Southern California Rapid Transit District

METRO RAIL PROJECT

SYSTEM SAFETY AND SECURITY PROGRAM PLAN

CONSTRUCTION/ACQUISITION EDITION

REVISION 1

MARCH 1989

c.2

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I N D E X O F E X H I B I T S

1.0 INTRODUCTION

1.0 INTRODUCTION

The 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 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 California Public Utilities Commission (CPUC) to provide oversight and regulate the safety aspects of the transit property. Under this authority, the CPUC 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.)

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

Title 8, and the city and county fire and police departments. Cal/OSHA has regulatory and 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. National Fire Protection Association (NFPA) Standard 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 Project is in part 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 that agency's 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 SCRTD 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 works 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 of Metro Rail, the emphasis of the safety and security program was on eliminating, minimizing, or controlling hazards through design analysis, review, and equipment selection.

During the Construction/Acquisition Phase, the emphasis will shift to assuring the system meets the safety requirements identified by contracts, and in preparing for testing and operations by developing safety-related procedures.

1.3 GOALS

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

- Safety and security considerations, compatible with other system requirements, are incorporated into Metro Rail facilities, equipment, and plans 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 Metro Rail) are analyzed and used to support the SCRTD Metro Rail system safety and security program.

- Safety, security, and fire/life safety considerations are coordinated with reliability, maintainability, and quality assurance activities identified in the System Assurance Program Plan.[2]

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

1.4 PURPOSE

The purpose of this SSSPP is to set forth the requirements for identifying, evaluating, and minimizing or eliminating safety and security risks throughout all phases of the SCRTD Metro Rail Project. The SSSPP 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

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2 SCRTD Metro Rail Project, System Assurance Program Plan, Rev. 1 (Draft), May 1988.

- 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 all phases of the Metro Rail Project. This edition of the plan identifies the safety and security tasks associated with Construction/Acquisition, Pre-Operational Testing, and Start-Up Operations. It also reviews the safety and security tasks conducted during the Preliminary Engineering, Continuing Preliminary Engineering, and Final Design Phases.

Construction safety activities are covered in the Metro Rail Construction Safety and Security Manual.[3] Test requirements and the process for managing tests are covered in the Test Program Plan.[4] This SSSPP 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 and Security Manual, the Test Program Plan, and this SSSPP complement one another.

1.6 UPDATE PROCEDURES

The SSSPP will be updated prior to the start of Pre-Operational Testing and Start-Up Operations to:

- Review progress on tasks accomplished during construction
- Refine and improve the current task descriptions and activities for pre-operational testing
- Identify new tasks which may be required as the system progresses
- Explain in detail the safety-related tasks and responsibilities for system start-up.

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3 SCRTD Metro Rail Project, Test Program Plan, Rev. 1, September 1988.

4 PDCD, Metro Rail Construction Safety and Security Manual, Rev. 2, February 1987.

The analysis, review, and revision process is the responsibility of the SCRTD Director of Systems and Construction Safety. Inputs for these periodic updates will be solicited from SCRTD Systems Design and Analysis, Rail Facilities Engineering, Construction Management, the General Consultant, the Systems Engineering and Analysis Consultant, the Construction Management Consultant, 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.

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.
CM Consultant	Construction Management Consultant. The CM Consultant on the Metro Rail Project is PDCD, a joint venture of Ralph M. Parsons Company; Dillingham Construction, Inc.; and DeLeuw, Cather & Company.
CPUC	California Public Utilities Commission; the agency empowered to maintain overview and regulation in transit safety for the State of California.
DIA	District Insurance Administrator. The DIA on the Metro Rail Project is a joint venture of Fred S. James & Company of California, Inc.; Akasaka, Ortiz & Ciocatto Insurance Associates; and Rideau & Associates Insurance Agency.
Fire/Life Safety	That portion of safety which deals with fire protection, fire suppression and emergency preparedness.
GC	General Consultant. The General Consultant on the Metro Rail Project is Metro Rail Transit Consultants, a joint venture of Daniel, Mann, Johnson, Mendenhall/Parsons, Brinckerhoff, Quade & Douglas/Kaiser Engineers/Harry Weese and Associates (DMJM/PBQD/KE/HWA).

LACCME	Los Angeles County Coroner/Medical Examiner.
LACFD	Los Angeles County Fire Department.
LACSD	Los Angeles County Sheriff's Department.
LAFD	Los Angeles City Fire Department.
LAPD	Los Angeles Police Department.
NTSB	National Transportation Safety Board, which has the responsibility for, and authority to, conduct accident investigations and make recommendations at the Federal Government level.
S&CS	Systems and Construction Safety Office of the SCRTD's Transit Systems Development Department; responsible for establishment of requirements and criteria for safety, fire/life safety, security, reliability, maintainability, and quality assurance and development of implementation plans.
SCRTD	Southern California Rapid Transit District; an agency created by the California legislature and charged with the development of a rapid transit system.
SE&A Consultant	Systems Engineering and Analysis Consultant. The SE&A Consultant on the Metro Rail Project is Booz, Allen & Hamilton Inc.
SS&A	Systems Safety and Assurance group of the S&CS Office; responsible for the systems safety and assurance efforts.
System Safety	The application of operating, technical, and management safety techniques to the system to reduce hazards to the lowest level possible within system resources.
TSC	Transportation Systems Center.
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.

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:

SCRTD Metro Rail Project, as revised, System Design Criteria and Standards, 1983, Volume I, Sec. 2--Fire/Life Safety; Sec. 3--System Safety; and Sec. 4--Security.

Safety, Fire/Life Safety, Security and Systems Assurance, SCRTD Metro Rail Project, Milestone 7 Final Report, March 1983.

Safety Program Report for the SCRTD Board of Directors, SCRTD Metro Rail Project, Rev. 1, January 1989.

Construction Safety and Security Manual, SCRTD Metro Rail Project, PDCD, Rev. 2, February 1987.

Test Program Plan, SCRTD Metro Rail Project, Rev. 1, September 1988.

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

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

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.

BART 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, 1964.

System Design Criteria, SCRTD Metro Rail Project, Milestone 2 Final Report, August 1982.

2.0 SYSTEM DESCRIPTION

2.0 SYSTEM DESCRIPTION

2.1 OVERVIEW

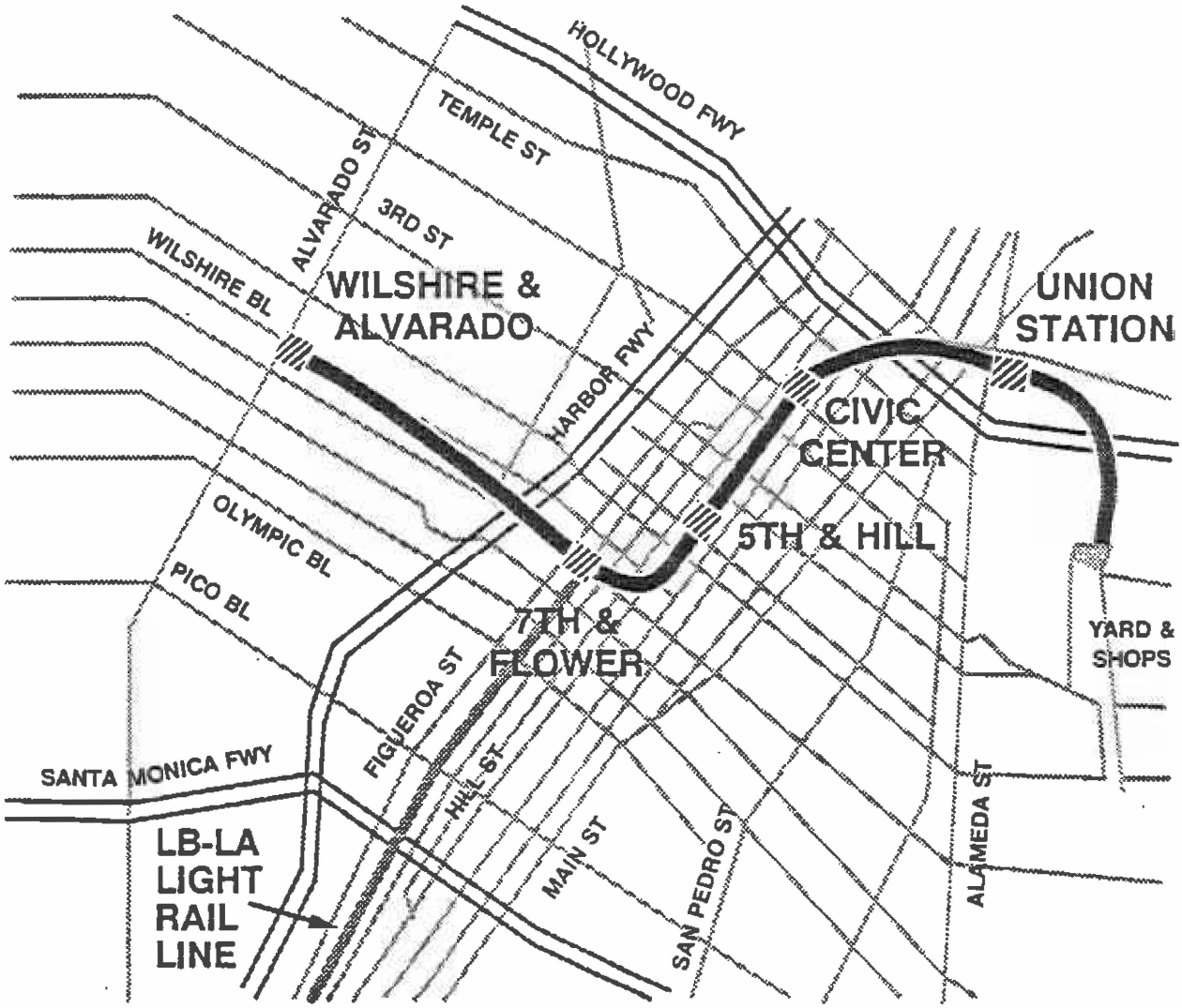
The SCRTD is developing a rail rapid transit system planned to run from downtown Los Angeles through Hollywood to the San Fernando Valley. This system, called Metro Rail, will be the core element of a regional rail rapid transit network which will include both heavy and light rail modes. Funding limitations necessitate that the Metro Rail system be built in stages. Initially a 4-mile segment with five stations and yard and shop facilities will be constructed. This initial segment is identified as Minimum Operable Segment-1, or MOS-1.

As shown in Exhibit 2-1, the MOS-1 main-line route will begin at Union Station, where it will turn southwest and run through the central business district along Hill Street. Turning on 7th Street, the route will head toward the west side of downtown, pass the Harbor Freeway, and continue to the Wilshire/Alvarado Station, where the line will terminate. The main line will be entirely in subway, with line segments constructed by tunneling machines and stations and crossovers excavated by cut-and-cover construction techniques. Three double crossovers will be included in the main-line portion of MOS-1: one on each side of Union Station, and one on the east side of the Wilshire/Alvarado Station.

Additional subway and surface track will connect the main line with the yard, southeast of Union Station. MOS-1 will include all yard and shop facilities planned for the full system, except for a portion of the yard storage tracks and some shop equipment that will be installed as warranted by system extension and fleet expansion.

MOS-1 will include five stations. Four of the stations will be of a double-ended design with two mezzanines; the fifth station, Wilshire/Alvarado, will be of a single-center-mezzanine design. The station at 7th/Flower will be the transfer point between the Long Beach-Los Angeles light rail system and the Metro Rail system. The Metro Rail stations have been designed for unattended operations; however, some stations may be attended at certain times of day.

EXHIBIT 2-1
MOS-1 System Alignment



A barrier-free, self-service fare collection system will be implemented on a trial basis for MOS-1. Each station mezzanine will contain automated ticket vending machines. Transit Police serving on fare inspection duty will rove the system and conduct random checks of the validity of patrons' fare media. The fare structure for MOS-1 will be based on a single zone; however, the fare collection equipment will have a multi-zone capability to accommodate travel to light rail destinations as well as expansion of the Metro Rail system. Escalators, stairs, and elevators will provide normal vertical circulation between surface, mezzanine, and platform levels of Metro Rail stations.

The vehicles for the system will be stainless steel, standard gauge, 75-foot-long rail cars which will be configured in dependent pairs. They will be capable of operating at speeds up to 70 miles per hour and will operate on 750 VDC power supplied via third rail. Present plans call for trains on the MOS-1 system to consist of four vehicles, although the system is being designed to accommodate a maximum train length of six vehicles. Each single vehicle will have a capacity of 59 seated passengers plus space for one wheelchair, up to 109 standing passengers at normal loads, and 160 standing passengers at crush loads.

Trains will have automatic train protection equipment to ensure safe speed and separation of trains. Automatic train operation equipment will also be included to regulate train speed and provide precision station stopping and train berthing verification for trains operating on the main line. System operation will be centrally controlled from the Rail Control Center, located in the yard, using communication links with facilities and trains involving telephones, radios, closed-circuit televisions, and data transmission.

Ridership on MOS-1 by the year 2000 is projected to be approximately 54,000 per day. An estimated two-thirds of these passengers will transfer to or from SCRTD buses serving the five Metro Rail stations. Maximum passenger loading on MOS-1 during peak hours will be from Union Station in the morning and to Union Station in the evening. The 24-hour loading pattern, however, shows relatively constant loadings on each of the links, with the heaviest travel volume occurring on the link between the Wilshire/Alvarado and 7th/Flower Stations.

2.2 PROPOSED OPERATIONS

Operating plans[1] for the full system and MOS-1 were developed based on results of analyses pertaining to ridership projections and system characteristics.

The operating plan for the MOS-1 system is based on the following operating philosophy:

- All trains will stop at each station.
- Train service will be provided at policy headways unless additional service is required to meet vehicle load standards or to move trains to points where they are needed.
- Four-car trains will operate during all revenue service periods.
- Trains will be stored overnight at the yard and will be dispatched from Union Station.

The full system operating philosophy is similar to that for MOS-1, except that train consists will vary from four to six cars depending on service periods.

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.

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1 SCRTD Metro Rail Project, System Operating Plan, October 1986; and System Operating Plan for MOS-1, Rev. 0, November 1987.

