Metro Blue Line Rail Transit Project

LOS ANGELES COUNTY TRANSPORTATION COMMISSION

TRANS

Transit Consultants of Southern California

A Joint Venture of:
- Parsons Brinckerhoff Quade & Douglas, Inc.
- Daniel, Mann, Johnson, & Mendenhall
- Kaiser Engineers (California) Corp.
- North Pacific Construction Management

METRO BLUE LINE
CAPITAL COST REPORT

Prepared For

Urban Mass Transportation Administration

METRO BLUE LINE RAIL TRANSIT PROJECT

The Los Angeles County Transportation Commission (LACTC) was created by the California Legislature in 1976, and is governed by an 11-member board composed of the L.A. County Supervisors, the Mayor of Los Angeles, two members appointed by the Mayor, a member of the Long Beach City Council, and two City Council members appointed to represent the other 84 cities in the County of Los Angeles. The LACTC sets policies and funds the county's streets and highways, buses, rail transit, shuttle and social-service (paratransit) transportation.

The Rail Construction Corporation (RCC) is a subsidiary of the LACTC. Activated in 1989, the RCC manages all Los Angeles County rail design, construction and related activities. The RCC is responsible for daily design and construction decisions; while the LACTC continues to set policy regarding the county's rail transit programs.

TRANSCAL is a joint venture consisting of Parsons Brinckerhoff Quade & Douglas Inc., Daniel, Mann, Johnson & Mendenhall, Kaiser Engineers (California) Corp., and The Nettleship Group. TRANSCAL acts as a consultant to the RCC and LACTC on general engineering and construction management of the Metro Blue Line.

Begun in 1985, the Metro Blue Line Rail Transit Project began operation July 14, 1990, and is the first leg of a 150-mile rail transit network that is projected to be built over a 30-year period. The principal source of funds for this transit project is Proposition A monies. Proposition A, passed by county voters in 1980, increased local sales taxes by one half cent and provides about $370 million annually in transit revenue.

This Fixed Guideway Capital Cost Report submitted at the request of the Urban Mass Transportation Administration (UMTA) represents the efforts of a considerable number of TRANSCAL people. We would like to extend a deep thanks to all of TRANSCAL in achieving a significant milestone in the transportation history of Los Angeles, returning rail transit to Los Angeles County as part of LACTC's commitment to providing the greatest mobility to the people at the least cost to taxpayers.

It takes a great many people working together in their respective organizations to bring a project of this magnitude to completion. We commend the efforts of LACTC, RCC, and TRANSCAL who together have made this project a success.

TABLE OF CONTENTS

NARRATIVE

METRO BLUE LINE RAIL TRANSIT PROJECT

NARRATIVE - SUMMARY

By

David D. Chambers and Djalil H. Abadi

The Metro Blue Line Rail Transit Project is a modern, state-of-the-art Light Rail Transit System which extends from downtown Los Angeles to downtown Long Beach, a distance of approximately 22 miles. In downtown Los Angeles the Metro Blue Line links up to Metro (Red Line) at the shared 7th and Flower Street Subway Station. The Metro Blue Line links up with the Metro Green Line at the I-105 Freeway now under construction. Please refer to the Los Angeles Metro Rail Plan Map at the end of this introductory summary.

The Metro Blue Line passes through the cities of Los Angeles, Compton, Carson, Long Beach, and various unincorporated areas of the County, primarily along an approximate 16 mile right-of-way which was purchased by the Los Angeles County Transportation Commission (LACTC) from the Southern Pacific Transportation Company (SPTC). Rights-of-way, with respect to the balance of the 22 mile route of the Metro Blue Line, have either been purchased by LACTC or are in street rights-of-way already in public ownership.

The Metro Blue Line Project is designed as a dual track line for the entire route with the exception of the Long Beach Loop which consists of a single track line. The system comprises 22 stations and a fleet of 54 articulated Light Rail Vehicles (LRV's). The LRV's are powered by an Overhead Contact System

which in turn is supplied power with the aid of 20 Traction Power Substations. Utility service to the Traction Power Substations is furnished by either the Los Angeles Department of Water and Power or Southern California Edison Company.

The Transit Signaling system for the Metro Blue Line is implemented in five areas along the dual track LRT main line and Long Beach Loop. There are seven interlockings on the system with wayside signals located at these interlockings.

The Maintenance Facility and Yard are located in Long Beach adjacent to the Long Beach Freeway. The Maintenance Facility is comprised of an LRV storage area and the following building areas:

1. Vehicle Shop
2. Operation Center and Ancillary Shops
3. Paint Shop

The Central Control Facility (CCF) is located at the intersection of Imperial Highway and the Metro Blue and Metro Green Lines. This facility is designed to accommodate all communications and computer systems associated with these two rail lines as well as the Metro Red Line. This includes the Supervisory Control and Data Acquisition (SCADA), the Green Line Automatic Train Control System and the Transit Radio System.

The Project Composite Capital Cost Report represented in Section 2 is based on the Total Project Current Forecast dated July 1990, as published by the Cost department. This system has been computerized so that when any Contract Forecast changes, this report is automatically brought up to date.

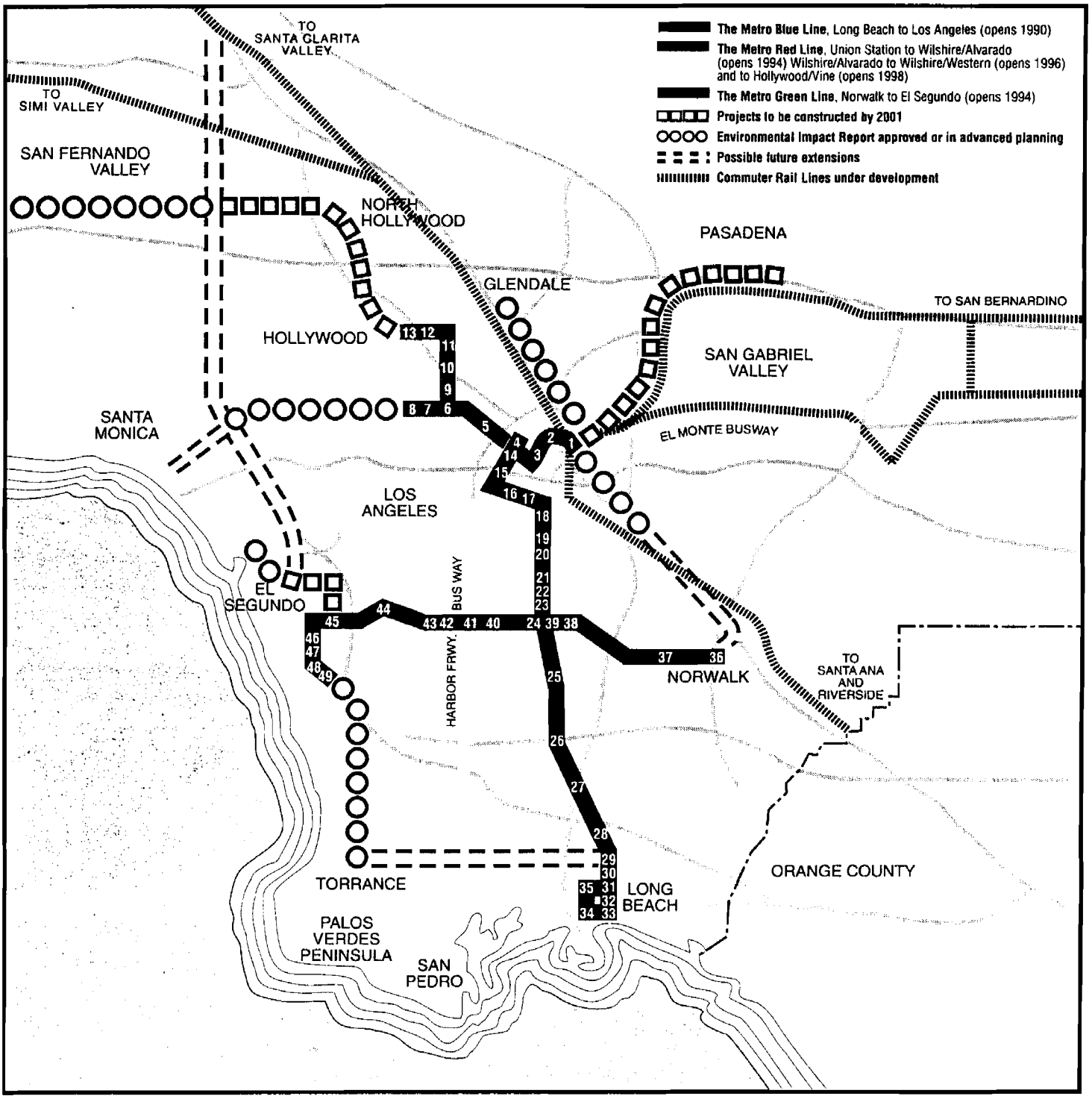
The fixed Guideway Capital Cost Questionnaire as given by the UMTA Consultant (Booz-Allen & Hamilton Inc.) originally consisted of section numbers assigned to specific items that were not

necessarily applicable to any specific project. With this in mind and also with the concurrence of various people at UMTA and Booz-Allen & Hamilton Inc. it was decided to format the sections in the Fixed Guideway Capital Cost Questionnaire to suit UMTA and this particular project, The Metro Blue Line. In this way the various cost sub-elements are more accurately reflected in the particular section elements they make up.

The Cost portion of this report was accomplished by breaking each contract of the Metro Blue Line Rail Transit Project into the various UMTA sub-elements utilizing the contract Schedule of Values. The cost report for each element is made up by combining the various UMTA sub-elements. The contract changes were either proportioned over the UMTA sub-elements or were proportioned over the sub-elements with a weight factor as required. For example, if 80 per cent of a particular contracts changes were due to utility conflicts and betterments, then 80 percent of the total contract changes were put into Section 6 - Special Conditions. The other 20 per cent were simply proportioned over the remaining UMTA elements that made up the contract value.

The dollars represented in this Capital Cost Report are to be taken as 1988 dollars.

LOS ANGELES *METRO RAIL PLAN*



STATION LOCATIONS

***Metro Red Line**-Union Station to Hollywood/Vine*

1. Union Station
2. 1st St./Hill St. (Civic Center)
3. 5th St./Hill St.
4. 7th St./Flower St.
5. Wilshire Blvd./Alvarado St.
6. Wilshire Blvd./Vermont Ave.
7. Wilshire Blvd./Normandie Ave.
8. Wilshire Blvd./Western Ave.
9. Vermont Ave./Beverly Blvd.
10. Vermont Ave./Santa Monica Blvd.
11. Vermont Ave./Sunset Blvd.
12. Hollywood Blvd./Western Ave.
13. Hollywood Blvd./Vine St.

***Metro Blue Line**-Long Beach to Los Angeles*

14. 7th St./Flower St.
15. Pico Blvd./Flower St.
16. Grand Ave./Washington Blvd.
17. San Pedro St./Washington Blvd.
18. Washington Blvd./Long Beach Ave.
19. Vernon Ave./Long Beach Ave.
20. Slauson Ave./Long Beach Ave.
21. Florence Ave./Graham Ave.
22. Firestone Blvd./Graham Ave.
23. 103rd St./Graham Ave.
24. Imperial Hwy./Wilmington Ave.
25. Compton Blvd./Willowbrook Ave.
26. Artesia Blvd./Acacia Ave.
27. Del Amo Blvd./Santa Fe Ave.
28. Wardlow Rd./Pacific Ave.
29. Willow St./Long Beach Blvd.
30. Pacific Coast Hwy./Long Beach Blvd.
31. Anaheim St./Long Beach Blvd.
32. 5th St./Long Beach Blvd.
33. 1st St./Long Beach Blvd.
34. 1st St./Pine Ave.
35. 5th St./Pacilic Ave.

***Metro Green Line**-Norwalk to El Segundo*

36. Studebaker Rd./605 Fwy.
37. Lakewood Blvd./Imperial Hwy.
38. Long Beach Blvd./Imperial Hwy.
39. Imperial Hwy./Wilmington Ave.
40. Avalon Blvd./117th St.
41. 110 Fwy./117th St.
42. Vermont Blvd./117th St.
43. Crenshaw Blvd./119th St.
44. Hawthorne Blvd./111th St.
45. Aviation Blvd./Imperial Hwy.
46. Mariposa Ave./Nash St.
47. El Segundo Ave./Nash St.
48. Douglas St.
49. Freeman Ave.

CAPITAL COST REPORT SUMMARY

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Summary Report

By: Djalil H. Abadi / David Chambers
Date: August – 1990

Line Item / Description	Total Cost	Remarks
1.0 GUIDEWAY ELEMENTS	$192,076,888	
2.0 YARD / SHOP & CENTRAL CONTROL FACILITY	44,204,740	
3.0 SYSTEMS	115,274,245	
4.0 PASSENGER STATIONS	65,893,478	
5.0 VEHICLES	79,939,129	
6.0 SPECIAL CONDITIONS	117,391,610	
7.0 RIGHT OF WAY	60,084,803	
8.0 ADD ONS	202,405,963	
TOTAL PROJECT COST	$877,270,856	

CAPITAL COST REPORT
BY ELEMENT

CAPITAL COST REPORT
BY ELEMENT

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements

By: Djalil H. Abadi / David Chambers
Date: August – 1990

Line Item / Description	Unit	Quantity	Unit Cost	Total Cost	Remarks
1.0 – GUIDEWAY ELEMENTS	**RTF**	**119,282**	**$1,610**	**$192,076,888**	
1.1 GUIDEWAY AT GRADE	**RTF**	**96,253**	**700**	**67,408,807**	
1 Direct Fixation					
2 Ballasted	DTF	61,869	487	30,145,147	
3 In Pavement Ballasted	DTF	1,618	2,848	4,608,103	
4 Embedded – Double Track	DTF	24,619	1,071	26,373,178	
5 Embedded – Single Track	STF	8,147	771	6,282,380	
1.2 GUIDEWAY – AERIAL STRUCTURE	**RTF**	**10,785**	**3,286**	**35,437,637**	
1 Direct Fixation	DTF	9,376	3,033	28,435,174	
2 Ballasted	DTF	1,409	4,970	7,002,464	
3 In Pavement Ballasted					
4 Embedded					
1.3 GUIDEWAY – RETAINED FILL	**RTF**	**6,407**	**932**	**5,973,099**	
1 Direct Fixation					
2 Ballasted	DTF	6,407	932	5,973,099	
3 In Pavement Ballasted					
4 Embedded					
1.4 GUIDEWAY – ELEVATED FILL	**RTF**	**2,052**	**678**	**1,390,912**	
1 Direct Fixation					
2 Ballasted	DTF	2,052	678	1,390,912	
3 In Pavement Ballasted					
4 Embedded					
1.5 SUBWAY	**RTF**	**3,296**	**6,965**	**22,955,679**	
1 Direct Fixation	DTF	3,296	6,965	22,955,679	
2 Ballasted					
3 In Pavement Ballasted					
4 Embedded					
1.6 GUIDEWAY – RETAINED CUT	**RTF**	**490**	**4,756**	**2,330,510**	
1 Direct Fixation	DTF	490	4,756	2,330,510	
2 Ballasted					
3 In Pavement Ballasted					
4 Embedded					
1.7 NON-REVENUE TRACK	**STF**	**16,495**	**521**	**8,586,709**	
1 Access Track – At Grade – Ballasted	STF	4,391	326	1,433,273	
2 Access Track – Retained – Ballasted	STF	1,340	449	602,107	
3 Access Track – Aerial – Ballasted	STF	1,040	3,063	3,185,653	
4 Storage Track – At Yard – Ballasted	STF	6,600	326	2,154,105	
5 Storage Track – Mainline – Ballasted	STF	2,074	423	462,775	
6 Storage Track – Mainline – Embedded	STF	508	743	377,457	
7 Connector Track – At Grade – Ballasted	STF	542	885	371,339	
1.8 SPECIAL TRACKWORK	**EA**	**76**	**60,997**	**4,635,749**	
1 Turnouts	EA	53	39,111	2,072,889	
2 Equilateral Turnouts	EA	4	36,644	146,576	
3 Single – Crossovers	EA	12	93,340	1,120,080	
4 Double – Crossovers	EA	1	205,473	205,473	
5 Diamond – Crossings	EA	4	107,787	431,149	
6 D/F Double – Crossovers	EA	2	329,791	659,582	
1.9 RAILROAD RELOCATION	**LS**	**1**	**43,357,784**	**43,357,784**	
1 Railroad Relocation (SPTC)	LS	1	13,392,784	13,392,784	
2 Railroad Relocation (MC-5)	LS	1	29,965,000	29,965,000	

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Yard / Shop and Central Control Facility

By: Djalil H. Abadi / David Chambers
Date: August - 1990

Line Item / Description	Unit	Quantity	Unit Cost	Total Cost	Remarks
2.0 - YARD / SHOP and CCF	LS	1	$44,204,740	$44,204,740	
2.1 YARD ACCESS	LS	1	2,467,635	2,467,635	
1 Yard Access Road	LF	2,456	342	838,996	
2 Yard Access Bridge	LF	715	2,278	1,628,639	
2.2 YARD SITE WORK	SF	365,000	7	2,663,822	
1 Site Improvements	SF	365,000	4	1,302,148	
2 Site Utilities	LS	1	1,361,674	1,361,674	
2.3 YARD SYSTEMS	LS	1	6,374,019	6,374,019	
1 Signal System	LS	1	2,367,707	2,367,707	
2 Electrification	LS	1	2,594,156	2,594,156	
3 Communications	LS	1	1,412,155	1,412,155	
2.4 VEHICLE SHOP	LS	1	12,047,289	12,047,289	
1 Building	SF	80,300	112	8,967,030	
2 Electronics	LS	1	1,129,881	1,129,881	
3 Shop Cranes	EA	6	56,034	336,202	
4 Car Hoist	EA	1	1,266,763	1,266,763	
5 Truck Truntable	EA	1	217,331	217,331	
6 Truck Repair Hoist	EA	1	130,082	130,082	
2.5 OPERATIONS CENTER	LS	1	6,435,699	6,435,699	
1 Building	SF	34,644	105	3,650,831	
2 Electronics	LS	1	680,810	680,810	
3 Car Wash	EA	1	959,396	959,396	
4 Wheel Truing	EA	1	1,144,662	1,144,662	
2.6 PAINT SHOP	LS	1	2,152,357	2,152,357	
1 Building	SF	7,400	150	1,106,527	
2 Electronics	LS	1	453,873	453,873	
3 Paint Spray Booth	EA	1	591,957	591,957	
2.7 YARD EQUIPMENT	LS	1	884,000	884,000	
1 Lifts, Loader & Handling Truck	LS	5	30,000	150,000	
2 Carts, Generator & Compressor	LS	5	8,800	44,000	
3 Misc. Shop Equipment & Machinery	LS	4	150,000	600,000	
4 Shop Testing Equipment/Tool	LS	1	90,000	90,000	
2.8 CENTRAL CONTROL FACILITY	LS	1	11,179,919	11,179,919	
1 Building	LS	1	6,106,054	6,106,054	
1 Structure	SF	29,600	186	5,496,054	
2 Site Work	SF	129,000	5	610,000	
2 Mimic Board	LS	1	4,432,019	4,432,019	
1 Signal Monitoring System	LS	1	1,498,149	1,498,149	
2 Power Monitoring System	LS	1	1,045,828	1,045,828	
3 S&S Comm. Monitoring System	LS	1	1,359,366	1,359,366	
4 Fare Collection Monitoring System	LS	1	379,272	379,272	
5 Environmental Monitoring System	LS	1	149,404	149,404	
3 Computer System	LS	1	641,846	641,846	
1 Computer Hardware	LS	1	376,504	376,504	
2 Computer Software	LS	1	265,343	265,343	

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
System Elements

By: Djalil H. Abadi / David Chambers
Date: August - 1990

Line Item / Description	Unit	Quantity	Unit Cost	Total Cost	Remarks
3.0 – SYSTEMS	LS	1	$115,274,245	$115,274,245	
3.1 SIGNAL SYSTEM	LS	1	40,745,221	40,745,221	
1 SIGNAL SUBSTATION (C/S)	EA	19	163,531	3,107,086	
1 Building	EA	19	102,961	1,956,256	
2 Hardware	EA	19	54,446	1,034,481	
3 Installation of Hardware	EA	19	6,124	116,349	
2 WAYSIDE SIGNALING	LS	119,282	206	24,608,161	
1 Ductbanks (Raceways)	LF	119,282	51	6,070,001	
2 Cables	LF	119,282	155	18,538,160	
3 CROSSING PROTECTION	LS	1	13,029,974	13,029,974	
1 Traffic Signals (Purchase & Install)	LS	1	12,124,025	12,124,025	
2 Crossing Gates	EA	28	12,618	353,308	
3 Installation of the Gates	EA	28	19,737	552,641	
3.2 ELECTRIFICATION	LS	1	49,433,018	49,433,018	
1 TRACTION POWER SUBSTATIONS	EA	19	1,108,452	21,060,588	
1 Building	EA	19	299,268	5,686,091	
2 Hardware – 1500KW	EA	11	489,996	5,389,959	
3 Hardware – 3000KW	EA	8	614,589	4,916,710	
4 Installation of Hardware	EA	19	266,728	5,067,828	
2 CATENARY SYSTEM	LS	1	28,372,431	28,372,431	
1 Ductbanks (Raceways)	LF	119,282	81	9,686,627	
2 Poles and Components	EA	994	14,301	14,214,975	
3 Wire – Trolly	LF	119,282	16	1,905,017	
4 Wire – Messenger	LF	119,282	22	2,585,811	
3.3 SAFETY & SECURITY COMM. SYSTEM	LS	1	15,508,349	15,508,349	
1 S&S COMM. SUBSTATION (C/S)	EA	19	137,923	2,620,540	
1 Building	EA	19	77,353	1,469,709	
2 Hardware	EA	19	54,446	1,034,481	
3 Installation of Hardware	EA	19	6,124	116,349	
2 WAYSIDE S&S COMMUNICATION	LS	1	10,072,562	10,072,562	
1 Ductbanks (Raceways)	LF	119,282	50	5,950,654	
2 Cable	LF	119,282	35	4,121,908	
3 PASSENGER STATIONS S&S COMM.	LS	1	2,815,247	2,815,247	
1 Closed Circuit TV	EA	22	45,324	997,124	
2 Public Address System (PA)	EA	22	46,214	1,016,711	
3 Fire Alarm System (FA)	EA	22	36,428	801,412	
3.4 RADIO SYSTEM	LS	1	2,521,859	2,521,859	
1 Hardware	LS	1	2,048,459	2,048,459	
2 Installation of Hardware	LS	1	473,400	473,400	
3.5 TELEPHONE SYSTEM	LS	1	1,061,262	1,061,262	
1 Hardware	LS	1	813,262	813,262	
2 Installation of Hardware	LS	1	248,000	248,000	
3.6 FARE COLLECTION SYSTEM	LS	1	6,004,536	6,004,536	
1 TICKET VENDING MACHINES (TVM)	LS	74	57,288	4,239,307	
1 Hardware	LS	67	38,781	2,598,310	
2 Installation of Hardware	LS	67	18,402	1,232,966	
3 Spares	LS	7	58,290	408,030	
2 CASH COLLECTION	LS	1	157,399	157,399	
1 Money Carts	EA	36	2,011	72,399	
2 Revenue Trucks	EA	1	85,000	85,000	
3 OPTIONS	LS	1	1,607,830	1,607,830	
1 Metro Red Line	LS	1	1,607,830	1,607,830	

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Passenger Stations

By: Djalil H. Abadi / David Chambers
Date: August, 1990

Line Item / Description	Unit	Quantity	Unit Cost	Total Cost	Remarks
4.0 - PASSENGER STATIONS	LS	1	$65,893,478	$65,893,478	
4.1 AT GRADE STATION	EA	18	1,051,819	18,932,742	
1 Center Platform	EA	15	1,079,409	16,191,134	
2 Side Platform	EA	3	913,869	2,741,608	
4.2 SUBWAY STATION	EA	1	27,684,300	27,684,300	
1 Double Side Platform	EA	1	27,684,300	27,684,300	
2 Side Platform		N/A			
4.3 AERIAL STATION	EA	3	2,928,894	8,786,682	
1 Center Platform	EA	3	2,928,894	8,786,682	
2 Side Platform		N/A			
4.4 PARK & RIDE FACILITIES	LT	5	1,698,107	8,490,533	
1 Parking Spaces	EA	1051	8,079	8,490,533	
4.5 PEDESTRIAN OVERPASSES	EA	2	999,611	1,999,222	
1 Pedestrian Overpasses	EA	2	999,611	1,999,222	

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Vehicles

By: Djalil H. Abadi / David Chambers
Date: August - 1990

Line Item / Description	Unit	Quantity	Unit Cost	Total Cost	Remarks
5.0 – VEHICLES	**LS**	**1**	**$79,939,129**	**$79,939,129**	
5.1 REVENUE VEHICLES	EA	54	1,446,965	78,136,129	
1 Light Rail Vehicles	EA	54	1,446,965	78,136,129	
5.2 NON–REVENUE VEHICLES	LS	1	1,803,000	1,803,000	
1 High Rail Trucks	EA	5	136,000	680,000	
2 Mobile Crane and Car Mover	EA	2	391,500	783,000	
3 Trucks, Sedans and Vans	EA	12	28,333	340,000	

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Special Conditions

By: Djalil H. Abadi / David Chambers
Date: August - 1990

Line Item / Description	Unit	Quantity	Unit Cost	Total Cost	Remarks
6.0 - SPECIAL CONDITIONS	LS	1	$117,391,610	$117,391,610	
6.1 UTILITY RELOCATION - IN STREET	LS	1	34,617,489	34,617,489	
1 Gas Line	LS	1	206,296	206,296	
2 Telephone	LS	1	125,237	125,237	
3 Electric	LS	1	4,209,354	4,209,354	
4 Water Line	LS	1	2,683,644	2,683,644	
5 Storm Drain	LS	1	12,441,718	12,441,718	
6 Sanitary Sewer	LS	1	1,903,471	1,903,471	
7 Power Line	LS	1	12,929,948	12,929,948	
8 Others	LS	1	117,821	117,821	
6.2 UTILITY RELOCATION - SUBWAY	LS	1	4,820,343	4,820,343	
1 Gas Line	LS	1	193,992	193,992	
2 Telephone	LS	1	129,328	129,328	
3 Electric	LS	1	231,715	231,715	
4 Water Line	LS	1	323,320	323,320	
5 Storm Drain	LS	1	1,359,569	1,359,569	
6 Sanitary Sewer	LS	1	2,259,099	2,259,099	
7 Power Line	LS	1	161,660	161,660	
8 Others	LS	1	161,660	161,660	
6.3 UTILITY RELOCATION - ROW	LS	1	941,216	941,216	
1 Gas Line	LS	1	34,339	34,339	
2 Telephone	LS	1	22,893	22,893	
3 Electric	LS	1	14,308	14,308	
4 Water Line	LS	1	63,407	63,407	
5 Storm Drain	LS	1	611,049	611,049	
6 Sanitary Sewer	LS	1	49,134	49,134	
7 Power Line	LS	1	28,616	28,616	
8 Others	LS	1	117,469	117,469	
6.4 FORCE ACCOUNT RELOCATIONS	LS	1	47,378,308	47,378,308	
1 Gas Line	LS	1	4,600,000	4,600,000	
2 Telephone	LS	1	1,893,400	1,893,400	
3 Electric	LS	1	3,788,000	3,788,000	
4 Water Line	LS	1	3,227,816	3,227,816	
5 Storm Drain	LS	1	4,853,000	4,853,000	
6 Sanitary Sewer	LS	1	4,908,952	4,908,952	
7 Oil Line	LS	1	2,216,350	2,216,350	
8 Southern California RTD	LS	1	8,400,000	8,400,000	
9 CALTRANS	LS	1	400,000	400,000	
10 SPTC & Other RR	LS	1	13,040,790	13,040,790	
11 Other	LS	1	50,000	50,000	
6.5 DEMOLITION	LS	1	967,836	967,836	
1 Buildings	LS	1	384,438	384,438	
2 Bridges	LS	1	583,398	583,398	
6.6 ROADWAY CHANGES	LS	1	11,688,912	11,688,912	
1 Curb & Gutter	LS	1	3,506,674	3,506,674	
2 Paving	LS	1	8,182,239	8,182,239	
6.7 ENVIRONMENTAL	LS	1	16,977,505	16,977,505	
1 Safety & Security Fencing	LS	1	6,202,600	6,202,600	
2 Visual	LS	1	9,174,962	9,174,962	
3 Informative - Signs	LS	1	949,943	949,943	
4 Others	LS	1	650,000	650,000	

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Right - Of - Way

By: Djalil H. Abadi / David Chambers
Date: August - 1990

Line Item / Description	Unit	Quantity	Unit Cost	Total Cost	Remarks
7.0 - RIGHT - OF - WAY	**LS**	**1**	**$60,084,803**	**$60,084,803**	
7.1 LAND ACQUISITION - PURCHASED	LS	1	28,202,402	28,202,402	
1 Mainline	LS	1	25,552,813	25,552,813	Sum of 1 - 6
2 Yard & Shop					
3 Central Control Facility					
4 TPPS & C/S Substations					
5 Passenger Stations					
6 Park & Ride Facilities					
7 MC-5 Railroad Relocation	LS	1	2,649,589	2,649,589	
7.2 LAND ACQUISITION - DONATED	N/A	N/A			
1 Mainline					
2 Yard & Shop					
3 Central Control Facility					
4 TPPS & C/S Substations					
5 Passenger Stations					
6 Park & Ride Facilities					
7.3 RIGHT-OF-WAY ACQUISITION	LS	1	27,235,000	27,235,000	
1 Railroad Right-Of-Way	LS	1	26,358,000	26,358,000	
2 MC-5 Right-Of-Way	LS	1	877,000	877,000	
7.4 LEGAL & CONSULTING	LS	1	2,211,075	2,211,075	
1 Special Counsel Services	LS	1	1,545,075	1,545,075	
2 Real Estate Acquistion	LS	1	600,000	600,000	
3 Others	LS	1	66,000	66,000	
7.5 PROPERTY MANAGEMENT	LS	1	2,241,826	2,241,826	
1 Parcel Groups	LS	1	946,826	946,826	
2 Railroad Right-Of-Way	LS	1	375,000	375,000	
3 MC-5 Program	LS	1	920,000	920,000	
7.6 APPRAISAL	LS	1	40,500	40,500	
1 Appraisal	LS	1	40,500	40,500	
7.7 RELOCATION	LS	1	154,000	154,000	
1 Business	LS	1	77,000	77,000	
2 Residence	LS	1	77,000	77,000	

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
By: Djalil H. Abadi / David Chambers
Add Ons
Date: August - 1990

Line Item / Description	Unit	Qty.	Unit Cost	Total Cost	Remarks
8.8 – ADD ONS	LS	1	$202,405,963	$202,405,963	
8.1 GENERAL ENGINEERING SERVICES	LS	1	69,586,796	69,586,796	
1 General Engineering Services	LS	1	61,287,148	61,287,148	
2 Final Design 7th & Flower	LS	1	3,064,648	3,064,648	
3 Rail Car Design Management	LS	1	4,950,000	4,950,000	
4 Other Design Services	LS	1	285,000	285,000	
8.2 CONSTRUCTION MANAGEMENT SERVICES	LS	1	86,130,800	86,130,800	
1 Construction Management General	LS	1	82,942,800	82,942,800	
2 Construction Management MC-5	LS	1	2,400,000	2,400,000	
3 System & CM Vehicles	LS	1	788,000	788,000	
8.3 PROJECT MANAGEMENT OVERSIGHT	LS	1	4,591,000	4,591,000	
1 Project Management Oversight	LS	1	4,591,000	4,591,000	
8.4 PROJECT ADMINISTRATION	LS	1	14,800,000	14,800,000	
1 Project Administration	LS	1	14,800,000	14,800,000	
8.5 PROJECT INSURANCE	LS	1	35,638,000	35,638,000	
1 Risk Management Services	LS	1	4,096,000	4,096,000	
2 Owner's Insurance	LS	1	31,542,000	31,542,000	
8.6 SPECIAL PROGRAMS	LS	1	9,408,722	9,408,722	
1 Affirmative Action Program	LS	1	225,322	225,322	
2 Community Involvement	LS	1	2,855,000	2,855,000	
3 Public Art Program	LS	1	2,728,400	2,728,400	
4 Florence / Graham Ave Park & Ride	LS	1	3,600,000	3,600,000	
8.7 PROJECT TRAINING, STARTUP & TESTING	LS	1	9,915,093	9,915,093	
1 Project Training, Startup & Testing	LS	1	9,915,093	9,915,093	
8.8 PROJECT RESERVE	LS	1	2,212,852	2,212,852	
1 Project Reserve	LS	1	2,212,852	2,212,852	
8.9 PROJECT REVENUE	LS	1	(29,877,300)	(29,877,300)	
1 Project Revenue	LS	1	(29,877,300)	(29,877,300)	

PROJECT STATION MATRIX

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Project Chart By Stations

By: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / Guideway Type	From Station	To Station	Route Feet	At Grade Ballasted	At Grade In Pvmt Balst	At Grade Embedded - DT	At Grade Embedded - ST	Aerial Direct - Fixation	Aerial Ballasted	Retained Fill Ballasted	Elevated Fill Ballasted	Subway Direct - Fixation	Retained Cut Direct - Fixation
7th & Flower Station – C115	4 + 61	14 + 21	960										
SUBWAY Direct Fixation	4 + 61	14 + 21	960									960	
Flower Street Subway – C117	14 + 21	42 + 47	2,826										
SUBWAY Direct Fixation	14 + 21	37 + 57	2,336									2,336	
RETAINED CUT Direct Fixation	37 + 57	42 + 47	490										490
LA CBD Approach – C140	42 + 47	172 + 62	13,015										
AT GRADE Embedded D-Track	42 + 47	172 + 62	13,015			13,015							
*Satellite Yard To LA River – C2125***	53 + 68	154 + 50	10,082										
AT GRADE Ballasted	53 + 68	100 + 0	4,632	4,632									
AT GRADE In Pavement Ballasted	100 + 0	102 + 0	200		200								
AT GRADE Ballasted	102 + 0	154 + 50	5,250	5,250									
Aerial Structure (Slauson) – C435	154 + 50	191 + 45	3,695										
AT GRADE Ballasted	154 + 50	155 + 62	112	112									
RETAINED FILL Ballasted	155 + 62	160 + 40	478							478			
AERIAL Direct Fixation	160 + 40	185 + 50	2,510					2,510					
RETAINED FILL Ballasted	185 + 50	190 + 60	510							510			
AT GRADE Ballasted	190 + 60	191 + 45	85	85									
Satellite Yard To LA River – C2125	191 + 45	257 + 81	6,637										
AT GRADE Ballasted	191 + 45	200 + 0	855	855									
AT GRADE In Pavement Ballasted	200 + 0	202 + 5	205		205								
AT GRADE Ballasted	202 + 5	257 + 81	5,577	5,577									
Firestone Bridge – C415	257 + 81	294 + 50	3,669										
AT GRADE Ballasted	257 + 81	264 + 90	709	709									
RETAINED FILL Ballasted	264 + 90	272 + 10	719							719			
AERIAL Ballasted	272 + 10	275 + 27	317						317				
RETAINED FILL Ballasted	275 + 27	285 + 76	1,049							1,049			
AT GRADE Ballasted	285 + 76	294 + 50	874	874									

