

IX PARSONS, BRINCKERHOFF, HALL AND MACDONALD, AND  
REGIONAL RAPID TRANSIT

In January, 1956, PBHM presented the BARTC and the metropolitan area with Regional Rapid Transit.<sup>1</sup> The plan embodied the ideas discussed by the consultants and the Commission Engineering Committee in late 1954. It was essentially a three-part system, closely following the conception put forth by downtown Oakland early in the movement's history. There was a network of East Bay rapid transit lines radiating from the Oakland central business district through Berkeley to Richmond in western Contra Costa County; through the Berkeley Hills to Concord in central Contra Costa; and to the Union City area south of Hayward in southern Alameda County. There was a network of West Bay rapid transit lines radiating from the San Francisco central business district south, through San Mateo County and into northern Santa Clara County; and north, across the Golden Gate into central Marin County. There was a connection between the Oakland and San Francisco downtown areas.

The consultants provided a truly regional transit plan: there were very few stops in San Francisco and Oakland outside the central cores. In San Francisco there were only five residential area stations. Two of these were along the peninsula line; three were on the Marin route.<sup>2</sup> The volume of traffic projected for the peak hours on the

peninsula trains would be sufficiently great to prevent San Francisco residents from boarding the cars heading downtown during the peak. One of the Marin line stations was located in the Presidio, a large area owned by the U.S. military near the Golden Gate Bridge. The Presidio was maintained as a military reservation; civilians did not live there. Why a Presidio station? The Report did not explain. When the other San Francisco stations were mentioned there was an indication of which neighborhoods would be served by it. On the Marin line, for example, the Green Street station would serve the North Beach residential and commercial area; and the Van Ness station would serve the Marina district.<sup>3</sup>

It seems to me the Presidio station was one small illustration of the larger purposes the rapid transit plan was designed to accomplish. San Francisco had been lobbying hard for years at the national capitol to get the military to turn over Presidio lands for commercial and residential development; this was a choice location. After the second World War San Francisco's lobbyist in Washington, D.C., Francis V. Keesling, Jr., was working to get the Presidio declared surplus Federal property so it could be released to the tax rolls and privately developed. In 1948 a House of Representatives committee agreed the Presidio would be perhaps the most desirable residential area in the entire city; they recommended the Army reconsider its plan to utilize the territory for military housing.<sup>4</sup> In 1956 the city was still trying to get the lands declared Federal surplus. Marvin Lewis had resigned his seat on the Board of Supervisors and taken up Keesling's job as city lobbyist. It seems likely that Lewis, who was still an active BARTC member, was working on an opportunity to use transit for classic real estate

development purposes.<sup>5</sup> This was, however, a very small, very unusual part of the overall design.

A 1955 Status Report from Walter Douglas to the Commission Engineering Committee clearly articulated the foundations on which the regional rapid transit plan had been erected. The conceptual underpinnings were familiar ones: "The basic characteristic of this plan is that it represents an interurban main line, trunk system, designed to receive the vast majority of its inbound passengers at stations to which they must be delivered by private motor car or local mass transit . . . This is in sharp contrast to an infinitely more extensive system--a neighborhood system--that would be required to bring interurban rapid transit within walking distance of the homes of the majority of the citizens in the Bay Area . . ."<sup>6</sup>

Douglas then proceeded to outline the reasons why a main line system was chosen: (1) "The regional plan . . . which confirms the present pattern and forecasts the continuing trend of low density residential areas characterized by the single family home; (2) The certainty that success of interurban rapid transit will depend upon its competitive posture in relation to the private automobile . . . ; (3) The certainty that potential patronage of interurban rapid transit lines which draw only from residences within convenient walking distance of their stations, will never justify the short headways, the regular service, that is necessary to compete with the automobile . . . ; (4) A conviction, accordingly, that success in diverting motor vehicle passengers to interurban transit lies more in reduction of waiting time at convenient transfer points on a trunk system over which short headways can be maintained, than in neighborhood interurban transit extensions

which reduce the length of initial automobile travel, but increase waiting time because of the longer headways dictated by smaller tributary population; (5) A conviction, also, that impairment of speed by the many station stops necessary to provide neighborhood service will be a much greater deterrent to patronage than the necessity to use a private car to a trunk line system with a few stops and high speeds; (6) A conviction that the same prerequisites for attracting to interurban rapid transit the patronage of those who have automobiles at their command, namely, short headways and speed, limit the destination areas to be served to the major centers of employment and commerce.

The foregoing considerations compel in our minds a recommendation for a main line, trunk system, even without taking into account its much lower capital and operating costs as compared to a neighborhood system."<sup>7</sup>

Douglas saw that such a main line system had certain important consequences: (1) "In its outer reaches, interurban rapid transit can not function, can not develop patronage, of itself. It must be fed by private motor cars and buses. Generous parking and convenient transfer facilities at stations will be mandatory; and (2) Delivery in the urban cores must be made within convenient walking distance of the major centers of employment and commerce. This requirement derives from the simple realization that a private automobile driver will not be disposed to leave his car behind at one of our tributary parking lots if, at the end of his transit ride, he must transfer to a local mass transportation vehicle to make the last lap of the journey."<sup>8</sup>

Douglas then took up the question of what kind of patronage a main line system could develop. "If, as I have set forth above, the

very nature of interurban rapid transit in relation to a successful competitive posture with the private automobile, dictates the type of system it must be, it equally clarifies the type of patronage it can develop. Clearly, a system inherently designed to receive so substantial a portion of its passengers from private motor cars, and to discharge them at fixed destinations along its route, contemplates their return via its facilities." Douglas anticipated a great volume of "kiss-and-ride" patronage in addition to those leaving their cars at station parking lots; ". . . if his wife has driven him to . . . a station, she will be looking forward to picking him up."<sup>9</sup> In general, rapid transit patrons would be those making regular round trips. Who were they?