2.3 METRO RAIL PROJECT ORGANIZATION

The organizational structure of the Metro Rail Project is shown in Exhibit 2-2. This organizational structure was established to direct the Design, Construction/Acquisition, Pre-Operational Testing, and Start-Up Phases of the Metro Rail Project. As the Metro Rail system becomes fully operational, a transition will occur to a new Metro Rail organizational structure encompassing the maintenance and operations functions necessary for revenue service.

Within the SCRTD Transit Systems Development (TSD) Department, the Director of Systems and Construction Safety has overall responsibility for the system safety and security program.

Personnel from the TSD Systems Design and Analysis, Rail Facilities Engineering, and Construction Management Offices participate in the safety and security program, given that their design, construction, and procurement decisions will affect, and be affected by, system safety and security requirements. Similarly, Metro Rail operations and maintenance personnel also participate in the program.

2.4 SAFETY ORGANIZATION

The Director of Systems and Construction Safety (S&CS) has the responsibility for coordinating the safety-related activities of the Metro Rail Project. The Director of S&CS 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&CS organization is shown in Exhibit 2-3. Exhibits 2-4, 2-5, and 2-6 illustrate the project organizations of the General Consultant, the Systems Engineering and Analysis Consultant, and the Construction Management Consultant. Finally, Exhibit 2-7 illustrates the organization of the District Insurance Administrator (DIA).

EXHIBIT 2-2
SCRTD Metro Rail Organization

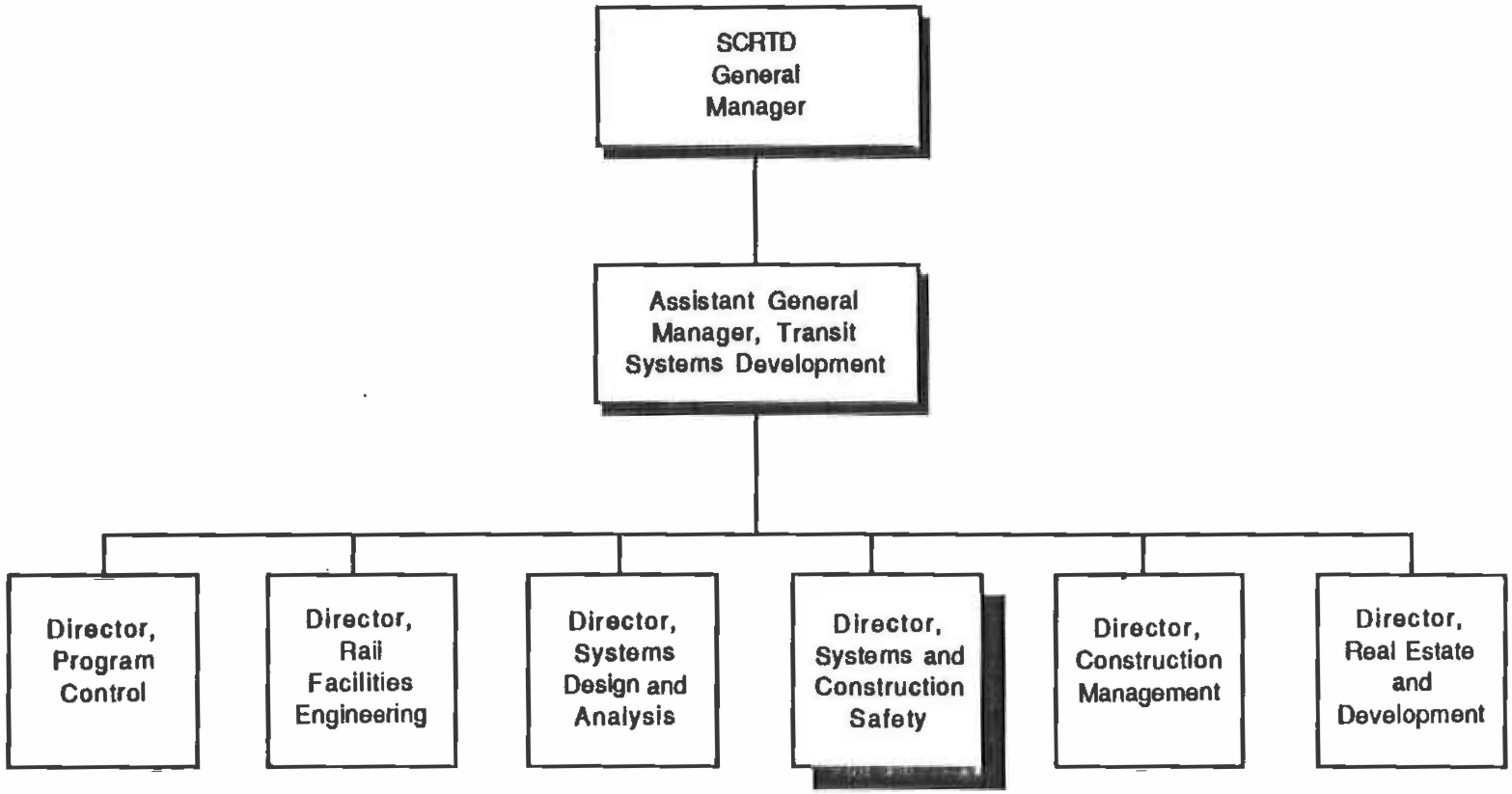
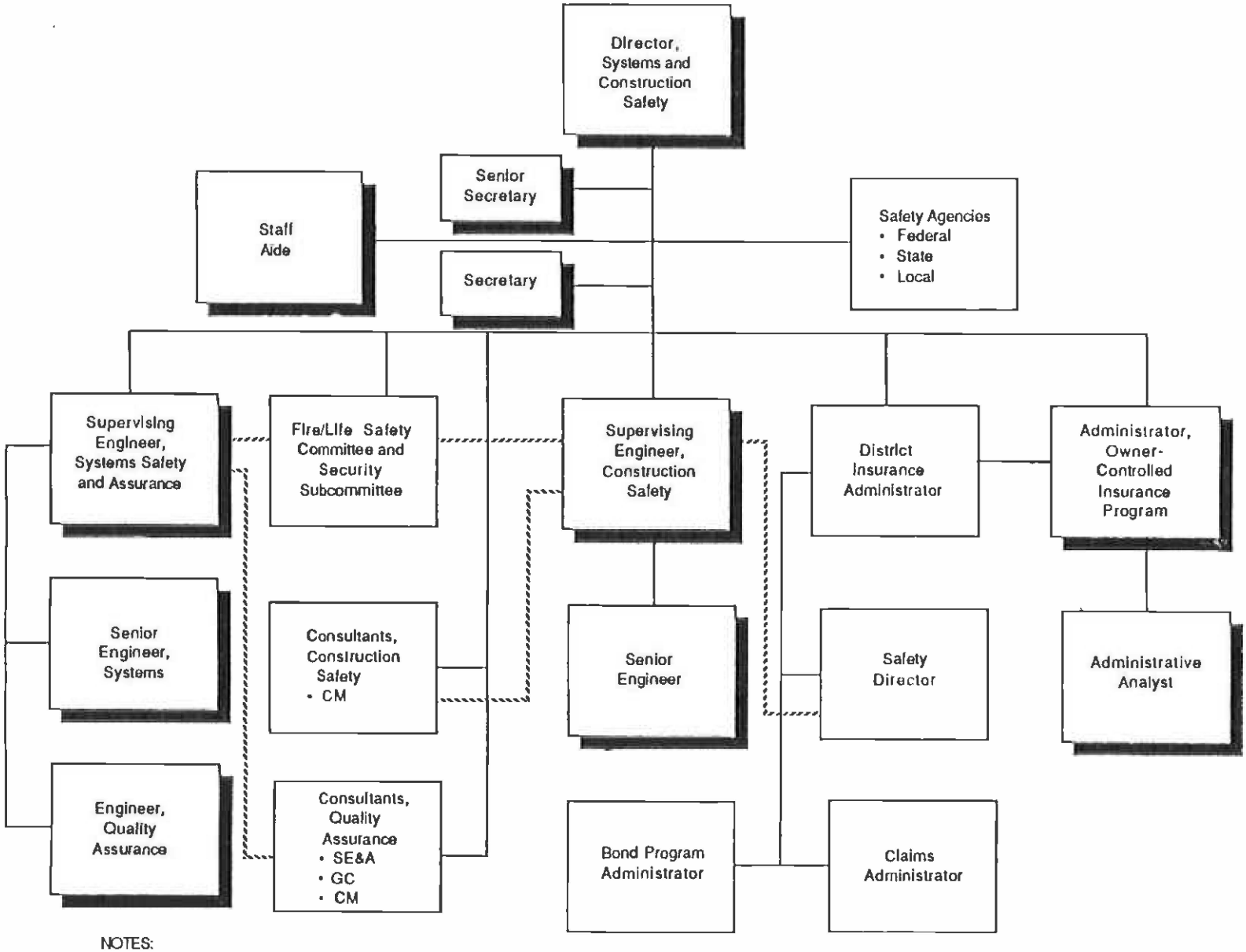


EXHIBIT 2-3
Systems and Construction Safety Organization



NOTES:
Highlighted boxes indicate groups/personnel belonging to Systems and Construction Safety.
Dashed line (- - - - - - -) denotes support relationship.

