DODGER STADIUM TRANSIT ACCESS STUDY

PREPARED FOR THE:

LOS ANGELES COUNTY TRANSPORTATION COMMISSION

LACTC

PREPARED BY:

GRUEN ASSOCIATES

AUGUST 1990

DODGER STADIUM ACCESS STUDY

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AUGUST 1990

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SUMMARY

This report focuses on alternative connections that directly link Dodger Stadium and the planned Pasadena Line Rail Transit Station near the intersection of College and Spring Streets in Chinatown. Two key factors in the consideration of any such connection are: 1) steep grades surrounding the bluff top parking areas of Dodger Stadium and 2) the infrequent but high crowd peaking that occurs at major events.

Dodger Stadium is located on a bluff top that is elevated more than 200 feet above the Pasadena Rail Transit Line. Any connector option would need to be able to handle this steep grade. Secondly, before and after events at Dodger Stadium, large numbers of people entering and exiting the parking facilities cause congestion and delay for attendees. Any transit technology must accomodate a peak loading phenomenon where up to 56,000 persons enter or leave the Stadium within a brief period of time before or after events.

Because of these factors, the access study identified a selected group of representative route and technology alternatives that could function over a short (approximately one mile) route in which elevation changes of 225-275 feet are encountered. The technologies examined include shuttle buses, automated guideway transit, light rail transit, gondola tramways, walkways and escalators. Furthermore, each of the connector alternatives was developed with the goal of supporting economic development potential in and around the future Chinatown Rail Transit Station.

As shown on Table 1, the connector alternatives with the greatest system capacities are the automated guideway transit (AGT) and light rail alternatives. These alternatives could provide a maximum capacity of 18,000 passengers per hour for an AGT system such as a six-car monorail train or 14,000 passengers/hour for a 3-car LRT train. This represents approximately 25-30% of a sold out event exiting Dodger Stadium. Total travel time to College Street Station would be 3 minutes for AGT and 7 minutes for LRT. Waiting time following events at Dodger Stadium could add up to 18 minutes to these travel times. Costs for a light AGT system are estimated at $20-25 million. Costs for grade separated LRT are estimated at $50-55 million.

A gondola tramway alternative offered the lowest capacity of the technologies considered. Systems similar to the Palm

Springs Aerial Tranmway could carry up to 2,800 passengers/hour over the Dodger Stadium route. Travel time from Dodger Stadium to College Street Station would necessarily involve long waiting times during peak events due to the lower system capacities of gondola tramways. An average travel time following a Dodger game, including waiting time, would be well over one hour. Costs for a gondola tram system would be $12-15 million.

Shuttle buses, running as an extension of RTD and DASH systems, could provide a peak event capacity of 7,200 passengers/hour, assuming 30 second headways. Travel time to College Street Station would be 10 minutes, although waiting time following events at Dodger Stadium could add up to 33 minutes to trip time. Capital costs would be minimal, as existing RTD buses could be dispatched from the Downtown Central Bus Facility for Dodger Stadium events which generally occur outside of rush hour periods.

Pedestrian improvements, including escalators from the blufftop parking lots of Dodger Stadium to an existing pedestrian overcrossing of the Pasadena Freeway, could be linked to the College Street Station via pedestrian walkways. Capacities for a double-escalator, double-walkway configuration would be 16,000 persons/hour, or 29% of a sold out event at Dodger Stadium. The major advantage of this system is that there would be very little waiting for an escalator before or after an event, and walking time compares favorably with other technologies when waiting times are accounted for. Costs for this alternative would be $2 to 5 million.

A more detailed description of the alternatives is provided beginning on page 7 of this document. A more detailed comparison of the alternatives is provided beginning on page 25.

Route	Dodger Stadium Mode/Assumptions	Peak Exiting Capacity persons/hour* (% of Dodger Stadium capacity)	Exiting, Boarding, & Travel Time to Pasadena Line**	Route Length* (1-way: Stadium Mid-Station to Pasadena Line)	Order of Magnitude Costs	Notes
A	**Shuttle Bus** • DASH or RTD extension • 60 persons / bus • 30-second headway	7,200 / hour (13% of capacity)	43 minutes	A1 = 7,500' (1.4 miles) A2 = 8,500' (1.6 miles) A3 = 9,500' (1.8 miles)	minimal capital costs	Assumes use of RTD & DASH buses, personnel and maintenance facilities.
B	**AGT Shuttle** • grade separated • double guideway • 90-second headway • 6-car trains	18,000 / hour (32% of capacity)	17 minutes	B1 = 4,400' (.83 miles) B2 = 4,300' (.81 miles)	$20-25*** million	B1 requires guideway construction to flatten grades at freeway crossing.
C	**LRT Spur** • grade separated • double guideway • 3-minute headway • 3-car trains	14,000 / hour (25% of capacity)	25 minutes	7,500' (1.4 miles)	$50-55*** million	Some grading required to flatten grades along Stadium Way South.
D	**Gondola Tram** • 2 125-passenger cars	2,800 / hour (5% of capacity)	92 minutes	2,800' (.53 miles)	$12-15 million	Roosevelt Island Aerial Tramway costs escalated from 1975 costs of $6.25 million. The length of the Roosevelt Island tramway is 3,100 feet.
E	**Escalator/Walkway**	Escalator: 16,000 / hour (29% of capacity) Escalator + Stairway: 24,000 / hour (43% of capacity)	23 minutes	600' (escalator) 4,500' (.85 miles) (stadium to station)	$2-5 million	Length of escalator is 600 feet with 200 feet of elevation gain.

* See Chapter 2.0 for discussion of technology, capacity, and route length assumptions.

** Total time to move more than 4,000 riders from Dodger Stadium to Pasadena Line following an event. (See Table 3, Section 3.2 for discussion of exiting, boarding and travel times.)

*** Costs are typical per mile costs for aerial guideway systems. Costs are not included for stations, rail maintenance and storage. Such capital costs should be considered order-of-magnitude costs for initial comparison of alternatives only. Further engineering and route refinement study is required for more detailed cost estimates.

TABLE 1

CAPACITY AND COST COMPARATIVE MATRIX

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LOS ANGELES COUNTY TRANSPORTATION COMMISSION
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GRUEN ASSOCIATES
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GANNETT FLEMING

KEY

- Elysian Park
- Chinatown
- LA Union Passenger Terminal
- Downtown CBD
- Dodger Stadium Parking Entrances

FIGURE 1

LOCATION MAP

DODGER STADIUM TRANSIT ACCESS STUDY

LOS ANGELES COUNTY TRANSPORTATION COMMISSION

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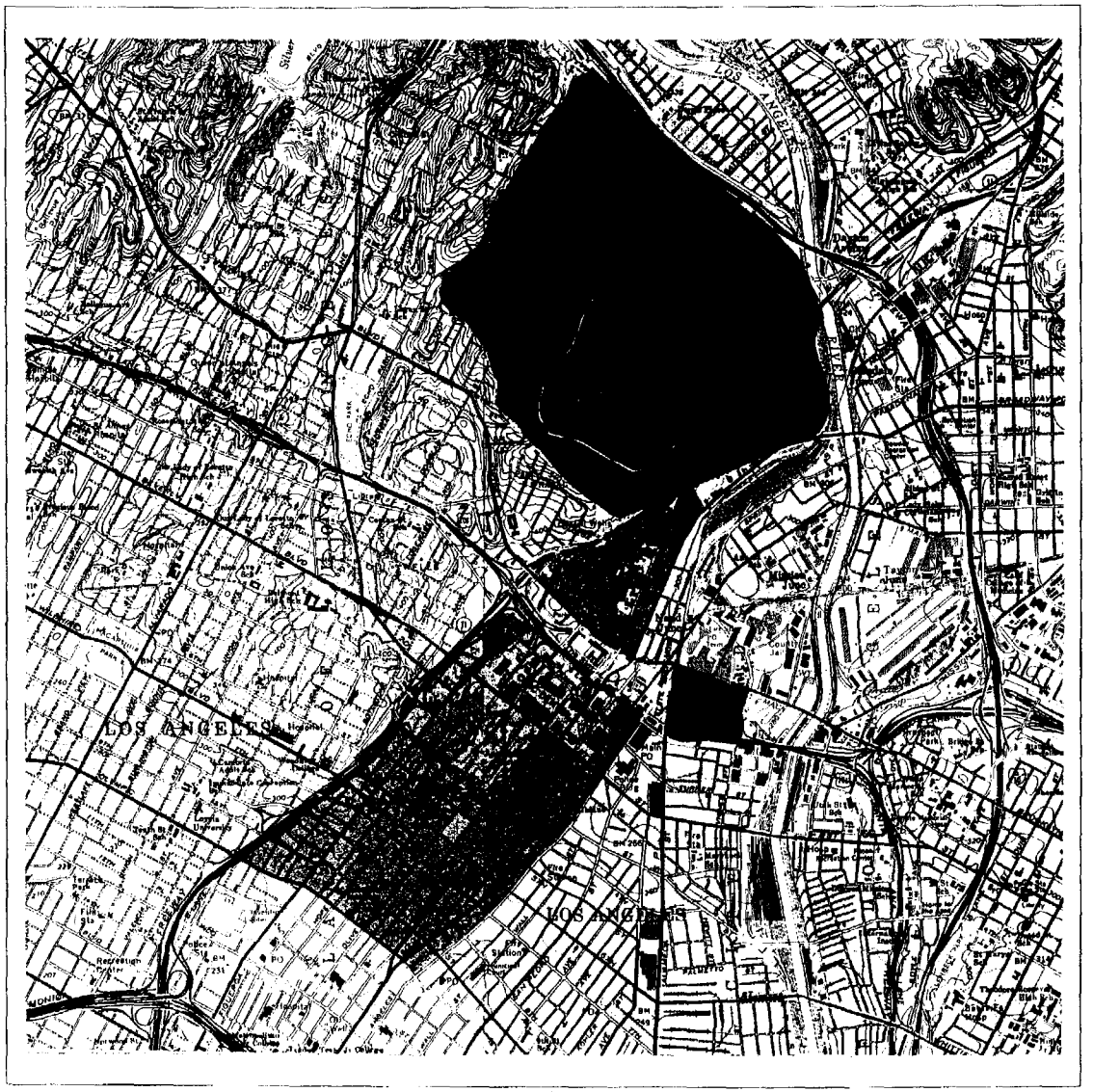

1.0 *PURPOSE AND NEED FOR THE PROJECT*

1.1 PROJECT BACKGROUND

Dodger Stadium is a nationally known 56,000 seat baseball and multi-function sports, concert and outdoor exhibition facility located in Chavez Ravine north of Downtown Los Angeles. The Stadium was opened in 1962, to provide a new home for the Los Angeles Dodgers baseball franchise, which had recently relocated to Los Angeles from New York and had been temporarily playing in the Los Angeles Memorial Coliseum at Exposition Park. Dodger Stadium plays host to at least 81 major league baseball games per year between April and October as well as numerous concerts and exposition events. Recent events, in addition to baseball, have included a rock concert by David Bowie, religious gatherings, and a Recreational Vehicle & Boat Show. Annual attendance for baseball is greater than 2 million spectators.