Douglas answered they were two types of patrons: commuters and shoppers. "Of these, from the point of view of demand on rapid transit equipment, the commuters are dominating, for it is they who create the striking concentration of trips during the morning and evening rush hours . . ."<sup>10</sup>

PBHM's regional rapid transit system was designed to lure peak hour commuters out of their cars. Frequent, high speed service were the main attractions. The patrons were to come willingly, and in very large numbers. Rapid transit was not intended, however, as an alternative to freeway construction. On the contrary, the regional plan assumed an extensive freeway network would be in place; an extensive freeway network was, in fact, the region's top transportation priority.<sup>11</sup> The role of rapid transit would be to handle peak hour loads the freeways could not accommodate. While the transit planners recognized the priority of freeway construction to handle those commuters who

could not or would not leave their cars at home, they argued it was not feasible to construct the freeway capacity necessary to carry the total volume of peak period travel. The costs and disruption that would be caused by the construction of so much freeway and related parking capacity would kill the major employment and commercial center patients the planners were trying to save. "The primary advantage of a system of interurban train rapid transit, complementary to the regional highways, lies in its ability to vastly amplify the delivery capacity of highways and the reception capacity of downtown business and shopping centers without usurping land from highly productive business activities."<sup>12</sup> This virtually unlimited capacity was the central goal of the regional rapid transit movement.

However, PBHM had some difficulty in finding out exactly where the projected network of Bay Area freeways was going to be built; the Division of Highways was reluctant to talk about its advance plans because they feared escalating right-of-way acquisition costs in the proposed freeway corridor.<sup>13</sup> However, with a little help from their influential sponsors the consultants were able to secure enough information to plan a transit system that would supplement the freeways.

Several of the assumptions in Douglas' outline are especially noteworthy. Transfer behavior is one. Travelers would willingly make one transfer: they would change from a car or a local bus to a rapid transit vehicle to complete the trip downtown. A commuter would either park his car at an outlying station parking lot, or his wife would drive him to the station and leave him off; she would then have the car available for suburban housewifely errands. However, these commuters had to be able to walk from the rapid transit vehicle to their

final destinations; they would not willingly make two transfers.

With this standard of maximum one transfer in mind, consider the propaganda BARTC's public relations consultant, Herbert Cerwin and Company, started circulating in the San Francisco public schools during 1956. Cerwin and his staff pointed out the tactical significance of spreading the word through the educational system: "The interest of these young people is contagious. They bring their lessons and their discussions home to their families. This is an excellent way to make Rapid Transit a subject of wider discussion."<sup>14</sup> Nestor Barrett, BARTC's member chairing the Commission's Public Relations Committee, wrote to Cerwin, "I am extremely interested in the success you have had in getting our material into the school system in San Francisco. I regard this as one of the most important things that we can do from a public relations standpoint since, despite what I know we all hope for, I am certain it will be a long and difficult struggle before our Transit District finally comes into being. Many of these young people that are being educated today will be voting on these bonds tomorrow."<sup>15</sup>

The approach taken was to hit impressionable children where they were vulnerable and, at the same time, attack one of the pressing social problems of modern America: the consequences of the absentee father. BARTC told the following story:<sup>16</sup>

Mary Brown walked across the schoolyard. She was very sad. The reason she was sad was because earlier in the day Jimmy Foley had told the other students in her class how his father played all sorts of games with him after work.

Mary liked to play games too. She lived in San Francisco. But, whenever she tried to play games with her father he said that he was tired and that he had to get up early to go to work.

Her father worked in San Mateo, in one of the industrial plants. He often said he liked living in San Francisco and working in San Mateo.

The reason he was tired at night was because he had to travel so far to get to and from work. Because of this he

had to get up much earlier and of course he got home later, too. Mary wished that there were some way he could get to and from work much faster . . . Then he wouldn't be so tired and could spend more time playing with her.

The promise that transit would improve the living conditions of the industrial working class was a truly historic one. Wherever transit lines were built in industrializing cities, in Europe, Latin America, all over the United States, their promoters held out the promise that workers would be able to abandon filthy, stinking crowded neighborhoods located in the shadows of industrial plants. They would be able to leave behind the slums where crime, vice and revolution were bred for clean, healthy living in suburban quarters. This was the moral dimension of transit policy;<sup>17</sup> it was still being promised in the mid-twentieth century, much as it had been one and two generations ago. The cost of auto transport was said to be too high for the working man; rapid transit would lower these costs, allowing a larger portion of wages to be spent on family necessities.

