RAIL CONSTRUCTION CORPORATION

METRO PASADENA PROJECT

Operations & Maintenance Plan

May, 1993

ENGINEERING MANAGEMENT CONSULTANT
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METROPOLITAN TRANSPORTATION AUTHORITY

METRO PASADENA PROJECT

OPERATIONS & MAINTENANCE PLAN

MAY, 1993

Prepared for the

Metropolitan Transportation Authority (MTA)

by

PB/DMJM - EMC TEAM

OPERATIONS AND MAINTENANCE PLAN

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CHAPTER I

INTRODUCTION

1.1 PURPOSE

The purpose of this operations and maintenance (O&M) plan for the Metro Pasadena Project is to define the basic operating and maintenance philosophies and methodologies for the system. Consideration has been given to the current operations of the Metro Blue Line and the applicable O & M planning aspects of the Metro Green Line in the preparation of this plan. The information presented herein represents a level of detail that will support final engineering of facilities and will permit final engineering level annual operations and maintenance cost estimating. This plan is dynamic in nature, in that it will be periodically updated as additional and further detailed design information becomes available.

1.2 OBJECTIVES/SCOPE

The plan's objectives are to describe the system from both operational and maintenance viewpoints in order to:

A. Define service and operating characteristics

B. Provide a frame of reference for system design

C. Provide a basis for analyzing operating alternatives and operating costs

D. State the policies and objectives for the Metro Pasadena Project

E. Establish programs that will maximize the availability and dependability of facilities and equipment

1.3 O & M ORGANIZATION

The O&M Plan consists of eight chapters as follows:

1. Chapter 1 provides an introduction to the plan

2. Chapter 2 is a brief description of the entire system including the route alignment and interface with future transit lines

3. Chapter 3 identifies agencies external to the Pasadena Line that influence or regulate operation of the system

4. Chapter 4 establishes basic operating requirements for normal as well as abnormal train operations, including service standards and levels, operating statistics, and fleet requirements for both initial and future operations

5. Chapter 5 presents the functions and requirements for central control

6. Chapter 6 discusses operations and security at stations

7. Chapter 7 defines the yard and maintenance shop functions, operations, activities, and facility and equipment requirements for the initial yard and shop as well as for the future yard and shop

8. Chapter 8 presents the estimated staffing levels and annual costs for the initial year of operation and maintenance of the Pasadena Line

CHAPTER 2

SYSTEM DESCRIPTION

2.1 GENERAL

The proposed Metro Pasadena Project (Pasadena Line) involves the extension of the Metro Blue Line from downtown Los Angeles through Pasadena. While the Pasadena Line will eventually be connected with the existing Metro Blue Line at the 7th Street Metro Center Station in downtown Los Angeles, the line will initially terminate at Union Station. The Pasadena Line will, therefore, operate independently from the Metro Blue Line for an interim period of several years.

The Pasadena Line will involve exclusive and semi-exclusive alignments, power collection from an overhead contact system (750 VDC nominal), barrier-free fare collection system, manual operation with automatic train protection, and cab signaling in exclusive and semi-exclusive alignment locations. The rail vehicles will be articulated with an operator's cab at each end, will be approximately 90 feet long, and will be capable of operating at a maximum speed of 55 mph. Each vehicle will have a design capacity of 76 seated passengers, plus 107 standing passengers at design service loads, and 161 standing passengers at crush loads.

Initially, a flat fare structure will be used, but future fares will be based upon a zone structure relative to distance traveled. Fare collection will be of the self-service type (no barriers). Single ride, round-trip and transfer fare media will be sold at ticket vending machines (TVM's) at each station. The TVM's will have change-making capability so that separate change machines will not be necessary. Monthly passes will be sold at offsite outlets. Transit Police will randomly inspect fare media for validity on trains and in paid areas of stations. Passengers riding without valid proof of payment will be cited. Provisions will be made for transfers between other rail and bus systems.

2.2 ROUTE ALIGNMENT

While several alignment alternatives are currently being considered, it is expected that the Pasadena Line will initially operate from Union Station to Sierra Madre Villa Avenue in Pasadena, a distance of approximately 13.4 miles. The initial service route will have 14 stations. Most of the stations will be at-grade and a few stations will be of aerial or perhaps subway or depressed (cut) in configuration. The initial route is scheduled to open for revenue service in November 1997.

Two potential extensions of the Pasadena Line which are being considered are the Glendale Branch and an extension to Azusa. North of downtown Los Angeles, the Glendale Branch would meet the Pasadena Line just north of Chinatown. The Glendale Branch would operate from Union Station to a possible interim terminus at Sonora in northwest Glendale, a distance of approximately 9.1 miles. The branch would have 7 stations and would be approximately 7.4 miles in length from the junction with the Pasadena Line. An additional 3-station, 4.5 mile extension to Burbank is also being studied. A non-revenue connecting track will be provided between the Glendale Branch and the northbound direction of the Pasadena Line.

Train storage, cleaning, and maintenance facilities will be provided on a temporary basis for the initial service to Pasadena and on a permanent basis in conjuction with the start of service on the Glendale Branch. The temporary yard and shop facilities will be located at the ex SPTC Midway yard site.

The other extension would operate from Sierra Madre Villa to Azusa, a distance of approximately 9 miles. The Azusa extension would have about 4 stations.

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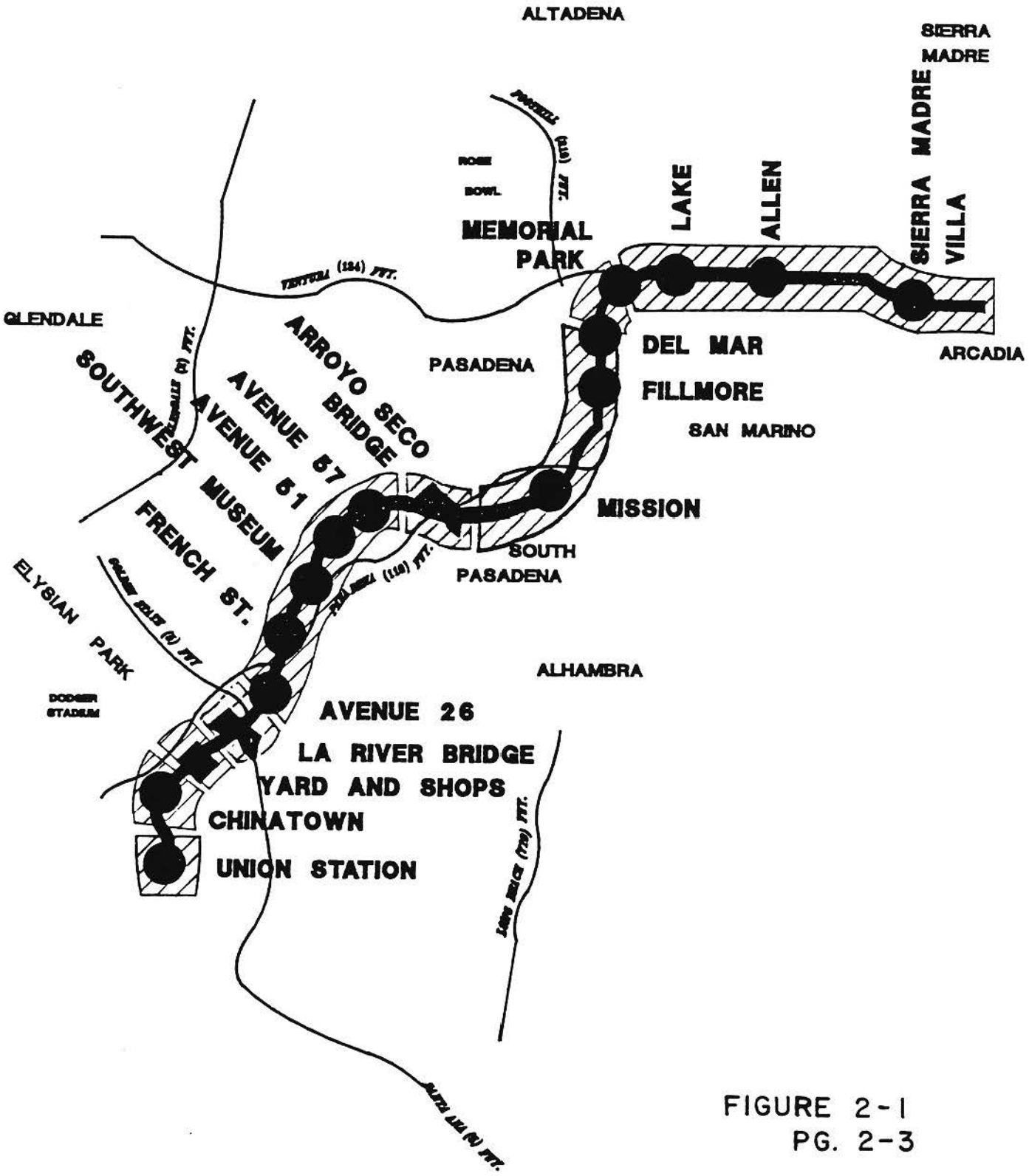


FIGURE 2-1
PG. 2-3

2.3 RAIL/TRANSIT CONNECTIONS

The Pasadena Line will allow connections with the Metro Red Line, Metrolink Commuter Rail Network, Amtrak, bus, and other transportation services at the Union Station. In the future, the Pasadena Line will connect directly with Metro Blue Line at the 7th Street Metro Center Station. Transfers between the Pasadena Line and the Metro Red Line will also be available at the 7th Street Metro Center Station when the Pasadena Line is connected directly with the Metro Blue Line.

2.4 PATRONAGE PROJECTIONS

Patronage projections are required in order to establish equipment quantities such as the number of vehicles and pieces of fare collection equipment, operational requirements such as consist length and headways, and station circulation requirements. For operations planning, the most important patronage projection is the peak-hour, peak-direction link volume, as it constitutes the basis for establishing the operating schedule.

The design year patronage projections for the Union Station to Sierra Madre Villa segment of the Pasadena Line are extracted from the FEIR of February, 1990. The design year daily patronage is projected to be 64,300. The peak-hour, peak-link volume patronage is estimated to be 5,345. The A.M. peak-hour passenger loading is shown in Table 2-1. Patronage projections for the initial year of service are assumed to be approximately 65% of the design year patronage. The initial year daily patronage is estimated to be 41,800. The peak-hour, peak-link volume patronage is estimated to be 3,470 for the initial year of service.

Table 2-1

METRO PASADENA PROJECT
AM PEAK HOUR PASSENGER LOADINGS

	Northbound			Southbound			Totals	
Station	Board	Alight	On-Train	Board	Alight	On-Train	Boarding	Alighting
Union Station	1239		1239		4851	4851	1239	4851
Chinatown	86	303	1022	162	656	5345	248	959
Avenue 26	34	118	938	451	38	4931	485	156
Marmion Way/Figueroa	82	153	867	367	201	4765	449	354
Avenue 51	51	42	876	700	15	4080	751	57
Marmion Way/Ave 57	121	114	883	1235	62	2907	1356	176
Mission	43	70	856	451	27	2483	494	97
Fillmore	91	111	836	208	101	2375	299	212
Del Mar	147	483	499	1064	266	1578	1211	749
Memorial	52	195	356	334	110	1354	386	305
Lake	33	79	310	349	30	1035	382	109
Hill	14	50	275	159	22	898	173	22
Sierra Madre Villa		275		898			898	275

Source: FEIR, February 1990

CHAPTER 3

OPERATING REGULATIONS

This chapter identifies agencies external to the Pasadena Line that have specific regulations or requirements that directly impact the operation of the system.

3.1 CALIFORNIA PUBLIC UTILITIES COMMISSION (CPUC)

The regulations of the CPUC applicable to system operations and maintenance will be strictly followed. The following is a list of the CPUC General Orders that are applicable to the Pasadena Line Extension.

GENERAL ORDER NO.	GENERAL ORDER DESCRIPTION:
22-B	Regulations governing the reporting of accidents on light rail and railroad systems
26-D	Regulations governing clearance of railroads and street railroads with reference to side and overhead structures, parallel tracks, crossings of public roads, highways, and streets
33-B	Regulations governing the construction, reconstruction, maintenance and operation of interlocking plants at crossings, junctions, drawbridges, in yards, and at sidings of railroads and street railroads.
52	Construction and Operating of Power and Communication Lines for the Prevention and Mitigation of Inductive Interference
72-B	Rules governing the construction and maintenance of crossings at grade of railroads with public streets, roads and highways in the State of California
75-C	Regulations governing the protection of crossings at grade of roads, highways, and streets with railroads in the State of California
88-A	Rules for altering public railroad/highway grade crossings

GENERAL
ORDER NO. GENERAL ORDER DESCRIPTION:

95	Rules for overhead electric line construction
108	Regulations requiring railroad corporations to file rules and regulations of their operating departments and any changes or reissues thereof.
110	Radio Communications on Railroad Operations
118	Regulations governing the construction, reconstruction, and maintenance of walkways adjacent to rail tracks and the control of vegetation adjacent thereto
127	Regulations governing the construction, reconstruction, maintenance, and operation of automatic train control systems with respect to train detection and separation, route interlocking, speed enforcement, and right-of-way hazard protection for rail transit systems
128	Rules for construction of underground electric supply and communication systems
131	Planning and Construction of Facilities for the generation of electricity and certain electric transmission facilities
135	Regulations governing the occupancy of public grade crossings by railroads
143-A	Rules for the design, construction, and operation of light rail transit systems, including streetcar operations*
145	Rules for exempting certain at-grade crossings from motor vehicle stop requirements

* Table 1 of General Order 143-A identifies speeds permitted on LRT systems. For reference purposes, a copy of Table 1 is included herein as Table 3-1.

TABLE 3-1 CPUC GENERAL ORDER 143A

MAXIMUM PERMITTED SPEEDS FOR LIGHT-RAIL TRANSIT SYSTEMS

9.04	Alignment Classification	Crossing or Intersection Control	Train Protection	Maximum Permitted Speed	Notes
a.	Exclusive	Not Applicable Not Applicable Not Applicable	ATP & ATS ~~ATP Only~~ ABS None Required	No Limit 55 mph 45 mph	1 2
b.	Semi-Exclusive	1) Between Crossings	Train Protection & Maximum Permitted Speed as for Alignment Classification 9.04, a above		
	(1) Fenced Right-of-Way with At-Grade Crossings	2) At Crossings Flashing Lights & Gates Flashing Lights & Gates Flashing Lights & Gates Traffic Signal of other Approved Device	ATP & ATS ~~ATP Only~~ ABS None Required None Required	No Limit 55 mph 45 mph See footnote 3	
	(2) Street Median or Side Alignment with 6" Curb & Fence	1) Between Crossings	None Required	Legal Speed of Parallel Traffic + 10 mph	2,5
		2) At Crossings Flashing Lights & Gates (Side Alignment Only)	None Required	Legal Speed of Parallel Traffic + 10 mph	2,5
		Traffic Signal or Other Approved Device	None Required	Legal Speed of Parallel Traffic but not to exceed 35 mph	2
	(3) Street Median or Side Alignment with 6" curb	Traffic Signal or Other Approved Devices	None Required	Legal Speed of Parallel Traffic but not to exceed 35 mph	2
	(4) Mountable Curb or Transit Lane	Traffic Signal or other Approved Device	None Required	Legal Speed of Parallel Traffic but not to exceed 35 mph	2
Non-Exclusive	(1) Mixed Traffic	Traffic Signal or other Approved Device	None Required	Legal Speed of Parallel Traffic but not to exceed 35 mph	2
	(2) Pedestrian Mall	Traffic Signal or other Approved Device	None Required	20 mph	4

Notes: 1) Speed is limited only by vehicle or alignment characteristics.
2) Provided adequate stopping sight distance is available.
3) Traffic signal or other approved device at crossings on 9.04, b (1) right of way may be authorized only in special locations, where speeds do not exceed 35 mph.
4) Lower speed may be required for malls paved flush with the tracks.
5) Maximum speed of 55 mph unless ATP & ATS are provided. Maximum speed 45 mph unless ATP is provided.

3.2 OTHER AGENCIES

The requirements of the 1990 Americans with Disabilities Act (ADA) will be implemented for the Pasadena Line.

The recommendations of the Light Rail Subcommittee of the California Traffic Control Devices Committee will be followed to the extent practicable for all traffic signage and control devices required for the Pasadena Line.

3.3 RAILROAD INTERFACE REQUIREMENTS

The Pasadena Line will interface with the trackage and/or operations of the Metrolink Regional Commuter Rail Network and the Southern Pacific Transportation Company (SPTC). The interface with railroad operations will involve track connections, common right-of-way, and over/under crossings.

Interface with the railroad operations will occur primarily in the vicinity of Union Station (the downtown terminal station) and the Taylor and Midway yards (the site of the Metrolink and Pasadena Line yards and shops). In these areas, the Pasadena Line crosses over Metrolink and Southern Pacific. In addition, track connections with Metrolink and shared use of the Capitol Milling spur exist at the Midway Yard site.

All interface requirements relative to the Pasadena Line and railroads will be designed and implemented in accordance with the regulations and standards of the Federal Railroad Administration (FRA), CPUC, American Railway Engineering Association (AREA), and the railroads involved.

CHAPTER 4

SYSTEMS OPERATIONS

This chapter presents the operating plan for train operations for the Pasadena Line Extension. The following topics are included in this section:

A. Operational requirements (including operating hours and schedules, patronage projections, operating headways, trip time, fleet size, and mainline route schematic)

B. Normal operation (including daily train operation and terminal operation)

C. Abnormal operation (including events, responses, and mid-route special trackwork).

4.1 OPERATIONAL REQUIREMENTS

The basic assumptions regarding operational requirements and service levels are presented below. These assumptions are consistent with the operations of the Metro Blue Line.

A. The system will ultimately operate seven days per week, 24 hours per day. Initially, the system will operate seven days per week, 20 hours per day.

B. Trains will operate with consists of 2 and/or 3 vehicles, depending upon service requirements.

C. Peak-hour, adjusted peak-link volume patronage is estimated to be 5,345 in the design year 2020 and 3,470 in the initial year 1997. Daily patronage is estimated to be 41,800 in the initial year of operation and 64,300 in the design year.

D. An average peak-period seated-to-standee loading ratio of 1:1 (76 seated + 76 standing = 152 passengers per vehicle) is desirable in order to avoid overcrowding and to allow reasonable fare inspection capability.

4.1.1 Operating Schedule

The preliminary operating schedules for the initial year and future years are shown in Tables 4-1 and 4-2, respectively. The schedules were developed based upon the above assumptions, as well as trip time and headway requirements. Tables 4-3 and 4-4 contain the estimated annual vehicle miles and vehicle hours associated with each of the operating schedules.

Each weekday consists of five or six operating periods, in accordance with the required service level. The operating periods are as follows:

Early	4:30 a.m. to 6:00 a.m.
A.M. peak	6:00 a.m. to 9:00 a.m.
Mid-day	9:00 a.m. to 3:00 p.m.
P.M. peak	3:00 p.m. to 6:00 p.m.
Evening	6:00 p.m. to 12:30 a.m.
Late (Future)	12:30 a.m. to 4:30 a.m.

Saturdays, Sundays, and holidays consist of three or four operating periods: 4:30 a.m. to 9:00 a.m., 9:00 a.m. to 6:00 p.m., 6:00 p.m. to 12:30 a.m., and 12:30 a.m. to 4:30 a.m. (future). Operating schedules will be revised, if necessary, once actual operations begin and actual patronage demands are identified.

4.1.2 Station to Station Trip Time

The details of the station to station trip time for the initial and future service routes for the Pasadena Line will be developed once specific station locations are established. The one-way trip time will include actual running time, station dwell time (an average of 20 seconds per station stop), traffic signal delay time, and acceleration/deceleration time associated with traffic signals and speed restrictions.

At this time, the one-way trip times for the initial service route and the two potential future service routes are estimated to be as follows:

TABLE 4-1

PASADENA LINE OPERATING SCHEDULE - INITIAL YEAR

	MON	TUE	WED	THUR	FRI	SAT	SUN
AM 4:00							
5:00	2-CAR TRAINS AT 15-MINUTE HEADWAY						
6:00							
7:00	2 & 3-CAR TRAINS AT 8-MINUTE HEADWAY					2-CAR TRAINS AT 15-MINUTE HEADWAY	
8:00							
9:00							
10:00							
11:00							
PM 12:00	2-CAR TRAINS AT 8-MINUTE HEADWAY						
1:00						2 & 3-CAR TRAINS 8-MINUTE HEADWAY	
2:00							
3:00							
4:00	2 & 3-CAR TRAINS AT 8-MINUTE HEADWAY						
5:00							
6:00							
7:00							
8:00							
9:00	2-CAR TRAINS AT 15-MINUTE HEADWAY					2-CAR TRAINS AT 15-MINUTE HEADWAY	
10:00							
11:00							
AM 12:00							
1:00							

(SERVICE ROUTE = UNION STATION TO SIERRA MADRE VILLA AVE.)

SCHDIY

TABLE 4-2

PASADENA LINE OPERATING SCHEDULE - FUTURE SERVICE

	MON	TUE	WED	THUR	FRI	SAT	SUN
AM 5:30 – 6:30	3-CAR TRAINS AT (GLENDALE = 2-CAR TRAINS) 4-MINUTE HEADWAY					2-CAR TRAINS AT 8-MINUTE HEADWAY	
7:30 – 8:30							
9:30 – 10:30	2 & 3-CAR TRAINS AT (GLENDALE = 2-CAR TRAINS) 8-MINUTE HEADWAY						
11:30 – PM 12:30						2 & 3-CAR TRAINS (GLENDALE=2 CARS) 8-MINUTE HEADWAY	
1:30 – 2:30							
3:30 – 4:30	3-CAR TRAINS AT (GLENDALE = 2-CAR TRAINS) 4-MINUTE HEADWAY						
5:30 – 6:30							
7:30 – 8:30	2-CAR TRAINS AT 15-MINUTE HEADWAY					2-CAR TRAINS AT 15-MINUTE HEADWAY	
9:30 – 10:30							
11:30 – AM 12:30							
1:30 TO 5:30	1-CAR TRAINS AT 20-MINUTE HEADWAY					1-CAR TRAINS AT 20-MINUTE HEADWAY	

(SERVICE ROUTE = UNION STATION TO AZUSA AND GLENDALE BRANCH)

TABLE 4-3

PASADENA LINE ANNUAL REVENUE VEHICLE HOURS/MILES - INITIAL YEAR

SERVICE PERIOD	SERVICE HOURS	HEADWAY (minutes)	TRAINS ON LINE	CARS PER TRAIN	DAILY CAR MILES	DAILY CAR HOURS	ANNUAL CAR MILES	ANNUAL CAR HOURS
WEEKDAYS:								
AM Peak	3.0	8	9	2.5	1508	64	392080	16580
Off-Peak	6.0	8	9	2	2412	102	627120	26520
PM Peak	3.0	8	9	2.5	1508	64	392080	16580
Early/Evening	8.0	15	5	2	1715	73	445900	18856
Late	0.0	0	0	0	0	0	0	0
Weekday Subtotal	20.0				7143	302	1857180	78537
WEEKENDS:								
Morining	4.5	15	5	2	965	41	100360	4244
Base	9.0	8	9	2.5	4523	191	470392	19892
Evening	6.5	15	5	2	1394	59	144976	6131
Late	0.0	0	0	0	0	0	0	0
Weekend Subtotal	20.0				6882	291	715728	30267
TOTAL							2,572,908	108,805

Route Distance	=	13.4	Miles (UNION STATION TO SIERRA MADRE VILLA AVE)
One-Way Run Time	=	0.57	Hours (34 Minutes)
Round Trip Time	=	68	Minutes
Average System Speed	=	23.6	Mph
Total Fleet Size	=	36	Cars
Annual Miles per Car	=	71,470	Average

TABLE 4-4

PASADENA LINE ANNUAL REVENUE VEHICLE HOURS/MILES - FUTURE SERVICE

SERVICE ROUTE/ SERVICE PERIOD	SERVICE HOURS	HEADWAY (minutes)	TRAINS ON LINE	CARS PER TRAIN	DAILY CAR MILES	DAILY CAR HOURS	ANNUAL CAR MILES	ANNUAL CAR HOURS
UNION STATION TO AZUSA								
WEEKDAYS:								
AM Peak	3.0	4	31	3	6588	252	1712880	65520
Off-Peak	6.0	8	15	2.5	5490	210	1427400	54600
PM Peak	3.0	4	31	3	6588	252	1712880	65520
Early/Evening	8.0	15	8	2	3123	120	811980	31200
Late	4.0	20	6	1	586	22	152360	5720
Weekday Subtotal	24.0				22375	856	5817500	222560
WEEKENDS:								
Morining	4.5	15	8	2	1757	67	182728	6968
Base	9.0	8	15	3	8235	316	856440	32864
Evening	6.5	15	8	2	2538	97	263952	10088
Late	4.0	20	6	1	586	22	60944	2288
Weekend Subtotal	24.0				13116	502	1364064	52208
TOTAL							7,181,564	274,768
UNION STATION TO WESTERN/SONORA (GLENDALE BRANCH)								
WEEKDAYS:								
AM Peak	3.0	4	11	2	1386	48	360360	12480
Off-Peak	6.0	8	5	2	1386	48	360360	12480
PM Peak	3.0	4	11	2	1386	48	360360	12480
Early/Evening	8.0	15	3	2	986	34	256360	8840
Late	4.0	20	2	1	185	6	48100	1560
Weekday Subtotal	24.0				5329	184	1385540	47840
WEEKENDS:								
Morining	4.5	15	3	2	554	19	57616	1976
Base	9.0	8	5	2	2079	72	216216	7488
Evening	6.5	15	3	2	801	28	83304	2912
Late	4.0	20	2	1	185	6	19240	624
Weekend Subtotal	24.0				3619	125	376376	13000
TOTAL							1,761,916	60,840

UNION STATION TO AZUSA:

Route Distance	=	24.4	Miles
One-Way Run Time	=	0.93	Hours (56 Minutes)
Round Trip Time	=	122	Minutes
Average System Speed	=	26.1	Mph
Total Fleet Size	=	119	Cars
Annual Miles per Car	=	60,349	Average

UNION STATION TO WESTERN/SONORA:

Route Distance	=	7.7	Miles
One-Way Run Time	=	0.27	Hours (16 Minutes)
Round Trip Time	=	42	Minutes
Average System Speed	=	28.9	Mph
Total Fleet Size	=	29	Cars
Annual Miles per Car	=	60,756	Average

Service Route	Distance (Miles)	No. of Stations	1-way trip time (Minutes)
Union Station - Sierra Madre Villa	13.4	14	34
Sierra Madre Villa - Azusa	11.0	6	22
Union Station - Western/Sonora	7.7	5	16

The estimated station to station trip time for the initial Union Station to Sierra Madre Villa service route is shown in Table 4-5.

4.1.3 Operating Headways

The operating headways for the initial service and future service operating periods will be as follows:

Operating Period	Operating Headway (minutes) Initial	Future
WEEKDAYS:		
AM/PM Peak	8	4
Mid-day	8	8
Early/Evening	15	15
Late	N/A	20
WEEKENDS:		
Early	15	15
Mid-day	8	8
Evening	15	15
Late	N/A	20

Note that operation of 4-minute headways on the Pasadena and Glendale Lines result in 2-minute headway between the Glendale Junction and Union Station.

TABLE 4-5

PASADENA LINE STATION TO STATION TRIPTIME
INITIAL SERVICE ROUTE

STATIONS	DISTANCE (MILES)	CUM DIST (MILES)	TRIP (MIN)	DWELL (MIN)	DELAY (MIN)	TOTAL (MIN)	CUM TOT (MIN)
UNION STATION	0.00	0.00	0.00	0.00		0.00	0.00
CHINATOWN	0.63	0.63	1.56	0.33		1.89	1.89
YARD & SHOP	0.00						
GLENDALE BRANCH JCT	0.00						
AVENUE 26	1.55	2.18	2.66	0.33		2.99	4.88
FRENCH	0.63	2.81	1.15	0.33		1.48	6.35
MUSEUM	0.85	3.66	1.55	0.33		1.88	8.23
AVENUE 51	0.72	4.38	1.31	0.33		1.64	9.87
AVENUE 57	0.62	5.00	1.32	0.33	5.00	6.65	16.52
MISSION	2.11	7.11	3.25	0.33		3.58	20.10
FILMORE	1.50	8.61	2.58	0.33		2.91	23.01
DEL MAR	0.56	9.17	1.93	0.33		2.26	25.27
MEMORIAL PARK	0.45	9.62	0.96	0.33		1.29	26.56
LAKE AVENUE	1.09	10.71	1.39	0.33		1.72	28.29
ALLEN AVENUE	0.98	11.69	1.73	0.33		2.06	30.35
SIERRA MADRE VILLA	1.72	13.41	2.55	0.00		2.55	32.90
TOTALS	13.41		23.94	3.96	5.00	32.90	
AVERAGE SPEED	24.45						

NOTE: DELAY TIME BASED UPON NEED FOR COORDINATING TRAIN OPERATIONS WITH CONDITIONS SUCH AS NEAR-SIDE SATION STOPS AND TRAFFIC SIGNALS UNTIL SUCH TIME AS SPECIFIC IMPACTS CAN BE QUANTIFIED.

4.1.4 Fleet Size

At this time, the estimated fleet sizes for the initial service route and the future service routes are based upon the total round trip time (including a total of 12 minutes for terminal station turnback time), peak period headway, train consist length, operational spare vehicles (one spare train per terminal or common terminal), and a maintenance spare vehicle ratio of 20%. The fleet size estimates will be refined when the appropriate peak-hour, peak-link passenger volumes are established for the future service routes.

The estimated fleet sizes are shown in Table 4-6 for the initial service route and in Tables 4-7 and 4-8 for the future service extensions to Azusa and Glendale, respectively. The total fleet size requirements are potentially as follows:

Service Route	8-minute Peak Headway	4-minute Peak Headway
Union Station - Sierra Madre Villa	36	79
Sierra Madre Villa - Azusa	18	40
Union Station - Western/Sonora	14	29
Total Cars	68	148

It should be noted that the fleet sizes shown can also accommodate different peak-period headways if the train consist lengths are adjusted accordingly. For example: if the Union Station - Sierra Madre Villa route was operated at a 6-minute (rather than 8-minute) peak-hour headway in the future, the same 36 car fleet would provide the same capacity per hour by operating 2 trains with 3 cars each and 9 trains with 2 cars each (rather than 10 trains, 5 with 2 cars and 5 with 3 cars).

4.1.5 Mainline Route Schematic

Figure 4-1 shows a mainline route schematic diagram of the mainline trackage for the Pasadena Line. The schematic is a simplified representation of station locations, special trackwork including tail tracks, and other important features such as yard locations, railroad crossings, bridges, and traction power substations.

TABLE 4 - 6

PASADENA LINE FLEET SIZE - UNION STATION TO SIERRA MADRE VILLA

INITIAL 8-MINUTE HEADWAY		FUTURE 4-MINUTE HEADWAY	
34	MINUTE ONE-WAY TRIP TIME	34	MINUTE ONE-WAY TRIP TIME
68	MINUTE ROUND TRIP TIME	68	MINUTE ROUND TRIP TIME
12	MINUTE TOTAL TURNBACK TIME	12	MINUTE TOTAL TURNBACK TIME
80	MINUTE TOTAL ROUND TRIP TIME	80	MINUTE TOTAL ROUND TRIP TIME
8.0	MINUTE PEAK-HOUR HEADWAY	4.0	MINUTE PEAK-HOUR HEADWAY
2.5	CARS PER TRAIN (Peak-hour)	3	CARS PER TRAIN (Peak-hour)
20%	MAINTENANCE SPARE RATIO	20%	MAINTENANCE SPARE RATIO
	FLEET SIZE:		FLEET SIZE:
10	TRAINS ON LINE	20	TRAINS ON LINE
25	CARS ON LINE (Peak-hour)	60	CARS ON LINE (Peak-hour)
5	OPERATIONAL SPARE CARS	6	OPERATIONAL SPARE CARS
30	REVENUE CARS (Peak-hour)	66	REVENUE CARS (Peak-hour)
6	MAINTENANCE SPARE CARS	13	MAINTENANCE SPARE CARS
36 *	FLEET SIZE	79	FLEET SIZE
2850	CAPACITY/HOUR AT 152 PER CAR	6840	CAPACITY/HOUR AT 152 PER CAR
3431	CAPACITY/HOUR AT 183 PER CAR	8235	CAPACITY/HOUR AT 183 PER CAR

* = EXCLUDES 4 ADDITIONAL CARS REQUIRED FOR OFF-LINE WHEEL TRUING, HEAVY REPAIR, AND PAINTING EVENTS.