As shown in Figure 1, Dodger Stadium is located on a blufftop overlooking Downtown Los Angeles and is well served by highways (Pasadena, Hollywood and Golden State Freeways) and arterial roadways (Stadium Way, Academy Road). During events at the Stadium, the public is directed into parking lots at five different access points. Parking is provided for upwards of 20,000 vehicles in parking lots surrounding the Stadium.[1] Additionally, charter bus parking is provided at a central location within the parking lot area.

[1] Estimate is based upon ±175 acres of surface parking at 350 sq. ft./ vehicle.

KEY

- Metro Red Line (opens 1993)
- Metro Blue Line (Long Beach segment opens 1990) (Pasadena segment opens 1998)
- DASH "Route B"
- RTD Route #635

FIGURE 2

TRANSIT CONTEXT

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Transit service in the vicinity of Dodger Stadium is provided by SCRTD via surface bus routes in Chinatown and Elysian Park. As shown in Figure 2, this service is supplemented by DASH service (Downtown Area Shuttle) and three new rail transit projects scheduled for completion between 1990 and 1998.

Dodger Stadium is located one mile west of the adopted route of the Pasadena Light Rail Line. This project is scheduled for completion in 1998 with a station to be located in Chinatown, near the intersection of Spring Street and College Street. Since a Dodger Stadium Station was not possible along the Pasadena Line route, alternative means of connecting Dodger Stadium to the future Pasadena Line rail transit station have been analyzed in this report. In addition, the Metro Red Line, serving LA Union Passenger Terminal (LAUPT), Civic Center, 5th & Hill, 7th & Flower, and Wilshire & Alvarado is scheduled to open in 1993. Metro Blue Line service between Downtown Los Angeles and Downtown Long Beach opened for service in July 1990. RTD has recently commenced service on Line #635, which provides service between the Metro Blue Line Pico Station and Dodger Stadium. Direct connection by RTD buses is provided starting 2 1/2 hours prior to each game and 15 minutes following the end of a game.

DASH service has been expanded in the downtown area with two routes. Route B presently runs along Hill Street and North Broadway in the vicinity of Dodger Stadium.

Providing transit access to persons attending events at Dodger Stadium will be the primary purpose of the Dodger Stadium Connector. The connector would ease traffic congestion before and after events at the Stadium and could attract additional attendance to these events by providing convenient access from Chinatown, downtown and the rest of the metropolitan region for those who cannot or do not wish to drive to the ballpark.

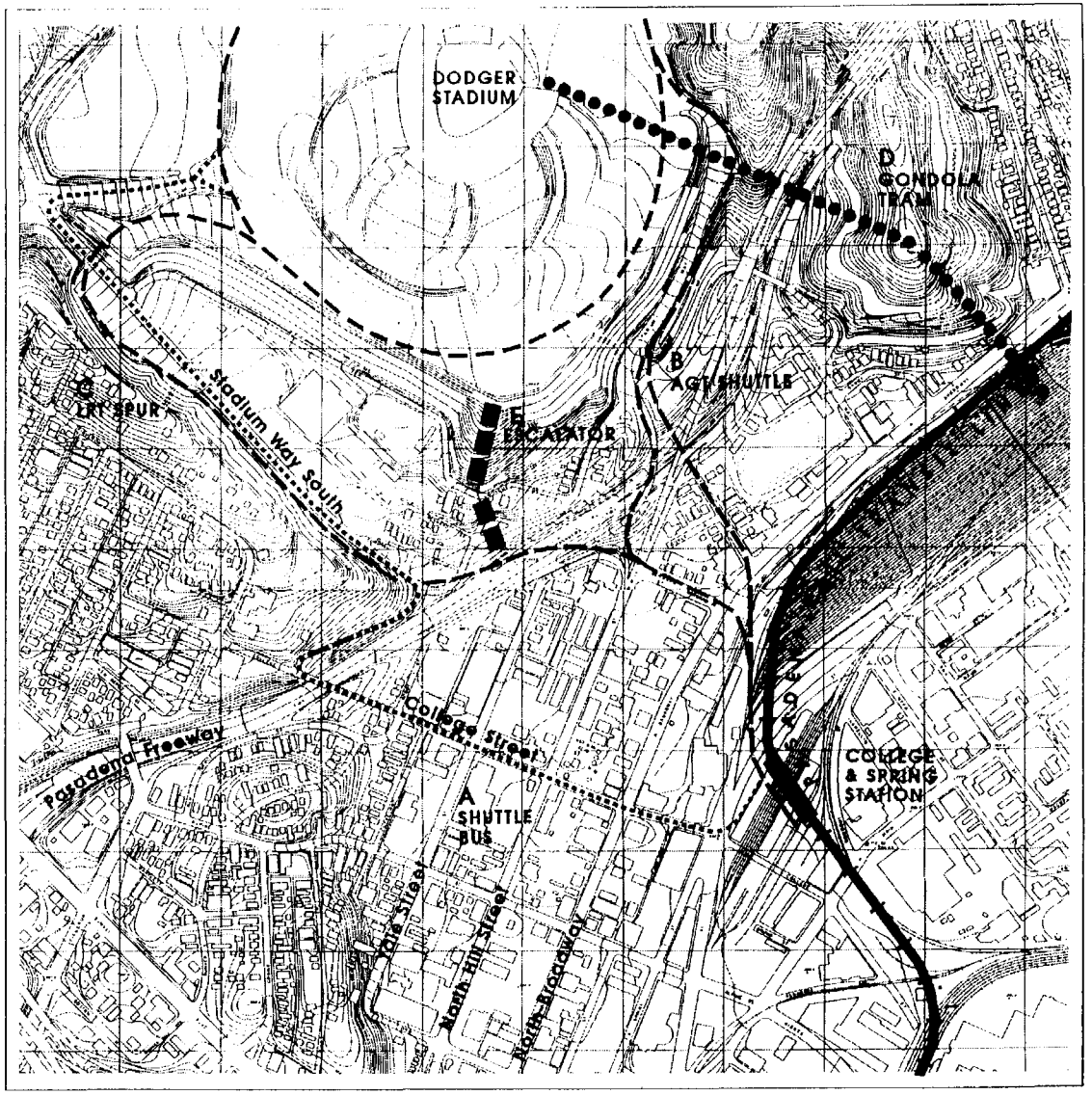

FIGURE 3

CONNECTOR ALTERNATIVES

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1.2 PROJECT ALTERNATIVES

A major constraint to the provision of transit service to Dodger Stadium is the hilly terrain surrounding the Stadium blufftop location. Dodger Stadium is located between 200-300 feet above the surrounding urbanized areas, and any connector route would need to negotiate the steep slopes on the south and east faces of the blufftop parking area. Several alternative routes and technologies were examined to determine their ability to serve as transit connectors between the Dodger Stadium and the Pasadena Line. As shown in Figure 3, five generic profile and technology options were identified for study:

Route A
Shuttle Bus Service: An at-grade bus shuttle that would provide service between the College & Spring Station and the loop road of the Dodger Stadium parking lots. Service would either be direct from downtown via DASH, or via the College & Spring Station where transit riders would change from LRT to shuttle buses.

Route B
AGT Shuttle: An automated guideway transit shuttle that would provide service between the College & Spring Station and Dodger Stadium via either Bernard Street or Cottage Home Street and Stadium Way East.

Route C
LRT Spur: An elevated spur track from the Pasadena Line that would allow LRT trains to be diverted from the Pasadena line in the vicinity of the College & Spring Station to provide service to a Dodger Stadium Station via an elevated guideway along Bernard Street and Stadium Way South.

Route D
Gondola Tramway: Similar to the Palm Springs Aerial Tramway, this alternative would utilize an aerial cablecar system that would travel from the future Central City North Area, via Radio Tower Hill in Elysian Park, to Dodger Stadium. Such a transit mode would tend to serve as a visitor attraction in itself because of views of downtown Los Angeles, Dodger Stadium and Elysian Park.

Route E
Escalator: A pedestrian connection from the College & Spring Station through Chinatown and above the Pasadena Freeway to an escalator and/or stairway that would provide vertical connection to the Dodger Stadium blufftop parking lots.

FIGURE 4

ALTERNATIVE A
SHUTTLE BUS

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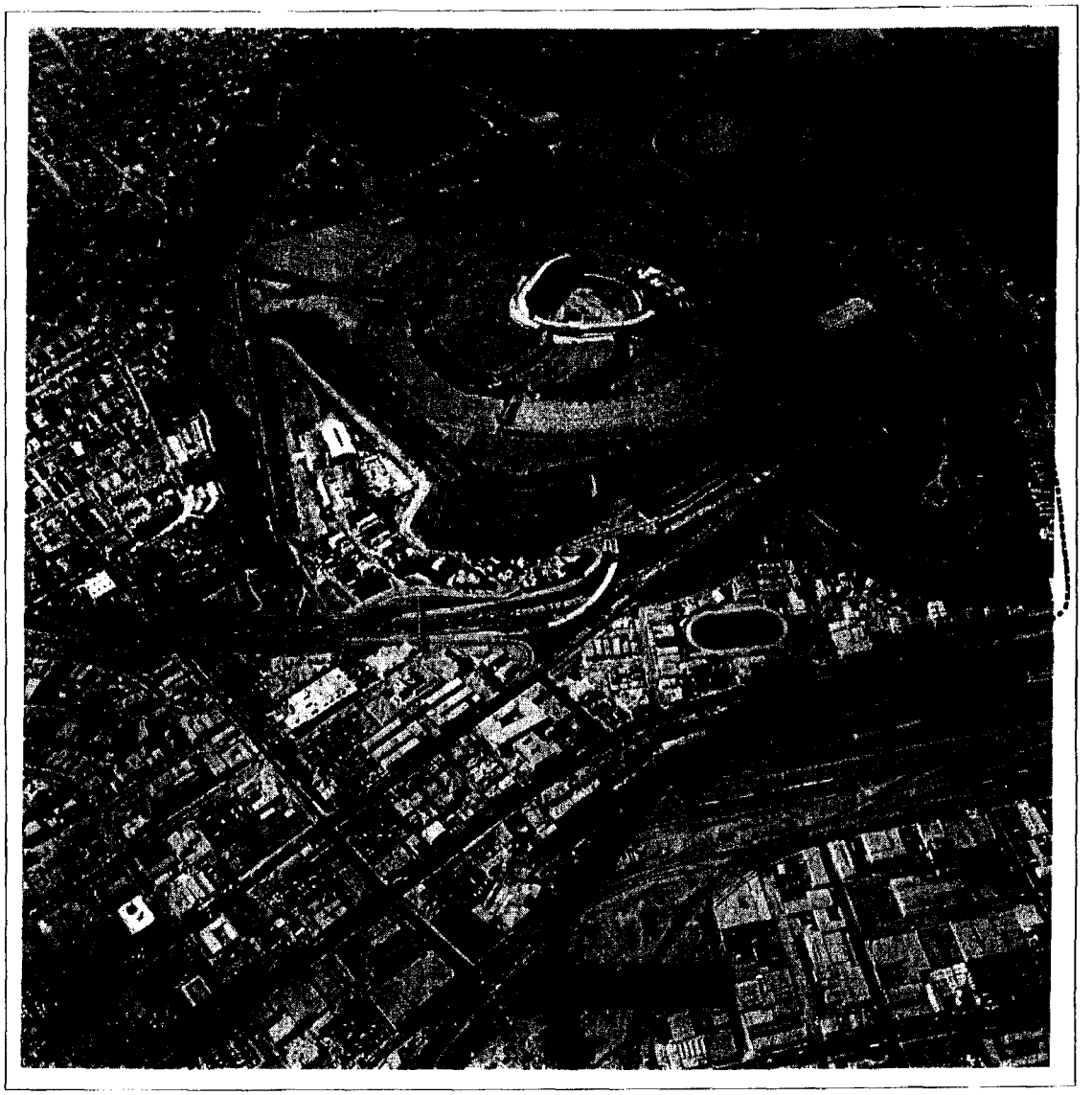