Marvin Lewis told BARTC organized labor would even support a sales tax to finance rapid transit, (labor historically opposed sales taxes because of their regressivity) because labor was currently "paying through the nose" to travel by car between home and work; labor had a great deal to gain from transit.<sup>18</sup> Recall the theme of living and working wherever one chose; rapid transit promised to vastly expand the range of employment opportunities open to workers.

The choice of a San Francisco resident who worked in an industrial plant in San Mateo County to represent the kinds of San Franciscans who would benefit from the regional rapid transit project was, to say



the least, a strained one. The number of stations in San Francisco and in San Mateo and their location were such as to guarantee a worker traveling to an industrial plant a tortuous, time-consuming journey involving at least two transfers, with no guarantee at all there would even be any transit connection from the San Mateo County station to the plant. If the worker were traveling during usual daytime hours, he would be traveling opposite to peak hour traffic flows; he could drive on uncongested freeways.

The continuing movement of industrial production, particularly larger plants, to dispersed suburban locations and to rural-urban fringes was a widely discussed phenomenon during this period. The Urban Redevelopment Study, which was conducted between 1948 and 1951 by some of the leading city planners in the nation, did a major survey of patterns of industrial location through 1947. For the Pacific region the Study cited data showing that while the number of manufacturing production workers in central cities had declined between 1899 and 1947, the number of such workers in industrial peripheries, areas outside of central and other large cities but within the metropolitan area, had increased dramatically during this time. Pacific region industrial peripheries increased their share of area manufacturing production employment significantly during the 1939-1947 period;<sup>19</sup> the location policies followed by the War Production Board accentuated this trend.

During World War Two the nine Bay Area counties plus Los Angeles County accounted for eighty-one percent of all the investment in California plant and equipment authorized by the War Production Board. However, the city of Los Angeles received just twenty-five percent

of the total invested in Los Angeles County. San Francisco received about fifteen percent of the total Bay Area investment. Alameda County received the same share as San Francisco; Oakland received thirty-six percent of the Alameda County investment.<sup>20</sup>

In its 1947 report the San Francisco Transportation Technical Committee predicted that industrial production would continue to diffuse throughout the Bay Region. PBHM itself projected a similar pattern of industrial location, although they hoped enlightened local agency planning would group manufacturing plants into spatially concentrated industrial zones. The costs of providing utilities and transport facilities to such concentrations would be less than the costs of servicing scattered sites.<sup>21</sup>

Industrial consultant Stuart Walsh, in a paper presented to the first annual University of California Conference on City and Regional Planning (Melvin Webber addressed the second Conference), analyzed the California pattern of industrial location: ". . . the industrialist often feels that if he got out to a place where people don't have so many job opportunities, where they cannot readily go from one employer to another, he would have a better break in his labor problems, through lower turnover . . . It is the reason why the Rohr Aircraft Company recently established its new plant at Riverside . . . They were seeking a new source of labor away from a metropolitan center."<sup>22</sup>

Walsh then described the kind of employee the industrialist was attracted to in such areas: ". . . you could cite case after case all over California and the West, where the desire to employ stable people who have roots in the community, who own their homes and have a garden to work in on the longer week-ends, is the overwhelming consideration

in regard to plant location."<sup>23</sup>

Walsh said a little bit more about Rohr, who would build the trains for the Bay Area Rapid Transit District; the Rohr personnel manager, " . . . said that the thing that pleased them most in their new plant at Riverside was that they were hiring so many farmers, so many agriculturists, so many folks who had orchards a little too small to live on, and orange groves a little too small to support the family, who would come to work for Rohr because they 'belonged' in the community. That's not the kind of labor that you find in Oakland or in San Francisco, but it is the kind of labor that many industrialists want."<sup>24</sup>

The Bay Area rapid transit system was not being built to transport workers to dispersed industrial plants. Interestingly, this issue would surface in the late 1960s as the racial problem of unemployed and underemployed central city black workers unable to use regional rapid transit to reach suburban industrial production jobs. Transit never fulfilled the moral promises its proponents made; it couldn't. The claims, however, were valuable symbolic political capital.

Another set of important assumptions are the ones concerning future living arrangements and the consequences of these for rapid transit patronage. PBHM explicitly embraced a continuing pattern of single-family home building all over the region. As a corollary of this residential pattern, PBHM did not expect significant numbers of transit patrons to walk to the stations. Since most commuters would live in widely dispersed single-family homes, they would drive their cars (or be driven and kissed) to widely-spaced station parking lots.

PBHM did anticipate high-density residential concentrations located near centers of employment and commercial activity. These high-density zones would be attractive primarily to younger and older people. They would, however, supply a relatively small proportion of all regional transit riders.

The central logic of the regional transit plan was to allow dispersed, single-family residential development to continue after the regional freeway network was saturated with automotive commuters. Regional rapid transit would enable vastly more suburban commuters and shoppers to conveniently travel to the region's major employment and commercial centers--downtown Oakland, downtown San Francisco, and Berkeley--than would be possible via freeways alone. PBHM never intended rapid transit to alter or even challenge regional development patterns based on the private automobile, although they did hope that subdividing would be guided by local government planning to create full communities rather than scattered tracts. As with spatially concentrated manufacturing plants, utility and public service costs could be reduced by such a subdivision program,<sup>25</sup>

Transit had blazed the land development trail until World War One; the Key System, Pacific Electric and the Muni were pioneers. That era was long gone. Bay Area rapid transit would trail behind as the automobile continued to open up new lands for development, picking up those settlers the automobile couldn't, and shouldn't, carry. PBHM's attitude toward the modern land development process was clearly illustrated in their treatment of the transportation needs of southern Alameda and Santa Clara Counties.

