will participate in design reviews where the security of patrons, Metro Rail personnel, equipment or facilities could be affected by the design of the system. These reviews include Conceptual Design Reviews, Preliminary Design Reviews and Final or Critical Design Reviews. The results of the design reviews will be documented and action items assigned to resolve deficiencies.

4.5.4 Participate in Contractor Audits, Inspections and Tests

The security organization will participate in contractor audits, inspections and tests where the security of patrons, Metro Rail personnel, equipment or facilities could be affected by the improper construction or manufacture of system elements. These audits and inspections cover both facilities and systems elements. Included are First Article Configuration Identification (FACI) Inspections, Mock-Up Reviews, Qualification(s) Tests, Performance Tests, and Acceptance Tests.

4.5.5 Participate in System Integration Test Program Development

The security organization will participate in system integration and pre-revenue testing activities where the security of patrons or Metro Rail employees may be affected. During the Construction/Acquisition phase, the security organization will assist the Metro Rail Construction Department, the Construction

Manager and Metro Rail Operations and Maintenance personnel with developing integrated test plans and procedures for system verification and demonstration.

4.5.6 Participate in Training Course Program Development

The security organization will assist various Metro Rail Departments, other SCRTD staff and outside agencies with developing the security related aspects of training programs for:

- Train Operators
- Central Control Facility Personnel
- Facilities Maintenance Personnel
- Vehicle Maintenance Personnel
- Systems Maintenance Personnel
- Coroner/Medical Examiner's Office
- Fire Departments.

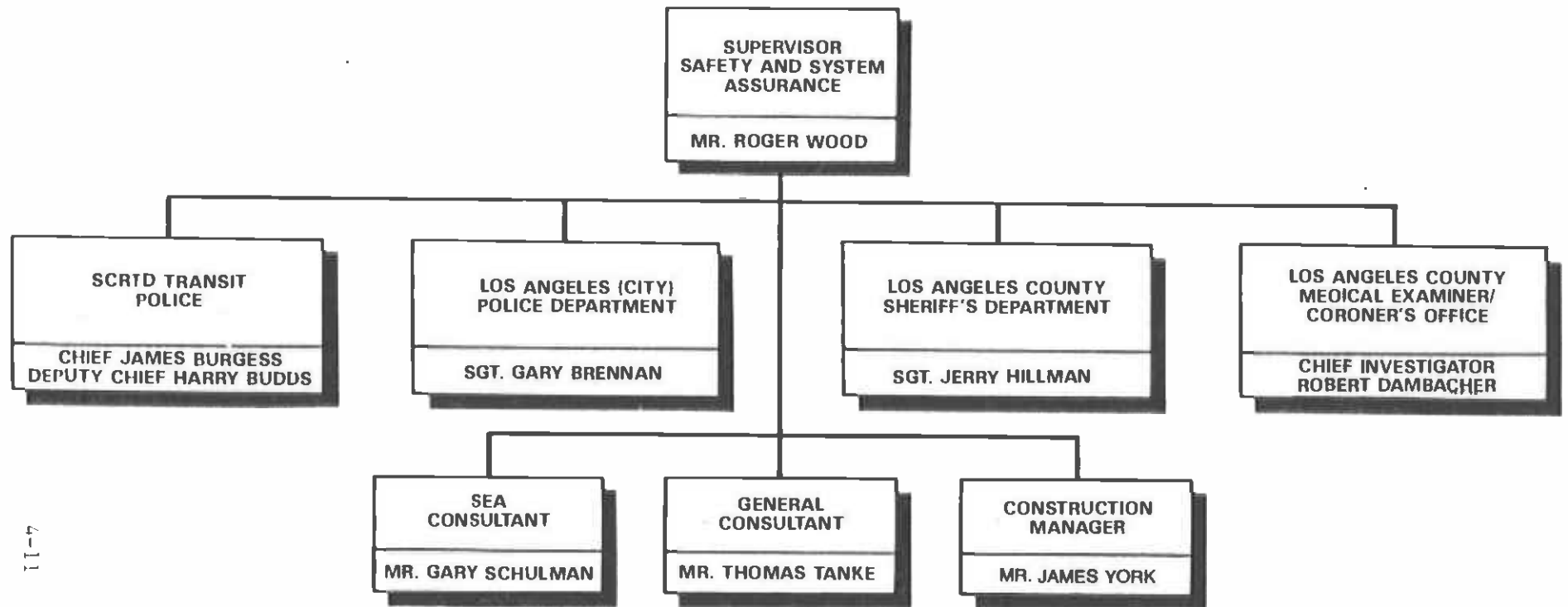
4.5.7 Participate in Public Education Program Development

The security organization will assist SCRTD public relations staff with developing security related education programs for school children and the general public. The security organization will be responsible for the development and presentation of information relating to security.

4.5.8 Participate on the Fire/Life Safety Committee/Security Subcommittee

To insure supportive interaction between the Metro Rail security organization, their consultants, and police and fire organizations, a Fire/Life Safety Committee and Security Subcommittee was established. The organization of the Security Subcommittee is shown in Exhibit 4-3 and charter in Exhibit 4-4. Along with its other coordinating responsibilities, the Committee acts as a review board of the activities, analyses and reports generated on security issues. The Committee recommends necessary changes, additions, and/or improvements to ongoing security activities.

The Security Subcommittee meets on a periodic and scheduled basis. It will function throughout the Design, Construction/Acquisition, Testing and Revenue Operation phases of the Metro Rail Program. Its emphasis will shift from design review in the early stages of the Metro Rail Program to the development and improvement of security procedures in the Construction/Acquisition phase to investigation and reporting of criminal incidents in the Revenue Operating phase.



