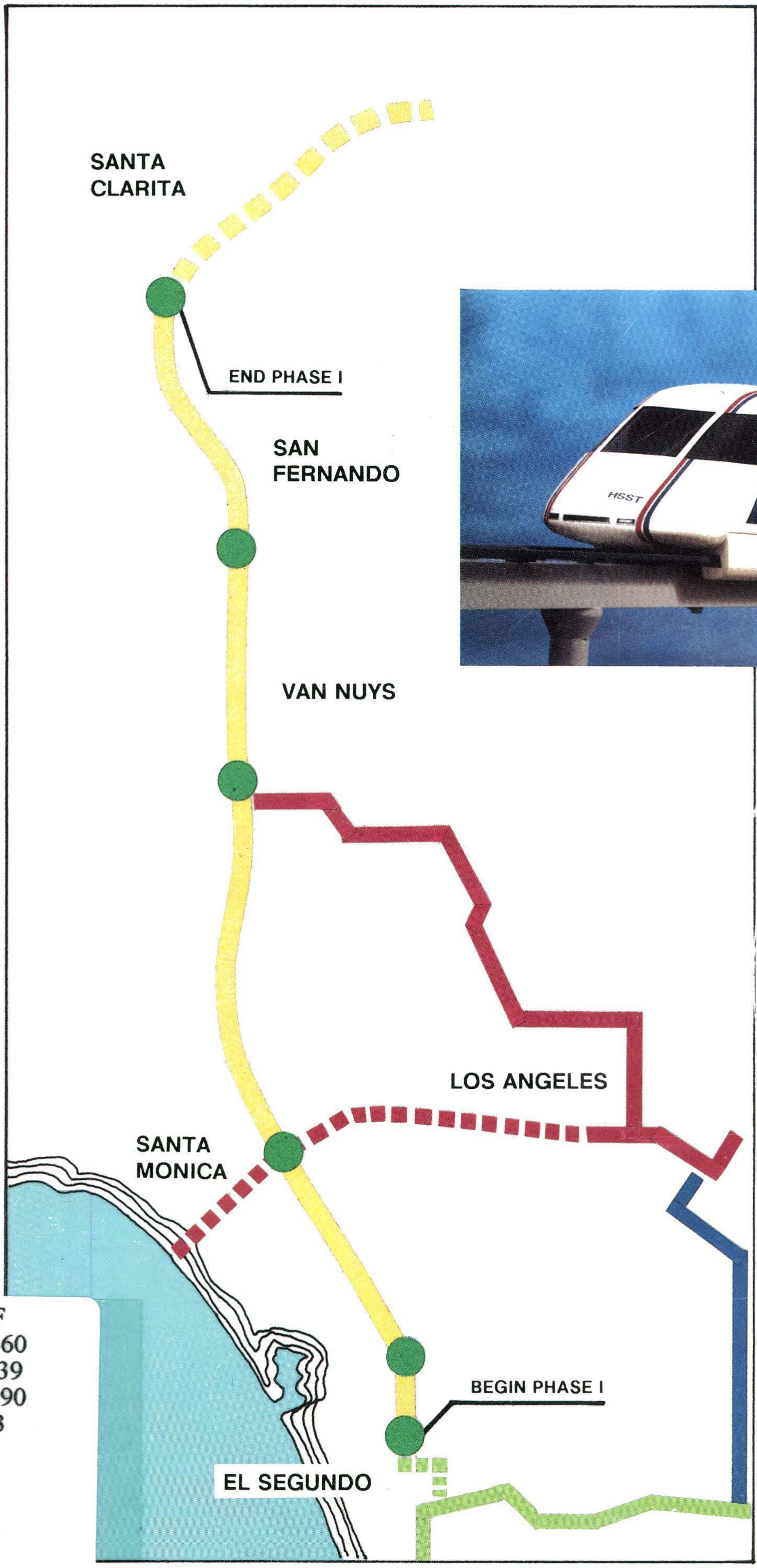
Volume 3
TECHNICAL PROPOSAL



CALTRANS PRIVATIZATION PROJECT

LAX TO PALMDALE TRANSIT

PERINI/DMJM/HSST

The Perini/DMJM consortium, one of those originally qualified by Caltrans to submit project proposals, has subsequently added HSST as a key member. Bank of America and Lockheed Air Terminal are additional supporting members of the project team. Perini will provide overall project management and will perform the construction work. DMJM will perform the design and engineering for the project. HSST will supply the maglev system elements. Bank of America serves as a financial advisor to the project, and Lockheed Air Terminal is the designated entity to operate the system.

The consortium of Perini/DMJM/HSST is excited about the privatization program in general and about this proposed project in particular. We feel that this project has the potential to provide substantial benefits to the southern California area, and we look forward to working with Caltrans to make the proposal a reality.

Sincerely,

Perini Corporation

Thomas E. Dailey

Thomas E. Dailey
President

Daniel, Mann, Johnson, & Mendenhall

M. Paul Brott
President

HSST Corporation

Akira Hayashi

Akira Hayashi
President

CONCEPT REPORT

CONCEPT REPORT

CONCEPT REPORT

A. INTRODUCTION

1. PROJECT DESCRIPTION

The project that Perini/DMJM/HSST is proposing consists of a transit system using state-of-the-art magnetic levitation (maglev), ultimately connecting Los Angeles International Airport (LAX) with the proposed Palmdale Regional (or possibly International) Airport.

The project will be staged in two phases, with Phase I initially being built between LAX and the Santa Clarita area. The alignment will generally follow within the freeway rights-of-way of the San Diego Freeway (I-405), the Golden State Freeway (I-5), and the Antelope Valley Freeway (Route 14), with a length of about 31 miles.

The project's southerly terminus is proposed in the vicinity of LAX's Parking Lot C, where the Norwalk-El Segundo Light Rail (Green Line) will interface with LAX's Transportation Center. Currently, an LAX multimodal study is investigating a series of alternatives, including a people-mover system that would connect the Lot C Transportation Center with the roadway loop in the center of the airport (World Way). The possibility of extending the proposed maglev system into the airport terminal will also be investigated.

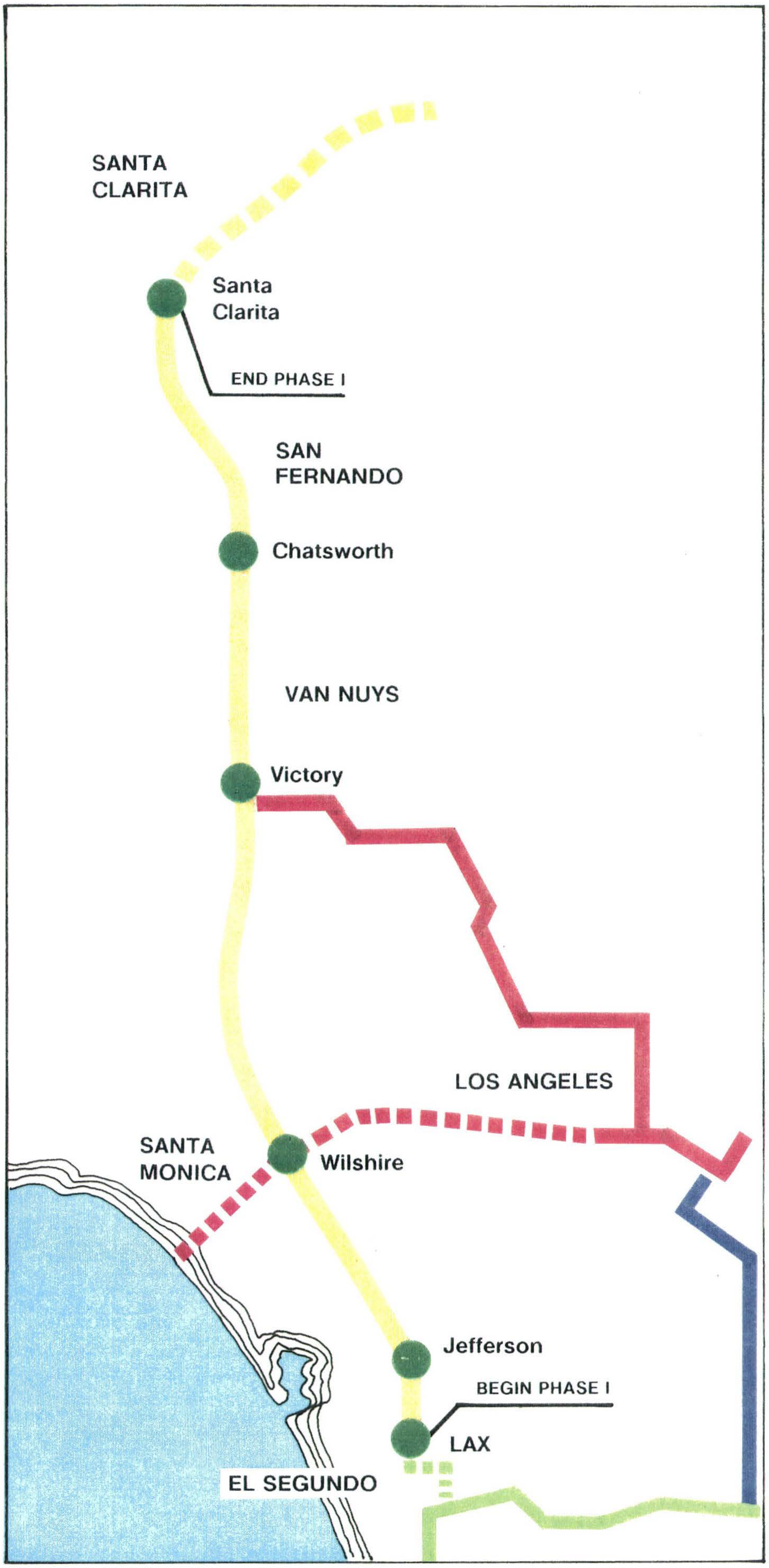
The northerly terminus of Phase I is proposed in the Santa Clarita area at the intersection of the Antelope Valley Freeway and San Fernando Road, Route 126.

Within Phase I, there are proposed stations and/or transportation centers at some freeway-to-freeway interchanges, at some major street interchanges, and at transit connections such as the Metro Rail system (Red Line) and the Norwalk-El Segundo Light Rail System (Green Line).

The transportation function of Phase I is to serve as a feeder to LAX and its nearby employment centers and to the regional rapid transit system now under development. The system will also relieve automobile traffic, diverting riders and vehicles off the crowded freeway corridors in the service area. It will interface with local bus and van services, providing the maximum possible range of opportunity for travelers to utilize on their journeys. Stations will be provided with automobile parking and with bus, van, and automobile drop-off facilities.

Phase II of the project will extend from the Santa Clarita area to the proposed Palmdale Airport, a distance of about 38 miles.

The alignment will be located within the Antelope Valley Freeway until reaching Palmdale, where it will veer east until reaching its terminus at the future Palmdale Airport. Proposed at this terminus is a major transportation center, which will also provide an interface with the high-speed train connecting Las Vegas with southern California.


SANTA CLARITA
Santa Clarita
END PHASE I
SAN FERNANDO
Chatsworth
VAN NUYS
Victory
LOS ANGELES
SANTA MONICA
Wilshire
Jefferson
BEGIN PHASE I
LAX
EL SEGUNDO

The transportation function of Phase II includes that of Phase I but incorporates the additional features of an expanded service area, linkage of the LAX and Palmdale airport facilities, and linkage to the proposed high-speed train to Las Vegas. Current planning of this high-speed train includes terminating in Anaheim but with consideration of a spur line running to Palmdale, provided there is a complementary connection from Palmdale to the Los Angeles Basin. The Perini/DMJM/HSST project provides this connection.

Phase I and Phase II will allow the existing transportation infrastructure in the service area to accommodate a substantially greater volume of travelers, with minimal impact on its surroundings. The project allows for the projected greater future travel volumes to occur, while keeping the increased person flows generally isolated from the neighboring communities.

2. PROPOSED TRANSIT SYSTEM

A maglev system, considered by many people in the public transportation field as the technology of the future, is proposed for this project. Perini/DMJM chose the HSST maglev technology for this project because of its advantages:

- Capability of high speed
- Comfortable ride
- Free of air and noise pollution and vibration
- Aesthetically attractive
- Economical, energy-efficient operation
- Reliable
- Safe
- Proven record (licensed by Japanese government for revenue operation)
- Low construction cost.

The HSST maglev vehicle is propelled by a linear motor along a track over which it magnetically floats. As there is no rail-wheel contact between the vehicle and guideway, the problems of noise and vibration associated with conventional rail systems are essentially eliminated. Due to the system's simplicity and the vehicle's light weight, a comparatively light track structure is required. It also occupies only a small amount of physical land space, standing on slender, easily constructed columns. This facilitates implementation in the available space, with minimal land encroachment problems, and also reduces the problems of visual obtrusion.

The "no-friction, no-moving parts" features of the HSST maglev allow it to operate on only a fraction of the power required by wheeled systems. Using electric power, it contributes to substantial reductions in automobile pollutants.

The HSST maglev vehicle straddles and surrounds the guideway structure, eliminating the possibility of derailment or toppling.

A central automated control system controls vehicle operations at a level of safety higher than that possible with human operators and ensures that collisions are a virtual impossibility.

The automated control, coupled with the high-performance capabilities of maglev technology, allows the system proposed here to operate efficiently at a high frequency of service and at high average speeds. The intended speeds of the maglev vehicles for this project are generally in the range of 80 to 100 mph between stations, with speeds in excess of 100 mph where there is sufficient distance for acceleration and deceleration. Average travel speed, including station stops, is in excess of 60 mph. The resulting service level is substantially superior to that achieved by conventional transit technology. Considering the state of southern California's freeways and arterials, the system will also be substantially superior to automobile travel.

3. PROJECT ALTERNATIVES

The principal objective underlying the project is to link LAX and Palmdale with an improved-capacity, improved-service mode of transportation, while simultaneously serving as an integral link in the growing Los Angeles area rapid transit system. The primary alternative choices were project vs. no-build. The alternative of not building the proposed project could result in worsening of congestion on the freeway corridors within the route as traffic volume continues to grow over the next several decades. Implementation of the project can serve to alleviate this condition by providing substantial additional person transport capacity. Thus, the decision was made to proceed with the project proposal.

Within the project alternative, there are four categories of subalternatives to be considered: alignment, mode, technology, and construction.

- Alignment — The corridor linking LAX with Palmdale is generally well defined, consisting of the I-405, I-5, and Route 14 Freeway rights-of-way. These freeways provide the space necessary for the project and, under AB 680, also provide available right-of-way. Significant alternatives were not considered feasible.

  Minor alternatives included the exact placement of the alignment within the freeway right-of-way. Once the technology and construction alternatives had been considered and decided on, the alignment alternatives were further refined. The resulting conclusion was to place the system in the center medians of the freeways to the maximum extent possible. Through the Sepulveda Pass on Route 405, some straightening was necessary to reduce curvature and increase speeds. This resulted in two alignment alternatives: one staying entirely within the Caltrans right-of-way and one making use of some adjacent City-owned land. No decision on this has yet been reached.

  At the intersection of the San Diego and Marina Freeways, the proposed alternative leaves the Caltrans right-of-way and proceeds south along Sepulveda Boulevard toward LAX. At about Manchester Avenue, the alignment veers slightly eastward and runs behind the stores along Sepulveda. An alternative to this would be to remain on Sepulveda. Possible adverse effects of this would be visual and traffic impacts on the business district of Westchester, a more severe intrusion into building restriction areas associated with the airport flight paths, and interference with plans for further extension of the Metro Rail Green Line.

- Mode — Specific goal Number III of the California Environmental Quality and Energy Conservation Goal promotes the implementation of "transportation strategies, facilities, services, and technologies to support the air quality, energy conservation, noise mitigation, and greenhouse effect prevention goals and to improve and preserve our community and natural resources."

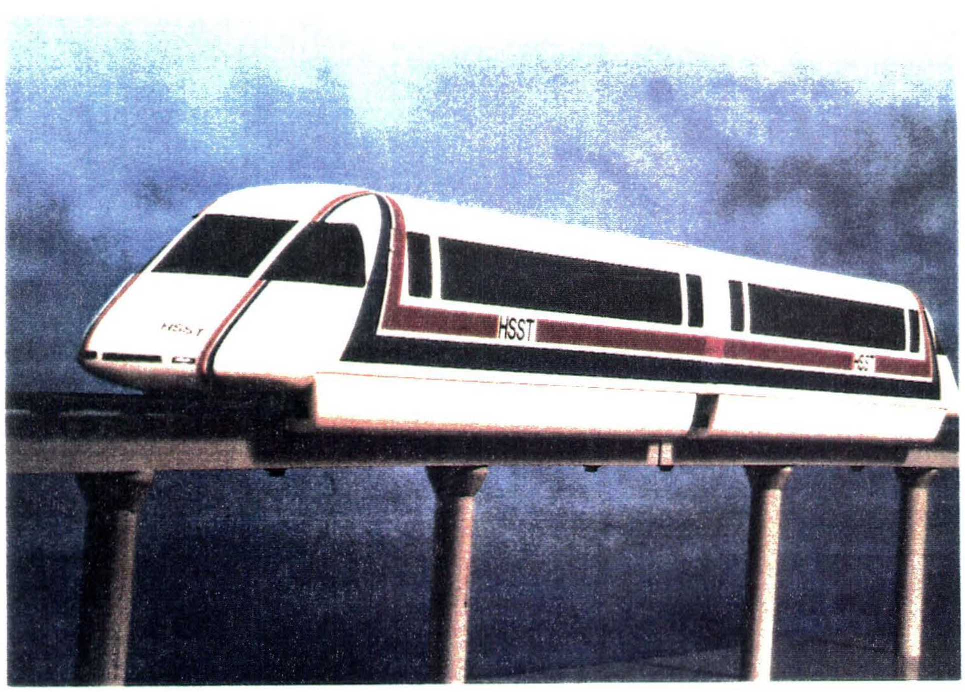
  Two mode alternatives were considered: automobile and transit. Of these, transit was considered to better support the achievement of the above goal. In addition, transit provides superior support to other specific goals of this group, including II (economic prosperity), IV (land use), V (mobility), and VI (equity). Hence, transit was selected as the modal alternative of choice.

- Technology — There are three general groupings of technology alternatives: bus, rail, and new technology. Bus and rail systems both suffer from problems of sizable structures and unsatisfactory performance as compared to the new technologies available. Other concerns related to bus and rail involve noise, vibration, and visual appearance issues; in the case of bus transit, pollution must be considered.

  Among the new technologies, magnetically levitated (maglev) systems were considered to combine the desired features of low noise, low vibration, high performance, and small structures, resulting in reduced visual impacts and construction costs.

  Of the commercially available maglev systems, the 200 series offered by the HSST Corporation best meets the perceived requirements of speed, accleration, safety, and comfort, while maximizing the environmental benefits. This is the chosen technology alternative.

- Construction — Since this is a privatized project, capital cost control is of primary consideration. The alignment chosen does not generally have sufficient room for the lowest cost mode of construction (at-grade). Hence, the next lowest cost alternative is chosen: elevated. The underground alternative, tunneling, would be prohibitively expensive and was rejected along the entire route.



B. SYSTEM DESCRIPTION

1. ROUTE ANALYSIS

The following discussion relates to Phase I of the project, from LAX to Santa Clarita.

Beginning at Parking Lot C of LAX, the system route proceeds north to about Manchester Avenue and then joins and follows Sepulveda Boulevard to the San Diego Freeway. The route then proceeds north onto the Golden State Freeway and finally onto the Antelope Valley Freeway, ending at San Fernando Road in the Santa Clarita Valley. Alignment of the system is mostly within the freeway right-of-way and in the center of the freeway median.

Six stations are proposed for the initial construction of the 31.5-mile route (Phase I): the LAX Station, to be located in LAX Parking Lot C; the Jefferson Station, to be located in the vicinity of Jefferson Boulevard and Centinela Avenue; the Wilshire Station, to be located at Wilshire Boulevard; the Victory Station, to be located just south of Victory Boulevard; the Chatsworth Station, to be located at Chatsworth Boulevard; and the Santa Clarita Station, to be located at San Fernando Road.

At the Wilshire, Victory, and Santa Clarita Stations, the station platforms will be in the freeway median. Access to and from station areas to the platforms will be via a pedestrian walkway above the freeway.

At the Jefferson and Chatsworth Stations, the Station platforms are located to one side of the freeway. The alignment will leave the freeway median and enter the stations directly.

Plan and profile drawings of the alignment are included in Volume 4 of this proposal.

1.1. LAX to Jefferson

Distance (ft) — 13,500
Travel Time (min:sec) — 3:24

Located in Lot C, the LAX Station will be the beginning of the system alignment. It will also interface with other proposed transit systems: the Metro Rail Green Line and an intra-airport transportation system.

From the LAX Station, the system alignment exits Lot C, crosses through several parking lots behind the Westchester business district, and then proceeds to the corner of Manchester Avenue and Sepulveda Boulevard, where it moves into the center of Sepulveda Boulevard. The alignment then proceeds along the center of Sepulveda Boulevard, just past Centinela Avenue, where it then parallels the San Diego Freeway (I-405) and crosses the Centinela Creek Drainage Channel. Within the area of freeway right-of-way, bordered by Centinela Creek, the San Diego Freeway, and the Marina Freeway, is the site of the Jefferson Station.

1.2. Jefferson to Wilshire

Distance (ft) — 30,500
Travel Time (min:sec) — 4:36

After leaving the Jefferson Station, the system alignment ascends to pass over the Marina Freeway interchange and enters the San Diego Freeway median. The alignment continues along the freeway median until National Boulevard, at which point it crosses to the east side of the freeway and proceeds to pass over the Santa Monica Freeway interchange, while staying within the freeway right-of-way.

Again crossing the freeway and reentering the median, the alignment reaches the Wilshire Station. At the Wilshire Station, the system stops at a platform on the freeway. This platform is for access to and from the train only. Purchasing of tickets and other station duties will be performed in buildings adjacent to the freeway. A pedestrian walkway will link the two facilities.

1.3. Wilshire to Victory

Distance (ft) — 50,000
Travel Time (min:sec) — 7:17

The system continues north in the median to the vicinity of Getty Center Drive at the foothills of the Santa Monica Mountains. Between Getty Center Drive and Rimerton Road, the alignment crosses back and forth across the freeway to straighten out the alignment and thereby increase the speed at which the trains travel through the Sepulveda Pass.

An alternative is to use as much of existing State and City right-of-way as possible, to keep crossing over the freeway at a minimum. Tunneling through the hills was considered too expensive an alternative.

By the time the system reaches Rimerton Road, the alignment is again back in the median. Passing over Rimerton Road, it continues to follow the median under the Mulholland Boulevard overcrossing to the San Fernando Valley.

Passing over the Ventura Freeway, the system enters the Victory Station terminal located in the freeway median. As with the Wilshire Station, a pedestrian walkway would connect the train platform to the Victory Station. The Victory Station is located on the east side of the San Diego Freeway and would interface with the proposed Metro Rail Red Line.

1.4. Victory to Chatsworth

Distance (ft) — 31,800
Travel Time (min:sec) — 5:08

Just north of Devonshire Boulevard, the alignment crosses to the west side of the San Diego Freeway, where it parallels the freeway until it reaches the Chatsworth Station. The Chatsworth Station is located in the triangular area bordered by the southbound Simi Valley and San Diego Freeway connectors.

1.5. Chatsworth to Santa Clarita

Distance (ft) — 40,625
Travel Time (min:sec) — 6:54

Immediately after leaving the Chatsworth Station, the system ascends to pass over the Simi Valley Freeway (Route 118). After passing the San Fernando Mission Boulevard overcrossing, the alignment again reenters the freeway median and follows the freeway alignment until the Golden State Freeway (I-5) is reached. The system continues north along the Golden State Freeway median.

Continuing north, the alignment passes over the Foothill Freeway (I-210) interchange and the Balboa Boulevard overcrossing.

As the alignment nears the Antelope Valley Freeway (Route 14), the system crosses the northbound lanes to the east side of the Golden State Freeway, where it then parallels the northbound connector to Route 14. Once past the interchange, the alignment enters the median and follows Route 14 to the terminal station at San Fernando Road. This terminus, at Santa Clarita, is a median design, with the train platforms in the median and the actual station off the freeway.

The Santa Clarita Station will include a maintenance facility for the system.

The alignment will generally be located in the freeway median. In areas where available median width is substantial, a construction system using concrete columns and guideways on pile foundations will be used. Where median space is constrained, a steel column/steel guideway system with drilled shaft foundations will be utilized to minimize the amount of space and the number of foundation sites required. Through the Sepulveda Pass, the alignment has less curvature than the freeway median. This results in the freeway weaving back and forth under the alignment and necessitates some bent structures in this area.

In all cases, the construction will be designed so that it does not reduce the number of available freeway lanes for roadway traffic. Also, it will not constrain the existing plans for widening of the freeways, to allow for the provision of additional traffic lanes.

2. FUTURE EXTENSIONS

Phase II will extend the system line from the Santa Clarita Valley to the proposed Palmdale International Airport. The routing for this extension will be to continue in the median of Route 14 to the City of Palmdale. Planning activities in Palmdale have identified an approach corridor from the freeway to the Palmdale International Airport. It is anticipated that the maglev system will depart from the freeway and follow this approach route to the airport. Timing of this extension will depend on the development of the airport and/or the implementation of a Palmdale connection for the Los Angeles-Las Vegas high-speed rail connection.

3. SERVICE

The proposed system will operate at a high level of service. During the peak periods of the day, trains will be spaced at 3.5-minute intervals. Schedules for the remainder of the day will be tailored according to demand. The highly efficient nature of the maglev vehicles and the automated control of the trains means that there is little cost penalty in operating a substantial portion of the fleet for a large part of the day. The absence of on-board drivers allows for substantial changes in operating fleet to be made rapidly, efficiently, and economically.

The high speeds of the system result in relatively short travel times. Assuming a 30-second dwell time at stations, the following trip times result:

From the Santa Clarita Station (northern terminus) to:

Station	Minutes:Seconds
Chatsworth	6:54
Victory	12:32
Wilshire	20:19
Jefferson	25:25
LAX	29:19

In other words, the projected travel time from one end of the line to the other, including station stops, is just under 30 minutes. This is an average service speed in excess of 60 mph. A fleet of 44 vehicles, operating in two-car trains, is required to provide this service. This figure includes vehicles in maintenance and standby.

The service quality assumes maximum accelerations and decelerations of 0.1g and maximum jerk levels of 0.1g/sec, consistent with conventional ride quality standards.

The fleet as proposed provides a capacity of approximately 3,400 persons per hour per direction. This could be increased to as high as 12,000 persons per hour per direction for the Phase I system by enlarging the fleet, allowing the operation of four-car trains at 2-minute headways. The total fleet in this case would be about 144 vehicles. The station platforms are being built to accommodate trains of this length, and the vehicle storage and maintenance yard is being sized to support this fleet size. Such expansion of capacity will depend on demand.

4. RIDERSHIP

A sketch-planning approach was taken to developing ridership estimates at the conceptual level for this project. The procedure used in the patronage model follows the general methodology commonly used in the engineering profession for transportation demand forecasting. The analysis includes four general steps: trip generation, trip distribution, mode split, and trip assignment. Trips generated in the study area are distributed between zones based on relative attractiveness and travel times between origin zones and destinations. Trips are then assigned to the network to produce estimates of passenger trips on each segment of the line. The computer processing was accomplished using the EMME/software system on a microcomputer.

4.1. Model Components

The ridership model involves the interaction of various data sets and processes:

- **Transit System Network,** which is a description of the proposed transit system, including the feeder bus system
- **Roadway Network,** which is a description (speed, distance, connections, and capacity) of the major roads in the region
- **Traffic Analysis Zone System,** which represents the origins and destinations of travel within the region
- **Trip Generation,** which quantifies the amount and type of travel based on socioeconomic information
- **Trip Distribution,** the estimate of how many trips travel from one zone to another
- **Mode Split,** the assignment of trips to either transit or auto
- **Traffic Assignment,** the allocation of trips to travel paths.

4.1.1. TRANSIT AND ROADWAY NETWORKS

The transit and roadway networks are a computerized representation of the two systems within the study area. Although it is theoretically possible to represent almost all regional road systems in the network, only the freeways are included in this model. The analysis began with the complete SCAG regional highway network and then focused on a consolidated portion of the model in the areas generally west of downtown Los Angeles.

The networks are fundamental inputs to the model and are used in two parts of the modeling process. They are first used in the trip distribution step to determine the travel time between any two zones of the study area. Second, they are used in the mode choice process to determine path selection for trips between any two zones within the rail catchment area.

Due to the time constraints associated with the development of the proposal's passenger forecasting model, it was not feasible to conduct both capacity-constrained highway forecasts and transit assignments as input to the mode split model. An abbreviated approach was utilized whereby a static set of highway speed assumptions was input to the model so that the mode choice decision could be made by comparing auto travel times on the highway network at these assigned speeds vs. traveling by train.

Roadway speeds are estimated for each network link based on its characteristics. In this model, five speed classifications were adopted. These speeds replicate future projected conditions during the peak hour based on the level of congestion forecast by SCAG in the 2010 Regional Mobility Plan. The initial assumptions for the five generalized zones of the highway network were:

- Los Angeles CBD — 10 mph
- Los Angeles Metro Core — 20 mph

- Urbanized area between I-405, I-710, and I-210 — 30 mph
- Peripheral areas — 45 mph
- Palmdale/Lancaster — 40 mph.

Intrazonal travel time was estimated to be one-half the time to the nearest zone.

4.1.2. TRAFFIC ANALYSIS ZONE SYSTEM

The SCAG model study area is split into 1,527 zones. For purposes of this evaluation, the zone system was aggregated to 58 zones to maintain manageability and because many of the SCAG zones are far removed from the project (i.e., San Gabriel Valley and Orange, Riverside, and San Bernardino Counties) and were not expected to contribute passengers on the train.

The zone boundaries were designed so that all the land uses in the zone have similar access patterns to the major roadway links. Zone boundaries are generally determined by geographical barriers such as rivers, railroad tracks, and freeways. In addition, the major streets in the road network are often used to define zone boundaries. Wherever possible, road network links run at the edges of zones rather than across zones. This allows for more accurate estimates of access patterns to the road system. The zones are generally smaller in size where land use density is higher, while larger zones are set up for the more rural edges of the study area. Each zone is connected to the regional network via a zone centroid connector to reflect the local street access system. Catchment area zones are also connected to the stations via park-and-ride and transit links and, where appropriate, walk access.

4.1.3. TRIP GENERATION

The trip generation step quantifies the total magnitude of travel ("trip ends") generated in each zone in the study area, based on socioeconomic data (population and employment) within the zone. Each type of land use is associated with a certain number of trips. A trip (or trip end) in this case is defined as a one-way movement. For example, a car that enters an office building parking lot and then leaves some time later would account for two vehicle trips. Trip generation rates are generally based on an average of actual counts of vehicles entering and exiting at buildings with known square footage of buildings.