The regional rapid transit plan contemplated construction in two stages. During the first stage, assumed to be complete by 1962, the

peninsula line would not extend beyond Palo Alto in northern Santa Clara to reach into the San Jose area. The East Bay line would not extend into and through the Fremont and Milpitas areas. However, extension of both East Bay and peninsula lines into San Jose was planned for second-stage construction, target completion date: 1970.<sup>26</sup>

PBHM forecast large increases in intra-peninsula traffic volumes between 1954 and 1970 as the result of a large expansion of commercial and industrial employment south of San Francisco. Commuter travel into central San Jose would rise accordingly. However, until 1970 the consultants projected relatively few San Francisco-bound commuter trips from south of Palo Alto. "The San Jose area is still, trafficwise, an entity in large part separate from the San Francisco-Oakland area." PBHM noted that the Santa Clara Valley was already characterized by a dispersed pattern of urbanization; dispersed patterns of traffic flow were already in evidence as a result. "Thus the urban pattern in the Santa Clara Valley is not at present compatible with fixed-rail, rapid transit service; and the area's immediate relief appears to lie in surface transit and in the improved highways that are being planned." However, by 1970 highway congestion would have advanced to the point that rail rapid transit service would be necessary to expand transport capacity in the Valley.<sup>27</sup> PBHM did not anticipate any problems for transit in this area, even though the land use structure of the Valley would have grown up around the motor vehicle. Santa Clara County's Planning Director disagreed with this analysis.

Santa Clara County Planning Director Karl Belser wanted all of his county included in the first-stage transit plan. "It seems to me that those of us who are charged with the responsibility for looking

ahead would be remiss in our duty if we did not advocate such services for our area as seemed essential, even if it is in advance of public pressure and support. That, in my opinion, is what the job of planning in local government is. We see development coming . . . The advent of rapid transit to us seems inevitable. We see the three-way linkage of the San Francisco, San Jose, Oakland area by rapid transit as the means of melding these three great major population concentrations together into one great metropolitan complex . . . Nothing, in my opinion, would be worse than to have an area whose population was oriented and distributed on a pattern to be accommodated by an auto-freeway type facility as a service area for a fast rail system of transit. The two types of transit are dynamically competitive and it is difficult enough to overcome tradition and habit without having such bents built into the physical pattern. In Northern Santa Clara and in Southern Alameda County the possibility of changing the direction of development and orienting it specifically to the transit system is still open. It would be possible to provide a type of urban living facility which would be primarily based on the transit system for mobility."<sup>28</sup>

Belser felt that rapid transit must be within walking distance of the homes of the thousands of people who would be streaming into the County, particularly the industrial production workers who would be unwilling or unable to support the luxury of a car. "Yet, if industry locates itself hit or miss, without regard to rapid transit, it becomes impossible, as it is today in the Los Angeles area, to locate effective desire lines upon which to locate the line. It might be said that rapid transit is the backbone of the development pattern. In all

propriety, it should come first and govern many aspects of development."<sup>29</sup>

Regional Rapid Transit represented a rejection of Belser's transit-led development process. PBHM's stance regarding southern Alameda prospects was similar. PBHM forecast that the area between the end of the first-stage line south of Hayward and San Jose would undergo rapid urbanization between 1962 and 1970. The transit planners recommended construction on this line to San Jose for the 1962-1970 period. They noted that in 1970 freeway capacity in the area would not yet be congested; lack of highway capacity was not the reason for the extension. "Rather, it is the opportunity to construct the backbone of a high-capacity transportation system during the area's formative period."<sup>30</sup> This backbone construction opportunity, however, was not intended to counteract the urbanization pattern established during the period prior to construction.

The important point, the *raison d'etre* for the regional rapid transit movement, was that existing transit operators would not be able to play their role in this regional development process. The final report urgently expressed this concern: "Of dramatic significance . . . is the fact that patronage on existing interurban mass transportation has been at a stagnant level or actually declining during recent years while the Bay Area has been growing rapidly and automobile traffic increasing in record proportions. Indeed, the deficits being experienced by private operators of existing interurban mass transportation facilities give clear warning that the region cannot depend on a continuing availability of these services." PBHM stressed the significance of these private transit difficulties: "Without . . . interurban mass transportation . . . the region's centers of commerce must wither for

lack of accessibility."<sup>31</sup>

Highway capacity tests and transit diversion ratios were at the center of Regional Rapid Transit's technical analyses. Highway capacity tests were crucial for determining where transit capacity would be necessary. Highway capacity was defined by PBHM as the "practical" capacity for free flow of vehicles, without congestion or slow-down below the normal and reasonable speeds of interurban auto movements. This was clearly a high standard of movement; congestion would be ubiquitous. PBHM projected the future regional highway system and determined its peak hour capacity. Test lines were then chosen in critical corridors: across the Golden Gate into San Francisco; between Oakland and San Francisco; the boundary between San Francisco and the peninsula; and into Oakland from the East Bay region. Traffic volumes were projected in the corridors based on the regional land use plans and a 1954 origin and destination study. Deficits were established where projected peak hour traffic volumes exceeded highway capacity. PBHM determined that critical deficiencies existed where deficits were greater than 2,000 people per hour; critical deficiencies signalled a need for rapid transit in that corridor.