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Project Chart By Stations

By: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / Guideway Type	From Station	To Station	Route Feet	At Grade Ballasted	At Grade In Pvmt. Balst.	At Grade Embedded - DT	At Grade Embedded - ST	Aerial Direct - Fixation	Aerial Ballasted	Retained Fill Ballasted	Elevated Fill Ballasted	Subway Direct - Fixation	Retained Cut Direct - Fixation
Satellite Yard To LA River - C2125	294 + 50	467 + 47	17,297										
AT GRADE Ballasted	294 + 50	375 + 0	8,050	8,050									
AT GRADE In Pavement Ballasted	375 + 0	383 + 30	830		830								
AT GRADE Ballasted	383 + 30	467 + 47	8,417	8,417									
Rosecrans Ave LRT Overpass - C4360	467 + 47	500 + 0	3,253										
AT GRADE Ballasted	467 + 47	470 + 86	339	339									
RETAINED FILL Ballasted	470 + 86	473 + 70	284							284			
AERIAL Direct Fixation	473 + 70	494 + 30	2,060					2,060					
RETAINED FILL Ballasted	494 + 30	496 + 74	244							244			
AT GRADE Ballasted	496 + 74	500 + 0	326	326									
Satellite Yard To LA River - C2125	500 + 0	574 + 20	7,420										
AT GRADE Ballasted	500 + 0	525 + 0	2,500	2,500									
AT GRADE In Pavement Ballasted	525 + 0	527 + 5	205		205								
AT GRADE Ballasted	527 + 5	574 + 20	4,715	4,715									
Compton Creek Bridge - C455	574 + 20	584 + 90	1,070										
ELEVATED FILL Ballasted	574 + 20	577 + 73	353								353		
AERIAL Ballasted	577 + 73	579 + 90	217						217				
AT GRADE Ballasted	579 + 90	584 + 90	500	500									
Satellite Yard To LA River - C2125	584 + 90	631 + 35	4,645										
RETAINED FILL Ballasted	584 + 90	588 + 85	395							395			
AT GRADE Ballasted	588 + 85	611 + 75	2,290	2,290									
AT GRADE In Pavement Ballasted	611 + 75	612 + 25	50		50								
AT GRADE Ballasted	612 + 25	631 + 35	1,910	1,910									
Aerial Structure (Dominguez) - C435	631 + 35	660 + 70	2,935										
AT GRADE Ballasted	631 + 35	633 + 52	217	217									
RETAINED FILL Ballasted	633 + 52	637 + 50	398							398			
AERIAL Direct Fixation	637 + 50	654 + 22	1,672					1,672					
RETAINED FILL Ballasted	654 + 22	658 + 54	433							433			
AT GRADE Ballasted	658 + 54	660 + 70	215	215									

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Project Chart By Stations

By: *Djalil H. Abadi / David Chambers*
Date: *August, 1990*

Contract Description / Guideway Type	From Station	To Station	Route Feet	At Grade Ballasted	At Grade In Pvmt. Balst.	At Grade Embedded - DT	At Grade Embedded - ST	Aerial Direct - Fixation	Aerial Ballasted	Retained Fill Ballasted	Elevated Fill Ballasted	Subway Direct - Fixation	Retained Cut Direct - Fixation
Satellite Yard To LA River – C2125	660 + 70	681 + 99	2,129										
AT GRADE Ballasted	660 + 70	681 + 99	2,129	2,129									
Aerial Structure (Del Amo) – C435	681 + 99	718 + 16	3,617										
AT GRADE Ballasted	681 + 99	691 + 61	962	962									
RETAINED FILL Ballasted	691 + 61	699 + 4	743							743			
AERIAL Direct Fixation	699 + 4	711 + 58	1,254					1,254					
RETAINED FILL Ballasted	711 + 58	715 + 35	377							377			
AT GRADE Ballasted	715 + 35	718 + 16	281	281									
Aerial Structure (Cota Xing) – C435	718 + 16	750 + 85	3,269										
AT GRADE Ballasted	718 + 16	721 + 7.	292	292									
RETAINED FILL Ballasted	721 + 7.	726 + 0	492							492			
AERIAL Direct Fixation	726 + 0	744 + 80	1,880					1,880					
RETAINED FILL Ballasted	744 + 80	747 + 64	284							284			
AT GRADE Ballasted	747 + 64	750 + 85	321	321									
LA River Bridge – C425	750 + 85	764 + 42	1,357										
AT GRADE Ballasted	750 + 85	751 + 75	90	90									
AERIAL Ballasted	751 + 75	760 + 50	875						875				
ELEVATED FILL Ballasted	760 + 50	764 + 42	392								392		
*LA River To Willow Station – C315 ***	835 + 50	947 + 0	11,150										
AT GRADE Ballasted	835 + 50	902 + 95	6,745	6,745									
AT GRADE In Pavement Ballasted	902 + 95	903 + 78	83		83								
ELEVATED FILL Ballasted	903 + 78	916 + 85	1,307								1,307		
AT GRADE In Pavement Ballasted	916 + 85	917 + 30	45		45								
AT GRADE Ballasted	917 + 30	947 + 0	2,970	2,970									

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Project Chart By Stations

By: *Djalil H. Abadi / David Chambers*
Date: *August, 1990*

Contract Description / Guideway Type	From Station	To Station	Route Feet	At Grade Ballasted	At Grade In Pvmt Balst.	At Grade Embedded - DT	At Grade Embedded - ST	Aerial Direct - Fixation	Aerial Ballasted	Retained Fill Ballasted	Elevated Fill Ballasted	Subway Direct - Fixation	Retained Cut Direct - Fixation
Willow Station To 10th St. – C325	947 + 0	1053 + 60	10,660										
AT GRADE Ballasted	947 + 0	952 + 6	506	506									
AT GRADE Embedded	952 + 6	1053 + 60	10,154			10,154							
Long Beach Loop – C3270	1053 + 60	1149 + 57	9,597										
AT GRADE Embedded D-Track	1053 + 60	1059 + 74	614			614							
AT GRADE Embedded S-Track	1059 + 74	1098 + 7	3,833				3,833						
AT GRADE Embedded D-Track	1098 + 7	1106 + 43	836			836							
AT GRADE Embedded S-Track	1106 + 43	1149 + 57	4,314				4,314						
Total Revenue Track (Route Feet)			119,282	61,869	1,618	24,619	8,147	9,376	1,409	6,407	2,052	3,296	490

** *Station Break*

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Project Chart By Stations

By: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / Guideway Type -NR		From Station	To Station	Track Feet	NR - Access T At Grade - Ballst.	NR - Access T Retained - Ballst.	NR - Access T Aerial - Ballst	NR - Storage T Ballst - Yard	NR - Storage T Ballst. - ML	NR - Storage T Embedded - ML	NR - Connector T Ballst. - GL			
Aerial Structures (Yard Access) - C435														
RETAINED FILL	*Ballasted*	0 + 0	3 + 60	720		720								
AERIAL	*Ballasted*	3 + 60	8 + 80	1,040			1,040							
RETAINED FILL	*Ballasted*	8 + 80	11 + 90	620		620								
Main Yard and Shops - C560														
AT GRADE	*Ballasted*	11 + 90	33 + 85	4,391	4,391									
AT GRADE	*Ballasted*	0 + 0	33 + 0	6,600				6,600						
Satellite Yard To LA River - C2125														
AT GRADE	*Ballasted*	10 + 31	16 + 2	571					571					
AT GRADE	*Ballasted*	15 + 50	20 + 92	542							542			
AT GRADE	*Ballasted*	409 + 6	418 + 9	903					903					
LA River To Willow Station - C315														
AT GRADE	*Ballasted*	939 + 14	945 + 14	600					600					
Long Beach Loop - C3270														
AT GRADE	*Embedded*	0 + 0	5 + 8	508						508				
Total Non Revenue Track (Track Feet)				16,495	4,391	1,340	1,040	6,600	2,074	508	542			

PHYSICAL AND OPERATIONAL DESCRIPTION

G U I D E W A Y E L E M E N T S (1.0)

GUIDEWAY AT GRADE - BALLASTED (1.1.2)

This guideway consists of earthwork preparation, scarification and compaction of the top 6" of subgrade to the required density as defined in the specifications. The guideway includes placement of 8" minimum thickness sub-ballast followed by placement of 12" minimum thickness ballast as measured at the crown of the slope. Concrete ties are placed on this ballast at a spacing of 30" on average. A final layer of ballast is brought to within 1" of the top of the tie. The 115 lb. T-rail sits on a moulded rail pad. The rails are fastened to the concrete ties by a system of rail clips and malleable iron shoulders. Refer to exhibits A and B.

GUIDEWAY AT GRADE - IN PAVEMENT BALLASTED (1.1.3)

This guideway consists of earthwork preparation, scarification and compaction of the top 12" of subgrade, placement of a 7" thick cement treated base followed by 8" minimum thick sub-ballast which in turn is followed by a 12" minimum thick layer of ballast. Timber ties are placed on this ballast at a spacing of 18". A final layer of ballast is brought flush to the top of tie. The 115 lb. T-rail rests on a metal tie pad and the rails are secured by the usual spike method. A.C. pavement or rubberized grade crossing material is placed between rails through the crossings depending on whether the crossings are light or heavy traffic. Refer to exhibits C and D.

GUIDEWAY AT GRADE - EMBEDDED - DOUBLE AND SINGLE TRACK (1.1.4 & 1.1.5)

This guideway consists of A.C. pavement demolition and removal, earthwork preparation, scarification and compaction of the top 6" of subgrade, placement of 14" minimum crushed aggregate base followed by a 9" thick reinforced concrete track slab. The 115 lb. T-rail rests on an insulated pad and is secured by a system of rail clips and shoulders. The rail is furthermore isolated by an imbedded rail isolator. There is approximately 2" of crushed aggregate base directly on top of the concrete track slab followed by approximately 4" of A.C. paving as the finished surface between rails. Refer to exhibits E, F and G.

GUIDEWAY - AERIAL STRUCTURE - DIRECT FIXATION (1.2.1)

This guideway consists of the excavation for pile caps, construction of cast-in-place concrete piles and backfilling to required densities as defined in the specifications. The elevated portion which is a typical cast-in-place reinforced box girder structure is supported by a heavily reinforced bent column that increases in cross sectional area as one goes from base to bottom of box girder. The guideway is finished by placing a reinforced concrete second pour to the required height necessary for top of rail elevation tolerance. The 115 lb. T-rail sits on a rubber/steel isolator which in turn rests on galvanized steel shims. The rail is fastened by a system of rail clips and anchor insert assemblies. Refer to exhibits H, I, J and K.

GUIDEWAY - AERIAL STRUCTURE - BALLASTED (1.2.2)

This guideway consists of earthwork preparation, including, depending on the type of structure, piling, pile caps, bent columns, abutments and backfilling to required densities in loose lifts as defined in the specifications. The elevated portion which is of a cast-in-place reinforced concrete girder design is supported by heavily reinforced bent columns and/or abutments. The "and/or" is used because Compton Creek Bridge and Firestone Bridge (south bound) are simple spans with no piers as part of the structure. The L.A. River Bridge and Firestone Bridge (north bound) have piers as part of the structure. The guideway is finished by placing a waterproofing membrane on the concrete followed by approximately 8" of ballast including wire mesh at the mid point of the ballast layer. Concrete ties rests on this ballast and a final placement of ballast occurs to within 1" of the top of tie. The 115 lb. T-rail sits on a moulded rail pad. The rail is fastened to the concrete ties by a system of rail clips and malleable iron shoulders. Refer to exhibits B and L.

GUIDEWAY - RETAINED FILL - BALLASTED (1.3.2)

This guideway consists of earthwork preparation, scarification and compaction to the required densities as defined in the specifications. All backfilling must be accomplished with a porous soil as called out in the specifications. The guideway includes a retaining wall on both sides, placement of 8" minimum thickness sub-ballast followed by placement of 12" minimum thickness ballast as measured at the crown of the slope. Concrete ties are placed on this ballast at a spacing of 30". A final layer of ballast is brought to within 1" of the top of the tie. The 115 lb. T-rail sits on a moulded rail pad. The rail is fastened to the concrete ties by a system of rail clips and malleable iron shoulders. Refer to exhibits B and M.

GUIDEWAY - ELEVATED FILL - BALLASTED (1.4.2)

This guideway consists of earthwork preparation, bench cutting into existing right of way during construction of new embankment, scarification and compaction of the top 6" to the required density as defined in the specifications. Fill soil shall be proof rolled with heavy compaction equipment to detect any soft areas, which if encountered must be removed. The guideway includes placement of 8" minimum thickness sub-ballast followed by placement of 12" minimum thickness ballast as measured at the crown of the slope. Concrete ties are placed on this ballast at a spacing of 30". A final layer of ballast is brought to within 1" of the top of the tie. The 115 lb. T-rail sits on a moulded rail pad. The rails are fastened to the concrete ties by a system of rail clips and malleable iron shoulders. refer to exhibits B and N.

SUBWAY - DIRECT FIXATION (1.5.1)

This guideway consists of earthwork preparation, removing contaminated soils, scarification and compaction in loose lifts not exceeding 8" to proper densities as defined in the specifications. The subway which is constructed by the cut and cover method consists of a box structure with a partial center wall dividing the North bound LRV's from the South bound. An elevated walkway enclosing a 9-way communication/signaling ductbank occurs on each side of the box structure. The guideway is finished by placing a reinforced concrete second pour to the required height necessary for top of rail elevation tolerance. The 115 lb. T-rail sits on a rubber/steel isolator which in turn rests on galvanized steel shims. The rail is fastened by a system of rail clips and anchor insert assemblies. Refer to exhibits K, O and P.

GUIDEWAY - RETAINED CUT - DIRECT FIXATION (1.6.1)

This guideway consists of earthwork preparation, removing contaminated soils, scarification and compaction in loose lifts not exceeding 8" to proper densities as defined in the specifications. The portal consists of a sloping U-section structure with retaining walls forming the sides of the U. The top of the U-section is surmounted by a heavy galvanized decorative iron fence with top rail. The guideway is finished by placing reinforced concrete second pour to the required height necessary for top of rail elevation tolerance. The 115 lb. T-rail sits on a rubber/steel isolator which in turn rests on galvanized steel shims. The rail is fastened by a system of rail clips and anchor insert assemblies. Refer to exhibits K, Q, R and S.

YARDS AND SHOPS (2.0)

The Yard Shops are made accessible to automobiles by the construction of an access road, access road bridge and retaining walls. The road connects from the 208th Street cul-de-sac, runs along the west side parallel to the LTR line where it crosses onto a retrofitted SPTC bridge over the Long Beach Freeway and finally onto a new cast-in-place concrete bridge structure over the yard loop track.

The Yard Site Work includes demolition, clearing and grubbing, earthwork preparation and installation of new underground utilities (storm drains, sewer, gas, telephone, water and track underdrains). The site work includes work for systems which consists of laying underground conduits and installation of electrical, traction power, signaling and communication ductbanks and pull boxes.

The Yard Systems are completed with the installation of the catenary pole foundations, poles, contact and messenger wire, and wire or cable in ductbanks for traction power, signaling and communication.

The Yard Car Storage consists of all trackwork at grade ballasted including earthwork preparation, scarification and compaction of the top 12" to the required density as defined in the specifications, placement of 8" minimum thickness sub-ballast followed by placement of 12" minimum thickness ballast, concrete and wood ties, turnouts, switches, 115 lb. T-rail, rail fasteners and other track appurtenances. The storage tracks have a capacity of 48 vehicles.

The Vehicle Shop consists of a two-story building of which the first floor has an area of 67,000 square feet and the second floor 12,700 square feet. The second floor is composed of

offices, toilets and locker rooms for maintenance personnel and supervisors. The first floor consists of a heavy repair shop, truck repair shop, motor shop, wheel shop, machine shop, air condition shop and an electronics shop. The Heavy Repair Shop contains two tracks each with in-floor hoists for two LRV vehicles. An additional floor level position for one vehicle is provided on each track. This Heavy Repair Area is equipped with a 10-ton overhead crane. A Truck Repair Shop is located adjacent to the Heavy Repair Shop and has two in-floor truck hoists. A 10-ton overhead crane serves this area. Seven turntables are provided to transport the trucks between the heavy repair tracks and Truck Shop. The Motor Shop will be used for minor repair work on traction motors. Any major work, such as rewinding or balancing will be done at the Red Line (Metro Rail) Shop. This motor shop is adjacent to the Truck Repair Shop. The Motor Shop is equipped with two high voltage DC generators to spin the traction motors. The Wheel Shop contains a tire press to mount and remove the outer tire rims. The Machine Shop is equipped with a drill press, small lathe, horizontal band saw, vertical band saw, pedestal grinder, bead blaster and bearing press. The Air Conditioning Shop consists of a large bench stand to service the modular HVAC units. A 2-ton boom crane is used to remove the units from the top of the LRV vehicles and place them on the work stand. Standard HVAC pressure gauges and a freon reclamation unit are the primary items used in this shop. The Electronics Shop will be used to perform diagnostic testing, troubleshooting and repairs on state of the art electronics equipment. Test equipment used for these tasks consists of bench oscilloscopes, frequency generator, frequency counter, digital multimeters and a chart recorder.

The Operation Center consists of a two story building of which the first floor has an area of 21,265 square feet and the second floor 13,379 square feet. The second floor is composed of offices, toilets and locker rooms for operations personnel. The first floor comprises an LRV car wash, body shop, blow down pit and wheel truing shop. The car wash uses a water reclamation

system. A pre-rinse arch sprays detergent on the vehicle which is then brushed and rinsed. The LRV proceeds at 3 miles per hour or less and is guided by two signals inside the wash. A car floor level platform and roof level platform is provided for the cleaning of windows and roofs respectively. The Body Shop will be used for light repair work on the LRV body while the blow down pit is used to clean the underside of the vehicle. The Wheel Truing Shop is equipped with a set of tracks for one vehicle and an in-line drive over truing pit which houses a computer controlled set-profile truing machine.

The Paint Shop consists of a single story building, a set of tracks within a paint booth large enough for a single LRV, a paint/equipment storage room, a mixing room, and a restroom. The paint booth is supplied with 6 exhaust fans to collect the fumes caused by painting. There are three fan forced heaters mounted on the roof to accomplish the drying of paint. Refer to Exhibit T.

Y A R D S A N D S H O P S (2.0)

CENTRAL CONTROL FACILITY (2.8)

The Central Control Facility (CCF) is located at the intersection of Imperial Highway and Century Freeway (under construction), at the approximate geographical center of the light rail systems, and serves as the operational control point for the Metro Blue, Metro Green and Metro Red Lines. The facility is designed to accommodate all communications and computer systems associated with these three Lines. This includes the SCADA system, the Green Line Automatic Train Control System and the Transit Radio System.

Four train dispatcher consoles, a communication controller console, and an emergency liason console, occupy the CCF Control Room. Additional consoles for the transit police and the software engineer are located in other rooms. Most consoles include two CRT display screens and a keyboard that can be assigned to either CRT, plus public address, telephone, and other communications equipment. These systems allow the control operators to contact any station platform, LRV vehicle, Transit Police, or RTD supervisor.

One SCADA console also includes a 19-inch closed circuit television (CCTV) monitor that can display images from cameras located on passenger station platforms. An additional 19-inch monitor and video recorder are located in the transit police dispatcher's office. A main CCTV console, also located in the CCF Control Room, contains monitors for 64 passenger station cameras, plus video recording equipment. The main communications equipment room is located on the first floor immediately beneath the Control Room, and houses electronics equipment and the main connection frame for all the communications systems which home on the CCF.

The main display system in the CCF is comprised of ten (10) 40 by 54 inch rear-projection statusboards which are arranged in a semi-circle, allowing the dispatcher consoles an overview of the entire rail system territory. Changes to the format and content of information displayed can be made in minutes. The Blue and Green Lines each utilize four of the ten screens, leaving two of the screens available to extend the array or display size of the rail system territory, if required.

Special overview displays are designed specifically for the statusboards. These displays depict the entire rail line and indicate an overall status for the several categories of equipment at each location along the right-of-way. Supervisory control is performed by selecting the appropriate device symbol on a graphic display, or by selecting the device description from a tabular display. Each console can be partitioned according to the responsibility area of specific operators, or dynamically changed to re-assign areas during periods of reduced staffing levels.

S Y S T E M S (3.0)

SIGNAL SYSTEM (3.1)

The signal system for the LACTC Metro Blue Line Rail Transit (LRT) project will be implemented in five areas along the 2-track LRT main line and Long Beach Loop. Track 1 will be the normally northbound track and Track 2 will be the normally southbound track. The areas include the Los Angeles Subway Segment from 7th and Flower streets to 12th Street; the Los Angeles Central Business District (CBD) Segment from 12th Street to Long Beach Avenue and Washington Boulevard; the Mid-Corridor Segment from Washington Boulevard to the L.A. River Bridge, including the main yard entrance interlocking; the Long Beach Segment from the L.A. River Bridge to the Willow Street Passenger Station. Block signaling will not be provided between 12th Street and along Washington Boulevard in the Los Angeles CBD or between Willow Street and First Street in Long Beach.

The Mid-Corridor Segment will be equipped with a bidirectional cab signal system. The Los Angeles Subway Segment will be equipped with unidirectional cab signaling; however, the interlocking and tail tracks at 7th and Flower streets will be bidirectional. The Los Angeles CBD Segment and the Long Beach Segment will not be equipped with cab signals.

There will be seven interlockings on the system, one on the Los Angeles Subway Segment and six on the Mid-Corridor Segment. There will be one powered facing point switch at First/Pacific Station on the Long Beach Segment. Wayside signals will be located at interlockings.

The yard will not be interlocked but will be equipped with wayside switch selection push buttons, yard switch machines, detector locking track circuits, and switch position indicators. Two wayside signals shall control the yard loop track.

The central control facility will be used to monitor operations and will have the capability to control all interlockings.

There will be 28 highway grade crossings and four pedestrian crossing that require warnings systems. Most of these crossings will be shared with the Southern Pacific Transportation Company (SPTC).

There are also two at-grade railroad crossings with the SPTC.

Nominal design headway is 180 seconds except in the Los Angeles Subway Segment where the headway is 90 seconds.

S Y S T E M S (3.0)

ELECTRIFICATION - SUBSTATIONS (3.2.1)

The Traction Power Supply System consists of engineering, testing, and delivery of prefabricated traction power substations needed to support operations. Included in the pre-fabricated buildings are AC switchgear, transformer/rectifier units, DC switchgear, batter, battery charges and accessories, supervisory control interface cabinet, negative bus box and DC distribution panel.

The installation of prefabricated traction power substations includes the installation of all cabling from substation to wayside (up to but excluding catenary), in conduit provided by others in the appropriate civil line section contracts. Also included are the construction of concrete foundations to receive the prefabricated substation buildings, DWP customer service buildings and ductbanks to within five feet of concrete foundation, installation of all cabling for substations to the overhead contact system interface manholes and testing of all substations.

Also included is the site demolition, substation site fencing, site paving and substation signage.

This Traction Power Supply System contract consists of 20 substations in total. There are 5 - 3000 Kw stations with AC input at 34.5 KV by the Department of Water and Power. There is 1 - twin 1500 Kw and 1 - 500 Kw rectifier in the Main Yard, the one 1500 Kw rectifier providing 750 V DC to the Main Line, the 500 Kw rectifier providing power to the workshop area for test purposes.

All the AC power for the Main Yard is supplied by Southern California Edison at 12 KV AC input.

There is furthermore 1 - 16 KV 3000 Kw substation, 3 - 12 KV 1500 Kw, 2 - 12 KV 3000 Kw and 8 - 16 KV 1500 Kw Traction Power Substations, all power being supplied by Southern California Edison.

S Y S T E M S (3.0)

ELECTRIFICATION - CATENARY (3.2.2)

The Overhead Contact System consists of manufacturing, testing, delivery, and installation of catenary systems, support systems (poles, cantilevers, and other required assemblies and components) for the entire transit line and connection of feeder cables from interface manholes to the catenary. The pole foundations, electrical, traction power, signaling and communications ductbanks and pullboxes are included in the appropriate civil line section contracts.

The Overhead Contact System can be divided into three distinct sections:

1. The Main Yard
2. Catenary System
3. Trolley System

The Main Yard consists of approximately 5 straight track miles (S.T.M.) of fixed equipment, the Catenary System consists of approximately 18 S.T.M. of automatic tensioning equipment, and the Trolley System consists of approximately 4 miles of fixed trolley wire.

All poles were supplied by Ameron (Pole Products Division). All hardware was supplied by Brown - Boveri Corp. of Munich, Germany. The Main Yard is a grounded system whereas the Main Line is ungrounded to eliminate corrosion caused by stray ground currents.

S Y S T E M S (3.0)

METRO BLUE LINE COMMUNICATIONS SYSTEMS

OVERVIEW

The total communication systems of the Metro Blue Line Rail Transit Project are made up of five major systems that provide command, control and communications for the 22.3 mile transit system. These are:

Cable Transmission System (CTS)
Supervisory Control and Data Acquisition System (SCADA)
Telephone System
Radio System
Safety and Security Communications System (S&SCS)

Each of these systems provides a specific type of communication support to the light rail system. They are brought together at the Central Control Facility (CCF) by the Cable Transmission System (CTS).

The Communications System serves nineteen (19) remote locations, covering 22 passenger stations on the Metro Blue (LB-LA) light rail line. The Central Control Facility equipment and operating areas are sized to service two future light rail lines and an extension to the Metro Blue Line.

The Safety and Security Communications System (S&SCS) includes requirements for each passenger station; closed circuit television surveillance, public address announcements, fire detection and an intrusion detection system.

The S&SCS furnishes the fire detection and suppression systems for each communication and signaling (C&S) building/room including the Yard and Shops communications rooms. Additionally, the S&SCS includes the public address systems for the Yard and Shops, and the Central Control Facility, including recording of designated communication circuits. Each subsystem is next described in detail.

S Y S T E M S (3.0)

CABLE TRANSMISSION SYSTEM (CTS)

The Cable Transmission System (CTS) contract consists of all land communications systems transmission paths, and includes:

1. Communications Power
2. Emergency Trip Stations
3. Communications and Signaling (C&S) Buildings
4. Transfer Trip Cabling
5. Communications Interface Cabinets
6. Duct Liners (innerduct)

The CTS incorporates both a backbone distribution transmission medium utilizing fiber optics, and a metallic distribution system such as within the confines of the Yard, passenger station areas, within buildings, and along wayside to remote devices. The fiber optic backbone system operates initially at a rate of 45 Mbps, and is expandable to 560 Mbps.

The Communications Power subsystem provided under the CTS consists of battery/rectifier plants at each communications system backbone location. All communications systems, except SCADA in the CCF operates from these power supplies.

The Communications and Signalling (C&S) Buildings are provided at each system backbone location, and also house systems such as S&SCS and Signalling.

Emergency Trip Stations are provided throughout the rail system to allow the emergency removal of power from the traction power distribution Overhead Contact System (OCS).

Transfer Trip Cabling is provided for control of the Traction Power Supply System.

Communications Interface Cabinets are provided at each passenger station as an interface point between wayside cable plant and communication systems operating at the station.

Duct Liners (Innerduct) are provided for additional cable protection within the ductbank system.

Fire Telephones (sound-powered) are furnished for the subway, at designated locations.

The Cable Transmission System backbone includes:

1. Fiber Optic (FO) transmission equipment and associated backbone and local distribution cable.
2. Pulse Code Modulation (PCM) multiplex (MUX) equipment.
3. Wayside, passenger station, CCF, Yard buildings, and Yard hardwire distribution cables.
4. Voice and data line conditioning equipment.
5. Automatic redundancy for fiber optic medium, voice and data channels.

S Y S T E M S (3.0)

SUPERVISORY CONTROL AND DATA ACQUISITION (SCADA)

The SCADA subsystem provides the medium for monitoring and controlling critical parameters of the rail system such as those contained in signalling, traction power, fire detection and intrusion detection systems and subsystems. SCADA provides various CRT displays for operator viewing and control, and an overall system summary status board. SCADA also provides semi-automatic control scenarios for complicated control sequences such as emergency ventilation and smoke ejection for the subway section of the rail line.

Utilizing the Fiber-Optic Cable (CTS) as the transmission medium, the SCADA subsystem provides real-time monitoring, detection and annunciation of normal, abnormal and emergency conditions, historic record-keeping, and supervisory control for signals, track switches, and other remote equipment, from the Central Control Facility. This facility was designed to accommodate all communication equipment and computer systems associated with the Metro Blue, Metro Green and Metro Red Lines including the Green Line Automatic Train Control system.

The SCADA system is fully redundant and independently switchable between primary and backup. The system has no single point for total failure. Approximately 5000 status inputs, 150 analog inputs, and 700 control outputs are interfaced to the SCADA system, via 26 Remote Terminal Units (RTU's) located at passenger stations and traction power substations. The SCADA system is currently configured for 85 RTU's, which is more than adequate to handle the Blue and Green Lines, plus the expansion of these two

lines. Updates of values and changes of state that are detected by the RTU's are retained and transferred to the central SCADA computer upon request. Every two seconds, the SCADA computer interrogates each RTU for this updated information. Alarm conditions are presented on the status board and console display screens within a few seconds of the occurrence in the field. Examples of SCADA functions follow:

1. Incident Reports
2. Crossing Gate Monitoring
3. Train Tracking
4. Emergency Control
5. Interface to Traffic Control System

S Y S T E M S (3.0)

SAFETY AND SECURITY COMMUNICATIONS SYSTEM (S&SCS) (3.3)

PUBLIC ADDRESS (PA)

The public address subsystem provides the capability to make announcements from the CCF to individual or groups of passengers at stations and/or on passenger vehicles. In some locations, the PA system is also a part of the fire/life safety warning system.

The PA Subsystem provides for voice announcements to all desired locations from the Central Control Facility (CCF) and/or other desired locations. It is used to make announcements of importance to transit passengers and employees and to provide emergency information from local Emergency Management Panels (EMP). Areas serviced by the PA Subsystem include:

1. Passenger Stations (PS)
2. Traction Power Substations (TPSS)
3. Communications and Signalling rooms/buildings (C&S)
4. Central Control Facility (CCF)
5. Main Yard Buildings and Wayside Areas (Y&S)

PA equipment furnished for the CCF, Main Yard Buildings and Wayside areas, and aerial passenger stations have zone paging capabilities. The CCF consoles have the ability to access each location individually or on a group-call basis. System status and alarms are reported to the CCF via the SCADA Subsystem. Pre-recorded messages can be activated from the CCF for standard conditions, by pushing a button on the controller's console. PA announcements are routed to the passenger stations via the Pulse

Code Modulation (PCM) (Fiber-Optic Cable), and to the Yard & Shops via the Telephone System.

CLOSED CIRCUIT TELEVISION (CCTV)

The CCTV Subsystem provides visual surveillance of each passenger station platform, fare vending equipment, and elevator entrance areas to aid in security control and assistance to patrons. The CCTV camera pictures are routed to the CCF via a 7/8-inch coaxial trunk cable.

Each camera is monitored at the CCF by a designated 9-inch monitor which can select any camera picture on the entire rail system. In addition, a 19-inch monitor and video tape recorder are provided for recording events of special interest by the controller or transit police. System status and alarms are reported to the CCF via the SCADA Subsystem. All cameras are protected by vandal resistant hardware.

INTRUSION DETECTION

The Intrusion Detection Subsystem provides security surveillance of selected buildings and rooms and reports intrusion violations via SCADA for display at the CCF. Each selected area is protected by entry or tempering switches.

FIRE DETECTION AND SUPPRESSION MONITORING (FDSM)

The FDSM Subsystem provides monitoring of fire detectors and suppression systems status devices via SCADA for display at the CCF. Each communications equipment building/room is protected by a Fire Alarm and Control Panel (FACP) with associated smoke and heat detectors and Halon 1301 automatic discharge system for fire suppression. In addition, the FACP panels at the CCF and Yard and Shops also pre-arm the dry-standpipe fire sprinkler systems for activation in the event a fire progresses beyond the point of extinguishing by the Halon.

AUDIO RECORDER

A dual-transport, 40-track, audio recorder/playback unit is provided to record message traffic on radio and telephone channels in the CCF on a per-console basis. The tape transport is dual-redundant to continue recording in the event of a failure in either one transport, or a recording channel.

S Y S T E M S (3.0)

RADIO SYSTEM (3.4)

The Radio System is the main communications link between the light rail vehicles and the Central Control Facility (CCF). It is part of the Transit Radio System (TRS), a computer-aided radio dispatch system serving both bus and light rail. Included in the subsystem is the ability to gather certain data from light rail vehicles and provide vehicle location data to the CCF.

The Radio System provides two-way voice and data communication between the CCF and the light rail vehicles over the entire light rail system territory, utilizing six (6) of the new 800 MHz bus channels for the LRT communication systems. Shared bus/rail operations on 800 MHz will provide rail sub-group operation with rail priority over bus operations.

Rail system design provides open voice channels so that all dispatch transmissions are heard, and in the case on duplex channels, all transmissions are heard by all vehicles. All rail lines function independently via a different sub-fleet or sub-tone operation. The LRT Radio System will provide four radio channels for functions listed below:

1. Operations
2. Emergency Communications
3. Data and Paging
4. Yard and Maintenance

Each light rail vehicle is equipped with one (1) radio and logic unit, two control head units (one on each end of the car in the operator's compartment), and one (1) vehicle location system

unit. Special features provided are: access to the on-board Public Address system by the LRT central control dispatcher, passenger and cab-to-cab intercom system, individual call, group call and/or all-call, and includes the capability to make a one-way public address announcement by the LRT central control dispatcher. Two-way message capability for other functions are also provided.

Each operator will also be equipped with a portable radio for communications to LRT central control when away from the train operating compartment.

The LRT Radio System will operate above ground and below ground. In the downtown Los Angeles area where LRT will interface with Metro-Rail, LRT is underground for approximately 3500 feet.

TRAIN TRACKING

The Transit Radio System (TRS) computer in the CCF will be responsible for periodically polling each train and providing train tracking information to the SCADA system. Trains will communicate with base stations by radio; the base stations then relay the communications via microwave to the TRS computer, which then communicates to the SCADA system.

Signposts along the right-of-way will provide reference points by which trains can indicate their position. Incoming transmissions from trains include vehicle, consist and operator identification, the odometer reading, the last two signposts passed by the train, and on-board alarm conditions.

The SCADA system will use the information received from the train, along with switch position and track topology information

to compute and display the position of each train relative to street crossings and passenger stations that are shown on the CRT displays. The SCADA system also will use the information to anticipate arrival of a train at subsequent signposts and will generate an alarm if the appropriate signpost is not detected. Upon entry of a consisted train into the controlled area of the rail system, it shall transmit the Location Polling data, and the following:

a. Work Run Number
b. Operator Badge/ID Number
c. Consist Vehicle Serial Numbers

Location polling of rail passenger vehicle will be scanned every 10 seconds for the following data:

a. Train run number
b. Present odometer register
c. Last sign post number
d. Sign Post number previous to last sign post

All data links will be redundant between LRT/TRS and SCADA.

S Y S T E M S (3.0)

TELEPHONE SYSTEM (3.5)

The Telephone service for the rail system is part of a large, multi-nodal telephone system operated by the Southern California Rapid Transit District. A major node of the system is located at the LRT Central Control Facility (CCF) and is served by a digital electronic private automatic branch exchange (EPABX), a Northern Telecom SL-1. In addition, an independent satellite EABX, connected to the CCF EPABX by the LRT CTS system, is located in the Main Yard to service that facility.

The EPABX provides all Administrative (ATEL), Emergency (ETEL), Passenger Assistance (PTEL), Maintenance (MTEL) and Special Telephone Service (STEL) throughout the light rail territory.

The Telephone System provides the switching required to support dial and direct line telephone service throughout the rail system. The LRT CTS system provides the transmission facility for all telephone subsystems remote to the CCF or Main Yard.