EXHIBIT 2-4
General Consultant Organization

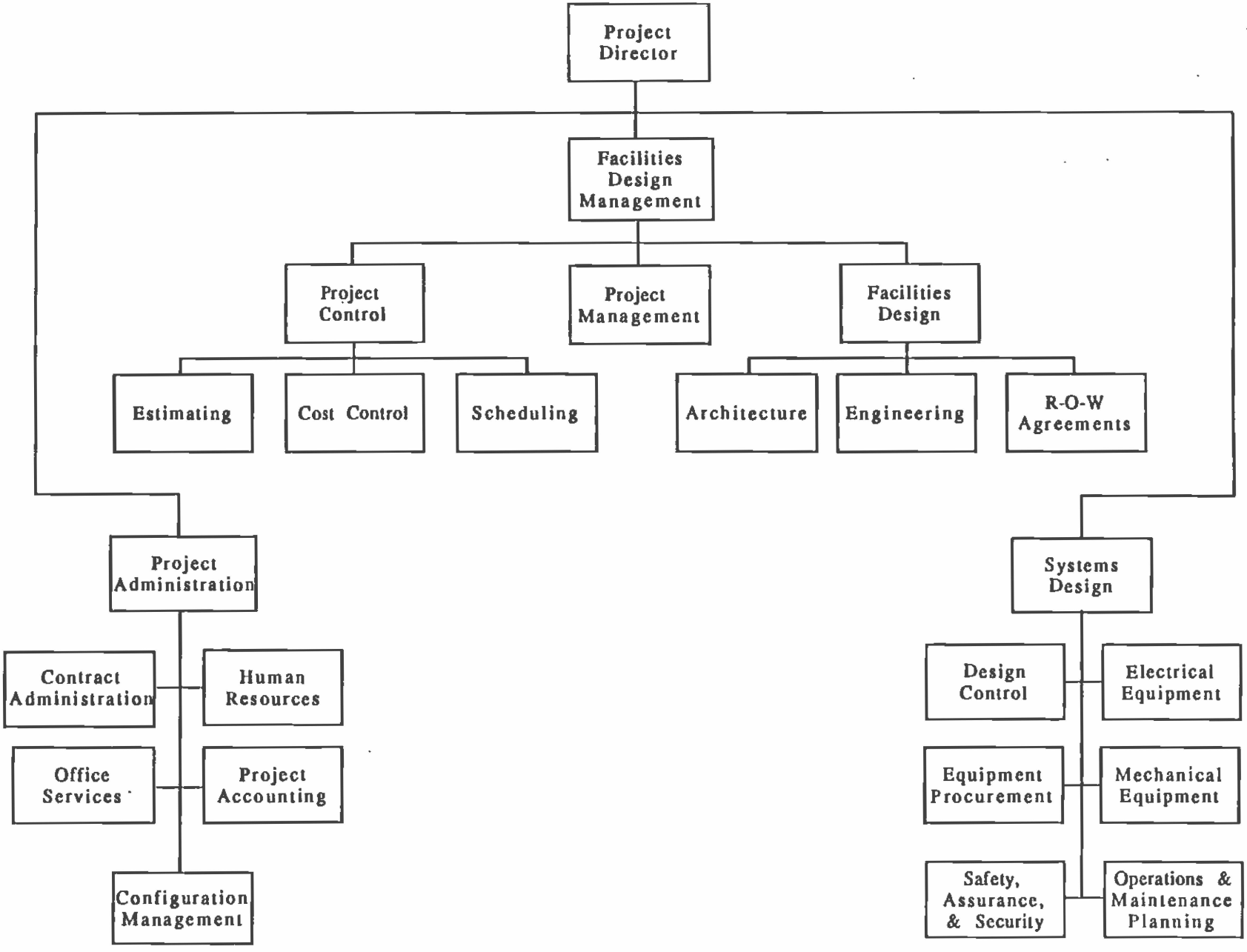


EXHIBIT 2-5
Systems Engineering and Analysis Consultant Organization

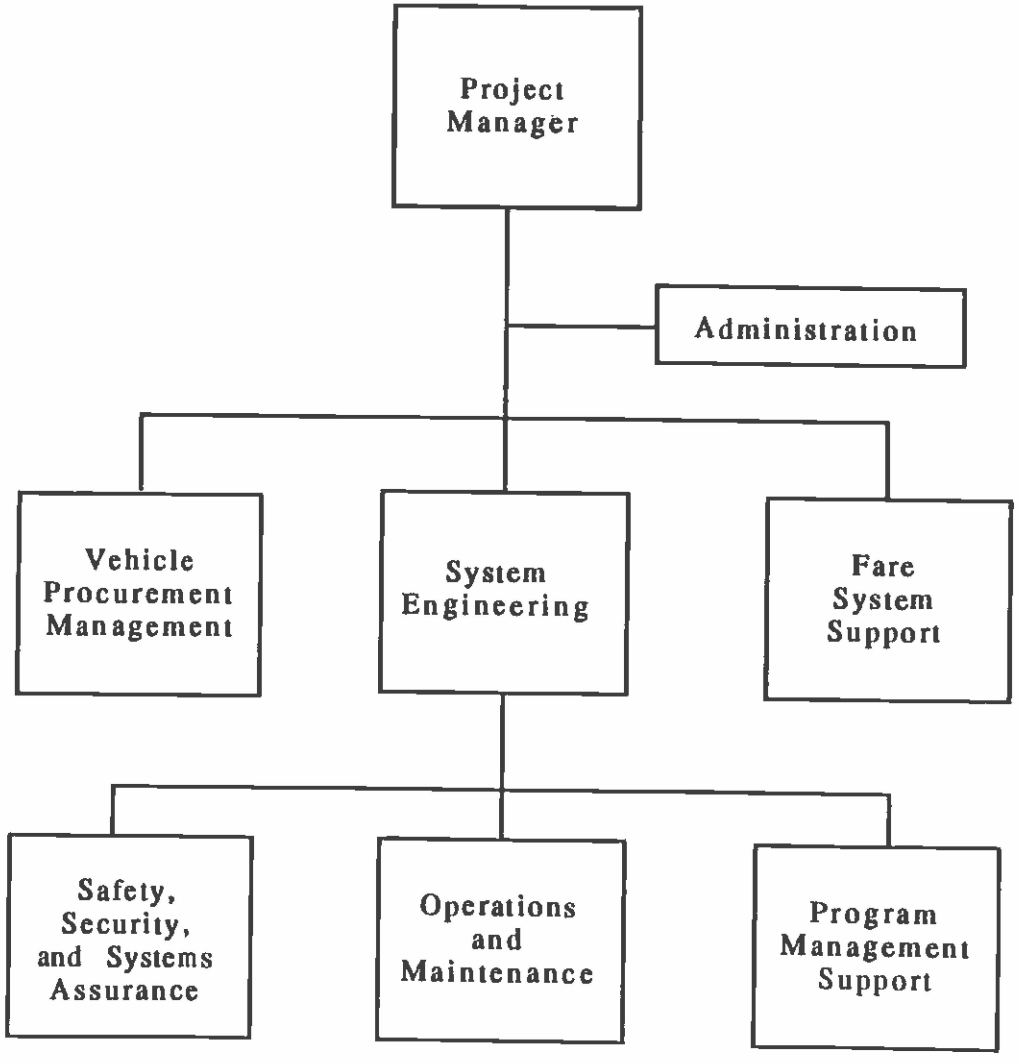


EXHIBIT 2-6
Construction Management Consultant Organization

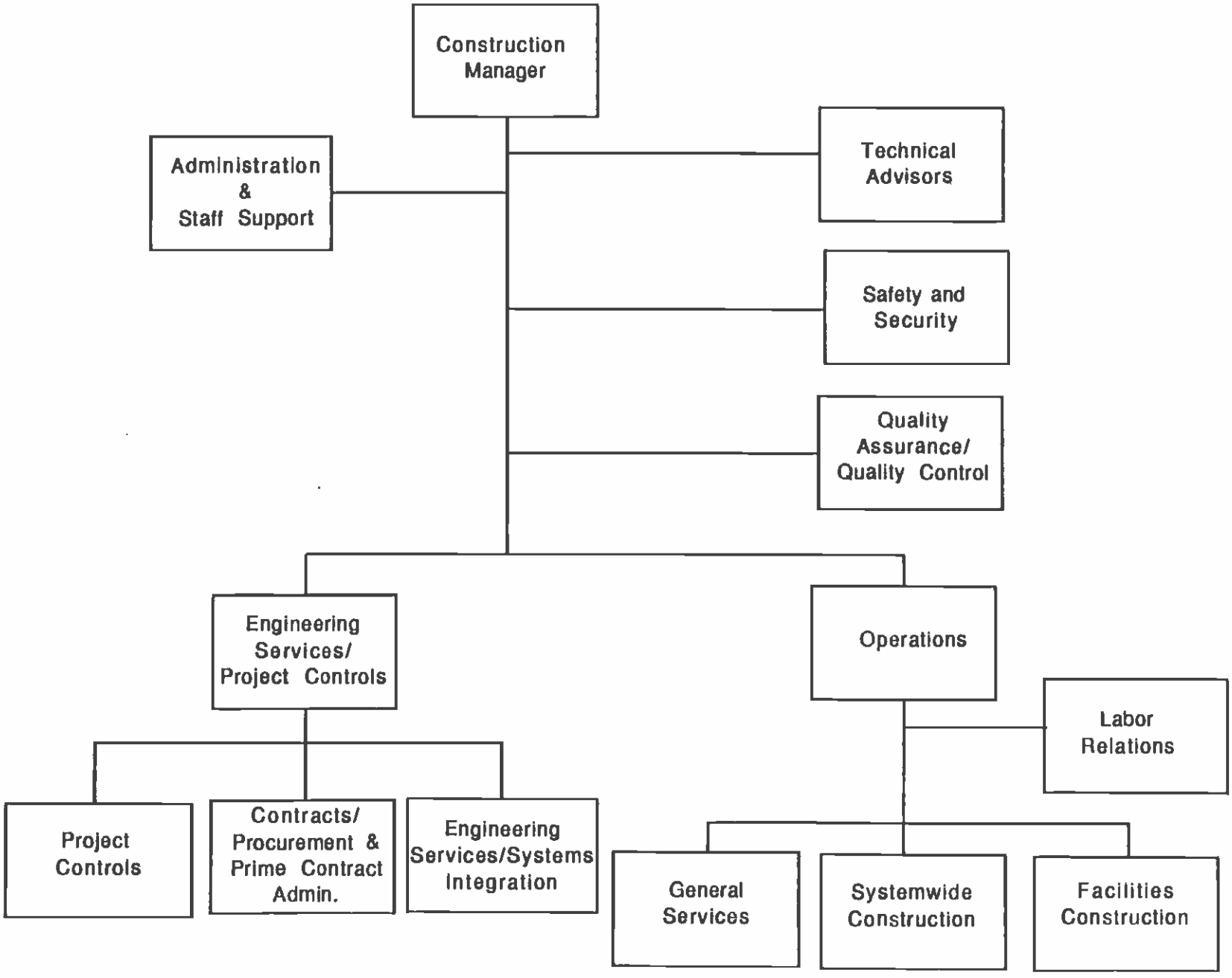
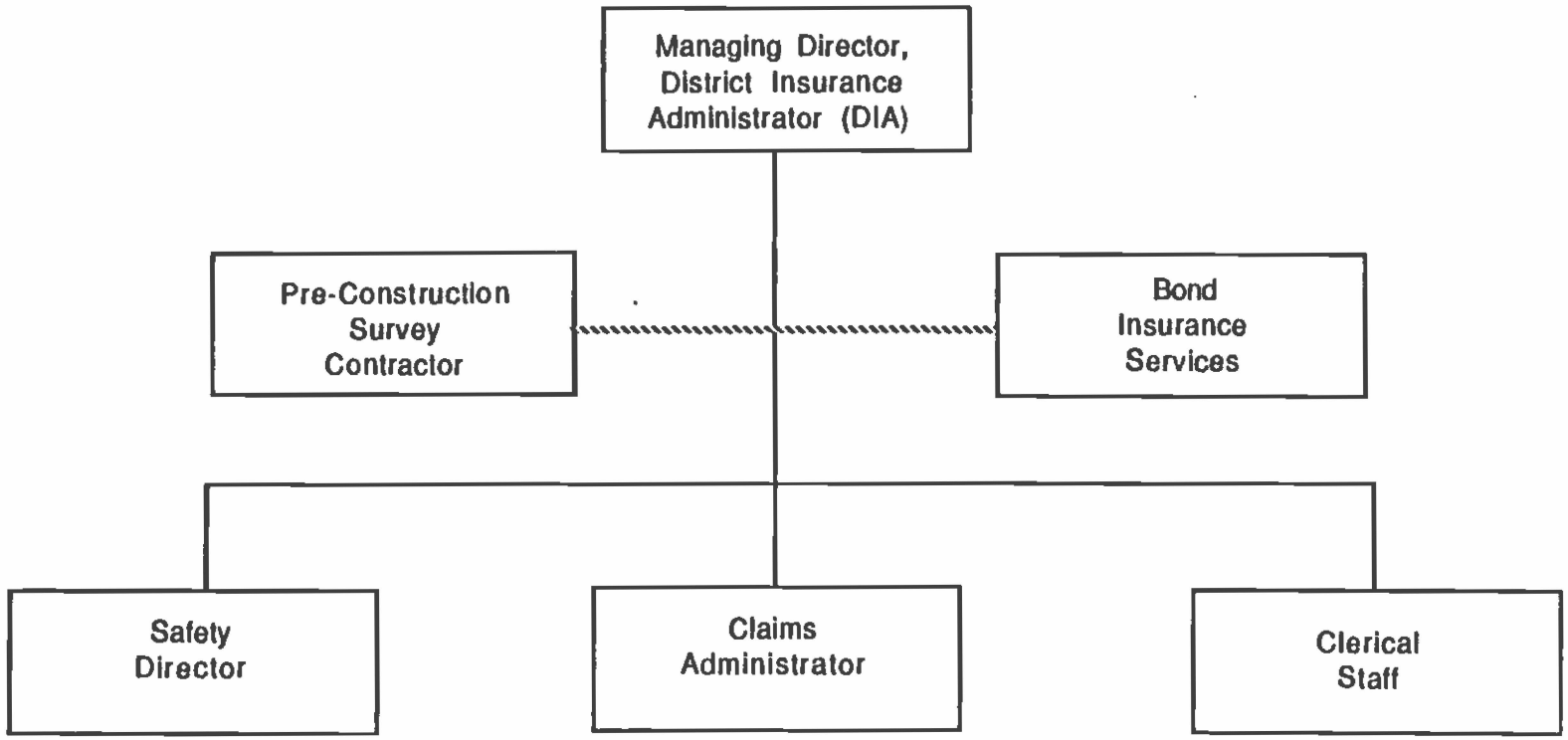


EXHIBIT 2-7
Insurance Consultant Organization



NOTE: Dashed line (----) indicates subcontractor to DIA.

The Systems and Construction Safety 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, which is designed to evaluate and document the system's readiness for revenue service from a safety viewpoint
- Participating in the development, review, and approval of the Construction Safety and Security Manual
- Monitoring contractors' compliance with the safety and security requirements as set forth in the Construction Safety and Security Manual
- Monitoring the reporting of accidents and incidents during construction and assisting in coordinating emergency responses
- Assisting in processing claims for accidents and incidents occurring at construction sites

- Monitoring, in the Pre-Operational 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 safety and security program status.

3.0 SAFETY PROGRAM TASKS

3.0 SAFETY PROGRAM TASKS

3.1 GENERAL

The SCRTD system safety and security program focuses on the safety-related activities that are required throughout the development of the Metro Rail system to provide for a high level of safety and security. The Metro Rail Project 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 specific activities to be performed by the safety organization during the evolution of the Metro Rail system.

Another document, the System Safety Program Plan--Operations, to be 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 are reflected in revisions of the System Safety and Security Program Plan. The analysis, review, and revision process is the responsibility of the SCRTD Systems and Construction Safety Office, with support from other groups (Systems Design and Analysis, Rail Facilities Engineering, Construction Management, GC, SE&A Consultant, CM Consultant, and the Fire/Life Safety Committee and Security Subcommittee).

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

- Safety--Chapter 3 covers those tasks relating to both construction and operational safety, including all aspects of 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 Systems and Construction Safety Director.

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

- Criteria Development

- Plans and Procedures

- Analyses and Studies

EXHIBIT 3-1
Safety Activities and Tasks

PARAGRAPH NUMBER	TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
	CRITERIA DEVELOPMENT						
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	●	●	●	●	●	●
3.2.10	Conduct APTA Peer Audit on Safety Program			●			

EXHIBIT 3-1 (Continued)
Safety Activities and Tasks

PARAGRAPH NUMBER	TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
	PLANS AND PROCEDURES						
3.3.1	Prepare and Periodically Update the System Safety and Security Program Plan	•	•	•	•	•	•
3.3.2	Prepare a Safety Program Document for Adoption by the SCRTD Board of Directors			•			
3.3.3	Develop a Construction Emergency Response Plan			•			
3.3.4	Develop Emergency Operations Procedures				•	•	•
3.3.5	Prepare a Safety Certification Methodology		•				
3.3.6	Prepare a Safety Certification Plan			•			
3.3.7	Prepare a Construction Safety and Security Manual			•			
3.3.8	Prepare Contractor Safety Submittal Review Procedures				•		
3.3.9	Outline Preliminary Safety Procedures and Training Course Requirements				•		

EXHIBIT 3-1 (Continued)
Safety Activities and Tasks

PARAGRAPH NUMBER	TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
3.3.10	Prepare a Hazard Resolution Procedure			•			
3.3.11	Develop an Accident/Incident Investigation and Reporting Procedure (for Operations)				•	•	
3.3.12	Develop a Safety and Security Data Management System				•	•	
3.3.13	Develop Safety Rules				•		
3.3.14	Prepare a Fire Protection Features Manual				•		
3.3.15	Prepare a Fire and Police Communications Systems Handbook				•		
3.3.16	Prepare Safety Features Test Plans and Procedures				•		
3.3.17	Prepare Plans for Emergency Team Training Exercises and Drills				•		
3.3.18	Establish the Operational Phase System Safety Organization					•	•
3.3.19	Prepare the System Safety and Security Program Plan--Operations					•	•
3.3.20	Establish a Continuing Safety Certification and Audit Program					•	•

EXHIBIT 3-1 (Continued)
Safety Activities and Tasks

PARAGRAPH NUMBER	TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
	ANALYSES AND STUDIES						
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 a 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 Emergency Ventilation Study for Union Station			•			

EXHIBIT 3-1 (Continued)
Safety Activities and Tasks

PARAGRAPH NUMBER	TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
3.4.12	Prepare a Water Supply Analysis		•				
3.4.13	Prepare and Update a Station Emergency Egress Study		•	•			
3.4.14	Prepare and Update Fire Hazard and Toxic Materials Lists			•	•		
3.4.15	Prepare Emergency Equipment Lists for Operations			•	•		
3.4.16	Prepare Safety Trade-Off Studies		•	•	•	•	•
	DESIGN, CONSTRUCTION/PROCUREMENT AND TESTING SUPPORT						
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 Configuration Control Board Meetings			•	•	•	•
3.5.5	Participate in Contractor Audits, Inspections, and Tests				•	•	
3.5.6	Participate in Test Program Development				•		

