MUNI METRO CONFIGURATION

Mission Bay
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San Francisco Department of City Planning

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I INTRODUCTION

This Muni Metro Configuration report is one of about 20 Mission Bay Special Studies. Its purpose is to determine the best route for the Metro service through the Mission Bay project. The study is not intended to identify the precise location of the right-of-way for the Metro but, rather, to determine the Metro service corridor which can best serve Mission Bay and also provide the maximum benefit for all transit users. The analysis includes the concerns of the community as expressed at various public meetings, the needs of potential Metro riders, and also accounts for the requirements and standards of the operator of the Metro, the Municipal Railway (Muni).

The Muni Metro is the light rail vehicle (LRV) service now operated by the Muni in the Market Street subway and on surface streets in several residential and commercial neighborhoods. Light rail transit has the inherent ability to operate at higher speeds and carry more people than other forms of transit now operated by the Muni. The Metro service in the Mission Bay area will have to provide sufficient capacity to serve the commuters transferring from the Caltrain Peninsula Commuter Railroad as well as serve the residents and workers of Mission Bay. Further, it must be able to serve the Bayshore Corridor area of the City as future extensions to the south become possible.

In order to provide this level of Metro service, the Muni will operate the Metro in up to four car trains each of which will have greater capacity than any other form of transit available on Muni. The plan for the extension of Metro service into Mission Bay is based on taking advantage of the capacity and speed capabilities of light rail transit.

The Metro Configuration study is one of three transportation Special Studies being prepared as part of the planning work for Mission Bay. The other two are the Caltrain Station Location and the Transportation Network studies. These studies will present information on the impact of the Mission Bay project on the transit systems and street network which will be needed to serve the new development. Each of the three Special Studies is being carefully coordinated with the others to insure a fully comprehensive transportation systems data base is developed to help guide the planning of the Mission Bay project.

II SUMMARY

The following is a brief summary of some of the most important findings and conclusions of the Metro location study. More detailed discussion of these and other considerations are included in the subsequent sections of this report.

The location of the entrance of the Metro into the Mission Bay project area is dependent on the route selected for the Metro south from the existing Market Street subway. A route which locates the Metro in the median of The Embarcadero would mean the Metro should be located in the median of King Street within Mission Bay. If the Metro were located landside of The Embarcadero it could be located on the north side of King Street or on Townsend Street as it entered the Mission Bay area. The Townsend Street alternative is less desirable because of the conflict between rail transit and the residential development planned along Townsend Street in the South Beach Redevelopment Area.

From its entrance on King Street the Metro should be aligned to serve the areas of highest density development proposed for Mission Bay. The higher density portion of the project is planned along the King Street corridor and the Metro should follow this area of greatest trip generation across the portion of the project north of the China Basin Channel. Locating the Metro in this corridor will also provide Metro service to the South of Market areas immediately to the north of Mission Bay.

The connection with the Caltrain Peninsula Commute Service will require that the Metro be located along King Street to serve the existing Caltrain station at Fourth Street or to be routed across the project to serve a new station near Seventh and Channel Streets if Caltrain service is relocated to that site.

Service to a possible ballpark at Seventh and Townsend Streets is an additional requirement for Metro to be located in the King Street corridor across the north side of the project.

The long range plans of the City to provide rail transit service to the Bayshore Corridor south of Mission Bay require that the Metro turn south after serving the high transit demands north of the China Basin Channel. The route to the south which provides both good service to Mission Bay and also allows for the maximum degree of exclusive right-of-way for the Metro is adjacent to the Caltrain (Southern Pacific Railroad) mainline tracks from the China Basin Channel to near Mariposa Street.

Crossing the China Basin Channel east of Owens Street would require a new bridge over the navigable waterway or use of one of the existing bridges. This route incorporates the disadvantages of locating the high quality rail transit service on a drawbridge and removes it from a portion of the north side of the project where the greatest demand for transit is projected to occur.