4.1.4. TRIP PURPOSES

Only home-based work trips and trips to Los Angeles International Airport were considered in estimating system patronage.

For purposes of modeling trip generation and distribution, trips are defined in terms of trip productions and attractions. Trip productions are defined as the home end of any home-based trip, regardless of whether the trip is directed to or from home, or the origin of any nonhome-based trip. Trip attractions are defined as the nonhome end of a home-based trip, or the destination end of a nonhome-based trip. For example, a typical commute round trip from home to work and back in the evening represents two separate home-based work trips, and corresponds to two work trip end productions (in the home zone) and two trips end attractions (in the work zone). Prior to trip assignment, the productions/attractions format is converted to trip origin/destination format to replicate legs of the trip.

For purposes of transit patronage forecasting, the home-to-work trips are the trips forecasted and assigned to the network. During peak hours, these are the predominant trip types. In forecasting total regional transit trips, SCAG and SCRTD have determined that home-based work trips represent only 45 percent of the total daily transit trips made in the region. Rather than separately assigning other types of trips to transit, the bus patronage has been forecast by factoring up the peak-hour, home-based work assignment by a factor of 2.2 to represent total daily transit ridership.

In forecasting rail patronage (i.e., Metro Rail, light rail, commuter rail), SCAG and SCRTD have typically not factored up the home-based work trip assignments. This is to reflect the rail systems' tendency to operate primarily as a commuter system, whereas many of the bus transit trips in the region are made by transit dependent persons for shopping, school, and other types of trips. Given the nature of the service provided by the proposed system, it was assumed that the base system ridership would also be primarily related to home-to-work trips, not trips by transit dependent persons. Therefore, the peak-hour home-to-work trips were not factored up to reflect other trip purposes.

There is substantial potential, however, for other categories of trips. The system's Wilshire Station is in close proximity to UCLA, for example, and it is likely that promotional or student fares could be used to market school-oriented trips (i.e., home-based school trips). Successful capture of significant quantities of such other trips could provide a substantial increase to project revenues. Thus, the present analysis is believed to be conservative on this issue.

Trip Distribution

The trip distribution process estimates how many trips travel from one zone to another. Trip distributions are based on the productions and attractions in each zone and the likelihood of travel between the zones.

The trip distribution equations for this model are as follows:

Pi*(Aj*2ttij/SUMj(Aj*2TTij)) for travel time < 120 minutes

Pi*(Aj*3ttij/SUMj(Aj*3TTij)) for travel time > 120 minutes, where

Pi = productions originating in zone i
Aj = attractions for destinations to j
2ttij = travel time from origin i to destination j to the inverse square
3ttij = travel time between i and j to the inverse cube
FFij = Friction Factors for trips between i and j, = Aj*2ttij or Aj*3ttij

The inputs to the gravity model include productions and attractions for each zone as defined by the trip generation step, friction factors which define the effects of travel time zonal attractiveness.

Mode Split

The mode choice model utilizes a demand function based on cost expressed in terms of marginal utility. Marginal utility is defined as the difference in disutility, or perceived cost of travel, between the transit and auto modes. Disutility may be expressed in terms of money or time. In this model it is expressed in minutes.

The marginal utility equation used in the model is as follows:

MU = 200 + (2.5*TA+2.5*TW+TR+F/0.25I)-(2.5*AT-AR-(AO+AP)/0.25I), where
MU = Marginal Utility
TA = Transit access
TW = Transit wait time
TR = Transit running time
F = Transit fare
AT = Auto terminal time
AR = Auto running time
AO = Auto operating cost
AP = Auto parking costs

The conversion of costs to equivalent minutes is done by dividing the money value by the trip makers' perceived value of time (i.e., cents per minute). The perceived value of 1 minute of time has been shown statistically to be one-quarter the zonal median household income, expressed in cents per minute.

Results

The patronage projected by the model was judged to be higher than might be expected for purposes of a conservative analysis. Therefore, it was reduced by subtracting short trips, particularly trips that used only one link. Further reductions were made to bring the parking capacity being proposed at the various stations with the volumes using those stations.

Based on the development concepts, estimates were made of the ridership that might be derived from the joint development activities. These figures were assumed to start at a low level and increase yearly as more of the development is put in place. The resulting ridership is assumed as follows:

- Nondevelopment-induced: 55,000 ADT in 1995, increasing at a 1-percent yearly rate. Average trip length is 9.3 miles.
- Development-induced: 2,000 ADT in 1997, increasing by 2,000 per year until the year 2001, when it increases by 2,500 and thereafter holds constant at a value of 12,500. Average trip length is assumed to be 9.3 miles.

The general conclusion is that conventional mode choice models, such as that used here, are not appropriate for premium-fare, high-speed systems that rely heavily on transfer between autos and transit. Further work will be necessary on this vital question in subsequent phases of the project.

5. RIGHT-OF-WAY

The station sites proposed for this project will involve substantial amounts of development and construction of automobile parking. The intent is to place these as much as possible on Caltrans right-of-way. The Jefferson Station, located at the intersection of the San Diego and Marina Freeways, will have both parking and development. The same situation will exist at the Wilshire and Victory Stations. The Chatsworth and Santa Clarita Stations are expected to focus primarily on auto parking, with little opportunity foreseen at this time for significant commercial or residential development relevant to the project. In addition, the Santa Clarita Station will house the storage and maintenance yard and the operations control center.

The LAX Station, being on airport property, does not require Caltrans right-of-way.

In addition, a concept has been developed for a roving platform development, wherein a structure would be built directly over the freeway right-of-way with access from adjacent surface streets. Such structures would not necessarily be directly associated with the various transit stations, but could instead be free-standing relative to the system. Their relevance to the project would be the revenues they would generate to assist in defraying project costs. Although exact sites for such roving platforms have not yet been established, current project planning envisions at least two of these within the project extent.

To accommodate these developments, station structures, and the system guideway, the right to access to all Caltrans right-of-way along the system will be necessary. This includes all right-of-way associated with interchanges between the freeways through which the alignment runs and crossing freeways and highways. Particularly, the interchanges at the following locations — San Diego/Marina Freeways, San Diego Freeway/Wilshire Boulevard, San Diego/Simi Valley (118) Freeways, and Antelope Valley Freeway (Route 14)/San Fernando Road — are necessary for project implementation. Where Caltrans has approved or established a prior use for any of these areas with other parties, appropriate arrangements will need to be made to either compensate these other parties for their loss of such area or involve them cooperatively into the project activities. No such arrangements have yet been initiated by the project.

The southern end of the project leaves Caltrans right-of-way and traverses local streets and highways, potentially crossing private property. The consortium will need to develop appropriate agreements with these property owners and the local public bodies regarding access to these areas.

It is anticipated that, for the most part, interference with local utilities will be relatively minor and limited in nature. In areas of overhead high-tension power lines, it is expected that vertical clearance will be sufficient. There may be cases, however, where detailed design indicates an insufficient degree of vertical clearance. In such cases, the options for the project will be to either elevate the power lines further, realign them, or place them underground.

Access into LAX property will require coordination with and approval from the airport and perhaps the FAA. Although the alignment has been chosen to eliminate or minimize intrusion into building restriction zones associated with flight paths, interaction with aviation officials will be required.

C. TECHNOLOGY DESCRIPTION

1. INTRODUCTION

"Silky ride" were the first words spoken by the Princess of Wales when she stepped off the vehicle of the HSST (High-Speed Surface Transport) in Vancouver Expo '86. This was a unique but suitable expression for the transport of the new era. This revolutionary transportation system provides state-of-the-art technologies superior to those of conventional transit systems.

- The maglev vehicle has no wheels.
- It is levitated by magnetic force and propelled by linear motors, not by conventional rotary motors.

The system also offers the following advantages:

- The most comfortable ride of any surface transportation system
- No air or noise pollution
- Aesthetic attractiveness
- Cost effectiveness
- Reliability
- Safety
- Wide range of speed applicability
- Reduced energy consumption.

1.1. Ride Comfort

Very little noise or vibration is apparent while riding the vehicle. By controlling the magnets, vehicle yaw is eliminated. This provides a smooth and comfortable ride.

1.2. Air and Noise Pollution

Unlike conventional wheeled vehicles, the maglev produces almost no noise or vibrations. This means a tranquil atmosphere both within the vehicle itself and in its surrounding environments. It makes night operations in residential areas feasible and possible.

1.3. Aesthetics

The HSST's elevated track offers light and simple structures with comparatively slim beams and pillars, making the system aesthetics adaptable and acceptable to the urban landscape and modern environment.

1.4. Cost

The track structure will contribute to construction costs lower than those of other conventional transportation systems.

As for operating and maintenance cost, HSST maglev has an advantage over conventional transit systems because of its energy-saving characteristics and low maintenance.

The levitated maglev system does not physically contact the track over which it runs. Thus, it does not wear or damage the track, resulting in low track maintenance cost. Due to the absence of rotary equipment such as wheels and rotary motors, the maglev vehicles require less maintenance than do conventional transit systems.

1.5. System Reliability

Having fewer moving parts, the HSST maglev system is less susceptible to component and system failures.

1.6. Safety

The vehicle body interlocks with the rail. Therefore, in contrast to conventional rail systems, derailment or toppling cannot occur.

Even if the power for levitation is lost through a power outage or other reason, an on-board storage battery enables continuation until a stop is reached.

The vehicle is equipped with regenerative braking by the linear motor and with a hydraulic friction brake system. Additionally, as a last resort, it can stop floating and glide safely back down onto its track to a halt. Hence, the system is provided with a triple-redundancy braking system.

1.7. Range of Speed Applicability

Like conventional transit systems, the HSST system can utilize lower speeds. It can also be utilized as a high-speed transportation system, with speeds greater than 120 miles per hour.

1.8. Energy Consumption

Unlike conventional railroad transit systems, the HSST maglev has no rolling resistance. It exerts very low resistance to the forward motion and thus consumes less energy.

2. BASIC PRINCIPLES

2.1. Levitation

Ordinary direct-current electromagnets attached to the bottom of the fuselage lift the vehicle upward toward a steel rail. See Figure 2-1.

A gap sensor measures the air gap between the rail and magnets. If the gap is greater than a target value, current flow to the electromagnet is increased by an amplifier to increase the magnet's attraction force, thereby bringing the magnet and rail closer together. If the gap is smaller than the target value, the current to the magnet is reduced, allowing the gap to enlarge to its proper size.

The current of the magnet is controlled to maintain the gap target value of 3/8 inch. See Figure 2-2.

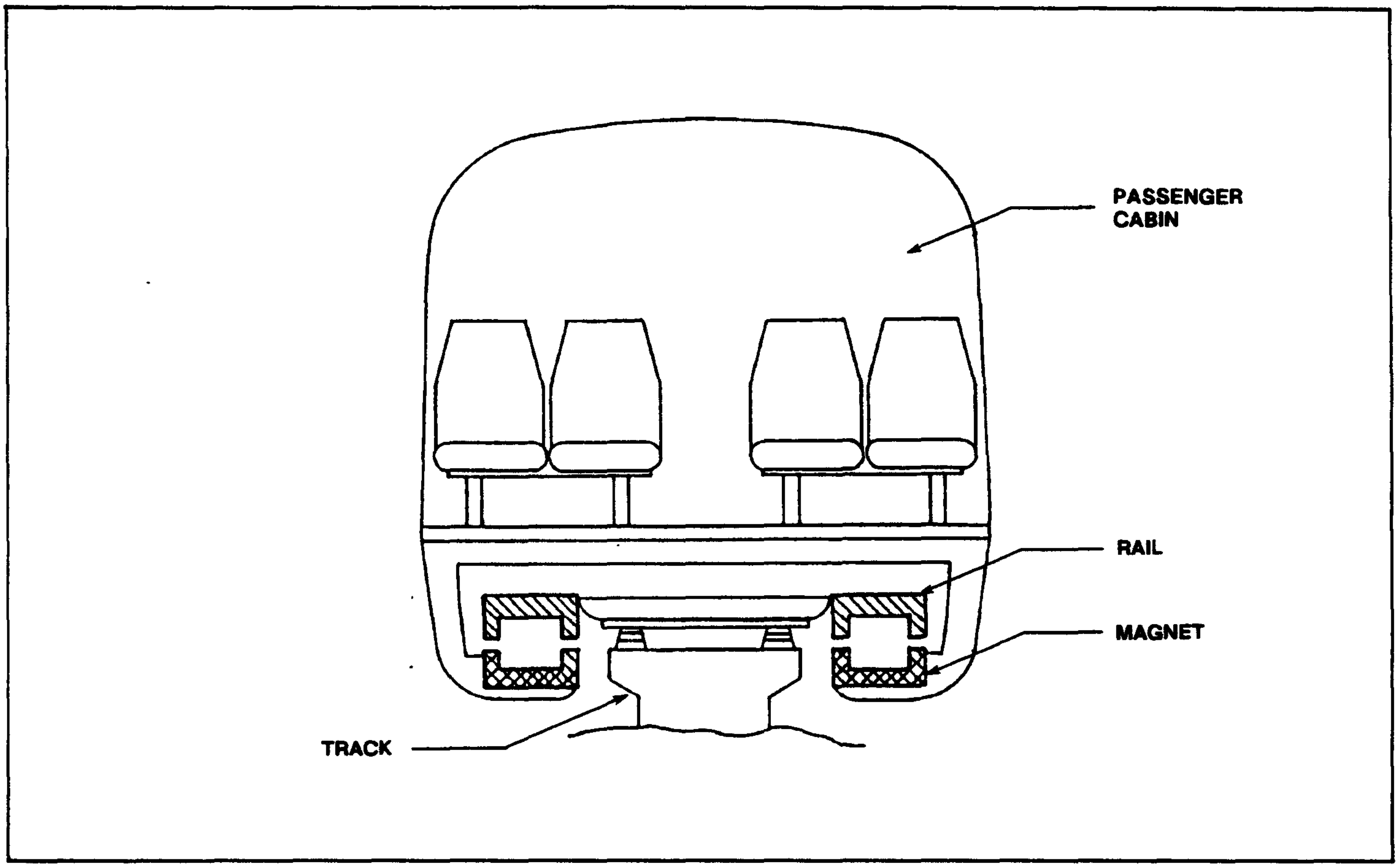


Figure 2-1
PRINCIPLE OF LEVITATION

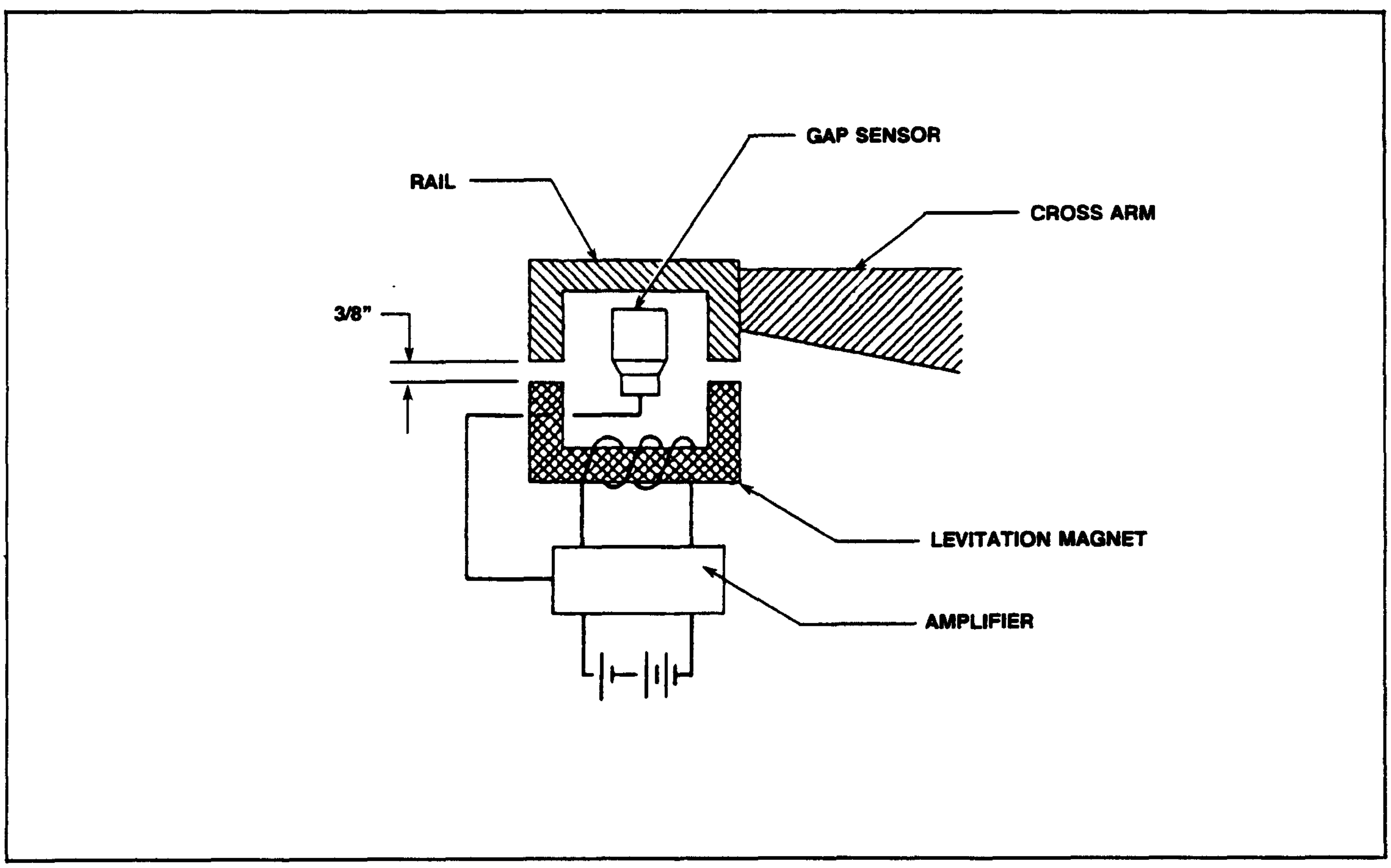


Figure 2-2
PRINCIPLE OF LEVITATION (2)

For lateral guidance the inverted U-shaped rail and magnets produce a natural steering force.

2.2. Propulsion

A single-sided linear induction motor (SLIM) is used for propulsion. The primary coil of the motor is attached to the vehicle body, and the secondary side (reaction plate) is attached to the track surface. The principle of this linear motor is the same as that of a conventional rotary induction motor. When three-phase alternating current is provided to the primary side, it generates a field of magnetic waves traveling along the length of the motor. This induces a current to flow in the reaction plate. The interaction between the magnetic flux and the induced current generates the propulsive force. See Figure 2-3.

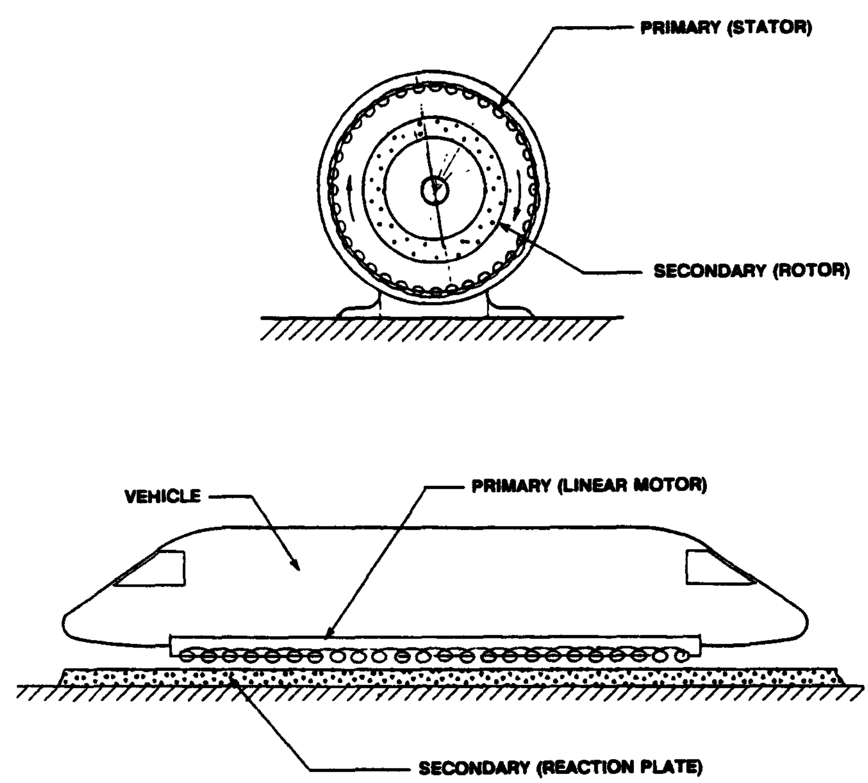


Figure 2-3
PRINCIPLE OF PROPULSION

A conventional rotary motor transmits its rotation via various transmission gears to change it into driving power, while a linear motor changes its generating power directly into driving power, having no rotating section such as reduction or transmission gears.

To control the speed of this linear motor, the supplied voltage and its frequency are varied. This allows for smooth acceleration of the vehicle and provides comfortable travel. Maintenance cost is also reduced because of the absence of rotating or friction parts.

2.3. Arrangement Methods of Magnets and Linear Induction Motor (LIM)

The magnets and motors are mounted in a series of modules under the vehicle body, as shown in Figure 2-4. These modules are independently connected to the body by an air-spring suspension system. This has the following advantages:

- The vehicle load is evenly distributed, reducing the required strength of vehicle and track and reducing the weight and cost.
- Independent suspension of the modules improves the trackability of magnets and the ride quality of the vehicle.
- The arrangement of the LIM with magnets allows minimization of the air gap of the LIM, thus improving its efficiency.
- Combination of functions for levitation, guidance, and propulsion into one rail assembly minimizes construction and maintenance costs.
- Continuous configuration of magnets and LIMs reduces levitation magnetic drag and LIM end effects.
- Operational reliability is increased in case of magnet failure.

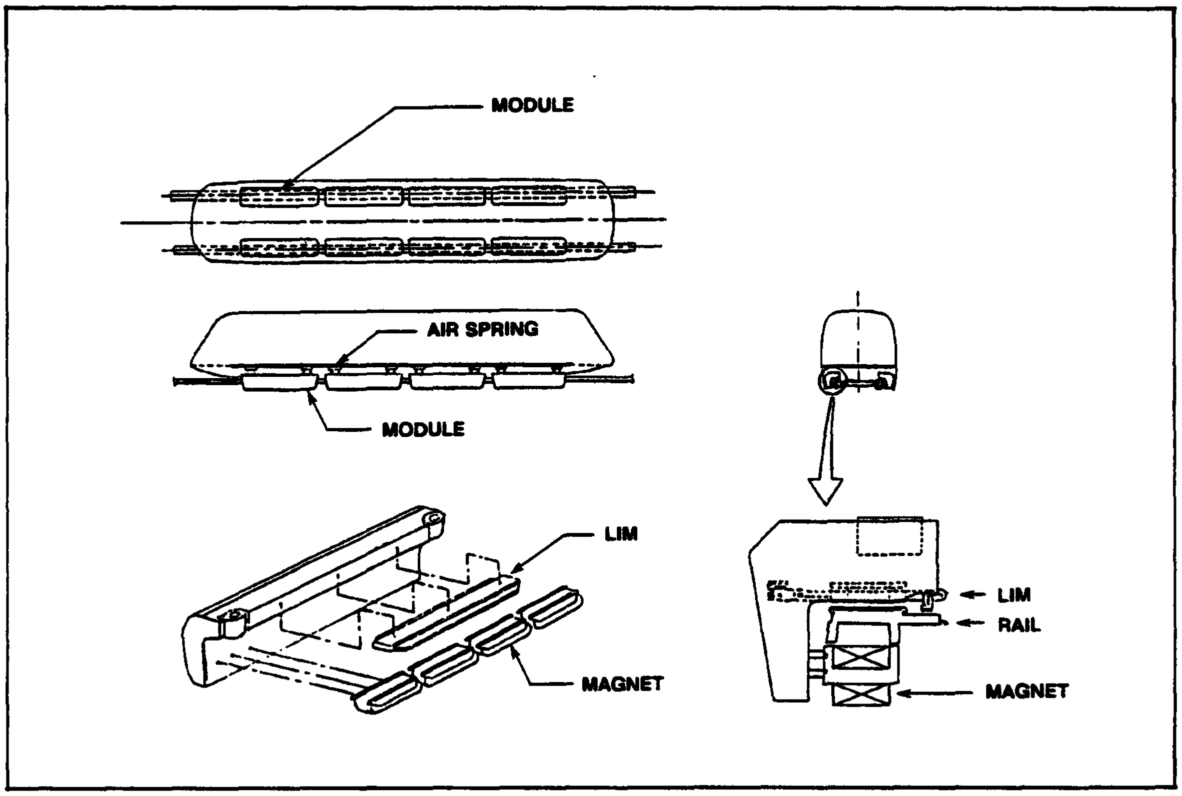


Figure 2-4
MODULE SYSTEM

3. DEVELOPMENT AND EXPERIENCE

Five different types of HSST vehicles have been previously developed and built: HSST-01, -02, -03, -04, and -05. These systems have been through rigorous tests and exhibitions, as indicated in Figure 3-1.

HSST-01 was constructed in 1975 for use in basic experiments at a high speed of 186 mph (300 kph) and attained the maximum speed of 191 mph (307.8 kph) in 1978. No passenger-carrying ability was provided. See Figures 3-2 and 3-3.

HSST-02, a test vehicle with secondary suspension and passenger-carrying ability, was constructed in 1977. The length of the experimental track was so short that HSST-02's maximum speed was limited to 75 mph. However, open runs were conducted between intervals in experiments, and a total of 3,000 passengers had a trial ride. Basic experiments using the HSST-01 and HSST-02 models were successfully completed in 1981. See Figure 3-4.

HSST-03 was constructed in 1984 for exhibition runs in international exposition in Canada and Japan. During both expositions, a total of 1.08 million people experienced a comfortable ride in a magnet levitation vehicle. See Figures 3-5 and 3-6.

The HSST vehicle has few rotating parts such as wheels, motors, etc., which wear out. Therefore, vehicle maintenance requirements were few, and high operational reliability was attained in both expositions.

Additionally, due to the levitated operation of the vehicle, the track was virtually maintenance-free during the 6-month period of each exposition. Since these expositions, the HSST-03 has been on continuous exhibit open to the public in Okazaki City, Japan.

HSST-04, Type 200S, was built in 1987 and expositioned for a period of 3 months in Saitama, Japan, in 1988. See Figure 3-7. This vehicle was very popular among exposition visitors due to its simple, slender, and aesthetically attractive elevated guideway and its quiet and smooth rides. Long lines formed at the ticket office daily.

HSST-05, Type 201S, was built in 1988 and operated in an exposition in Yokohama, Japan, from March 25, 1989, through October 1, 1989. This vehicle is similar in appearance to the vehicle being proposed for this project. See Figures 3-8 and 3-9.

On April 30, 1988, HSST Corporation obtained a license for this business from the Government of Japan.

Currently, the HSST development efforts have culminated in three families of vehicles: the -100, -200, and -300 series. The -100 system has a top speed of approximately 60 mph (100 kph) and is designed to play an urban transit role, such as light rail or metro service. The -200, with a top speed in the range of 125 mph (200 kph), is focused at longer haul commuter types of service. It is the system base for this proposal. The -300, with a top speed of about 180 mph (300 kph), is intended for intercity, long-distance service.

PERINI/DMJM/HSST

August 1, 1990

Mr. Carl Williams
Office of Privatization
California Department of Transportation
1120 N Street, Room 1100
Sacramento, California 95814

Subject: Toll Revenue Transportation Project Proposal

Dear Mr. Williams:

The Perini/DMJM/HSST Consortium is pleased to submit this proposal to the California Department of Transportation for consideration under the Toll Revenue Transportation Projects program established by the provisions of Assembly Bill No. 680. This proposal is divided into four volumes:

- Volume 1 — EXECUTIVE SUMMARY
- Volume 2 — DESCRIPTION OF PROPOSER
- Volume 3 — TECHNICAL PROPOSAL
- Volume 4 — ALIGNMENT AND STATION DRAWINGS.

The project proposed herein is for a rapid transit link between the Los Angeles International Airport (LAX) and, ultimately, the proposed Palmdale Regional (or possibly International) Airport. The project will be staged in two phases. Phase I, the focus of this proposal, will be built between LAX and the Santa Clarita area, utilizing the Route 405, 5, and 14 Freeway corridors. Phase II will extend the project from the Santa Clarita area to Palmdale using the Route 14 Freeway corridor.

The technology being proposed by the consortium for this project is the most advanced transit technology available in the world today: a magnetically levitated (maglev) system developed by consortium member High-Speed Surface Transport (HSST) Corporation. This environmentally beneficial technology provides substantial benefits in terms of reduced noise, vibration, and visual intrusion and improved performance and efficiency, in comparison to conventional rail transit technology.