TABLE 4 - 7

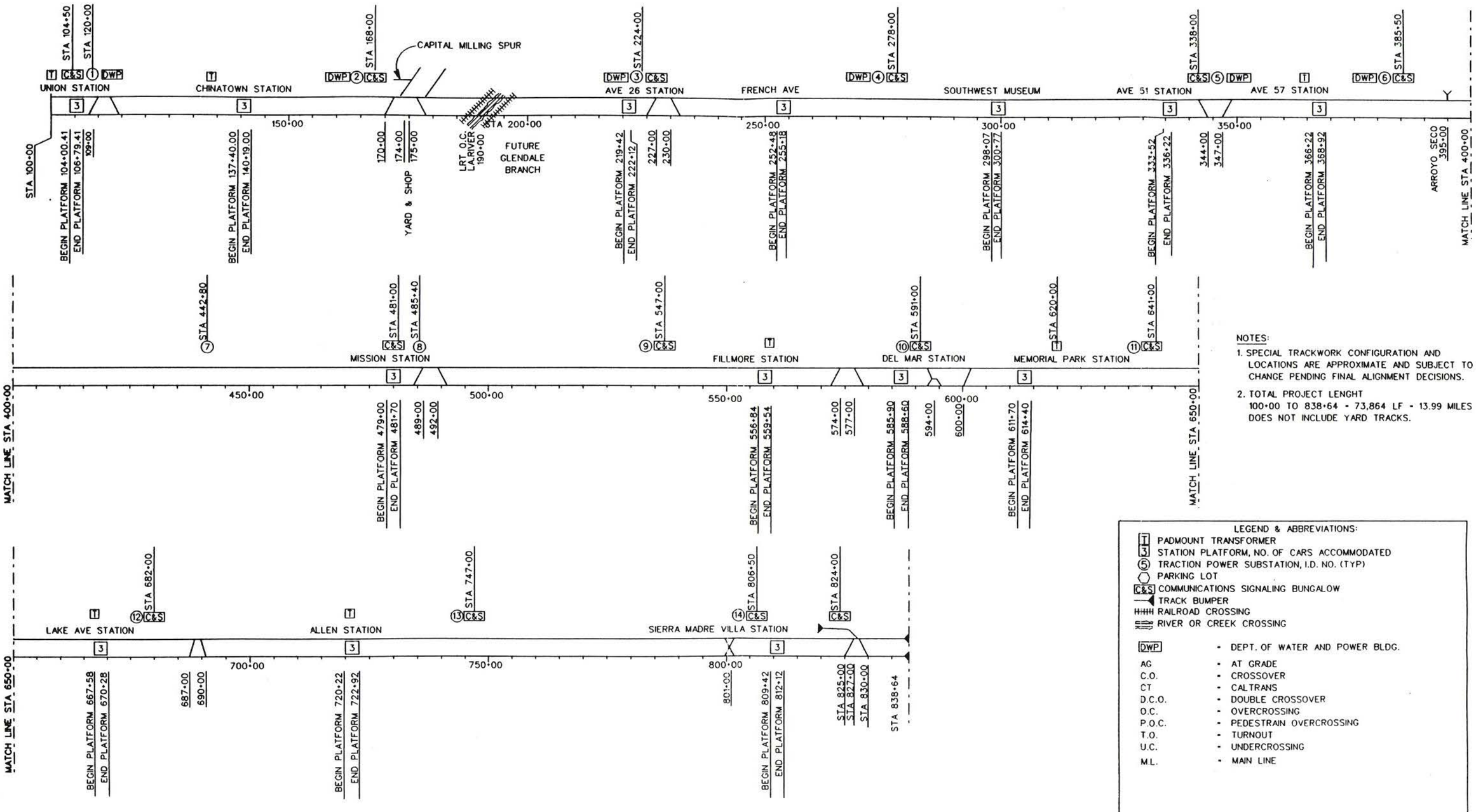
PASADENA LINE FLEET SIZE - FUTURE AZUSA EXTENSION

8-MINUTE HEADWAY		4-MINUTE HEADWAY	
22	MINUTE ONE-WAY TRIP TIME	22	MINUTE ONE-WAY TRIP TIME
44	MINUTE ROUND TRIP TIME	44	MINUTE ROUND TRIP TIME
0	MINUTE TOTAL TURNBACK TIME	0	MINUTE TOTAL TURNBACK TIME
44	MINUTE TOTAL ROUND TRIP TIME	44	MINUTE TOTAL ROUND TRIP TIME
8.0	MINUTE PEAK-HOUR HEADWAY	4.0	MINUTE PEAK-HOUR HEADWAY
2.5	CARS PER TRAIN (Peak-hour)	3	CARS PER TRAIN (Peak-hour)
20%	MAINTENANCE SPARE RATIO	20%	MAINTENANCE SPARE RATIO
FLEET SIZE:		FLEET SIZE:	
6	TRAINS ON LINE	11	TRAINS ON LINE
15	CARS ON LINE (Peak-hour)	33	CARS ON LINE (Peak-hour)
0	OPERATIONAL SPARE CARS	0	OPERATIONAL SPARE CARS
15	REVENUE CARS (Peak-hour)	33	REVENUE CARS (Peak-hour)
3	MAINTENANCE SPARE CARS	7	MAINTENANCE SPARE CARS
18	ADDITIONAL FLEET SIZE	40	ADDITIONAL FLEET SIZE
2850	CAPACITY/HOUR AT 152 PER CAR	6840	CAPACITY/HOUR AT 152 PER CAR
3431	CAPACITY/HOUR AT 183 PER CAR	8235	CAPACITY/HOUR AT 183 PER CAR

TABLE 4 - 8

PASADENA LINE FLEET SIZE - FUTURE GLENDALE EXTENSION

8-MINUTE HEADWAY		4-MINUTE HEADWAY	
16	MINUTE ONE-WAY TRIP TIME	16	MINUTE ONE-WAY TRIP TIME
32	MINUTE ROUND TRIP TIME	32	MINUTE ROUND TRIP TIME
10	MINUTE TOTAL TURNBACK TIME	10	MINUTE TOTAL TURNBACK TIME
42	MINUTE TOTAL ROUND TRIP TIME	42	MINUTE TOTAL ROUND TRIP TIME
8.0	MINUTE PEAK-HOUR HEADWAY	4.0	MINUTE PEAK-HOUR HEADWAY
2	CARS PER TRAIN (Peak-hour)	2	CARS PER TRAIN (Peak-hour)
20%	MAINTENANCE SPARE RATIO	20%	MAINTENANCE SPARE RATIO
FLEET SIZE:		FLEET SIZE:	
5	TRAINS ON LINE	11	TRAINS ON LINE
10	CARS ON LINE (Peak-hour)	22	CARS ON LINE (Peak-hour)
2	OPERATIONAL SPARE CARS	2	OPERATIONAL SPARE CARS
12	REVENUE CARS (Peak-hour)	24	REVENUE CARS (Peak-hour)
2	MAINTENANCE SPARE CARS	5	MAINTENANCE SPARE CARS
14	ADDITIONAL FLEET SIZE	29	ADDITIONAL FLEET SIZE
2280	CAPACITY/HOUR AT 152 PER CAR	4560	CAPACITY/HOUR AT 152 PER CAR
2745	CAPACITY/HOUR AT 183 PER CAR	5490	CAPACITY/HOUR AT 183 PER CAR



NOTES:

1. SPECIAL TRACKWORK CONFIGURATION AND LOCATIONS ARE APPROXIMATE AND SUBJECT TO CHANGE PENDING FINAL ALIGNMENT DECISIONS.
2. TOTAL PROJECT LENGHT 100+00 TO 838+64 - 73,864 LF - 13.99 MILES DOES NOT INCLUDE YARD TRACKS.

LEGEND & ABBREVIATIONS:

- T — PADMOUNT TRANSFORMER
- 3 — STATION PLATFORM, NO. OF CARS ACCOMMODATED
- (5) — TRACTION POWER SUBSTATION, I.D. NO. (TYP)
- ⬡ — PARKING LOT
- C&S — COMMUNICATIONS SIGNALING BUNGALOW
- TRACK BUMPER
- RAILROAD CROSSING
- RIVER OR CREEK CROSSING

DWP	- DEPT. OF WATER AND POWER BLDG.
AG	- AT GRADE
C.O.	- CROSSOVER
CT	- CALTRANS
D.C.O.	- DOUBLE CROSSOVER
O.C.	- OVERCROSSING
P.O.C.	- PEDESTRAIN OVERCROSSING
T.O.	- TURNOUT
U.C.	- UNDERCROSSING
M.L.	- MAIN LINE

"FIGURE" 4-1
PG 4-14

5-21-93

REV	DATE	BY	SUB	APP	DESCRIPTION	REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED BY
DRAWN BY LORETTA
CHECKED BY
IN CHARGE
DATE ~~04-20-93~~

a Subsidiary of the Los Angeles County Transportation Commission

Rail Construction Corporation

ENGINEERING MANAGEMENT CONSULTANT
an association of
Parsons Brinckerhoff Quade & Douglas, Inc.
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SUBMITTED
APPROVED

MAINLINE ROUTE SCHEMATIC

CONTRACT NO. R05
DRAWING NO. C008
REV
SCALE 1"-1000'
SHEET NO. 8

4.2 NORMAL OPERATIONS

Except for trains entering or leaving the mainline during service level transition periods. trains will carry passengers over the entire length of the system for each trip, stopping at each of the stations. The normal direction of traffic will be on the right-hand track in the direction of travel. Trains will run between stations at the maximum speeds consistent with safety, civil speed limitations, passenger comfort, and vehicle and signal equipment performance levels during all hours of system operation. Scheduled intermediate turnback (short turning) operations are not planned for the basic service route. However, patronage projections for future line extensions may warrant intermediate turnback operations. Intermediate turnback operations may be accommodated at certain stations which have the necessary special trackwork.

All mainline train operations, including all operations at pocket tracks and terminal station tail tracks will be performed under the authority and direction of central control personnel in accordance with established operating schedules, rules, and procedures.

4.2.1 Daily Train Operations

The following is a description of a typical weekday's operation with emphasis on the transition from one service level to another. The operation is described for the initial year level of service. The operation for future levels of service will be similar except that trains will operate 24 hours per day on more frequent headways with longer consists.

A. Startup to AM Peak Service

System startup will be accomplished by dispatching trains from the yard on 8-minute headways. Most of the trains will be routed from the yard towards Pasadena when dispatched. Note that trains must reverse direction and use the main line crossover to get from the yard to Pasadena. At the start of the AM peak-period, 10 trains (5 at 2 cars each and 5 at 3 cars each) will be operating on 8-minute headways in both directions over the route. The first train dispatched each day will operate as a "sweeper" train to verify conditions along the right-of-way.

B. **AM Peak to Mid-day Service**

The Transition from AM peak service to mid-day service is accomplished by removing one car from each of the trains with 3 cars. The five cars will be removed from trains at the Union Station. The cars will either be stored at the Union Station or at the yard. Ten trains of 2 cars each will operate on 8-minute headways during the mid-day service period.

C. **Mid-day to PM Peak Service**

Prior to the start of the PM peak-period service, five cars will be added to four of the mid-day trains. The five cars will be added to the trains at the Union Station. Like the AM peak-period, 10 trains (5 at 2 cars and 5 at 3 cars) will operate on 8-minute headways during the PM peak-period service.

D. **PM Peak to Evening Service**

The transition from PM peak-period service to evening service will be accomplished by removing the five, 3-car trains from service and lengthening the operating headway from 8 minutes to 15 minutes. The 5 trains will be removed from service at the Union Station and will be sent to the yard for storage or maintenance. The evening service will be operated with 5 trains of 2 cars each on a 15-minute headway.

E. **Evening Service to System Closing**

As each of the 5 evening service trains makes its final arrival of the day at the Union Station, it will be removed from service and sent to the yard for storage or maintenance.

4.2.2 Terminal Operations

There are two terminals on the initial Pasadena Line route; the south terminal at the Union Station and the north terminal at the Sierra Madre Villa Station. These terminals are the starting and ending points of all trips for trains in revenue service and serve as the turnback points for the trains. It is important that turnback operations be accomplished as expeditiously as possible so that scheduled headways can be maintained.

A. Terminal Station Requirements

Ideally, terminal station operations utilize two double crossovers, one in front of and one behind the station. The two double crossovers provide maximum flexibility for train movements in the terminal station. Two tail tracks, each capable of holding at least one 3-car train, should also be provided. The station should also consist of a center platform if at all possible. It should be noted that the crossover ahead of the terminal station can also be configured as two single crossovers provided that the minimum operating headway can be maintained.

The passenger unloading/loading pattern onto and from the platform will remain the same for all service periods. The normal method of train turnback will be to unload and load passengers at the platform on the outbound track. This is accomplished by crossing the train from the inbound track to the outbound track via the double crossover ahead of the station. Train direction is reversed while at the platform. The train will leave via the outbound track. When shorter headways are operated, the crossover ahead of the station will still be utilized, but trains will be alternated between platform tracks in order to maintain the schedule. See Figure 4-2.

B. Terminal Station Tail Tracks

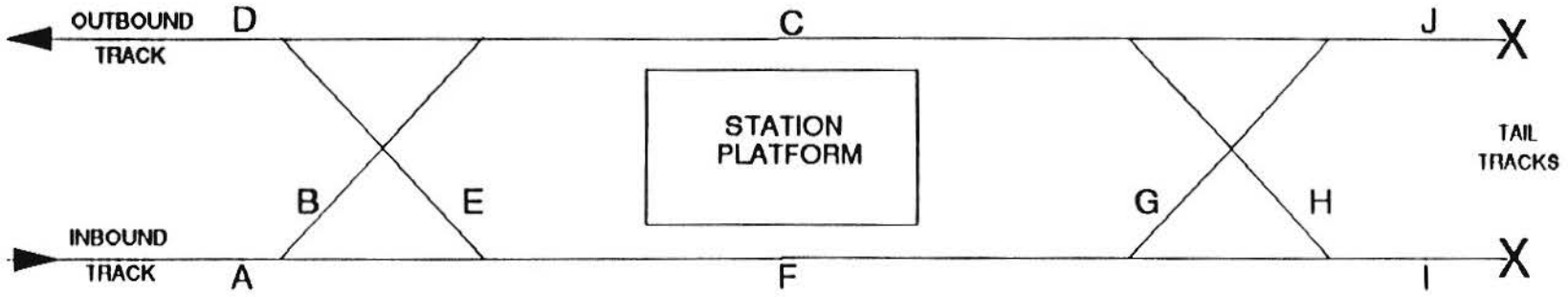
Tail tracks are required at the terminals in order to:

1. Provide temporary storage capability for failed cars or trains at a location other than at the maintenance facilities. This capability helps to minimize disruptions to revenue service operations when a failed car or train must be removed from service. Otherwise a failed car or train may have to be run (at reduced speed) over a significant length of the system to the maintenance facilities. This would result in delay to following trains and in disruption of service.

2. Provide a location adjacent to the mainline for changing train consist, thus precluding the need to route all trains to a yard for consist changing.

3. Provide a location for the placement of a spare train to replace an inbound defective train. This avoids or reduces delays or gaps in service as a result of a train failure.

4. Provide capability to accommodate the storage of at least three vehicles on each tail track (with adequate safe-braking distance). Movements between the mainline and tail tracks will be under the authority and direction of central control.



OPERATING SEQUENCE:

NORMAL FOR LONGER HEADWAYS = A - B - C - D (PREFERRED)
OR A - F - E - D

NORMAL FOR SHORTER HEADWAYS = A - B - C - D AND A - F - E - D
(TRAINS ALTERNATE BETWEEN PLATFORMS)

ALTERNATE FOR ALL HEADWAYS = A - F - G - J - C - D (PREFERRED)
OR A - F - I - H - C - D

TERMINAL STATION OPERATIONS
(PREFERRED CONFIGURATION)

FIGURE 4-2

C. **Terminal Station Supervision**

Monitoring of terminal operations (routing, signaling, and dispatching) will be performed from central control. To ensure a smooth terminal operation, a supervisor may be located at a terminal station during peak-period operations. The primary responsibilities of the terminal supervisor will be to:

1. Observe passenger flow and report overcrowding conditions to central control

2. Ensure train operators are on board trains before scheduled departure time

3. Assist train operators during delays or abnormal conditions

4. Observe additions and deletions of vehicles during headway transition periods

5. Report and expedite minor repair to vehicle-related failures occurring at the terminal

6. Ensure train operator compliance to rules and procedures.

D. **Terminal layover facilities will be provided at terminal stations and will include:**

1. A supervisor's booth (approximately 80 square feet) at the normal departure end of the outbound station platform that will include a telephone, public address announcement capability, control for "Next Train Out" via variable message signs, and portable radio capability.

2. A restrcom and layover room for operations personnel.

4.3 Abnormal Operations

Abnormal mainline operations usually result from equipment failures (either vehicle or wayside) and incidents that hinder system performance and disrupt operations beyond normal schedule recovery capabilities. The impact that these failures and incidents have upon operations is influenced by the following factors:

A. Nature of failure

B. Location of failure

C. Headways operated at time of failure

D. Strategy used to recover from the failure

This section discusses events that can cause abnormal operations and the means that are planned to restore the system to its scheduled service levels. Also, the uses and locations of tail tracks, crossovers, and pocket tracks for the Pasadena Line are detailed.

4.3.1 Equipment Failures

The equipment failures that can result in abnormal operations can be grouped into three categories: vehicle, wayside, and miscellaneous failures.

A. Vehicle Failures:

A vehicle failure is a failure due to vehicle equipment malfunction or damage, with the result that the train cannot proceed normally under its own propulsion. These failures can arise from many specific causes; however, all failures will result in one of the following three occurrences:

1. Train cannot move - Until the train can be moved safely, single track operations must be conducted around the stopped train. Once the failed vehicle subsystem is cutout or temporarily repaired or a car is rerailed, the train can be moved to the closest storage location, by other vehicles if necessary.

2. Train can move, but at reduced speed - Certain propulsion or braking failures can result in a train operating at reduced speeds. Such events cause the train to operate at an average speed that is well below normal speed.

3. Train can move in one direction only - Under some circumstances, trains with failures localized to equipment in one end of the train can leave the line with reduced impact on operations. If the unaffected end is headed toward a convenient and nearby storage location (terminal or pocket track), then the train can be reversed and brought to storage under control of the working end.

B. Wayside Failures:

1. Power Distribution Failure - A failure that results in a section of track being out of service due to a loss of overhead catenary voltage or voltage insufficient for propulsion.

2. Track/Signal Failure - A failure that results in a section of track being out of service due to defective track or service is disrupted due to the failure of a signal component.

3. Derailment - A derailed train may block one mainline track or both tracks; it may foul a mainline or terminal interlocking; it may block one or both tracks leading to the yard. In any event, the result is the long-term blockage of the affected track or tracks.

C. Miscellaneous Failures:

While the above failures are specifically attributed to vehicle and wayside equipment, other occurrences not classified as failures can result in abnormal operations. The following examples are typical of this type of occurrence:

1. Track Blockage - A track blockage that results from vandalism or from a breakdown or accident involving nontransit (surface) vehicles.

2. Fire on Adjacent Property - A structure fire that requires an adjacent track to be out of service due to smoke, flames, debris, fire department obstructions, etc.

3. Suicide - A suicide or attempted suicide that results in removing a section of track from service.

All of the above disruptions will result in abnormal operations due to blocked track(s).

4.3.2 Identification of and Response to Abnormal Events

Central Control (CC) personnel are responsible for correcting the disruption of scheduled revenue train service due to equipment failure, passenger behavior, or external incident. For each event, the means of detection and the types of response are described.

A. Event Detection:

Central Control personnel monitor the system status and the position and movement of trains on the mainline through information derived from the following sources. CC personnel's response to this information forms the means for identification of the abnormal event.

1. System Status Display Board - Monitoring the indications on the transit system's visual display board which reflect train movements on a real-time basis.

2. Traction Power Support Facilities Status Board - Observing the status of the traction power board which indicates energized and non-energized segments of the traction power system.

3. Terminal/Roving Supervisor - Learning of the situation or event by telephone or radio communication with the terminal or roving supervisor.

4. Train Operator - Learning directly of the situation or event by radio or telephone communication from the Train Operator.

5. Information from Other Sources - Obtaining information from other LRT personnel (i.e., maintenance-of-way and vehicle maintenance), Transit Police, utility companies, passenger, local police, citizens, etc., is also a source of problem identification.

B. Event Response:

Central control personnel are in command of the system operation. In the event of a system/schedule adherence failure, they are responsible for taking appropriate action to restore service in the most expeditious manner. Given the availability of radio, telephone, and data communication, central control can direct appropriate personnel to the site of a problem. The radio system will be used to direct activities of supervisors, operators, and maintenance personnel. Emergency response by police or fire department personnel can also be summoned to a particular problem by central control personnel.

Some of the methods of dealing with service failures are indicated in the following sections.

4.3.3 Close-in Operation

Close-in operation is a primary method in which one train closes in on another, normally for the purpose of providing assistance to a disabled train. Assistance may be required to push or pull an inoperable train or to assist in the evacuation of passengers. This method of operation would be used in an attempt to clear track blockage resulting from

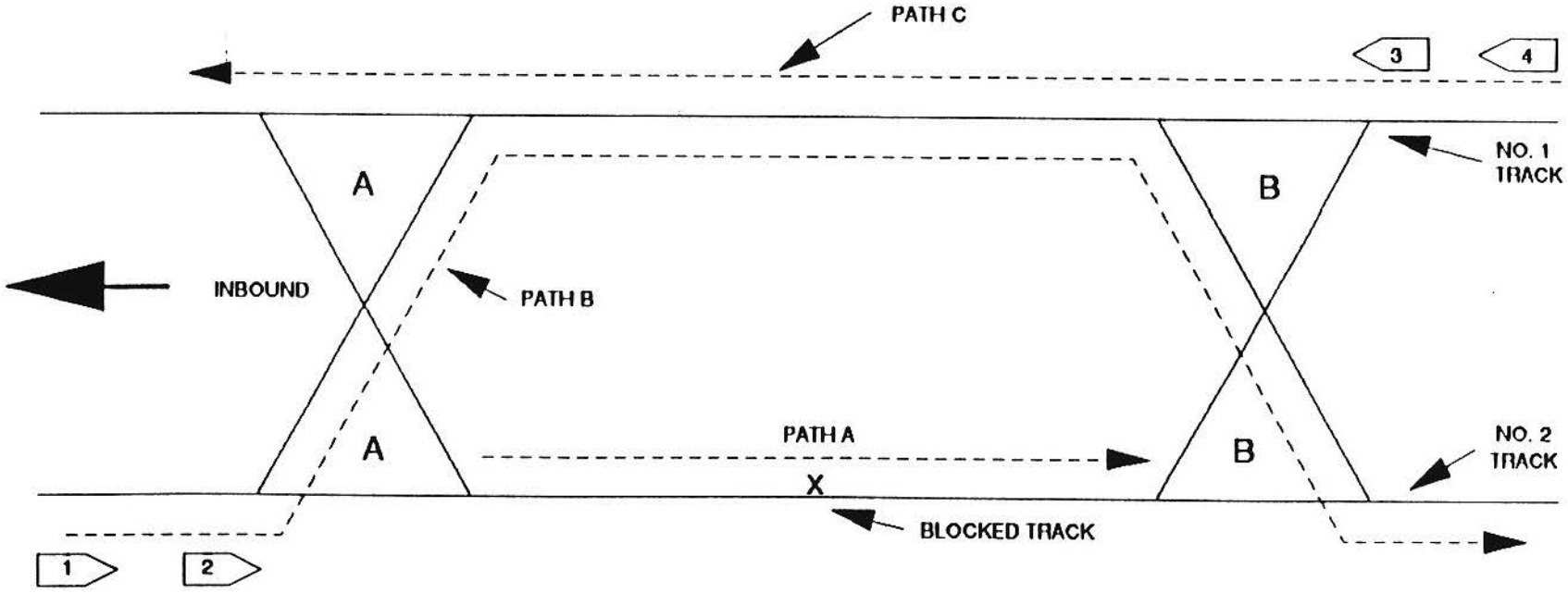
a vehicle failure, in order to avoid the requirement for single-tracking operation. Except under emergency conditions, the disabled train will not carry passengers beyond the next station.

4.3.4 Single-Track Operations

Single-track operation is necessary when one track on a two-track system is blocked or is removed from service for maintenance. When this occurs, it is necessary to operate trains in both directions on one track. Thus, capacity of the restricted system decreases. A number of factors affect the degree of capacity limitation. These factors relate to the civil design, the signal system, and the operating strategy.

Figure 4-3 schematically illustrates a typical single-track operation. In the simplest case, if track 2 is blocked between the two crossovers, then trains can move alternately (one train in each direction) through the single-track section, with the crossovers being used to re-route trains from track 2 to track 1. If r-1 is the running time between crossovers for trains traveling on track 1 (using path C) and if r-2 is the total running time for rerouted trains (those switching tracks at crossover A and B using path B) in the opposite direction on track 2, then every r-1 + r-2 minutes a train can enter the single-track section alternately in either direction. These running times in turn depend on the distance between crossovers, the speed limit through the crossovers, and the speed limits and number of station stops in the single-track segment.

Single-track capacities can be increased by introducing operating strategies such as fleeting, in which several trains are run in one direction prior to running a train in the opposite direction. In Figure 4-3, fleeting would involve the movement of trains 1 and 2 over path B to track 1 via crossover A and returning to track 2 via crossover B, then the movement of trains 3 and 4 over path C. Fleeting can be an effective technique as the system permits controlled following-move capability in the reverse direction of traffic; that is, the system will permit more than one train to move consecutively in the reverse direction on a given section of track.



SINGLE-TRACK
OPERATION

FIGURE 4-3

4.3.5 Midline Turnback

When a train is unable to continue in revenue service, it must be removed from the track as quickly as possible so that other trains may continue operation without interference. In many cases, the fastest way to remove a train from service or to restore service after a delay, is to switch the train to the other track and move it to the nearest storage or maintenance facility. In some instances, revenue trains can be operated to the closest special trackwork at one or both ends of blocked trackage and turned back to create shorter, independent operating segments or to hasten system recovery. When necessary, bus substitution for trains (bus bridge) can be implemented to connect separate operating segments if a blockage is expected to last for an extended period of time.

4.3.6 Consist Breakup

If the failure of a train is localized in a leading or trailing vehicle of a consist, then it may be convenient to break up the consist. The vehicle with the failed equipment can be stored at a convenient storage location while the remaining vehicle continues in revenue service.

4.3.7 Special Trackwork

Figure 4-1, mainline route schematic, schematically shows the types and locations of crossovers and pocket tracks for the Pasadena Line. The distance and estimated trip time between crossover and storage locations are shown in Table 4-9. Typical uses of these facilities are described below:

A. Terminal Trackwork

Section 4.2.2 of this chapter provides the details of the planned use of terminal crossovers and trackwork at terminal stations. In summary, these crossovers and tracks will be used for turnback of trains by permitting trains to enter or depart either station track. Other uses are the storage of failed trains or vehicles and the changing of train consists.

B. Mid-Route Crossovers and Pocket Tracks

Mid-route crossovers and pocket tracks will be used for bypass of maintenance activities, bypass of a stalled train, midline turnback of trains, or (in the case of a pocket track or tail track) storage of failed vehicles. Pocket tracks will be designed to accommodate at least one, 3-car train (300 feet between points of equilateral switches). Mid-route crossovers located in street alignment will be electric powered and will be controlled from the rail vehicle cab via TWC.

TABLE 4-9

PASADENA LINE SPECIAL TRACKWORK TRIPTIME

STATIONS	DISTANCE (MILES)	TRIP (MIN)	SINGLE TRACKING HDWAY (MIN)
UNION STATION			
Double cross-over	0.00	0.00	
CHINATOWN			
Single cross-over			
YARD & SHOP			
GLENDALE BRANCH JCT			
AVENUE 26			
Double cross-over	2.26	4.24	12.5
FRENCH			
MUSEUM			
AVENUE 51			
Double cross-over	2.24	4.07	12.1
AVENUE 57			
MISSION			
Single cross-overs	2.71	4.52	13.0
FILMORE			
Double cross-over	1.85	3.08	10.2
DEL MAR			
Pocket Track/Xover	0.26	0.60	5.2
MEMORIAL PARK			
LAKE			
Single cross-overs	1.70	2.37	8.7
ALLEN			
Double cross-over	2.21	3.23	10.5
SIERRA MADRE VILLA			
Single cross-overs			

NOTES:

Sustained single tracking headway = 2 times one-way trip time plus 4 minutes for signal/switch time and negotiating crossovers.

Goal for sustained single tracking headway is 12 minutes or less.

Special trackwork configurations and locations are subject to change pending final alignment decisions.

4.3.8 Emergency Operations

Procedures for emergency operations will be governed by an emergency preparedness plan. The plan will address, as a minimum:

1. Fire and/or smoke on a train or any other part of the system

2. Fire and/or smoke adjoining or adjacent to the system that threatens the system or disrupts service

3. Collision and/or derailment involving transit vehicles or transit vehicles and automobiles

4. Loss of electric power resulting in a stalled train(s) and/or loss of illumination

5. Evacuation of passengers from a train under adverse conditions

6. Panic of passengers

7. Disabled and/or stalled trains under adverse conditions

8. Flooding

9. Structural collapse or threat of imminent collapse that threatens system

10. Seepage of flammable, toxic, or irritating products into system

11. Serious vandalism or other criminal acts

12. Emergency medical attention required by passengers

13. Extreme weather conditions causing disruption of service

14. Seismic event

15. Trespassing and suicide.

CHAPTER 5

CENTRAL CONTROL OPERATIONS

This chapter describes the basic operational responsibilities and systems requirements for the Central Control Facility (CCF) relative to the operation of the Pasadena Line.

5.1 GENERAL

The central control operations, security and fare inspection functions are located in the two-story structure adjacent to the crossing of the Metro Blue Line and the Metro Green Line at the Imperial/Wilmington stations. The Central Control Facility functions as the nerve center of system operations, for not only the Metro Blue Line, but also the Metro Green Line, Pasadena Line, and the Metro Red Line. Every aspect of mainline and station operations, mainline maintenance activities, and any maintenance-of-way that affects mainline operation will be coordinated and monitored from the CCF. The CCF will also serve as the transit police dispatch center.

5.2 CENTRAL CONTROL RESPONSIBILITIES

With respect to Pasadena Line operations, central control's primary areas of responsibility are system safety and mainline, station, and yard interface operations.

5.2.1 Mainline Operations

Central control personnel will maintain supervisory control over all mainline train operations, maintenance activities, and traction power distribution. They will monitor and coordinate mainline operations in accordance with established operating schedules, rules, and procedures. They will implement any corrective actions that may be required to maintain service schedules and to minimize adverse impacts of equipment failures or emergency situations. During emergencies, central control personnel will be responsible for implementing emergency procedures and coordinating with outside agencies as may be required.