Routing the Metro into the center of the lower density neighborhoods to be located south of the Channel would require the long Metro trains, up to 360 feet for four cars, to travel a circuitous route and thereby slow service on any possible extensions into the Bayshore Corridor, interfere with traffic on residential streets, and not provide a substantially improved transit service for the residents of Mission Bay.

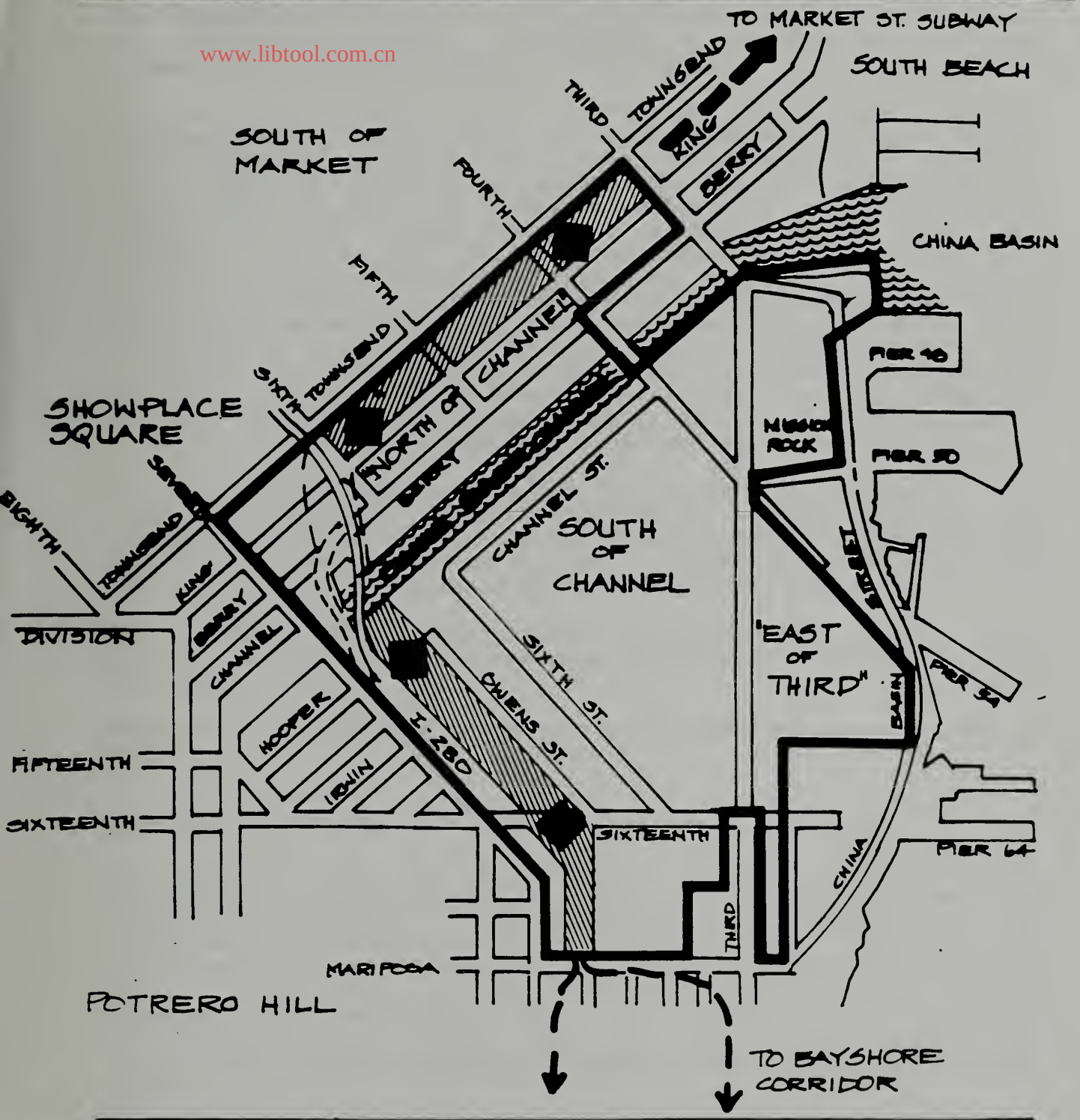
Based on the above findings, the Metro service corridor through Mision Bay is defined as follows:

Along King Street from Third to Sixth Street.