75 Broadway, Golden Gateway Commons, San Francisco, California 94111 • 415/981-8880

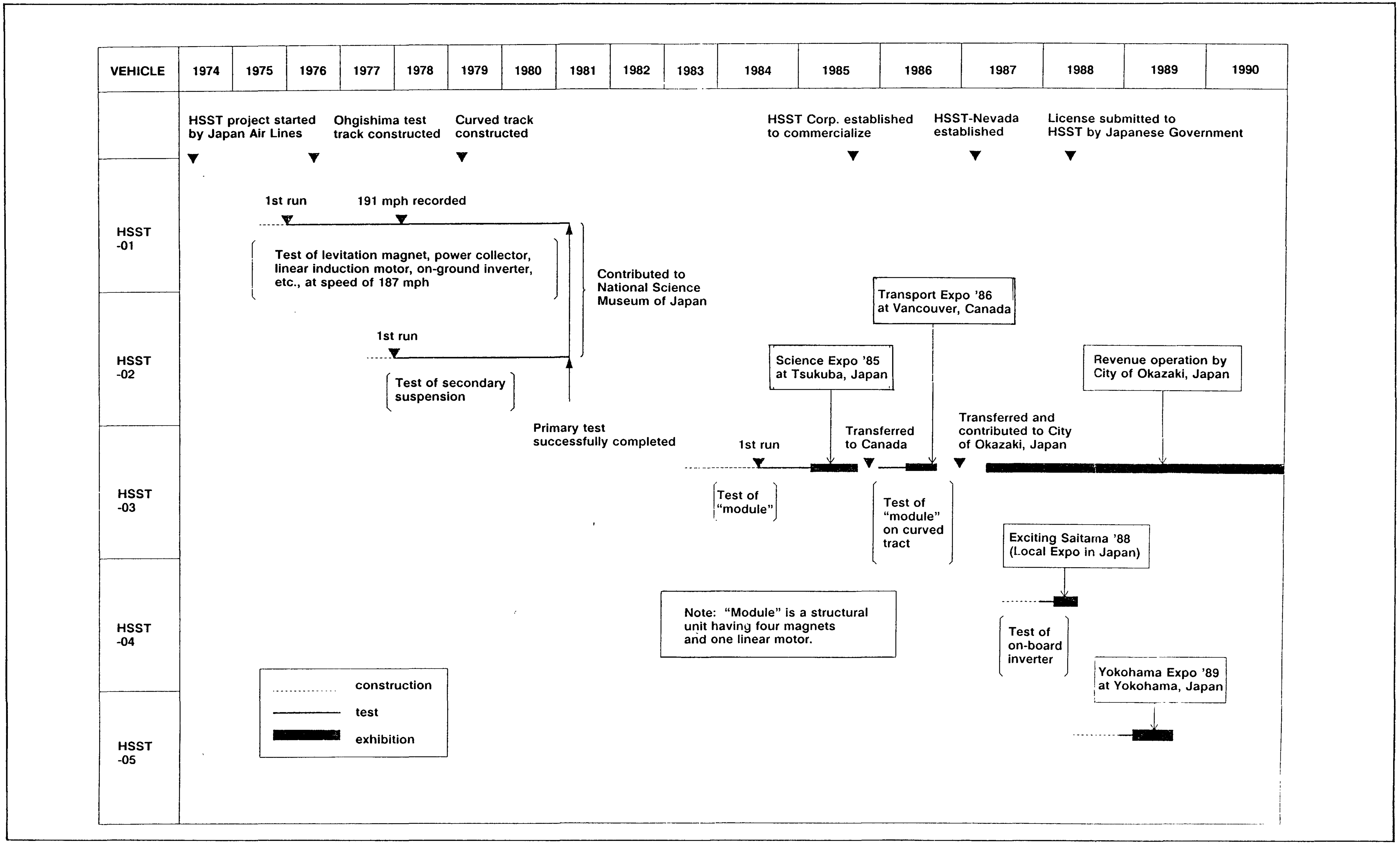


Figure 3-1
DEVELOPMENT OF HSST

Figure 3-2
A RECORD OF HSST DEVELOPMENT (II)

HSST-01 Records a Speed of 307.8 Kilometers per Hour

Only two years and two months after its successful magnetically levitated test run, the HSST-01 recorded a speed of 307.8 kilometers per hour. JAL's target speed of 300 k.p.h. was satisfied on a 1300-meter test course built on reclaimed land in the city of Kawasaki.

Figure 3-3
A RECORD OF HSST DEVELOPMENT (III)

HSST-02 Completes Run on 280m. Radius Curved Track

In February, 1979, both HSST's the 01 and the 02 were tested on a curved and inclined test track. The test run proved that fundamental technical problems related to levitation and guidance systems in practical operation had been solved.

Figure 3-4
A RECORD OF HSST DEVELOPMENT (V)

HSST--Expo '85

Based on the established engineering, the HSST-03 was demonstrated to the public at the Tsukuba Science Expo '85. The HSST-03 is capable of carrying 50 Expo visitors at one time.

Figure 3-5
A RECORD OF HSST DEVELOPMENT (VII)

Figure 3-6
A RECORD OF HSST DEVELOPMENT (IX)

HSST-04 (70-seat) & Track
in Saitama Exposition
(March 19- May 29, 1988

HSST-04 (70-seat) & Track
in Saitama Exposition
(March 19- May 29, 1988

Figure 3-7

Figure 3-8
HSST-05 IN YOKOHAMA EXPO '89 (II)
FIRST MAGLEV LICENSED BY ANY
NATIONAL GOVERNMENT IN THE WORLD

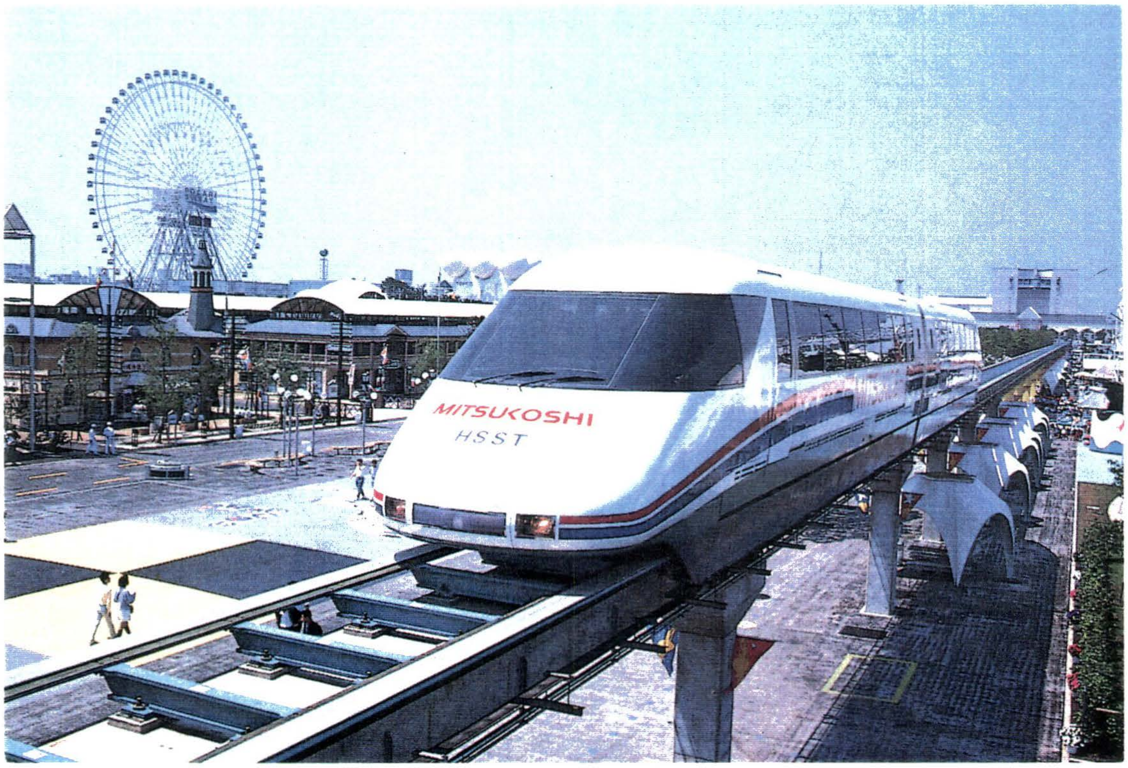


Figure 3-9
HSST-05 IN YOKOHAMA EXPO '89 (I)
FIRST MAGLEV LICENSED BY ANY
NATIONAL GOVERNMENT IN THE WORLD

The HSST-100 system is undergoing its first implementation, in Nagoya, Japan. A development company, the Chubu HSST Development Corporation, was formed in 1989 by the Aichi Prefecture (with the third largest metropolitan area in Japan), the Nagoya Railroad Company (one of the biggest private railroad companies in Japan), and the HSST Corporation. This development company has begun construction of the test track and the first of the -100 series vehicles for the project. After 1 or 2 years of test operation the 6-mile system, extending into a hilly region east of the city of Nagoya, will be built. Currently planned for eight stations, the system will have approximately 48 vehicles operating in four-car trains. It will provide a connection from an outer commuter rail line to a subway line serving the Nagoya central city area.

The HSST-200 system's first installation is in Las Vegas, Nevada. Construction is scheduled to get under way near the end of 1990 or the first part of 1991, with service beginning in 1993. This implementation is about 4 miles in length, with three stations and four vehicles. The maximum speed reached will be above 90 mph.

4. HSST-200 SYSTEM

4.1. Vehicle

See Figure 4-1.

4.1.1. GENERAL CHARACTERISTICS

TABLE 4-1

	Item	Specifications
1.	Type	HSST-200 Series
2.	Body Construction	
	Material	Aluminum Alloy
	Structure	Semi-Monocoque, Welded
3.	Speed	125 mph (200 kph)
4.	Acceleration	
	At Start	0.11g (2.4 mph ps)
5.	Deceleration Average Over Stop	
	Full Service (Electric)	At least 0.08g (1.8 mph ps)
	Emergency (Electrical and Hydromechanical)	At least 0.22g (4.8 mph ps)
6.	Minimum Turning Radius	328 ft (100 m)
7.	Maximum Gradient Capability	7%

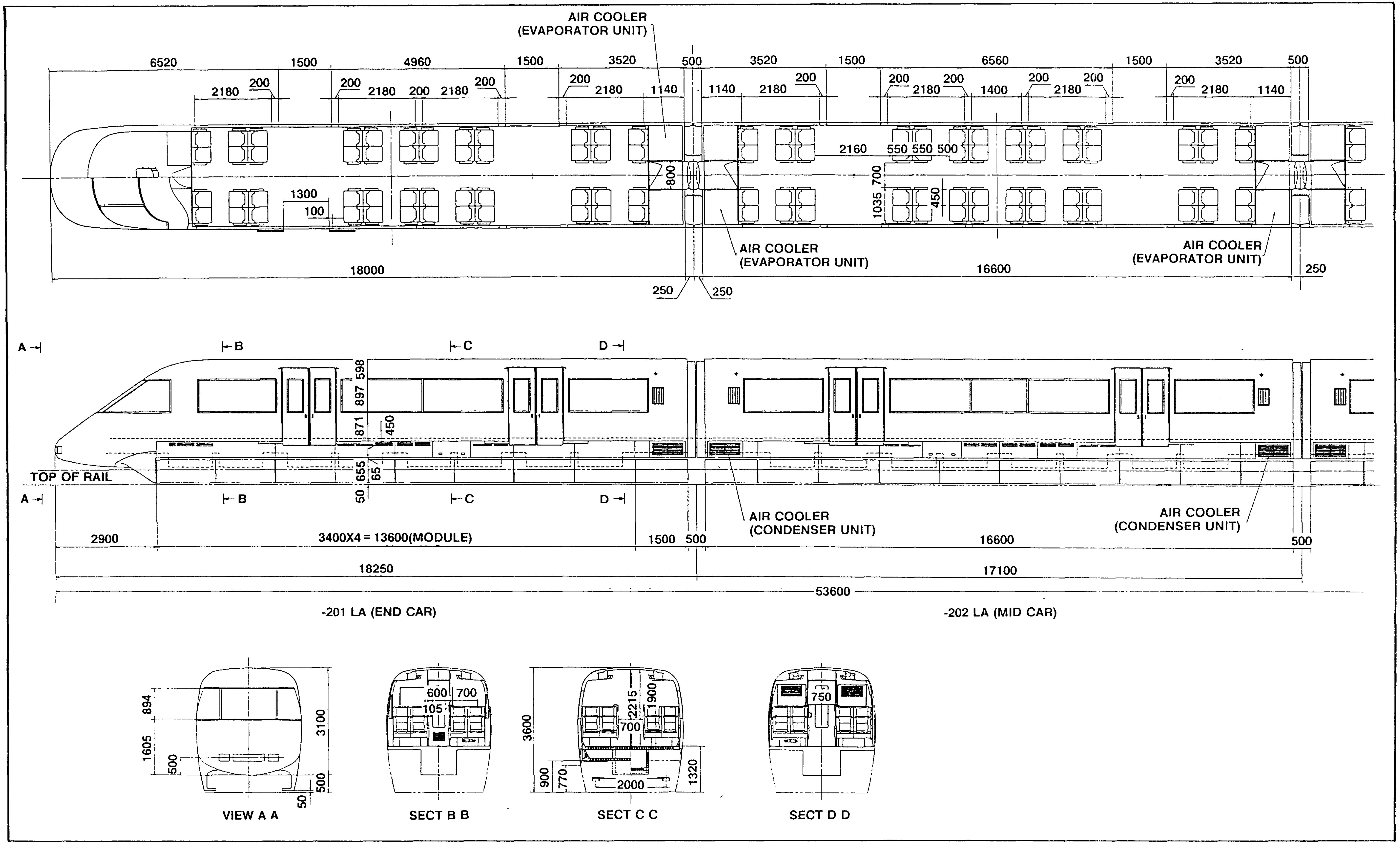


Figure 4-1
GENERAL ARRANGEMENT

TABLE 4-2

DIMENSIONS AND CAPACITIES

Item	HSST-201 LA (End Car)	HSST-202 LA (Mid-Car)
1. Dimensions		
Length	59'-11" (18.25m)	56'-11" (17.1m)
Width	9'-10" (3.0m)	9'-10" (3.0m)
Height	11'-10" (3.6m)	11'-10" (3.6m)
2. Weight		
Empty	41,890 lbs	41,890 lbs
With Maximum Load	58,590 lbs	58,590 lbs
3. Passenger Capacity		
Seated	48	56
Standing	53	45
TOTAL	101	101

4.1.2. MODULE

Each suspension module has four magnets for levitation and one linear motor for propulsion. It serves the same function as the truck in a conventional railroad vehicle. Each vehicle has eight interchangeable modules connected to the vehicle body through a secondary suspension system.

The module frame structure is made of welded aluminum alloy. See Figure 4-2. The principal components of the module are:

- Levitation and Guidance System
  - Magnets (four per module)
  - Gap Sensors (two per module)
  - Accelerometers (four per module)
- Propulsion System
  - Linear Induction Motor (one per module)
- Friction Braking System
  - Hydraulic Brake Assemblies (one per module)
- Power Collector Assemblies
  - Power Collector Assemblies are hung from the module structure
- Contact Surfaces:
  - Vertical (two per module)
  - Lateral Guides (four per module).

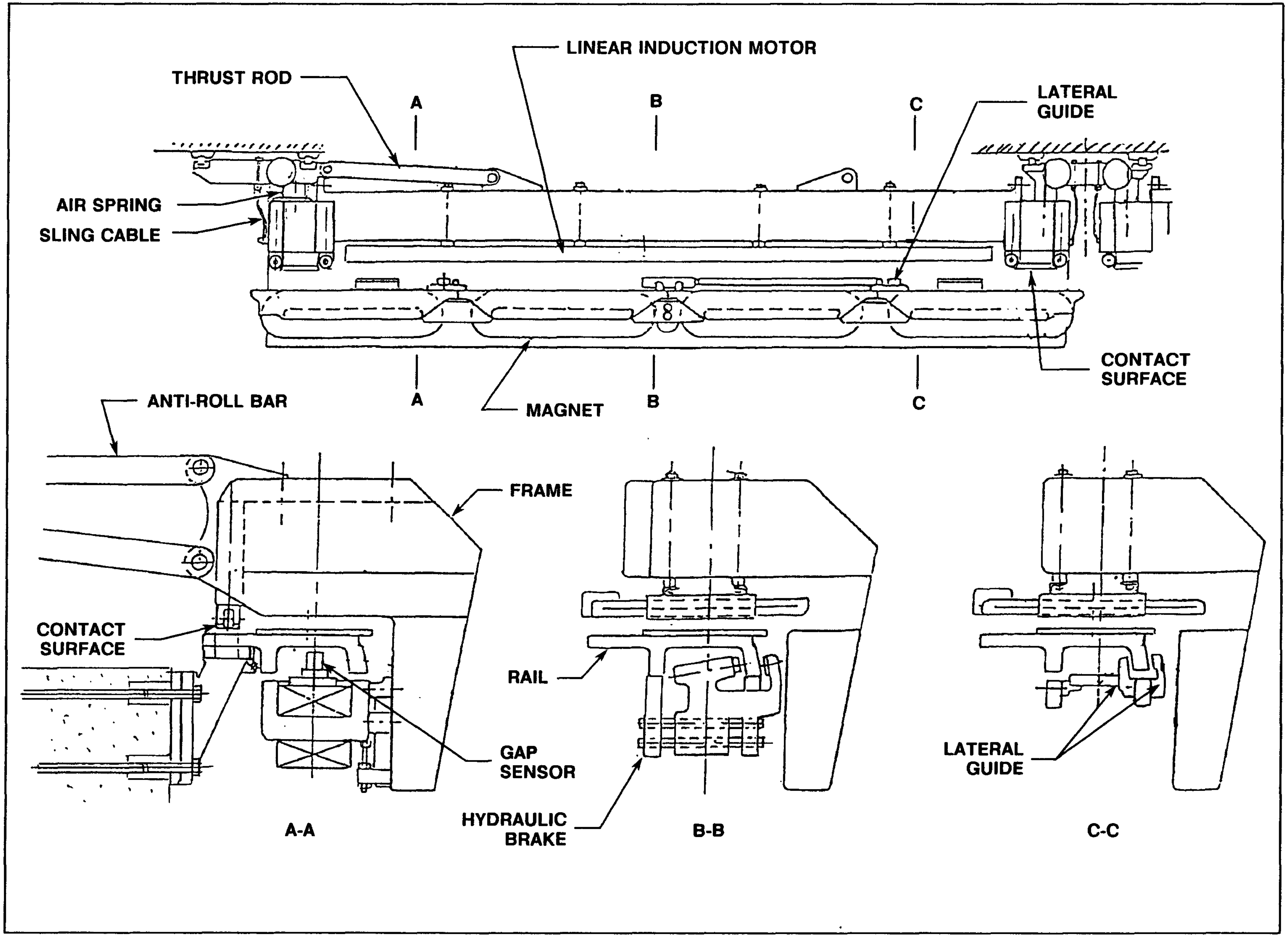


Figure 4-2
MODULE

4.1.3. SUSPENSION

The vehicle body is supported on the modules by an air-spring suspension system. This air system is arranged to position the vehicle body on the module assemblies and to minimize the vibration transferred to the body. See Figure 4-3.

Four air springs per module (total of 32 per vehicle) support the vehicle body in both the vertical and lateral directions. Air spring pressure is adjusted by four leveling valves for vertical positioning of the vehicle body.

Transverse hydraulic cylinders move the modules into segments of an arc as the vehicle negotiates curves. Each module thus performs four functions with regard to movement of the vehicle body: heave, pitch, lateral motion, and yaw. Heave and pitch loads are carried by air springs, and lateral and yaw loads are carried by the hydraulic cylinders. On the other hand, rolling motion is controlled by antiroll bars, and longitudinal forces are carried by thrust rods connected to the car body.

4.1.4. POWER SUPPLY SYSTEM

Electric power of (1,500 volts DC) is supplied from the wayside electric substation to the power rails on the guideway and picked up by power collectors on the vehicle. This power is then utilized through an inverter for propulsion and is also converted to the following forms for the following services.

- 280 volts DC for levitation and air conditioning
- 105 volts DC for control
- 220 volts 3-phase AC (60 Hz) for hydraulic pump, air compressor, cabin lights, and other services
- 100 volts single-phase AC (60 Hz) for hydraulic pump control, air compressor control, and other services.

In case of power failure, auxiliary batteries provide both 280 and 105 volts DC power, which enables the levitation to continue until the vehicle stops. Batteries also maintain the lighting, communications, and on-board train control systems.

The major components of the power supply system are as follows and are shown schematically in Figure 4-4:

- Power Collectors
- Circuit Breakers
- Power Supply Units (PSU)
- Batteries
- DC/DC Converters.

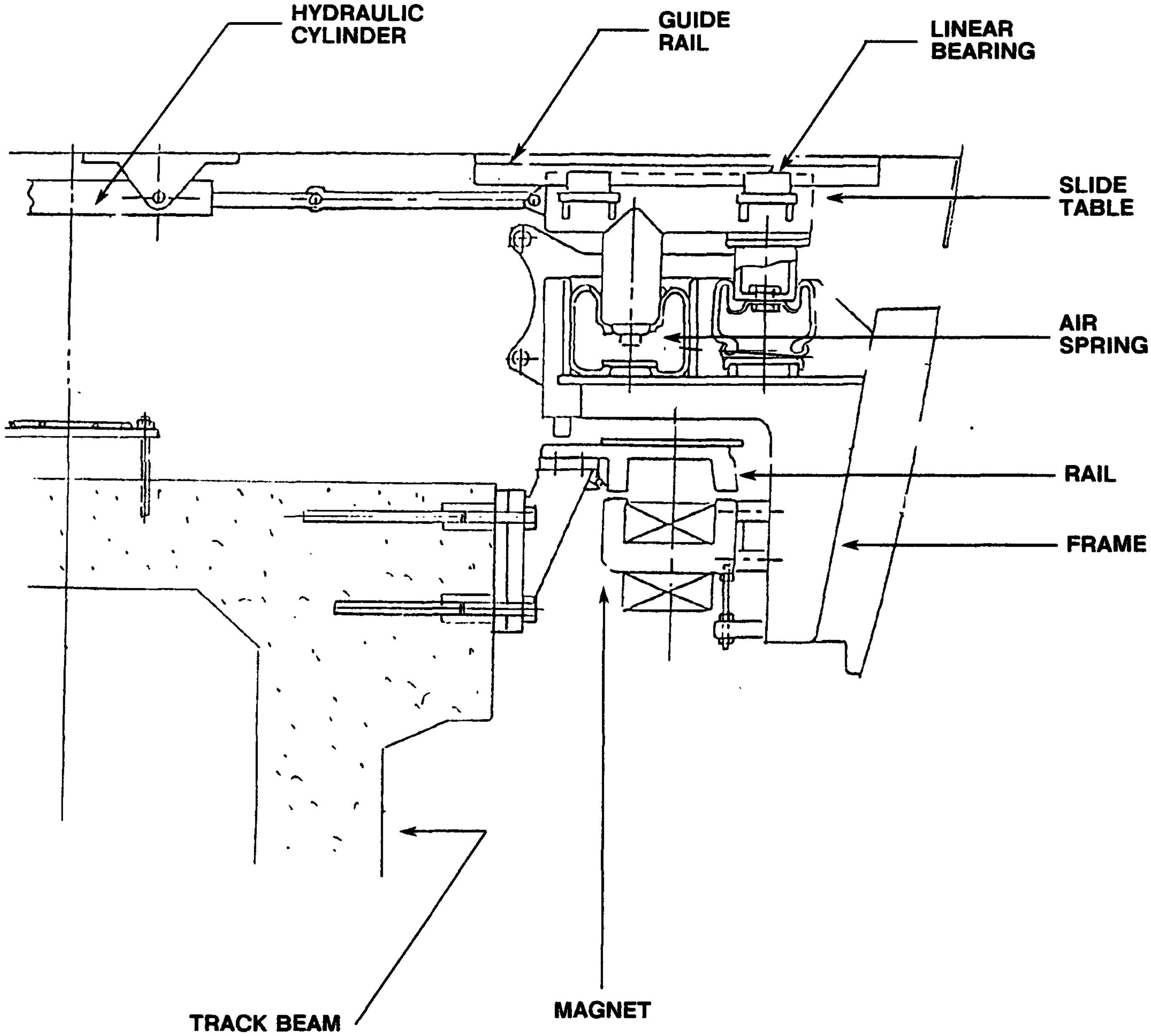


Figure 4-3
SUSPENSION

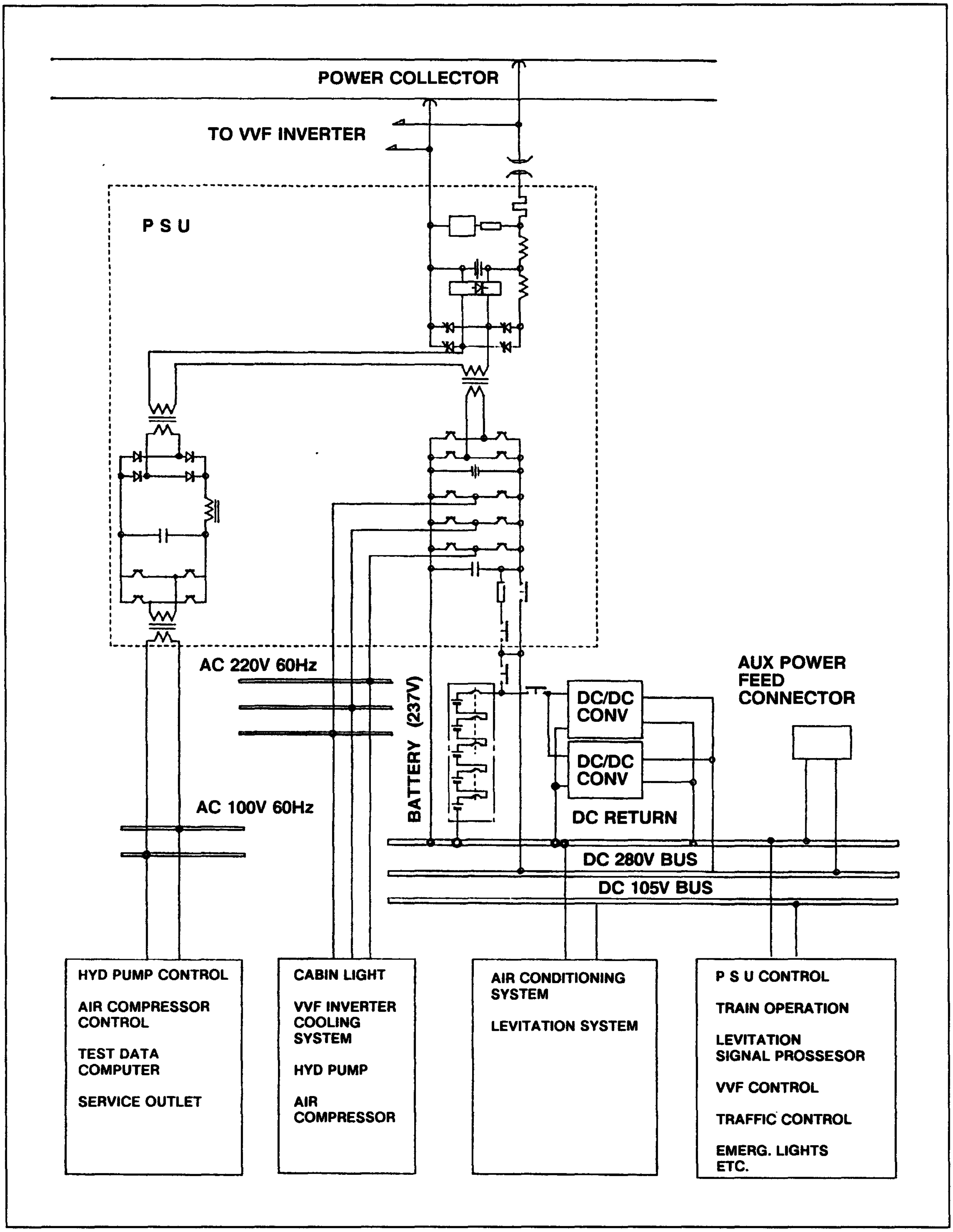


Figure 4-4
POWER SUPPLY SYSTEM

4.1.5. LEVITATION

Levitation is provided by the eight suspension modules on the car. Each module has four magnets in a staggered configuration, two gap sensors, and four accelerometers. The vehicle carries a total of 16 magnet-drivers, two per module, which supply electrical power to each magnet, and control circuits.

The levitation feedback control circuits maintain constant air gap by calculating the magnet current from information supplied on the air gap and on the acceleration of the module. Lateral guidance is inherently stable in an electromagnetic levitation system using attractive force acting between inverse U-shaped rail and U-shaped magnet. That is, if the vehicle-borne magnetic element is displaced with respect to the guideway, magnetic attraction will attempt to correct the displacement. This natural corrective force is augmented through a slightly staggered arrangement of the magnets in the module. Some module magnets are slightly inside the rail center, paired with others outside the rail center. Increasing the current of one magnet of the magnet pair and decreasing the other creates lateral damping forces.

The 280V DC levitation power is supplied to the magnets through the magnet drivers. Backup battery power supply is activated if the primary power supply system fails. Protective breakers are located between 280V DC power bus and magnet drivers to protect the levitation power system from overcurrents or short circuits. See Figure 4-5.

4.1.6. PROPULSION AND ELECTRODYNAMIC BRAKES

The combined propulsion and electrodynamic brake system consists of the linear induction motors (LIMs) mounted on the eight suspension modules, on-board variable voltage variable frequency (VVVF) inverters, on-board controls, and wayside dynamic brake energy dissipation grids.

The configuration of LIM that is used involves no wayside coils, as it operates on magnetic forces resulting from induced circulating currents. The configuration is also such that vertical forces from the LIM are minimized, facilitating levitation controls. In the braking mode, the induced magnetic field creates current in the on-board LIM. This is returned to the power rails, where it can either be utilized by other vehicles or dissipated as heat in resistor grids.

4.1.7. CONTROL SYSTEM

4.1.7.1. Introduction

The maglev system will operate under automatic control. Control equipment is located on board the vehicle, along the wayside (concentrated in the stations), and at the central control room located in the operations and maintenance facility. There are no human operators on board the vehicles.

Automated, computer-driven control systems offer several advantages compared to manually controlled operations with drivers:

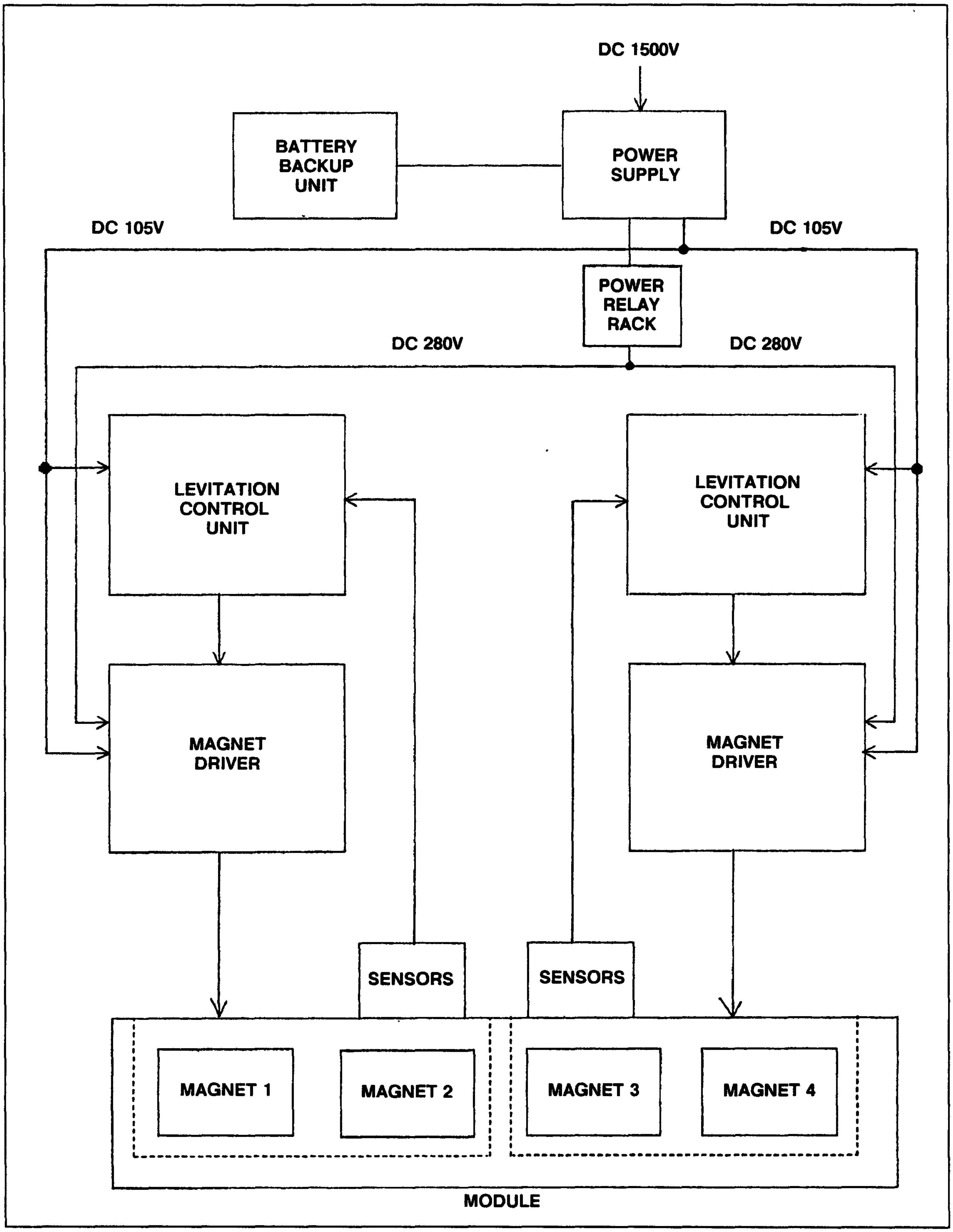


Figure 4-5
LEVITATION SYSTEM

- **Greater Safety.** Computer response times are much quicker than those of human beings. There is no problem of potential inattentiveness or degradation of performance due to fatigue, substance abuse, or other complications. The automated control system is designed for fail-safe operation.

