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SCRTD
METRO RAIL PROJECT
SAFETY CERTIFICATION PROJECT
CRITERIA CONFORMANCE CERTIFICATION

CONTRACT A631

TRACTION POWER INSTALLATION

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INTRODUCTION

This Criteria Conformance Verification package is submitted for review and compliance assessment in accordance with Rev. 1.1 of the SCRTD Metro Rail Project Safety Certification Plan dated June 1988. The purpose of this package is to document the incorporation of safety-related design criteria into the contract drawings and specifications. This activity is part of a multi-phased program to provide a traceable history of the Metro Rail Project Safety Program.

During design progression, MRTC Safety, Assurance personnel, in conjunction with Rolf Jensen & Associates and the Metro Rail Project Fire/Life Safety Committee, have reviewed design documents at the 60%, 85%, and 100% levels. The 100% design review for this document was held in July 1986. An additional legal/technical review was held in June 1988. The contract was originally advertised for bid in December 1988. A total of five addenda were issued against the December 1988 bid document. At each review level design review checklists were utilized and appropriate design review comments generated. Subsequent reviews were initiated by determining the resolution status of comments. Unresolved comments were repeated at each review level until resolution was achieved and verified.

Design review checklists for the Fire/Life Safety, System Safety, Security, and System Assurance design criteria were updated in December 1986 to reflect the significant revisions made through the Change Request process. A vertical bar in the Req. I.D. column of the checklist was used to indicate only those changes which impacted design. For clarity, editorial revisions and clarifications of intent were not indicated on the checklist; however, all revisions were indicated in the text of the design criteria and pertinent Change Requests. The updated checklists were applied to the conformed document to verify that compliance with applicable design criteria was maintained.

The comments included in this package represent the result of the 100% and Legal/Technical design reviews. The checklists included are the updated checklists applied to the conformed document. Checklist references to specific drawing numbers or specification sections are based on the conformed contract documents. Only those portions of the checklists containing design criteria requirements directly applicable to this contract, including those for Fire/Life Safety, Security, System Safety, Reliability, Maintainability, Quality Assurance, and Configuration Management are included in this document. Responses to the comments are included in most cases, as well as resolution verification by MRTC Safety &

Assurance personnel. Supporting correspondence has been included where deemed appropriate. Addenda issued, have been reviewed to determine impact on the Safety Certification Program. Addenda distribution letters, annotated to indicate results of the review, are included.

The scope of this contract encompasses the installation of MOS-1 traction power and auxiliary power electrical equipment, including LRT equipment (funded by the Los Angeles County Transportation Commission) at the 7th/Flower substation, including field testing. The traction power equipment includes high-voltage ac switchgear assemblies. In MOS-1, the operating requirements defined by SCRTD Design Directives DD-003 and DD-004 require only one ac-to-dc conversion assembly; provisions are made to add a second unit in the future. Auxiliary power electrical equipment in each substation includes redundant power transformers and 480 V switchgear. Both of the redundant units must be provided in MOS-1 as part of the dual independent feeds required by the System Design Criteria and Standards for emergency lighting and ventilation. The contract covers MOS-1 and includes a small amount of equipment installation for interfacing with the LRT at the 7th/Flower Station.

This verification package, once audited and confirmed by the SCRTD, will become the primary documentation to allow the SCRTD to issue a Criteria Conformance Certification Certificate. Once issued, the Certificate will be appended to this document.

METRO RAIL PROJECT RTD

CRITERIA CONFORMANCE VERIFICATION

Metro Rail Transit Consultants
DMJM/PBQD/KE/HWA
548 South Spring Street, Seventh Floor, Los Angeles, California 90013 213/612-7000

Safety Certification Program

DESIGN REVIEW CONTACT NO. A-631 TRACTION POWER INSTALLATION

REVIEWING DISCIPLINE MRTC SAFETY, ASSURANCE

EXCEPTIONS NOTED: NONE

This verifies that the specifications and drawings of the above DESIGN REVIEW PACKAGE comply with the applicable SCRTD DESIGN CRITERIA for safety, fire/life safety, security and system assurance.

Signature [signature] Date 1/22/90	Signature [signature] Date 1/23/90
Manager–MRTC Safety Assurance & Security	Manager–MRTC Systems Division

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT DESIGN REVIEW CHECKLIST

CERTIFIABLE ELEMENT: TRACTION POWER INSTALLATION

GROUP: MRTC-SAFETY, ASSURANCE & SECURITY

DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: FIRE/LIFE SAFETY - STATIONS

REVIEW REFERENCE: METRO RAIL PROJECT SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 2.2

CONTRACT No.: A631

REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
2.2	STATION FACILITIES			
2.2.1.3	The design of stations and their appurtenances shall conform to California Administrative Code (CAC) Title 24, CAC Title 19, CAC Title 8, California Public Utilities Commission (CPUC) General Orders except as specifically set forth in this chapter, and Uniform Building Code (UBC), 1979, as applied by Title 24, CAC.	X		See Criteria Conformance Checklist for applicable Station.
2.2.2.1	Building construction for underground stations shall be not less than UBC Type I construction.	X		See Criteria Conformance Checklist for applicable Station.
2.2.2.2	Where stations have floor levels at or above ground level, that portion which is above ground shall be not less than UBC Type II-FR construction.			N/A to this Contract
2.2.2.3	Stations having more than two levels below grade or more than 80 feet to the lowest level from grade will require protected level separation or other protection features to provide safe egress regardless of exit time calculations.			N/A to this Contract
2.2.2.4.1	Station public occupancy shall be separated from station ancillary occupancy by minimum 2-hour fire rated construction.	X		See Criteria Conformance Checklist for applicable Station.

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	Exception: A maximum of 2 station agents, supervisors, or information booths may be located within station public occupancy areas when constructed of approved noncombustible materials and limited in floor area to 100 square feet each. Automatic fire protection systems installed in the area in which the booth is located shall extend into the booth.	X		See Criteria Conformance Checklist for applicable Station.
2.2.2.4.2	Station public occupancy shall be separated from power substations and transformer vault areas in station ancillary occupancies by 3-hour fire-rated construction.	X		
2.2.2.4.3	Station public and ancillary occupancies shall be separated from nontransit occupancies by 3-hour fire-rated construction.	X		
2.2.2.5.1	Electrical equipment areas which contain transformers and traction power equipment shall be separated from all other occupancies by 3-hour fire-rated construction.	X		
2.2.2.5.2	Vaults of not less than 3-hour fire-rated construction shall be constructed for oil-insulated electric transformers and shall meet the NEC requirements for vault construction, including door and sill requirements.			N/A to this Contract

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
2.2.2.5.3	Electrical equipment rooms, electric rooms, battery rooms, train control and communication rooms, and trash rooms shall be separated from other occupancies by 2-hour fire-rated construction.	X		See Criteria Conformance checklist for applicable Station.
2.2.2.6.1	Openings in 3-hour fire-rated separations shall be protected by labeled 3-hour fire-rated (Class A) assemblies.	X		
2.2.2.6.2	Openings in 2-hour fire rated separations shall be protected by labeled 1½-hour fire-rated (Class B) assemblies.	X		
2.2.2.6.3	Openings in 1-hour fire rated separations shall be protected by 1-hour fire-rated (Class B) assemblies.	X		
2.2.2.6.4	Fire-rated assemblies protecting openings in fire-rated separations shall be automatic or self-closing. Automatic closing assemblies protecting openings into station public occupancies shall be activated by approved detection devices, responding to products of combustion other than heat. Alternatively, automatic closing assemblies may be released by heat-actuated devices alone where a separate smoke barrier is provided. Installation shall be in accordance with UBC Section 4306.	X		
2.2.2.7	Section 2.3.2.3 requirements for protection of underground guideways shall be applied to underground stations.	X		See Criteria Conformance Checklist for applicable Station.

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
2.3.2.3.1	Vent or fan shafts utilized for ventilation of subway tunnels shall not terminate at grade on any vehicle roadway or parking lot.	X		See Criteria Conformance Checklist for applicable Station.
2.3.2.3.2	Vent and fan shafts may terminate in the median strips of divided highways or on sidewalks designed to accept such shafts, or in open space areas, provided that their location at the level of the median strips, or sidewalk, or open space, is protected by a concrete curb. This curb shall be of sufficient elevation to exclude drainage into the shaft, but in no case shall the height be less than 6 inches.	X		
2.3.2.3.3	Installation of underground hazardous substance storage tanks and related piping shall not be permitted directly over any transit system subsurface structure or within 25' measured horizontally from the outside wall of such a subsurface structure (See 2.3.2.3.5).			No Stations are impacted by this Contract.
2.3.2.3.4	Installation of underground hazardous substance storage tanks and related piping, located in the area between 25 feet and 100 feet (measured horizontally from the outside wall) of any transit system subsurface structure, and within that same area such tanks and related piping which are within 2' below the lowest point of excavation limit, shall meet the following requirements:			

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	A. Tanks shall be of double wall construction. B. Tanks shall be equipped with an approved automatic leak detection and monitoring system. C. Tanks shall be provided with an approved corrosion detection system. D. Installation, maintenance and inspection shall conform to the requirements specified by the authority having jurisdiction.			No Stations are impacted by this Contract.
2.3.2.3.5	Existing underground hazardous substance storage tanks located in or under buildings which are located directly above or within 25 feet (measured horizontally from the outside wall) of the subsurface transit structure, shall be removed. Where it is not possible to remove tanks, such tanks shall be abandoned in accordance with provisions of the authority having jurisdiction.			
2.3.2.3.6	Facilities dispensing hazardous substances from underground tanks where such tanks are located in the area within 100' (measured horizontally from the outside wall) of the subsurface structure shall be required to comply with the following:			

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	A. The surface around pump islands shall be graded or drained in a manner to divert possible spills from subway vent gratings, entrances, or exits. B. Appropriate continuous drains across driveways, ramps, and/or curbs of at least 6 inches in height shall separate facilities from adjacent subway property. C. No connection (such as venting or drainage) of any storage tanks and related piping of hazardous substances to a fixed subsurface transit structure shall be permitted. D. Points of dispensing for hazardous substances shall not be located less than 50 feet from the nearest subway system opening.			No Stations are impacted by this Contract.
2.2.2.3.7	Other fill or dispensing points for hazardous substances shall be subject to restrictions as prescribed in 2.3.2.3.6.			
2.2.2.8.1	All structural assemblies and building appurtenances shall conform to Type I structures per UBC Chapters 5, 17, and 18.	X		See A163, Sect. 13121, Para. 1.2.
2.2.2.8.2	Combustible adhesives and sealants used shall not compromise requirements of section 2.2.2.9.	X		See Criteria Conformance Checklist for applicable Stations.

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
2.2.2.8.3	Elevators and escalators shall be constructed of noncombustible materials and conform to CAC Titles 24 and 8.	X		See Contract A720 and A710 for Elevators & Escalators.
2.2.2.9.1	Interior finishes shall be Class I (per UBC Chapter 42) for all exit access routes and exits. Platforms and mezzanines in transit stations shall be considered exit access routes for the purpose of determining interior finish requirements.	X		See Criteria Conformance Checklist for applicable Stations.
2.2.2.9.2	Interior finishes in all other areas shall be UBC Chapter 42, Class I or II.	X		
2.2.3.1.1	Provisions shall be made for emergency ventilation for protection of patrons and employees from fire and products of combustion.	X		
2.2.3.1.3	Ventilation shaft terminals at grade shall be located as follows:	X		
	A. Openings for blast relief shafts, and underplatform and smoke exhaust shafts at grade shall be separated by a minimum horizontal distance of 40 feet from the closest station entrance, surface emergency stair doorways, unprotected outside air intake or other openings, or from each other.	X		
	o Where this distance is not practical, the horizontal distance may be reduced to 15 feet if the closest	X		

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	blast relief or underplatform and smoke exhaust shaft terminal is raised a minimum of 8 feet above the station entrance, emergency stair doorway and unprotected outside air intake or other opening, or the underplatform and smoke exhaust shaft terminal is raised a minimum of 8 feet above the blast relief shaft terminal.	X		See Criteria Conformance Checklist for applicable Station.
	B. The minimum distance between the edges of adjacent openings for outside air intake shafts protected by smoke dampers and blast relief shafts or underplatform and smoke exhaust shafts shall be as follows: $d = 0.25 \times (l_1 + L_2)$ Where: d = minimum distance in feet between the edges of the adjacent openings. L_1 and L_2 = lengths in feet of the adjacent parallel sides of the openings.	X		
2.2.3.2.1	Ventilation systems shall be designed so that in a fire emergency the air temperature in exit pathways does not exceed 120°F.	X		
2.2.3.2.2	Emergency ventilation systems shall produce airflow rates so as to provide a stream of noncontaminated air to patrons	X		

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	in egress path.			
2.2.3.3.1	Ventilation fans used for emergency service, their motors and all related components exposed to the ventilation airflow shall be designed to operate in an ambient atmosphere of 300°F for a period of at least 1 hour.	X		See A740, Sect. 15865-12.
2.2.3.3.2	Local fan motor starters and related operating control devices shall be isolated from the ventilation airflow by a separation having a fire-resistance rating of at least 2 hours.	X		Coordinated Between Contracts A631 & A740.
2.2.3.3.3	Fans used for emergency ventilation shall be single or dual-speed, reversible, or capable of changing direction of airflow by use of dampers.	X		See A740, Sect. 15865-8, A740 Dwgs.
2.2.3.3.4	Fans required for emergency operation shall be capable of satisfying emergency air-velocity criteria in either supply or exhaust modes.	X		See A740, Sect. 15865-8 & A740 Dwgs.
2.2.3.3.5	Thermal overload protective devices shall not be provided on motor controls of fans used for emergency ventilation. Circuits shall be designed to maintain current to the emergency fan motors without operation of protective devices (unless excess current is sensed simultaneously with a no-airflow signal).	X		See Criteria Conformance Checklist for applicable Station. Also Elect. single line dwgs.
2.2.3.3.6	Two independent electrical supplies shall be provided for each of the	X		See Criteria Conformance Checklist for

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	emergency fans. Automatic transfer shall be provided in the event the normal supply source fails.			applicable Station. Also Elect. single line dwgs.
2.2.3.4.1	Operation and fail-safe verification of proper operation of emergency fans shall be effected by Central Control with supply-off-exhaust indication provided for each fan as well as from a local control isolated as in 2.2.3.3.2.	X		See Contract A640, Contract Dwgs., N-057, N-257, N-054, N-254, N-059, N-062, N-063. Also see Spec. Sect TP-10 & Contract A740.
2.2.3.4.2	Controls shall be provided at the EMP for operating the ventilation system in all modes. This location and the local control shall override control from CC.	X		
2.2.3.4.3	Emergency ventilation shall be designed to operate in full coordination with the trainway ventilation system.	X		
2.2.3.4.4	Emergency ventilation systems shall be controlled in all operating modes; locally, from the EMP, and from CC.	X		
2.2.3.5.1	Ancillary area ventilation systems shall be arranged so that air is not exhausted into station public occupancy areas. Controls for shutdown of ancillary area ventilation systems shall be provided at the EMP.	X		See Criteria Conformance Checklist for applicable Station. Also see Contract A740.
2.2.3.5.2	Battery storage or similar ancillary rooms in which hydrogen gas or other hazardous gases may be released shall	X		See Criteria Conformance Checklist for applicable

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	require mechanical ventilation and be ventilated in accordance with NFPA 91 and as follows:			Station.
	A. Exhaust ducts from battery rooms shall not connect with duct systems used for other purposes.	X		See Criteria Conformance Checklist for applicable Station HVAC Dwgs.
	B. Exhaust system operation shall be proven by means of an air-flow switch, from which a no-air-flow signal produces an alarm at a continuously attended location and will cause battery charging serving the affected area to be deenergized.	X		See Criteria Conformance for applicable Station. Also see Struct & Arch. Plans.
2.2.4.1	Electrical equipment and wiring materials and installations within stations shall comply with NEC and, other than for traction power, shall satisfy the following requirements:	X		See Criteria Conformance Checklist for applicable Station. Also see Elect. Plans & Specs.
2.2.4.1.1	Materials manufactured for use as conduits, raceways, ducts, boxes, cabinets, equipment closures and their surface finish materials shall be capable of withstanding 932°F for 1 hour and shall not support combustion. Other materials when embedded in concrete are acceptable.	X		
2.2.4.1.2.	All conductors shall be insulated. Copper ground wires may be bare. All thicknesses of insulation and jackets	X		

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	shall conform to NEC.			
2.2.4.1.3	Insulation shall conform to Article 310 of NEC and be moisture- and heat-resistant, and carry temperature ratings corresponding to application not lower than 194°F.	X		See Criteria Conformance Checklist for applicable Station. Also see Elect. Plans & Specs.
2.2.4.1.4	Wire and cable used in operating vital train signal circuits and power circuits to emergency fans, lights, etc., shall pass the flame-propagating criteria of IEEE 383 and have a minimum short circuit time of 5 minutes in the flame test of IEEE 383. Such tests shall be performed with the wire and/or cables protected as they will be when installed.	X		See Criteria Conformance Checklist for applicable Station. Also Spec. Sects.
2.2.4.1.5	o All conductors shall be enclosed in conduits, enclosed raceways, boxes and cabinets, except in traction power substations, electrical equipment rooms, train control rooms, or communications rooms.	X		See Criteria Conformance Checklist for applicable Station. Also see Elect. Dwgs.
	o Conductors in conduits or raceways may be embedded in concrete or run in concrete electrical duct banks.	X		
	o Conductors shall not be installed exposed or surface-mounted in air plenums which may carry air at the elevated temperature accompanying the fire-emergency conditions.	X		

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2.2.4.1.6	Overcurrent elements which (a) are designed to protect conductors serving emergency equipment motors, emergency lighting, and communications equipment, and (b) which are located in spaces other than main distribution system equipment rooms, shall operate on magnetic principles and not depend upon thermal properties for operation.			See Critiera Conformance Checklist for applicable Station. Also See Elect. Dwgs.
2.2.4.1.7	Wiring for fans essential for emergency ventilation service shall meet the requirements of 2.2.4.1.4.	X		See Criteria Conformance Checklist for applicable Station. Also Spec. Sects.
2.2.4.1.8	Conductors for emergency lighting, communications, etc. shall be protected from physical damage by transit vehicles or other normal transit system operations, and from fires in the transit system by suitable embedment or encasement, or by routing such conductors through areas of low fire potential (light hazard).	X		See Criteria Conformance Checklist for applicable Sta. Also see Elect. Dwgs.
2.2.4.1.9	Switches, electrical outlets, and lighting fixtures in areas where batteries are installed/charged shall be explosion proof per NEC.	X		See Criteria Conformance for applicable Station. also Elect. Dwgs.
2.2.5.2	Occupancy and Occupant Load			
2.2.5.2.1	The occupant load for a station shall be determined based on an emergency	X		See Exit Calculations prepared by RJA (12-5-85)

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	condition requiring evacuation of that station load to a point of safety.			
2.2.5.2.2	A. Access to the platform and/or the station must be operationally constrained to a platform net area ocupancy equivalent to 4 square feet per person. For anticipated platform entraining loads that would result in area occupancies of less than 4 square feet per person, the calculated platform load will be limited to the net platform area divided by 4 square feet per person. The minimum total exit width in feet shall be equal to this platform load divided by 50 patrons per foot of exit width.	X		See Exit Calc's Prepared by RJA (12-5-85.)
	B. Notwithstanding other provisions in 2.2.5.2, exiting shall be provided, as a minimum, to accommodate the equivalent of 7 square feet per person.	X		
	C. Special design consideration shall be given to stations directly servicing areas where events occur that result in abnormal patron loads.	X		
2.2.5.2.3	If there are side platform stations, each platform shall be considered separately. At center platform stations, arrival of trains from both directions, plus their entraining loads, shall be considered.	X		

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
2.2.5.2.4	At mezzanines or multi-level stations, simultaneous platform loads shall be considered for all exit paths passing through that area.	X		See Exit Calculations prepared by RJA 12-5-85.
2.2.5.3.1	Exit capacities shall be calculated on the basis of 22-inch wide exit lanes. Width shall be measured in the clear at the narrowest point except that individual handrails may project 3½ inches into the required width. Fractional lanes shall not be counted in measuring exit capacities except that 12 inches added to one or more lanes shall be counted as ½ a lane.	X		
2.2.5.3.2	There shall be sufficient exit lanes to evacuate the station occupant load as defined in 2.2.5.2.1 from the station platforms in 4 minutes or less (see Figure 2-1 "Emergency Exit Capacity Calculation" of criteria).	X		
2.2.5.3.3	The station shall also be designed to permit evacuation from the most remote point on the platform to a point of safety in 6 minutes or less.	X		
2.2.5.3.5	The capacity in persons per minute (ppm), travel speeds in feed per minute (fpm), and requirements for exit lanes shall be as follows: A. Platforms, corridors, and ramps of 4 percent slope or less: Exit corridors and ramps shall be a minimum	X		

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DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: FIRE/LIFE SAFETY - STATIONS

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	clear width of 5 feet 8 inches. In computing the number of exit lanes available, 1 foot 6 inches shall be deducted at each platform edge and 1 foot at each sidewall. Per exit lane: Capacity - 50 ppm Travel speed - 200 fpm	X		See Exit Calculations prepared by RJA (12-5-88.)
	B. Stairs, stopped escalators, and ramps of over 4 percent slope: Exit stairs shall be a minimum clear width of 3 feet 8 inches. Exit ramps shall be a minimum clear width of 6 feet. Stopped escalators may be considered as emergency exits of two-lane capacity provided they are of nominal 4 feet width; of 1½ lane capacity provided they are of nominal 2 feet 8 inches width; and one-lane capacity if less than 2 feet 8 inches width. Per exit lane "up" direction: Capacity - 35 ppm Travel Speed - 50 fpm* Per exit lane "down" direction: Capacity - 40 ppm Travel Speed - 60 fpm* (*Indicates vertical component of travel speed)	X		
	C. Doors and gates: Exit doors and gates shall be a minimum of 3 feet wide.	X		

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	Per exit lane: Capacity - 50 ppm	X		See Exit Calc's prepared by RJA (12-5-85).
	D. Fare collection gates qualifying for use in exit paths shall be electrically deactivated to assume an acceptable exit mode in the event of a power failure or through a manual or remote control activation.			
	1. Bi-parting gates when deactivated shall provide a clear unobstructed aisle, a minimum of 20 inches in width, mounted between consoles that do not exceed 3 feet 3 inches in height.	X		
	Per gate: Capacity - 50 ppm			
	2. Turnstiles a minimum of 20 inches in width having a bar positioned to have maximum height of 3 feet which, when deactivated, will free wheel in the exit direction. Consoles shall not exceed 3 feet 3 inches in height.	X		
	Per gate: Capacity - 25 ppm			
	3. Gates fitted with approved panic hardware and opening in the direction of exit travel, with minimum nominal width of 3 feet.	X		
	Per gate: Capacity - 50 ppm per exit lane			