2.0 ROUTE AND TECHNOLOGY ALTERNATIVES

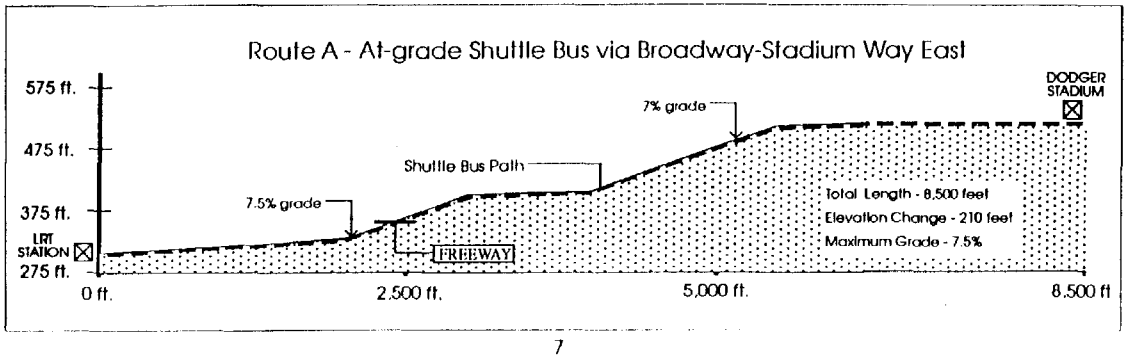
2.1 ALTERNATIVE A SHUTTLE BUS CONNECTORS

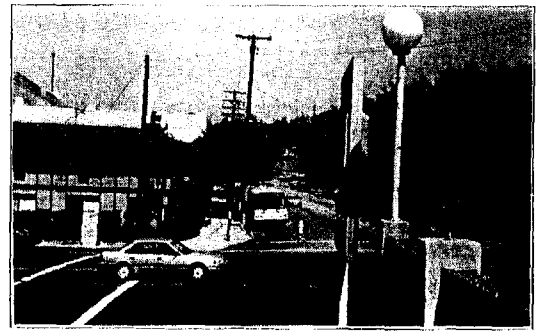
Shuttle bus service is currently provided from downtown Los Angeles to North Broadway and Hill Streets near Dodger Stadium via LA Department of Transportation DASH buses. These buses run approximately every ten minutes (more frequently in the midday hours) from 6:30am to 6:30pm Monday-Friday, and every 15 minutes from 10:00am to 5:00pm on Saturdays. The DASH shuttle fare is 25 cents. These buses run north bound on North Broadway, turn west on College Street to Hill, travel north on Hill to Bernard Street which is the end of the line. After layover along Bernard Street, DASH buses return to downtown via North Broadway.

As shown in Figure 4, extension of DASH shuttle service to include Dodger Stadium would be possible via a loop that would proceed up College Street to Stadium Way South, along the ring road of the Dodger Stadium parking area and back down Stadium Way East to North Broadway. Such a loop could provide service from the proposed College Street LRT Station on the Pasadena Line as well as direct service from downtown. During peak traffic periods at Dodger Stadium an alternate route down the hill could be utilized along Solano Avenue that would avoid heavy traffic congestion at Stadium Way East.

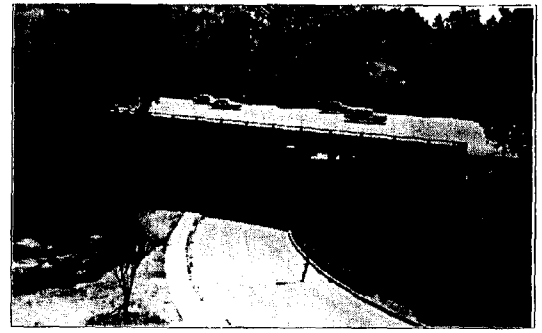
The one-way route length to the mid-point of the loop roadway is 7,500 feet via Stadium Way South, 8,500 feet via Stadium Way East and 9,500 feet via Solano Avenue. The steepest grades occur along the Stadium Way East segment where maximum grades of 7%-8% exist.

DASH Shuttle: *City Department of Transportation shuttles have been very successful in providing service to Downtown Los Angeles and other areas of the City.*

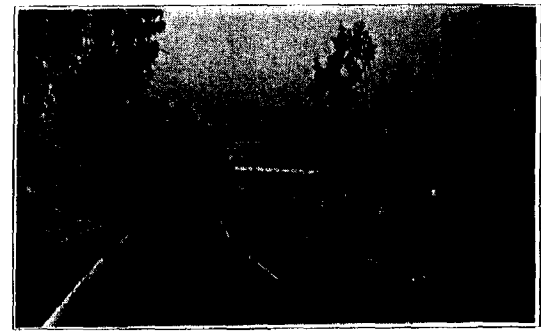




North Broadway at Bernard Street:
DASH Shuttles currently layover on Bernard Street between North Broadway and Hill Streets.



Stadium Way East crossing of Pasadena Freeway:
Access to Dodger Stadium is currently provided via Stadium Way East. This view shows the undercrossing of the Pasadena Freeway.



Dodger Stadium principal entrance on Stadium Way East:
The principal entrance to Dodger Stadium is from the east at the Pasadena Freeway. Direct freeway ramps converge on this entry which is heavily used during the periods immediately before and after stadium events. The high-rise structures of downtown Los Angeles are seen at the upper center of this photo.

Dodger Stadium from parking lot #32:
Terraced parking is provided along a circular ring road surrounding Dodger Stadium. Transit buses could pick up/discharge passengers along this ring road, or conversely, a single transit stop could be provided at a central location in the parking area.

FIGURE 5

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ALTERNATIVE B
AGT SHUTTLE

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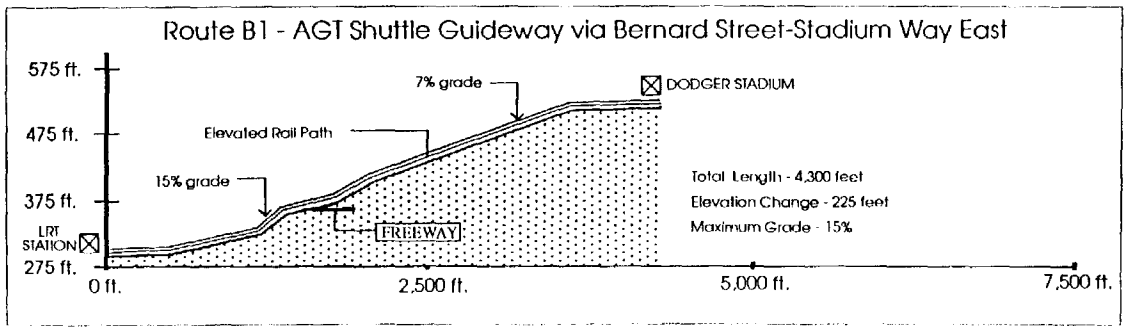
2.2 ALTERNATIVE B
AGT SHUTTLE

The most direct connector alternative between the Pasadena Line and Dodger Stadium would be via an Automated Guideway Shuttle that would run back and forth along Stadium Way East from the future College Street Rail Transit Station to Dodger Stadium.

Various types of AGT technologies are possible for this route including monorail systems, rubber tired people mover, and steel-wheel systems. A discussion of the various AGT technologies is included in Chapter 3 of this report. As shown in Figure 5, two alternative routes are possible; B1) from the College & Spring Street Station along Bernard Street to cross above the Pasadena Freeway, along the edge of Stadium Way East to Dodger Stadium; or B2) from the College Street Station along Cottage Home Street to cross above the Pasadena Freeway, along the edge of Stadium Way East to Dodger Stadium. Once inside the Dodger Stadium parking area, the AGT line would run along the loop roadway with several station stops to allow pick-up and drop-off.

Because of steep slopes along Stadium Way East, light rail transit technology, which is being used on the Pasadena Rail Line, could not be used for this route. Maximum grades for light rail are approximately 6% and grades below Dodger Stadium on this route exceed 7%. Other technologies however, such as certain types of monorail can accommodate steeper grades than light rail technology and would therefore be more appropriate if this route were selected. Light

AGT Shuttle:
The Disneyworld monorail in Orlando, Florida is a type of AGT technology that provides shuttle service between hotels and activity centers within the amusement park.



Note:
Smoothing of grades to reduce slopes for alternative B1 to less than 15% would result in a relatively high guideway structure on Bernard Street.

monorail and other AGT technologies can generally handle grades of up to 8%-10%, which would make it possible to climb the 225 feet from the College & Spring Street Station to Dodger Stadium over the 4,300 foot length of this route. Mag-lev technology, such as the M-Bahn, Magnetic Transit of America prototype vehicle, can handle slopes of up to 10%, although practical applications of this technology have not been made to date.

Under this alternative, the guideway would be totally grade-separated. The columns could be placed either in the middle or on the side of the street and would displace at least one traffic or parking lane from the street. Conversely, straddle bents would be utilized as the guideway support with no traffic lanes taken, but property displacements would occur on both sides of the street. The crossing of the Pasadena Freeway would require that columns be strategically placed resulting in a relatively high structure above the Chinatown segment of the route. Route B2 is slightly shorter and more direct than Route B1, however Route B2 is adjacent to Cathedral High School and numerous residential structures. Route B1 is slightly longer, however adjacent properties along Bernard Street are generally vacant or used for commercial purposes.

Route B1: This view looks west from North Broadway along Bernard Street. An elevated guideway would run along the center or side of Bernard Street where it would turn to the right to cross above the Pasadena Freeway. The bluff top parking lots of Dodger Stadium can be seen in the upper right of the photo.

Route B1:
At the intersection of Bernard Street and the Pasadena Freeway, the elevated guideway would turn to follow the northbound Dodger Stadium off-ramp, seen at the right of the photo. The guideway would climb at a 6% to 10% grade in order to gain 225 feet of elevation between North Broadway and Dodger Stadium.

Route B2:
This view looks toward Dodger Stadium from North Broadway along Cottage Home Street. The northbound Dodger Stadium off-ramp from the Pasadena Freeway can be seen against the bluff backdrop. An elevated guideway would run along the center or side of Cottage Home Street and would turn to the right to follow the freeway off-ramp up to Dodger Stadium.

At the intersection of Cottage Home Street and the Pasadena Freeway the elevated guideway would cross over the Pasadena Freeway (seen in the center of this photo) and join the northbound off-ramp, at the left of the photo.