S Y S T E M S (3.0)

FARE COLLECTION (3.6)

The fare collection system for the Metro Blue Line Rail Transit Project consists of ticket vending machines (TVM's) for the purchase of tickets. Ticket validity will be verified by roving fare inspectors. The ticket vending machine components are mounted for easy inspection, repair and/or removal. The cabinet is a stainless steel weldment with hidden hinges and multipoint high security locking system. Remote security alarms are provided as standard equipment. The TVM's have ability of accepting nickels, dimes, quarters and Susan B. Anthony dollar coins, tokens of up to two different sizes and dollar bills in $1, $5, $10 and $20 denominations. The TVM's print small size 1" x 3" tickets by utilizing a dot matrix printer with cartridge ribbon. Ticket stock is fed from 2 rolls into a printer. The TVM's operate on standard 115 volts A.C. single phase, 15 amps with a battery backup.

The L.A. TVM's are among the first in the U.S. to utilize a CRT display for instructions to the Patron on what to do next in order to buy a ticket. This will be done in English or at the Patron's selection in Spanish.

The TVM's will escrow dollar bills and return them to the Patron if the sale is aborted. This will preclude counterfeiters from tendering bogus bills, aborting the sale and receiving valid bills. The Long Beach TVM's are the first in the nation to report all data to a central computer such as cash received, tickets sold, serial numbers of cash box, etc. This is done by a dedicated phone line to each station from Central Control.

S T A T I O N S (4.0)

The Station Superstructures consists of construction of the platforms, ramps and shelters on previously constructed foundations as provided in the appropriate civil line section contracts. The construction includes traffic maintenance, all architectural finishes, domestic water, fire protection system, station electrical, traction power, signaling and communication cabling in conduits provided by the appropriate civil line section contracts. The station platforms are on average approximately 220 feet long. The stations at-grade are covered by a canopy for a distance of one third their length, while the aerial stations, on the other hand, are covered for approximately 80% of their length.

The station classification and location are as follows:

Station Type	Station Name
1. Subway - Double side Platform (Interface of Metro Blue with Metro Red Line)	7th & Flower
2. At-Grade - Center Platform	Pico, San Pedro, Washington, Vernon, Florence, 103rd, Compton, Artesia, Wardlow, Willow, Pacific Coast Highway, Anaheim and Transit Mall
3. At-Grade - Side Platform	5th St., 1st. St. and Pacific
4. Aerial - Center Platform	Slauson, Firestone and Del Amo
5. Combined At-Grade & Aerial (Interface of Metro Blue with Metro Green Line)	Imperial

A typical At-Grade - Center Platform Station is shown in Exhibits U and V.

V E H I C L E S (5.0)

REVENUE VEHICLES (5.1)

I. General

Contractor: Sumitomo Corporation of America

Car Manufacturer: Nippon Sharyo, Japan

Number of Cars: 54.

Type: Three truck, articulated car for surface, subway, and elevated operation.

Power: Nominal 750 VDC from an overhead catenary.

Dimensions: Length over anticlimbers -87 feet.
Length over couplers - 89 feet
Width of carbody at floor - 8 feet 8-3/4 inches.
Height over roof - 11 feet 6 inches over TOR.
Floor height - 39 inches over TOR.
Truck centers - 31 feet.
Truck wheelbase - 6 feet 2-51/64inches.
Wheel size(new) - 28 inches diameter.

Passenger Loading: High level, through 4 bi-parting sliding doors per side.
Doorway width: 4 feet.
Doorway height: 6 feet 6 inches.

Seats: 76

Standees: 159 at 6/m2.

Weight Empty: Approximate average wt. 98,500 lbs.

Fare Collection: Off car, proof of payment.

Performance: Acceleration to base speed: 3.0 mphps.
Service braking: 3.5 mphps.
Emergency braking: 4.0 - 6.0 mphps (including track brakes).
Maximum operating speed: 55 mph.

Wayside Design Parameters: Maximum superelevation: 6"
Minimum radius horizontal: 82 feet.
Minimum radius vertical curve:
1640 feet (crest or sag).

II. Mechanical

Carbody: Welded LAHT steel, 2g buff strength. (Subcontractor: Nippon Sharyo, Ltd.)

Articulation: Ball and socket type. (Subcontractor: Nippon Sharyo)

Couplers: Tightlock mechanical with side mounted automatic electric heads, cantilever mounting, energy absorbing shaft. (Subcontractor: Ohio-Brass)

Trucks: Fabricated steel, inboard journals, chevron rubber primary suspension, pneumatic secondary suspension, ball bearing ring connection to carbody (motor trucks). (Subcontractor: Nippon Sharyo, Ltd.)

Wheels: Resilient, steel hub. Bochum 54. (Subcontractor: Penn Machine)

Doors: Pneumatically operated, one engine per door leaf, trainlined and local passenger control, sensitive edge obstruction sensing. (Subcontractor: Vapor Corporation)

Operators Position: Enclosed cab at each end.

III. Propulsion

Manufacturer: Asea Brown Boveri.

Drive: Monomotor with right angle drive on end trucks (gearbox by Flender). Flexible axle couplings.

Traction Motor: Type, DC series wound. Rating 245 kW (one hour), 217 kW (continuous) per motor, nominal 750 VDC. Self and force ventilated.

Control: Dual choppers (one per motor truck) in single enclosure, automatic field weakening, fully-blended rheostatic/regenerative dynamic braking. Spin-slide control with two levels of correction sensing differential axle speed and axle acceleration (controls friction brake also).

Master Controller: Single handle with fore and aft movement, also contains deadman feature.

High Speed Circuit Breaker: Electrically operated with overload detection, and different current sensing (for propulsion only).

IV. Friction Brakes

Manufacturer: Knorr.

Type: Air apply service and emergency braking on all axles. Spring applied parking brake on end trucks (with mechanical release).

Discs: One on each end truck axle, two on each center truck axle.

Control: Separate systems for each truck, analog pressure control, blended with dynamic brakes on end trucks, fixed proportion on center truck.

Sand: Manual operation and automatic operation in emergency braking, both rails sanded ahead of lead truck of each car of train.

Track Brakes: Two articulated track brakes on each truck, low voltage operated.

V. Auxiliary Electrical

Pantograph: Single arm, steel, floating shoe with two carbon strips, pneumatically lowered and spring raised (Subcontractor: Stemmann)

Protection:
- Roof fuse (two parallel elements). (Subcontractor: Carborne Ferraz)
- Lighting arrestor.
- High Speed Circuit Breaker (for auxiliaries only), electrically operated, magnetic stick. (Subcontractor: Asea Brown Boveri)

Motor Alternator Set: 120/208 VAC 3 phase, 55 KVA output, self-ventilated. (Subcontractor: Stone Safety)

Low Voltage Power Supply: Regulated rectifier from M/A set output, 37.5 VDC nominal, 8 kW output. (Subcontractor: Stone Safety)

Battery: Nickel-Cadmium, 25-cell, 160 Ah/cell, pull-out battery box. (Battery subcontractor: SAFT)

VI. HVAC

Air Conditioning: Unitized with semi-hermetically sealed compressors, one unit per body section, 208 VAC 3-phase operation from M/A set output, Freon 22 refrigerant, 14.4 tons of capacity per car (2 units). (Subcontractor: Stone Safety)

Heat: Overhead heat as part of unitized air conditioning, 750 VDC powered, 24 kW per car (2 units). (Subcontractor: Stone Safety)

Cab Heat: Separate cab heaters and demisters, 120 VAC powered. (Subcontractor: Teleweld)

VII. Other Systems

Seats: Cross and knee to back seating. Stainless steel frames with upholstered inserts. Fold-up longitudinal seats at end doorways for wheelchair area.

Interior Lighting: Two rows of warm white fluorescent tubes in fixtures combined with air diffusers, 120 VAC powered (37.5 VDC powered for emergency lighting in doorway areas). (Subcontractor: Trans-Lite)

Radio: Authority furnished, FM multi-channel, with digital data unit.

Intercom/Public Address System: Inter cab and passenger to cab intercom, cab to passenger and radio to passenger public address. (Subcontractor: Comco)

ATP: Six aspect cab signal system with speed control, 100 Hz carrier frequency. (Subcontractor: General Railway Signal; Consultants, RTS).

TWC: Active train to wayside communication system. (Subcontractor: General Railway Signal; Consultants, RTS).

CONTRACT BREAKDOWN
BY ELEMENT

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report — *BY: Djalil H. Abadi / David Chambers*
Contract Breakdown By Element — *Date: August – 1990*

Contract Description / Element Description	Element Code	Element COST	Contract Current Forecast
Flower Street Station Shell – C115			**$23,882,000**
Guideway – Subway – Direct Fixation	1,510	$7,164,600	
Station – Subway – Double Side Platform	4,210	16,717,400	
Flower Street Station Finishes – C116			**7,168,000**
Station – Subway – Double Side Platform	4,210	7,168,000	
Flower Street Subway – C117			**22,695,000**
Guideway – Subway – Direct Fixation	1,510	15,143,448	
Guideway – Retained Cut – Direct Fixation	1,610	2,234,230	
System – Signal – Ductbank	3,121	199,494	
System – Power – Ductbank	3,221	48,875	
System – S&S Comm. – Ductbank	3,321	199,494	
Special Cond. – UR – SW – Elec.	6,230	150,885	
Special Cond. – UR – SW – SD	6,250	995,834	
Special Cond. – UR – SW – SS	6,260	2,057,024	
Special Cond. – RW Changes – C&G	6,610	190,261	
Special Cond. – RW Changes – Paving	6,620	443,942	
Special Cond. – Environ. – Visual – SW	6,720	1,031,513	
LA CBD Approach – C140			**43,600,000**
Guideway – At Grade – Embedded – Doubl	1,140	11,611,061	
System – Signal – Ductbank	3,121	686,924	
System – Signal – XP – TS	3,131	2,201,379	
System – Power – Ductbank	3,221	2,151,176	
System – Power – Pole Found.	3,222	495,826	
System – S&S Comm. – Ductbank	3,321	597,547	
Station – At Grade – Center Platform	4,110	717,535	
Special Cond. – UR – ST – Elec.	6,130	1,992,576	
Special Cond. – UR – ST – Water	6,140	1,189,569	
Special Cond. – UR – ST – SD	6,150	5,281,851	
Special Cond. – UR – ST – SS	6,160	1,728,534	
Special Cond. – UR – ST – Power	6,170	11,939,969	
Special Cond. – Demo. – Building	6,510	65,605	
Special Cond. – RW Changes – C&G	6,610	368,390	
Special Cond. – RW Changes – Paving	6,620	859,577	
Special Cond. – Environ. – Visual – SW	6,720	1,712,480	

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report — *BY: Djalil H. Abadi / David Chambers*
Contract Breakdown By Element — *Date: August - 1990*

Contract Description / Element Description	Element Code	Element COST	Contract Current Forecast
Satellite Yard To LA River - C2125			**$47,749,183**
Guideway - At Grade - Ballasted	1,120	$13,511,519	
Guideway - At Grade - In Pavement Ballas	1,130	3,829,314	
Guideway - NR - Stor. ML - AG - B	1,750	101,863	
Guideway - NR - Conn. GL - AG - B	1,770	277,021	
Guideway - RR - SPTC	1,910	6,729,715	
System - Signal - Ductbank	3,121	2,185,902	
System - Signal - XP - TS	3,131	1,746,016	
System - Power - Ductbank	3,221	1,655,471	
System - Power - Pole Found.	3,222	749,069	
System - S&S Comm. - Ductbank	3,321	2,185,902	
Station - At Grade - Center Platform	4,110	1,868,646	
Special Cond. - UR - ST - Elec.	6,130	487,846	
Special Cond. - UR - ST - Water	6,140	92,993	
Special Cond. - UR - ST - SS	6,150	4,977,455	
Special Cond. - UR - ST - Power	6,170	417,326	
Special Cond. - RW Changes - C&G	6,610	1,303,507	
Special Cond. - RW Changes - Paving	6,620	3,041,516	
Special Cond. - Environ. - Visual - Sidewa	6,720	2,588,102	
Aerial Structure - C435			**32,100,000**
Guideway - At Grade - Ballasted	1,120	610,100	
Guideway - Aerial - Direct Fixation	1,210	22,920,706	
Guideway - Retained Fill - Ballasted	1,320	982,668	
Guideway - NR - Acc. - RF - B	1,720	353,315	
Guideway - NR - Acc. - AR - B	1,730	2,992,560	
System - Signal - Ductbank	3,121	628,601	
System - Power - Ductbank	3,221	878,120	
System - Power - Pole Found.	3,222	127,372	
System - S&S Comm. - Ductbank	3,321	628,600	
Station - Aerial - Center Platform	4,310	1,662,497	
Special Cond. - UR - ROW - SD	6,350	302,098	
Special Cond. - UR - ROW - SS	6,360	13,365	

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report — *BY: Djalil H. Abadi / David Chambers*
Contract Breakdown By Element — *Date: August – 1990*

Contract Description / Element Description	Element Code	Element COST	Contract Current Forecast
Firestone Bridge – C415			**$12,000,000**
Guideway – At Grade – Ballasted	1,120	$498,256	
Guideway – Aerial – Ballasted	1,220	2,222,619	
Guideway – Retained Fill – Ballasted	1,320	1,955,788	
System – Signal – Ductbank	3,121	231,664	
System – Power – Ductbank	3,221	463,329	
System – Power – Pole Found.	3,222	69,275	
System – S&S Comm. – Ductbank	3,321	231,664	
Station – Aerial – Center Platform	4,310	1,301,866	
Special Cond. – UR – ST – SD	6,150	172,630	
Guideway – RR – SPTC	1,910	4,408,512	
Special Cond. – Demo. – Bridges	6,420	444,398	
Rosecrans Ave LRT Overpass – C4360			**5,248,000**
Guideway – At Grade – Ballasted	1,120	145,833	
Guideway – Aerial – Direct Fixation	1,210	3,672,176	
Guideway – Retained Fill – Ballasted	1,320	1,356,770	
System – Signal – Ductbank	3,121	1,775	
System – Power – Ductbank	3,221	3,550	
System – Power – Pole Found.	3,222	66,122	
System – S&S Comm. – Ductbank	3,321	1,775	
Compton Creek Bridge – C455			**1,808,844**
Guideway – Aerial – Ballasted	1,220	1,466,227	
Guideway – Retained Fill – Ballasted	1,320	97,496	
Guideway – Elevated Fill – Ballasted	1,420	93,467	
System – Signal – Ductbank	3,121	33,748	
System – Power – Ductbank	3,221	33,748	
System – Power – Pole Found.	3,222	9,074	
System – S&S Comm. – Ductbank	3,321	33,748	
Special Cond. – UR – ST – SD	6,150	41,336	
LA River Bridge Piers – C424			**904,696**
Guideway – Aerial – Ballasted	1,220	904,696	

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report — *BY: Djalil H. Abadi / David Chambers*
Contract Breakdown By Element — *Date: August – 1990*

Contract Description / Element Description	Element Code	Element COST	Contract Current Forecast
LA River Bridge – C425			**$365,430**
Guideway – Aerial – Ballasted	1,220	$2,061,344	
Guideway – Elevated Fill – Ballasted	1,420	145,163	
System – Signal – Ductbank	3,121	59,767	
System – Power – Ductbank	3,221	59,767	
System – Power – Pole Found.	3,222	40,967	
System – S&S Comm. – Ductbank	3,321	59,767	
LA River To Willow Station – C315			**2,889,028**
Guideway – At Grade – Ballasted	1,120	312,191	
Guideway – Elevated Fill – Ballasted	1,420	276,062	
System – Signal – Ductbank	3,121	509,262	
System – Power – Ductbank	3,221	734,173	
System – Power – Pole Found.	3,222	114,839	
System – S&S Comm. – Ductbank	3,321	509,262	
Station – At Grade – Center Platform	4,110	182,498	
Special Cond. – UR – ROW – W	6,340	6,176	
Special Cond. – UR – ROW – SD	6,350	244,565	
Willow Sta. To 10th St. – C325			**21,085,000**
Guideway – At Grade – Ballasted	1,120	248,868	
Guideway – At Grade – Embedded – Doubl	1,140	10,978,628	
System – Signal – Ductbank	3,121	649,474	
System – Signal – XP – TS	3,131	1,576,753	
System – Power – Ductbank	3,221	1,312,582	
System – Power – Pole Found.	3,222	208,679	
System – S&S Comm. – Ductbank	3,321	649,474	
Station – At Grade – Center Platform	4,110	471,469	
Special Cond. – UR – St. – E	6,130	767,498	
Special Cond. – UR – St. – SD	6,150	1,000,906	
Special Cond. – RW Changes – C&G	6,610	687,599	
Special Cond. – RW Changes – Paving	6,620	1,604,398	
Special Cond. – Environ. – Visual – SW	6,720	928,673	

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report — *BY: Djalil H. Abadi / David Chambers*
Contract Breakdown By Element — *Date: August - 1990*

Contract Description / Element Description	Element Code	Element COST	Contract Current Forecast
Long Beach Loop - C3270			**$23,380,000**
Guideway - At Grade - Embedded - Doubl	1,140	$1,288,316	
Guideway - At Grade - Embedded - Single	1,150	5,456,669	
Guideway - NR - Stor. ML - AG - EM	1,760	325,970	
Guideway - Special TW - Diamond X-ing	1,850	36,219	
System - Signal - Ductbank	3,121	663,369	
System - Signal - XP - TS	3,131	6,579,946	
System - Power - Ductbank	3,221	1,008,318	
System - Power - Pole Found.	3,222	342,090	
System - S&S Comm. - Ductbank	3,321	663,368	
Station - At Grade - Center Platform	4,110	261,164	
Station - At Grade - Side Platform	4,120	458,454	
Special Cond. - UR - St. - E	6,130	884,083	
Special Cond. - UR - St. - SD	6,150	608,395	
Special Cond. - UR - St. - Power	6,170	454,831	
Special Cond. - RW Changes - C&G	6,610	956,917	
Special Cond. - RW Changes - Paving	6,620	2,232,807	
Special Cond. - Environ. - Visual - SW	6,720	1,159,083	
Railroad Relocation & Roadwork - C235			**15,700,000**
Guideway - Railroad Relocation - MC-5	1,920	15,700,000	
MC-5 Utility Relocation - C420			**3,000,000**
Guideway - Railroad Relocation - MC-5	1,920	3,000,000	
Rosecrans Ave / Alameda Overpass - C421			**8,765,000**
Guideway - Railroad Relocation - MC-5	1,920	8,765,000	
Compton Creek SPTC Bridge - C4510			**2,500,000**
Guideway - Railroad Relocation - MC-5	1,920	2,500,000	

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report — *BY: Djalil H. Abadi / David Chambers*
Contract Breakdown By Element — *Date: August – 1990*

Contract Description / Element Description	Element Code	Element COST	Contract Current Forecast
LRT Trackwork Installation – C258, C258S			**$15,665,000**
Guideway – At Grade – Ballasted	1,120	$8,699,944	
Guideway – Aerial – Direct Fixation	1,210	1,411,308	
Guideway – Aerial – Ballasted	1,220	204,773	
Guideway – Retained Fill – Ballasted	1,320	931,070	
Guideway – Elevated Fill – Ballasted	1,420	516,220	
Guideway – Subway – Direct Fixation	1,510	496,125	
Guideway – Retained Cut – Direct Fixation	1,610	73,756	
Guideway – NR – Acc. – AG – B	1,710	370,226	
Guideway – NR – Acc. – RF – B	1,720	112,982	
Guideway – NR – Acc. – AR – B	1,730	87,687	
Guideway – NR – Stor. YD – AG – B	1,740	556,478	
Guideway – NR – Stor. ML – AG – B	1,750	150,709	
Guideway – NR – Conn. GL – AG – B	1,770	39,385	
Guideway – At Grade – In Pavement Ballasted	1,130	614,802	
Guideway – RR – SPTC	1,910	175,404	
System – Signal – Ductbank	3,121	19,932	
System – Signal – XP – TS	3,131	19,932	
System – Power – Ductbank	3,221	39,865	
System – S&S Comm. – Ductbank	3,321	190,054	
Guideway – Special TW – T/O #10	1,810	405,735	
Guideway – Special TW – T/O Equalateral	1,820	28,469	
Guideway – Special TW – X/O Single	1,830	142,365	
Guideway – Special TW – X/O Double	1,840	35,490	
Guideway – Special TW – Diamond X–ing	1,850	14,238	
Guideway – Special TW – DF, X/O Double	1,860	328,049	
Special Trackwork Procurement – P830, P835			**3,333,125**
Guideway – Special TW – T/O #10	1,810	1,443,652	
Guideway – Special TW – T/O Equalateral	1,820	101,240	
Guideway – Special TW – X/O Single	1,830	927,110	
Guideway – Special TW – X/O Double	1,840	165,766	
Guideway – Special TW – Diamond X–ing	1,850	363,825	
Guideway – Special TW – DF, X/O Double	1,860	331,532	

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report — *BY: Djalil H. Abadi / David Chambers*
Contract Breakdown By Element — *Date: August – 1990*

Contract Description / Element Description	Element Code	Element COST	Contract Current Forecast
Concrete Ties, R Rails & Fasteners– P815, P0822 & P0910			**$13,032,226**
Guideway – At Grade – Ballasted	1,120	$6,118,437	
Guideway – At Grade – In Pavement Ballasted	1,130	163,987	
Guideway – At Grade – Embedded – Double	1,140	2,495,172	
Guideway – At Grade – Embedded – Single	1,150	825,711	
Guideway – Aerial – Direct Fixation	1,210	430,984	
Guideway – Aerial – Ballasted	1,220	142,804	
Guideway – Retained Fill – Ballasted	1,320	649,308	
Guideway – Elevated Fill – Ballasted	1,420	360,000	
Guideway – Subway – Direct Fixation	1,510	151,506	
Guideway – Retained Cut – Direct Fixation	1,610	22,524	
Guideway – NR – Acc. – AG – B	1,710	445,034	
Guideway – NR – Acc. – RF – B	1,720	135,811	
Guideway – NR – Acc. – AR – B	1,730	105,406	
Guideway – NR – Stor. YD – AG – B	1,740	668,920	
Guideway – NR – Stor. ML – AG – B	1,750	210,203	
Guideway – NR – Stor. ML – AG – EM	1,760	51,487	
Guideway – NR – Conn. GL – AG – B	1,770	54,933	
Wood Ties – P825			**2,345,398**
Guideway – Special TW – T/O #10	1,810	223,501	
Guideway – Special TW – T/O Equalateral	1,820	16,868	
Guideway – Special TW – X/O Single	1,830	50,604	
Guideway – Special TW – X/O Double	1,840	4,217	
Guideway – Special TW – Diamond X-ing	1,850	16,868	
Guideway – RR – SPTC	1,910	2,033,340	

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report — BY: Djalil H. Abadi / David Chambers
Contract Breakdown By Element — Date: August - 1990

Contract Description / Element Description	Element Code	Element COST	Contract Current Forecast
Main Yard and Shops - C560			**$26,350,327**
Guideway - NR - Acc. - AG - B	1,710	$618,013	
Guideway - NR - Stor. YD - AG - B	1,740	928,707	
Yard - Site Work - Improvements	2,210	1,302,148	
Yard - Site Work - Utilities	2,220	1,361,674	
Yard - System - Signal	2,310	838,105	
Yard - System - Power	2,320	1,015,812	
Yard - System - S&S Comm.	2,330	838,105	
Yard - Vehicle Shop - Building	2,410	8,960,977	
Yard - Vehicle Shop - Electronics	2,420	1,129,881	
Yard - Vehicle Shop - Cranes	2,430	336,202	
Yard - Vehicle Shop - Car Hoist	2,440	1,266,763	
Yard - Vehicle Shop - Truck Turntable	2,450	217,331	
Yard - Vehicle Shop - Truck Repair Hoist	2,460	130,082	
Yard - Oper. Center - Building	2,510	3,644,778	
Yard - Oper. Center - Electronics	2,520	680,810	
Yard - Oper. Center - Car Wash	2,530	511,121	
Yard - Oper. Center - Wheel Truing	2,540	334,662	
Yard - Paint Shop - Building	2,610	1,100,474	
Yard - Paint Shop - Electronics	2,620	453,873	
Yard - Paint Shop - Spary Booth	2,630	591,957	
Special Cond. - UR - ROW - Other	6,380	88,854	
Yard Access Road - C550			**2,467,635**
Yard - Access Road - Roadway	2,110	838,996	
Yard - Access Road - Bridge	2,120	1,628,639	
Wheel Truing Machine - H0880			**810,000**
Yard - Oper. Center - Wheel Truing	2,540	810,000	
Light Rail Vehicle Wash Equipment - H0885			**448,275**
Yard - Oper. Center - Car Wash	2,530	448,275	
Lift, Loader & Handling Truck - P0853			**150,000**
Yard - Equip. - Material Handling	2,710	150,000	
Carts, Generator & Compressor - P0854			**44,000**
Yard - Equip. - Testing & Tools	2,720	44,000	

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report — *BY: Djalil H. Abadi / David Chambers*
Contract Breakdown By Element — *Date: August – 1990*

Contract Description / Element Description	Element Code	Element COST	Contract Current Forecast
Miscellaneous Shop Equipment – P860			**$600,000**
Yard – Equip. – Misc.	2,730	$600,000	
Shop Testing Equipment – P870			**70,000**
Yard – Equip. – Testing & Tools	2,740	70,000	
Shop Tools – P875			**20,000**
Yard – Equip. – Testing & Tools	2,740	20,000	
Centeral Control Facilities – C245			**6,100,000**
Yard – CCF – Build. – Structure	2,811	5,490,000	
Yard – CCF – Build. – Site Work	2,812	610,000	
Traction Power Equipment, P&I – H811			**21,432,500**
Yard – System –Power	2,320	885,679	
System – Power – TPSS – Build.	3,211	5,315,708	
System – Power – TPSS – H 1500KW	3,212	4,762,752	
System – Power – TPSS – H 3000KW	3,213	4,618,426	
System – Power – TPSS – Inst.	3,214	4,897,128	
System – Power – Ductbank	3,221	952,809	
TPSS And C/S Civil Site Work – C4700			**1,216,366**
System – Signal – C&S – Building	3,111	729,820	
System – Power – TPSS – Building	3,211	243,273	
System – C&S Comm. – C&S – Building	3,311	243,273	
Overhead Contact System – H812			**17,500,000**
Yard – System – Power	2,320	692,666	
System – Power – Ductbank	3,221	1,011,073	
System – Power – Poles & Components	3,222	11,325,433	
System – Power – Wire – T	3,223	1,905,017	
System – Power – Wire – M	3,224	2,565,811	
Procure & Install Transit Power Equipment P0920 & P0930			**575,000**
System – Power – TPSS – HW – 1500KW	3,212	222,365	
System – Power – TPSS – HW – 3000KW	3,213	181,935	
System – Power – TPSS – Install	3,214	170,700	

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report — *BY: Djalil H. Abadi / David Chambers*
Contract Breakdown By Element — *Date: August – 1990*

Contract Description / Element Description	Element Code	Element COST	Contract Current Forecast
Communication Reimbursements To RTD – H0940			**$2,153,900**
System – Signal – Data Collec. Hardware	3,112	$200,089	
System – Signal – Ductbank	3,121	200,089	
System – S&S Comm. – Data Collec.	3,312	200,089	
System – S&S Comm. – CCTV	3,331	122,226	
System – S&S Comm. – P.A. System	3,332	54,323	
System – S&S Comm. – F.A. System	3,333	363,963	
System – Comm. – Radio	3,410	943,859	
System – Comm. – Telephone	3,510	69,262	
Transit Signaling – H825			**17,865,000**
Guidway – R R – SPTC – Signal	1,910	45,814	
Yard – System – Signal	2,310	390,174	
Yard – System – Signal	2,310	881,954	
System – Signal – Wayside – Cable	3,122	5,142,624	
System – Signal – Wayside – Cable	3,122	10,498,485	
System – Signal – XP – Gate – HW	3,132	353,308	
System – Signal – XP – Gate – Install	3,133	552,641	
Supervisory Control & Data Acuisition – H831			**5,096,000**
Yard – CCF – Mimic Board – Signal	2,821	1,045,828	
Yard – CCF – Mimic Board – Traction Power	2,822	1,045,828	
Yard – CCF – Mimic Board – S&S Comm.	2,823	448,212	
Yard – CCF – Mimic Board – Fare Collection	2,824	298,808	
Yard – CCF – Mimic Board – Environ.	2,825	149,404	
Yard – CCF – Comp. System – Hardware	2,831	376,504	
Yard – CCF – Comp. System – Software	2,832	265,343	
System – Signal – Data Collec. Hardware	3,112	372,342	
System – Signal – Data Collec. Install	3,113	116,349	
System – Power – Data Collec. Hardware	3,212	372,342	
System – Power – Data Collec. Install	3,213	116,349	
System – S&S Comm. – Data Collec. Hardware	3,312	372,342	
System – S&S Comm. – Data Collec. Install	3,313	116,349	

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report — *BY: Djalil H. Abadi / David Chambers*
Contract Breakdown By Element — *Date: August – 1990*

Contract Description / Element Description	Element Code	Element COST	Contract Current Forecast
Cable Transmission System – H832			**$10,400,000**
System – Signal – Hardware	3,112	$462,050	
System – S&S Comm. – Hardware	3,312	462,050	
System – Signal – Building	3,111	1,131,103	
System – S&S Comm. – Building	3,311	1,131,103	
Yard – System – Signal	2,310	257,475	
Yard – System – S&S Comm.	2,330	257,475	
Yard – CCF – Mimic Board – S&S Comm.	2,823	452,322	
Yard – CCF – Mimic Board – Signal	2,821	452,322	
System – Signal – Cable	3,122	2,897,050	
System – S&S Comm. – Cable	3,322	2,897,050	
Radio System – H833			**1,578,000**
System – Radio Comm. – Hardware	3,410	1,104,600	
System – Radio Comm. – Install	3,420	473,400	
Telephone System – H834			**992,000**
System – Telephone – Hardware	3,510	744,000	
System – Telephone – Install	3,520	248,000	
Safety & Security Communication System – H836			**4,275,000**
Yard – System – S&S Comm.	2,330	151,458	
Yard – System – S&S Comm.	2,330	165,118	
Yard – CCF – Mimic Board – S&S Comm.	2,823	391,284	
Yard – CCF – Mimic Board – S&S Comm.	2,823	67,548	
System – S&S Comm. – Cable	3,322	1,224,857	
System – S&S Comm. – CCTV System	3,331	874,898	
System – S&S Comm. – P.A. System	3,332	962,388	
System – S&S Comm. – F.A. System	3,333	437,449	
Fare Collection System – H840			**6,000,000**
Yard – CCF – Mimic Board – FC	2,824	80,464	
System – FC – TVM – Hardware	3,611	2,598,310	
System – FC – TVM – Install	3,612	1,232,966	
System – FC – TVM – Spare	3,613	408,030	
System – FC – Money Carts	3,621	72,399	
System – FC – Option – 1	3,631	1,607,830	

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report — *BY: Djalil H. Abadi / David Chambers*
Contract Breakdown By Element — *Date: August – 1990*

Contract Description / Element Description	Element Code	Element COST	Contract Current Forecast
Revenue Trucks – P0857			**$85,000**
System – FC – Cash C – Rev. Trucks	3,622	$85,000	
Landscaping Mid Corridor – C275			**1,786,000**
Station – At Grade – Center Platform	4,110	380,956	
Station – Aerial – Center Platfrom	4,310	104,497	
Station – Park & Ride – Parking	4,410	1,209,122	
System – Signal – Build. Landscap	3,111	10,573	
System – Power – Build. Landscap	3,211	14,097	
System – S&S Comm. – Build. Landscap	3,311	10,573	
Special Cond. – Environ. – Visual – LS	6,720	56,183	
Long Beach Landscaping – C355			**2,220,000**
Station – Park & Ride – Parking	4,410	339,317	
System – Signal – Build. Landscap	3,111	84,760	
System – Power – Build. Landscap	3,211	113,013	
System – S&S Comm. – Build. Landscap	3,311	84,760	
Special Cond. – Environ. – Visual – LS RO	6,720	79,907	
Special Cond. – Environ. – Visual – LS ST	6,720	1,518,242	
Graphics & Signs – H860			**1,675,000**
Yard – Vehicle Shop – Building	2,410	6,054	
Yard – Operation Center – Building	2,510	6,054	
Yard – Paint Shop – Building	2,610	6,054	
Yard – CCF – Building – Structure	2,811	6,054	
Station – At Grade – Center Platform	4,110	374,110	
Station – At Grade – Side Platform	4,120	112,205	
Station – Park & Ride – Parking	4,410	93,562	
Station – Subway – Double Side Platform	4,210	49,900	
Station – Aerial – Center Platform	4,310	71,065	
Special Cond. – Environ. – Signage	6,730	949,943	
LA – MD Station Superstructures – C265			**18,753,000**
Station – At Grade – Center Platform	4,110	8,094,064	
Station – Park & Ride – Parking	4,410	5,012,180	
Station – Aerial – Center Platform	4,310	5,646,757	

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report — *BY: Djalil H. Abadi / David Chambers*
Contract Breakdown By Element — *Date: August – 1990*

Contract Description / Element Description	Element Code	Element COST	Contract Current Forecast
Long Beach Station Superstructures – C335			**$7,800,000**
Station – At Grade – Center Platform	4,110	$3,840,694	
Station – At Grade – Side Platform	4,120	2,170,948	
Station – Park & Ride – Parking	4,410	1,582,775	
Special Cond. – Demo. – Build.	6,410	205,583	
Artisea / Del Amo Storage Sites – C276			**366,826**
Station – Park & Ride – Parking	4,410	253,576	
Special Cond. – Demo. – Build.	6,410	113,250	
Reimbursements to RTD – H0950, 55, 60, 65, 70 & 75			**3,781,500**
Station – Subway – Double Side Platform	4,210	3,749,000	
System – Power – Hardware	3,212	32,500	
Pedestrian Overpasses – C510			**2,100,000**
Station – Overpasses – Pedestrian	4,510	1,999,222	
Special Cond. – Environ. – Visual – LS	6,720	100,778	
Light Rail Vehicles – P865			**78,136,129**
Vehicles – LRV	5,110	78,136,129	
Hi Rail Trucks – P0851			**680,000**
Vehicles – NR – Hi Rail Trucks	5,210	680,000	
Mobile Crane & Car Mover – P852			**783,000**
Yard – MOW – Mobile Crane & Car Mover	5,220	783,000	
Trucks, Sedans & Vans – P0856			**340,000**
Vehicles – NR – Trucks & Vans	5,230	340,000	
Utility Exploration Program – C490			**286,158**
Special Cond. – UR – ROW, Gas	6,310	34,339	
Special Cond. – UR – ROW, Telephone	6,320	22,893	
Special Cond. – UR – ROW, Elec.	6,330	14,308	
Special Cond. – UR – ROW, Water	6,340	57,232	
Special Cond. – UR – ROW, SD	6,350	64,386	
Special Cond. – UR – ROW, SS	6,360	35,770	
Special Cond. – UR – ROW, Power	6,370	28,616	
Special Cond. – UR – ROW, Other	6,380	28,616	

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report — *BY: Djalil H. Abadi / David Chambers*
Contract Breakdown By Element — *Date: August – 1990*

Contract Description / Element Description	Element Code	Element COST	Contract Current Forecast
RTD Utility Relocation – C114			**$1,616,600**
Special Cond. – UR – SW, Gas	6,210	$193,992	
Special Cond. – UR – SW, Telephone	6,220	129,328	
Special Cond. – UR – SW, Elec.	6,230	80,830	
Special Cond. – UR – SW, Water	6,240	323,320	
Special Cond. – UR – SW, SD	6,250	363,735	
Special Cond. – UR – SW, SS	6,260	202,075	
Special Cond. – UR – SW, Power	6,270	161,660	
Special Cond. – UR – SW, Other	6,280	161,660	
Flower Street Utility Relocation – C119			**1,104,453**
Special Cond. – UR – ST, Gas	6,110	132,534	
Special Cond. – UR – ST, Telephone	6,120	88,356	
Special Cond. – UR – ST, Elec.	6,130	55,223	
Special Cond. – UR – ST, Water	6,140	220,891	
Special Cond. – UR – ST, SD	6,150	248,502	
Special Cond. – UR – ST, SS	6,160	138,057	
Special Cond. – UR – ST, Power	6,170	110,445	
Special Cond. – UR – ST, Other	6,180	110,445	
Water Relocation / 20th – Manville			**1,475,239**
Special Cond. – UR – ST, Gas	6,110	73,762	
Special Cond. – UR – ST, Telephone	6,120	36,881	
Special Cond. – UR – ST, Elec.	6,130	22,129	
Special Cond. – UR – ST, Water	6,140	1,180,191	
Special Cond. – UR – ST, SD	6,150	110,643	
Special Cond. – UR – ST, SS	6,160	36,881	
Special Cond. – UR – ST, Power	6,170	7,376	
Special Cond. – UR – ST, Other	6,180	7,376	
LA River Bridge Demolition – C423			**139,000**
Special Cond. – Demo. – Bridges	6,520	139,000	
Misc. Construction Services – C4710			**550,000**
Special Condition – Environ – Other	6,740	550,000	
Systemwide Fencing – C495			**6,202,600**
Special Cond. – Environ. – Safety & Protection	6,710	6,202,600	
Hazardous Waste Removal – C6100			**100,000**
Special Cond. – Environ. – Other	6,740	100,000	

ELEMENT COST MATRIX

E L E M E N T C O S T M A T R I X

This Element Cost Matrix is for Section 1.0 (Guideway) only.