- **Greater Efficiency.** A small crew of operators in the central control room oversees the entire system operation. Adjusting the number of trains in service to respond to sudden or planned changes in demand or operation is accomplished quickly and easily, with no impact on the size of the operating staff.

- **Greater Performance.** Computer-operated systems are capable of more precise operations than manually controlled ones, and the maintenance of short headway, high-service quality, and high-comfort-level operations is readily achieved.

These advantages have been aptly demonstrated by the operations of the large-scale automated transit systems in Vancouver, BC, Kobe, Japan, and Lille, France, over the past several years. Their records of safety, efficiency, and performance are unexcelled by conventional systems. A growing number of new transit systems in the world, including the United States, are planning automated operations for these reasons.

There are three layers of control applied to the maglev system, typical for automated transit operations:

- ATO (Automatic Train Operation) — controls normal train functions and movements

- ATP (Automatic Train Protection) — provides an independent safety function that intervenes when a situation arises that could lead to a safety problem, overriding the ATO and bringing the system back into a safe state

- ATS (Automatic Train Supervision) — provides a top-level oversight and control function and provides for human interaction via the central control room staff.

4.1.7.2. Automatic Train Operation (ATO)

The ATO subsystem controls the train operations, performing the following functions:

- **Programmed Station Stops.** Vehicle speed and final application of brakes under jerk and acceleration limits are controlled to make a precise station stop.

- **Station Dwell Control.** Wait time at the station and vehicle door opening/closing are automatically controlled. Each vehicle door set is controlled by an automatically predetermined adjustable timer. The doors may not open at a station until the vehicle has come to a stop, and the vehicle may not leave the station until all the doors are closed and locked.

- **Vehicle Start, Stop, and Speed Control.** When the start command is received, the train automatically accelerates up to the programmed speed limit. Then the train runs at its cruising speed, under the supervision of the ATP subsystem.

4.1.7.3. Automatic Train Protection (ATP)

The ATP subsystem provides an independent safety protection for the passengers and trains. It monitors train conditions and operations and intervenes whenever the possibility of a dangerous situation arises. In such cases it overrides the ATO, exerts control over the system, and returns conditions to a safe state. The particular conditions observed by the ATP are:

- **Vehicle Speeds.** The ATP monitors the actual vehicle speed, comparing it with the desired value. In the event that the vehicle exceeds the speed commanded by the ATO, or the ATO attempts to command a speed above a preset safety limit, the ATP removes control from the ATO and initiates the vehicle's service brakes. Should the vehicle not respond, the ATP then activates the emergency brakes.
- **Vehicle Presence Detection.** The ATP constantly monitors the presence and location of all vehicles on the system. It uses this information to prevent vehicle collisions. In the event a situation develops that could lead to the possibility of a collision between vehicles, the ATP brings all potentially affected vehicles to a halt.
- **Switch Interlocking.** The ATP controls the positions of all track switches to make certain that all train routings are safe and do not lead to potential conflicts.
- **Vehicle Door Operations.** The ATP guarantees that vehicle doors will not open at a station until the vehicle is safely stopped and that the vehicle will not depart a station until all vehicle doors are closed and locked.
- **Parted Train.** In the event a multicar train separates while in operation, the ATP will command all vehicles of that train to come to a halt.
- **Vehicle Braking.** In the event that a vehicle does not respond as required in service braking, the ATP activates its emergency brakes.

4.1.7.4. Automatic Train Supervision (ATS)

The ATS provides comprehensive control, oversight, and supervision of the vehicle operations. Its functions are as follows:

- Obtain information on the position and status of every train in operation in real time, and carry out the control required for the automatic operation of the trains.
- Conduct the automatic operation of the trains according to the predetermined schedule.
- Provide information for passengers at stations such as train destinations, etc.
- Provide information pertinent to the central control operators in case of emergency during operation, so that they can take prompt countermeasures.
- Record the events occurring on the system.

4.1.8. BRAKE SYSTEM

The brake system consists of electrodynamic and hydromechanical brake systems. Each magnetic module provides both dynamic brake and friction capability.

4.1.8.1. Electric Brake

Electric braking is achieved by switching the linear induction motor to a generating configuration. This converts the vehicle kinetic energy into regenerated electricity, causing the vehicle to decelerate. This is the normal brake mode (service braking) at speeds higher than 5 mph (8 kph). During brake assurance or emergency actions, it is blended with the hydraulic brakes.

4.1.8.2. Hydraulic Brake System

The mechanical brake system uses a hydraulically powered friction caliper mounted on the module assembly to apply pressure against the running rails and thereby slow the vehicle. See Figure 4-6.

The means of control of the application varies, depending on use. The mechanical brake is used in the following situations:

- Speeds below 5 mph (8 kph) in all braking modes
- As an alternative to electrodynamic brakes at all speeds
- Brake assurance actions and emergencies at all speeds.

Two independent hydraulic subsystems are furnished, one for the normal service mode and one for the brake assurance-emergency mode. Each independent subsystem is protected against leaks in the other.

Under the normal service mode, hydraulic brakes operate at modulated pressures applied to all eight brake units. On the brake assurance-emergency mode, all eight brake units are applied at unmodulated full pressure.

Brake assurance-emergency braking is applied by activating both electrodynamic and hydraulic brake systems under various conditions. These conditions include the detection of a deceleration at less than the intended minimum train protection rate by the brake assurance feature.

In the event of poor emergency brake performance, the vehicle will smoothly delevitate and utilize the contact surface to supplement the braking modes.

4.2. Track

The track structure for the HSST is composed of a prestressed concrete or steel beam and rails formed by metal plates. The even distribution of the load of the HSST vehicles on the rails and the absence of rail contact by the HSST vehicles essentially eliminate the track wear that usually occurs on conventional transit systems. When disalignment of the rails occurs due to uneven settlement of the ground or any other reason, it is correctable at the bolted track mounting points. The track structure is shown in Figures 4-7, 4-8, and 4-9.

The light vehicle weight and the even load distribution of the vehicle result in lighter structures than are typically found in conventional transit systems.

Two power rails are installed on the track beam with insulators and support brackets. Also installed on the beam is the signal and communication inductive loop. A walkway for emergency evacuation and routine inspection is installed between the two track beams. This walkway (not shown in the figures herein) will be sufficiently wide and suitably located vertically with respect to the vehicle floor level, to provide for safe and convenient egress from the vehicles.

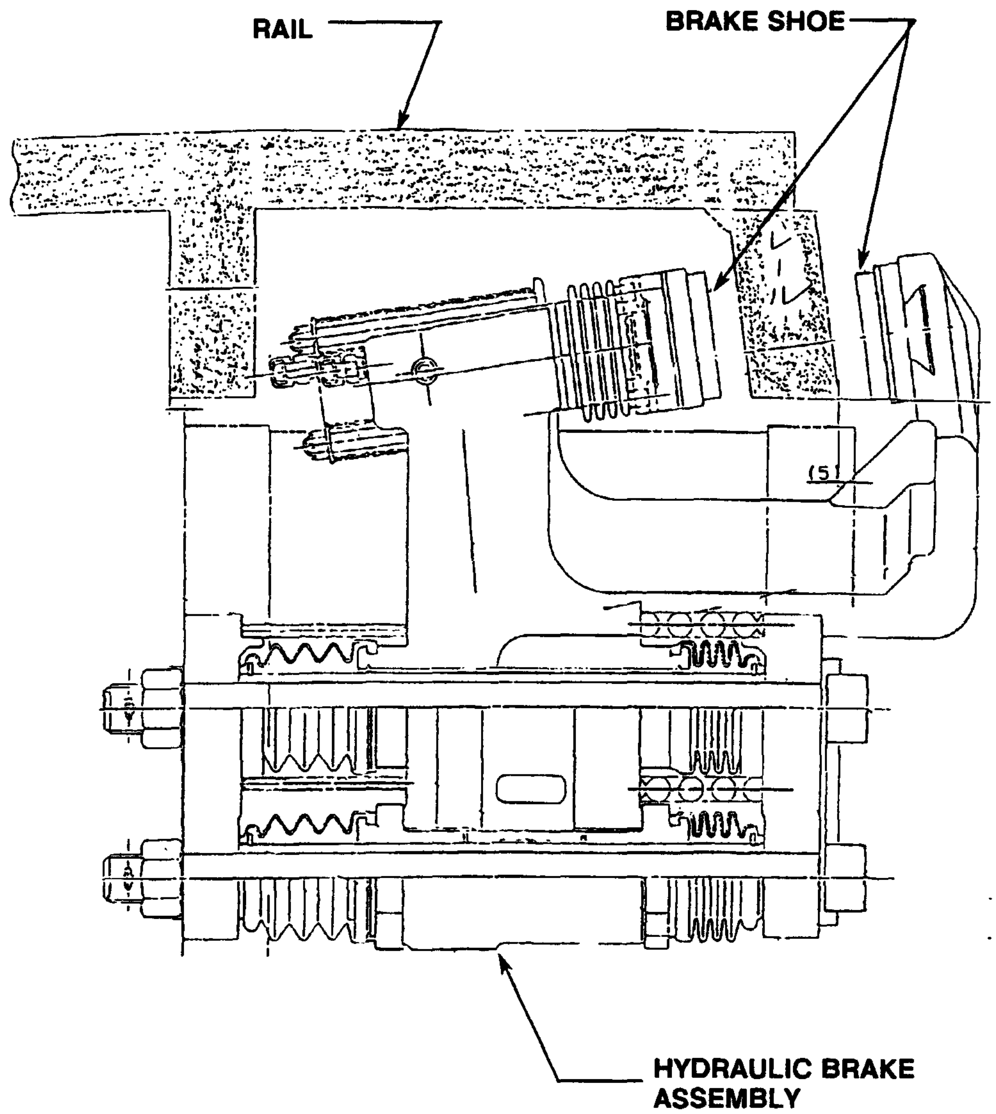


Figure 4-6
HYDRAULIC BRAKE FRICTION CALIPER

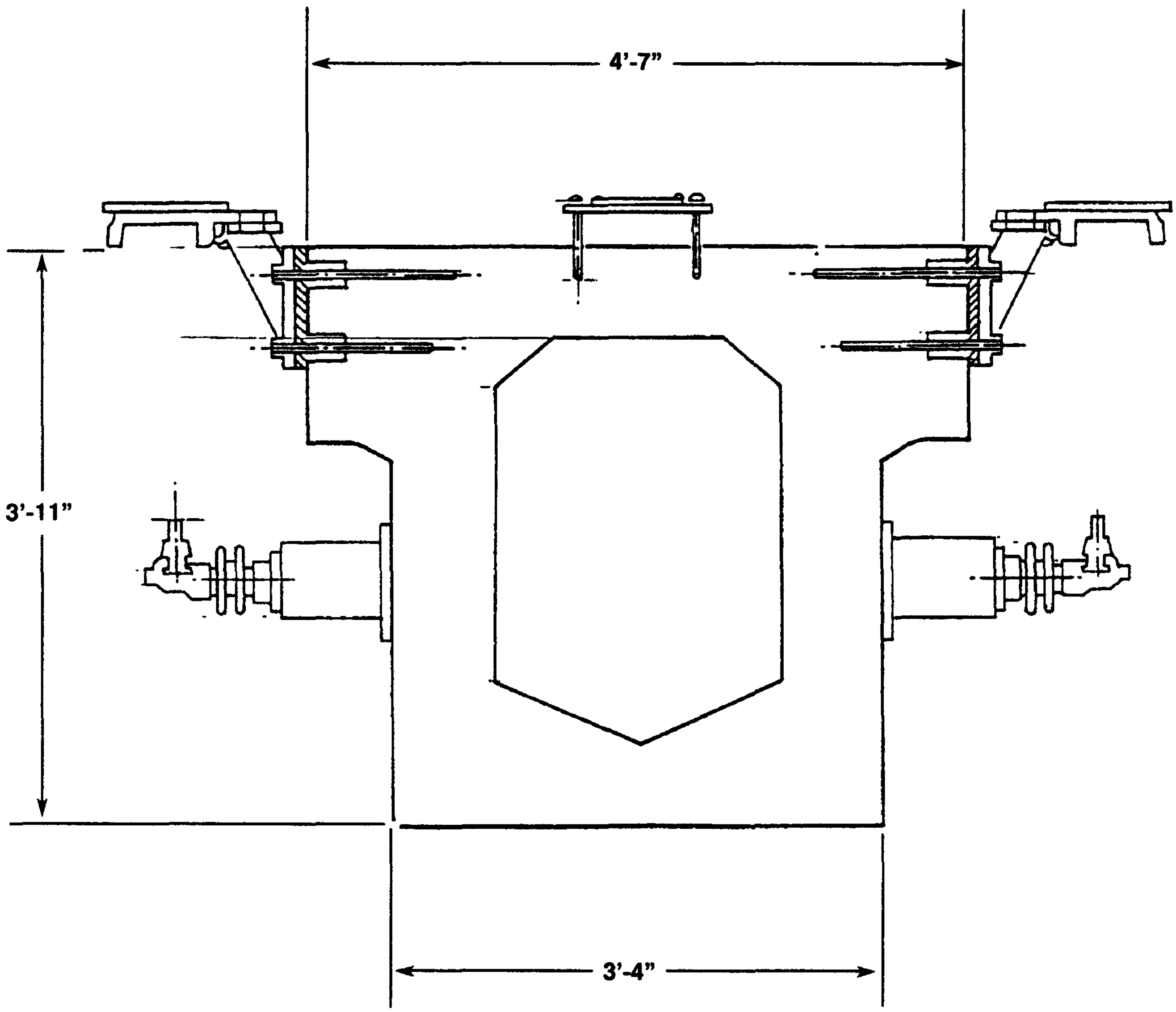
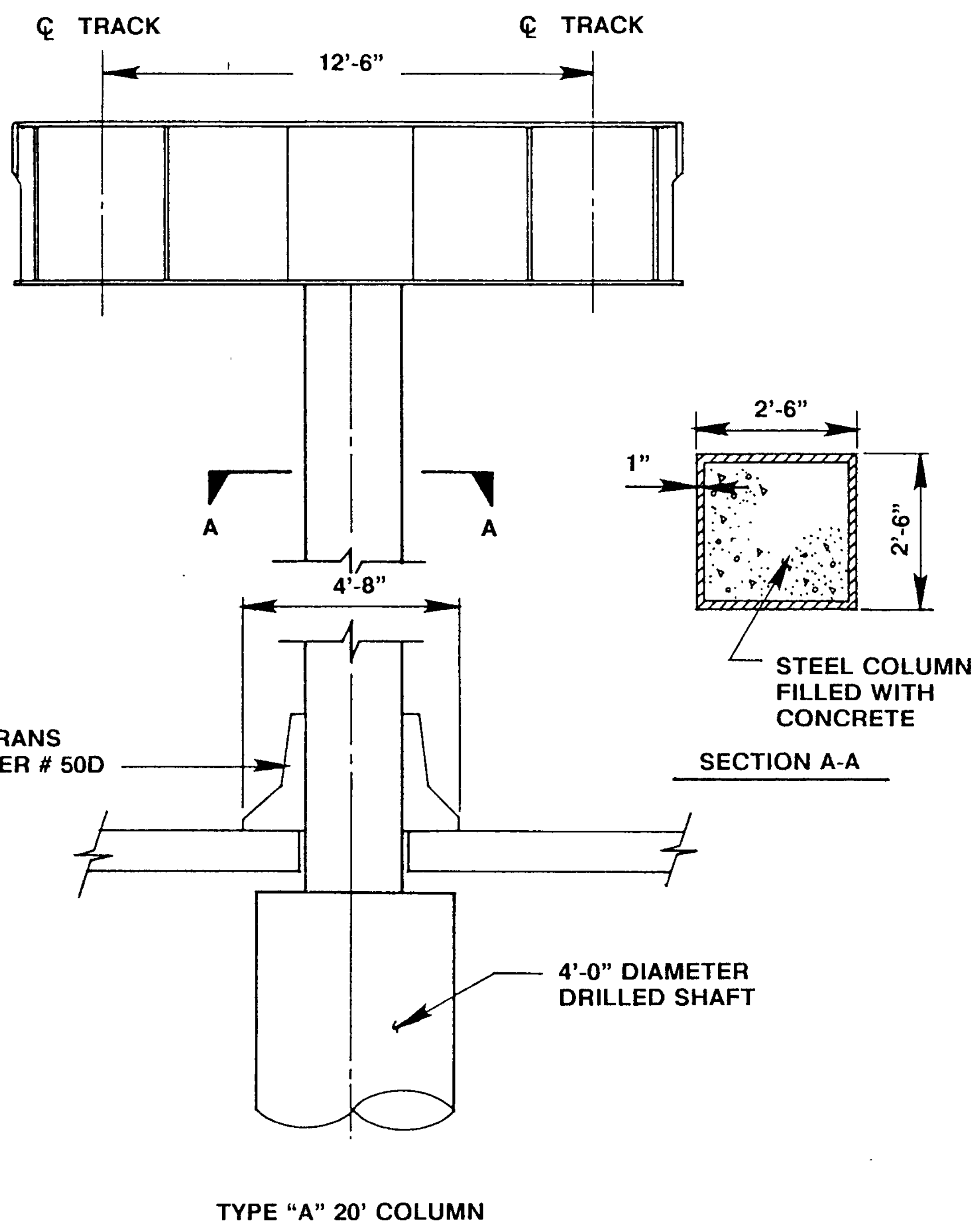


Figure 4-7
CONCRETE (TYPICAL 65' LENGTH)



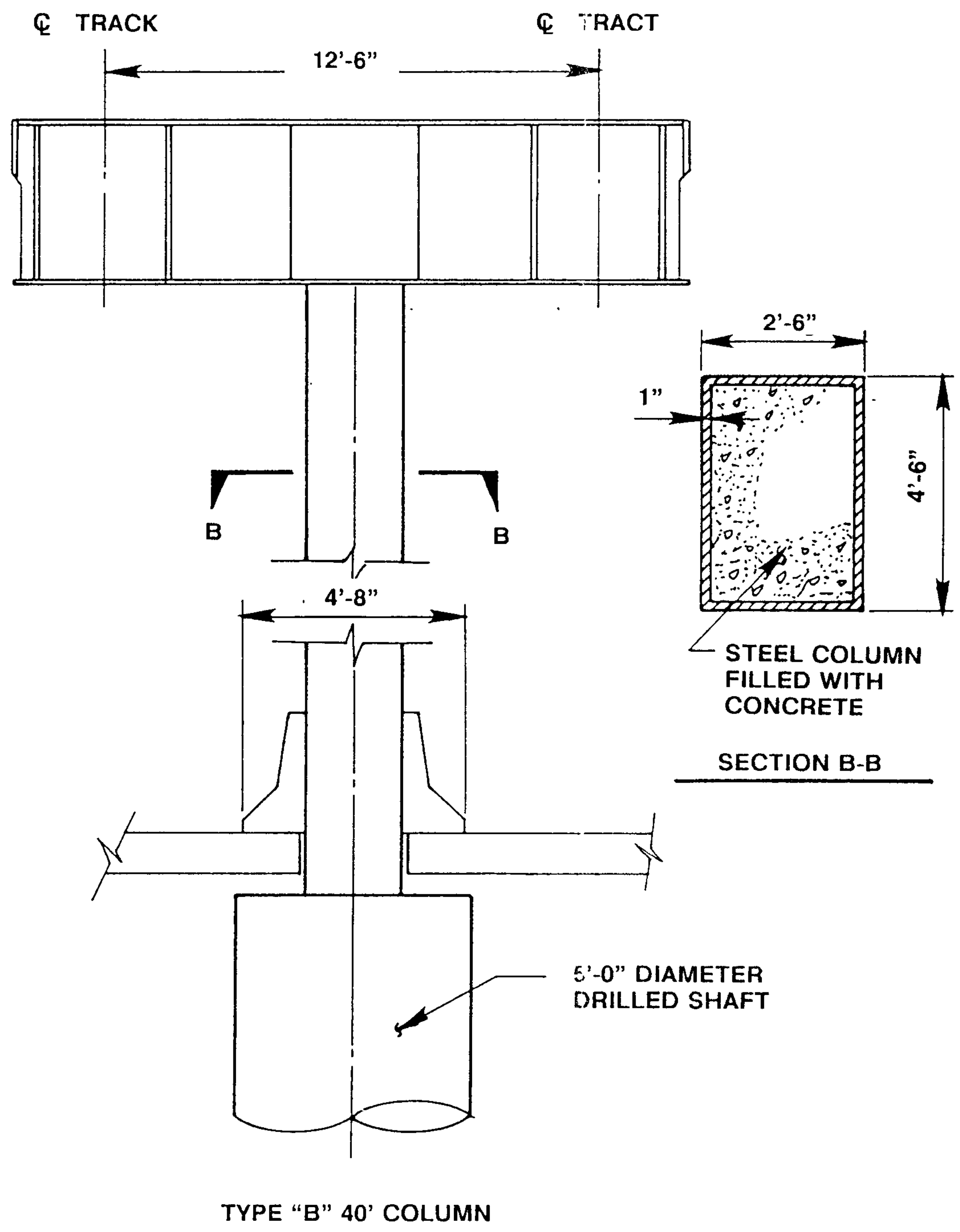
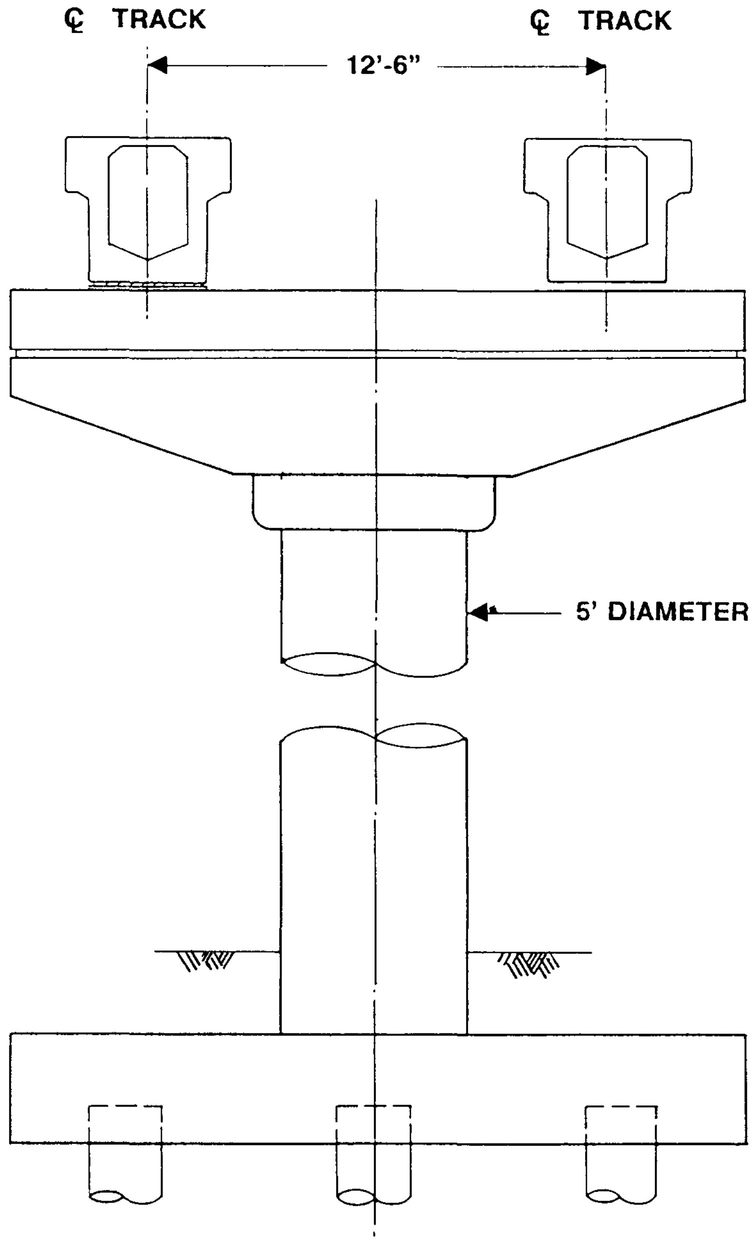
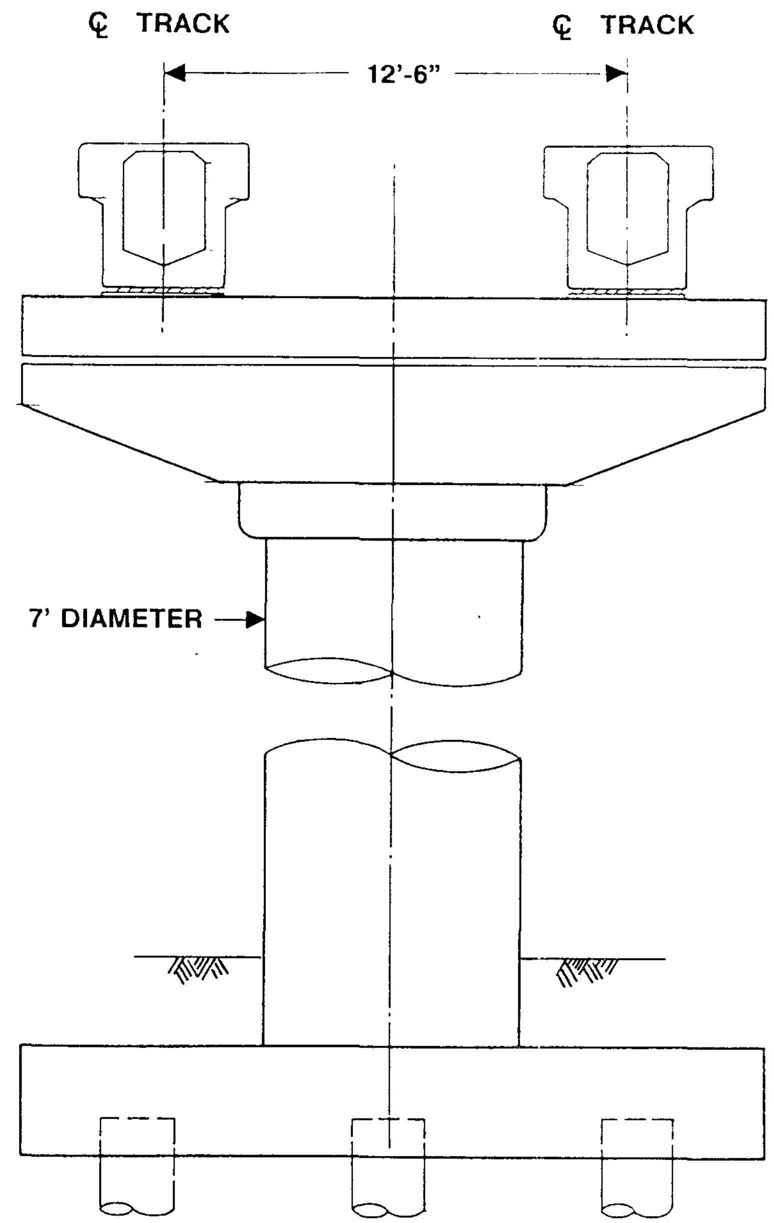


Figure 4-8 (a)
GUIDEWAY SUPPORT COLUMNS
STEEL



TYPE "A" 20' COLUMN



TYPE "B" 40' COLUMN

Figure 4-8 (b)
GUIDEWAY SUPPORT COLUMNS
CONCRETE

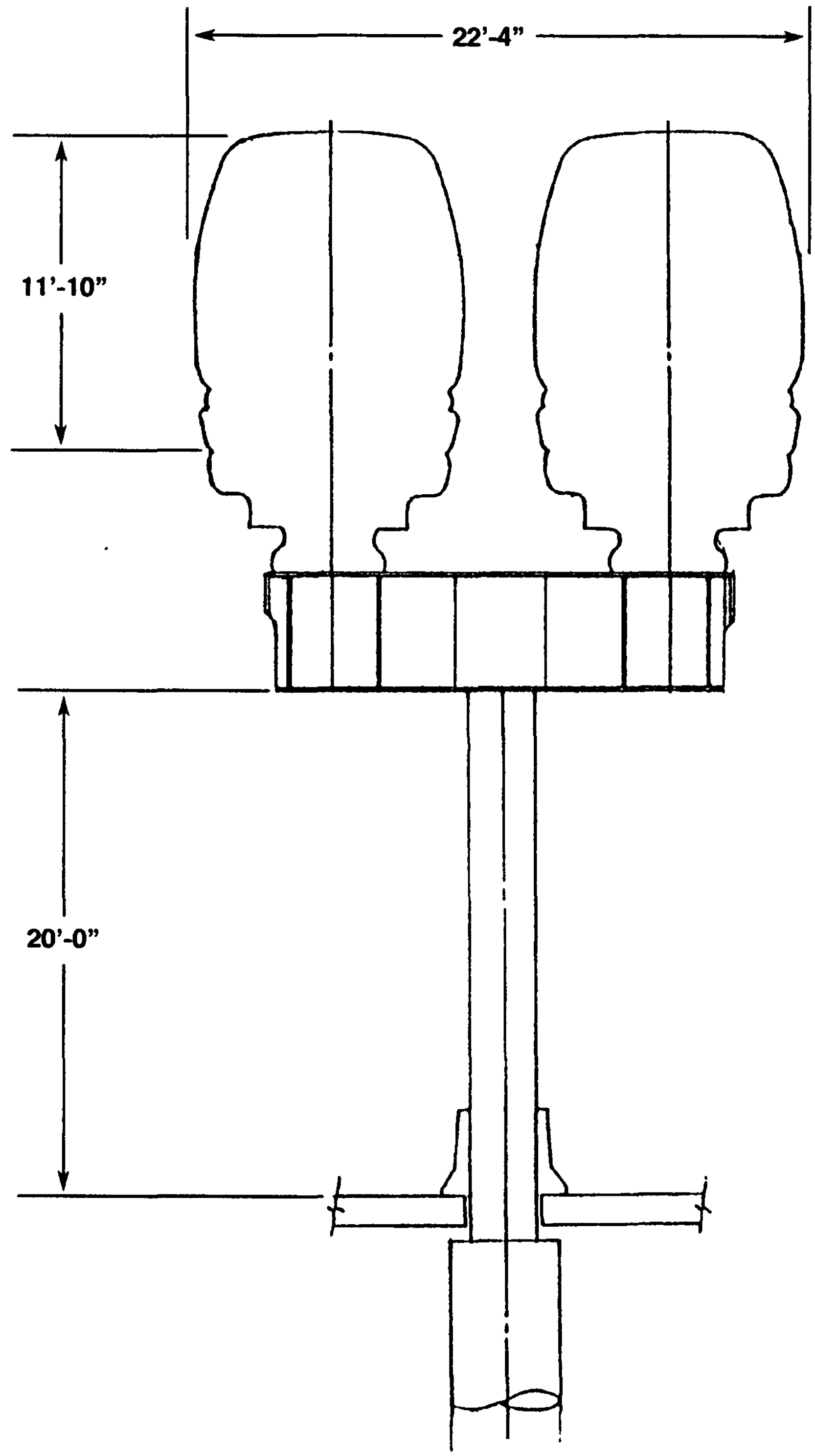


Figure 4-9
TYPICAL TRACK

4.3. Power Supply

4.3.1. POWER DISTRIBUTION

Electric power of 1,500V DC will be supplied from a traction power substation to operate the vehicle. Power is picked up by the power collector shoes located below the suspension modules under the car.