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	Fare gates not qualifying for use in exit paths shall be prominently marked "Not an Exit."			
2.2.5.3.6	From each platform there shall be a minimum of 2 exits not less than 100 feet apart. Platform exits shall be stairs, escalators stopped or moving in the direction of egress to mezzanine level, emergency stairs, doorways, corridors, or walkways to a point of safety. Routes from platform ends into the underground trainway are not considered as exits for calculating exiting requirements.	X		See Criteria Conformance Checklist for applicable Station. Also Arch Plans.
2.2.5.3.7	There shall be a minimum of 2 exits from each mezzanine not less than 40 feet apart.	X		
2.2.5.3.8	No point on the station platform(s) or mezzanine(s) shall be more than 300 feet from an exit.	X		
2.2.5.3.9	All exit measurements shall be to a point of access to the exit.	X		
2.2.5.3.10	Exits other than fare collection gates shall provide for at least 50 percent of the exit capacity in any fare barrier.	X		
2.2.5.3.12	Means of ingress shall be provided from each trainway to the platform, as follows:	X		

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	A. Two 2 feet 10 inch wide stairways, or other arrangement having equivalent capacity, shall be provided at each end of platform, arranged to provide full capacity exiting from either trackway.	X		See Criteria Conformance Checklist for applicable Station. Also see Arch. Plans.
	B. Gates at the top of each stairway shall swing in direction of access to platform and provide clear opening width of not less than 3 feet.	X		
	C. Gates, stairs, and landings shall conform to NFPA 101 and applicable building codes.	X		
2.2.5.3.13	Vertical circulation elements shall be comprised of stairs or stair/escalator combinations. Escalators shall not account for more than half the units of exit at any one level in the public area.	X		See RJA Station Exiting Calcu. 12-1-84.
2.2.5.4	Means of egress shall be arranged in accordance with applicable codes and regulations, except that for the purpose of the criteria, exits from station ancillary occupancy areas into station public occupancy areas shall be considered as discharging into a protected passageway leading directly to a point of safety.	X		See Criteria Conformance Checklist for applicable Station. Also see Arch. Plans.
2.2.5.5.1	Station structures shall be provided with an emergency lighting system in	X		See Criteria Conformance Checklist

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	accordance with UBC except as noted in 2.2.			for applicable Station. Also see Arch. & Elec. Plans.
2.2.5.5.2	Emergency lighting system is installed and maintained per NFPA Article 700, "Emergency Systems" to provide an illuminance level of 1 footcandle.	X		See Criteria Conformance Checklist for applicable Station. Also see Arch. & Elec. Plans.
2.2.5.5.3	Exits shall be marked with readily visiable signs complying with the requirements of UBC. Where emergency lighting is required, exit signs shall be illuminated from the emergency lighting source.	X		See Contract A760, Arch. & Elect. Dwgs. for applicable Sta. Also see Criteria conformance Checklist for applicable station.
2.2.5.5.4	Exit lights and essential signs shall be included in the emergency lighting system and be powered by an uninterruptable power supply. Emergency fixtures, exit lights, and signs shall be separately wired from the emergency distribution panels.	X		
2.2.5.5.5	Emergency lighting for stairs and escalators shall be designed to emphasize illumination on the top and bottom steps or landings. A minimum of one footcandle of emergency lighting shall be provided throughout the entire run of each stair and escalator (per UBC, Section 3312(a)).	X		
2.2.6.1.1	Fire alarm control system shall be installed in each station facility,	X		See Contract A640 & Elec./Comm Dwgs. for

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	conforming to NFPA 72A and 72D and CAC Title 19:			applicable Station. Also see Criteria Conformance Checklist for applicable Station.
	A. Fire alarm devices shall be protected by a proprietary system Style D and Style 2 per NFPA 72D, Tables 3-9.1 & 3-10.1.	X		See Contract A640 & Elec./Comm. Dwgs. for applicable station.
	B. The station facility fire alarm system shall be electrically supervised and operated on low voltage with battery standby power.	X		See Criteria Conformance Checklist for applicable Station. Also see Contract A640, & A795.
	C. The public address system shall be utilized for sounding required buildingaudible fire alarm signals from the fire alarm control panel by means of a tone generator preceeding verbal announcements to direct patron evacuation. Audibility level shall be a minimum of 10 dB over any background noise.	X		See Criteria Conformance Checklist for applicable Station. Also A640 Contract & Elec./Comm Dwgs for applicable Station.
	D. All detector and extinguishing system fire alarm, smoke detection, valve switches, and water flow indicator signals throughout the system shall, when activated, be transmitted simultaneously within the local station and to a central supervising station per NFPA 72D.	X		

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	E. The fire alarm control system shall provide means to trip special extinguishing systems and to control ventilation systems in accordance with applicable codes.	X		See Criteria Conformance Checklist for applicable Station. Also see Contracts A640, A740, A745 & Mech. Elec./ Comm. Dwgs. for applicable Station.
2.2.6.1.2	The EMP shall include an annunciator panel which indicates by audible and visual alarm the activation and location of any fire signal generated at the station facility. It shall also indicate fire system supervisory signals and a fire alarm control panel trouble signal.	X		See Criteria Conformance Checklist for applicable Station. Also see Contract A640 & Elec/Comm Dwgs. for applicable Station.
	A minimum of one EMP shall be located in the public area on the mezzanine adjacent to the fare array in the patron assist area in the pathway of the entrance to which the fire department will respond.	X		
2.2.6.1.3	Automatic fire detection devices shall be installed throughout all station ancillary areas where automatic sprinkler protection is not required, including return air and after the filters in air conditioning and ventilation systems serving more than one area.	X		See Criteria Conformance Checklist for applicable Station. Also see Contracts A640, A740 & Arch., Mech., & Elec./Comm Dwgs for applicable Stations.
2.2.6.1.4	Manual fire alarm capability shall be provided by an emergency phone system.	X		See Criteria Conformance Checklist

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
				for applicable Stations. Also see Contract A640 & Elec/ Comm. Dwgs. for applicable Station.
	A. Emergency phones shall be located adjacent to each fire hose cabinet throughout the station.	X		
	B. The emergency phones shall be a dedicated system that alarms at CC. The emergency phone system shall annunciate at CC and indicate station of origin.	X		
2.2.6.1.5	A supervised public address system shall be provided to facilitate patron evacuation in the event of an emergency.	X		See Criteria Conformance Checklist for applicable Station. Also see Contract A640 & Elec./Comm. Dwgs. for applicable Station.
	A. The public address system shall be operable from the EMP and from CC	X		
	B. The public address system shall conform to NFPA 72A and 72D. Supervision of the public address address system shall be through the station fire alarm control panel.	X		
2.2.6.1.6	Seismic alarm devices and controls shall be provided to detect a seismic event such that it will permit safe stopping of trains entering any zone of the	X		

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	system where a seismic event has occurred. Detection of a seismic event shall be annunciated in CC.			
2.2.6.1.7	Gas detection devices shall be provided to detect the presence of methane or other gases entering into the system. Presence of such gases shall be annunciated in CC.	X		See Criteria Conformance Checklist for applicable Station. Also see Contract A640 & Elect/Comm. Dwgs. for applicable Station.
2.2.6.2.1	Automatic sprinkler protection in accordance with NFPA 13, UBC Chapter 38, and LA Plumbing Code shall be provided in all station ancillary areas, except as provided in 2.2.6.2.2. Any other exception shall be approved by the F/LS Committee.	X		See Criteria Conformance for applicable Station.
2.2.6.2.2	Train control and communication rooms shall be protected with an automatic Halon 1301 extinguishing system meeting NFPA 12A and LAFD Requirement 33, activated manually and through the fire alarm control panel by a cross-zoned detection system.	X		See Criteria Conformance Checklist for applicable Station. Also see Contract A640 & Mech. Elect/Comm Dwgs for applicable Station.
	Standpipe and Hose Systems			
2.2.6.3.1	Class III standpipe system coverage shall be provided throughout the station per NFPA 14 and UBC Chapter 38. Fire hose outlets shall be located so that any point may be reached including in and around transit vehicles which may be stopped at the station, with 100 feet of hose and 30 feet of water stream.	X		See Criteria Conformance Checklist for applicable Station.

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
2.2.6.3.2	Manual and remote actuation of under-vehicle water spray extinguishing systems shall be provided at stations, supplied from platform standpipe systems. Separately controlled systems, shall be provided on each track for lengths along the platform corresponding to each vehicle pair, considering variations in stopping position. Provisions for removing third rail power shall be provided so that power is automatically removed from that section of track, prior to actuating the under-vehicle extinguishing system.	X		See Criteria Conformance Checklist for applicable Station. Also see Mech., Elect & Arch. Dwgs for the applicable Station.
	Fire Extinguishers			
2.2.6.4.1	Portable fire extinguishers complying with NFPA 10, CAC Title 19, and LA Fire Code shall be placed at each fire hose location and at other locations as required by hazard type and space utilization. Multipurpose dry chemical extinguishers having a capacity of 10 pounds and rated 4A-30B:C shall be used, supplemented by 10 pound, 10B:C CO extinguishers in rooms used for electrical equipment: except that 10 pound 2A-20B:C Halon 1211 extinguishers shall be provided in train control and communication rooms.	X		To be furnished by District (SCRTD)
2.2.6.4.2	Maximum travel distance to nearest extinguisher shall not exceed 150 feet in public areas.	X		See Criteria Conformance Checklist for applicable Station.

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
				Also see Arch. Dwgs for applicable Stations.
	Emergency Access to Stations			
2.2.6.5.1	Access to station entrances and emergency egress locations shall be from public streets, or an access road of 20 foot minimum paved width, with widened 28-foot turnouts wherever emergency vehicles may stop.	X		See Criteria Conformance Checklist for applicable Station. Also see Arch. & Mech. Dwgs for applicable Station.
2.2.6.5.2	An access road to a station shall be continous from a public street to a public street, or a 66-foot outside radius turnaround shall be provided.	X		
2.2.6.5.3	Fire Department inlet connections for automatic sprinkler and standpipe systems shall be located within 25 feet of vehicular access. Hydrant spacing and locations shall be determined by the FLSC.	X		See Criteria Conformance Checklist for applicable Station. Also see Arch. & Mech. Dwgs for applicable Station.

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REVIEW LEVEL: ~~100% FINAL~~

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
2.3	TRAINWAY FACILITIES			
2.3.2.1	Underground Trainway Construction			
2.3.2.1.1	Perimeter walls and related construction of line sections constructed by the cut-and-cover method shall be at least Type I as defined by UBC.			N/A to this Contract
2.3.2.1.2	Structural liner of line sections constructed by a tunneling method through earth shall be Type I construction.			
2.3.2.1.3	Special liner requirements may be imposed to assist control of natural gas intrusion and, where utilized, shall be of noncombustible construction.			
2.3.2.1.4	Passenger evacuation walkways shall be constructed of noncombustible materials. Walking surfaces are shall have a slip resistant design. Open grating surfaces shall not be permitted.	X		See Criteria Conformance checklist for applicable station
2.3.2.1.5	Noncombustible rail ties shall be used in underground trainways, except at switch or crossover locations where fire retardant, pressure-treated ties may be used.	X		See Contract A610/ A115 Section 02457, Para" 2.1.B
2.3.2.1.6	Ancillary structures adjoining the trainway, including remote vertical exit shafts and ventilation structures, shall be not less than Type I approved noncombustible construction per UBC.			N/A to this Contract

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
2.3.2.2	Protection Separations for Underground Buildings			
2.3.2.2.1	Ancillary structures and areas within tunnels and tubes shall be separated from trackway areas by 3-hour fire-resistive construction with all openings protected with approved Class A (3-hour rated) assemblies.	X		See Criteria Conformance Checklist for applicable contract
2.3.2.2.2	All nonsystem structures or facilities shall be separated from underground trainway structures by unpenetrated 4-hour fire-rated construction.	X		See Criteria Conformance Checklist for applicable contract
2.3.2.3	Underground Trainway Protection Against Hazardous Substance Intrustion			
2.3.2.3.1	Vent or fan shafts utilized for ventilation of subway tunnels shall not terminate at grade on any vehicle roadway or parking lot.	X		See Criteria Conformance Checklist for applicable contract
2.3.2.3.2	Vent and fan shafts may terminate in the median strips of divided highways or on sidewalks designed to accept such shafts, or in open space areas, provided that their location at the level of the median strips, or sidewalk, or open space, is protected by a concrete curb. This curb shall be of sufficient elevation to exclude drainage into the shaft, but in no case shall the height be less than 6 inches.	X		See Criteria Conformance Checklist for applicable contract

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
2.3.2.3.3	Installation of underground hazardous substance storage tanks and related piping shall not be permitted directly over any transit system subsurface structure, or within 25 feet measured horizontally from the outside wall of such a subsurface structure (See 2.3.2.3.5).			N/A to this Contract
2.3.2.3.4	Installation of underground hazardous substance storage tanks and related piping, located in the area between 25 and 100 feet (measured horizontally from the outside wall) of any transit system subsurface structure, and within that same area such tanks and related piping which are within 2 feet below the lowest point of excavation, shall meet the following requirements: A. Tanks shall be of double wall construction. B. Tanks shall be equipped with an approved automatic leak detection and monitoring system. C. Tanks shall be provided with an approved corrosion detection system. D. Installation, maintenance and inspection shall conform to the requirements specified by the authority having jurisdiction.			

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
2.3.2.3.5	Existing underground hazardous substance storage tanks located in or under buildings which are located directly above a subsurface transit structure, or within 25 feet (measured horizontally from the outside wall) of the subsurface transit structure, shall be removed. Where it is not possible to remove tanks, such tanks shall be abandoned in accordance with provisions of the authority having jurisdiction.			N/A to this Contract
2.3.2.3.6	Facilities dispensing hazardous substances from underground tanks where such tanks are located in the area within 100 feet (measured horizontally from the outside wall) of the subsurface structure, shall be required to comply with the following: A. The surface around pump islands shall be graded or drained in a manner to divert possible spills from the subway vent gratings, entrances, or exits. B. Appropriate continuous drains across driveways, ramps, and/or curbs of at least 6" in height shall separate facilities from adjacent subway property. C. No connection (such as venting or drainage) of any storage tanks and			

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	related piping of hazardous substances to a fixed subsurface trainway transit structure shall be permitted. D. Points of dispensing for hazardous substances shall not be located less than 50 feet from the nearest opening to the subway system.			N/A to this Contract
2.3.2.3.7	Other fill or dispensing points for hazardous substances shall be subject to restrictions as prescribed in 2.3.2.3.6.			
2.3.3	TRAINWAY TRACTION POWER AND FACILITY WIRING			
2.3.3.1	Protective Coverboard			
2.3.3.1.1	The protective coverboard provided on all contact rail sections shall be securely anchored.	X		See Contract A615 Section TP-3-5, Para: 3.4.2. Also Dwg: P-152
	Coverboard materials shall be electrically insulating, capable of passing the ASTM E162-78 Radiant Panel Test with flame propagation index not exceeding 15, and capable of passing the ASTM E662-75 test with a smoke emission optical density index (D_s) of 200 or less in 4 minutes.	X		See Contract A615, Section TP-3.3, Para: 3.2.2,B,C,&D
2.3.3.1.2	The coverboard shall be capable of withstanding vertical mechanical load cycle and drop tests with loads of 250	X		See Contract A615, Section TP-4-4, Para: 4.6.4.A&B

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	pounds distributed over 6" by 12" area at any single location, when supported at maximum design spans and with specified attachment methods without manifesting cracks, splits, points of stress, or breaks and with a permanent deflection of no more than ¼ inch.			
	During load cycle, deflection shall not exceed 1½ inches and not exceed 2½ inches with a 12-inch drop test.	X		See Contract A615, Section TP-4-4, Para: 4.6.4.A&B
2.3.3.1.3	The coverboard shall be permanently and conspicuously marked to provide basic location identification by section of trainway and electrification feeder zone.	X		See Contract A615 nad A680, Also A610/A115
	Markings should be at ends of station platforms, at each end of each contact rail gap, and at intervals along the trainway not to exceed 500 feet.	X		See Contract A680 and A760. Also see A610/ A115
	Marking locations should be coordinated with graphics specified for emergency access points.	X		See Contract A615, A680 & 760. Also see A610/ A115
2.3.3.2	Cables connecting the contact rail, pot heads, and energized hardware shall be covered with insulating material and installed so as not to present an electrical or tripping hazard to personnel on the walkway.	X		See Contract A631, Sec. 16122-5, Para:3.3, also Dwgs: P-356, P-357-360 & P-365

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REVIEWER: W. SMITH

DISCIPLINE: FIRE/LIFE SAFETY - TRAINWAY FACILITIES

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
2.3.3.3	Warning signs shall be posted on the access to the trainway at stations, on fences of barriers adjacent to the trainway, or at other locations where nonemployees may attempt to trepass.	X		See Contract A680 & A760, also see A610/ A115
	The warning sign shall clearly state the hazard in letter, size, and colors as required by NFPA 70 and CAL/OSHA regulations.	X		See Contract A680 & A760. Also see A610/ A115
2.3.3.4	Wiring, materials, and all electrical installations including traction power or traction power control shall conform to the NEC. Facility wiring shall meet the additional requirements established in 2.2 for station facilities.	X		See Contract A631, Sec. 16120. For Facility wiring, see Criteria Conformance Checklist for applicable contract
2.3.3.5	The contact rail shall be located opposite the safety walkway and the station platform.	X		See Contract A610/A115 Dwgs., also see A612 dwgs
2.3.4	EMERGENCY EGRESS AND ACCESS FOR UNDERGROUND TRAINWAYS			
2.3.4.1	Areas of Safe Refuge			
	Emergency egress means of evacuating patrons from transit vehicles in tunnels and through tunnels to reach areas of safe refuge shall be provided.			N/A to this Contract
2.3.4.1.4	A trainway safe area of refuge shall meet the following requirements:			

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	A. A multiple tunnel underground trainway with either a minimum 2-hour rated fire barrier at each tunnel and with openings at each end of cross passages protected by Class B (1½ hour) fire assemblies, or with a minimum 3-hour rated fire barrier with a common wall between tunnels with openings protected with Class A (3-hour) fire assemblies. B. Emergency ventilation facilities shall be provided at each unclosable opening in the fire-rated barrier, as necessary for center platform stations or for special track sections, of sufficient capability that the effects of a vehicle fire can be prevented from passing beyond the opening for a minimum of 6 hours. (See 2.3.5.) C. Means shall be available at each point of access to the area of refuge for removal of traction power and for communication with the transit control center. (See 2.3.7.) D. Egress from and access to this area shall not require returning through the tunnel of fire origin. E. Emergency lighting shall be provided. (See 2.3.4.7.)			N/A to this Contract X See Criteria Conformance Checklist for applicable Contract

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
2.3.4.2	Egress Paths			
2.3.4.2.1	Safety walks shall be provided on one side of the tunnels, and shall be placed at the height of the vehicle floor (+0", -7") to facilitate egress through vehicle side doors. The following additional requirements shall be met: A. Level walkways, including ramps having a slope not exceeding 4%, shall have a clear width not less than 2 feet 6 inches, a maximum cross slope toward the trackway of 0.5% and continuous wall handrails of 1¼- to 1½-inch standard galvanized pipe mounted 2 feet, 6 inches to 2 feet, 10 inches above the walkway with 3-inch minimum clearance to the wall. No protrusions into the walkway shall extend further than a perpendicular line tangent to the handrail. B. Stairs and ramps having a slope in excess of 4% and level walkways on the contact rail side of the trackway shall have a clear width of 2 feet 10 inches and be equipped with 3 foot, 6-inch high guardrails having an intermediate rail at midheight. Clear headroom and cross slope shall be as required for level walkways.			N/A to this Contract

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	Stairs shall have a minimum of 2 risers, equal and not greater than 7½ inches, and 10 inch treads. C. Safety walks shall be brought down to rail elevation at track level at each end of a station platform to provide access to the undersides of vehicles for lengths not less than 15 feet but not greater than 150 feet. Safety walks shall be brought down to rail elevation at crosswalks. Safety walks on the contact rail side of the trackway shall not be brought below the level of the contact rail cover-board. Where walkways are at track level, guard rails shall be provided to afford vehicle hot shoe level protection. D. A clear vertical envelope shall be maintained on the walkway of 1 foot 6 inches at the walking surface, 2 feet from 5 feet to 5 feet 6 inches, and 1 foot 6 inches at 6 feet 8 inches with a worst case static vehicle envelope.			N/A to this Contract
2.3.4.2.2	Track walkways, when used for emergency egress, shall have a smooth walking surface, not less than 3 feet 8 inches wide, provided between the running rails. The surface shall be flat and			

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	free from obstruction, holes, and drainage channels for the required width.			N/A to this Contract
2.3.4.2.3	Crosswalks shall be provided at track level to assure walkway continuity where safety walks are discontinued on one side of the tunnel and continued on the opposite side and where access is required from safety walks and track walkways to emergency stairs or cross-passages. The crosswalks shall be of concrete construction, have a minimum width of 6 feet and a walking surface at top of rail. The crosswalk surface shall be sloped a maximum of 4% from track walkway elevation. Where the crosswalk is to extend to the side of the tunnel with the contact rail, the contact rail shall be discontinued not less than 5 feet from each side of the crosswalk.			
2.3.4.2.4	Walkway continuity shall be maintained at special track sections. Crosswalks shall be provided the full width of all trackways at both ends of special track sections.			

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	Safety walks of both trackways shall be located at the exterior walls above the contact rail coverboard. They shall have a clear width of 2 feet, 8 inches, guard rails, and use maximum 4% slope ramps for elevation changes, or both trackways shall be provided with walkway top-of-rail height a minimum of 3 feet 8 inches from crosswalk to crosswalk.			N/A to this Contract
2.3.4.3	Emergency Exits To The Surface			
2.3.4.3.1	Emergency exits to the surface shall be provided at intervals not exceeding 1,000 feet when trackways are not separated by solid walls or when the trackways are not accessible from each other due to individual tunnel profiles.			
2.3.4.3.2	Where trackways are separated from each other by solid walls with the required fire resistance and having cross-passages meeting the requirements of 2.3.4.4, emergency exits to the surface shall be provided: A. At unprotected openings in the separating wall away from stations, such as special track locations. B. At maximum 2000 ft intervals where tunnel separation does not qualify as a safe area of refuge as defined by 2.3.4.1.4.			

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
2.3.4.3.3	Emergency exit enclosures shall be separate from ventilation shafts, although they may be adjacent. Stairs and passageways shall have a minimum clear width of 3 feet 8 inches. Stairways shall have standard handrails or guardrails on each side, landings of length equal to the stair width at the bottom and at not greater than 12-foot vertical intervals, minimum 7-foot headroom, maximum 7½-inch step risers, and minimum 10-inch wide step treads. Doors shall be single leaf, 4-foot wide, Class B (1½-hour) fire doors, arranged to open in the direction of travel and equipped with self-closing devices.			N/A to this Contract
2.3.4.3.4	Emergency exit discharge shall be to an area of safety as defined in 2.3.4.1, through an opening with a width of 3 feet 8 inches and a height or length of 6 feet 8 inches. The exit will normally be one of the following: A. Vertical exit door in a surface kiosk or an adjacent building. Such a door shall be equipped with panic hardware on the emergency exit stairway side and shall have a minimum fire rating fo 1½ hours. Entrance from the outside shall be provided by a key or wrench.			