Other Element Cost Matrices are available upon Request.

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / Element Description	Element COST	At Grade Ballasted	At Grade In Pvmt. Ballasted	At Grade Embedded – DT	At Grade Embedded – ST	Aerial Direct – Fixation	Aerial Ballasted	Retained Fill Ballasted	Elevated Fill Ballasted	Subway Direct – Fixation
Flower Street Station Shell – C115										
Guideway – Subway – Direct Fixation	$7,164,600									7,164,600
Station – Subway – Double Side Platform	16,717,400									
Flower Street Subway – C117										
Guideway – Subway – Direct Fixation	15,143,448									15,143,448
Guideway – Retained Cut – Direct Fixation	2,234,230									
System – Signal – Ductbank	199,494									
System – Power – Ductbank	48,875									
System – S&S Comm. – Ductbank	199,494									
Special Cond. – UR – SW – Elec.	150,885									
Special Cond. – UR – SW – SD	995,834									
Special Cond. – UR – SW – SS	2,057,024									
Special Cond. – RW Changes – C&G	190,261									
Special Cond. – RW Changes – Paving	443,942									
Special Cond. – Environ. – Visual – SW	1,031,513									
LA CBD Approach – C140										
Guideway – At Grade – Embedded – DT	11,611,061			11,611,061						
System – Signal – Ductbank	686,924									
System – Signal – XP – TS	2,201,379									
System – Power – Ductbank	2,151,176									
System – Power – Pole Found.	495,826									
System – S&S Comm. – Ductbank	597,547									
Station – At Grade – Center Platform	717,535									
Special Cond. – UR – ST – Elec.	1,992,576									
Special Cond. – UR – ST – Water	1,189,569									
Special Cond. – UR – ST – SD	5,281,851									
Special Cond. – UR – ST – SS	1,728,534									
Special Cond. – UR – ST – Power	11,939,969									
Special Cond. – Demo. – Building	65,605									
Special Cond. – RW Changes – C&G	368,390									
Special Cond. – RW Changes – Paving	859,577									
Special Cond. – Environ. – Visual – SW	1,712,480									

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / Element Description	Element COST	At Grade Ballasted	At Grade In Pvmt. Ballasted	At Grade Embedded – DT	At Grade Embedded – ST	Aerial Direct – Fixation	Aerial Ballasted	Retained Fill Ballasted	Elevated Fill Ballasted	Subway Direct – Fixation
Satellite Yard To LA River – C2125										
Guideway – At Grade – Ballasted	$13,511,519	13,511,519								
Guideway – At Grade – In Pvmt. Ballasted	3,829,314		3,829,314							
Guideway – NR – Stor. ML – AG – B	101,863									
Guideway – NR – Conn. GL – AG – B	277,021									
Guideway – RR – SPTC	6,729,715									
System – Signal – Ductbank	2,185,902									
System – Signal – XP – TS	1,746,016									
System – Power – Ductbank	1,655,471									
System – Power – Pole Found.	749,069									
System – S&S Comm. – Ductbank	2,185,902									
Station – At Grade – Center Platform	1,868,646									
Special Cond. – UR – ST – Elec.	487,846									
Special Cond. – UR – ST – Water	92,993									
Special Cond. – UR – ST – SS	4,977,455									
Special Cond. – UR – ST – Power	417,326									
Special Cond. – RW Changes – C&G	1,303,507									
Special Cond. – RW Changes – Paving	3,041,516									
Special Cond. – Environ. – Visual – SW	2,588,102									
Aerial Structure – C435										
Guideway – At Grade – Ballasted	610,100	610,100								
Guideway – Aerial – Direct Fixation	22,920,706					22,920,706				
Guideway – Retained Fill – Ballasted	982,668							982,668		
Guideway – NR – Acc. – RF – B	353,315									
Guideway – NR – Acc. – AR – B	2,992,560									
System – Signal – Ductbank	628,601									
System – Power – Ductbank	878,120									
System – Power – Pole Found.	127,372									
System – S&S Comm. – Ductbank	628,600									
Station – Aerial – Center Platform	1,662,497									
Special Cond. – UR – ROW – SD	302,098									
Special Cond. – UR – ROW – SS	13,365									

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / Element Description	Element COST	At Grade Ballasted	At Grade in Pvmt. Ballasted	At Grade Embedded – DT	At Grade Embedded – ST	Aerial Direct – Fixation	Aerial Ballasted	Retained Fill Ballasted	Elevated Fill Ballasted	Subway Direct – Fixation
Firestone Bridge – C415										
Guideway – At Grade – Ballasted	$498,256	498,256								
Guideway – Aerial – Ballasted	2,222,619						2,222,619			
Guideway – Retained Fill – Ballasted	1,955,788							1,955,788		
System – Signal – Ductbank	231,664									
System – Power – Ductbank	463,329									
System – Power – Pole Found.	69,275									
System – S&S Comm. – Ductbank	231,664									
Station – Aerial – Center Platform	1,301,866									
Special Cond. – UR – ST – SD	172,630									
Guideway – RR – SPTC	4,408,512									
Special Cond. – Demo. – Bridges	444,398									
Rosecrans Ave LRT Overpass – C4360										
Guideway – At Grade – Ballasted	145,833	145,833								
Guideway – Aerial – Direct Fixation	3,672,176					3,672,176				
Guideway – Retained Fill – Ballasted	1,356,770							1,356,770		
System – Signal – Ductbank	1,775									
System – Power – Ductbank	3,550									
System – Power – Pole Found.	66,122									
System – S&S Comm. – Ductbank	1,775									
Compton Creek Bridge – C455										
Guideway – Aerial – Ballasted	1,466,227						1,466,227			
Guideway – Retained Fill – Ballasted	97,496							97,496		
Guideway – Elevated Fill – Ballasted	93,467								93,467	
System – Signal – Ductbank	33,748									
System – Power – Ductbank	33,748									
System – Power – Pole Found.	9,074									
System – S&S Comm. – Ductbank	33,748									
Special Cond. – UR – ST – SD	41,336									
LA River Bridge Piers – C424										
Guideway – Aerial – Ballasted	904,696						904,696			

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / Element Description	Element COST	At Grade Ballasted	At Grade In Pvmt. Ballasted	At Grade Embedded – DT	At Grade Embedded – ST	Aerial Direct – Fixation	Aerial Ballasted	Retained Fill Ballasted	Elevated Fill Ballasted	Subway Direct – Fixation
LA River Bridge – C425										
Guideway – Aerial – Ballasted	$2,061,344						2,061,344			
Guideway – Elevated Fill – Ballasted	145,163								145,163	
System – Signal – Ductbank	59,767									
System – Power – Ductbank	59,767									
System – Power – Pole Found.	40,967									
System – S&S Comm. – Ductbank	59,767									
LA River To Willow Station – C315										
Guideway – At Grade – Ballasted	312,191	312,191								
Guideway – Elevated Fill – Ballasted	276,062								276,062	
System – Signal – Ductbank	509,262									
System – Power – Ductbank	734,173									
System – Power – Pole Found.	114,839									
System – S&S Comm. – Ductbank	509,262									
Station – At Grade – Center Platform	182,498									
Special Cond. – UR – ROW – W	6,176									
Special Cond. – UR – ROW – SD	244,565									
Willow Sta. To 10th St. – C325										
Guideway – At Grade – Ballasted	248,868	248,868								
Guideway – At Grade – Embedded – DT	10,978,628			10,978,628						
System – Signal – Ductbank	649,474									
System – Signal – XP – TS	1,576,753									
System – Power – Ductbank	1,312,582									
System – Power – Pole Found.	208,679									
System – S&S Comm. – Ductbank	649,474									
Station – At Grade – Center Platform	471,469									
Special Cond. – UR – St. – E	767,498									
Special Cond. – UR – St. – SD	1,000,906									
Special Cond. – RW Changes – C&G	687,599									
Special Cond. – RW Changes – Paving	1,604,398									
Special Cond. – Environ. – Visual – SW	928,673									

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / Element Description	Element COST	At Grade Ballasted	At Grade In Pvmt. Ballasted	At Grade Embedded – DT	At Grade Embedded – ST	Aerial Direct – Fixation	Aerial Ballasted	Retained Fill Ballasted	Elevated Fill Ballasted	Subway Direct – Fixation
Long Beach Loop – C3270										
Guideway – At Grade – Embedded – DT	$1,288,316			1,288,316						
Guideway – At Grade – Embedded – ST	5,456,669				5,456,669					
Guideway – NR – Stor. ML – AG – EM	325,970									
Guideway – Special TW – Diamond X-ing	36,219									
System – Signal – Ductbank	663,369									
System – Signal – XP – TS	6,579,946									
System – Power – Ductbank	1,008,318									
System – Power – Pole Found.	342,090									
System – S&S Comm. – Ductbank	663,368									
Station – At Grade – Center Platform	261,164									
Station – At Grade – Side Platform	458,454									
Special Cond. – UR – St. – E	884,083									
Special Cond. – UR – St. – SD	608,395									
Special Cond. – UR – St. – Power	454,831									
Special Cond. – RW Changes – C&G	956,917									
Special Cond. – RW Changes – Paving	2,232,807									
Special Cond. – Environ. – Visual – SW	1,159,083									
Railroad Relocation & Roadwork – C235										
Guideway – Railroad Relocation – MC-5	15,700,000									
MC-5 Utility Relocation – C420										
Guideway – Railroad Relocation – MC-5	3,000,000									
Rosecrans Ave / Alameda Overpass – C421										
Guideway – Railroad Relocation – MC-5	8,765,000									
Compton Creek SPTC Bridge – C4510										
Guideway – Railroad Relocation – MC-5	2,500,000									

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / Element Description	Element COST	At Grade Ballasted	At Grade In Pvmt. Ballasted	At Grade Embedded – DT	At Grade Embedded – ST	Aerial Direct – Fixation	Aerial Ballasted	Retained Fill Ballasted	Elevated Fill Ballasted	Subway Direct – Fixation
LRT Trackwork Installation – C258, C258S										
Guideway – At Grade – Ballasted	$8,699,944	8,699,944								
Guideway – Aerial – Direct Fixation	1,411,308					1,411,308				
Guideway – Aerial – Ballasted	204,773						204,773			
Guideway – Retained Fill – Ballasted	931,070							931,070		
Guideway – Elevated Fill – Ballasted	516,220								516,220	
Guideway – Subway – Direct Fixation	496,125									496,125
Guideway – Retained Cut – Direct Fixation	73,756									
Guideway – NR – Acc. – AG – B	370,226									
Guideway – NR – Acc. – RF – B	112,982									
Guideway – NR – Acc. – AR – B	87,687									
Guideway – NR – Stor. YD – AG – B	556,478									
Guideway – NR – Stor. ML – AG – B	150,709									
Guideway – NR – Conn. GL – AG – B	39,385									
Guideway – At Grade – In Pvmt. Ballasted	614,802		614,802							
Guideway – RR – SPTC	175,404									
System – Signal – Ductbank	19,932									
System – Signal – XP – TS	19,932									
System – Power – Ductbank	39,865									
System – S&S Comm. – Ductbank	190,054									
Guideway – Special TW – T/O #10	405,735									
Guideway – Special TW – T/O Equalateral	28,469									
Guideway – Special TW – X/O Single	142,365									
Guideway – Special TW – X/O Double	35,490									
Guideway – Special TW – Diamond X-ing	14,238									
Guideway – Special TW – DF, X/O Double	328,049									
Special Trackwork Procurement – P830, P835										
Guideway – Special TW – T/O #10	1,443,652									
Guideway – Special TW – T/O Equalateral	101,240									
Guideway – Special TW – X/O Single	927,110									
Guideway – Special TW – X/O Double	165,766									
Guideway – Special TW – Diamond X-ing	363,825									
Guideway – Special TW – DF, X/O Double	331,532									

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / *Element Description*	**Element COST**	At Grade Ballasted	At Grade In Pvmt. Ballasted	At Grade Embedded – DT	At Grade Embedded – ST	Aerial Direct – Fixation	Aerial Ballasted	Retained Fill Ballasted	Elevated Fill Ballasted	Subway Direct – Fixation
Concrete Ties, R Rails & Fasteners– P815, P0822 &										
Guideway – At Grade – Ballasted	$6,118,437	6,118,437								
Guideway – At Grade – In Pvmt. Ballasted	163,987		163,987							
Guideway – At Grade – Embedded – DT	2,495,172			2,495,172						
Guideway – At Grade – Embedded – ST	825,711				825,711					
Guideway – Aerial – Direct Fixation	430,984					430,984				
Guideway – Aerial – Ballasted	142,804						142,804			
Guideway – Retained Fill – Ballasted	649,308							649,308		
Guideway – Elevated Fill – Ballasted	360,000								360,000	
Guideway – Subway – Direct Fixation	151,506									151,506
Guideway – Retained Cut – Direct Fixation	22,524									
Guideway – NR – Acc. – AG – B	445,034									
Guideway – NR – Acc. – RF – B	135,811									
Guideway – NR – Acc. – AR – B	105,406									
Guideway – NR – Stor. YD – AG – B	668,920									
Guideway – NR – Stor. ML – AG – B	210,203									
Guideway – NR – Stor. ML – AG – EM	51,487									
Guideway – NR – Conn. GL – AG – B	54,933									
Wood Ties – P825										
Guideway – Special TW – T/O #10	223,501									
Guideway – Special TW – T/O Equalateral	16,868									
Guideway – Special TW – X/O Single	50,604									
Guideway – Special TW – X/O Double	4,217									
Guideway – Special TW – Diamond X-ing	16,868									
Guideway – RR – SPTC	2,033,340									

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalli H. Abadi / David Chambers
Date: August, 1990

Contract Description / *Element Description*	*Element COST*	At Grade Ballasted	At Grade In Pvmt. Ballasted	At Grade Embedded – DT	At Grade Embedded – ST	Aerial Direct – Fixation	Aerial Ballasted	Retained Fill Ballasted	Elevated Fill Ballasted	Subway Direct – Fixation
Main Yard and Shops – C560										
Guideway – NR – Acc. – AG – B	$618,013									
Guideway – NR – Stor. YD – AG – B	928,707									
Yard – Site Work – Improvements	1,302,148									
Yard – Site Work – Utilities	1,361,674									
Yard – System – Signal	838,105									
Yard – System – Power	1,015,812									
Yard – System – S&S Comm.	838,105									
Yard – Vehicle Shop – Building	8,960,977									
Yard – Vehicle Shop – Electronics	1,129,881									
Yard – Vehicle Shop – Cranes	336,202									
Yard – Vehicle Shop – Car Hoist	1,266,763									
Yard – Vehicle Shop – Truck Turntable	217,331									
Yard – Vehicle Shop – Truck Repair Hoist	130,082									
Yard – Oper. Center – Building	3,644,778									
Yard – Oper. Center – Electronics	680,810									
Yard – Oper. Center – Car Wash	511,121									
Yard – Oper. Center – Wheel Truing	334,662									
Yard – Paint Shop – Building	1,100,474									
Yard – Paint Shop – Electronics	453,873									
Yard – Paint Shop – Spary Booth	591,957									
Special Cond. – UR – ROW – Other	88,854									
Transit Signaling – H825										
Guidway – R R – SPTC – Signal	45,814									
Yard – System – Signal	390,174									
Yard – System – Signal	881,954									
System – Signal – Wayside – Cable	5,142,624									
System – Signal – Wayside – Cable	10,498,485									
System – Signal – XP – Gate – HW	353,308									
System – Signal – XP – Gate – Install	552,641									
Guideway Elemnts Total Cost *(In $1000)*		$30,145	$4,608	$26,373	$6,282	$28,435	$7,002	$5,973	$1,391	$22,956

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / *Element Description*	*Element COST*	Retained – Cut Direct – Fixation	NR – Access T At Grade – Ballasted	NR – Access T Retained – Ballasted	NR – Access T Aerial – Ballasted	NR – Storage T Ballasted – Yard	NR – Storage T Ballasted – ML	NR – Storage T Embedded – ML	NR – Connector T Ballasted – GL	Special Trackwork Turnouts
Flower Street Station Shell – C115										
Guideway – Subway – Direct Fixation	$7,164,600									
Station – Subway – Double Side Platform	16,717,400									
Flower Street Subway – C117										
Guideway – Subway – Direct Fixation	15,143,448									
Guideway – Retained Cut – Direct Fixation	2,234,230	2,234,230								
System – Signal – Ductbank	199,494									
System – Power – Ductbank	48,875									
System – S&S Comm. – Ductbank	199,494									
Special Cond. – UR – SW – Elec.	150,885									
Special Cond. – UR – SW – SD	995,834									
Special Cond. – UR – SW – SS	2,057,024									
Special Cond. – RW Changes – C&G	190,261									
Special Cond. – RW Changes – Paving	443,942									
Special Cond. – Environ. – Visual – SW	1,031,513									
LA CBD Approach – C140										
Guideway – At Grade – Embedded – DT	11,611,061									
System – Signal – Ductbank	686,924									
System – Signal – XP – TS	2,201,379									
System – Power – Ductbank	2,151,176									
System – Power – Pole Found.	495,826									
System – S&S Comm. – Ductbank	597,547									
Station – At Grade – Center Platform	717,535									
Special Cond. – UR – ST – Elec.	1,992,576									
Special Cond. – UR – ST – Water	1,189,569									
Special Cond. – UR – ST – SD	5,281,851									
Special Cond. – UR – ST – SS	1,728,534									
Special Cond. – UR – ST – Power	11,939,969									
Special Cond. – Demo. – Building	65,605									
Special Cond. – RW Changes – C&G	368,390									
Special Cond. – RW Changes – Paving	859,577									
Special Cond. – Environ. – Visual – SW	1,712,480									

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / Element Description	Element COST	Retained – Cut Direct – Fixation	NR – Access T At Grade – Ballasted	NR – Access T Retained – Ballasted	NR – Access T Aerial – Ballasted	NR – Storage T Ballasted – Yard	NR – Storage T Ballasted – ML	NR – Storage T Embedded – ML	NR – Connector T Ballasted – GL	Special Trackwork Turnouts
Satellite Yard To LA River – C2125										
Guideway – At Grade – Ballasted	$13,511,519									
Guideway – At Grade – In Pvmt. Ballasted	3,829,314									
Guideway – NR – Stor. ML – AG – B	101,863						101,863			
Guideway – NR – Conn. GL – AG – B	277,021								277,021	
Guideway – RR – SPTC	6,729,715									
System – Signal – Ductbank	2,185,902									
System – Signal – XP – TS	1,746,016									
System – Power – Ductbank	1,655,471									
System – Power – Pole Found.	749,069									
System – S&S Comm. – Ductbank	2,185,902									
Station – At Grade – Center Platform	1,868,646									
Special Cond. – UR – ST – Elec.	487,846									
Special Cond. – UR – ST – Water	92,993									
Special Cond. – UR – ST – SS	4,977,455									
Special Cond. – UR – ST – Power	417,326									
Special Cond. – RW Changes – C&G	1,303,507									
Special Cond. – RW Changes – Paving	3,041,516									
Special Cond. – Environ. – Visual – SW	2,588,102									
Aerial Structure – C435										
Guideway – At Grade – Ballasted	610,100									
Guideway – Aerial – Direct Fixation	22,920,706									
Guideway – Retained Fill – Ballasted	982,668									
Guideway – NR – Acc. – RF – B	353,315			353,315						
Guideway – NR – Acc. – AR – B	2,992,560				2,992,560					
System – Signal – Ductbank	628,601									
System – Power – Ductbank	878,120									
System – Power – Pole Found.	127,372									
System – S&S Comm. – Ductbank	628,600									
Station – Aerial – Center Platform	1,662,497									
Special Cond. – UR – ROW – SD	302,098									
Special Cond. – UR – ROW – SS	13,365									

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / Element Description	Element COST	Retained – Cut Direct – Fixation	NR – Access T At Grade – Ballasted	NR – Access T Retained – Ballasted	NR – Access T Aerial – Ballasted	NR – Storage T Ballasted – Yard	NR – Storage T Ballasted – ML	NR – Storage T Embedded – ML	NR – Connector T Ballasted – GL	Special Trackwork Turnouts
Firestone Bridge – C415										
Guideway – At Grade – Ballasted	$498,256									
Guideway – Aerial – Ballasted	2,222,619									
Guideway – Retained Fill – Ballasted	1,955,788									
System – Signal – Ductbank	231,664									
System – Power – Ductbank	463,329									
System – Power – Pole Found.	69,275									
System – S&S Comm. – Ductbank	231,664									
Station – Aerial – Center Platform	1,301,866									
Special Cond. – UR – ST – SD	172,630									
Guideway – RR – SPTC	4,408,512									
Special Cond. – Demo. – Bridges	444,398									
Rosecrans Ave LRT Overpass – C4360										
Guideway – At Grade – Ballasted	145,833									
Guideway – Aerial – Direct Fixation	3,672,176									
Guideway – Retained Fill – Ballasted	1,356,770									
System – Signal – Ductbank	1,775									
System – Power – Ductbank	3,550									
System – Power – Pole Found.	66,122									
System – S&S Comm. – Ductbank	1,775									
Compton Creek Bridge – C455										
Guideway – Aerial – Ballasted	1,466,227									
Guideway – Retained Fill – Ballasted	97,496									
Guideway – Elevated Fill – Ballasted	93,467									
System – Signal – Ductbank	33,748									
System – Power – Ductbank	33,748									
System – Power – Pole Found.	9,074									
System – S&S Comm. – Ductbank	33,748									
Special Cond. – UR – ST – SD	41,336									
LA River Bridge Piers – C424										
Guideway – Aerial – Ballasted	904,696									

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / *Element Description*	*Element COST*	Retained – Cut Direct – Fixation	NR – Access T At Grade – Ballasted	NR – Access T Retained – Ballasted	NR – Access T Aerial – Ballasted	NR – Storage T Ballasted – Yard	NR – Storage T Ballasted – ML	NR – Storage T Embedded – ML	NR – Connector T Ballasted – GL	Special Trackwork Turnouts
LA River Bridge – C425										
Guideway – Aerial – Ballasted	$2,061,344									
Guideway – Elevated Fill – Ballasted	145,163									
System – Signal – Ductbank	59,767									
System – Power – Ductbank	59,767									
System – Power – Pole Found.	40,967									
System – S&S Comm. – Ductbank	59,767									
LA River To Willow Station – C315										
Guideway – At Grade – Ballasted	312,191									
Guideway – Elevated Fill – Ballasted	276,062									
System – Signal – Ductbank	509,262									
System – Power – Ductbank	734,173									
System – Power – Pole Found.	114,839									
System – S&S Comm. – Ductbank	509,262									
Station – At Grade – Center Platform	182,498									
Special Cond. – UR – ROW – W	6,176									
Special Cond. – UR – ROW – SD	244,565									
Willow Sta. To 10th St. – C325										
Guideway – At Grade – Ballasted	248,868									
Guideway – At Grade – Embedded – DT	10,978,628									
System – Signal – Ductbank	649,474									
System – Signal – XP – TS	1,576,753									
System – Power – Ductbank	1,312,582									
System – Power – Pole Found.	208,679									
System – S&S Comm. – Ductbank	649,474									
Station – At Grade – Center Platform	471,469									
Special Cond. – UR – St. – E	767,498									
Special Cond. – UR – St. – SD	1,000,906									
Special Cond. – RW Changes – C&G	687,599									
Special Cond. – RW Changes – Paving	1,604,398									
Special Cond. – Environ. – Visual – SW	928,673									

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / Element Description	Element COST	Retained – Cut Direct – Fixation	NR – Access T At Grade – Ballasted	NR – Access T Retained – Ballasted	NR – Access T Aerial – Ballasted	NR – Storage T Ballasted – Yard	NR – Storage T Ballasted – ML	NR – Storage T Embedded – ML	NR – Connector T Ballasted – GL	Special Trackwork Turnouts
Long Beach Loop – C3270										
Guideway – At Grade – Embedded – DT	$1,288,316									
Guideway – At Grade – Embedded – ST	5,456,669									
Guideway – NR – Stor. ML – AG – EM	325,970							325,970		
Guideway – Special TW – Diamond X-Ing	36,219									
System – Signal – Ductbank	663,369									
System – Signal – XP – TS	6,579,946									
System – Power – Ductbank	1,008,318									
System – Power – Pole Found.	342,090									
System – S&S Comm. – Ductbank	663,368									
Station – At Grade – Center Platform	261,164									
Station – At Grade – Side Platform	458,454									
Special Cond. – UR – St. – E	884,083									
Special Cond. – UR – St. – SD	608,395									
Special Cond. – UR – St. – Power	454,831									
Special Cond. – RW Changes – C&G	956,917									
Special Cond. – RW Changes – Paving	2,232,807									
Special Cond. – Environ. – Visual – SW	1,159,083									
Railroad Relocation & Roadwork – C235										
Guideway – Railroad Relocation – MC-5	15,700,000									
MC-5 Utility Relocation – C420										
Guideway – Railroad Relocation – MC-5	3,000,000									
Rosecrans Ave / Alameda Overpass – C421										
Guideway – Railroad Relocation – MC-5	8,765,000									
Compton Creek SPTC Bridge – C4510										
Guideway – Railroad Relocation – MC-5	2,500,000									

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / Element Description	Element COST	Retained - Cut Direct - Fixation	NR - Access T At Grade - Ballasted	NR - Access T Retained - Ballasted	NR - Access T Aerial - Ballasted	NR - Storage T Ballasted - Yard	NR - Storage T Ballasted - ML	NR - Storage T Embedded - ML	NR - Connector T Ballasted - GL	Special Trackwork Turnouts
LRT Trackwork Installation – C258, C258S										
Guideway – At Grade – Ballasted	$8,699,944									
Guideway – Aerial – Direct Fixation	1,411,308									
Guideway – Aerial – Ballasted	204,773									
Guideway – Retained Fill – Ballasted	931,070									
Guideway – Elevated Fill – Ballasted	516,220									
Guideway – Subway – Direct Fixation	496,125									
Guideway – Retained Cut – Direct Fixation	73,756	73,756								
Guideway – NR – Acc. – AG – B	370,226		370,226							
Guideway – NR – Acc. – RF – B	112,982			112,982						
Guideway – NR – Acc. – AR – B	87,687				87,687					
Guideway – NR – Stor. YD – AG – B	556,478					556,478				
Guideway – NR – Stor. ML – AG – B	150,709						150,709			
Guideway – NR – Conn. GL – AG – B	39,385								39,385	
Guideway – At Grade – In Pvmt. Ballasted	614,802									
Guideway – RR – SPTC	175,404									
System – Signal – Ductbank	19,932									
System – Signal – XP – TS	19,932									
System – Power – Ductbank	39,865									
System – S&S Comm. – Ductbank	190,054									
Guideway – Special TW – T/O #10	405,735									405,735
Guideway – Special TW – T/O Equalateral	28,469									
Guideway – Special TW – X/O Single	142,365									
Guideway – Special TW – X/O Double	35,490									
Guideway – Special TW – Diamond X-ing	14,238									
Guideway – Special TW – DF, X/O Double	328,049									
Special Trackwork Procurement – P830, P835										
Guideway – Special TW – T/O #10	1,443,652									1,443,652
Guideway – Special TW – T/O Equalateral	101,240									
Guideway – Special TW – X/O Single	927,110									
Guideway – Special TW – X/O Double	165,766									
Guideway – Special TW – Diamond X-ing	363,825									
Guideway – Special TW – DF, X/O Double	331,532									

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements - Cost Matrix

BY: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / Element Description	Element COST	Retained - Cut Direct - Fixation	NR - Access T At Grade - Ballasted	NR - Access T Retained - Ballasted	NR - Access T Aerial - Ballasted	NR - Storage T Ballasted - Yard	NR - Storage T Ballasted - ML	NR - Storage T Embedded - ML	NR - Connector T Ballasted - GL	Special Trackwork Turnouts
Concrete Ties, R Rails & Fasteners- P815, P0822 &										
Guideway - At Grade - Ballasted	$6,118,437									
Guideway - At Grade - In Pvmt. Ballasted	163,987									
Guideway - At Grade - Embedded - DT	2,495,172									
Guideway - At Grade - Embedded - ST	825,711									
Guideway - Aerial - Direct Fixation	430,984									
Guideway - Aerial - Ballasted	142,804									
Guideway - Retained Fill - Ballasted	649,308									
Guideway - Elevated Fill - Ballasted	360,000									
Guideway - Subway - Direct Fixation	151,506									
Guideway - Retained Cut - Direct Fixation	22,524	22,524								
Guideway - NR - Acc. - AG - B	445,034		445,034							
Guideway - NR - Acc. - RF - B	135,811			135,811						
Guideway - NR - Acc. - AR - B	105,406				105,406					
Guideway - NR - Stor. YD - AG - B	668,920					668,920				
Guideway - NR - Stor. ML - AG - B	210,203						210,203			
Guideway - NR - Stor. ML - AG - EM	51,487							51,487		
Guideway - NR - Conn. GL - AG - B	54,933								54,933	
Wood Ties - P825										
Guideway - Special TW - T/O #10	223,501									223,501
Guideway - Special TW - T/O Equalateral	16,868									
Guideway - Special TW - X/O Single	50,604									
Guideway - Special TW - X/O Double	4,217									
Guideway - Special TW - Diamond X-ing	16,868									
Guideway - RR - SPTC	2,033,340									

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / Element Description	Element COST	Retained – Cut Direct – Fixation	NR – Access T At Grade – Ballasted	NR – Access T Retained – Ballasted	NR – Access T Aerial – Ballasted	NR – Storage T Ballasted – Yard	NR – Storage T Ballasted – ML	NR – Storage T Embedded – ML	NR – Connector T Ballasted – GL	Special Trackwork Turnouts
Main Yard and Shops – C560										
Guideway – NR – Acc. – AG – B	$618,013		618,013							
Guideway – NR – Stor. YD – AG – B	928,707					928,707				
Yard – Site Work – Improvements	1,302,148									
Yard – Site Work – Utilities	1,361,674									
Yard – System – Signal	838,105									
Yard – System – Power	1,015,812									
Yard – System – S&S Comm.	838,105									
Yard – Vehicle Shop – Building	8,960,977									
Yard – Vehicle Shop – Electronics	1,129,881									
Yard – Vehicle Shop – Cranes	336,202									
Yard – Vehicle Shop – Car Hoist	1,266,763									
Yard – Vehicle Shop – Truck Turntable	217,331									
Yard – Vehicle Shop – Truck Repair Hoist	130,082									
Yard – Oper. Center – Building	3,644,778									
Yard – Oper. Center – Electronics	680,810									
Yard – Oper. Center – Car Wash	511,121									
Yard – Oper. Center – Wheel Truing	334,662									
Yard – Paint Shop – Building	1,100,474									
Yard – Paint Shop – Electronics	453,873									
Yard – Paint Shop – Spary Booth	591,957									
Special Cond. – UR – ROW – Other	88,854									
Transit Signaling – H825										
Guidway – R R – SPTC – Signal	45,814									
Yard – System – Signal	390,174									
Yard – System – Signal	881,954									
System – Signal – Wayside – Cable	5,142,624									
System – Signal – Wayside – Cable	10,498,485									
System – Signal – XP – Gate – HW	353,308									
System – Signal – XP – Gate – Install	552,641									
Guideway Elemnts Total Cost *(In $1000)*		**$2,331**	**$1,433**	**$602**	**$3,186**	**$2,154**	**$463**	**$377**	**$371**	**$2,073**

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / Element Description	Element COST	Special Trackwork Eq. Turnoute	Special Trackwork Single X-Over	Special Trackwork Double X-Over	Special Trackwork Diamond X-Ing	Special Trackwork Double X-Over D/F	RR – Relocation SPTC	RR – Relocation MC-8		
Flower Street Station Shell – C115										
Guideway – Subway – Direct Fixation	$7,164,600									
Station – Subway – Double Side Platform	16,717,400									
Flower Street Subway – C117										
Guideway – Subway – Direct Fixation	15,143,448									
Guideway – Retained Cut – Direct Fixation	2,234,230									
System – Signal – Ductbank	199,494									
System – Power – Ductbank	48,875									
System – S&S Comm. – Ductbank	199,494									
Special Cond. – UR – SW – Elec.	150,885									
Special Cond. – UR – SW – SD	995,834									
Special Cond. – UR – SW – SS	2,057,024									
Special Cond. – RW Changes – C&G	190,261									
Special Cond. – RW Changes – Paving	443,942									
Special Cond. – Environ. – Visual – SW	1,031,513									
LA CBD Approach – C140										
Guideway – At Grade – Embedded – DT	11,611,061									
System – Signal – Ductbank	686,924									
System – Signal – XP – TS	2,201,379									
System – Power – Ductbank	2,151,176									
System – Power – Pole Found.	495,826									
System – S&S Comm. – Ductbank	597,547									
Station – At Grade – Center Platform	717,535									
Special Cond. – UR – ST – Elec.	1,992,576									
Special Cond. – UR – ST – Water	1,189,569									
Special Cond. – UR – ST – SD	5,281,851									
Special Cond. – UR – ST – SS	1,728,534									
Special Cond. – UR – ST – Power	11,939,969									
Special Cond. – Demo. – Building	65,605									
Special Cond. – RW Changes – C&G	368,390									
Special Cond. – RW Changes – Paving	859,577									
Special Cond. – Environ. – Visual – SW	1,712,480									