Along Owens Street or the Southern Pacific mainline tracks from the China Basin Channel to near Mariposa Street.

The Metro service corridor is shown on Figure 1.

FIGURE 1
MUNI METRO MISSION BAY SERVICE CORRIDOR



◆ APPROXIMATE LOCATION OF METRO STOPS IN MISSION BAY

▨ MUNI METRO SERVICE CORRIDOR

━ MISSION BAY PROJECT BOUNDARY

III DETERMINANTS OF THE LOCATION OF THE METRO

The location of the Metro in the Mission Bay area is determined by planning requirements both within Mission Bay and for the areas to the north and south of the project.

The extension of Metro service to Mission Bay will be from the existing Market Street subway. The route from Market Street south will determine where the rails enter the Mission Bay project. Metro planning criteria recommend that the Metro not cross a heavy traffic street such as The Embarcadero or the proposed King Street boulevard except at or near a right angle. Thus the location of the Metro on The Embarcadero will indicate its location where it enters the Mission Bay project. This suggests that if the Metro is side running on The Embarcadero, it would enter Mission Bay either on the north side of King Street or in the median or south side of Townsend Street. Should the Metro be located in the median of The Embarcadero, it should continue in the median of King Street where it enters Mission Bay. Examples of how the Metro can be accomodated in either a median or side running location on a landscaped boulevard are shown on Figure 2.

To the south of Mission Bay the long range City policy is to serve the Bayshore Corridor with rail transit service. The extension of Metro service to the Bayshore Corridor from Mission Bay must therefore be considered of primary concern when the Metro route is being planned within the project area.

The location of the Metro within the Mission Bay project must also account for the land use plans and physical constraints of the project itself.

Each of these planning determinants is discussed in more detail below.

Planning From Market Street to Mission Bay

The area of the City from Market Street south along The Embarcadero to the Caltrain Station at Fourth and Townsend Streets was included in the planning work completed under the Interstate 280 Transfer Concept Program in 1984. The result of this work was the adoption of City policy to extend Muni Metro service south from the Market Street subway to the Caltrain Station. The details of the exact location of the breakout from the Market Street subway and the right-of-way along The Embarcadero are the subject of ongoing planning and engineering work.

The Public Utilities Commission (PUC) and the Muni are currently conducting engineering studies to determine which of several possible alignments for the subway to a breakout are most efficient from operational and cost of construction perspectives. The options being considered include breakouts on Steuart Street

FIGURE 2

EXAMPLE OF MUNI-METRO LOCATED IN THE MEDIAN VS. THE SIDE OF A ROADWAY

METRO

CENTER-RUNNING

METRO

SIDE-RUNNING

in one of several alternative blocks between Mission and Harrison Streets or a breakout in the median of The Embarcadero.

The engineering studies on the operation and cost of the alternative locations for the breakout are not expected to be completed for several months. The final decision on whether the Metro tracks come up to street level on Steuart Street or in the median of The Embarcadero will not be made until these studies are available.

The selection of the location of the breakout from the Market Street subway is an important factor in deciding the location of the Metro along the Embarcadero south toward Mission Bay. The breakout, however, is only one of several factors which need to be considered as the City decides on the location of the Metro in the cross section of The Embarcadero between Harrison and King Streets. These factors include:

1- The number of roadway lanes needed to serve Embarcadero traffic.

2- The location and width of the Belt Railroad right-of-way.

3- The width of pedestrian and bicycle routes both inside and on the bayside of the roadway.

4- The location of a subway for the possible extension of Caltrain commuter service to the Transbay Terminal.

5- The advantages or disadvantages of the Muni Metro operating either on the inside of the roadway or in the roadway median.

The following is a summary of the current City staff position in each of the issue areas. A revision of any of the following positions may be required as more data from engineering and planning studies becomes available.