Like the uncongested, free-flow standard adopted to measure highway capacity, 2,000 persons per hour critical deficiencies established a very low threshold level for rapid transit need. Such a low threshold level was consistent with a focus on supplying capacity.<sup>32</sup>

Once corridor automobile traffic volumes were forecast and capacity-deficient areas determined, ratios were calculated expressing the proportion of auto drivers who would be diverted to the proposed rapid transit system. Calculating these transit diversion ratios was



another one of the pioneering aspects of PBHM's work. The idea of supplying transit service that was so attractive that commuters would willingly transfer from a car did not originate with PBHM. However, there was virtually no literature on the subject of "modal split"; there was precious little experience either. No other area had the kind of rapid transit system PBHM was planning. PBHM's Henry D. Quinby worked up the diversion ratios to project rapid transit patronage; he was breaking new ground every step of the way.

Quinby had the origin and destination survey that was done in 1954. In order to provide an empirical basis for estimating the division of traffic between transit and autos, Quinby chose to analyze conditions on the peninsula. The peninsula was relatively well-supplied with transit service; Southern Pacific and Pacific Greyhound provided peak-hour and off-peak service between peninsula points and downtown San Francisco. Moreover, peninsula transit service paralleled a major freeway route into central San Francisco. Finally, Southern Pacific commuter rail service was the closest thing to what PBHM was proposing in the Bay Area. The SP suffered in comparison with the regional rapid transit system; the SP downtown San Francisco terminal was poorly located and its speed was compromised by numerous grade crossings and occasional conflict with freight trains. However, it was the best available.<sup>33</sup>

Quinby's transit patronage assignments were based on several assumptions. Speed, which determined travel time, was the critical variable. In addition, Quinby assumed the complete elimination of all transit service in the Bay Area competitive with the proposed system, and a ban on all future provision of transit facilities likewise competitive. These conditions were built into every forecast made by

the transit planners, including patronage, costs, revenues and rolling stock requirements.<sup>34</sup>

The PBHM system would be much faster than existing Eastern and Midwestern operations. Scheduled average speeds on these older systems ranged from eighteen to twenty-six miles per hour for most. The Bay Area system would average forty-five miles per hour. A major factor in the much higher Bay Area average speed was the much greater distance between stations on the planned system. Station-spacing on the older rapid transit lines ranged from less than one-half mile to a little over one mile. The Bay Area lines would have an average spacing between stations of almost two and one-half miles. One other important difference was the absence of significant parking facilities on the established systems; large capacity parking lots were critical features of the PBHM plan.<sup>35</sup>

Speed was the crucial factor in diverting auto commuters to transit. Speed was also the main reason why PBHM thought their system would have a far more favorable operating financial situation than existing transit companies; higher speeds meant lower unit operating costs because each transit worker and each piece of transit equipment would perform more service in a given period of time.

The 1954 traffic survey revealed the three major private interurban transit carriers continued to carry a large share of the peak-hour traffic volumes even as they slid financially and quality-wise downhill. During the peak-hours, sixty-four percent of the people making trips between the San Francisco central business district and peninsula points made them by transit. From all of San Francisco fifty-six percent of the peninsula-bound rush hour travel was by transit. On the transbay

crossing, fifty-two percent of the people traveling during the peak traveled in transit vehicles. Finally, forty-one percent of the people crossing the Golden Gate into Marin during the peak were carried by buses. These were the established transit corridors.

However, the regional plan forecast tremendous growth in the southern part of Alameda County and in central Contra Costa County east of the Berkeley Hills. The level of employment would increase substantially in these areas, but a large expansion in the Oakland business and industrial districts would generate a large increase in the volume of commuter traffic into the central East Bay zone. There was little existing transit capacity in these areas; this was reflected in the division between auto and transit use during the peak in these corridors.

Only four percent of the people heading into southern Alameda County from the north during the peak traveled via transit. Through the Berkeley Hills only nineteen percent of the peak period travelers were transit riders. Regional Rapid Transit warned that unless transport capacity in these corridors was vastly increased their growth would be severely restricted. In these areas the proposed first-stage regional transit system would play a significant developmental role.

The total volume of traffic heading into southern Alameda County during the peak, assuming regional rapid transit was in place, was projected to increase by 104 percent between 1954 and 1970. The proportion of this total traveling by transit was projected to increase from four percent to forty-five percent. Through the Berkeley Hills into central Contra Costa the increases were even more dramatic: the total traffic forecast for 1970 was 205 percent greater than in 1954.

The proportion of transit travelers increased from nineteen percent to sixty-three percent. The attractiveness of frequent, high-speed rapid transit service in these two corridors would be so great that about eighty-five percent of the total increase in rush hour traffic would be diverted to transit.