Mainline operations (whether normal or abnormal) will be coordinated and monitored by CCF personnel utilizing radio, telephone, and public address communications systems. Consoles will be used for monitoring wayside signals, interlockings, and traction power and support facilities. Visual display boards will assist in the monitoring of the total mainline system status.

Central control personnel will be responsible for coordinating all yard-related operations that result in train movements between the mainline and the yard. The yard control function will coordinate train movements within the yard. However, once the trains are released from the yard, they come under central control's coordination. Central control will then be responsible for coordinating the dispatch of trains into service from the yard or the removal of trains from service in order to meet mainline schedule requirements.

All central control monitored mainline operations will be coordinated with the Transit Police Dispatch Center, train operators, and yard control, and, when appropriate, with emergency response agencies. The Transit Police Dispatch Center will be the centralized transit police dispatch facility for all lines controlled from the CCF.

5.2.2 Station Operations

Central control personnel will monitor station operations to provide for the safety and security of passengers, employees, and system facilities and equipment.

Central control personnel will view the station area via closed-circuit television (CCTV) monitors linked to camera equipment at each station. In this manner, activities at the station can be visually monitored at all times. If a situation arises that could endanger the health or welfare of passengers, or if equipment or facilities are being tampered with or vandalized, then central control personnel will utilize its direct telephone communications to alert the adjacent Transit Police Dispatch Center. Transit Police personnel will respond to the situation and, if necessary, will contact the proper

authorities for assistance. In addition to the direct telephone link-up between central control and the Transit Police Dispatch Center, there will be a direct link of the CCTV so that any single camera image selected at central control can be monitored at the adjacent Transit Police Dispatch Center.

Besides monitoring the safety and security of passengers and equipment at the stations, central control personnel (CCTV Operators) will notify passengers of any change of schedule or other informational items via a visual and audible public address (PA) system. Controllers will notify maintenance personnel via radio or telephone when equipment or facilities become inoperative or need servicing.

5.3 Central Control Systems Requirements

The following briefly describes the various systems that will be available for central control operation of the Pasadena Line. The configuration and equipment of the systems will be based upon the systems currently in use for the Metro Blue Line.

A. Train Status Display - this system will provide a complete visual indication of train block occupancy, switch settings, signal indications, and summary field equipment and secure area alarm indications. A console-mounted CRT will provide detail, when appropriate, of specified locations and alarm details.

B. Power Control Display/Control Panel (SCADA console) - this will provide a display and appropriate console CRT detail and control of traction power substations. Control of overhead contact system from central control will allow power to be controlled for specific track zones for maintenance and emergency purposes.

C. Radio Communications - this system will provide for a number of channels (user group assignments) that correspond to train, security, maintenance, and emergency operations. A train operations channel will provide for two-way communications between central control and all trains. The security operations channel will also provide for two-way communications for coordination of all system security activities. Maintenance personnel will be provided with an exclusive channel on which to coordinate the maintenance of vehicles and fixed plant equipment and facilities.

An emergency operation channel will be an extra means of communication to be used for special operations during emergencies.

D. Telephone Communications - this system will provide dedicated voice channels for use as telephone extensions from central control to selected sites along the right-of-way. Telephone services will be provided for passenger assistance and for administrative and maintenance purposes. Emergency telephones will be provided at station platforms, emergency power trip (blue light) stations, traction power substations, and at various yard locations.

E. Closed Circuit Television (CCTV) - this system of cameras placed throughout station facilities will terminate at central control for connection to monitor banks and recorders. Surveillance of the station areas will provide ongoing security for passengers and facilities.

F. Public Address (PA) - this system will be used to issue systemwide announcements or selective announcements to stations and trains. In all stations, a hardwired PA system will disseminate visual and audible announcements throughout the station area and along the platforms. A PA system may also be provided in the yard and shop areas to enable personnel in the maintenance office to make announcements anywhere in the maintenance buildings, or in the yard control room to make announcements anywhere in the yard.

G. Tape Recorder - this system will be installed to provide a record of all central control radio transmissions and telephone conversations.

H. Cable Transmission (CTS) - this system will provide the backbone communication link between central control and various field locations. Terminals located at central control and at each major node of the LRT system will be interconnected by the CTS.

I. Supervisory Control and Data Acquisition System (SCADA) - this system will operate over the CTS to transmit and receive data. Supervisory alarm and control circuits will be established to connect each traction power substation with the control consoles. Electrical and support data related to intrusion and field equipment status and alarms will also be transmitted on this system to the appropriate consoles at central control.

CHAPTER 6
STATIONS

Patrons of the Pasadena Line can only board and alight from the system's trains at stations or stops. This chapter discusses the stations and considers their operating conditions. Stations will be designed to incorporate with the requirements of the 1990 Americans With Disabilities Act (ADA).

6.1 STATION DESCRIPTIONS

The 14 initial Pasadena Line station locations are shown on the system map (Figure 2-1).

Station characteristics are listed in Table 6-1 with information such as vertical alignment (e.g., at-grade, aerial, depressed, or subway) placement in the right-of-way, platform configuration, and availability of parking. In general, these locations were established because they:

A. Provide reasonable station spacing for maximizing service coverage and operating speed
B. Provide cross-corridor transit connections
C. Serve major sources of ridership.

6.1.1 Platforms

Platforms will be designed to accommodate 3-car trains (90'-long car). The platform length will be equal to the length of the train plus 9' (4 1/2' at each end) of leeway or platform edge taper. High-level platforms, which are at the same level as the light rail vehicle floor (39" above top of rail), will be used at all station locations. Station platforms will include both center and side configurations depending upon specific site conditions. However, center platforms will be provided whenever possible. The platform edge area will be textured in accordance with ADA requirements to indicate presence of hazard to vision-impaired patrons.

TABLE 6-1

PASADENA LINE STATION CHARACTERISTICS

STATION	STATION TYPE	PLATFORM TYPE	APPROX PARKING SPACES	REMARKS
UNION STATION	AT-GRADE	CENTER (#1)	0	
CHINATOWN	AERIAL	CENTER	8	
AVENUE 26	AT-GRADE	SIDE	105	
FRENCH	AT-GRADE	SIDE	160	
MUSEUM	AT-GRADE	CENTER	0	
AVENUE 51	AT-GRADE	CENTER	75	
AVENUE 57	AT-GRADE	CENTER	100	PARKING STRUCT
MISSION	AT-GRADE	CENTER	52	
FILMORE	AT-GRADE	CENTER	130	
DEL MAR	OPEN CUT	CENTER	600	PARKING STRUCT
MEMORIAL PARK	OPEN CUT	SIDE	0	
LAKE	FRWY MEDIAN	CENTER	0	
ALLEN	FRWY MEDIAN	CENTER	0	
SIERRA MADRE VILLA	FRWY MEDIAN	CENTER	1000	
		APPROX TOTAL PARKING SPACES	2230	

Fare collection areas for at-grade stations will be approximately 30' long at one end of the station or shall be within two 15'-long areas at each end of the platform. Ramps will be provided to facilitate patron flow and to allow for individuals with disabilities access to the ticket vending area. For aerial and subway stations, fare collection areas will be located on the mezzanine or at other appropriate station areas.

In all aerial or subway stations, platform access will be via elevators, escalators, stairs, ramps, or walks as appropriate for the station configuration and wheelchair access.

6.1.2 Station Amenities

Because of the relatively good weather in the Los Angeles area, passenger waiting facilities will not be fully enclosed or air conditioned. A canopy will be provided over a portion of at-grade and aerial platforms. The canopy will cover the fare collection area and approximately 90' of each end-loading platform. Benches will also be provided. Parking will be provided as indicated in Table 6-1. Parking lots will be planned with full provisions for the disabled. Landscape buffers will be designed to separate parking areas from abutting residential properties. Portal signs and various graphics will provide station identification and other directional and safety information.

6.2 STATION OPERATIONS

The current operating concept for the system calls for all passenger trains in revenue service to stop at each station on the Pasadena Line. The average dwell time at each station will be 20 seconds.

Station and associated equipment will be designed to function without a station agent on duty. Any necessary control of the station or essential contact with a patron will be accomplished by CCF personnel using CCTV, public address, and other electronic communications and monitoring systems. The staffing plan for the Pasadena Line will include monitoring personnel for closed-circuit television surveillance of stations.

6.2.1 Station Security

High levels of security/control will be provided. Enforcement will be the responsibility of Transit Police and other law enforcement organizations throughout the corridor. The stations will be open and well lighted, and each will be equipped with CCTV cameras, passenger assistance, and emergency telephones.

6.2.2 Fare Collection

A. Fare Structure:

Fare zones for the Pasadena Line will be based upon the MTA bus operations. Downtown Los Angeles will be the central zone.

B. Barrier-Free System:

Fare collection will be self-service. No barriers will be installed in the stations. Single-ride, round trip, and single-ride with bus transfer tickets will be sold at vending machines provided at each station. The fare vendors will have changemaking capability so that separate change machines will not be necessary. Monthly passes will be sold at offsite outlets used by the MTA for pass sales.

A force of Transit Police will ride the trains and patrol stations and will randomly inspect fare media for validity. Passengers riding with invalid fares will be cited.

C. Intermodal Transfers:

Transfer privileges will be available between the Pasadena Line and the Metro Red Line, bus, and other appropriate transportation services.

D. Revenue Processing:

At present, it is assumed that all revenue processing will be conducted by contract service or by the MTA at their money handling facility at 16th and San Pedro streets. Revenue personnel will collect the revenue from the ticket vending machines and deliver it in specially equipped trucks to the revenue processing facility. Security escort will accompany revenue personnel at all times.

CHAPTER 7
YARD AND SHOP

This chapter defines the yard and maintenance shop operations, functions, activities, and facility requirements for the initial and the future (including Glendale Line) Pasadena Line yard and shop sites. This chapter also defines the requirements for the future maintenance-of-way facilities for the Pasadena and Glendale Lines. The initial yard and shop site contains approximately 8 acres in the City of Los Angeles bounded by Broadway, the L.A. River and the Metrolink maintenance facility. The initial yard and shop site plan is shown on Figure 7-1. The following activities or functions will be performed at the initial or at the future yard and shop site:

A. Vehicle storage and yard operations

B. Vehicle servicing and light maintenance

C. Component replacement and limited repair

D. Parts and Materials storage

E. Maintenance-of-way operations (future)

7.1 YARD AND SHOP DESIGN REQUIREMENTS

The yard and shop design requirements are based upon the operation of the initial Union Station to Sierra Madre Villa segment and the future extensions to Azusa and Glendale/Burbank.

The following requirements constitute the basis for the design and sizing of the yard and shop.

7.1.1 Fleet Size

A. 36 to 40-vehicle initial fleet.

B. 70 to 150-vehicle future fleet.

It is assumed that additional vehicle storage capability will be provided at the end(s) of future line extensions.

7.1.2 System Operation

A. Revenue operation of 20 hours per day, 7 days per week initially.

B. Revenue operation of 24 hours per day, 7 days per week in the future.

C. Train consists of two to three vehicles per train.

D. Eight-minute initial operating headway and four-minute ultimate operating headway during weekday peak periods.

E. Average of 65,000 annual miles per vehicle.

7.1.3 Maximum Vehicle Dimensions

A. Articulated, 3-truck, 6-axle vehicle, approximately 90' in length, 8'-9" in width, 12'-3" in height (23'-6" maximum height with pantograph in "up" position).

B. Empty vehicle weight (AWO) of approximately 98,000 lbs.

C. Other vehicle characteristics will be similar to those for the existing Metro Blue Line vehicles except for wheel gage which will be AAR standard (4' - 7 11/16") for a 4' - 8 1/2" track gage.

7.1.4 Yard Trackwork

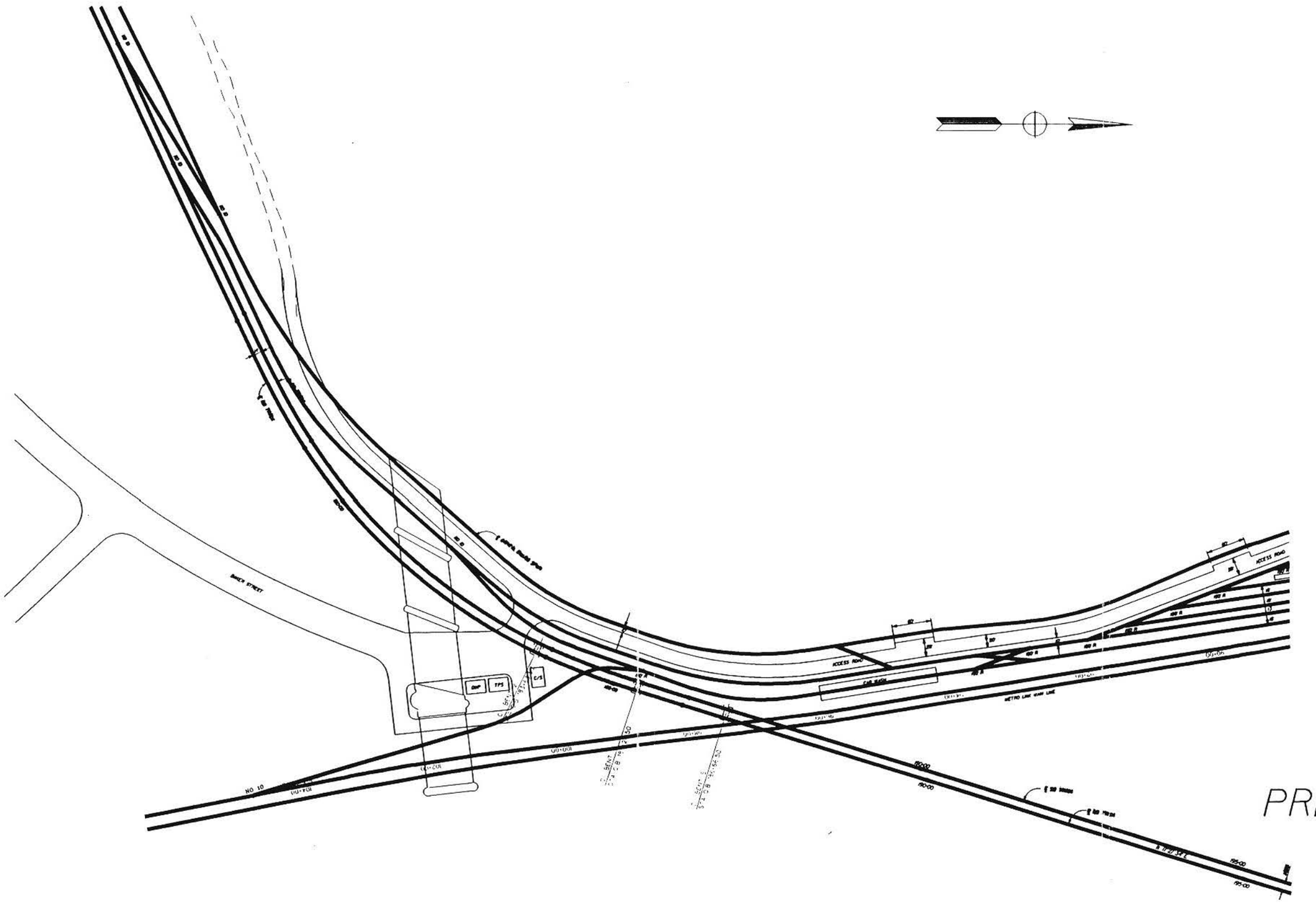
A. Layout design that precludes single-point failures resulting in a shut-down of yard operations; the storage yard ladder tracks at the mainline end of the yard may be paved (except for switchpoint areas) to facilitate the rerailing of derailed cars, should it be necessary.

B. Connections between yard and mainline trackage without route conflicts for simultaneous train arrivals and departures at minimum design headways.

C. Layout design that provides flexibility and efficiency in yard movements while minimizing non-revenue travel distance.

D. Double-ended storage tracks of sufficient length to allow efficient storage of maximum-length trains; storage tracks will have direct access to mainline connecting trackwork and will be on track centers with adequate space for catenary poles and a 4' paved walkway between alternate tracks.

E. Connecting track with adjacent commuter railroad trackage.



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"FIGURE" 7-3
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DESIGNED BY
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CHECKED BY
IN CHARGE
DATE

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ENGINEERING MANAGEMENT CONSULTANT
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Kaszubers-Fribourg Architects
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The Nathaniel Group, Inc.

SUBMITTED _____

APPROVED _____

LAUPT TO PASADENA
BLUE LINE EXTENSION
MIDWAY YARD SITE PLAN

H090

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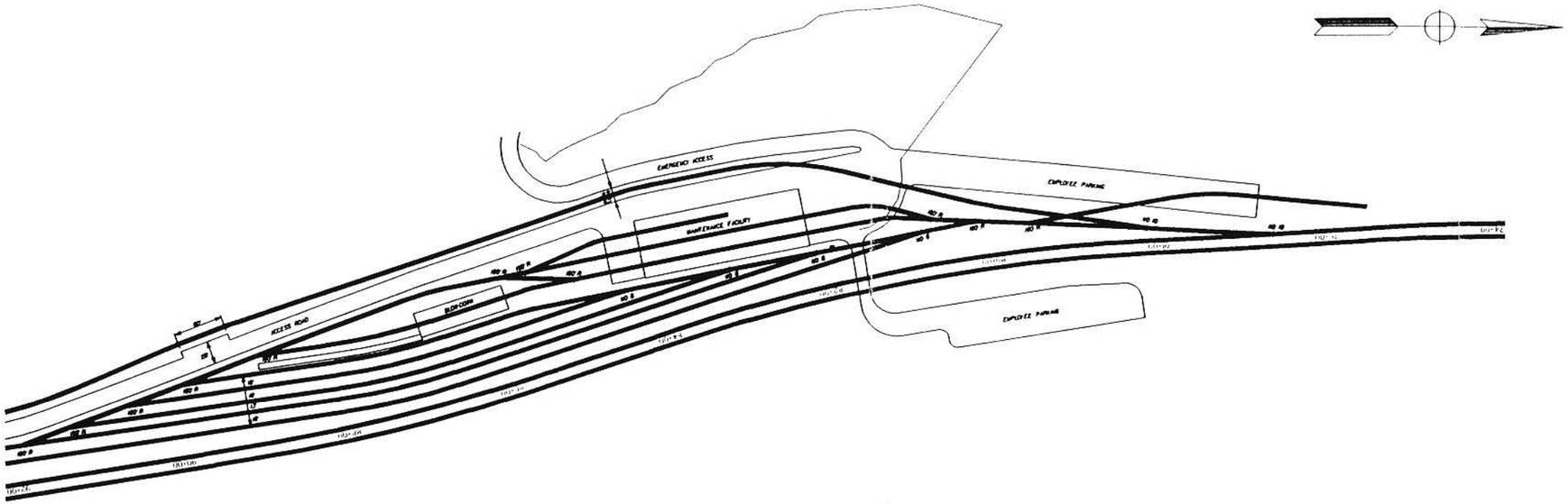

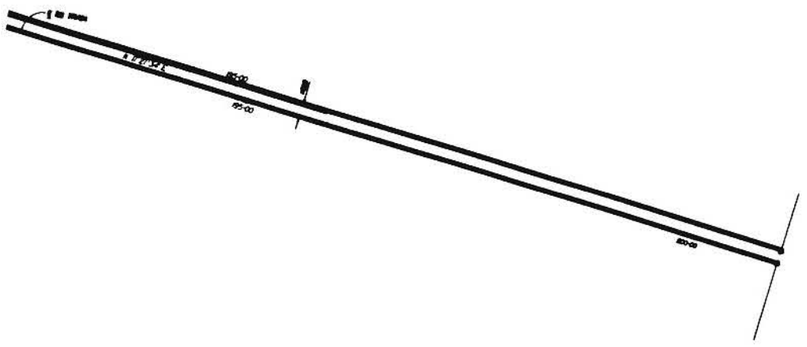

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The Wellership Group, Inc.

SUBMITTED
APPROVED

LAUPT TO PASADENA
BLUE LINE EXTENSION
MIDWAY YARD SITE PLAN

H090
DRAWING NO. 0
SCALE NO SCALE
SHEET NO.

7.1.5 Site Access/Security

A. A network of main access roadways to the primary yard buildings and service roadways to the secondary yard buildings, train storage tracks, and material storage areas will be provided.

B. The entire site will be fenced and adequate lighting will be provided throughout the body of the yard.

C. Single-point entry for normal operations will be controlled by a guard on a 24-hour basis. Other gates will normally be closed and locked. A normally staffed guardhouse and gate with automobile turnaround space will be provided at the main entrance. A gate will be located at the secondary access point, but will not be staffed except during emergency or unusual conditions.

D. Parking for employees, visitors, and others will be provided. Employee parking areas will accommodate the two largest shift changes. When appropriate, mainline access platforms will be provided for yard/mainline trips. The platforms, when provided, will serve as a "flag stop" for employees or accompanied visitors and as a relief point for train operators.

E. Yard site fire protection will, as a minimum, include:

1. Fire hydrants where appropriate in the site to meet the minimum hose reach requirements of the fire department having jurisdiction (usually 300' on center for 150' reach)
2. Emergency fire and rescue access to appropriate points in the site
3. An emergency evacuation plan for yard vehicles and position-specific individuals with coordination and implementation responsibility on each shift
4. Other requirements in accordance with established Fire/Life Safety criteria.

7.2 YARD OPERATIONS

Yard operations consist of all activities and facilities necessary to provide trains for mainline operations and to receive trains from mainline operations in accordance with the established operating schedule. The yard operating plan outlined in this section reflects the basic methodology for accomplishing the necessary yard operations activities.

7.2.1 Yard Operations Concepts

A. All movements within the yard site will be monitored and coordinated by the Yard Controller located in the yard control room on the mezzanine of the vehicle shop.

B. The Yard Controller will coordinate all yard movements using train radio (on yard frequency) and public address communications with yard personnel.

C. All movements within the yard site will be made at a maximum speed of 10 mph or less.

D. All train operators will be qualified for both mainline and yard operations within a single job classification. The majority of train operators reporting for work for mainline or yard assignments will report to a Yard Controller located at the yard site. Operators assigned to runs that require the operation of trains from locations other than the yard will report to a transportation supervisor prior to going on duty. Operators reporting at the yard site for mainline operations will be responsible for taking their scheduled train from the storage yard to the mainline for revenue service.

E. Movement of vehicles into, within, and out of the shop, and movements over shop trackage may be performed by qualified maintenance personnel.

F. The transition where the authority for train operations is under the jurisdiction of central control (for movements to and from the mainline) or the Yard Controller, (for movements to and from the yard), will be accomplished on the yard arrival/departure tracks.

7.2.2 Yard Movements and Related Activity

Transportation and Maintenance Departments' operations and responsibilities associated with the yard-related activities include:

A. Train movements to/from revenue service

B. Vehicle movements to/from vehicle shop

C. Consist Changes

D. Vehicle inspection

E. Vehicle interior cleaning

F. Vehicle exterior cleaning

G. Major scrub

H. Vehicle sanding (replenishment of vehicle on-board sand hoppers).

The methodology for accomplishing the required yard and yard related activities is described below.

1. Yard to Revenue Service Moves (Pull-Out):

   a. Operator reports to Yard Controller prior to scheduled pull-out.

   b. Operator receives car number, or numbers if multicar consist, and location of consist in the yard from the Yard Controller.

   c. Operator proceeds to yard and locates consist.

   d. Operator performs pre-pull-out inspection (walk around visual inspection) and pre-operating check (brakes, lights, doors, etc.) and notifies Yard Controller of any deficiencies.

   e. Yard Controller notifies Maintenance Department of defects.

   f. Mechanic determines if defect is serious enough to retain vehicle from entering revenue service or determines if quick fix can be made. Mechanic performs fix if it will get consist into revenue service on schedule. If fix will take an extended period of time, then mechanic puts consist or vehicle on hold list with Yard Controller. Operator obtains new vehicle or consist assignment from the Yard Controller and repeats from step "c" above.

g. Operator moves vehicle or consist to the transition area at the direction of the Yard Controller, and into revenue service at the direction of Central Control.

2. Revenue Service to Yard Moves (Pull-In):

a. Yard Controller directs train operator to spot inbound consist at the shop building, the washer, cleaning platform, or a specific storage track. Cars requiring work (preventive maintenance, corrective maintenance, washing, or daily inspection) which cannot be handled immediately are placed on one of the tracks in the storage yard designated for such cars. Consists requiring only interior cleaning are placed on the cleaning platform track.

b. Operator spots consist as directed and reports to the Yard Controller for sign on, layover, or next assignment.

c. Yard Controller coordinates any defects or other work to be done with Maintenance Supervisor.

d. Yard Controller directs operator or qualified maintenance person (shop movements only) to move car or consists appropriately as follows:

- From the storage yard to the washer, shop, or other storage track
- Through the vehicle washer to the storage yard
- From the shop to the washer or storage yard
- From one shop track to another shop track.

e. Maintenance personnel perform daily inspections, washing, cleaning, preventive maintenance, or corrective repair as required.

f. Maintenance Supervisor updates the daily workload schedule and other documentation as required.

3. Routine Car Cleaning:

Car interior cleaning will be performed at least once daily at the cleaning platform. Initially, car exterior washing is planned for every other day. Depending on experience and environmental conditions, exterior washing may be

scheduled for every third day, once per week, or other appropriate interval. Interior car cleaning will involve:

a. Picking up loose papers, cans, bottles, and other bulky items left in the car.

b. Sweeping the floor and picking up residue.

c. Removing graffiti.

d. Cleaning windows that are smeared or dirty.

e. Collecting debris in plastic garbage bags and taking it out of the car to the yard dumpster or refuse collector.

4. Major Scrub

Performed by Maintenance Department personnel in the car washer or in the shop after quarterly inspection and involves the following activities:

a. Clean all windows

b. Scrub and wax vinyl or special coverings

c. Scrub and clean wainscots and ceiling liners

d. Clean all fixture lenses

e. Hand wash car roof area, wash car including car ends, clean cab areas and seats, remove graffiti, fill sand hoppers.

5. Daily Inspection

Performed on the service and inspection shop tracks or on yard tracks by Maintenance Department personnel once per day per car, normally before revenue service or after peak-period service.

Daily inspection will involve inspecting at least the following:

a. Pantograph and other roof-mounted equipment

b. Undercar equipment

c. Trucks (including wheels and brake components)

d. Doors

e. Couplers

f. Interior and exterior lights

g. General condition of car exterior

h. General condition or car interior

i. Radio, public address, and intercom

6. Sanding:

Replenishment of on-board vehicle sand hoppers will be performed manually in the yard or during all monthly inspections (in the shop) and on an as-needed basis during daily inspections.

7.3 OPERATIONS FACILITIES

The facilities to be located within the yard and shop site that are required for the yard and mainline operations function will be located on the mezzanine of the vehicle shop. This location, will allow yard operations to be located in the vicinity of the yard areas where the majority of the operations activity occurs and will also allow more flexibility to accommodate an efficient yard layout given the normal constraints of the potential sites.

The operations facilities will accommodate the following operations activities:

A. Yard control

B. Operator reporting and training

C. Operations administration

7.3.1 Yard Control

All train or vehicle movements within the yard will be coordinated and monitored by the Yard Controller located in the yard control room. The yard control room will be located at a corner on the mezzanine of the vehicle shop and will be staffed at all times. The yard control room will be designed to provide as unrestricted a view of the yard trackwork as possible. The most critical yard areas requiring unrestricted viewing are:

A. Trackage between yard and mainline

B. Yard storage tracks

C. Vehicle washer and cleaning platform

The window area for the yard control room will be maximized and windows will be tinted and sloped to reduce glare and transmission of heat.

Close communication, plus use of established schedules, rules, and procedures will be necessary between the Yard Controller and the Train Controller at central control for coordination of train movements between the yard and the mainline. Support for the maintenance facilities will require close coordination between the Yard Controller and designated maintenance personnel.

The yard control room will require approximately 350 square feet of floor space for radio, PABX, public address, and emergency communications; a magnetic yard trackwork schematic; computer terminals; and a desk for the Yard Controller. The yard control room will also be provided with a computer-type floor and air conditioning and will be separated from the operator reporting area by a counter.

7.3.2 Operator Reporting

The train operator reporting area will be located on the mezzanine of the vehicle shop adjacent to the yard control room and will be the reporting location for the mainline and yard train operations personnel who begin and end their shift at the yard. Administrative offices for operations supervisory personnel will also be located on the mezzanine of the vehicle shop.

The operations reporting and administration facilities will be air conditioned and will include the following:

A. Dispatch area with a counter and a secured storage room for the processing of train operators going on and off duty including the issuing and receiving of train operators' equipment such as portable radios, vehicle keys, flashlights, etc.

B. Offices for yard and mainline supervisory personnel

C. Reporting room and lunch room for operations personnel

D. Training and conference rooms

E. Men's and women's restrooms, showers, and locker rooms (50-50 ratio)

Approximately 3,500 square feet of floor space will be required for these operational areas. Additional design data for the operations facilities are listed in Table 7-1. The floor plan for the initial operations facilities is shown on Figure 7-2. A potential floor plan for the future yard and shop is shown on Figure 7-3.

7.4 MAINTENANCE OPERATIONS

The maintenance plans for rail vehicles and facilities for the Pasadena Line are presented in this section.

7.4.1 Maintenance Philosophy

A. General

Functionally, the maintenance organization is a service organization responsible for making available to operations, on a timely basis, the facilities and equipment necessary to perform their intended functions safely, efficiently, and economically.

Controlled maintenance over the life of a system is economical, conducive to lower operating costs, and contributes to an increased availability of facilities and equipment. The primary objectives of controlled maintenance programs are:

1. To maximize the safety, comfort, satisfaction, and convenience of passengers and employees

2. To provide adequate protection of property and equipment

3. To minimize system downtime

4. To minimize operating costs.

B. Preventive Maintenance

Preventive maintenance programs consist of routine tasks which are scheduled and performed at specified intervals. Tasks such as inspection, cleaning, lubrication, and servicing are included in preventive maintenance programs. The objectives of preventive maintenance programs are to:

1. Maximize passenger comfort and satisfaction

2. Reduce service failures and resultant corrective maintenance

3. Prolong facility and equipment life

4. Provide for inspection to ensure operational safety and system dependability

5. Minimize system maintenance costs

6. Optimize workload schedules.

C. Corrective Maintenance

Corrective maintenance consists of troubleshooting, repairing failed equipment, and returning the equipment to service.

The goal of corrective maintenance is to return a failed piece of equipment to service as quickly as possible in order to minimize system downtime and to reduce the time required to restore operational service. To accomplish this goal, corrective maintenance includes two distinct methods for troubleshooting and repairing system elements and subsystems as follows:

1. The restoration to service of a failed system element will be accomplished, where possible, by a technique called unit exchange, which involves replacing the lowest-level replaceable unit. When a system element fails, diagnostic technicians will respond to the failure and correct the problem, if possible, by replacing the failed unit from a supply of like units previously tested and adjusted to perform the intended function. Unit exchange requires that equipment and facilities be designed and configured so that repairs can be accomplished in this fashion and that provisions are made in manufacturing to assist the diagnostic technician in quickly and effectively determining the problem. This may require the incorporation of special fault indicators, portable test equipment, and a supply of critical replacement units.

2. Corrective maintenance of assemblies or components will consist of troubleshooting and repairing failed assemblies or components and then testing and adjusting the assemblies or components to meet the intended function and to ensure the correctness of the repair. To accomplish the corrective maintenance of failed assemblies or components requires that equipment and facilities be provided so that repairs and overhaul activity will be accomplished in a component repair shop under conditions of efficient shop layout, cleanliness, competent supervision, adequate testing, and quality control.

D. Testing

Testing will be accomplished by the use of test apparatus configured to perform static and dynamic testing at the vehicle or wayside system and subsystem levels, and static bench testing at the assembly and component levels. The objectives of thorough testing are:

1. To ensure proper function of items under test

2. To provide for timely and accurate failure diagnosis

3. To reduce the time required to restore equipment to serviceable condition (and reduce the resultant costs) by identifying the lowest-level, failed, replaceable component.