An independent battery backup power supply of 110V DC is provided as backup for the switchgear. Additionally, battery backup is provided for the communications and control systems and for emergency lighting/signage.

4.3.2. TRACTION POWER SUBSTATION-FACILITY

Three power substations are envisioned for the system, located approximately equidistantly along the alignment. One will be placed in or near the operating and maintenance facility. (See 4.4., Maintenance Yard and Facilities, below.) Exact sites for the other substations have not yet been identified. Although efforts will be made to locate these facilities on Caltrans rights-of-way, it is possible that private property may need to be acquired for their placement. The space required for a substation is estimated at approximately 14,500 sq ft each.

Power may be acquired from either the Los Angeles Department of Water and Power or Southern California Edison. Details of the locations of substations, providers of power, and connection details will be developed later if this project is selected for implementation.

The traction power substation will include the fire/life safety requirements of NFPA 101, NFPA 130, and any other local and state building codes as applicable.

4.4. Maintenance Yard and Facilities

4.4.1. GENERAL

Since the HSST vehicle has no rotary equipment such as wheels or rotary motors, such maintenance activities are eliminated. Since the vehicle operates in a levitated mode, track maintenance is also significantly reduced.

Vehicles undergo a bidaily, 3-month, and 3-year inspection cycle. In addition, vehicles are cleaned daily. A conceptual schematic of the facility is shown in Figure 4-10. The exact layout of the facility will be determined later.

The major required maintenance facilities within the maintenance yard are:

- Traverser
- Vehicle Washing Gate
- Vehicle Maintenance Hangar
- Repair Shop for Components
- Store

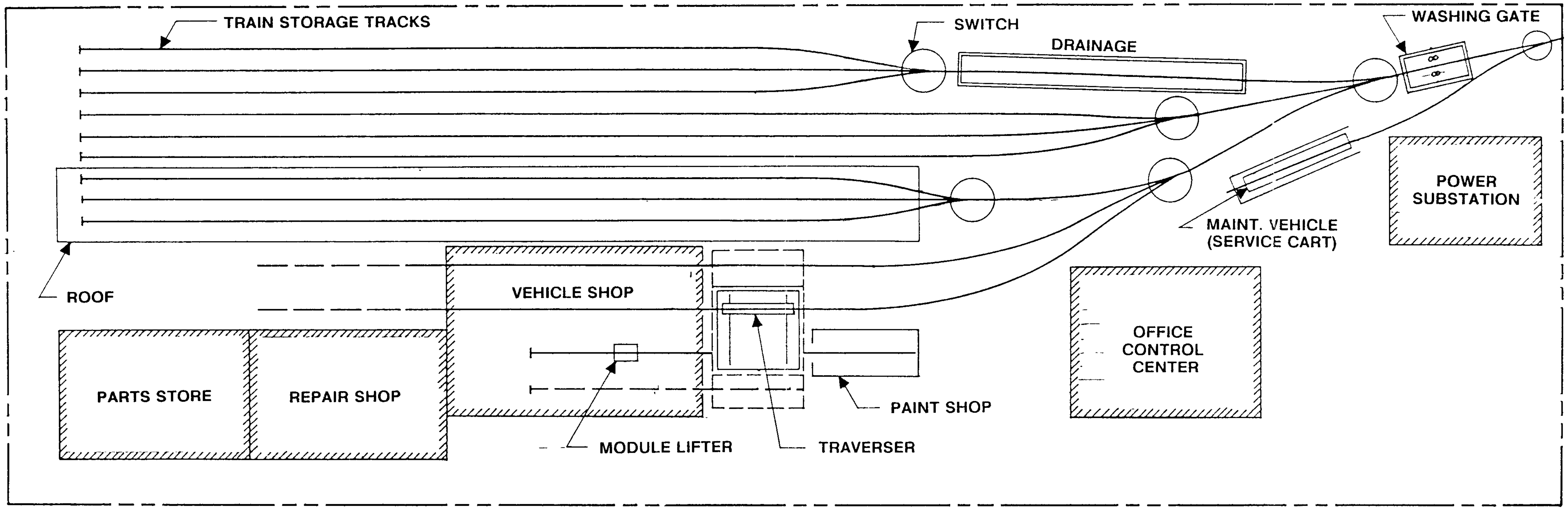


Figure 4-10
MAINTENANCE YARD
CONCEPTUAL LAYOUT

- Office
- Service Cart for Track Maintenance.

4.4.2. FIRE/LIFE SAFETY

Fire protection and suppression systems will be provided within the maintenance yard and its facilities in accordance with the applicable NFPA and local and state codes.

Emergency egress and personnel protection will be provided in accordance with NFPA 130, NFPA 101, and OSHA requirements.

4.5. Control Systems

The principal control system is the automatic train protection system (ATP), the general operations of which are the on-board vehicle elements discussed in the vehicle section. The vehicle responds to wayside commands inductively transmitted. These wayside commands are generated by logic circuits that are prearranged to prevent the following:

- Vehicle-to-vehicle contact
- Vehicle contact with route extremities
- Vehicle overspeed
- Approach to or movement through a switch set against the direction of traffic or a switch that is not aligned and locked.

The wayside logic is arranged in vital and directional categories, and vital logic is either performed through vital relay circuits or checked by them. The information used by these circuits is:

- Train location
- Switch alignment and locking
- Movement direction
- Track geometry and block layout.

The wayside circuits are so arranged that single-point equipment failures or power failures result in either a stop command or a command to a lower speed (fail operational/fail safe).

The control system algorithms and layout are based on conservative assumptions on vehicle-stopping capability and equipment reaction time.

A central control facility will be located on the system. Central control will have a security and supervisory function; vital automatic train protection functions are managed by local control equipment. At central control, the operating conditions of the HSST system, including power facility and switching, are continuously indicated on monitor panels. Equipment for communication with the vehicles, stations, and other facilities is also available in the control room.

The control system is designed to improve convenience and comfort and keep operating hazards to a minimum. The features of this design approach are summarized below:

- **Derailment Prevention.** The body of the HSST interlocks with the rail; derailments are positively prevented.
- **Automatic Train Protection.** Every train's speed is automatically monitored by the Automatic Train Protection (ATP) system. All input and output elements of the system are fail-safe, and overspeed conditions are automatically detected and corrected in a fail-safe manner.
- **Power Failure Management.** In case of a vehicle power failure, levitation is enabled by on-board batteries to continue, as are the functions of the operation control system, the signal system, and the communications systems. Similar systems on the wayside are backed up by batteries. In the case of levitation failure, the module settles onto contact surface pads contacting the rails.
- **Multiple Brake Systems.** Electric braking by the LIM is used for normal operation; in case of electric brake failure, the hydraulic brake is fully capable of all stopping requirements. Also, the vehicle can delevitate and then glide safely back down onto the rails to stop.
- **Fire Resistance.** The vehicles are made of incombustible materials. Fire extinguishers are provided in each car at an easily recognizable location.
- **Vehicle Doors.** The vehicle doors are operated automatically by pneumatic power. A safety lock mechanism is installed, preventing the doors from opening during train movement. The doors can be manually operated in an emergency.
- **Protection of Electrical Shock From Power Rails.** To prevent the general public from electrical shock from the power rails, the power rails are installed on the elevated guideway recessed behind and under the edge. As an additional safety feature, the positive rail is located on one side of the guideway, while the negative rail is on the opposite side. Additionally, a fence is built around the maintenance yard or other areas where the guideway approaches the ground.

D. STATIONS

Six stations are incorporated into the proposed system: the southern terminus Lot C, at LAX; Jefferson Station, at the intersection of the San Diego and Marina Freeways; Wilshire Station, at the intersection of the San Diego Freeway and Wilshire Boulevard; Victory Station, at the intersection of the San Diego Freeway and Victory Boulevard; Chatsworth Station, at the intersection of the San Diego and Simi Valley Freeways; and Santa Clarita Station, at the intersection of Route 14 and San Fernando Road. All stations include parking, and the Jefferson, Wilshire, and Victory Stations incorporate joint development. All stations, except for LAX, are situated on Caltrans right-of-way.

The station platforms are approximately 200 feet long and are sized for a four-car train. Adequate platform space, stair and escalator capacity, and elevators for handicapped patrons will be provided according to conventional transit standards. Extensive use will be made of closed-circuit television, public address systems, interactive graphics signage, and two-way information telephones to enhance passenger security and convenience. The stations will be open-air, although covers will be provided for shelter from sun and precipitation. Benches will be provided in waiting areas. No decisions have yet been made on the nature of the fare collection system or its associated hardware.

Illustrations of potential station concepts are included in Volume 4 of this proposal.

Brief descriptions of the stations follow.

- LAX: The LAX Station is located in Lot C at the airport, adjacent to the proposed Metro Rail Green Line station. The placement of the proposed project station is such that convenient transfers between the two systems are possible. In addition, the Airport Commission is studying various people-mover concepts that would result in a convenient connection between Lot C and the airport terminal complex.

  Significant development potential exists at this lot. It is generally located just outside the LAX building restriction zone. There is a height restriction at Lot C imposed by the FAA, which limits vertical development possibilities. This restriction decreases as one travels eastward across the lot, so that at the eastern edge, buildings on the order of 10 stories may be constructed.

  No definitive concepts are proposed for development at Lot C in conjunction with the proposed LAX Station, since any such development would require active airport participation. It is anticipated, though, that such arrangements will be made. Parking for the LAX Station is assumed to be that located at Lot C.

  Currently, entry to the parking lot is from 96th Street and Westchester Parkway; exit is onto Jenny Avenue. There is no direct access to Sepulveda Boulevard.

- Jefferson: The site of the Jefferson Station is at the meeting point of the San Diego and Marina Freeways and Jefferson, Slauson, and Sepulveda Boulevards, adjacent to a large parcel of developable land owned by Hughes interests. It is a narrow site, immediately adjacent to Centinela Creek. It is anticipated that the creek could be covered and air rights to it obtained from the Corps of Engineers for development purposes. Access to the site is via Jefferson Boulevard. Traffic control measures would be required for access and egress. A total of 2,400 parking spaces serving the transit system are provided at Jefferson Station in a multistory parking structure. Joint development plans envision 400,000 sq ft each of residential and commercial, for a total of 800,000 sq ft.

- Wilshire: The Wilshire Station itself is located in the median of the San Diego Freeway. The associated parking and joint development is placed within the general area of the intersection of the freeway and Wilshire Boulevard. Access and egress from the station, station parking, and development area would be from multiple points on Sepulveda Boulevard. Traffic control measures on Sepulveda will be required, and parking for 1,500 cars serving the transit system will be provided in multistory parking structures. Development of 1.6 million sq ft each of residential and commercial space is envisioned in the right-of-way site. The location of the Wilshire Station is designed to provide for convenient transfer to the Metro Rail Orange Line extension at some point in the future when the extension is completed.

- Victory: Victory Station is in the median of the San Diego Freeway, located adjacent to the Metro Rail Red Line Burbank Branch extension's Sepulveda Boulevard Station. The Victory Station will include provisions for convenient transfer between the two systems.

  Station access will be from either Victory or Sepulveda Boulevards, or both. Metro Rail projects 675 parking spaces serving the Red Line at that site in a surface parking configuration. An additional 2,400 parking spaces serving the project proposed here will be required, located in a multistory structure on the Caltrans freeway right-of-way. Joint development at the Victory Station site is conceived as being totally residential, with approximately 500,000 sq ft being constructed in the freeway right-of-way.

- Chatsworth: The Chatsworth Station is located within the intersection of the San Diego and Simi Valley Freeways. Access to and from the station will be via Chatsworth Street. The Chatsworth Station will not incorporate any project-sponsored joint development, but might incorporate private commercial development already under consideration for the site. Parking for 2,200 automobiles will be provided in a multistory parking structure.

- Santa Clarita: The Santa Clarita Station is the northern terminus of Phase I of the proposed project. The storage and maintenance yard and operations control center are located at this site, in addition to parking for 2,300 cars. The uses are collocated in a multistory structure. Modifications to the freeway northbound access ramps will be required to allow access to and egress from the station from Santa Clarita Boulevard. The station itself is located in the freeway median.

  Access to the station from San Fernando Road will utilize the eastbound Antelope Valley Freeway on-ramp with an added left-turn pocket for entrance to the parking facility. Exiting the station to San Fernando will require the addition of a ramp paralleling the eastbound on-ramp. Access from the station to the eastbound freeway will also use the eastbound on-ramp.

E. JOINT DEVELOPMENT

Joint development is considered feasible at three of the station sites: Jefferson Station, Wilshire Station, and Victory Station. At these locations, sufficient Caltrans right-of-way is available to support project-sponsored development without having to utilize substantial land areas under other ownership. At the southern terminus of the system (the LAX Station), significant opportunities exist for development in conjunction with the airport. However, this would be on airport-owned land and would require airport involvement, approval, and, probably, leadership. Consequently, for purposes of analyzing potential sources of project revenues, development at the airport was not considered in the financial plan.

An additional development concept was identified, consisting of stand-alone platform structures bridging the freeway. These "roving platforms" might be directly associated with a particular station.

Discussion of these development concepts follows.

Illustrations of potential joint development concepts are included in Volume 4 of this proposal. These illustrations do not necessarily correspond exactly to the following joint development discussion, due to the current conceptual level of planning. More definitive planning of the joint development will occur at a later date.

1. JEFFERSON STATION

The Jefferson Station right-of-way is located west of the 405 Freeway and, according to consortium estimates, could accommodate a minimum of 800,000 sq ft of development. Both residential and commercial development is appropriate for this site, given its location and orientation. Estimated current fee market values per sq ft of development are $30 for commercial office use and $20 for residential use, based on expected FARs of 3.0 and 1.5 and land values per sq ft of $90 and $30, respectively.

Since the development potential at the Jefferson Station is on Caltrans-owned right-of-way, no additional cost is expected to be incurred for platforms, although $2 million has been allocated for special outside access costs for these sites. It is estimated that an additional $4 per sq ft in higher construction costs would be involved, given the location and orientation of this site. It is also estimated that the 800,000 sq ft combined potential for commercial and residential uses would be absorbed within 10 years of system opening.

2. WILSHIRE STATION

The Wilshire Station represents by far the most significant potential for capturing development values along the Phase I transit system as currently proposed. It not only generates the highest fee market land values because of its location, but also accounts for almost 50 percent of the total development potential as defined in this analysis. Although incremental costs per sq ft of development are higher than at the other sites (with the exception of the roving platforms, which are totally constructed sites), the incremental land values per sq ft are higher here than those in any other location because of the station's prime location for both office and high-value residential development.

The preliminary sites for the Wilshire Station development lie within and adjacent to the on- and off-ramp system at Wilshire Boulevard and the 405 Freeway. These locations offer a significant opportunity for the development of high-value commercial space (office, retail, and hotel) as well as high-value high-rise condominiums. It is estimated that 1.6 million sq ft of commercial and residential development will be absorbed over a 15-year period from system opening.

3. VICTORY STATION

The Victory Station represents a key location, as it is the expected terminus for the Metro Rail line feeding into downtown Los Angeles. Because of limited land area, most development will be built on a platform at least partially spanning the 405 Freeway.

The platform area for the transit station and parking would approximate 350,000 sq ft, and a portion of the platform could be utilized for private development. The allocated incremental development costs are significant because of the platform construction costs — almost 60 percent of the fee market value for residential development. As a result, the incremental fee value of the site area for private development is the lowest of all the stations.

Commercial development potential is limited at this location and generates very little incremental fee value because of the high site development costs. As a result, only residential development was considered for this analysis.

4. ROVING PLATFORMS

A generic case identified by the project team consists of development on platforms that bridge the 405 Freeway and could be developed at high-value locations (West Los Angeles) along the right-of-way. The team analyzed the potential development values from a generic development profile, namely, 1 million sq ft each of commercial and residential development. The team also utilized relatively high densities (6.0 FAR) in evaluating this generic case, primarily because the high cost of platform construction ($50 per sq ft) necessitates a higher density to be able to bear this incremental development cost.

As indicated, development of this generic case yields an incremental fee land value per sq ft of building area of approximately $14 for high-density residential uses and $24 for high-density commercial uses, values comparable to the Wilshire Station location. The incremental development costs are similar to the Wilshire Station alternative, indicating that there exists substantial potential value to developing additional platform sites along the West Los Angeles transit corridor, if suitable sites are made available.

5. FUTURE CALTRANS INCOME

While the analysis concentrated on estimating the present value of development rights over a 35-year lease term, it is important to understand the future lease income available to Caltrans if the development scenario materializes. As shown in the table below, Caltrans could receive annual income of $11.7 million per year in 1990 dollars from the indicated development sites beginning in year 36 of the lease.

	Jefferson Station	Wilshire Station	Victory Station	Roving Station
Incr. Fee Land Value ($000s)	13,800	74,800	4,165	37,800
Annual Lease Income @ 9% ($)	1,242	6,732	375	3,402

F. CONSTRUCTION

Construction of the HSST guideway is divided into two general systems. Prefabricated steel construction is planned for the guideway from the LAX station to the Victory Station, with the balance of construction northward being conventional cast-in-place concrete column cap with two prestressed concrete beams carrying the track. The difference in construction techniques was dictated by the need for a construction system that would be light, compact, and easily prefabricated in areas having a heavy traffic interface (between LAX and Victory Station). This first, or steel zone (approximately 16 miles), will be characterized by slender (approximately 2.5 feet) prefabricated steel columns with a prefabricated steel T-shaped cap. The carrying girders will be steel. To minimize the need for extensive foundation construction in the median, the average span between supports is anticipated to be over 120 feet.

It is intended that the construction take place in the median, utilizing a strip approximately 16 feet wide that is protected on both sides by a "K" rail with a "gawk" screen. To maintain unimpeded traffic flow, existing shoulder lanes will be employed for traffic. It is anticipated that no more than 10 percent of the 16 miles will be utilized for construction at any one time.

In zones where the shoulder is devoted to traffic, a full-time radio-directed service patrol will be maintained to assist incapacitated motorists and prevent tie-ups. Movement of materials in and out of the construction islands will be restricted to hours of minimum traffic.

After erection of the track beams, control equipment, power pickup, and the maglev track will be installed by equipment running on the newly installed track system. Construction methods in this first zone will be characterized by extensive offsite prefabrication, preassembly of components, and simplicity of installation. Construction methods for stations to be constructed in the median will follow the same principles.

The northern 15 miles of construction will be in an existing median 30 feet wide. It will not be necessary to utilize the shoulders for traffic. The same system of K rails and gawk screens will be employed. However, due to the width of the existing median, conventional concrete construction methods will be employed. It is anticipated that spans between supports will be in the 60-foot range. Movement of materials into the construction zone will again be dictated by traffic density. It is anticipated that no more than 20 percent of this final 15-mile zone will be occupied by construction at any one time.

PROJECT TRAFFIC MANAGEMENT PLAN

The project limits of Phase I, encompassing approximately 30 miles of Routes 405, 5, and 14, include some of the most heavily traveled freeway corridors in the Los Angeles metropolitan area. Route 405, within the project limits, is carrying as many as 295,000 vehicles per day, with congestion developing in both directions for substantial periods (7 to 8 hours daily). Within the project limits of Phase I, Routes 5 and 14 are carrying additional high daily vehicle counts of 175,000 and 110,000, respectively.

There are few alternative routes that could be used, although Sepulveda Boulevard is a possibility through much of the Route 405 segment of the project. Sepulveda Boulevard could only be used as a partial alternative, because it is already congested during peak-hour periods. For these reasons, the project construction plan is based on not reducing the number of freeway lanes for daytime traffic and on accomplishing the work in stages. During this staged construction, the median, where available, and the right shoulders will be utilized for construction and maintaining traffic.

To alleviate construction impact on traffic going through the area, a comprehensive Traffic Management Plan (TMP) will be developed. The TMP is envisioned as an incorporation of many of the traffic management strategies used for the recently completed Ventura Freeway rehabilitation project, as well as the ongoing Harbor Freeway transitway project. These traffic management strategies, in addition to the service patrol, may include the following:

- Changeable Message Signs
- Highway Advisory Radio
- Closed Circuit Television
- Public Relations Firm
- Traffic Management Coordinator
- Onsite Traffic Management Field Office.

G. COMPLIANCE WITH DESIGN STANDARDS

Although the proposed project is a transit project and not a highway project, it is the intent of the Perini/DMJM/HSST Consortium to fully comply with the appropriate Caltrans design standards and practices.

The project plans, specifications, and estimates will be prepared in accordance with Caltrans regulations, policies, manuals, and standards including Federal Highway Administration (FHWA) requirements.

The following Caltrans manuals and guides are not all-inclusive but are intended to illustrate the types of sources that will be utilized to comply with the design standards:

- Highway Design Manual
- Drafting & Plans Manual
- Guide for the Submittal of Plans, Specifications, and Estimates
- Standard Specifications and Standard Special Provisions
- Standard Plans
- Materials Manual
- Surveys Manual
- Landscape Architecture Project Plan Standards
- Traffic Manual
- Manual on Uniform Traffic Control Devices
- Hydraulic Design & Procedures Manual
- Bridge Design Specifications
- Bridge Design Details Manual
- Bridge Design Aids Manual
- Bridge Memos to Designers.

The design of this transit project will comply with all horizontal and vertical clearances standards as specified in the above manuals. In response to requests by the District 7 office of Caltrans and by FHWA representatives, the design of the project is intended to provide clearances sufficient to allow for future freeway widening planned for these corridors.

Because the project is not a highway project, any discussions of a roadway structural section appears unnecessary.

As Phase I of the project is an elevated maglev transit facility composed of a narrow guideway, no appreciable increase in storm runoff as a result of the project is anticipated. Since the transit guideway is planned to be supported in the freeway median by a series of columns, the construction of the columns and their footings will affect median drainage facilities. The project's design will accommodate impacts to the median drainage during and after construction according to the above manuals. Reconstruction of the existing median barrier will be required to accommodate the guideway.

In Phase II, the project's alignment is envisioned to occupy a portion of the wide median of the Route 14 Freeway and at-freeway grade. For this portion of the project within the Route 14 Freeway median, any runoff as a result of the transitway will be accommodated by using the manuals noted above. Since the transitway is planned at freeway grade, jersey barriers will be provided on both sides.

The structural elements of the guideway will be designed for all loading combinations, including seismic. For the substructures, several foundation schemes will be considered based on geotechnical parameters; the most cost-effective and expedient alternative will be selected. The guideway design will comply with the above-noted manuals. All building structures will be designed in conformance with the 88 UBC.

The consortium is particularly sensitive to the unique safety and oversight concerns raised by the proposed introduction of a new technology. During the proposal preparation process, the consortium reviewed State Public Utility Commission (PUC) requirements in detail. This review included PUC: Rules of Practice and Procedure; General Order No. 167, relating to the construction, maintenance, and operation of automated train control systems, and General Order No. 143, pertaining to the design, construction, and operation of light rail transit systems. In addition, safety plans prepared for the PUC by local transit operators in the state were reviewed including the Los Angeles County Transportation Commission's "Safety Oversight Plan", prepared for the Long Beach-Los Angeles Rail Transit project.

In addition to reviewing the PUC regulatory framework and requirements, discussions were held with the PUC staff. These discussions produced insights into the PUC process and identified the types of issues that would need to be addressed prior to construction and implementation of a maglev system project.

Based on review of PUC orders and discussions with the PUC staff, the consortium is confident that a project safety plan and oversight program could be developed and presented to the Commission within the next 12 to 24 months. In addition, the consortium believes that the direct involvement of Caltrans in the PUC process, including performance as lead agency, would be an important dimension to the project in meeting PUC requirements in a timely manner.

H. AGENCY PERMITS AND APPROVALS

Individual stations will require municipal and county planning approvals, including possible general plan amendments, zone changes, use permits, and building permits. Coordination with the City of Los Angeles Department of Airports will be essential at the southern terminus for Phase I and at the eventual northern terminus for Phase II. Coordination with the Las Vegas High-Speed Train consortium will be equally important.

Where alignments affect blueline streams or wetlands and/or riparian vegetation, permits may be required from the U.S. Army Corps of Engineers and the California State Department of Fish and Game in consultation with the U.S. Department of Fish and Wildlife. Coordination with Fish and Game and with Fish and Wildlife will also be necessary where the station sites affect vacant, previously undeveloped lands, particularly where endangered plants and animals may exist. These issues are likely to arise along the northerly portions of the alignment along Route 14.

It is not expected that local freeway agreements will be affected. It will be necessary to obtain from Caltrans an overall freeway agreement for the project addressing the air rights lease to use the freeway right-of-way for the system. Encroachment permits for facilities to be constructed within the Caltrans right-of-way will also be required.

All newly disturbed areas will have to be surveyed for the presence or absence of historic, archaeological, or paleontological resources. If such resources are found, a determination of their significance must be made according to the eligibility factors for the National Register of Historic Places. This requires concurrence of the State Historic Preservation Office. Native American sites require review and consultation with the local Native American representatives regarding site significance and mitigation. Should Section 106 of the Historic Preservation Act be applied to any National Register-eligible sites that are disturbed, the Advisory Council on Historic Preservation in Washington, D.C., will be consulted and a formal memorandum of agreement will be prepared regarding mitigation actions.

Should site reconnaissance uncover the existence of hazardous waste within the construction areas, remediation plans will be formulated and approved by local health departments and water and air quality officials, as well as by the State Department of Health Services and the Environmental Protection Agency.

I. PROJECT COSTS

Costs for the proposed project fall into three general categories: construction and system costs, engineering management and development fees, and operating costs. These categories will be further discussed and summary tables presented. This information is consolidated into a series of spreadsheets which, when combined with the ridership forecast developed earlier, indicate the likely return-on-investment for the fully privatized scenario and a pro forma reflecting LACTC participation.

Construction and system costs were developed in three major sections and two categories. As indicted in Table 1, these categories are construction costs and system costs. The major sections are right-of-way, facilities and stations, and vehicles. The right-of-way section is further subsectioned into the four principal construction zones: Sepulveda Boulevard from Lot C to Jefferson Station, the narrow median zone from Jefferson Station to Wilshire Station, Sepulveda Pass from Wilshire Station to Victory Station, and the wide median zone from Victory Station to South Clarita Station. Extensive efforts were taken by a team of experienced construction cost estimator to identify all sources of cost for each construction zone and to utilize current cost information and years of experience to prepare detailed cost estimate reports. The detailed cost estimate supporting the summary table is too extensive for inclusion here but will be available for review as necessary during subsequent periods.

Similar steps were taken with subsection facilities and stations to identify the six proposed stations, the maintenance facility, the power distribution substations, and the track switches. Again, the consortium's cost estimator prepared extensive, unit-priced estimates in support of the summary table.

Finally, utilizing the loads predicted in the patronage report, a fleet of 44 HSST-200 vehicles was decided on and the appropriate pricing provided.

Table 1 does not include any contingency amounts. These are summarized separately in the spreadsheets that follow.

TABLE 1 — SUMMARY CONSTRUCTION AND SYSTEM COSTS ESTIMATE

		1990 $000,000	
Description	**Construction**	**System**	**Total**
1. Right-of-Way			
Sepulveda Boulevard (14,600 LF)	$ 28.9	$ 20.6	$ 49.5
Narrow Median Zone (28,000 LF)	59.0	40.7	99.7
Sepulveda Pass (44,700 LF)	82.6	63.1	145.7
Wide Median Zone (80,300 LF)	81.7	113.3	195.0
Subtotal	252.2	237.7	489.9
2. Facilities and Stations			
LAX Station Complex	2.3	0.5	2.8
Jefferson Station	30.4	0.2	30.6

Description	Construction	1990 $000,000 System	Total
Wilshire Station	21.5	0.4	21.9
Victory Station	27.0	0.4	27.4
Chatsworth Station	24.8	0.4	25.2
Santa Clarita Station	6.7	0.5	7.2
Maintenance Facility	10.0	6.0	16.0
Power Distribution Substations	42.0		42.0
Track Switches	0.2	9.4	9.6
Subtotal	164.9	17.8	182.7
3. Vehicles			
HSST-200, 44 ea.		118.8	118.8
TOTAL CONSTRUCTION AND SYSTEM	$417.1	$374.3	$791.4

Engineering management and development fees are summarized in Table 2. These costs were developed in five major sections: development costs, engineering costs, construction management, system development and engineering, and Caltrans fees. Extensive detailed estimates are available, if required, to support this summary table.