FIGURE 6

ALTERNATIVE C
LRT SPUR

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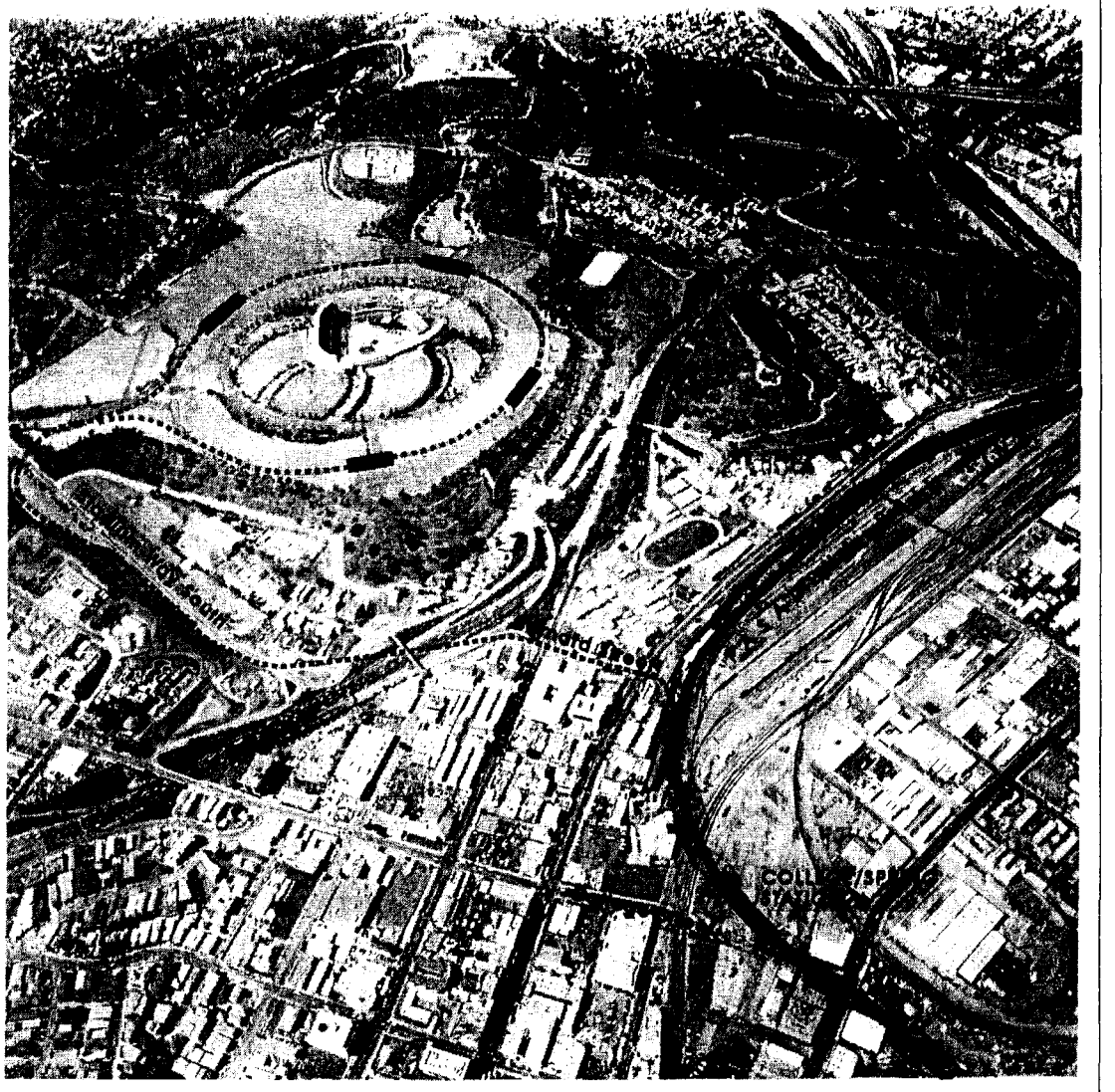
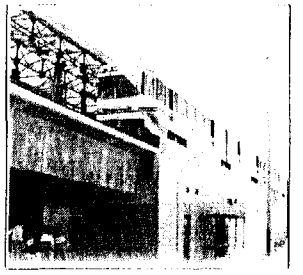


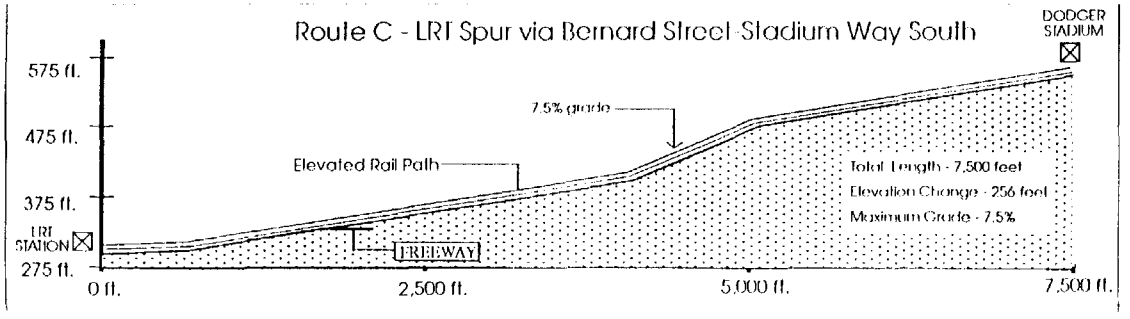
2.3 ALTERNATIVE C
LRT SPUR

A spur track from the Pasadena Line would be possible to serve Dodger Stadium. As shown in Figure 6, such a spur track would branch north of College Street to cross above North Broadway and run along Bernard Street. At the Pasadena Freeway, a long-span structure would be required. The aerial guideway would climb along the south side of Stadium Way South. Near the Sunset Boulevard entrance to Dodger Stadium, the structure would curve along the backside of the south parking lot and cross over Stadium Way obliquely, crossing into the Dodger Stadium parking area. Once inside the Dodger Stadium parking area, the LRT spur line would run along the loop roadway with several station stops to allow pick-up and drop-off.

At 7,500 feet in length, this alternative is among the longest of the alternatives considered in this report. The greater length is necessary to accommodate the climbing characteristics of light rail technology. While this greater length adds to costs for this alternative, the use of the same technology as is being used on the Pasadena Rail Transit Project provides efficiencies in the service and maintenance of vehicles. Additionally, operational flexibility is afforded whereby extra trains could be added to serve special events at Dodger Stadium. It would even be possible for special "express" trains to run directly to Dodger Stadium from various parts of the rail network.

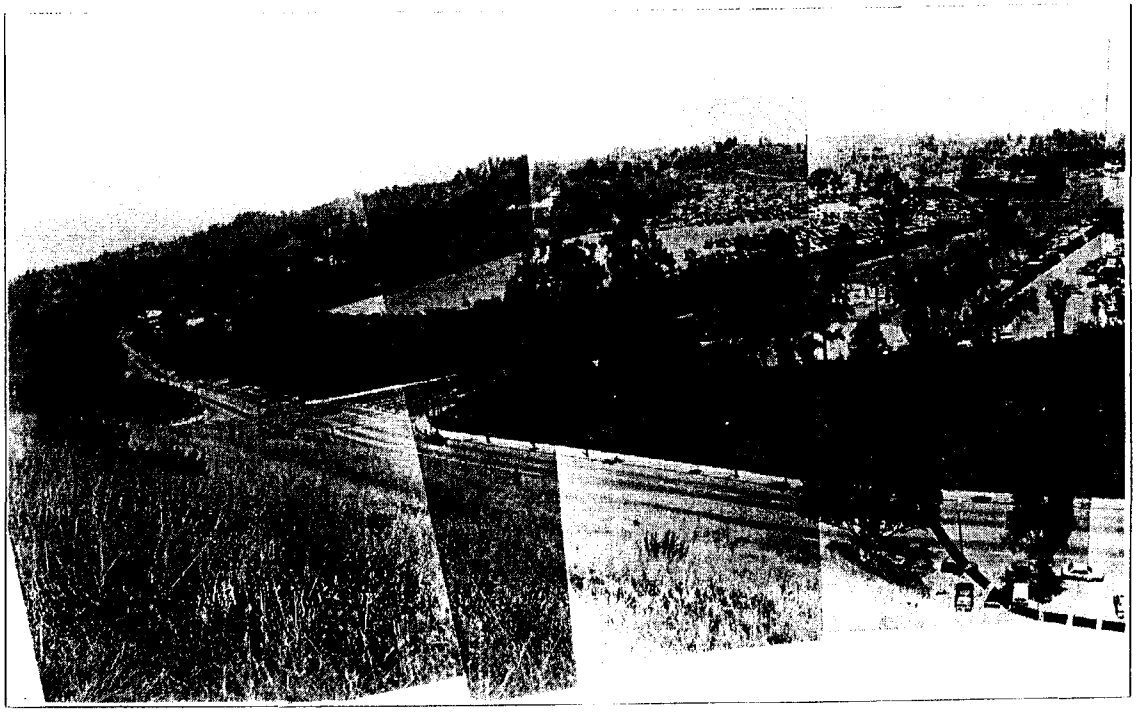


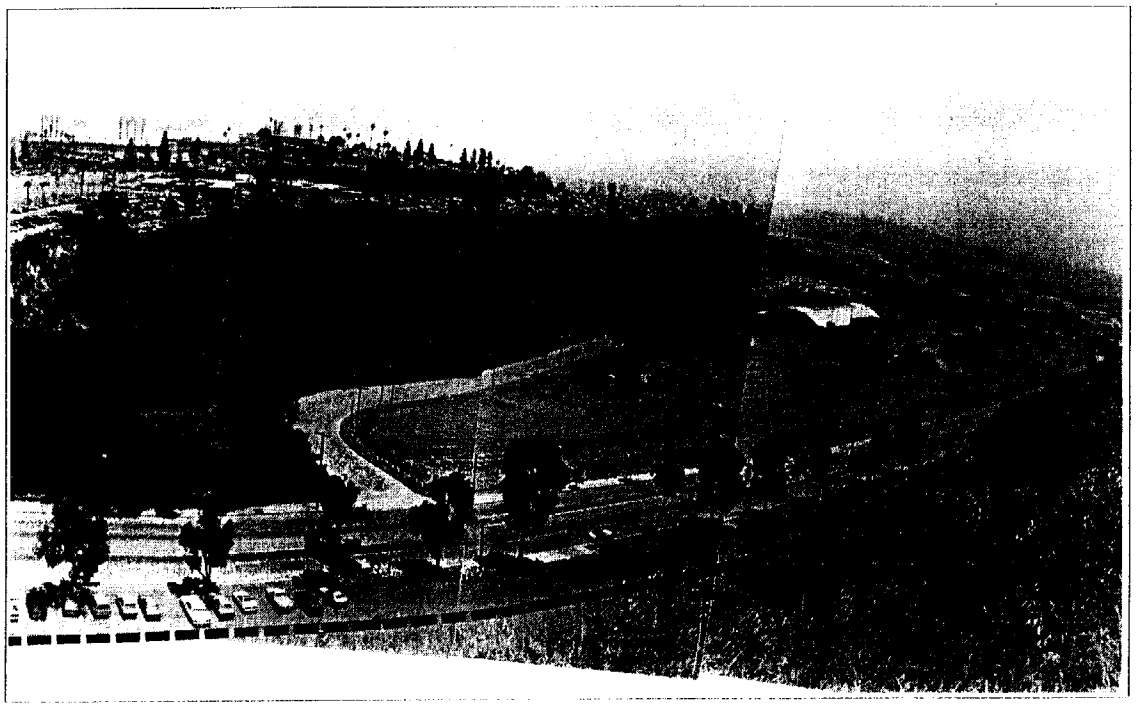
LRT Spur:
The Metro Blue Line which currently runs between Downtown Los Angeles and Long Beach has several grade separated stations and street crossings. Such grade-separation would be necessary along a spur track serving Dodger Stadium.