E. Contract Maintenance

In certain instances, it may be more cost effective to have assembly or component repair and overhaul work performed by service contracts. The degree to which component or assembly repair and overhaul work is contracted out to local service shops or to the original equipment manufacturers is an important determinant of maintenance facility requirements, staffing, personnel skill levels, spare parts inventory, and component repair procedures. Factors to be evaluated in the decision include:

1. MTA policies and practices
2. Availability of suitable contractors
3. Logistics, inventory, and material-handling requirements
4. Labor agreements
5. Special equipment requirements and costs
6. Availability of special skills and workload of maintenance forces
7. Liability implications
8. Equipment warranty implications
9. Relative costs.

F. Maintenance Scheduling

Maintenance scheduling maintains all vehicle and wayside workload schedules (preventive maintenance, corrective repairs, overhauls, modifications, etc.). This function coordinates maintenance requirements with operations, engineering, and inventory control personnel to ensure availability of vehicles, wayside elements, parts and materials, and the resolution of problems. Maintenance scheduling also maintains all vehicle and wayside maintenance records and documentation and provides the backup for the preparation of reports, analyses, and annual maintenance budgets.

7.4.2 Rail Vehicle Maintenance

The following vehicle maintenance activities will be performed at the Pasadena Line Yard and Shop:

- Daily inspection
- Preventive maintenance
- Corrective repairs
- Major component changeout
- Undercar blowdown
- Interior cleaning
- Exterior washing
- Limited component repair (future)

- Wheel Truing (future)

- Painting (future)

Each vehicle operated in revenue service will be inspected daily in the service and inspection bay of the shop building or in the yard. Daily inspection will consist of a general safety and vehicle condition type of inspection (see 7.2.2, item 5).

Preventive maintenance for rail vehicles will be performed on the basis of hours or miles of mainline operation in accordance with the manufacturers' recommendations. Changeout of major components will involve the replacement of failed components or scheduled changeouts. Components removed from vehicles will be shipped to the appropriate component repair location (e.g. Long Beach main yard, Red Line yard, other MTA facility, contract vendor, or the manufacturer). Limited component repair capability will be provided in the future for vehicle truck assemblies, vehicle electronic components, batteries, and various electrical and mechanical components which can be repaired quickly and easily after removal from a vehicle. Major carbody repairs, wheel truing, and painting will be performed either at the Red Line Yard and Shop or at another MTA facility.

Interior cleaning of rail vehicles will be performed daily at the car cleaning platform. The cleaning platform will be located between two tracks in the vicinity of the car washer or the blowdown facility. Power outlets, hose bibs, and lighting will be provided along the cleaning platform. The platform will accommodate at least 3 cars (270 feet) on each side, will be at least 6 feet in width, and will be equipped with an access ramp and stairs. Exterior cleaning will be performed in the car washer. Trains or cars will operate through the washer in the wash mode. The wash operation will be initiated by the train operator at a control panel located at the entrance to the washer. The car washer will include storage and mixing tanks for water and cleaning chemicals, recycling equipment, brushes, water and chemical application arches with splash shields, manual cleaning platforms, local control panel, power outlets, hose bibs, and lighting. The design of the car washer will be similar to the washers located at the Metro Blue Line and the Metro Green Line yards and shops. Initially, each rail vehicle will be washed once every two days. Provision will also be made for an undercar blowdown facility to

be located adjacent to the car washer or the vehicle shop.

7.4.3 Vehicle Shop Requirements

The vehicle maintenance shop will include the space, facilities, and equipment needed to accomplish the required activities in an efficient and orderly manner. The future vehicle shop will be capable of maintaining all of the rail vehicles for the Pasadena and Glendale Lines. The overall facility layout will have an orderly arrangement of maintenance functions by activity, and in such a manner that each work activity can be performed with a minimum of interference from the other work activities. The vehicle work positions will be designed for quick and easy access to vehicle equipment.

The requirements for the vehicle shop are as follows:

A. The initial and the future shops will be designed to provide at least the following vehicle work positions:

Initial Shop	Future Shop	
0	1	in-floor vehicle hoist position
1	1	floor level position (for portable vehicle jacks)
4	4	pit positions
0	2	wheel truing positions
=	=	
5	8	shop positions total

B. Shop tracks will accommodate not more than 2 cars each and will be spaced 25 feet apart, insofar as possible.

C. An overhead contact wire system will be provided for the movement of cars into/out of the shop. Sectionalization of the OCS will be provided for each rail vehicle shop position (the wheel truing track will be considered as one vehicle position).

D. The future wheel truing machine track will be separated from other shop tracks due to noise considerations. The wheel truing machine will be located near the center of the track to allow a car to remain within the shop during wheel truing and to allow other maintenance activities when the machine is not in use. The wheel truing machine shall be interlocked with the OCS in order to prevent simultaneous operation.

E. The future in-floor hoist position will be located in line with a floor-level position with reinforced floor areas for accommodating portable LRV jacks. The in-floor vehicle hoists will be shallow-pit type. The body supports will also be capable of lifting the vehicle. Three manually operated truck turntables will provide access to a truck/component track located adjacent to the in-floor hoist position. The truck/component track will be equipped with one truck hoist and one or two 7 1/2-ton capacity jib cranes.

F. Vehicle pit work positions will be equipped with stairs, ramps, lighting, water, conpressed air, and power as provided for the service and inspection pits at the Metro Green Line and Blue Line Shops.

G. A two-ton capacity jib crane will be provided for two of the shop tracks equipped with pits. The two-ton capacity jib crane located over the pit positions will be interlocked with the OCS to preclude simultaneous operation.

H. An inspection/maintenance platform will be provided in conjunction with the two-ton capacity jib crane for access to rail vehicle roof-mounted equipment at the two pit work positions. A safety catwalk with handrailing will be provided at the opposite side of the car roof from the inspection/maintenance platform.

I. An assembly/parts cleaning room will be provided in the future shop for the steam cleaning or blowdown of vehicle trucks and other major vehicle components. The cleaning room will be located to allow access to/from the truck/component track.

J. The undercar blowdown facility will be equipped with an adequate pit (full length and width access), compressed air, water, breathable air, and appropriate environmental (dust collection) system.

K. The use of natural light will be maximized in the design of the shops.

L. A loading/unloading dock or equivalent will be provided in conjunction with the parts and materials storeroom.

The floor space requirements for the Pasadena Line operations and vehicle maintenance functions located in the vehicle shop are shown in Table 7-1.

The estimated staffing for future Pasadena Line operations and maintenance to be used for the design of the future yard and shop facilities is shown in Table 7-2. The estimated staffing requirements for the initial Pasadena Line operations and maintenace is presented in Chapter 8.

The floor plans for the first floor and the mezzanine of the vehicle shop are shown in Figure 7-2 for the initial shop and in Figure 7-3, for the potential future shop.

TABLE 7-1

VEHICLE SHOP DESIGN DATA

APPROXIMATE

ROOM/SPACE	SQ. FT.	REMARKS
Yard control room	300	Mezzanine (corner location) with view of yard.
Transportation offices	1,000	Mezzanine
Train operator reporting room	500	Adjacent to Yard Control room on mezzanine
Transportation restrooms/lockers	900	Mezzanine, with 50:50 men-to-women ratio.
Transporation Training/Conference room	500	Quiet area on mezzanine.
Transporation lunch room	400	Mezzanine

TABLE 7-1 (CONTINUED)

ROOM/SPACE	SQ. FT.	REMARKS
Maintenance offices	1800	1000 sq. ft. on 1st floor. 800 sq.ft on mezzanine.
Maintenance training/conference room	500	Mezzanine.
Maintenance lunch room	400	First floor preferred
Maintenance restrooms/lockers	900	Preferably on first floor, 90:10 men to women ratio
Car cleaning supplies	300	First floor or adjacent to car cleaning platform in yard.
Electronic test & repair	400	First floor (future)
Small component repair	350	First floor
Major component area	3000	Adjacent to truck/component track (future)

TABLE 7-1 (CONTINUED)

ROOM/SPACE	SQ. FT.	REMARKS
Parts storeroom	8000 (avg.)	First floor, with mezzanine (4,000 s.f. minimum initially, 12,000 s.f. in future)
Parts office & records	250	Adjacent to storeroom.
Secured parts storage	250	Adjacent to storeroom.
Toolroom	300	Adjacent to storeroom.
Tool cart storage	150	First floor.
Assembly/parts cleaning room	400	First floor accessible from truck/component track (Future)
Battery room	200	First floor on outside wall (Future)
Forklift/electric cart storage	As req'd.	For 5-6 vehicles. Near battery room.

TABLE 7-1 (CONTINUED)

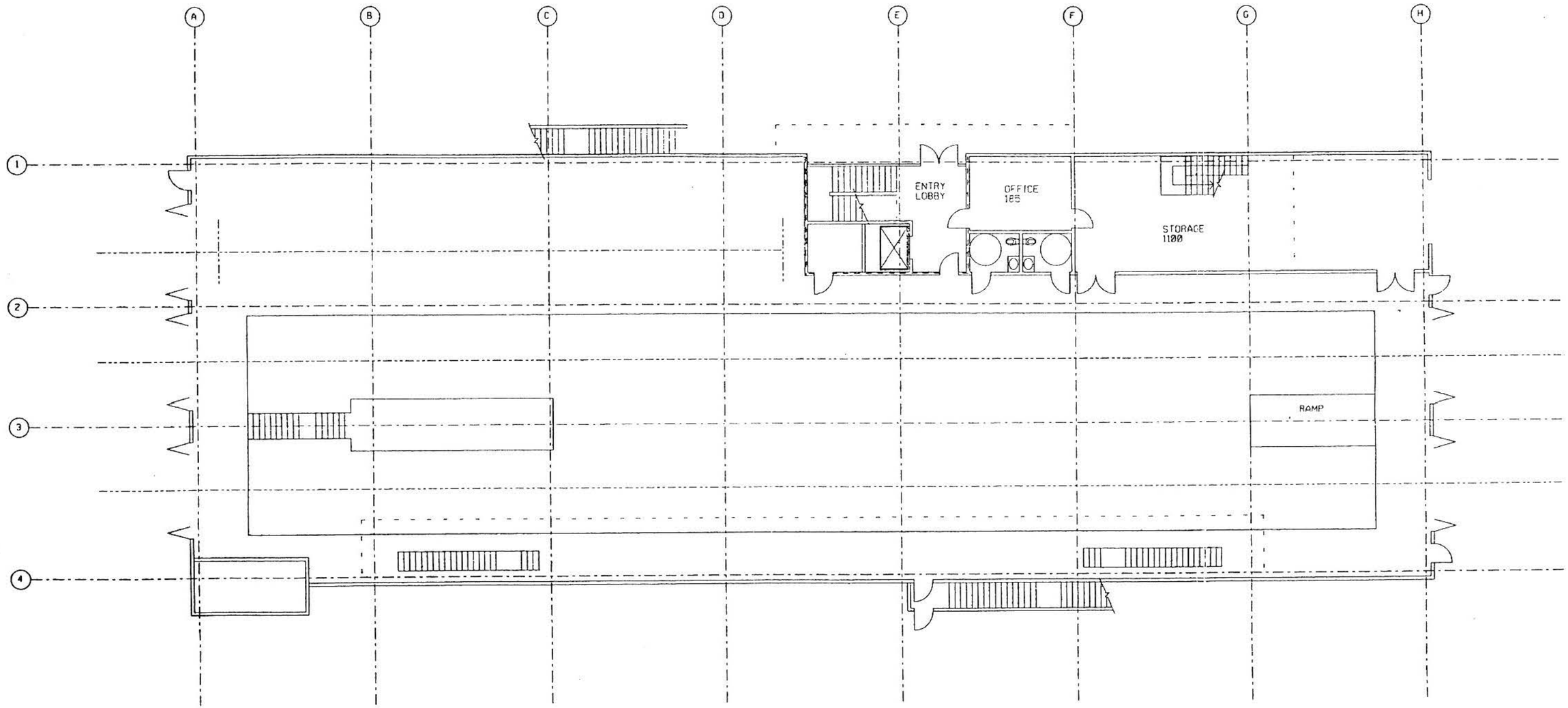
ROOM/SPACE	SQ. FT.	REMARKS
Communications Equipment Room	200	First floor, preferred. Includes UPS battery room.
Air compressor room	600	Isolate due to noise.
Mechanical/electrical equipment rooms	As req'd.	

TABLE 7-2

PASADENA LINE FUTURE YARD AND SHOP - DESIGN STAFFING

JOB CLASSIFICATION	DAYS/ WEEK	DAY	AFTN	NITE	TOTAL STAFF
TRANSPORTATION:					
MANAGER	5	1	0	0	1
ASSISTANT MANAGER	5	1	0	0	1
SECRETARY	5	1	0	0	1
INSTRUCTOR	5	2	0	0	2
ANALYST	5	1	0	0	1
SUPERVISOR	7	3	3	2	13
TRAIN OPERATOR	7	19	19	14	84
SUBTOTAL		28	22	16	103
VEHICLE MAINTENANCE:					
ASSIST. MANAGER	5	1	0	0	1
SECRETARY/CLERK	5	1	0	0	1
INSTRUCTOR	5	1	0	0	1
WARRANTY ANALYST	5	1	0	0	1
SUPERVISOR	7	2	1	1	6
ELECTRO MECHANIC	7	8	8	8	39
LABORER/CLEANER	7	3	3	5	18
SUBTOTAL		17	12	14	67
FACILITIES MAINTENANCE:					
ASSIST. MANAGER	5	1	0	0	1
SECRETARY/CLERK	5	1	0	0	1
SUPERVISOR	7	3	2	2	11
MAINTAINER	7	5	6	7	29
LABORER	7	2	3	4	14
SUBTOTAL		12	11	13	56
MATERIAL DEPARTMENT:					
SUPERVISOR	5	1	0	0	1
STOREKEEPER	5	1	0	0	1
STOCK CLERK	7	2	1	1	6
SUBTOTAL		4	1	1	8
TOTAL		61	46	44	234

THE STAFFING LEVELS SHOWN ARE INTENDED ONLY FOR USE IN THE DESIGN OF THE FUTURE YARD AND SHOP FACILITIES AND ARE NOT INTENDED TO REPRESENT EITHER INITIAL STAFFING LEVELS OR FINAL JOB CLASSIFICATION TITLES.



FIRST FLOOR PLAN

FIGURE 7-2
PG. 7-26

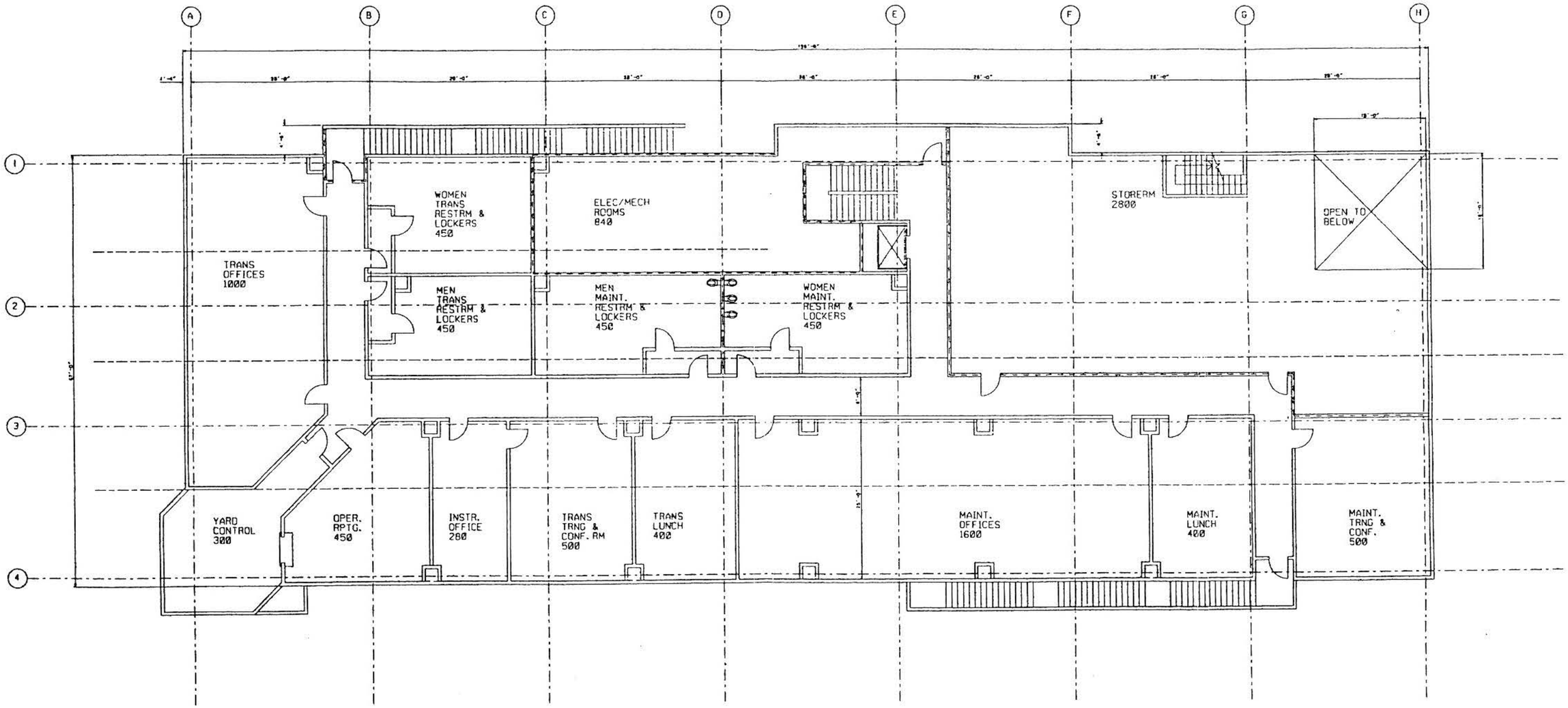
REV.	DATE	BY	SUB.	APP.	DESCRIPTION

REV.	DATE	BY	SUB.	APP.	DESCRIPTION

DESIGNED BY
DRAWN BY
CHECKED BY
IN CHARGE
DATE

A · C · G
ENVIRONMENTS
SUBMITTED _____ APPROVED _____

DRAWING FILE	CONTRACT NO.
REFERENCE FILE	DRAWING NO. / REV.
USER NAME	SCALE
PLOT DATE	SHEET NO.



SECOND FLOOR PLAN

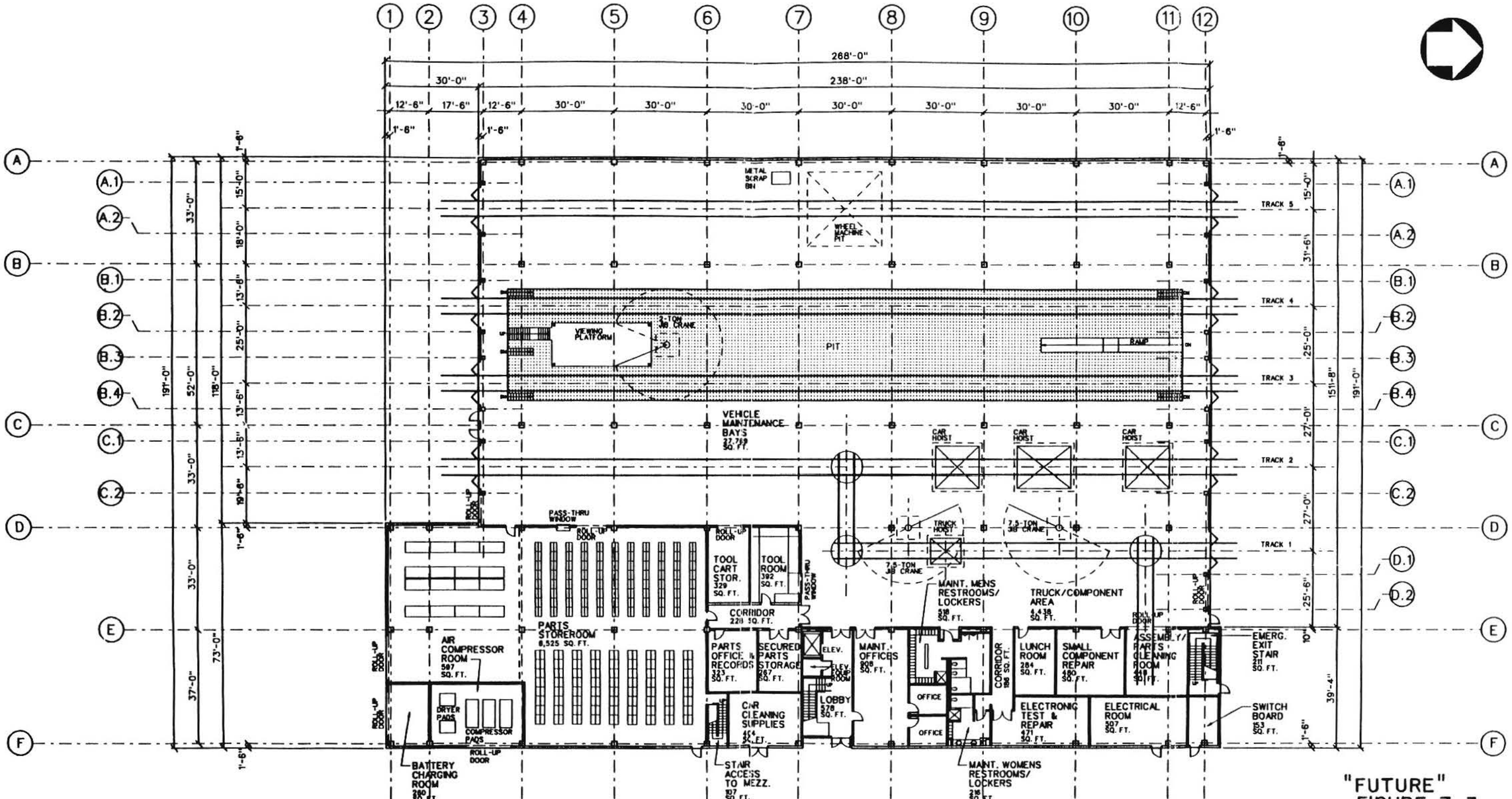
FIGURE 7-2
PG. 7-26A

REV.	DATE	BY	SUB.	APP.	DESCRIPTION	REV.	DATE	BY	SUB.	APP.	DESCRIPTION

DESIGNED BY
DRAWN BY
CHECKED BY
IN CHARGE
DATE

A · C · G ENVIRONMENTS
SUBMITTED _____ APPROVED _____

DRAWING FILE	CONTRACT NO.
REFERENCE FILE	DRAWING NO. / REV.
USER NAME	SCALE
PLOT DATE	SHEET NO.



"FUTURE"
FIGURE 7-3
PG. 7-27

0 8' 64'
1/16" = 1'-0" GRAPHIC SCALE

REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED BY A. RAY
DRAWN BY A. RAY
CHECKED BY J. SOTO
IN CHARGE J. SOTO
DATE 7 MAY 92

a Subsidiary of the Los Angeles County Transportation Commission
Rail Construction Corporation
METRO PASADENA PROJECT

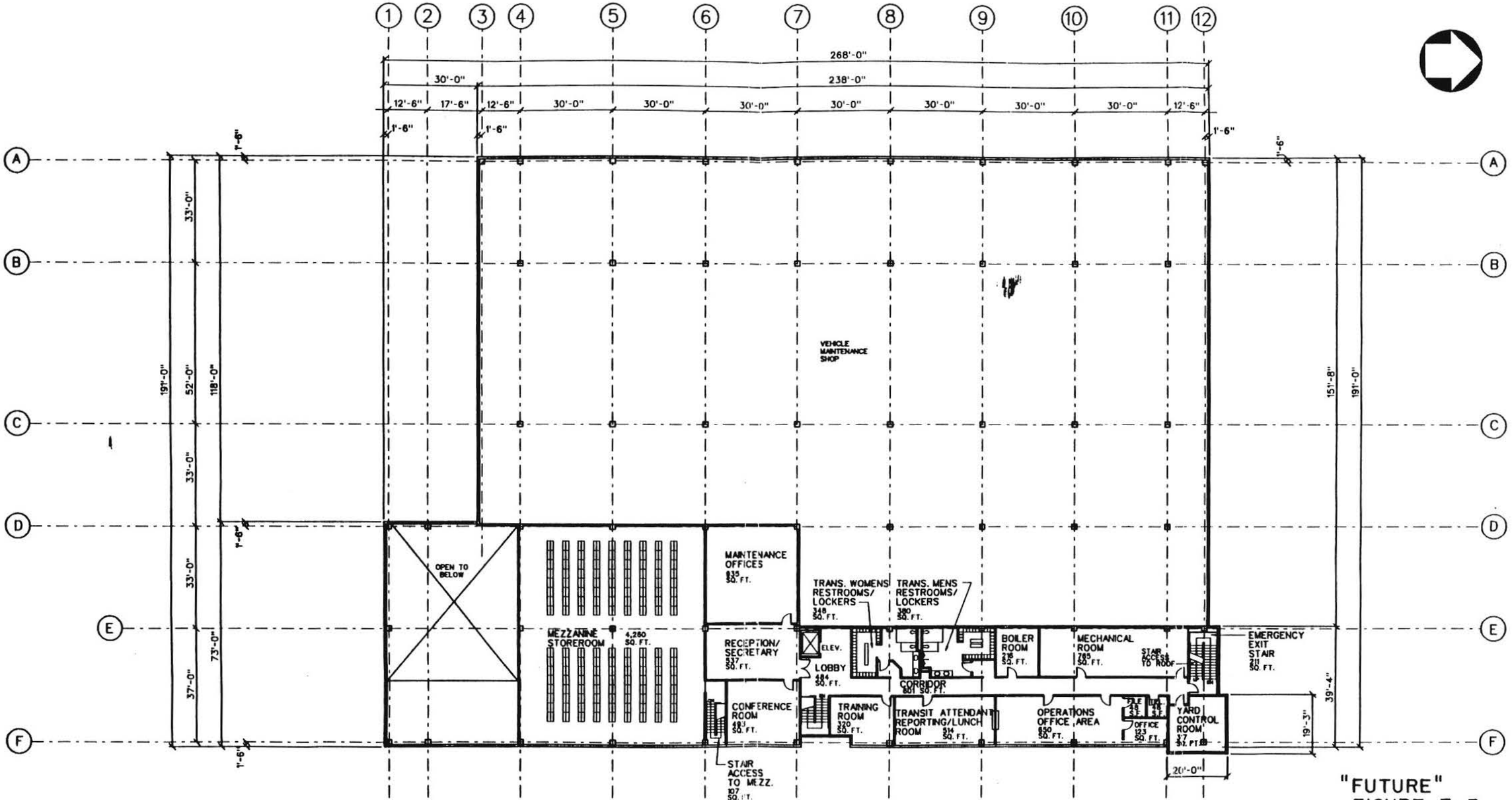
METRO RAIL TRANSIT CONSULTANTS
DMJM/PBQD/KE/HWA

SUBMITTED _____ APPROVED _____

LAUPT TO PASADENA MAINT. YARDS & SHOPS

COMPOSITE GROUND FLOOR PLAN

CONTRACT NO
DRAWING NO AR-17-12 REV
SCALE 1/16" = 1'-0"
SHEET NO



"FUTURE"
FIGURE 7-3
PG. 7-27A

0 8' 64'
1/16" - 1' - 0" GRAPHIC SCALE

REV	DATE	BY	SUB	APP	DESCRIPTION	REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED BY A. RAY
DRAWN BY A. RAY
CHECKED BY J. SOTO
IN CHARGE J. SOTO
DATE 7 MAY 92

Rail Construction Corporation
A Subsidiary of the Los Angeles County Transportation Commission
METRO PASADENA PROJECT

METRO RAIL TRANSIT CONSULTANTS
DMJM/PBQD/KE/HWA

SUBMITTED _____ APPROVED _____

LAUPT TO PASADENA MAINT. YARDS & SHOPS

COMPOSITE MEZZANINE FLOOR PLAN

CONTRACT NO
DRAWING NO AR-17-13 REV
SCALE 1/16" - 1' - 0"
SHEET NO

7.5 MAINTENANCE-OF-WAY (FUTURE)

7.5.1 Maintenance-of-Way Functions

Facilities maintenance functions for the Pasadena Line will be performed primarily out of the maintenance-of-way facility located at MTA's Metro Red Line yard site. The future facilities maintenance functions associated with the Pasadena Line include inspection, maintenance, and repair of the following elements:

- Trackwork
- Train control/signaling (including grade crossings)
- Communications
- Traction power and overhead contact system
- Fare collection equipment
- Stations and other structures
- Landscaping, fencing and other right-of-way elements
- Maintenance vehicles and equipment

The actual facilities maintenance work will be carried out at the equipment site and will require personnel to travel with necessary tools, equipment, and material to the specific site. Diagnostic maintenance techniques will be used and faulty components will be replaced or repaired at the site. Utilizing the philosophy of lowest replaceable unit exchange whenever practicable, failed items will generally be replaced and, if repairable, consigned to the designated component repair or electronics shop.

Facilities maintenance will be accomplished utilizing a combination of system personnel and service contracts. Generally, the approach to facilities maintenance will parallel that utilized for the Blue Line. To the extent practical, personnel and equipment for other Metro lines will also be utilized for the Pasadena Line.

7.5.2 Maintenance-of-Way Facility

An additional facility for maintenance-of-way will be provided at the future Pasadena Line yard and shop site. The maintenance-of-way facility will accommodate the following activities:

1. Staging point for Pasadena Line facilities maintenance personnel, vehicles and equipment.

2. Storage (indoor and outdoor) of facilities - related components and materials.

3. Storage (indoor and outdoor) of maintenance vehicles, equipment, and tools.

4. Staging area for wayside component dispositions to various component repair shops and contract vendors.

5. Storage track for track machines and other rail-borne equipment (track will be at least 300' in length).

6. Offices for maintenance-of-way supervisory personnel.

7. Employee restrooms, lockers and showers.

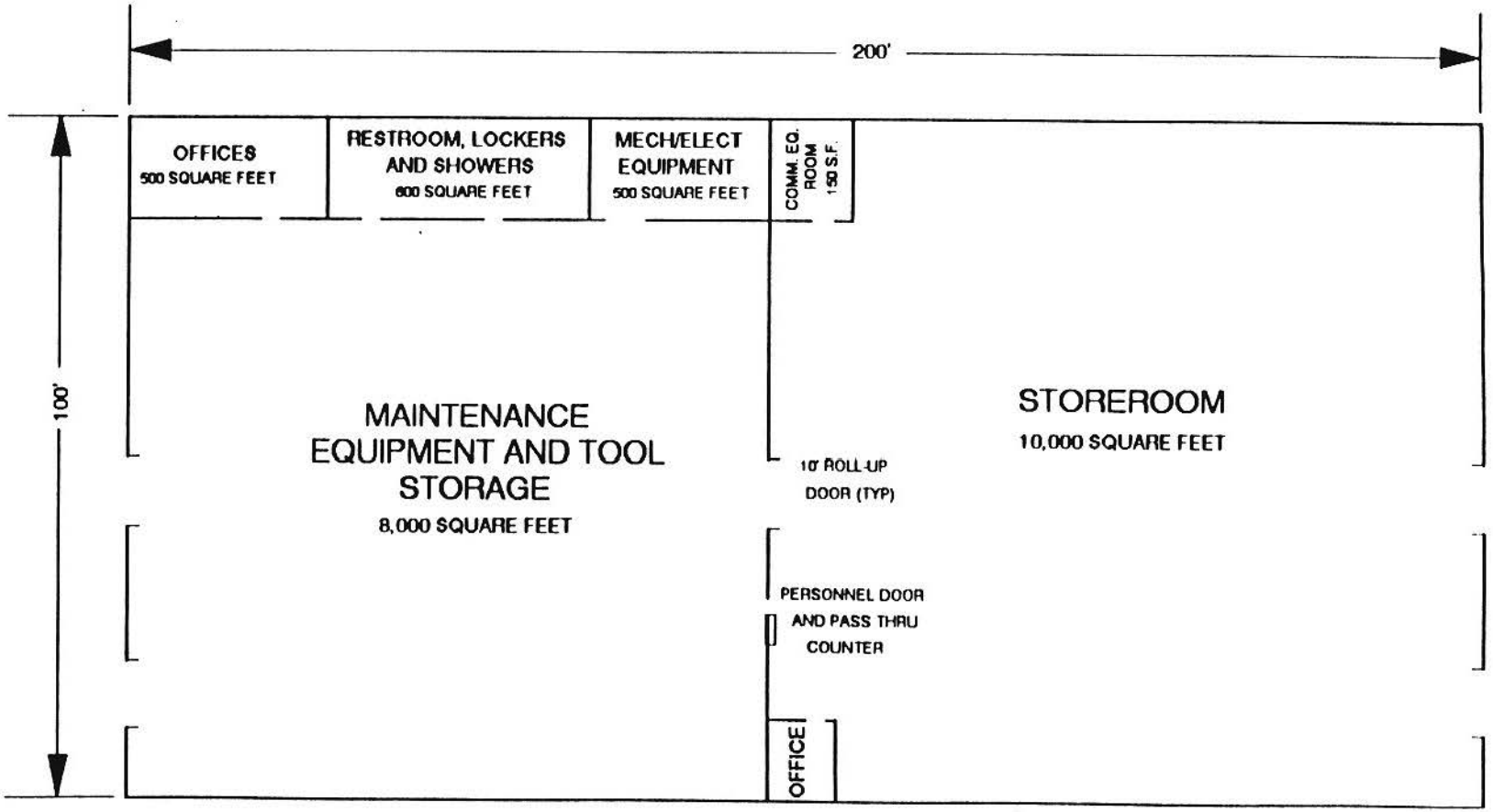
8. Employee parking.