The absolute number of people involved in these projections, however, provides some perspective on the underlying dynamics of the regional transit movement. The projected 1970 volume of transit patronage in the southern Alameda corridor was about 7,800 people in the peak hour. In the Berkeley Hills corridor the analogous figure was 9,700. Recall the 40,000 persons per hour figure that had been a piece of transit movement scripture since the Joint Army-Navy Board mentioned it in 1947; the 1970 figure represented the level of "seasoned" transit demand on the proposed system. The goal was to provide transportation capacity to facilitate growth. The fact that future transit volumes would fall substantially short of the maximum capacity figure was not a cause for alarm; grade-separated transit on exclusive rights of way was necessary to effectively supplement freeways and parking facilities.

The San Francisco situation was somewhat different than in the East Bay. The total number of people leaving San Francisco during the peak period for Marin, the peninsula and the East Bay was projected to increase by forty-eight percent between 1954 and 1970, about 21,000 persons. The text of the final report said that most of this increase would result from commuting between San Francisco and the West Bay counties. "Only a negligible increase is expected from the East Bay."<sup>37</sup> According to the charts in the report about sixty-three percent of the increase in peak period travel from San Francisco would be to Marin and

the peninsula; the remaining thirty-seven percent would travel transbay.

Since relatively high proportions of San Francisco-bound commuters already used transit, the increases in these proportions projected for 1970 were not nearly as spectacular as the analogous Oakland-focused figures. The transit proportion for peak period peninsula-bound traffic was forecast to rise from fifty-six percent to sixty-seven percent; the regional transit system would, however, accommodate almost ninety percent of the total peak period traffic increase in this corridor. The Golden Gate corridor peak hour transit patronage was projected to increase from forty-one percent to fifty-five percent; the PBHM system would likewise handle about ninety percent of the total traffic increase going to Marin. The absolute number of peak period travelers was as interesting in these two corridors as in the East Bay: 20,625 people would be riding transit on the peninsula line and about 5,300 on the Marin route. The peninsula figure was substantially higher than that projected for any other segment of the system; the Marin projection was by far the lowest.

The treatment of the transbay crossing was the most fascinating, and controversial, part of the regional rapid transit plan. Recall that PBHM forecast the increase in commuter travel between the East Bay and San Francisco would be "negligible." Indeed, analysts had been noticing for some years the Bay Bridge corridor had not been participating in the general upsurge in traffic occurring throughout the region.

In a 1954 report the state Division of Highways noted the traffic saturation point had been reached for some time on the Bridge during the peak hours, and that ". . . no appreciable increase in private vehicular traffic seems practicable . . ." In the last several years

the increase in the total number of cars crossing the Bridge had been extremely small; it was smaller than traffic increases in other Bay Area travel corridors and was lagging far behind the increase in motor vehicle registrations in the Bay Area counties. The total number of cars crossing the Bridge increased from about 21,750,000 in 1946 to twenty-seven million in 1954; this was an increase of twenty-four percent in eight years. However, sixty-five percent of the increase had occurred in the first four years. The standard assumption at the time was 1.8 persons per auto; the number of people crossing the Bridge by car increased from roughly thirty-nine million in 1946 to about 48,750,000 in 1954.

The increase in auto passengers, however, was more than offset by the precipitous decline in transbay transit traffic. Figures for Key System showed a decline in patronage from 31.5 million in 1946 to eleven million in 1954, a sixty-three percent drop. Putting the transit and auto figures together meant the number of people crossing the Bay Bridge had declined by about twelve percent to thirteen percent since 1946; since the transit declines were much larger in the earlier years the total number of people crossing the Bay had remained about the same for the latter part of the period.<sup>38</sup>

The Division of Highways analysts suggested several reasons for the stagnation in Bay Bridge traffic. One, of course, was insufficient motor vehicle capacity. Another was that the quality of transit service was decreasing while fares were increasing. A third reason was that new patterns of dispersed suburban development had made transit non-competitive. Real estate development was no longer being located with the idea of convenient access to transit in mind; the density of

development was lower than in the past. Finally, the East Bay was said to be becoming more self-sufficient; there were fewer reasons to go to San Francisco to work, to shop or to play.<sup>39</sup> The highway planners thought travel to and from the San Francisco central business district would increase moderately in the coming years, perhaps twenty-five percent by 1970.<sup>40</sup>

The San Francisco Department of City Planning noted similar traffic trends. In a 1955 study of travel patterns they pointed to the decline in the total number of people crossing the Bay Bridge since the end of the war, and the stable number of cars crossing the Bridge during the peak period. The San Francisco planners agreed the East Bay was becoming more self-sufficient. They noted, however, that trips from Marin and the peninsula had been increasing roughly in proportion to the population increases in these two areas.

Indeed, forty percent of the employed residents of Marin and San Mateo Counties worked in San Francisco; these figures were much higher than anywhere else in the Bay region.<sup>41</sup> Most of these people, as well as those commuting from the East Bay, worked downtown, mostly in the financial district. Seventy percent of these financial district-bound suburban commuters used transit for their journey-to-work. These figures emphasized the crucial importance of regional transit for the financial district.