Operating costs are summarized in Table 3. These costs were developed in two major sections: annual operating costs and equipment replacement fund. The annual operating cost section in further subsectioned into executive management, operations and maintenance labor, security labor, insurance, electric power, and spares. As indicated above, extensive supporting material is available for this summary table.

TABLE 2 — ENGINEERING MANAGEMENT AND DEVELOPMENT FEES

Description	1990 $000,000
1. Development Costs	
Proposal Preparation	$ 0.5
Management	4.0
Development Fee	39.0
Subtotal	43.5
2. Engineering Costs	
EIRs/Permits	8.3
Conceptual Design	8.3
Final Design	20.9
Engineering During Construction	29.2
Subtotal	66.7
3. Construction Management	
Overhead and Management	104.3

Description	1990 $000,000
4. System Development and Engineering	
System Development	93.6
Site Engineering	7.1
Subtotal	100.7
5. Caltrans Fees	4.2
6. Total Engineering Management and Development Fees	$319.4

TABLE 3 — OPERATING COSTS

Description	1990 $000,000
1. Annual Operating Costs	
Executive management	$ 2.0
Operations and maintenance labor	9.0
Security labor	6.0
Insurance	3.4
Electrical power	7.5
Spares	4.0
Subtotal	31.9
2. Equipment Replacement Fund	
To yield $44 million in 1990 dollars in the year 2021, based on payment escalating 5 percent per year into an 8-percent sinking fund	1.8
TOTAL OPERATING COSTS	$33.7

Tables 4-2 and 4-3 consolidate the information provided in Tables 1, 2, and 3. Table 4-1 combines this information with the patronage forecast and anticipated joint development revenue developed in eariler sections to yield a privatization pro forma spreadsheet. In the opinion of our financial advisers, the indicated 7.4-percent interest rate-of-return is not sufficiently robust to present a financial proposition to the financial community.

Subsequent discussions with LACTC, as evidenced in its letter of support included herein, have revealed that the proposed project is of considerable interest to the Commission. This project will provide a cost-effective means of addressing an identified, long-term need that LACTC cannot otherwise now resolve. LACTC has further indicated an interest in taking a lead role in working with the consortium and other parties to establish the means to support the financing requirements determined in Tables 5-1 and 5-2. Under this scenario, the consortium will design, build, and test the system, then transfer ownership to Caltrans and accept the lease back, as will be provided in the franchise agreement. The consortium will then sublease the system to LACTC under an arrangement where LACTC manages the fare box and all operating costs and pays to the consortium an annual amount sufficient to retire the captialized cost. While the calculations presented indicate tax-free debt at 8 percent, our financial advisers have indicated that an alternative, taxable transaction benefiting from the costs of depreciation will yield equivalent results. *We reiterate that this proposal is contingent on the successful conclusion of such an agreement with LACTC or with an LACTC-led group of parties.*

CALTRANS PRIVATIZATION

LAX - SANTA CLARITA

FINANCIAL ANALYSIS

PRIVATIZATION PROFORMA

07/25
08:47

					$ MILLIONS - ANNUAL REVENUE				$ MILLIONS - ANNUAL COST												
(A) YEAR	(B) ADT	(C) DEVEL ADT	(D) TOTAL ADT	(E) AVE FARE	(F) TRIP REVENUE	(G) DEVEL REVENUE	(H) PARKING REVENUE	(I) TOTAL REVENUE	(J) DEVEL COST	(K) ENGRG	(L) CONSTR	(M) HSST SYSTEM	(N) CONTING	(O) CALTRANS O&M	(P) REPLCMNT ACCRUAL	(Q) TOTAL COST	(R) ANNUAL RESIDUAL	(S) 5%/YR ESCAL FACTOR	(T) ESCAL'D RESIDUAL	(U) CUM ESCAL'D RESIDUAL	(A) YEAR
				<----------------$ 1990 $	------------------	------------------	------------------$ 1990 $	------------------	------------------	------------------$ 1990 $	------------------	------------------	------------------$ 1990 $	------------------	------------------	------------------>					
1990	0	0	0	0	0	0	0	0	0.5							0.5	-0.5	1.000	-0.5	-0.5	1990
1991	0	0	0	0	0	0	0	0	2.0	5.5	0.0	0.0	1.1	0.7		9.3	-9.3	1.050	-9.8	-10.3	1991
1992	0	0	0	0	0	0	0	0	2.0	7.5	0.0	0.0	1.5	0.7		11.7	-11.7	1.103	-12.9	-23.2	1992
1993	0	0	0	0	0	0	0	0	39.0	14.1	31.8	0.0	9.2	0.7		94.8	-94.8	1.158	-109.7	-132.9	1993
1994	0	0	0	0	0	0	0	0		20.1	130.3	126.2	30.1	0.7		307.3	-307.3	1.216	-373.5	-506.4	1994
1995	55000	0	55000	0	0	28.8	0	28.8		9.6	260.6	211.6	54.1	0.7		536.6	-507.9	1.276	-648.2	-1154.6	1995
1996	55550	0	55550	0	0	27.4	0	27.4		9.6	130.3	137.3	28.0	0.7		306.0	-278.6	1.340	-373.3	-1527.9	1996
1997	56106	2000	58106	$3.25	54.0	26.1	12.4	92.5						31.9	1.8	33.7	58.8	1.407	82.7	-1445.2	1997
1998	56667	4000	60667	$3.25	56.4	24.8	12.4	93.6						31.9	1.8	33.7	59.9	1.477	88.5	-1356.7	1998
1999	57233	6000	63233	$3.25	58.8	23.7	12.4	94.8						31.9	1.8	33.7	61.1	1.551	94.8	-1261.8	1999
2000	57806	8000	65806	$3.25	61.2		12.4	73.6						31.9	1.8	33.7	39.9	1.629	64.9	-1196.9	2000
2001	58384	10000	68384	$3.25	63.6		12.4	76.0						31.9	1.8	33.7	42.3	1.710	72.3	-1124.6	2001
2002	58967	12500	71467	$3.25	66.4		12.4	78.8						31.9	1.8	33.7	45.1	1.796	81.0	-1043.6	2002
2003	59557	12500	72057	$3.25	67.0		12.4	79.4						31.9	1.8	33.7	45.7	1.886	86.1	-957.4	2003
2004	60153	12500	72653	$3.25	67.5		12.4	79.9						31.9	1.8	33.7	46.2	1.980	91.5	-865.9	2004
2005	60754	12500	73254	$3.25	68.1		12.4	80.5						31.9	1.8	33.7	46.8	2.079	97.3	-768.6	2005
2006	61362	12500	73862	$3.25	68.7		12.4	81.1						31.9	1.8	33.7	47.4	2.183	103.4	-665.3	2006
2007	61975	12500	74475	$3.25	69.2		12.4	81.6						31.9	1.8	33.7	47.9	2.292	109.8	-555.4	2007
2008	62595	12500	75095	$3.25	69.8		12.4	82.2						31.9	1.8	33.7	48.5	2.407	116.7	-438.7	2008
2009	63221	12500	75721	$3.25	70.4		12.4	82.8						31.9	1.8	33.7	49.1	2.527	124.0	-314.7	2009
2010	63853	12500	76353	$3.25	71.0		12.4	83.4						31.9	1.8	33.7	49.7	2.653	131.8	-182.9	2010
2011	64492	12500	76992	$3.25	71.6		12.4	84.0						31.9	1.8	33.7	50.3	2.786	140.0	-42.8	2011
2012	65137	12500	77637	$3.25	72.2		12.4	84.6						31.9	1.8	33.7	50.9	2.925	148.8	106.0	2012
2013	65788	12500	78288	$3.25	72.8		12.4	85.2						31.9	1.8	33.7	51.5	3.072	158.1	264.0	2013
2014	66446	12500	78946	$3.25	73.4		12.4	85.8						31.9	1.8	33.7	52.1	3.225	168.0	432.0	2014
2015	67110	12500	79610	$3.25	74.0		12.4	86.4						31.9	1.8	33.7	52.7	3.386	178.5	610.5	2015
2016	67782	12500	80282	$3.25	74.6		12.4	87.0						31.9	1.8	33.7	53.3	3.556	189.6	800.1	2016
2017	68459	12500	80959	$3.25	75.3		12.4	87.7						31.9	1.8	33.7	54.0	3.733	201.4	1001.5	2017
2018	69144	12500	81644	$3.25	75.9		12.4	88.3						31.9	1.8	33.7	54.6	3.920	214.0	1215.5	2018
2019	69835	12500	82335	$3.25	76.5		12.4	88.9						31.9	1.8	33.7	55.2	4.116	227.3	1442.8	2019
2020	70534	12500	83034	$3.25	77.2		12.4	89.6						31.9	1.8	33.7	55.9	4.322	241.5	1684.3	2020
2021	71239	12500	83739	$3.25	77.8		12.4	90.2						31.9	1.8	33.7	56.5	4.538	256.6	1940.9	2021
2022	71951	12500	84451	$3.25	78.5		12.4	90.9						31.9	1.8	33.7	57.2	4.765	272.5	2213.4	2022
2023	72671	12500	85171	$3.25	79.2		12.4	91.6						31.9	1.8	33.7	57.9	5.003	289.5	2502.9	2023
2024	73398	12500	85898	$3.25	79.8		12.4	92.2						31.9	1.8	33.7	58.5	5.253	307.5	2810.5	2024
2025	74132	12500	86632	$3.25	80.5		12.4	92.9						31.9	1.8	33.7	59.2	5.516	326.7	3137.2	2025
2026	74873	12500	87373	$3.25	81.2		12.4	93.6						31.9	1.8	33.7	59.9	5.792	347.0	3484.2	2026
2027	75622	12500	88122	$3.25	81.9		12.4	94.3						31.9	1.8	33.7	60.6	6.081	368.6	3852.8	2027
2028	76378	12500	88878	$3.25	82.6		12.4	95.0						31.9	1.8	33.7	61.3	6.385	391.5	4244.3	2028
2029	77142	12500	89642	$3.25	83.3		12.4	95.7						31.9	1.8	33.7	62.0	6.705	415.8	4660.1	2029
2030	77913	12500	90413	$3.25	84.0		12.4	96.4						31.9	1.8	33.7	62.7	7.040	441.7	5101.8	2030
2031	78692	12500	91192	$3.25	84.8		12.4	97.2						31.9	1.8	33.7	63.5	7.392	469.1	5570.9	2031
					2549.0	130.7	434.0	3113.8	43.5	66.4	553.1	475.1	123.9	1120.7	63.0	2445.7	668.1		5570.9		
								3113.8								2445.7	668.1				
									DEVL/ENGG/CONST/HSST/CONTIN--------> 1262.0							IRR------>	2.37%		7.48%		

Table 4-1

07/25
08:47

ENGINEERING COST BREAKOUT	1991	1992	1993	1994	1995	1996	TOTAL
EIR'S/PERMITS @2%	2.8	3.8	1.8				8.3
CONCEPT DESIGN @2%	2.8	3.8	1.8				8.3
FINAL DESIGN @5%			10.4	10.4			20.9
ENGG CONST @7%				9.6	9.6	9.6	29.2
TOTALS @16%	5.5	7.5	14.1	20.1	9.6	9.6	66.7

CALTRANS FEES	1991	1992	1993	1994	1995	1996	TOTAL
@1% CONSTRUCTION	0.7	0.7	0.7	0.7	0.7	0.7	4.2

ANNUAL OPERATING COST BREAKOUT	
EXECUTIVE MNGMNT	2.0
OPS/MAINT LABOR	9.0
SECURITY LABOR	6.0
INSURANCE	3.4
ELECTRICITY	7.5
SPARES	4.0
TOTAL	31.9

CONSTRUCTION COST BREAKOUT						25% OH & P	
	1991	1992	1993	1994	1995	1996	TOTAL
LAND ACQUISITION			31.8				31.8
ROW CONSTRUCTION				63.1	126.1	63.1	252.2
FACILITIES				41.2	82.4	41.2	164.8
PERINI OH & P				26.1	52.1	26.1	104.3
TOTALS	0.0	0.0	31.8	130.3	260.6	130.3	553.1

HSST COST BREAKOUT					25%	2% FEE										
	1991	1992	1993	1994	1995	1996	TOTAL	ADJ	ADJ TOT	1991	1992	1993	1994	1995	1996	
ROW MATLS/INSTL				59.4	118.9	59.4	237.7	0.0	237.7				59.4	118.9	59.4	ROW MATLS/INSTL
FACIL MATLS/INSTL					9.0	9.0	17.9	0.0	17.9					9.0	9.0	FACIL MATLS/INSTL
VEHICLES (44@$2.7)				39.6	39.6	39.6	118.8	0.0	118.8				39.6	39.6	39.6	VEHICLES (44@$2.7)
SUBTOTAL	0.0	0.0	0.0	99.0	167.4	108.0	374.4	0.0	374.4	0.0	0.0	0.0	99.0	167.4	108.0	SUBTOTAL
SYSTEM ENGG FEE	0.0	0.0	0.0	24.8	41.8	27.0	93.6	0.0	93.6	0.0	0.0	0.0	24.8	41.8	27.0	SYSTEM ENGG FEE
CIVIL ENGG FEE	0.0	0.0	0.0	2.4	2.4	2.4	7.1	0.0	7.1	0.0	0.0	0.0	2.4	2.4	2.4	CIVIL ENGG FEE
TOTALS	0.0	0.0	0.0	126.2	211.6	137.3	475.1	0.0	475.1	0.0	0.0	0.0	126.2	211.6	137.3	TOTALS

Table 4-2

07/25
08:47

(A) YEAR	(G-1) DEVEL REVENUE FLOW	(G-2) REVENUE FLOW 1990 $'S
1990	0.0	0.0
1991	0.0	0.0
1992	0.0	0.0
1993	0.0	0.0
1994	0.0	0.0
1995	36.7	28.8
1996	36.7	27.4
1997	36.7	26.1
1998	36.7	24.8
1999	36.7	23.7

NPV PER KRM = 70.0607

(A) YEAR	(P-1) REPLCMNT 8% SNK F ACCRUAL ESCL'D @ 5%/YEAR	(P-2) REPLCMNT 8% SNK F CUR VAL	(P-3) REPLCMNT EXPENSE 1990 $'S	(P-4) REPLCMNT EXPENSE ESCL'D $	(P-5) REPLCMNT 8% SNK F NET VAL
1990					
1991					
1992					
1993					
1994					
1995					
1996					
1997	1.8	1.8			1.8
1998	1.9	3.8			3.8
1999	2.0	6.1			6.1
2000	2.1	8.7			8.7
2001	2.2	11.6			11.6
2002	2.3	14.8			14.8
2003	2.4	18.4			18.4
2004	2.5	22.4			22.4
2005	2.7	26.9			26.9
2006	2.8	31.8			31.8
2007	2.9	37.3			37.3
2008	3.1	43.3			43.3
2009	3.2	50.0			50.0
2010	3.4	57.4			57.4
2011	3.6	65.6			65.6
2012	3.7	74.6			74.6
2013	3.9	84.5			84.5
2014	4.1	95.4			95.4
2015	4.3	107.3			107.3
2016	4.5	120.5			120.5
2017	4.8	134.9			134.9
2018	5.0	150.7			150.7
2019	5.3	168.0			168.0
2020	5.5	187.0			187.0
2021	5.8	207.7	44.0	199.7	8.1
2022	6.1	14.8			14.8
2023	6.4	22.4			22.4
2024	6.7	30.9			30.9
2025	7.1	40.4			40.4
2026	7.4	51.1			51.1
2027	7.8	62.9			62.9
2028	8.2	76.1			76.1
2029	8.6	90.8			90.8
2030	9.0	107.1			107.1
2031	9.5	125.1			125.1
	162.6		44.0	199.7	

Table 4-3

CALTRANS PRIVATIZATION

LAX - SANTA CLARITA

FINANCIAL ANALYSIS

LACTC OPERATIONS

07/25
09:53

(A) YEAR	(B) ADT	(C) DEVEL ADT	(D) TOTAL ADT	(E) AVE FARE	$ MILLIONS - ANNUAL REVENUE (F) TRIP REVENUE	(G) DEVEL REVENUE	(H) PARKING REVENUE	(I) TOTAL REVENUE	(O) CALTRANS O&M	(P) REPLCMNT ACCRUAL	(Q) TOTAL COST	(R) ANNUAL RESIDUAL	(S) 5%/YR ESCAL FACTOR	(T) ESCAL'D RESIDUAL	(TT) LEASE PAYMENT	(TTT) T+TT	(U) CUM ESCAL'D RESIDUAL	(A) YEAR
				<------------------$ 1990 $					-----$ 1990 $			---->						
1990	0	0	0					0			0.0	0.0	1.000	0.0	0.0	0.0	0.0	1990
1991	0	0	0					0			0.0	0.0	1.050	0.0	0.0	0.0	0.0	1991
1992	0	0	0					0			0.0	0.0	1.103	0.0	0.0	0.0	0.0	1992
1993	0	0	0					0			0.0	0.0	1.158	0.0	0.0	0.0	0.0	1993
1994	0	0	0					0			0.0	0.0	1.216	0.0	0.0	0.0	0.0	1994
1995	55000	0	55000					0.0			0.0	0.0	1.276	0.0	0.0	0.0	0.0	1995
1996	55550	0	55550					0.0			0.0	0.0	1.340	0.0	0.0	0.0	0.0	1996
1997	56106	2000	58106	$3.25	54.0		12.4	66.4	31.9	1.8	33.7	32.7	1.407	46.0	155.7	-109.7	-109.7	1997
1998	56667	4000	60667	$3.25	56.4		12.4	68.8	31.9	1.8	33.7	35.1	1.477	51.8	155.7	-103.9	-213.5	1998
1999	57233	6000	63233	$3.25	58.8		12.4	71.2	31.9	1.8	33.7	37.5	1.551	58.1	155.7	-97.6	-311.1	1999
2000	57806	8000	65806	$3.25	61.2		12.4	73.6	31.9	1.8	33.7	39.9	1.629	64.9	155.7	-90.8	-401.8	2000
2001	58384	10000	68384	$3.25	63.6		12.4	76.0	31.9	1.8	33.7	42.3	1.710	72.3	155.7	-83.4	-485.2	2001
2002	58967	12500	71467	$3.25	66.4		12.4	78.8	31.9	1.8	33.7	45.1	1.796	81.0	155.7	-74.6	-559.9	2002
2003	59557	12500	72057	$3.25	67.0		12.4	79.4	31.9	1.8	33.7	45.7	1.886	86.1	155.7	-69.6	-629.5	2003
2004	60153	12500	72653	$3.25	67.5		12.4	79.9	31.9	1.8	33.7	46.2	1.980	91.5	155.7	-64.2	-693.6	2004
2005	60754	12500	73254	$3.25	68.1		12.4	80.5	31.9	1.8	33.7	46.8	2.079	97.3	155.7	-58.4	-752.0	2005
2006	61362	12500	73862	$3.25	68.7		12.4	81.1	31.9	1.8	33.7	47.4	2.183	103.4	155.7	-52.3	-804.4	2006
2007	61975	12500	74475	$3.25	69.2		12.4	81.6	31.9	1.8	33.7	47.9	2.292	109.8	155.7	-45.8	-850.2	2007
2008	62595	12500	75095	$3.25	69.8		12.4	82.2	31.9	1.8	33.7	48.5	2.407	116.7	155.7	-39.0	-889.2	2008
2009	63221	12500	75721	$3.25	70.4		12.4	82.8	31.9	1.8	33.7	49.1	2.527	124.0	155.7	-31.7	-920.8	2009
2010	63853	12500	76353	$3.25	71.0		12.4	83.4	31.9	1.8	33.7	49.7	2.653	131.8	155.7	-23.9	-944.8	2010
2011	64492	12500	76992	$3.25	71.6		12.4	84.0	31.9	1.8	33.7	50.3	2.786	140.0	155.7	-15.7	-960.4	2011
2012	65137	12500	77637	$3.25	72.2		12.4	84.6	31.9	1.8	33.7	50.9	2.925	148.8	155.7	-6.9	-967.3	2012
2013	65788	12500	78288	$3.25	72.8		12.4	85.2	31.9	1.8	33.7	51.5	3.072	158.1	155.7	2.4	-964.9	2013
2014	66446	12500	78946	$3.25	73.4		12.4	85.8	31.9	1.8	33.7	52.1	3.225	168.0	155.7	12.3	-952.7	2014
2015	67110	12500	79610	$3.25	74.0		12.4	86.4	31.9	1.8	33.7	52.7	3.386	178.5	155.7	22.8	-929.9	2015
2016	67782	12500	80282	$3.25	74.6		12.4	87.0	31.9	1.8	33.7	53.3	3.556	189.6	155.7	33.9	-896.0	2016
2017	68459	12500	80959	$3.25	75.3		12.4	87.7	31.9	1.8	33.7	54.0	3.733	201.4	155.7	45.7	-850.3	2017
2018	69144	12500	81644	$3.25	75.9		12.4	88.3	31.9	1.8	33.7	54.6	3.920	214.0	155.7	58.3	-792.0	2018
2019	69835	12500	82335	$3.25	76.5		12.4	88.9	31.9	1.8	33.7	55.2	4.116	227.3	155.7	71.6	-720.3	2019
2020	70534	12500	83034	$3.25	77.2		12.4	89.6	31.9	1.8	33.7	55.9	4.322	241.5	155.7	85.8	-634.5	2020
2021	71239	12500	83739	$3.25	77.8		12.4	90.2	31.9	1.8	33.7	56.5	4.538	256.6	155.7	100.9	-533.6	2021
2022	71951	12500	84451	$3.25	78.5		12.4	90.9	31.9	1.8	33.7	57.2	4.765	272.5	155.7	116.8	-416.8	2022
2023	72671	12500	85171	$3.25	79.2		12.4	91.6	31.9	1.8	33.7	57.9	5.003	289.5	155.7	133.8	-283.0	2023
2024	73398	12500	85898	$3.25	79.8		12.4	92.2	31.9	1.8	33.7	58.5	5.253	307.5	155.7	151.8	-131.1	2024
2025	74132	12500	86632	$3.25	80.5		12.4	92.9	31.9	1.8	33.7	59.2	5.516	326.7	155.7	171.0	39.9	2025
2026	74873	12500	87373	$3.25	81.2		12.4	93.6	31.9	1.8	33.7	59.9	5.792	347.0	155.7	191.3	231.2	2026
2027	75622	12500	88122	$3.25	81.9		12.4	94.3	31.9	1.8	33.7	60.6	6.081	368.6	155.7	212.9	444.1	2027
2028	76378	12500	88878	$3.25	82.6		12.4	95.0	31.9	1.8	33.7	61.3	6.385	391.5	155.7	235.8	679.9	2028
2029	77142	12500	89642	$3.25	83.3		12.4	95.7	31.9	1.8	33.7	62.0	6.705	415.8	155.7	260.1	940.0	2029
2030	77913	12500	90413	$3.25	84.0		12.4	96.4	31.9	1.8	33.7	62.7	7.040	441.7	155.7	286.0	1226.0	2030
2031	78692	12500	91192	$3.25	84.8		12.4	97.2	31.9	1.8	33.7	63.5	7.392	469.1	155.7	313.4	1539.5	2031
					2549.0	0.0	434.0	2983.0	1116.5	63.0	1179.5	1803.5		6988.7	5449.3	1539.5		

Table 5-1

07/25
09:53

(A) YEAR	(J) DEVEL COST	(K) ENGRG	(L) CONSTR	(M) HSST SYSTEM	(N) CONTING	(O) CALTRANS O&M	(P) REPLCMNT ACCRUAL	(Q) TOTAL COST	(S) 5%/YR ESCAL FACTOR	(V) ESCAL'D COST	(W) CUM ESCAL'D COST	(X) INTEREST @ 8% HALF-YR CONVTN	(Y) TOTAL CAPITAL COST
	$ MILLIONS - ANNUAL COST												
	$ 1990 $			$ 1990 $			$ 1990 $						
1990	0.5							0.5	1.000	0.5	0.5	0.0	0.5
1991	2.0	5.5	0.0	0.0	1.1	0.7		9.3	1.050	9.8	10.3	0.4	10.2
1992	2.0	7.5	0.0	0.0	1.5	0.7		11.7	1.103	12.9	23.2	1.3	14.2
1993	39.0	14.1	31.8	0.0	9.2	0.7		94.8	1.158	109.7	132.9	6.2	115.9
1994		20.1	130.3	126.2	30.1	0.7		307.3	1.216	373.5	506.4	25.6	399.1
1995		9.6	260.6	211.6	54.1	0.7		536.6	1.276	684.9	1191.3	67.9	752.8
1996		9.6	130.3	137.3	28.0	0.7		306.0	1.340	410.0	1601.3	111.7	521.7
	43.5	66.4	553.1	475.1	123.9	4.2		1266.2		1601.3		213.2	1814.5
									ANNUAL PAYMENT @8%, 35 YEARS--------->				155.7

Table 5-2

J. FHWA AND NEPA INVOLVEMENT

Because the route affects federally assisted highways, the environmental clearance documentation for the project must meet the requirements of both state and federal law. The project will require an air rights lease, which directly triggers the need for review under the National Environmental Policy Act (NEPA). NEPA involvement raises the question of whether property acquisition outside of freeway right-of-way necessary for stations and alignment transitions into stations could be subject to Section 4(f) of the Department of Transportation Act and to Section 106 of the Historic Preservation Act, even though such acquisitions would not be federally funded. Recent court decisions have extended the definition of a "federal action" to potentially mean that in granting an air rights lease the agency would thereby have a hand in creating impacts to Section 4(f) and/or Section 106 properties. For this reason it will be important to obtain an early decision on this issue from FHWA, if possible. And, even if the decision leads to the conclusion that Section 4(f) and Section 106 do not apply, precautions must be taken to avoid potentially significant historic sites and other Section 4(f) lands, including public parks and recreation lands, wetlands, and wildlife areas.

If Section 4(f) and Section 106 are ultimately determined to be applicable, the specific processing requirements of these regulations can add 6 months to 1 year to the project implementation schedule. A variety of special reports are required, including a report demonstrating that there is absolutely no other prudent and feasible alternative to disturbing these sites. This includes preparation of additional design concepts that avoid *all* impacts to these uses and justifications as to why the alternatives are considered infeasible.

PRELIMINARY ENVIRONMENTAL EVALUATION

PRELIMINARY ENVIRONMENTAL EVALUATION

A. INTRODUCTION

The project as proposed is generally located within the rights-of-way of the I-405, I-5, and Route 14 Freeways and Sepulveda Boulevard. The alignment will pose minimal adverse impacts, as it is located primarily within the medians of existing major transportation routes, with the outlying freeway lanes serving as a buffer between the maglev system and the adjacent land uses. Key impacts of the alignment are therefore focused on temporary construction impacts and the visual impacts of the elevated structure, particularly where it must be run at a high elevation to clear overcrossings. A short segment of the alignment near LAX diverges from Sepulveda Boulevard. The effects of this segment are addressed in more detail throughout this discussion.

As with most rail transportation systems, the primary impacts of the project result from the development and operation of stations. At these sites, there may be traffic impacts from accessing/egressing auto and bus movements and parking, pedestrian access issues, land use compatibility concerns, noise and air quality impacts, and aesthetic considerations. In areas where previously vacant land may be disturbed, biological issues may also arise.

B. ENVIRONMENTAL GOALS

The proposed maglev train project is consistent with the policies of the California Environmental Quality Act in that :

- It provides a high-capacity, clean-running mode of transportation, which reduces dependence on fossil fuel burning motor vehicles.
- It substantially increases the ability to move people and goods along the existing rights-of-way, with only minimal need for additional land.
- By running largely within existing freeway rights-of-way, it creates minimal disturbance to existing natural areas. Any such disturbance will be appropriately mitigated in adherence to the requirements of CEQA.
- By maintaining a ground footprint limited to widely spaced columns and a limited number of station sites, the system creates very little surface disturbance to the environment.
- The system brings a new technology to California that can ultimately serve as the beginning of a network to provide for an even larger share of our citizen's transportation needs.

C. POTENTIAL ENVIRONMENTAL RESOURCES AND ISSUES

1. PHYSICAL

Since the mid-range speed of this maglev technology has more flexible design constraints than do ultrahigh-speed systems, allowing it to be neatly integrated into the freeway alignment, the project involves little topographic change. Certain station sites may require special grading, however, to accommodate parking structures and, where appropriate, joint development opportunities. All facilities will be designed to accommodate motion from the maximum credible earthquake and to meet applicable seismic code requirements. During construction, standard wind and water erosion control measures, such as watering, will be implemented to control dust and sedimentation ponds.

Other concerns about the alignment include the noise, vibration, and electromagnetic radiation issues that have surfaced from time to time during consideration of similar projects. Because this system operates without wheels, is levitated in the air, and operates at an intermediate speed (less than 125 mph), it is anticipated that train noise and vibration will be minor and will be masked by adjacent surface traffic effects. Electromagnetic radiation from the proposed system is very low and is similar in magnitude to the earth's natural magnetic field. This stems from the HSST maglev technology's utilizing an attraction-based levitation principle using ordinary electromagnets, which results in the magnetic fields being tightly concentrated by and captured within the levitation structures of the vehicles and track. There is little stray magnetic flux.

Net impacts on air quality and energy will be calculated, including diverted auto trips, as well as the more typical construction and operating energy and air quality impacts. Solid waste generation, expected to be minimal, will be quantified along with use of any natural resources, such as electric power.

Effects on any wetlands, surface water bodies, groundwater, groundwater recharge, and floodplains will be identified. With the possible exception of wetlands, we do not anticipate any significant water-based impacts from this project, due to the location of the alignment within the existing right-of-way. Wetlands may only be a problem where small amounts of reparian vegetation are found on vacant station sites. It is anticipated that all such impacts can be avoided with proper system and station design.

2. BIOLOGICAL

As noted above, the intent is to avoid as much natural area as possible. As can be seen from the concept design for the system, very few vacant natural lands are disturbed by the proposed project. In the northern portion of the project area, along Route 14, there will be concerns regarding potential presence of sensitive species. Generally, however, the selected sites are not likely to create significant adverse effects. None of the areas proposed is in agricultural or timber use.

3. SOCIOLOGICAL

Land use changes created by the project will be documented in the EIR/EIS. Any direct impacts to existing uses will be identified. In most cases, these impacts will be minor due to the use of the highway medians. However, near LAX, in the Westchester area, the alignment would be shifted off the Sepulveda Boulevard median to run behind the commercial businesses, in some cases above rear parking areas. This route would require the acquisition of a limited number of residential units and would therefore necessitate the preparation of a housing study per Caltrans/FHWA standards. It is anticipated that relocation assistance would be required and that the program followed would, at a minimum, meet current Caltrans/FHWA requirements. The housing study would address the number and types of units being displaced, the number and types of households requiring relocation, the socioeconomic characteristics of the displacees, the availability of replacement housing in the area, and the actions to be taken to assist the relocatees in obtaining replacement housing. Business displacement and disruption, where it would occur, would similarly be addressed in the document. Again, it is anticipated that current Caltrans standards for documentation of business impacts will be met. Such issues as direct displacement, parking and access disruption, and partial takings, among others, will be assessed.