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / *Element Description*	*Element COST*	Special Trackwork Eq. Turnouts	Special Trackwork Single X-Over	Special Trackwork Double X-Over	Special Trackwork Diamond X-ing	Special Trackwork Double X-Over D/F	RR – Relocation SPTC	RR – Relocation MC-5		
Satellite Yard To LA River – C2125										
Guideway – At Grade – Ballasted	$13,511,519									
Guideway – At Grade – In Pvmt. Ballasted	3,829,314									
Guideway – NR – Stor. ML – AG – B	101,863									
Guideway – NR – Conn. GL – AG – B	277,021									
Guideway – RR – SPTC	6,729,715						6,729,715			
System – Signal – Ductbank	2,185,902									
System – Signal – XP – TS	1,746,016									
System – Power – Ductbank	1,655,471									
System – Power – Pole Found.	749,069									
System – S&S Comm. – Ductbank	2,185,902									
Station – At Grade – Center Platform	1,868,646									
Special Cond. – UR – ST – Elec.	487,846									
Special Cond. – UR – ST – Water	92,993									
Special Cond. – UR – ST – SS	4,977,455									
Special Cond. – UR – ST – Power	417,326									
Special Cond. – RW Changes – C&G	1,303,507									
Special Cond. – RW Changes – Paving	3,041,516									
Special Cond. – Environ. – Visual – SW	2,588,102									
Aerial Structure – C435										
Guideway – At Grade – Ballasted	610,100									
Guideway – Aerial – Direct Fixation	22,920,706									
Guideway – Retained Fill – Ballasted	982,668									
Guideway – NR – Acc. – RF – B	353,315									
Guideway – NR – Acc. – AR – B	2,992,560									
System – Signal – Ductbank	628,601									
System – Power – Ductbank	878,120									
System – Power – Pole Found.	127,372									
System – S&S Comm. – Ductbank	628,600									
Station – Aerial – Center Platform	1,662,497									
Special Cond. – UR – ROW – SD	302,098									
Special Cond. – UR – ROW – SS	13,365									

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / Element Description	Element COST	Special Trackwork Eq. Turnouts	Special Trackwork Single X-Over	Special Trackwork Double X-Over	Special Trackwork Diamond X-Ing	Special Trackwork Double X-Over D/F	RR - Relocation SPTC	RR - Relocation MC-5		
Firestone Bridge – C415										
Guideway – At Grade – Ballasted	$498,256									
Guideway – Aerial – Ballasted	2,222,619									
Guideway – Retained Fill – Ballasted	1,955,788									
System – Signal – Ductbank	231,664									
System – Power – Ductbank	463,329									
System – Power – Pole Found.	69,275									
System – S&S Comm. – Ductbank	231,664									
Station – Aerial – Center Platform	1,301,866									
Special Cond. – UR – ST – SD	172,630									
Guideway – RR – SPTC	4,408,512						4,408,512			
Special Cond. – Demo. – Bridges	444,398									
Rosecrans Ave LRT Overpass – C4360										
Guideway – At Grade – Ballasted	145,833									
Guideway – Aerial – Direct Fixation	3,672,176									
Guideway – Retained Fill – Ballasted	1,356,770									
System – Signal – Ductbank	1,775									
System – Power – Ductbank	3,550									
System – Power – Pole Found.	66,122									
System – S&S Comm. – Ductbank	1,775									
Compton Creek Bridge – C455										
Guideway – Aerial – Ballasted	1,466,227									
Guideway – Retained Fill – Ballasted	97,496									
Guideway – Elevated Fill – Ballasted	93,467									
System – Signal – Ductbank	33,748									
System – Power – Ductbank	33,748									
System – Power – Pole Found.	9,074									
System – S&S Comm. – Ductbank	33,748									
Special Cond. – UR – ST – SD	41,336									
LA River Bridge Piers – C424										
Guideway – Aerial – Ballasted	904,696									

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalil H. Abadl / David Chambers
Date: August, 1990

Contract Description / *Element Description*	*Element COST*	Special Trackwork Eq. Turnoute	Special Trackwork Single X-Over	Special Trackwork Double X-Over	Special Trackwork Diamond X-ing	Special Trackwork Double X-Over D/F	RR – Relocation SPTC	RR – Relocation MC-8		
LA River Bridge – C425										
Guideway – Aerial – Ballasted	$2,061,344									
Guideway – Elevated Fill – Ballasted	145,163									
System – Signal – Ductbank	59,767									
System – Power – Ductbank	59,767									
System – Power – Pole Found.	40,967									
System – S&S Comm. – Ductbank	59,767									
LA River To Willow Station – C315										
Guideway – At Grade – Ballasted	312,191									
Guideway – Elevated Fill – Ballasted	276,062									
System – Signal – Ductbank	509,262									
System – Power – Ductbank	734,173									
System – Power – Pole Found.	114,839									
System – S&S Comm. – Ductbank	509,262									
Station – At Grade – Center Platform	182,498									
Special Cond. – UR – ROW – W	6,176									
Special Cond. – UR – ROW – SD	244,565									
Willow Sta. To 10th St. – C325										
Guideway – At Grade – Ballasted	248,868									
Guideway – At Grade – Embedded – DT	10,978,628									
System – Signal – Ductbank	649,474									
System – Signal – XP – TS	1,576,753									
System – Power – Ductbank	1,312,582									
System – Power – Pole Found.	208,679									
System – S&S Comm. – Ductbank	649,474									
Station – At Grade – Center Platform	471,469									
Special Cond. – UR – St. – E	767,498									
Special Cond. – UR – St. – SD	1,000,906									
Special Cond. – RW Changes – C&G	687,599									
Special Cond. – RW Changes – Paving	1,604,398									
Special Cond. – Environ. – Visual – SW	928,673									

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / Element Description	Element COST	Special Trackwork Eq. Turnouts	Special Trackwork Single X-Over	Special Trackwork Double X-Over	Special Trackwork Diamond X-Ing	Special Trackwork Double X-Over D/F	RR – Relocation SPTC	RR – Relocation MC-5		
Long Beach Loop – C3270										
Guideway – At Grade – Embedded – DT	$1,288,316									
Guideway – At Grade – Embedded – ST	5,456,669									
Guideway – NR – Stor. ML – AG – EM	325,970									
Guideway – Special TW – Diamond X-Ing	36,219				36,219					
System – Signal – Ductbank	663,369									
System – Signal – XP – TS	6,579,946									
System – Power – Ductbank	1,008,318									
System – Power – Pole Found.	342,090									
System – S&S Comm. – Ductbank	663,368									
Station – At Grade – Center Platform	261,164									
Station – At Grade – Side Platform	458,454									
Special Cond. – UR – St. – E	884,083									
Special Cond. – UR – St. – SD	608,395									
Special Cond. – UR – St. – Power	454,831									
Special Cond. – RW Changes – C&G	956,917									
Special Cond. – RW Changes – Paving	2,232,807									
Special Cond. – Environ. – Visual – SW	1,159,083									
Railroad Relocation & Roadwork – C235										
Guideway – Railroad Relocation – MC-5	15,700,000							15,700,000		
MC-5 Utility Relocation – C420										
Guideway – Railroad Relocation – MC-5	3,000,000							3,000,000		
Rosecrans Ave / Alameda Overpass – C421										
Guideway – Railroad Relocation – MC-5	8,765,000							8,765,000		
Compton Creek SPTC Bridge – C4510										
Guideway – Railroad Relocation – MC-5	2,500,000							2,500,000		

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / *Element Description*	*Element* **COST**	Special Trackwork Eq. Turnouts	Special Trackwork Single X-Over	Special Trackwork Double X-Over	Special Trackwork Diamond X-ing	Special Trackwork Double X-Over D/F	RR – Relocation SPTC	RR – Relocation MC-8		
LRT Trackwork Installation – C258, C258S										
Guideway – At Grade – Ballasted	$8,699,944									
Guideway – Aerial – Direct Fixation	1,411,308									
Guideway – Aerial – Ballasted	204,773									
Guideway – Retained Fill – Ballasted	931,070									
Guideway – Elevated Fill – Ballasted	516,220									
Guideway – Subway – Direct Fixation	496,125									
Guideway – Retained Cut – Direct Fixation	73,756									
Guideway – NR – Acc. – AG – B	370,226									
Guideway – NR – Acc. – RF – B	112,982									
Guideway – NR – Acc. – AR – B	87,687									
Guideway – NR – Stor. YD – AG – B	556,478									
Guideway – NR – Stor. ML – AG – B	150,709									
Guideway – NR – Conn. GL – AG – B	39,385									
Guideway – At Grade – In Pvmt. Ballasted	614,802									
Guideway – RR – SPTC	175,404						175,404			
System – Signal – Ductbank	19,932									
System – Signal – XP – TS	19,932									
System – Power – Ductbank	39,865									
System – S&S Comm. – Ductbank	190,054									
Guideway – Special TW – T/O #10	405,735									
Guideway – Special TW – T/O Equalateral	28,469	28,469								
Guideway – Special TW – X/O Single	142,365		142,365							
Guideway – Special TW – X/O Double	35,490			35,490						
Guideway – Special TW – Diamond X-ing	14,238				14,238					
Guideway – Special TW – DF, X/O Double	328,049					328,049				
Special Trackwork Procurement – P830, P835										
Guideway – Special TW – T/O #10	1,443,652									
Guideway – Special TW – T/O Equalateral	101,240	101,240								
Guideway – Special TW – X/O Single	927,110		927,110							
Guideway – Special TW – X/O Double	165,766			165,766						
Guideway – Special TW – Diamond X-ing	363,825				363,825					
Guideway – Special TW – DF, X/O Double	331,532					331,532				

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements – Cost Matrix

BY: Djalil H. Abadi / David Chambers
Date: August, 1990

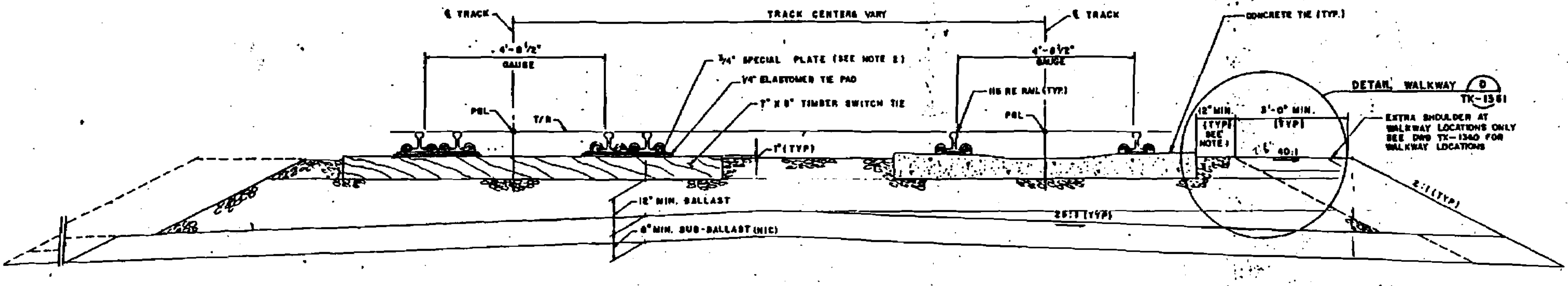
Contract Description / Element Description	Element COST	Special Trackwork Eq. Turnouts	Special Trackwork Single X-Over	Special Trackwork Double X-Over	Special Trackwork Diamond X-ing	Special Trackwork Double X-Over D/F	RR - Relocation SPTC	RR - Relocation MC-5		
Concrete Ties, R Rails & Fasteners– P815, P0822 &										
Guideway – At Grade – Ballasted	$6,118,437									
Guideway – At Grade – In Pvmt. Ballasted	163,987									
Guideway – At Grade – Embedded – DT	2,495,172									
Guideway – At Grade – Embedded – ST	825,711									
Guideway – Aerial – Direct Fixation	430,984									
Guideway – Aerial – Ballasted	142,804									
Guideway – Retained Fill – Ballasted	649,308									
Guideway – Elevated Fill – Ballasted	360,000									
Guideway – Subway – Direct Fixation	151,506									
Guideway – Retained Cut – Direct Fixation	22,524									
Guideway – NR – Acc. – AG – B	445,034									
Guideway – NR – Acc. – RF – B	135,811									
Guideway – NR – Acc. – AR – B	105,406									
Guideway – NR – Stor. YD – AG – B	668,920									
Guideway – NR – Stor. ML – AG – B	210,203									
Guideway – NR – Stor. ML – AG – EM	51,487									
Guideway – NR – Conn. GL – AG – B	54,933									
Wood Ties – P825										
Guideway – Special TW – T/O #10	223,501									
Guideway – Special TW – T/O Equalateral	16,868	16,868								
Guideway – Special TW – X/O Single	50,604		50,604							
Guideway – Special TW – X/O Double	4,217			4,217						
Guideway – Special TW – Diamond X-ing	16,868				16,868					
Guideway – RR – SPTC	2,033,340						2,033,340			

Los Angeles County Transportation Commission
METRO BLUE LINE Rail Transit Project
Project Composite Capital Cost Report
Guideway Elements - Cost Matrix

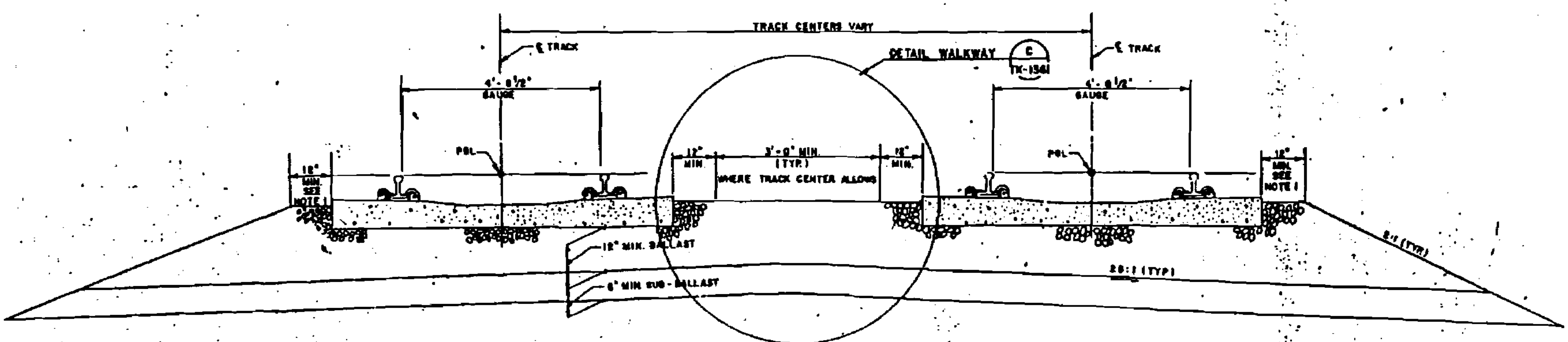
BY: Djalil H. Abadi / David Chambers
Date: August, 1990

Contract Description / Element Description	Element COST	Special Trackwork Eq. Turnouts	Special Trackwork Single X-Over	Special Trackwork Double X-Over	Special Trackwork Diamond X-Ing	Special Trackwork Double X-Over D/F	RR - Relocation SPTC	RR - Relocation MC-5		
Main Yard and Shops - C560										
Guideway - NR - Acc. - AG - B	$618,013									
Guideway - NR - Stor. YD - AG - B	928,707									
Yard - Site Work - Improvements	1,302,148									
Yard - Site Work - Utilities	1,361,674									
Yard - System - Signal	838,105									
Yard - System - Power	1,015,812									
Yard - System - S&S Comm.	838,105									
Yard - Vehicle Shop - Building	8,960,977									
Yard - Vehicle Shop - Electronics	1,129,881									
Yard - Vehicle Shop - Cranes	336,202									
Yard - Vehicle Shop - Car Hoist	1,266,763									
Yard - Vehicle Shop - Truck Turntable	217,331									
Yard - Vehicle Shop - Truck Repair Hoist	130,082									
Yard - Oper. Center - Building	3,644,778									
Yard - Oper. Center - Electronics	680,810									
Yard - Oper. Center - Car Wash	511,121									
Yard - Oper. Center - Wheel Truing	334,662									
Yard - Paint Shop - Building	1,100,474									
Yard - Paint Shop - Electronics	453,873									
Yard - Paint Shop - Spary Booth	591,957									
Special Cond. - UR - ROW - Other	88,854									
Transit Signaling - H825										
Guidway - R R - SPTC - Signal	45,814						45,814			
Yard - System - Signal	390,174									
Yard - System - Signal	881,954									
System - Signal - Wayside - Cable	5,142,624									
System - Signal - Wayside - Cable	10,498,485									
System - Signal - XP - Gate - HW	353,308									
System - Signal - XP - Gate - Install	552,641									
Guideway Elemnts Total Cost (In $1000)		$147	$1,120	$205	$431	$660	$13,393	$29,965		

EXHIBITS



TYPICAL BALLASTED TRACK- MAINLINE
SIDE WALKWAY



TYPICAL BALLASTED TRACK - MAINLINE
CENTER WALKWAY

NOTES:
1. BALLAST SHOULDERS SHALL BE 18" MINIMUM ON THE OUTSIDE OF CURVES WHERE THERE IS NO WALKWAY.
2. TO BE USED IN AREAS OF SPECIAL TRACKWORK.

3/4" = 1'-0" GRAPHIC SCALE

REV	DATE	DESCRIPTION
		ISSUED FOR CONSTRUCTION
		ISSUED FOR BID

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project

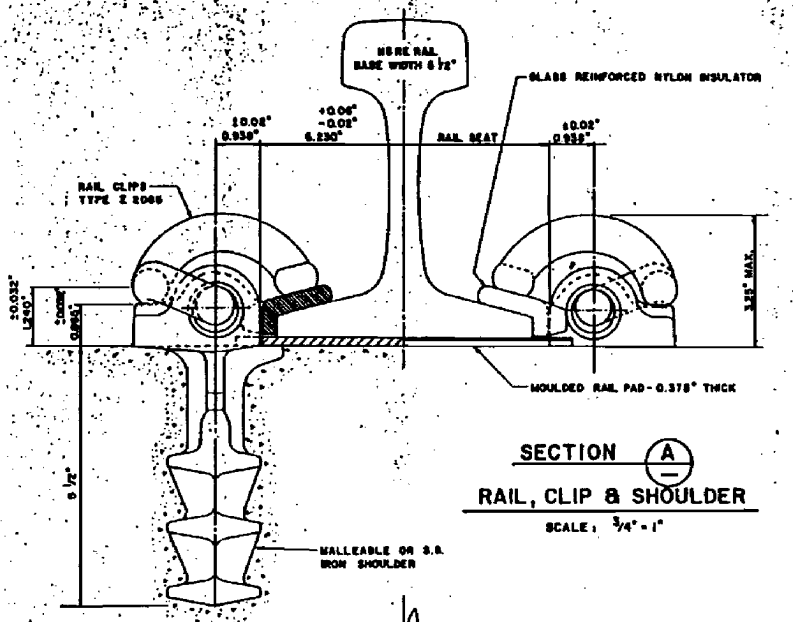
DMJM

Southern California Rail Consultants

LRT TRACKWORK INSTALLATION
TYPICAL SECTIONS
BALLASTED MAINLINE

CONTRACT NO RCI-TOS-C258
DRAWING NO. TK-1211
SHEET NO. 88
SCALE 3/4" = 1'-0"

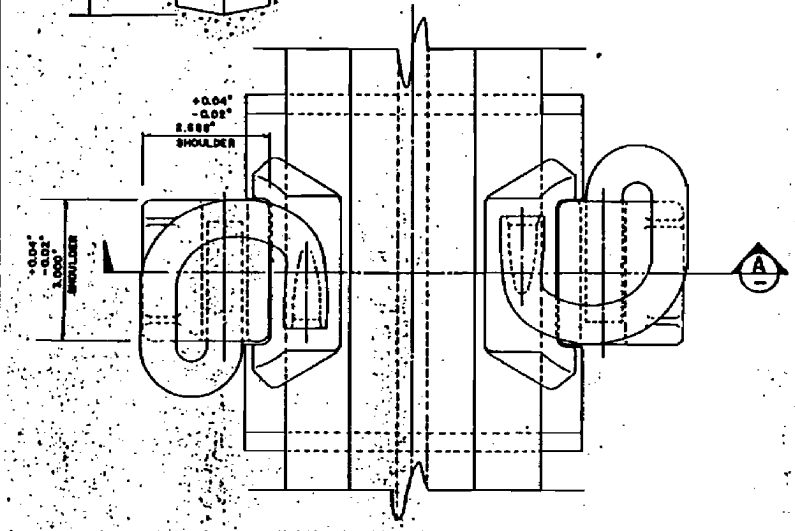
EXHIBIT A



SECTION (A)

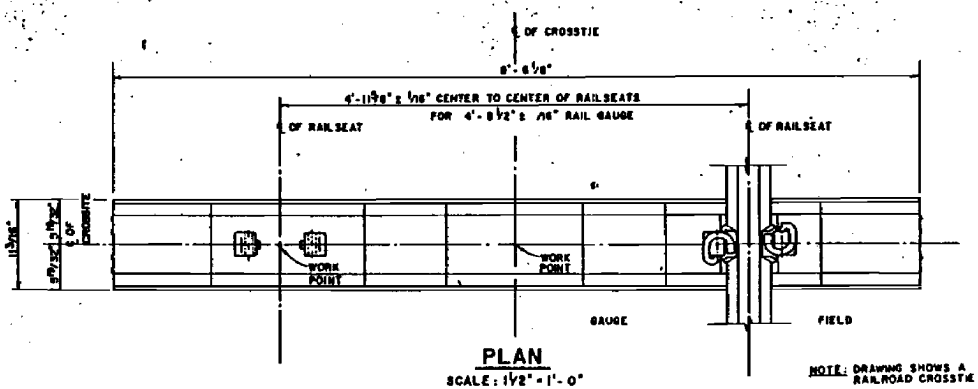
RAIL, CLIP & SHOULDER

SCALE: 3/4" = 1"



RAIL FASTENING ASSEMBLY

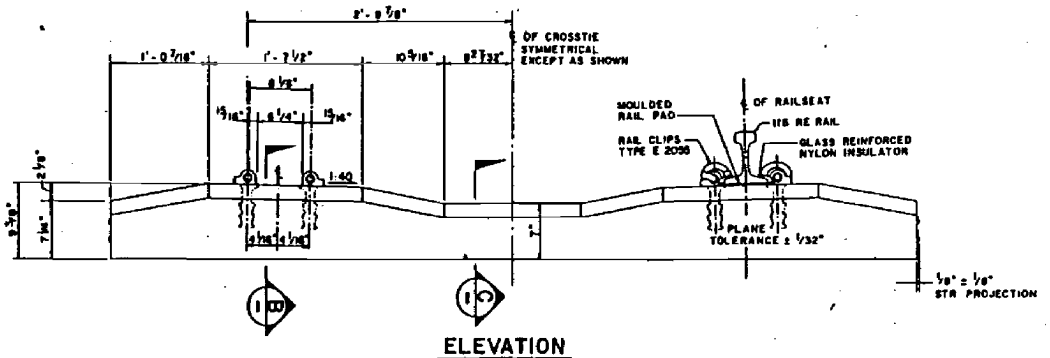
SCALE: 3/4" = 1"



PLAN

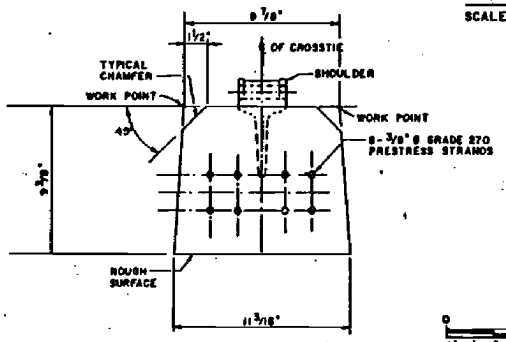
SCALE: 1 1/2" = 1'-0"

NOTE: DRAWING SHOWS A RAILROAD CROSSTIE



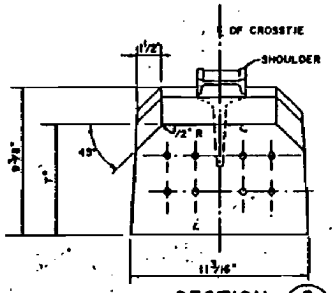
ELEVATION

SCALE: 1 1/2" = 1'-0"



SECTION (B)

SCALE: 3" = 1'-0"



SECTION (C)

SCALE: 3" = 1'-0"

0 1/2
3" = 1'-0" GRAPHIC SCALE

0 1 2 3
1 1/2" = 1'-0" GRAPHIC SCALE

0 1 2 3
3/4" = 1" GRAPHIC SCALE

REV.	DATE	DESCRIPTION	BY	APP.
2	5/87	ISSUED FOR CONSTRUCTION		
1	2/87	ISSUED FOR BID		

DESIGNED BY: [illegible]
DRAWN BY: [illegible]
CHECKED BY: [illegible]
APPROVED BY: [illegible]
DATE: 5/10/87

REGISTERED PROFESSIONAL ENGINEERS — WAYNE L. SAN FILIPPO — No. 19837 — EXP. 9/30/89 — CIVIL — STATE OF CALIFORNIA

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project

DMJM

Southern California Rail Consultants

SUBMITTED: [illegible]
APPROVED: [illegible]

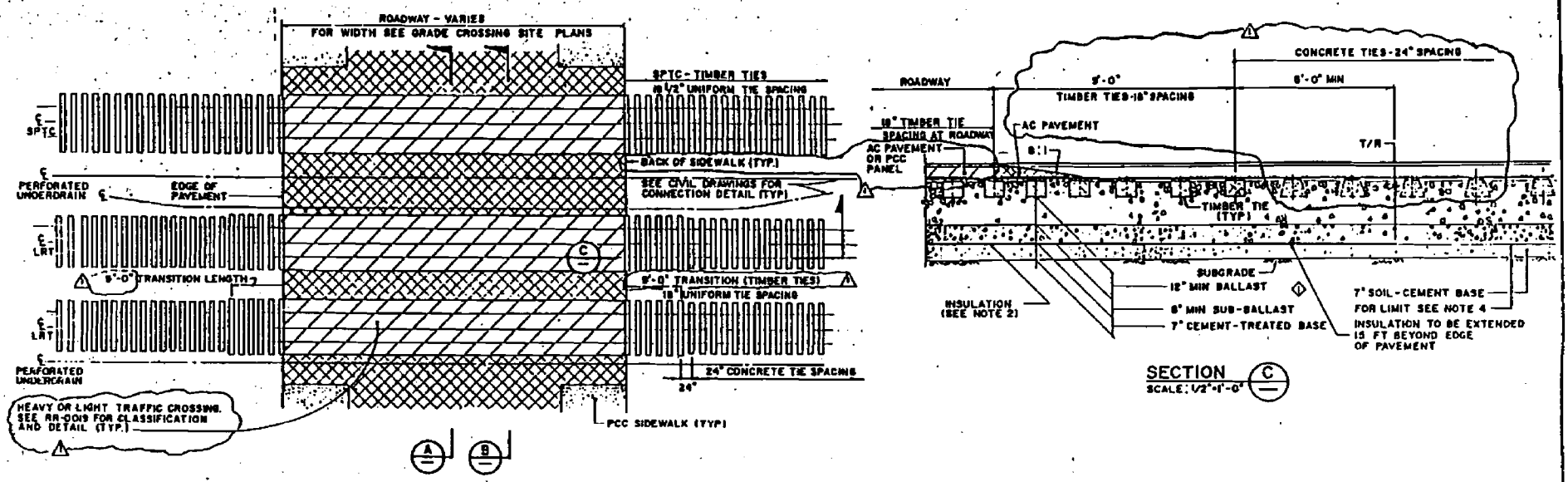
LRT TRACKWORK INSTALLATION

RAIL CLIP ASSEMBLY DETAILS

CONCRETE TIES - SHEET 1 OF 2

CONTRACT NO. ROI-TOB-C250
DRAWING NO. TK-1333
REV.
SHEET NO. 137
SCALE AS NOTED

EXHIBIT B



NOTES:

1. FOR THE LIMITS OF LRT TRACK CONSTRUCTION SEE SPTC PLAN AND PROFILE DRAWINGS AND STAGING PLAN AND PROFILE DRAWINGS.
2. INSULATION SHALL CONSIST OF GEOTEXTILE FABRICS AND POLYETHYLENE SHEETS OR EQUIVALENT MATERIAL. THE GEOTEXTILE FABRICS (8 OZ/SQ YD) SHALL BE PLACED ON TOP AND BOTTOM OF POLYETHYLENE SHEETS (100 MIL).
3. INSULATION ASSEMBLY CAN BE PLACED VERTICAL OR SLOPED AS SHOWN AT THE DISCRETION OF THE CONTRACTOR.
4. 7" CEMENT-TREATED BASE SHALL EXTEND WITHIN THE LIMITS OF LRT TRACKWORK SHOWN ON SPTC PLAN AND PROFILE DRAWINGS. 7" SOIL CEMENT BASE SHALL BE USED FOR ALL OTHER LRT TRACKWORK SHOWN ON STAGING PLAN AND PROFILE DRAWINGS.

REV	DATE	DESCRIPTION	BY	CHK
7	9/97	CHANGE NOTICE 5, REVISED CONCRETE TIE LIMITS	LK	LG
6	10/96	ISSUED FOR CONSTRUCTION		
5	8/96	ADDENDUM 2 ADD ARCON DIRECTION		LG
4	3/96	ADDENDUM 1: ADD GRAPHIC SCALES, CHANGE 36 TO 18 CABLE HOLE		LG
3	12/95	ISSUED FOR BIDS		

DESIGNED BY: [illegible]
DRAWN BY: J. A. Arnold
CHECKED BY: Joseph B. Valenzuela
APPROVED BY: [illegible]
DATE: OCT. 3, 1995

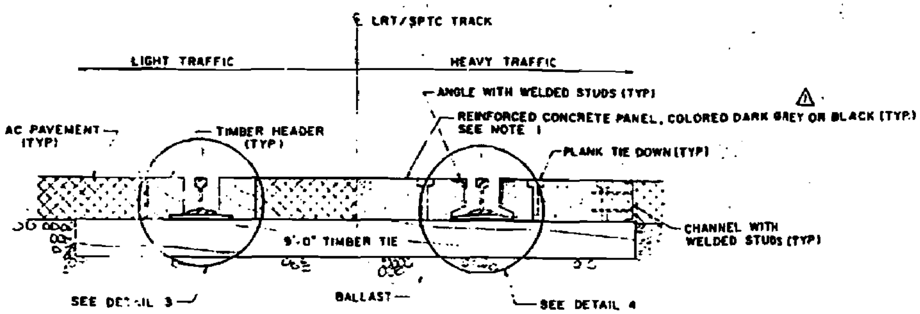
LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project
LACTC
SCRRC Southern California Rail Consultants
SUBMITTED: Joseph B. Valenzuela
Southern California Rail Consultants
APPROVED: [illegible]

MID-CORRIDOR SITE WORK AND RAILROAD RECONSTRUCTION
SATELLITE YARD AND MYRRH STREET

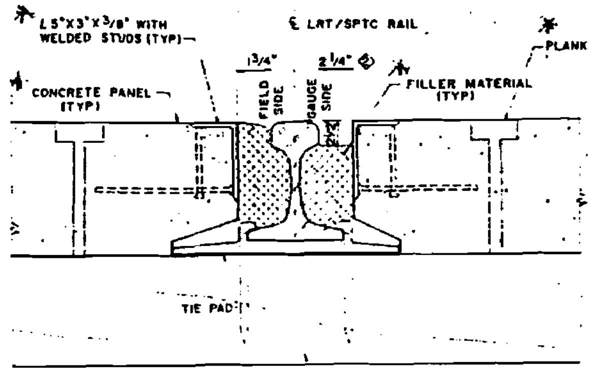
TYPICAL TRACKWORK ROAD CROSSING PLAN AND SECTIONS

CONTRACT NO RO1-TDI-C215
DRAWING NO RR-0018
REV 7
SHEET NO 13
SCALE AS NOTED

EXHIBIT C



DETAIL 2
SCALE 1" = 1'-0" RR-0018

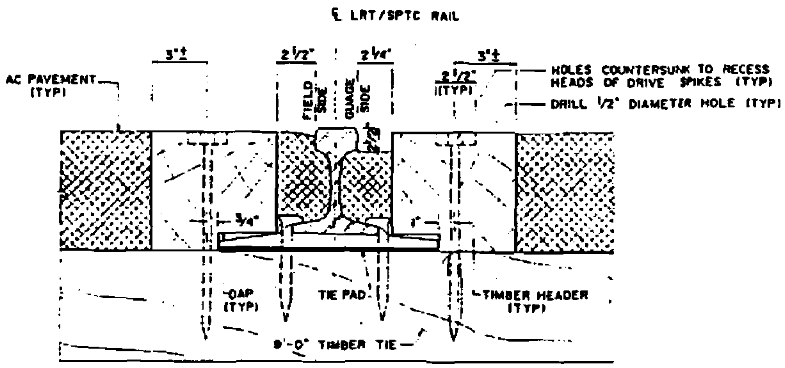


HEAVY TRAFFIC DETAIL 4
SCALE 1/4" = 1'

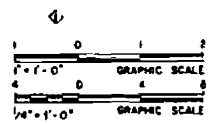
* NOTE: Concrete panels were replaced by change order to stainless rubberized grade crossing material.

CLASSIFICATION OF AT-GRADE CROSSINGS

HEAVY TRAFFIC	LIGHT TRAFFIC
WASHINGTON BLVD (SPTC ONLY)	24TH ST
VERNON AVE	41 ST ST
SLAUSON AVE	48TH ST
GAGE AVE	55TH ST
FLORENCE AVE	60TH ST
NADEAU ST	92TH ST
CENTURY BLVD	108TH ST
103 RD ST	119TH ST
WILMINGTON AVE	124TH ST
IMPERIAL HIGHWAY	130TH ST
EL SEGUNDO BLVD	STOCKWELL ST
ROSECRANS AVE	ELM ST
COMPTON BLVD	LONG BEACH AVE (SPUR TRACK ONLY)
	MEALY ST (SPUR TRACK ONLY)
	TAMARIND AVE (SPUR TRACK ONLY)
	ALAMEDA ST (SPUR TRACK ONLY)
	20TH STREET



LIGHT TRAFFIC DETAIL 3
SCALE 1/4" = 1'



NOTES:

1. DETAIL SHALL BE PROVIDED BY THE CONTRACTOR FOR REVIEW AND APPROVAL BY THE ENGINEER.
2. LRT/SPTC LIGHT TRAFFIC CROSSINGS SHALL BE A MODIFIED SP COMMON STANDARD 579. TIMBER HEADER SHALL BE INSTALLED AT GAUGE SIDE AND FIELD SIDE OF RAIL. AC PAVEMENT SHALL BE USED INSTEAD OF BALLAST BETWEEN RAIL AND HEADER.