Approximately 20,000 square feet of floor space will be required for the maintenance-of-way facility to accommodate the activities listed above. The conceptual floor plan for the future Pasadena maintenance-of-way facility is shown in Figure 7-4.

7.6 MAINTENANCE EQUIPMENT

The vehicle shop equipment and maintenance vehicle requirements for the Pasadena Line are listed on Tables 7-3 and 7-4, respectively. The equipment lists were developed with consideration given to the needs of the Pasadena Line and the equipment available or planned for the other Metro rail lines.

The equipment lists should be considered as being preliminary as refinements will be made as the design of the Pasadena Line progresses.



NOTE: ROLL-UP DOOR LOCATIONS SUBJECT TO CHANGE DEPENDING UPON ACTUAL SITE CONDITIONS.

PASADENA LINE
MAINTENANCE-OF-WAY FACILITY
CONCEPTUAL FLOOR PLAN
FIGURE 7-4
"FUTURE" PG. 7 - 31

PASADENA LINE YARD & SHOP EQUIPMENT LIST - TABLE 7-3

LINE ITEM	EQUIPMENT	DESCRIPTION	USE/LOCATION	QUANTITY		
				INITIAL	FUTURE	TOTAL
1	In-floor LRV hoists	Electric, 25-ton, 480v/3ph/30amp	Shop track	0	3	3
2	In-floor carbody supports	Electric, 10-ton, 480v/3ph/30amp	Shop track	0	6	6
3	Jib crane	Electric, 2-ton, 480v/3ph/20amp	Shop track	1	0	1
4	Jib crane	Electric, 7.5-ton, 480v/3ph/20amp	Shop track	1	1	2
5	LRV truck repair hoist	Electric, 480v/3ph/20amp	Truck/component track	0	1	1
6	LRV truck turntable	Manual, 10' diameter	Truck/component track	0	3	3
7	Wheel truing machine	With chip conveyor & bin, 480v	Wheel truing track	0	1	1
8	Car wash equipment	Complete w/recycling, 480v	Car washer	1	0	1
9	Blowdown equipment	Complete w/dust collection equip	Blowdown	1	0	1
10	Portable LRV jacks	Electric, 10-ton capy.	Shop track	6	0	6
11	Portable carbody stands	10-ton capy.	Shop track	8	0	8
12	Forklift	Electric, 2-ton	LRV & M-of-W Shops	2	1	3
13	Shop lift truck	Electric, walk behind	LRV & M-of-W Shops	2	1	3
14	Lift table	1-ton, air operated	General shop	2	0	2
15	Lift truck hopper	2-cu.yd.	LRV & M-of-W Shops	6	0	6
16	Pedestal grinder	12", 2hp, 208v	LRV & M-of-W Shops	2	0	2
17	Drill press	15", 208v	LRV & M-of-W Shops	2	0	2
18	Magnetic particle tester	Portable, 120v	Truck/component area	1	0	1
19	Pipe bending table	120v	Truck/component area	1	0	1
20	Ultrasonic parts cleaner	6 gt. capy, 120v	Electronic repair	1	0	1
21	Battery rack	2 tier, 24 battery capy.	Battery room	2	0	2
22	Battery charger	LRV & shop vehicles, as required	Battery rm/storerm	3	0	3
23	Storage cabinet	Metal, lockable	LRV & M-of-W Shops	12	0	12
24	Storage rack	Metal, adjustable shelf	LRV & M-of-W Shops	6	0	6
25	Shop workbench	Steel top	LRV & M-of-W Shops	12	0	12
26	Electronic workbench	Metal bench, wood top, with 120v	Electronic repair	2	0	2
27	Ladder, LRV access	Portable, insulated	General shop	4	0	4
28	Scaffold	Portable, insulated	General shop	2	0	2
29	Vacuum cleaner	Wet/dry, 10 gal. capy, 120v	General shop	5	0	5
30	Lubrication cart	Portable, 4 ten gal. drums	General shop	4	0	4
31	Bench grinder	7", 120v	LRV & M-of-W Shops	3	0	3
32	ARC welder/generator	Portable, 300amp, 208v	LRV & M-of-W Shops	2	0	2
33	MIG Welder	Portable, 400amp, 208v	General shop	1	0	1
34	Welding curtain	4 panel	LRV & M-of-W Shops	3	0	3
35	Electrode oven	Bench mounted, 120v, 1200w	LRV & M-of-W Shops	2	0	2
36	Welding/cutting outfit	Portable, 2 wheel, gas	LRV & M-of-W Shops	2	0	2
37	Shop floor scrubber	Electric, with charger	LRV & M-of-W Shops	1	0	1
38	Shop/yard personnel cart	Electric, with charger	Yard storage tracks	2	2	4
39	Track power tools	Rail saw, grinder, drill, etc.	Track	0	3	3
40	Truck/Wheel Dolly	For 28" thru 34" wheels	Equipment Maint.	2	0	2
41	Scissor-lift truck dock	Electric, 15-ton capacity	Material Dept	1	2	3
			Total	110	26	136

PASADENA LINE AUTOMOTIVE VEHICLES & EQUIPMENT LIST - TABLE 7-4

LINE ITEM	EQUIPMENT	DESCRIPTION	USE/LOCATION	QUANTITY		
				INITIAL	FUTURE	TOTAL
1	LRV car mover/locomotive	Hi-rail, w/LRV couplers	Yard & Shop	1	0	1
2	Scissors platform truck	Hi-rail, stake sides	Track, OCS	1	0	1
3	Track crew truck	Hi-rail, 1-ton hoist	Traction Power, OCS	1	0	1
4	Pickup, 1-ton	Hi-rail, with lift gate	Facilities Maint.	1	0	1
5	Track machines	Tamp, line, gage, etc.	Track-all rail lines	0	3	3
6	Portable generator	2 wheel, 30 kw minimum	Emergency power	1	1	2
7	Stake truck	5-ton, lift gate	Stores Dept	1	0	1
8	Utility van	1-ton, side & rear doors	Sig, Tctn Pwr, Comm, FC	4	1	5
9	Pickup	1/2-ton	Equip/Facilities	2	1	3
10	Sport wagon	Small size Blazer/Bronco	Transportation	1	0	1
11	Van	11-passenger	Transportation	1	0	1
12	Sedan	Standard size	Transportation/Equip	2	0	2
13	Sedan	Standard size	Security	5	2	7
14	Personnel carrier	Electric	General yard use	4	2	6
			Total	25	10	35

CHAPTER 8

O & M STAFFING AND COST ESTIMATES

8.1 GENERAL

The staffing plan and annual cost estimates for the Pasadena Line for the initial year and the system startup period are presented in this section for the following organizations:

- Transportation
- Vehicle Maintenance
- Facilities Maintenance
- Material Department

The staffing plan and cost estimates are subject to refinement as system design progresses and are based upon the following assumptions:

A. Existing staff for the Blue Line will be utilized to the extent practical.

B. Costs are expressed in 1993 dollars and are based upon MTA rates and other costs utilized for the Blue Line O&M cost estimates. Cost estimates include the following:

1. Fringe benefit rate of 45%.

2. General and Administration rate of 8.67%.

3. Average productive hours per year per employee of 1810.

4. Wage rates for Pasadena Line personnel are the same as those for the Metro Blue Line.

C. The staffing plan will reflect a functional organization (such as the functional O&M organization chart shown in Figure 8-1).

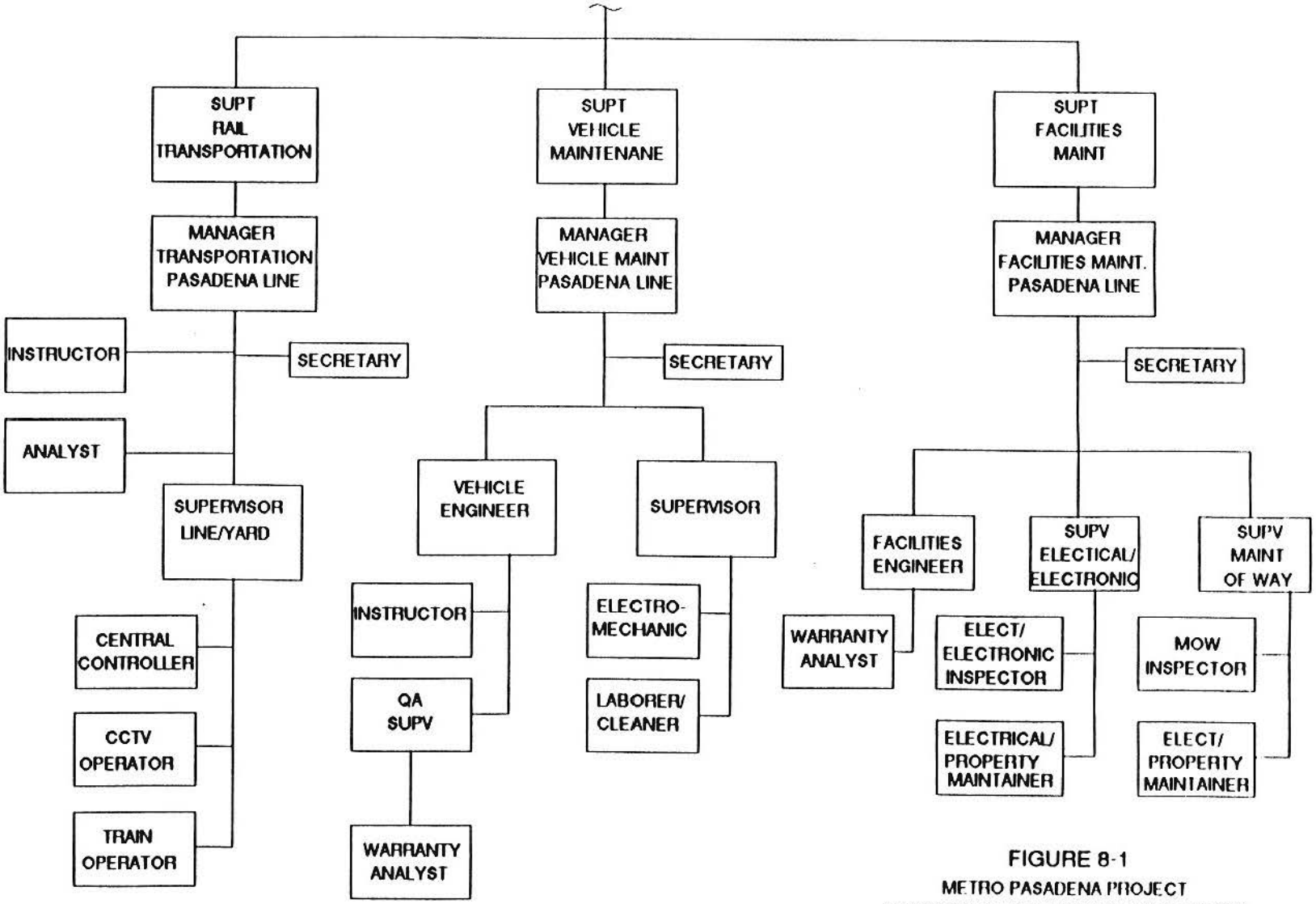


FIGURE 8-1
METRO PASADENA PROJECT
FUNCTIONAL O&M ORGANIZATION CHART

8.2 INITIAL YEAR STAFFING AND COST ESTIMATES

The staffing estimates for the initial year are based upon shift coverage and annual productive hours per employee. Shift coverage for the Pasadena Line is established with consideration for the following staffing characteristics:

- Positions which must be continually available on-line in order to accomplish operations. Such positions include train operators, fare inspectors and transit police officers, ATO technicians, central control dispatchers, CCTV observers, fare collection equipment technicians, etc...

- Positions which are necessary in order to accommodate yard and shop operations. Such positions include rail vehicle mechanics, car cleaners, storekeepers, etc...

- Positions which are required, but not necessarily on a continuous on-line basis. Such positions include track workers, TPSS electricians, communications technicians, etc... These positions, when combined with those of other MTA lines, provide mobile, full coverage capability for routine activities as well as immediate response needs for all lines.

The cost estimate for the initial year includes direct labor, indirect labor, general and administrative, non-labor, and traction power costs. Labor costs are based upon the equivalent staff calculated from the shift coverage and the appropriate hourly and fringe benefit rates. Non-labor costs are based upon the quantities of equipment and facilities and other factors appropriate for the Pasadena Line.

A summary of the cost estimate for the initial year is shown in Table 8-1. Staffing and labor cost estimates for Transportation, Vehicle Maintenance, Facilities Maintenance and the Material Department are shown in Table 8-2 through 8-5, respectively. The cost estimates for the non-labor categories are shown in Table 8-6.

OPERATIONS AND MAINTENANCE COST ESTIMATE

PASADENA LINE O & M COST ESTIMATE SUMMARY (1993 $)

INITIAL YEAR TABLE 8 - 1

	STAFF	ANNUAL COST (INCL FRINGE)	PER CENT DISTRIB	LABOR% DIST
DIRECT LABOR				
TRANSPORTATION	85	5,252,786	33.35	48.78
VEHICLE MAINTENANCE	39	2,645,696	16.80	24.56
FACILITY MAINTENANCE	33	2,234,585	14.19	20.74
MATERIAL DEPARTMENT	8	428,393	2.72	3.98
SUB TOTAL	165	$10,561,459	67.05	
OVERTIME ALLOWANCE % =	0.02	211,229	1.34	1.96
GENERAL & ADMIN % =	0.0867	1,256,748	7.98	
NON LABOR		$1,561,429	9.91	
TRACTION POWER		$2,161,243	13.72	
				100.00
GRAND TOTAL		$15,752,108	100.00	

SUM2

OPERATIONS AND MAINTENANCE COST ESTIMATE

PASADENA LINE TRANSPORTATION STAFFING

INITIAL YEAR TABLE 8 - 2

JOB CLASS	PROD. HRS/YR	DAYS WEEK	SHIFT: DAY	P.M.	GRAVE	TOT. LAB HRS	TOTAL STAFF	EQUIV STAFF	HOUR RATE	ANNUAL COST
MANAGER. TRANSP.	1810	5	1	0	0	2080	1.1	1	32.53	67.662
ASSIST. MANAGER	1810	5	1	0	0	2080	1.1	1	29.43	61.214
SECRETARY	1810	5	1	0	0	2080	1.1	1	17.03	35.422
INSTRUCTOR	1810	5	1	0	0	2080	1.1	1	28.01	58.261
ANALYST	1810	5	1	0	0	2080	1.1	1	26.66	55.453
SUPERVISOR - LINE	1810	7	2	2	1	14560	8.0	8	26.66	443.622
YARD CONTROLLER	1810	7	1	1	1	8736	4.8	5	26.66	277.264
CENTRAL CONTROLLER	1810	7	2	2	1	14560	8.0	8	26.66	443.622
CCTV OPERATOR	1810	7	2	2	1	14560	8.0	8	17.03	283.379
TRAIN OPERATOR	1810	5	10	12	10	66560	36.8	37	17.88	1,376,045
TRAIN OPERATOR	1810	2	10	10	10	24960	13.8	14	17.88	520,666
TOTAL STAFF PER SHIFT			32	29	24					

SUBTOTAL		3,622,611
FRINGE: (45%)		1,630,175
TOTAL: (1993 $)	85	5,252,786

OPERATIONS AND MAINTENANCE COST ESTIMATE

PASADENA LINE VEHICLE MAINTENANCE STAFFING

INITIAL YEAR TABLE 8 - 3

JOB CLASS	PROD. HRS/YR	DAYS WEEK	SHIFT: DAY	P.M.	GRAVE	TOT. LAB HRS	TOTAL STAFF	EQUIV. STAFF	HOUR RATE	ANNUAL COST
MANAGER, VEHICLE MT.	1810	5	1	0	0	2080	1.1	1	34.44	71,635
ENGINEER	1810	5	1	0	0	2080	1.1	1	34.44	71,635
SECRETARY/CLERK	1810	5	1	0	0	2080	1.1	1	17.03	35,422
INSTRUCTOR	1810	5	1	0	0	2080	1.1	1	30.15	62,712
WARRANTY/ANALYST	1810	5	1	0	0	2080	1.1	1	33.01	68,661
QA SUPERVISOR	1810	5	1	0	0	2080	1.1	1	30.15	62,712
SENIOR SUPERVISOR	1810	5	1	0	0	2080	1.1	1	33.01	68,661
SUPERVISOR	1810	7	1	1	1	8736	4.8	5	30.15	313,560
ELECTRO MECH	1810	5	4	4	4	24960	13.8	14	21.42	623,750
ELECTRO MECH	1810	2	2	2	2	4992	2.8	3	21.42	133,661
LABORER/CLEANER	1810	5	2	2	3	14560	8.0	8	15.01	249,766
LABORER/CLEANER	1810	2	2	2	0	3328	1.8	2	15.01	62,442
TOTAL STAFF PER SHIFT			18	11	10					
SUBTOTAL:										1,824,618
FRINGE: (45%)										821,078
TOTAL: (1993 $)								39		2,645,696

OPERATIONS AND MAINTENANCE COST ESTIMATE

PASADENA LINE FACILITIES MAINTENANCE STAFFING

INITIAL YEAR TABLE 8 - 4

JOB CLASS	PROD. HRS/YR	DAYS WEEK	SHIFT: DAY	P.M.	GRAVE	TOT. LAB HRS	TOTAL STAFF	EQUIV STAFF	HOUR RATE	ANNUAL COST
MANAGER, FACILITIES	1810	5	1	0	0	2080	1.1	1	32.48	67,558
ENGINEER	1810	5	1	0	0	2080	1.1	1	31.94	66,435
SECRETARY/CLERK	1810	5	1	0	0	2080	1.1	1	17.03	35,422
WARRANTY/ANALYST	1810	5	1	0	0	2080	1.1	1	33.01	68,661
SUPV, MAINT-OF-WAY	1810	5	2	0	0	4160	2.3	2	32.05	133,328
SUPV, ELECTL/ELECTNC	1810	5	2	0	0	4160	2.3	2	32.05	133,328
M-OF-W INSP	1810	5	2	2	0	8320	4.6	5	19.93	207,272
ELECTL/ELECTNC INSP	1810	7	2	2	2	17472	9.7	10	19.93	414,544
ELECT/PROP MAINT	1810	7	2	2	2	17472	9.7	10	19.93	414,544
LABORER	1810	5	0	0	0	0	0.0	0	15.01	0
			---	---	---					
TOTAL STAFF PER SHIFT			14	6	4					

SUBTOTAL			1,541,093
FRINGE: (45%)			693,492
TOTAL: (1993 $)		33	2,234,585

OPERATIONS AND MAINTAINENCE COST ESTIMATE

PASADENA LINE MATERIAL DEPT. STAFFING

INITIAL YEAR TABLE 8 - 5

JOB CLASS	PROD. HRS/YR	DAYS WEEK	SHIFT: DAY	P.M.	GRAVE	TOT. LAB HRS	TOTAL STAFF	EQUIV STAFF	HOUR RATE	ANNUAL COST
SUPERVISOR	1810	5	1	0	0	2080	1.1	1	32.05	66.664
STOREKEEPER	1810	5	1	0	0	2080	1.1	1	19.93	41.454
STOCK CLERK	1810	7	2	1	1	11648	6.4	6	15.01	187.325
			---	---	---					
			4	1	1					

TOTAL STAFF PER SHIFT

SUBTOTAL			295,443
FRINGE: (45%)			132,949
TOTAL: (1993 $)		8	428,393

OPERATIONS AND MAINTENANCE COST ESTIMATE

PASADENA LINE NON LABOR COSTS

INITIAL YEAR TABLE 8 - 6

REF.	DIVISION	COST	
	TRANSPORTATION		
TR1	MISC. SUPPLIES & SERVICES	26,264	
	SUBTOTAL:		$26,264
	VEHICLE MAINTENANCE		
VM1	VEHICLE PARTS & MATERIAL	133,200	
VM2	COMPONENT REPAIR CONTRACT	33,300	
VM3	MISC. SUPPLIES & SERVICES	13,228	
	SUBTOTAL:		$179,728
	FACILITIES MAINTENANCE		
MW1	TRACK MATERIAL	15,750	
MW2	RAIL GRINDING CONTRACT	17,250	
MW3	RAIL INSPECTION CONTRACT	6,750	
MW4	OTHER TRACK CONTRACT	28,500	
MW5	SIGNAL MATERIAL	16,000	
MW6	SIGNAL CONTRACT	48,000	
MW7	COMMUNICATIONS MATERIAL	32,000	
MW8	COMPUTER MAINT. CONTRACT	75,000	
MW9	FARE EQUIP. MATERIAL/CONTRACT	20,500	
MW10	TRACTION POWER MATERIAL	7,500	
MW11	OCS MATERIAL	12,750	
MW12	TRACTION POWER/OCS CONTRACT	12,750	
MW13	BLDG/FACILITY MATERIAL	6,000	
MW14	ELEVATOR CONTRACT	51,000	
MW14	ESCALATOR CONTRACT	82,500	
MW15	STA/BLDG JANITORIAL CONTRACT	60,000	
MW16	LANDSCAPING/GROUNDS CONTRACT	120,000	
MW17	BUILDING MAINTENANCE CONTRACT	15,000	
MW18	MAINT VEHICLE MATERIAL	9,900	
MW19	MAINT VEHICLE CONTRACT	18,000	
MW20	SHOP EQUIPMENT MATERIAL	9,000	
MW21	SHOP EQUIPMENT CONTRACT	7,200	
MW22	CORROSION CONTROL CONTRACT	14,800	
MW23	MISC. SUPPLIES/SERVICES	11,173	
	SUBTOTAL:		$697,323

	MATERIAL DEPARTMENT		
MD1	MISC. SUPPLIES & SERVICES	4,284	
	SUBTOTAL:		$4,284
	UTILITIES		
UT1	LIGHT, HEAT & POWER	150,000	
UT2	WATER	18,000	
UT3	TRASH REMOVAL	6,000	
UT4	TELEPHONE	45,000	
UT5	WASTE DISPOSAL	9,900	
	SUBTOTAL:		$228,900
	OTHER		
OT1	FARE MEDIA	15,375	
OT2	FUEL & LUBRICANTS	21,900	
OT3	MISC. SUPPLIES & SERVICES	36,000	
OT4	CLAIMS/LEGAL EXPENSE	351,655	
	SUBTOTAL:		$424,930
	TOTAL	$1,561,429	$1,561,429
TP1	TRACTION POWER	2,161,243	
	TOTAL		$2,161,243

8.3 SYSTEM STARTUP STAFFING AND COST ESTIMATES

Staffing and cost estimates for the startup of the Pasadena Line are based upon the staffing requirements for the initial year of operation, key milestone events, and lead times for personnel hiring and training. The startup period consists of approximately 24 months; from the arrival of the first rail vehicle in October 1995 to the start of revenue service in November 1997.

Startup cost includes estimates for labor, non-labor, travel and per diem (for system operator's personnel), traction power, and general and administrative costs. Labor costs are based upon the number of Transportation, Vehicle Maintenance, and Facilities Maintenance personnel required for each job classification on a monthly basis. Labor and non-labor costs are then summarized on a quarterly basis.

The startup cost summary, by quarter, is shown in Table 8-7. The startup staffing summary, by quarter, is shown in Table 8-8. Table 8-9 contains the monthly staffing schedule for the startup of the Pasadena Line.

TABLE 8-7

QUARTERLY COST SUMMARY

TO BE DEVELOPED

TABLE 8-8

QUARTERLY STAFFING SUMMARY

TO BE DEVELOPED

TABLE 8-9

MONTHLY STAFFING SCHEDULE

TO BE DEVELOPED

APPENDIX A

Review Comments and Responses

MTA

TELECOPY FROM THE

LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY

TRANSPORTATION DEPARTMENT

DATE: 04/02/93

TO: Ron Rypinski, EMC

FAX NO.: 362-3106

PHONE NO.:

FROM: Ed Vandeventer, Asst. Director/Transportation

NUMBER OF PAGES: 10
(Including Cover Sheet)

We are sending you, by telecopy, the attached material. If you wish to send us material, our facsimile number is **(213) 972-4401.**

If you do not receive all copies of the fax, or if any of the copies are illegible, please call me immediately at the number indicated:

OPERATOR: Gerald W. Masters

TELEPHONE NO.: (213) 972-4424

MESSAGE:

LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY
TRANSPORTATION DEPARTMENT

****

Date: April 1, 1993

To: Ron Rypinski, EMC

From: Ed Vandeventer, MTA Transportation

Subject: Draft Operations and Maintenance Plan - Pasadena Line

****

Attached are the combined comments of John Byrd, Everett Wooden, Rita Malone, and myself.

I will send you revised hourly wages for Transportation Department Employees as soon as possible. In addition, MTA Transportation will soon be discussing our staffing needs for this project.

Thank you for your patience.

cc: Art Leahy
Dan Ibarra
John Byrd
Everett Wooden
Rita Malone
Rich Morton

REVIEW COMMENTS - M. RO PASADENA PROJECT

TITLE OF SUBMITTAL: DRAFT OPERATIONS AND MAINTENANCE PLAN - FEBRUARY 1993 **DATE: March 31, 1993**

REVIEWER: Ed Vandeventer **ORGANIZATION: MTA Transportation**

RESPONDER: RON RYPINSKI **ORGANIZATION: O&M PLANNING-EMC TEAM**

REF NO	PAGE NO	DRAWING NO SPEC SECT	COMMENTS BY REVIEWER	ACT CODE	RESPONSE/ACTION	ACT DONE
		General	Replace all references to SCRTD with MTA	1	Will revise.	
		General	Replace all references to LACTC with MTA	1	Will revise.	
		General	Replace all references to Yard Dispatcher with Yard Controller	1	Will do	
		General	Replace all references to Division Dispatcher with Yard Controller	1	Will do, but seems to change with every Plan.	
		General	There are references to running a mixture of 2 car and 3 car trains. What is the purpose of this? Is the intention to have alternating 2 and 3 car trains? Or, is this an indication that there will be a time period when 3 car trains are needed so that a fixed headway can be maintained?	2	Consists are subject to change pending new patronage estimates. 2 and 3-car trains at 8-minute to 4-minute headways was based upon data from M. Padron & assoc.	
		General	The yard does not appear to be adequately sized to handle the expected fleet of 35-40 cars. With that many cars in the yard, it will be difficult to move cars around for maintenance without moving many cars to get to the one that is needed.	2	Let's discuss. You are correct in that space is limited, but some planned movement is allowed for in the yard.	
	2-1	2.1	With regards to zone fares: All fares on the rail lines are currently flat fares. It is anticipated that we will eventually switch to a zone fare or other distance based fare system.	1	The flat fare is essentially a one-zone fare. Will clarify that flat fare is initial.	
	2-1	2.1	MTA is exploring the use of "Debit Cards" for fare payment - similar to the Stored Value Cards used on BART. These could be used in TVMs to purchase tickets.	1	Text revised to "fare media" so as not to limit capability.	
	3-4	3.3	There is a reference to interfacing with railroads at "at grade crossings". Where will these be? If there are none, this reference should be deleted. At grade crossings with freight or passenger railroads should be avoided.	2	Text states "may involve" not will be at-grade crossings. O&M Plan establishes requirements for the line and is updated periodically to reflect reality.	
	4-1	4.1	See general comments on train lengths. It may be better to adjust the headway!	2	Please see response to general comment.	
	4-2	4.1.1	Current Blue Line experience indicates that the PM peak headway should begin earlier - around 3 pm. After the morning rush hour, ridership drops but starts building up again before noon.	1	Will adjust PM peak to 3:00-6:00 PM, note: mid-day headway considers noon pattern.	
	4-2	4.1.2	The definition of "early", "evening", and "late" should be the same 7 days a week. We would not need more frequent service on Saturday and Sunday mornings before 6 am than we have on weekdays. Also Tables 4-1 and 4-2 do not show an "early" period.	1	Agree. Will revise text and tables.	