Note:
LRT technology can handle maximum slopes up to 6%. Therefore, some slope modifications would be required to maintain a constant grade of less than 6%.

Route C:
This view looks north at Dodger Stadium from the adjacent bluffs along Figueroa Terrace. Stadium Way West climbs toward the Stadium from the right of the photo where it passes the US Naval Armory complex and the Dodger Stadium ticket office.





Route C:
At the left of the photo, the Sunset Boulevard entrance to the Stadium parking lots can be seen. Route C would follow Stadium Way and would cross above the street to enter the Stadium parking lots.

FIGURE 7

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ALTERNATIVE D
GONDOLA TRAM

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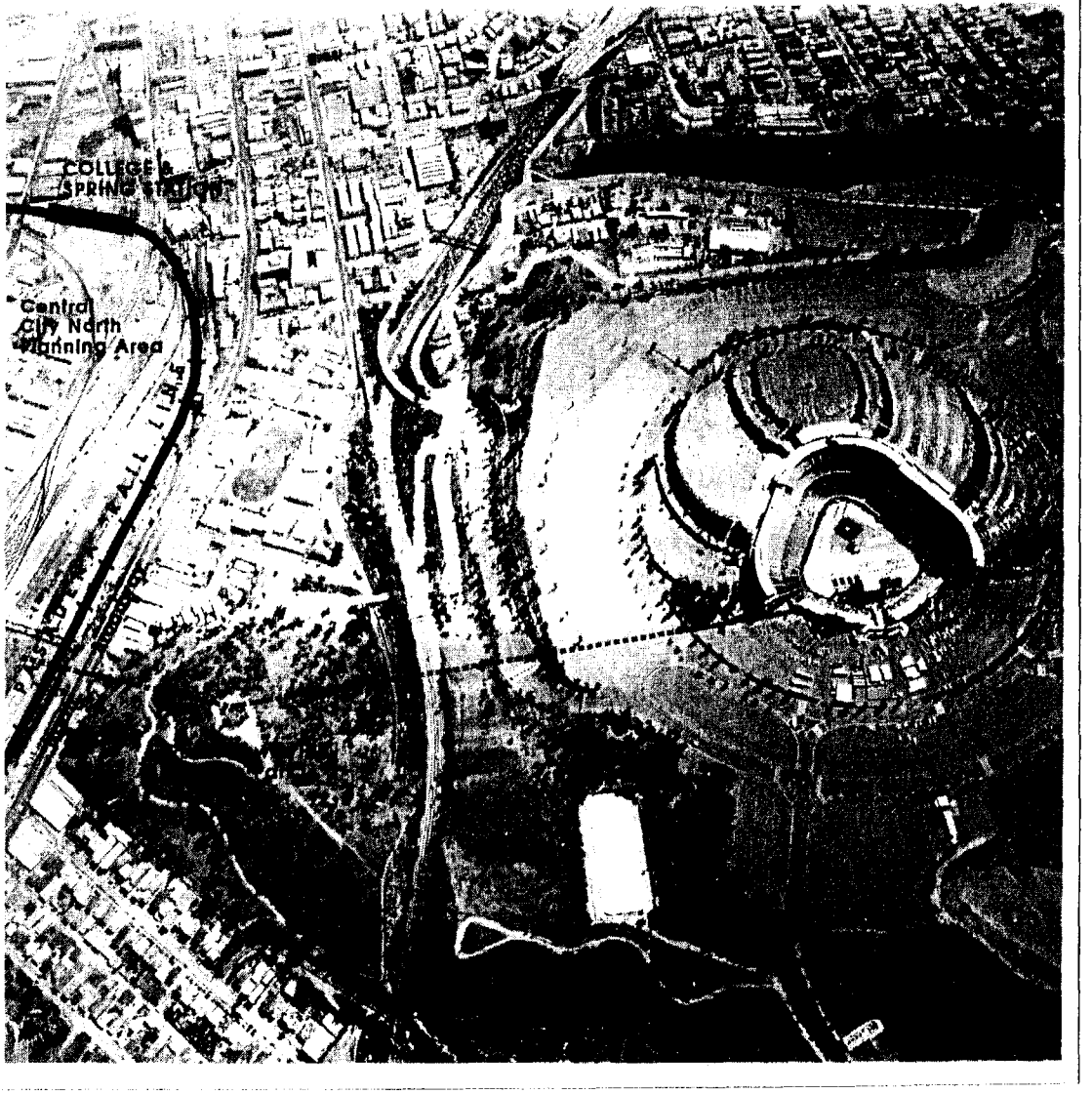
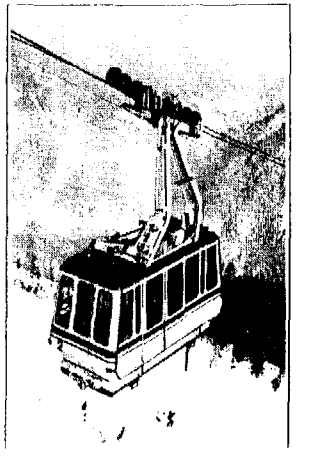


2.4 ALTERNATIVE D
GONDOLA TRAM

The City of Los Angeles Planning Department has identified major re-use potential in the "Cornfield" railroad storage yards adjacent to North Broadway, along the route of the planned Pasadena Rail Transit Project. As a part of initial planning for redevelopment of this area, conceptual sketches illustrating possible future scenarios for the area show a gondola tramway connecting the heart of this redeveloped area to Dodger Stadium.

As shown in Figure 7, such a tramway could run from a central location in the planned Central City North Development Area to the top of Radio Tower Hill in Elysian Park, and then across the valley formed between Radio Tower Hill and the bluffs of the Dodger Stadium Parking area. A mid-station stop at Radio Tower Hill would open up this little used portion of Elysian Park to greater public use and at the same time, provide a scenic view point, picnic and recreation area. The closest application of a technology such as this in Southern California is the Palm Springs Aerial Tramway at Mt. San Jacinto. This system utilizes cable cars accommodating up to 80 persons and move up to 400 persons per hour to the top of a 6,000 foot incline. A more urban application of this technology is the Roosevelt Island Aerial Tramway in New York City. This system was constructed in 1976 and moves 1,500 persons per hour between midtown Manhattan and Roosevelt Island in the middle of the East River. Many ski resorts utilize smaller, 4-8 person gondola cars than run in a continuous series. Systems such as the 8 person gondola at Steamboat Springs, Colorado can accommodate up to 2,800 persons per hour.

Two obvious problems are: 1) accessibil-



Gondola Tramway: Ski resort technology has been adopted to amusement park and urban applications such as the Palm Springs Aerial Tramway and the Roosevelt Island Aerial Tramway in New York City.

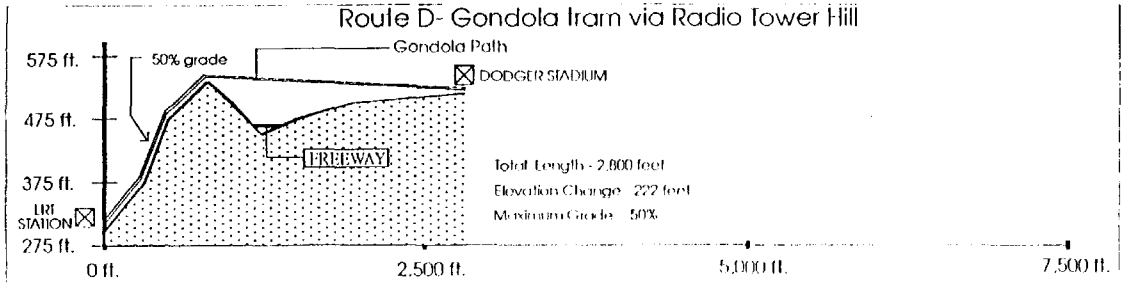


FIGURE 8

ALTERNATIVE E
ESCALATOR WALKWAY
CONNECTION

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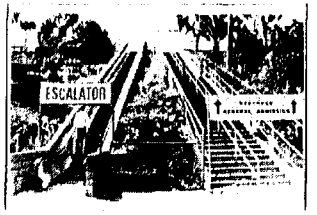
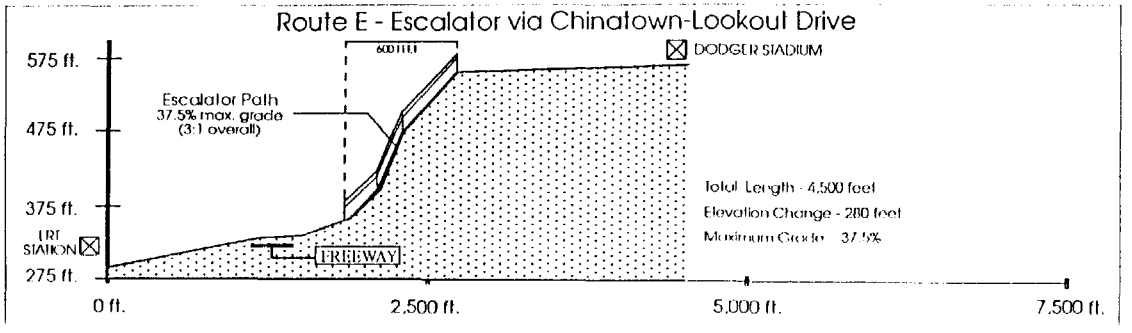
ity to the individual tower support locations, and 2) whether the soil bearing capacity and friction resistance will be great enough to support the tower foundations. Several towers and foundations will be required. Also, the structure at the beginning of the aerial tramway located in the existing rail yard will have to be a sizeable structure in itself to keep the maximum climbing grades to a minimum and provide adequate clearance over North Broadway. In order for this technology alternative to connect directly to the Pasadena-Los Angeles Rail Transit Project, a new station would need to be provided in the vicinity of North Broadway and the foot of Radio Tower Hill.

2.5 ALTERNATIVE E ESCALATOR /WALKWAY

Before and after events at Dodger Stadium, large numbers of people entering and exiting the parking facilities cause congestion and delay for attendees. A drawback with any transit technology is this peak loading phenomenon whereby up to 56,000 persons seek to enter or leave Dodger Stadium within a brief period of time before or after events. Any technology used will develop queues with people waiting to board trains, buses, or simply exit the parking lot in their cars. Because of this waiting time, many attendees would prefer to walk some distance rather than wait in lines. Because it is less than one mile from Dodger Stadium to the College Street Rail Transit Station, many people could reach the station on foot following major events faster than they could be conveyed by transit. For these reasons, this alternative provides high-capacity vertical circulation to assist pedestrians with the 280 foot grade change between Dodger Stadium and the Pasadena Line Station.



Dodger Stadium Escalator:
Escalators are presently used at Dodger Stadium to transport fans from different levels of the terraced parking lots. Additional use of such escalators would provide a high-capacity pedestrian route between the Pasadena Rail Line and Dodger Stadium.