Depending on ridership characteristics such as the preponderance of long-haul use vs. commuters or recreational users, the presence of a station can generate demand for auxiliary development in the form of ancillary commercial uses such as dry cleaners, convenience stores, florist shops, and fast food vendors; new office development for sites that can be characterized as destinations; and higher density residential developments. The joint development considered with this project represents a portion of this activity and will be evaluated in the impact assessment.

Local planning agencies are encouraged to permit intensification of uses around station sites to enhance ridership and maximize the use of the newly available transportation system capacity. Generally, as shown by numerous past studies, fixed-guideway transit systems do not bring additional growth into a region over and above that originally forecast. Rather, the growth within the area is simply redistributed to focus on the rail stations and the enhanced mobility they provide.

One question presented by this system involves the opportunity created by the high-speed transportation connection to reducing commute time from the Santa Clarita area to the San Fernando Valley, and from both of these to the Los Angeles Basin. The system may make the outlying areas substantially more attractive to commuters, with a resultant potentially significant shift in regional growth. Because of the presence of the system, this growth could occur without a commensurate impact on the surface traffic corridors.

By providing an improvement to regional accessibility, the system creates opportunities for businesses needing convenient access to airport facilities and provides enhanced commute accessibility for their employees. A full economic assessment will be prepared to describe the anticipated interrelationships of business development, industry, local economic opportunity, and employment associated with the system. Economic impacts are not considered relevant under California environmental law unless they in turn have a significant physical effect on the environment. This project may result in such effects. Economic effects are, however, a required topic of investigation under NEPA.

Population shifts may also occur if denser development is permitted around station areas. This will be up to local agency approval. In some cases, the prospect of a new fixed-guideway transit system results in the formation of local task forces to address station area issues. Coordination with any such task forces would be essential.

Neighborhood concerns will primarily focus on traffic and parking impacts around the station sites and the need to establish buffer landscaping or noise barriers around certain station functions, such as bus drop-off areas. Intensification of use at joint development sites is likely to be a key concern. The proximity of the alignment will also be an issue where it diverges from Sepulveda Boulevard to run behind the commercial and adjacent residential areas. Concerns will arise regarding public safety and security and the likelihood of vandalism and crime in parking lots and structures. Data from other rail systems will be used to examine these issues. There will also be a concern regarding the light and glare from the alignment stations; care will be taken to direct all lighting inward and to minimize illumination as viewed from any adjacent residential uses. Parking must be adequate to handle anticipated demand so that intrusion into adjacent areas is prevented. Other parking control measures, such as local permit parking, may become necessary if parking intrusion materializes as a serious issue.

As proposed, the system will not adversely impact any schools or existing public facilities. One planned public facility, however, will be affected by the current concept: the proposed elevated bikeway in West Los Angeles south of the Veterans Administration Hospital adjacent to the I-405 Freeway. A way will be found to coordinate the design of both these facilities. A key concern will be the height of the crossings over the freeway to allow the freeway, bikeway, and system guideway to obtain proper vertical clearances. The most sensitive area for aesthetic impacts is likely to be in the Westchester area.

Historic and cultural resources are not likely to be found within the vast majority of the right-of-way and station areas, since they comprise existing freeways and streets and fairly recently developed land. The only exception applies to the vacant lands at the northern end of the alignment. All these areas will be properly reviewed and/or surveyed by professional archeologists and historians, and if any significant resources are found, efforts will be made to avoid them or properly mitigate them.

As noted in the initial discussion of the alignment impacts, the visual impact of the guideway structure will be minimized by the nature of the structure itself. It is narrow, and columns are widely spaced. The varied terrain, the location of the facility (generally within freeway and arterial medians), and the variety of the adjacent building heights along much of the alignment will soften its appearance.

Stations will have a more noticeable impact, particularly where parking demands are anticipated as substantial and joint development is anticipated to occur. Measures will be incorporated to harmonize station structures with surrounding development and terrain as appropriate. This can be done in consultation with local planning officials.

D. MITIGATION MEASURES

A variety of mitigation opportunities has been discussed above under specific environmental parameters. It is important to recognize, however, that very little of the area needed for facility construction extends outside existing freeway or street rights-of-way. It therefore results in minimal environmental impacts — generally, impacts that can be readily mitigated. The most difficult to mitigate are likely to be the station area impacts. These, like any intensive development use, require close attention to the necessity of eliminating traffic impacts, noise problems, and parking intrusion and of designing stations and any related development in a manner sensitive to surrounding land uses and compatible in scale and design treatment.

The project EIR/EIS will require the preparation of a Mitigation Monitoring Plan as required by state law. The plan will specify each mitigation measure required by the EIR and associated permits and decide who is responsible for implementing the measure, when it must be implemented, and who is responsible for ensuring that it has been satisfactorily implemented.

FINANCIAL PLAN

Bank of America

H. Anton Tucher
Vice President

Capital Markets Division

July 27, 1990

Mr. Carl B. Williams
Assistant Director
Department of Transportation
State of California
P.O. Box 942873
Sacramento, CA 94273-0001

Dear Mr. Williams:

Bank of America has been working with the Joint Venture ("JV") of Perini Corporation, Daniel, Mann, Johnson & Mendenhall ("DMJM") and the High Speed Surface Transportation Company ("HSST") as Financial Advisor in the formulation of the JV's conceptual proposal of a magnetic levitation transit line running from Los Angeles Airport to Santa Clarita. We are happy to submit this letter, outlining our thoughts on how the financing for such a venture might be arranged, in support of the JV's proposal.

The finance plans we are proposing are conceptual structures suggesting possible allocations of project risks and returns among various project participants in ways in which we believe the project might be financed. The structure represents the Financial Advisor's professional judgments based on our knowledge of present financial market conditions, our understanding of the applicable tax and general legal framework, and our understanding of what might reasonably be negotiated with various parties who would be involved in any of the suggested structures.

In submitting these conceptual financing structures, the Financial Advisor expresses no professional opinions on tax, legal or accounting matters, nor is there any representation regarding any commitments by any possible participant, including Bank of America or any other lender or investor. Therefore, there can be no assurance that any of the financing structures can, in fact, be implemented.

INTRODUCTION

A new urban mass transit venture, involving a state-of-the-art technology and designed to link up with a number of other existing and planned

Bank of America National Trust and Savings Association
555 California Street San Francisco, California 94104

transit facilities, is obviously considerably more complex to plan than a toll road or bridge. At the time of writing, a number of significant business points and project risk allocation issues remain to be negotiated. The conceptual finance plan necessarily reflects the uncertainties of the business plan.

Probably most important among the issues needing further refinement are the terms of the participation of many of the principal project participants required to make the project financeable. Paramount among these are the local authorities in Los Angeles, whose support along the lines indicated later in this letter is a keystone to the financial viability of the proposed project. Other very important participants are the vendors of the Japanese magnetic levitation technology and project components. HSST operates as the provider of the technology, but not as the supplier of the hardware. The components and equipment would be supplied by a group of major manufacturers, many of them presumably Japanese, but some quite likely American or from third countries. The terms of their participation, particularly as they relate to completion support, performance warranties and financing, has not yet been defined.

Perhaps an equally important issue is the fact that a transit project involves a far more fundamental change in user behavior patterns than simply inducing a change of highway route and the willingness to pay for an uncongested ride. The traffic study which could be completed within available time and budget constraints indicates substantial potential ridership, but it is based on what appears to be the best available but outdated traffic model for the Los Angeles basin. While reason and instinct argue in favor of higher ridership numbers than those generated by the model, there is no empirical data to indicate how the travelling public will respond to an ultra-modern, very fast transit alternative to an increasingly congested artery at a fare considerably higher than has been customary in conventional urban mass transit systems.

Based on preliminary capital cost and ridership estimates, it appears that a purely privately built, financed and operated transit system cannot generate sufficient net operating cash flows to service the debt and equity capital at rates of return sufficient to attract it. This conclusion is based on the assumptions that such a system would require a minimum equity capitalization of 30% to 35%, that investors in a risky start-up operation, such as this, would need very attractive returns, at least 30% before taxes, to induce their participation, and that all debt would be raised on a taxable basis.

The sponsors believe, however, that the project has many compelling, attractive features and these advantages argue persuasively that the project ought to be pursued as a partnership venture between the private and public sectors. The advantages of a transit project which truly relieves congestion and reduces air pollution by reducing the number of cars on the road, over projects which simply provide additional asphalt for more cars and more pollution, and which, while relieving congestion on one highway increase congestion throughout the surrounding road system, are obvious. Citing these advantages is not intended to deny the need for additional highway facilities, but simply to argue for the merit of transit where transit is feasible.

The sponsors submit that despite the very conceptual nature of the business and finance plans, involving significant issues yet to be resolved, there are sufficient encouraging indications that satisfactory resolutions are possible to warrant pursuing the project to the next phase of the project development process. The Los Angeles County Transportation Commission ("LACTC") and its Executive Director have shown great support for the project and have indicated strong interest in exploring a major LACTC role in the proposed project, which has a very high priority in LACTC's long term transit plans. A copy of the Executive Director's letter is included elsewhere in the proposal. The Commission of the Los Angeles Department of Airports ("LADA") and its General Manager have similarly indicated strong support for the project on a public-private partnership basis. A copy of the unanimous Commission resolution of support for the project is likewise included elsewhere in the proposal.

There appear to be feasible structures which would permit such a partnership within the parameters of the AB 680 program. Given the short time available and the fact that the negotiation of such arrangements with public institutions is necessarily time consuming, the nature of this proposal and suggested finance plans are truly conceptual.

Various approaches to such a public-private partnership considered in this proposal all rest on the assumption that creditable ridership studies would demonstrate that the expected revenues would fully service the required capital over the 35 year operating life of the concession with at least a modest margin of safety. Very preliminary traffic studies indicate that it is reasonable to believe that detailed ridership studies could validate this critical assumption. To the extent the project meets its projections, there would be no need for any cash subsidy. The only element of public support would be the explicit or indirect debt guaranties. If on the other hand, definitive traffic studies indicate that the expected passenger revenues will be insufficient to meet operating and capital servicing costs, then a subsidy commitment would be required to make the project financeable; in the event actual ridership turns out sufficiently higher than projected, the subsidy payment would turn out to be unnecessary.

<u>Construction Financing</u> The common feature of any model of public-private partnership under the sponsors' proposal would be that the sponsors would design, finance and build the project on a fixed price, turnkey basis under a construction contract calling for delivery of a completed system meeting detailed performance specifications. The construction contract would accompanied by a completion support package satisfactory to the construction lenders, Caltrans and local authorities participating in the project. The support package would cover cost overruns, completion delays, performance shortcomings or failure to complete and would involve substantial cost and risk sharing by the contractors, vendors, sponsors, equity investors and banks providing construction financing or credit enhancement for the construction debt.

Ownership of the concession and the project during the development and construction periods would be in the hands of a concession entity ("CE"), probably set up as a partnership of single purpose subsidiaries of the JV partners. The entity would be relatively thinly capitalized, approximately with the amount represented by the "sunk" development expenses incurred prior to the Closing Date when all significant project agreements and the construction financing arrangements are firmly committed.

Present indications are that it may well be possible to develop a financing structure eligible for tax-exempt financing through the issuance of short term paper on a revolving basis and backed by a bank standby letter of credit to cover the completion and refinancing risks.

Given the very substantial proportion of imported components, we would expect to be able raise substantial quantities of supplier credits on relatively attractive terms. It is not possible to be specific in this regard until one knows to what extent it will be possible to arrange for competition in procurement and to get Japanese government agency support for what would be a very important demonstration project for a new Japanese technology.

Operating Period Financing After timely, successful completion, there are many forms such partnership could take, on terms believed to be consistent with the terms of the AB 680 program.

Several models are briefly outlined below, but there are many permutations and combinations of the features of these approaches, resulting in other models. Exhibit 1 shows schematic diagrams illustrating three models.

1. Outright Sale to the Los Angeles County Transportation Commission
   This approach has the obvious advantage of simplicity. LACTC would presumably finance the purchase with tax-exempt debt, and service the debt out of the revenue stream generated by the project, but backed by its general sales tax revenues. The tax-exempt debt would be for "public use" purposes and thus fall outside any state volume cap for tax-exempt financings.

   LACTC would operate the venture as part of its growing network of rail transit lines. LACTC would be relieved of all construction risks, such as delays and cost overruns, and would be obligated to pay only for a completed, working system.

   This approach would keep the equity requirement of the CE to a minimum. Post-completion, the venture would be essentially fully debt financed.

   Because of its simplicity and the ease of showing its financing costs, we are using this first approach as the base case for the financial analysis. Exhibit 2 displays a base case set of financial projections showing a project life internal rate of return ("IRR") of 9% which indicates that the project could support 100% tax-exempt debt financing over that period at 8% p.a. with approximately a 1.1 debt service coverage ratio. The challenge would be to structure an overall amortization schedule that closely matches the cash flows available for debt service.

The sponsors' proposal is based on conceptual capital cost estimates and preliminary, conservative traffic studies. In agreement with the sponsors, our projections are based on modestly more aggressive assumptions regarding the growth rate in passenger traffic in order to produce the 9% IRR which we believe is the minimum required to finance the project without projecting cash subsidies. We consider this growth rate assumption reasonable, but in any event it will have to be validated by detailed further traffic studies. The target IRR could also be achieved by a reduction in the capital cost estimate, which may well be achieved as the result of further study and negotiation.

2. Lease of the Completed Project to LACTC An alternative approach would involve the lease of the completed project concession by the CE to LACTC, which would operate the facility, assume all post-completion revenue and operating cost risks, and would be obligated to pay the concession entity a fixed periodic lease payment. The lease payments could escalate at the expected rate of inflation, e.g. 5% per annum, and would be sufficient to service and amortize the project debt equal to the full financed cost of the project over the life of the concession. The LACTC lease would be the security and source of repayment of the project entity's debt.

As in the first approach, LACTC's lease obligations would be expected to be serviced out of the project's revenue stream, but they would be supported by LACTC's general revenues if actual net revenue turned out to be lower than projected.

Preliminary indications are that the use of tax-exempt debt could be feasible. Because the project's borrowings would be backed by the strong credit of LACTC, the debt should command an excellent rate in a broad market. Provided the financing were structured so that after completion the CE served purely as a holding and financing vehicle and had no business risk or profit, it should be possible to qualify the tax-exempt debt as public use bonds and thus exempt it from the state volume cap. If it were not possible to qualify the tax-exempt issue as public use financing, and a private activity structure were feasible, it would require an allocation under the state cap.

As in the first approach, it should be possible to finance essentially all the project costs with debt, thus minimizing the project's revenue requirement for capital servicing costs, and thus optimizing the project's economic viability. The financing costs of this approach are essentially similar to those in the previous case.

3. Private Operation Under Contract with LACTC Conceptually, this approach allows for maximum flexibility in fine-tuning the precise sharing of risks and returns between LACTC, the project investors and the lenders, but there are very stringent limitations on this flexibility dictated by present rules covering eligibility for tax-exempt financing. It is probably useful to consider this approach only in connection with taxable financing options, because regulations

place very stringent restraints on the ability to finance projects with public-use tax-exempt debt if the assets are utilized by a private operator under a long term contract.

Our investigations thus far indicate that there are viable structures using taxable debt and private operation under contract with the LACTC and/or the LADA which could achieve an all in financing cost lower than tax-exempt structures. This lower cost would be achieved in structures which permit utilization of both accelerated depreciation and a tax deduction for interest payments. Such structures would require a long term contract from credit-worthy public sector entities guaranteeing project revenues sufficient to meet operating and debt servicing costs and agreed-upon returns on and of equity. As in the previous approaches, there should be no need to call on the subsidy commitment if the project revenues and costs work out as projected.

BASE CASE FINANCIAL STRUCTURE

The base case for the finance plan makes the following assumptions:

Total project costs of $1,829 million, including interest during construction and cost escalation due to inflation, resulting, after deducting assumed property development revenues of $73 million generated during the construction period, in total capital costs to be financed of $1,756 million.

A 35 year concession from the State of California, on terms satisfactory to investors and lenders. The concession would be subject to early termination, other than in the case of default, only after all project debt was repaid and predetermined return on investment targets were achieved.

A set of compelling traffic studies demonstrating that it can be reasonably and conservatively expected that the projected passenger counts and revenues will materialize as projected.

Detailed feasibility studies confirming technical feasibility, capital and operating cost estimates and construction schedules.

Project economics showing project IRR of at least 9% and debt service or lease coverage ratios of LACTC's obligations of 1.1.

In any structure involving the CE on a continuing basis during the operating phase of the project, a 35 year agreement between LACTC and/or LADA and the project entity, in which the former obligate(s) itself (themselves) to provide the appropriate risk sharing as discussed earlier.

The term debt, or at least a major portion of it, would have received or be capable of receiving an investment grade bond rating from a major rating agency. The take out debt would have to be firmly committed or the debt rating would have to have been received by the time of closing. We would expect the required rating to be available based on a strong support arrangement from LACTC and/or LADA.

A financial closing date of December 31, 1992, at which time all important permits and approvals would have to be in hand, all important project agreements would have to be in effect, and all construction debt and equity / subordinated loan financing required to finance the construction of the project, including any amounts deemed necessary for contingencies and delay would have to be firmly committed.

A targeted completion date of December 31, 1996.

CONCLUSION

Our conclusions as to the financial feasibility of the proposed project at this point are necessarily conceptual. We believe that the indicated project economics, while not sufficiently robust to make a purely privatized operation financeable, are very attractive when compared with any other transit system with which we are familiar. Our base case illustrates the ability of the project to cover full operating and debt service costs - truly an unprecedented case for any urban mass transit project in modern times.

The assumptions in the base case require a relatively small increase in the ridership projections from those indicated by preliminary traffic studies. Alternatively, the same project IRR could be achieved by a modest paring of total capital costs, as result of further study and negotiation. We consider both possibilities realistic.

If further work validates those assumptions, and strong support arrangements, along the lines indicated in this letter, with LACTC and/or LADA can be negotiated, we believe that a viable finance plan to fit those arrangements could be designed and implemented.

Bank of America would be very happy to work with the sponsors, Caltrans and the local agencies in Los Angeles to bring this very exciting project to fruition.

We are of course available to discuss these ideas further with you and your staff.

Sincerely,

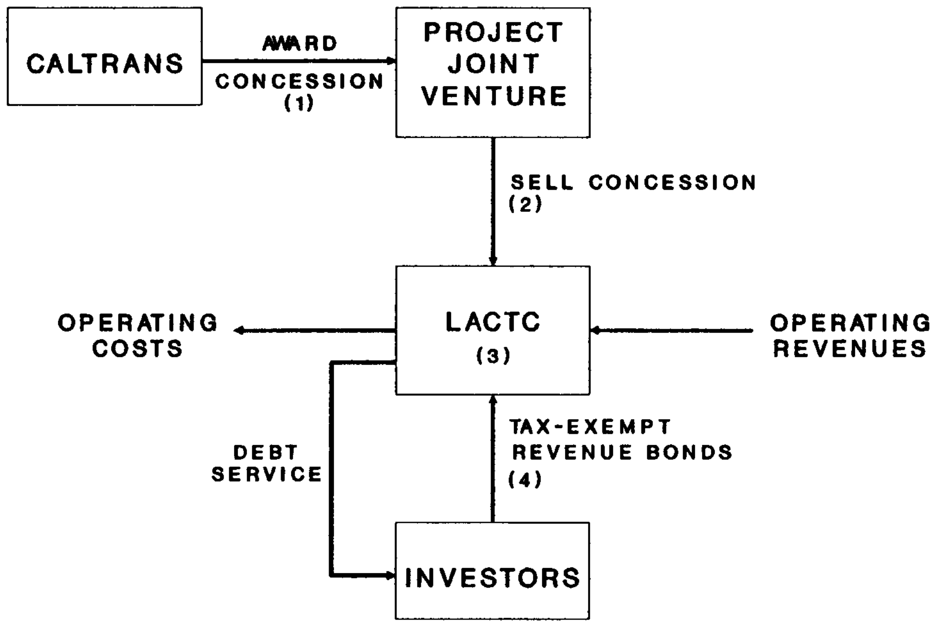
Richard J. Cerf
Vice President
Construction Group

H. Anton Tucher
Vice President
Project Finance Group

EXHIBIT 1

LAX-TO-SANTA CLARITA MAGLEV TRANSIT SYSTEM

OUTRIGHT SALE TO LACTC



(1) Caltrans awards 35-year concession to Perini-DMJM-HSST joint venture.

(2) JV sells concession to LACTC or other credit-worthy public sector entity upon completion of construction.

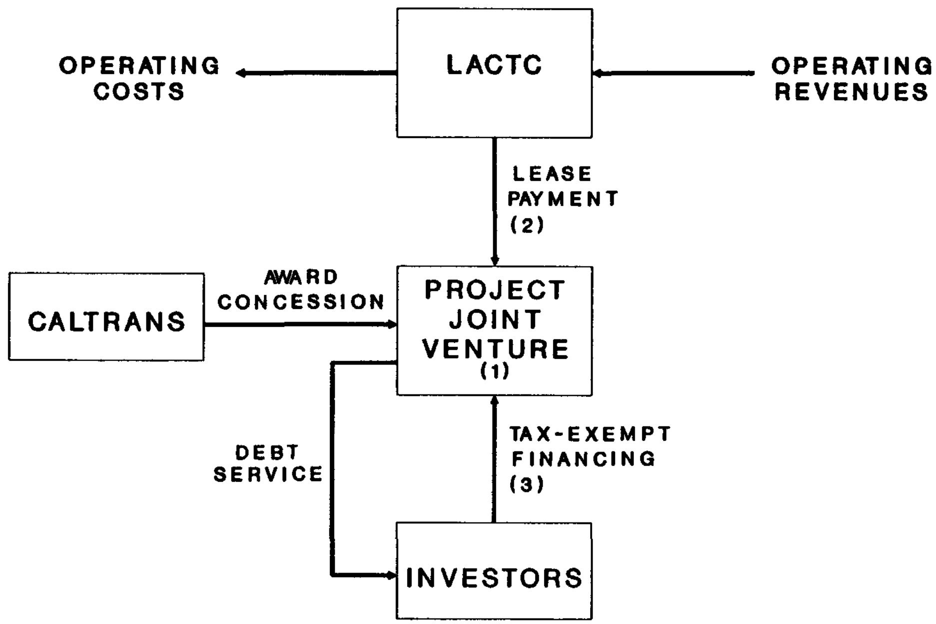
(3) LACTC owns and operates maglev system.

(4) Tax-exempt financing is used to acquire the concession and is serviced by net operating revenues.

EXHIBIT 1

LAX-TO-SANTA CLARITA MAGLEV TRANSIT SYSTEM

LEASE OF THE COMPLETED PROJECT TO LACTC



(1) JV retains ownership of concession but leases it LACTC who operates the maglev system.

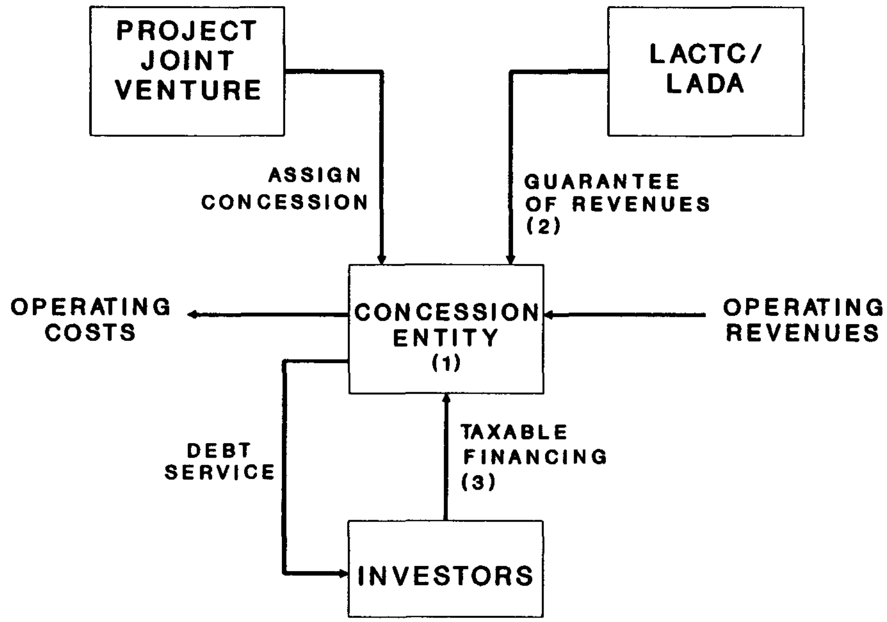
(2) Lease payments could be structured to escalate at the expected rate of inflation, e.g., 5% per annum, and would be sufficient to service the project debt.

(3) All-debt financing with tax-exempt debt based on the strong credit support represented by the lease should be possible.

EXHIBIT 1

LAX-TO-SANTA CLARITA MAGLEV TRANSIT SYSTEM

PRIVATE OPERATION UNDER CONTRACT WITH LACTC/LADA



(1) Concession Entity probably a partnership of subsidiaries of the JV partners. The CE operates the system under contract with LACTC/LADA.

(2) Terms of the operating contract would be structured to underwrite project revenues to cover operating and capital servicing costs.

(3) Taxable structures could be attractive by efficiently utilizing tax deductions for accelerated depreciation and interest.

EXHIBIT 2

27-Jul-90

CALTRANS PRIVATIZATION
LAX-TO-SANTA CLARITA
MAGNETIC LEVITATION TRANSIT SYSTEM

BASE CASE ASSUMPTIONS

1. Project development begins in 1990. Construction begins in 1993 and is completed as of year-end 1996. The project goes into operation in the beginning of 1997.

2. All revenues and costs are expressed in current year dollars which assume an inflation escalation factor of 5% per annum.

3. Average daily ridership of 57,784 commencing in 1997 based on an assumed 55,000 average daily trips (ADT) in 1995 and an ADT growth rate of 2.5% per annum.

4. Average fare of $3.25.

5. Incremental daily ridership shown under the line item labeled R-E Development ADT is assumed to be generated by real estate development projects along the corridor.

6. The Project Development Cost line item refers to the overall project development costs incurred and are not associated directly with real estate development.

7. The construction loan begins funding in 1993. All costs prior to that date are assumed to be contributed by the project joint venture partners in the form of equity.

8. Interest during the construction period accrues at a fixed rate of 9% per annum, which includes a 8% tax-exempt rate plus a 1% premium for credit enhancement.

9. The project joint venture sells the concession to LACTC at year-end 1996 upon completion of the construction for a consideration of $1.73 billion. This amount would be funded by tax-exempt revenue bonds and represents the cost of building the system, plus capitalized interest. LACTC operates the system for the life of the concession beginning in 1997.