ACTION CODES: 1=WILL COMPLY 2=DISCUSSION/CLARIFICATION NEEDED 3=NOT APPLICABLE BECAUSE D=RESPONSE ACTION COMPLETED

REVIEW COMMENTS - M[illegible]RO PASADENA PROJECT

TITLE OF SUBMITTAL: DRAFT OPERATIONS AND MAINTENANCE PLAN - FEBRUARY 1993 **DATE: March 31, 1993**

REVIEWER: Ed Vandeventer **ORGANIZATION: MTA Transportation**

RESPONDER: Ron Rypinski **ORGANIZATION:** O+M

REF NO	PAGE NO	DRAWING NO SPEC SECT	COMMENTS BY REVIEWER	ACT CODE	RESPONSE/ACTION	ACT DONE
	4-2	4.1.1	In all the meetings we have attended, there is no indication of any street running segment. It appears that we intend to use cab signaling throughout. What is the traffic signal delay time?	D	You are correct, there is no street running. The delay time is a factor to allow for nearside station stops and such constraints.	4/6 RR
	4-8	Table 4-5	There is another reference to a delay time. Also, do the running times reflect any civil speed restrictions from the curves?	D	See NOTE at bottom of this Table. Run time reflects curve speed restrictions.	4/6 RR
	4-10	Table 4-6 Table 4-7 Table 4-8	How were the "total turn back times" established. Why is it 12 minutes on the Pasadena Line and only 10 minutes on the Glendale Extension.	2	12 minutes is based upon 6 minutes per terminal to balance runtime, turnback time and schedule recovery. Glendale is preliminary estimate at this time.	
	4-13	Figure 4-1	Union Station - Provide crossovers at both sides of the Union Station platform.	2	negotiations with developer include trying to fit tail tracks south of station. Physically not enough space for tail tracks & crossovers.	
	4-13	Figure 4-1	Yard Connection - The diagram does not show either switch connecting the main line with the yard. Provide a pocket track south of the more southerly switch to that trains pulling out to Pasadena do not block the main track. Without a pocket track, trains pulling out of the yard will cross over to the northbound track where they will sit while the operator changes ends. This involves keying down at one cab, getting out of the train, walking the length of the train, getting in the train at the other end, and keying up the other cab. This takes time.	1 2	Will show yard leads. a pocket track could be provided if additional right-of-way were available from the old Cornfield site. This would be a critical addition if, in the future, non-revenue connector exists for the Glendale Line. Remember things will change in the future. Will, however, provide double crossovers at yard leads to main line.	
	4-13	Figure 4-1	LA River - two railroad tracks are shown crossing the Pasadena Line. Are these separated or are they crossing at grade?	1	They are separated. Will clarify.	
	4-13	Figure 4-1	Crossovers - Additional crossovers are needed to minimize service disruption whenever single tracking is required. This has been a problem on the Blue Line where we operate a 6 minute headway in both directions on a track that can only support a 15 minute headway (at best) during single track operations.	2	Agree, but physical limitations (grades and curves) exist which will not allow even distribution of special trackworks. See Tab P. No. 4-9 for 5.2 minute to 13.0 minute. (10.3 minute avg.) distribution of special trackwork.	
	4-13	Figure 4-1	Sierra Madre Villa - Because of the limited storage capacity of the yard, it may be necessary to store cars overnight at this location. What are the capacities of the tail tracks and the siding?	D	6 cars on each tail track plus at least 3 cars in siding (say 17 to 15 cars total).	4/6 PP
	4-14	4.2	What Civil Speed Limitations are there?	D	Curves.	PP

ACTION CODES: 1=WILL COMPLY 2=DISCUSSION/CLARIFICATION NEEDED 3=NOT APPLICABLE BECAUSE D=RESPONSE ACTION COMPLETED

REVIEW COMMENTS - M[illegible].RO PASADENA PROJECT

TITLE OF SUBMITTAL: DRAFT OPERATIONS AND MAINTENANCE PLAN - FEBRUARY 1993 **DATE: March 31, 1993**

REVIEWER: Ed Vandeventer **ORGANIZATION: MTA Transportation**

RESPONDER: Ron Rypinski **ORGANIZATION: O&M**

REF NO	PAGE NO	DRAWING NO SPEC SECT	COMMENTS BY REVIEWER	ACT CODE	RESPONSE/ACTION	ACT DONE
	4-14	4.2.1 A	See the general comment on the capacity of Midway Yard. Unless it can be shown that the yard is adequate for both storage and maintenance activities, it will become necessary to store trains overnight at Sierra Madre Villa. This will add operating costs for Transportation and Equipment Maintenance as well as security. The track arrangement where the yard connects with the main line is not conducive to "routing trains from the yard towards Pasadena". As shown in Figure 4-1, trains must cross over to the northbound track when leaving the yard. They will obstruct northbound service while the operators change ends. They should pull out of the yard into a pocket track before changing ends.	2 2	Let's discuss midway vs fleet size. See response on page 2 concerning this subject.	
	4-14	4.2.1 A	See the general comments on the length of trains. What is the design headway of the signal system? It would be likely that we would run all 3 car or all 2 car trains.	2	Signal system design is 3 minutes on non-trunk and 1.5 minutes on trunk route. Consists subject to actual ridership [illegible]	rd.
	4-15	4.2.1 C	See previous comment	1	See Previous response.	
	4-15	4.2.1 D	Blue Line experience indicates that we would probably want to operate single car trains after 8 pm to improve security and reduce operating costs. The decision would be based on loadings.	D	Agree that single car consist decision will be based upon ridership. At this time 2 cars used initially and 1 car in future (See Table 4-2)	4/6/93 RR
	4-18	4.2.2 D	Having a "Next Train Out" sign is good. It must be understood however that the Supervisors Booth will not be staffed at all times. Relying on the Supervisor to operate the sign is not satisfactory. Look for another method to control the sign. For example, the operator might be able to trigger with through push buttons or TWC. The should be able to make a request before a train on the other track has left and have the request held until the train on the other track has departed.	2	next train out message will appear on the variable message signs on the platform which can be controlled from central control. will clarify.	
	4-22	4.3.3	This section is not clear. It states: "Except under emergency conditions, neither the disabled train nor the rescue train will carry passengers beyond the next station". A situation where it is necessary to push out a train is an emergency condition.	2	Not necessarily. A failure during an earthquake is an emergency condition. A failure during normal conditions is not an emergency where passengers go beyond the next station.	
	4-24	4.3.7 B	There are again references to street running.	D	Yes because Plan establishes requirements.	P.R.
	4-25	Table 4-9	Add crossovers sufficient to maintain at least a 10 minute headway.	2	See previous response on page 2.	

ACTION CODES: 1=WILL COMPLY 2=DISCUSSION/CLARIFICATION NEEDED 3=NOT APPLICABLE BECAUSE D=RESPONSE ACTION COMPLETED

REVIEW COMMENTS - MTA RO PASADENA PROJECT

TITLE OF SUBMITTAL: DRAFT OPERATIONS AND MAINTENANCE PLAN - FEBRUARY 1993 **DATE: March 31, 1993**

REVIEWER: Ed Vandeventer **ORGANIZATION: MTA Transportation**

RESPONDER: Ron Rypinski **ORGANIZATION: O+M**

REF NO	PAGE NO	DRAWING NO SPEC SECT	COMMENTS BY REVIEWER	ACT CODE	RESPONSE/ACTION	ACT DONE
	5-1	5.2	Central Control does not have responsibility for "yard related operations". They had off trains to the Yard Controller.	1	will change "yard related" to "yard interface."	
	5-2	5.2.1	Same comment	1	will add "coordinating" all yard-related....	
	5-2	5.2.1	Transit Security Dispatch Center is a new term. Is this located at CCF? It must be designed to accommodate for than one police jurisdiction. There are currently the LA Sheriff and the Transit Police.	1	will be changed to Transit Police Dispatch Center per other comment received.	
	5-2	5.2.2	The third paragraph should be more specific. CCTV Operators will "notify passengers of any change of schedule....". Controllers will "notify maintenance personnel via....".	1	will be more specific.	
	5-3	5.3	The Red Line and the Blue Line have totally difference SCADA systems. We need to settle in on a single approach to SCADA.	3	Agree, but this document cannot resolve the matter.	
	5-3	5.3 C	Is the radio system described here the 900 mhz system to be installed on the Blue Line and Green Line. If so, users will be assigned to one or more user groups. No group of users will have an exclusive channel.	D	It is the Blue and Green Line System. Note that text refers to channel as user group assignment.	4/7/93 RR
	5-3	5.3 E	Provide a video taping capability for the CCTV.	1	Provided by Communications system. will clarify	
	5-4	5.3 F	Provide the capability of making voice announcements and "canned announcements". Announcements should be made by either Controllers or CCTV Operators at CCF. Also provide the capability from the Supervisors Booth at the terminal stations.	1	Provided by Communications system. also see 4.2.2, D, 10 pg. 4-18 and 5.2.1 on pg 5-1 of this Plan.	
	5-4	5.3 G	Please install a tape recorder adequate to handle all radio and telephone transmissions at the CCF rather than adding another tape recorder and another set of tapes. We have found it necessary to keep tapes for one year. That would add a lot of tapes. Taping from the 900 mhz radio system will present a new problem. Unless a tape channel is provided for each user group, a conversation may be spread over several tape channels as the frequencies are switched. This will make listening to a tape cumbersome.	3	Please coordinate these requirement with the Communications System design. O+M Plan contains requirement for recorders; the Communications System implement the requirements.	

ACTION CODES: 1=WILL COMPLY 2=DISCUSSION/CLARIFICATION NEEDED 3=NOT APPLICABLE BECAUSE D=RESPONSE ACTION COMPLETED

REVIEW COMMENTS - ML RO PASADENA PROJECT

TITLE OF SUBMITTAL: DRAFT OPERATIONS AND MAINTENANCE PLAN - FEBRUARY 1993 **DATE: March 31, 1993**

REVIEWER: Ed Vandeventer **ORGANIZATION: MTA Transportation**

RESPONDER: Ron Rypinski **ORGANIZATION: O+M**

REF NO	PAGE NO	DRAWING NO SPEC SECT	COMMENTS BY REVIEWER	ACT CODE	RESPONSE/ACTION	ACT DONE
	6-1	6.1.1 Table 6-1	Do not use side platform stations. They are a problem during single track operations because it become necessary to get passengers on one side to move to the other platform. The problem will exist at every involved station throughout the period of single tracking because new passengers will be constantly arriving. We will not have staff to send out to each station to herd the passengers.	2	Agree with preference for center platforms, however physical and right-of-way constraints will not allow every station to be center platform.	
	6-1	Table 6-1	It should be noted that there is commercial parking at Union Station.	D	Commercial=yes - light rail=no.	RR
	6-3	6.1.2	Provide pedestrian access from adjacent neighborhoods. There is no access from the neighborhood on the southwest side of French Station.	3	Station site specific consideration covered in Design criteria.	
	6-4	6.2.2 A	See the previous comment on fare zones.	1	Will revise wording.	
	7-1	7.1.1	Please show how you can store 36-40 cars in Midway yard and still make the yard moves necessary to maintenance.	2	Let's discuss.	
	7-2	7.1.4 B	There is a reference to simultaneous arrivals and departures at the yard. This assumes that the track to Capital Milling is to be used on a regular basis for getting in an out of the yard. Is that correct? Do we have agreement with the railroad? Who will own the track?	2	Per 7.1 on pg. 7-1, the items listed constitute the basis for design of the yard & shop; not all of which are always physically possible. Owner of Capital Spur is TBD.	
	7-2	7.1.4 E	What is the purpose of the Metrolink track connection? I assume this is to get cars to the Red Line Yard. The operating implications of moves over Metrolink (FRA Regulated) trackage need to be identified. Will cars be towed dead? By whom? Will the trackage be electrified so that they are run under their own power? What training, qualification, and certification requirements does this imply? Will FRA jurisdiction then be extended onto the Pasadena Line and perhaps other lines? There are some potentially significant operating costs involved. How many additional cars will be required to do maintenance at another site, thereby removing the cars from the system?	2	Connection is to (1) get freight access to Capital Milling Spur and (2) to get Pasadena Line cars to metrolink, Red, Blue, or other rail facilities. Cars will probably be towed by railroad special move. FRA jurisdiction over commuter and freight - not light rail. Allowance of 4 extra cars for off-site work.	
	7-3 C	Figure 7-1	Where is the employee parking? How will employees get between the parking areas and their work locations?	2	Parking areas still being considered. Plan is to locate as close to shop as possible.	
	7-4	7.1.5 D	Where is the "flag stop" and how do people get there from the Transportation area?	2	Currently, no flag stop for yard is planned (text states "when appropriate").	

ACTION CODES: 1=WILL COMPLY 2=DISCUSSION/CLARIFICATION NEEDED 3=NOT APPLICABLE BECAUSE D=RESPONSE ACTION COMPLETED

REVIEW COMMENTS - M[illegible]RO PASADENA PROJECT

TITLE OF SUBMITTAL: DRAFT OPERATIONS AND MAINTENANCE PLAN - FEBRUARY 1993 **DATE: March 31, 1993**

REVIEWER: Ed Vandeventer **ORGANIZATION: MTA Transportation**

RESPONDER: Ron Rypinski **ORGANIZATION: O+M**

REF NO	PAGE NO	DRAWING NO SPEC SECT	COMMENTS BY REVIEWER	ACT CODE	RESPONSE/ACTION	ACT DONE
	7-4	7.2.1 C	Replace "restricted speed" with "maximum speed". Under our rules restricted speed is not to exceed 15 mph.	1	Will change.	
	7-4	7.2.1 E	Movements "into" and "out of" shops are done by Train Operators	D	Text states "may" thus is not restrictive.	RR
	7-4	7.2.1 F	Identify the Arrival and Departure tracks.	2	Where? Will be done on yard drawing.	
	7-6	7.2.2	Steps "e" and "f" are really sub-steps of step "d".	2	Disagree. Substeps of cleaning - not interior cleaning.	
	7-6	7.2.2 2b	Replace "sign out" with "sign on".	1	Will change.	
	7-6	7.2.2 2d	All of these movements require a Train Operator. Movements within a shop, however, and under the direction of a maintenance supervisor.	D	Text intended to not be restrictive. note that ( ) reads shop movements only for maint. personnel.	4/7/93 RR
	7-8	7.3.1	Provide a canopy over the Yard Control observation windows to provide shade.	2	See text which states tinted and sloped to reduce glare.	
	7-9	7.3.1	What is the purpose of the "computer type floor"? The computers should be located in another location. Is it needed because of other electrical apparatus? If so, what?	2	See your first comment on page 7 and my response.	
	7-9	7.3.2	Transportation prefers a Unisex locker room to minimize locker room space requirements. On the Blue Line, there are only a few female employees using a locker room equal in size to the male locker room. At the same time there are more males working at the location than there are lockers. A unisex locker room would solve the problem. If separate locker rooms are provided, they must be designed so that there is a wall separating the two sides which can be easily moved at very little cost. Initial mix in this case should be 80% male and 20% female.	2	We did and then un-did this already for Pasadena shop when yard was at Cornfield. will consider adjustable wall concept rather than unisex lockers. (Suggest hiring more women operators).	
	7-14	7.4.2	Moving cars to another location for maintenance will require a bigger fleet. If done over Metrolink, SP, ATSF, or UP tracks, we will be at their mercy to accomplish the moves. We will need the extra cars because we cannot readily transfer cars between locations at will.	2	4 extra cars are identified for this purpose.	

ACTION CODES: 1 = WILL COMPLY 2 = DISCUSSION/CLARIFICATION NEEDED 3 = NOT APPLICABLE BECAUSE D = RESPONSE ACTION COMPLETED

REVIEW COMMENTS - ML RO PASADENA PROJECT

TITLE OF SUBMITTAL: DRAFT OPERATIONS AND MAINTENANCE PLAN - FEBRUARY 1993 **DATE: March 31, 1993**

REVIEWER: Ed Vandeventer **ORGANIZATION: MTA Transportation**

RESPONDER: RON RYPINSKI **ORGANIZATION: O+M**

REF NO	PAGE NO	DRAWING NO SPEC SECT	COMMENTS BY REVIEWER	ACT CODE	RESPONSE/ACTION	ACT DONE
	7-18	Table 7-1	Yard Control needs an enclose room for computer and communications equipment. It also needs a voice recorder for recording yard radio and telephone conversations. The counter should have phone jacks.	2	Provided in yard control room.	
			A storage room is needed for supplies, tapes, lost and found, etc.	1	will add.	
			Provide rest rooms adjacent to yard control. The yard controllers are on duty 24 hours a day and cannot leave the area for extended periods.	1	will add.	
	7-22	Figure 7-2	Rest rooms must have showers.	1	will add (as shown previously)	
			Provide offices for the Manager and the Assistant Manager within the Transportation offices.	1	will provide (per previous yard design)	
	7-28	Table 7-4	Provide 3 mini-vans for Field Supervisors. Provide 1 Sedan for the Manager and 3 other sedans for operators to use to make relief. Provide 1 full sized passenger van.	2	list shows: 1 full-size van 2 Sport wagon 2 Sedan 5 total Please justify additional 3 vehicles.	
	8-2	Figure 8-1	This chart is incorrect. The Central Control Facility manager reports to the Rail Operations Superintendent. The CCF controllers and CCTV Operators report to him.	2	Per 8.1, C on page 8-1: this is only a functional organization chart.	
	8-4	Table 8-1	Include security costs.	2	will if MTA agrees.	

ACTION CODES: 1=WILL COMPLY 2=DISCUSSION/CLARIFICATION NEEDED 3=NOT APPLICABLE BECAUSE D=RESPONSE ACTION COMPLETED

REVIEW COMMENTS - ML RO PASADENA PROJECT

TITLE OF SUBMITTAL: DRAFT OPERATIONS AND MAINTENANCE PLAN - FEBRUARY 1993 **DATE: March 31, 1993**

REVIEWER: Ed Vandeventer **ORGANIZATION: MTA Transportation**

RESPONDER: RON RYPINSKI **ORGANIZATION:** EMC O+M

REF NO	PAGE NO	DRAWING NO SPEC SECT	COMMENTS BY REVIEWER	ACT CODE	RESPONSE/ACTION	ACT DONE
	8-5	Table 8-2	The number of train operators shown is inconsistent with Table 7-2.	2	True. 7-2 is facility design; while 8-2 is initial year.	
			The hourly wage rates are way out of date. I will send you updated rates.	1	will update when new data received.	
			Staffing levels need to be expanded to reflect non-productive time as well as non-work time. This is needed to account for time spent in training and periodic retraining, meetings, hearings, etc.	2	Please provide estimate of these hours by classification and levels will be revised.	
			Staffing levels need to be increased if it is necessary to store trains overnight at Sierra Madre Villa. The PUC has stated that a Supervisor must personally sign each operator on and off so that they can be sure that the operator is fit for service.	2	will adjust pending outcome of over discussion relative to midway yard capacity.	

ACTION CODES: 1=WILL COMPLY 2=DISCUSSION/CLARIFICATION NEEDED 3=NOT APPLICABLE BECAUSE D=RESPONSE ACTION COMPLETED

RTD

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
RAIL DIVISION 20 (METRO RED LINE)
320 SOUTH SANTA FE AVENUE
LOS ANGELES, CA 90013

FAX TRANSMITTAL

DATE OF TRANSMISSION: 3-12-93

DELIVER DOCUMENT TO:

NAME: Ron Rypinski FAX NUMBER: 362-3106

FROM:

NAME: Jeff Barenbaum FAX NUMBER: 213-972-3302

PHONE: 972-3380

NUMBER OF PAGES INCLUDING COVER SHEET TO BE TRANSMITTED: 8

If you do not receive all pages, or if any are illegible, please call the operator on 213-972-3300 immediately.

MESSAGE: Please call 972-3380 to verify receipt of pages 1-7 and that they are legible.

JB

SC-05263

RECEIVED
MAR 15 1993
DCC

March 11, 1993

MEMO TO: RON RYPINSKI, EMC

FROM: for Bart Kane
BART KANE

SUBJECT: METRO PASADENA PROJECT
REVIEW COMMENTS ON OPERATIONS & MAINTENANCE PLAN (2/93)

COPIES: J. McDOWELL (8520-5), J. NOGA (8520-5),
RTD USERS GROUP (3), CHRON/RMC: R05-OM100-DE141

In response to the memorandum (Joe O'Donnell to Distribution, dated 2/26/93, same subject), the Operations Maintenance & Start-up department has reviewed the subject document. Our comments are attached and include the following:

- Comments by Jack McDowell on review form provided (Sheet 1 of 1).
- Comments by John Noga which are "red inked" directly on draft O&M plan (ten pages attached). These change pages include 4-18, 5-1, 5-2, 7-4, 7-8, 7-12, 7-14, 7-24, 8-1, and 8-3.

BMK:WMc:jr

Attachment

Rail Construction Corporation
a Subsidiary of the Los Angeles County Transportation Commission
818 West Seventh Street
Suite 1100
Los Angeles, CA 90017
Tel 213 623-1194
Fax 213 236-4805

ENGINEERIK MAGEMENT CONSULTANT
(association of Parsons Brinckerhoff Quade & Douglas, Inc; Daniel, Mann, Johnson & Mendenhall; ICF-Kaiser Engineers (Calif.) Corp; Escudero-Fribourg Architects; Jenkins Gates Martinez, Inc; The Hambishop Group, Inc)

REVIEW COMMENTS - METRO PASADENA PROJECT

DATE 3-24-93

SHEET 1 OF 3

TITLE OF SUBMITTAL Operations & Maintenance Plan

FINAL DESIGN ☐

PRELIMINARY ENGINEERING ☐

REPORT ☐

TASK MANAGER

REVIEWER Jeff Barenbaum ORGANIZATION OPM-RTD-MTA

RESPONDER Ron Rypinski ORGANIZATION O+M

REF. NO.	PAGE NO.	DRAWING NO. SPEC.SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
	7-21	Table 7-2	As per previous comments dated 3-12-93 our staffing requirements are as follows. 1 Supervisor (1st shift) 1 Storekeeper (1st shift) 5 Stockclerks (2 1st shift) (1 2nd shift) (1 3rd shift) (1 Relief shift)			
			7 Day / 3 shift coverage can be provided with the 5 stock clerks 6 are not required. See attached schedule.	2	The 6th position covers sick, vacation, jury, and other time off by the others so that 1 or more shifts do not go uncovered.	

ACTION CODE 1= WILL COMPLY 2= DISCUSSION/CLARIFICATION NEEDED 3= NOT APPLICABLE BECAUSE D= RESPONSE ACTION COMPLETED

Shift	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1st		Supervisor	Supervisor	Supervisor	Supervisor	Supervisor	
1st	Stockclerk 2	Storekeeper	Storekeeper	Storekeeper	Storekeeper	Storekeeper	Stockclerk 5
1st		Stockclerk 1	Stockclerk 1	Stockclerk 1	Stockclerk 1	Stockclerk 1	
1st		Stockclerk 2	Stockclerk 2	Stockclerk 2	Stockclerk 2		
2nd	Stockclerk 5	Stockclerk 5	Stockclerk 3	Stockclerk 3	Stockclerk 3	Stockclerk 3	Stockclerk 3
3rd	Stockclerk 4	Stockclerk 4	Stockclerk 5	Stockclerk 5	Stockclerk 4	Stockclerk 4	Stockclerk 4

PBDMJM ENGINEERING MANAGEMENT CONSULTANT
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Daniel, Mann, Johnson & Mendenhall
ICF Kaiser Engineers (Calif.) Corp
Escudero Fellenzg Architects
Jenkins Gales Martinez, Inc
The Nemetschp Group, Inc

REVIEW COMMENTS - METRO PASADENA PROJECT

DATE 3-24-93

SHEET 2 OF 3

TITLE OF SUBMITTAL _____ FINAL DESIGN ☐

TASK MANAGER _____ PRELIMINARY ENGINEERING ☐

REVIEWER Jeff Barenbaum ORGANIZATION OCPM-RTD-MTA REPORT ☐

RESPONDER Ron Rypinski ORGANIZATION O&M

REF. NO.	PAGE NO.	DRAWING NO. SPEC.SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
	7-27	Table 7-3	See attached list of required equipment which was submitted on 11/21/91.	1	Will use these listings for revising equipment lists in the Plans.	
			Also see updated listing dated 3-24-93.	1	see above.	

ACTION CODE 1= WILL COMPLY 2= DISCUSSION/CLARIFICATION NEEDED 3= NOT APPLICABLE BECAUSE D= RESPONSE ACTION COMPLETED

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
OFFICE OF CONTRACTS, PROCUREMENT, AND MATERIEL
INTERDEPARTMENTAL MEMORANDUM

****

TO: Ron Rypinski

FROM: Jeff Barenbaum

DATE: 11/12/91

SUBJECT: Green Line Material Management Equipment

****

The following is a list of equipment , in addition to the stake bed truck already listed , which the Materiel Division will require to operate an efficient warehouse. Considerations have been made to maximize the utilization of available space as well as to maximize our support to the Rail Equipment Maintenance & Rail Facilities Maintenance Departments. I have attached requirements which have been submitted for the Red Line as a guideline. We will obtain Green Line specific requirements in the future.

1)	Stak Racking System	$ 250,000
2)	White Horizontal Carousel System	$ 100,000
3)	Stak Cabinet / Drawer System	$ 35,000
4)	10,000 lb. Rough Terrain Forklift	$ 50,000
5)	4,000 lb. Indoor Electric Forklift with battery charger & fork extensions	$ 15,000
6)	4 Material Handling Carts	$ 1,000
7)	Hand Truck	$ 100
8)	Pallet Jack	$ 600
9)	Electric Stock Chaser	$
10)	Mop Wringer & Bucket	$ 200
11)	Key Lock Box	$ 50

12)	Time Clock	$	500
13)	Time Card Holder	$	25
14)	2 Haz. Mat. Storage Cabinets	$	1400
15)	Work Table	$	500
16)	Enclosed Glass Bulletin Board	$	200
17)	Cork Board	$	50
18)	Bar Stock Racks	$	
19)	Drum Storing & Handling Equipment	$	
20)	Banding Tool	$	800
21)	Banding Strap Cart	$	400
22)	Hot & Cold Water Dispenser	$	
23)	Dock Levelers	$	
24)	Hoists	$	
25)	Electric Fans	$	500
26)	Platform Ladders	$	500
27)	Fax Machine	$	
28)	IPC Holders	$	
29)	Copy Machine	$	
30)	Electronic Counting Scale	$	1,300
31)	Shipping Scale	$	500
32)	Refrigerator	$	
33)	Microwave	$	
34)	Miscellaneous Hand Tools	$	
35)	Polaroid Camera	$	

cc: Ted Montoya

SOUTHERN CALIFORNIA RAPID TRANSIT DISTRICT
OFFICE OF CONTRACTS, PROCUREMENT, AND MATERIEL
INTERDEPARTMENTAL MEMORANDUM

****

TO: Ron Rypinski

FROM: Jeff Barenbaum

DATE: 03/24/93

SUBJECT: Material Management Equipment Standards

****

Description	Esimated Price
1) Stakebed Delivery Truck	$ 25,000
2) Stak Racking System	$ 250,000
3) White Horizontal Carousel System	$ 100,000
4) Plastic Carousel Bin Boxes	$ 15,000
5) Stak Cabinet / Drawer System (Tool Room)	$ 35,000
6) 10,000 lb. Rough Terrain Forklift	$ 50,000
7) 4,000 lb. Indoor Electric Forklift with battery charger & fork extensions	$ 15,000
8) 4 Material Handling Carts	$ 1,000
9) Hand Truck	$ 100
10) Electric Pallet Jack	$ 10,000
11) Pallet Jack	$ 600
12) Electric Stock Chaser	$ 5,000
13) Sit Down Electric Supervisor's Cart	$ 6,000
14) Mop Wringer & Bucket	$ 200
15) Key Lock Box	$ 50
16) Time Clock	$ 500
17) Time Card Holder	$ 25
18) 2 Haz. Mat. Storage Cabinets	$ 1400
19) Work Table	$ 500
20) Enclosed Glass Bulletin Board	$ 200
21) Cork Board	$ 50

22)	Bar Stock Racks	$	
23)	Drum Storing & Handling Equipment	$	
24)	Banding Tool	$	800
25)	Banding Strap Cart	$	400
26)	Hot & Cold Water Dispenser	$	
27)	Dock Levelers / Scissor Lift	$	40,000
28)	Hoists	$	
29)	Electric Fans	$	500
30)	Platform Ladders	$	500
31)	Fax Machine	$	850
32)	IPC Holders	$	
33)	Copy Machine	$	
34)	Electronic Counting Scale	$	1,300
35)	Shipping Scale	$	500
36)	Refrigerator	$	
37)	Microwave	$	
38)	Miscellaneous Hand Tools	$	300
39)	Polaroid Camera	$	150
40)	P.C. w/ Software & Laser Printer	$	
41)	2 Mainframe Computer Terminals & Printers	$	
42)	Furniture	$	5,000
43)	Protective Floor Sealant	$	10,000
44)	Central Air Conditionong / Fans	$	
45)	Central Heat / Heaters	$	
46)	Motorized Service Windows	$	2,000
47)	Magnetic Label Gun	$	200
48)	Micro - Cassette Recorder	$	
49)	Window Blinds	$	

cc: Ted Montoya

ENGINEERING '4GEMENT CONSULTANT
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REVIEW COMMENTS - ME 'O PASADENA PROJECT

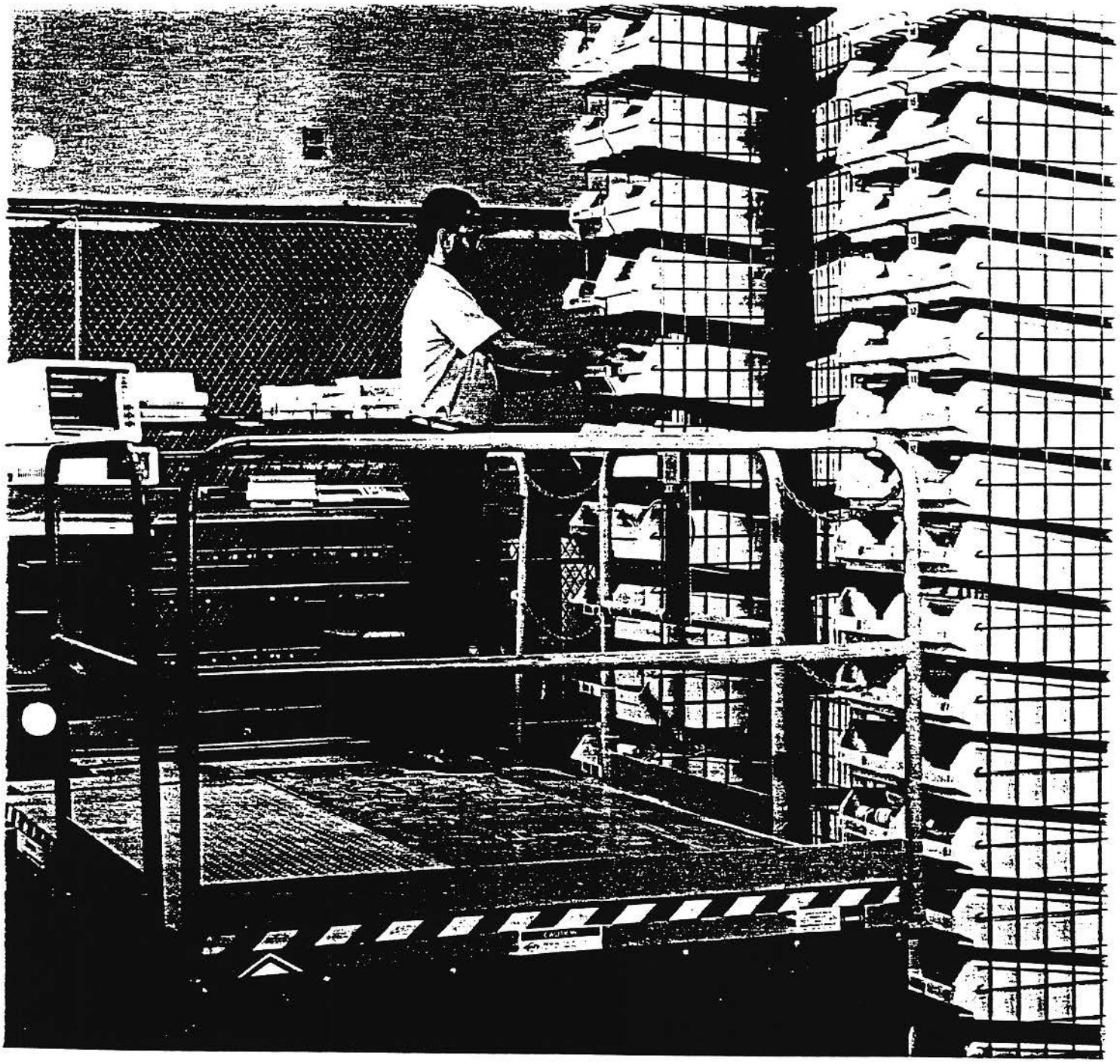
DATE 3-24-93
SHEET 3 OF 3

TITLE OF SUBMITTAL _____ FINAL DESIGN ☐
TASK MANAGER _____ PRELIMINARY ENGINEERING ☐
REVIEWER Jeff Barenbaum ORGANIZATION OPM-RTD-MTA REPORT ☐
RESPONDER Ron Rypinski ORGANIZATION O+M

REF. NO.	PAGE NO.	DRAWING NO. SPEC.SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
	7-2	Figure 7-2	Eliminate the mezzanine. Utilizing a horizontal carousel with a hydraulic man lift the need for a mezzanine has been eliminated. This carousel system is the "standard" utilized at the Red & Green Lines.	2	Suggest leaving the mezzanine and using carousel system on ground floor with other storage bins and shelves on mezzanine. Let's discuss	
	7-3	Figure 7-3				
			See attached brochures.			