However, just twenty-five percent of the people working in all of downtown San Francisco, and thirty percent of those working in the financial district were suburban commuters. The rest, of course, lived within San Francisco; the city planners were concerned over the downward trend of transit utilization by these local downtown commuters.

The proportion of financial district work-trips made via Municipal Railway had declined from seventy-one percent at the end of the war to about sixty-three percent in 1954. Moreover, between 1947 and 1954 the total number of people leaving downtown during the peak hour by auto increased by nineteen percent while the number of transit riders declined by nineteen percent. These changes balanced out to mean that roughly the same number of people left downtown in 1954 as had left in 1947.<sup>42</sup> This stagnation was what worried the San Francisco planners.

Yet even though the regional plan forecast large travel volume increases within the East Bay and an increasingly self-contained East Bay area; even though relatively small increases in commuter travel were projected between the East Bay and San Francisco; and even though commuting between San Francisco and the peninsula represented the largest transit movement in the Bay Area, Regional Rapid Transit made the connection between downtown San Francisco and downtown Oakland the key part of the entire proposal. "By whatever alignment or structure this connection be made, it is the single, most important link in the entire system. We [PBHM] are certain that the region's transportation demands cannot be met without a rapid transit crossing of the Bay." The consultants expected a " . . . reduction in travel time across the Bay will have a profound influence in creating a single metropolitan center."<sup>43</sup>

Regional Rapid Transit presented the BARTC and the region with two alternative ways of connecting the Oakland and San Francisco central business districts. One was called the Optimum Plan; the other was the Minimum Plan. The Optimum proposal called for constructing a



transbay tube and underground stations in the San Francisco and Oakland downtown areas. The Minimum option called for continued use of a modernized Bridge Railway and elevated lines through the San Francisco and Oakland central areas. The Optimum was estimated to cost seven hundred and sixteen million dollars, and the Minimum \$586 million. The tube accounted for about sixty-seven million of the 130 million dollar difference; underground construction in the downtown areas took the remainder. The choice between these two alternatives was the centerpiece of Regional Rapid Transit; PBHM express its unqualified preference for the Optimum Plan.<sup>44</sup> It seems clear to me that PBHM structured the choice between these two alternatives to guarantee the rejection of the Minimum Plan.

The final report put forward the following as a standard to be used in evaluating the two options: "Travel time between downtown Oakland and downtown San Francisco should not exceed fifteen minutes." No explanation was offered as to why this particular criterion was relevant.<sup>45</sup> It is important to note the Minimum Plan clearly failed this test. Even though the Minimum Plan called for using the Bridge Railway, PBHM used travel times from downtown Oakland to the San Francisco terminal to compare the two connections. Using a tube it would take eleven minutes to make this trip; the Bridge Railway route would require twenty-two minutes. Key System currently made this trip in forty-three minutes.<sup>46</sup>

The point is that all travel from the East Bay to San Francisco was routed to and through downtown Oakland before reaching the transbay connection. This represented a major change in East Bay transit patterns;

transit was formerly focused on downtown San Francisco. Trains from Berkeley, the rest of northern Alameda County, and from all of Contra Costa were routed first to downtown Oakland and then to the Bridge Railway for the trip to San Francisco. The Berkeley-northern Alameda Key trains currently transported the largest volume of passengers between the East Bay and San Francisco. The portion of the trip between downtown Oakland and the Bridge Railway accounted for most of the eleven minute difference between tube and Bridge-route running times. Interestingly, the Minimum Plan contained a direct link between the Berkeley trains and the Bridge Railway which would be used during the peak hour; these commuters would not have to go to San Francisco via downtown Oakland. However, PBHM never offered a comparison between the travel time for this direct Bridge Railway route and the tube. Such a comparison would have greatly increased the attractiveness of the Minimum Plan. A direct link for commuters from central Contra Costa County, enabling them to avoid the circuitous trip to downtown Oakland, would have further enhanced the Minimum Plan's appeal.<sup>47</sup>

Furthermore, elevated stations in downtown San Francisco (on Mission Street, one block from Market) and Oakland were not the only choices available for Bridge Railway connections, as was specified in the Minimum Plan. PBHM had itself explored the possibility of a direct connection between the Bridge Railway and a subway under San Francisco's Market Street. A Technical Report by Rush Ziegenfelder in April, 1955 (revised August, 1955) concluded that the Bridge Railway could be adapted for use by modern, high-speed, light-weight rapid transit trains; he discussed the particular merits of rubber-tired,

guided vehicles that were then being tried on the Paris, France subway. Ziegenfelder did not see any problems with a direct connection for such trains to a Market Street subway.<sup>48</sup> The final report also noted the possibility of a Market Street subway connection to the Bridge Railway at a cost of \$45.5 million more than the Mission Street elevated line.<sup>49</sup> A subway connection to and through downtown Oakland was never thought to be any problem. Yet Regional Rapid Transit did not formulate this option as a midway alternative to the other two connecting link proposals. This Bridge-subway combination would save at least the sixty-seven million dollar cost of the tube; it would also preserve the existing Bridge Railway investment.