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	B. Horizontal exit door or hatch flush with surface level. The flush exit doors shall be of solid steel and shall be counterweighted or spring loaded so that they will open when pressure is put on panic release bar on the emergency exist stairway side. The force required to open or close the hatch shall not exceed 15 pounds applied at the latch side. The hatch shall be equipped with a hold open device which shall automatically latch the door in the open position so as to preclude accidental closure. Entrance from the surface side shall be provided by a key or wrench. Where the hatch is in a position subject to pedestrian traffic, an automatic warning bell at the surface shall be activated by foot traffic at the bottom of the stairs or at an intermediate landing. C. Exit doors at the surface shall be at locations acceptable to local authorities and shall not be provided in areas subject to vehicular traffic.			N/A to this Contract
2.3.4.4	Distance between tunnel cross-passages shall be approved by the FLSC; cross-			

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	passage spacing shall not exceed 800 feet, unless authorized by the FLSC. They shall meet the following requirements:			N/A to this Contract
2.3.4.4.1	The sill of a cross-passage opening shall match the elevation of the service walkway or crosswalk to which it connects. The cross-passage shall have a minimum clear, unobstructed width of 6 feet, 6 inches, and it shall have a desirable height of 8 feet and a minimum height of 7 feet. Ventilation and drainage shall be provided.			
2.3.4.4.2	Cross-passage may be incorporated in pump or ventilation structures. Where they are a part of a ventilation structure, the passageway shal be separated from the air plenums and sumps and be enclosed by construction with a minimum fire rating of 2 hours. Space for any ventilation or drainage equipment shall be provided exclusive of the 6 feet 6 inches as required in 2.3.4.4.1.			
2.3.4.4.3	The minimum dimensions of the door opening shall be 3 feet 8 inches wide by 80 inches high. Doors shall be provided at each end and arranged to open into the cross-passages. The doors shall be offset to the same side of the cross-passage.			

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
2.3.4.4.4	Doors, door frames, and hardware shall have a minimum fire rating of 1½ hours (Class B).			N/A to this Contract
2.3.4.4.5	Doors shall be equipped with door closures and passage latch sets to allow opening from either side. All doors and hardware systems shall be designed to withstand an air pressure of 70 pounds per square foot applied on either side of the entire door area.			
2.3.4.5	Emergency exit doors shall be provided at maximum 500-foot intervals in the common wall separating the trainways in cut-and-cover structures. A single sliding door shall be used with the door and hardware having a minimum fire rating of 3 hours (Class A). The door shall be selfclosing and equipped with pull handles to allow opening from either side.			
2.3.4.6	Cross-passage and exit doors shall be identified by signs and lights.			
2.3.4.7	Emergency Lighting			
2.3.4.7.1	Emergency tunnel lighting illumination levels shall not be less than 1 foot-candle measured at ground level.	X		See Criteria Conformance Checklist for applicable station
2.3.4.7.2	Emergency lighting at walking surface within emergency exits and cross-passages, and within tunnels at exit and	X		See Criteria Conformance Checklist for applicable contract

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	cross-passage doors, walkway stairs, walkway ramps over 4% slope, and cross-walks shall provide illumination at not less than 1 footcandle and all other walking surfaces of means of egress at not less than 1 footcandle.			
2.3.4.7.3	Underground trainway emergency lighting shall otherwise conform to requirements for station emergency lighting. (See 2.2.5.5.)	X		See Critiera Conformance Checklist for applicable station
2.3.4.8	Emergency Access To Trainway			
2.3.4.8.1	In those locations where emergency egress from the trainway is provided, emergency access shall also be provided, meeting the requirements of 2.2.6.5.			N/A to this Contract
2.3.4.8.2	At such locations in 2.3.4.8.1, Command Posts (CP) as defined in 2.3.7.4 shall be provided.			N/A to this Contract
2.3.5	VENTILATION SYSTEMS			
2.3.5.1	General			
	Trainway ventilation systems shall be comprised of normal environmental control systems and emergency ventilation systems. Emergency ventilation facilities may be used under abnormal conditions to control unusually large gas and vapor and penetrations, and under conditions of failure of the normal air handling control systems.	X		See Criteria Conformance Checklist for applicable contract

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
2.3.5.2	Emergency Ventilation System Capability			
2.3.5.2.1	An emergency ventilation system shall be provided.	X		See Criteria Conformance Checklist for applicable contract
2.3.5.2.2	Emergency ventilation systems shall be capable of controlling air quality for not less than 60 minutes in tunnels having unseparated trainways or lacking cross-passages.	X		See Criteria Conformance Checklist for applicable contract
	With trainways in separated tunnels having cross-passages, emergency ventilation shall control fire effects in the tunnel of fire origin for 60 minutes, and in the unaffected tunnel indefinitely.	X		See Criteria Conformance Checklist for applicable contract
2.3.5.3	Ventilation Of Exit Routes From Trainways			
	Emergency egress between trainways and areas of safety, which will be through stations or through independent passageways and/or stairways, shall be protected by ventilation control as follows:	X		See Criteria Conformance Checklist for applicable station
2.3.5.3.1	Egress paths shall remain protected for an additional time, beyond that specified in 2.3.5.2.2, determined on the basis of exiting scenarios considering maximum train capacity.	X		See RJA calculations for applicable contract

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2.3.5.3.2	Exit stair shafts and passageways shall not be used to exhaust air in either normal or emergency ventilation modes.	X		See Criteria Conformance Checklist for applicable contract
2.3.5.3.3	Exhaust air shall be discharged sufficiently away from egress discharge points, so that exhaust will neither enter the stair shafts or passageways, nor impede the discharge of patrons from the exits to areas of safety.	X		See Criteria Conformance Checklist for applicable contract
2.3.5.3.4	Station ventilation systems shall be designed with an operational mode permitting them to function in coordination with the emergency ventilation system.	X		See Criteria Conformance Checklist for applicable station
	Circuit control and supervision and duplicated power supply shall be provided as necessary for station ventilation systems to properly perform the emergency function.	X		See Criteria Conformance Checklist for applicable station
2.3.5.4	Air Quality Requirements			
	Ventilation for control of fire effects shall be designed to be adequate in the event of multiple transit vehicle fire involvement and the resultant generation of combustion products as described in 2.2.3.2.	X		See RJA calculations for applicable contract
2.3.5.5	Ventilation Equipment Requirements			
2.3.5.5.1	Wiring for fans essential for emergency ventilation service shall consist of 2	X		See Criteria Conformance Checklist for

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	electrical feeders from 2 separate sources. Power feeders from a utility company furnishing power for fans shall be isolated from each other and shall originate from separate and distinct sources.			applicable contract. Also Elect. Dwgs.
2.3.5.5.2	Conductors for emergency power shall be protected from physical damage by transit vehicles or other normal transit system operations and from fires in the transit system by suitable embedment or encasement, or by routing such conductors external to the interior underground portions of the transit system facilities.	X		See Criteria Conformance Checklist for applicable contract
2.3.5.5.3	Fans shall be single- or dual-speed and reversible or capable of changing the direction of airflow by means of dampers. The minimum acceptable reverse (supply) flow capacity shall be 90 percent of the forward (exhaust) flow capacity.	X		See Contract A740
2.3.5.5.4	Fans required for emergency operation shall be capable of satisfying emergency air velocity criteria in either supply or exhaust modes.	X		See Contract A740, also Criteria Conformance Checklist for applicable contract
2.3.5.5.5	Ventilation fans used for emergency service, their motors, and all related components exposed to the ventilation airflow shall be designed to operate in an ambient atmosphere of 300°F for a period of at least one hour.	X		See Contract A740, also Criteria Conformance Checklist for applicable contract

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2.3.5.5.6	Local fan motor starters and related operating control devices shall be isolated from the ventilation airflow by a separation having a fire-resistance rating of at least 2 hours.	X		See Criteria Conformance Checklist for applicable contract
2.3.5.5.7	Thermal overload protective devices shall not be provided on motor controls of fans when used for emergency ventilation.	X		See Criteria Conformance Checklist for applicable contract. Also see Elect. Dwgs.
	Circuits shall be designed to maintain current to the emergency fan motors when in emergency mode without operation of protective devices (unless excess current is sensed simultaneously with a no-air-flow signal).	X		See Criteria Conformance Checklist for applicable contract. Also see Elect. Dwgs.
2.3.5.5.8	Sufficient emergency ventilation shall be provided with one of the most critical ventilation fans malfunctioning.	X		See Criteria Conformance Checklist for applicable contract
2.3.5.6	Supervision And Control			
2.3.5.6.1	Emergency ventilation systems shall be supervised and controlled in all operating modes locally and remotely at both the CC facility and at the station EMP.	X		See Criteria Conformance Checklist for applicable contract. Also see Contract A640
	Local controls and EMP controls shall have primary and secondary overriding capability, respectively.	X		See Criteria Conformance Checklist for applicable contract. Also see Contract A640 & applicable Elect. Dwg.

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2.3.5 6.2	Local control shall be from a protected location near the fans separated from other areas by 2-hour fire-rated construction. Access shall be from the trainway and from the street level access adjacent to the fan shaft.	X		See Criteria Conformance Checklist for applicable contract
2.3.5.6.3	Power availability on each power source shall be annunciated in the local control room and means shall be provided for manually transferring fan circuits from one power source to the other.	X		See Criteria Conformance Checklist for applicable contract. Also see Elect. plans
	When using manual transfer switches, both remote control locations should have similar annunciation and manual switch capability. With automatic transfer switches, the remote control locations shall have a single annunciation that power is available.	X		See Criteria Conformance Checklist for applicable contract. Also see Elec. plans
2.3.5.6.4	Fan running shall be proven by air-flow sensing devices for each fan for operation in both the supply and exhaust directions. Air movement at 90% of rated air flow shall be required to initiate the fan-running signal for both the high-speed and low-speed modes.	X		See Criteria Conformance Checklist for applicable contract. Also see Elec. plans
	Fan speed and direction shall be controlled and status fully annunciated at local and remote control locations.	X		See Criteria Conformance Checklist for applicable contract. Also see Elec. plans
2.3.5.6.5	The following trouble status signals shall be annunciated in the local	X		See Criteria Conformance Checklist for

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
				applicable contract. Also see Elec. plans
	control room: high temperature, excess fan vibration, excessive current demand, and loss of current in any phase.			
	A summarized trouble signal shall be annunciated at CC and EMP.	X		See Criteria Conformance Checklist for applicable contract. Also Contract A640
2.3.5.6.6	Control and status annunciation circuits shall be supervised by the fire alarm control panel in a nearby station.	X		See Criteria Conformance Checklist for applicable station
2.3.6	FIRE PROTECTION SYSTEMS			
2.3.6.1	Protective Signaling Systems			
	Protective signaling systems shall be installed as indicated in 2.2, 2.2.6.1.3 for traction power substations, gap-tie stations, unit substations, pump and valve rooms, and in ventilation systems as noted; 2.2.6.1.6; and 2.2.6.1.7.	X		See Criteria Conformance Checklist for applicable contract
2.3.6.2	Standpipe Signaling Systems			
	A Class I wet standpipe system shall be installed in accordance with Chapter 38 UBC as applicable and the following requirements:			N/A to this Contract
2.3.6.2.1	The standpipe system shall be supplied through direct connections from the			

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REVIEWER: W. SMITH

DISCIPLINE: FIRE/LIFE SAFETY - TRAINWAY FACILITIES

REVIEW REFERENCE: METRO RAIL PROJECT SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 2.3

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REVIEW LEVEL: ~~100% FINAL~~

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	public water supplies at station locations, portals, and other access points to the system. Station standpipe supplies and trainway standpipe supplies may be combined.			N/A to this Contract
2.3.6.2.2	Where water supplies divide to feed standpipe systems in two directions, check valves shall be provided at the point of connection to each feed main. When needed for required system reliability, a normally closed bypass may be employed.			
2.3.6.2.3	Fire department inlet connections shall be provided at each point of connection to public supplies. A. Inlet connection shall be arranged to join the public main supply at street level, utilizing the standard valve pit arrangement of NFPA 24, Appendix A, figure A-2-6c, including control valves and check valves. B. Inlet connections shall be visible from a public way and comply with the requirements of 2.2.6.5.3. C. Graphics identifying the portions of the trackway supplied shall be placed at inlet connection locations.			
2.3.6.2.4	Control valves and check valves at points of system supply and subdividion			

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	shall only be located at stations, portals, street level valve pits, and within cross-passages and exit enclosures.			N/A to this Contract
2.3.6.2.5	The trainway standpipe shall be a Class I wet standpipe system capable of providing a minimum of 500 gallons per minute at a residual pressure of 65 pounds per square inch to the most hydraulically remote standpipe outlet.			
2.3.6.2.6	Fire hose outlets shall be equipped with 2½" NST fire hose coupling thread and be positioned as follows: A. Two outlets shall be provided within each cross-passage between underground trainways and at the trainway level within the enclosure of each emergency exit to the surface. B. Outlets shall also be installed in each trainway with locations coordinated with cross-passages and exit enclosures to obtain a spacing not exceeding 250 feet between hose outlets. C. In cut-and-cover subway structures, hose outlets shall be provided on each side of the separating common wall, near each exit door.			
2.3.6.2.7	All common supply piping shall be sized for a minimum flow of 500 GPM for the			

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	first standpipe plus 250 GPM for each additional standpipe, the total not to exceed 2,500 GPM.			N/A to this Contract
2.3.6.2.8	Standpipe system control valves shall be supervised from the fire alarm control panel in an adjacent station by means of valve-position indicators. One valve-position indicator signal shall be provided for each valve within each fire-rated enclosure (series wired indication circuit). Valves which are to be normally closed shall be supervised in that position.			
2.3.6.3	Fire Extinguishers			
2.3.6.3.1	Portable fire extinguisher with a minimum rating of 4A-30B:C, 10 pound capacity and UL approved, shall be provided adjoining each trainway blue light station (BLS). (See 2.7.5 for BLS locations.)			To be provided by SCRTD
2.3.6.3.2	A minimum of one Halon 1211 extinguisher, UL approved, rated 2A-20B:C and having 10 pound capacity, shall be provided in each emergency fan control room.			To be provided by SCRTD
2.3.7	EMERGENCY COMMUNICATION			
2.3.7.1	Emergency Telephones			
2.3.7.1.1	Trainway emergency telephones shall be	X		See Criteria Confor-

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	part of the emergency telephone system required in 2.7.4.2.			mance Checklist for applicable contract. Also see Contract A640
2.3.7.1.2	Emergency telephones shall be provided at each Blue Light Station.	X		See Contract A640
2.3.7.1.3	Emergency telephones shall be provided in emergency fan control rooms.	X		See Contract A640 Criteria Conformance Checklist
2.3.7.2	Blue Light Stations (BLS)			
	Blue light station requirements for transit stations and trainways are described in 2.7.5.	X		See Contract A640 Criteria Conformance Checklist
2.3.7.3	Tactical Communications			
	Fire department tactical communications capability shall be provided throughout underground trainways, and shall be designed in accordance with the requirements of 2.7.3.	X		See Contract A640 Criteria Conformance Checklist
2.3.7.3.1	Hard-wired systems shall include fire phone access positions at street level inlet connection locations, trainway entrances to enclosed exits to the surface, at all standpipe hose outlets, and at all BLS locations.	X		See Contract A640 Criteria Conformance Checklist
2.3.7.3.2	Where equipment is provided for augmentation of public emergency organization radio channel transmission, receiving	X		See Contract A640 Criteria Conformance Checklist

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	and transmitting access facilities shall be provided for each command post location.			
2.3.7.4	Command Post (CP) Locations			
2.3.7.4.1	Equipment shall be provided for CP locations as described in 2.7.2.4.	X		See Criteria Conformance Checklist for applicable station
2.3.7.4.2	Locations shall be established at the station EMP, at portals, and at surface emergency access to trainway (2.3.4.8).			
2.3.8	STORAGE OR TAIL TRACK			
2.3.8.1	Trackway sections providing storage areas for trains shall be separated by a 2-hour fire rated partition. Any opening in the partition shall be protected by a 1½ hr. rated assembly.			N/A to this Contract
2.3.8.2	Exits to the surface shall be provided at termination ends.			N/A to this Contract
2.3.8.3	Emergency ventilation shall be provided at each end in accordance with section 2.3.5.	X		See Criteria Conformance Checklist for applicable contract
2.3.8.4	Wet standpipes shall be provided in accordance with 2.3.6.2 except that Class III hose cabinets shall be provided not to exceed a spacing of 250 feet.			N/A to this Contract

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
2.3.8.5	Approved automatic fire detection system meeting 2.2.6.1 shall be installed in the trackway.	X		See Criteria Conformance Checklist for applicable contract
2.3.8.6	Access shall be provided at both ends of a maximum train length for each trainway section.	X		See Criteria Conformance Checklist for applicable contract
2.3.8.7	A minimum spacing of 6 feet 6 inches shall be provided between trains stored on the same track.			N/A to this Contract
2.3.8.8	Conform to all other requirements for underground trainways as defined in section 2.3.	X		See Criteria Conformance Checklist for applicable contract

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DISCIPLINE: SYSTEM SAFETY - STATION AND SITE

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
3.3	STATION AND SITE			
3.3.1	Station and Site Layout			
3.3.1.A	Site access points shall be located to preclude traffic congestion. Traffic patterns for vehicles and pedestrians shall be clearly marked.	X		See Criteria Conformanc Checklist for applicable Station.
3.3.1.B	Vehicle patterns that cross or result in counter-flow shall be minimized.	X		L.A.-Dot Responsbility
3.3.1.C	Patron drop-off zones and taxi stands shall be located to minimize patron exposure to traffic. Patrons shall be able to move directly to the station entrance without crossing traffic lanes.	X		L.A.-Dot Responsibility
3.3.1.D	If public parking is provided, spaces shall be set aside for the handicapped at the closest point to the station entrance to minimize their exposure to traffic.	X		No parking provided.
3.3.1.E	Bus loading and unloading zones shall be located so that patrons do not have to cross traffic lanes.	X		L.A.-Dot Responsibility
3.3.1.F	Clearly defined and well-marked crosswalks and sidewalks shall be provided with slip-resistant surfaces.	X		See Criteria Conformance for applicable Station. L.A. Dot responsibility for crosswalk markings. Also see Civil Dwgs. & Specs for applicable Station.

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
3.3.2	Station Architectural Features			
3.3.2.A	Signing	X		See A680 & 760 Contracts.
3.3.2.A.1	Clear, legible, and well-illuminated signing and graphics shall be provided in stations.			
	The signing and graphics shall be located in a manner which enhances the safety and convenience of patrons.	X		Proceed under Contract A680 & A760; to be installed by applicable Station Contract.
3.3.2.A.2	Right-hand traffic shall be maintained where possible through signing.	X		
3.3.2.B	Architectural Psychology			
	Any design features or vistas which may distract patrons at the head or foot of stairs and escalators shall be avoided.	X		
3.3.2.C	Platform			
3.3.2.C.1	A platform safety strip shall be provided as follows:	X		See Criteria Conformance Checklist for applicable Station.
3.3.2.C.1.a	The width of the safety strip shall be 18 inches, which includes the tactile strip and edge material.	X		
3.3.2.C.1.b	The platform edge material shall be slip-resistant and different in color and texture to distinguish it from the main platform area.	X		

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
3.3.2.C.1.c	A narrow tactile strip two inches or less in width shall contrast with the platform edge and the main platform area. It shall be designed to improve the probability of the safety strip being sensed by the blind.	X		See Criteria Conformance Checklist for applicable Station. Also applicable Station Arch. Dwgs.
3.3.2.C.2	The underplatform design shall incorporate an area where one can crouch and not be struck by the collector shoe or other parts of the train.	X		See Criteria Conformance Checklist for applicable Station. Also applicable Station ARch. & Struct. Dwgs.
	The contact rail shall be located on the opposite side of the tracks from the underplatform refuge.	X		See Criteria Conformance Checklist for applicable Station. Also Contract A610/115.
3.3.2.C.3	The platform design shall be coordinated with the track layout and the vehicle static and dynamic outline to provide an acceptable interface between the platform and vehicle. This interface is to minimize horizontal and vertical gaps at the vehicle door threshold. The dimensions shall be a nominal three inches for horizontal gap between platform and vehicle static outline; and a nominal 0.75 inches for the vertical gap downward from the vehicle doorsill to the platform finished floor.	X		See Structural Standards A650 Dwgs.
	Alignment of the vehicle platform interface shall reduce the potential for catching and trapping the wheels of a wheelchair.	X		

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
3.3.2.C.4	Sufficient clear space shall be provided around overhead and side projections and corners to reduce the potential for bumping and walking into these protuberances.	X		See Criteria Conformance Checklist for applicable Station. Also applicable Station Arch. Plans.
3.3.2.D	Station Walking Surfaces			
	All walking surfaces within the station shall have slip-resistant surfaces.	X		See Criteria Conformance Checklist for applicable Station. Also see Arch. Standards for applicable Station.
3.3.2.E	Walkway Screening			
	When passarelles or pedestrian walkways are provided over the trackway, the walkways shall be screened.			None Provided
3.3.2.F	Top of Parapet			
	The top of the parapet shall be sloped away from the vertical circulation elements and visual openings to prevent objects from being placed upon them.	X		See Criteria Conformance Checklist for Applicable Station. Also see Arch. Standards & Struct. Std's for applicable Station.
3.3.2.G	Railings/Guardrails			
3.3.2.G.1	Railings and guardrails shall comply with the requirements of NFPA-101 and the applicable local codes.	X		
3.3.2.G.2	Glazed railings shall not be installed.			
3.3.3	Elevators/Escalators			
3.3.3.A	Elevators			

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
3.3.3.A.1	Elevators shall meet the safety requirements in the elevator/escalator codes, ANSI A17.1, the handicapped requirements in ANSI A117.1, and Title 24 of the California Administrative Code.	X		Not a part of this Contract. See Spec. A720 Sect. 14200, Para: 1.2, 1.6, & 3.3.
3.3.3.A.2	Two-way communication from within the elevator cab shall be provided between the patron and Rail Control Center (RCC).	X		See Applicable Criteria Conformance Checklist for Station. Also see A640 & A720, & Elect/ Comm. Dwgs. for applicable Station.
3.3.3.A.3	Elevators shall be sized to accommodate a horizontally positioned stretcher of the type carried in emergency vehicles.	X		See Contract A720 Dwgs.
3.3.3.A.4	Remote elevator indicators and controls shall be provided at RCC for emergency operation.	X		See A720 Sect. 14200.
3.3.3.B	Escalators			
3.3.3.B.1	Escalators shall meet the safety requirements in the elevator/escalator code, ANSI A17.1.	X		See A710, Sect. 14210-12
3.3.3.B.2	Signing and graphics shall be provided to enable patrons to determine the direction of escalator motion prior to their arrival at, and well clear of, the landing plate.	X		See Contracts A680, A760, A710 and the applicable Station Contract.
3.3.3.B.3	Status indicators shall be provided.	X		See A710, Sect. 14310, Para:2.2.