ACTION CODE 1= WILL COMPLY 2= DISCUSSION/CLARIFICATION NEEDED 3= NOT APPLICABLE BECAUSE D= RESPONSE ACTION COMPLETED

VER 1.1 10/16/92



Continuous uptime!

When you're handling emergency parts orders, uptime dependability can be crucial. It means promises kept, customers satisfied.

A White horizontal carousel system will typically require only a few hours of routine maintenance every six months. That's uptime miniloads and other automated systems can't provide.

White carousels not only give you dependability, they also help quadruple your picking rates, usually with less floor space and man-hour requirements. And, they can pay you back in less than a year.

More experience than anyone in the industry. That's White! More choices, more models. Proven software and robot interface. For more information on how you can increase your uptime, call 201/272-6700. Or write White Storage & Retrieval Systems, Inc., 30 Boright Avenue, Kenilworth, NJ 07033.

White

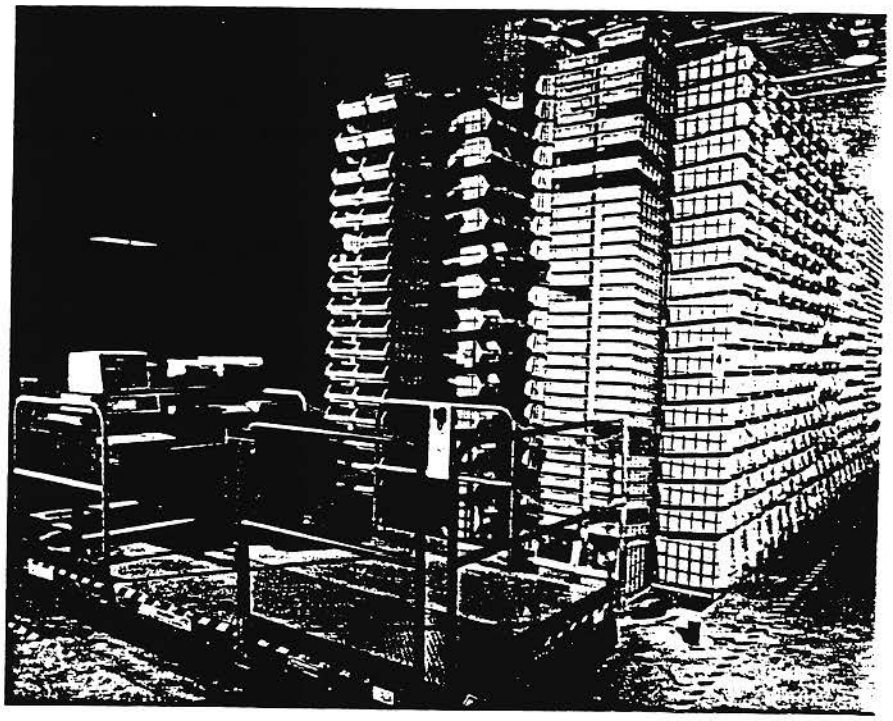
Horizontal Carousels
Bottom Drive & Twin Drive
Dimensions and Data

Bottom drive and twin drive horizontal carousels from White are designed for larger live loads and heavier duty cycles.

They are furnished in eight standard bin widths, with other custom widths available, and can be configured for up to 80-100 bins.

Bottom and twin drive units distribute loads uniformly over a large floor area without high concentrations near uprights. Less bracing is required than top drive models. Leveling is easier, and seismic protection better. Accessibility for maintenance is superior. The series features a lower profile for greater utilization of overhead space.

White takes pride in being able to furnish a great variety of special carousels in order to precisely meet a customers requirements. This is possible because of the many years of experience in carousel engineering and manufacturing and the White modular design.



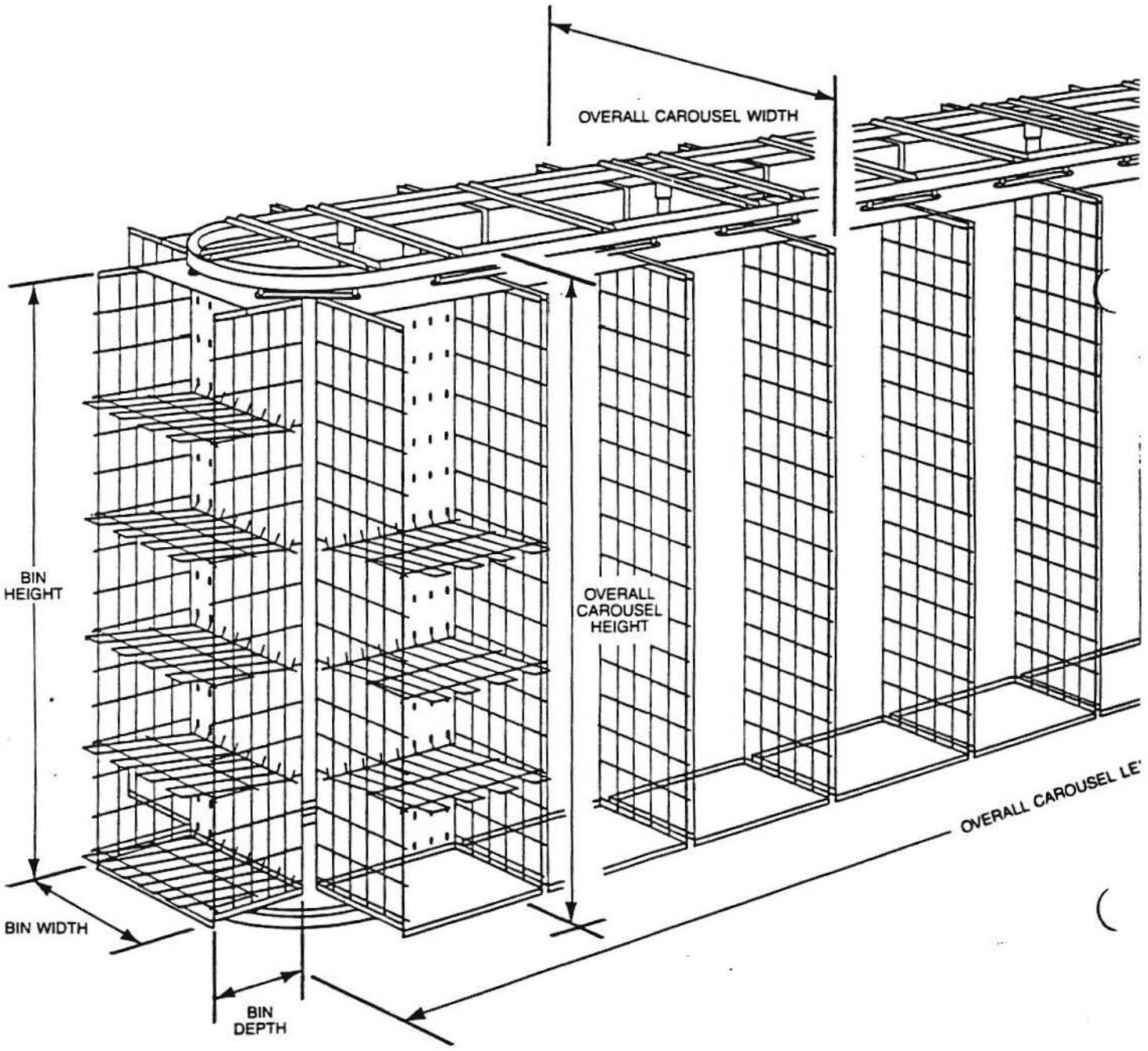
Structural Features

- Modular design permits easy installation, expansion or movement.
- Bottom supporting frame distributes load uniformly over large floor area.
- Capacity classes up to 1500 pounds per bin live load.
- Carousel is tested and sections are match marked before shipment.
- Units can be stacked without the need for full mezzanine to make use of total available height.
- Catwalks or mezzanines can be mounted directly to top of carousels or supported between units.

Bins and Shelves

- Units can be furnished with an even or odd number of bins from 14 to 100 bins. Even numbers between 16 and 50 are considered standard.
- Choice of bin depth, heights and widths, with adjustable dust free wire shelves on varying spacing.
- Bin heights of 73, 85, 97, 109, 121, 133, and 145 inches standard. Special heights on application.
- Overall height 14.25 inches greater than bin height.
- Bin widths (inside) of 14.75, 18.01, 20.96, 24.39, 26.50, 29.89, and 35.98 inches.
- Unique bin design distributes shelf loads through the two sides and back of bin, forming a rigid box structure, then through platform base plate to wheels and track.
- Approximately seven degree slope of shelves using 18 inch shelves (16 inch deep bin) to counteract centrifugal force. Angle varies with depth and shelf spacing.
- Solid steel top and bottom mounting plates provide superior rigidity and a variable mounting surface for special bin designs.
- Standard bin depths 12, 16, 20 inches. Optional 22 and 28 inches.
- Shelf depth is two inches greater than bin depth.
- Shelf ratings: 75 lbs., 150 lbs., 200 lbs. Special higher ratings on application.
- Shelves are easy to remove and adjust on choice of centers. No bolts.
- Shelf spacing six inch standard. Optional: 2, 2½, 3, 3½, 4, 5, 7, 7½ inches.
- Heavy gauge steel wire: .283 inch diameter on vertical wires; .177 on horizontal wires.
- Wire may be baked enamel or optional nickel-chrome plated.
- Optional solid steel bin backs.
- Optional full steel bins and steel shelves.
- Special bin designs on application.

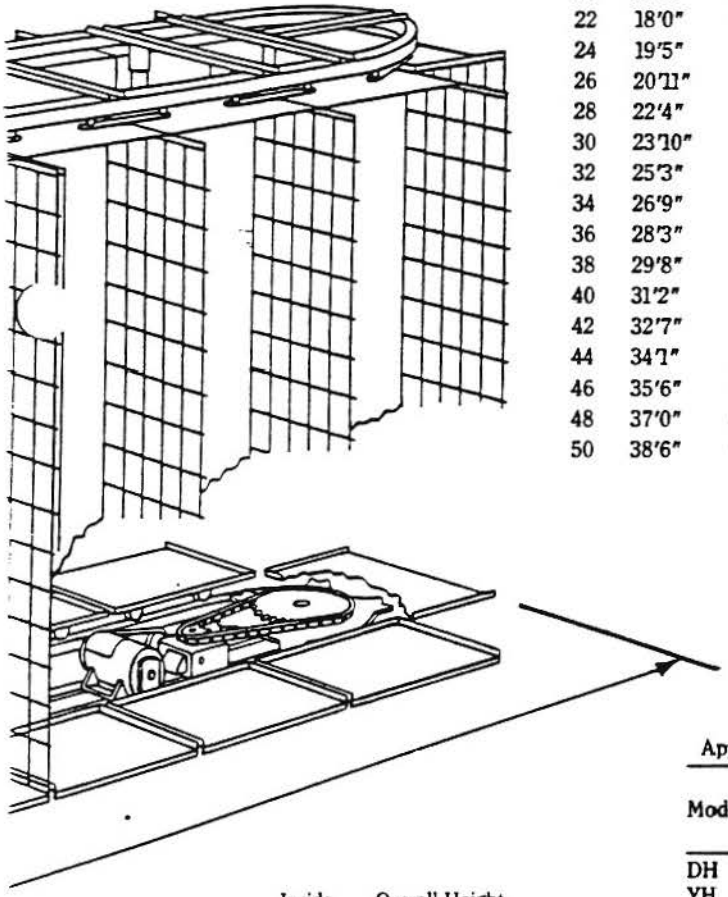
Horizontal Carousels
Bottom Drive & Twin Drive
Models DH, YH, HP, PH, SH, VH & XH



Overall Carousel Dimensions

	DH	YH	HP	WH	PH	SH	VH	XH
				Nominal Bin Width - Inside				
	14¾"	18"	21"	24½"	26½"	28"	30"	36"
				Overall Width - Includes shelf overhang and sweep radius				
Bin Depth								
12	4'1½"	4'2"	4'2½"	4'7"	4'9"	4'5¾"	4'7"	5'1"
16	4'9¼"	4'9½"	4'10"	5'2"	5'4¼"	5"0¾"	5'1¾"	5'7½"
20	5'5"	5'5¼"	5'5½"	5'9½"	5'11¾"	5'8"	5'8¾"	6'2½"
				Overall Length - Includes shelf overhang and sweep radius				
Bins								
16	13'7"	15'2"	17'3"	19'7"	22'4"	25'2"	25'3"	28'11"
18	15'0"	16'10"	19'2"	21'10"	24'11"	28'0"	28'1"	32'3"
20	16'6"	18'6"	21'1"	24'0"	27'5"	30'11"	31'0"	35'7"
22	18'0"	20'2"	23'0"	26'3"	30'0"	33'9"	33'10"	38'11"
24	19'5"	21'10"	24'11"	28'6"	32'6"	36'8"	36'9"	42'3"
26	20'11"	23'6"	26'10"	30'8"	35'1"	39'6"	39'7"	45'7"
28	22'4"	25'2"	28'9"	32'11"	37'8"	42'5"	42'6"	48'11"
30	23'10"	26'10"	30'8"	35'1"	40'2"	45'3"	45'4"	52'2"
32	25'3"	28'6"	32'7"	37'4"	42'9"	48'1"	48'2"	55'6"
34	26'9"	30'1"	34'6"	39'7"	45'3"	51'0"	51'1"	58'10"
36	28'3"	31'9"	36'5"	41'9"	47'10"	53'10"	53'11"	62'2"
38	29'8"	33'5"	38'4"	44'0"	50'4"	56'9"	56'10"	65'6"
40	31'2"	35'1"	40'3"	46'2"	52'11"	59'7"	59'8"	68'10"
42	32'7"	36'9"	42'2"	48'5"	55'6"	62'6"	62'7"	72'2"
44	34'1"	38'5"	44'1"	50'8"	58'0"	65'4"	65'5"	75'6"
46	35'6"	40'1"	46'0"	52'10"	60'7"	68'3"	68'4"	78'10"
48	37'0"	41'9"	47'11"	55'1"	63'1"	71'1"	71'2"	82'2"
50	38'6"	43'5"	49'10"	57'3"	65'8"	73'11"	74'0"	85'6"

Overall length assumes a 16 inch deep bin, 18 inch shelf, normal sweep radius without product overhang.



Inside Bin Ht (ins)	Overall Height XH (ins)	Overall Height Others (ins)
73	88 7/8	87 5/8
85	100 7/8	99 5/8
97	112 7/8	111 5/8
109	124 7/8	123 5/8
121	136 7/8	135 5/8
133	148 7/8	147 5/8
145	160 7/8	159 5/8

Approximate Shipping Weights

Model	16 bin Unit (lbs)	Add per pair of bins (lbs)
DH	3550	250
YH	3700	280
HP	3800	300
WH	4000	350
PH	4350	360
SH	4600	380
VH	5000	400
XH	6000	500

Does not include shelves, accessories or optional equipment.

Shelf Spacing (in)	Bin Depths (ins) 12	16	20	22	28
2	+	+	+	0	0
2 ½	+	+	+	0	0
3	+	+	+	0	0
3 ½	+	+	+	0	0
4	+	+	+	0	0
5	+	+	+	0	0
5 ½	+	+	+	0	0
6	std	std	std	0	0
7	0	0	0	0	0
7 ½	0	0	0	0	0

+ optional 0 on application
Assumes clearance ½ inch less than centers.

■ Bin boxes, shelf and bin markers available.

Motors and Controls

■ DC drives (standard) allow controlled acceleration/deceleration with +/- .125 inch stopping capability.
■ Single speed DC motors furnish speeds of 60 to 80 feet per minute.
■ Optional variable speed DC motors provide 3:1 ratio within a specified range.
■ AC motors optional.
■ Motors are sized to the application.
■ Single or dual drive capability.
■ Indirect modular drive allows inexpensive replacement of components.
■ Low voltage DC control system — 12 volt with DC drive, 24 volt with AC drive.
■ Motors and controls meet NEC standards.
■ Footswitch with OSHA guard standard. Many electrical, electronic and computer control options available including White systems software.
■ Controls can be placed in any location convenient to user requirements.
■ Power as required by project: 115/1/60, 230/1/60, 208/1/60, 230/3/60 or 460/3/60. 50 Hz available with DC or AC motors.
■ Drive located in base allows lowest height of carousel and provides low center of gravity requiring less bracing.
■ Carousel interface box (CIB) provides link to PLC controls and stand-alone and networked PC based software packages.

Power Transmission

■ Flame-cut ½ inch steel sprockets for superior strength and durability. Sprockets at both drive and idler end for smooth operation.
■ Drive sprockets provide contact around entire circumference of the end section for smooth continuous movement of the bins.
■ Solid steel links with oilite bushings at all pivot points.
■ Use of torque transfer tubes for twin drive units permit top and bottom sprockets of carousel to be driven simultaneously, insuring equal drive pressure, minimizing bin sway, insuring smoother stop and start of tall bin units, which can be critical with inserter/extractors and high live loads.
■ Oversized concave double flange ductile iron wheels with axial roller bearings pivot on double thrust bearings.
■ Thick wall tubular steel track varies with live load capacity required. All end sections utilize type 304 stainless steel track.
■ Upper guide track has flush surface for mounting second tier of carousels directly on top of lower tier or for clearing tight ceilings.
■ Heavy-duty roller chain from gear box to drive sprocket.
■ Power transmission components meet ANSI B29.1.

Environment

■ Quiet and smooth operation. Meets OSHA noise specifications. Less than 65 dbA at three feet from source.
■ Operating environment: - 20 F to 150 F with 15 to 90% relative humidity.
■ NEMA-1 or NEMA-12 enclosures optional; others on application.
■ Can meet Zone 4 seismic, Class 10,000 clean room, JIC standards.
■ Can interface with lightree and sortbar operator aids.
■ Special units for ovens, freezers and other environments available.
■ Inserter/extractor mechanisms can be furnished to integrate the carousels with conveyors, AGVs and other materials handling equipment.
■ Baked enamel paint: black frame, silver top and bottom plates, blue bin backs. Other colors available.

Safety Features

■ Emergency stop button.
■ Safety floor mat.
■ Audible alarm with beacon.
■ Horizontal and vertical infrared photo eyes for personnel and product.

Maintenance Features

■ Modular drive design means easy access to motor, gear box, drive sprocket and chain.
■ Provision for access panels for simple and safe maintenance of drive.
■ Simple and accessible lubrication points.
■ Automatic track lubricator available.

WHITE STORAGE & RETRIEVAL SYSTEMS, INC.
30 Boright Avenue, Kenilworth, NJ 07033 ■ 908-272-6700 ■ Fax 908-272-5920
4104 Sorrento Valley Blvd., San Diego, CA 92121 ■ 619-457-2320 ■ Fax 619-457-5858

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TO: R. RYPINSKI

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REVIEW COMMENTS - METRO PASADENA PROJECT

93-04322

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DATE 3-2-93

SHEET 1 OF 2

TITLE OF SUBMITTAL Revised O&M Plan - Pasadena

FINAL DESIGN ☐

PRELIMINARY ENGINEERING ☐

REPORT ☒

TASK MANAGER

REVIEWER Rob Ball ORGANIZATION RCC

RESPONDER Ron Rypinski ORGANIZATION O&M PLANNING 3/4/93

REF. NO.	PAGE NO.	DRAWING NO. SPEC.SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
1	2-2	Route Alignment	What happens if the Azusa extension is built before the Glendale line.	2	The answer depends upon whether the future shop/yard is located in Burbank or Azusa.	
			Would Midway accommodate both Pasadena and the Azusa extension.	D	No. The additional 18 cars would exceed Midway's storage and maintenance capability.	✓
2	2-4	Patronage Projections	Are you aware that the original model used for the Pasadena line has been updated. New patronage projections which may or may not be different will be available this month.	2	No, I was not aware. Please provide the new data just as soon as it is available so that the final version of this update of the O&M Plan can include the latest figures.	
3	6-2	Station table	Parking requirements at Del Mar and Sierra Madre Villa are shown as 600 and 1007, respectively on the station plans.	1	You are more correct. Will revise the counts on the table.	

ACTION CODE 1= WILL COMPLY 2= DISCUSSION/CLARIFICATION NEEDED 3= NOT APPLICABLE BECAUSE D= RESPONSE ACTION COMPLETED

VER 1.1 10/16/92

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DATE 3-2-93

SHEET 2 OF 2

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REPORT ☒

RESPONDER Ron Rypinski ORGANIZATION O+M PLANNING 3/4/93

REF. NO.	PAGE NO.	DRAWING NO. SPEC.SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
4		STY 01 thru STY 03	All tracks including Metrolink should be labelled.	1	will label.	
			Label buildings and access roads as well.	1	will label.	
			Show secondary access road from Elysian Park into the Midway Yard site	1	will show.	
5	7-13	Rail Vehicle Maint.	Are you sure all these activities can be handled at Midway Yard.	2	all which are not marked with "(future)" can be handled as long as the fleet does not exceed 40 cars.	
6	7-15	D	Will we ever do wheel truing at Midway or wait until we can go to the Carson Yard.	2	No wheel truing at midway - if we can tow cars to Red Line shop (or metrolink shop).	
			Is wheel truing proposed for Glendale shop?	D	yes, see 7.4.3 A and D on page 7-15.	✓

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REVIEWER Rob Ball ORGANIZATION RCC

REPORT ☒

RESPONDER Ron Rypinski ORGANIZATION O+M Planning 3/4/93

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			Label buildings and access roads as well.	1	will label.	
			Show secondary access road from Elysian Park into the Midway Yard site	1	will show.	
5	7-3	Rail Vehicle Maint.	Are you sure all these activities can be handled at Midway Yard.	2	all which are not marked with "(future)" can be handled as long as the fleet does not exceed 40 cars.	
6	7-15	D	Will we ever do wheel truing at Midway or wait until we can go to the Carson Yard.	2	No wheel truing at midway - if we can tow cars to Red Line shop (or Metrolink shop).	
			Is wheel truing proposed for Glendale shop.	D	yes, see 7.4.3 A and D on page 7-15.	✓

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REVIEW COMMENTS - METRO PASADENA PROJECT

DATE 9-4-93

SHEET 1 OF 1

TITLE OF SUBMITTAL OPERATIONS AND MAINTENANCE PLAN (FEBRUARY 1993)

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TASK MANAGER

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REVIEWER Jack McDowell ORGANIZATION RCC OM&S

REPORT ☐

RESPONDER Ron Rypinski ORGANIZATION O&M EMC

REF. NO.	PAGE NO.	DRAWING NO. SPEC.SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
	5-1	Chap. 5	Change any ref to "Transit Security" to read "Transit Police". Security has different & negative connotation	1	Will change to "Transit Police".	
	6-4	6.2.2.	B - Change "Fare Inspections" to read "Transit Police", also either include word "transfers" or use catch-all term "Fare Media"	1	Will change to Transit Police and fare media.	
			D - Suggest adding what armed escort services will be provided.	1	Will add reference to security escort of revenue personnel.	
			General Comment: Where ever SCRTD or LACTC is mentioned, delete and use MTA	1	Will use MTA.	
	7-18	Table 7-4	Facilities Maintenance Prefers Hydraulic Platform Truck vs Item # 2.	2	"Scissors platform truck" is hydraulic and is what Bud Moore requested previously.	

ACTION CODE 1= WILL COMPLY 2= DISCUSSION/CLARIFICATION NEEDED 3= NOT APPLICABLE BECAUSE D= RESPONSE ACTION COMPLETED

C. Terminal Station Supervision

Monitoring of terminal operations (routing, signaling, and dispatching) will be performed from central control. To ensure a smooth terminal operation, a supervisor may be located at a terminal station during peak-period operations. The primary responsibilities of the terminal supervisor will be to:

1. Observe passenger flow and report overcrowding conditions to central control

2. Ensure train operators are on board trains before scheduled departure time

3. Direct/assist train operators during delays or abnormal conditions

4. Observe additions and deletions of vehicles during headway transition periods

5. Report and expedite minor repair to vehicle-related failures occurring at the terminal

6. Ensure train operator compliance to rules and procedures.

D. Terminal layover facilities will be provided at terminal stations and will include:

1. A supervisor's booth (approximately 80 square feet) at the normal departure end of the outbound station platform that will include a telephone, public address announcement capability, control for "Next Train Out" signs, and portable radio capability.

2. A restroom and layover room for operations personnel.

4.3 Abnormal Operations

Abnormal mainline operations usually result from equipment failures (either vehicle or wayside) and incidents that hinder system performance and disrupt operations beyond normal schedule recovery capabilities. The impact that these failures and incidents have upon operations is influenced by the following factors:

A. Nature of failure

B. Location of failure

C. Headways operated at time of failure

D. Strategy used to recover from the failure

CHAPTER 5

CENTRAL CONTROL OPERATIONS

This chapter describes the basic operational responsibilities and systems requirements for the Central Control Facility (CCF) relative to the operation of the Pasadena Line.

5.1 GENERAL

The central control operations, transit security and fare inspection functions are located in the two-story structure adjacent to the crossing of the Metro Blue Line and the Metro Green Line at the Imperial/Wilmington stations. The Central Control Facility functions as the nerve center of system operations, for not only the Metro Blue Line, but also the Metro Green Line, Pasadena Line, and the Metro Red Line. Every aspect of mainline and station operations, mainline maintenance activities, and any maintenance-of-way that affects mainline operation will be directed, coordinated, and monitored from the CCF. The CCF will also serve as the transit security dispatch center.

5.2 CENTRAL CONTROL RESPONSIBILITIES

With respect to Pasadena Line operations, central control's primary areas of responsibility are system safety and mainline, station, and yard related operations.

5.2.1 Mainline Operations

Central control will maintain supervisory control over all mainline train operations, maintenance activities, and traction power distribution. It will monitor and direct mainline operations in accordance with established operating schedules, rules, and procedures. It will implement any corrective actions that may be required to maintain service schedules and to minimize adverse impacts of equipment failures or emergency situations. During emergencies, central control will be responsible for implementing emergency procedures and coordinating with outside agencies as may be required.

Mainline operations (whether normal or abnormal) will be directed, controlled, and monitored by CCF personnel utilizing radio, telephone, and public address communications systems. Consoles will be used for monitoring wayside signals, interlockings, and traction power and support facilities. Visual display boards will assist in the monitoring of the total mainline system status.

Central control personnel will be responsible for all yard-related operations that result in train movements between the mainline and the yard. The yard control function will coordinate train movements within the yard. However, once the trains are released from the yard, they come under central control's coordination. Central control will then be responsible for coordinating the dispatch of trains into service from the yard or the removal of trains from service in order to meet mainline schedule requirements.

All central control personnel monitored mainline operations will be coordinated with the Transit Security Dispatch Center, train operators, and yard control, and, when appropriate, with emergency response agencies. The Transit Security Dispatch Center will be the centralized transit security dispatch facility for all lines controlled from the CCF.

5.2.2 Station Operations

Central control personnel will monitor station operations to provide for the safety and security of passengers, employees, and system facilities and equipment.

Central control personnel will view the station area via closed-circuit television (CCTV) monitors linked to camera equipment at each station. In this manner, activities at the station can be visually monitored at all times. If a situation arises that could endanger the health or welfare of passengers, or if equipment or facilities are being tampered with or vandalized, then central control personnel will utilize its direct telephone communications to alert the adjacent Transit Security Dispatch Center. Transit Security personnel will respond to the situation and, if necessary, will contact the proper authorities for assistance. In addition to the direct telephone link-up between central control and the Transit Security Dispatch Center, there will be a direct link of the CCTV so that any single camera image selected at central control can be monitored at the adjacent Transit Security Dispatch Center.

Besides monitoring the safety and security of passengers and equipment at the stations, central control personnel will notify passengers of any change of schedule or other informational items via a visual and audible public address (PA) system. They will also notify maintenance personnel via radio or telephone when equipment or facilities become inoperative or need servicing.

7.1.5 Site Access/Security

A. A network of main access roadways to the primary yard buildings and service roadways to the secondary yard buildings, train storage tracks, and material storage areas will be provided.

B. The entire site will be fenced and adequate lighting will be provided throughout the body of the yard.

C. Single-point entry for normal operations will be controlled by a guard on a 24-hour basis. Other gates will normally be closed and locked. A normally staffed guardhouse and gate with automobile turnaround space will be provided at the main entrance. A gate will be located at the secondary access point, but will not be staffed except during emergency or unusual conditions.

D. Parking for employees, visitors, and others will be provided. Employee parking areas will accommodate the two largest shift changes. When appropriate, mainline access platforms will be provided for yard/mainline trips. The platforms, when provided, will serve as a "flag stop" for employees or accompanied visitors and as a relief point for train operators.

E. Yard site fire protection will, as a minimum, include:

1. Fire hydrants where appropriate in the site to meet the minimum hose reach requirements of the fire department having jurisdiction (usually 300' on center for 150' reach)
2. Emergency fire and rescue access to appropriate points in the site
3. An emergency evacuation plan for yard vehicles and position-specific individuals with coordination and implementation responsibility on each shift
4. Other requirements in accordance with established Fire/Life Safety criteria.

7.2 YARD OPERATIONS

Yard operations consist of all activities and facilities necessary to provide trains for mainline operations and to receive trains from mainline operations in accordance with the established operating schedule. The yard operating plan outlined in this section reflects the basic methodology for accomplishing the necessary yard operations activities.

7.2.1 Yard Operations Concepts

Will change RR

A. All movements within the yard site will be monitored and directed by the Yard Dispatcher located in the yard control room on the mezzanine of the vehicle shop. X a COORDINATED

B. The Yard Dispatcher will direct all yard movements using train radio (on yard X & COORDINATE

h. General condition or car interior

i. Radio, public address, and intercom

6. Sanding:

Replenishment of on-board vehicle sand hoppers will be performed manually in the yard or during all monthly inspections (in the shop) and on an as-needed basis during daily inspections.

7.3 OPERATIONS FACILITIES

The facilities to be located within the yard and shop site that are required for the yard and mainline operations function will be located on the mezzanine of the vehicle shop. This location, will allow yard operations to be located in the vicinity of the yard areas where the majority of the operations activity occurs and will also allow more flexibility to accommodate an efficient yard layout given the normal constraints of the potential sites.

The operations facilities will accommodate the following operations activities:

A. Yard dispatching

B. Operator reporting and training

C. Operations administration

will change RR & COORDINATED

7.3.1 Yard Dispatching

All train or vehicle movements within the yard will be directed and monitored by the Yard Dispatcher located in the yard control room. The yard control room will be located at a corner on the mezzanine of the vehicle shop and will be staffed at all times. The yard control room will be designed to provide as unrestricted a view of the yard trackwork as possible. The most critical yard areas requiring unrestricted viewing are:

A. Trackage between yard and mainline

B. Yard storage tracks

C. Vehicle washer and cleaning platform

The window area for the yard control room will be maximized and windows will be tinted and sloped to reduce glare and transmission of heat.

Close communication, plus use of established schedules, rules, and procedures will be

D. Testing

Testing will be accomplished by the use of test apparatus configured to perform static and dynamic testing at the vehicle or wayside system and subsystem levels, and static bench testing at the assembly and component levels. The objectives of thorough testing are:

1. To ensure proper function of items under test

2. To provide for timely and accurate failure diagnosis

3. To reduce the time required to restore equipment to serviceable condition (and reduce the resultant costs) by identifying the lowest-level, failed, replaceable component.