1 - The retention of the Embarcadero Freeway, a policy recently expressed in a referendum approved by the voters, will reduce the need for a high traffic capacity roadway in this area along the Embarcadero. Initial traffic projections indicate that four moving lanes will be adequate to serve traffic demands. A parking lane on the inside of the roadway is favored by some City agencies but not felt desirable by others. It is agreed that the maximum roadway section which should be considered is four moving lanes and one parking lane. Sufficient width for a bicycle lane in each direction will also be included in the roadway cross section.

2 - The Belt Railroad will have to be accomodated on The Embarcadero in order to continue to provide rail freight service to the Port. Of particular importance is service to Piers 30/32. The Belt will require an exclusive right-of-way eighteen feet

wide. Any relocation of the Belt mainline would require reconstruction of the spur tracks and the pier apron for each of the piers to be served with rail. The Belt Railroad should not cross the Metro tracks and must, therefore, be located on the bayside of the Metro right-of-way.

3 - Pedestrian routes are needed on both sides of The Embarcadero. On the bayside a promenade sixteen feet wide is desirable to accomodate both pedestrian and bicycle traffic. The inside sidewalk which provides access to development should also provide pedestrian amenities, requiring a width of at least twelve to fifteen feet. A special consideration for the inside sidewalk is required if the Metro is located on the inside of the roadway. In order to provide adequate access for fire equipment between the side running Metro and the building fronts, the Fire Department requires up to a thirty foot sidewalk area be provided.

4 - The extension of Caltrain service to a downtown terminal is supported by both the City and Caltrans. The route favored by Caltrans is via a subway along The Embarcadero to the Transbay Terminal. The Embarcadero cross section needs to be designed to allow for the possible construction of this subway at some future time. The location of the subway needs to be west of the large sewer box and under an open section of the roadway which will allow access for future year construction work while maintaining the roadway and Metro operations.

5 - In addition to all of the above factors which influence the decision on the location of the Metro in the Embarcadero cross section, there are several factors regarding Metro operations and service which are major determinants for deciding whether the Metro should operate in the median or on the inside of the roadway. The major advantage of side running along The Embarcadero is that the Metro service will be immediately adjacent to the majority of users who will live or work in locations landside of The Embarcadero. Relatively few users will come from the recreation areas planned for the bayside of the road. The proximity of the side running Metro service to its potential users will mean fewer pedestrian crossings of the roadway than would be required if the Metro were located in the median.

The disadvantages of the side running Metro are its impact on the street frontage and its potential conflicts with right-turning vehicles. Some concern has been expressed that the Metro will not be an attractive feature along the frontage of the South Beach Redevelopment project and that because the traditional curb lane frontage will not be available, commercial and residential development will be less feasible. Noise and vibration issues have also been raised. Further information on noise implications of the Metro are in the Noise Buffering Special Study. Examples of side running rail transit in other areas indicate that these problems may be adequately resolved.

The conflicts of the side running Metro with right-turning traffic would need to be controlled by installation of traffic control measures aimed at alerting motorists to the unusual circumstance of oncoming transit vehicles to the right of normal traffic, and to the fact that there are transit vehicles approaching from the driver's right rear.

The median operation of the Metro would have the opposite advantages and problems as described above for the side running. It would allow the traditional frontage for properties along the roadway. It would be less convenient for users but would also have less potential conflict with turning traffic. Median running Metro trains would conflict with left-turning traffic but, because this is a more common installation in San Francisco, it should be more obvious to motorists.

At the time that this report is being prepared the City is in the process of deciding the best route for the Metro on The Embarcadero. This decision will be the most important determinant in locating the entrance of the Metro route into the Mission Bay project area. A decision by the City on the location of the Metro on The Embarcadero is expected in the next several months.