EXHIBIT 3-1 (Continued)
Safety Activities and Tasks

PARAGRAPH NUMBER	TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
3.5.7	Participate in Training Course Program Development				●	●	
3.5.8	Participate in Public Education Program Development				●	●	
3.5.9	Participate on the Fire/Life Safety Committee	●	●	●	●	●	●
3.5.10	Participate on the Elderly/Handicapped Committee		●	●	●	●	●
3.5.11	Prepare Criteria Conformance Checklists		●	●			
3.5.12	Prepare Specification Conformance Checklists			●	●		
3.5.13	Identify Safety Documentation Requirements for Contract Specifications		●	●			
3.5.14	Review Contractor Analyses and Reports				●	●	
3.5.15	Review Operating and Maintenance Manuals and Procedures				●	●	●
3.5.16	Conduct Pre-Construction Surveys				●		
3.5.17	Participate in Safety Inspections and Audits of Contractor Work Sites				●		
3.5.18	Participate in Construction Safety Oversight Committee Meetings				●		

EXHIBIT 3-1 (Continued)
Safety Activities and Tasks

PARAGRAPH NUMBER	TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
3.5.19	Direct the Safety Certification Program			•	•	•	•
3.5.20	Participate in Testing				•	•	•
3.5.21	Provide Operations/Maintenance Support				•	•	•
3.5.22	Conduct Safety Training Courses					•	•
3.5.23	Develop Safety Management Reports				•	•	•
3.5.24	Conduct Emergency Training					•	•
	DOCUMENTATION						
3.6.1	Establish Safety Library	•	•	•	•	•	•
3.6.2	Establish Safety Documentation and Review Procedures		•	•			

EXHIBIT 3-2
Task Responsibilities

PARAGRAPH NUMBER	TASK/ACTIVITY	TRANSIT SYSTEMS DEVELOPMENT							CONSULTANTS						OPERATIONS		
		SYSTEMS AND CONSTRUCTION SAFETY			SYSTEMS DESIGN AND ANALYSIS												
		SYSTEMS SAFETY AND ASSURANCE	CONSTRUCTION SAFETY	TECHNICAL SUPPORT	SYSTEMS ENGINEERING AND ANALYSIS	SYSTEMS DESIGN	RAIL FACILITIES ENGINEERING	CONSTRUCTION MANAGEMENT	SYSTEMS ENGINEERING AND ANALYSIS CONSULTANT	GENERAL CONSULTANT	CONSTRUCTION MANAGEMENT CONSULTANT	INSURANCE CONSULTANT	FIRE DEPARMENTS AND RESCUE SQUAD	POLICE DEPARTMENTS AND CORONER'S OFFICE	TRANSPORTATION	EQUIPMENT MAINTENANCE	FACILITIES MAINTENANCE
	CRITERIA DEVELOPMENT																
3.2.1	Review All Applicable Codes, Guidelines, and Regulations	S	S		RC	RC	RC			P			S				
3.2.2	Develop Fire/Life Safety Criteria	S			RC	RC	RC		RC	P			S				
3.2.3	Develop System Safety Criteria	S			RC	RC			P	S			RC	RC			
3.2.4	Update and Revise Fire/Life Safety Criteria	S	S		RC	RC	RC	RC	RC	P	RC	RC	S	RC			
3.2.5	Update and Revise System Safety Criteria	S	S		RC	RC	RC	RC	S	P	RC	RC	RC	RC			
3.2.6	Conduct Peer Reviews on Fire Safety	P							S								
3.2.7	Conduct Peer Reviews on System Safety	P							S	S							
3.2.8	Develop Safety Input to Milestone Program	P							S	S			S	RC			
3.2.9	Conduct Familiarization Trips to Other Transit Properties	P							S	S			S				
3.2.10	Conduct APTA Peer Audit on Safety Program	P	P		S	S	S		S	S	S		S	S	S	S	S

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

EXHIBIT 3-2 (Continued)
TASK RESPONSIBILITIES

PARAGRAPH NUMBER	TASK/ACTIVITY	TRANSIT SYSTEMS DEVELOPMENT							CONSULTANTS						OPERATIONS		
		SYSTEM AND CONSTRUCTION SAFETY			SYSTEMS DESIGN AND ANALYSIS												
		SYSTEM SAFETY AND ASSURANCE	CONSTRUCTION SAFETY	TECHNICAL SUPPORT	SYSTEMS ENGINEERING AND ANALYSIS	SYSTEMS DESIGN	RAIL FACILITIES ENGINEERING	CONSTRUCTION MANAGEMENT	SYSTEMS ENGINEERING AND ANALYSIS CONSULTANT	GENERAL CONSULTANT	CONSTRUCTION MANAGEMENT CONSULTANT	INSURANCE CONSULTANT	FIRE DEPARMENTS AND RESCUE SQUAD	POLICE DEPARTMENTS AND CORONER'S OFFICE	TRANSPORTATION	EQUIPMENT MAINTENANCE	FACILITIES MAINTENANCE
	PLANS AND PROCEDURES																
3.3.1	Prepare and Periodically Update the System Safety and Security Program Plan	S	S	S	RC	RC	RC	RC	P	RC	RC	RC	RC	RC			
3.3.2	Prepare a Safety Program Document for Adoption by the SCRTD Board of Directors	S	S	S				S	P		S	S					
3.3.3	Develop a Construction Emergency Response Plan		S				RC	RC			P	S	S	S			
3.3.4	Develop Emergency Operations Procedures	S			RC	RC			P	RC			S	S	S	S	S
3.3.5	Prepare a Safety Certification Methodology	S			RC	RC	RC	RC	P	RC	RC		RC	RC			
3.3.6	Prepare a Safety Certification Plan	S			RC	RC	RC	RC	P	RC	RC		RC	RC	RC	RC	RC
3.3.7	Prepare a Construction Safety and Security Manual		S				RC	RC			P	S	RC	RC			
3.3.8	Prepare Contractor Safety Submittal Review Procedures	P			RC	RC	RC	RC	RC	RC	RC		RC				
3.3.9	Outline Preliminary Safety Procedures and Training Course Requirements	S			RC				P	RC			RC	RC	RC	RC	RC

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RC = Review and Comment

EXHIBIT 3-2 (Continued)
Task Responsibilities

PARAGRAPH NUMBER	TASK/ACTIVITY	TRANSIT SYSTEMS DEVELOPMENT							CONSULTANTS						OPERATIONS		
		SYSTEMS AND CONSTRUCTION SAFETY			SYSTEMS DESIGN AND ANALYSIS												
		SYSTEMS SAFETY AND ASSURANCE	CONSTRUCTION SAFETY	TECHNICAL SUPPORT	SYSTEMS ENGINEERING AND ANALYSIS	SYSTEMS DESIGN	RAIL FACILITIES ENGINEERING	CONSTRUCTION MANAGEMENT	SYSTEMS ENGINEERING AND ANALYSIS CONSULTANT	GENERAL CONSULTANT	CONSTRUCTION MANAGEMENT CONSULTANT	INSURANCE CONSULTANT	FIRE DEPARMENTS AND RESCUE SQUAD	POLICE DEPARTMENTS AND CORONER'S OFFICE	TRANSPORTATION	EQUIPMENT MAINTENANCE	FACILITIES MAINTENANCE
3.3.10	Prepare a Hazard Resolution Procedure	S			RC	RC	RC	RC	P	RC	RC		RC	RC			
3.3.11	Develop an Accident/Incident Investigation and Reporting Procedure (for Operations)	S			RC	RC	RC	RC	P	RC	RC		RC	RC	RC	RC	RC
3.3.12	Develop a Safety and Security Data Management System	P			RC				S				RC	RC	RC	RC	RC
3.3.13	Develop Safety Rules	P			RC		RC	RC	RC	RC	RC		RC	RC	S	S	S
3.3.14	Prepare a Fire Protection Features Manual	RC	RC		RC	RC	RC	RC	RC	P	RC		S		RC	RC	RC
3.3.15	Prepare a Fire and Police Communications Systems Handbook	RC	RC		RC	RC	RC	RC	RC	P	RC		S	S	RC	RC	RC
3.3.16	Prepare Safety Features Test Plans and Procedures	S			RC	RC	RC	RC	RC	RC	P		S		RC	RC	RC
3.3.17	Prepare Plans for Emergency Team Training Exercises and Drills	P			RC		RC	RC	RC	RC	S		S	S	RC	RC	RC
3.3.18	Establish the Operational Phase System Safety Organization	P	S	S					S				RC	RC	RC	RC	RC

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EXHIBIT 3-2 (Continued)
Task Responsibilities

PARAGRAPH NUMBER	TASK/ACTIVITY	TRANSIT SYSTEMS DEVELOPMENT							CONSULTANTS						OPERATIONS		
		SYSTEMS AND CONSTRUCTION SAFETY			SYSTEMS DESIGN AND ANALYSIS												
		SYSTEMS SAFETY AND ASSURANCE	CONSTRUCTION SAFETY	TECHNICAL SUPPORT	SYSTEMS ENGINEERING AND ANALYSIS	SYSTEMS DESIGN	RAIL FACILITIES ENGINEERING	CONSTRUCTION MANAGEMENT	SYSTEMS ENGINEERING AND ANALYSIS CONSULTANT	GENERAL CONSULTANT	CONSTRUCTION MANAGEMENT CONSULTANT	INSURANCE CONSULTANT	FIRE DEPARMENTS AND RESCUE SQUAD	POLICE DEPARTMENTS AND CORONER'S OFFICE	TRANSPORTATION	EQUIPMENT MAINTENANCE	FACILITIES MAINTENANCE
3.3.19	Prepare the System Safety and Security Program Plan--Operations	S			RC	RC	RC	RC	P		RC		RC	RC	RC	RC	RC
3.3.20	Establish a Continuing Safety Certification and Audit Program	S	S	S	RC	RC	RC	RC	P	RC	RC		RC	RC	RC	RC	RC
	ANALYSES AND STUDIES																
3.4.1	Prepare and Update a Preliminary Hazard Analysis	RC			RC	RC	RC	RC	P	S	RC		RC	RC			
3.4.2	Prepare and Update Subsystem Hazard Analyses	RC			RC	RC	RC	RC	RC	P	RC		RC	RC			
3.4.3	Prepare and Update Interface Hazard Analyses	RC			RC	RC	RC	RC	RC	P	RC		RC	RC	RC	RC	RC
3.4.4	Prepare and Update Fault Tree Analyses	RC			RC	RC	RC	RC	RC	P	RC		RC	RC	RC	RC	RC
3.4.5	Prepare and Update Critical/Catastrophic Items List	P							S	S	S				S	S	S
3.4.6	Prepare and Update Operating and Maintenance Hazard Analyses	S			RC	RC	RC	RC	P	RC	RC		RC	RC	S	S	S
3.4.7	Prepare a Methane/Combustible Gases Study	RC					RC	RC		P			RC				

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EXHIBIT 3-2 (Continued)
Task Responsibilities

PARAGRAPH NUMBER	TASK/ACTIVITY	TRANSIT SYSTEMS DEVELOPMENT							CONSULTANTS						OPERATIONS		
		SYSTEMS AND CONSTRUCTION SAFETY			SYSTEMS DESIGN AND ANALYSIS												
		SYSTEMS SAFETY AND ASSURANCE	CONSTRUCTION SAFETY	TECHNICAL SUPPORT	SYSTEMS ENGINEERING AND ANALYSIS	SYSTEMS DESIGN	RAIL FACILITIES ENGINEERING	CONSTRUCTION MANAGEMENT	SYSTEMS ENGINEERING AND ANALYSIS CONSULTANT	GENERAL CONSULTANT	CONSTRUCTION MANAGEMENT CONSULTANT	INSURANCE CONSULTANT	FIRE DEPARMENTS AND RESCUE SQUAD	POLICE DEPARTMENTS AND CORONER'S OFFICE	TRANSPORTATION	EQUIPMENT MAINTENANCE	FACILITIES MAINTENANCE
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					RC	RC		P			S				
3.4.10	Prepare an Emergency Ventilation Analysis	RC				RC	RC			P			RC				
3.4.11	Prepare Emergency Ventilation Study for Union Station	RC			RC	RC	RC			P			RC				
3.4.12	Prepare a Water Supply Analysis	RC				RC	RC			P			RC				
3.4.13	Prepare and Update a Station Emergency Egress Study	S			RC	RC	RC			P			S				
3.4.14	Prepare and Update Fire Hazard and Toxic Materials Lists	P	S			RC	RC	RC	RC	S	S		S				
3.4.15	Prepare Emergency Equipment Lists for Operations	S				RC	RC	RC	RC	P	RC		S	S	RC	RC	RC
3.4.16	Prepare Safety Trade-Off Studies	P	S		RC	RC	RC	RC	S	S	S		RC	RC	RC	RC	RC

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EXHIBIT 3-2 (Continued)
Task Responsibilities

PARAGRAPH NUMBER	TASK/ACTIVITY	TRANSIT SYSTEMS DEVELOPMENT							CONSULTANTS						OPERATIONS		
		SYSTEMS AND CONSTRUCTION SAFETY			SYSTEMS DESIGN AND ANALYSIS												
		SYSTEMS SAFETY AND ASSURANCE	CONSTRUCTION SAFETY	TECHNICAL SUPPORT	SYSTEMS ENGINEERING AND ANALYSIS	SYSTEMS DESIGN	RAIL FACILITIES ENGINEERING	CONSTRUCTION MANAGEMENT	SYSTEMS ENGINEERING AND ANALYSIS CONSULTANT	GENERAL CONSULTANT	CONSTRUCTION MANAGEMENT CONSULTANT	INSURANCE CONSULTANT	FIRE DEPARMENTS AND RESCUE SQUAD	POLICE DEPARTMENTS AND CORONER'S OFFICE	TRANSPORTATION	EQUIPMENT MAINTENANCE	FACILITIES MAINTENANCE
	DESIGN, CONSTRUCTION/PROCUREMENT AND TESTING SUPPORT																
3.5.1	Provide General Design Support	P	P	P	S	S	S	S	S		S		S				
3.5.2	Provide General Construction/Procurement Support	P	P	P	S	S	S	S	S	S		S	S				
3.5.3	Participate in Design Reviews	P	P		S	S	S	S	S	S	S		S				
3.5.4	Participate in Configuration Control Board Meetings	P															
3.5.5	Participate in Contractor Audits, Inspections, and Tests	P	P	S	S	S	S	S	S	S	S	S	S				
3.5.6	Participate in Test Program Development	P	S	S				S	S	S	S		S		S	S	S
3.5.7	Participate in Training Course Program Development	P	P		S	S	S	S	S	S	S		S		S	S	S
3.5.8	Participate in Public Education Program Development	P	P		S	S	S	S	S	S	S		S	S	S	S	S
3.5.9	Participate on the Fire/Life Safety Committee	P	P						P	P	P		P	P			
3.5.10	Participate on the Elderly/Handicapped Committee	P					P			P							