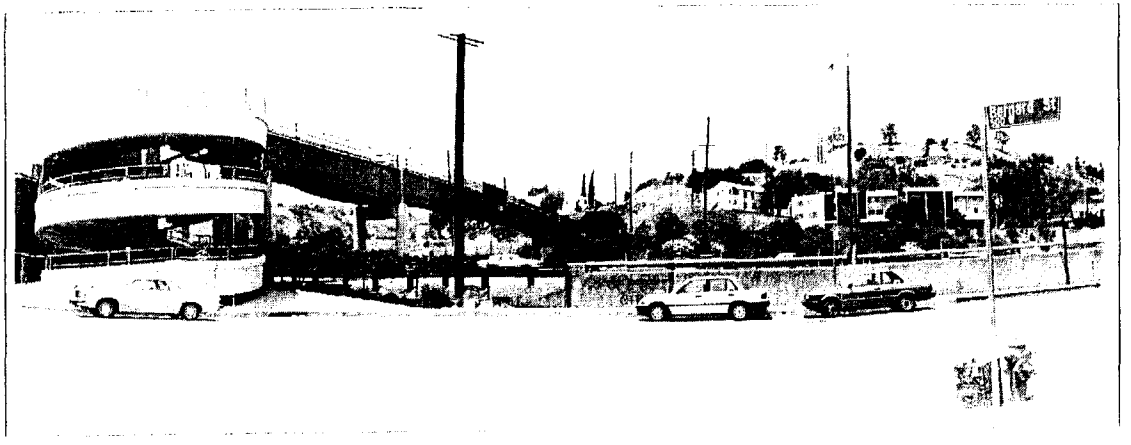
but allows them to walk or be conveyed on elevated moving walkways for the remainder of the route.

As shown in Figure 8, an existing pedestrian overpass above the Pasadena Freeway is provided at Bernard Street. It is less than 800 feet from this pedestrian bridge to the blufftop edge of Dodger Stadium parking lot #32, however there is a 200' rise in elevation over this same distance. Similar to the historic Angel's Flight inclined railway, an inclined escalator could provide automated pedestrian transport over this distance. Two 48" wide escalators would have a peak capacity of over 16,000 persons per hour. There is also very little waiting with this technology, thus allowing crowds to disperse quickly following events. At the foot of the Dodger Stadium hill, pedestrians would have a choice of routes between the pedestrian overcrossing and the College Street Rail Transit Station. An elevated walkway above Bernard Street could provide a automated walkway connecting directly to the rail transit station. Conversely, pedestrians could be directed through Chinatown where numerous restaurants, shops and pedestrian ammenities are provided. A further option would be to take a DASH shuttle from this point directly to downtown.

The total length from Dodger Stadium to the College Street Station would be 4,500 feet under this alternative, with an average walking time of 13 minutes. This is comparable to other alternatives such as LRT and AGT where waiting times during peak periods increase travel time. Also, passenger waiting following a game is

Perhaps the best views of downtown Los Angeles are to be had from Dodger Stadium. This view looks south from the edge of the blufftop parking lots, across the Pasadena Freeway and the existing pedestrian overcrossing, toward Chinatown and the Civic Center area. Alternative Route E would provide access up this hillside from the pedestrian overcrossing to allow pedestrian access from DASH shuttles and the Pasadena Line.

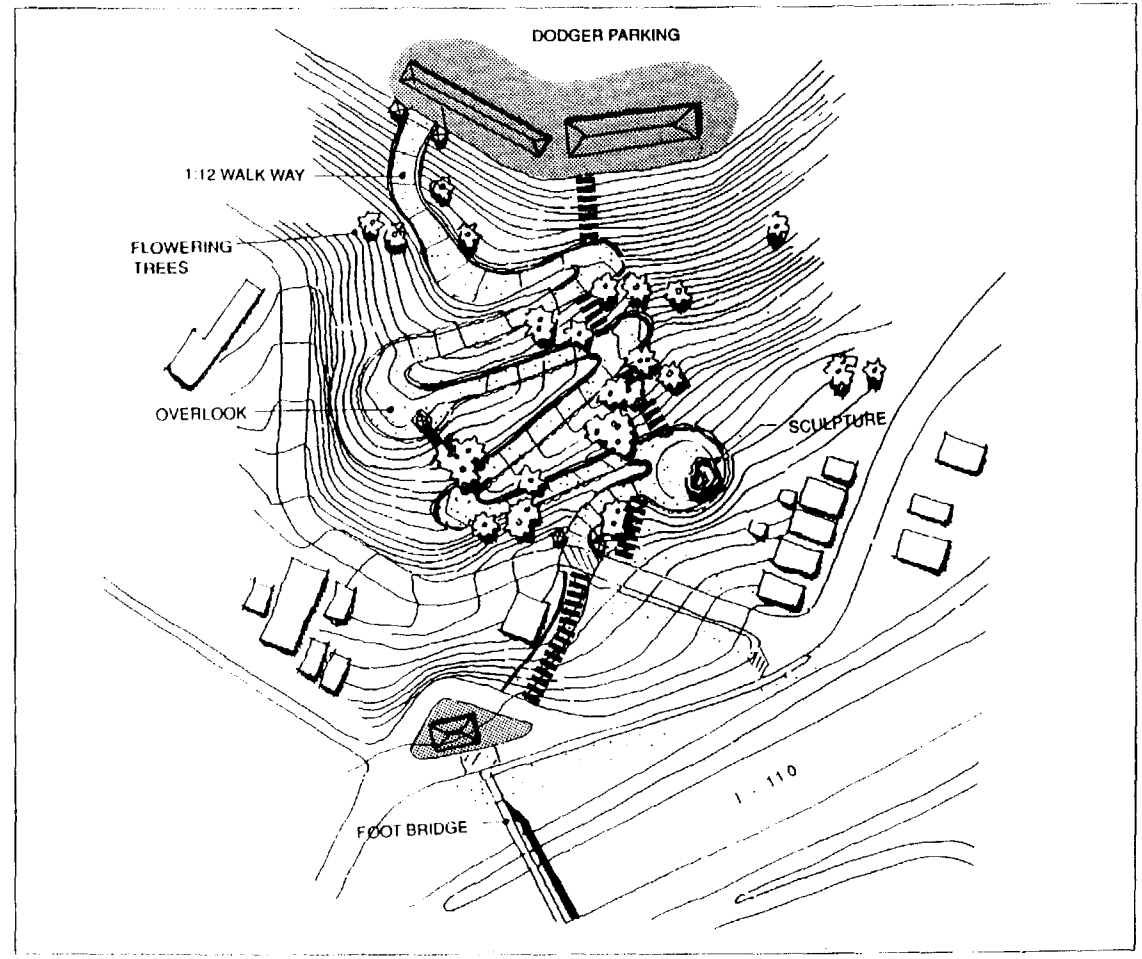
psychologically perceived as being three to four times longer than actual waiting time.



The existing Bernard Street pedestrian overcrossing of the Pasadena Freeway is seen in this view. The overcrossing could be improved to provide a better, more interesting walking environment that would connect to an escalator/parkway connection to Dodger Stadium on the opposite side of the Pasadena Freeway. The bluttop Dodger Stadium parking lots are seen at the upper right of the photo.

Route E:

From the pedestrian overcrossing of the Pasadena Freeway, an escalator similar to Angel's Flight on Bunker Hill could provide pedestrian access to the Dodger Stadium bluff top parking lots. A park-like landscaping theme would provide a walkway up the hill. Such a walkway could be designed with rest areas at viewpoints and picnic areas that could be used prior to Stadium events. The walkway shown has been designed to maintain handicapped-accessible slopes.



KEY

Escalators / Stairways

3.0 *DEVELOPMENT AND INITIAL SCREENING OF ALTERNATIVES*

The previous chapter described a selected group of technologies that can provide automated transit connection between Dodger Stadium and the planned Pasadena Rail Line. The alternatives presented were chosen to represent a range of possible solutions. This chapter broadens the discussion to discuss a family of transit technologies that would be possible to evaluate in future route refinement, environmental and engineering studies. The chapter also provides additional discussion of the key factors affecting the selection of a technology to serve Dodger Stadium.

3.1 TOPOGRAPHIC CONSTRAINTS & DOWNTOWN CONNECTION COMPATIBILITY

Perhaps the key factor in the selection of a technology to serve Dodger Stadium are the steep slopes surrounding the Dodger Stadium parking lots that would eliminate many types of transit technology from consideration at the outset. Any technology to be considered for further evaluation would need to be able to climb grades in excess of 8% over the shortest and most direct route to Dodger Stadium on Stadium Way East, or over 6% for the longer, more gradual grade along Stadium Way South.

A second important consideration in the selection of any technology for further evaluation is the ability of that technology to interface with other transit systems that are existing or are being planned for the downtown area. The ability to connect Dodger Stadium to downtown Los Angeles directly has been mentioned in several planning studies dating from the Downtown People Mover in the early 1980's through current planning for the Bunker Hill Transit Tunnel/Downtown Circulator transit system. Technologies currently being evaluated for Downtown range from simple sidewalk improvements and moving sidewalk facilities, through cable driven technologies, rubber-tired automated systems (as have been used in many airports), steel-wheeled systems and advanced technology such as monorail and mag-lev systems. The following table provides a summary of the key characteristics of these systems and their general suitability to the topographic requirements of the Dodger Stadium connection.

* Capacities based on 3-minute headways for applicable technologies.

Table adapted from *Bunker Hill Transit Study; Phase 2*, LADOT, LACRA, Schimpeler-Corradino Associates/Delon Hampton & Associates, June 1990.

TABLE 2

KEY CHARACTERISTICS OF TRANSIT TECHNOLOGIES

(UNDER CONSIDERATION FOR DOWNTOWN LOS ANGELES DISTRIBUTOR SYSTEM)

DODGER STADIUM TRANSIT ACCESS STUDY

LOS ANGELES COUNTY TRANSPORTATION COMMISSION
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Technology	Typical Capacity* (Passengers / Hour)	Maximum Speed (mph)	Maximum Grades
Moving Sidewalk / Escalator	3,000 - 10,000	2	15% (Sidewalk) 50% (Escalator)
Rubber-tired	3,000 - 15,000	30 - 50	10%
Steel Wheel / Light Rail	20,000	50	6 - 8%
Monorail: Top-Riding Underslung	7,000 - 50,000 3,000	20 - 70 20	12%
Magnetic Levitation	9,000	50	8%
Cable-Driven	100 - 20,000	15 - 20	50% +

Moving Sidewalks/Escalators: Moving sidewalks are used at major airports to convey passengers between the terminal and boarding gates. They are also used at the Hollywood Bowl and at shopping centers such as the Beverly Connection in West Hollywood to convey passengers from parking areas to shopping and activity areas. Escalators are used outdoors in Downtown Los Angeles along the skybridges and plazas near Arco Plaza, the Bonaventure Hotel and the new First Interstate Tower. They are also used at many transit systems throughout the world including the future Metro Red Line stations in Downtown Los Angeles. Outside escalators are also used at Dodger Stadium to convey fans from different levels of the terraced parking facilities. Such systems operate continuously at about 2 miles per hour and because of their continuous operation, can carry large numbers of people. The actual capacity depends on the width of the walkway installed but ranges between 3,000 and 10,000 people per hour for each walkway provided. Moving sidewalks have limited applications for climbing grades with a maximum slope of about 15%. Escalators routinely handle 2:1 slopes exceeding 50%. Such a system has been identified as Route Alternative E in this study.