Planning for the Extension of Metro to the Bayshore Corridor

The City has designated the Bayshore Corridor, the area along Third Street from Mission Bay to the south City limit, as an area which should be served by rail transit at some future time. The most likely routes for Metro service have been identified as either on the Southern Pacific Transportation Company (SP) mainline right-of-way or on Third Street. If the Metro is to be maintained as a high grade light rail transit service it will need as much exclusive right-of-way and as direct a route as possible wherever it is extended in the future. Use of the SP mainline route would guarantee maximum exclusivity while a route on Third Street would mean Metro would have to compete with street traffic for its right-of-way.

The location of the Metro in Mission Bay needs to account for the possible extension of the service on either the Third Street or SP mainline routes.

Metro Service Within Mission Bay

As discussed above, the point at which the Muni Metro enters and leaves the Mission Bay area is determined, at least in part, by the planning for the areas adjacent to the project. Between these two points where Metro will enter and leave the project area is the Metro's Mission Bay service corridor. The choice for the location of this service corridor within Mission Bay is based on several factors the most important of which are:

1- The most efficient service for the types of development planned for Mission Bay.

2- Service to the Caltrain Station.

3- Service to a possible ballpark.

4- The constraints imposed by the need to cross the China Basin Channel.

Each of these factors is discussed below in terms of how it affects the decision on the best location for Metro service within the Mission Bay project area.

Service to the Land Use Planned for Mission Bay

While the land use plan for Mission Bay has not yet been determined, there are some generally agreed upon development patterns which tend to establish an initial service pattern for the Metro. Of greatest significance is the location of the highest density development north of the China Basin Channel and centered on King Street. The inherent ability of the Metro to provide a quality high volume service means it should logically be located where the greatest density trip generation will take place. Metro service to the area of the project north of the Channel is therefore an important determinant for the location of the Metro route.

The areas of the project south of the Channel are proposed for lower density development including a large area of residential development. While Metro service might be provided to lower density residential areas as is done on some existing routes, it is not as essential as for the high density areas of the project. The plan for Mission Bay will include high quality alternative Muni services for those lower density areas which are not served by Metro. A plan for these other Muni routes is described in the Transportation Network Special Study.

Service to the Caltrain Station

The policy of the City to extend Muni Metro south from Market Street has been largely based on providing a rail connection from the Caltrain Peninsula Commute Service Terminal and downtown. The location of the Metro must be able to provide a convenient "cross platform" transfer between the two transit services. The planning for Mission Bay includes two possible locations for the Caltrain station. These are either the current location at Fourth and Townsend Streets on the surface or in a subway, or a new location in the vicinity of Seventh and Channel Streets.

In order to assure a convenient transfer between Caltrain and the Metro, it is necessary to provide a route for the Metro which serves both the Fourth and Townsend and the Seventh and Channel

locations. This means that the Metro should run across the project on the north side of the China Basin Channel past the existing station and then turn south to reach the location of the possible Seventh and Channel station.

Service to a Ballpark at Seventh and Townsend Streets

The proposal to build a ballpark at Seventh and Townsend Streets means that a substantial level of Muni service would be needed to serve that location. The Metro, because of its inherent capacity and connections to regional transit services, should be part of any expansion of Muni service to serve a new ballpark. Because the proposed ballpark is adjacent to the possible new location of the Caltrain station near Seventh and Channel Streets, the extension of the Metro to this location would be able to serve both commuters and baseball fans. The concept of a ballpark at Seventh and Townsend Streets would further confirm the desirability of extending Metro service across the north area of the project.

China Basin Channel Crossing

The location of the Metro is somewhat constrained by the existence of China Basin Channel. The Channel is designated by the Coast Guard as a navigable waterway and as such requires that no barrier be constructed which would impair the operation of vessels. This means that any new bridge will need to be high level or be capable of moving out of the way of any vessel upon demand. A high level bridge is not feasible from both cost of construction and visual impact perspectives. The cost of a new drawbridge is estimated to be about $40 million as compared to about $10 million for a fixed low level bridge.

In addition to the cost of a new drawbridge, there are other factors which make the combination of high speed rail transit service incompatible with a bridge which must be opened upon the demand of waterway traffic. The time between transit vehicles would not allow for the operation of the bridge without degrading service schedules. There is also the technical problem of breaking the overhead power source when the bridge is opened. While this problem is believed to be soluble, the continuous breaking of the overhead can present an additional maintenance problem.