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EXHIBIT 3-2 (Continued)
TASK RESPONSIBILITIES

PARAGRAPH NUMBER	TASK/ACTIVITY	TRANSIT SYSTEMS DEVELOPMENT							CONSULTANTS						OPERATIONS		
		SYSTEM AND CONSTRUCTION SAFETY			SYSTEMS DESIGN AND ANALYSIS												
		SYSTEM SAFETY AND ASSURANCE	CONSTRUCTION SAFETY	TECHNICAL SUPPORT	SYSTEMS ENGINEERING AND ANALYSIS	SYSTEMS DESIGN	RAIL FACILITIES ENGINEERING	CONSTRUCTION MANAGEMENT	SYSTEMS ENGINEERING AND ANALYSIS CONSULTANT	GENERAL CONSULTANT	CONSTRUCTION MANAGEMENT CONSULTANT	INSURANCE CONSULTANT	FIRE DEPARMENTS AND RESCUE SQUAD	POLICE DEPARTMENTS AND CORONER'S OFFICE	TRANSPORTATION	EQUIPMENT MAINTENANCE	FACILITIES MAINTENANCE
3.5.11	Prepare Criteria Conformance Checklists	RC	RC	RC			RC	RC	RC	P	RC		RC				
3.5.12	Prepare Specification Conformance Checklists	RC	RC	RC			RC	RC	RC	P	S		RC				
3.5.13	Identify Safety Documentation Requirements for Contract Specifications	S	S	S		S	S	S	S	P	S		S				
3.5.14	Review Contractor Analyses and Reports	RC	RC	RC	RC	P	RC	RC	RC	RC	RC	RC	RC		RC	RC	RC
3.5.15	Review Operating and Maintenance Manuals and Procedures	RC	RC	RC	RC	P	RC	RC	RC	RC	RC		RC	RC	RC	RC	RC
3.5.16	Conduct Pre-Construction Surveys		S					S			S	P					
3.5.17	Participate in Safety Inspections and Audits of Contractor Work Sites		S					S			P	P					
3.5.18	Participate in Construction Safety Oversight Committee Meetings		P				S	S			P	P					
3.5.19	Direct the Safety Certification Program	P			S	S	S	S	S	S	S		S	S	S	S	S
3.5.20	Participate in Testing	P			S	S	S	S	S		S		S		S	S	S

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

EXHIBIT 3-2 (Continued)
Task Responsibilities

PARAGRAPH NUMBER	TASK/ACTIVITY	TRANSIT SYSTEMS DEVELOPMENT							CONSULTANTS						OPERATIONS		
		SYSTEMS AND CONSTRUCTION SAFETY			SYSTEMS DESIGN AND ANALYSIS												
		SYSTEMS SAFETY AND ASSURANCE	CONSTRUCTION SAFETY	TECHNICAL SUPPORT	SYSTEMS ENGINEERING AND ANALYSIS	SYSTEMS DESIGN	RAIL FACILITIES ENGINEERING	CONSTRUCTION MANAGEMENT	SYSTEMS ENGINEERING AND ANALYSIS CONSULTANT	GENERAL CONSULTANT	CONSTRUCTION MANAGEMENT CONSULTANT	INSURANCE CONSULTANT	FIRE DEPARMENTS AND RESCUE SQUAD	POLICE DEPARTMENTS AND CORONER'S OFFICE	TRANSPORTATION	EQUIPMENT MAINTENANCE	FACILITIES MAINTENANCE
3.5.21	Provide Operations/Maintenance Support	P			S	S	S		S	S					S	S	S
3.5.22	Conduct Safety Training Courses	P											S		S	S	S
3.5.23	Develop Safety Management Reports	P	P	P													
3.5.24	Conduct Emergency Training	P											S	S	S	S	S
	DOCUMENTATION																
3.6.1	Establish Safety Library	P	P	P													
3.6.2	Establish Safety Documentation and Review Procedures	P	P	P													

P = Primary Responsibility
S = Secondary or Support Responsibility

- Support for Design, Construction/Procurement, and Testing
- Documentation.

Tasks in each area are described in the following sections.

3.2 CRITERIA DEVELOPMENT

3.2.1 Review All Applicable Codes, Guidelines, and Regulations

During Preliminary Engineering, a study[1] 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 criteria[2] were developed during Preliminary and Continuing Preliminary Engineering. The fire/life safety criteria specify the requirements to be followed by design engineers in the selection of equipment and design of facilities. The fire/life safety criteria are integrated into all aspects of design, architectural concepts, specification preparation, equipment selection, construction, procedures, and operations.

3.2.3 Develop System Safety Criteria

System safety criteria[3] were developed during Preliminary and Continuing Preliminary Engineering. The system safety criteria specify the requirements to be

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

2 SCRTD Metro Rail Project, System Design Criteria and Standards, 1983 as revised, Volume I, Section 2 -- Fire/Life Safety.

3 SCRTD Metro Rail Project, System Design Criteria and Standards, 1983 as revised, Volume I, Section 3 -- System Safety.

followed by design engineers in the selection of equipment and design of facilities. Through the criteria, system safety is 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 the established Metro Rail change control process.

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 the established Metro Rail change control process.

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 Workshop[4] was held at the SCRTD on October 14-15, 1981. Participants during the review included the SCRTD, CPUC, the Los Angeles Fire Departments, as well as transit safety experts from MARTA, WMATA, MUCTC, PATH, BART, UMTA, and the SE&A Consultant. 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 system safety criteria, industry peer review comments were solicited from knowledgeable sources. A Safety Peer Review Board meeting[5] was held at the SCRTD on June 29-30, 1982. Participants included the SCRTD, CPUC, UMTA, TSC, CalTrans, the SCRTD Transit Police, the GC, SE&A Consultant, LAFD, LACFD, LAPD, and safety experts from MARTA, WMATA, BART, and PATCO. Additional peer reviews may be held during subsequent phases of the project.

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4 SCRTD Metro Rail Project, Peer Review Workshop on Fire Safety, October 14-15, 1981, Transcript of Proceedings, prepared by Charles Harris, Inc.

5 SCRTD Metro Rail Project, UMTA/SCRTD/Industry Safety Peer Review Boards, June 29-30, 1982, Transcript of Proceedings, prepared by Charles Harris, Inc.

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.[6] 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 participated as observers in disaster drills at BART and WMATA. Additional familiarization trips may be taken on an as-required basis during subsequent phases of the project.

3.2.10 Conduct American Public Transportation Association Peer Audit on Safety Program

The American Public Transportation Association (APTA) actively conducts peer audits of safety programs of transit properties. An APTA audit of the SCRTD Metro Rail safety program was held at the SCRTD on August 4-6, 1987. The audit team consisted of transit safety experts from APTA and from Houston and Portland transit authorities. Participants interviewed during the audit included representatives from the SCRTD, SCRTD Transit Police, LAFD, LACFD, GC, CM Consultant, and SE&A Consultant. Results of the audit are contained in a report issued by APTA on November 4, 1987, entitled "Final Audit Report for the Southern California Rapid Transit District."

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

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6 SCRTD Metro Rail Project, Milestone 7 Final Report: Safety, Fire/Life Safety, Security and Systems Assurance, March 1983.

Security Program Plan. It defines the management and technical tasks to be performed during each project phase. The System Safety and Security Program Plan will be periodically updated prior to the start of each phase of the Metro Rail Project.

3.3.2 Prepare a Safety Program Document for Adoption by the SCRTD Board of Directors

During Final Design, the SCRTD, with input from consultants, prepared a Safety Program[7] document which presents the SCRTD's comprehensive system safety program for the Metro Rail Project. The program covers all phases of Metro Rail safety, from Preliminary Engineering through Start-Up Operations. The Safety Program was adopted by the SCRTD Board of Directors in January 1987.

3.3.3 Develop a Construction Emergency Response Plan

During Final Design, the CM Consultant prepared an Emergency Response Plan (ERP).[8] This plan specifies the procedures to be used in responding to emergency situations occurring at construction sites. The plan also identifies the Emergency Response Team and details the responsibilities of each member. The purpose of the ERP is to ensure that appropriate personnel are notified in a timely manner and that appropriate emergency response personnel (fire, police, ambulances, etc.) are dispatched to the scene of the emergency. The CM Consultant will regularly conduct training sessions to ensure that ERP participants understand their responsibilities and to discuss any recent changes to the ERP.

3.3.4 Develop Emergency Operations Procedures

Detailed procedures for operations response to emergencies must be developed, reviewed, integrated, and rehearsed prior to system revenue operations. Input to the procedures will be provided by representatives of the Fire Department(s), Police Department(s), the Coroner/Medical Examiner's Office, and SCRTD and consultant staff. The procedures will be prepared during Construction/Acquisition and revised during Pre-Operational Testing and Start-Up Operations.

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7 SCRTD Metro Rail Project, Safety Program, Report prepared for the SCRTD Board of Directors, Rev. 1, January 1989.

8 SCRTD, Emergency Response Plan for the Los Angeles Metro Rail Project Construction, prepared by PDCD, May 1987.

3.3.5 Prepare a Safety Certification Methodology

During Continuing Preliminary Engineering, a process for evaluating the readiness of the Metro Rail system to safely be placed into revenue service was developed. The Safety Certification Methodology[9] 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.

3.3.6 Prepare a Safety Certification Plan

Following approval of the Safety Certification Methodology, a more detailed and comprehensive Safety Certification Plan[10] was prepared during Final Design. The Plan documents specific responsibilities for program implementation, identifies documentation and certification forms, and establishes a Safety Certification Review Team (SCRT) to oversee the collection, review, and approval of evidence needed for certification.

3.3.7 Prepare a Construction Safety and Security Manual

During Final Design, the CM Consultant prepared a Construction Safety and Security Manual[11] to guide contractors in the establishment of the safety and security programs required for Metro Rail construction. The manual is an SCRTD contract document, and contractors are required to comply with the manual's provisions and with the minimum standards set forth by all applicable Federal, state, and local safety regulations. The construction safety and security program requirements documented in the manual are intended to protect the public, workers on the project, and property during construction of Metro Rail facilities, and to minimize losses due to accidents and vandalism. The Construction Safety and Security Manual discusses the roles and responsibilities of key groups and personnel; monitoring and control of construction safety and security compliance; medical, emergency, and accident reporting; emergency planning; project security; and emergency

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9 Booz, Allen & Hamilton Inc., Safety Certification Methodology, WBS 06, October 1984.

10 SCRTD Metro Rail Project, Safety Certification Plan, Rev. 1.1, June 1988.

11 PDCD, Metro Rail Construction Safety and Security Manual, Rev. 2, February 1987.

operations plan. The manual is revised and updated by the CM Consultant with input, review, and approval from cognizant SCRTD representatives.

3.3.8 Prepare Contractor Safety Submittal Review Procedures

Procedures for reviewing contractor-prepared submittals have been developed.[12] These procedures provide for a comprehensive review of the contractors' safety documentation by the SCRTD, the CM Consultant, the SE&A Consultant, and other safety program participants.

3.3.9 Outline Preliminary Safety Procedures and Training Course Requirements

As part of rail activation planning during Construction/Acquisition, required safety procedures and training course requirements will be identified. The outline will be used to further define the safety certification requirements for plans and procedures and development of training courses or materials related to safety.

3.3.10 Prepare a Hazard Resolution Procedure

During Final Design, the SCRTD developed a Hazard Resolution Procedure[13] to systematically identify, evaluate, and resolve potential hazards that become apparent during Metro Rail design, construction, testing, start-up, or revenue service. Hazard identification and 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 experience of program participants during construction and testing.

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12 SCRTD Metro Rail Project, Contractor Submittal Review Procedure: Construction/Installation and Procurement Contracts, Rev. 0 (Draft), August 1988.

13 SCRTD Metro Rail Project, Hazard Resolution Procedure, November 1986.

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.

3.3.11 Develop an Accident/Incident Investigation and Reporting Procedure (for Operations)

The SCRTD will draft procedures for investigating any accidents, mishaps, or incidents that occur during start-up or revenue service. The procedures will deal with the investigation of accidents/incidents as well as reporting to government agencies. A draft procedure will be prepared during Construction/Acquisition and will be revised during Pre-Operational Testing.

3.3.12 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 Metro Rail safety statistics to SCRTD management and applicable government agencies. 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 Section 3.3.11 above.

3.3.13 Develop Safety Rules

During the Construction/Acquisition Phase, operating rules will be developed to ensure safety during Metro Rail testing, start-up, and revenue service. Safety rules will include:

- General Safety Procedures
- Main-Line Operations
- RCC Operations
- Yard Operations
- Discipline Code.

The safety rules will also be used as input to:

- Emergency Operating Procedures
- Standard Operating Procedures
- Operators' Rulebook
- Training Course Materials.

3.3.14 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 Metro Rail fire protection and suppression equipment and systems. The manual will be used for training course instruction and as a basic reference document for Metro Rail and fire and police personnel.

3.3.15 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, RCC personnel).

3.3.16 Prepare Safety Features Test Plans and Procedures

During the Construction/Acquisition Phase, the safety organization will assist the CM Consultant in developing plans and procedures for conducting 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 Test Program Plan (see Section 3.5.6).

3.3.17 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 defined in the Emergency Operations Procedures. The actual drills and emergency exercises will take place during the Pre-Operational Testing Phase.