REV	DATE	DESCRIPTION
5		CHANGE NOTICE 94 - ADDED 20TH STREET
4		CHANGE NOTICE 5, ADDED REINFORCED CONCRETE
3		ISSUED FOR CONSTRUCTION
2		ADDENDUM 2 - CHANGED FROM ...
1		ADDENDUM 1 - ADD GRAPHIC SCALES
0		ISSUED FOR BIDS

DATE OCT. 3, 1986

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project
Southern California Rail Consultants

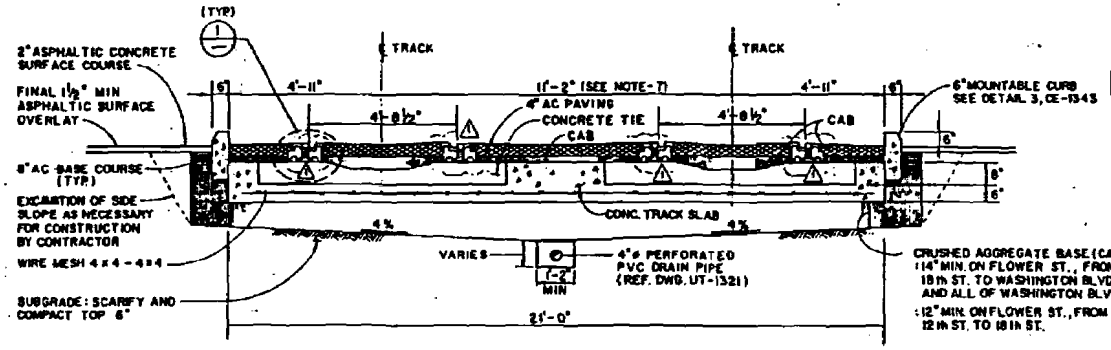
MID-CORRIDOR SITE WORK AND RAILROAD RECONSTRUCTION
SATELLITE YARD AND MYRRH STREET

TYPICAL TRACKWORK ROAD CROSSING DETAILS

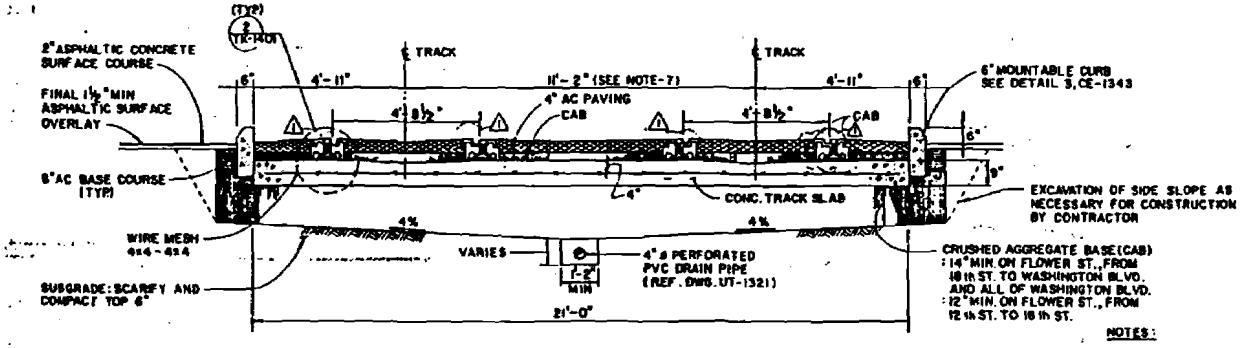
CONTRACT NO RO1-T01-C2
DRAWING NO RR-0019
REV 5
SHEET NO 14
SCALE AS NOTED

EXHIBIT D

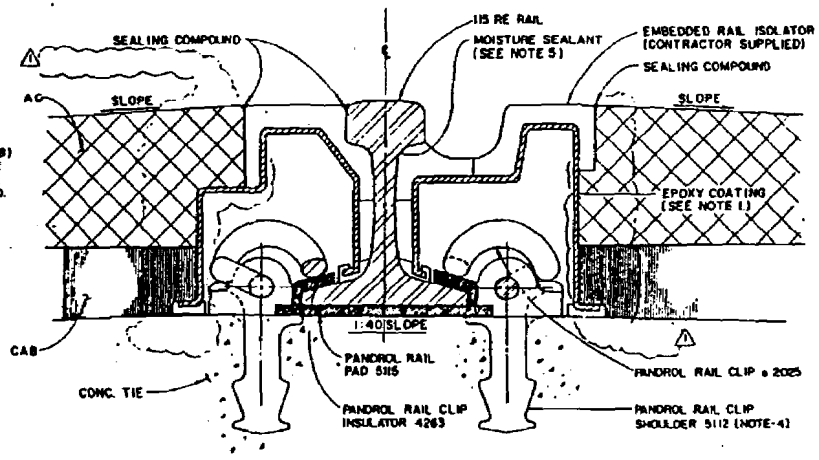
COMMISSION FURNISHED MATERIALS	DESCRIPTION
RAIL	115 RE
RAIL PAD	PANDROL 5115
RAIL CLIP	PANDROL e 2025
RAIL CLIP SHOULDER	PANDROL 5112 (NOTE-4)
RAIL CLIP INSULATOR	PANDROL 4263
CONCRETE TIES	J.H. POMEROY RT-732
RAIL CLIP SHOULDER	PANDROL 3356M ⚠



CURVED & STATION TRACK
N.T.S.



TANGENT TRACK
N.T.S.



DETAIL 1
N.T.S.
TK-1400
TK-3383
TK-3387
TK-3400

NOTES:

1. ALL EXTERIOR SURFACES OF THE EMBEDDED RAIL ISOLATOR IN CONTACT WITH ASPHALT CONC. FILLER AND CONCRETE SHALL BE COATED WITH EPOXY.
2. ALL CONCRETE WORK SHALL CONFORM TO ACI 301-72, f'c = 4000 PSI.
3. ALL WIRE MESH SHALL CONFORM TO ASTM A185.
4. PANDROL SHOULDERS EMBEDDED IN CONCRETE SLAB, PANDROL TYPE 3356 M SHALL BE PROVIDED BY THE ⚠ LACTC.
5. ALL EXTERIOR SURFACES OF THE EMBEDDED RAIL ISOLATOR IN CONTACT WITH THE RAIL SHALL BE COATED WITH MOISTURE SEALANT.
6. FOR CONTRACTION AND CONSTRUCTION JOINT DETAILS ON CONCRETE TRACK SLAB, SEE DWG TK-1401.
7. DETAILS SHOWN ARE TYPICAL AND MUST BE MODIFIED FOR VARYING TRACK CENTERS.

REV	DATE	DESCRIPTION	BY	APP.
⚠1	9-23-88	APPROVED ON CHG. CO. ON REVISED PER CO NEGOTIATION	MB	
⚠2	6-23-88	APPROVED ON CHG. CO. NEW DRAWING		

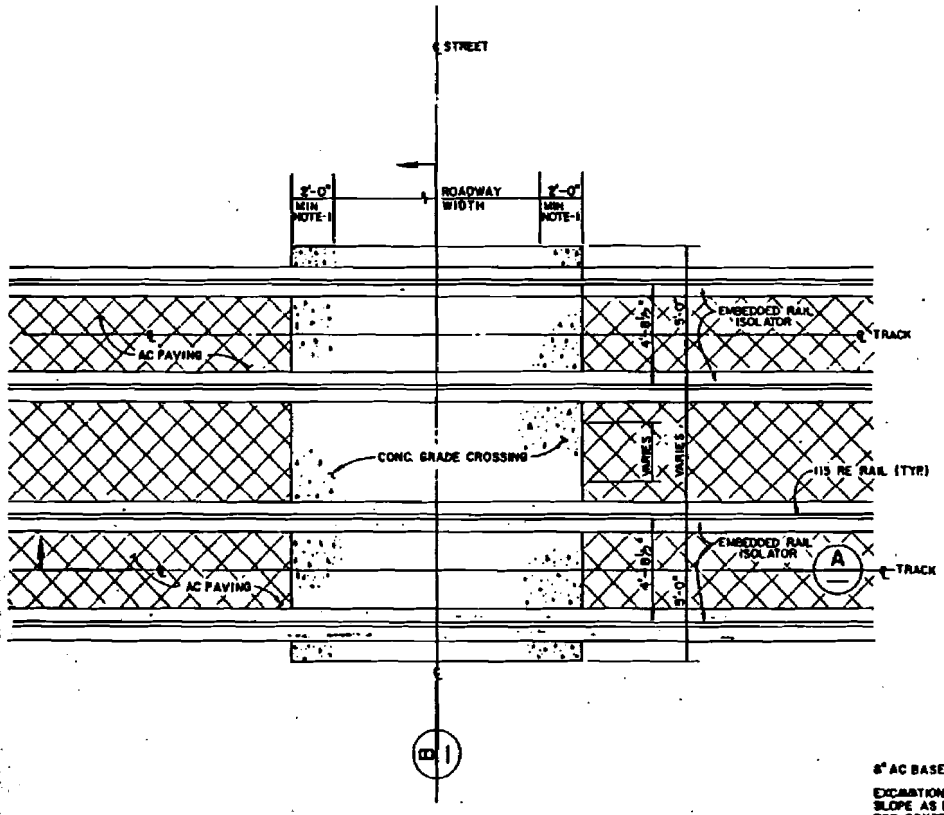
DESIGNED BY J. Valencia
DRAWN BY L. Dechoratt
CHECKED BY J. Svenson
APPROVED BY
DATE 6-28-88

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project
LACTC
TRANSCAL
SUBMITTED
TRANSCAL
APPROVED

LOS ANGELES CBD APPROACH
EMBEDDED TRACK
(TYPICAL SECTIONS)

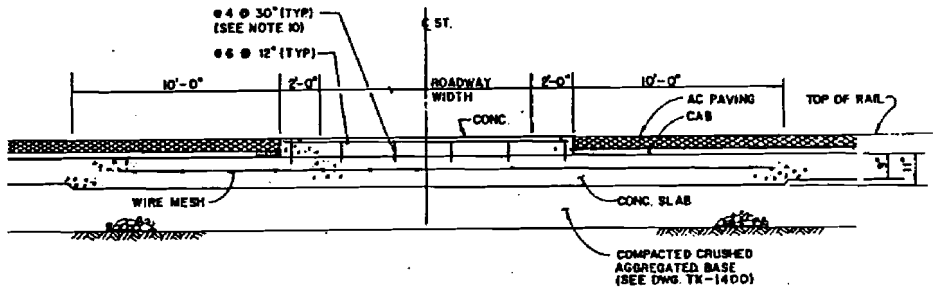
CONTRACT NO RDI-TOI-C140
DRAWING NO TK-1400
REV ⚠1
SHEET NO 106A
SCALE NONE

EXHIBIT E



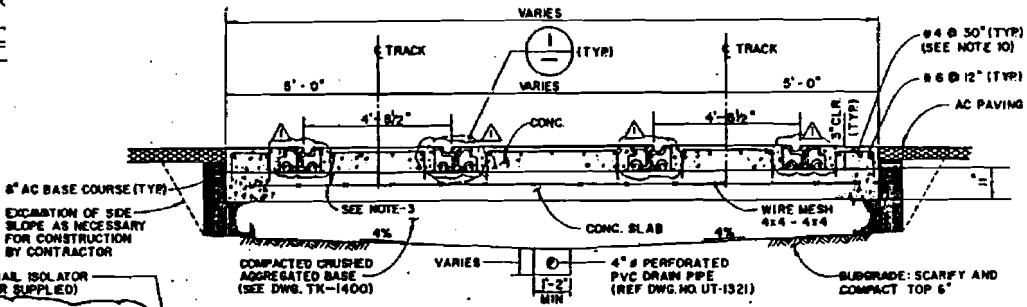
ROAD CROSSING PLAN

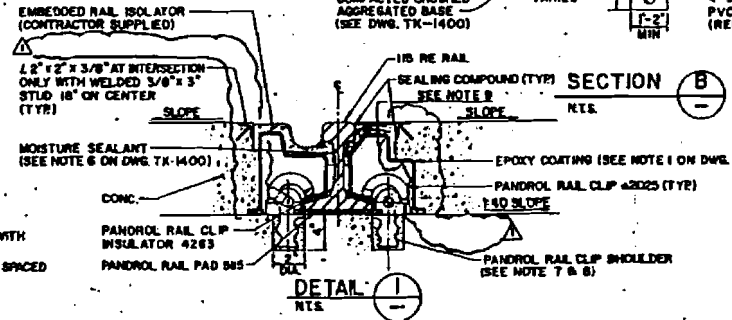
N.T.S.



SECTION A

N.T.S.





SECTION B

N.T.S.

DETAIL 1

N.T.S.

NOTES:

1. GRADE CROSSING MATERIAL SHALL EXTEND A MINIMUM OF 2 FEET BEYOND THE ROADWAY WIDTH. ROADWAY WIDTH INCLUDES PEDESTRIAN WALKWAY WHERE APPLICABLE.
2. TRACK SLAB THICKNESS SHALL BE INCREASED FROM 9 INCHES TO 11 INCHES FOR CONCRETE SLAB CONSTRUCTION AND FROM 6 INCHES TO 8 INCHES FOR CONC. TIE CONSTRUCTION AT GRADE CROSSINGS AND 10 FEET BEFORE AND AFTER EACH GRADE CROSSING.
3. SECTION SHOWN IS FOR CONCRETE SLAB CONSTRUCTION. FOR CONCRETE TIE CONSTRUCTION DETAILS SEE NOTE 2 AND SECTION ON DWG TK-1400.
4. FOR LOCATION OF GRADE CROSSING, SEE DRAWING TK-3389.
5. DETAILS SHOWN ARE TYPICAL AND MUST BE MODIFIED FOR VARYING TRACK CENTERS AND TRACK CURVATURES.
6. BOTTOM OF GRADE CROSSING MATERIAL SHALL FOLLOW THE CONTOUR OF THE TRACK SLAB IN CONC. SLAB CONST. AND CONC. TIE IN CONC. TIE CONSTRUCTION.
7. FOR PANDROL SHOULDERS EMBEDDED IN CONC. TIES SEE DETAIL 1 ON DWG. TK-1400.
8. PANDROL SHOULDERS EMBEDDED IN CONC SLAB, PANDROL TYPE 3356 M SHALL BE PROVIDED BY THE LACTC. 1
9. TOP OF CONC. GRADE CROSSING SHALL BE LEVEL WITH TOP OF RAIL.
10. FOR CONC. TIE CONSTRUCTION, #4 BARS SHALL BE SPACED BETWEEN CONC. TIES AT 30 INCHES ON CENTERS.

REV.	DATE	DESCRIPTION	BY	APP.
1	3-23-98	APPROVED ON CHGR; CO ON (REVISED PER CO NEGOTIATION		
0	5-23-96	APPROVED ON CHG; CO (NEW DRAWING		

DESIGNED BY J. Valenzuela
DRAWN BY N. Martin
CHECKED BY J. Simmons
APPROVED BY
DATE 4-29-96

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project

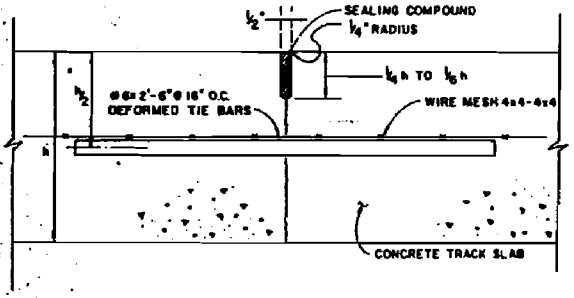
TRANSCAL Rail Consultants of Southern California
SUBMITTED:

TRANSCAL
APPROVED:

LOS ANGELES CBD APPROACH
EMBEDDED TRACK
GRADE CROSSING DETAILS

CONTRACT NO. ROI-TOI-C140
DRAWING NO. TK-1402
REV. 1
SHEET NO. 106C
SCALE NONE

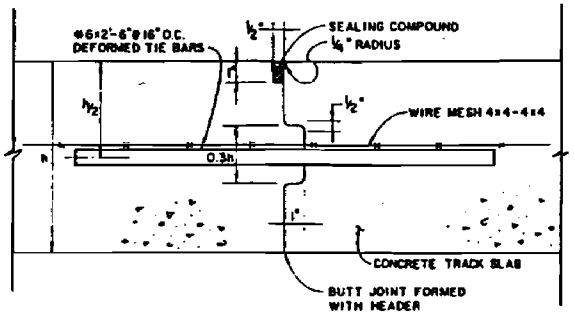
EXHIBIT F



FORMED GROOVE

CONTRACTION/CONTROL JOINT

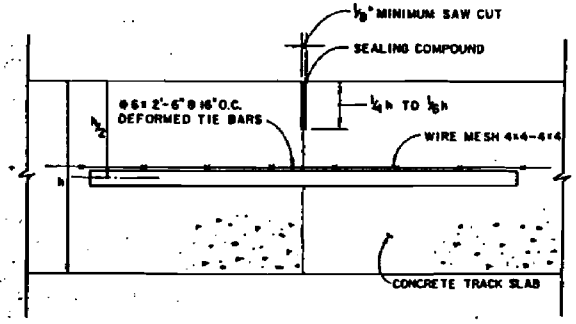
N.T.S. (AT 25 FEET SPACING)



CONSTRUCTION JOINT

N.T.S. SPACED AT

- 600 FEET MAXIMUM
- OR END OF POUR/SHIFT
- OR CHANGE OF TRACK SECTION

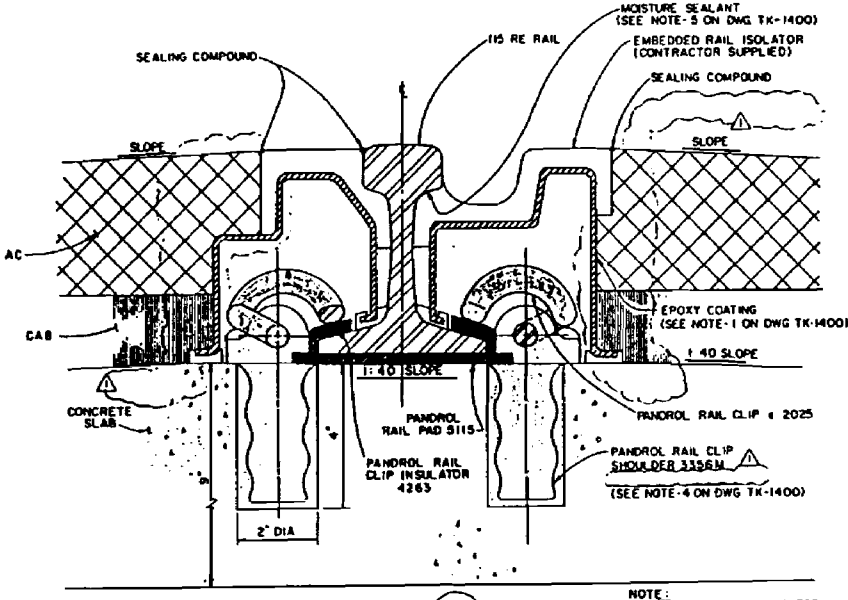


SAWED GROOVE

CONTRACTION/CONTROL JOINT

N.T.S. (AT 25 FEET SPACING)

NOTE: METHOD OF CONTRACTION/CONTROL JOINT SHALL BE CONTRACTOR'S OPTION.



DETAIL 2

N.T.S

TK-1400
TK-3270
TK-3271
TK-3390

NOTE: SEE DWG. TK-1400 FOR NOTES, MATERIALS AND DESCRIPTIONS.

REV.	DATE	DESCRIPTION	BY	APP
1	9-23-88	APPROVED ON OVER, CO ON ; REVISED PER CO NEGOTIATION	MT	RF
0	6-23-88	APPROVED ON DIR; CO ; NEW DRAWING		

DESIGNED BY J. Valencia
DRAWN BY A. Belion
CHECKED BY J. Swanson
APPROVED BY
DATE 6-23-88

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project

TRANSCAL Transit Consultants of Southern California

SUBMITTED:

TRANSCAL Transit Consultants of Southern California

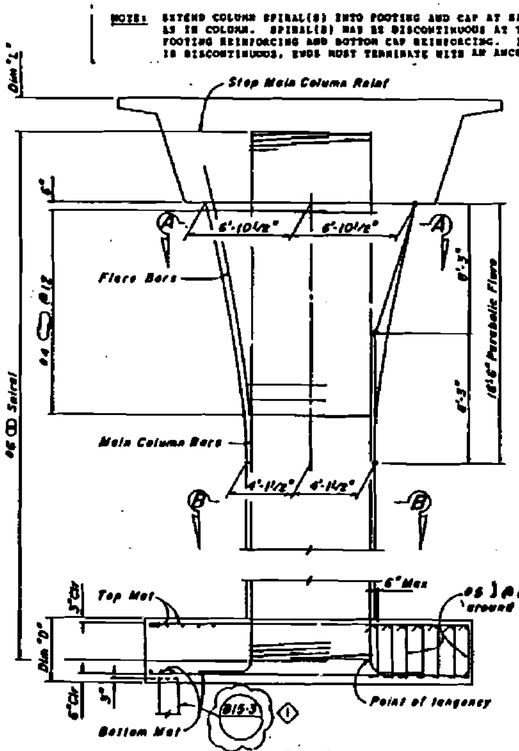
APPROVED:

LOS ANGELES CBD APPROACH EMBEDDED TRACK

SECTIONS & DETAILS

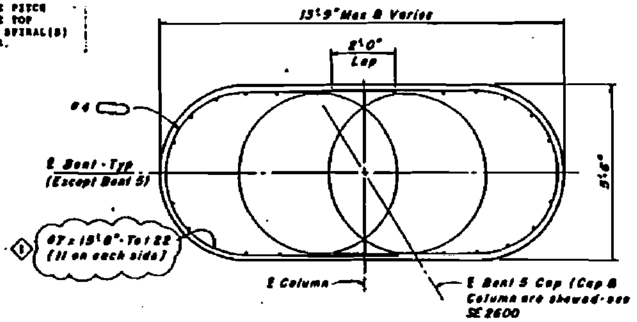
CONTRACT NO RO1-TO1-CM0
DRAWING NO TK-1401
REV 1
SHEET NO 106B
SCALE NONE

EXHIBIT G



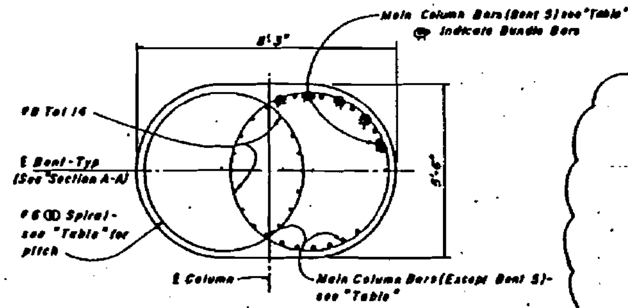
ELEVATION

1/4" = 1'-0"



SECTION A-A

1/2" = 1'-0"

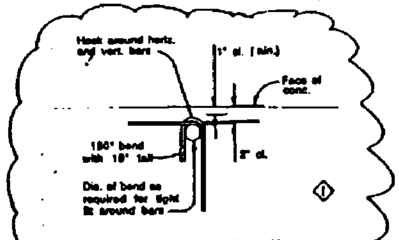


SECTION B-B

1/2" = 1'-0"

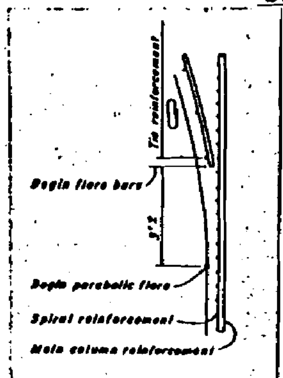
Bent Number	* Main Column Bars	Dimensions "D"	Dimensions "L"	Spiral Pitch	Footing Type
2	#11 ⌊ Tot 52	4'-2"	2'-4"	2 3/4"	F
3	#14 ⌊ Tot 48	4'-3"	2'-0"	3"	D
4	#11 ⌊ Tot 48	4'-2"	2'-4"	3"	A
5	#14 ⌊ Tot 60	5'-6"	2'-0"	3"	B
6	#14 ⌊ Tot 52	4'-3"	2'-0"	3"	C
7	#11 ⌊ Tot 48	4'-2"	2'-4"	3"	F
8	#11 ⌊ Tot 48	4'-2"	2'-4"	3"	F
9	#9 ⌊ Tot 60	4'-2"	3'-10"	3"	E
10	#9 ⌊ Tot 60	4'-2"	3'-10"	3"	E
11	#9 ⌊ Tot 60	4'-2"	3'-10"	3"	E
12	#9 ⌊ Tot 60	4'-2"	3'-10"	3"	E
13	#14 ⌊ Tot 30	4'-3"	1'-9"	3"	D
14	#14 ⌊ Tot 42	4'-3"	1'-9"	3"	D

* Splices not allowed in Column.

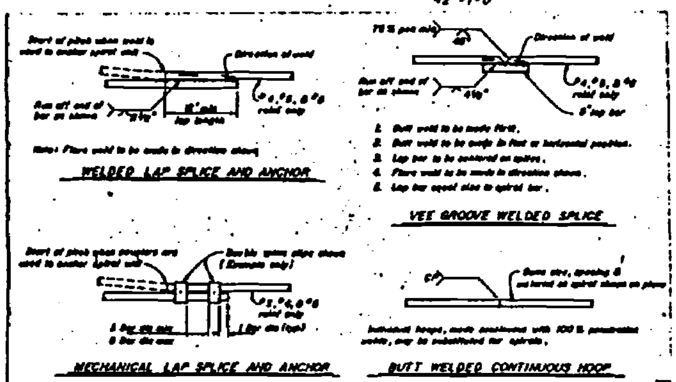


TIE BAR DETAIL

NOT TO SCALE



SPIRAL AND TIE DETAIL



BAR SPIRAL SPLICE & SPIRAL ANCHOR AND HOOP DETAIL

CALTRANS: COTA UNDERPASS (LART) BR. NO. 53-2731 07 LA 710 P.M. 10.82 CONTRACT NO. R01-T01-C436 EA 632610

ALTERNATIVE

1	9-30-97	ISSUED FOR CONSTRUCTION
	4-20-97	ADDENDUM NO. 1 GENERAL REVISIONS
	3/4/?	Issued for bid
REV.	DATE	DESCRIPTION

DESIGNED BY: D.T. [illegible]
DRAWN BY: McGill
CHECKED BY: D [illegible]
APPROVED BY: [illegible]
DATE: 9-17-97

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project

Dokken Engineering

Southern California Rail Consultants

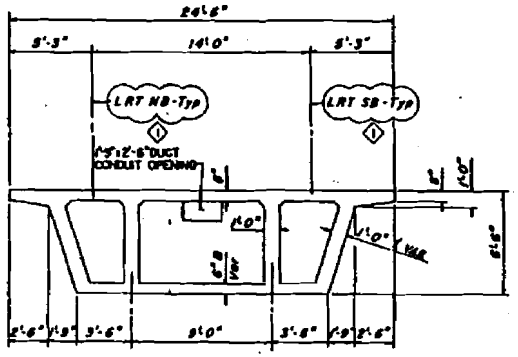
SUBMITTED: [signature]
APPROVED: [signature]

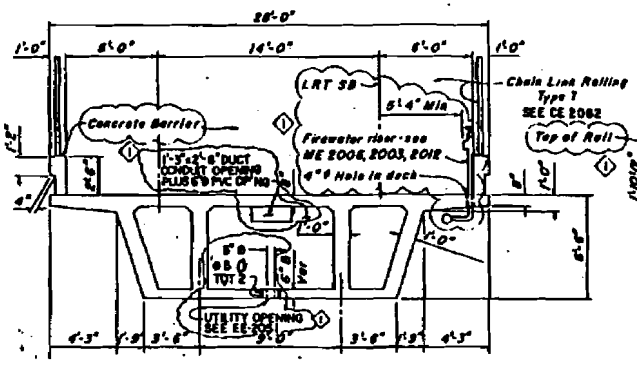
MID-CORRIDOR LRT AERIAL STRUCTURES

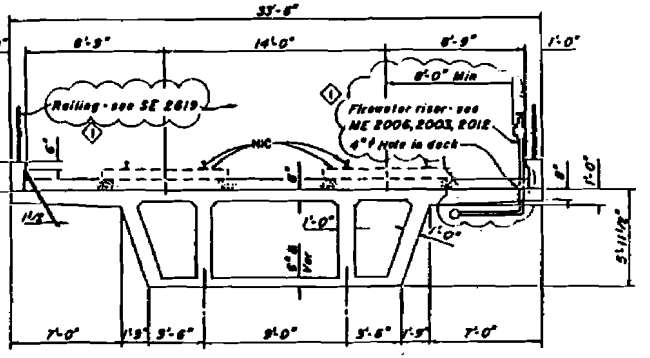
COTA CROSSING LRT OVERPASS
BENT COLUMN DETAILS

CONTRACT NO. R01-T01-C43
DRAWING NO. SE 2601
REV. 1
SHEET NO. 350
SCALE: AS NOTED

EXHIBIT H

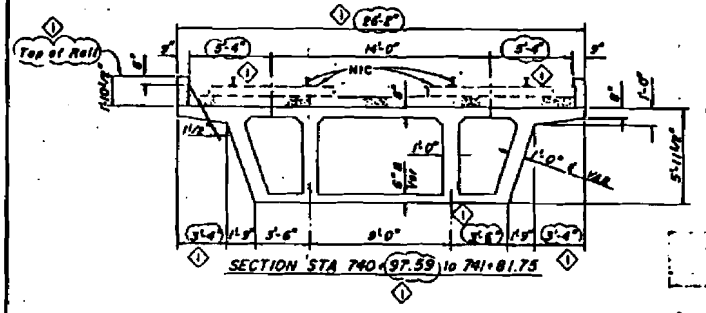






SECTION OVER FRWY

SECTION BEYOND STA 741+81.75



SECTION STA 740+97.59 to 741+81.75

TYPICAL SECTIONS

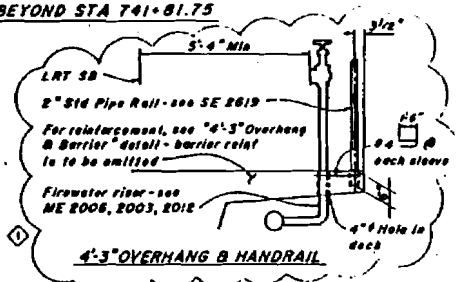
1/4"=1'-0"

BT-10

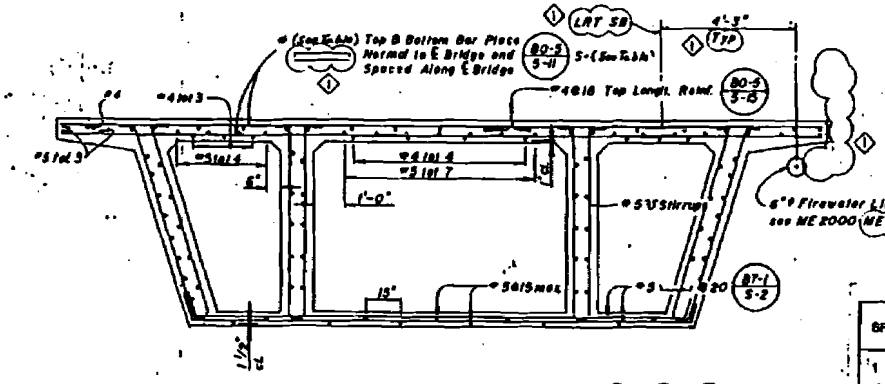
NOTE: CAST DUCT CONDUIT OPENINGS PLUS 6"ø PVC OPENING THROUGH CAPS AT BENTS 3 THROUGH 7 AND ALL HINGES AND OCS DIAPHRAMS IN BETWEEN. FOR LAYOUT OF OPENINGS, SE-2812. CAST 6"ø PVC OPENING THROUGH CAPS AT BENTS 10 AND 11 AND ALL HINGES AND OCS DIAPHRAMS IN BETWEEN. USE SAME LAYOUT AS THAT SHOWN FOR DUCT CONDUIT OPENING ON SE 2812. FOR UTILITY SUPPORTS, SEE 2809.

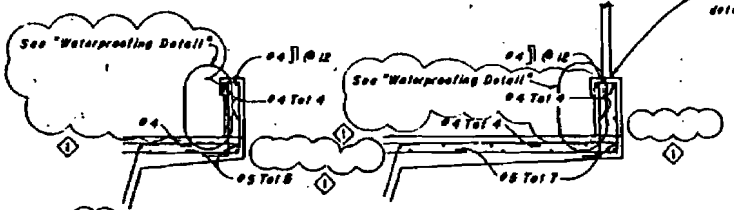
Note: Reinforcement in Typical Sections similar, except in overhangs.