An alternative to a new crossing would be to use one of the existing bridges at either Third or Fourth Streets for a Metro crossing of the Channel. This scheme presents several problems including:

1- As traffic volumes grow with the development of Mission Bay there will not be available capacity for an exclusive Metro route. The projected traffic congestion would impair Metro service if it were in a mixed traffic lane on the bridge.

2- The use of the existing bridges would require the routing of the Metro away from some of the highest density areas of the Mission Bay development.

3- The need to open these bridges upon the demand of waterway traffic would interrupt Metro service as was discussed above.

A further consideration with regard to a possible crossing of the Channel is the concern of the Mission Creek Harbor Association, which includes houseboats and other boats on the south side of the Channel between Fifth and Sixth Streets. The residents of this community have asked that no new crossing be located between their area and the Fourth Street Bridge. It is their belief that a new structure would be detrimental to the current residents and would not substantially improve traffic circulation as compared to a new crossing located to the west of their community.

A new Channel crossing appears to be most feasible if it is located at the extreme westerly end of the China Basin Channel near or to the west of the Owens Street right-of-way. While a crossing at or west of Owens Street would technically be over navigable waters, it is likely that the Coast Guard would be more receptive to an application for a new structure at the extreme westerly end of the Channel than would be the case for a new bridge east of Owens Street. Should an administrative approval by the Coast Guard not be possible for any new crossing, the City would have to seek an action by Congress in order to allow a new low level bridge to be built over the Channel.

It is possible to avoid all the issues associated with a new Channel crossing by routing the Metro around the westerly end of the Channel on Seventh Street. This alternative is not recommended as it would require a circuitous route including several "tight" curves and thereby degrade the service potential of the Metro. If, however, no new crossing of the Channel is possible, this longer route would permit Metro service to turn south and make possible its future extensions to serve the areas of the City south of Mission Bay.

The factors of the need for the Metro to serve the areas planned for highest density land uses, to serve the Caltrain station and ballpark, and the constraints imposed by the China Basin Channel establish the corridor for the Metro route in Mission Bay. This corridor is shown on Figure 1 and discussed in more detail in the next section of this report.

IV MUNI METRO SERVICE CORRIDOR WITHIN MISSION BAY

Based on the determinants described in the previous section, the Metro service corridor in Mission Bay will begin at Third and King Streets, extend across the project along the King Street corridor to the westerly end of the China Basin Channel and then turn south along the Owens Street corridor to the southerly limits of the project near Mariposa Street. The exact location of the Metro route within this corridor will be based on several land planning and engineering factors. The remainder of this section discusses some of the more important of these factors.

King Street Portion of the Metro Service Corridor

In this highest density area of the Mission Bay development the Metro will provide two stations, one of which will have to be capable of very high peak passenger volumes if the Caltrain station remains at or near its current location on Fourth Street.

Because the standard Metro station spacing of 1200 to 2000 feet should be maintained for the entire extension of service from Market Street to Mission Bay, the location of these stations within Mission Bay is somewhat dependent on where stations can be located on The Embarcadero. Based on the service requirements of Mission Bay and assuming the locations can be appropriately coordinated with the design of The Embarcadero, the stations in the King Street corridor would be near Fourth and Sixth Streets. The approximate locations of Metro stations in Mission Bay are shown on Figure 1.

If the Caltrain station remains at Fourth Street between King and Townsend Streets, the Metro route should be immediately adjacent to the Caltrain station meaning it should be located either on the north side of King Street or the south side of Townsend Street. If the Metro could not be located on the side of either street, a grade seperated pedestrian route would be needed to accomplish the transfer of commuters between Caltrain and the Metro. If the Caltrain station were located in a subway under King Street, the Metro station could be located in the median of the street directly above the Caltrain station.