3.3.18 Establish the Operational Phase System Safety Organization

The roles and responsibilities of the Metro Rail safety organization will evolve as the Metro Rail Project progresses. Metro Rail safety efforts are directed by the Systems and Construction Safety Office during the Construction/Acquisition, Pre-Operational Testing, and

Start-Up Operations Phases. As revenue operations near, the Risk Management Office, under the Inspector-General, will assume many responsibilities for operational safety.

3.3.19 Prepare the System Safety and Security Program Plan--Operations

The System Safety and Security Program Plan is periodically updated prior to the start of each phase of the Metro Rail Project. An edition of the plan for revenue operations will be prepared. This edition will define the management and technical tasks which will be performed to ensure the safe and secure operation of the Metro Rail system.

3.3.20 Establish a Continuing Safety Certification and Audit Program

The safety organization will establish a continuing safety certification and audit program for Metro Rail revenue operations. The program will follow the certification methodology and plan described in Sections 3.3.5 and 3.3.6. The operational safety certification and audit program will ensure that designs or design changes, procurement/construction activities, and new operating procedures with safety implications are formally and adequately reviewed, audited, and certified.

3.4 ANALYSES AND STUDIES

The System Safety and Security Program Plan delineates the development of several hazard analyses, including:

- A Preliminary Hazard Analysis
- 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:

- A Methane/Combustible Gases Study
- A Seismic Risk Analysis
- A Firefighting Capabilities and Requirements Study
- An Emergency Ventilation Analysis
- An Emergency Ventilation Study for Union Station
- A Water Supply Analysis
- Station Emergency Egress Studies
- Fire Hazard and Toxic Materials Lists
- Emergency Equipment Lists.

3.4.1 Prepare and Update a Preliminary Hazard Analysis (PHA)

During Continuing Preliminary Engineering, a Preliminary Hazard Analysis[14] 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 guidelines,[15] and is used by all project participants as a top-level checklist for resolving system-level hazards. The PHA also serves as the framework for conducting other hazard analyses. An update of the PHA was prepared at the end of the Final Design Phase.[16] The PHA will be periodically updated to document the resolution of system-level hazards.

3.4.2 Prepare and Update Subsystem Hazard Analyses

During Final Design, the PHA was used as a basis for analyzing the potential hazards associated with each subsystem. These subsystem hazard analyses (SSHAs) included 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 SSHAs will be expanded and refined during subsequent project phases. The results of the SSHAs are 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.

3.4.3 Prepare and Update Interface Hazard Analyses (IHA)

Initial Interface Hazard Analyses (IHAs) were conducted to identify and assess potential hazards arising from integration of Metro Rail subsystems and equipment. As actual integration proceeds, the IHAs will be revised and updated to ensure that all potential hazards are identified and resolved.

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

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

16 Metro Rail Transit Consultants, Preliminary Hazard Analysis, Design Resolution Update, November 1987.

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 will provide 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.

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 were identified. These failures were compiled into a Critical/Catastrophic Items List (C/CIL) to provide management visibility of these items and to permit monitoring and control. The C/CIL will be updated in subsequent project phases and will be used in 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 Resolution Procedure (see Section 3.3.10).

The C/CIL format has been defined in an SCRTD document entitled Guidelines for the Preparation of Safety and System Assurance Analyses.[17] A sample C/CIL is shown in Exhibit 3-3. In the Hazard Category heading, the first character refers to the severity of the hazard, with I being Catastrophic; II, Critical; III, Marginal; and IV, Negligible. The second character indicates the probability of the hazard's occurrence, with A for frequent; B for reasonably probable; C for occasional; D for remote; and E for extremely improbable.

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17 SCRTD Metro Rail Project, Guidelines for the Preparation of Safety and System Assurance Analyses, Rev. 2, March 1987.

EXHIBIT 3-3
Sample Critical/Catastrophic Items List

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:	RESPONSIBILITY	INCORPORATED AS OF:
9	10	11

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)
   - Critical (II)
   - Marginal (III)
   - Negligible (IV)
7. PROBABILITY – The likelihood the hazard will occur
   - Frequent (A)
   - Reasonably Probable (B)
   - Occasional (C)
   - Remote (D)
   - Extremely Improbable (E)
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.

In addition to the C/CIL, the guidelines document (also referred to as SCRTD 5-001) provides uniform formats and methodologies for conducting the following analyses:

- Preliminary Hazard Analysis
- Subsystem Hazard Analysis
- Interface Hazard Analysis
- Operating Hazard Analysis
- Failure Mode, Effects, and Criticality Analysis
- Corrective Maintenance Analysis.

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

Operating and maintenance hazard analyses provide 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 Pre-Operational Testing and Start-Up Operations to document the resolution of hazards as procedures are written and approved.

3.4.7 Prepare a Methane/Combustible Gases Study

A study[18] 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 study[19] 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 study[20] was performed to determine the capabilities of the Los Angeles City and County Fire

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

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

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

Departments to provide firefighting, rescue, and medical services for 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, communications, and fire prevention inspection programs.

3.4.10 Prepare an Emergency Ventilation Analysis

A study[21] was prepared to verify the adequacy of emergency and mid-tunnel fan capacities. The analysis focused on evaluating air-flow characteristics past a single six-car train stalled in a tunnel during a multiple-car fire.

3.4.11 Prepare Emergency Ventilation Study for Union Station

During Final Design, a decision was made to realign the A-130 (yard leads and transfer zone) trackage to avoid identified areas of contaminated soil. This realignment resulted in the repositioning of tracks near Union Station. A study[22] using computer simulation runs was performed to assess emergency ventilation capabilities, given the alignment and profile changes near Union Station and its contiguous tunnels leading to the yard. The study simulated fire emergency situations involving a stalled train in three different locations in the tunnel sections adjacent to Union Station, and for each one analyzed the air-flow characteristics past the train. Results verified the adequacy of the emergency ventilation system's capabilities as originally designed.

3.4.12 Prepare a Water Supply Analysis

A study[23] 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.

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21 Parsons, Brinckerhoff, Quade & Douglas, Final Report: Environmental Control System, August 1985.

22 Parsons, Brinckerhoff, Quade & Douglas, Emergency Ventilation Study for Alignment Modification of Union Station and A-130, February 1988.

23 Rolf Jensen and Associates, Analysis of Water Supply at Station Sites, March 1984, and Revised Water Supply Analysis: MOS-1 Metro Rail Project, May 1986.

3.4.13 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. Studies[24] were prepared to analyze whether the station emergency exiting criteria were adequate and achieved exit requirements and objectives.

3.4.14 Prepare and Update Fire Hazard and Toxic Materials Lists

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

3.4.15 Prepare Emergency Equipment Lists for Operations

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 and stored at each Metro Rail station, at the RCC, at each appropriate local firehouse, on-board the passenger vehicles, at the yard and shops, etc.; how and where the equipment is to be stored; and who controls access to it. This emergency equipment is in addition to the ventilation, fire protection, control and communications systems installed as part of the fixed facilities.

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24 Harry Weese and Associates/Tibbets, Abbott, McCarthy & Stratton, Station Emergency Egress Study, WBS 13DAM, Volumes I and II, August 1983; and Rolf Jensen and Associates, Analysis of Exiting and Fire/Life Safety, March 1984.

3.4.16 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/PROCUREMENT AND TESTING SUPPORT

The safety organization will participate directly and continuously with SCRTD and consultant staff to ensure that safety is adequately incorporated into the system and subsystem designs and procurement specifications as well as the end products delivered or installed.

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 SCRTD Construction Management Office, Systems Design and Analysis Office, CM Consultant, and SE&A Consultant, as required.

3.5.3 Participate in Design Reviews

The safety organization will participate in all design reviews where the safety of Metro Rail patrons, 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 Configuration Control Board Meetings

The safety organization is represented on the Configuration Control Board (CCB) by the Director of S&CS. The CCB is the SCRTD group with the authority to approve or disapprove all proposed changes to established Metro Rail designs. As a CCB member, the Director of S&CS is responsible for evaluating the safety implications of all proposed changes.

3.5.5 Participate in Contractor Audits, Inspections, and Tests

The safety organization will participate in all contractor audits, inspections, and tests where the safety of Metro Rail patrons, 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.

3.5.6 Participate in Test Program Development

During Construction/Acquisition, the safety organization will assist the System Design and Analysis Office, the Construction Management Office, the SE&A Consultant, the CM Consultant, and Metro Rail transportation and maintenance personnel in developing test plans and procedures. The test program will encompass tests of fixed facilities and system equipment; system integration and pre-revenue tests; and all safety-related tests. The test program will be implemented from Construction/Acquisition through Start-Up Operations. The Metro Rail tests are identified in the Test Program Plan.[25]

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25 SCRTD Metro Rail Project, Test Program Plan, Rev. 1, September 1988.

3.5.7 Participate in Training Course Program Development

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

- Train Operators
- RCC Personnel
- Facilities Maintenance Personnel
- Equipment 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, including Paramedics
- Police Departments
- Department of Water and Power
- Coroner/Medical Examiner's Office.

3.5.8 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.

3.5.9 Participate on the Fire/Life Safety Committee

To ensure 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 3-4, and its charter is shown in Exhibit 3-5. 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 all phases of the Metro Rail Project. Its emphasis will shift from design reviews in the early stages of the Metro Rail Project, to the development and improvement of safety procedures in the Construction/Acquisition Phase, to

EXHIBIT 3-4
Fire/Life Safety Committee Organization

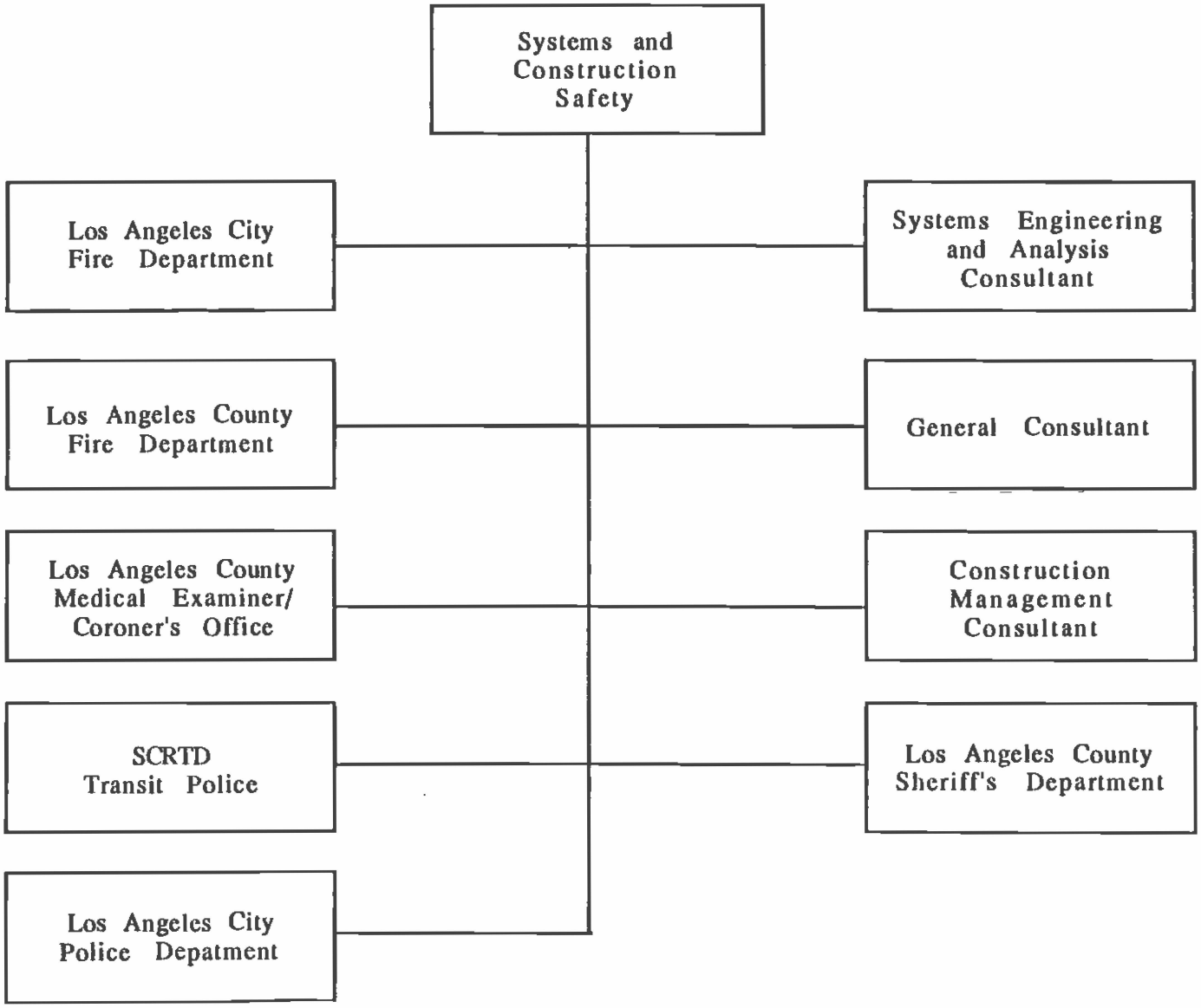

EXHIBIT 3-5
Fire/Life Safety Committee Charter

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 SCRTD 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

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Rev. 1

investigation and reporting of accidents and incidents during revenue operations.

3.5.10 Participate on the Elderly/Handicapped Committee

To ensure that 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 3-6) 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.