Rubber-Tired: Typical rubber-tired systems run on a dedicated right-of-way that is usually elevated in urban areas. Vehicles range in size from small minibus size to streetcar size and can usually be linked into trains of several cars to increase carrying capacity. The most common application to date has been at airports to serve remote terminal and boarding areas. Capacities range from 3,000 to 15,000 passengers per hour at speeds of between 30-50 mph. Such a technology could be used under the Automated Guideway Transit Alternative B in this report.

Steel Wheel Rail: Both the Metro Blue Line and Metro Red Line are steel wheel systems. The Metro Red Line is defined as a heavy-rail system utilizing large, heavy vehicles running on full weight rails. Heavy rail systems would not be appropriate to serve Dodger Stadium because of slope limitations associated with this technology. Light rail systems, such as the Metro Blue Line currently running between Downtown Los Angeles and Long Beach, have lighter vehicles and lighter weight tracks. They run at slower speeds, and are capable of negotiating tighter turns than heavy rail systems. The future Pasadena Rail Line will be such a light rail systems. Maximum climbing grades for light and heavy rail systems are about 6% for practical applications. This would preclude the use of this technology along Stadium Way East at Dodger Stadium and would necessitate the longer route along Stadium Way South described as the Route C alternative in this report.

Monorail: Southern Californians are familiar with monorail technology as one of the earliest applications was at Disneyland

in the late 1950's. Since that time, monorail technology has progressed, and although only the Seattle World Fair and DisneyWorld monorail have been built in the United States, over 40 miles of urban route service is currently in operation in Japan. This technology requires approximately 1/3 of the structure of comparable LRT and rubber-tired elevated systems because of its relative light weight. Monorails can be configured as either top-riding or underslung. Top-riding monorails usually utilize a concrete or steel box beam, with a rubber-tired vehicle riding on top and guide wheels at the sides. Underslung monorail systems are similar in appearance to ski resort cable cars, with vehicles suspended below a single slender steel track. Vehicle size can range from small "personal" vehicles through heavy rail size cars. Train capacity ranges from 7,000 to 50,000 passengers per hour at speeds ranging from 20 to 70 mph. Medium capacity monorail systems can generally climb grades of 10-12% which would make them appropriate for use at Dodger Stadium along the shortest, most direct route along Stadium Way East. Such a system would be suitable as an Automated Guideway Transit (AGT) Alternative B in this report.

Magnetic Levitation: The "M-bahn" system in Germany is currently the only application of this technology although prototype systems have been demonstrated for several years. Mag-lev technology utilizes electromagnetic resistance to hold vehicles above the guideway, thereby providing smooth, frictionless travel. Mag-levs have high speed intercity application at speeds exceeding 300 mph, but have also been demonstrated to have lower speed downtown applications, such as the Japanese HSST urban maglev system. This system can handle grades of 8% which would be marginally acceptable for the route to Dodger Stadium.

Cable Driven: Two types of cable-driven systems exist for downtown urban applications. The first type can run on steel rails, rubber tires or other support mechanism and be pulled by cable. The second type is supported by an overhead cable and also driven by cable. These systems operate at relatively low speeds of 15-20 mph and have capacities that are generally limited to between 1,000 and 4,000 passengers per hour. Very few applications of this technology exist in the United States in urban areas, although the technology has been used extensively in ski resorts and amusement parks. Applications in downtown Los Angeles are generally being considered for the Bunker Hill Transit Tunnel over a distance of less than one mile. Because of the low speed, it would be difficult to achieve any effective linkage between Dodger Stadium and downtown Los Angeles using this technology. The Gondola Tram alternative D has been included in this study to provide a comparison with the other alternatives and because of its potential application

In providing an attraction in its own right for the City North Development Area, Elysian Park and Dodger Stadium.

3.2 STADIUM EXITING, BOARDING & TRAVEL TIME

A unique feature of transit service at Dodger Stadium that would not occur to the same degree at other locations in the Downtown area, is the peak loading of any transit system that would occur following baseball games and other major events. Any technology used will develop queues with people waiting to board trains, buses or simply exit the parking lots in their cars. Table 3 presents a comparison of the technologies to determine waiting and travel times for the alternatives. In order to develop the analysis, the following assumptions were made:

• Average waiting times and travel times were developed based on the assumption that approximately 10% of an average crowd (40,000 attendees) would use transit to exit the stadium in the peak period following an event at the Stadium. This would mean that 4,000 persons would arrive and queue up at approximately the same time to board whatever mode of transit was provided. Waiting times were then calcuated based on the time that it would take each different transit mode to move 4,000 riders to the Pasadena Line Station at College and Spring Street.

• Typical transit technologies were selected to estimate system loading capacities. The following typical technologies were used:

Route A- Shuttle Bus: Standard RTD buses were assumed that can handle up to 60 persons per bus. Maximum headways of 30 seconds were assumed yielding a peak hour exiting capacity of 7,200 passengers per hour.

Route B- AGT Shuttle: A medium-capacity monorail technology was assumed. Such technologies could theoretically accommodate 90 second headways during peak periods configured in standard 6-car trains. Up to ten car trains would be possible, although such a configuration would require larger station platforms over 400 feet in length. 6-car train configurations would more closely match station platform lengths used on the Pasadena Rail Line and would accommodate up to 450 passengers per train. Boarding of 4,000 passengers would therefore require 10 trains, or 15 minutes.

Route C- LRT Spur: The light rail transit vehicle being planned for use on the Pasa-

KEY

Existing and Boarding

Travel Time

* Travel time from Dodger Stadium to Pasadena Line at 4,000 passengers.

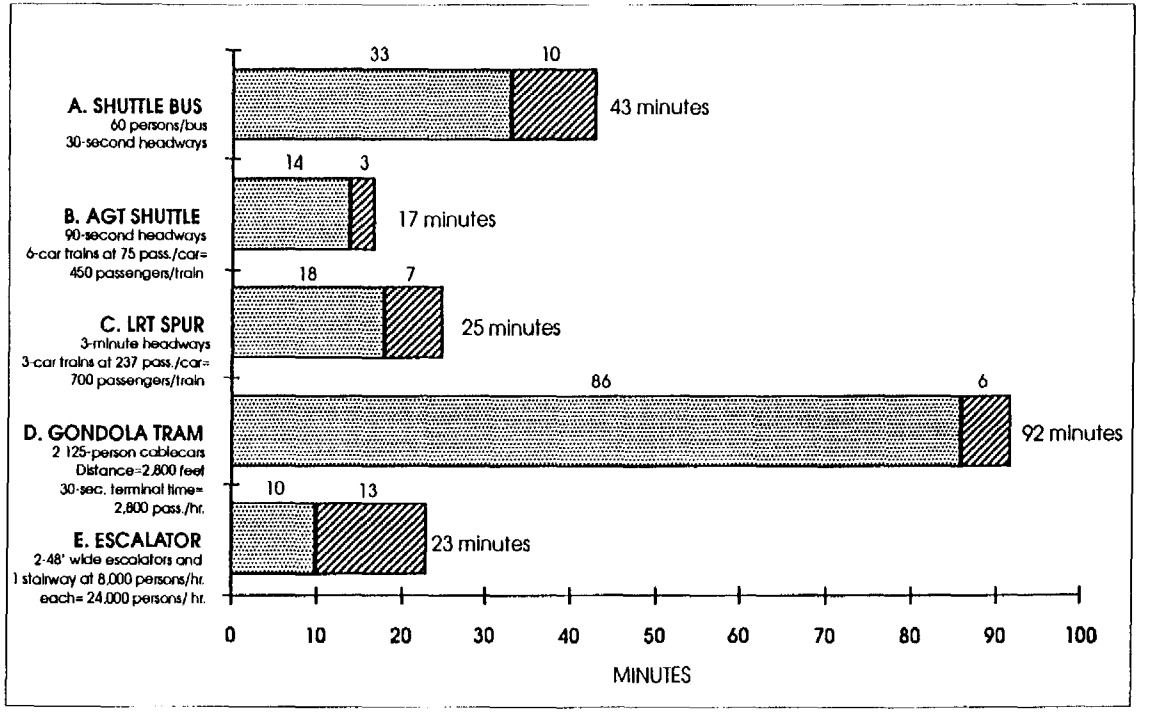

TABLE 3

BOARDING AND TRAVEL TIME BY ALTERNATIVE

DODGER STADIUM TRANSIT ACCESS STUDY

LOS ANGELES COUNTY TRANSPORTATION COMMISSION

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GRUEN ASSOCIATES

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dena Rail Line was assumed. Such vehicles can accommodate up to 237 riders per car configured in three-car consists. At 3-minute headways, boarding of 4,000 passengers would require 6 trains, or 18 minutes.

Route D - Gondola Tram: The Roosevelt Island Aerial Tramway in New York City was used as a comparable model for the Dodger Stadium system. Roosevelt Island utilizes two cablecars that travel over a distance of 3,100 feet. The Dodger Stadium route would cover a distance of 2,800 feet under similar conditions. Capacity of the New York system is about 1,500 passengers/hour. By increasing the size of the cablecars and increasing speeds, a peak hour capacity of 2,800 persons per hour could be achieved. At this rate of boarding, it would take 86 minutes to board 4,000 passengers following an event at Dodger Stadium.

Route E - Escalator Walkway: Two 48" wide escalators would accommodate up to 8,000 passengers/hour each, or 16,000 passengers/hour total. A stairway would also be necessary that would accommodate a similar number of walkers going down the slope following an event at Dodger Stadium would increase the total capacity to 24,000 persons/hour. At this rate, 4,000 persons arriving at the top of the escalator/walkway could be accommodated in 10 minutes.

From this analysis, it can be seen that the waiting time and boarding time is more critical in the evaluation of a connector system to Dodger Stadium than the actual travel time required to cover the one mile to the College & Spring Station. The AGT shuttle is both the shortest transit route, and the one requiring the shortest wait. The Escalator/Walkway Alternative however, compares favorably with other alternatives in total travel time due to the short route length and the short waiting time involved.

3.3 ENVIRONMENTAL ISSUES

Each of the alternatives considered would have environmental impacts associated with the construction and operation of these systems. A summary of potential environmental impacts associated with each alternative includes the following:

Route A - Shuttle Bus: The provision of an increased number of shuttle buses serving Dodger Stadium would add to congestion in Downtown and Chinatown during PM peak hour periods when evening rush hour traffic overlaps with pre-game arrivals at the Stadium.

Route B - AGT Shuttle: The construction of an aerial guideway structure along either Bernard Street or Cottage Home Street would require the reconstruction and re-

configuration of a two-story parking structure located on the east side of North Broadway. The guideway structure would also require the displacement of one lane of traffic (probably a parking lane) on Bernard Street with Option B1 or Cottage Home Street with Option 2. Visual and noise impacts would be greater with Option B2 than with Option B1 due to the proximity of Cathedral High School and more residential structures along Cottage Home Street than along Bernard Street. Construction of the aerial guideway above the Pasadena Freeway could require some temporary lane closures during the construction period to allow for the placement of guideway beams. Depending upon the technology selected, and the type of grades that are possible, the height of the aerial guideway could potentially reach 30 to 40 feet in height due to clearance and grade requirements associated with the freeway crossing creating visual impacts for adjacent land uses in Chinatown.