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
3.3.3.B.4	Adequate queuing space shall be provided at both the top and bottom of escalators.	X		See Criteria Conformance Checklist for applicable Station. Also A710 Arch. Plans.
3.3.3.B.6	An emergency stop capability shall be provided at the top and bottom of escalators and shall meet the requirements of Cal/OSHA.	X		See A610, Sect. 14310.
3.3.3.B.7	The clearance between the combplate and the steps and the balustrade and the steps shall be such that no shoes, clothing, or other similar articles may be trapped between these elements.	X		
3.3.3.B.8	Sufficient clearance shall be provided between the structure and escalator moving handrails to prevent hands or clothing from being trapped.	X		
3.3.3.B.9	Safety devices shall include brakes that assure that the escalator will not move when power is removed and patrons are using the stopped escalator as a stairway.	X		
3.3.4	Stairs			
3.3.4.A	There shall be a minimum of one stair connecting all levels in the public area that meets Fire/Life Safety requirements.	X		See Criteria Conformance Checklist for applicable Station. Also see applicable Stations Arch. Std. Plans.
3.3.4.B	The tread-riser relationship shall meet the requirements of NFPA-101.	X		

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
3.3.4.C	The stairs shall be of a slip-resistant material with an eased nosing that is distinct and meets the requirements of ANSI A117.1, and Title 24 of the California Administrative Code.	X		See Criteria Conformance Checklist for applicable Station. Also see Arch. Std.
3.3.4.D	When gutters/runnels are provided, they shall be protected by the handrails.			None Provided
3.3.4.E	Handrails shall be continuous and meet the requirements of ANSI A117.1, and Title 24 of the California Administrative Code.	X		See Criteria Conformance Checklist for applicable Station. Also see Arch. Std.
3.3.5	Fare Collection			
3.3.5.A	Remote operation from the RCC shall be provided to permit control of inbound patrons passing through the fare collection array.	X		Barrier free fare collection System being provided. No fare gate arrays installed initially; will be addressed in Contract A660 as required.
3.3.5.B	In the event of a power loss, the fare collection array shall permit free exiting.	X		
3.3.5.C	Remote controls shall be provided to permit free exiting.	X		
3.3.5.D	Provisions shall be incorporated to permit access by the handicapped using wheelchairs.	X		
3.3.5.E	Sufficient exit gates shall be provided to allow rapid and complete discharge of station occupant loads.	X		

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
3.3.6	Vehicle Approach System			
	A visual and audible method shall be provided to alert patrons of the impending arrival of a train.	X		See Contracts A650 and A620 Spec.
3.3.7	Other Design Features for Station and Site			
3.3.7.A	Patron flow patterns shall maintain a right-hand circulation where possible and shall be as simple as practicable.	X		See Operations Plans & A760 Contract Dwgs.
3.3.7.B	Maps shall be provided and located in the Emergency Management Panel (EMP) which show locations of shutoff controls for water, gas, electricity and fuel lines.	X		See A640, Sect. 10.4 & A760 Contract.
3.3.7.C	Guards and restraining rails, and similar items, shall be installed in specific areas where trains pose a clear danger to patrons, personnel or equipment.	X		See Criteria Conformance Checklist for applicable Station. Also see Arch. Std. Dwgs.
3.3.7.D	Adequate lighting of stairs and escalators shall be provided.	X		See Criteria Conformance Checklist for applicable Station. Also see applicable Station Elect. Lighting Plans.

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DISCIPLINE: SYSTEM SAFETY - COMMUNICATIONS

REVIEW REFERENCE: SCRTD METRO RAIL SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 3.4 COMMUNICATIONS, 07/86 REVISION 2

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REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
3.4	COMMUNICATIONS			
3.4.1	Closed Circuit Television (CCTV)			
	Electronic surveillance shall be implemented to allow RCC to monitor selected station areas.	X		See Criteria Conformance Checklist for applicable Station. Also see applicable Arch. & Elect. Dwgs.
	CCTV shall permit RCC to monitor the station and platform.	X		
	As a minimum, platform edges shall be covered by CCTV.	X		
3.4.2.A	Public Address (PA) System			
	The PA system shall provide RCC full station coverage at a level sufficient to be heard over normal train, equipment, and public noise.	X		
3.4.2.B	The PA system installation shall be designed so that loss of an amplifier or a single audio loop will not leave any public area without a public address capability.	X		N/A to this Contract See A640 Contract Section.
	The PA system shall be on an uninterruptible power source.			
3.4.2.C	The RCC shall have the capability to communicate with all the stations either singly or as a group.			

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REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
3.4.3.A	Telephone Service			
	Emergency telephone (ETEL) service shall be provided at each passenger station.	X		See Criteria Conformance Checklist for Applicable Station. Also see Arch & Elect. Plans for applicable Station.
	Emergency phones shall be located at the Emergency Management Panel (EMP) and Command Post Locations, at the Emergency Trip Station (ETS), in the elevator, and at fire hose cabinets.	X		
	The ETEL for ETS locations shall be used for communication with RCC or Yard Tower.	X		
3.4.3.B	Patron assistance shall be provided by a hands-free intercom service between patron at the station and RCC.	X		
	Intercom service shall be located adjacent to fare-vending equipment and at other locations as determined by SCRTD.	X		
	Intercom operating controls, positions, and locations shall be readily accessible and operable by elderly and handicapped persons.	X		See Contract A640 Sect. 5.
3.4.3.C	Public pay phones may be provided in both free and paid areas of each station.	X		See Criteria Conformance Checklist for applicable Station. Also see Arch. & Elect. plans for applicable Station.

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CERTIFIABLE ELEMENT: TRACTION POWER INSTALLATION

GROUP: MRTC-SAFETY, ASSURANCE & SECURITY

DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: SYSTEM SAFETY - COMMUNICATIONS

REVIEW REFERENCE: SCRTD METRO RAIL SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 3.4 COMMUNICATIONS, 07/86 REVISION 2

CONTRACT No.: A631

REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	Public phones shall be located so that they will not interfere with pedestrian flow.	X		See Criteria Conformance Checklist for applicable Station. Also see Arch. & Elect. plans for applicable Station.
3.4.4	Radio Communications			
3.4.4.A	As a minimum, radio communication capabilities shall be provided for:			Not applicable to this Contract. See A640, Sect. 4.
3.4.4.A.1	Emergency train operations			
3.4.4.A.2	Police emergency			
3.4.4.A.3	Fire emergency.			
3.4.4.B	Emergency radio communications shall be on separate channels.			
	Emergency radio communications shall be provided to accommodate local Fire and Transit Police jurisdictions.			
3.4.4.C	An antenna system or other suitable arrangement shall be provided to permit use of handy-talkies of local fire departments and other emergency service providers.			
3.4.4.D	Multiple channel capability shall be provided for emergency transmission in case of transmitter failure.			

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GROUP: MRTC-SAFETY, ASSURANCE & SECURITY

DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: SYSTEM SAFETY - POWER

REVIEW REFERENCE: SCRTD METRO RAIL SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 3.7 POWER, 07/86 REVISION 2

CONTRACT No.: A631

REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
3.7	POWER			
3.7.1	Emergency Trip Station (ETS)			
3.7.1.A	An ETS shall be located at each end and on each side of the platform, with appropriate signing.	X		See Criteria Conformance Checklist for applicable station. Also see applicable Station Elect. Plans. See A680 for signage.
	The locations shall not be accessible to patrons under normal conditions.	X		See Criteria Conformance Checklist for applicable Station. Also see Arch. Plans.
3.7.1.B	An ETS shall be located at each tunnel cross passage, tunnel portals, and special trackwork.	X		See Contract A640, Appendix TP-10-A and Article 15.12.2.
3.7.1.C	ETS shall be located in the Yard, Yard Tower(s), and Yard buildings that require traction power.	X		See Contract A115 Elect. Dwgs. E-104 through E-121. Also see Contract A640, Article 15.13.4.
3.7.1.D	ETS shall be easily opened.	X		See Contract A640, 10.9.1.
3.7.1.E	ETS activation shall alarm at the RCC.	X		See Contract A640, Article 10.9.1, 10.9.2 and 10.9.3.
	The section of contact rail deenergized shall be identified.	X		See Contract A640, Article 10.9.3.

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GROUP: MRTC-SAFETY, ASSURANCE & SECURITY

DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: SYSTEM SAFETY - POWER

REVIEW REFERENCE: SCRTD METRO RAIL SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 3.7 POWER, 07/86 REVISION 2

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REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
3.7.1.F	Yard ETS activation shall alarm at the Yard Tower.	X		See Contract A640, Article 4.2.11 and 12.2.1.
3.7.2	Station Emergency Power Requirements			
	During power failures, emergency power shall be available at designated locations of each station and for all functions considered critical.	X		See A795 Contract - Exhibit-1-one-Line Diagram and A640, Section 13.
3.7.2.A	Dual primary feeders shall be provided.	X		See Elect. Single-Line dwgs. for Applicable station.
3.7.2.B.1	Emergency power shall be provided for the following functions: o Public Address o Fire Suppression Systems o Fire Detection Systems o Security Detection and Alarms o CCTV Cameras and Monitors o Radio Subsystem o Displays depicting vertical circulation element direction o Emergency Lighting o Emergency Telephones o Automatic Train Control Equipment	X		See Contract A795 - Exhibit 1 and Contract A640, Article 13.
3.7.2.B.2	Emergency lighting shall be provided in the following locations: o Platform, other levels and entrances o Emergency exit routes o Ancillary rooms and spaces.	X		See Criteria Conformance Checklist for applicable Station. Also Elect. Plan.

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DISCIPLINE: SYSTEM SAFETY - POWER

REVIEW REFERENCE: SCRTD METRO RAIL SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 3.7 POWER, 07/86 REVISION 2

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REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
3.7.2.B.3	Emergency power shall be provided in the following locations: o RCC o Train Control & Communication Rooms o Yard Tower.	X		See Contracts A640 and A795.
3.7.3	Tunnel Emergency Power Requirements			
	The loss of a single substation or a tunnel feeder shall not interrupt the functioning of safety-critical systems, such as the ventilation system, ETS, telephones and lighting.	X		See Elect. Single-Line dwgs. for applicable Station. Also see Contracts A795 and A640.
3.7.3.A	Tunnel fans, lighting, ETS and telephones shall be fed from two separate power sources.	X		See Single-Line dwgs. for applicable Station. Also see Contracts A640 and A795.
3.7.4	Contact Rail			
3.7.4.A	The contact rail shall be located opposite the safety walk and the station platform.	X		See A612 Contract.
3.7.4.B	Patrons and employees shall be alerted to the hazards of the contact rail through signing.	X		See A680 Contract.
3.7.4.C	Coverboards shall be installed to reduce the possibility of patrons and employees inadvertently contacting the contact rail.	X		See Criteria Conformance Checklist for applicable Station. Also see Contract A680.

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DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: SYSTEM SAFETY - POWER

REVIEW REFERENCE: SCRTD METRO RAIL SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 3.7 POWER, 07/86 REVISION 2

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REVIEW LEVEL:

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
3.7.5	Traction Power			
3.7.5.A	Electrical grounding and lightning protection shall be provided for all traction power subsystems and gap breaker stations.	X		See Contract A631, Section 01010-1, Para:1.2. Also see A630 Elect. Plans for TPSS grounding details.
3.7.5.B	The RCC shall have the capability of operating and controlling essential ac/dc switchgear functions.	X		See Contract A640, Article 9.2.5.
	There shall be alarms and visual indication of status changes and abnormal conditions associated with traction power substations and gap breaker stations.	X		See Contract A640, Article 9.2.5.
3.7.5.C	Remote control of the Yard traction power substation shall be provided at the Yard Tower.	X		See Contract A640, Article 4.2.11, 2.2.1 and 12.3.6. Also see Dwg. N-108.
3.7.5.E	The cable connecting the contact rail to the pothead and specified energized hardware shall be covered with suitable insulating material. This material shall be installed so as not to present an electrical or tripping hazard to people on the trackway.	X		See Contract A631, Sect. 16122-5, Para: 3.2.A and 3.2.B. Also see Para:3.3 and Dwgs. P-356, P-357, P-360, and P-365.

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DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: SYSTEM SAFETY - POWER

REVIEW REFERENCE: SCRTD METRO RAIL SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 3.7 POWER, 07/86 REVISION 2

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REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
3.7.5.F	Key locks shall be provided on all manual ac/dc breaker control cabinets.	X		See Contract A630, Sect. TP-5-3, Para: 5.2.4.A. Also see Sect. TP-6-3, Para: 6.2.2.B.3.
3.7.5.G	Transformer/rectifier doors shall be provided with power interlock safety switches.	X		See Contract A630, Sect. TP-4-15, Para: 4.4.2.B.
3.7.5.H	All drawout switchgear shall have shutters to protect personnel from accidental contact with live power circuits when the circuit breaker is removed.	X		See Contract A630, Sect. TP-5-3, Para: 5.2.3.C.
3.7.5.I	Circuit interrupting devices which do not have load-break capability shall be equipped with interlocks to prevent unsafe operation.	X		See Contract A630, Sect. TP-5-6, Para: 5.3.3.B. Also see Sect. TP-6-6, Para: 6.3.2.D.
3.7.5.J	High-voltage terminations shall be protected to prevent accidental contact.	X		See Contract A631, Sect. 16443-5, Para: 2.9.
3.7.5.K	Substation monitoring devices for dc equipment enclosed in metal housings shall detect and annunciate the condition when the dc equipment enclosure is grounded or a positive bus is being faulted to the enclosure.	X		See Contract A630, Section TP-5-9, Para: 5.4.1.
3.7.5.L	Rubber matting of high dielectric strength, or an epoxy coating, shall be provided on the floor around the	X		See Contract A631, Sect. 09660-1.

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DISCIPLINE: SYSTEM SAFETY - POWER

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REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	perimeter of dc conversion equipment and switchgear.			
	The equipment shall be located such that personnel cannot bridge to grounded surfaces.	X		See Contract A630, TPSS equipment arrangement plans for applicable station.
3.7.5.M	Two means of egress shall be provided from each substation.	X		See Criteria Conformance Checklist for applicable Station. Also see Arch. Plans.
3.7.5.N	Traction power zones shall be separated by nonbridgeable gaps.	X		See Contract A610/115, A620, A615, and A631.
3.7.5.O	Traction power substations shall have ac receptacles isolated to prevent accidental grounding of the dc power when using test equipment.	X		See Contract A630, Sect. TP-5-19, Para: 5.9. Also see A630 Contract Plan, 4598-D320.
3.7.6	Other Design Features			
3.7.6.A	All critical support facilities shall have subsystem status indicators on the RCC mimic board.	X		See Contract A640.
	An alarm shall sound when an equipment failure occurs.	X		See Contract A640, Sect. TP-9-72, Para: 9.4.4 and Sect. TP-9-111, Para: 9.5.11.

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REVIEWER: W. SMITH

DISCIPLINE: SYSTEM SAFETY - POWER

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REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
3.7.6.B	The RCC shall have the capability to isolate contact rail sections under normal and abnormal conditions.	X		See Contract A640.
3.7.6.D	Equipment provided shall protect against battery overcharging.	X		See Contract A640, Sect. TP-13-4, Para: 13.3.3.
3.7.6.E	"Stingers"used in locations such as the maintenance shop shall be of the fail-safe (deadman's switch) type.			Not applicable to this Contract.
3.7.6.F	Battery rooms shall contain a fixed eye and body wash unit meeting Cal/OSHA requirements.	X		See Criteria Conform- and Checklist for applicable Station. Also see Arch. Dwgs.

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REVIEWER: W. SMITH

DISCIPLINE: SYSTEM SAFETY

REVIEW REFERENCE: SCRTD METRO RAIL SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 3.9 WAYS AND STRUCTURES, 07/86 REVISION 2

CONTRACT No.: A631

REVIEW LEVEL: 100% FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
3.9	WAYS AND STRUCTURES			
3.9.1	Yard and Shops			
3.9.1.A	Shops shall be provided with dual power feeders and/or an emergency power source.	X		See Contract A610 A615, Dwg: E-036
3.9.1.B	The requirements of Cal/OSHA and applicable local codes shall be met in the design of the Yard, shops, and equipment.	X		See Contract A112
3.9.1.C	Maintenance and other auxiliary vehicles, including the hi-rail, shall have positive train protection capability for detection purposes and shall be compatible with ATC train detection.			N/A to this Contract
3.9.1.D	The Yard design shall provide the capability to perform daily safety and operational checks on all trains entering revenue service.	X		See Contract A112
3.9.1.E	Isolated yard tracks shall not be powered inadvertently by bridging.	X		See Contracts A620, A631 & A610/A115 Dwgs
3.9.1.F	Slip-resistant surfaces shall be provided in all maintenance facilities areas.	X		See Dwg, S080, Contract A610/A115
3.9.1.G	Personnel in the Yard Tower shall be able to view the yard.			N/A to this Contract
3.9.1.H	Yard access for vehicular traffic by perimeter road shall be provided.			N/A to this Contract

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REVIEWER: W. SMITH

DISCIPLINE: SYSTEM SAFETY

REVIEW REFERENCE: SCRTD METRO RAIL SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 3.9 WAYS AND STRUCTURES, 07/86 REVISION 2

CONTRACT No.: A631

REVIEW LEVEL: 100% FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
3.9.1.I	Storage rooms and rooms containing combustible or hazardous materials or high-energy sources/equipment shall be provided with emergency exits.	X		See Criteria Conformance Checklist for applicable contract
3.9.1.J	Overhead ac/dc power bus systems shall be protected or recessed to prevent contact with movable maintenance platforms, ladders, or mobile cranes.			N/A to this Contract
3.9.1.K	Emergency eye wash and shower systems and drainage shall be provided for personnel decontamination, and shall be located in the immediate area of the battery or battery or battery charging rooms(s).	X		See Criteria Conformance Checklist for applicable contract
3.9.1.N	Rotating or other moving machinery shall be enclosed or properly guarded from personnel contact, and located away from pedestrian flow and maintenance activities.	X		See Criteria Conformance Checklist for applicable contract
3.9.1.O	High-temperature equipment and piping shall be properly guarded or covered with approved insulation in locations where contact by personnel or combustibles may occur.	X		See Criteria Conformance Checklist for applicable contract
	Routing of high-temperature liquids over maintenance activities, personnel areas, or electrical equipment shall be avoided.	X		See Criteria Conformance Checklist for applicable contract
3.9.1.P	Adequate clearance shall be provided in the shop area for safe "stinging" operations.			N/A to this Contract

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DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: SECURITY - STATION AND SITE

REVIEW REFERENCE: METRO RAIL PROJECT SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 4

CONTRACT No.: A631

REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
4.3.1	Station and site landscape plantings and design features shall be coordinated with traffic movements and lines of signt so as not to interfere or obstruct with electronic or visual surveillance or result in potential hiding places for vandals/intruders.			Not applicable to this Contract.
4.3.1.B	Station sites and parking lots shall be illuminated during hours of darkness and reduced visibility, in accordance with IES standards and APTA security guidelines.			Not applicable to this Contract.
4.3.1.C.1	Parking lots shall be fenced and open-spaced to provide a high degree of visibility by an attendant when present.			Not applicable to this Contract.
4.3.1.C.2	Controlled access shall be provided whenever possible.			Not applicable to this Contract.
4.3.1.D	Traffic patterns and site layouts shall be structured to permit rapid and easy access to all portions of the site and station by security personnel, whether on foot or by vehicle.			Not applicable to this Contract.
4.3.2.A.1	All levels of the station, including the platform and mezzanine, shall be as open as possible.	X		See Criteria Conformance Checklist for applicable Station. Also see Arch. Dwgs.
4.3.2.A.2	Columns and other obstructions to visual and electronic surveillance shall be minimized.	X		See Criteria Conformance Checklist for applicable Station. Also see Arch. Dwgs.

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DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: SECURITY - STATION AND SITE

REVIEW REFERENCE: METRO RAIL PROJECT SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 4

CONTRACT No.: A631

REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
4.3.2.B.1	Illumination of station elements shall be guided by applicable IES standards and APTA design guidelines.	X		See Criteria Conformance Checklist for applicable
4.3.2.B.2	Emergency power and lighting requirements shall be developed as part of the overall security and safety requirements (See Table I-4-1 of Criteria).	X		See Contract A795 and applicable Station's Elect. Plans.
4.3.2.C	Construction and finish materials shall be graffiti- and vandal-resistant, easily cleaned, and meet the appropriate Fire/Life Safety requirements for flammability, smoke emission, and toxicity.	X		See Criteria Conformance Checklist for applicable Station.
4.3.2.D	CCTV cameras shall be used to cover selected sectors of the station and platform, and shall be monitored at Central Control.	X		See Contract A640, Sect. 7, also see Arch. Dwgs. for applicable Station.
4.3.2.E	Station entrances shall be well lighted and designed to have high visibility by patrons and the public.	X		See Criteria Conformance Checklist for applicable Station. Also see Elect. Plans.
4.3.2.F	No concessions other than newspaper vending machines and a public telephone will be considered for installation in transit stations.	X		See Criteria Conformance Checklist for applicable Station. Also see Arch. Plans.
4.3.3.A	A single occupancy unisex restroom shall be provided. Restrooms shall be easily visible within the station mezzanine.	X		See Criteria Conformance Checklist for applicable Station. Also see Arch. Plans.

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DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: SECURITY - STATION AND SITE

REVIEW REFERENCE: METRO RAIL PROJECT SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 4

CONTRACT No.: A631

REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
4.3.3B	Conduit for electronic access control of restrooms shall be provided.			Not applicable to this Contract.
4.3.4.A	Station entrances shall be secured and alarmed during nonrevenue hours.	X		See Criteria Conformance Checklist for applicable Station. Also see Arch. Plans and Key Implementation Plan.
4.3.4.B	Non-public areas shall be secured to preclude unauthorized entry.	X		See Card Key Implementation Plan.
4.3.4.B.2	Where public access is required through ancillary spaces for emergency purposes, access into that area shall be annunciated.	X		See Criteria Conformance Checklist for applicable Station. Also see Arch. Plans.
4.3.4.B.3	Any unauthorized areas along an emergency egress route through ancillary space shall be secured against inadvertent entry.	X		See Criteria Conformance Checklist for applicable Station. Also Arch. Plans and Doors w/locking hardware provided.