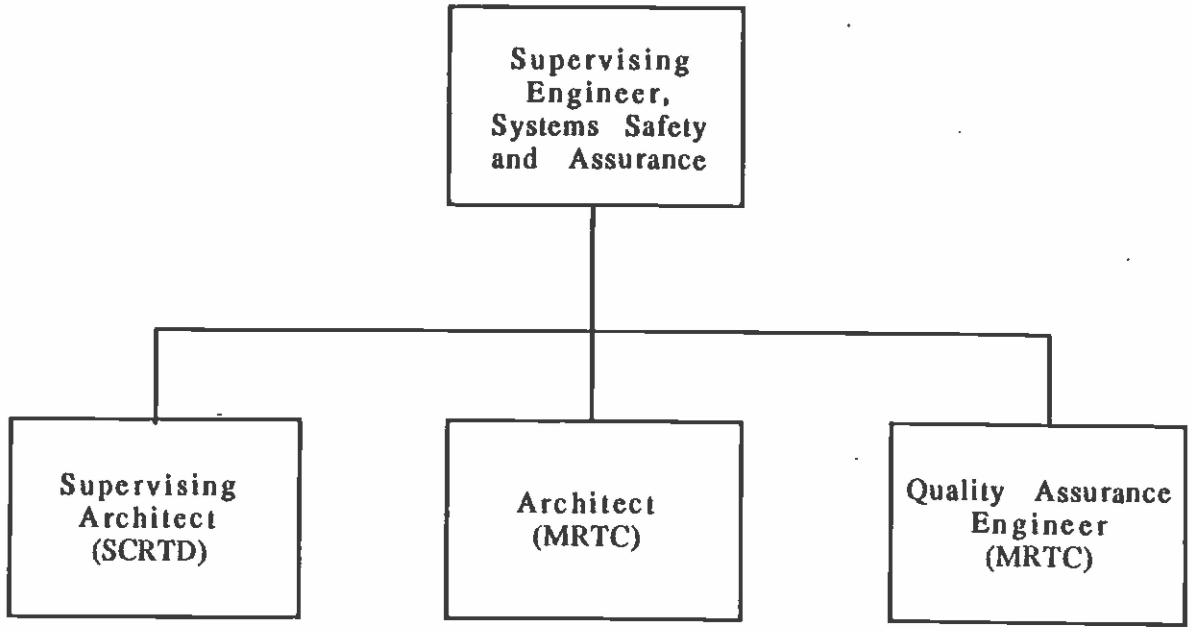
3.5.11 Prepare Criteria Conformance Checklists

To ensure that safety criteria are properly reflected in contract drawings and specifications, the GC developed comprehensive checklists of items which must be verified during the Metro Rail design review process. Checklists for systemwide elements and facilities contracts have been developed to support the Safety Certification Program. The checklists are used by safety organization staff to ensure a comprehensive and consistent review of specifications and drawings. Any discrepancies are formally submitted to the GC and are resolved to the satisfaction of SCRTD safety management.

3.5.12 Prepare Specification Conformance Checklists

Checklists will be developed to ensure that all safety criteria incorporated into specifications are reflected in contractors' final designs and products. The 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 GC and used by SCRTD and representatives of the CM Consultant and SE&A Consultant (for passenger vehicle procurement) during contractor design reviews, audits, inspections, and tests. Any discrepancies between the specification conformance checklist requirements and contractor designs or final products will be resolved to the satisfaction of SCRTD safety management.

EXHIBIT 3-6
Elderly/Handicapped Committee Organization



3.5.13 Identify Safety Documentation Requirements for Contract Specifications

During Continuing Preliminary Engineering and Final Design, the safety organization was responsible for identifying contractor or supplier safety-related analyses, tests, tasks, and submittals that form part of the procurement specifications. The safety organization assisted the GC in identifying and phrasing the requirements for safety analyses, test requirements, and submittals in the procurement specifications.

In the specification books, the requirements are contained in the Contract Data Requirements List (CDRL) section. Typical requirements include:

- Hazard Analysis
  - Subsystem
  - Interface
  - Operating
- Critical/Catastrophic Items List
- Reliability Demonstration Plan
- Maintainability Analyses
- Quality Assurance Procedures
- Test Program Plan
- Test Procedures.

3.5.14 Review Contractor Analyses and Reports

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

3.5.15 Review Operating and Maintenance Manuals and Procedures

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

3.5.16 Conduct Pre-Construction Surveys

Prior to the award of construction contracts, the District Insurance Administrator (DIA) will contract for the services of an experienced company to conduct pre-construction surveys of buildings, structures, streets, roads, and bridges in order to ascertain their condition prior to start of any construction activity adjacent to the property. The survey will document any existing damage to the structures' interior and exterior in the zone of influence of the construction project. The surveys are primarily intended for use as a defense in liability claims, but can also give advance warning of potential problem areas and/or hazardous conditions.

3.5.17 Participate in Safety Inspections and Audits of Contractor Work Sites

The safety organization will conduct surveillance and formal safety audits to ensure that construction safety requirements are being implemented. Representatives from the CM Consultant, DIA, and SCRTD S&CS Office will periodically visit construction sites. Their identification of deficiencies and of required corrective actions will assist in ensuring that the safety program is being properly implemented.

3.5.18 Participate in Construction Safety Oversight Committee Meetings

The safety organization will participate in Construction Safety Oversight Committee (CSOC) meetings, which will be held regularly during Metro Rail construction to discuss and review contractual safety requirements and the status of contractor compliance with construction safety requirements. The CSOC meetings will be attended by safety representatives from each of the active construction contractors, the SCRTD S&CS Office, the CM Consultant, and the DIA. The meetings will serve as a forum to discuss contractor-experienced problems that impact safety, and to assist in developing resolutions to these problems. The meetings will also be used to report on incidents or accidents that occur at the construction sites.

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 ensure that the Metro Rail system can safely transport patrons in revenue service. Review of certification materials rests with the Safety Certification Review Team (SCRT).

3.5.20 Participate in Testing

The comprehensive Metro Rail test program encompasses tests of fixed facilities and system equipment; system integration and pre-revenue tests; and all safety-related tests. The safety organization's participation in testing will include reviewing, coordinating, or witnessing tests which impact safety.

3.5.21 Provide Operations/Maintenance Support

The safety organization provides input to evolving operations and maintenance philosophies. The safety organization will review new designs or design changes that impact operations and maintenance and will also provide safety input to operations and maintenance plans and procedures. The safety organization provides input to the Rail Activation Plan, which identifies the tasks necessary to activate and operate Metro Rail MOS-1 and the Long Beach-Los Angeles light rail lines.[26]

3.5.22 Conduct Safety Training Courses

The safety organization will develop training materials and conduct courses to teach SCRTD personnel in the safe operation and maintenance of the Metro Rail system. Training courses will be conducted during the Pre-Operational Testing and Start-Up Operations Phases.

3.5.23 Develop Safety Management Reports

The safety organization will develop management reports to inform SCRTD management of progress on safety objectives and safety-related activities. The reports will contain operational safety statistics, such as accidents or incidents which have occurred and claims filed. The reports will also identify hazardous trends in Metro Rail operations and will include recommendations to improve safety.

3.5.24 Conduct Emergency Training

During the Pre-Operational Testing and Start-Up Operations Phases, the safety organization will conduct emergency training and simulated disaster drills to ensure that Metro Rail personnel are adequately prepared to respond to emergencies. The roles and responsibilities of the emergency team participants will be as defined in the

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26 LACTC and SCRTD, LB-LA and MOS-1 Rail Activation Plan, Rev. 0, June 1988.

Emergency Operations Procedures. The safety organization will coordinate the drills and emergency exercises with participants, such as the fire, police, rescue squad, and operations personnel.

3.6 DOCUMENTATION

As part of its activities, the safety organization is responsible for gathering and maintaining 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
- 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
- Source data for a management information reporting system.

3.6.2 Establish Safety Documentation and Review Procedures

The safety organization has prepared procedures to review, comment on, and track changes to safety criteria and related documentation, including:

- Internal and contractor-provided safety-related analyses
- 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 safety-related analyses
- Test and safety certification documents

- Status of safety training programs for operators, maintenance personnel, RCC 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. In addition, 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/Procurement, and Testing
- Documentation.

The tasks in each are described in the following sections.

4.2 CRITERIA DEVELOPMENT

4.2.1 Develop Security Criteria

System security criteria were developed during Preliminary Engineering and Continuing Preliminary Engineering. The security criteria provide the

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1 SCRTD Metro Rail Project, System Design Criteria and Standards, 1983 as revised, Volume I, Section 4 -- Security.

EXHIBIT 4-1
Security Activities and Tasks

PARAGRAPH NUMBER	TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
	CRITERIA DEVELOPMENT						
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	●	●	●	●	●	●

EXHIBIT 4-1 (Continued)
Security Activities and Tasks

PARAGRAPH NUMBER	TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
	PLANS AND PROCEDURES						
4.3.1	Prepare a Preliminary Transit Police Staffing Plan	•					
4.3.2	Prepare Contractor Security Submittal Review Procedures			•			
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				•	•	
4.3.7	Prepare a Card Key Implementation Plan			•			

EXHIBIT 4-1 (Continued)
Security Activities and Tasks

PARAGRAPH NUMBER	TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
	ANALYSES AND STUDIES						
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 Analysis			●			
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		●	●			
4.4.9	Prepare a Yard Lighting Analysis			●	●		

EXHIBIT 4-1 (Continued)
Security Activities and Tasks

PARAGRAPH NUMBER	TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
	DESIGN, CONSTRUCTION/PROCUREMENT AND TESTING SUPPORT						
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 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 Criteria Conformance Checklists		•	•			
4.5.10	Prepare Specification Conformance Checklists			•	•		
4.5.11	Review Contractor Analyses and Reports			•	•	•	

EXHIBIT 4-1 (Continued)
Security Activities and Tasks

PARAGRAPH NUMBER	TASK TITLE	PROJECT PHASE					
		PRELIMINARY ENGINEERING	CONTINUING PRELIMINARY ENGINEERING	FINAL DESIGN	CONSTRUCTION/ ACQUISITION	PRE-OPERATIONAL TESTING	START-UP OPERATIONS
4.5.12	Develop Metro Rail Security Problem Forms and Management Reports				•	•	
4.5.13	Participate in Testing				•	•	•
4.5.14	Conduct Security Training Courses				•	•	•
	DOCUMENTATION						
4.6.1	Establish Security Library	•	•	•	•	•	•
4.6.2	Establish Security Documentation and Review Procedures		•	•			

EXHIBIT 4-2
Task Responsibilities

PARAGRAPH NUMBER	TASK/ACTIVITY	TRANSIT SYSTEMS DEVELOPMENT							CONSULTANTS						OPERATIONS		
		SYSTEMS AND CONSTRUCTION SAFETY			SYSTEMS DESIGN AND ANALYSIS												
		SYSTEMS SAFETY AND ASSURANCE	CONSTRUCTION SAFETY	TECHNICAL SUPPORT	SYSTEMS ENGINEERING AND ANALYSIS	SYSTEMS DESIGN	RAIL FACILITIES ENGINEERING	CONSTRUCTION MANAGEMENT	SYSTEMS ENGINEERING AND ANALYSIS CONSULTANT	GENERAL CONSULTANT	CONSTRUCTION MANAGEMENT CONSULTANT	INSURANCE CONSULTANT	FIRE DEPARMENTS AND RESCUE SQUAD	POLICE DEPARTMENTS AND CORONER'S OFFICE	TRANSPORTATION	EQUIPMENT MAINTENANCE	FACILITIES MAINTENANCE
	CRITERIA DEVELOPMENT																
4.2.1	Develop Security Criteria	S			RC	RC	RC		P	S				RC			
4.2.2	Update and Revise Security Criteria	S	S		RC	RC	RC	RC	RC	P	RC	RC	RC	S			
4.2.3	Conduct Peer Reviews on System Security	P															
4.2.4	Develop Security Input to Milestone Program	P							S	S			RC	S			
4.2.5	Conduct Familiarization Trips to Other Transit Properties	P							S	S				S			

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

EXHIBIT 4-2 (Continued)
Task Responsibilities

PARAGRAPH NUMBER	TASK/ACTIVITY	TRANSIT SYSTEMS DEVELOPMENT							CONSULTANTS						OPERATIONS		
		SYSTEMS AND CONSTRUCTION SAFETY			SYSTEMS DESIGN AND ANALYSIS												
		SYSTEMS SAFETY AND ASSURANCE	CONSTRUCTION SAFETY	TECHNICAL SUPPORT	SYSTEMS ENGINEERING AND ANALYSIS	SYSTEMS DESIGN	RAIL FACILITIES ENGINEERING	CONSTRUCTION MANAGEMENT	SYSTEMS ENGINEERING AND ANALYSIS CONSULTANT	GENERAL CONSULTANT	CONSTRUCTION MANAGEMENT CONSULTANT	INSURANCE CONSULTANT	FIRE DEPARMENTS AND RESCUE SQUAD	POLICE DEPARTMENTS AND CORONER'S OFFICE	TRANSPORTATION	EQUIPMENT MAINTENANCE	FACILITIES MAINTENANCE
	PLANS AND PROCEDURES																
4.3.1	Prepare a Preliminary Transit Police Staffing Plan	S												P			
4.3.2	Prepare Contractor Security Submittal Review Procedures	S	S			RC	RC	RC	RC	P	RC			RC			
4.3.3	Outline Preliminary Security Procedures and Training Course Requirements	S			RC	RC			RC	RC			RC	P			
4.3.4	Finalize the Security Staffing and Organization Plan	S			RC				P	RC				S	RC		
4.3.5	Develop a Security Incident Investigation and Reporting Procedure	S							S	RC				P	RC	RC	RC
4.3.6	Develop Security Operating Procedures	RC							RC	RC			RC	P	RC	RC	RC
4.3.7	Prepare a Card Key Implementation Plan	RC					RC	RC	RC	P	RC		RC	RC	RC	RC	RC

P = Primary Responsibility
S = Secondary or Support Responsibility

EXHIBIT 4-2 (Continued)
Task Responsibilities

PARAGRAPH NUMBER	TASK/ACTIVITY	TRANSIT SYSTEMS DEVELOPMENT							CONSULTANTS						OPERATIONS		
		SYSTEMS AND CONSTRUCTION SAFETY			SYSTEMS DESIGN AND ANALYSIS												
		SYSTEMS SAFETY AND ASSURANCE	CONSTRUCTION SAFETY	TECHNICAL SUPPORT	SYSTEMS ENGINEERING AND ANALYSIS	SYSTEMS DESIGN	RAIL FACILITIES ENGINEERING	CONSTRUCTION MANAGEMENT	SYSTEMS ENGINEERING AND ANALYSIS CONSULTANT	GENERAL CONSULTANT	CONSTRUCTION MANAGEMENT CONSULTANT	INSURANCE CONSULTANT	FIRE DEPARMENTS AND RESCUE SQUAD	POLICE DEPARTMENTS AND CORONER'S OFFICE	TRANSPORTATION	EQUIPMENT MAINTENANCE	FACILITIES MAINTENANCE
	ANALYSES AND STUDIES																
4.4.1	Prepare a Security Profile of the Metro Rail Corridor	P								RC				RC			
4.4.2	Prepare a Security Policies Recommendations Study	S			RC				P	RC				RC			
4.4.3	Prepare a Closed-Circuit Television Evaluation	RC			RC	RC	RC		RC	P				RC			
4.4.4	Prepare a Closed-Circuit Television Utilization Analysis	RC			RC	RC	RC		RC	P				RC			
4.4.5	Prepare an Access Control Study	RC			RC	RC	RC		RC	P			RC	RC			
4.4.6	Prepare Transit Parking Security Studies	RC			RC	RC	RC		RC	P				RC			
4.4.7	Prepare a Fare Collection Equipment Security Analysis	RC			RC	RC	RC	RC	RC	P	RC			RC			
4.4.8	Prepare a Security Command Center Requirements Analysis	S			RC	RC	RC	RC	P	S	RC		RC	S	RC		
4.4.9	Prepare a Yard Lighting Analysis	RC			RC		RC			P			RC	RC	RC	RC	RC