NOTE: FOR CROSS SLOPE AND TRACK ATTACHMENT DETAILS SEE SE 2815



4'-3" OVERHANG @ HANDRAIL





3'-4" OVERHANG @ PARAPET

7'-0" OVERHANG @ PARAPET

4'-3" OVERHANG @ BARRIER

SPANS	BAR SIZE	SPACING
	#	"
1 - 11	6	13
12 -14	7	11

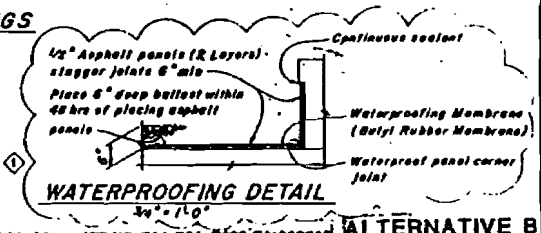
TYPICAL SECTION

1/8"=1'-0"

BT-1 BD-2 AD-2

DECK OVERHANGS

1/2"=1'-0"



WATERPROOFING DETAIL

3/4"=1'-0"

ALTERNATIVE B

ISSUED FOR CONSTRUCTION

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project

Dokken Engineering

Southern California Rail Consultants

MID-CORRIDOR LRT AERIAL STRUCTURES

COTA CROSSING LRT OVERPASS

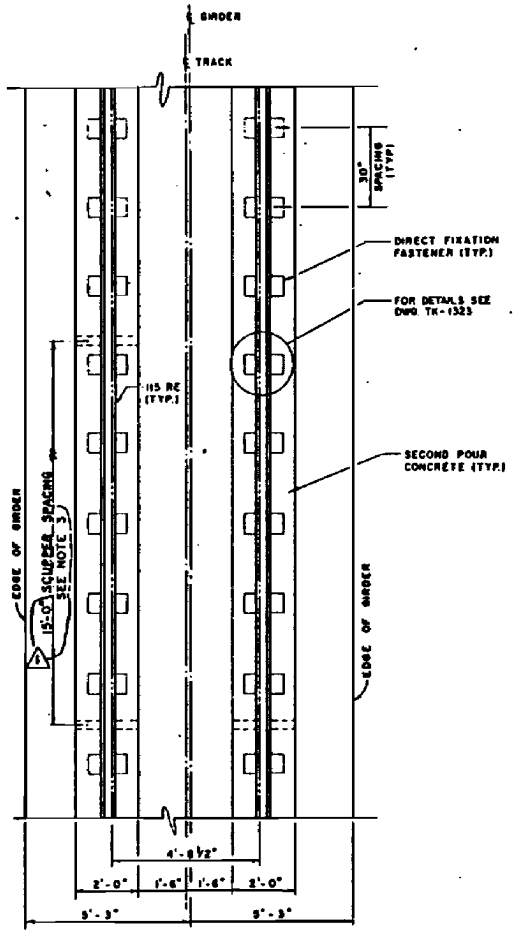
TYPICAL SECTION

DRAWING NO. SE 2804

REV. 1 SHEET NO. 360

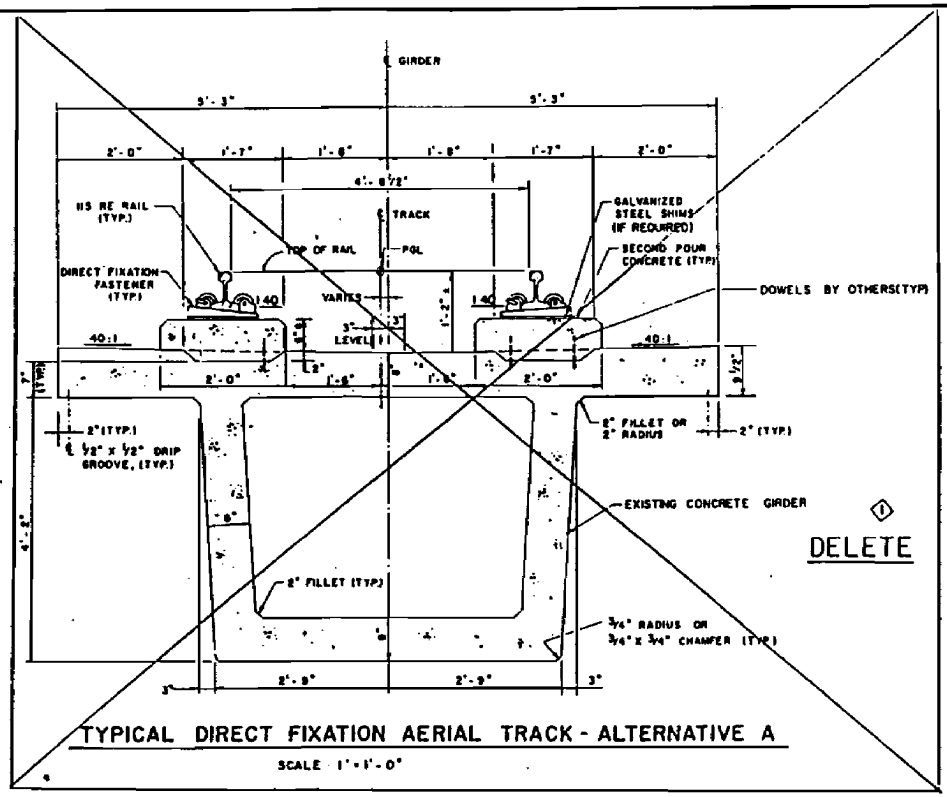
SCALE [AS NOTED]

EXHIBIT I



PLAN

SCALE: ½"=1'-0"



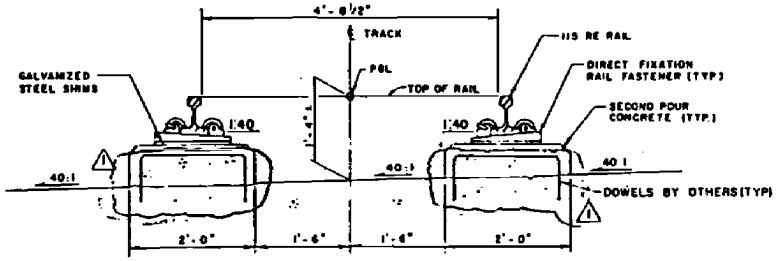
TYPICAL DIRECT FIXATION AERIAL TRACK - ALTERNATIVE A

SCALE 1"=1'-0"

DELETE

NOTES:

1. FOR ADDITIONAL DETAILS, SEE DWGS. SE-1250, SE-1251, CP-1221 & CP-1222. ⟨1⟩
2. CONTACT SURFACES BETWEEN BEAMS AND SECOND POUR CONCRETE ARE TO BE ROUGHENED BY SAND BLASTING, THEN CLEANED BEFORE POURING CONCRETE.
3. FOR SCUPPERS, SEE DWG. SE-1251. ⟨1⟩



TYPICAL DIRECT FIXATION AERIAL TRACK ⟨1⟩

SCALE 1"=1'-0"

½" = 1'-0" GRAPHIC SCALE

1" = 1'-0" GRAPHIC SCALE

REV	DATE	DESCRIPTION	BY
⟨1⟩	12/86	APPROVED CN 052.CO, ADDED NOTE 8 REVISED DETAIL	
	12/87	ISSUED FOR CONSTRUCTION	
⟨2⟩	7/6/87	ADDENDUM NO 1- ALTERNATIVE A DELETED	
	5/87	ISSUE FOR BID	

DESIGNED BY
DRAWN BY
CHECKED BY
APPROVED BY
DATE 3/27/87

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project

DMJM

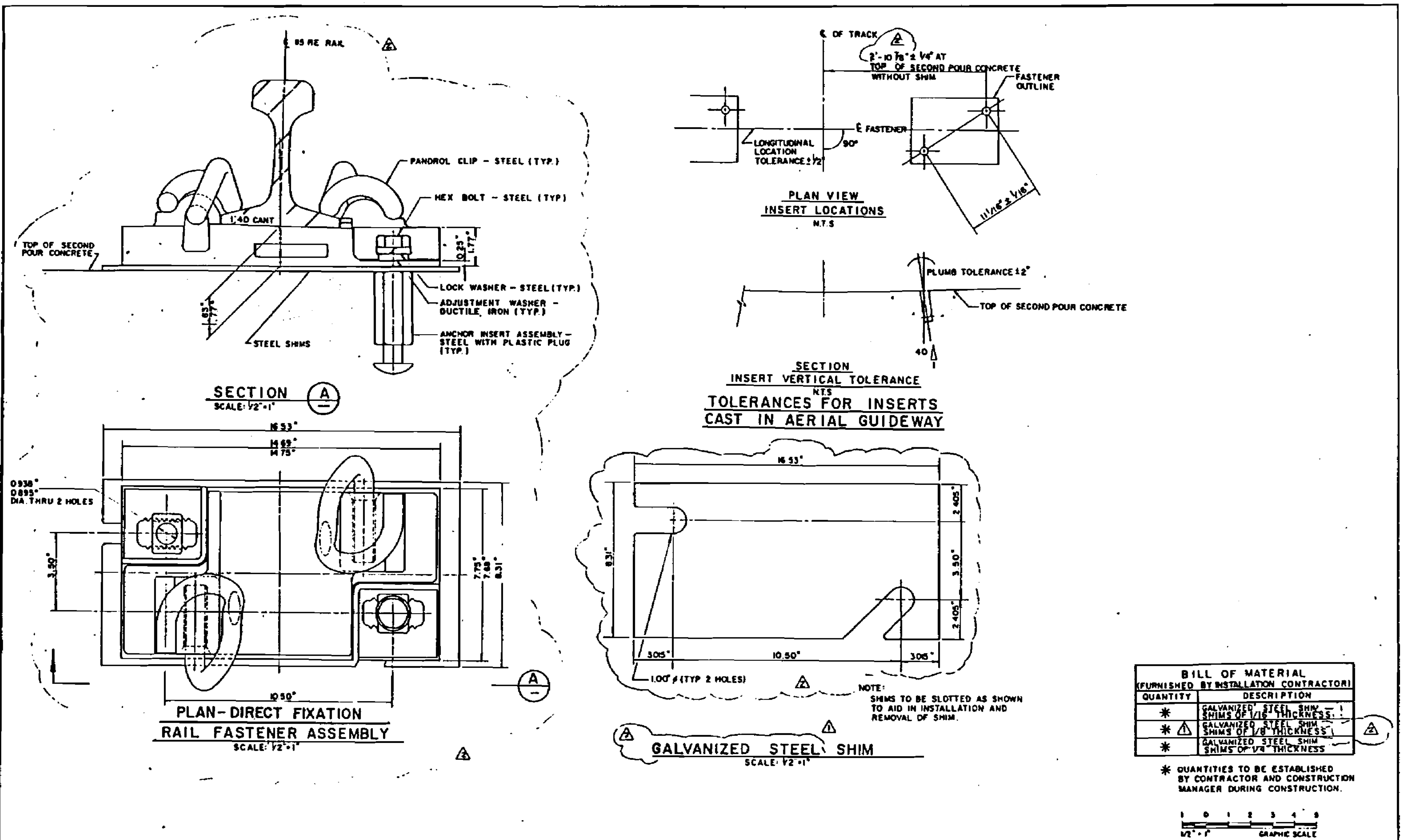
Southern California Rail Consultants

SUBMITTED:
APPROVED:

LRT TRACKWORK INSTALLATION
TYPICAL PLAN AND SECTIONS
DIRECT FIXATION AERIAL

CONTRACT NO RO1-T08-C2
DRAWING NO TK-1214
REV ⟨1⟩
SHEET NO 91
SCALE AS NOTED

EXHIBIT J



REV	DATE	DESCRIPTION
		REVISED RAIL FASTENER ASSEMBLY
		CHANGE NOTICE 1-SHIMS CHANGED TO HD POLYETHYLENE
		ISSUED FOR CONSTRUCTION
		ISSUED FOR BID

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project

DMJM

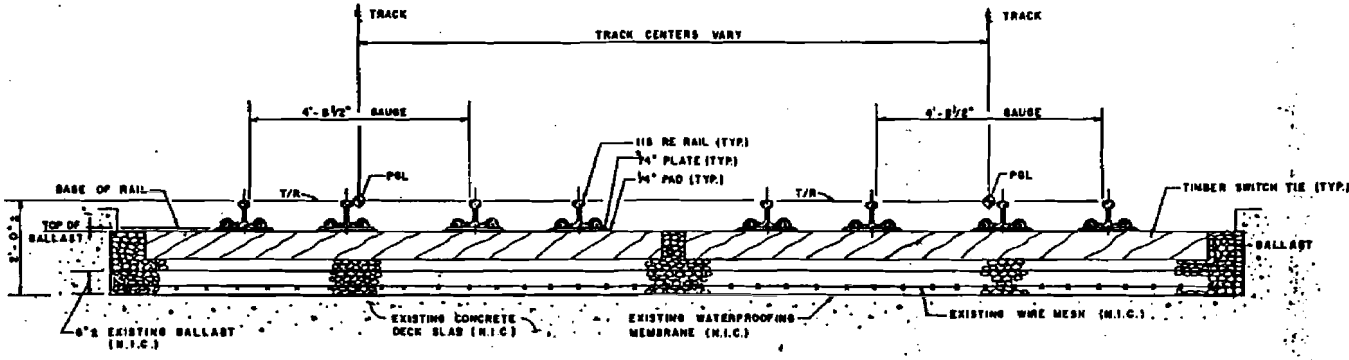
Southern California Rail Consultants

LRT TRACKWORK INSTALLATION

DIRECT FIXATION
MOUNTING DETAILS

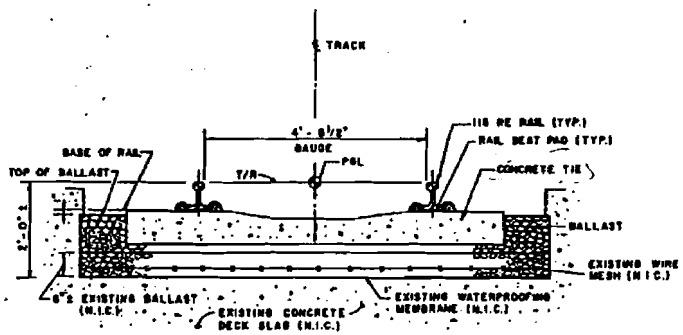
DRAWING NO. TK-1323
SHEET NO. 132
SCALE: AS NOTED

EXHIBIT K



TYPICAL BALLASTED AERIAL TRACK

SPECIAL TRACKWORK



TYPICAL BALLASTED AERIAL TRACK

SEE NOTE 1

NOTES:

1. PLAIN TRACK IS SOMETIMES ON A TWO-TRACK DECK AS SHOWN FOR SPECIAL TRACKWORK.

1 0 1 2 3
3/4" = 1'-0" GRAPHIC SCALE

REV.	DATE	DESCRIPTION	BY	APP.
		ISSUED FOR CONSTRUCTION		
	5/87	ISSUED FOR BID		

DESIGNED BY
DRAWN BY
CHECKED BY
DATE 03/27/87

REGISTERED PROFESSIONAL ENGINEER WAYNE K. SAKAMOTO No. 19437 exp. 4/30/89 CIVIL STATE OF CALIFORNIA

LACTC

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project

DMJM

Southern California Rail Consultants

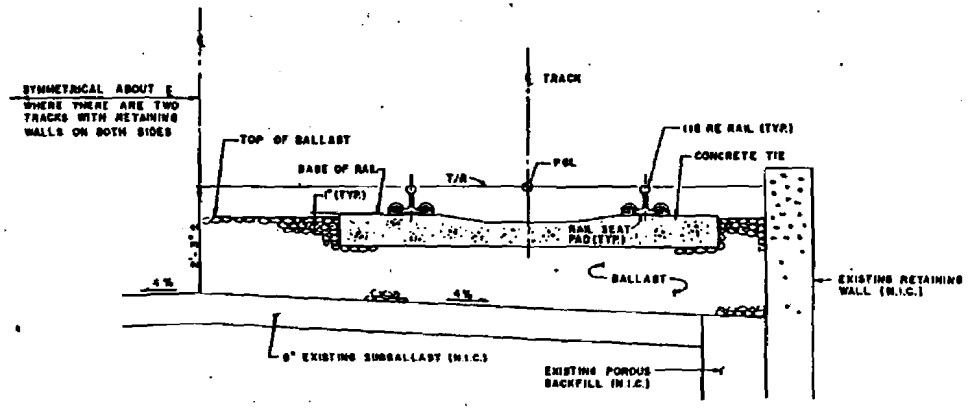
SUBMITTED

APPROVED

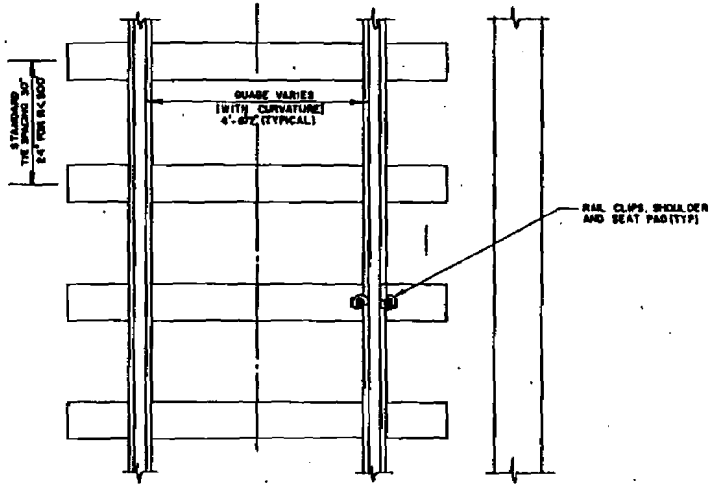
LRT TRACKWORK INSTALLATION
TYPICAL PLAN AND SECTIONS BALLASTED AERIAL

CONTRACT NO RDI-TOS-C250
DRAWING NO. TK-1213
REV.
SHEET NO. 90
SCALE 3/4" = 1'-0"

EXHIBIT L



TYPICAL BALLASTED TRACK ON RETAINED FILL



PLAN VIEW

1 0 1 2 3
3/4"=1'-0" GRAPHIC SCALE

REV.	DATE	DESCRIPTION	BY	APP.
	2/1/87	ISSUED FOR CONSTRUCTION		
	8/5/86	ISSUED FOR BID		

DESIGNED BY
DRAWN BY
CHECKED BY
APPROVED BY
DATE 3/27/87

REGISTERED PROFESSIONAL ENGINEER WAYNE K. SAN FILIPPO No. 19837 STATE OF CALIFORNIA CIVIL

LACTC LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project

DMJM

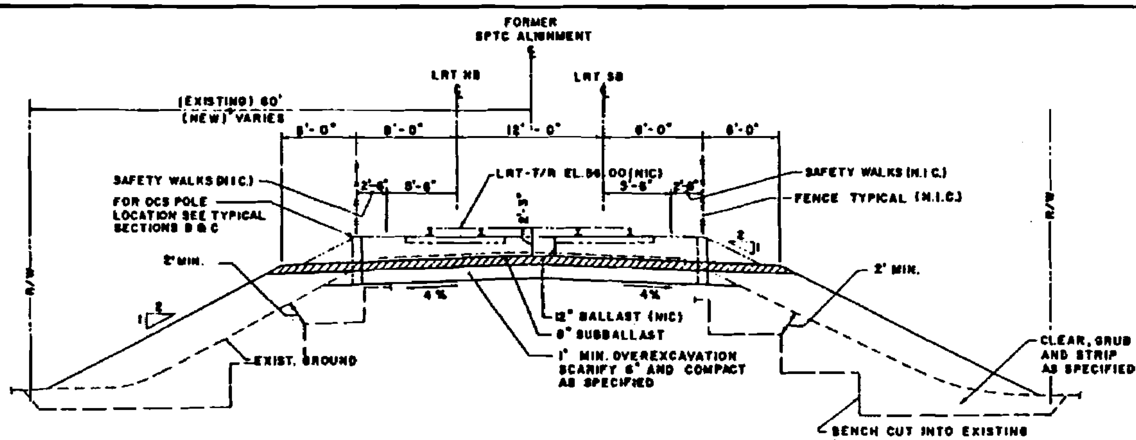
Southern California Rail Consultants

SUBMITTED: Wayne K. San Filippo
APPROVED:

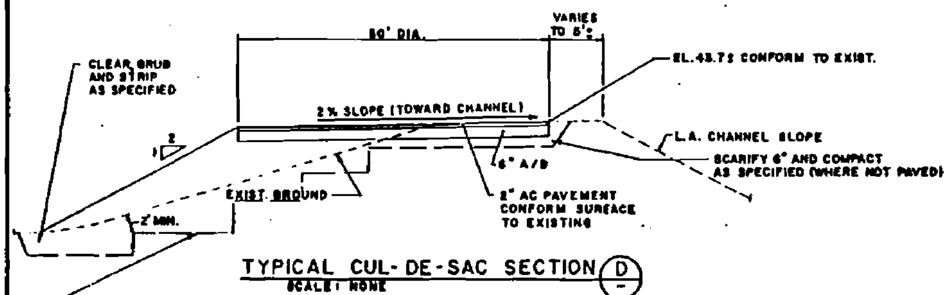
LRT TRACKWORK INSTALLATION
TYPICAL PLAN AND SECTIONS RETAINED FILLS

CONTRACT NO. RO1-T08-C258
DRAWING NO. TK-1215
REV.
SHEET NO. 92
SCALE 3/4"=1'-0"

EXHIBIT M



TYPICAL EMBANKMENT SECTION (A)
LRT - STA 750 + 85 TO 764 + 42.06
SCALE: 1" = 8'



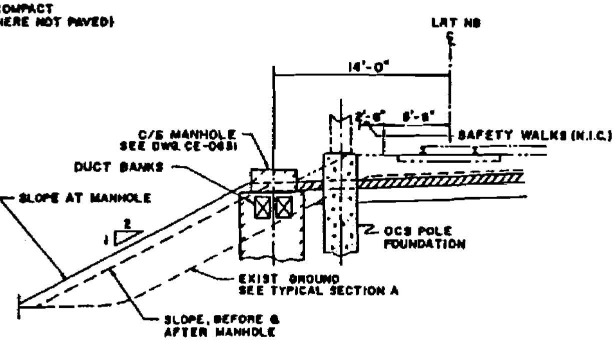
TYPICAL CUL-DE-SAC SECTION (D)
SCALE: NONE

TYPICAL SECTION | 90° BEND | 22-1/2° BEND

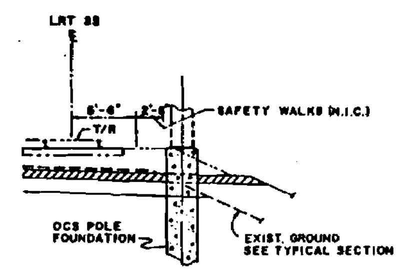
NOTES
1. THRUST BLOCKS SHALL BE CONCRETE-2000 PSI MIN COMPRESSIVE STRENGTH.
2. CONCRETE SHALL BE PLACED AGAINST UNDISTURBED SOIL. (90% ASTM 1557)
3. JOINTS AND FACES OF PLUGS SHALL BE CLEAR OF CONCRETE.
4. AREAS ARE H×W, FOR 150 PSI LINE PRESSURE AND 1500 PSF SOIL BEARING CAPACITY.

TYPICAL THRUST BLOCK DETAIL (E)
SCALE: NONE

LRT ALIGNMENT DATA							
ALIGNMENT	POINT NO.	POINT DESC.	DIST. BETW'N.	BEARING	COORDINATES N	COORDINATES E	STATION
LRT-SB	1	POT	58.88	S24°04'34.6"E	52,168.96	225,880.43	750 + 85.00
↓	–	PI #10 TO	31.42	↓	52,115.47	225,904.33	751 + 43.58
	–	PS #10 TO	90.00		52,086.79	225,917.14	751 + 75.00
	–	PS #10 TO	31.42		52,004.61	225,953.88	752 + 65.00
	–	PI #10 TO	1,145.64		51,975.93	225,966.68	752 + 96.42
↓	3	POT			50,929.96	226,434.04	764 + 42.06
LRT-NB	4	POT	331.72	S24°04'34.6"E	52,173.85	225,891.38	750 + 85.00
↓	–	PI #10 TO	31.42	↓	51,871.54	226,026.47	754 + 16.72
	–	PS #10 TO	993.92		51,842.85	226,039.28	754 + 48.14
↓	5	POT			50,934.85	226,445.00	764 + 42.06
–	2	–	58.88	S29°48'03.6"E	52,168.56	225,875.07	–
–	–	PI #10 TO			52,115.47	225,904.33	751 + 43.58
CRSVR	–	PS #10 TO	31.42	S29°48'03.6"E	52,004.61	225,953.88	14 + 00
↓		PI #10 TO	120.30	↓	51,975.93	225,966.68	14 + 31.42
		PI #10 TO	31.42		51,871.54	226,026.47	15 + 51.72
↓		PS #10 TO			51,842.85	226,039.28	15 + 83.14



TYPICAL SECTION (B)
SCALE: 1" = 8'



TYPICAL SECTION (C)
SCALE: 1" = 8'

1" = 8' 5' 0 5' 10'

REV	DATE	DESCRIPTION
		ISSUED FOR CONSTRUCTION
		ISSUED FOR BIDS

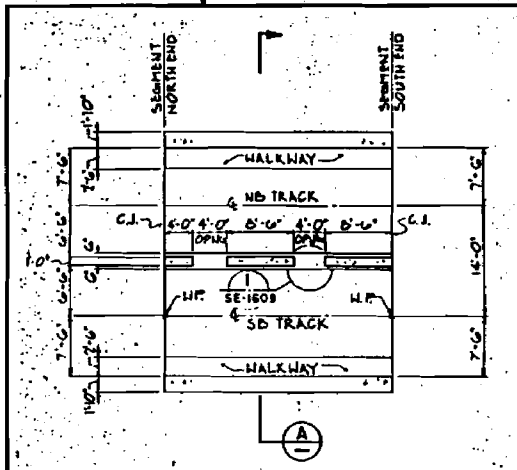
DATE 09/25/86

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project
QTECH
Southern California Rail Consultants
SUBMITTED:
APPROVED:

L. A. RIVER BRIDGE
TYPICAL SECTIONS & ALIGNMENT DATA

CONTRACT NO R01-T01-C425
DRAWING NO CE-0633
SHEET NO 35
SCALE AS NOTED

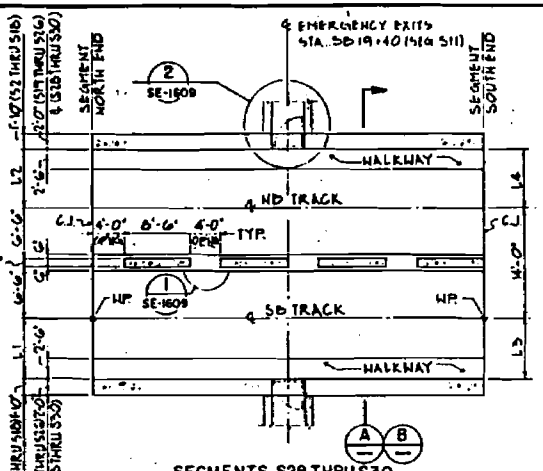
EXHIBIT N



SEGMENT S1

PLAN AT TOP OF WALKWAY

SCALE: 1/8"=1'-0"



SEGMENTS S28 THRU S30

SEGMENTS S2 THRU S26

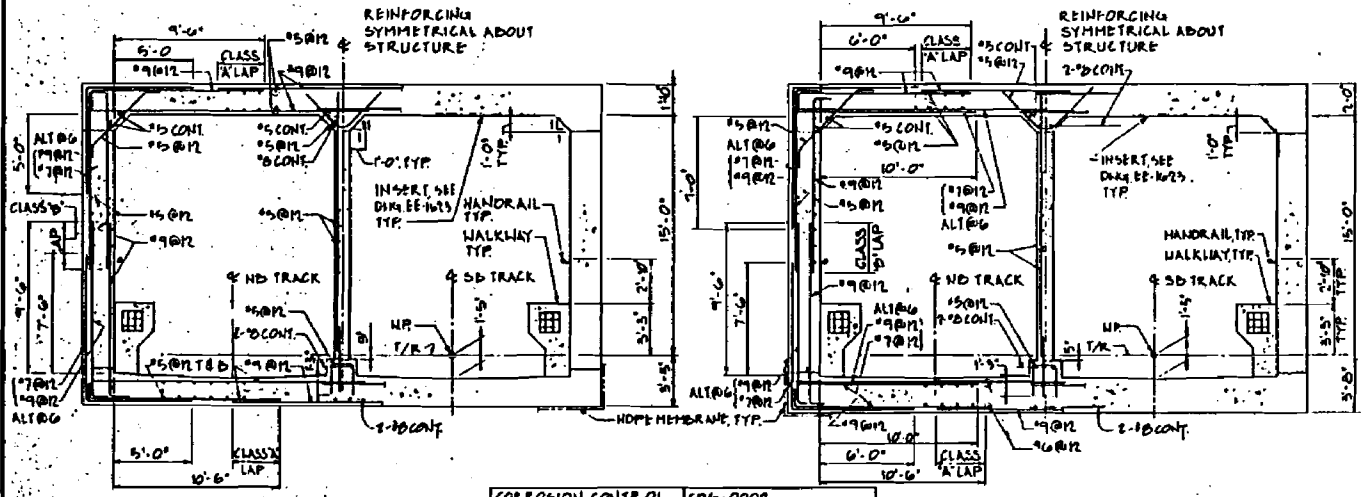
PLAN AT TOP OF WALKWAY

SCALE: 1/8"=1'-0"

NOTES:

1. FOR WALKWAY DETAILS SEE DWG. SE-1632.
2. FOR HANDRAIL DETAILS SEE DWG SE-1634.
3. FOR INVERT DETAILS & SECOND POUR HAIR PIN DOWELS SEE DWG. SE-1621.
4. FOR IMPERVIOUS HIGH DENSITY POLYETHYLENE MEMBRANE DETAILS SEE DWG. SE-1622.
5. FOR DOOR SCHEDULE & DETAILS SEE DWG SE-1635, SE-1637.
6. FOR ELECTRICAL CONTINUITY OF LONGITUDINAL REINF. BARS IN INVERT (BASE SLAB) SEE DWG. CPS-0002.

SEGMENT	SEGMENT NORTH END				SEGMENT SOUTH END			
	SD STA.	HP. ELEV.	L1	L2	SD STA	HP. ELEV.	L3	L4
S1	14+21	230.16	1'-6"	1'-6"	14+50	230.01	1'-6"	1'-6"
S2	14+50	230.01			15+00	235.55		
S3	15+00	235.55			15+50	234.05		
S4	15+50	234.05			16+00	234.09		
S5	16+00	234.09			16+50	233.32		
S6	16+50	233.32			17+00	232.56		
S7	17+00	232.56			17+50	231.79		
S8	17+50	231.79			18+00	231.03		
S9	18+00	231.03			18+50	230.26		
S10	18+50	230.26			19+00	229.50		
S11	19+00	229.50			19+50	228.73		
S12	19+50	228.73			20+00	227.97		
S13	20+00	227.97			20+50	227.20		
S14	20+50	227.20			21+00	226.44		
S15	21+00	226.44			21+50	225.67		
S16	21+50	225.67			22+00	224.91		
S17	22+00	224.91			22+50	224.14		
S18	22+50	224.14			23+00	223.38		
S19	23+00	223.38			23+50	222.61		
S20	23+50	222.61			24+00	221.85		
S21	24+00	221.85			24+50	221.08		
S22	24+50	221.08			25+00	220.32		
S23	25+00	220.32			25+50	219.55		
S24	25+50	219.55			26+00	218.79		
S25	26+00	218.79			26+50	218.02		
S26	26+50	218.02			27+00	217.26		
S27	SEE DWG SE-1607							
S28	27+50	216.49	1'-6"	1'-6"	28+00	215.73	1'-6"	1'-6"
S29	28+00	215.73	1'-6"	1'-6"	28+50	214.96	1'-6"	1'-6"
S30	28+50	214.96	1'-6"	1'-6"	29+00	214.23	1'-6"	1'-6"



SEGMENTS S1 THRU S18

SECTION A

SCALE: 1/4"=1'-0"

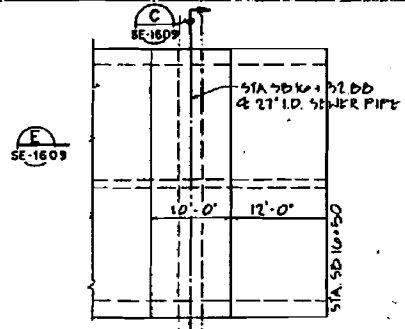
SEGMENTS S28 THRU S30

SEGMENTS S19 THRU S26

SECTION B

SCALE: 1/4"=1'-0"

CORROSION CONTROL	CPS-0002
DOOR SCHEDULE & DETAILS	SE-1635
WALKWAY & HANDRAIL DETAILS	SE-1632, SE-1634, SE-1637
STRUCTURAL DETAILS	SE-1621, SE-1622, SE-1633
ELECTRICAL DETAILS	EE-1615, EE-1623, EE-1625
MECHANICAL DETAILS	ME-1604, ME-1605
UTILITY	UT-1641
REFERENCE DRAWINGS	DRAWING NO.



ROOF SLAB PLAN

SEGMENT S5

SCALE: 1/8"=1'-0"

REV	DATE	DESCRIPTION	BY	APP.
		ISSUED FOR CONSTRUCTION		

DESIGNED BY: T.B.
DRAWN BY: Mary NOONAN
CHECKED BY: L. Andrade
APPROVED BY: R. Bridges
DATE: 06/05/87

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project

Parsons Brinckerhoff — Southern California Rail Consultants

SUBMITTED: E. Allen

APPROVED: Chris Hand

FLOWER STREET SUBWAY

BOX STRUCTURES

SEGMENTS S1 THRU S26 & S28 THRU S30

PLAN & SECTIONS

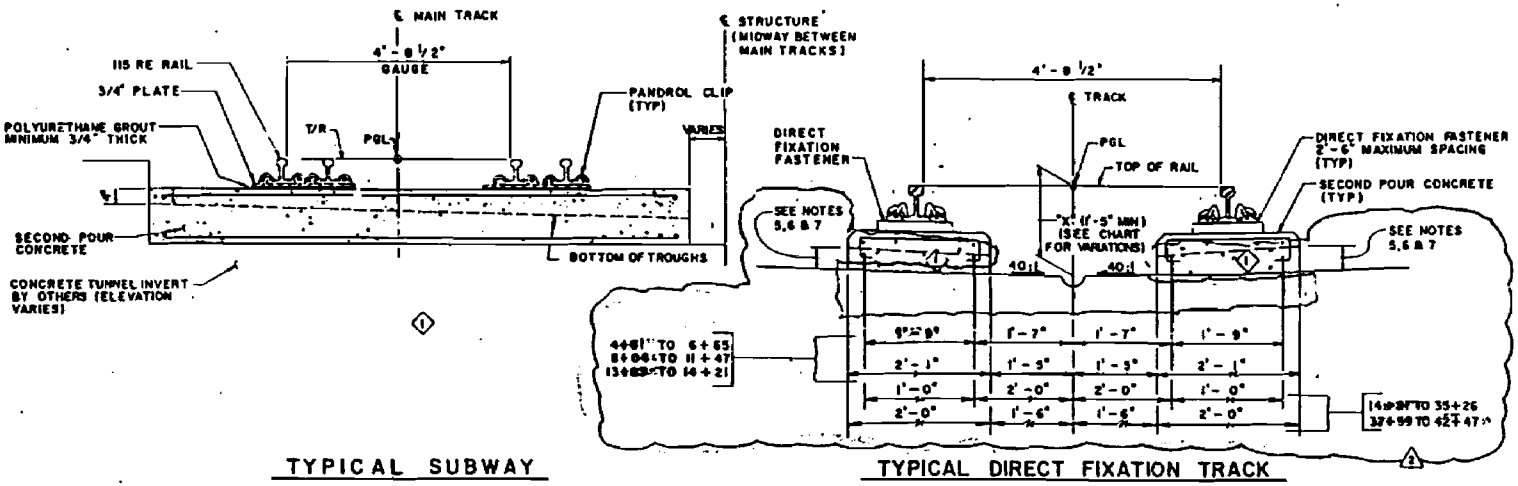
CONTRACT NO. RDI-TOI-C11

DRAWING NO. SE-1606

REV. | SHEET NO. 127

SCALE: AS NOTED

EXHIBIT O



TYPICAL SUBWAY SPECIAL TRACKWORK

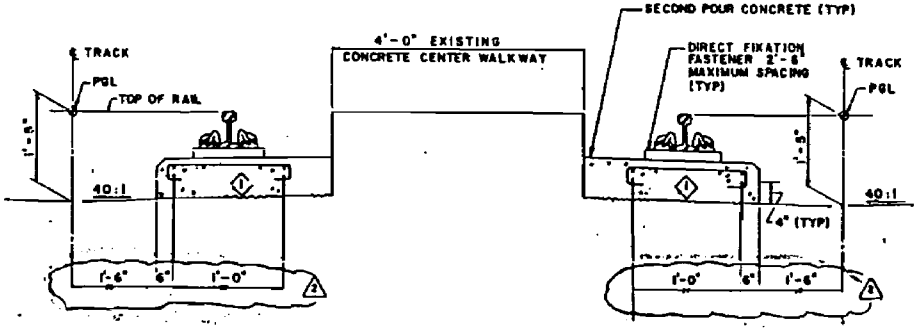
SCALE : 3/4" = 1'-0"

STA. 6+65 TO 8+04
STA. 11+47 TO 13+83

TYPICAL DIRECT FIXATION TRACK SUBWAY AND RETAINED CUT

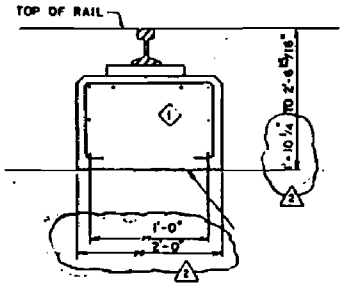
SCALE : 1" = 1'-0"

STATIONING	"X" DIMENSION NB TK	"X" DIMENSION SB TK	REMARKS
4+61 TO 6+65	1'-5"	1'-5"	
6+65 TO 8+04	1'-9"	1'-9"	CROSSOVER SEE DWG NO SE-1235 ①
8+04 TO 11+47	1'-5"	1'-5"	
11+47 TO 13+83	1'-9"	1'-9"	CROSSOVER SEE DWG NO SE-1230 ①
13+83 TO 29+00	1'-5"	1'-5"	
29+00 TO 34+00	1'-9"	1'-9" ①	A PORTION SHALL BE CONSTRUCTED TO ALLOW FUTURE TURNOUTS PER DWG NO TK-1340
34+00	1'-5"	1'-5"	
34+38	1'-5"	1'-6 9/16"	STATIONING IS ALONG SOUTHBOUND TRACK ②
34+72	1'-9"	1'-10 1/4"	
38+20	1'-5"	2'-6 15/16"	
35+20 TO 42+47	1'-5"	1'-5"	SEE DETAIL FOR PORTION WITH EXISTING CONCRETE CENTER WALKWAY



DIRECT FIXATION EXISTING TRACK SPECIAL DETAIL AT RAISED CENTER WALKWAY IN SUBWAY

STA 35+20± TO STA 37+59±
SCALE : 1" = 1'-0"



DIRECT FIXATION SB TRACK SPECIAL DETAIL

STA 34+72 TO 35+20
SCALE : 1" = 1'-0"