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GROUP: MRTC-SAFETY, ASSURANCE & SECURITY DATE: 11/20/89

REVIEWER: W. SMITH

DISCIPLINE: SECURITY - LOCK AND KEYING SYSTEM

REVIEW REFERENCE: METRO RAIL PROJECT SYSTEM DESIGN CONTRACT No.: A631

CRITERIA AND STANDARDS - VOL. 1, SECTION 4 REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
4.9.1	A multiple level master key system shall be provided to permit ease of use and convenience in changing key combinations when necessary. Critical access areas, which are defined as extremely hazardous, essential to the system safe operation, or which require restricted access due to the nature of the equipment or value of the product within these areas, shall be equipped with an electronic card access control system which can be monitored and controlled from a central point.	X		See Criteria Conformance Checklist for applicable Station. *ALSO SEE CONTRACT A640.*
4.9.2	The multiple level master key system to be developed for the SCRTD shall not be modified to accommodate the system-unique keys such as the gamewell and elevator access keys.	X		See Criteria Conformance Checklist for applicable Station.
4.9.3	Entrance to the vehicle's operator cab by key shall be provided.	X		See Contract A650.

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GROUP: MRTC-SAFETY, ASSURANCE & SECURITY

DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: RELIABILITY

REVIEW REFERENCE: METRO RAIL PROJECT SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 5.2

CONTRACT No.: A631

REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
5.2.1.B	Manufacturers of the following system equipment shall be required, by contract, to establish and maintain a Reliability Program and Plan: Program and Plan: 1. Vehicle 2. Train Control 3. Fare Collection. Their plans shall be prepared using the SCRTD System Assurance Program Plan as a guide for style, content, and format.			Reliability Program requirements are not applicable to this Contract. Equipment is District-Furnished. Systems Installation
5.2.2.C	Contractors for the following systems shall be required to prepare and submit a FMECA to identify all critical single point failure modes. The FMECA shall be conducted to the lowest replaceable module. 1. Vehicle 2. Train Control 3. Fare Collection.			
5.2.2.D	Contractor for the Vehicle, Train Control, and Fare Collection systems shall be required to prepare and submit a Reliability Analysis which shall include, as a minimum: 1. System definitions and related assumptions			

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REVIEWER: W. SMITH

DISCIPLINE: RELIABILITY

REVIEW REFERENCE: METRO RAIL PROJECT SYSTEM DESIGN CONTRACT No.: A631

CRITERIA AND STANDARDS - VOL. 1, SECTION 5.2 REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	2. Functional flow and reliability block diagrams			Not Applicable
	3. Description of data base and any adjustment factors			
	4. System and subsystem failure assumptions and predicted MTBF, MTBSF, MCBF, as appropriate			
	5. Comparison of reliability predictions with allocations in the Reliability Requirements Report (Criteria R4)			
	6. Impact of operating or design changes on predicted values			
	7. Definitions of all interfaces, such that every part is identified as being part of a particular subsystem.			
5.2.2.E	The contractors for Vehicle, Train Control, Fare Collection, and Vehicle Propulsion systems shall be required to develop Reliability Demonstration Test Plans. The Reliability Test Plan shall include:			
	1. Criteria to be used by the SCRTD for evaluating the equipment under test			
	2. The failure reporting procedures to be used by the Contractor			
	3. The mathematical verification that the test shall demonstrate the required			

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REVIEWER: W. SMITH

DISCIPLINE: RELIABILITY

REVIEW REFERENCE: METRO RAIL PROJECT SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 5.2 CONTRACT No.: A631

REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	MTBF, MTBSF, MCBF, and failure rates as specified by contract.			Not Applicable
5.2.3.A	Contractors shall be legally bound to ensure that contractual reliability requirements are achieved.			
5.2.4	The contractor shall demonstrate the achievement or prove the failure of reliability requirements incorporated into contractor specifications and track system reliability during testing and revenue service.			
5.2.4.A	Contractors shall be required to use the format designed by the SCRTD for reporting failures.			
5.2.5.A	The system elements, as described below, shall be suitable for a lifetime of use in the Southern California environment, with normal maintenance and overhaul, if required, for the number of years as outlined below: 1. Vehicle Body: 30 years 2. Train Control System: 25 years 3. Fare Collection System: 25 years 4. Tunnels: 100 years 5. Trackwork: 30 years.			
5.2.5.B	The system elements shall be capable of being operated, stored, and maintained at specific performance levels without impairment resulting from the impact of			

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT DESIGN REVIEW CHECKLIST

CERTIFIABLE ELEMENT: TRACTION POWER INSTALLATION

GROUP: MRTC-SAFETY, ASSURANCE & SECURITY DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: RELIABILITY

REVIEW REFERENCE: METRO RAIL PROJECT SYSTEM DESIGN CONTRACT No.: A631

CRITERIA AND STANDARDS - VOL. 1, SECTION 5.2 REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	the following environmental parameters throughout the indicated range of values: 1. Air temperature: Minimum: 20°F Maximum: 110°F Average: 66°F 2. Relative humidity: 24 hour range: 45% to 85% 3. Rainfall in 24 hours: Maximum recorded: 6.11" 4. Rainfall in 1 hour: Maximum recorded: 1.87" 5. Wind speed: Average: 10 mph Maximum recorded: 49 mph 6. Seismic activity: (Reference "DESIGN EARTHQUAKE PARAMETERS" and "DESIGN FAULT PARAMETERS" tables of Criteria) 7. Air pollution: o Dust Particulates: Size: 1 to 200 microns Concentration: (max.) 0.248 mg/m³ (avg.) 0.142 mg/m³ o Acid Precipitation: pH of 4.41 o Gases and fumes: (Reference "Types" and "Concentrations" table of Criteria)			Not Appicable

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT DESIGN REVIEW CHECKLIST

CERTIFIABLE ELEMENT: TRACTION POWER INSTALLATION

GROUP: MRTC-SAFETY, ASSURANCE & SECURITY DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: MAINTAINABILITY

REVIEW REFERENCE: METRO RAIL PROJECT SYSTEM DESIGN CONTRACT No.: A631

CRITERIA AND STANDARDS - VOL. 1, SECTION 5.3 REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
5.3.1.B	Manufacturers of the following system equipment shall be required, by contract, to establish and maintain a Maintainability Program and Plan. 1. Vehicle 2. Train Control 3. Communications 4. Fare Collection 5. Traction Power. Their plans shall be prepared using the SCRTD System Assurance Plan as a guide for style, content, and format.			Maintainability program requirements are not applicable to this Systems Installation Contract. Equipment is District-furnished.
5.3.2.A	A detailed Maintenance Concept shall be developed and submitted to the SCRTD by the contractors indicated in 5.3.1.B. The Maintenance Concept shall include a description of how the contractor intends to achieve the maintenance requirements identified in their contract. The Maintenance Concept shall cover the following, as a minimum: 1. Maintenance Levels a. System repairs done on SCRTD property b. Module and component repairs done on SCRTD property c. Module and component repairs done at the contractor's facilities.			

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT DESIGN REVIEW CHECKLIST

CERTIFIABLE ELEMENT: TRACTION POWER INSTALLATION

GROUP: MRTC-SAFETY, ASSURANCE & SECURITY DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: MAINTAINABILITY

REVIEW REFERENCE: METRO RAIL PROJECT SYSTEM DESIGN CONTRACT No.: A631

CRITERIA AND STANDARDS - VOL. 1, SECTION 5.3 REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	2. Maintenance Tasks a. Scheduled Maintenance i. Preventive Maintenance ii. Service Maintenance b. Corrective Maintenance. 3. Shop Facilities a. Union Station maintenance activities b. Hollywood maintenance activities c. Component Repair Facilities. 4. Shop Equipment and Tools a. Furnished by Vehicle/Train Control/ Fare Collection Contractor b. Furnished by Shop Equipment Contractor. 5. Spare Part Requirements a. Expected Part Life b. Consumables and Repairables. 6. Skill Levels and Mechanics Required.			Not applicable to this Contract.
5.3.2.B	A Maintenance Analysis shall be developed and submitted to the SCRTD by the Vehicle,			

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT DESIGN REVIEW CHECKLIST

CERTIFIABLE ELEMENT: TRACTION POWER INSTALLATION

GROUP: MRTC-SAFETY, ASSURANCE & SECURITY DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: MAINTAINABILITY

REVIEW REFERENCE: METRO RAIL PROJECT SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 5.3 CONTRACT No.: A631 REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	Train Control, and Fare Collection contractors. The Maintenance Analysis shall be submitted iteratively (every 90-180 days) as the design develops. The analysis shall describe all the maintenance tasks SCRTD personnel may be required to perform on the system. The analysis shall include for each maintenance task, as a minimum: 1. Frequency of task 2. Time to perform 3. Test equipment, tools, and facilities required 4. Crew size and skill level 5. Manuals and instructions needed.			Not applicable to this Contract.
5.3.4.A	All suppliers and contractors shall be required to submit maintenance manuals which contain all the information needed to service, maintain, repair, inspect, adjust, troubleshoot, replace, and overhaul each component or subsystem. Requirements for the maintenance manuals shall include, but not be limited to: 1. Running Maintenance and Servicing Manuals			

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT DESIGN REVIEW CHECKLIST

CERTIFIABLE ELEMENT: TRACTION POWER INSTALLATION

GROUP: MRTC-SAFETY, ASSURANCE & SECURITY DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: MAINTAINABILITY

REVIEW REFERENCE: METRO RAIL PROJECT SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 5.3 CONTRACT No.: A631

REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	2. Heavy Repair Maintenance Manuals 3. Parts Catalogs 4. Test Equipment Maintenance Manuals.			Not applicable to this Contract.
5.3.4.B	The manuals shall be designed for continuous, long term service in a maintenance shop environment. All manuals shall be in either pocket size (3-1/2" x 8" x less than 1" thick) or standard size (8-1/2" wide x 11" high). All manuals shall be prepared in accordance with normal commercial standards, using MIL-M-38784 and MIL-M-15071 as guides for format and technical content, respectively.			
5.3.5.A	Contractors shall be required to provide a comprehensive training program for SCRTD maintenance personnel. Contractors shall provide the SCRTD with course materials, instructors, training aids, equipment, and all literature required. The contractor shall train all SCRTD maintenance personnel to a level of competence such that work performed by these personnel will not void any of the warranties or guarantees in effect.			

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT DESIGN REVIEW CHECKLIST

CERTIFIABLE ELEMENT: TRACTION POWER INSTALLATION

GROUP: MRTC-SAFETY, ASSURANCE & SECURITY DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: MAINTAINABILITY

REVIEW REFERENCE: METRO RAIL PROJECT SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 5.3 CONTRACT No.: A631

REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
5.3.6.A	The contractors shall incorporate qualitative features into all equipment whenever feasible. MIL-STD-1472C shall be used as a guide, along with the design features in the "Maintainability Checklist" provided in paragraph 15.3.6 of UMTA Report No. IT-06-0027-A "Guideline Specification for Urban Rail Cars", March 1973.			Not applicable to this Contract.

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT DESIGN REVIEW CHECKLIST

CERTIFIABLE ELEMENT: TRACTION POWER INSTALLATION

GROUP: MRTC Safety, Assurance & Security DATE: 10/20/89

REVIEWER: W. Smith

DISCIPLINE: Quality Assurance

REVIEW REFERENCE: SCRTD Metro Rail Project System Design Criteria & Standards - Vol. 1, Sect. 5.4 CONTRACT No.: A631

REVIEW LEVEL: Final

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
5.4.1.B	QUALITY ASSURANCE PROGRAM PLAN - CONTRACTORS Manufacturers of the following system elements shall be required by contract to establish and maintain a QA Program and Plan: 1. Facilities 2. Vehicle 3. Train Control 4. Fare Collection 5. Communications 6. Escalators 7. Elevators 8. Auxiliary Vehicles These plans shall be prepared using the SCRTD System Assurance Program Plan and the SCRTD QA Manual as a guide for style, content, and format.			Unless otherwise noted QA Requirements for Systems Contracts are the responsibility of PDCD Construction Management Consultants. See RTD letter dated 10/22/89, DCC #84-11620. Reference PDCD QA/QC Procedures Manual and Resident Engineer's Manual for details.
5.4.2	WARRANTIES			
A.	Warranty provisions shall be included in all contracts, both civil and system. The following additional time warranties shall be included in the vehicle contract: 1. Carbody - 5 years 2. Truck-Structural Elements - 5 years 3. Traction Motors, except brushes - 5 years	X		See General Conditions Article 19, Contract A631. Not applicable to this Contract.

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT DESIGN REVIEW CHECKLIST

CERTIFIABLE ELEMENT: TRACTION POWER INSTALLATION

GROUP: MRTC Safety, Assurance & Security DATE: 10/20/89

REVIEWER: W. Smith

DISCIPLINE: Quality Assurance

REVIEW REFERENCE: SCRTD Metro Rail Project System CONTRACT No.: A631

Design Criteria & Standards - Vol. 1, Sect. 5.4 REVIEW LEVEL: Final

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	4. Gear reducers for propulsion subsystem - 5 years.			Not applicable to this Contract.
5.4.3	QUALITY PROGRAM CONTENT			
A.	Receiving Inspection			
	Contractors shall provide for the inspection of all incoming material. Statistical sampling is acceptable.			See Spec. A631, Section Submittal Para: of various Spec. Sections. Maintenance of Records is PDCD responsibility.
	All material certifications and test reports used as the basis for acceptance by the contractors shall be maintained as quality records.			
B.	Statistical Sampling Plans			
	Statistical sampling used in inspection shall be fully documented and based on generally recognized statistical practices, such as MIL-STD-105 or MIL-STD-414.			Not applicable.
C.	Changes to Drawings and Specifications			
	Contractors shall ensure that all inspection and acceptance test are based on the latest revision or changes to drawings and specifications.			PDCD responsiblity.
	An acceptable configuration management and control system shall be established and maintained.	X		PDCD and MRTC responsibility.
	The responsibility for control of changes shall extend to suppliers.			Not applicable to this Contract.

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT DESIGN REVIEW CHECKLIST

CERTIFIABLE ELEMENT: TRACTION POWER INSTALLATION

GROUP: MRTC Safety, Assurance & Security DATE: 10/20/89

REVIEWER: W. Smith

DISCIPLINE: Quality Assurance

REVIEW REFERENCE: SCRTD Metro Rail Project System CONTRACT No.: A631

Design Criteria & Standards - Vol. 1, Sect. 5.4 REVIEW LEVEL: Final

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
D.	Identification of Inspection Status			
	Contractors shall maintain a system for identifying the progressive inspection status of components or materials as to their acceptance, rejection or non-inspection.			PDCD responsibility.
E.	Shipping Inspection			
	Contractors shall provide for the proper inspection of products to ensure completion of manufacturing and conformance to contract requirements prior to shipment.	X		See Spec. Section 01450-2, Para: 1.2.J, Contract A631.
F.	Quality Assurance Organization			
	The organization of each contractor's QA Program shall be well defined.			PDCD responsiblity. See PDCD QA/QC Procedures Manual.
	QA personnel shall have sufficient, well-defined responsibilities and organizational freedom which encourage the identification and evaluation of quality problems.			
	Contractors shall have a QA Program that can verify compliance with contract requirements.			
G.	Qualification of Personnel			
	Contractor personnel performing inspections, test or special processes shall be	X		See Spec. Sect. 05500-1, Para: 1.2.A and 1.3.D

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT DESIGN REVIEW CHECKLIST

CERTIFIABLE ELEMENT: TRACTION POWER INSTALLATION

GROUP: MRTC Safety, Assurance & Security DATE: 10/20/89

REVIEWER: W. Smith

DISCIPLINE: Quality Assurance

REVIEW REFERENCE: SCRTD Metro Rail Project System CONTRACT No.: A631

Design Criteria & Standards - Vol. 1, Sect. 5.4 REVIEW LEVEL: Final

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	qualified for such work based on prior experience and training.			test and insp. is PDCD Responsibility, Contract A631.
	Records of personnel qualifications shall be maintained and available for review.	X		Maintenance of records is PDCD responsibility.
H.	In-Process Inspection			
	The contractor shall ensure that all machining, wiring, batching, shaping, and all basic production operations, together with all processing and fabricating, shall be accomplished under controlled conditions.			PDCD responsibility.
I.	Handling, Storage and Delivery			
	Contractors shall provide adequate work and inspection instructions for handling, storing, preserving, packing, marking, and shipping to protect the quality of products and to prevent damage, loss, deterioration, or substitution thereof.	X		Requirements called out in product Delivery; Handling, and Storage para. of various Spec. Sections.
J.	Corrective Action			
	Contractors shall establish, maintain, and document procedures to ensure that conditions adverse to quality are promptly identified and corrected.			PDCD responsibility.
K.	Nonconforming Material			
	Contractors shall establish and maintain an effective system for controlling			PDCD responsiblity.

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT DESIGN REVIEW CHECKLIST

CERTIFIABLE ELEMENT: *TRACTION POWER INSTALLATION*

GROUP: MRTC Safety, Assurance & Security DATE: 10/20/89

REVIEWER: W. Smith

DISCIPLINE: Quality Assurance

REVIEW REFERENCE: SCRTD Metro Rail Project System CONTRACT No.: A631

Design Criteria & Standards - Vol. 1, Sect. 5.4 REVIEW LEVEL: Final

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	nonconforming material including procedures for identification, segregation, and disposition. A Material Review Board consisting of appropriate SCRTD, contractor, QA and design personal shall be established.			Not applicable to this Contract.

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT DESIGN REVIEW CHECKLIST

CERTIFIABLE ELEMENT: TRACTION POWER INSTALLATION

GROUP: MRTC-SAFETY, ASSURANCE & SECURITY DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: CONFIGURATION MANAGEMENT

REVIEW REFERENCE: METRO RAIL PROJECT SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 5.6

CONTRACT No.: A631

REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
5.6.1.B.1	The following system equipment contractors shall be required to prepare and maintain a Configuration Management Program that complies with the basic requirements of MIL-STD-483-USAF: o Vehicle o Train Control o Communications o Fare Collection o Traction Power.			Configuration Management Program requirements are not applicable to this Traction Power Installation Contract.
5.6.1.B.2	The configuration management program shall include the elements of: o Configuration identification, including drawing identification and release o Change control o Configuration accountability.			
5.6.1.B.3	Equipment manufacturers shall not be required to modify, expand or replace their existing manufacturing, and change control and reporting systems if they can show, to the satisfaction of the SCRTD, that their existing systems will accomplish the configuration management objectives as defined in contractual documents. Drawing numbering shall be in accordance with the system being established by the GC for the Metro Rail Project.			

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT DESIGN REVIEW CHECKLIST

CERTIFIABLE ELEMENT: TRACTION POWER INSTALLATION

GROUP: MRTC-SAFETY, ASSURANCE & SECURITY DATE: 10/20/89

REVIEWER: W SMITH

DISCIPLINE: CONFIGURATION MANAGEMENT

REVIEW REFERENCE: METRO RAIL PROJECT SYSTEM DESIGN CONTRACT No.: A631

CRITERIA AND STANDARDS - VOL. 1, SECTION 5.6 REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
5.6.1.B.4	Construction contractors, and systems equipment contractors other than those listed in paragraph B.1. above shall demonstrate to the SCRTD that at the time he receives Notice to Proceed he has in place adequate procedures for: o Drawing Release and Control o Change Control o Drawing Number and (if required) Part Numbering Identification o Change Status Reporting.			N/A to Contract A631
5.6.1.B.5	Drawing numbering shall be in accordance with the system being established by the GC for the Metro Rail Project.			
5.6.3.A	The contractor's technical documentation shall be capable of defining the approved configuration of system equipment under development, test, production, or operational use. The technical documentation shall identify the configuration to the lowest level necessary to meet production and maintenance requirements. The contractor's release records and documentation shall be capable of determining:			

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT DESIGN REVIEW CHECKLIST

CERTIFIABLE ELEMENT: TRACTION POWER INSTALLATION

GROUP: MRTC-SAFETY, ASSURANCE & SECURITY DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: CONFIGURATION MANAGEMENT

REVIEW REFERENCE: METRO RAIL PROJECT SYSTEM DESIGN CONTRACT No.: A631

CRITERIA AND STANDARDS - VOL. 1, SECTION 5.6 REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	1. The composition of any part number at any level in terms of subordinate part numbers 2. All next assembly part numbers of any part 3. The specification document or drawing number associated with the part number.			N/A to Contract A631
5.6.3.B	All part numbers used by contractors or subcontractors shall identify a specific item having a specific configuration.			N/A to Contract A631
	All items, beginning with the lowest replaceable or repairable unit, and identified by the same part number, shall have the same physical and functional characteristics, shall be equivalent in performance and durability and shall be interchangeable without alteration to themselves or associated items, other than normal field adjustments.			N/A to Contract A631
5.6.3.C	Contractors shall assure that all engineering change proposals are screened at management levels high enough so that only essential changes are submitted. All potential impacts of the change shall be considered including: 1. Safety 2. Reliability 3. Maintainability			N/A to Contract A631

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT DESIGN REVIEW CHECKLIST

CERTIFIABLE ELEMENT: TRACTION POWER INSTALLATION

GROUP: MRTC-SAFETY, ASSURANCE & SECURITY DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: CONFIGURATION MANAGEMENT

REVIEW REFERENCE: METRO RAIL PROJECT SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 5.6

CONTRACT No.: A631

REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
	4. Human Engineering 5. Scheduling and Cost Impact 6. Test(s) Implications 7. Retrofit Requirements 8. Publications 9. Training 10. Spare Parts. Engineering changes shall be classified as Class I or Class II, as defined in MIL-STD-480A. Class I changes shall be processed on a change request form provided by the General Consultant and shall be submitted to the SCRTD for approval prior to implementation.			N/A to Contract A631
5.6.3.D	Contractors shall maintain records such that the configuration of any item being delivered shall be definable in terms of its component part numbers. A serialization and configuration record shall be maintained for all items delivered by a contractor to the SCRTD.			
5.6.4	The following design reviews and audits shall be conducted jointly by the SCRTD and the contractors.			
5.6.4.A	A Preliminary Design Review shall be conducted prior to detail design to evaluate the progress and technical adequacy of the selected design approach.			

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT DESIGN REVIEW CHECKLIST

CERTIFIABLE ELEMENT: TRACTION POWER INSTALLATION

GROUP: MRTC-SAFETY, ASSURANCE & SECURITY DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: CONFIGURATION MANAGEMENT

REVIEW REFERENCE: METRO RAIL PROJECT SYSTEM DESIGN CONTRACT No.: A631

CRITERIA AND STANDARDS - VOL. 1, SECTION 5.6 REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
5.6.4.B	Every contractor shall prepare the requested material for submission to In-Progress, Pre-Final, and Final Design Reviews at design milestones determined by SCRTD.			N/A to Contract A631
5.6.4.C	For major systems equipment as defined in 5.6.1-B, the SCRTD shall conduct a physical configuration audit on the first production unit by formal examination against the production drawings and specifications in order to establish the production baseline.			
5.6.4.D	Functional configuration audits shall be conducted on system equipment subjected to qualification testing after successful completion of qualification testing. An audit shall also be conducted at the completion of the passenger vehicle performance demonstration testing to verify formally that the vehicle has achieved the performance required by the contract specifications.			
5.6.4.E	As configuration baselines are established, the baseline documentation shall be identified and recorded. All approved changes to a baseline shall be recorded and maintained and periodically reported to the SCRTD.			
5.6.5	Drawings shall be of appropriate quality and size.			