E. Contract Maintenance

In certain instances, it may be more cost effective to have assembly or component repair and overhaul work performed by service contracts. The degree to which component or assembly repair and overhaul work is contracted out to local service shops or to the original equipment manufacturers is an important determinant of maintenance facility requirements, staffing, personnel skill levels, spare parts inventory, and component repair procedures. Factors to be evaluated in the decision include:

Will change RR

1. LACTC and SCRTD, MTA policies and practices X
2. Availability of suitable contractors
3. Logistics, inventory, and material-handling requirements
4. Labor agreements
5. Special equipment requirements and costs
6. Availability of special skills and workload of maintenance forces
7. Liability implications
8. Equipment warranty implications
9. Relative costs.

Each vehicle operated in revenue service will be inspected daily in the service and inspection bay of the shop building or in the yard. Daily inspection will consist of a general safety and vehicle condition type of inspection (see 7.2.2, item 5).

will change RR

Preventive maintenance for rail vehicles will be performed on the basis of hours or miles of mainline operation in accordance with the manufacturers' recommendations. Changeout of major components will involve the replacement of failed components or scheduled changeouts. Components removed from vehicles will be shipped to the appropriate component repair location (e.g. Long Beach main yard, Red Line yard, other SCRTD facility, contract vendor, or the manufacturer). Limited component repair capability will be provided in the future for vehicle truck assemblies, vehicle electronic components, batteries, and various electrical and mechanical components which can be repaired quickly and easily after removal from a vehicle. Major carbody repairs, wheel truing, and painting will be performed either at the Red Line Yard and Shop or at another MTA facility.

2, MTA

OK as written.

Interior cleaning of rail vehicles will be performed daily at the car cleaning platform. The cleaning platform will be located between two tracks in the vicinity of the car washer. Power outlets, hose bibs, and lighting will be provided along the cleaning platform. The platform will accommodate at least 3 cars (2700 feet) on each side, will be at least 6 feet in width, and will be equipped with an access ramp and stairs. Exterior cleaning will be performed in the car washer. Trains or cars will operate through the washer in the wash mode. The wash operation will be initiated by the train operator at a control panel located at the entrance to the washer. The car washer will include storage and mixing tanks for water and cleaning chemicals, recycling equipment, brushes, water and chemical application arches with splash shields, manual cleaning platforms, local control panel, power outlets, hose bibs, and lighting. The design of the car washer will be similar to the washers located at the Metro Blue Line and the Metro Green Line yards and shops. Initially, each rail vehicle will be washed once every two days. Provision will also be made for an undercar blowdown facility to be located adjacent to the car washer or the vehicle shop.

7.4.3 Vehicle Shop Requirements

The vehicle maintenance shop will include the space, facilities, and equipment needed to accomplish the required activities in an efficient and orderly manner. The future vehicle shop will be capable of maintaining all of the rail vehicles for the Pasadena and Glendale Lines. The overall facility layout will have an orderly arrangement of maintenance functions by activity,

7.5 MAINTENANCE-OF-WAY (FUTURE)

7.5.1 Maintenance-of-Way Functions

Facilities maintenance functions for the Pasadena Line will be performed primarily out of the maintenance-of-way facility located at SCRTD's Metro Red Line yard site. The future facilities maintenance functions associated with the Pasadena Line include inspection, maintenance, and repair of the following elements:

- Trackwork
- Train control/signaling (including grade crossings)
- Communications
- Traction power and overhead contact system
- Fare collection equipment
- Stations and other structures
- Landscaping, fencing and other right-of-way elements
- Maintenance vehicles and equipment

The actual facilities maintenance work will be carried out at the equipment site and will require personnel to travel with necessary tools, equipment, and material to the specific site. Diagnostic maintenance techniques will be used and faulty components will be replaced or repaired at the site. Utilizing the philosophy of lowest replaceable unit exchange whenever practicable, failed items will generally be replaced and, if repairable, consigned to the designated component repair or electronics shop.

Facilities maintenance will be accomplished utilizing a combination of system personnel and service contracts. Generally, the approach to facilities maintenance will parallel that utilized for the Blue Line. To the extent practical, personnel and equipment for other Metro lines will also be utilized for the Pasadena Line.

CHAPTER 8

O & M STAFFING AND COST ESTIMATES

8.1 GENERAL

The staffing plan and annual cost estimates for the Pasadena Line for the initial year and the system startup period are presented in this section for the following organizations:

- Transportation
- Vehicle Maintenance
- Facilities Maintenance

The staffing plan and cost estimates are subject to refinement as system design progresses and are based upon the following assumptions:

A. Existing staff for the Blue Line will be utilized to the extent practical.

B. Costs are expressed in 1990 dollars and are based upon SCRTD rates and other costs utilized for the Blue Line O&M cost estimates. Cost estimates include the following:

1. Fringe benefit rate of 45%.
2. General and Administration rate of 8.67%.
3. Average productive hours per year per employee of 1810.
4. Wage rates for Pasadena Line personnel are the same as those for the Metro Blue Line.

C. The staffing plan will reflect a functional organization (such as the functional O&M organization chart shown in Figure 8-1).

8.2 INITIAL YEAR STAFFING AND COST ESTIMATES

The staffing estimates for the initial year are based upon shift coverage and annual productive hours per employee. Shift coverage for the Pasadena Line is established with consideration for the following staffing characteristics:

- Positions which must be continually available on-line in order to accomplish operations. Such positions include train operators, fare inspectors and transit police officers, ATO technicians, central control dispatchers, CCTV observers, fare collection equipment technicians, etc...

- Positions which are necessary in order to accommodate yard and shop operations. Such positions include rail vehicle mechanics, car cleaners, storekeepers, etc...

- Positions which are required, but not necessarily on a continuous on-line basis. Such positions include track workers, TPSS electricians, communications technicians, etc... These positions, when combined with those of other Metro rail lines, provide mobile, full coverage capability for routine activities as well as immediate response needs for all lines.

Will change to MTA RR

The cost estimate for the initial year includes direct labor, indirect labor, general and administrative, non-labor, and traction power costs. Labor costs are based upon the equivalent staff calculated from the shift coverage and the appropriate hourly and fringe benefit rates. Non-labor costs are based upon the quantities of equipment and facilities and other factors appropriate for the Pasadena Line.

A summary of the cost estimate for the initial year is shown in Table 8-1. Staffing and labor cost estimates for Transportation, Vehicle Maintenance, and Facilities Maintenance are shown in Table 8-2 through 8-4, respectively. The cost estimates for the non-labor categories are shown in Table 8-5.

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REVIEW COMMENTS - METRO PASADENA PROJECT

DATE 3-12-93

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REPORT ☐

TASK MANAGER

REVIEWER Jeff Barenbaum ORGANIZATION SCRTD-MTA

RESPONDER Ron Rypinski ORGANIZATION O&M

REF. NO.	PAGE NO.	DRAWING NO. SPEC.SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
	7-21	Table 7-2	The Materiels Department the 4th operating department has been excluded. There are Stores keeper positions which are incorrectly listed under both Vehicle Maintenance & Facilities Maintenance. The Materiels Department's requirement for staffing are as follows. 1 Supervisor 1 Storekeeper 5 Stock clerks 2 1st shift 1 2nd Shift 1 3rd Shift 1 Relief Shift	1	Will provide for separate Material Department on this Table. Note that 6 Stock Clerks are needed if 7 day / 3 shift coverage is provided.	

ACTION CODE 1= WILL COMPLY 2= DISCUSSION/CLARIFICATION NEEDED

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REVIEWER J BARENBAUM ORGANIZATION SCRTD REPORT ☐

RESPONDER R RYPINSKI ORGANIZATION O+M

REF. NO.	PAGE NO.	DRAWING NO. SPEC.SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
	7.22	Figure 7-2	There are 2 offices located to the left of the Storeroom 1, is marked 150 S.F. and the other 225 S.F. If both of these offices are to be occupied by the Materiels Department then no changes are required. If however one of these offices is to be occupied by the Maintenance Department the door which leads into the Storeroom will have to be removed for security reasons.	1	Agree. The 225 S.F. office is for Equipment Maint. Will have this corrected in early final design phase.	
			Require windows facing out to the Storeroom for Materiels Offices only not Maint. Offices.	1	Will have included in Final Design.	

ACTION CODE 1= WILL COMPLY 2= DISCUSSION/CLARIFICATION NEEDED 3= NOT APPLICABLE/REJECT

ENGINEERING MANAGEMENT CONSULTANT

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REF. NO.	PAGE NO.	DRAWING NO. SPEC. SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
	7-23	Figure 7-3	The tool cert storage and tool room should be reversed. A pass-thru window will not be required however a fence with a sliding door will be required for the wall facing the storeroom. This will allow us to issue tools with existing storeroom personnel.	D	The floor plan shown is the last configuration for the Cornfield shop which included input from SCRTD and RCC. It is provided here so as to 1) remind all of us that a permanent facility will be needed and 2) act as a starting point for a shop for the Pasadena and Glendale Lines. These comments will be appropriate when the conceptual design is done for the future yard. These comments will be incorporated in an appendix to the O+M Plan so that they may be available in the future.	
			Require windows facing out to the Store room from the parts office & records room.	D		
			Require a door which goes directly from the parts office into the storeroom.	D		

ACTION CODE 1= WILL COMPLY 2= DISCUSSION/CLARIFICATION NEEDED 3= NOT APPLICABLE

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TASK MANAGER _____ PRELIMINARY ENGINEERING ☐

REVIEWER J BARENBAUM ORGANIZATION SCRTD REPORT ☐

RESPONDER R RYPINSKI ORGANIZATION O&M

REF. NO.	PAGE NO.	DRAWING NO. SPEC. SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
	7-26	Figure 7-4	Suggest that the Communication equipment room be relocated to the Maintenance Equip. and Tool Storage side of the facility. If this is not possible then we require that the door to the storeroom be removed and relocated to the Mech/Fleet Equipment room.	D	Please see response on page 3 of these comments.	
			Require that the Storeroom office have windows looking out into the storeroom.	D	see above response.	

ACTION CODE 1= WILL COMPLY 2= DISCUSSION/CLARIFICATION NEEDED 3= NOT APPLICABLE BECAUSE D= RESPONSE/ACTION

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REVIEW COMMENTS - METRO PASADENA PROJECT

DATE _____

SHEET 5 OF 7

TITLE OF SUBMITTAL _____ FINAL DESIGN ☐

TASK MANAGER _____ PRELIMINARY ENGINEERING ☐

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REF. NO.	PAGE NO.	DRAWING NO. SPEC. SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
	7-27	Table 7.3	The requirements of the Material Department have been left out. Our equipment requirements are extensive from racking and shelving to forklifts to smaller material handling and other misc. required equipment. A complete listing is available upon request.	2	Please note that forklifts are listed. Racking + Shelving will be part of shop design. Please provide a copy of the listing mentioned so that your needs can be added.	

ACTION CODE 1= WILL COMPLY 2= DISCUSSION/CLARIFICATION NEEDED 3= NOT APPLICABLE BECAUSE _____

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DATE _____

SHEET 6 OF 7

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TASK MANAGER _____ PRELIMINARY ENGINEERING ☐

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REF. NO.	PAGE NO.	DRAWING NO. SPEC. SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
	8-1	8.1	Again the Materiel Department has been left out.	1	will incorporate Material Dept.	
	8-4	Table 8-1	These figures are not accurate due to the Materiel Department having been left out.	1	will include.	
	8-8	Table 8-5	These figures are not accurate due to the Materiel Department having been left out.	1	will include	

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DATE _____

SHEET 7 OF 7

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RESPONDER RON RYPINSKI ORGANIZATION O+M

REF. NO.	PAGE NO.	DRAWING NO. SPEC.SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
	7-22	Figure 7-2	Require a scissor lift at the roll up doors at the receiving end of each of these 3 storerooms. This is required because an elevated dock has not been designed for any of these locations. The scissor lift will allow a forklift to be able to access delivery trucks of varying heights and will allow it to drive into trucks to access pallets which are in the trailor.	1	Agree. Will add these to equipment list (Table 7-3) and include lift in Midway Yard final design.	
	7-23	Figure 7-3				
	7-26	Figure 7-4				

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SHEET 1 OF 1

TITLE OF SUBMITTAL OPERATIONS + MAINTENANCE PLAN

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TASK MANAGER R. RYPINSKI

PRELIMINARY ENGINEERING ☐

REVIEWER JORGE M. SUTO ORGANIZATION EMC

REPORT ☑

RESPONDER RON RYPINSKI ORGANIZATION O+M PLANNING

REF. NO.	PAGE NO.	DRAWING NO. SPEC.SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
1	2.3	—	"CORNFIELD" SHOWN IDENTIFY MIDWAY INSTEAD	1	will revise.	
2	3.4	—	ITEM 3.3 2ND ¶ REFERS TO "CORN FIELD" - CHANGE	1	will change to Midway.	
3	4-1	—	SHOULD COORDINATE WITH TPSS & C/S SITE DW'GS	1	will check Fig 4-1 on pg 4-13 with TPSS / C+S sites.	
4	6.1	—	6.1.1 REFERS TO PLATF LENGTH = TO TRAIN + 10' LEEWAY. SEE PRESENT P.E. DRW'GS TO ENSURE WHETHER THIS HAS BEEN ACCOMPLISHED	2	Should be 9' leeway (4½' at each end) for platform edge taper.	
5	6-2	—	PPK'G SPACES: ONE 57 = ± 100 FOR LRT & 100 ± = CITY	1	Will correct Table 6-1.	
			DEL MAR = 600 PER EIR			
			3 MV = 1000 " "			

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DATE March 8 93

SHEET 1 OF 1

TITLE OF SUBMITTAL O & M Plan

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REPORT ☑

TASK MANAGER

REVIEWER John Barber ORGANIZATION S & SA

RESPONDER Ron Rypinski ORGANIZATION OrM

REF. NO.	PAGE NO.	DRAWING NO. SPEC.SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
1	4-14	§ 4.2.1	Text indicates 7 trains running at 8-minute headways, with a round trip time of 80 minutes. For this round trip time and this headway, a fleet of 10 trains would be required. Otherwise, need to increase the headway.	1	Agree. Will change text to reflect 10 trains on line.	

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REVIEW COMMENTS - METRO PASADENA PROJECT

DATE 3/11/93

SHEET 1 OF 5

TITLE OF SUBMITTAL Metro Pasadena Project - Operations & Maintenance Plan

FINAL DESIGN ☐

PRELIMINARY ENGINEERING ☐

REPORT ☑

TASK MANAGER Ron Rypinski

REVIEWER Matt Hurwitz ORGANIZATION EMC - Civil

RESPONDER Ron Rypinski ORGANIZATION O&M

REF. NO.	PAGE NO.	DRAWING NO. SPEC.SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
1	3-4	3.3	- Reference to "Carnfield Yard" in second paragraph should be changed to "Midway Yard"	1	Will change to Midway Yard.	
2	4-1	4.1.C	- Initial year "1996" conflicts with year "1997" on p. 2-2. Please resolve.	1	Will change to 1997.	
3	4-13	Fig. 4-1	- Please add/show yard tracks (not just call out stationing).	1	Will have them added.	
4	4-13	Fig. 4-1	- Please call at crossover sizes (No. 10, 10.8, etc.). Helps to, at a glance, get an idea of speed and configuration.	1	Will identify turnout sizes.	
5	4-13	Fig. 4-1	- "Legend": Most of the symbols listed aren't used! Please delete unused symbols to reduce clutter on dwg.	1	Will delete those which will not be applicable. This drawing is dynamic and will continue to change during Final Design.	

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REVIEW COMMENTS - METRO PASADENA PROJECT

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SHEET 2 OF 5

TITLE OF SUBMITTAL Metro Pasadena - O & M Plan

FINAL DESIGN ☐

PRELIMINARY ENGINEERING ☐

REPORT ☑

TASK MANAGER R. Rypinski

REVIEWER M. Hurwitz ORGANIZATION EMC - Civil

RESPONDER Ron Rypinski ORGANIZATION O+M

REF. NO.	PAGE NO.	DRAWING NO. SPEC.SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
6	4-14	4.2	(General) - Is this portion written from the point of view of operation to SMI or to Abuse? It's hard to tell.	D	Applies to all main line operations and routes (it is philosophy for normal operations).	✓
7	4-20	4.3.1.C.	- Suggest adding case of accident involving LRV and pedestrian or motor vehicle, with associated investigation time.	D	See item 1 for motor vehicle incidents. As stated, these are examples - not an exhaustive list.	
8	4-26	4.3.8	- Paragraph number is incorrectly numbered as "5.3.8". Please correct.	1	Will change to 4.3.8.	
9	5-4	5.3.E.	- Are cameras set in a fixed position or can they be moved by remote control? Please indicate.	3	May be both per Design Criteria and actual conditions. Not appropriate here as this is Communications system design detail.	
10	5-4	5.3.G.	- Doesn't CCF have a video recorder as well? Please indicate if so.	3	Yes per Design Criteria. Such detail is not part of this plan as it is communications system design detail.	

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REVIEW COMMENTS - METRO PASADENA PROJECT

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SHEET 3 OF 5

TITLE OF SUBMITTAL Metro Pasadena - O & M Plan

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PRELIMINARY ENGINEERING ☐

TASK MANAGER R. Rypinski

REVIEWER M. Hirunitz ORGANIZATION Emc-Civil

REPORT ☑

RESPONDER Ron Rypinski ORGANIZATION O+M

REF. NO.	PAGE NO.	DRAWING NO. SPEC.SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
11	6-1	6.1	-The eleven future stations are not shown on the system map Fig. 2-1, as stated in first paragraph. Please correct.	1	will correct.	
12	6-1	6.1.1	-Platform length is a 3-car train + 2-4.5' extensions, not 10' leeway ("10' leeway" sounds as if all 10' could be put at one end!). Please fix.	1	will revise text to reflect 9' extension with 4½' at each end.	
13	6-4	6.2.2.B	- TVM's also sell round-trip tickets and tickets with bus transfers. Please indicate.	1	single ride includes 1 round trip ticket. will clarify and include Bus transfers.	
14	7-1	General	- ~~Please~~ What is the "future" yard referred to in this chapter? The only yard on the Pasadena line is Midway. The main yard in the future for this line is on the Glendale line. Please clarify in the report.	1	It is potentially for Pasadena and Glendale Lines, but may be located on either - even though it is to be on Glendale Line as of this time. will clarify that future Y+S includes Glendale Line.	

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REVIEW COMMENTS - METRO PASADENA PROJECT

DATE 3/11/93

SHEET 4 OF 5

TITLE OF SUBMITTAL Metro Pasadena - O & M Plan

FINAL DESIGN ☐

TASK MANAGER R. Rypinski

PRELIMINARY ENGINEERING ☐

REVIEWER M. Hurwitz ORGANIZATION EMC - ~~Area~~ Civil

REPORT ☑

RESPONDER Ron Rypinski ORGANIZATION O&M

REF. NO.	PAGE NO.	DRAWING NO. SPEC.SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
15	7-6	7.2.2.2.a.	- Please add description/note that train operators operate yard switches by post switches; they are not operated by yard dispatcher.	3	This is detail for train control design. O&M Plan only establishes activity. Switches may or may not be pole mounted.	
16	7-6	7.2.2.2.d.	- Are rail cars washed on the way into the yard at Midway? Your description sounds like they are washed after storage. Please clarify.	D	Cars may be washed on way into yard or later. Washing on way in only possible if train operator still has time left from work schedule. (See 2 a, first sentence).	
17	7-7	7.2.2.5	- Does daily inspection include insp. of horn & bell signals? If so, please add.	D	Included under b or g along with other items not specifically listed.	
18	7-8	7.3.1.A.	- Trackage between yard and mainline cannot be viewed from the Yard Control Room @ Midway. Please indicate how this will be controlled.	D	As stated - "as unrestricted a view of the yard trackwork as possible." Control will be via train radio. Remember - the O&M Plan establishes the functional requirements. The objective of facilities and systems is to achieve as many as possible.	

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REVIEW COMMENTS - METRO PASADENA PROJECT

DATE 3/11/93

SHEET 5 OF 5

TITLE OF SUBMITTAL Metro Pasadena - O & M Plan

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REPORT ☑

TASK MANAGER R. Rypinski

REVIEWER M. Hurwitz ORGANIZATION EMC - Civil

RESPONDER Ron Rypinski ORGANIZATION O&M

REF. NO.	PAGE NO.	DRAWING NO. SPEC.SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
19	7-14	7.4.2 - last	paragraph: At Midway, the cleaning platform is not located in the vicinity of the car-washer, as indicated.	1	will also add "Rubidoux facility as a potential location.	
20	7-14	7.4.2 - last paragraph:	At Midway, the cleaning platform does not accomodate 3 cars, as indicated. Also,	2	It is not 3 cars at the moment.....	
			there is a typo - "2700 feet" should read "270 feet".	1	will correct (wanted to see who really read the Plan).	
21	7-16	7.4.3.F.	- Should compressed air be added to items available in pit?	1	Yes, will add.	
			END OF COMMENTS		END OF RESPONSES	

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REVIEW COMMENTS - METRO PASADENA PROJECT

DATE 3/9/93

SHEET 1 OF 4

TITLE OF SUBMITTAL Operations & Maintenance Plan

FINAL DESIGN ☐

TASK MANAGER Ron Rypinski

PRELIMINARY ENGINEERING ☐

REVIEWER R. Boerwinkle ORGANIZATION EMC

REPORT ☐

RESPONDER Ron Rypinski ORGANIZATION O+M

REF. NO.	PAGE NO.	DRAWING NO. SPEC.SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
1			Single crossover at South side of Yard exit to mainline does not provide adequate operation. The objective in morning rush hour is to send trains North from yard. Single crossover requires either sending trains to Union Station before heading north (effectively dead time for the operators) or routing into reverse traffic while turning around (Thus locking any north bound train into Union Station. Diamond crossover would permit the option of normal to normal direction turnback.	2	Agree. Will discuss with Facilities / Civil members of the Team.	

ACTION CODE 1= WILL COMPLY 2= DISCUSSION/CLARIFICATION NEEDED 3= NOT APPLICABLE BECAUSE D= RESPONSE ACTION COMPLETED

VER 1.1 10/16/92

DESIGN REVIEW COMMENTS

Reviewer	Organization	Discipline	Sheet
R. Boerwinkle	FMC	ATC	2 of 4

Project	Contract No.	Contract Title	Submittal	Drawing Subset	Date
		Metro Pasadena Project			3/9/93

Ref. #	Page #	Dwg #/Spec Section	Comments	* Response	** Action
			Diamond crossover would also permit better single track operation in the most critical segment of the line. Event on either the Pasadena or Glendale extension that required single track north of the junction would require both lines to be restricted by single track operation all the way to Union Station without diamond crossover.	(see above).	
2	7-14	7.4.2	The platform will accommodate at least 3 cars (2700 feet) on each side ~~~~ it should be (270 feet)	Will correct.	
3	4-13	figure 4-1	Number the tracks such as TRK1, TRK2, consistent with Blue Line.	I will add track #1 (northbound) and #2 (southbound).	

* Responses: 1 = Will Comply 2 = Discussion/Clarification Required 3 = Not Applicable ** D = Action Completed

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REVIEW COMMENTS - METRO PASADENA PROJECT

DATE 3/9/93

SHEET 3 OF 4

TITLE OF SUBMITTAL Operations & Maintenance Plan

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TASK MANAGER Ron Rypinski

PRELIMINARY ENGINEERING ☐

REVIEWER R. Boerwinkle ORGANIZATION EMC

REPORT ☐

RESPONDER Ron Rypinski ORGANIZATION O+M

REF. NO.	PAGE NO.	DRAWING NO. SPEC.SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
4	6-1	6.1.1	Platforms - The platform length will be equal to the length of train (3-car train (90'- long car) ≈270' Plus 10' of leeway. But following stations are 270' long on Page 4-13, figure 4-1. - AVE 26 STATION - 270' - FRENCH AVE - 270' - Southwest Museum - 270' - AVE 51 STATION - 270' - AVE 57 STATION - 270' - MISSION STATION - 270' - FILLMORE STATION - 270' - DEL MAR STATION - 270' - MEMORIAL PARK STATION - 270' - LAKE AVE STATION - 270' - ALLEN STATION - 270' - SIERRA MADRE VILLA - 270'	3 1	Platforms are actually 279' (9' of leeway with 4½' at each end) overall with 270' available for train loading/unloading. The schematic is being revised (to 279') by the facilities team members. The text on this page will be revised to reflect 279'.	

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DATE 3/9/93

SHEET 4 OF 4

TITLE OF SUBMITTAL Operations & Maintenance Plan

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REPORT ☐

TASK MANAGER Ron Rypinski

REVIEWER R. Boerwinkle ORGANIZATION TMC

RESPONDER Ron Rypinski ORGANIZATION O&M

REF. NO.	PAGE NO.	DRAWING NO. SPEC.SECTION	COMMENTS BY REVIEWER	ACTION CODE	RESPONSE/ACTION	ACTION DONE
5	4-14	4.2.1.B.	"The cars will either be stored at union station or at the yard." YARD is more logical place If union station NO SBD.	2	Agree. At this time, the SBD at Union Station is not certain. We should strive to allow storage on at least one of the tail tracks.	
6	7-4	7.1.5.C	small yard! what about electronic card controlled gate and remote control from tower with intercom, Intercom switchable to CC.	D	Need human security presence at yard site - especially at small yard.	
7	7-8	7.2	What about daily test of ATP Function.	2	Will add if test can be done in shop without extensive equipment.	
8	8-8	Table 8-5	There is NO ATO material and ATO contract Designed interface material or Contract.	1	Agree. Will revise.	

ACTION CODE 1= WILL COMPLY 2= DISCUSSION/CLARIFICATION NEEDED 3= NOT APPLICABLE BECAUSE D= RESPONSE ACTION COMPLETED

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Response by Ron Rypinski

Manuel Padron & Associates
Suite 414, 1175 Peachtree Street, NE
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(404) 873-3206

93-09424

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Date: April 21, 1993

To: Ron Rypinski, EMC

From: Manuel Padron

Subject: Metro Pasadena Project, Operations & Maintenance Plan

We have reviewed the February 1993 draft of the subject report, and offer the following comments.

2.1 The Pasadena Line will be part of the Blue Line system; to avoid confusion, we suggest that the current Blue Line be referred to as the LB/LA Line or Long Beach Line. (also in 2.3) Project uses Pasadena and Blue without confusion. Wording is consistent with other project documentation.

2.1 The stated standing capacity at "design service loads" is 107 passengers. This is a load factor of 2.41. However, section 4.1.D defines a desirable load factor of 2.0 (1:1 standing:seated ratio). The higher load factor may be applicable for structural design, but we question whether it is sustainable for a full hour. We recommend that the 2.0 factor be used, and that it be applied to the peak hour patronage projections. ← "crush load"

Loading ratio stated (not loading factor) is what operation is based upon. The 107 passengers is vehicle design number.

2.1 While a zone fare structure is a future possibility, it is likely that initial operations will use a flat fare, as is the case on the LB/LA Line. will clarify wording.

2.2 The latest plan for the Glendale Branch has 7 stations; the distance we got from Pete deHaan is 7.4 miles from the **junction**, or about 9.1 from Union Station. The terminal station (Northwest Glendale) would be at Sonora (as in Table 4-4). An additional 3-station, 4.5-mile extension to Burbank is also being studied.
The extension to Azusa is likely to end at Irwindale, a distance of 9 miles, with 4 vs. 6 stations. will revise text.

Fig. 2-1 Revise to show Midway Yard site vs. Cornfield, West Bank, and Taylor sites.
What is station name beyond Avenue 26: French (Table 4-5) or Figueroa/Marmion?
will revise yard site and French is beyond Ave 26.

2.4 New patronage projections were made in March 1993 as part of the Candidate Corridor Analysis. These should be used instead of those in the FEIR, which were made in 1989 and do not reflect the current station arrangement. (also in 4.1)

Please provide the new projections so that I can incorporate them.

3.3 Can the locations where railroad interface will occur be described? Yes. will do ultimately - connection with Metrolink near Midway. also service to Capitol Milling spur.

4.1.A Is 24 hour operation really intended? Yes.

4.1.D See second comment under 2.1 above. See response above.

4.1.1 Lengths of service periods listed here do not agree with those in Table 4-3. will revise Table

4.1.2 Station locations have been defined. What is status of getting better definition of potential traffic signal delays, so that run times can be refined? The 5 minutes allowance for delays in table 4-5 seems too long. To date, slower speeds into stations at near side stops and curve restrictions have used about 3 of the 5 minutes. I hope 5 minutes is enough.....

Initial Operating Plan (Tables 4-1, 4-3, and 4-6):

- Peak capacity of 2,850 (at desirable load factor of 2.0) is less than forecast load of 3,470. Is 3470 the new number? 8-minute headway is from 30-year Plan.
- 10-minute headways should be sufficient initially for the midday period. LB/LA started with 15-minute midday service. True, but why Issale a 7 minute headway change of ridership is like the Blue Line in March?
- We cannot replicate your computations of daily car-miles and car-hours. For example, in AM peak: 4 hours x 15 1-way-trips/hour x 13.4 miles/trip x 2.5 cars/train = 2,010 car-miles. Will correct calculation.
- We recommend an annualization factor of 255 for weekdays, and 110 for weekends (vs. 260). Actually, normal weekday service is often run on holidays (RTD bus routes) so 260 is more realistic for L.A.

Future Operating Plan:

- With the extension to Irwindale or Azusa, a peak period turnback appears to be desirable. In previous operating plans we have assumed a turnback at Del Mar Station: 4-minute headway to Del Mar, 8-minute headway from there to Irwindale or Azusa. We had suggested an alternative turnback site at Lake Avenue, since that would provide shorter headways to downtown Pasadena stations, but RCC staff decided to stay with the pocket track just north of Del Mar. No action required.
- The Irwindale/Azusa extension will probably not be completed until after the downtown subway link is completed, so calculating statistics for Azusa to Union Station gives only a partial picture of future fleet and yard requirements. True, but the Azusa extension affects Pasadena operations enough that folks need to be thinking about it now.

4.1.4 Figures in last paragraph do not agree with tables. Will correct.

Fig. 4-1 Track schematic should show yard leads. will add them.

4.2.1 This section should describe the procedure for moving trains between the yard and Pasadena; where and how will trains reverse direction? A schematic similar to Figure 4-2 might be helpful. Crossovers at yard/main line will be used to reverse direction and will be shown on revised Main Line Schematic

4.2.1 Numbers of trains in sections B-E do not agree with tables. Will correct B-E.

4.3.3 (last sentence) If passengers are evacuated from a disabled train to a rescue train, why not allow the rescue train to continue in revenue service, i.e. beyond the next station? Will service to disabled and not rescue Train.

6.1 Future stations are not shown on map. Table 6-1 only covers Union Station to S M V and no future stations are involved.

7. Yard & Shop:

- We have discussed the problems with the use of the Midway site. After reviewing the proposed layout, I am even more convinced that it is a mistake to use this site, rather than a larger site such as Cornfield or Taylor. The site is too small, resulting in difficult train movements, both between the yard and revenue service, and between the yard and shop. There is no capacity for future expansion. Midway is intended to serve 8 min headway to SMV ONLY, as an initial facility it will work. Full future yard will be provided later with Midway a great spot for mid-day layover.
- Depending on the schedule for completion of the Glendale branch, the yard may only be used for a few years before a larger site must be found. With this in mind, would it make sense to build only temporary facilities at Midway, e.g. a simple Butler-type building for the shop bays, with all offices and other spaces located in modular buildings that could later be relocated or resold. Some of these buildings could be located just south of the TPSS. Midway should be converted to Maint-of-Way use plus mid-day train storage. Thus, it will not be removed as some folks think. Indeed - why remove it when it can be used.

Figure 7-1:

- Plan should show crossover(s) on main line to allow trains to move between the yard and Pasadena. Will add.
- Would it be possible for the northbound yard lead to branch off the east side of the northbound main, and then cross under the main line, about where the Metrolink connection is now shown? Requires property from old Cornfield site (a no no) and as there is only 1 yard lead (the spur lead is for emergency use), it would make yard to Union Station moves more difficult.

cc: Tom Frawley, BAH