NOTES:

1. EXISTING SEMICIRCULAR DRAINAGE SLOT IS FROM STA. 4+61 TO 6+65, 8+04 TO 11+47 AND 13+83 TO 14+21 ONLY.
2. TOP OF SECOND POUR CONCRETE IS TO BE FLAT, CANT WILL BE PROVIDED BY DIRECT FIXATION RAIL FASTENER.
3. CONTACT SURFACES BETWEEN EXISTING CONCRETE SLABS AND SECOND POUR CONCRETE ARE TO BE ROUGHENED BY SAND BLASTING THEN CLEANED AND A BONDING AGENT APPLIED IMMEDIATELY BEFORE POURING CONCRETE.
4. FOR ADDITIONAL DETAILS SEE DWG CPS-0002.
5. INSTALL SCUPPER OR 3" RADIUS HALF CIRCLE PVC PIPE 30'-0"C TO C FROM STA 4+61 TO STA 33+95. ②
6. INSTALL 3" DIAMETER GRS SLEEVES AT THE FOLLOWING LOCATIONS:, STA 22+27±, STA 27+52±, STA 35+14±, THESE SLEEVES SHALL EXTEND A MAXIMUM OF 1" BEYOND THE OUTSIDE FACE OF THE SECOND POUR. THE LOCATION OF THESE SLEEVES SHALL BE MODIFIED TO COINCIDE WITH THE NEAREST ROOF SUPPORT OPENING.
7. FOR OTHER LOCATIONS OF 3" SQUARE SLOT OR 3" Ø PVC PIPE FOR IMPEDANCE BONDS, SEE DWG TK-1330. ①

1" = 1'-0" GRAPHIC SCALE
3/4" = 1'-0" GRAPHIC SCALE

REV	DATE	DESCRIPTION	BY
2	12-5-86	APPROVED CN052.CO ,REVISED SECOND POUR DETAIL	MB
1	10/1/87	CHANGE NOTICE CO1-REVISED STATIONING OF WALKWAY	MB
0	10/1/87	ISSUED FOR CONSTRUCTION	MB
①	7/1/87	ADDENDUM NO.1-REVISE REBAR. REVISED SECOND POUR FOR SPECIAL TRACKWORK. ADD NOTE 4	MB
	6-5-87	ISSUE FOR BID	MB

DESIGNED BY
DRAWN BY
CHECKED BY
APPROVED
DATE 3/27/87

REGISTERED PROFESSIONAL ENGINEER WAYNE R. LARTIGUE No. 19027 EXP 1/30/89 CIVIL STATE OF CALIFORNIA

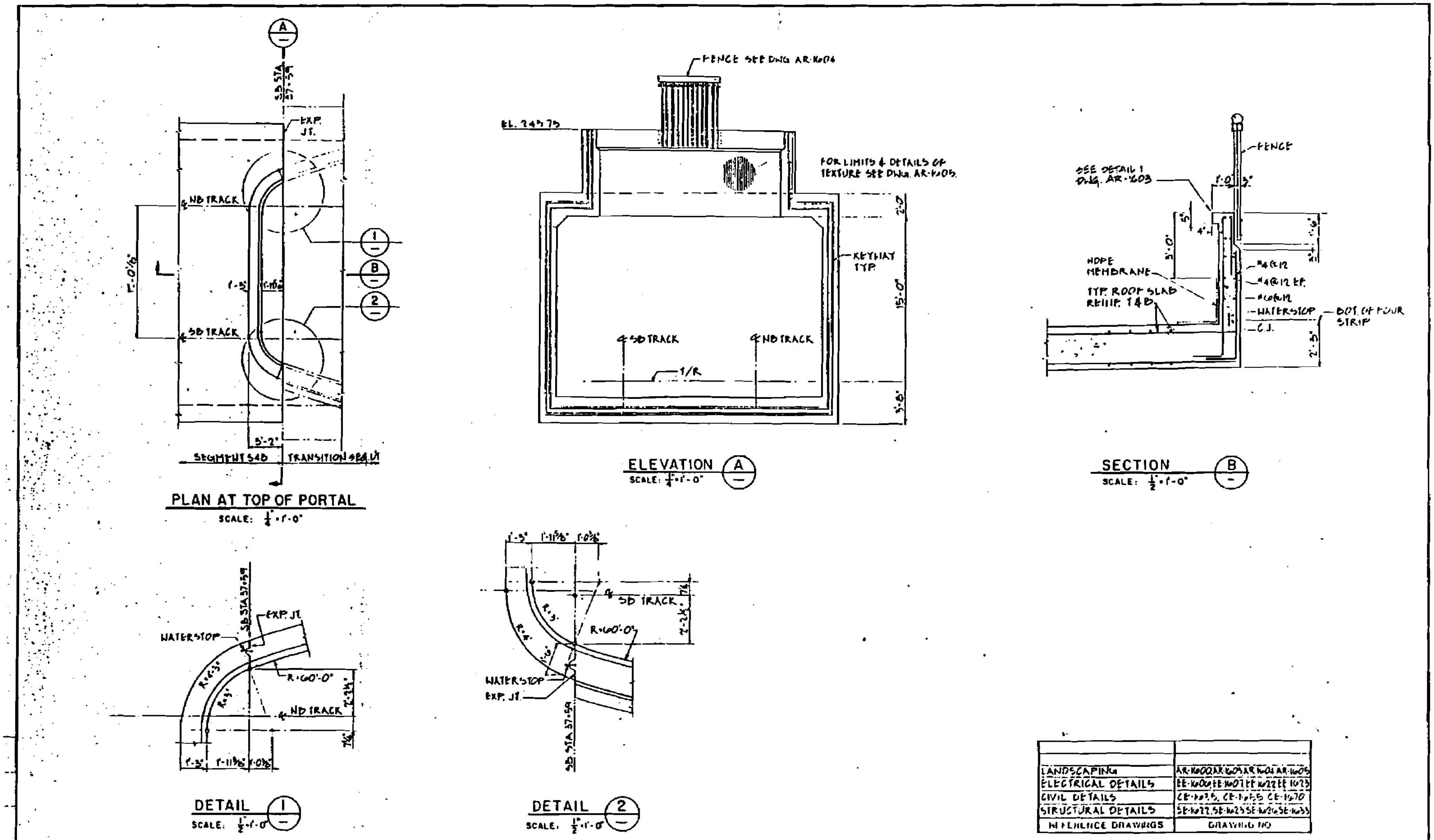
LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project
LACTC
CMJM
Southern California Rail Consultants
SUBMITTED
APPROVED:

LRT TRACKWORK INSTALLATION

TYPICAL PLAN AND SECTION-SUBWAY

CONTRACT NO RO1-TO8-C2X
DRAWING NO TK-1212
REV 2
SHEET NO. 89
SCALE AS NOTED

EXHIBIT P



LANDSCAPING	AR-1602, AR-1603, AR-1604, AR-1605
ELECTRICAL DETAILS	EE-1600, EE-1607, EE-1622, EE-1623
CIVIL DETAILS	CE-1625, CE-1655, CE-1670
STRUCTURAL DETAILS	SE-1622, SE-1625, SE-1626, SE-1635
REFERENCE DRAWINGS	DRAWING NO

ISSUED FOR CONSTRUCTION

REV | DATE | DESCRIPTION

DATE 06/05/87

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project

Southern California Rail Consultants

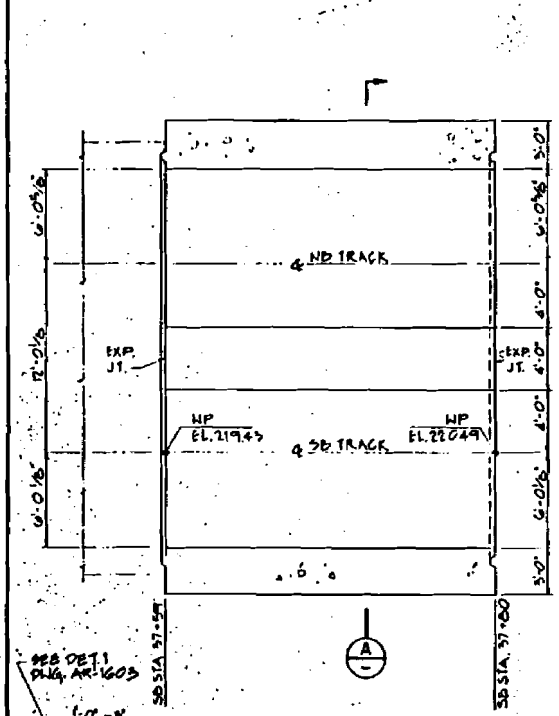
SUBMITTED:

APPROVED:

FLOWER STREET SUBWAY
BOX STRUCTURES
SEGMENT S4B
PORTAL DETAILS

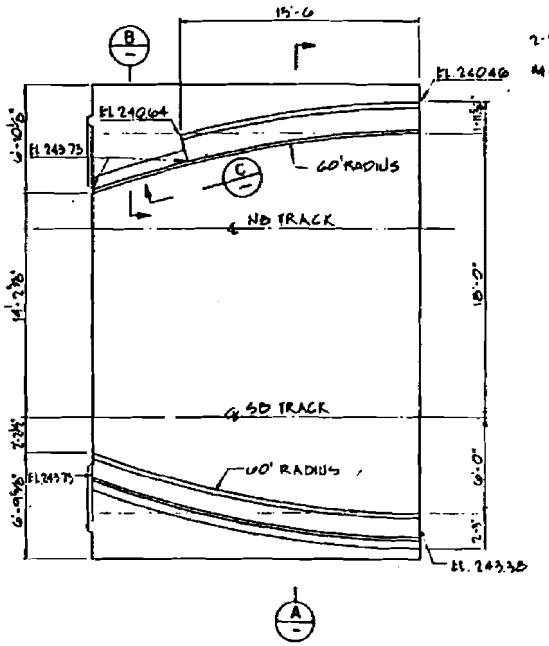
CONTRACT NO. R01-T01-C117
DRAWING NO. SE-1620
REV
SHEET NO. 141
SCALE AS NOTED

EXHIBIT Q



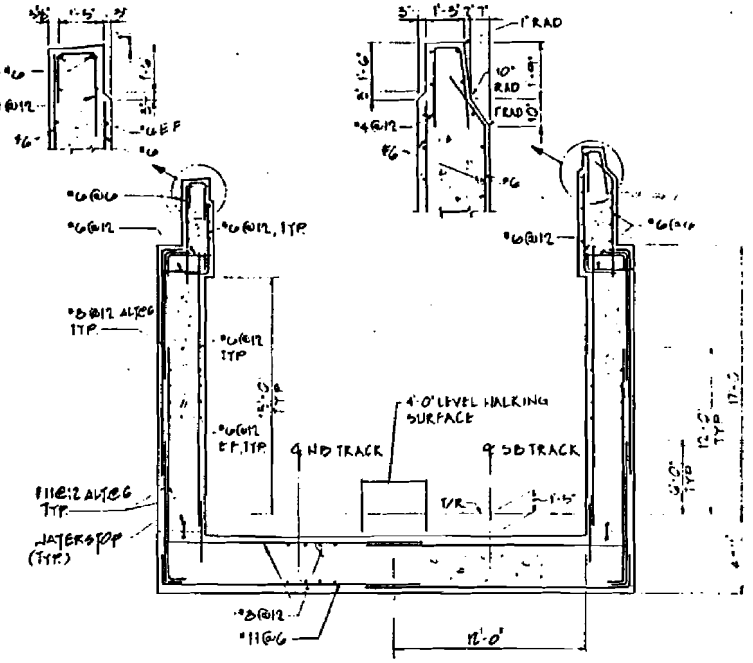
PLAN AT TOP OF BASE SLAB

SCALE: 1/4" = 1'-0"



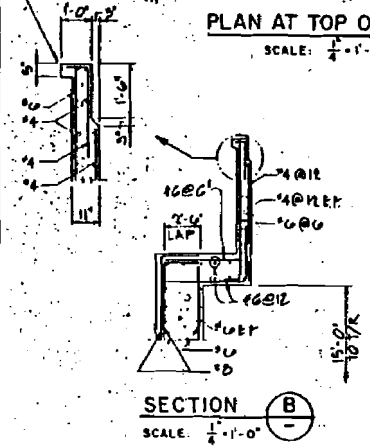
PLAN AT STREET

SCALE: 1/4" = 1'-0"



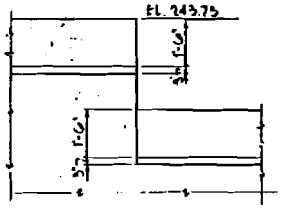
SECTION (A)

SCALE: 1/4" = 1'-0"



SECTION (B)

SCALE: 1/4" = 1'-0"



ELEVATION (C)

SCALE: 1/2" = 1'-0"

NOTES:

1. FOR INVERT DETAILS AND SECOND POUR HATCH PATTERN DOWELS SEE DWG. SE-1626.
2. FOR ELECTRIC CONTINUITY OF TOP LONGITUDINAL REINFORCING BARS IN INVERT (BASE SLAB) SEE DWG. CPS-0002.

CORROSION CONTROL	CPS-0002
CIVIL	CE-1655, CE-1665, CE-1670
UTILITY	UT-1700 THRU UT-1705
ELECTRICAL DETAILS	EE-1650
LANDSCAPE	AR-1603, AR-1604, AR-1605
STRUCTURAL DETAILS	SE-1620, SE-1621, SE-1623
INTERFERENCE DRAWINGS	DRAWING NO.

REV	DATE	DESCRIPTION	BY
	5/88	ISSUED FOR CONSTRUCTION	
	12/1/87	REVISED PER ADD	

DESIGNED BY
DRAWN BY
CHECKED BY
APPROVED BY
DATE 06/05/87

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project

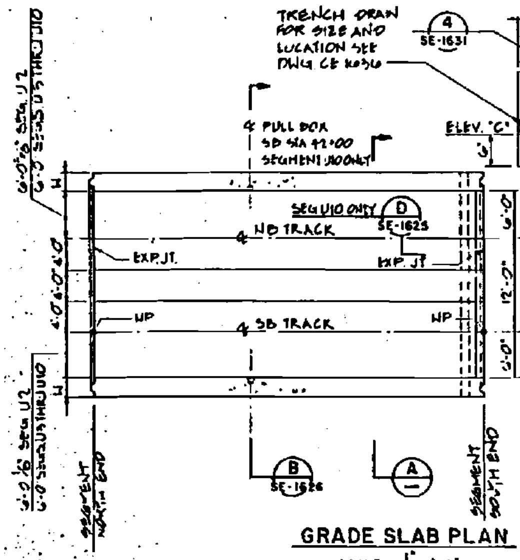
Parsons Brinckerhoff Quade & Douglas, Inc.
SUBMITTED:

Southern California Rail Consultants
APPROVED:

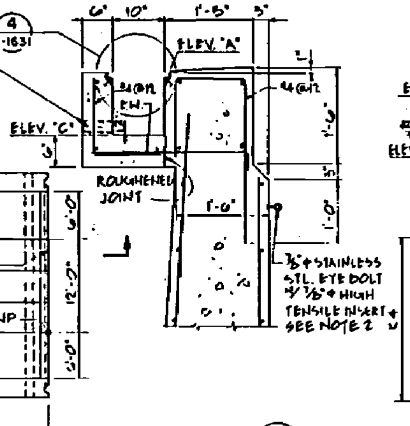
FLOWER STREET SUBWAY
TRANSITION STRUCTURE
SEGMENT U1
PLAN & SECTIONS

CONTRACT NO. RDI-TOI-C117
DRAWING NO. SE-1623
REV
SHEET NO. 144
SCALE AS NOTED

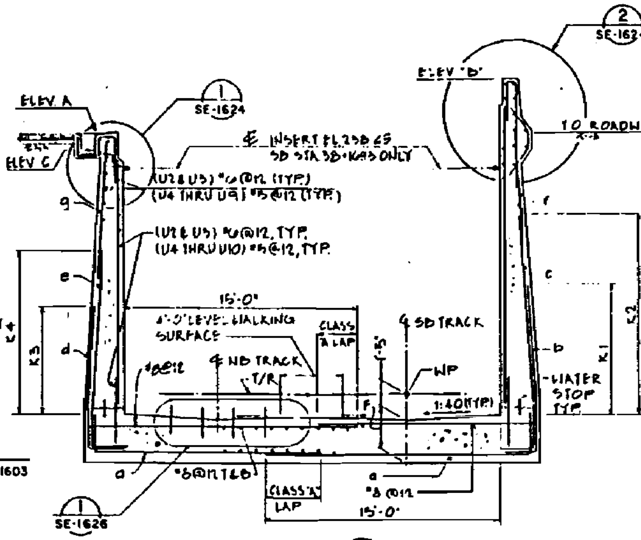
EXHIBIT R



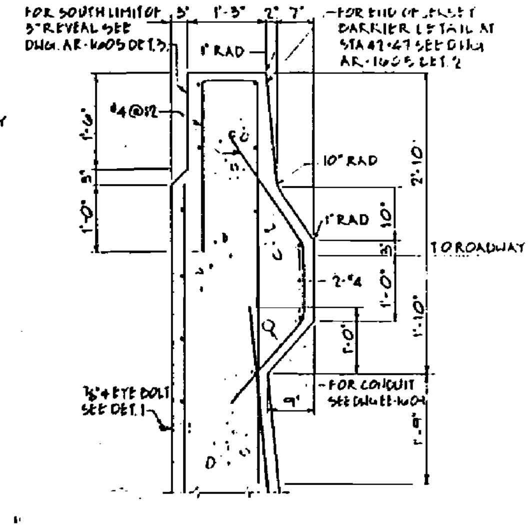
GRADE SLAB PLAN
SCALE: 1/8" = 1'-0"



DETAIL 1
SCALE: 1" = 1'-0" SE-1624 SE-1605, AR-1603



SECTION A
NO SCALE



DETAIL 2
SCALE: 1" = 1'-0" SE-1624, SE-1605

SEGMENT	SEGMENT NORTH END					SEGMENT SOUTH END					DIMENSIONS						REINFORCING BARS						
	S.B. STA.	W.P. ELEV.	ELEV. "A"	ELEV. "B"	ELEV. "C"	S.B. STA.	W.P. ELEV.	ELEV. "A"	ELEV. "B"	ELEV. "C"	W	F	K1	K2	K3	K4	a	b	c	d	e	f	g
U2	37+80	220.49	240.46	243.38	239.46	38+30	223.27	240.23	243.15	239.14	2'-6"	3'-0"	11'-6"	6'-9"	7'-6"	13'-6"	#10@6	#11@12	#11@12	#11@12	#11@12	#8@12	#8@12
U3	38+30	223.27	240.23	243.15	239.14	38+80	226.27	240.00	242.92	238.82	1'-11"	2'-5"	9'-9"	14'-9"	5'-9"	11'-0"	#9@6	#11@12	#11@12	#11@12	#11@12	#8@12	#8@12
U4	38+80	226.27	240.00	242.92	238.82	39+30	229.27	239.76	242.68	238.51	1'-8"	2'-2"	11'-0"	10'-4"	—	6'-6"	#9@6	#11@12	#5@12	—	#11@12	#7@12	#8@12
U5	39+30	229.27	239.76	242.68	238.51	39+80	232.06	239.53	242.45	238.19	1'-6"	2'-0"	6'-0"	4'-0"	—	5'-0"	#8@6	#9@12	#9@12	—	#9@12	#7@12	#7@12
U6	39+80	232.06	239.53	242.45	238.19	40+30	234.36	239.29	242.21	237.88	↓	1'-6"	5'-3"	6'-6"	—	4'-3"	#9@12	#9@12	#8@12	—	#8@12	#7@12	#7@12
U7	40+30	234.36	239.29	242.21	237.88	40+80	236.16	239.06	241.98	237.56	↓	1'-6"	—	WALL HEIGHT	—	WALL HEIGHT	#9@12	—	#9@12	—	#7@12	—	—
U8	40+80	236.16	239.06	241.98	237.56	41+30	237.46	238.82	241.74	237.24	↓	1'-6"	—	↓	—	↓	#8@12	—	#8@12	—	#6@12	—	—
U9	41+30	237.46	238.82	241.74	237.24	41+80	238.26	238.59	241.51	236.92	↓	1'-6"	—	↓	—	↓	#9@12	—	#7@12	—	#6@12	—	—
U10	41+80	238.26	238.59	241.51	237.92	42+47	238.55	238.33	241.27	236.50	↓	1'-6"	—	↓	—	↓	#8@12	—	#6@12	—	#6@12	—	—

NOTES:

1. FOR OCS POLE SUPPORT DETAILS SEE DWG. SE-1625 FOR LOCATIONS SEE DWG. SE-1603
2. THE 3/8" ⌀ HIGH TENSILE INSERT SHALL HAVE A MINIMUM TENSION LOAD VALUE OF 4000 LBS. WITH SAFETY FACTOR OF 3:1.
3. FOR ELECTRIC CONTINUITY OF TOP LONGITUDINAL REINFORCING BARS IN INVERT (BASE SLAB) SEE DWG. CPS-0002.
4. FOR STREET LIGHT POLE SUPPORT LOCATIONS AND DETAILS SEE DWG. SE-1603.

REFERENCE DRAWINGS	DRAWING NO.
CORROSION CONTROL	CPS-0002
CIVIL	CE-1636, CE-1655, CE-1670
LANDSCAPE	AR-1605
LANDSCAPE	AR-1601, AR-1602, AR-1603, AR-1604
ELECTRICAL DETAILS	EE-1650
ELECTRICAL DETAILS	EE-1629, EE-1622, EE-1624
STRUCTURAL DETAILS	SE-1631, SE-1633
STRUCTURAL DETAILS	SE-1605, SE-1625, SE-1626

ISSUED FOR CONSTRUCTION
ISSUED FOR BID

DATE 06/05/87

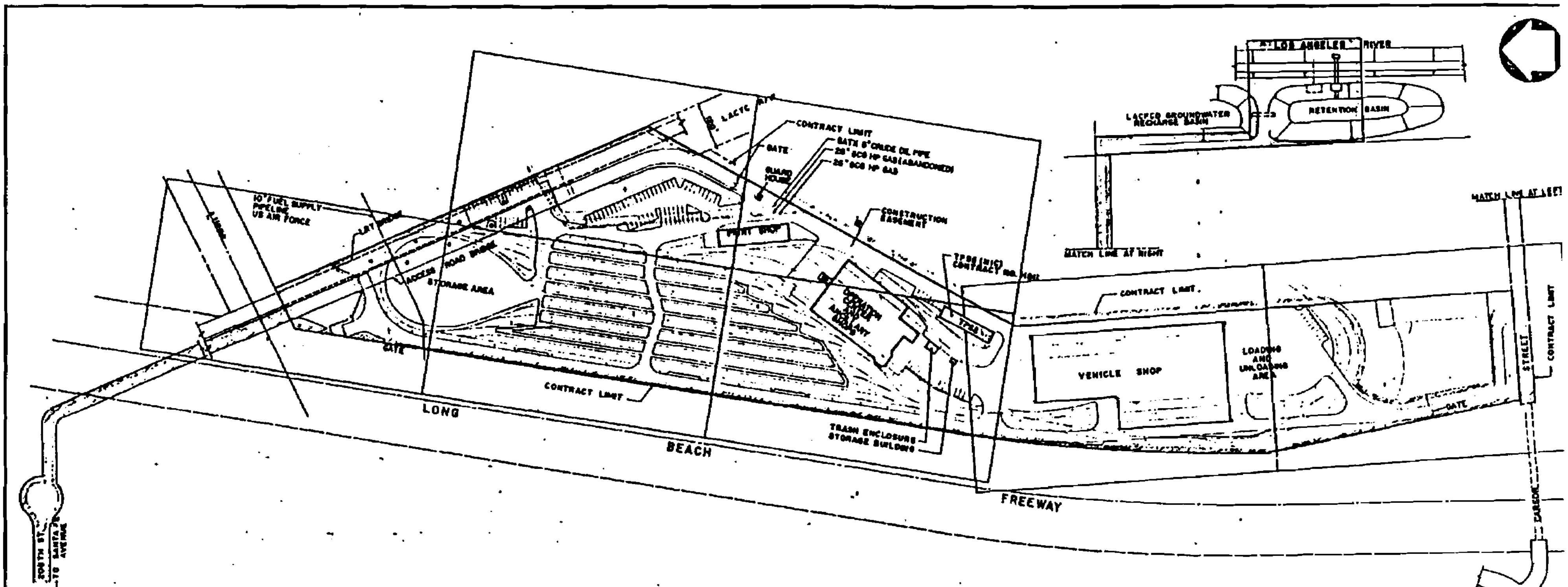
LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project

Southern California Rail Consultants

FLOWER STREET SUBWAY
TRANSITION STRUCTURE
SEGMENTS U2 THRU U10
PLAN & SECTIONS

CONTRACT NO. R01-T01-C11
DRAWING NO. SE-1624
SHEET NO. 145
SCALE AS NOTED

EXHIBIT S



UBC 1982 EDITION
SHOPS (NON-COMBUSTIBLE & NON-EXPLOSIVE MATERIALS)

A. VEHICLE SHOP (MIXED OCCUPANCY) B-4 (TWO STORY) 1

B. OPERATIONS CENTER AND ANCILLARY SHOP (MIXED OCCUPANCY) B-2 TWO STORY

C. PAINT SHOP H-2 ONE STORY

D. STORAGE BUILDING H-2 ONE STORY

BUILDING AREAS

A. VEHICLE SHOP

B. OPERATIONS CENTER AND ANCILLARY SHOP

C. PAINT SHOP

D. STORAGE BUILDING 100 SQ FT

E. ALL BUILDING TYPE II N W/AUTOMATIC SPRINKLER SYSTEM

F. PARKING:
132 PARKING SPACES

LEGEND

CONTRACT LIMIT

100 0 100 200
1" = 100' GRAPHIC SCALE

ISSUED FOR CONSTRUCTION

ISSUED FOR BIDS

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project

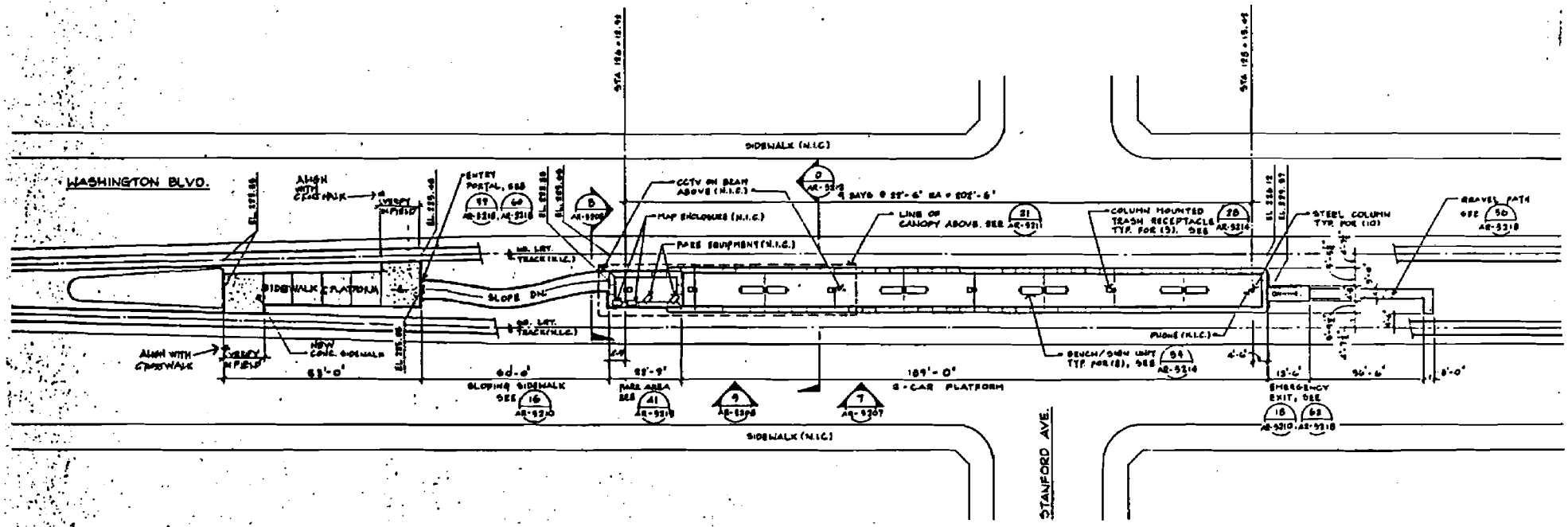
KDG

Southern California Rail Consultants

MAIN YARD AND SHOPS
BUILDINGS AND SITE FINISH
GENERAL SITE PLAN

DRAWING NO. GI-1358
SHEET NO. 7
SCALE 1" = 100'

EXHIBIT T



STATION PLAN - SAN PEDRO

1/8" = 1'-0"

AREA SUMMARY (FOR CITY OF LOS ANGELES PERMIT USE ONLY)

1. PLATFORM	=	2,892.11 S.F.
2. SLOPING SIDEWALK	=	562.79 S.F.
3. STAIR	=	69.79 S.F.
TOTAL	=	3,524.69 S.F.
4. CANOPY	=	1,277.56 S.F.

NOTES

1. FOR TYPICAL ENLARGED PLATFORM PLAN SEE AR-3209.
2. FOUNDATIONS FOR NEW SAN PEDRO STATION ARE EXISTING AND N.I.C. VERIFY IN FIELD ALL EXISTING CONDITIONS.
3. SEE STRUCTURAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
4. ELEVATION AT EDGES TO BE +5'-9" FROM TOP OF RAIL AND TO BE ESTABLISHED ONLY AFTER RAIL HAS BEEN INSTALLED AND TRAIN FLOOR HEIGHT HAS BEEN VERIFIED.

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

REV.	DATE	DESCRIPTION
-	4/4/88	ISSUED FOR BIDS

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project

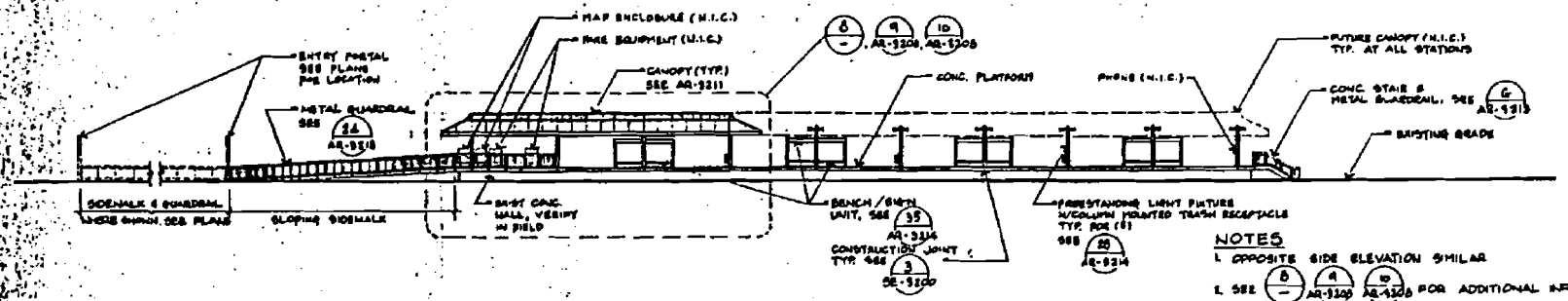
Southern California Rail Consultants

LOS ANGELES AND MID-CORRIDOR STATIONS

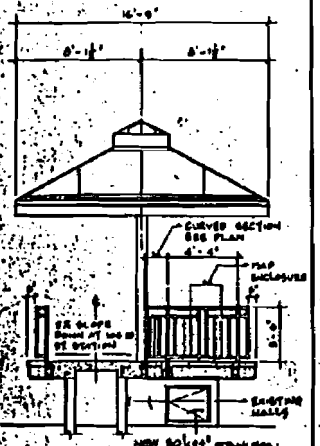
STATION PLAN - SAN PEDRO

CONTRACT NO. ROI-TOI-C265
DRAWING NO. AR-3203
REV.
SHEET NO. 16
SCALE 1/8" = 1'-0"

EXHIBIT U

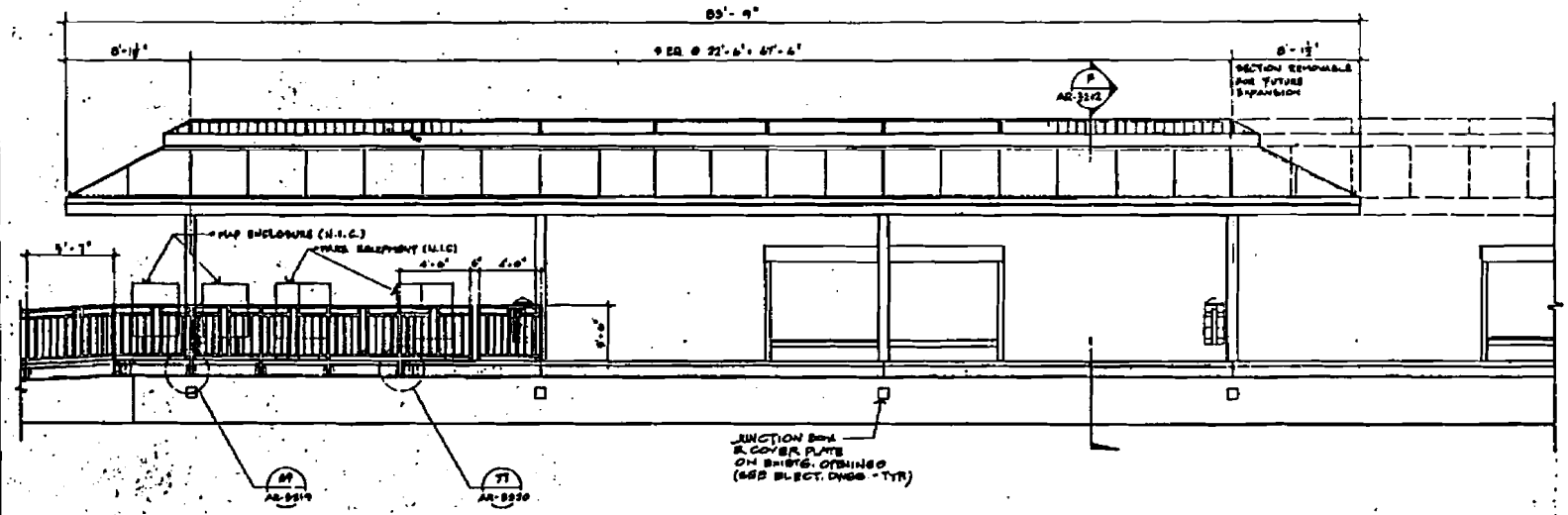


TYPICAL PLATFORM ELEVATION



WASHINGTON & 103RD ST. STATIONS

SLOPING SIDEWALK SECTION



PLATFORM ELEVATION AT WASHINGTON & 103RD STREET STATIONS

NOTE
SEE FOR TYPICAL NOTES

GRAPHIC SCALE

REV.	DATE	DESCRIPTION	BY
		INITIAL ISSUED FOR CONSTRUCTION	
1	7/5/88	ADDENDUM NO 1 - DELETED NOTE	
	4/4/88	ISSUED FOR BIDS	

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
The Long Beach-Los Angeles Rail Transit Project
The Tanzmann Associates
Southern California Rail Consultants

LOS ANGELES AND MID-CORRIDOR STATIONS

PLATFORM ELEVATIONS
(SHEET 1)

CONTRACT NO. ROI-TOI-C26
DRAWING NO. AR-3207
REV.
SHEET NO. 20
SCALE AS NOTED

EXHIBIT V