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT DESIGN REVIEW CHECKLIST

CERTIFIABLE ELEMENT: TRACTION POWER INSTALLATION

GROUP: MRTC-SAFETY, ASSURANCE & SECURITY DATE: 10/20/89

REVIEWER: W. SMITH

DISCIPLINE: CONFIGURATION MANAGEMENT

REVIEW REFERENCE: METRO RAIL PROJECT SYSTEM DESIGN CRITERIA AND STANDARDS - VOL. 1, SECTION 5.6

CONTRACT No.: A631

REVIEW LEVEL: FINAL

REQ. I.D.	REQUIREMENT	YES	NO	COMMENT
5.6.5.A	Drawings shall be of a quality where every line, number, and symbol is clearly legible.			N/A to Contract A631
5.6.5.B	Standard drawing size shall be 22" by 34" unless approved by the SCRTD.			
5.6.5.C	Any microfilm provided shall be 35mm silver halide film and shall be processed to archival standards.			

Cross Reference
Section II
Dcc #
Dcc # 86-02817

METRO RAIL TRANSIT CONSULTANTS
DMJM/PBQD/KE/HWA

DATE 7/11/86
SHEET 1 OF 4

DESIGN REVIEW COMMENTS

REVIEWER ~~George~~ Poli/D. Fiedler FILE NO. _____ ORGANIZATION RJA

100 % SUBMITTAL FOR A-631: Traction Power Sub-Stations

REF. NO.	PAGE NO.	DRAWING NO./ SPEC. SECTION	COMMENTS	RESPONSE	ACTION
1		P-242	Note 6: The Contractor Should Be Instructed To Not Only Clear Out Any "Physical" Interferences Between Cable Trays & Lighting Fixtures, But That The Contractor Also Maintain The Required "Emergency" Illumination Level @ The Floor.	Will change "clear out" to "coordinate". Lighting design and installation is facilities contractor's responsibility.	Complied WHS 1-19-90
2		P-242	Note 7: See Note 6, Dwg P-253	Will add	Complied WHS 1-19-90
3		P-242	Note 2: Include Cable Tray Penetrations.	The cable tray is NIC. Will add approp. note	N.A. WHS 1-19-90 To this contract
4		P-242	Note 4: Non-Combustible Material Should Be Used For Cable Trays. (Sect. 2.2.4.1.1 A/LSC)	Will replace with steel	Complied WHS 1-19-90
5		P-253	Note 2: Fire Stop Barrier Should Be Rated @ 2 Hrs.	Will add	Complied WHS 1-19-90
6		P-253	Note 7: See Ref. #1 Above	same as #1 above	Complied WHS 1-19-90

METRO RAIL TRANSIT CONSULTANTS
DMJM/PBQD/KE/HWA

DATE 7/11/86
SHEET 2 OF 4

DESIGN REVIEW COMMENTS

REVIEWER George Poli/D. Fiedler FILE NO. _____ ORGANIZATION RJA

100 % SUBMITTAL FOR A-631: Traction Power Sub-Stations

REF. NO.	PAGE NO.	DRAWING NO./ SPEC. SECTION	COMMENTS	RESPONSE	ACTION
7		P-273	Note 7: "Lightinging" Should Be "Lighting".	Will correct	Complied 1-19-90 WHS
8		P-278	Note 2: Fire Stop Barrier Should Be Rated @ 3 Hrs (Sect. 2.2.2.5.1 F/LSC).	Will add	Complied 1-19-90 WHS
9		P-278	Note 6: See Ref # 1 Above.	Same as No. 1	Complied 1-19-90 WHS
10		P-295	Note 2: See Ref # 8 Above,	Same as No. 8	Complied 1-19-90 WHS
11		P-295	Note 6: See Ref # 1 Above.	Same as No. 1	Complied 1-19-90 WHS
12		P-312	Provide Code Approved 3 Hr. Rated Fire Stop Barrier For Conduit Penetrations (Sect. 2.2.2.5.1 F/LSC).	Will add	Complied 1-19-90 WHS
13		P-312	Note 5: See Ref. #1 Above.	Same as No. 1	Complied 1-19-90 WHS
14		P-325	Note 2: See Ref #8 Above.	Same as No. 8	Complied 1-19-90 WHS
15		P-325	Note 7: See Ref. # 1 Above.	Same as No. 1	Complied 1-19-90 WHS

METRO RAIL TRANSIT CONSULTANTS
DMJM/PBQD/KE/HWA

DATE 7/11/86
SHEET 3 OF 4

DESIGN REVIEW COMMENTS

REVIEWER George Poli / D. Fridger FILE NO. _____ ORGANIZATION RJA
100 % SUBMITTAL FOR A-631: Traction Power Sub-Station

REF. NO.	PAGE NO.	DRAWING NO./ SPEC. SECTION	COMMENTS	RESPONSE	ACTION
16		P-342	Note 2: See Ref. #8 Above.	Same as No. 8	Complied 1-19-90 WHS
17		P-342	Note 6: See Ref. #1 Above.	Same as No. 1	Complied 1-19-90 WHS
18		P-371	Note 4: See Ref. #1 Above.	Same as No. 1	Sht. deleted 1-19-90 WHS
19		P-371	See Ref. #12 Above.	will be installed by the A631 contractor at this substation	Sht. deleted - 1-19-90 WHS

METRO RAIL TRANSIT CONSULTANTS
DMJM/PBQD/KE/HWA

DATE 7/11/86
SHEET 1 OF 1

DESIGN REVIEW COMMENTS

REVIEWER DR FIEDLER FILE NO. _____ ORGANIZATION ROLF JENSEN & ASSOC.
100 % SUBMITTAL FOR A631 TRACTION POWER INSTALLATION

REF. NO.	PAGE NO.	DRAWING NO./ SPEC. SECTION	COMMENTS	RESPONSE	ACTION
		13121			
20		1.2.G	REFERENCE 1979 UBC PER F/LS CRITERIA.	WILL ADD	COMPLIED 1-19-90 WHS
21		1.3.C	PRE-ENGINEERED BUILDING SUBMITTALS SHALL BE APPROVED BEFORE CONSTRUCTION	WILL ADD	COMPLIED 1-19-90 WHS

V001-001-0384 / 1

Cross Reference Section III Doc #

RTD 81-
EFF 3/84

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

RTD

METRO RAIL PROJECT
REVIEW / COMMENT SHEET

Reviewer H.E. Storey File No. A-631 Date 2/6 1986

Dept. / Section S&SA Submittal No. and/or Date _____ Sheet 1 of 4

Design Review / Submittal Title FINAL DESIGN — Traction Power Installation

REF NO.	PAGE NO.	DRAWING NO. / DOCUMENT SECT	COMMENT	RESPONSE / ACTION
1	2 of 3	01340	Paragraph 2.2. B, C, & D not quite as detailed as RTD "System Maintenance plan page 10-2. Contract does not spell out Product Data will also be a "Maintenance Manual" as stated in our System Maintenance Plan.	The Maintenance Manuals have been requested in the Specific Sections where required (16442, 16443 16761). Will add detailed requirements in Section 01340. COMPLIED WHS 1-19-90
2	1	02232	Some method for insuring "Job quality (Quality Assurance) or "Inspection" should be added to this section	Will add a requirement to submit test results in accordance with SSPWC. Inspection should not be part of the contract, but should be done by CM. OK *
3	2	04150	Add method for "Quality Assurance" for products required, as an inspection before use. See Section Part-2, Products.	Will add a requirement to submit certificates of compliance for all products. Inspection should not be part of the contract but should be done by CM. * OK
		* SECTION	04150 - QA SECTION AS OUTLINED BY MALCOLM INGRAM, MRTC, IN ACCORDANCE WITH MEMO, DATED 6-27-88, FROM HAROLD STOREY TO P.M. BURGESS (MRTC)-MRTC-DOCUMENT CONTROL # 88-02836, HAS BEEN INCORPORATED INTO A631 CONTRACT SPECIFICATION. WHS 1-19-90	

RTD 81-1
EFF 3/84

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT
REVIEW / COMMENT SHEET

Reviewer H. E Storey File No. A-631 Date 7/17 1986

Dept. / Section S&SA Submittal No. and/or Date _____ Sheet 2 of 4

Design Review / Submittal Title FINAL DESIGN - Traction Power Installation

REF NO.	PAGE NO.	DRAWING NO. / DOCUMENT SECT	COMMENT	RESPONSE / ACTION
4	4	13121-4	Add section on "Quality Assurance" for the Pre-Engineered Building and its Inspection before erection.	QA is covered by the requirement for submittal of certificate of compliance (1.3.C.4) Inspection should not be part of the contract, but should be done by CM * OK
5	16	16050	Section 3.10 Pull and Junction Boxes. The terms "~~fasten~~ firmly and securely" are too vague for good installation. Develop some criteria to enable inspectors to determine if work is adequate.	Will delete "firmly and securely" and refer to as "indicated". OK WHS 1-19-90 Equipment layout drawings will be noted to require contractor to provide adequate equipment supports in accordance with the seismic safety requirements of the City of Los Angeles OK WHS 1-19-90
6	16	16050	Section 3.11 "Use of word "FIRMLY" in place is too vague. See above comment.	
7	3	16120	Section 1.4 Product ---, Add sections on Quality Assurance" and Inspection to determine if cable (35KV) received is not damaged and store properly.	See No. 4 above * * OK WHS

RTD 81-1
EFF 3/84

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT
REVIEW / COMMENT SHEET

Reviewer H.E. Storey File No. A-631 Date 7/17 1986

Dept. / Section S&SA Submittal No. and/or Date _____ Sheet 3 of 4

Design Review / Submittal Title Final Design - Traction Power Installation

REF NO.	PAGE NO.	DRAWING NO. / DOCUMENT SECT	COMMENT	RESPONSE / ACTION
8	1	16371	Section 1.3. "Product---" Add sections on Quality Control and Inspection of products upon delivery.	see No. 4 above * * OK
9	2	16442	Section 2. "Products". Add Sections on Quality Control and Inspection of products before installation.	will add the requirement to submit the Certificate of Compliance. See No. 4 above *OK
10	6	16442	Section 3.1 Use of the words "Firmly" "in place" are too vague. Develop and add a ~~---~~ Term that can be evaluated by an inspector without ~~---~~ being too "opinionated"	See No. 5 and No. 6 *OK
11	2	16443	Section 2 - Products. Add section on Quality Control or inspection of materials before use	see No. 4 above *OK

RTD 81-1
EFF 3/84

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT

METRO RAIL PROJECT
REVIEW / COMMENT SHEET

Reviewer H E. Storey File No. A-631 Date 7/17 1986

Dept. / Section S&SA Submittal No. and/or Date _____ Sheet 4 of 4

Design Review / Submittal Title Final Design - Traction Power Installation

REF NO.	PAGE NO.	DRAWING NO. / DOCUMENT SECT	COMMENT	RESPONSE / ACTION
12	2	16451	Section 2 - Products. Add a section on Quality Control and inspection of products before use to determine if any damage or storage is improper	see No. 4 above *OK
13	2	16761	Section 2 - Products. Add a section on Quality Control and inspection to determine condition and proper storage before use.	see No. 4 above *OK

SOUTHEASTERN PENNSYLVANIA TRANSIT AUTHORITY

Cross Ref Section VII DCC #

RTD

METRO RAIL PROJECT
REVIEW / COMMENT SHEET

Reviewer Bartlett/Schiehl File No. W001A631 Date 7/18 1986

Dept. / Section FLSC Submittal No. and/or Date FLSC 86-6-071 TRAC PWR 86-2 Sheet 1 of 1

Design Review / Submittal Title A-631, Traction Power, 100% Design

REF NO.	PAGE NO.	DRAWING NO. / DOCUMENT SECT	COMMENT	RESPONSE / ACTION
1		General	Traction power installations shall comply with the following FLS Criteria: o STATIONS - 2.2.4 o TRAINWAYS - 2.3.3 o YARDS & SHOPS - 2.5.3.5 o RAIL CONTROL CENTER - 2.8.4	Noted.
2		"	Emergency Trip Stations installations shall comply with the following FLS Criteria: o GENERAL - 2.7.5 o TRAINWAY - 2.3.7.2 o YARDS & SHOPS - 2.5.3.5.2 (B)	Noted.

METRO RAIL TRANSIT CONSULTANTS
DMJM/PBQD/KE/HWA

DATE 6/24/88
SHEET 1 OF 4

DESIGN REVIEW COMMENTS

REVIEWER M. INGRAM FILE NO. S440A631X022 ORGANIZATION MRTC Safety, Assurance & Security
L/T X SUBMITTAL FOR A631 Traction Power Installation

REF. NO.	PAGE NO.	DRAWING NO./ SPEC. SECTION	COMMENTS	RESPONSE	ACTION
1	—	GENERAL	This contract requires a section on Quality (System) Assurance. Please modify the attached mark-up of the A630 QA requirements to fit the CSI format and add to contract.	ACTUAL TEXT USED TO BE MUTUALLY AGREED	ADD NEW SECTION 01450 COMPLIED 1-19-90 WHS
2	01500-2 01500-4 01500-6	1.1.D 2.4.A 3.4.A.2	Requirements should be contract specific. Temp. fire protection will likely be provided by Stage II contractor or permanent system might be installed. The most A631 would likely have to provide is portable extinguishers.	AGREE. WILL DELETE REQUIREMENT FOR TEMPORARY STANDPIPE	REVISE 1.1D, 2.4A AND 3.4.A.1 COMPLIED 1-19-90 WHS
3	01518-3	3.2.B, C & D	Requirements should be contract specific. Don't think cited paragraphs are applicable to A631.	AGREE	REVISE COMPLIED 1-19-90 WHS
4	15176-5	3.3.A	Add reference to Los Angeles City Fire Code, Div. 31.	WILL ADD	REVISE COMPLIED 1-19-90 WHS
5	16050-2	1.3.D	Correct Typo- "Five" should be "Fire".	WILL CORRECT	REVISE DELETED 1-19-90 WHS
6	16050-15	3.2.A	For consistency, seismic requirements should be	SEE SHT. 2	

METRO RAIL TRANSIT CONSULTANTS
DMJM/PBQD/KE/HWA

DATE 6/24/88
SHEET 2 OF 4

DESIGN REVIEW COMMENTS

REVIEWER M. Ingram FILE NO. S490A631X082 ORGANIZATION MRTC S,A&S
L/T % SUBMITTAL FOR A631 Trac. Pwr. Install.

REF. NO.	PAGE NO.	DRAWING NO./ SPEC. SECTION	COMMENTS	RESPONSE	ACTION
6	cont'd.		the same as A620 - TP 3.3.5 - See attached. Also see A631 16622 - 1.4.F for appropriate requirements.	AGREE. WILL MODIFY	REVISE COMPLIED 1-19-90 WHS
7	16050-21	3.16.A	SEE REF. NO. 6	WILL REPLACE "UBC" BY "THE SPECIFIED"	REVISE COMPLIED 1-19-90 WHS
8	16120-3	1.4	Add requirement for submittal of Production Test Reports required by 16120 - 2.3.I and 2.4.F.	WILL ADD	REVISE COMPLIED 1-19-90 WHS
9	16122-1	1.2.A 1.4.C	Requirements should by contract specific. Installation of 35 Kv cable is not within scope of A631.	INSTALLATION OF SPLICES AND TERMINATION	NO CHANGE
	16122-4	2.3, 2.4 & 2.5	Modify accordingly.	IS BY A681. SEE	
	16122-5	3.4 & 3.5		SECT. 01010, PARA	
				1.2 B AND 1.2 C	
10	16371-3	3.1	Verify that seismic requirements are not required. Also see Ref. No. 6 RE: Seismic Reqmts.	WILL ADD GENERAL STATEMENT IN SECTION 01010	WILL REVISE COMPLIED 1-19-90 WHS
11	16405-9	3.4.A	See Ref. No. 6 RE: Seismic Reqmts.	PARA 3.7 "SEISMIC ENVIRONMENT" PER A620.	AS REF. 10 COMPLIED 1-19-90 WHS
12	16412-3	3.4.A	See Ref. No. 6 & 10 RE: Seismic Reqmts.		AS REF. 10 COMPLIED 1-19-90 WHS

METRO RAIL TRANSIT CONSULTANTS
DMJM/PBQD/KE/HWA

DATE 6/24/88
SHEET 3 OF 4

DESIGN REVIEW COMMENTS

REVIEWER M. Ingram FILE NO. S440A631X082 ORGANIZATION MRTC S,A&S
4/I % SUBMITTAL FOR A631

REF. NO.	PAGE NO.	DRAWING NO./ SPEC. SECTION	COMMENTS	RESPONSE	ACTION
13	16493-7	3.1	See Ref. Nos. 6 & 10 re: Seismic Reqmts.	AS REF. 10	WILL REVISE COMPLIED WHS 1-19-90
14	16451-3	2.1.D	Revise to read "... molded of UL listed flame-resistant ...".	WILL CHANGE	REVISE COMPLIED WHS 1-19-90
15	16451-4	3.1	See Ref. Nos. 6 & 10 re: Seismic Reqmts.	AS REF. 10	WILL REVISE COMPLIED WHS 1-19-90
16	16500-10	3.1.D	See Ref. No. 6.	AS REF. 10	WILL REVISE COMPLIED WHS 1-19-90
17	16622-8	3.1	See Ref. No. 6.	AS REF. 10	WILL REVISE COMPLIED WHS 1-19-90
18	16950-3 16950-5	3.1.A.2 3.4.C.3	Installation of 35 Kv cable not within scope of A631. Delete test reqmts. and energization reqmts.	FINAL TESTS AND ENERGIZATION OF 35KV TUNNEL FEEDER IS BY A631.	NO CHANGE
19	16050-2 16492-1 16493-1	1.4.A.2 1.3.A 1.3.A.1	ANSI Std. Z 55.1 has been withdrawn. Please determine other applicable standard.	ANSI ADVISE THAT STANDARD is DOD ADOPTED AND STILL VALID.	NO CHANGE
20	16050-3	1.4.B.6	ASTM A 386 has been replaced by A 123. Please revise.	WILL REPLACE	REVISE COMPLIED WHS 1-19-90

METRO RAIL TRANSIT CONSULTANTS
DMJM/PBQD/KE/HWA

DATE 6/29/88
SHEET 4 OF 4

DESIGN REVIEW COMMENTS

REVIEWER M. Ingram FILE NO. S440 A631 X082 ORGANIZATION MRTC S,A&S
L/T % SUBMITTAL FOR A631

REF. NO.	PAGE NO.	DRAWING NO./ SPEC. SECTION	COMMENTS	RESPONSE	ACTION
21	16493-1	1.3.A.2	Relocate to 1.3.B - This is a NEMA std., not ANSI	WILL DO	REVISE COMPLIED 7-19-90
22	16451-1	1.3.A.2	See Ref. No. 19	SEE REF. # 19	NO CHANGE
	16761-1	1.3.A			

SECTION 9

SYSTEM ASSURANCE

9.1 QUALITY ASSURANCE PROGRAM

The Contractor shall provide and maintain a Quality Assurance (QA) Program to regulate methods, procedures, and processes to ensure compliance with the Contract requirements. The QA Program, including ~~QA~~ written procedures, shall be submitted for approval. (CDRL)

The requirements of this QA Program shall apply to all activities related to quality of items, including designing, purchasing, inspecting, handling, ~~assembling, fabricating,~~ testing, storing, and shipping. installation

9.2 ORGANIZATION

The QA organization shall be clearly defined. Management responsibility for ~~the~~ QA shall be set forth on the Contractor's policy and organization chart.

9.3 EVIDENCE OF COMPLIANCE

The Contractor may use certificates of compliance for certain equipment or materials and products in lieu of the sampling and testing procedures. Certificates of compliance shall be accompanied by certified documentation of test results or shall state that such test results are on file and will be furnished to the District on request.

9.4 CALIBRATION/CERTIFICATION OF MEASURING EQUIPMENT AND TOOLS

An effective time- or usage-cycled calibration/certification program shall be demonstrated. Validity of measurements and tests shall be ensured through the use of suitable inspection, measurement, and test equipment of the range and type necessary to determine conformance of items. Calibration certifications shall be recorded and be part of the QA records.

9.5 QUALITY ASSURANCE RECORDS

Adequate records shall be maintained in a readily retrievable manner to provide documented evidence of quality and accountability. These records shall be maintained, completed, and available to the District at

all times during the term of the Contract and for a 3-year retention period thereafter.

9.6 VERIFICATION

The QA operations shall be subject to District verification at any time, including: surveillance of the operations to determine that practices, methods, and procedures of the program are being properly applied; inspection to measure quality of items to be offered for acceptance; inspection of items awaiting release for shipment; and audits to ensure compliance with requirements of the Contract documents. 9.11

9.7 QUALIFICATION AND CERTIFICATION OF PERSONNEL 9.12

~~The QA~~ personnel performing inspections and tests shall be qualified for such work by virtue of those skills which are obtained by experience or training. ~~Manufacturing~~ Installation personnel performing special processes, such as ~~welding and brazing~~ splicing and terminations, shall be certified for such work. Records of personnel certifications shall be maintained and monitored by the QA personnel. These records shall be made available to the District for review, upon request.

9.8 SPECIAL PROCESSES splicing and terminations 9.13

Processes that control or verify quality, such as ~~heat treating~~, welding, ~~plating~~ and nondestructive testing, shall be performed by certified personnel and in accordance with approved documented procedures.

9.9 PROCUREMENT QUALITY ASSURANCE 9.14

The methods to be used for the selection and control of suppliers shall be defined.

9.10 INSPECTION AND TEST

Inspect and physically or functionally test all items to be delivered (Reference: General Conditions and Section 11). Inspection and testing instructions shall provide for reporting nonconformances or questionable conditions to the District. 9.15

Inspect shall occur at appropriate points in the ~~manufacturing and~~ installation sequence to ensure compliance with drawings, test specifications, ~~process specifications~~ and quality standards. The District may designate inspection hold points into the ~~manufacturing~~ 9.16

installation or inspection planning, upon review of Contractor's efforts.

In-process tests, including tests of raw materials, shall be performed and documented.

9.11 RECEIVING INSPECTION

The receiving inspection activity shall provide for the inspection of incoming materials. These inspection measures shall be used to preclude the use of nonconforming materials and to ensure that only correct and accepted items are used and installed.