A second Metro station where a very heavy peak pedestrian flow could be expected would be at a ballpark if such a facility were built at Seventh and Townsend Streets. This station would be open only when special events were scheduled at the ballpark and would be in addition to the two regularly operated stations discussed above. The ballpark Metro station should be immediately adjacent to the stadium or a grade separated pedestrian route would be needed between the ballpark and the station. The Metro route on the north side of King Street would offer a better opportunity for an efficient ballpark station than would a median location for the Metro.

Owens Street Portion of the Metro Service Corridor

The Metro route should turn south from the King Street corridor near the westerly end of the China Basin Channel. If the Caltrain station is relocated to Seventh and Channel Streets the Metro would be routed to be immediately adjacent to the east side of the new station. A major Metro station would be provided to accomodate the heavy peak period loads of commuters transferring from Caltrain and to serve this area of Mission Bay. If the Caltrain station is not relocated the Metro could be routed directly onto Owens Street.

The location of the Metro route south from the possible Caltrain station will be either on Owens Street or adjacent to the Caltrain mainline.

Routing of the service east of Owens Street is not recommended as it would require a circuitous alignment within Mission Bay and not be consistent with the high quality service potential of the Metro both for users within Mission Bay and for the possible extension to the Bayshore Corridor.

A second problem with the routing of the Metro east of Owens Street is the probable lack of compatability of the length of Metro trains and the size of the blocks now being planned for this area of Mission Bay. The Metro operations in this area of the City will employ up to four car trains 360 feet long. This length of train would block one or two cross streets at each stop if it were routed into the lower density residential areas of the project. For the same reason, the long trains could also be a problem if the Metro were located in the median of Owens Street.

There will be two Metro stations located south of the China Basin Channel. The approximate location of these stations is shown on Figure 1. The more northerly of these stations will be just south of the Channel either at the relocated Caltrain station or on Owens Street if Caltrain is not relocated. Based on the Metro's station spacing standards, 1200 to 2000 feet between stations, there will be just one more Metro stop south of a Channel Street Station. This second south of the Channel stop would be at or near Sixteenth Street.

The most direct routing of the Metro to the Sixteenth Street station is adjacent to the Caltrain mainline. There appears to be no advantage to route the Metro on Owens Street as there will be no opportunities for access prior to the Sixteenth Street station. Use of Owens Street would have the disadvantage of mixing the transit service with pedestrian and vehicle traffic, all of which can be avoided by using the route adjacent to the Caltrain tracks.

South of Sixteenth Street the Metro will need a small dispatching yard until the service is further extended into the Bayshore Corridor. There appears to be space for such a yard adjacent to the Caltrain mainline tracks.

V MAINTENANCE AND STORAGE FACILITY

This analysis assumes that a Metro maintenance and storage facility will be located on property near Mission Bay but not within the Mission Bay project area. The extension of Metro service to Mission Bay cannot occur unless such a facility is developed.

The PUC is about to conduct a study of this need aimed at identifying available property and estimating the cost for the required maintenance and storage facility. The results from this study are expected in the next several months.

VI IMPLICATIONS FOR MISSION BAY

The Metro service corridor presented in Figure 1 of this report would provide a highly visible rail transit connection between Mission Bay and the Downtown. This corridor is determined largely by constraints of Metro service beyond the boundaries of the Mission Bay site. Additional decisions on routing outside the site will be important in determining precisely where the Metro will be located.

A center running Metro on King Street would represent a more traditional City solution for Mission Bay than would a side running Metro. A side running Metro would require some adaptation by surrounding development, and most likely a larger street right-of-way. Either solution appears possible within Mission Bay, and can be accomodated in its planning. From the standpoint of good vehicle access to development and maximum developable space, however, center running is preferable.

The Transportation Network Special Study addresses the broad spectrum of potential transit within Mission Bay. Portions of the site more than two blocks from the Metro service corridor would be closer to and served by another transit line. As is the case elsewhere in the City, good transit service in Mission Bay will not depend on adjacency to the Metro line. The Noise Buffering Special Study suggests that trolley coaches are less noisy and are therefore preferable to the Metro on residential streets.