The transbay crossing traffic projections forecast an increase of about fifty percent in the total volume of people crossing the Bay during the peak hour between 1954 and 1970. Separate projections were made for the Optimum and Minimum Plans. The Minimum Plan assumed that a southern crossing would have been built by 1962. Bridge Railway transit was expected to account for fifty-six percent of the increase in total peak hour traffic, far below the figure for diversion in other corridors. The peak hour transit proportion would increase from fifty-two percent to only fifty-four percent. The Optimum Plan assumed a southern crossing would not be built and that the Bay Bridge would be reconstructed for motor vehicle traffic. With a tube in place transit would take eighty percent of the increase in total traffic; the transit proportion would increase from fifty-two percent to sixty-one percent of all trips.

Once again, the absolute number of people traveling transbay during the peak is interesting. With the Optimum Plan there would be

about 15,625 transit riders. Note the relation of this figure to the capacity of the Bridge Railway, 17,000 in the peak twenty minute period and 50,000 people per hour. As traffic analysts had been pointing out for years, this capacity would be adequate for any future growth in transbay transit traffic.

PBHM had determined, however, that the Optimum Plan was necessary. Recall they had indicated their preference for an underwater crossing as early as late 1954. At that time they had argued two main points on behalf of a tube. One was its crucial role in unifying the Bay Area centers, allowing maximum regional growth and downtown competitiveness. The other was the possibility of reconstructing the Bay Bridge for motor vehicle traffic, thereby eliminating the need for another bridge crossing for at least fifteen years. Regional Rapid Transit called BARTC's and the region's attention to this important tube fringe benefit: the region would be able to postpone additional bridge construction projects until after 1970.<sup>50</sup>

Proposing elevated trains downtown would have been sufficient to bury the Minimum Plan forever. At a time when New York and other cities were busily ripping down their ancient elevated lines the mere thought of elevations was enough to curdle the blood of every downtown merchant and commercial property owner on both sides of the Bay. Sherwood Swan told BARTC he feared to even contemplate it.<sup>51</sup>

There were three main reasons, it seems to me, why the Optimum Plan was necessary. First, recall downtown Oakland's condition for participation in the regional transit movement: the East Bay lines had to converge there. Both plans accomplished this. However, the Minimum Plan did so at a substantial cost in time for San Francisco-

bound transit travelers from the East Bay. A tube would minimize the additional time travelers from Contra Costa and northern Alameda Counties would have to spend going to and through downtown Oakland before they arrived in San Francisco. Second, the cost of the regional transit system was enormous. If a tube would eliminate the need for a southern crossing, then perhaps the transit project could claim the surplus Bay Bridge revenues that were currently reserved for the southern crossing. These toll revenues would ease the burden of financing the regional transit system; the tolls could pay for the tube. Finally, the tube-reconstructed Bay Bridge option would concentrate additional transbay transportation capacity around the existing central business districts. Recall the number of people entering central San Francisco from the East Bay was stagnating; insufficient crossing capacity was an important factor in this stagnation. The tube was the concrete expression of a potential alliance between downtown Oakland and downtown San Francisco.

PBHM emphasized the Optimum Plan would provide the least-cost total solution to the Bay Area's interurban transportation needs; a tube would be cheaper than another bridge. Suburban areas would continue to grow; the major centers of employment and commerce would be unified. The Bay Area would flourish; ". . . it is very probable that among the metropolitan centers of the West the Bay Area will grow to contain the greatest variety of human activities; offer the widest choice of goods, services, occupations, and associations; claim the largest concentration of specialized skills, inventiveness, and creativity; and become the headquarters for the major industries and business enterprises serving the Western states and the Pacific. Should the Bay Area succeed

in freeing its internal communications, it may well become the World Capital on the Pacific Coast."<sup>52</sup>

Regional Rapid Transit was followed by a report on organizational and financial alternatives, prepared for the BARTC by the Stanford Research Institute (SRI).<sup>53</sup> The organizational question was straightforward, a district would be necessary. The regional rapid transit system would be built to accommodate peak hour demands; therefore, it would have to be publicly subsidized because it would not be either feasible nor desirable to charge the fares required to cover total costs. Since public subsidy would be required to pay for construction, the public would have to be given some voice in the decision to use taxes to pay for construction bonds. This was, of course the political weakness of a district as opposed to an authority; a vote of the people would be necessary to issue general obligation bonds.

The next question was what sources of public subsidy would work best. SRI considered several possibilities. One was bridge tolls. The consultants also mentioned the possibility of charging higher tolls during the peak period to encourage transit use and to relieve congestion. Another source was a regional sales tax. The merit of this was that it would spread the burden geographically and among all classes of people. This tax suffered "somewhat", however, with respect to the ability-to-pay principle. A third source was a regional gas tax. SRI thought this would be in addition to existing taxes on motor fuel. The final source was the property tax. SRI considered a special tax to be levied in those parts of the region most directly benefited by the transit lines.

SRI recommended a combination plan for tax support. The main

point was the property tax should not carry the entire burden. Loading the total cost on this one back was considered to be much too dangerous, politically speaking. SRI therefore called for a regional sales tax and bridge tolls in addition to a tax on real property. They noted, of course, the southern crossing currently had priority claim on bridge tolls; this would have to be eliminated if transit were going to make use of this source.<sup>54</sup>

The rapid transit plan was now before the region. The BARTC considered its own and other responses to it. It would then be time to create an agency to implement the plan.