9.12 ~~PRODUCTION~~ INSTALLATION OPERATIONS

~~Machining, wiring, batching, shaping, and other basic production operations of any type, together with all processing, fabricating and installation of any type,~~ Installation shall be accomplished under controlled conditions. Documented work instructions shall be the criteria for all ~~production, processing, and fabrication~~ installation work. The QA program shall effectively monitor the issuance of and compliance with work instructions. Quality inspection procedures shall be used where applicable. Criteria for approval and rejection shall be established and shall be subject to approval.

9.13 SHIPPING INSPECTION

The QA program shall provide and enforce procedures for the proper inspection of all products deliverable to the District, to assure completion and conformance prior to shipment.

9.14 STATISTICAL SAMPLING PLANS

Statistical sampling used in inspection shall be fully documented and based on generally recognized and accepted statistical practices and shall be approved.

9.15 IDENTIFICATION OF INSPECTION STATUS

A system for identifying the progressive inspection status of equipment, materials, components, subassemblies, and assemblies as to their acceptance, rejection, or noninspection shall be maintained.

9.16 IDENTIFICATION AND CONTROL OF ITEMS

Item identification and traceability control shall be provided. Where specified, items having limited

calendar or operating life or cycles shall be identified and controlled to preclude use of items whose shelf life or operating life has expired.

9.17 HANDLING, STORAGE, AND DELIVERY

Provide for adequate work, ~~surveillance~~ and inspection instructions for handling, storing, preserving, packaging, packing, marking, and shipping.

9.18 CORRECTIVE ACTION

Ensure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, and defects in equipment and material shall be promptly identified and corrected.

9.19 NONCONFORMANCES

Establish, document, and maintain an effective and positive system for controlling nonconforming material OR work, including procedures for its identification, segregation, and disposition. Dispositions for the use or repair of nonconforming material shall require approval.

END OF SECTION

Artic

10.1

10.2
10.2.1
10.2.2
10.2.3
10.2.4

10.3

10.4

10.5
10.5.1
10.5.2
10.5.3
10.5.4
10.5.5
10.5.6
10.5.7

D. Vehicle-mounted equipment shall meet vibration criteria specified herein (Reference: Section 8).

3.3.5 Seismic Environment

The design and installation of equipment included in the Work shall comply with earthquake regulations set forth in Title 24, CAC and City of Los Angeles Building Code for essential ~~hospital~~ facilities within Seismic Hazard Zone 4.

3.3.6 Modular Design

A. Use modular design throughout. Organize electrical and mechanical components in rack-mounted, plug-in assemblies.

B. Within one plug-in assembly, minimize mixing of equipment associated with separate functions.

C. Where practicable, mount equipment serving similar functions in the same relative location on racks.

3.3.7 Interchangeability - Accessibility

A. Parts, components, and assemblies performing like functions shall be physically and functionally interchangeable. Those not functionally interchangeable shall not be physically interchangeable.

B. Accessibility to system elements shall be provided by using the following techniques:

1. Panels and openings shall be of sufficient size, quantity, and placement to permit ready access from a normal or service work area.

2. Self-retaining fasteners shall be used wherever practicable.

3. Special-access opening tools shall not be required unless necessary to prevent vandalism.

4. Latch hold-open devices shall be incorporated, where practicable, as an additional safety factor.

5. In equipment cabinets, the components that are most frequently maintained or adjusted shall be the most accessible.

PDCD

PROJECT REVIEW/COMMENT SHEET

REVIEWER R. Frias FILE NO. W001A631 DATE June 24, 1988

DEPT/SECTION QA SUBMITTAL NO. AND/OR DATE Rec. 6/09/88 SHEET 2 OF 2

DESIGN REVIEW/SUBMITTAL TITLE A631 Traction Power Installation Contract "Legal/Technical Review"

REF NO.	PAGE NO.	DRAWING NO./ DOCUMENT SECT	COMMENT	RESPONSE/ACTION
1.	01340-3	2.2.E.	Modify 2.2.E.2 as follows: Delete "Certified" and add "or manufacturer's data sheets or brochures indicating compliance with required standards". Delete "and be notarized" from 2.2.E.4.	DISAGREE. TEXT OF THIS SECTION IS A BASELINE DOCUMENT PREVIOUSLY REVIEWED BY ALL PARTIES AND USED IN PREVIOUS CONTRACTS. NO CHANGE
2.		General	Note we are still referring to CAL/OSHA in the specifications. Suggest using OSHA. (01500/.1.2, 01620/3.1A, 16050/1.3.G)	CAL/OSHA STILL EXISTS AT THIS TIME. NO CHANGE.

88-02836

M E M O R A N D U M

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
TRANSIT SYSTEMS DEVELOPMENT DEPARTMENT
SYSTEMS AND CONSTRUCTION SAFETY

****

Date: June 27, 1988

To: P. M. Burgess

From: Harold E. Storey

Subject: Contract A631, Traction Power Installation
Legal-Technical Review

****

The Systems and Construction Safety Department has reviewed the subject contract and submits the following comments:

Even though the contract title implies installation work, a number of items are being purchased by the contractor and therefore a Quality Assurance effort is required. Please add a QA section as outlined by Malcolm Ingram, MRTC, in his correspondence to you concerning this subject.

cc: L. Boyden
R. Frias
B. Hansson
M. Ingram

RESPONSE/ACTION.

SEE RESPONSE TO M. INGRAM COMMENT No. 1

8B-0 1867

METRO RAIL TRANSIT CONSULTANTS
DMJM/PBQD/KE/HWA

MEMORANDUM

DATE: May 4, 1988

TO: Geoffrey Penney - Systems
Supervising Engineer, Electrical

FROM: Eva Bencze - Facilities E.B.
Supervisor, Mechanical Engineering

SUBJECT: Ventilation for DWP Service Yard Battery Room
Contract A-631

FILE: T420A631

Per CAL/OSHA Title 8. requirement battery rooms should be adequately ventilated to prevent concentration of flammable gases exceeding 20 percent of the lower explosive limit and to prevent harmful concentration of mist from the electrolyte. To satisfy this requirement mechanical ventilation is required, and we have provided a small wall fan in the Service Yard Battery Room for this purpose.

Significant hydrogen production occurs only, when maximum system voltage is impressed on the fully charged cells. Fan should run continuously during this period. Otherwise fan shall be operated twice a day for 10 minutes, which provides adequate ventilation during float charging operations, when very little hydrogen gas is produced.

EB/srt

cc: Alan Dale
G. M. Cofer
Malcolm Ingram
K. V. Sain
DCC (2)

16323

Q010-002-0883

METRO RAIL TRANSIT CONSULTANTS
DMJM/PBQD/KE/HWA

88-01981

MEMORANDUM

DATE: May 10, 1988

TO: Eva Benze - Facilities
Supervisor Mechanical Engineering

FROM: Geoff Penney - Systems Geo Penney.
Supervising Engineer, Electrical

SUBJECT: Contract A631, DWP Service Station Battery Room Ventilation at Yard TPSS

FILE: W550A631

In response to your memo of May 4, 1988, Bo Hansson of SCRTD/TSDA has agreed with the need for mechanical ventilation of subject battery room per subparagraph 2.2.3.5.2 (page I-2-12) of the Fire/Life Safety design criteria. However, since DWP does not allow de-energization of their battery charger in the event of failure of the exhaust system, it will be necessary to provide two full capacity fans (main and standby) per standard arrangement for DWP battery rooms at the passenger stations.

Attached is a marked copy of Drawing No. P-396 incorporating the required fan control elementary diagram, which is a modification of the standard WD-D7 scheme for stations, by the omission of motorized dampers and battery charger disconnect circuit.

GP/rl

Attachment

cc: G. Cofer
A. Dale
M. Ingram
K. Sain
DCC (2)

16522

Cross Reference
Section III
Design Review Comments

METRO RAIL TRANSIT CONSULTANTS
DMJM/PBQD/KE/HWA

MEMORANDUM

88-03282

DATE: July 20, 1988

TO: Distribution

FROM: A.M. Dale

SUBJECT: Legal/Technical Review Comments
Traction Power Installation Contract A631

FILE: W001A631

Attached is a copy of all comments received to date on the A631 pre-bid review package, together with the proposed responses. Each comment has been evaluated and appropriate resolutions will be incorporated into the contract specifications book before the pre-advertise sign-off commences on October 12, 1988. Any lack of agreement with the proposed comments resolutions, or any additional requests for changes must be brought to the attention of Geoff Penney by September 2, 1988.

AMD/GWP/r1
GWP
Attachment

cc: Distribution
DCC(2)

17020

TRACTION POWER INSTALLATION (A631)

Legal/Technical Review Distribution

MRTC	SCRTD
H. Chaliff	*W. Rhine
G. Cofer	B.J. Hanson
W. Armento	
C. Vaswani	S. Louis
K. Sain	
J. Hegede	J. Crawley
A. Dale	S. Gifford
N. Brown	
M. Burgess	*W. Norwood
M. Ingram	A. Martinez
D. Mohapatra	
G. Penney	*M. Walters
A. Sanderson	T. Johnson
G. Wasz	D. Griffin
T. Cook	J. Sandberg
	B. Hansson
	R.P. Townley
	J. Christiansen
	H. Storey
	OTHERS
	M. Polacek (PDCD) (2)
	R. Lontok (PDCD)
	R. Frias (PDCD)
	R. Schiehl (F/LSC)

cc: DCC(2)
Chron
Subject

*w/o attachments

17020

86-01396

M. Ingram

METRO RAIL TRANSIT CONSULTANTS

MEMORANDUM

DATE: April 4, 1986

TO: Distribution

FROM: I. Shafir Isaak Shafir

SUBJECT: Traction Power Design
Action Items #180, #181 & #184

FILE: W550A630
P.8.2

SAFETY & ASSURANCE
APR 04 1986
RECEIVED BY MRTC

1. A.I.#180 (Also prefinal design review A.I. #1). "Obtain F/LS Committee approval for use of fiberglass cable trays and conduits, as specified, in substations and tunnel".

2. A.I.#181 (Also prefinal design review A.I. #2). "Review traction power cable installation in trays within stations, but outside of substation room, for fireproofing requirements."

3. A.I.#184. "Resolve F/LS Committee's objections to spray-on fireproofing".

The subject action items were discussed with F/LSC at a March 18, 1986 working session. A summary of that discussion is provided in the attached memorandum from M. Ingram to attendees.

Members of F/LSC objected to the use of non-metallic enclosures and raceways as well as a spray-on fireproofing within Metro Rail stations and tunnels. They also stated that a 2-hour rated ceiling assembly was required to separate exit corridors from exposed traction power raceways.

The following modifications to the prefinal traction power installation design (Contract A631) are being proposed in order to resolve the above F/LSC objections:

1. A.I. #180

   a. At substation rooms:
      - o Metallic cable trays and conduits will be used instead of fiberglass ones.
      - o The metallic trays/conduits housing dc positive

cables will be insulated from ground and connected to the dc switchgear enclosure to satisfy traction power design criteria, Volume V, Section 4, paragraph 4.4.8.C. Such design would allow us to utilize the dc switchgear alarm circuits so as to monitor conditions when the trays/conduits become grounded and/or energized.

- o The metallic trays/conduits housing dc negative cables will be insulated from ground and from the negative bus box enclosure. This is necessary to prevent leakage current in the event cable insulation is damaged. No connections to any monitoring circuits will be made for the negative trays/conduits.

b. At track level, cut and cover/tunnel interface:

- o The outer surface of a disconnect switch enclosure will be specified to be made of steel and the inner surface of the enclosure to be made of fiberglass.
- o DC positive cables connecting disconnect switches to contact rail will be run exposed and mounted on support insulators attached to concrete walls/tunnel liners (see attached sketch Figure 1).

2. A.I. #181

- o DC positive and negative cables within exit corridors (outside substation rooms) will be run in exposed steel conduits. These conduits will be insulated from ground. Conduits housing dc positive cables will be connected to the associated cable trays (see attached sketch Figure 2).
- o A 2-hour fire rated ceiling assembly will be provided below the exposed steel conduits.

3. A.I. #184

- o Tunnel 35kv cable (three single conductors) will be run in 5-inch GRS conduit. No fireproofing will be provided around the conduit (see attached sketch Figure 3). Members of F/LSC indicated at the March 18, 1986 meeting that such design would be acceptable.

- o It is noted that the requirement to enclose tunnel 35kv cable in conduit will result in a MOS-1 cost increase of some $180,000 (largely conduit cost) compared to currently utilized fireproofed armored cable. This cost increase

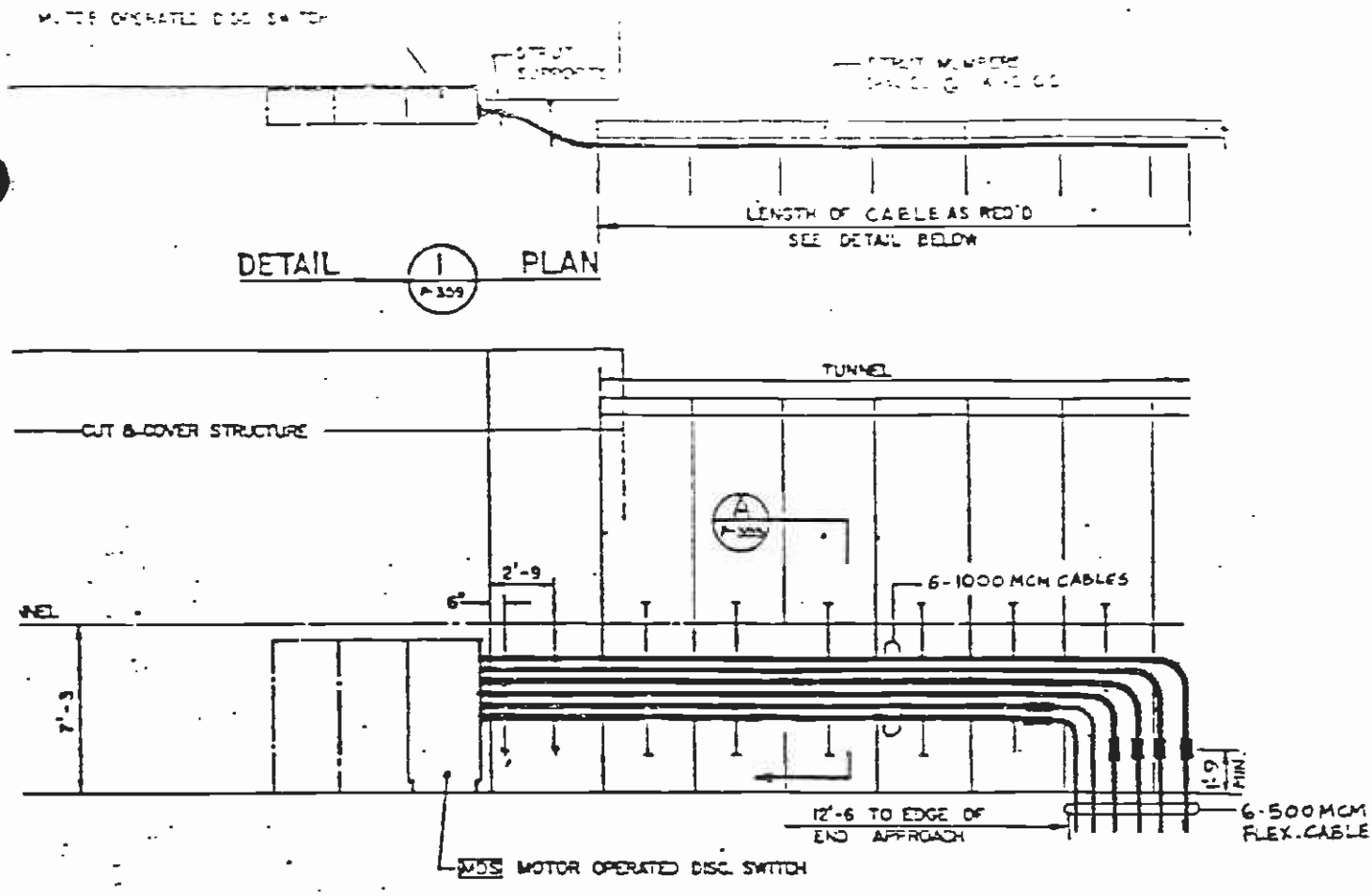
will have to be absorbed by Contract A620. Also some A631 budget (approximately $160,000) would have to be transferred to A620 contract.

We plan to incorporate the above design modifications into the A631 final submittal scheduled to be completed by April 30, 1986. Please review the proposed design concepts and submit your comments to me no later than April 14, 1986.

IS/cc

Distribution:
D. Bartlett, F/LSC
B. Blakesley
L. Boyden, SCRTD
J.N. Brown
P.M. Burgess
G. Cofer
A.M. Dale
D. Gary, SCRTD
B. Hansson, SCRTD
M. Ingram
S. Loo, SCRTD
K.N. Murthy
D. Schiehl, F/LSC
T. Tanke

cc: DCC (2)



ELEVATION

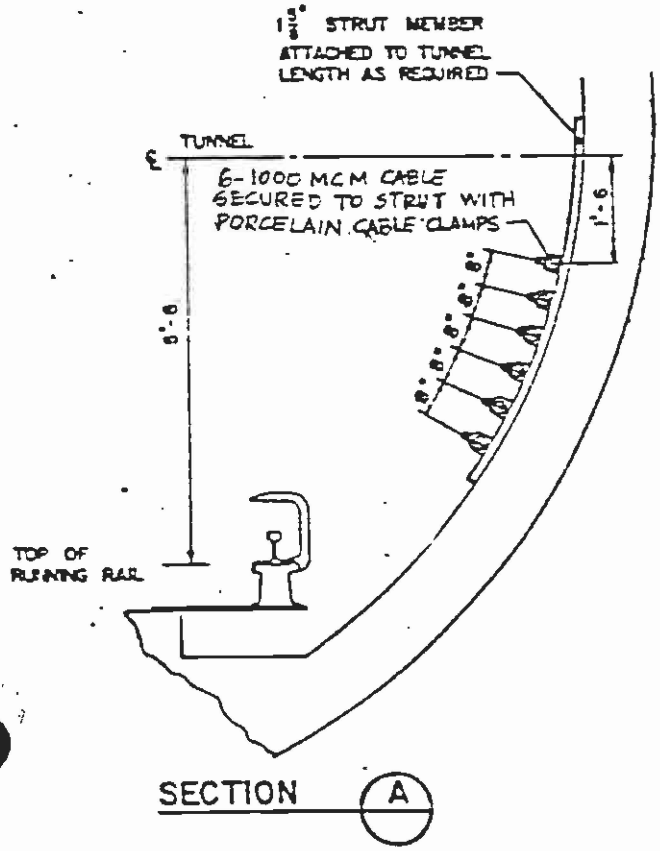


FIGURE 1

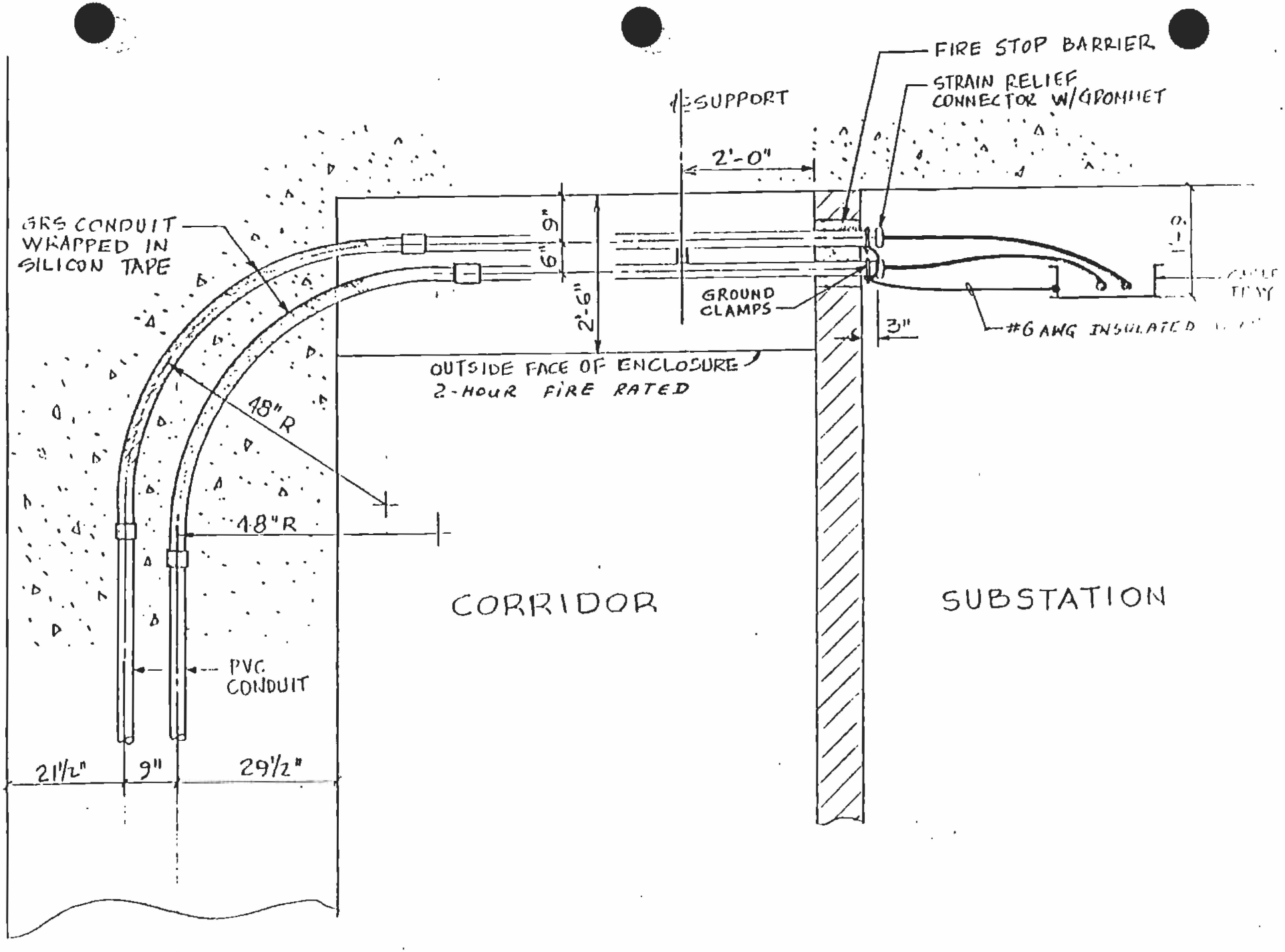
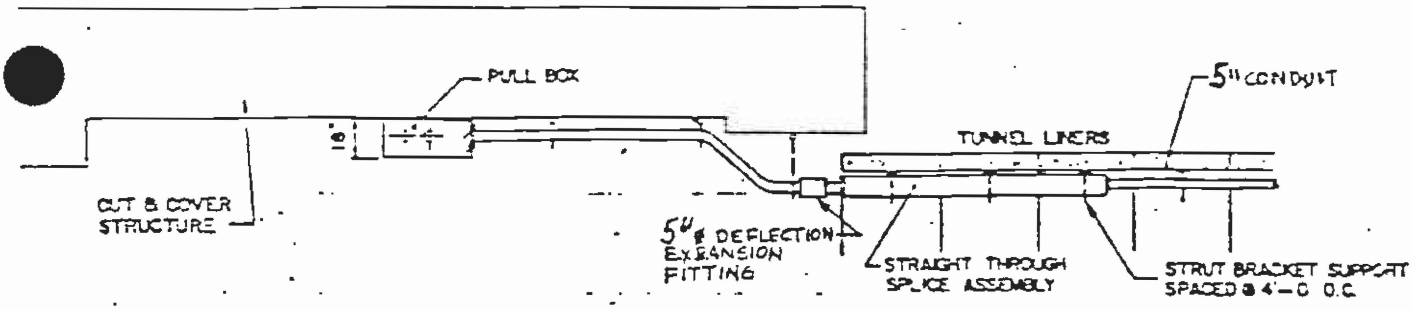
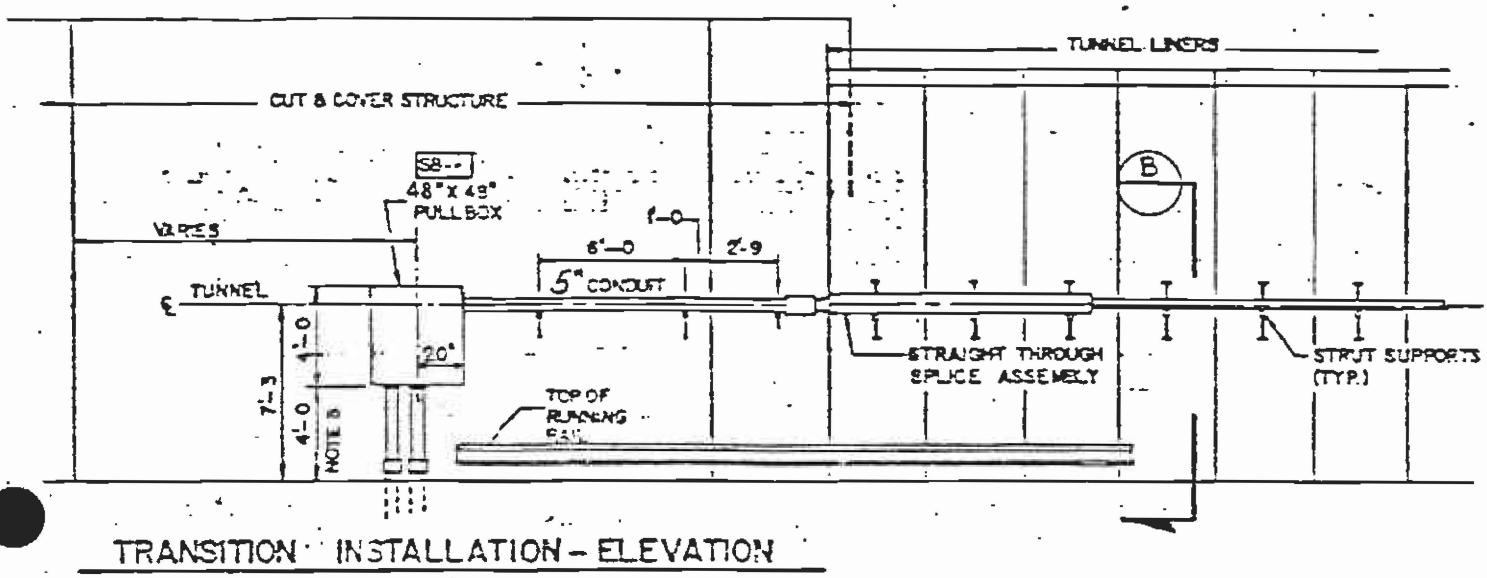