11-7

SCR TD METRO RAIL SECURITY SUB-COMMITTEE

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
METRO RAIL PROJECT
FIRE/LIFE SAFETY COMMITTEE CHARTER
ADDENDUM I
CHARTER FOR THE SUBCOMMITTEE ON SECURITY

WHEREAS, the route alignment selected as the Metro Rail System preferred alternative extends through geographic areas within both the City of Los Angeles and Los Angeles County, each of which has separate and distinct police service responsibilities and enforcement requirements.

WHEREAS, it has been proven that experience gained from other municipalities who have built transit systems indicates the need for the continuous interchange of information between local law enforcement agencies, transit police and transit systems designers to establish a commonality of purpose, maintain efficient channels of communication and to input design preferences early in the design process.

BE IT RESOLVED THAT:

A permanent subcommittee on Security within the Fire/Life Safety Committee (hereafter referred to as the "Subcommittee") is established to facilitate the interchange of information, make evaluations and recommendations, and set requirements relative to the design, construction, and operation of a rail rapid transit system for the purpose of minimizing the security hazards to patrons, employees, and property.

The Subcommittee will be comprised of representatives from the Los Angeles Police Department, the Los Angeles County Sheriff's Department, and representatives of the Southern California Rapid Transit District, (the Deputy Chief Engineer, Systems Design and Analysis or his designee, who will act as chairman of the Committee and transit police).

The Subcommittee will provide input to, and comments on the Security criteria, emergency preparedness plans, and safety and security plans.

The Subcommittee will make recommendations and requirements relative to Security by a consensus of all permanent members using available standards as guidelines and jurisdictional laws, codes and ordinances as requirements. The aforementioned jurisdictional laws, codes and ordinances, as interpreted and defined by said Subcommittee, shall comprise the basis for the Security design requirements.

Law enforcement representatives will provide input to and comments on the security criteria, make recommendations relating to the security of patrons, employees and assets of the S.C.R.T.D. All security-related issues shall have the consensus of the full fire/life safety committee to insure compatibility with fire/life safety standards, codes, and ordinances.

The Subcommittee will provide a vehicle and format for resolving issues which cannot be resolved by consensus of the Security Subcommittee.

The Subcommittee will prepare "mutual assistance agreements" for ratification by the participating agencies which will establish format and the working agreement for the Subcommittee.

The Subcommittee will provide a means for soliciting and gaining the understanding and cooperation of the various public service departments within the City and County of Los Angeles during the design and construction of the Metro Rail System. This agreement provides the basis for the comprehensive development of the Security program.

These signatures indicate agreement with the Addendum I of the Fire/Life Safety Committee Charter. It is a working agreement between the City of Los Angeles Police Department, County of Los Angeles Sheriff's Department, and the Southern California Rapid Transit District - Metro Rail Project.

APPROVED:

Los Angeles City Police Department

Los Angeles County Sheriff's Department

Southern California Rapid Transit District/
Metro Rail Project

Southern California Rapid Transit District
Transit Police Department

4.5.9 Prepare Security Criteria Conformance Checklists

To assure that the security criteria are properly reflected in contract drawings and specifications, the security organization will develop a comprehensive checklist of items which must be verified during the Metro Rail design review program. The checklists will be used by the Security Subcommittee members to assure a comprehensive and consistent review of specifications and drawings. Any discrepancies will be formally submitted to the General Consultant and will be resolved to the satisfaction of the Security Subcommittee.

4.5.10 Prepare Specification Conformance Checklists

To assure that security criteria incorporated into the specifications are reflected in suppliers final designs, equipment and materials selection, the security organization will refine those checklists developed in 4.5.9 above, and orient them to the procurement, construction and acquisition phase. The security checklists will be incorporated into the Metro Rail design review, audit, inspection and testing program and used to support the Safety Certification Program. The checklists will be prepared by the General Consultant and used by SCRTD and C.M. representatives during supplier design reviews, audits, inspections and tests. Any security discrepancies between the specification conformance checklists and the suppliers designs or final products will be resolved to the satisfaction of the SCRTD management.

4.5.11 Review Contractor Analyses and Reports

The security organization will review any contractor analyses, reports, and submittals relating to security. This includes change proposals, hazard analyses, critical/catastrophic items lists, fault tree analyses, test plans, CDRL items, etc.

4.5.12 Develop Metro Rail Security Problem Forms and Management Reports

The security organization will develop forms and reports to collect information on security incidents. The forms and management reports will be consistent with present requirements of the SCRTD Transit Police and local agencies.

4.6 DOCUMENTATION

As part of its activities, the security organization will organize and maintain security-related documentation as part of a Safety, Security and System Assurance library.

4.6.1 Establish Security Library

The organization and maintenance of a security-related library of Metro Rail data and other rapid rail properties data will be a continuing activity. The security-related data bases will provide:

- Archival data of other properties' reports, records, and statistics (as it can be obtained)
- Records of contractors' analyses, tasks, test certifications, etc.
- Qualitative data for investigation of security incidents and quantitative data for statistical analysis of types of security incidents
- The source data for a management information reporting system.

4.6.2 Establish Security Documentation and Review Procedures

The security organization will prepare procedures to review, comment on and track changes to security related documentation. This will include:

- The internal and contractor provided security-related analyses
- The resolution of all hazards itemized in the Critical/Catastrophic Items List which relate to security
- Security incident reports on construction activity
- Status reports of all contractor/supplier security-related analyses
- Status of security training programs for operators, maintenance personnel, Central Control personnel, and station agents (if used).