EXHIBIT 2: INTERNAL RATE OF RETURN

BASE CASE 27-Jul-90
1995 ADT = 55000
ADT ANNUAL GROWTH RATE = 2.50%
AVERAGE FARE = $3.25

CALTRANS PRIVATIZATION
LAX-TO-SANTA CLARITA
MAGNETIC LEVITATION TRANSIT SYSTEM

PERIOD BEGINNING	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
PERIOD NUMBER	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Average Daily Trips (ADT)	|<-------------- Engineering Period ----------------->|							57784	59229	60710	62227	63783	65378	67012
R-E Development ADT				|<----- Construction Period ---->|				2000	4000	6000	8000	10000	12500	12500
Total ADT								59784	63229	66710	70227	73783	77878	79512
INFLATION FACTOR @ 5.00%	1.00	1.05	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55	1.63	1.71	1.80	1.89
(Current $ in Millions)														
Annual Trip Revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	78.2	86.8	96.2	106.3	117.3	130.0	139.4
Annual Parking Revenue	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.4	18.3	19.2	20.2	21.2	22.3	23.4
R-E Development Profits	0.0	0.0	0.0	0.0	0.0	36.8	36.7	36.7	36.6	36.8	0.0	0.0	0.0	0.0
Total Revenue	0.0	0.0	0.0	0.0	0.0	36.8	36.7	132.4	141.8	152.2	126.5	138.5	152.3	162.7
Less:														
Maintenance and Operating Costs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.9	47.1	49.5	52.0	54.6	57.3	60.2
Replacement Cost	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.5	2.7	2.8	2.9	3.1	3.2	3.4
Net Operating Profit	0.0	0.0	0.0	0.0	0.0	36.8	36.7	84.9	92.0	99.9	71.6	80.9	91.7	99.2
Less:														
Project Development Cost	0.5	2.0	2.0	39.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Engineering Cost	0.0	5.8	8.3	16.3	24.4	12.3	12.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Land and Construction Cost	0.0	0.0	0.0	36.8	158.4	332.6	174.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HSST System Cost	0.0	0.0	0.0	0.0	153.4	270.1	184.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Contingency	0.0	1.2	1.7	10.6	36.6	69.0	37.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Caltrans Fees	0.0	0.8	0.9	0.9	1.0	1.1	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital Costs	0.5	9.7	12.8	103.7	373.8	685.0	410.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Project Cash Flow	-0.5	-9.7	-12.8	-103.7	-373.8	-648.3	-373.5	84.9	92.0	99.9	71.6	80.9	91.7	99.2
Capital Costs	0.5	9.7	12.8	103.7	373.8	685.0	410.2							
Capitalized Interest @ 9.00%	0.0	0.0	0.0	4.7	26.6	75.0	127.7							
Total Capital Costs	0.5	9.7	12.8	108.4	400.4	760.0	537.9							
Less: Development Revenue	0.0	0.0	0.0	0.0	0.0	36.8	36.7							
Construction Financing Requirement	0.5	9.7	12.8	108.4	400.4	723.2	501.2							
Equity Contribution	0.5	9.7	12.8	0.0	0.0	0.0	0.0							
Construction Loan	0.0	0.0	0.0	108.4	400.4	723.2	501.2							
Cumulative Loan Amount	0.0	0.0	0.0	108.4	508.7	1232.0	1733.2							
CASH FLOW ASSUMING OUTRIGHT SALE AT END OF CONSTRUCTION PERIOD	0.0	0.0	0.0	0.0	0.0	0.0	-1733.2	84.9	92.0	99.9	71.6	80.9	91.7	99.2
PROJECT IRR	9.17%													

EXHIBIT 2: INTERNAL RATE OF RETURN

BASE CASE 27-Jul-90
1995 ADT = 55000
ADT ANNUAL GROWTH RATE = 2.50%
AVERAGE FARE = $3.25

CALTRANS PRIVATIZATION
LAX-TO-SANTA CLARITA
MAGNETIC LEVITATION TRANSIT SYSTEM

PERIOD BEGINNING		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
PERIOD NUMBER		15	16	17	18	19	20	21	22	23	24	25	26	27	28
Average Daily Trips (ADT)		68687	70405	72165	73969	75818	77714	79656	81648	83689	85781	87926	90124	92377	94686
R-E Development ADT		12500	12500	12500	12500	12500	12500	12500	12500	12500	12500	12500	12500	12500	12500
Total ADT		81187	82905	84665	86469	88318	90214	92156	94148	96189	98281	100426	102624	104877	107186
INFLATION FACTOR @	5.00%	1.98	2.08	2.18	2.29	2.41	2.53	2.65	2.79	2.93	3.07	3.23	3.39	3.56	3.73
(Current $ in Millions)															
Annual Trip Revenue		149.4	160.2	171.8	184.2	197.6	211.9	227.3	243.8	261.5	280.6	301.0	323.0	346.6	372.0
Annual Parking Revenue		24.6	25.8	27.1	28.4	29.8	31.3	32.9	34.5	36.3	38.1	40.0	42.0	44.1	46.3
R-E Development Profits		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Revenue		174.0	186.0	198.9	212.6	227.4	243.2	260.2	278.3	297.8	318.7	341.0	365.0	390.7	418.3
Less:															
Maintenance and Operating Costs		63.2	66.3	69.6	73.1	76.8	80.6	84.6	88.9	93.3	98.0	102.9	108.0	113.4	119.1
Replacement Cost		3.6	3.7	3.9	4.1	4.3	4.5	4.8	5.0	5.3	5.5	5.8	6.1	6.4	6.7
Net Operating Profit		107.2	115.9	125.3	135.4	146.3	158.1	170.8	184.5	199.2	215.2	232.4	250.9	270.9	292.4
Less:															
Project Development Cost		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Engineering Cost		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Land and Construction Cost		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HSST System Cost		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Contingency		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Caltrans Fees		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital Costs		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Project Cash Flow		107.2	115.9	125.3	135.4	146.3	158.1	170.8	184.5	199.2	215.2	232.4	250.9	270.9	292.4
Capital Costs															
Capitalized Interest @	9.00%														
Total Capital Costs															
Less: Development Revenue															
Construction Financing Requirement															
Equity Contribution															
Construction Loan															
Cumulative Loan Amount															
CASH FLOW ASSUMING OUTRIGHT SALE AT END OF CONSTRUCTION PERIOD		107.2	115.9	125.3	135.4	146.3	158.1	170.8	184.5	199.2	215.2	232.4	250.9	270.9	292.4
PROJECT IRR															

EXHIBIT 2: INTERNAL RATE OF RETURN

BASE CASE 27-Jul-90
1995 ADT = 55000
ADT ANNUAL GROWTH RATE = 2.50%
AVERAGE FARE = $3.25

CALTRANS PRIVATIZATION
LAX-TO-SANTA CLARITA
MAGNETIC LEVITATION TRANSIT SYSTEM

PERIOD BEGINNING		2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
PERIOD NUMBER		29	30	31	32	33	34	35	36	37	38	39	40	41	42
Average Daily Trips (ADT)		97054	99480	101967	104516	107129	109807	112552	115366	118250	121207	124237	127343	130526	133789
R-E Development ADT		12500	12500	12500	12500	12500	12500	12500	12500	12500	12500	12500	12500	12500	12500
Total ADT		109554	111980	114467	117016	119629	122307	125052	127866	130750	133707	136737	139843	143026	146289
INFLATION FACTOR @	5.00%	3.92	4.12	4.32	4.54	4.76	5.00	5.25	5.52	5.79	6.08	6.39	6.70	7.04	7.39
(Current $ in Millions)															
Annual Trip Revenue		399.2	428.4	459.8	493.6	529.8	568.8	610.6	655.6	703.9	755.8	811.6	871.5	935.9	1005.1
Annual Parking Revenue		48.6	51.0	53.6	56.3	59.1	62.0	65.1	68.4	71.8	75.4	79.2	83.1	87.3	91.7
R-E Development Profits		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Revenue		447.8	479.5	513.4	549.9	588.9	630.8	675.8	724.0	775.7	831.2	890.8	954.6	1023.2	1096.8
Less:															
Maintenance and Operating Costs		125.1	131.3	137.9	144.8	152.0	159.6	167.6	176.0	184.8	194.0	203.7	213.9	224.6	235.8
Replacement Cost		7.1	7.4	7.8	8.2	8.6	9.0	9.5	9.9	10.4	10.9	11.5	12.1	12.7	13.3
Net Operating Profit		315.7	340.8	367.8	396.9	428.3	462.2	498.7	538.1	580.5	626.3	675.6	728.7	786.0	847.7
Less:															
Project Development Cost		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Engineering Cost		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Land and Construction Cost		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HSST System Cost		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Contingency		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Caltrans Fees		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital Costs		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Project Cash Flow		315.7	340.8	367.8	396.9	428.3	462.2	498.7	538.1	580.5	626.3	675.6	728.7	786.0	847.7
Capital Costs															
Capitalized Interest @	9.00%														
Total Capital Costs															
Less: Development Revenue															
Construction Financing Requirement															
Equity Contribution															
Construction Loan															
Cumulative Loan Amount															
CASH FLOW ASSUMING OUTRIGHT SALE AT END OF CONSTRUCTION PERIOD		315.7	340.8	367.8	396.9	428.3	462.2	498.7	538.1	580.5	626.3	675.6	728.7	786.0	847.7
PROJECT IRR															

EXHIBIT 2: INTERNAL RATE OF RETURN

BASE CASE 27-Jul-90
1995 ADT = 55000
ADT ANNUAL GROWTH RATE = 2.50%
AVERAGE FARE = $3.25

PERIOD BEGINNING		
PERIOD NUMBER		
Average Daily Trips (ADT)		
R-E Development ADT		
Total ADT		
INFLATION FACTOR @	5.00%	TOTALS
(Current $ in Millions)		
Annual Trip Revenue		13414.8
Annual Parking Revenue		1575.9
R-E Development Profits		183.6
Total Revenue		15174.4
Less:		
Maintenance and Operating Costs		4054.2
Replacement Cost		228.8
Net Operating Profit		10891.4
Less:		
Project Development Cost		43.5
Engineering Cost		79.9
Land and Construction Cost		702.4
HSST System Cost		607.5
Contingency		156.5
Caltrans Fees		6.0
Capital Costs		1595.7
Net Project Cash Flow		9295.7
Capital Costs		1595.7
Capitalized Interest @	9.00%	233.9
Total Capital Costs		1829.6
Less: Development Revenue		73.5
Construction Financing Requirement		1756.1
Equity Contribution		23.0
Construction Loan		1733.2
Cumulative Loan Amount		1733.2
CASH FLOW ASSUMING OUTRIGHT SALE AT END OF CONSTRUCTION PERIOD		9084.8
PROJECT IRR		9.17%

PROJECT SCHEDULE

PROJECT SCHEDULE

PROJECT SCHEDULE

The Master Project Schedule is a bar chart representation of Level I of the Work Breakdown Structure for Phase I of the proposed project. Commencing with Caltrans notification on September 17, 1990, the consortium will promptly commence four principal tasks: negotiation of the franchise agreement with Caltrans, preliminary design sufficient to support the environmental/permitting and cost estimating processes, the environmental/permitting processes and final development of the financial structure. Immediately following successful negotiation of the franchise agreement, we plan to utilize Caltrans in both oversite and environmental lead agency roles, commencing in the first or second quarter of 1991. Because of the anticipated extent and duration of the environmental/ permitting process, we anticipate a 2-year process, which, if successful, will permit a financial closing during the fourth quarter of 1992.

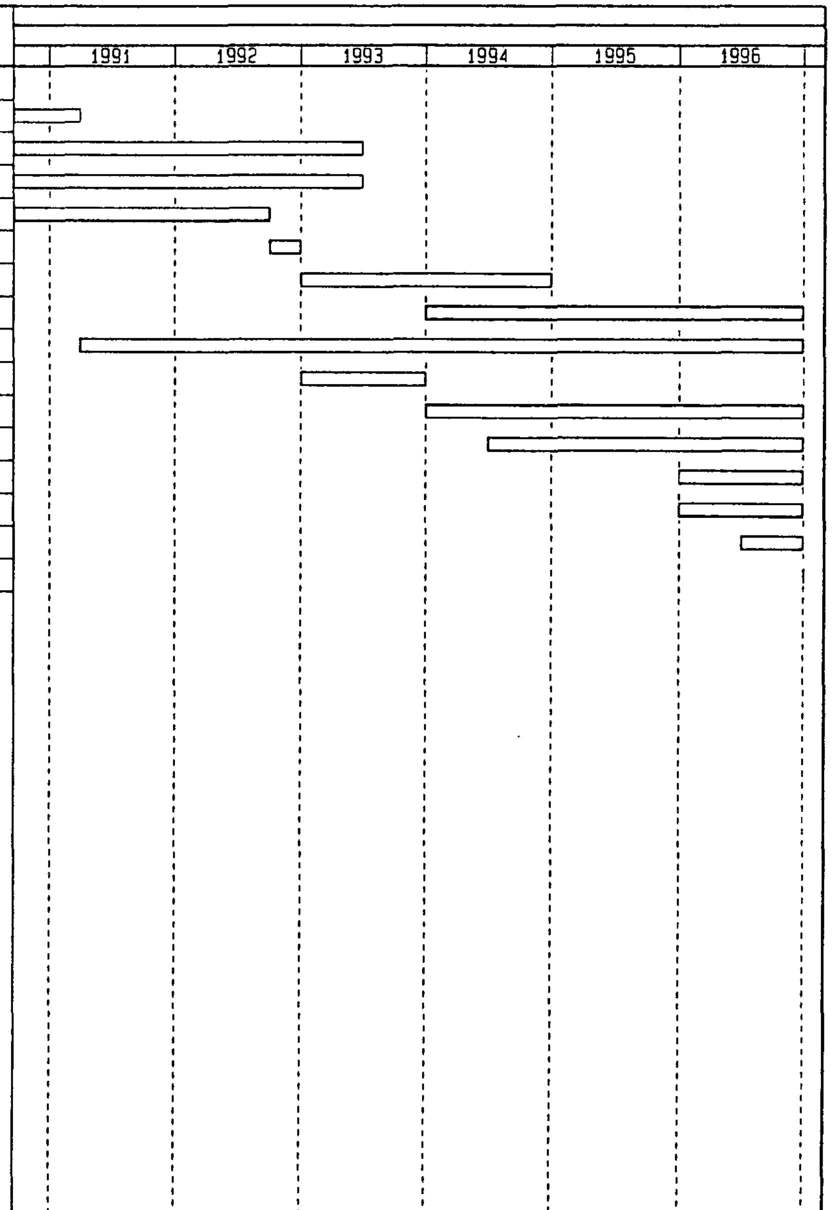
The financial closing will signal the initiation of the final design phase and the land acquisition process, both beginning in the first quarter of 1993. Given the extensive preliminary design that will have been accomplished during prior activities, we will fast-track the construction, which will have been initiated along with its attendant engineering inspection activities, during the first quarter of 1994.

Installation of maglev system components will begin as soon as sufficient structure is in place, estimated to lag the start of construction by about 6 months. Vehicle deliveries will commence during the first quarter of 1996, concurrent with the development and training of operation, maintenance, security, and administrative staff. A 6-month system test and certification period is scheduled for the third and fourth quarters of 1996, prior to start-up of service on January 1, 1997.

The Master Project Schedule is designed with a series of cutouts, which permit management of the key tasks while limiting the consortium's exposure. (The first of these is the Caltrans notification, without which all further efforts and expenditures will be terminated. Assuming that this proposal successfully passes the first hurdle, then work in preliminary design, environmental/permitting, and financial planning will commence concurrent with negotiation of the franchise agreement. This work will continue pending a successful negotiation, but a break- down of negotiations would cause us to cease all efforts to curtail the consortium's exposure.

Sufficient progress, as yet undefined, in the environmental/permitting area will be required for a successful financial closing. This part of the schedule is, of course, critical, since extensive delays will impact costs to the extent that this project will become, financially, not viable under any scenario. However, given success along the lines proposed, then a successful financial closing will lead to the commitment of the major engineering, land acquisition, procurement, and construction staging expenses necessary to meet the balance of the schedule.

ACTIVITY ID	ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH
1000	CALTRANS NOTIFICATION	17SEP90A	17SEP90A
1100	FRANCHISE AGREEMENT	17SEP90A	31MAR91A
2000	PRELIMINARY DESIGN	17SEP90A	30JUN93A
2100	EIR'S/PERMITS	17SEP90A	30JUN93A
2200	FINANCIAL STRUCTURE	17SEP90A	30SEP92A
2300	FINANCIAL CLOSING	1OCT92A	31DEC92A
2400	FINAL DESIGN	1JAN93A	31DEC94A
2500	ENGINEERING DURING CONSTRUCTION	1JAN94A	31DEC96A
3000	CALTRANS OVERSITE	1APR91A	31DEC96A
4000	LAND ACQUISTION	1JAN93A	31DEC93A
5000	CONSTRUCTION	1JAN94A	31DEC96A
6000	SYSTEM INSTALLATION	1JUL94A	31DEC96A
7000	VEHICLE DELIVERY	1JAN96A	31DEC96A
8000	DEVELOP/TRAIN STAFF	1JAN96A	31DEC96A
8100	SYSTEM TEST & CERTIFICATION	1JUL96A	31DEC96A
9000	START-UP	1JAN97A	1JAN97A



Activity Bar/Early Dates
Critical Activity

Primavera Systems, Inc 1984-1989

Project Start 17SEP90
Project Finish 1MAR97*

Sheet 1 of 1

LAX - PALMDALE TRANSIT
CALTRANS PRIVATIZATION PROJECT
PHASE I

Data Date 17SEP90
Plot Date 19JUL90

**** DMJM ****			
Date	Revision	Checked	Approved

DOCUMENTATION OF SUPPORT

DOCUMENTATION OF SUPPORT

DOCUMENTATION OF SUPPORT

The Los Angeles area is in the midst of rail transit renaissance. With the passage in 1980 of Proposition A, funds were generated to design and construct a 150-mile rail transit system. Part of the rail network, being managed by the Los Angeles County Transportation Commission (LACTC), is well under way: Metro Blue Line (operational); Metro Red Line (under construction); and Metro Green Line (under construction). Once completed, this rail system will make a major contribution to enhancing the mobility of the area's commuters and provide an alternative to the automobile in these highly concentrated corridors.

The maglev transit project contained in this proposal has been designed to complement and be operationally integrated with the LACTC Proposition A rail transit program. In the San Fernando Valley, the maglev system will provide a north-south connector with the planned extension of the Metro Red Line. Further south, in the area of the Wilshire Corridor, the system would also intersect with the Metro Red Line connection planned for this high-density corridor. In the area of the Los Angeles International Airport, the system is designed to create a connection to the Metro Green Line, currently being constructed in the median of the Glen M. Anderson Freeway (I-05). The system will also complement a proposed internal circulation system the Los Angeles Department of Airports is planning to implement in the future.

Another interregional and interstate connection to the proposed maglev system will be provided by the super speed maglev system currently being developed by an international private consortium, sponsored by the California-Nevada Bi-State Commission. Once completed, this system will provide a high-speed connection between the states of California and Nevada and the proposed intercontinental airport, located in the Palmdale area.

In addition, the maglev system is planned to address major congestion problems in the Route 14 and 405 corridors, recently identified by Caltrans and the LACTC. In June 1990, the LACTC, with the assistance of Caltrans, identified the most congested corridors in Los Angeles County. The corridor to be served by the maglev system was selected as the third most congested and transportation-deficient corridor in the county.

Because the proposed maglev system provides service to a highly congested corridor and is designed to complement and be integrated with major new rail systems in the county and region, a number of letters of support have been generated for the project.The letters include:

1. California-Nevada Super Speed Train Commission

2. Mayor of Los Angeles

3. Los Angeles Airport Commission

4. Mayor of Palmdale

5. Los Angeles County Transportation Commission

6. State Assemblyman Richard Katz.

These letters are representative of the support for the project that was voiced in individual meetings with a majority of elected officials who represent districts in the corridor to be served by the proposed maglev system. During the project development process for the proposal, meetings were held with state and local elected officials representing over 20 districts. They voiced support for the environmental, social, economic, and mobility benefits the building and operating of the maglev system will generate. In addition, they viewed the proposal as new generation of public-private partnership. Lastly, discussions were also held with private real estate development interests who are planning projects in proximity to the corridor. Many voiced an interest in considering a physical connection between the maglev project and their proposed private development.

California-Nevada
Super Speed Train
Commission

July 2, 1990

Mr. Carl Williams
Office of Privatization
California Department
of Transportation
1120 N Street, Room 1100
Sacramento, CA 95814

Dear Mr. Williams:

I understand that Caltrans will receive a proposal under the "AB 680 Program" to implement a high-speed transit system providing service between Palmdale and Los Angeles International Airport. As you can see from the enclosed resolution of October 27, 1989, the Commission's objective includes a spur to Palmdale if others provide a link from there to Los Angeles; I believe that the public interest would be served well by Caltrans' favorable action on a Palmdale-Los Angeles high-speed connection.

If you have questions or would like further information, please do not hesitate to call me.

Sincerely,

Arnie Adamsen

ARNIE ADAMSEN
Chairman

Enclosure
cc All Commissioners
Paul Taylor

DIRECT REPLY TO:

California Office
211 Culver Blvd., Suite G
Playa Del Rey, California 90293
(213) 578-9212 FAX (213) 578-9227

Nevada Office
400 E. Stewart Ave.
Las Vegas, Nevada 89101
(702) 386-6631 FAX (702) 388-1807

California-Nevada
Super Speed Train
Commission

COMMISSIONERS

California

Assemblyman Richard Katz
Chairman

Rolfe Arnhym

Commissioner Ken Kevorkian

Senator Bill Leonard

M. D. McKeown

Angie Papadakis

Supervisor Don Roth

Mayor Howard Snider

Nevada

Councilman Arnie Adamsen
Vice-Chairman

Bruce A. Aguilera

Commissioner Jay Bingham

Senator Nick Horn

Assemblyman Jack Jeffrey

Jack Libby

Dr. William Wells

Claudine Williams

Paul Taylor
Executive Director

California-Nevada
Super Speed Ground
Transportation
Commission

RESOLUTION OF THE COMMISSION
MEETING IN LOS ANGELES
October 27, 1989

The Commission's objective is that, at a minimum, the super-speed train will start in the Las Vegas Valley and end in Anaheim. It will include a spur to Palmdale if others provide a link from there to Los Angeles.

The proposer has the responsibility to return to the Commission with a plan including the route and stations (number and location) to be served by a commercially-viable project; the plan should conform to the Commission's objective unless the proposer presents good reasons for its choice otherwise. All stations identified are eligible for inclusion in the plan.

Each proposer must present a specific plan to--as part of its proposal--serve commuters and reduce traffic congestion in San Bernardino, Riverside, Orange and Los Angeles Counties.

THIS RESOLUTION WAS PASSED BY UNANIMOUS VOTE OF THE 15 COMMISSIONERS PRESENT.

DIRECT REPLY TO:

☐ California Office
211 Culver Blvd., Suite G
Playa Del Rey, California 90293
(213) 578-9212 FAX (213) 578-9227

☐ Nevada Office
400 E. Stewart Ave.
Las Vegas, Nevada 89101
(702) 386-6631 FAX (702) 388-1807

City of Los Angeles

CITY HALL
LOS ANGELES, CALIFORNIA 90012
(213) 485-3311

OFFICE OF THE MAYOR

TOM BRADLEY
MAYOR

June 15, 1990

Mr. Carl Williams
Office of Privatization
California Department of Transportation
1120 N Street, Room 1100
Sacramento, CA 95814

Dear Mr. Williams:

I am writing to you in strong support for the proposed project submission by the Perini/DMJM consortium, under provisions of AB680. The creative mag-lev transportation project proposed by the Perini/DMJM consortium will transform our region, and the state into a new era of transportation and mobility.

The proposal contains a well conceived business and operational plan to provide a high degree of transportation service to two of the state's heaviest traveled corridors: the Route 14 corridor from Palmdale through Route 405 corridor to the Los Angeles International Airport. As proposed, the project would serve as a north-south transit connection to many of the rail transit systems under the development by the Los Angeles County Transportation Commission. It would provide a high speed transit alternative to the thousands of commuters who travel these corridors every day. When implemented, the system would connect Los Angeles International Airport to the proposed Palmdale International Airport, and the super speed transit system currently under review by the Bi-State Commission. In addition, the introduction of mag-lev technology, developed by the HSST Corporation, into our region, would place California in the forefront of technology innovation in meeting our current mobility crisis. I strongly urge Caltrans to approve the Perini/DMJM proposal.

The City of Los Angeles stands ready to assist the State, and the project's sponsors in making this unique transportation project a reality. Please let me know if I can be of further assistance.

Sincerely,

Tom Bradley

TOM BRADLEY
Mayor

TB:ed

ONT PMD LAX VNY

City of Los Angeles Department of Airports
Tom Bradley, Mayor

Board of Airport Commissioners

Jerry B. Epstein
President
Johnnie L. Cochran, Jr.
Vice President
Robert A. Crick
Samuel Greenberg
Diane Pasillas

Clifton A. Moore
Executive Director

RESOLUTION NO. 17211

WHEREAS, the Board of Airport Commissioners of the City of Los Angeles urges the Office of Privitization, California Department of Transportation, to give high priority to consideration of a proposed privitization project connecting Los Angeles International Airport to Palmdale in the most expedient and efficient manner; and

WHEREAS, the Board of Airport Commissioners has been briefed with regard to the proposal of DMJM/Perini, and further requests that this proposal be given positive consideration; and

WHEREAS, the connection between the Los Angeles International Airport and the Palmdale Airport is of considerable importance with regard to the successful introduction of additional airport capacity into the Los Angeles area; and

WHEREAS, this action, as a continuing administrative activity, is exempt from the requirements of the California Environmental Quality Act as provided by Article III, Section 2.f. of the Los Angeles City CEQA Guidelines;

NOW, THEREFORE, BE IT RESOLVED that the Board of Airport Commissioners determined that this action is exempt from CEQA requirements, and approved Management's recommendation to transmit this Resolution to the Office of Privitization, California Department of Transportation.

oOo

I hereby certify that the above is a true and correct copy of Resolution No. 17211 adopted by the Board of Airport Commissioners at a regular meeting held Wednesday, July 25, 1990.

Elaine E. Staniec

Elaine E. Staniec - Secretary
BOARD OF AIRPORT COMMISSIONERS

CITY OF
Palmdale
INCORPORATED AUGUST 24, 1962
FIRST CITY OF ANTELOPE VALLEY

CITY OF PALMDALE

Wm. J. "Pete" Knight
MAYOR
Joseph P. "Joe" Davies, Jr.
MAYOR PRO TEM
Janis C. Hamm
COUNCILMEMBER
James C. Ledford, Jr.
COUNCILMEMBER
James A. Root
COUNCILMEMBER

July 11, 1990

Mr. Carl Williams
Office of Privatization
California Department of Transportation
1120 North Street, Room 1100
Sacramento, CA 95814

Dear Mr. Williams:

I am writing to you to urge your support of the privatized magnetically levitated transit proposal being submitted to you by the consortium of Perini Corporation and Daniel, Mann, Johnson & Mendenhall (DMJM) under the provisions of AB680.

This proposed transit system would provide much needed transportation service to two of the state's heaviest traveled corridors; the Route 14 corridor from Palmdale to the San Fernando Valley and the 405 corridor from the San Fernando Valley to the Los Angeles International Airport. The proposed project would serve as a north-south transit connection to many of the rail transit systems under development by the Los Angeles County Transportation Commission and provide a high-speed transit alternative to the many thousands of commuters who travel these corridors every day. When implemented, the system would connect Palmdale, Santa Clarita, the San Fernando Valley, downtown Los Angeles (via connection) and the Los Angeles International Airport.

We believe this project will provide the critical transportation link between the Los Angeles area and Palmdale and could provide the impetus needed for development of an International Airport at Palmdale. In addition, it would connect with the proposed super-speed train that would run from Las Vegas to Southern California. The system would also help relieve traffic congestion on our roads and freeways and help reduce air pollution. We strongly urge your support this proposal.

AREA CODE 805/273-3162 • 708 E. PALMDALE BLVD., PALMDALE, CALIF. 93550
CITY FAX 805/273-6368 PLANNING/ENGINEERING FAX 805/274-7613

Mr. Carl Williams
July 11, 1990
Page 2

The City of Palmdale stands ready to assist the California Department of Transportation and the project sponsors in making this much needed project a reality. Please feel free to call me if I can be of assistance.

Sincerely,

Wm. J. Knight
Mayor

WJK:DMJM:bmw
wp964

cc Members of the City Council
Robert W. Toone, Jr., City Administrator

LACTC

Los Angeles County
Transportation Commission
818 West Seventh Street
Suite 1100
Los Angeles, CA 90017
213/ 623-1194

July 25, 1990

Mr. Carl Williams
Office of Privatization
California Department of Transportation
1120 N. Street, Room 1100
Sacramento, CA 95814

Dear Mr. Williams:

Because of timing constraints, the Los Angeles County Transportation Commission has not reviewed the Perini/DMJM/HSST LAX to Palmdale Transit proposal for the AB 680 process.

However, the LACTC staff have reviewed this proposal and, based on existing LACTC policy, we would like to express our support for such innovative efforts by the private sector to introduce energy saving new technology in the Los Angeles area. Not only does this proposal demonstrate new rail technology, it uses a good transportation corridor and creative financing techniques with the private sector.

This unique Maglev transit project can do much to alleviate the congestion and mobility problems that face our region. Property integrated, this project can become a part of the comprehensive rail transit service that began in Los Angeles on July 14, 1990 with the successful opening of the Metro Blue Line. This system could be a valuable component of the regional 150 mile Proposition A rail system and the commuter rail program.

The proposal would provide a significant level of transit service in a highly congested and underserved transportation corridor - the 405 Corridor. We understand Phase I could operate between the LAX and Santa Clarita areas and Phase II would further extend to the proposed Palmdale Airport. The project's extension to the proposed Palmdale area would also provide a connection to the super-speed train between Las Vegas and Southern California. As proposed, the project would serve to relieve the crowded north-south corridors of the 405, 5, and 14 freeways. The project would provide additional connection for many of the rail transit systems that are being developed by the LACTC. These connections include the Metro Red Line in the San Fernando Valley as well as the Wilshire Blvd. extension and the Metro Green Line in the LAX area. The Proposed project lies within the Route 405 corridor, a corridor which is presently on the adopted Proposition A rail corridor map, but could remain unserved for up to twenty years without the benefit of a privately-financed project.

We believe that this project will be most complementary to the regional rail system if it is fully integrated into the overall plans for rail, highway and bus improvements in the West Los Angeles and San Fernando Valley areas. Toward this end, we would anticipate working closely with the project sponsors and Caltrans on station location, system interface and access issues. In addition, we anticipate that the project's sponsors will ensure that the project design and operation is compatible with present and future traffic and community plans and fully compatible with Green Line to LAX and the San Fernando Valley east-west rail alignment plans.

LACTC staff would like to explore this proposal further and would be willing to work with the project sponsors to enhance their financing options by helping to establish a broad coalition of partners including HSST, private developers, public transportation agencies and the aviation sector (LAX and Palmdale airports), among others.

We hope that Caltrans will give the Perini/DMJM/HSST proposal every consideration for selection in the AB 680 process. We look forward to the successful implementation of this project.

Sincerely,

Neil Peterson
Executive Director

NP:LB:sm

williams

Assembly California Legislature

ASSEMBLY COMMITTEE ON TRANSPORTATION

RICHARD KATZ
Chairman

CONSULTANTS
John R. Stevens
Principal

L. Erik Lange
Kathryn B. Riley
Mary Kaems

COMMITTEE SECRETARY
Pamela R. Calhoun

ADDRESS
State Capitol
Sacramento, CA 95814
(916) 445-7278

July 27, 1990

Mr. John E. Chiaverini
Senior Vice President
Perini Corporation
75 Broadway, Golden Gate Commons
San Francisco, California 94111

Dear Mr. Chiaverini:

I understand that the consortium which includes Perini Corporation will be submitting a proposal to Caltrans for consideration as one of the public transportation demonstration projects authorized by last year by AB 680.

I want to express by strong support for the construction of a mag-lev transit project which would link Los Angeles International Airport with the Palmdale Regional Airport.

First, I believe such a system would serve the transit needs of the San Fernando Valley, reducing congestion on highways and freeways by providing a convenient, attractive and environmentally sensitive alternative to local commuters.

Second, as you know, I authored legislation which created the California-Nevada Super Speed Ground Transportation Commission which is exploring the possibility of a privately financed super speed train linking southern Nevada with southern California. At my request, this system will include a connection to Palmdale <u>if</u> other rail transit service is established between LAX and Palmdale. Your project proposal would fulfill this condition.

I will be joining with other elected officials, business people, and environmental organizations on Wednesday, August 1st, to announce our support for your project proposal at a press conference.

Mr. John Chiaverini
July 27, 1990
Page 2

I would appreciate it if you would provide 50 executive summaries of the project proposal, some visual displays of the proposed technology, and have project staff available at the press conference on the 1st to answer any technical questions.

Sincerely,

RICHARD KATZ, Chairman
Assembly Transportation Committee

RK:jsa

cc: Akira Hayashi, President HSST Corp.
Robert Band, Perini Corp.
Don Cross, DMJM

STATE SERVICES DESIRED

STATE SERVICES DESIRED

Caltrans oversight of the project design and construction will be required under the program guidelines. Also, Caltrans will act as the lead agency for environmental reviews under the state and federal environmental processes.

Other than this, however, there are no specific State services identified as desired at this time. It is quite possible that during further project development or implementation, the need for specific assistance or services from the State will become apparent. At such time, the consortium will enter into discussions with Caltrans regarding such issues and the costs that must be reimbursed by the consortium to the State for such services.

STATE CIVIL RIGHTS OBJECTIVES

STATE CIVIL RIGHTS OBJECTIVES

The Perini/DMJM/HSST Consortium will develop a policy to identify and utilize the capabilities of MBE/WBE firms throughout the design, construction, and operation of this project. The spirit and intent of this program is to bring minority and women professionals into the mainstream business environment in meaningful roles. To this end, the consortium will demand that MBE/WBE firms on our team not only play meaningful roles on the project but also meet the same exacting standards for quality that we demand of ourselves.

To maintain a posture of allowing maximum opportunity for MBE/WBE participation, the consortium will remain flexible on our selection of MBE/WBE subconsultants until a final scope of services is determined.

The consortium will strive to attain the state goals of 15 percent MBE and 5 percent WBE participation in the project. Achievement of these goals will depend on the availability of suitable, qualified MBE/WBE support and on competitive conditions.