Route C - LRT Spur: Environmental impacts of this alternative would be similar to Route B with regard to potential impacts along Bernard Street and at the crossing of the Pasadena Freeway. Additionally, this alternative would require some grading at the edge of the bluffs along Stadium Way South to allow for flattening of the grades of the LRT aerial guideway structure as it enters the Dodger Stadium parking lots.

Route D - Gondola Tram: This alternative would require the displacement of at least one home along North Broadway to allow for the cablecar right-of-way between the Central City North Development Area and Radio Tower Hill. The visual impact of the cablecars and their support towers would need to be evaluated for possible impacts to Elysian Park and adjacent residential properties on North Broadway.

Route E - Escalator Walkway: This alternative would require the displacement of one home on Lookout Drive to allow for the escalator/walkway right-of-way connection between the Dodger Stadium parking lot #32 and the pedestrian bridge crossing of the Pasadena Freeway.

3.4 NEXT STEPS

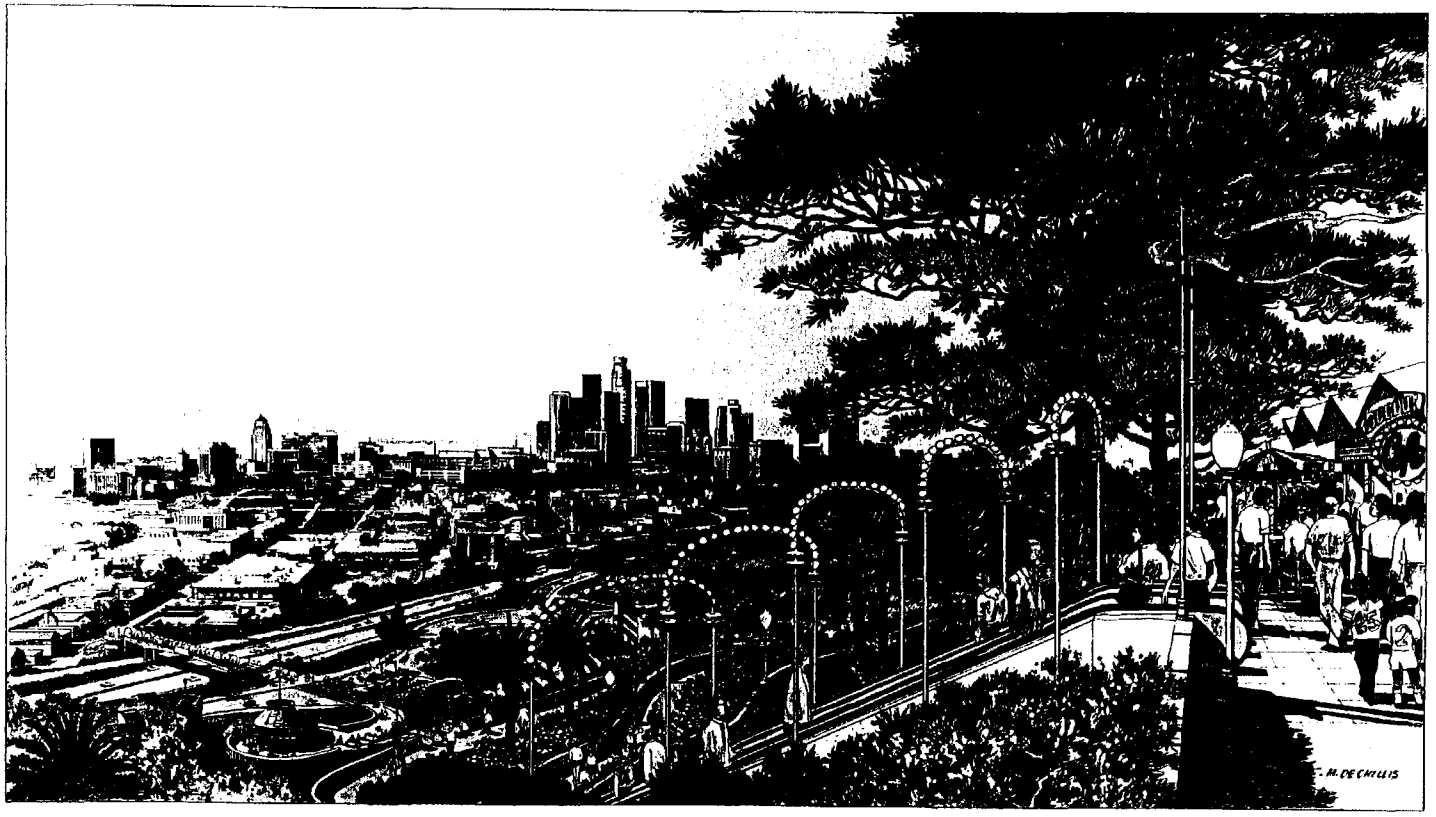
This initial feasibility study has presented several possible connector options between Dodger Stadium and the planned Pasadena Line Rail Transit Station at College and Spring Streets. Basic data involving technology, slopes, costs, and environmental factors have been reviewed.

Before further technical work can be undertaken, a review of the ideas presented herein should be undertaken between the Dodgers and affected local agencies. This would include the Los Angeles City Coun-

cil, the Department of Transportation, the Los Angeles City Planning Department, the Los Angeles Community Redevelopment Agency, and Caltrans.

The provision of a transit connection would benefit the Dodgers by providing increased access to Dodger Stadium. Additionally, the connector could benefit others and other sources of funding may be available. Peripheral parking for Downtown Los Angeles is one potential benefit of the connector that could occur on weekdays when no events are scheduled at the Stadium.

Figures 9 and 10 on the following pages illustrate two of the potential connector concepts that have particular merit following initial screening. In the short term, the escalator walkway would permit pedestrian access to Dodger Stadium coupled with park enhancements in Elysian Park. In the longer term, the AGT Shuttle connector would provide high capacity direct transit that would link Dodger Stadium to Downtown Los Angeles and the entire 150 mile rail transit system under construction by the LACTC. In tandem, these two alternatives could function together and provide an important urban link that would serve the Dodgers, the City, and the greater Los Angeles Region.



DODGER STADIUM
TRANSIT
ACCESS STUDY

FIGURE 9

ALTERNATIVE F

ESCALATOR / WALKWAY CONCEPT

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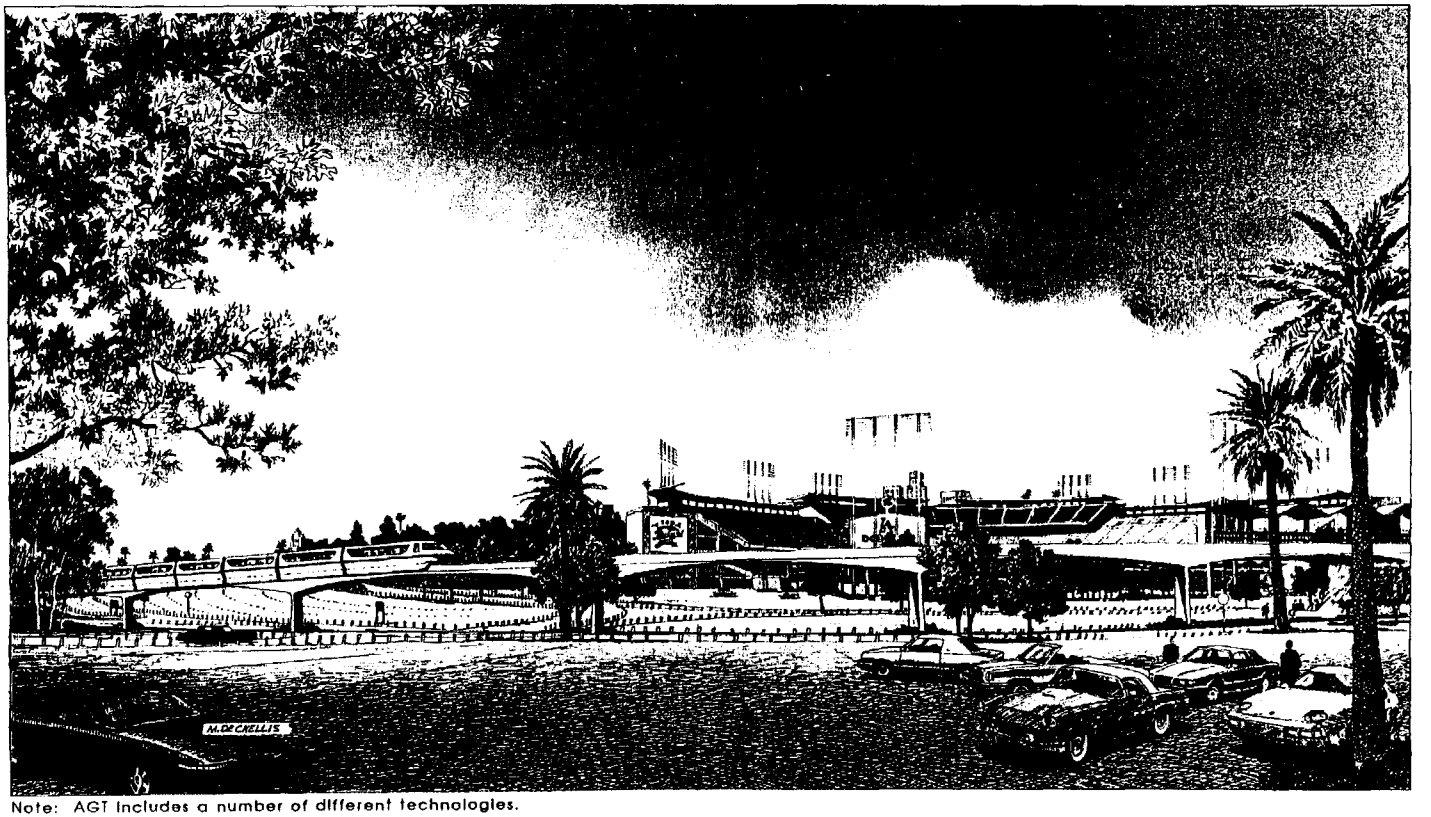

Note: AGT includes a number of different technologies. Monorail is shown for illustrative purposes as one such AGT technology.

DODGER STADIUM TRANSIT ACCESS STUDY

FIGURE 10

ALTERNATIVE B

AUTOMATED GUIDEWAY (AGT) SHUTTLE CONCEPT

LACTC

LOS ANGELES COUNTY TRANSPORTATION COMMISSION

GRUEN ASSOCIATES

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Hollywood Bowl Connector Study Technical Memorandum, SCRTD, Parsons, Brinkerhoff Quade & Douglas, Inc., March 1988

1. **Downtown Connector Proposal**

Tommy Hawkins met with Antonovich's staff recently regarding the Downtown Connector proposal. The proposal was originally prepared by Gruen Associates back in August, 1990. In the past, Mr. Hawkins has submitted the attached proposal to CRA, LADOT and MTA.

Mr. Hawkins, via Antonovich's office is requesting assistance from MTA to provide modeling/ridership numbers and to waive the service fee.

Per Jim de la Loza, providing modeling assistance at this time would not be feasible for the following reasons:

- current focus is on the Regional Transit Alternative Analysis modeling through October; and maybe through December.
- modeling is labor intensive and can take anywhere from two-four weeks to complete one scenario, depending on the number of variables involved.
- the lead modeler (Deng-Bang Lee) for the MTA left the organization via the last layoff. Planning has not replaced him with another individual. Keith Killough is now having to feel in while they go through a recruitment.