FIRE STOP BARRIER
STRAIN RELIEF CONNECTOR W/GROMMET
SUPPORT
2'-0"
GRS CONDUIT WRAPPED IN SILICON TAPE
6"
6"
2'-6"
GROUND CLAMPS
3"
#6 AWG INSULATED
OUTSIDE FACE OF ENCLOSURE 2-HOUR FIRE RATED
18" R
18" R
CORRIDOR
SUBSTATION
PVC CONDUIT
21½"
9"
29½"

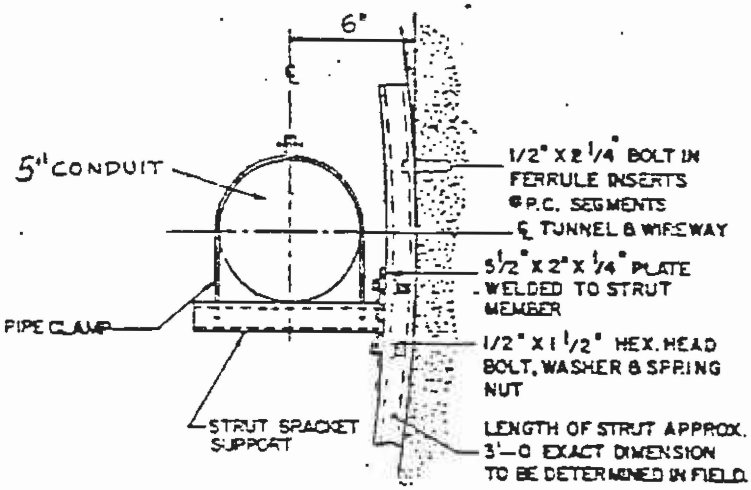
FIGURE 2



TRANSITION INSTALLATION - PLAN



TRANSITION INSTALLATION - ELEVATION



SECTION B

FIGURE 3

METRO RAIL TRANSIT CONSULTANTS
DMJM PBQD KE HWA

86 01[illegible]

MEMORANDUM

RECEIVED
MAR 26 1986
D.I.C.C.

DATE: March 26, 1986

TO: Attendees

FROM: M. Ingram M. Ingram

SUBJECT: **F/LSC WORKING SESSION - TRACTION POWER**

FILE NO.: S440 A631X028

A working session of the F/LSC was held at 10:00 a.m., March 18, 1986 in RTD Conference Room "B" to discuss materials used for traction power electrical conduits, cable trays and equipment enclosures. The following topics were discussed and are followed by the resulting decisions/action items.

1. Use of exposed fiberglass disconnect switch enclosures/junction boxes and conduit to contact rail connections in trainways at nine end-of-platform locations in MOS-1. Junction or switch enclosure box and eight-two inch conduits, maximum length of installation approximately fifty feet. Reference drawing A631/P359A. (Handouts included the referenced drawing, product data on Fipco fiberglass raceways and Thermo-Lag Fire Resistive Coating, and excerpt of traction power design criteria volume V, section 4, paragraph 4.4.8.C.)

   The referenced drawing indicates the use of PVC for the indicated components. The use of exposed PVC is not allowed by F/LSC design criteria 2.2.4.1.1 and 2.3.3.4. Exposed fiberglass also does not meet these requirements nor does it meet the requirements of Article 347 of the NEC. Use of fire resistive coating on non-metallic raceways is not acceptable to the F/LSC due to the potential negative impacts of maintenance actions on the integrity of the coating.

   ACTION ITEMS: 1-A) F/LSC to investigate the use of exposed fiberglass for traction power raceways at other modern U.S. transit properties.

   1-B) MRTC to consider the use of non-metellac liners for GRS conduit and the use of metal shielding for the equipment enclosure/junction boxes.

2. Use of exposed fiberglass cable trays in TPSS rooms. Approximately 120 feet of overhead cable trays in each of four TPSS rooms. Reference drawing A631/P278A.

   Unacceptable to the F/LSC for the same reasons stated in Item 1 relative to design criteria compliance and use of fire resistive coating.

   ACTION ITEM: 2-A) MRTC to revise contract documents to require the use of metallic cable trays possibly with non-metallic liners for traction power. The cable trays will comply with the requirements of design criteria volume V, section 4, paragraph 4.4.8.C.

3. Use of exposed cable trays (metallic or non-metallic) in corridors. Approximately 150 feet of overhead cable trays in each of four station ancillary area corridors. Reference drawing A631/P278A.

   Routing of electrical raceways through required exit corridors is not allowed by requirements stated in Uniform Building Code Chapter 33.

   ACTION ITEM: 3-A) MRTC to revise contract documents as described in Action Item 2-A.

   3-B) MRTC to revise appropriate facilities drawings to provide a 2 hour rated ceiling assembly to separate required exit corridors from exposed traction power raceways.

4. The F/LSC reiterated their position that the use of armored cable for the 34.5 KV dedicated feeder did not comply with the requirements of F/LSC design criteria 2.2.4.1.5.

   ACTION ITEM: 4-A) MRTC to review the use of GRS conduit for the 34.5 KV dedicated feeder. Change Request 4-057 will be reviewed to determine configuration of original proposed change.

5. The F/LSC restated that cable trays with fire-resistive coating and exposed in the trainway did not meet the requirements of F/LS design criteria 2.2.4.1.5, 2.2.4.1.8 and 2.3.3.4. This position was originally stated in F/LSC letter to W. Rhine, dated March 13, 1986 (F/LSC #86-3-029/-STA. 86-8.)

MI:MI:fp/jb

cc: Attendees:

D. Bartlett	F/LSC
D. Blakesley	MRTC
L. Boyden	SCRTD
B. Hansson	SCRTD
M. Ingram	MRTC
J. Loo	SCRTD
D. Schiehl	F/LSC
I. Shafir	MRTC

M. Burgess
N. Brown
G. Cofer
A. Dale
K. N. Murthy
T. Tanke
DCC(2)
Chron
Subject

86-02817

Rolf Jensen & Associates, Inc.
Fire Protection Engineers
Building Code Consultants

Cross Ref
Section II
Design Review
comments
7-11-88

July 11, 1986

FEDERAL EXPRESS

RECEIVED
JUL 14 1986
D.T.C.

Mr. Malcolm Ingram
Metro Rail Transit Consultants
548 South Spring Street, Seventh Floor
Los Angeles, California 90013

A-631
TRACTION POWER SUBSTATIONS
100% FINAL DESIGN REVIEW

Malcolm:

We have reviewed the above subject package. Our comments are enclosed.

Sincerely,

David R. Fiedler, P. E.

DRF:pkb - H3275 - Traction Power

Enclosure

METRO RAIL TRANSIT CONSULTANTS
DMJM/PBQD/KE, HWA

Cross Ref: Section II Design Review Comments 7-11-86

86-03166

MEMORANDUM

DATE: July 28, 1986

TO: I. Shafir

FROM: J. N. Brown J.N. Brown

SUBJECT: Design Review Comments - A631 Final Design Review

FILE NO.: S400XA631X028
X082

Attached are design review comments on the subject contract from MRTC Safety, Assurance & Security. Please contact M. Ingram at Ext. 7134 should you have any questions.

MI
JNB:MI:jb
Attachment

cc: H. J. Chaliff, w/o attachment
T. W. Cook
A. M. Dale, w/o attachment
M. Ingram
D. Mohapatra
DCC(2)
Chron
Subject

11727

Q010-002-0883

METRO RAIL TRANSIT CONSULTANTS
DMJM/PBQD/KE/HWA

Cross Ref: 86-0355/
Section II
Design Review
Comments
7-17-86
7-18-86

MEMORANDUM

DATE: August 20, 1986

TO: Distribution

FROM: I. Shafir Isaak Shafir

SUBJECT: Responses to A631 Final Review Comments

FILE: W550A630
P.10

The subject responses are being transmitted for your information. Please review the attached material and note your disagreements with the provided responses.

A series of meetings with the reviewers is being planned for the week of August 25 to discuss the proposed disposition of comments. The time and place are as follows:

Organization	Date	Time	Place
SCRTD	08/26	9:00 a.m.	SCRTD Conf. Room C
PDCD	08/25	9:00 a.m.	PDCD Conf. Room 1315
MRTC	08/25	1:30 a.m.	MRTC 11th Floor Conf. Room

A marked up set of the A631 drawings and a revised specification will be available during the meetings to supplement the responses and to illustrate the planned revisions.

Distribution:

W.J. Armento
A.S. Atalla, PDCD
D.L. Baker, PDCD
D. Fiedler
R. Frias, PDCD
B. Hannson, SCRTD
R. Honingford, PDCD
J. Loo, SCRTD
R.D. Lontok, PDCD
E.S. Martins, PDCD
G. Poli
W. Robertson, PDCD
K. Sain
H.E. Storey, SCRTD
F.W. Thompson, PDCD

cc: J.N. Brown
P.M. Burgess
A.M. Dale
D.A. Gary
M. Ingram
E. Noack
W.J. Rhine, SCRTD
J.A. Strosnider, SCRTD
DCC(2)

11772

Q010-002-0881

RTD

FIRE/LIFE SAFETY
COMMITTEE

D. 67
Comments on
A-631

Hal
7-18-86

FLSC 86-6-071
TRAC PWR 86-2

July 18, 1986

Mr. William J. Rhine, Director
Systems Design & Analysis Dept.
Southern California Rapid
Transit District
425 South Main Street
Los Angeles, CA. 90013

Dear Mr. Rhine:

A-631, Traction Power, 100% Design Review

On June 26, 1986, the Fire/Life Safety Committee (FLSC) received a transmittal from MRTC requesting review of A-631, Traction Power, 100% Design, dated June 26, 1986.

After review of this submittal, the FLSC hereby forwards its comments on the attached Review/Comment sheet/s.

Should you have any questions regarding this matter, please contact the FLSC at 972-3457.

Very truly yours,

Donald E. Bartlett, Battalion Chief
Los Angeles City Fire Department

Richard B. Schiehl, Battalion Chief
Los Angeles County Fire Department

Mr. Harold E. Storey
SCRTD, Metro Rail

REVIEWED BY MRTC
SAFETY, ASSURANCE
NO ADVERSE IMPACT ON
SAFETY CERTIFICATION

RTD

A D D E N D U M

covering

CHANGE IN SPECIFICATIONS AND/OR PLANS

Date Issued: January 12, 1989 Addendum No: A631-1

Addendum Date: January 12, 1989

Bid No: _____

Contract: A631: TRACTION POWER INSTALLATION

INTENT

1. This addendum is issued prior to receipt of bids to provide for modifications in Specifications. Acknowledgement of this addendum shall be made, and cost of work included or excluded, in bidder's proposal.

2. This addendum consists of the following items:

   The Bid due date is changed from February 1, 1989 to March 1, 1989.

   Revisions to the following Specification Section and the pages included:

   ° Invitation to Bid. Pages 1 and 2.

   Specification addendum revisions are identified by the Addendum Number in the margins before and after each line modified. Pages changed due to relocation of lines or paragraphs that are not modified by addendum will not have identifying numbers, but are included to keep the Contract Specifications Book intact and continuous. Please place the enclosed pages in your Contract Specifications Book and remove amended pages.

Issued By: _____

for Paul Como
Director
Office of Contracts
Procurement and Materiel

MZW/RV/ez

Southern California Rapid Transit District 425 South Main Street Los Angeles, California 90013 (213) 972-6000

REVIEWED BY MRTC
SAFETY ASSURANCE
NO ADVERSE IMPACT
ON SAFETY CERTIFICATION

RTD

A D D E N D U M

covering

CHANGE IN SPECIFICATIONS AND/OR PLANS

Date Issued: January 25, 1989 Addendum No: A631-2

Addendum Date: January 25, 1989

Bid No: _____

Contract: A631: TRACTION POWER INSTALLATION

INTENT

1. This addendum is issued prior to receipt of bids to provide for modifications in Contract Drawings and Specifications. Acknowledgement of this addendum shall be made, and cost of work included or excluded, in bidder's proposal.

2. This addendum consists of the following items:

   The Bid due date is changed from March 1, 1989 to March 15, 1989.

   Revisions to the following Specification Sections and the pages included:

   - Table of Contents. Pages 1, 2.
   - Invitation to Bid. Pages 1 and 2.
   - Instructions to Bidders. Pages 1 and 2, 7 and 8.
   - General Conditions Table of Contents. Page iii.
   - Special Conditions, Appendix A and B. Pages 5 and 6.
   - Exhibit 5, Minimum Wage Rates. Pages 1 through 74.
   - Section 01300, Submittals. Pages 1 and 2.
   - Section 01310, Network Analysis System. Pages 1 through 16.
   - Section 16122, Splices and Terminations. Pages 3 through 5.

   Specification addendum revisions are identified by the Addendum Number in the margins before and after each line modified. Pages changed due to relocation of lines or paragraphs that are not modified by addendum will not have identifying numbers, but are included to keep the Contract Specifications Book intact and continuous. Please place the enclosed pages in your Contract Specifications Book and remove amended pages.

Southern California Rapid Transit District 425 South Main Street, Los Angeles, California 90013 (213) 972-6000

Revised Contract Drawings as follows:

Sheet No.	Drawing No.	Sheet No.	Drawing No.
A631			
31	P229	114	P279
81	P258	134	P308
83	P261	152	P313
89	P385	166	P323
98	P390	190	P355
		219	P361

Issued By: J. L. Johnson
for Paul Como
Director
Office of Contracts
Procurement and Materiel

MZW/RV/ez

METRO RAIL TRANSIT CONSULTANTS
DMJM/PBQD/KE/HWA

REVIEWED BY MRTC
SAFETY ASSURANCE
NO ADVERSE IMPACT
ON SAFETY CERTIFICATION

MEMORANDUM

Date: March 21, 1989

To: Planholders, Contract A631
Traction Power Installation

From: T.W. Cook
Manager, Configuration Control

Subject: Supplement to Specifications Addendum #2

This letter is issued to transmit "General Prevailing Wage Rates" (January 1989) to all planholders of Contract A631. Although listed on the cover sheet of Addendum #2 as "Exhibit 5, Minimum Wage Rates...", that section was, in fact, omitted from the addendum.

Please update your specifications sets accordingly.

REVIEWED BY MRTC
SAFETY, ASSURANCE
NO ADVERSE IMPACT ON
SAFETY CERTIFICATION

RTD

A D D E N D U M

covering

CHANGE IN SPECIFICATIONS AND/OR PLANS

Date Issued: February 8, 1989 Addendum No: A631-3

Addendum Date: February 8, 1989

Bid No: _____

Contract: A631: TRACTION POWER INSTALLATION

INTENT

1. This addendum is issued prior to receipt of bids to provide for modifications in Contract Drawings and Specifications. Acknowledgement of this addendum shall be made, and cost of work included or excluded, in bidder's proposal.

2. This addendum consists of the following items:

Revisions to the following Specification Sections and the pages included:

- Table of Contents. Pages 1 and 2.
- Invitation to Bid. Pages 1 and 2.
- Special Conditions, Appendix A and B. Pages 5 and 6.
- Section 01545, Worksite Safety Requirements. Pages 1 and 2.
- Section 16950, Testing and Start-up. Page 5.

Specification addendum revisions are identified by the Addendum Number in the margins before and after each line modified. Pages changed due to relocation of lines or paragraphs that are not modified by addendum will not have identifying numbers, but are included to keep the Contract Specifications Book intact and continuous. Please place the enclosed pages in your Contract Specifications Book and remove amended pages.

Southern California Rapid Transit District 425 South Main Street. Los Angeles. California 90013 (213) 972-6000

Revised and New Contract and New Reference Drawings as follows:

Revised Contract Drawings

Sheet No.	Drawing No.	Sheet No.	Drawing No.
A631			
1	P-201	79	P-382
3	P-203	95	P-389
29	P-227	98	P-390
45	P-241	106	P-399
52	P-248	113	P-278
53	P-249	125	P-288
66	P-271	132	P-295
77	P-256	188	P-342
78	P-270	219	P-361
		A631/1	P-400

New Contract Drawings

A631	
91	P-274

New Reference Drawings

A115		A112	
A631/50	C105	A631/91	C098
A631/51	C107		
A631/52	E261		

Issued By: _____

Paul Como
Director
Office of Contracts
Procurement and Materiel

MZW/RV/ez

REVIEWED BY MRTC
SAFETY, ASSURANCE
NO ADVERSE IMPACT ON
SAFETY CERTIFICATION

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A D D E N D U M

covering

CHANGE IN SPECIFICATIONS AND/OR PLANS

Date Issued: March 8, 1989 Addendum No: A631-4

Addendum Date: March 8, 1989

Bid No: _____

Contract: A631: TRACTION POWER INSTALLATION

INTENT

1. This addendum is issued prior to receipt of bids to provide for modifications in Contract Drawings and Specifications. Acknowledgement of this addendum shall be made, and cost of work included or excluded, in bidder's proposal.
2. This addendum consists of the following items:

   The Bid due date is changed from March 15, 1989 to March 29, 1989.

   Revisions to the following Specification Sections and the pages included:

   - Table of Contents. Pages 1 and 2.
   - Invitation to Bid. Pages 1 and 2.
   - Instructions to Bidders. Pages 3, 4, 9 and 10.
   - Special Conditions. Pages i, and 1 through 10.

   Specification addendum revisions are identified by the Addendum Number in the margins before and after each line modified. Pages changed due to relocation of lines or paragraphs that are not modified by addendum will not have identifying numbers, but are included to keep the Contract Specifications Book intact and continuous. Please place the enclosed pages in your Contract Specifications Book and remove amended pages.

   The following Sections have been ADDED:

   - Bid Form A-1. Pages 1 and 2.

Issued By: _____

Paul Como
Director
Office of Contracts
Procurement and Materiel

MZW/RV/ez

Southern California Rapid Transit District 425 South Main Street, Los Angeles, California 90013 (213) 972-6000

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covering

CHANGE IN SPECIFICATIONS AND/OR PLANS

Date Issued: March 24, 1989 Addendum No: A631-5

Addendum Date: March 24, 1989

Bid No: _____

Contract: A631: TRACTION POWER INSTALLATION

INTENT

1. This addendum is issued prior to receipt of bids to provide for modifications in Contract Drawings and Specifications. Acknowledgement of this addendum shall be made, and cost of work included or excluded, in bidder's proposal.

2. This addendum consists of the following items:

   Revisions to the following Specifications Sections and the pages included:

   - Section 16442, DC No-load Disconnect Switches. Pages 3, 4 and 7.
   - Section 16443, DC Load Interrupter Switches. Pages 5 and 6.
   - Section 16451, Negative Bus Boxes and Voltage Recorders. Pages 3 and 4.
   - Section 16622, Standby Engine-Generator Set. Pages 5 and 6.

   Specification addendum revisions are identified by the Addendum Number in the margins before and after each line modified. Pages changed due to relocation of lines or paragraphs that are not modified by addendum will not have identifying numbers, but are included to keep the Contract Specifications Book intact and continuous. Please place the enclosed pages in your Contract Specifications Book and remove amended pages.

Issued By: Jack E. Maddox
FOR Paul Como
Director
Office of Contracts
Procurement and Materiel

MZW/RV/ez

Southern California Rapid Transit District 425 South Main Street, Los Angeles, California 90013 (213) 972-6000