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

EXHIBIT 4-2 (Continued)
Task Responsibilities

PARAGRAPH NUMBER	TASK/ACTIVITY	TRANSIT SYSTEMS DEVELOPMENT							CONSULTANTS						OPERATIONS		
		SYSTEMS AND CONSTRUCTION SAFETY			SYSTEMS DESIGN AND ANALYSIS												
		SYSTEMS SAFETY AND ASSURANCE	CONSTRUCTION SAFETY	TECHNICAL SUPPORT	SYSTEMS ENGINEERING AND ANALYSIS	SYSTEMS DESIGN	RAIL FACILITIES ENGINEERING	CONSTRUCTION MANAGEMENT	SYSTEMS ENGINEERING AND ANALYSIS CONSULTANT	GENERAL CONSULTANT	CONSTRUCTION MANAGEMENT CONSULTANT	INSURANCE CONSULTANT	FIRE DEPARMENTS AND RESCUE SQUAD	POLICE DEPARTMENTS AND CORONER'S OFFICE	TRANSPORTATION	EQUIPMENT MAINTENANCE	FACILITIES MAINTENANCE
	DESIGN, CONSTRUCTION/PROCUREMENT AND TESTING SUPPORT																
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		S		S			
4.5.3	Participate in Design Reviews	P	P		S	S	S	S	S	S	S			S			
4.5.4	Participate in Contractor Audits, Inspections and Tests	P	P		S	S	S	S	S	S	S	S		S			
4.5.5	Participate in Test Program Development	P	S	S	S	S	S	S	S	S	S			S	S	S	S
4.5.6	Participate in Training Course Program Development	P	P		S	S	S	S	S	S	S			S	S	S	S
4.5.7	Participate in Public Education Program Development	P	P		S	S	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 Criteria Conformance Checklists	RC					RC	RC	RC	P	RC			RC			
4.5.10	Prepare Specification Conformance Checklists	RC					RC	RC	RC	P	RC			RC			

P = Primary Responsibility
S = Secondary or Support Responsibility

EXHIBIT 4-2 (Continued)
Task Responsibilities

PARAGRAPH NUMBER	TASK/ACTIVITY	TRANSIT SYSTEMS DEVELOPMENT							CONSULTANTS						OPERATIONS		
		SYSTEMS AND CONSTRUCTION SAFETY			SYSTEMS DESIGN AND ANALYSIS												
		SYSTEMS SAFETY AND ASSURANCE	CONSTRUCTION SAFETY	TECHNICAL SUPPORT	SYSTEMS ENGINEERING AND ANALYSIS	SYSTEMS DESIGN	RAIL FACILITIES ENGINEERING	CONSTRUCTION MANAGEMENT	SYSTEMS ENGINEERING AND ANALYSIS CONSULTANT	GENERAL CONSULTANT	CONSTRUCTION MANAGEMENT CONSULTANT	INSURANCE CONSULTANT	FIRE DEPARMENTS AND RESCUE SQUAD	POLICE DEPARTMENTS AND CORONER'S OFFICE	TRANSPORTATION	EQUIPMENT MAINTENANCE	FACILITIES MAINTENANCE
4.5.11	Review Contractor Analyses and Reports	RC	RC		RC	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						S	S				P			
4.5.13	Participate in Testing	P			S	S	S	S	S		S			S	S	S	S
4.5.14	Conduct Security Training Courses	P												S	S	S	S
	DOCUMENTATION																
4.6.1	Establish Security Library	P	P	P													
4.6.2	Establish Security Documentation and Review Procedures	P	P	P													

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

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requirements to be followed by design engineers in equipment selection and facilities design. Through the criteria, security concerns are 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 are revised in accordance with the established Metro Rail change control process.

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 Workshop[2] was held at the SCRTD sources on January 11-12, 1983. Participants included the SCRTD and representatives from WMATA, BART, MARTA, NYCTA, APTA, UMTA, TSC, CPUC, CalTrans, LA County Sheriff's Department, LA City Police Department, the GC, and the SE&A Consultant. 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 community participation and milestone program, a chapter on security was incorporated into Milestone 7.[3] It described the SCRTD's comprehensive security program in the areas of stations, communications, vehicles, central control, ways and structures and right-of-way, Transit Police, and public education. The Milestone Report was adopted by the Board of Directors in March 1983.

4.2.5 Conduct Familiarization Trips to Other Transit Properties

In preparation for development of the security criteria and the Security Policies Recommendations Study,

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2 SCRTD Metro Rail Project, UMTA/SCRTD/Industry Security Peer Review, January 11-12, 1983, Transcript of Proceedings, prepared by Charles Harris, Inc.

3 SCRTD Metro Rail Project, Milestone 7 Final Report: Safety, Fire/Life Safety, Security and Systems Assurance, March 1983 (Chapter IV).

members of the SCRTD Security Subcommittee visited other rapid transit systems in the U.S. and Canada. Additional familiarization trips may 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 Metro Rail. The staffing plan was used as input to the operating cost estimates.

4.3.2 Prepare Contractor Security Submittal Review Procedures

Procedures for reviewing contractor-prepared submittals and documents have been developed. These procedures provide for a comprehensive review of contractors' security-related documentation by the SCRTD, the CM Consultant, the SE&A Consultant, and other security program participants.

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, station agents, RCC personnel, Transit Police, LAPD, and LACSD personnel 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 fare inspection and 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. The procedure will address the requirements of investigations of criminal activities or security incidents that occur during Metro Rail start-up and revenue service. The procedure will cover 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 3.3.12).

4.3.6 Develop Security Operating Procedures

During Construction/Acquisition, draft security operating procedures will be developed. Final procedures will be developed during Pre-Operational Testing.

4.3.7 Prepare a Card Key Implementation Plan

During Final Design, a Card Key Implementation Plan[4] was developed. The basis of the report is the Security Access Control Report, which is described in Section 4.4.5. The plan describes the functional aspects of a card access control system, and includes the identification of required security levels for rooms and facility areas, locking scheme (mixed hard key/card key), and associated costs for construction, operations, and maintenance. The plan also includes proposed card reader locations for the MOS-1 system, including the yard facilities. The plan provides sufficient detail to extend the functional design philosophy to additional stations as the system expands.

4.4 ANALYSES AND STUDIES

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
- Closed-Circuit Television Evaluation
- Closed-Circuit Television Utilization Study
- Access Control Study
- Transit Parking Security Study
- Fare Collection Equipment Security Analysis
- Security Command Center Requirements Analysis
- Yard Lighting Analysis.

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4 Metro Rail Transit Consultants, Card Key Implementation Plan, November 1986.

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 analysis[5] 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 study[6] 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 evaluation[7] of alternative closed-circuit television (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.

4.4.4 Prepare a Closed-Circuit Television Utilization Analysis

During Final Design, an analysis was conducted of CCTV system design and operation, and of resultant equipment costs and requirements, locations, coverage, and

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

6 Booz, Allen & Hamilton, Security Policies Recommendation Study, prepared for the Security Subcommittee, December 1983.

7 Metro Rail Transit Consultants, CCTV Coverage in Station Areas, Letter Report, February 14, 1984.

manpower. The assessment, prepared by the GC, was used as input to the CCTV specification and to update operating cost estimates.

4.4.5 Prepare an Access Control Study

A study[8] 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

Drawings for station sites with parking lots were evaluated for their security risks, and recommendations were made to mitigate security problems.

4.4.7 Analyze Fare Collection Equipment Security

Analyses were conducted to identify security problems that cam be minimized by design selection of special locks, access controls, alarms, etc. The analyses were used in the preparation of the fare collection equipment specification.

4.4.8 Prepare a Security Command Center Requirements Analysis

The basic requirements for the location of the Transit Police Dispatch Center were covered as part of a special study on central control facilities. An updated study was conducted during Final Design, which discussed the RCC communications link with the Transit Police Dispatch Center.[9]

4.4.9 Prepare a Yard Lighting Analysis

During Final Design, an Operations and Maintenance (O&M) Committee working group on yard lighting was

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8 Metro Rail Transit Consultants, Security Access Control Report, September 1984.

9 Booz, Allen & Hamilton, Special Study of the Integration of Bus and Rail Operations Control Centers, July 1984; Central Control Facility Functional Plan, Presentation by SCRTD/MRTC/BAH, April 24, 1984; and SCRTD/MRTC, Rail Control Center Functional Plan, March 1987.

convened and identified issues relating to yard light poles. The working group recommended design changes to pole configurations and locations and established maintainability requirements. The yard lighting recommendations were adopted and forwarded to a lighting consultant for use in a yard lighting simulation. The simulation work incorporated the design changes and generated runs showing the lighting level throughout the entire yard. The analysis demonstrated that the new pole configurations and locations met the illumination level for yard lighting set by Metro Rail design criteria for safety and security considerations.

4.5 DESIGN, CONSTRUCTION/PROCUREMENT AND TESTING SUPPORT

The security organization participates directly and continuously with SCRTD and consultant staff to ensure that security is adequately incorporated into the system and subsystem designs and specifications as well as the end products.

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.
- The resulting compromises achieved by the coordination of safety, security, and system assurance considerations which impact on 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 security in the construction, manufacture, acquisition, procurement, and installation of Metro Rail facilities and equipment. The security organization will, as required, assist the SCRTD Construction Management Office, SCRTD Systems Design and Analysis Office, CM Consultant, and SE&A Consultant.

4.5.3 Participate in Design Reviews

The security organization will participate in design reviews where the security of Metro Rail patrons, 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 Metro Rail patrons, 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 Test Program Development

During Construction/Acquisition, the security organization will assist the Systems Design and Analysis Office, the Construction Management Office, the SE&A Consultant, the CM Consultant, and Metro Rail transportation and maintenance personnel in developing test plans and procedures. The test program encompasses tests of fixed facilities and system equipment; system integration and pre-revenue tests; and all safety-related tests. The test program will be implemented from Construction/Acquisition through Start-Up Operations. The Metro Rail tests are identified in the Test Program Plan.

4.5.6 Participate in Training Course Program Development

The security organization will assist Metro Rail and other SCRTD staff and outside agencies in developing the security-related aspects of training programs for:

- Train Operators
- RCC Personnel
- Facilities Maintenance Personnel
- Equipment Maintenance Personnel
- Coroner/Medical Examiner's Office
- Fire Departments
- Police and Sheriff Departments.

4.5.7 Participate in Public Education Program Development

The security organization will assist SCRTD public relations staff in 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 ensure supportive interaction among the Metro Rail security organization, their consultants, and police and fire organizations, a Security Subcommittee within the Fire/Life Safety Committee was established. The organization of the Security Subcommittee is shown in Exhibit 4-3, and its charter is shown in Exhibit 4-4. Along with its other coordinating responsibilities, the Subcommittee acts as a review board for all security-related activities, analyses, and reports. The Subcommittee recommends necessary changes, additions, and/or improvements to on-going security activities.

The Security Subcommittee meets on a periodic and scheduled basis. It will function throughout all phases of the Metro Rail Project. Its emphasis will shift from design review in the early stages of the project, to the development and improvement of security procedures in the Construction/Acquisition Phase, and to investigation and reporting of criminal incidents during revenue operations.

4.5.9 Prepare Criteria Conformance Checklists

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

4.5.10 Prepare Specification Conformance Checklists

Checklists will be developed to ensure that security criteria incorporated into the specifications are reflected in contractors' final designs and products. The checklists will be incorporated into the Metro Rail design review, audit, inspection and testing program and used to support the Safety Certification Program. The

EXHIBIT 4-4
Security Subcommittee Charter

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

checklists will be prepared by the GC and used by the SCRTD and representatives of the CM Consultant and SE&A Consultant during contractor design reviews, audits, inspections, and tests. Any discrepancies between the specification conformance checklists and contractor designs or final products will be resolved to the satisfaction of the SCRTD security management.

4.5.11 Review Contractor Analyses and Reports

The security organization will review any contractor analyses, reports, and submittals relating to security. These include change proposals, hazard analyses, critical/catastrophic item 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 existing requirements of the SCRTD Transit Police and local agencies.

4.5.13 Participate in Testing

The comprehensive Metro Rail test program encompasses tests of fixed facilities and system equipment; system integration and pre-revenue tests; and all safety-related tests. The security organization's participation in the testing program will include reviewing, coordinating, or witnessing tests that relate to system security.

4.5.14 Conduct Security Training Courses

The security organization will develop training materials and conduct courses to teach SCRTD transit police, operations, and maintenance personnel the security procedures used in normal operations (e.g., fare enforcement, revenue collection, CCTV monitoring, station patrolling) and those used in emergencies (e.g., reporting of security incidents, emergency response). The training courses will ensure that SCRTD personnel are prepared to provide security coverage to the Metro Rail system. Training courses will be conducted during the Pre-Operational Testing and Start-Up Operations Phases.

4.6 DOCUMENTATION

As part of its activities, the security organization is responsible for organizing and maintaining 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
- 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
- Source data for a management information reporting system.

4.6.2 Establish Security Documentation and Review Procedures

The security organization has prepared procedures to review, comment on, and track changes to security-related documentation, including:

- Internal and contractor-provided security-related analyses
- Resolution of hazards itemized in the Critical/Catastrophic Items List which relate to security
- Security incident reports on construction activity
- Status reports on all contractor/supplier security-related analyses
- Status of security training programs for train operators, RCC personnel, and station agents.